point, exploring not only the tools and techniques of project management but also the context or milieu in which projects are typically executed. These context-specific aspects include organisational arrangements, project-governance structures and the use of technology in projects.

Our hope is that you will find the book informative and helpful but, above all, that it will make you an outstanding project manager.

Gerrit van der Waldt and William Fox

CHAPTER 1 – ESSENTIALS OF PROJECT MANAGEMENT
William Fox and Gerrit van der Waldt

In this chapter we discuss the following:

- Clarifying project and project management concepts
- Components of projects
- Project management's triple constraints
- Differences between organisational processes and projects
- Differences between programmes and projects
- Different types of projects
- The uniqueness of public sector projects
- The benefits of project management applications
- Reasons for project failure and uncovering key success factors
- Project management processes
- Origins of project management as management application, discipline and profession
- Models for the study and application of projects
- Global trends and international standards for project management
- Project-based management

1.1 INTRODUCTION

The twenty-first century brought with it tighter budgets, less time to get things done and dwindling resources. Rapid change, expanding technologies and global marketing are realities in this millennium. In order to compete, organisations will have to achieve more with fewer resources. Computers and automation have eliminated many types
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The world of work is full of examples of projects. Increasingly, public and private sector institutions utilise projects as vehicles or tools to operationalise their strategic objectives. Projects are extremely useful to get work done on time (i.e. schedule), within budget and according to the quality standards specified for the project deliverable (i.e. product or service).

Without knowing it, many people are involved in project management. The administrative assistant concerned with formulating new office procedures, the public relations official designing a departmental newsletter or the manager implementing new policies are just as clearly project managers as those who bear the title. There is a significant diversity in the meaning of the term itself or other related titles describing the form of project management. Apart from titles such as project engineer, project director and project surveyor, titles such as contracts engineer, control director and job co-ordinator also signify that project management is involved.

The purpose of this introductory chapter is to lay a solid theoretical foundation for the key concepts that will be used in this book. We will introduce the concepts 'projects' and 'project management' and differentiate between ordinary organisational processes and projects. We will also explore the differences between programmes and projects and uncover different types of projects. Another purpose of this chapter is briefly to unpack the respective phases in a typical project's life cycle and to consider the respective international standards and global trends evident in both the subject field and the practice of project management. Lastly, this chapter will outline the value chain in organisational processes and illustrate how projects fit into this chain of processes.

1.2 CLARIFYING PROJECT AND PROJECT MANAGEMENT CONCEPTS

Projects are used in a wide variety of industries such as commerce, engineering, information technology (IT), event management and scientific research. But what is a project?

In its simplest form a project can be regarded as an endeavour that has a beginning and an end (Turner, 1995a). Knutzen and Blitz (1991:2) add to this that a project also comprises a set of principles, methods, tools and techniques for the effective management of objective-oriented work. To this the Project Management Institute (PMI) (see www.pmi.org) further focuses on the end results or deliverables of a project, by stating that it produces a unique product, service or result. A project can also be defined by focusing on the management dimensions thereof. These managerial dimensions mainly refer to utilising resources optimally to ensure that the project output adheres to its terms of time, budget and quality constraints. Burke (2006:2-3) elaborates further by indicating that this includes planning, organising, directing and controlling activities. Kerzner (2003:9) in turn provides a comprehensive definition of a project, namely that it can be regarded as:

Any series of activities and tasks that have a specific objective to be completed within specification; have defined start and end dates; have funding limits; consume human and other resources and are multi-functional.

A project thus has an explicit, projected outcome or deliverable, a deadline stating when the project should be completed and a budget limiting the number of people, supplies and money that may be used to complete the project. To further give meaning to the concept of projects, Baguley (2003:6-8) identifies the following five fundamentals that are present in all projects:

1. Projects are one-time efforts. Like the life-cycles of humans, their actions have a definitive start, their workload grows from modest beginnings to reach a peak of activity and they eventually fade away, leaving unique outcomes.
2. Projects are unique. Every project has as its core something that is unique to that specific project. This uniqueness can be quite considerable.
3. Projects have limited and controlled time spans. They are about the creation of something within a specified timescale. They have deadlines or target completion dates.
4. Projects are about change. They create the new and sometimes eliminate the old. This change may be large or small and could either have a trivial or a significant impact on people's lives.
5. Projects have defined outcomes. They have well-defined deliverables. The pathways to these outcomes consist of linked chains of activities.

From the definitions provided above it is evident that the management of a project is especially about utilising resources effectively by applying relevant management processes and functions. PMI (2004:368) defines project management as the application of knowledge, skills, tools, and techniques to project activities to meet...
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project requirements. Lock (1983) further defines project management as getting results through people to successfully complete the project with the resources available.

Duncan (1996) contributes by adding a stakeholder perspective and defines project management as applying knowledge, skills, tools and techniques to project activities to meet stakeholder needs and expectations. Kerzner (2003) and Van der Walt and Knope (2007) in turn focus on the management dimensions of project management. According to these authors project management entails planning, organising, co-ordinating, controlling and directing the activities of a project. It can be regarded as different actions taken by management to successfully plan and execute a project such as monitoring within time, cost and the desired performance level, as well as using resources effectively and efficiently to be accepted by the customer. Mayer’s (1996) definition includes planning, organising, directing and controlling activities and adds the motivation of people (the most expensive resource on a project) to the concept of project management. Motivating people (i.e. team members) to be productive and to perform refers to the embracing and commitment side of the project. Knipe et al (2002) refer to the human dimensions of project management as the project leadership activity.

By evaluating the various definitions it is evident that there are certain common aspects, which can be listed as follows:

- a set of principles, tools, techniques and methods
- time, cost, scope, quality and performance constraints
- effective management inclusive of planning, organising, leading and controlling
- objective-oriented work
- a unique and specific environment
- application of knowledge and skills
- fulfillment of stakeholder requirements
- team motivation.

Project management can thus be defined as the application of knowledge, skills, tools and techniques to project activities by the process of defining, planning, controlling and closing project activities, and motivating the people within the parameters of scope, time, cost and quality.

CHAPTER 1 - ESSENTIALS OF PROJECT MANAGEMENT

This definition serves as an operational definition for the purposes of this book. Project management, then, is the application of knowledge, skills and techniques to execute projects effectively and efficiently. It’s a strategic competency for organisations, enabling them to tie project results to business goals (i.e. private sector) and constitutional mandates (i.e. public sector).

Project management is the means by which projects are managed and change is achieved. A specific intervention is required to achieve something unique. This achievement, in the form of products or services, may only be realised if something extraordinary is done, and that is an important reason why routine tasks cannot be regarded as projects. It requires the management of work activities in such a way as to move from a current, specific situation to a desired position, which requires a specific form of management.

Project managers have two fundamental choices: either to manage a project efficiently, effectively and optimally, or to manage it in such a way that it results in deficient productivity, ineffectiveness, low morale and high staff turnover. Managing a project efficiently, effectively and optimally means that project managers are in control of the project or, if they lose control, they are able to regain control within a short period of time. Successful project managers stay in full control of all phases of a project. This means that they have to be proactive and take a long-term view of the project as a whole. Taking a long-term view implies that successful project managers know the following six most important features of projects:

1. A project has a defined beginning and an end. Getting from the beginning to the end typically involves a definable sequence of steps or activities.
2. Projects require resources (people, time and money) that have been specifically allocated to the work of the project.
3. All projects produce a unique outcome. These unique outcomes or end results also have specific goals and objectives of quality and control.
4. Projects should follow a planned, organised approach to meet their goals and objectives.
5. A project usually involves a team of people to get it done.
6. All projects have a unique set of stakeholders who almost always bring differing expectations about the end results of the project. These expectations have to be managed for the completed project to be considered a success.
1.2.1 Components of projects

It is important to establish a common lexicon to ensure that all stakeholders and role-players involved in project management have a clear and common understanding of concepts. A project can be divided into milestones, activities, and deliverables that must be accomplished in order to achieve the project goals. Below, we will briefly outline each of these components.

Milestones

A project milestone does not involve any work, but can be regarded as a progress 'marker' to signify the completion of a specific target or sub-objective in the project's schedule. Milestones indicate the completion of one phase and the start of another. Milestones serve as important checkpoints in the life-cycle of a project and are used for monitoring and evaluation purposes. Usually the steering committee of a project will convene at the completion of a specific milestone to track status and to validate its successful completion. The steering committee will only then approve the transition to the next milestone. It should be noted that projects entail integrative and interdependent activities. That implies that the non-adherence to specific requirements and failure to meet specific targets in one milestone of the project will usually affect (i.e. snowball) all other remaining milestones. In the construction of a house, for example, failure to comply with building regulations, specific quality metrics and the set deadline for the construction of the foundation, will naturally lead to delays in the construction of the walls and the roof. It should also be noted that such delays will impact on the project's cost structure (i.e. budget), schedule (i.e. duration), team morale, project beneficiary or client’s satisfaction levels and the overall quality of the house.

Activities

Since projects usually entail a significant undertaking, it is important to subdivide it into manageable chunks for completion. A Work Breakdown Structure (WBS) is generally utilised for this purpose. A project activity can be regarded as the smallest unit of work with a definite duration and resource requirement. Activities are delegated to individual team members for completion. Identified activities actually become the temporary job description of team members and they may sign a performance contract to successfully complete these responsibilities. It should be noted that these activities may also be outsourced to external service providers in cases where the project host organisation does not have the necessary capacity and/or competency to execute these activities.

Deliverables

Each project phase is marked by the completion of one or more deliverables. A deliverable is a tangible, verifiable accomplishment en route to the final end product. Reviews are usually conducted when key deliverables are completed to determine if the project should continue into its next phase and to detect and correct any deviations from set requirements and quality metrics. These phase-end reviews are often called 'phase exits', 'stage gates' or 'kill points' (Ching, Holappa & Whinston, 1992).

1.2.2 Project management’s triple constraint

All projects are executed under certain constraints. Traditionally, these constraints have been regarded as scope, time and cost. This constraint combination became known as the 'Project Management Triangle', where each side of the triangle represents a particular constraint.

![Figure 1.1 Triple constraint of projects]

A further refinement of the constraints separates product 'quality' or 'performance from scope and turns quality into a fourth constraint.

A particular characteristic of the triple constraint is that the constraints are interdependent; one side of the triangle cannot be changed without affecting the others. For example, if the schedule (time) is reduced in the construction of a house, it will impact on resources, cost and quality (e.g. more speed could lead to reduced quality and the escalation of cost). As a discipline, project management is about studying and providing the necessary approaches, tools and techniques to enable the project team to successfully balance these constraints.
1.3 DIFFERENCES BETWEEN ORGANISATIONAL PROCESSES AND PROJECTS

Projects should not be confused with ordinary organisational processes including the production line in the manufacturing industry. Ordinary processes include systems and procedures that are designed to assist people to accomplish the strategic goals of an organisation and are usually repetitive in nature. This is also the reason why a person can be appointed in a particular position (i.e. financial manager) with a specific job description and responsibilities. This is not true in the case of projects. Projects are temporary endeavours with a specific start and stop date and therefore people cannot be permanently appointed on a project. Projects are used as instruments to help implement organisational processes. In the production of Mercedes vehicles, for example, the assembly line is an organisational process, but when a specific intervention is launched to improve the assembly line, such as installing new robotic arms for welding or training workers, projects are utilised. Projects are therefore carried out in almost every sphere of organisational endeavour, including in areas such as:

- a multi-billion purchase of defence informatics
- launching a space shuttle
- rationalising an organisation
- implementing national legislation
- constructing a housing complex.

Other differences between processes and projects are reflected in Table 1.1 below.

Table 1.1 The differences between organisational processes and projects

<table>
<thead>
<tr>
<th>Processes</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing same processes are annually repeated</td>
<td>Temporary: have a definite beginning and end</td>
</tr>
<tr>
<td>Produce the same output every time</td>
<td>Produce a unique output or deliverable; may be utilised to improve or amend existing organisational processes</td>
</tr>
<tr>
<td>Have predefined work assignments (i.e. job descriptions of staff members)</td>
<td>Have no predefined work assignments and are based on the specific nature of the project</td>
</tr>
</tbody>
</table>

1.4 DIFFERENCES BETWEEN PROGRAMMES AND PROJECTS

Organisations in the public and private sector usually unpack their strategies into programmes and eventually projects for execution. In its most elementary form a programme can be regarded as a group of projects. This grouping of similar projects is usually referred to as a ‘portfolio’ of projects. PMI’s Project Management Body of Knowledge (PMBoK™) defines a programme as a collection of projects related in some extent to a common objective. A programme thus entails the co-ordinated management of a group of related projects that organisations use to achieve benefits that are of strategic importance. Programmes exist to bridge the gap between corporate strategy and projects.

A programme is open-ended in the sense that it does not have a fixed due date like in the case of projects. Further differences between programmes and projects are identified in Table 1.2 below.

Table 1.2 Differences between programmes and projects

<table>
<thead>
<tr>
<th>Programmes</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have negotiated and broad objectives</td>
<td>Have predefined and specific objectives</td>
</tr>
<tr>
<td>Focus on strategic goals</td>
<td>Focus on specific deliverables</td>
</tr>
<tr>
<td>Programme managers are responsible for various project managers in their portfolio and act as creative and strategic thinkers</td>
<td>Project managers act as responsible persons with specific technical and project-related skills</td>
</tr>
</tbody>
</table>

Programme managers provide oversight of individual projects to ensure they stay on track within a specific schedule developed for the programme. Programme managers are furthermore responsible for identifying and managing all the intricate interdependencies between the projects in their portfolios, and monitoring and reporting on their respective statuses.

1.5 TYPES OF PROJECTS

Projects are context and application specific. Although all projects have generic characteristics, components, life-cycle phases, tools, techniques and approaches; the
particular application will significantly influence the design, planning and execution of projects. In construction projects, for example, labour actions and the weather play a major part in risk assessments and general planning but these aspects may have little or no effect on administrative projects. Furthermore, projects designed and executed in the public sector must take the particular political directives, socio-economic setting, and statutory and regulatory framework into consideration, however these issues may have little or no influence in software development projects in the private sector.

The different types of projects can be classified based on their specific product or end-result as well as factors such as size, duration, industrial sector, geographical location, complexity and urgency. Based on these factors four broad categories are typically used to classify projects, namely:

- **manufacturing projects** (e.g. production of a piece of equipment, ship, vehicle or some other item)
- **management projects** (e.g. arise when organisations develop and introduce new systems or processes)
- **research projects** (e.g. projects which aim to extend current scientific knowledge and theories)
- **development projects** (e.g. projects used as a way of effecting structural change in society, to improve socio-economic conditions).

Within these broad categories of projects, one may further differentiate between the following types of projects:

- administrative
- construction
- computer software development
- event or relocation
- maintenance of processes
- new product development.

In spite of their similarities, all projects are unique. Projects involve different goals, objectives and people with distinctive personalities, extend over varying timeframes, use different resources and produce different results. No two projects, even recurring projects with the same general goals and objectives, are ever identical when implemented. People who manage projects successfully soon become experienced in managing exceptions and risks because there are many surprises in project management, even when managing small projects.

### 1.5.1 Uniqueness of public sector projects

As stated, the particular contextual/environmental and organisational settings in which projects are designed and executed, will significantly influence its overall approach and implementation. In recognition of this reality, PMI (the largest professional body for project management) established the *Government Extension to a Guide to the Project Management Body of Knowledge* to make specific provision for the uniqueness of public sector projects. In the private sector, for example, projects find their origins in cost-benefit analyses and general profit and marketing decisions. In the case of projects in the South African public sector, the origins of projects can be traced to specific political directives, policies and strategies of government including the Government’s Programme of Action (GPA), the National Development Plan: Vision 2030 and decisions of the Government Cluster and Portfolio Committees. In the case of local government, projects are directly aligned with Integrated Development Plans (IDPs) of local, district and metropolitan municipalities as well as their Service Delivery and Budget Implementation Plans (SDBIPs). Furthermore, public sector projects are unique because their project governance, structures and mechanisms and the role of project managers differ vastly. Typically project managers in government have far less autonomy and decision-making authority than their counterparts in the private sector. The hierarchical and bureaucratic nature and the general management culture and service delivery ethos of government institutions place a further unique demand on public sector project managers to successfully execute their projects (Van der Walt, 2011:73). It is interesting to note in this regard that the competency profiles of public sector project managers also differ significantly from those in the private sector.

### 1.6 Benefits of project management applications

Private and public sector organisations utilise projects for various reasons, but all of these reasons involve adding value. Organisations would not get involved in highly complex projects (with multiple stakeholders, resources, tasks and decision points), if the projects did not add significant value to the organisations' overall objectives and mandates. Managers typically utilise tools such as earned-value analysis and cost-benefit analysis to ascertain the level of benefit (i.e. quality and quantity parameters) projects would add before they make an investment (i.e. in time, cost and effort) to execute projects.
The particular benefits that project management applications add to organisations are numerous and diverse in nature. Typical benefits, however, may include the following:

- improved cost estimation and budgeting
- increased product and service delivery response time
- better stakeholder involvement, relations and networking
- improved quality, efficiency and effectiveness
- reduced risks
- better resource control
- a single point of responsibility
- standardised methodology and procedures
- proactive termination of ‘bad’ projects.

Many other benefits may be added based on the specific applications and organisational settings.

1.7 PROJECT MANAGEMENT: REASONS FOR FAILURES AND KEY SUCCESS FACTORS

Reasons why projects fail are of course numerous and will depend on issues such as organisational readiness (i.e. capacity, competency and resources), the ability of team members in conjunction with key role-players and stakeholders to successfully design and implement the project, the environmental setting in which the project is executed and the complexity of the project. An analysis of typical reasons why projects fail could add real benefit to any organisation since proactive measures could then be taken to minimise or totally eliminate them. Project Risk Management, as one of the ten knowledge areas of project management, is specifically aimed at identifying risks and designing contingency plans and mitigation strategies to protect the project from any negative occurrence or situation.

Some of the typical reasons why projects fail, may include:

- Project objectives may be unclear or ambiguous. It is critical for all stakeholders and role-players to appreciate the nature of the project and to sign a project charter to acknowledge the project’s scope in operationalising its objective.
- The project lacks client or user involvement, especially concerning the design of expectations and quality metrics. Even when a project is delivered on time and within budget, a project can fail if it does not meet user needs or expectations.
- The organisation is inflexible and ineffective at accommodating a temporary project into the permanent organisational arrangement.
- The project lacks project reviews and effective follow-up on action plans to address deviations. It is critical for management to establish proper project oversight and support mechanisms such as a steering committee to guide the project to successful completion.
- The project has high and unplanned turnover of key project team members.
- There is insufficient planning and no learning from past mistakes and errors.
- There is insufficient and poor communication with role-players and stakeholders (i.e. absence of a detailed communication plan).
- The project’s costs and timeframes are not sufficiently estimated, which may lead to budget overruns.
- There is a lack of strong internal leadership, but destructive team dynamics are present.
- The project team experiences logistical and administrative problems.
- The project lacks senior management and political support.
- There is a lack of accepted project management methodology with support documentation such as planning and reporting templates.

Based on a detailed failure analysis, organisations hosting projects should design standard operating procedures (SOPs), benchmarks and best practices to ensure future successes. Organisations could also conduct case study analyses of international experiences to uncover critical, success factors for their project. According to Baker and Baker (2000:8) the following factors are essential to the success of all projects:

- Agreement among the project team and stakeholders (including the customers and management) on the goals and objectives of the project. Without clear goals and objectives and agreement among stakeholders, the results can be shattering. No project can be a success unless everybody agrees that they want to produce the same thing.
- Support from management to supply the resources and to remove organisational obstacles. Without this support, project managers rarely have sufficient authority of their own to implement the policies and decisions necessary to complete a project successfully. In order to gain support, project managers have to manage upward as well as manage the project team.
- Communication that is effective, appropriately delivered and ongoing throughout the project. Almost every technique of project management involves some form of communication. Without clear and concise communication, the members of the project team will not be able to agree on goals and objectives and then meet them.
Other success factors include:
• establishing and managing the project baseline to prevent scope creep
• actively managing risks and issues and timely decision-making supported by clear and short lines of reporting
• a senior individual with personal accountability and overall responsibility for the successful outcome of the project
• an appropriately trained and experienced project team and in particular a project manager whose capabilities match the complexity of the project
• well-defined and visibly managed processes that are appropriate for the scale and complexity of the project.

The secrets to project success (and failure) will probably be discovered if all the project management phases are effectively integrated (Black, 2004:28). These phases or core processes can be portrayed as a linear flowchart, commencing with initiation and planning and ending with closure or termination. Viewing a project as a collection of integrated processes provides a systematic approach to managing and controlling all the project’s activities throughout its entire life-cycle.

1.8 PROJECT MANAGEMENT PROCESSES

In a project-driven or project-based organisation, work is managed and controlled by the people doing the work and not by executives removed from the task. People operating in project groups are able to assume responsibility for and derive satisfaction from their own goals and objectives, while continuing to contribute to the larger goals and objectives of the organisation as a whole. Project management processes can assist these people in establishing uniform procedures and mechanisms to reduce the risks and make it easier to get more done with less effort. That does not mean that project management techniques make managing projects an exact science. Projects involve people and getting people to co-operate to achieve defined goals and objectives is a complex matter. Project management techniques only make it easier to co-ordinate things and to obtain more predictable results. When things do go wrong, the techniques can help managers to get out of trouble.

Project management processes are applicable to all kinds of projects. All projects have predictable phases that start with an idea to do something and hopefully end with the delivery of a complete project that achieves its goal and objectives for quality and performance.

Many models have been developed to describe the life-cycle of projects. One popular model, PMI’s PMBOK™ model, proposes that the project life-cycle consists of five phases: initiation, planning, implementation, controlling, and termination. Each of the five phases includes different tasks, behaviours and skills that are necessary to be successful. The following is a brief summary of these phases. At the outset it is necessary to point out that these phases are not detached entities. They contain processes, and as will be seen, there is significant overlap between phases.

1.8.1 Initiation

Initiating signifies the selection of a project worth doing, followed by developing a vision and establishing the goals and objectives for the project. During the process of initiation, some of the key individuals will be drawn together to form a core project team (also known as the management team) to start the next phase of planning.

1.8.2 Planning

Planning involves defining the work necessary to complete the project, identifying the resources required to complete the project, developing a schedule and devising a budget for the project. Planning also involves identifying goals and objectives for stakeholders and team members who will be involved in the project, as well as providing the means to achieve those goals and objectives.

1.8.3 Implementation

Implementation involves co-ordinating and guiding project team members to complete the work as outlined in the approved project plan. In the process of implementation, resources and people are kept focused on the work.

1.8.4 Control

The process of control is about watching over the project. Controlling a project involves measuring progress towards achieving goals and objectives, and taking action to ensure that deviations from the plan do not affect the desired end results. You should have an understanding of unexpected delays, cost overruns or changes in scope. In controlling the project you have to decide between alternatives for solving problems.
1.8.5 Termination

Terminating a project is the final phase in project management. This involves time for celebration as well as reflection. It includes keeping people involved in bringing the project to completion, even when they are thinking about new enterprises. It also emphasises gaining acceptance of the end product and bringing the project to an orderly conclusion.

Figure 1.2 illustrates the linear nature of the phases in the life-cycle.

![Figure 1.2 Phases of the project life-cycle](image)

A more detailed exposition of these phases in the project life-cycle will be provided in the next chapter.

1.9 ORIGINS OF PROJECT MANAGEMENT AS MANAGEMENT APPLICATION, DISCIPLINE AND PROFESSION

Aspects and principles of project management can be traced back to the early origins of humankind. The Egyptian pyramids, the Greek Parthenon and Stonehenge are evidence that project management has played an important part in the development of every civilisation.

As far as its more contemporary applications are concerned, Kerzner (2003:33) is of the opinion that the evolution of project management as a management field can be traced to the early days of systems management, especially in business, government and the military. In the late 1950s and early 1960s, the aerospace and defense industries in the West utilised project management on all their projects. A new methodology known as the Critical Path Method (CPM) was born to ensure that projects were completed on time and within budget. During the same time a new project management system for the Polaris Fleet Ballistic Missile programme was developed, known as the Program Evaluation and Review Technique (PERT) (Kastorin, 2004:17). CPM and PERT methodologies soon became popular in both public and private sector organisations.

To accommodate the adoption of early project management methodologies, executives in the late 1940s searched for organisational structures that were more suitable and flexible. This search, in conjunction with the fact that organisations increasingly adopted a matrix form of organisation, provided major impetus for the formation of the European Project Management Association (now the International Project Management Association); and in 1964 the North American Project Management Institute (now the Project Management Institute) (Shenhar & Dvir, 2007:8; Knipe et al, 2008:3). In 1969 the Project Management Institute (PMI) was founded to serve as the global umbrella body to professionalise project management, both as a management application and as a field of study. The activities of PMI and other country-specific initiatives promoted the adoption of standardised project management processes and organisations to restructure themselves to better align and integrate project management into their mainstream functions.

In South Africa project management applications are not uncommon. Project management principles are widely applied in civil engineering, manufacturing, education and the government sector. During the 1990s, project management gained dramatic popularity in the government sector, mainly due to the emphasis that was being placed on sound project management principles in newly drafted strategies and legislation such as the Reconstruction and Development Programme (RDP) as well as in alternative service delivery methodologies (Knipe et al, 2002:4).

The quantity of project management writings that emerged in the 1980s attested to the interest in the subject. Project management as a subject had 'matured' and a 'Body of Knowledge' emerged. Educational programmes at leading universities commenced and professional associations started with scholarly journals, conferences and certification (Clendin & Ireland, 2002). The driving force during the early 1990s was mainly in the area of computer tools and software applications. There was, however, still too narrow a focus and little of substance was being written or published in the mainstream project management literature on finance, contracting, and the management of community, environmental or other external factors despite the importance of these areas in real projects.

Towards the end of the 1990s it appeared that modern project management was relatively mature as a management discipline. However, it is also clear that project managers generally took only an operational, tools and techniques view of the subject. Few addressed the larger, more strategic issues that crucially affect the success of projects (Newbold, 1998:27). It could thus be argued that the scope of project
management as a discipline should be enlarged to make provision for a more holistic perspective. The scope should be informed by the question: ‘What makes projects successful?’ The answer to this question will involve a vastly increased range of issues and topics that anyone concerned with projects ought to be interested in addressing.

A contemporary professional project manager should not reflect only on the internal processes of managing projects, but should also take the wider organisational, technological, socio-economic and political contexts in which projects occur into consideration. To assist them to obtain the necessary skills, knowledge and holistic perspectives, PMI was constituted.

As stated earlier, PMI is the largest professional body for project management, with a worldwide membership (see www.pmi.org). PMI has its head office and a large proportion of its membership in the USA. However, PMI has chapters all over the world and it aims to be a global professional body for project management. Members are constantly interacting with each other through chapter events, special interest groups, conferences and global research and development work groups. PMI also has some well-recognised products. These include:

- A Guide to the Project Management Body of Knowledge: a guide to a set of project management standards. It provides a framework of understanding for a generic view of project management and also includes a glossary of terms.
- Project Management Professional (PMP) Certification: a renewable certification for individuals who have been working in project mode for three or more years.
- International Project of the Year award.

The establishment of the PMBOK® Guide as a major impetus to professionalise project management, PMBOK® Guide provides a common lexicon in the fraternity and includes proven processes and practices for professionals all over the globe. As indicated earlier, projects are unique and context-specific. PMBOK® Guide therefore only provides generally accepted processes and practices. PMBOK® Guide comprises so-called ‘knowledge areas’ to be generally applied in projects. The latest version of PMBOK® Guide (2014) includes the following ten knowledge areas:
1. Project Human Resources Management (managing the project team)
2. Project Cost Management (managing the budget of the project)
3. Project Quality Management (ensuring that all activities and tasks adhere to quality specifications)

4. Project Integration Management (ensuring that all activities of the project are integrated and also aligned with organisational processes)
5. Project Time Management (ensuring that tasks are completed on time)
6. Project Risk Management (identifying and managing risks)
7. Project Communication Management (documenting control, contracting, outsourcing, etc.)
8. Project Stakeholder Management (interacting with key stakeholders and role-players)
9. Project Procurement Management (obtaining the necessary resources for the project)
10. Project Scope Management (preventing scope creeping).

While the syllabi, curricula and assessment differ among various tertiary institutions, the aims and consequences are similar. The aim is to provide formal recognition that an individual has reached a high level of competence in the discipline of project management. Typically the PMBOK® Guide provides a basis for training. The most prominent certification to obtain to become a professional in project management is the Project Management Professional (PMP®) Certification from PMI. The Project Management Institute of South Africa (PMISA) facilitates and sponsors the PMP programme in South Africa. The PMP certification is based upon a combination of an exam and an assessment of an individual’s project management work experience and the application of the principles set out in a Guide to the Project Management Body of Knowledge. Having been awarded the PMP, individuals must submit evidence every three years of continued involvement with project management in order to recertify as a PMP.

To become a PMP, an individual must apply directly to PMI. Applicants must submit evidence of work experience and sign a code of ethics. Once PMI accepts the evidence of work experience, applicants must schedule to write the PMP exam. To be eligible for the PMP certification, an individual requires a minimum work experience (currently, if applicants have a degree it is 4 500 hours for individuals without a degree or equivalent need a minimum of 7 000 hours work experience – see www.pmis.org.za).

It could be argued that PMBOK® Guide has contributed significantly to the development of the discipline of project management, as well as in accreditation services and professional development programmes. It has also led to joint work with other professional bodies who initiate certification programmes, particularly in construction and information technology (IT) professions. These moves to formalise and strengthen
the broader scope of project management significantly contributed to the fact that project managers gained a multi-disciplinary perspective when managing projects. PMBOK™ also provides a basic reference for researchers, teachers and consultants, and helps the discipline to grow to ensure that projects are initiated, assessed, secured and accomplished successfully.

1.10 MODELS FOR THE STUDY AND APPLICATION OF PROJECTS

Over time, a wide variety of models emerged to study the processes associated with projects. A "model" is used to identify, monitor, measure and benchmark a progression of steps or methodology in a project’s life-cycle. A model could lead to the ability of an organisation to implement strategies and programmes through effective, efficient and consistent steps (Jugdev & Thomas, 2002:5). Models are gaining interest as organisations and theorists strive to make sense of why some projects succeed and others do not.

Some models were developed for specific types of projects, such as software development and construction, whilst others are more generic in nature. Below is a list of typical models that are in existence today. There are two broad categories of models for the study of projects: the so-called maturity models and the life-cycle models. It should be noted that some of these models are better known as quality or performance management models.

1.10.1 Maturity models

Current maturity models include:
- SMART Management model
- Dynamic Baseline Model (DBM)
- IPMA Competence Baseline (ICB)
- Association for Project Management (APM) Body of Knowledge
- Systems Engineering Capability Maturity Model (SE-CMM) for Software
- Project Management Assessment 2000 (PMA 2000)
- Balanced Scorecard
- Rosetta model
- Integrated Project Systems' model
- ESI ProjectSmart's PROJECTFOMESWORK™
- EFQM Excellence

- Organisational Project Management Maturity Model (OPM3™)
- IBM Progress Maturity Model
- Project Management Maturity Model (Knapp & Moore Pty Ltd)
- PM Solutions’ Project Management Maturity Model (SM).

The use of the concept ‘maturity’ in these models implies that capabilities must be grown over time in order to produce constant and repeatable success in organisational projects. This would imply that a ‘mature’ organisation has fully developed and integrated project supporting systems and procedures. It would mean that processes are in place and actively used to improve project management activities. Lessons learned are regularly examined and used to improve project processes, standards and documentation. Kerzner (2001) indicates that maturity levels portray the evolution of an organisation from immature project management practices to solid practices and the related infrastructure necessary to support projects. Most models provide structured objective criteria to be met at each level of maturity. The metrics collected during project execution are used not only to understand the performance of the particular project, but also for making organisational management decisions for continuous improvement.

Jugdev and Thomas (2002:4) postulate that maturity models are important assessment tools for the profession of project management. Maturity models also identify organisational strengths and weaknesses and provide benchmarking information. The models capture explicit, codified practice, but do not include the intangible assets of project management. These authors (Jugdev and Thomas) argue that by applying maturity models, organisations could gain a sustained competitive advantage. A common characteristic of maturity models is that there are clear interfaces between strategy, programmes and projects. In other words, projects are used as implementation ‘vehicles’ of organisational strategies.

On the downside, models are criticised because they tend to be inflexible when flexibility is required to manage change and to keep up with quality improvement principles. Jaffari (2000:44) argues, for example, that projects should be run as dynamic systems subject to uncertainty, risks and pressures. Thus, change during the life of a project is to be expected and models should be able to accommodate change. Models are furthermore geared toward identifying problems but not solving them. Jugdev and Thomas (2002:6) also warn that models should not only focus on methodology and work processes, but should also incorporate ‘soft’ issues such as human resources and organisational culture. It is extremely difficult, for example, to
codify and incorporate issues such as complex human interactions and relationships and intellectual capital. The Dynamic Baseline Model (Seely & Buong, 2001:25), for example, provides a framework for addressing these types of questions by using a set of graphical depictions, constructs and terminologies to link behaviour (people) with projects. The Rosetta model (Milinovic, 2002:19), as a further example, translates project information into interpretable reports, thereby meeting the varied needs of the many stakeholders. Despite these and other potential shortcomings, models make a significant contribution to project management as a discipline and reflect an increasing desire to link project management to organisational effectiveness and efficiency.

Probably the most well-established life-cycle model is PMBOK™ (discussed earlier). Most models, such as MPMM™ and PRINCE2, build on the framework provided by PMBOK™. These and other models will be briefly outlined below.

1.10.2 Project life-cycle models

Project management should be viewed as a tool that helps organisations to execute designated projects effectively and efficiently. But the use of such a tool does not automatically guarantee project success. Models are developed to provide frameworks within which projects could develop and be studied.

Each life-cycle model has its own methodology and every methodology has its own way of laying out the processes, procedures, best practices and templates required to successfully manage projects. There are, however, many similarities between them and it is apparent that different models place different emphasis on certain issues. Much of the knowledge needed to manage projects is unique or nearly unique to project management (e.g. Critical Path Analysis and Work Breakdown Structures).

Standard models can be adapted to fit organisational issues, and culture and time constraints. It is advised to customise a methodology to fit organisational needs (Kuhl, 2002). Jafar and Mahanong (2000:2731) argue that life-cycle models have the advantage that systems and processes associated with each phase of the project life-cycle are known – therefore enabling proactive management. The authors caution, however, that information transfer from one phase to another, integrated team work and the integration of organisational processes are crucial.

Project life-cycle models are not interchangeable. To deliver a quality system, it is critical to know the risks facing the particular project and to use a model that reduces those risks (Willson-Murphy, 1997). The following section describes some standard project life-cycle models, and reviews some of their strengths and weaknesses. These standard models can be adapted to fit organisational issues, corporate culture, time constraints and team vulnerabilities which comprise the project environment.

SMART Management

The origin of the SMART Management model can be traced to Francis Hartman who developed it to study the interface between technology, organisation and society. SMART, according to Hartman, stands for 'Strategically Managed, Aligned, Regenerative work environment and Transitional management' (2000:25). The core purpose of the model is to pre-empt and study change in projects. Hartman maintains that if these three 'problem areas' (technology, organisation and society) are effectively managed, change could be managed more proactively and the likelihood for project success would be significantly improved. Hartman proposes that a SMART Management approach, as opposed to the 'Management-made-wrong' or 'STUPID-cycle', should be followed in project management to ensure that projects are delivered faster, more cheaply and with better quality. Hartman promises that SMART project management facilitates faster and cheaper projects, higher customer satisfaction, better quality and creativity and the elimination of 'wrong' projects. This approach strongly emphasises organisational learning.

PRINCE2

PRINCE2 (Projects IN Controlled Environments Version 2) was developed by the UK Government as a standard for information technology (IT) project management. Due to its successes it was soon adopted in wider private sector and application contexts. PRINCE2 and PMBOK™ methodology are the most popular organisational models for project management. PRINCE2 defines forty-five separate sub-processes and organises these into eight processes as follows:

1. starting up a project (SU)
2. planning (PL)
3. initiating a project (IP)
4. directing a project (DP)
5. controlling a stage (CS)
6. managing product delivery (MP)
7. managing stage boundaries (SB)
8. closing a project (CP).
The fact that the context within which projects are executed is dynamic, as well as the fact that project management is a complex discipline, could mean that although PRINCE2 is correctly applied, the project is still unsuccessful. One should thus be careful to assume that every aspect of PRINCE2 will be applicable to every project. PRINCE2 makes provision for 'scalability' - to provide guidance to the project team as to 'how much' of the process to apply. PRINCE2 is thus flexible enough to be tailored to the needs of projects.

V-model

The V-model defines a uniform procedure for information technology (IT) product development. It is the standard for the German federal administration and defence projects to regulate software development processes. It is a project management method comparable to PRINCE2 and describes methods for project management, as well as methods for system development. The V-model describes 'what', 'how', and 'when' things need to be done during the process of producing software and also makes provision for 'who' is responsible for doing it.

The V-model provides a graphical representation of the system development life-cycle and summarises the main steps to be taken in conjunction with the corresponding deliverables within the framework. The left leg of the 'V' represents the specification stream where the system specifications are defined. The right leg represents the testing stream where the systems are being tested against the specifications defined on the left leg. The bottom of the 'V' where the legs meet represents the development stream. The specification stream consists mainly of user requirement specifications and functional specifications. The development stream can consist (depending on the system type and the development scope) of customisation, configuration or coding.

The V-model is application specific, but Figure 1.3 illustrates the typical design of the model.

Method123 Project Management Methodology (MPM3™)

MPM3™ has its origin in Method123 and is a project management methodology that describes in detail the phases, activities and tasks required to undertake a project. Every task within the project life-cycle is based on best practice and is described in depth. MPM3™ further provides the project team and stakeholders with the knowledge and tools required to deliver projects successfully. MPM3™ project management methodologies are based on the best practice industry standards for project management: PMBOK™ and PRINCE2.

MPM3™ provides a best practice and standard framework to successfully design and implement projects. The MPM3™ project management life-cycle comprises four phases:

1. **Initiation**: start the project, document **business cases**, conduct feasibility studies, establish terms of reference, appoint the team and set up a project office.
2. **Planning**: develop the project plan, resource plan, financial plan, quality plan, acceptance plan and communications plan.
3. **Execution**: build the deliverables and control the project delivery. Scope, costs, quality, risks and issues.
4. **Closure**: release staff, hand over deliverables to the customer and complete a post-implementation review.

With the application of these four phases, MPM3™ offers a solution to typical organisational challenges associated with project management.

![Figure 1.3 An example of the V-model](image-url)
**Pure Waterfall and Modified Waterfall models**

Inexperienced project managers are often confronted with a variety of methodologies to choose from, and they often struggle to decide which methodology is best suited for the particular project. The Waterfall model is widely used by new project managers since it is relatively simple to use and it provides a basic outline that can be used on any type of project. The Waterfall model development process is especially popular for projects that are familiar to the team or that require little originality. It provides a structured and linear approach to project planning and implementation.

Basically, one starts off understanding the requirements of the solution, designing a solution, building and testing a solution and then implementing the solution. Each of these major areas of focus is called a phase or step. The classic or Pure Waterfall model is extremely useful if the team has little knowledge about methodology and needs to build a project work plan from scratch. The model outlines the development of a project plan as flowing incrementally downwards like a waterfall through the phases of a project. Progress flows from the top to the bottom, like a waterfall. To follow the Waterfall model, one proceeds from one phase to the next in a purely sequential manner. Thus the Waterfall model maintains that one should move to a discrete phase only when its preceding phase is completed and perfected.

Typically, the breakdown of the waterfall development process is as follows:

- **Evaluate the problem:** This is the phase where current deficiencies are identified and relevant information is obtained.
- **Propose a solution:** This is where a detailed description of the solution that the project will address is presented. At this stage timelines, budgets, Work Breakdown Structure (WBS) and other supporting documentation are done.
- **Design the architecture:** Once the description of the solution (project proposal) has been accepted, workflow diagrams, module and functionality layouts and any other descriptions required by the solution are made. Each aspect is reviewed and tested.
- **Develop the system (code):** The work design completed in the previous phase is used to test each activity or phase of the project deliverable. Finally, the entire project deliverable is tested.
- **Deploy and use the system:** This phase is characterized by implementing or rolling-out the deliverables. It is important at this stage to train the users of the system and to make the necessary templates and documentation available.

- **Maintain the solution:** During the last phase the final deliverable is supported and improved to address post-project challenges.

There are various Modified Waterfall models that may include slight or major variations on this process.

**Spiral model**

The Spiral model focuses on reducing a project’s risks. It breaks a project up into smaller projects, each addressing one or more major risks. After major risks have been addressed, the Spiral model terminates as a Waterfall model. Spiral iterations involve six steps:

1. **Determine objectives, alternatives and constraints.**
2. **Identify and resolve risks.**
3. **Evaluate alternatives.**
4. **Develop the deliverables for that iteration and verify that they are correct.**
5. **Plan the next iteration.**
6. **Commit to an approach for the next iteration.**

For projects with potentially high-risk areas, the model makes it possible to run a series of risk-reduction iterations that can be followed by a waterfall or other non-risk-based life-cycles. The Spiral model is actually based in part on the Waterfall model, but is more suitable than the Waterfall model in the sense that it allows for risk management where the Waterfall model places too much emphasis on project management. Each iteration of the spiral can be adjusted to suit the needs of the project.

**Sashimi model**

The Sashimi model is named after the overlapping scales of a Japanese fish. The key feature of the Sashimi model is the possibility of an overlapping development phase, and it is often simply referred to as the Waterfall model with overlapping phases. Since the design and implementation phases of projects overlap in the Sashimi model, problems may be discovered before the team continues with other phases. This helps alleviate many of the problems associated with the 'big design up-front' philosophy of the Waterfall model (Matković & Tumbas, 2010:166).
1.11 GLOBAL TRENDS AND INTERNATIONAL STANDARDS FOR PROJECT MANAGEMENT

Since the early origins of project management as a discipline and project management as a discipline, much has been written about the need for better management practices and methodologies. The early studies on project management focused on the efficiency and effectiveness of project teams. However, with the increase in project complexity and the need for better project management, there has been a shift towards more systematic approaches to project management.

The 1950s and 1960s were characterized by the widespread adoption of project management tools and techniques. The Project Management Institute (PMI) and the Institute of Electrical and Electronics Engineers (IEEE) started to develop standards and guidelines for project management. These standards and guidelines were developed to help project managers and organizations to manage projects more effectively.

1.2 PROJECT-BASED MANAGEMENT

As organizations have become more project-based, the need for effective project management has become even more critical. Project management is the process of planning, organizing, and controlling resources to achieve specific goals. Project management is a critical component of strategic management, as it helps organizations to align their resources with their strategic objectives.

A further major influence on project management has been the introduction of project management software. This has allowed project managers to track project progress and allocate resources more efficiently. The use of project management software has also helped to improve communication and collaboration among project team members.

In conclusion, project management is a critical component of strategic management. By focusing on project management, organizations can ensure that their projects are completed on time, within budget, and to the satisfaction of stakeholders.
CHAPTER 1 - ESSENTIALS OF PROJECT MANAGEMENT

and performance, project-based organisations have the flexibility to maximise their efforts in core organisational projects and leverage evolving technology. Main drivers behind the adoption of more project-based management structures and practices are organisational setting dependent, but may include:

- Producing products and delivering services in shorter cycles
- More innovative and creative mechanisms to render goods and services
- Using multi-disciplinary and multi-functional teams more often to design and execute organisational products
- Adopting a specific project methodology in business operations
- Using resources optimally, including people.

1.1.2.1 A strategic systems perspective of projects

It is helpful to view projects from a systems perspective. In brief, the systems approach is about viewing something (such as a project) as a subsystem of a larger system and, in itself, comprised of smaller subsystems. The key elements of the systems approach are the input (resources needed to produce something); transaction (the utilisation of resources through the application of management systems, skills, policies, processes and techniques); output (what the organisation produces or renders through the application of project management); and, lastly, feedback (reaction to the output).

From a project perspective, the systems approach will assist in viewing its deliverables holistically. Table 1.3 illustrates the typical systemic elements to consider.

<table>
<thead>
<tr>
<th>Systems element</th>
<th>What to consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macro context</td>
<td>How will aspects of the political, social, economical, technological, cultural and legal environments impact on the project? How can risks be minimised or eliminated?</td>
</tr>
<tr>
<td>Input</td>
<td>What is the project about and what kinds of resources (financial, human, infrastructure, etc.) are required to produce or render the deliverables?</td>
</tr>
</tbody>
</table>
A fundamental question that should be posed during environmental scanning is: what future external environmental changes do we foresee over the next one to five years in each of the following areas? Table 1.4 shows the typical environmental forces with key questions to ask to analyse the potential influence of each force on the host organisation and the project.

Table 1.4 Environmental forces for consideration during environmental scanning

<table>
<thead>
<tr>
<th>Environmental forces (trends and events)</th>
<th>Changes foreseen?</th>
<th>Effect on organisations/project?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Politics and government (new legislation, regulations, labour issues, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economy (interest rates, budget cuts, etc.)</td>
<td></td>
<td></td>
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<tr>
<td>Technology (IT, equipment, infrastructure, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social change (demography, population, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer needs, desires and preferences in services and products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural issues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity issues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service delivery mechanisms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suppliers (availability of required resources)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Performing a SWOT analysis of a project

The SWOT analysis is a useful tool to understand the context of the project. It makes it possible to facilitate strategic decisions for all sorts of situations in organisations. SWOT is an acronym for Strengths, Weaknesses, Opportunities and Threats. The SWOT analysis headings provide a framework for reviewing strategy, position and direction...
of a business proposition or any idea. From a project management perspective it is also necessary to contextualise the environment within which the project will be implemented. Typically the project team should ask the following questions:

- Will the organisation support the project – is it of strategic importance?
- Does the organisation have adequate resources to support the project?
- Does the organisation have the necessary expertise among staff or should some technical aspects of the project be outsourced?

It is often helpful to complete a Political, Economic, Social and Technological (PEST) analysis prior to a SWOT analysis. A PEST analysis, which measures the market and potential of a business according to external factors – political, economic, social and technological – is used to analyse competitive position. A SWOT analysis measures a business unit a proposition or idea; a PEST analysis measures a market.

The SWOT analysis template is normally presented as a grid, comprising four sections, one for each of the SWOT headings: Strengths, Weaknesses, Opportunities and Threats. The SWOT analysis grid or template in Table 1.5 includes sample questions, whose answers are inserted into the relevant section of the SWOT grid. The questions are examples, or discussion points, and obviously can be altered depending on the type of project and organisation. Table 1.5 is an example of such a grid with the typical issues to consider for each area.

It should be noted that it is not usually the prerogative of the project manager to "fix" the context within which the project must succeed. For example, if the SWOT analysis clearly indicates that the organisation does not have certain technical skills available to support the project, the project manager cannot "force" the head of human resources to send seconded staff on training programmes. The project manager must, however, make this fact known to senior management with the request that the situation be remedied. If the project does not succeed because of a lack of trained staff (in this example), senior management must then take the responsibility of its failure – and not the project manager – provided that the project manager made them aware of the facts in writing.
CHAPTER 2 – PROJECT MANAGEMENT LIFE-CYCLE

William Fox and Gerrit van der Walit

In this chapter we discuss the following:

- Tracing the project life-cycle
- Project processes
- Identifying stakeholders
- Some project tools and techniques
- Some project documentation
- Project impact assessments
- Management checklist for the project life-cycle

2.1 PROJECT LIFE-CYCLE PHASES

As stated in the previous chapter, projects have a definite beginning and a definite end. Once a possible project and its feasibility have been considered and approved, the project has to be planned, which in itself entails various processes. Once the plan is in place and stakeholders are involved, the plan can be executed, which also entails various processes. When executing the project it has to be monitored and controlled. Finally, the project has to be concluded, either before or after its estimated end or as planned.

In all of this, the project manager has to play a leading role, not only during all of the phases and processes, but also in managing the whole project and keeping it on schedule. The project manager is responsible for ensuring that the end-result has been concluded within the scheduled time, within budget limitations and in adherence to the set quality standards.

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1.13 CONCLUSION

From the content of this chapter it is evident that projects vary significantly in application and type. Projects differ from ordinary organisational processes, but all projects have common features such as a start and stop date, triple constraints and a life-cycle. Project management both in practical application and as a study field, is growing exponentially and there is ample evidence globally that project management adds real value in business, industry and government. As more and more organisations become project-driven and project-based, new tools, techniques and innovative organisational arrangements are developed.

In the next chapter the project management life-cycle will be scrutinised. The project life-cycle can be viewed as a series of phases, each of which have to be managed. Therefore many models, as described in this first chapter, have been devised to assist project managers in managing the entire process.