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Chapter One

INTRODUCTION



“Framework – a structure for support” Oxford Dictionary

My aim in writing this book is to describe clearly and in detail, a straightforward, easy to follow framework for the successful management of projects across all industries and organisations – big and small – from project conception to completion. The framework offers a roadmap for successfully delivering projects and their associated benefits.

Framework Features

The framework I describe has two key features:

- It's the product of much experience – the consequence of candid feedback from pragmatic practitioners. It embodies years of good practice. It also relates well to the lifecycle-based and business-case driven Prince2 methodology www.prince2.com and www.ogc.gov.uk/prince, and is in sync with the comprehensive Bodies of Knowledge published by the Project Management Institute (PMI) www.pmi.org and the Association for Project Management (APM) www.apm.org.uk. Readers therefore have assurance that they are learning and applying a framework for project management that is consistent with good practice as currently defined by its foremost proponents.
- It's not intended to be a straightjacket or to curtail creativity – rather the framework is to be applied with discretion and commonsense. It's sufficiently scalable and adaptable to meet the unique needs of each project and organisation, even though different industries sometimes use different jargon. It is usually when project frameworks become bureaucratic and override commonsense that creativity is stifled.

Of course, the framework isn't the total answer. People, not frameworks or processes, deliver projects. Everything done on projects is done by people. Every technical aspect of project management has a human dimension. In particular, successful projects have a competent project manager, a project team that possesses the right social and technical abilities, a team that has the necessary authority to accomplish the project goal, and a team that works well together.

Framework Benefits

While this book doesn't dwell on the origins and development of project management and assumes that we're already convinced that the discipline is an essential competency, it's nevertheless worthwhile identifying some common arguments for employing a standard framework:

- Nowadays, organisations are experiencing unprecedented levels of change. The framework enables us to manage the inherent risk associated with such change and innovation, and helps ensure that benefits are achieved within budget, on time and to the required quality, without scope creep.

- Project managers and their team members have the guidance and confidence necessary to successfully manage projects, even as they continue to develop their experience and skills, and they find it easier to move from project to project. Our employees are motivated. They learn something that adds value for them professionally.
- Enhances the likelihood of quickly and cost-effectively producing a final deliverable that satisfies our most demanding stakeholders. And showing them we apply such a framework gives them confidence that we will deliver.
- Facilitates effective and unambiguous communication. We're all using a common frame of reference, language, templates and processes.
- Documents and preserves, in a readily accessible format, hard-earned knowledge, which prevents complacency, confusion and procrastination, cuts short the learning curve for new-comers, and minimises the need to re-invent how each project should be managed. We can focus on getting the job done in the sure knowledge of the process involved.
- Protects us from accusations of non-professionalism or even malpractice. Adhering to a validated framework is sound risk management practice.
- Ensures a consistent approach and a predictable output. Thus, expectations can be managed, forecasts, estimates and promises kept in check, surprises avoided, and people held accountable.
- Provides a sound basis for measuring accomplishment and progress, making comparisons, evaluation, benchmarking, and continuous improvement to maintain competitive advantage in project management. The framework is a living document. It's a roadmap that benefits from periodic tweaking.

These advantages aren't necessarily a complete list, or those most applicable to every situation. However, they might help us persuade our managers, colleagues and apprehensive stakeholders that a framework is preferable to some seat-of-the-pants approach. Without a framework those who commission the project, those who manage it, and those who work on it will have different ideas about how things should be organised and when different aspects of the project should be undertaken. Having no framework leads to misunderstanding, confusion and conflict, and ultimately to a failed project.

Framework Integrity

In a larger organisation the framework is usually the responsibility of the Project Management Office (PMO) that will insist we project managers use the framework and, at the completion of our projects, provide timely and specific feedback on its usefulness in order that suggested framework amendments can be prepared, evaluated, approved and published. In a smaller organisation, the responsibility for maintaining framework document control might be assigned to a functional manager – not necessarily an information technologist, although we welcome their help to install the framework and its associated templates on our intranets. Anyway, there needs to be a project management framework owner, otherwise well-intentioned 'local enhancements' will soon ensure its demise, or without any updating the framework will soon become an obstacle to new techniques and ways of working. As a minimum, the framework owner must continuously communicate with the framework users.

In fact, for those charged with establishing a PMO, the first challenge may be the adoption or adaptation of the project management framework. This could be the make-or-break proposition that determines PMO success. Project managers, sponsors and team members alike will no doubt subject the PMO and the framework to a great deal of scrutiny. The role of PMO as the framework owner and advocate is a very natural one. Framework version control is important.

Project Lifecycle

The project lifecycle or lifespan (given it's not really cyclical) describes the sequence of phases through which the project will evolve. It is fundamental to the management of projects. In fact, the lifecycle is the only thing that uniquely distinguishes projects from non-projects. Managing the evolution of the project through its lifecycle is one of the most important skills needed of a project manager.

The framework that this book describes is based on the widely recognised generic 'CDEF' project lifecycle at Figure 1.1 which identifies four phases that represent the essentially linear progression of a project:

1. **Conceive.** The project is initiated. The need, opportunity or problem is recognised, defined, its feasibility determined, key players appointed, and a project charter prepared, approved and published.
2. **Develop.** The details for implementation of the project are determined, commencing with the development of a work breakdown structure, and culminating in the publication of a comprehensive workable project plan for implementation.
3. **Execute.** The work to achieve the project goal is undertaken according to the plan. Resources are procured, work is assigned, progress monitored, corrective action taken, and the final deliverable produced.
4. **Finish.** The project deliverable is handed over to the sponsor or client, the project is closed down, a post-implementation report is prepared, and a review of initial benefits is completed. The review of benefits will intrude into the operational life of the deliverable, which is when most project benefits are realised.

Some points to note about this project lifecycle are:

- The lifecycle duration can vary from days to years, depending mainly on the scope of the project. Likewise the duration of each phase varies.
- Some lifecycles are described in only two phases (eg, design and build) and others may have six or more phases or stages. Also, phases may be given different names. For example, Conceive may be called Initiate, Develop may be called Plan, Execute may be called Implement, and Finish may be called Commission, Consolidation, Closedown etc.
- Phase gates represent milestone decision points (also called phase or stage boundaries, investment gates, review points, phase exits, off-ramps, exit points and kill points) when the project will be checked, revalidated or terminated. They aren't rubber-stamping occasions. Such decision points may also occur within phases. Indeed, whenever a review reveals that future costs appear to exceed future benefits (regardless of sunk costs), project termination is a distinct probability.

- The financial commitment to complete a project is at first minimal, increases rapidly during execution, and levels off during the final phase. This pattern is normal. The accumulated workload and expenditure typically produces a flattened 'S' shape curve. Once determined this is a useful baseline against which to compare actual progress – a basis for assessing project performance.
- The ability of stakeholders to influence the specification of the final deliverable is highest at the start of the project and diminishes as the project proceeds. And, conversely, the probability of successfully completing the project is lowest at the start of the project when risk and uncertainty are highest. Fortunately, there is much less at stake at the start of the project when cost and staffing levels are low, reinforcing the desirability of terminating a doubtful project earlier rather than later. At the completion of the project there is no uncertainty – it's all reality and facts at that point – except for benefits.
- The importance of the first two phases is emphasised. Although these phases typically represent only 20 percent of the total effort, they are essential to the success of any project. Most projects fail at the start rather than at the end. Experience has consistently shown that project managers generally wish they had been more thorough and/or spent more time at the project 'front end'. Nevertheless, there is a diminishing return associated with planning. Where there is considerable uncertainty, prototyping (adaptive action) and rolling-wave (progressive development or elaboration) approaches may be preferable. Also, some re-planning during execution is inevitable. Despite our best efforts to pre-empt problems, we simply can't predict the future exactly. An exact estimate is an oxymoron. Over their lives, projects are dynamic, continuously evolving organisms. Modern thinking is that a plan is essentially a basis for change.
- To meet challenging deadlines, phases might be overlapped (ie, fast tracked or concurrently engineered) and/or their durations minimised (ie, project timeframe is 'crashed', curtailed, or compressed are also common equivalent expressions). Minimising task duration is a key requirement of Critical Chain Project Management. However, unrealistic acceleration of a project may result in excessive cost and may jeopardise the quality of interim and final deliverables. When phases are overlapped, we might treat phase gates as entry points to the next phase. We can then start the next phase as soon as we are ready, regardless of whether or not the previous phase is completed. The most common overlapping, certainly for longer projects, is between Develop and Execute when we might execute the first part of the project while we plan the next stage as the future clarifies. Of course it is always sensible to revisit our plan as reality unfolds – especially when our planning estimates and assumptions prove to be wrong and unforeseen obstacles arise.
- While our success as project managers and the success of project management itself are usually assessed at the completion of the project lifecycle when the final deliverable is completed, the real success of the project depends on the realisation of the benefits (ie, positive outcomes) that justified the project's approval. These benefits are not usually evident until some time after the project lifecycle has run its course. Nevertheless, there

is plenty we can do during the project lifecycle to help ensure that planned benefits, and sometimes additional benefits, are realised. The project business case needs to be kept up to date.

- Often we project managers are not involved in the formative Concept phase. This is unfortunate and can threaten project continuity, but is sometimes unavoidable. By contrast, our project sponsors are always involved in the Concept phase and have an ongoing responsibility for the project beyond the conventional project lifecycle until business case benefits are realised or not realised as the case may be. Their concern is the business case lifecycle. They have a cradle-to-grave perspective.

Finally, I want to reiterate that many organisations have their own project management models and associated terminology. The generic model depicted in this book covers the same ground, but may be slightly different than what other organisations use. All models doubtlessly aim to do the same thing and commonsense should allow us to resolve any apparent inconsistencies. I now seldom hear the comment, *"We did a one-day course on project management five years ago, and decided it wasn't appropriate for our industry."* However, perhaps the true measure of project management's acceptance is the attention given it in 'Dilbert,' Scott Adam's excellent cartoon strip, where the four phases of a project are described as elation, panic, blame, and regret!

Framework Overview and Characteristics

The lifecycle framework at Figure 1.2 shows sequential steps to be followed by the project manager to drive change quickly and easily across the organisation to realise the project goal. Some points to note about the framework are:

- **Other terms are used.** For example, the terms proposal, business case, terms of reference, project brief, overview document and others are sometimes used instead of 'Charter'. Also, 'Pre-empt Problems' might variously be described as risk management, what-if analysis, scenario planning or future-proofing.
- **The framework is dynamic.** This high-level flowchart suggests self-contained sequential steps. However, previous process steps (and project phases) may need to be revisited as reality unfolds, new risks are revealed, and forecasts, estimates and assumptions prove to be wrong. For example, unanticipated delivery delays of essential supplies, legal disputes, non-availability of a contractor, and scope changes may require a new work schedule (baseline) to accommodate this new reality. Rebaselining is common practice, particularly with longer duration and uncertain projects – indeed it is essential. Version control is therefore important. Also, there are management activities that continue throughout all phases such as communications, and management of stakeholders, change and risk.
- **The framework is applicable to all projects.** While the nature of the work will vary, project type is pretty much irrelevant. Essentially, the framework is a thought process, not to be confused with the content of what's being done. The same thought process applies to small, medium and large projects. Each step is applicable. However, the size and complexity of the project will considerably determine the work-effort and documentation needed at each step and the extent to which specialised project management tools and techniques are useful. For example, 'Check Feasibility' for a

small project may require only brief attention, whereas a large and complex project may warrant a very detailed feasibility study, which could be a significant stand-alone project, possibly taking months to complete. Also, this framework is not just the purview of large organisations. The framework can help also the smallest business and non-business.

- **Excludes deliverable support.** The final deliverable is what remains behind after project completion. Its ongoing maintenance, support, repair, debugging, updating, enhancing, redevelopment, disposal, and termination are not part of the framework. Of course, many of these post-project activities, such as a specific act of maintenance, would best be managed as projects, and we project managers aren't of course absolved from:
 - producing a deliverable that continues to work satisfactorily after delivery to realise the benefits envisioned
 - helping to maintain the validity of the business case that justifies the project investment.

However, the framework does include a benefits' review early during the operational life of the final deliverable, recognising this is when most value is or should be realised as a result of the project. Such a review or reviews help validate the business case, identifies what benefits have and have not been achieved, some of which may be unexpected, and ensures our future justifications for projects are grounded in reality. And some argue that the project isn't completed until the outcomes, benefits or results, as initially proposed, are in fact achieved.

Prince2 and PMBOK®

PMBOK® means Project Management Body of Knowledge, which is authored and owned by the Project management Institute, Inc (PMI®). Prince2 stands for Projects in Controlled Environments, which means that Prince2 shows us how to establish a controlled environment in which to run a project. Prince2 was developed and commissioned by the UK Government and is in the public domain.

The author of this book recognises the complementary nature of Prince2 and PMBOK® and the benefits of combining them. PMBOK® is a compilation of 'generally accepted' project management knowledge and is the foundation of project management principles. It tells us *what we should know*. Whereas, Prince2 is a process-based project management methodology that describes in detail *what we should do*. Prince2 started life in the UK and PMBOK® started life in the US and these are still their respective strongholds although both are increasingly used worldwide. Importantly, they are not mutually exclusive. Prince2 is a pragmatic prescriptive methodology and PMBOK® is a descriptive encyclopaedic source of information. This book captures the best of both.

Unfortunately, neither of these process-heavy documents is simple, perhaps because academics believe simplicity would undermine their worth, or because consensus by committee is incapable of embracing simplicity since consensus usually means satisfying everyone! And both documents wisely disclaim any liability associated with their use. In short, caveat emptor – buyer beware!

Figure 1.1: CDEF Project Life Cycle

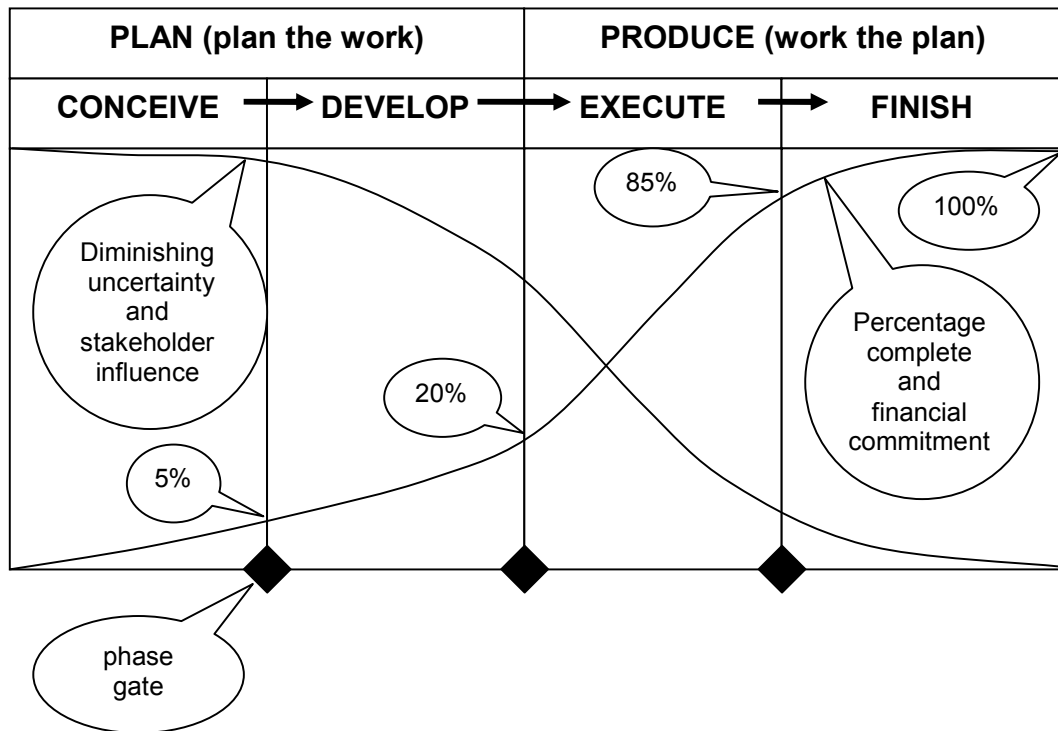
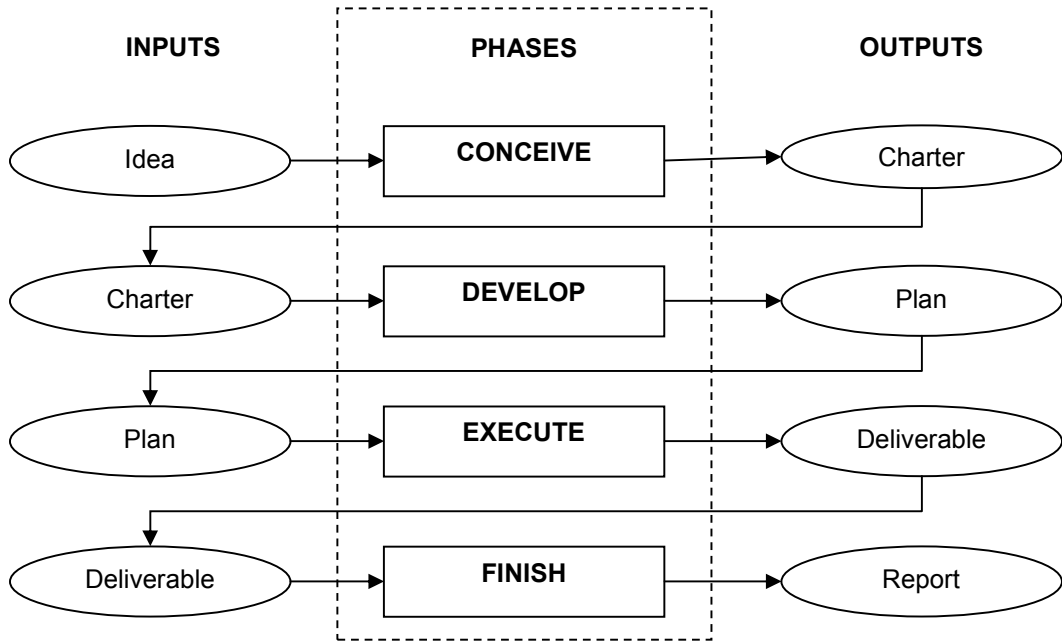
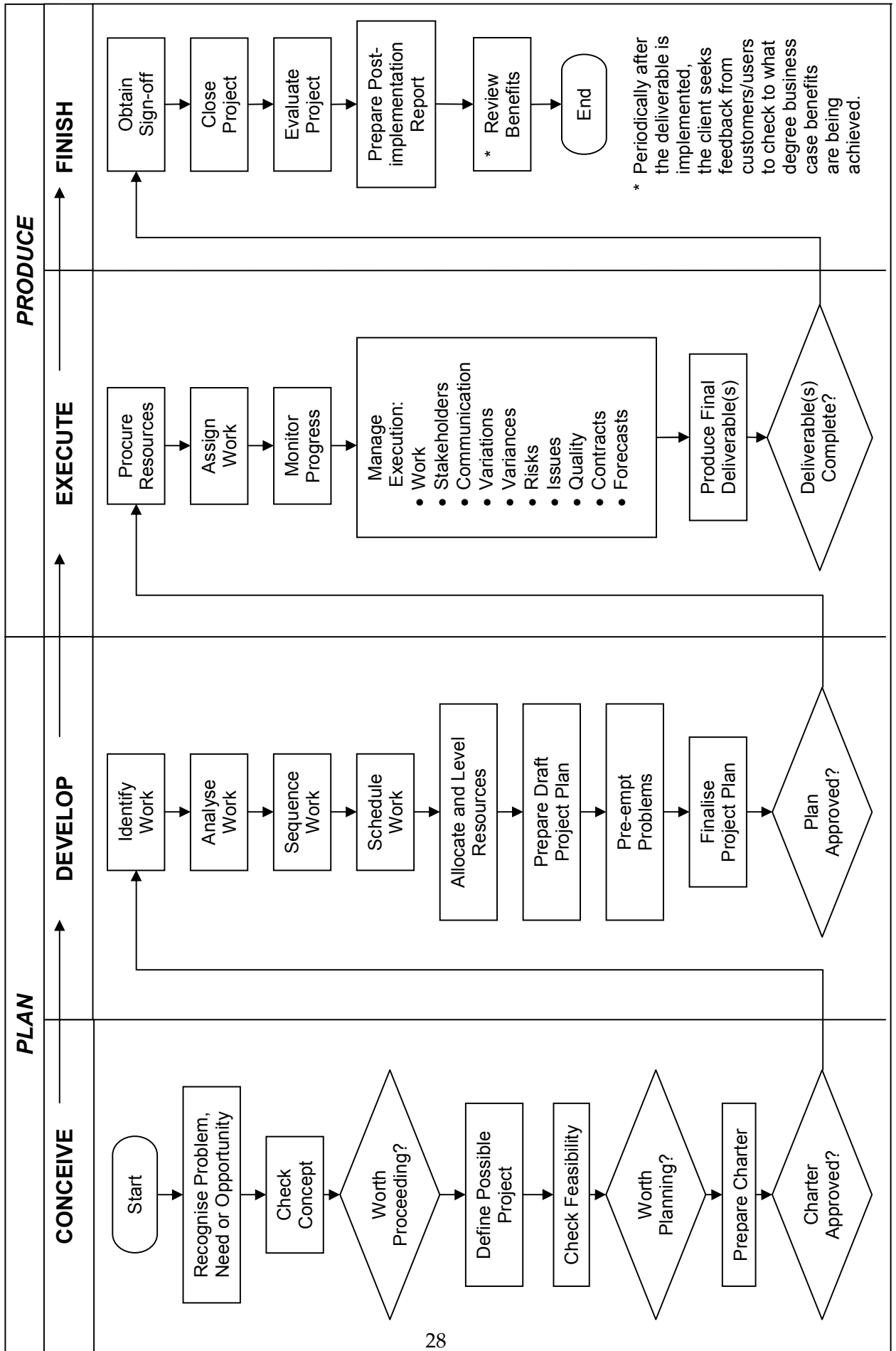


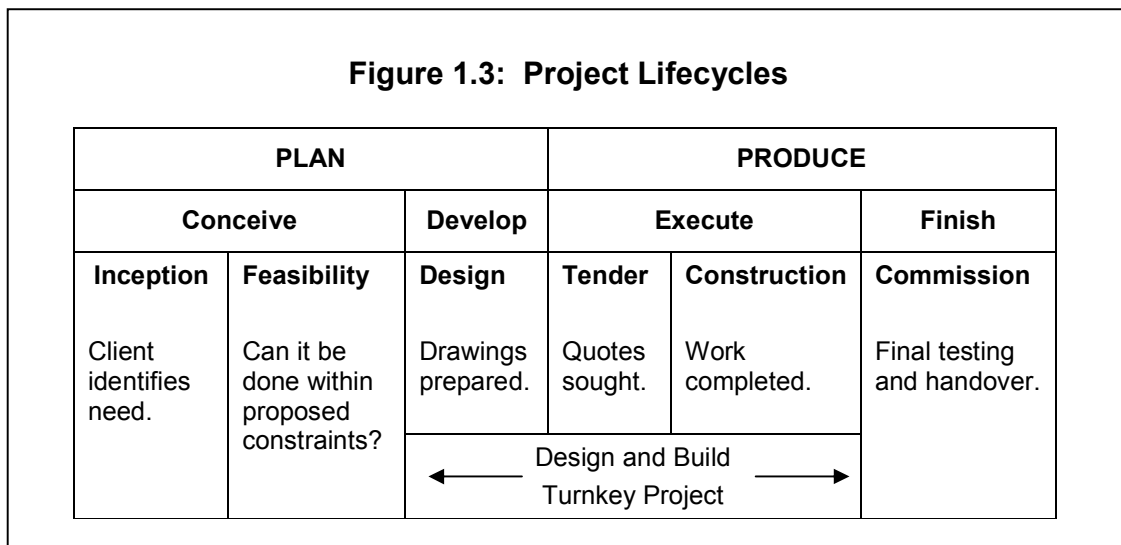
Figure 1.2: Project Management Framework



Lifecycles Compared

Specialised project lifecycles are compatible with the generic project lifecycle, and an extended lifecycle might also include operation and maintenance, disposal and replacement phases. PMBOK® separates Execute into execute and control, and Prince2 separates this phase into two or more stages for management control purposes.

The diagram at Figure 1.3 shows how phases closely relate when we compare a typical construction project lifecycle with our generic model.



Framework Summary

A brief explanation of what's involved at each step in the framework is at Figure 1.4. Remember that this standard framework is aimed at a wide spectrum of organisations. The framework cannot necessarily be applied straight out of the box, but it will be an excellent basis for developing our own solutions.

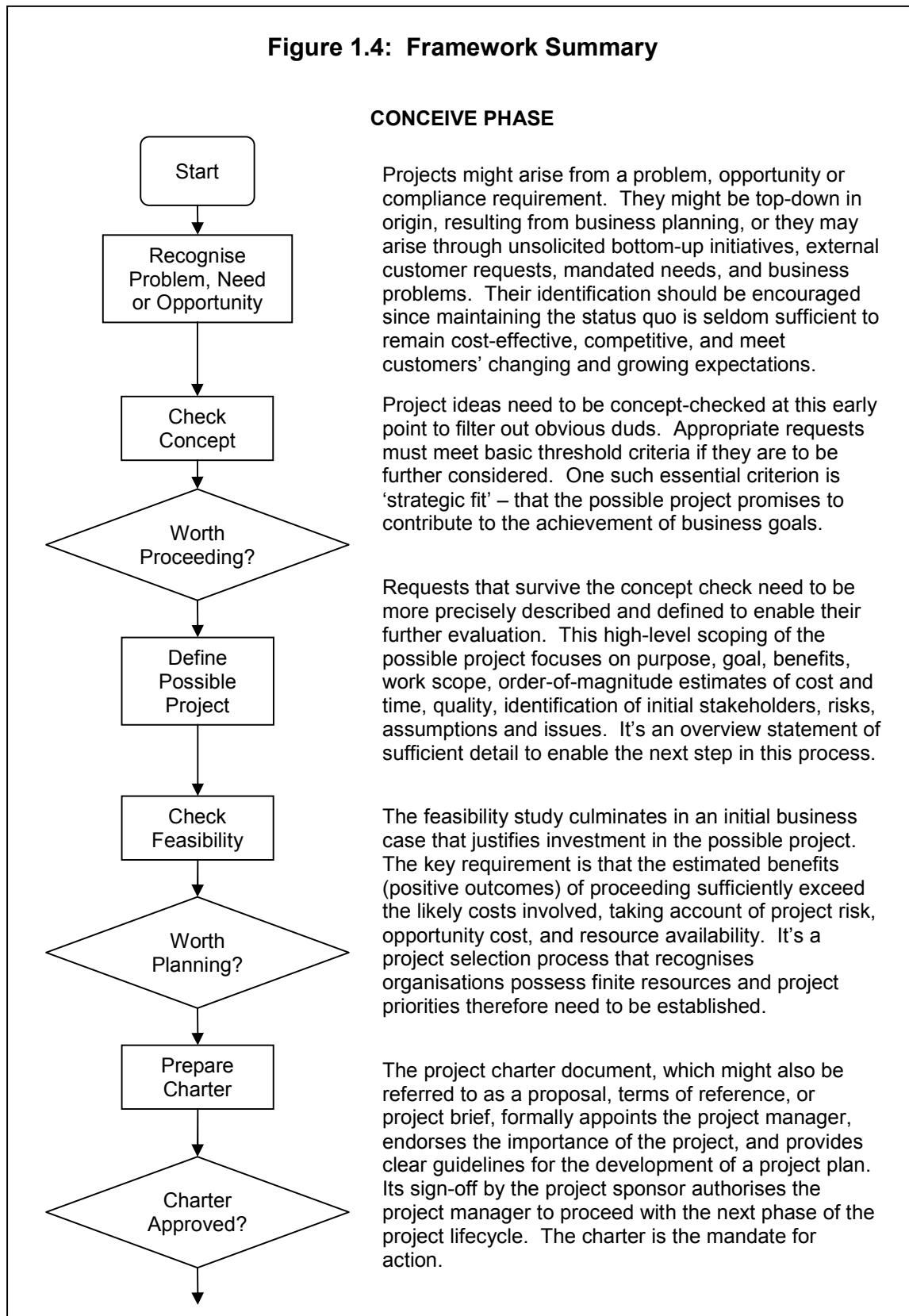
In some organisations, project manager is a position with that title, while in others, it is a temporary assignment. Whether a position or an assignment, whenever an individual is clearly responsible for the management of a project, that individual can be considered to be a project manager for the purposes of this framework.

What Now?

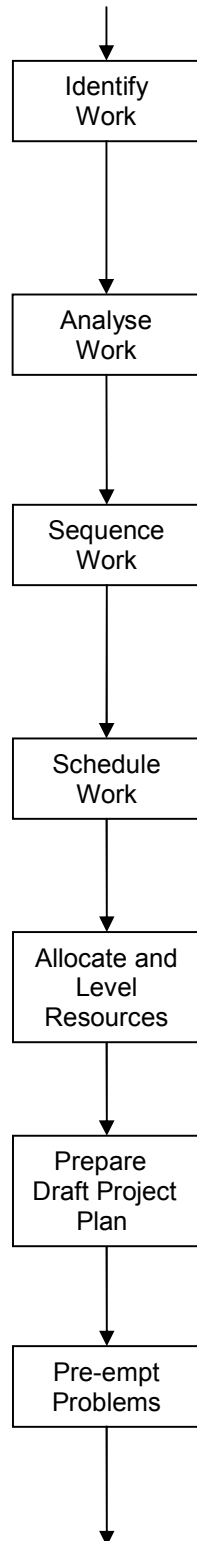
This first chapter has introduced us to the framework – its rationale, characteristics, and essential steps involved. Subsequent chapters will explain each step, but first there is a need to familiarise or re-familiarise ourselves with some more general aspects of project management.



Figure 1.4: Framework Summary



DEVELOP PHASE



The project manager secures a project office and gathers the planning team for the kick-off meeting. Team members usually discuss the charter and develop a Work Breakdown Structure (WBS), which is a 'family tree' of successively smaller chunks of work that need to be completed to achieve the project goal, the lowest levels of which are called 'work packages'.

Once the work has been decomposed into work packages, these are each analysed by team members with appropriate experience and expertise to more accurately determine resource needs, performance standards, costs, work effort and durations. The deliverable is a 'bottom-up' estimate.

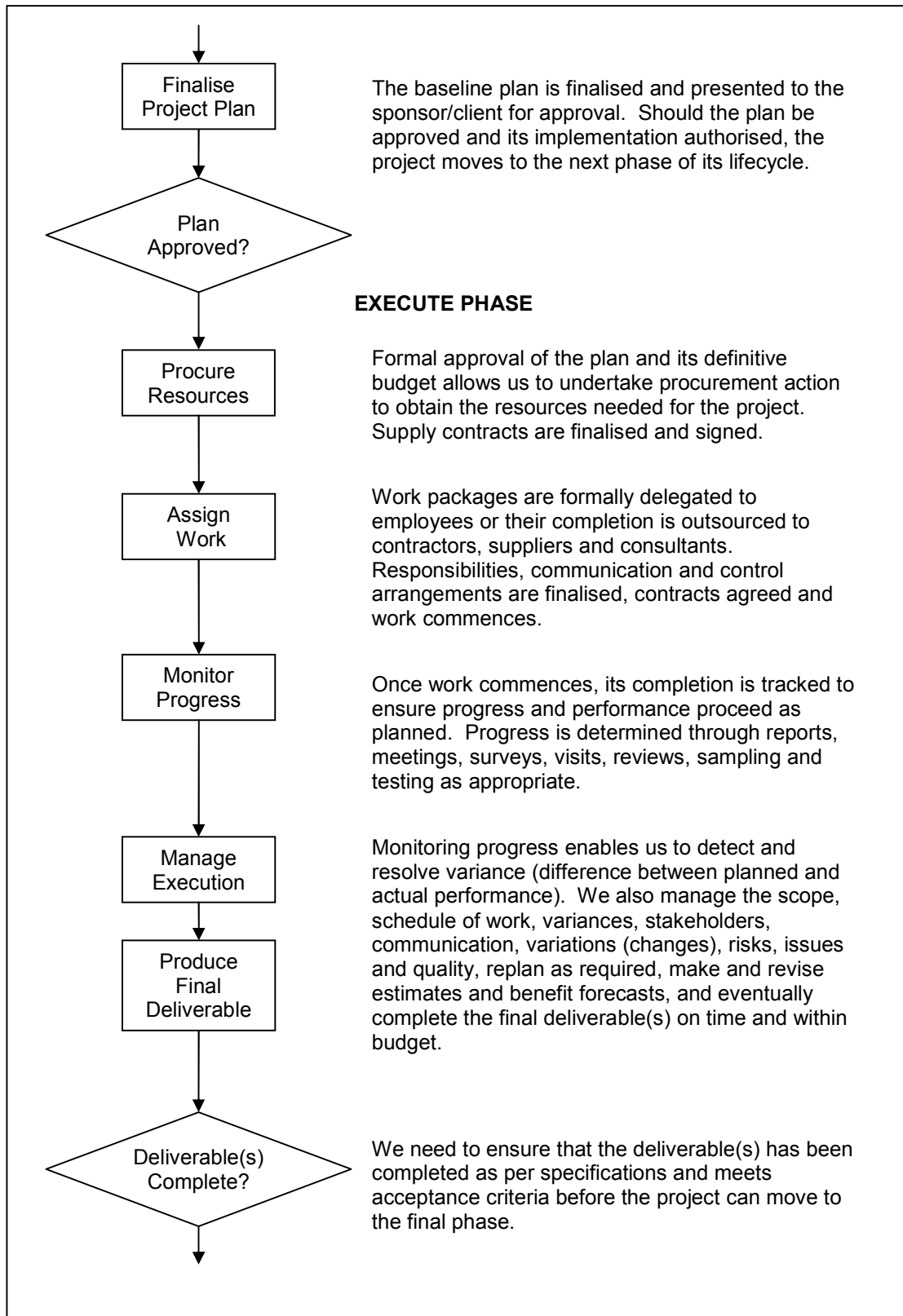
This step requires we decide the 'logic' of the project, which recognises the relationships between work packages and illustrates these relationships by network diagram. This output is an analytical tool that enables us to identify the project 'critical path', estimate project duration and completion date, and undertake a variety of what-if assessments.

The schedule, or work timetable, is prepared and published as a table or Gantt chart, showing what work is to be undertaken when (calendar dates) and by whom. A variety of software packages are available to assist us with this scheduling activity.

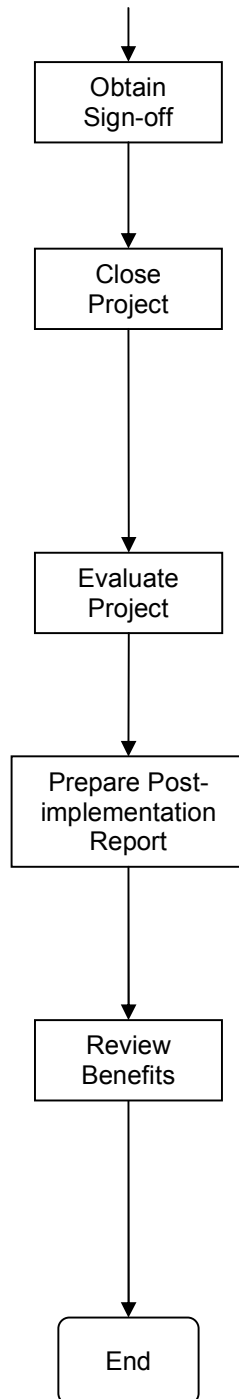
The detailed availability of resources is assessed and resource shortages and overloading resolved often by revising the schedule. The deliverable is a resource schedule that shows who and what is needed when. It is the basis for the project procurement plan.

The project plan is now prepared in draft. This document should contain sufficient information to ensure the successful implementation and completion of the project. It's a roadmap that shows how the work scope will be accomplished within defined parameters.

The tentative plan is now subject to careful analysis, often involving key stakeholders, to identify possible deficiencies and potential problems (ie, risks) and appropriate responses, which may then necessitate some revision to the plan. At this step we aim to 'future-proof' the plan. However, risk management is a continuous activity throughout the project lifecycle.



FINISH PHASE



At this step there may be careful feature-by-feature checking, defects are rectified, and we obtain formal acceptance of practical completion and sign-off from the sponsor/client. The deliverable is handed over to the owner/users, and incorporated into business-as-usual routine.

Given sign-off, the project can be closed down. Closure will already have been planned, but details will often need updating. This activity is essentially a project within the project when all closure activities are identified, scheduled and responsibilities for their completion assigned. Finish procedure might also address post-project requirements such as user training, deliverable operation and maintenance, and benefits realisation.

Before the project team disperses, project performance is evaluated and project final completion celebrated.

The project evaluation findings are contained in a formal report. Lessons learned are documented, estimating databases, processes and procedures updated as required, and the project files archived.

Periodically after project completion and product/service launch the client/sponsor will check with users/customers to determine the extent to which business case benefits are being achieved or have been achieved. As a result, project selection procedures may need to be updated.

The framework focuses on results rather than documentation, ensuring that nothing is done because the framework says so but rather because the activity is necessary and will contribute to the success of the project. Each step is designed to add value. Also, there are management activities that continue throughout all phases, such as communication, and management of stakeholders, change and risk.

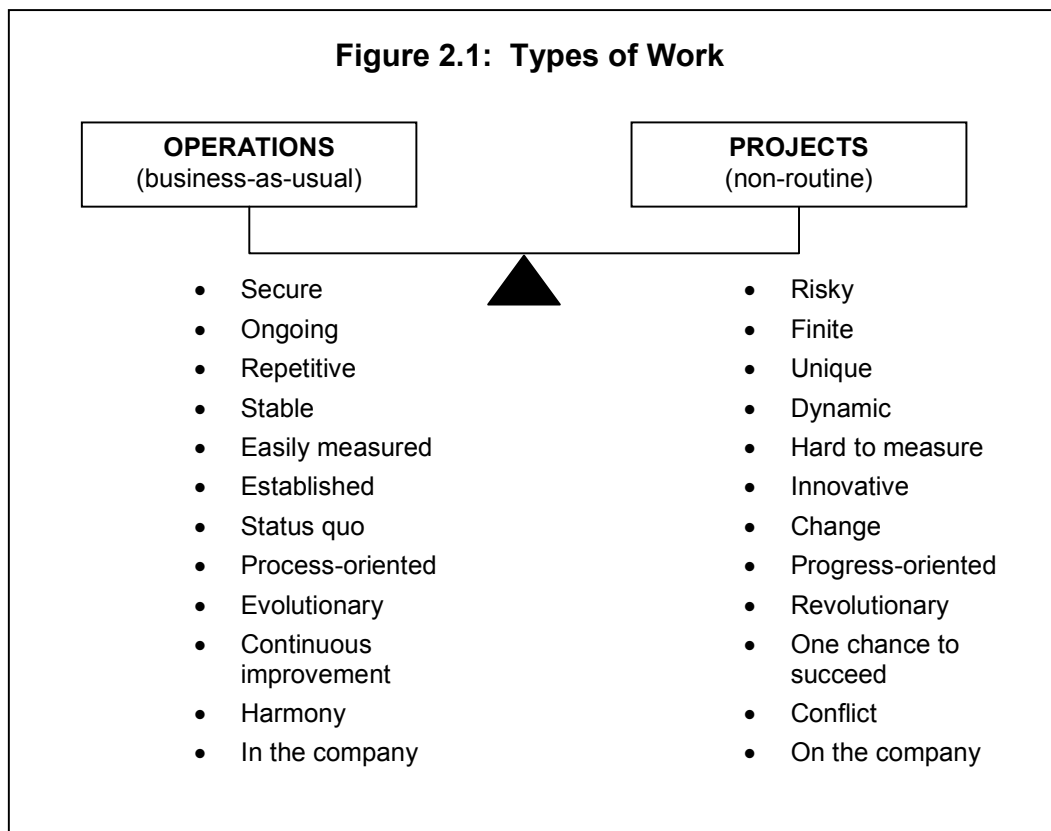
Chapter Two

FUNDAMENTALS



What is a Project?

Organisations perform work. Work involves either projects or operations (ie, business-as-usual), both of which deliver products and services. However, a project has a specific duration and no two projects are exactly the same, whereas an operation is a repetition of an established process. Thus, a project is work, but not all work is project work. In an organisation, projects and operations overlap and interact. They are the work that make organisations run. They deliver the goods and services that satisfy customers and owners. Commonly identified points of difference between operations and projects are listed at Figure 2.1, although these distinctions are not always clear cut. Sometimes an operation includes projects, and operational work can occur within a project. And, of course, the deliverables produced by projects may then be integrated into business-as-usual work.



Some examples to help us distinguish between project and business-as-usual work are shown at Figure 2.2. Projects are how we get work done that is not part of our business-as-usual routine, although if we are contractors our business-as-usual is projects.

Business-as-usual is the routine, ordinary work organisations typically undertake on a daily basis. It's repetitive and process-oriented, and normally has to continue undisturbed while projects are undertaken, which is sometimes a significant constraint on project resourcing.

Figure 2.2: Examples of Projects and Business-as-Usual

Projects	Business-as-Usual
Developing and implementing a software package to process membership applications.	Daily processing of membership applications.
Building and installing a robot to paint cars.	Painting car after car using a robot.
Researching and preparing a training course.	Presenting a training course repeatedly.
Responding to a client's particular enquiry.	Producing a weekly newsletter for clients.
Closing the books at the end of the fiscal year.	Routine running of the accounting function.
Developing a policy.	Applying the policy on a day to day basis.

A challenge for many organisations is to strike the appropriate balance between business-as-usual and project work. The status quo isn't sufficient if an organisation wishes to remain competitive and continue to meet or exceed customers' changing and growing expectations. To undertake project work is a particular challenge when job descriptions are comprised exclusively of business-as-usual work (except perhaps for that catch-all expression 'other work as assigned') and when performance rewards are based on employees' business-as-usual achievements. When we are fully occupied with business-as-usual, it's difficult to find time for projects, unless we are prepared to:

- recognise the similar importance of project work
- postpone, cancel or outsource business-as-usual work to free up organisational resources for projects
- obtain extra resources and/or redistribute existing resources to meet project needs
- reschedule projects according to their priorities and adjust their completion dates—thus smooth resource loading (ie, move peaks into troughs) at a macro level across the organisation (ie, apply multi-project or portfolio management).

Of course, no organisation has unlimited resources. This emphasises the need to assign a priority to each project, which then largely determines each project's access to our organisation's resource pool.

Anyway, to put projects into perspective we need a definition – a common starting point. There are a variety of very appropriate definitions for a project. One definition, which captures the project's top two distinguishing characteristics, is that provided by the Project Management Institute:

A project is a temporary endeavour undertaken to create a unique product, service or result.

This definition reminds us that projects are finite, since a completion date is envisaged and unique inasmuch as a project never occurs twice under precisely the same conditions. The output may be tangible, such as a software product, or it may be intangible, such as new recruiting guidelines. In fact, deliverables may be bundles of goods and services. This definition also helps us distinguish a project from an operation. To design and build a prototype new car is a project. To then manufacture thousands of them is an operation – repetitive and ongoing. However, the difference is becoming less obvious as on-going operations are increasingly being managed as projects. Each repetition may represent a new project. And 'customised' cars are now made to order.

Given this broad definition, projects come in many shapes and sizes. Projects may be individual or team endeavours. They abound in both our professional and personal lives. Projects occur at all levels in our organisation and may involve a single part of our organisation, several parts, or cross organisational and even national boundaries, in the form of global joint ventures. Some organisations may require that a project exceeds a certain cost, duration, risk or complexity threshold before it is formally recognised as a project and managed as such using the organisation's project management framework. Projects are change initiatives. They all change the status quo. The following list (some peculiar to New Zealand) illustrates their diversity from what were originally just technical defence, engineering and construction endeavours:

- hosting the World Rugby Cup 2011
- erecting power pylons in Waikato
- mapping Mars
- installing a computer system
- having a Santa parade
- revitalising ANZUS
- reducing compliance costs
- preparing for a flu pandemic
- staging 'The World of Wearable Arts'
- competing in a yacht race
- organising a hui
- arranging a sporting event
- planning a binge drink session
- organising a cave rescue
- plugging the brain drain
- making customised embryos
- repossessing Maori land
- producing a music CD
- getting out of Iraq
- introducing an accounting system
- putting down a hangi
- upgrading a site security system
- doing a benchmarking survey
- re-engineering a business process
- preparing a tsunami contingency plan
- organising a graduation ceremony

- having a wedding
- finding a replacement planet
- achieving carbon neutrality
- releasing the iPhone
- devising an honours system
- introducing nuclear power
- reviving the Ministry of Works
- renovating the kitchen
- conducting a market survey
- beating Aussies at cricket
- winning the America's Cup
- competing in the Coast to Coast
- designing, building and installing a half-decent parliamentary system
- preparing a Police code of conduct
- implementing tax cuts
- upgrading a performance management system
- overhauling NCEA
- conducting an advertising campaign
- reversing global warming
- arranging an anti-whaling battle
- repealing the Electoral Finance Act
- erecting a TV transmitter
- building a green shopping mall
- adopting an African child
- committing a bank robbery
- performing a heart transplant
- eliminating unelected list MPs
- abolishing parole for criminals
- having a state funeral
- collecting more OECD statistics
- developing a software package
- conducting a feasibility study
- cleaning up after a an earthquake
- resending astronauts to the Moon
- adopting a Vietnamese child
- winning a World Rugby Cup
- having another Diana inquest
- building an inner-city bypass
- cheap-seating Eden Park
- emigrating to Aussie
- abolishing smacking and smoking
- making 'Lord of the Rings'
- protesting about pylons

Project management applies to all of these unique endeavours because despite their technical differences they all have the need for structured management.

Tom Peters recently suggested that some 50 percent of an organisation's work is now project work. However, I suspect the percentage is even higher, simply because a lot of project work is not recognised and managed as such since it does not meet or exceed some threshold cost, size or complexity, or perhaps it's been chopped up into smaller chunks to ensure this and thus avoid formal project selection processes.

Also, projects may be internal or undertaken by or for an external organisation. For example, a staff training project may either be undertaken using our organisation's own training resources, or contracted out to another organisation that specialises in the delivery of 'customised' training solutions. Or parts of a project may be contracted out.

Project Characteristics

Figure 2.1 identifies some factors that help us distinguish projects from operations. Projects also have some factors in common with operations. For example, both are performed by people, produce outputs, have resource constraints, and often share the same resource pool. However, some frequently identified distinguishing characteristics common to most projects are:

- A project is **temporary**. It ends when the project scope has been achieved, or sometimes prematurely when the project runs out of time, out of money, or it becomes clear that the project will not achieve its goal, so it's scrapped.
- A project is supported by a **business case** that provides justification for the investment. The business case needs to be reviewed over the life of the project to ensure that the financial, operational and other benefits (tangible and intangible) are still valid. If project management is working properly, the project will be approved based on a cost-benefit scenario and business climate. If the climate changes, the project may be changed or cancelled without recrimination.
- A project has, or certainly needs, a well-defined **single goal** qualified by scope, schedule, cost, risk, and performance. An effective goal should meet SMART criteria—specific, measurable, achievable, realistic and time-bound. Clear, purposeful, challenging, prioritised, agreed and written down are also helpful qualities. The clearer this target the more likely we are to hit it.
- A project is carried out through a number of **interdependent tasks** that need to be assigned and satisfactorily completed in a certain sequence to realise the project goal. Usually a delay to one task has a knock-on effect often with the potential to delay project completion. A project task or work package is a clearly identifiable chunk of work that can be readily assigned. Its completion is measurable. In practice it's often simply viewed as a smaller project.
- A project uses **resources** (ie, people, skills, information, equipment, machines, materials, facilities etc) to carry out a scope of work. The resource schedule (ie, who and what are needed when) must comply with the work schedule. Project managers are usually resource borrowers. The resources may be owned by others; usually by functional (ie, line) managers. A very important requirement for effective project management is timely access to the necessary resources.
- A project has a **specific timeframe** or deadline for completion that may be self-imposed or externally specified (by the client). Unrealistically tight timeframes may jeopardise project success. Nevertheless, if there is no deadline, procrastination is probable as the project is queue-jumped by those projects that do have deadlines. In these circumstances we should establish a completion date for our project to avoid a 'never-ending' characteristic.
- A project has a **lifecycle**. The project as discussed earlier is conceived and eventually finished. The lifecycle can be divided into phases. See Figure 1.1.
- A project is a **unique endeavour**. Unique, since it has never been attempted before, or because of the customising required, or because of random variations, or the context in which it's undertaken. No two projects are entirely the same. Thus, previous lessons may not always be applicable, although periodic and post-implementation reviews are always appropriate.
- A project should desirably have a **client** who owns the final deliverable. The client may be a person, an organisation or a group of people or organisations. In project work the customer is

usually seen as the user and the sponsor as the funder. The project manager must keep in close contact with these important stakeholders whose satisfaction is an important measure of project success.

- A project has a **degree of uncertainty** since its planning is unavoidably based on assumptions, forecasts and estimates, which will not necessarily be accurate. These premises need to be reviewed and refined as the project proceeds. Effective risk management is therefore a very important and ongoing project management process.
- A project has **single-point responsibility** for its successful completion. The individual responsible is the project manager who should be assigned commensurate authority, which includes timely access to appropriate resources, to navigate the project to successful completion. This single-point responsibility principle applies at all levels as work is further sub-divided and assigned.
- A project has **stakeholders** who are people with something at stake in the project. They can affect the project or are affected by it. The principal stakeholder is the client. Sometimes the client is several people with different needs. The project manager will endeavour to broker solutions to which everyone agrees. Project success is often described as happy stakeholders.
- A project usually has task or **work package managers** who might be functional staff, contractors, suppliers, and consultants with the skill-sets needed for the successful completion of their assigned work packages. They too are project stakeholders. Thus, project managers often need contract management skills in addition to project management technical skills, industry knowledge, and a wide range of people skills – communicating, leading, negotiating, influencing, motivating, teambuilding, delegating, coaching, mentoring, conflict management, counselling and performance management. By ‘industry knowledge’ I mean sufficient at least to ask discipline experts the right questions and understand their answers, and be able to resolve differences when these experts disagree.
- A project means **change**. Project deliverables result in change – a new product, service or process. Thus, the project manager is also a change manager responsible for pre-empting obstacles and opposition to effective and efficient change. In fact, project management is change management.

What is Project Management?

When we think of the principles of management we often associate them with the management of people. These same principles also apply to projects. Project management is a framework, process or method and techniques based on accepted principles of management used for leading, planning and controlling a scope of work to reach a desired end result on time, within budget and according to specification. Thus, an appropriate and concise definition is:

Project management is the use of leadership, planning and controlling techniques to achieve the project goal.

The project goal is to produce a deliverable or deliverables within defined parameters of scope, time, cost and quality. These parameters represent the project objectives from the project client’s viewpoint, and perhaps the project constraints from the project manager’s viewpoint. The principal objective is usually the scope of the project, which is normally determined first. Scope is all the work that must be done and the deliverables that must be produced to realise the project goal.

To manage a project requires the application of a broad range of skills to properly conceive, develop, execute and finish the work. The primary skills are scoping the project (ie, developing the project goal, objectives and requirements), scheduling, and estimating. Added to these core skills are the essential competencies of leadership, risk and benefits management, communicating, teambuilding, and stakeholder management. Project management is the discipline of getting things done.

Project Parameters

The relationship among project parameters or objectives is shown at Figure 2.3. Each parameter is potentially a function of the other three, and balancing these competing demands is an important part of managing a project. For example, a progressive increase or elaboration in the scope of the project, as distinct from 'scope creep', might be formally accommodated by:

- eliminating excessive quality (ie, 'fit-for-purpose' rather than the ultra-perfectionist's 'gold-plated' version with every feature and function)
- increasing project expenditure (ie, apply more resources)
- extending project duration
- some combination of these options.

Without a formal change management process, 'scope creep' (or even 'scope gallop') will ensue. I liken scope creep to lead poisoning. It can have an accumulative dire consequence – project death. What started as a modest undertaking can grow into a costly behemoth. The diagram at Figure 2.3 shows if project scope increases, we can usually expect the project cost and/or time to also increase.

Disproportionate amounts of time and cost are usually needed to improve product quality beyond 'fit for purpose'. While it's important to meet stakeholders' expectations, it's also important we don't exceed these expectations. Significantly, PMI® no longer emphasises 'exceed expectations' because delivering more than needed can be a waste of time and money. Also, due to the direct and indirect costs involved, there is an optimum duration for a project from a cost perspective.

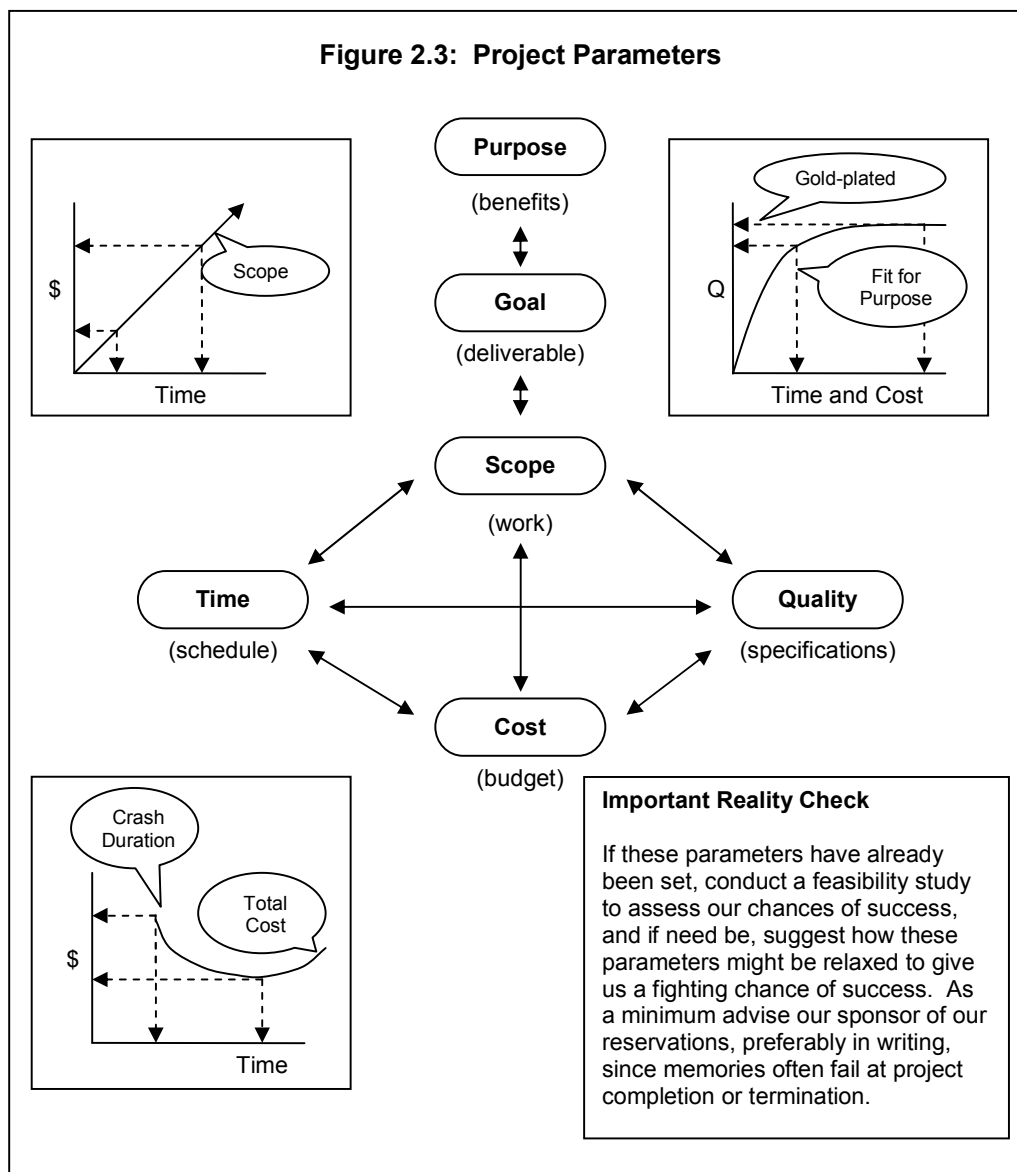
It is important that these parameters be unambiguously defined and preferably so before detailed planning commences. Together with client satisfaction, they provide a basis for project planning and for evaluating the progress and success of the project and project management. The challenge for the project manager is to balance these parameters to create the optimum equilibrium from the client's perspective, accepting also that the relative importance of the parameters might change over the life of the project.

Since the project parameters are historically the basis for evaluating our performance as project managers, it is in our interest that they be clearly defined at the start and their priority agreed with our client. Understandably, our client would prefer that the entire scope (plus a little more) be completed on schedule, within a tight budget, and that the final deliverable exceeds all performance expectations. Such a result is not usually realistic and some trade-off among parameters is often needed during the project lifecycle, particularly when unexpected situations arise. A useful tool to help determine parameter priorities is illustrated at Figure 2.4. For example, if the project 'driver' is time, then we realise the importance of adhering to the schedule and might limit work package sizes by duration, rather than by cost, in order to better track time throughout project execution. Scope, time, cost and quality are key components of the project goal, rather than independent measures of success.

While I have identified scope, cost, time and quality as the project parameters, risk and benefits (positive outcomes that justify a project) might now also be regarded as parameters. They too considerably affect project success and interact with the other four parameters. For example, a scope change might also affect risk and benefits. Conversely, revised benefit needs may require a change of project quality and scope to help ensure such new benefits are achieved.

Project Stakeholders

Project stakeholders sound like characters from Dracula, but are individuals and organisations who are actively involved in the project, or whose interests may be affected by the project. They have something at stake. They may be able to influence the project.



To help ensure a successful project, there is a need to continually identify the stakeholders, determine their needs and expectations, and then manage those needs and expectations. Important stakeholders on almost every project include:

- **Project Manager** – the individual responsible for the day-to-day managing of the project.
- **Client** – the individual, individuals or organisation for whom the project is undertaken. The client owns the project. The client may also be the customer.
- **Customer** – the individual, individuals or organisation who will ultimately use the product, service or process produced.
- **Sponsor** – the individual who usually develops the business case and ensures the financial resources for the project. The sponsor may also be the client. The sponsor needs authority commensurate with the project – must have ‘some skin in the game’.
- **Functional Departments** – resource providers and often the recipients of project deliverables who manage these to achieve benefits that ultimately justify the project investment.
- **Project Board or Steering Committee** – the senior managers who are the strategic decision-makers on resource issues and authorise the project and changes to the project. The group may be lead by the sponsor.
- **Performing Organisation** – the enterprise whose employees are most directly involved in doing the project work. The performing organisation provides the project team. They may be from outside the client organisation.

Figure 2.4: Project Parameter Priorities

Use this paired-comparison's tool to assist our client determine the relative importance of each parameter. For example, a non-urgent report writing project might be assessed as follows:

Rank	Score	Parameters	Quality	Time	Cost	Scope
2nd	2	Scope (S)	Q	S	S	
3rd	1	Cost (\$)	Q	\$		
4th	0	Time (T)	Q			
1st	3	Quality (Q)				

In this instance, Quality (clear, concise, complete, coherent presumably) is the driver (prime parameter), and Time is least important. Thus, if Quality is threatened, Time would be the most acceptable trade-off from the client's perspective. Extra time might enable more comprehensive editing and proofreading. Scope, which is mainly concerned with size, might be the issues to be addressed in the report to fully achieve the report's purpose for the intended audience.

The paired-comparison's tool might also be used to prioritise criteria, attributes, objectives, and product features and functions. The latter is useful if budget constraints dictate a reduction in product scope. Lower priority features are progressively eliminated until the project is within the new budget limit.

Perhaps quality ultimately transcends all else. It's the quality of the deliverable that endures.

In addition to these there may be various other stakeholders – internal and external, including owners, shareholders, investors, suppliers, contractors, consultants, competitors, project team members, other project managers who share the same resources, advocates, champions, lobbying organisations, government organisations, tax payers, rate payers, voters, ethnic groups and society at large, all with varying degrees of interest, emotion and influence in our project.

Managing stakeholders' expectations may be difficult because they often have different objectives, perspectives and assumptions. In general, such differences should be resolved in favour of the client wherever this is practicable.

In some situations, the client (person or group who has commissioned the work and will benefit from the end results) and the customer (person or group who will use or operate the deliverable) are the same person or group.

Usually the key participants are the project client, project customers, project manager, the project team, the functional managers from whom project resources are borrowed, and the project sponsor. Without the cooperation of these key players project success will be doubtful.

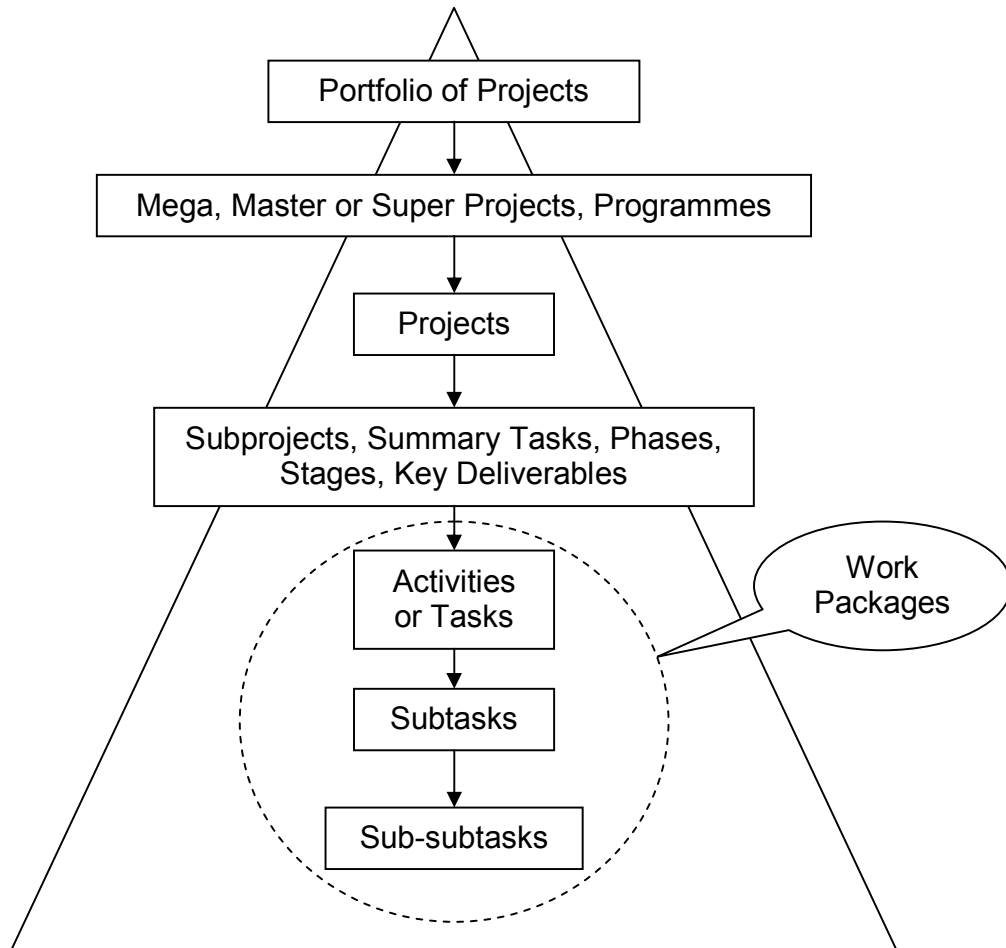
It is a responsibility of us project managers to lead all stakeholders and encourage them to work together. The management of stakeholders is considered further in Chapter 4.

Project Work

The typical breakdown of project work is shown at Figure 2.5. There is no universal agreement on the associated terminology. For example, the PMBOK® Guide and Nuku Open Workbench scheduling software describe an 'activity' as 'two or more tasks', whereas MS Project (the most widely used project management software package) describes a grouping of related tasks as a 'summary task'. Other recognised sources describe an 'activity' as an equivalent term for 'task'. Furthermore, the difference between a 'project' and a 'task' may depend on where we are in the work hierarchy. Our 'task' may be someone else's 'project', or vice versa. We may assign a 'work package' to a contractor who then appoints a 'project manager' to ensure the satisfactory completion of this work package that is now described by the contractor as their 'project'. And a portfolio of projects may occur at any level from corporate to individual project manager.

Nevertheless, a very important part of the project planning process is to 'chunk' the project into successively smaller pieces of work (ie, smaller more manageable projects) and usually publish the resultant chart as a work breakdown structure (WBS). The lowest level of work breakdown in this book is described as a 'work package', which may be an activity or task, subtask or sub-subtask – the definable elements of work or work items that are typically delegated or contracted out for completion during project execution. Perhaps the only common ground in this decomposition process is 'levels of breakdown' and often each chunk of work, regardless of its place in the family tree of work, is a project in itself.

Figure 2.5: Hierarchy of Project Work



Project Organisation

Projects involve a variety of people and groups of people. The precise project organisation will vary from project to project and from organisation to organisation. An indicative relationship chart is shown at Figure 2.6. To show all possible lines of communication, responsibility, authority and accountability would not be practicable in this format. Perhaps the best way to show basic responsibilities for a specific project is to develop a responsibilities assignment matrix (RAM) which is a table that relates the project organisation breakdown structure (OBS) to the project work breakdown structure (WBS) shown at Figure 2.7. It's a useful tool because it emphasises who is responsible for each work item and shows each individual's role supporting the overall project. It's also a helpful prelude to preparing detailed job descriptions if these are needed.

Figure 2.6: Working Relationships

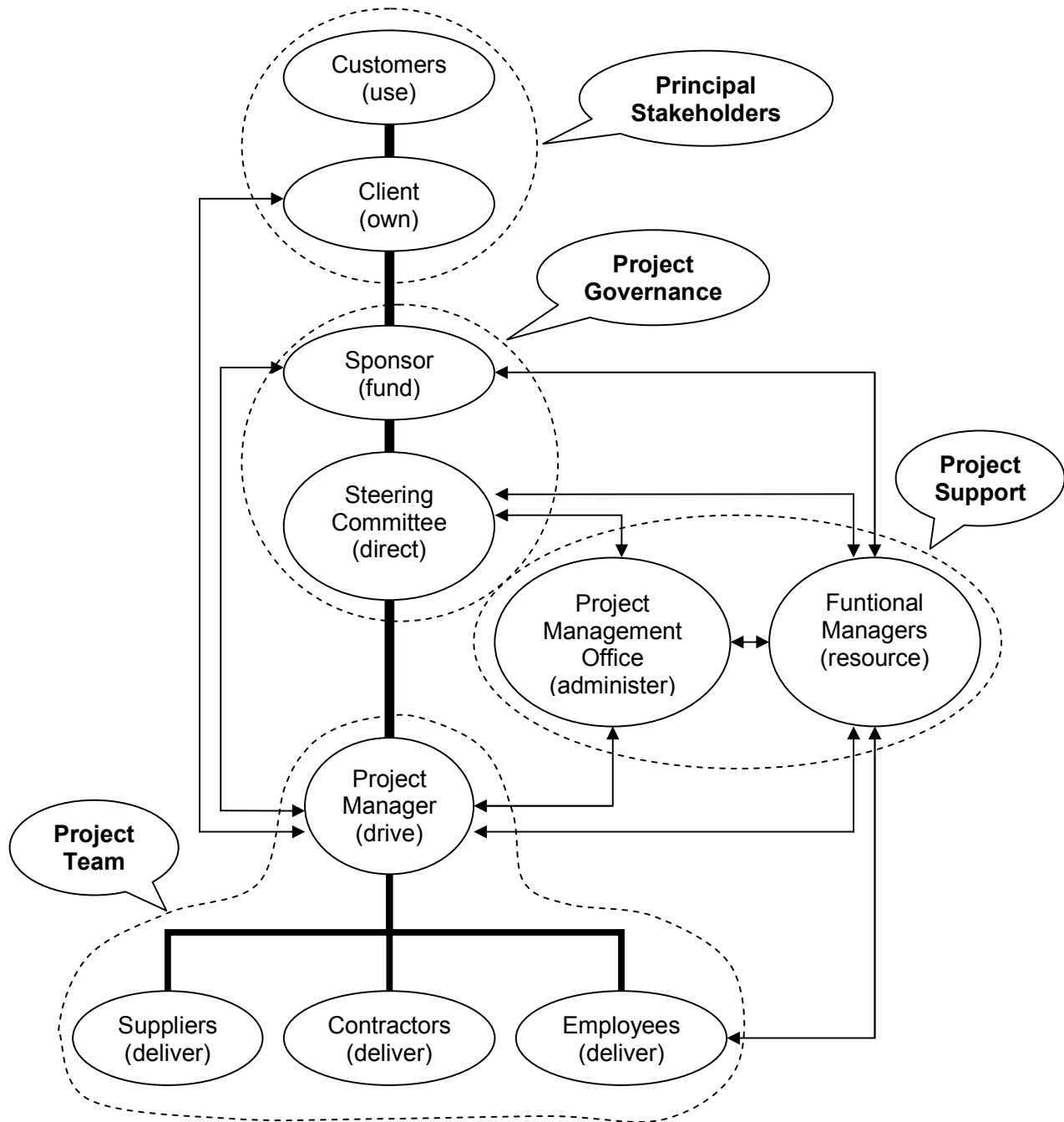
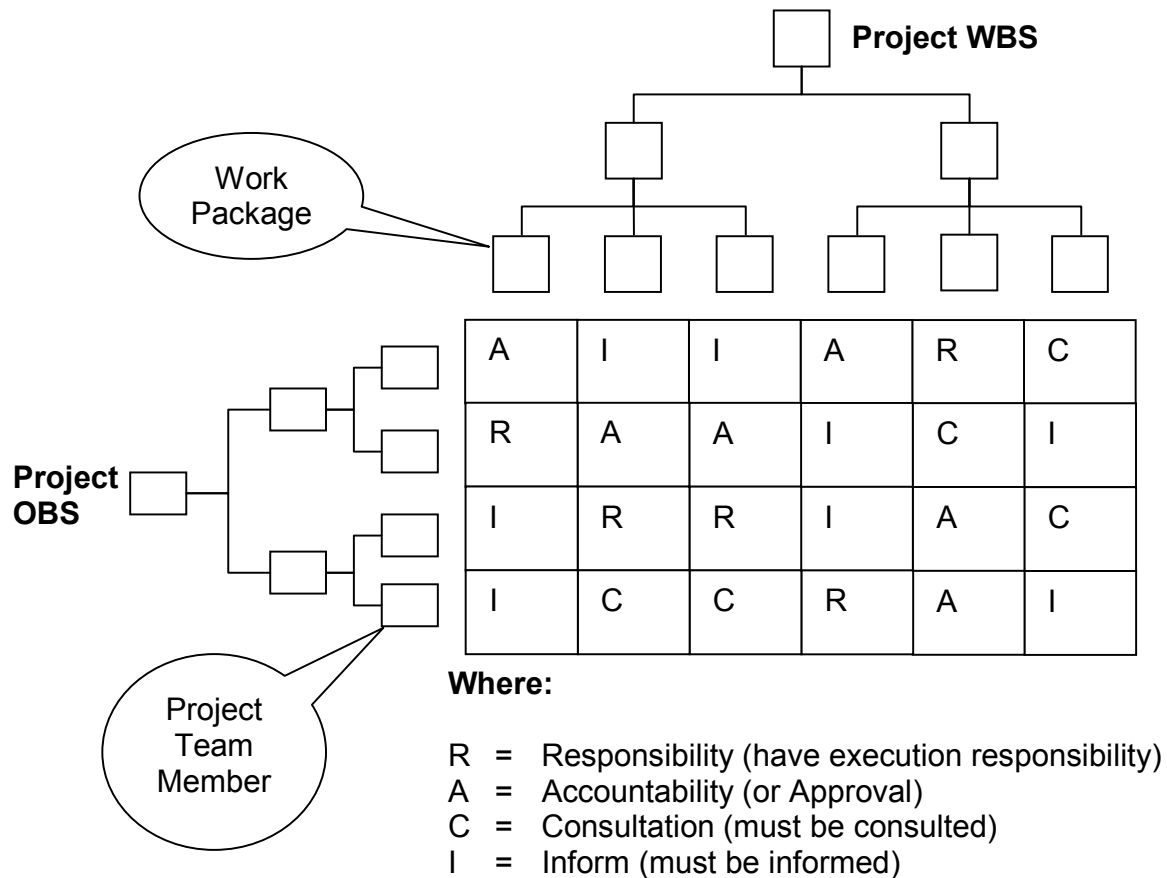


Figure 2.7: Responsibilities Assignment Matrix (RAM)



The RAM is a table that shows the connections between project work and project team members. Sometimes it's called a RACI table. An expanded version is RACI-VS where V is Verifies and S is Signs-off. One alternative version, CAIRO, uses the same designations (displayed in a different order) with the addition of O (Out of the loop).

The 'RACI' letters stand for different levels of expectation:

- **Responsibility** for people who are expected to actively participate and contribute to the best of their abilities.
- **Accountability** denoting the person ultimately held responsible for the results.
- **Consultation** for people/groups who either have a particular expertise they can contribute (ie, their advise is sought) or who must be consulted before a final decision is made.
- **Inform** for people/groups who are affected by the project but who do not participate in the effort. Typically they are notified after the decision.

Sometimes project work might be contracted out. In which case there may be a project manager from the client organisation and a project manager from the contracting organisation. They usually form a dual leadership and jointly carry out the project management responsibility. A contract manager might be responsible for the working relationship with the contractor without of course undermining the authority of the project manager.

Within the client organisation, the project sponsor has delegated authority from the CEO to sign-off the project deliverables and expenditure to agreed limits. The sponsor often chairs the steering committee and the project manager is responsible to the sponsor for the successful day-to-day management and completion of the project in accordance with the agreed scope and other parameters. The CEO usually has a governance role for the project and must therefore maintain some reasonable objectivity.

Project Offices

The project management phenomenon has seen the establishment of project offices within organisations. Such offices come in different forms; the two most common versions evolved thus far being the project office and the project management office, although terminology and functions vary.

The project office, or 'war room' as it is sometimes described, is usually a suitably equipped single office where the project team can meet and work on the project. The office may help strengthen project team communication and teamwork. It is a temporary venue that might also be the repository for the project's models, records, documentation, wall charts, etc. A project office may not be appropriate where team members are geographically spread or are involved in several projects and thus find it more convenient/efficient to work from their own disciplinary environment where their functional managers may also prefer they reside. In this instance a virtual website project office might be appropriate.

The project management office (or project support office) is likely to be a permanent office designed to provide administrative support to a number of projects and programmes (ie, related projects). The project management office (PMO) may also be the 'centre of excellence' responsible for maintaining and promoting project performance best practices throughout the organisation. Their authority normally comes almost entirely from their expertise in project management.

Our own organisation might seriously consider creating and maintaining a PMO if:

- scope keeps changing throughout projects, necessitating extra expertise to manage the changes
- we are managing multiple projects that share the same resource pool and there is a need for centralised control of resource allocation
- multiple contractors and suppliers are needed because of the size or complexity of our projects
- it is necessary to provide consolidated reports and apply common metrics across all projects
- it is necessary to provide a single source of communication with clients and other stakeholders
- projects are being implemented across diverse geographic regions.

The PMO usually supports projects by handling the more routine and mechanical jobs such as updating project plans, budgets and records. Staffed by project administrators and analysts, the office might be compared to bookkeepers who are responsible for maintaining accurate accounts while having no responsibility for profit and loss decisions. However, the responsibilities of the PMO are

evolving and vary, but might include:

- Maintain the integrity of the project management framework and establish enterprise standards, processes and templates. The PMO is our framework guardian.
- Provide a focal point for project information and planning data.
- Clarify the role of projects and project management in the organisation.
- Help ensure the proper integration of project work across functional lines.
- Manage and enforce project priorities.
- Maintain project files, contract documents and monitor contractual performance.
- Establish training objectives for project managers and teams, and provide project training to realise these objectives.
- Give hands-on help to project managers and provide consultants and project administrators to assist project managers.
- Benchmark projects and undertake audits and post-project evaluations.
- Centralise communications, which can alleviate or reduce project managers' individual responsibility to communicate with external or secondary stakeholders.
- Search outside the organisation for best practices worthy of adoption.
- Maintain project databases for planning and estimating purposes.
- Select and support project scheduling software.
- Coordinate project resource use across the organisation.
- Collate project charters and progress reports for steering committees.
- Provide secretarial services for steering committees.
- Maintain a pool of trained project managers and administrators.
- Arrange for the archiving of project documentation.

In recent years corporate PMOs have proliferated, driven mainly by the need to reduce major project cost overruns, delays, and cancellations. A dedicated PMO provides the oversight and coordination to deliver projects on time and on budget by managing and reporting on our organisation's total schedule, risk, cost, quality, scope and resources across all projects. But some PMOs fail to deliver on that promise, often because they are not sufficiently empowered, staffed, trained or equipped, and sometimes revel in bureaucracy.

Project Sponsor

In most projects the sponsor is the person with formal authority who is ultimately responsible for the project. A sponsor may be a senior manager or a junior manager depending on the project – its dollar value, priority, and sometimes who the client is.

Conceptually, the sponsor has a business need for the project, the organisation grants the sponsor the money and resources for the project, and the sponsor then contracts with the project manager to undertake the project. Hence in project organisation terms the project manager works for the project

sponsor, who works for the business. The sponsor's primary focus is on the project business objectives. The sponsor often chairs the project steering committee, which usually includes managers from those functional departments involved in resourcing the project and/or who will use or benefit from the final deliverable.

The sponsor's position and authority in the organisation are independent of the project. This enables the sponsor to act as the connection between the project and the organisation. The sponsor might use her or his authority on behalf of the project manager, provide advice, and influence project priority. The sponsor provides the formal authority that the project manager often lacks.

While the project manager performs the day-to-day functions, the sponsor provides executive authority needed to overcome organisational obstacles. The sponsor ensures the overall viability of the project and owns the business case. Thus in addition to checking if projects are meeting their deadlines and budget objectives, the sponsor should be asking *"Is the project still in line with our strategic goals and core values, and how will the project help us achieve those goals?"* Project managers are inclined to focus on detail and defined deliverables, not on strategic business goals.

The best sponsors appreciate that they aren't simply sponsoring the project; additionally they are sponsoring the project manager and the project team. They might be regarded as project champions. They provide behind-the-scenes assistance and can be especially useful in time of crisis. The project manager must therefore keep the sponsor well informed. Sponsors don't like or need surprises.

There are several ways sponsors lend their authority to our project:

- Ensure prospective projects are aligned to organisational goals and outcomes, and don't conflict with core values.
- Prepare or approve the business case that justifies investment in the project and ensure it remains valid.
- Chair the project board or steering committee/group.
- Appoint and empower the project manager.
- Write or approve the project charter.
- Champion the project at the highest level.
- Ensure project funding and timely availability of resources.
- Provide high-level direction to the project manager.
- Approve the project scope, plan, schedule and budget.
- Review project progress.
- Communicate with key stakeholders.
- Approve those variations that impact project parameters beyond the tolerance levels provided the project manager.
- Mentor and coach the project manager.
- Undertake benefit realisation reviews.
- Accept responsibility for issues escalated from the project manager.

- Approve the use of project reserve funds.
- Ensure the project's benefits are achieved.
- Approve project termination or closure.
- Review the post-implementation evaluation report.
- Recommend changes to the project management framework.

Not all the above responsibilities will apply in every situation. The organisation will usually determine which are applicable. There is no universal job description. Sponsors need fiscal authority, political clout and personal commitment. Comments from frustrated project managers suggest that not all sponsors fully understand their role and responsibilities. Some are inert. Some 'are responsible but not to blame!' They are the people with formal authority who are ultimately responsible for the project.

Project Manager

The project manager is accountable to the sponsor for planning and executing the project—or if you prefer—for optimising value through effectively managing change and risk in a constantly changing business environment. We shepherd the project through its four phases.

While again there's no standard job description, the following are activities commonly undertaken by the project manager:

- Assist the sponsor prepare the project business case.
- Prepare the project charter or assist the sponsor to do so.
- Accountable to the sponsor and client for project success.
- Define the scope of the project with the sponsor and client.
- Recruit team members, maintain their motivation, and ensure their productive cooperation.
- Negotiate resource needs.
- Prepare the project plan or lead its preparation.
- Assemble the project team, with the agreement of appropriate line managers, and enable their performance.
- Agree the responsibilities, work packages, and performance targets for team members.
- Arrange project procurement contracts.
- Regularly communicate with stakeholders.
- Regularly assess client satisfaction.
- Continuously identify and manage risk.
- Systematically monitor and manage project progress.
- Resolve or escalate project issues.
- Manage the scope of the project and control change.
- Make adjustments (schedule, resourcing, scope) necessary to achieve time, cost and quality

objectives (ie, rebaselining).

- Manage the budget (and preserve the margin).
- Maintain project files and project diary, and apply document version control.
- Manage the project risk/issue/opportunity/lessons learned logs.
- Produce the project deliverable(s).
- Prepare a post-implementation report that includes lessons learnt.
- May participate in benefits realisation reviews after project completion/product launch.

Sometimes, organisations will appoint their technical experts as project managers. The skills and expertise that helped them excel in their technical fields are mistakenly thought to translate into project management competence. This isn't necessarily so and project managers are usually generalists with many skills in their repertoire, particularly communication and people management skills.

Organisation Structures

Projects are typically part of an organisation larger than the project itself, and project success will be considerably influenced by that organisation's structure, people, culture and politics. Organisational structures span a spectrum from 'functional' to 'projectised', with a variety of matrix structures in between. The matrix structure aims to integrate projects and functions. See Figure 2.8. Members of matrix project teams (also called cross-functional or multi-disciplinary teams) have two managers – their functional manager and the project manager. When the project manager has greater authority, the matrix is called strong. When functional managers have more power (the more typical situation), it is a weak matrix. When power is shared equally, it's a balanced matrix.

Some potential **advantages** of the matrix structure are:

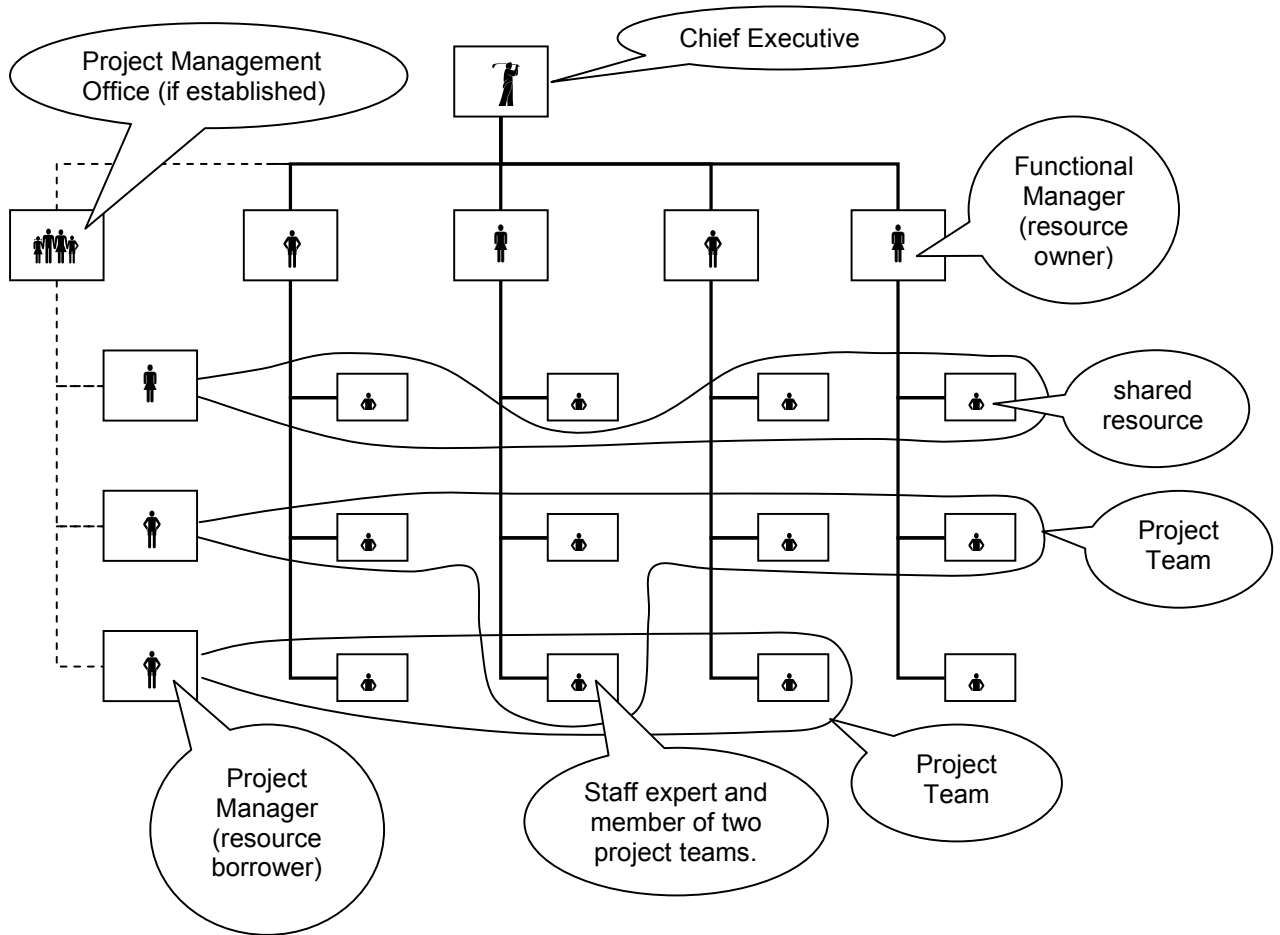
- efficient use of specialised skills
- staff have reasonable job security
- flexible and adaptive to changing circumstances
- clear and visible project goals
- efficient horizontal and vertical communications.

Some potential **disadvantages** of the matrix structure are:

- success depends on management interactions
- projects often staffed by teams of strangers
- project managers have no line authority
- politics and unproductive conflict are not uncommon
- project team members have at least two bosses.

In the matrix organisation, the respective responsibilities of project managers and functional managers must be clearly defined. See Figure 2.8.

Figure 2.8: Matrix Organisation



Typical Project Work Package Responsibilities							
	Why	What	Who	When	How	How Much	Where
Functional Managers			✓	✓	✓	✓	✓
Project Managers	✓	✓	✓	✓		✓	✓
Note: Who, When, How Much and Where are often negotiable.							

Typically:

- **project managers** decide why and what tasks are to be done, and monitor total project performance
- **functional managers** decide how tasks will be done, and assess how well the functional input has been integrated into the project
- **both** project managers and functional managers agree on who, when, how much and where.

In the matrix situation project success is considerably dependent on the cooperation of the project manager and functional managers whose resources are required for the project. The project manager also needs to lead this multi-disciplinary project team over which he or she may have very limited or no formal authority. The project manager's main sources of influence may include:

- expertise in project management
- identification with influential supporters
- access to information that others find valuable
- personal characteristics, charisma and mana
- ability to reward or withdraw privileges.

Later in the book we will identify specific strategies that might be used to achieve project commitment or 'buy-in' from project players, important among which is the need for the project manager to recognise, welcome and use the individual expertise possessed by the project team members. It's a matter of getting their attention, shaping their attitudes, and securing their commitment – not an easy job given today's multi-project workplace and heavy business-as-usual workloads, often further exacerbated by skill and staff shortages.

Traditionally, functional departments have been supreme, and while functional projects were well-resourced, cross-functional projects were accorded a lower resourcing priority. However, now that organisations are undertaking more cross-functional project work, the traditional perspective is changing. In these circumstances, functional departments sometimes exist primarily to ensure that projects are successful. It's a matter of projects taking priority over routine functional operations or business-as-usual, or at least an appropriate balance being struck.

When project teams are formed, their members are mainly recruited from functional departments. Members might stay where they are and report directly to their functional manager and indirectly to the project manager. Although this arrangement means two bosses, it does solve some problems:

- In a multidiscipline project team, some team members will be required to perform work that the project manager knows little about and could not therefore be sure that the person is performing properly and if the cost and time estimates provided by that person are valid. Thus, by having team members remain in their functional departments, their functional managers can better review their performance and provide technical guidance as required.
- Most projects do not require the full-time effort of all team members who are often involved in more than one project. By remaining in their functional groups, their functional manager can ensure that individual workloads are properly scheduled. However, if the person was assigned to the project fulltime, they may not be fully employed. Also, the project may have to

pay for this down time.

- Should project team members remain in their functional departments they can consult with each other as they need to. If they are physically removed from their functional colleagues, there may be less opportunity for them to seek timely assistance on technical issues.

Perhaps the main disadvantage of the matrix organisation is the potential for goal conflict. Project managers and functional managers may have different priorities. The project manager has only one project to contend with. However, the functional manager is concerned with meeting the needs of their functional department as well as the needs of a variety of projects that require the department's support. This situation emphasises the need for functional managers to be given maximum notice of project resourcing needs, and for us project managers to be skilled in our communication and negotiations with functional managers whose resources we need for our project.

This relationship between project managers and functional managers is the key to the matrix organisation's success. Projects within functional groups pose no such organisational problem, but projects that span functional groups are often arduous to manage because project managers have no functional authority and must therefore work through the functional managers to assign, monitor and coordinate project work. Functional silos, and the turf wars they enable, devastate projects. They can waste resources, kill productivity and jeopardise the achievement of project goals. They can also extract a human toll, causing conflict, frustration, stress and disillusionment by forcing team members to fight unwinnable battles with each other.

Dealing with diverse functions is a challenge for every project manager. Alan Patching, who was project director for Australia's impressive Olympic Stadium in Sydney, sums-up the situation thus: *"There's a function-versus-function silo mentality that can be part and parcel of corporate life. Company politics may actually encourage people to keep their thinking within their own discipline. We've all experienced the manager who tells people not to talk to people from other departments. On a project team, that's disastrous."* This successful working across functions is not simply a question of the project manager's people skills. It also requires serious senior management support, especially sponsor support.

The project-oriented or project-centric structure is most appropriate for organisations that mostly work on large, long-term projects. Rather than find projects within and among functional departments, functional departments exist within the project. To survive our organisation structure, the following are important practices:

- Recognise that some structures favour projects while others favour operations. In the functional or function-driven organisation, the project manager has little or no authority, and in the project-oriented organisation, the project manager has almost total authority.
- Whatever the organisational structure, communication is a very important project success factor. Most organisations facilitate up-down communication, but our project communication requirements are mostly lateral, not vertical. Communicating across functional boundaries takes more effort, but is nevertheless essential if stakeholders are to be kept informed and team members' efforts properly coordinated.
- Multiple projects compete for limited resources (eg, skilled people and funding), particularly in the function-driven organisation where project resources might be diverted for ongoing operations or new projects. In this situation project priorities need to be clearly established,

agree to and adhered to.

- Should an organisation be project-oriented, projects are priority and the reason for the organisation's existence. Everyone has a unifying purpose.
- When the chain of command runs counter to the organisation structure, clashes over authority can bring project progress to a standstill. In such cases, us project managers may have to rely on the authority of our own expertise. And hopefully we have an influential sponsor.

The matrix structure highlights the need for cooperation and the potential for conflict between the project manager and functional managers over resource needs. Where management by projects is practised, the Programme Manager (who might alternatively be titled Director of Projects, Manager of Project Managers, Manager of Projects, or Projects Manager) may report directly to the Chief Executive. This usually puts the balance of power in favour of project work and helps ensure that the same project priorities permeate the entire organisation.

Project management will only work properly in the matrix organisation where there exists a clear and unifying strategic vision to which all functional managers unselfishly subscribe. Otherwise, functional projects will always assume priority access to functional resources. Matrix organisations are needed when many projects span functional boundaries. Perhaps the main problem with the matrix organisation is that every person has two bosses for every project they work on, which is contrary to Peter Drucker's first principle of sound organisation structure: *"Thou shalt have only one boss."*

As I mentioned earlier, the projectised or project-oriented organisation is best suited to (although not limited to) companies that work mostly on large, long-term projects. Functional departments then exist within the project. If project work exceeds business-as-usual work, then arguably functional departments exist primarily to resource projects. The company is organised around the project. When the project is complete the company may be redundant – not an uncommon practice in our local building industry, although of course liquidation doesn't avoid liability.

The decision to introduce management by projects is a difficult one because it will require senior management to give up some of its power and functional managers to be partially or wholly subordinated to project management.

In determining the need to introduce management by projects, an organisation might ask the following questions:

- Are our projects mostly large?
- Are our projects mostly complex?
- Are our projects mostly risky?
- Are our projects occasions when many separate parts must be integrated?
- Does top management feel the need to have central control of all projects and a single point of responsibility for each project?
- Are tight schedules, budgetary constraints and other controls foreseen?
- Will quick responses to changing conditions be necessary?

- Will our projects significantly disrupt the present organisational structure?
- Will more than one functional group need to deal with our clients?
- Are many other projects to be conducted concurrently with this one?
- Is there likely to be significant conflict among functional managers concerning project priorities and resourcing?
- Is the organisation committed to firm project completion dates?
- Are there major parts of projects that must be contracted out?

If the answer to several of these questions is “yes”, then management by projects must be seriously considered. However, formalised management by projects or enterprise project management is not the solution to every organisation’s challenges. Recognise too that fully projectised organisations are constantly created, modified, and destroyed.

In summary, business projects are mostly carried out within organisations, and a thorough understanding of their organisational context is therefore necessary for project success. And we shouldn’t confuse project management with the mastery of the framework, specialised tools and techniques. The most effective project managers also understand the organisation in which they work. They are politicians. They have mastered the art of influence. More on that important but underestimated skill later.

Project Management Rewards

Managing projects is possibly not for those whose motivational needs focus on job security, routine, stability, regulation and predictability. The position of project management is by its nature both tenuous and demanding. Nevertheless, there are compensations. Those of us who find project management rewarding may give the following reasons:

- **We enjoy challenge.** Projects are often challenging if only in terms of their stakeholders’ wants and needs, leading edge technology, tight budgets and schedules, and one’s minimal authority to direct those sometimes reluctant resources. And a successful project is ‘rewarded’ with even more challenging project work.
- **We enjoy teamwork.** Projects typically require the close collaboration of individual experts operating in a highly interactive and stimulating environment.
- **We enjoy innovation.** Projects are often pioneering endeavours, without precedence, in which creativity and innovation are essential.
- **We enjoy autonomy.** Project management’s wide-ranging nature normally provides for considerable freedom of action within certain limits.
- **We enjoy learning.** Projects offer excellent opportunities for cross-functional learning and self-development.
- **We enjoy achievement.** Projects are often high profile endeavours and normally result in recognisable and useful products or services which provide for a sense of accomplishment not always evident in business-as-usual work. While the project is temporary, project deliverables are often permanent or semi-permanent testaments to our tenacity and ability. It’s a chance to make a difference and sometimes win a bonus. Managing a project that is going well is a great

feeling – a morale booster to all involved.

Project Management Challenges

As I mentioned above, projects are not without their challenges. Those frequently encountered are:

- **Clients.** Essential to any project, clients notoriously mis-state what they want, and what they want isn't always what they need. Furthermore, clients change their minds during the project. *There is a need to define the project as clearly as possible with the client in the first instance and also agree how to manage those inevitable changes as needs continue to evolve.*
- **Risk.** A project is unique, and as such, risk and uncertainty may be significant, especially at the start of the project. Also, sometimes there is a tendency not to disclose risk or to understate risk to protect the project status and team members' morale. *There is a need to honestly, objectively, comprehensively and continuously identify and analyse risk, and pre-empt problems throughout the project.*
- **Communications.** Successful projects demand excellent communications to which of course there are countless barriers – inattention, stress, emotion, distance, time zones, assumptions, jumping to conclusions, language differences and so on. *There is a need to make communication easy, encouraging the timely and clear transmission of both good and bad news continuously.*
- **Constraints.** Projects usually have tough financial and resource constraints, and deadline urgency. Such constraints are not necessarily frustrating providing they are realistic. However, on occasions project estimates are deliberately held down to ensure a project's selection. Later, funding to meet true project costs may not be readily available. *There is a need to check the feasibility of working within proposed constraints, and make recommendations, preferably in writing for their relaxation where appropriate, before the project is planned in detail.*
- **Scope Creep.** The continual addition of unplanned work ('creeping eloquence') to the project has been likened to death by a thousand cuts. The accumulated consequence of such uncontrolled changes can be project failure. *There is a need to clarify what's within and outside scope. Scope also needs to be reviewed and revised where appropriate over the project lifecycle, and all scope changes need to be formally authorised.*
- **Other Work.** Projects often interact with other projects and always interact with the organisation's ongoing business. Projects are often superimposed on other work, which can result in untenable workloads. Also, projects can divert key resources from normal operations to the detriment of business-as-usual. *Workloads need to be planned, prioritised and monitored. Project people may need to be temporarily relieved of other responsibilities. Careful resource scheduling is essential. Some work may need to be outsourced or postponed.*
- **Contractors.** A project often involves consultants, suppliers, contractors and subcontractors. Thus, on occasions, project success seems largely beyond the project manager's immediate influence. *Contractors need to be carefully selected, their tasks unambiguously defined, and their performance regularly monitored. We must ensure too that they can manage their subcontractors.*
- **Conflicts.** Projects can be adversarial endeavours. Project managers may find themselves in the middle of conflicts – faced with opposing views from technical experts who each are convinced they are right. *The most effective project managers relish such conflict. They see it as an opportunity to facilitate constructive debate and achieve a successful outcome that is good for the project,*

good for the organisation, and probably good for the project manager's career prospects should the issue be satisfactorily resolved.

- **Change.** Projects change and cause change. People are usually apprehensive about change and some may not be very cooperative, especially if they don't understand the need or feel the project could disadvantage them. *Project managers need to be change managers. Timely communication and involvement are essential.*
- **Estimates.** Whenever the CEO meets us in the lift and asks for our estimate, we respond with an optimistic, 'seat-of-the-pants' guess, which the CEO then adopts as a firm target. *Estimates evolve. They have a range of possible results, and become more accurate as planning proceeds. Avoid premature estimates and commitments, indicate likely accuracy of our estimates, and document estimating assumptions.*
- **Related Tasks.** A project consists of interdependent tasks where delays to some tasks can put the entire project schedule in jeopardy. Task delays are invariably passed on, whereas early finishes seldom are. *Those tasks whose delay might cause a delay to the project completion date (ie, critical tasks) need to be identified and carefully monitored from a scheduling perspective.*
- **Stakeholders.** Projects often have a variety of stakeholders with conflicting needs. *The project manager must keep disparate stakeholders moving in harmony. Better to be proactive than reactive in our stakeholder liaison.*
- **Inert Governance.** The project sponsor and steering committee don't always provide appropriate higher-level help and guidance, sometimes because they don't understand their roles and responsibilities. *The sponsor's and steering committee's terms of reference need to be clearly stated. Effective governance is critical for project success. Sponsors also need training. They need to have the resources available to support us, and the right level of influence in the business.*
- **User Requirements.** When we get to project execution, we discover that the so-called user requirements are a compromise, infamous for their complexity, incompleteness and constant modification. *Accept that user needs evolve. Keep in touch. Signoff may be essential to discourage never-ending changes. Yet we should avoid premature design freezes.*
- **Team Members.** Projects often mean teamwork. The project manager's challenge is to elicit high performance from a multidisciplinary team that the project manager may not have selected. Teams may not have worked together before, may have other agendas, be geographically spread, are also responsible to another boss and are not therefore readily or exclusively available, and the project manager cannot necessarily reward them commensurately with their performance. Also, the team often grows and membership changes. *Project managers need to be effective leaders and people managers. Teambuilding is an important responsibility. Achieving commitment is essential.*
- **Temporary.** Projects are often short-term and expedient exercises. Also, they can be halted prematurely when for example their resources might be better used elsewhere. A project manager therefore is a perishable position. Project team members also work themselves out of a job. This can cause concern particularly when the project nears completion and no other work is in the offing. *Redundancy, a certain eventuality in all project work, must be planned for.*
- **Penalties.** Projects often have high rewards for success, but the penalties for failure can also be high. Project managers are seen to be as good as their last project! *There is a need to learn from*

both successes and failures to ensure improvement. A post-implementation evaluation is essential.

- **External Factors.** Project success is often determined by factors beyond our immediate control – politics, economics, social and cultural considerations, technology, legislation, environmental influences, and competitors' activities. *External factors need to be monitored and their affect on the project estimated. The business case needs on-going reassessment. Benefits may be jeopardised or new benefits identified as external realities clarify.*

The project management framework described in this book has evolved to meet these and other challenges. However, the business world continues to evolve, which ensures that there will always be new challenges to successful project management, many of which will be outside our control – political, economic, social, technological, legal and environmental – all more significant with 'globalisation' – a term that frightens us older workers, since we translate it as losing Kiwi jobs overseas. A more palatable expression might be 'free-market economy' perhaps.

Project Success

The framework is designed to help ensure that:

- schedules are met
- budgets are not overspent
- project benefits are realised
- clients and other stakeholders are satisfied.

The last of these four factors is ultimately the most important measure of project success. There is little value in completing a project on time and within budget if the resultant deliverable doesn't satisfy the client. Thus, from the PMI® viewpoint the key rationale for project management is stakeholder satisfaction. And such satisfaction will depend largely on the project benefits, as contained in the business case that justified the investment, being achieved. Such benefits are realised during the deliverable (product or service) lifecycle and may be immediate, longer-term, direct, indirect, tangible and intangible. Figure 2.9 shows some different benefit profiles. Not all benefits can be readily quantified and no benefits are certain – they have degrees of likelihood. This is especially true of government initiatives where the economic, social and environmental consequences of new policies may not be fully evident for several years, and even then difficult to discern in a changing environment. Thus, while completed 'on time' and 'within budget' are important, the real interest lies in the answer to the question *"What benefits will this project bring to the organisation?"*

A supportive cultural ambience is also an important pre-requisite for project success. And not forgetting that all projects are at the mercy of the marketplace and those other external influences mentioned above such as political, economic, competitor, legal, social and environment factors, and particularly technology, which often sets the pace. Such factors can of course occasionally conspire to ensure our success, but best we don't depend on such luck.

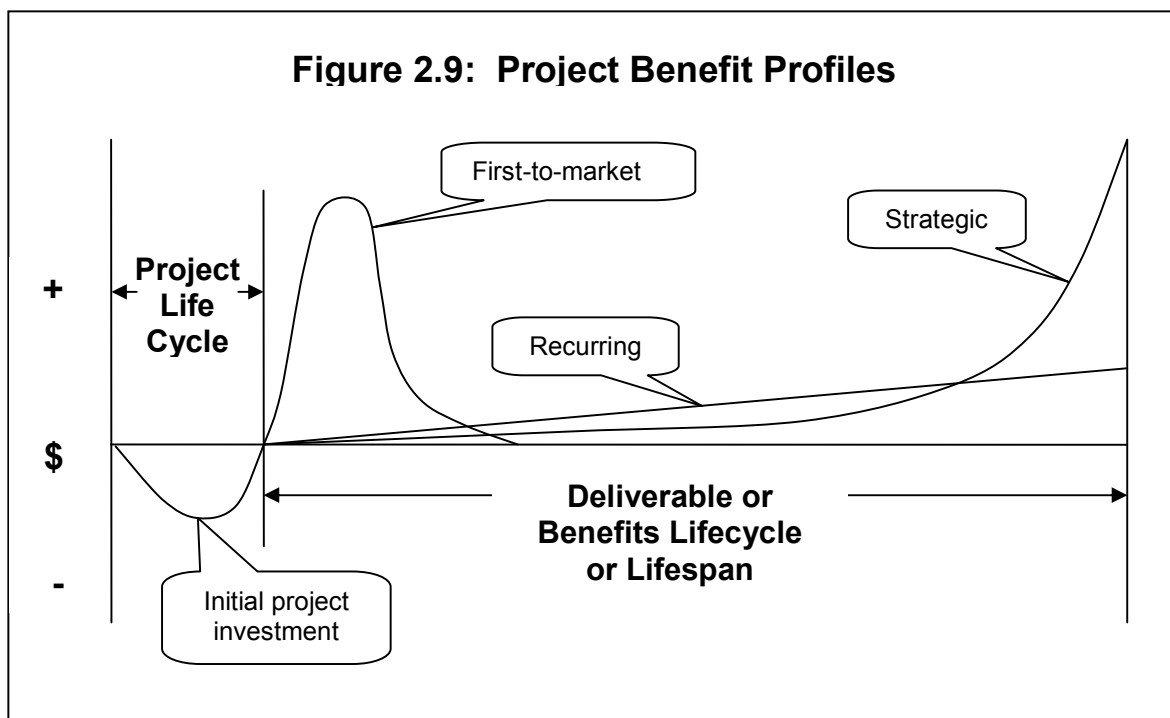
Project success may be perceived differently by different stakeholders:

- A project that has overrun cost and schedule, but provides the users with the benefits they expected, may be judged a success by the users.
- A project team member, who gains valuable experience and develops new skills, may consider

the project a success, regardless of project cost overruns.

- A supplier, who has profitably provided material for the project, may consider the project a success.
- A contractor whose tender to do work on the project was not selected, may consider the project a failure.
- A contractor, whose tender was accepted but made no profit, may also consider the project a failure.

A client, whose project was properly completed on time and on budget, may at first regard the project as a success, but later regard it as a failure when the new product doesn't realise promised benefits.



Project Failure

Projects can fail for all sorts of reasons. Failure might be caused by late completion, over-expenditure, non-performing deliverables etc. The cost of failed projects might be direct (eg, wasted materials, overtime, additional human resources etc) and indirect (eg, missed opportunities, sullied reputations, loss of competitive advantage, loss of employee goodwill, motivation and morale, and loss of customers). While overspent might mean failure, it's foolish to pad estimates to help ensure projects are completed within budget, since this encourages irresponsible spending, acceptance of waste and low productivity, and denies other projects their required resourcing or ensures their non-selection. Conversely, under-estimating costs to secure project approval, soon undermines the success of the under-estimated project when true costs become evident. And, unless the project is cancelled, resources might need to be redirected from other projects whose viability is also then at risk.

Adherence to the framework will not guarantee project success, but ignoring it could be fatal. Most project pitfalls can be avoided if the framework is followed. Perhaps the greatest challenge is Information Technology projects, which have never before been so complex to understand, difficult to justify, and risky to manage. At present most overrun their budgets and schedules. Incidentally, some would argue that there are no IT projects per se, only business projects. My research shows that common reasons (in random order) why all types of projects can fail or under-perform include:

- poor scope definition
- excessive scope change
- client uncertainty
- unsuitable contractors
- changing priorities
- inadequately defined tasks
- unclear responsibilities
- personality conflicts
- lack of executive support
- failure to delegate
- poor teamwork
- inaccurate estimates
- inadequate control
- lack of end-user training
- lack of authority
- unfamiliar technology
- lack of commitment
- excessive complexity
- unrealistic expectations
- poor time management
- inert sponsorship
- PMO bureaucracy
- unproven methodology
- insufficient user involvement
- risks not recognised
- unreliable suppliers
- unreasonable assumptions
- poor communication
- managerial ego
- stakeholder conflict
- organisational politics
- inadequate planning
- insufficient funds
- resource shortfalls
- requirements misinterpreted
- lack of historical data
- hidden agendas
- no independent audits
- inexperienced project manager
- inadequate legal input
- unclear specifications
- poor estimating
- benefits unmanaged
- benefits poorly articulated

As I mentioned, failure is particularly common for Information Technology (IT) projects – especially the big ones – which usually blow their budgets and timeframes, or fail to deliver the desired results. There are no common themes that explain the problems encountered, although the above list is pretty comprehensive. It's probably fair to accept that whatever is learned from past mistakes, large IT projects involve enough innovation, complexity and variables for there always to be something new to go wrong! We can safely be assured that whatever hardware we intend to use is already redundant!

Figure 2.10: Boardroom Language

Here's how to translate project management speak into business parlance our no-nonsense executives will more likely understand – and appreciate.	
Project Speak	Executive Equivalent
Gantt chart	Bar chart, or timeline
Dependency	Task sequence, or order of tasks
Resource	Be specific: people, money, plant, or supplies
Delays	Reveal the problem in conjunction with the solution
Project risk	Possible problem
Objectives	Be specific, such as 'cashflow'
Work breakdown structure	List of tasks
Labour hours	People
Critical path	Priority tasks
Earned value performance	Project status
Cost performance index	On or off budget? By how much?
Release plan	Where, how and when the project will be delivered
Deployment	Install, rollout, commission, publish

Terminology

Like most disciplines, project management uses a considerable amount of jargon. This is fine and invaluable for communicating with those in the profession, but most people are not fully familiar with the lingo. They may not understand the verbiage, leading to a breakdown in communication. Worse, it can alienate stakeholders and create distrust. Some light-hearted guidance is given at Figure 2.10 and a glossary of technical terms is at Appendix One – several taken from Wideman's widely-recognised, commonsense and comprehensive glossary at www.pmforum.org/library/glossary/PMG-A00.htm.

Unfortunately, there is no universal agreement about project management terminology. For example, see also www.projectnet.co.uk/gloss/. The same term may have a somewhat different meaning in the United Kingdom than in the United States. Locally we subscribe mostly to United States' terms.

Appendix Two lists common project management acronyms of which there seem to be a rapidly growing number –often to the detriment of clear communication.

Summary

A project is a temporary endeavour undertaken to create a unique product, service, or result. Alternatively, a project is a discrete piece of work carried out by a temporary team to deliver beneficial change. Some fundamental points about projects and project management are:

- Project management is no longer the bastion of engineering and IT professionals. We all find ourselves in a project role at some stage.
- Projects come in many shapes and sizes. They vary from individual to team pursuits, which may be undertaken within an organisation or undertaken by or for another organisation.
- Most business projects result from business planning and all projects should help to realise business goals.
- The project management challenge is to produce a deliverable within defined and prioritised parameters of scope, time, cost and quality, and to the satisfaction of the client. Client satisfaction depends largely on the attainment of the benefits that justified the project's selection.
- Project management is the use of leadership, organising and controlling techniques to achieve the project goal. Project managers must be able to both lead and manage.
- Project management occurs within a variety of organisation structures including the matrix structure, which aims to integrate projects and functions.
- Within organisations, departments support the status quo – in fact, they are the status quo. Projects, however, foster change and thus disturb the status quo. Also, departments aren't cross-functional, whereas projects often are.
- Project managers are the relatively new class of manager filling the niche formerly held by middle managers. The latter have pretty much gone as organisations flatten and restructure.
- The project manager is responsible for leading project stakeholders who are those actively involved in the project, or whose interests may be affected by the project. Key project stakeholders include the client, customers, sponsor, project manager and those functional managers who provide the resources for the project.
- Projects have a large numbers of challenges, many of which arise from the uncertainty inherent in such pioneering endeavours. Thus, project risk management is very important.
- Project management is both an art and a science. Once the technical skills have been mastered it's the people that make the real difference.
- The project management office is evolving from an advisory and consultative role to an organisation-wide information dissemination, evaluation, and project manager holding role.

The next chapter identifies and discusses some commonly identified principles and current best practices of project management. Of course what's 'best' can be fleeting.



Chapter Three

PROJECT MANAGEMENT PRINCIPLES



Project managers think about managing their projects in any number of ways, often depending on their education and experience, personality and the role they play in their projects. Many professional project managers believe that there is a right or 'best practice' way to manage projects, regardless of the type of project or the role and experience of the project manager. They recognise a number of principles, often hard-learned that help ensure project success.

Usually a principle expresses a general or fundamental truth – a basic concept. If observed, project management principles should help ensure project success, although there is no guarantee. However, we ignore principles at our peril. Also, a principle should be self-evident to experienced project managers and provide a basis for establishing effective processes, procedures and practices that can be proven through research, analysis and practical testing. Based on these criteria, the following frequently identified key project management principles, mentioned in no particular order, applied together should provide a foundation for successful project management:

1. Do the right project.
2. Have competent sponsorship.
3. Select the right project manager.
4. Use a proven framework.
5. Manage the client relationship.
6. Ensure effective communication.
7. Be reasonable and realistic.
8. Manage stakeholders' expectations.
9. Clearly define the project.
10. Properly plan the work and work the plan.
11. Recognise uncertainty and manage risk.
12. Maintain quality.
13. Lead the team.
14. Cover all knowledge areas.
15. Learn from each project.

Do the right project

Organisational success hinges on the right projects being done properly. The other principles of project management discussed in this chapter will not help unless we undertake the right project in the first instance. This is rightly our first principle.

Two guidelines to help ensure that we proceed with the right project are:

- Selecting and defining the right project involves more than choosing from a list of proposals. It requires clarity about the business reason for the project, determination to include all work in a scope description, and a strategic view involving a realistic assessment of risks and rewards.
- Ensuring the project delivers the benefits expected requires both benefits management, practices that are integral to managing the project, and benefits realisation, practices that involve business-as-usual in gathering the benefits from the project. Some good practices for managing benefits are:
 - line and project management work together
 - assign clear responsibilities for benefits delivery
 - involve stakeholders in planning benefits delivery
 - incorporate benefits delivery into the project plan
 - develop benefit measures for every project
 - integrate risk management with benefits management
 - communicate the benefits delivery plan to all stakeholders.

Selecting the right project and managing the benefits is central to any organisation that seriously wishes to achieve value from project investments. Organisations need to pay special attention to project selection criteria before initiating new projects to ensure the assessment is as impartial and as accurate as possible. A basic selection template is needed to help boost objective content and keep the subjective and political input to a minimum.

Have competent sponsorship

While we might have the right project, the success or failure of the project often hinges on how well the project sponsor – the person who funds the project and ensures desired benefits are achieved – relates to the project, the project manager, and other stakeholders. The sponsor's involvement will vary with the project manager's experience, and the scale and status of the project.

However, managers who are assigned as project sponsors often have little if any experience understanding their roles and responsibilities during the project lifecycle. Frequent comment from project managers attending project management courses that I deliver is that their sponsors are either inert or become too involved in project planning and execution, to the point of almost reversing roles with the project manager. It's hard to achieve successful projects in these circumstances.

Sponsors have a difficult dual responsibility that could seem to be conflicting in nature. On the one hand they are the top advocates of the project and its deliverables, while on the other hand they are custodians of the business interest, thereby ensuring that the business receives the benefits agreed to in the business case.

A sponsor initiates, funds, and supports the project from its inception through to its completion and on throughout the project deliverable lifecycle. Seems like a lot of work and whoever takes on

sponsorship will be affected by the outcomes. Failure of the project or even horror stories about the project, leave a bad taste and can have various negative side effects on sponsors. So why sponsor a project? The reasons might include:

- **Practical reasons** – with effective sponsorship the project can be completed successfully within the proposed schedule, scope and resource parameters. In turn, successful projects empower project sponsors to further success.
- **Profile reasons** – the value of a successful project is worth the investment and the risk of failure. And exciting projects often have high visibility. Media opportunities abound.
- **Personal reasons** – the project is a professional challenge and an opportunity to improve one's skills in dealing with people and organisations.
- **Stakeholder reasons** – the other project stakeholders want a specific person as the sponsor. They believe this person will have sufficient power and influence, knowledge of the business, time and leadership skills to do the job properly.

Individuals appointed to the sponsor role need to be sold on the features, advantages, and benefits that result from excellence in sponsorship. Also it is naïve to expect excellent sponsorship practices to happen by accident or wishful thinking. Sponsors need training, experience and practise. Excellent project sponsorship should be regarded as an organisational project management core competency.

Select the right project manager

Once the project is selected, the real problem is choosing the right project manager to run it. The project manager is the key to a successful project. Choosing the wrong person can quickly turn what could have been a profitable endeavour into an economic and political disaster.

Previously, project managers were chosen from those who had the most seniority or who had been successful technicians. Fifty years ago it was almost universally accepted that project managers had to be engineers. Also, it was rare that a project manager had any prior formal project management training; all project management training was done on the job. This type of experience and training is not all bad; working on a project is probably the best classroom there is. But there is more to running a project successfully than just understanding how to schedule work or prepare and distribute progress reports, and of course most projects now aren't engineering and construction endeavours.

Organisations are now being more selective about who they choose to put in the project management pool, and they are beginning to ensure that these people have the requisite attitude, skills, training, and experience.

So, what skills are needed to manage a project? The basic skills are scoping, scheduling, and estimating. Added to these core skills are managing risk and uncertainty, managing quality, communicating, managing ourselves, and collaborating with others, including suppliers of goods and services and everyone else who works on or is affected by the project. More specifically, the modern project manager needs to be proficient at:

- leading, influencing, motivating, and teambuilding
- analysing, organising, planning, problem solving and decision making
- communicating, negotiating, and managing relationships

- scoping, estimating, and scheduling tasks and resources
- managing risks, opportunities, benefits, issues, change and conflict.

The above list recognises the particular need for proficiency in people management, to which we might also add the need for commercial astuteness, business acumen, diplomatic and political awareness, and of course delivery and client focus. It's a growing list that recognises the increasing complexity of our projects and importance of project management to organisational success. Being a superb communicator might top the list. Simply being available or willing is no longer sufficient.

Use a proven framework

The idea that all it takes to be successful is technical knowledge, some scheduling software, and lots of intensive hard work usually leads to poor communications, unnecessary stress, avoidable rework, unnecessary conflicts and a greater chance of failure. As fun and exciting as it might be, managing in an ad hoc, seat-of-the-pants, shoot-from-the-hip manner is not the most effective way when it comes to managing projects. That is because projects often cannot be planned and carried out entirely from the top of our head. When we experience being overwhelmed, or our results are not as good as they could have been, it may be time for managing in a more disciplined and thoughtful way.

Not managing projects the right way leads to unnecessary work, costs, delays, unsatisfied customers and hostile relationships. Think about the times that we or our customers have been impacted by late delivery of project outputs or by having to do unnecessary rework or by having ourselves and others affected by conflict, confusion and chaos that could have been avoided by better project planning and control. Think about the time, effort and money that could have been saved. Think about the relations that were disrupted, in some cases irreparably so. Think about the high profile projects in which poor project management practices, lack of planning, unsatisfactory communication or control resulted in huge costs and delivery delays.

Managing projects well increases the probability of success and leads to better results, lower costs, less effort, shorter timeframes, better relationships and the ability to continuously improve performance across multiple projects. At the same time, it is necessary to not over manage. Too much of anything is counter productive. In managing projects, the right balance between discipline and flexibility is best.

Most projects are managed by people who are recruited because they have a combination of being available, have subject matter expertise, and are natural coordinators and/or good communicators. Many of these incidental or accidental project managers do a great job despite having had little or no training in project management. That is because much of project management is sound commonsense and because good project managers and performers combine acts of heroism, the acceptance of delays and other shortfalls, good leadership and management skills, and the ability to adapt well in moment-to-moment project performance realities.

Imagine how much better we might be with a more solid foundation afforded by a proven framework or methodology. If you're still reading this book, I'm probably preaching to the converted.

The larger, more critical and more complex the project, the greater is the need for formality. Formality or structure implies discipline in the form of documented processes, written agreements, coherent plans, regular formal communication, clear accountability, formal testing and acceptance criteria, clear roles and responsibilities, and formal decision making. And, if in doubt – it's usually better to over-control at least at the start.

Manage the client relationship

At face value, the phrase ‘managing the client relationship’ sounds somewhat manipulative or deceptive. Actually, managing the client relationship is one of the basics of effective project management, and centres on managing client expectations. The best way to do this is to put ourselves in the client’s shoes. After exercising this empathy, we will see that the following practices are fundamental to successfully managing the client relationship:

- **Treat the client as the boss.** Possibly one of the most potentially irritating buzzwords to clients is the trendy notion of ‘partnership’. In a high-level context, the work partnership may indicate a joint interest between the client and the project manager. The client is paying the project manager to do a job, and if the project manager does the job well, both parties benefit. However, when all is said and done, clients are always in charge; they have the final say. Clients make it possible for project managers to pay bills. Too often, it is easy to lose sight of this fact, especially if the client has an easygoing demeanour.
- **Visit the client.** Frequently in this technologically advanced environment, we forsake face-to-face contact for the more expeditious electronic medium. We communicate with a client via fax, email and voice mail, and send documents by 30 minute courier. When the client’s schedule permits, site visits are invaluable. Respect the client’s time and arrange to meet on their turf. A visit to the client may be costly time-wise, but worth the investment to maintain good relations.
- **Admit mistakes.** One simple rule of thumb when mistakes occur – be honest with the client without making excuses or becoming defensive. We all make mistakes, even our clients and their bosses. The project manager that readily admits a mistake, as well as provides a plan to correct the error, will have a more favourable client relationship in the long run. Avoid of course making the same mistake over and over. Mistakes are learning opportunities.
- **Take the client’s phone calls.** With the convenience of voice mail, it has become all too easy to avoid time-consuming phone calls when we are busy. Nothing irritates a client more than having a project manager dodge phone calls. Project managers should promptly take all client calls or have a message in place that informs the client when the call will be returned. Many times, the client is calling in reference to a question or a request from someone higher up their organisation. Keeping a client waiting not only damages the relationship between the client and the project manager, but potentially between the client and their boss too.
- **Ask for feedback.** Given the opportunity, most clients would love to provide feedback to the project manager on project performance. Done properly, the project manager should welcome this feedback as a way to improve the relationship. Rather than allowing issues to build-up, encourage clients to schedule constructive feedback sessions on a regular basis.
- **Establish a climate of mutual respect.** Finally, there is one additional component that must be present in order to build a lasting relationship with a client – the ability of the client to respect the job and position of the project manager. Clients who are less than honest or who demand the impossible are only setting themselves up for disappointing relationships. When both client and project manager bring shared respect and understanding to the table, a mutually beneficial relationship will result.

Ensure effective communication

Effective communication is a critical, if not the most critical, contributor to project success. Communication is vital to every aspect of project management and performance. It has been estimated that a project manager's job is 90 percent communications.

Effective communication is candid, clear, at the right level of detail, timely, relevant to the interests and needs of the participants, involves the right people, and ensures mutual understanding of content and conclusion. Much communication is informal and oral; however, written communications are also needed to document issues, understandings and action plans. Meetings should be well planned and their results accurately documented. A larger project might have its own website on which to post the charter, plan, work assignments, progress etc.

Communication is integral to project initiation when project champions describe their ideas and opportunities to those who authorise, influence and execute projects and create the dialogue needed to reach consensus regarding each project's definition.

Communication continues to be critical during project planning when both the outcome and the way the project will be carried out to produce the outcome are negotiated and described in detail. Communication during project initiation and planning focuses on why a project should be done, what impact it will have, who will be involved, who will have what authority, responsibility and accountability, how they will be organised, what procedures they will follow, how much the project will cost, how long it will take, and how much risk and uncertainty are involved.

During the project as it is being executed and controlled and as the plan is being kept updated, data is to be collected, summarised and distributed to keep people abreast of project progress (or lack thereof) at the appropriate level of detail. Timely, accurate, clear and candid information is the key requirement for project and functional managers to control and direct project work. Senior managers and clients need information to set strategic direction and to make decisions to continue or end the project. Changes, risks, opportunities and issues should be identified, evaluated, prioritised, scheduled and addressed.

When the project closes, communication again plays a key role to make sure that the outcome is acceptable. This is perhaps the most important communication in the project. Communication at closing is also to make sure that responsibility for the outcome is properly transferred, and that lessons learned are identified and made known throughout the organisation.

Each project needs a consciously developed planned communication plan with clearly defined expectations, roles and responsibilities. Written documentation should be kept to a minimum but there is a need for critical information to be in writing. A project may primarily use email and informal documents or use any degree of formal documentation supported by standard forms and templates. The amount of documentation and its form depends on the nature of the project and its environment.

An audit trail needs to be maintained.

Be reasonable and realistic

Saying "no" or at least "not now" can be a major prerequisite for effective project management. People are often overwhelmed by an unlimited flow of work. Saying "no" to clients and senior managers is not easy. However, there are many ways to creatively say no. Some are: "Your deadline is

understandable. Let's see how we can work together to get it done. It would be great to be able to deliver for that price and to that schedule. Let's see what features we can eliminate to make it possible." These expressions tend to be more successful than *"Are you joking?"* or *"There's no way that will happen."*

Our career may receive a severe blow if our project comes in late or over budget, regardless of what benefits are eventually realised as a result of the project investment. By the time the benefits identified in the business case have been achieved, our fate has already been determined, mainly against estimates of duration and cost, which sometimes we had no hand in setting!

Thus, in the interests of our own success and credibility, we might check such imposed estimates and their rationale, and as appropriate make recommendations for their relaxation to give us a fighting chance of success, or at least document our concerns. No one will recall at the end of the project our earlier verbal remonstrations about insufficient budget, resources or time.

This situation is particularly true for the private contractor who has secured the work with the lowest quote and requires their project manager to also create and preserve a margin that was foregone in the keenness to buy the work.

For the project manager, perceived success is often variance – the gap between estimate and actual. True project management success is perhaps the gap between what was estimated and what was reasonably possible.

Some sound practices for effective estimating and scheduling are to:

1. base the estimates on past experience and expert knowledge as much as possible
2. recognise that estimates are not actual results and therefore have uncertainty
3. base schedules on a logical flow or sequence of work
4. base estimates and schedules on realistic expectations regarding the availability of resources
5. do not expect the plan to be right the first time; refine and optimise it by playing what-if assessments that identify different sequences and use of resources.

Instead of addressing the risk of the estimating process, project managers sometimes qualify their estimate numbers with caveats like, *"You can't hold me to do this"* and, *"These are very rough numbers"* which the decision-makers totally ignore. Then the project manager gives the estimate, which our executives instantly carve in stone. Any future deviation from this is a gross violation of a solemn personal promise.

In the estimating process, there are also pressures for unjustified optimism in the estimates. We want everybody to be happy about us and enthusiastic about the project at the beginning. We don't want people to react to our initial estimates with thoughts like, *"It won't take that long! This clown has no idea about how to manage a project."*

The project manager is caught in a narrow vice when asked to provide estimates, particularly when the scope of the project is still vague and the availability of resources is largely unknown. We make this situation a little bit better for everyone with a methodical estimating process that specifically addresses the risk of the estimate in each of the four phases in the project lifecycle. An important benefit of addressing risk is that we often can use the decision-makers' desire for more precise numbers as a way to engage them in our scope definition process.

In order to have both a realistic plan and one that makes the best use of resources, the plan is optimised to come to the right combination of deliverable quality, cost and time with the client and/or sponsor deciding on priorities among these basic constraints. This means that the outcome, target date, budget, available resources, tools and techniques and the project environment may all be adjusted to find a realistic and optimum plan to achieve the goal. Remember, pushing back and justifying why we may have to say no is part of the process to manage expectations and ensure project success. In short, be realistic, not idealistic. Make it good, not perfect.

The 'kiss' principle is also particularly relevant to realistic and reasonable project management. Wherever practicable, we should shun unneeded complexity and keep our project plans simple. Project plans are a basis for change and some change is inevitable as reality is revealed during project execution. Complex plans often go wrong. They are difficult to communicate, difficult to understand, difficult to control, and difficult to change without causing further complexity and misunderstandings. Simple plans are usually less risky, easier to communicate, easier to understand, easier to control, and easier to change. Some ideas that might help keep stuff simple are:

- Always ask *"What's the straightforward thing to do here?"*
- Be able to describe the solution to a project issue in 25 words or less.
- Be able to explain proposed actions in 30 seconds. This is referred to by US marketing people as the 'elevator pitch'.
- Write it down and immediately ask *"What might go wrong?"* and *"Is there a more simple answer?"*
- Explain it to a 10 year old and get feedback to confirm their understanding.
- If the answer sounds complicated, go back and rethink it.
- Ask simple, revealing questions such as, *"Who? Why? What? Where? How? When?"*

Manage stakeholders' expectations

Project success is often defined as the degree to which the project satisfies stakeholders' expectations. Effective communication and realistic planning combined with risk, issue, and change control methods are the key means to manage expectations.

People are our single most critical element and the most complex to manage. In project management jargon, the people who work on, manage, sponsor or are otherwise affected or interested are called stakeholders. They come together to form teams and teams perform projects. Stakeholders are individuals or organisations who are actively involved in the project or whose interest may be affected, either positively or negatively, as a result of the project.

Relationships are complex. In projects they are even more complex because people work only temporarily together in the project team. Relationships are very complex when project team members are from different organisations and different cultures and are sometimes geographically spread. Also, contractors and members of functional groups and departments who work on projects frequently have many responsibilities outside of our project.

Effective teams have members with the right set of skills and experience required for the project. Team member skills and experience have a direct impact on how long a project will take, how much it will cost and on the quality of the deliverable. Effective teams value and promote clear roles, responsibilities and accountability. Uncertainty, unnecessary rework, and things 'falling through the

cracks' are all reduced when roles and responsibilities are clearly stated and agreed upon.

We manage people through 'contracts'. The contract need not be legally binding but should be in writing. It can be anything from an email message to a formal role and responsibility document, depending on the project's need. The contract states what is to be delivered, by when, for how much, by whom, and under what conditions. Accountability means that when commitments are made, status regarding them is reported with accuracy and regularity – and nothing is hidden. Blaming is replaced with objective analysis of the impact and cause of problems. This promotes continuous learning and improvement of performance and continuous updating of the plan to help manage expectations.

People have personalities. Some people may work better with certain other people, depending on personality and other personal factors, including age, gender, and culture. We need to use personal differences as a means to create a project team that looks at the project from as many perspectives as possible, to overcome the weaknesses of some with the strengths of others. Interpersonal conflict can be managed through effective kick-off meetings, teambuilding and open communication throughout the project.

Clearly define the project

The importance of having a clear goal seems obvious, yet many projects do not have a clear goal and the resultant fuzziness can be devastating.

For any project to be successful we need to understand what the project is supposed to achieve. Suppose our boss asks us to organise a campaign to get the employees to donate blood. Is the purpose to get as much blood as possible donated to the local hospital? Or, is it to raise the profile of the company in the local community? Deciding what the real purpose is will help us determine how to go about planning and managing the project.

We also need to clearly define the scope of the project. Is the organisation of transport to take staff to the hospital within the scope of the project? Or, should staff make their own way there? Deciding which activities are within the scope or out of scope has a big impact on the amount of work which needs to be performed during the project.

And a clear understanding of who are the stakeholders is also crucial if we are going to enlist their support and understand what each person expects to be delivered from the project. Once we've defined the scope, we will need to get the stakeholders to review this and agree to it as well as agreeing who should be on the list of stakeholders.

To achieve the desired results from the project, we must define what things (or products) are to be delivered by the end of the project. If our project is an advertising campaign for a new chocolate, then one of the deliverables might be the artwork for a newspaper advert. So, we need to decide what tangible things are to be delivered and document in enough detail what these things are. At the end of the day, someone will end up doing the work to produce this deliverable, so it needs to be clearly and unambiguously described.

Once we have defined the deliverables, we will need to have the key stakeholders review the work and get them to agree that this accurately and unambiguously reflects what they expect to be delivered from the project. Once they have agreed, we can begin to plan the project. Not defining the project, scope and deliverables in enough detail or clarity is a common reason why projects go wrong.

Properly plan the work and work the plan

Project planning is the most central and critical part of project management. Planning is where communication, collaboration, and teambuilding come together with the management of risk and uncertainty. Planning sets the stage for the project. It results in a project plan that should be used as the baseline for directing and controlling the project. Planning is needed to support project decision making, including the decision to initiate the project.

Planning is sometimes by-passed or 'expedited' to get to the 'real work'. This is a big mistake. Planning is real work. In a televised competition in the USA some years back a project team built a real house that met stringent building regulations in just three hours, coordinating equipment and multiple suppliers. The only way this was possible was to do several months of planning beforehand to minimise chance and make sure everything went perfectly. Of course, over-planning and expecting the plan to be rigidly followed can be as unhelpful as not planning. Put bluntly, without a plan we will not succeed or if we do, it will have been by luck or chance and is not repeatable.

The plan includes the definition of the result, the way the project will be performed and the estimated cost, time and resources needed for the project. There may be several iterations of planning. This is done to give project stakeholders increasingly accurate estimates and schedules as more becomes known about the project and its requirements. Iteratively refining the plan is the means to address the all too common problem of having to live with a definitive estimate that is made before any in-depth definition of requirements, staffing and other drivers of the estimate. Refining the project plan at key points in the project's life is also a step towards realism and a key element in managing expectations.

A common reason for overly optimistic plans is the assumption that resources will be available when in fact they may not be. Planning requires realistic assessment as to whether staff and other resources will be available at the right time. We must not assume that people who are working on multiple tasks while they are assigned to our project will be available 100% of their time. Make it a part of our planning to assess the likelihood of resources being what, when and where we need them.

Planning doesn't really end until the project is over. The plan is supposed to be an accurate reflection of the work to be done. It is used as a baseline for determining if expectations are being met and for identifying action needed to keep the project on track. As the project progresses, the project manager should evaluate and refine the plan so that it continues to accurately reflect the project.

Perhaps the most essential planning tool is the work breakdown structure (WBS) since every other project planning document is based on it. From the WBS, we generate our schedule, our budget, our quality plan, our risk plan, and our procurement plan. Therefore, we need to create the WBS very carefully, and ensure we have not missed any work. One key to preparing a successful WBS is to make it a team effort. This also ensures that the team has a sound understanding of what they are doing and why, and the process develops commitment.

Once our project is underway and we have an agreed plan, we will need to constantly monitor the actual progress of the project against the planned progress. To do this, we will need to get reports of progress from the project team members who are actually doing the work. We will need to record any variance between the actual and planned cost, schedule and scope performance. We will need to report any variance to our sponsor and other key stakeholders and take corrective actions if deviations get too large. There are lots of ways in which we can adjust the plan in order to get the project back on track (rearrange the order of tasks, assign tasks in parallel, add more staff to the project or reduce the

scope if the variation is very large).

All projects require the project manager to constantly juggle four things: cost, quality, scope and schedule. We could add benefits and risk. If we increase one of these, then at least one of the other parameters will inevitably need to be changed as well. So, for a project that is running behind schedule to recover so it can be delivered to its original schedule, the budget might be increased by employing more staff (although this may not achieve the desired result of reducing the time left to complete the project), or the scope will need to be reduced. It is the juggling of these elements that typically causes a project manager to tear hair out in frustration!

Recognise uncertainty and manage risk

We can be very precise. Precision is about the degree of detail presented in the estimate. For example, plans may promise delivery on an exact day and hour. But, precision doesn't mean accuracy. Accuracy is the degree to which an estimate is correct. Variance is the measure of accuracy. It is the difference between the actual outcome and the original planned outcome of a project. The longer and more complex the project and the more uncertain project stakeholders are about the project requirements, the greater the potential variance.

While everyone agrees that uncertainty is pretty certain, there are some people who seem averse to address it in their plans. There are some who think that talking about things that can go wrong is being negative and defeatist. Some seem to believe that discussing negative possibilities will bring them on. Still others just don't have the time. Some project plans are padded by adding extra time and money across the project. This pretty much guarantees that the project will take longer and cost more than it needs to. Parkinson's Law says that the amount of time and effort it takes to do something will expand to fill the time and resources available. Further, since sponsors and clients know that the plan is padded they will force time and cost reductions and force unrealistic plans. On the other hand, some Critical Chain Project Management advocates say that typically a plan is in excess of 50% optimistic. This belief probably guarantees late and over budget results.

Effective project planning must address risk and uncertainty. Planners identify contingency plans and reserves to protect the sponsors and others from false expectations and unacceptable losses. Risk is a significant factor in the decision to perform a project. This means including an assessment of the possible events that could disrupt the project, analysing the probability of their occurrence and their estimated impact and building appropriate responses into the plan. Because projects are dynamic, risk must be managed continuously across the project's life. A continuously updated register of the things that often go wrong is a very good starting point for managing risk.

Effective project managers know that by identifying and analysing risk possibilities they can eliminate or reduce the likelihood of negative events, minimise their impacts and more effectively manage expectations. We can also maximise the probability and impact of positive events. We identify contingency reserves so we can manage our projects to most-likely as opposed to best or worst case scenarios while being able to take risk into consideration.

Every project plan should clearly indicate the degree of possible variance (the difference between expectations and actual results). This degree of variance or tolerance can be derived from an informed guess or based on a statistical probability using sophisticated risk management tools.

Maintain quality

Quality is essential to our project because we need quality planning and quality work to meet the

project's purpose and deliver the project's goal. In plain English, quality is what makes something good. In business, what is good is what adds value to the business. Deming, the creator of total quality management (TQM), defined quality as 'conformance to specifications.' Deming, operating in a production manufacturing environment, figured if specifications were already correct, that the finished item, if made as specified, would satisfy the client.

However, in project management, there is a fundamental connection from value or benefits, to purpose, to goal, to detailed requirements, to specifications, and from specifications to a working product and a successful project. Quality is what holds them all together. Because each project is unique, we must define quality differently for each project. And we must make sure that the definition of quality is the client's, not just our own. When we have a picture and a set of requirements, we know what is really of value to the client. If the requirements are right, we can build a good specification. Then, when we deliver a product or service conforming to that specification, we deliver quality. Following that formula is a recipe for success. The widely-recognised five steps to project quality are:

- **Defining quality**, where we write down what qualities add value to the product or service we are creating, and how to measure them. Clear acceptance criteria are needed.
- **Planning for quality**, where we add steps to the project process for controlling, assuring, and delivering quality.
- **Quality control** is the process of reviewing work processes and deliverables to ensure quality and gather information for process improvement. Status reports are essential.
- **Quality assurance** is the process for testing the product to ensure quality, and also the process of auditing results to ensure proper quality procedures. Includes project plan reviews.
- **Delivering quality** is the process of assuring client satisfaction.

Quality is that which adds value. Each beneficial feature of a deliverable is an element of quality that we need to describe, measure and test. By beneficial features, we mean more than the features that the user will see. We also mean technical features that ensure reliability and reduced support costs.

Lead the team

Leading and supporting a good team is essential to project success. The first step is recruit a team of the right people. In the concept phase we develop a clear picture of what we will be doing. This allows us to define the areas of expertise we need on the project. This expertise may be employees, contractors, suppliers or consultants. As a project manager it is our job to meld these diverse people into a coherent and cooperative team. It's essential that we model good communications, trust and respect, and enable the team to succeed. A leader removes obstacles to their team's success. Thus, servant leadership rather than heroic leadership is the preferred style. Chapter 12 explores.

Cover all knowledge areas

The PMBOK® currently identifies nine knowledge areas. These provide a very comprehensive analysis of project management and a valuable guide to successful project management. We can't afford to neglect any of these areas if our project is to be successful. The areas are described briefly below:

- **Project Integration Management.** Every facet of a project needs attention, and integration management is the effort made to ensure that everything comes together. This means that scope, cost, control, and so on are defined and set up to function properly. Furthermore, the

product being produced is inseparable from the project management itself, as managing the job is done to ensure that the product will be what was intended at completion.

- **Scope Management.** Scope essentially defines what is to be done, and not done, in managing the project. In effect, it defines how large the job is. One cause of considerable frustration for project managers is frequent scope changes. These need to be properly authorised and managed.
- **Time Management.** This seems an unfortunate choice of terms. To many people, the term 'time management' is about managing one's personal time. But the PMBOK defines it as developing the project schedule. Because of the importance of project deadlines, scheduling receives a lot of attention, and scheduling software sells in large quantities.
- **Cost Management.** As the term implies, controlling project costs is very important. The difficulty with cost and schedule is that work effort, duration and resources for project work are estimated, and these estimates may not be very good – especially for poorly defined work. The net result is that there can be large variances from the estimates when actual work is performed. Organisations and project managers should recognise that all processes vary, that the variation can be reduced but never eliminated, and that there will be normal tolerances on all estimates that must be accepted.
- **Quality Management.** It has been customary to talk about the triple constraints in projects, but in doing so, the quality and scope components are combined. While they are related, they are not identical, so we should discuss the quadruple constraints. In fact, I'm personally inclined to think in terms of six constraints or parameters – this sextuple being scope, time, cost, quality, benefits and risks, all of which impact each other. In any event, quality is often the forgotten constraint. When we place people under pressure to finish a project in record time, quality sometimes suffers. Quality management is aimed at preventing this outcome.
- **Human Resource Management.** Although it should be obvious to any thinking person, projects are people, and project managers should have a high level of people skills before they are allowed to manage projects. In addition, every project must have the right people assigned to do the various tasks, and most of the time project managers don't get to choose their team members. Nevertheless, this knowledge area deals with all aspects of managing human resources, including staffing, evaluating, motivating and so on.
- **Communications Management.** The first thing to be clear about is that PMBOK communications management does not deal with the processes of communicating, but with determining the various stakeholders who need information, at what intervals, and in what formats. Information is vital to the health of a project, and this process is sometimes overlooked in the planning stage of a project.
- **Risk Management.** It's sometimes argued that project management is really all about managing risks. This seems a pretty good observation. Due to the need to estimate task durations, resource requirements, and costs, a project faces many risks. And this doesn't even begin to take into account all of the things that can go wrong and wreck our project – weather, accidents, contract disputes, and so on. It is often said that we must either manage risks or they will manage us.
- **Procurement Management.** Most projects make use of materials and services that must be

procured from outside sources. Note that the common term people use is purchasing or contract management, but not absolutely everything is purchased or contracted out. Some things are hired or built. Clearly, regardless of how they are acquired, a project team can't meet deadlines if they don't have the necessary resources in the right quantities, where and when they need them.

Learn from each project

Organisations learn in much the same way people do. Project management includes a learning process. Each project performed is an experience for learning how to perform the next project more effectively. We must evaluate performance periodically throughout the project and upon each project's completion and publish the results to inform others of pitfalls and best practices. These lessons need to be readily available, but applied with discretion given that no two projects are precisely the same.

Formal project evaluation should be a fundamental activity in any project. There are enormous potential benefits to be gained from this relatively minor effort. One approach is to organise a 'lessons learned' meeting and circulate a list of discussion questions as the agenda before the meeting. Typical questions might include:

1. What did we do right?
2. What things mattered most on this project?
3. What things surprised us on this project that weren't in our plan?
4. What things did we anticipate, but didn't happen?
5. Where could we improve?
6. What mistakes did we avoid?
7. What should we try out on our next project?
8. What did we learn by doing this project?
9. What would we do differently next time?
10. What skills do we need that were missing on this project?

It's useful to maintain a lessons learned log in which stakeholders, especially the project team, are encouraged to document their learning as the project proceeds, rather than attempt to identify lessons only at project completion. Nevertheless, we should complete our project by developing a 'lessons learned' document in the form of a report. This post-implementation report needs wide distribution so that others can benefit. It may be held by our PMO and readily available to all future project players.

Conclusion

While conscientiously adhering to these principles will not guarantee success, they are ignored at our peril. Their relative importance may vary with each project. Also, readers may wish to add to this list of principles as a result of their personal project management experiences. We usually have to discover for ourselves.



Chapter Four

STAKEHOLDER MANAGEMENT



“The art of painting a picture with 200 people holding the paintbrush!”

Why do it?

Stakeholder management is critical to the success of every project in every organisation, and the ultimate purpose of every project is to satisfy stakeholders. The potential benefits of stakeholder management are:

- We can use the opinions of the most powerful stakeholders to shape our projects at an early stage. Not only does this make it more likely that they will support us, their input can also improve the quality of our projects.
- Gaining support from powerful stakeholders can also help us to win more resources, which makes it more likely that our projects will be successful.
- By communicating with stakeholders early and frequently, we can ensure that they fully understand what we are doing and understand the benefits of our projects, which mean they can support us actively when necessary.
- We can anticipate what people’s reaction to our projects will be and build into our plans actions that will win their support or, if need be, overcome their resistance.

As we become more successful in our project management careers, the actions we take and the projects we run are likely to affect more and more people. The more people we affect, the more likely it is that our actions will impact people who have power and influence over our projects. These people could be strong supporters of our work – or they could block it. Stakeholder management is an important discipline that successful project managers use to win support from others. It helps us ensure that our projects succeed where other projects may fail.

Who are they?

A stakeholder is any individual or organisation whose interests are affected by our project, or who believe their interests may be affected. Such interests might be financial or non-financial, positive or negative, and may be affected during our project or on or after its completion. For example, our non-financial interests may be negatively affected by noise during the construction of our neighbour’s house, while our financial interests may be positively affected by the increased value of our own property due to this local development.

Accepting that the purpose of every project is to satisfy stakeholders and they are thus the ultimate judges of project success, it makes sense for us to understand who they are and the nature of their stake in our project. Ourselves as project managers, our clients, customers, sponsors, employees, contractors, subcontractors and suppliers are all clearly part of the stakeholder family. Our reputation, chances of promotion, and possibly our job are all at stake. And the same goes for our project team members. However, in a larger sense anyone who participates in the project or is

impacted by its deliverable(s) is a stakeholder. This list may include:

- direct users (ie, customers) of the project deliverable
- those elsewhere in our organisation whose day-to-day jobs will be affected by our project
- managers and team members of other projects that depend on our project to provide either certain outputs or to make resources available by a specific date or share the same resources used by our project
- people outside our organisation who have a particular view about what our organisation or our project is trying to achieve and who may adversely affect our organisation's image if they feel that our actions are inappropriate
- previous buyers of our goods and services who may react positively or negatively to news about our project
- consultants, suppliers and distributors who may benefit from our project or who may be fearful that the changes implied by our project will result in a loss of business for them.

Stakeholders' expectations vary. For example, our company may be expanding and we decide to run a job advertisement:

- Personally we wish to run an ad to communicate why the job on offer is attractive.
- Our boss wants an ad that presents a positive image of the company.
- Our employees want an ad that shows our company is one that people wish to work for.

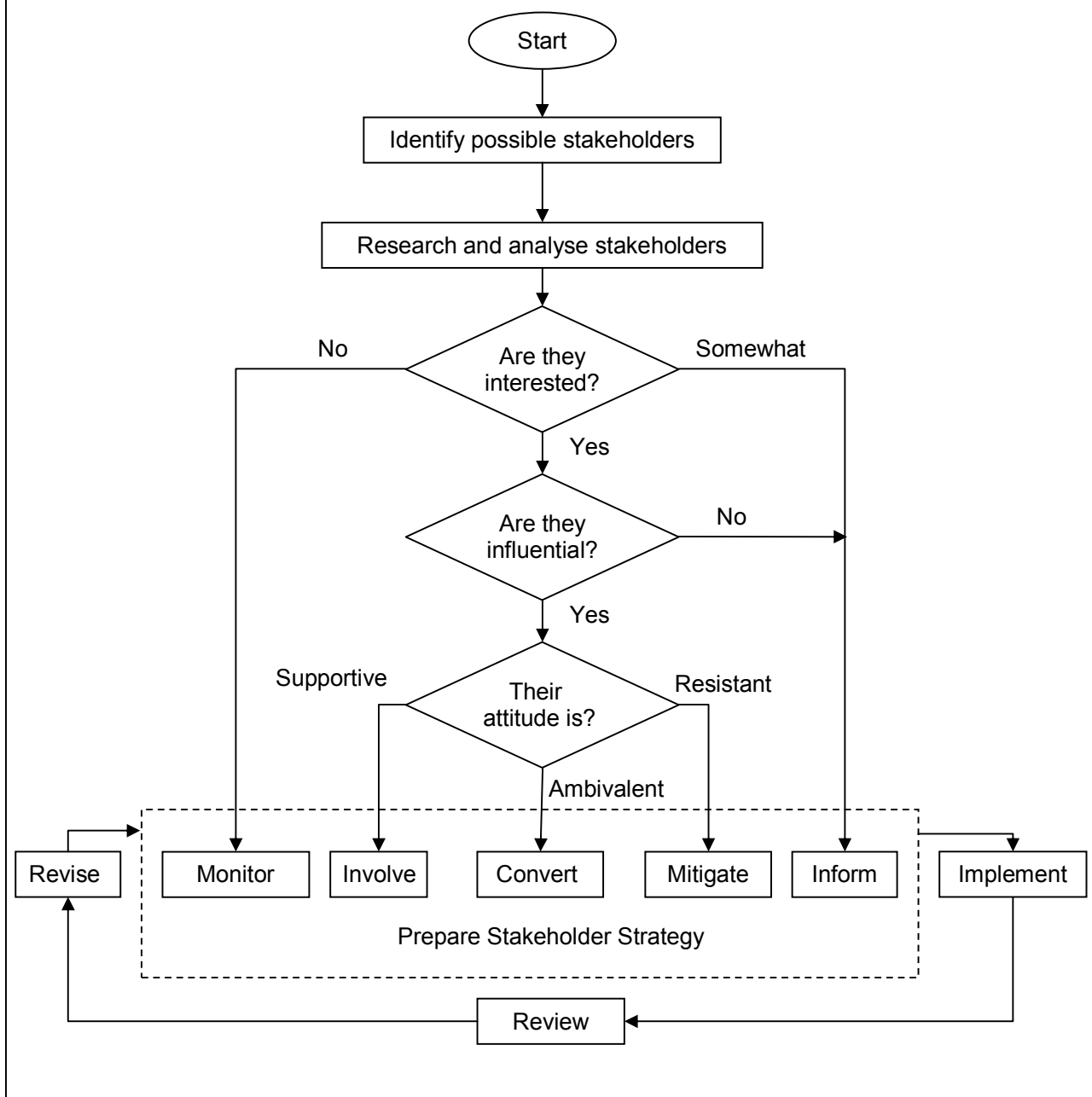
Thus, even for a simple project, stakeholders' expectations may vary considerably. In this instance we should aim to produce an ad that meets all the win conditions identified by the abovementioned stakeholders. Incidentally, ambiguous specifications are often the consequent of unresolved stakeholder conflict.

Project Manager's Role

As project managers, one of our most important and often most time-consuming roles is to establish and maintain contact with our project's stakeholders – striving to clearly understand and manage their expectations, and trying not to surprise them by properly briefing them, listening to them, keeping them 'on board', and perhaps influencing and even converting them. We need to acknowledge and actively monitor the concerns of all legitimate stakeholders. This process is termed stakeholder management, the main steps for which are shown in the flowchart at Figure 4.1.

Project managers have a paradoxical relationship with stakeholders. The project manager is supposed to satisfy the stakeholders. Stakeholders make the big decisions on the project; they set the scope-cost-schedule-quality equilibrium. At the same time, though, the project manager must lead this disparate group. In fact my first book on project management was titled 'Orchestrating Your Project', which recognised that just as the symphony conductor directs the orchestra to bring out the music, we project managers must strive to keep all project players moving in harmony.

Figure 4.1: Stakeholder Management Process



Identifying Stakeholders

The first step in our model is to identify who our stakeholders are. Probably the most effective technique to do this is simply team brainstorming, which requires we write down all the people and organisations that might have a stake in the project, who have influence or power over it, or have an interest in its success or failure. A possible list of stakeholders (internal and external) for a large community project is at Figure 4.2. This list will then need to be refined. We must involve others in this process and produce our own list relevant to our project. Ask stakeholders who they think the stakeholders are and what their interest/expectations might be. What would make them satisfied?

Figure 4.2: Stakeholder List

chief executive senior executives colleagues project team members customers client/owner our family/whanau rate payers/residents tax payers shareholders community leaders mayor/councillors auditors social groups politicians local government tourists project director advisors performing organisation landowners media interest groups public community/iwi	alliance partners suppliers vendors tenderers funders sponsors government departments ministers of the crown employees contractors steering committee end-users bankers/investors professional associations trade associations line managers consumers competitors regulatory authorities peers co-workers contractors sub-contractors consultants sponsors
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While the list at Figure 4.2 includes both individuals and organisations, ultimately we must involve and communicate with individual people. We need to identify these appropriate contacts or leaders within each relevant stakeholder group or organisation.

Analysing Stakeholders

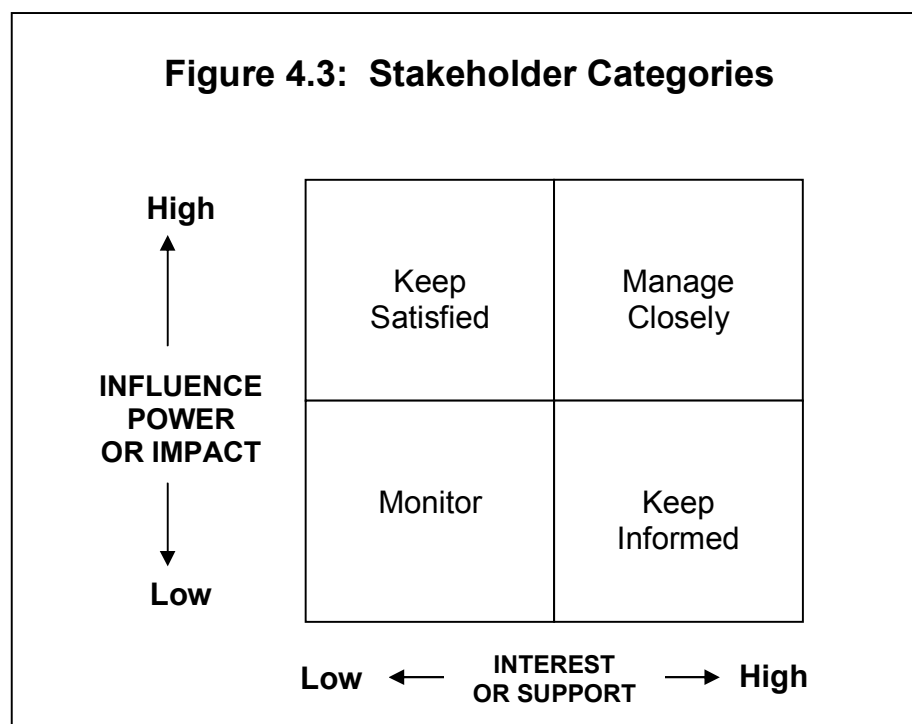
We may have a long list of those people and organisations that are affected by, or can affect, our project. Some of these will have the power either to block or advance our project. Some may be interested in our project and others may not care about it. To analyse our stakeholder list, it is therefore useful to consider them in terms of their power or influence and interest in our project, and classify them accordingly, using the simple chart at Figure 4.3.

For example, our project sponsor should have high influence and high interest in our project. Our sponsor can have major influence on the continuing allocation of resources and on the acceptance of our project and its deliverables. Our family may also have high interest, but are unlikely to have much direct influence over our project. The stakeholder category shows us how we might manage them:

- **High Influence, High Interest.** We must fully and proactively engage with these people whose support is critical to the success of our project, and focus the majority of our

relationship-building and communication efforts here in order to satisfy their expectations. We might be also able to enlist their support as project champions and advocates. Our project sponsor must be in this group if the project is to succeed.

- **High Influence, Low Interest.** These are people we need to keep happy, informed and proactively involved according to their circumstances. And if we can generate some positive interest in our project for them, their influence could be very helpful. However, they could be difficult to establish productive relationships with. They may behave passively most of the time. We certainly don't need to upset them. Their interest might be encouraged.
- **Low Influence, High Interest.** We should keep these stakeholders adequately informed about issues that interest them, and keep in contact with them to ensure that no major issues are arising from their perspective. These people can often be very helpful with the detail of our project. They can be valuable allies in important decisions.
- **Low Influence, Low Interest.** We should monitor this category of stakeholders, but take care not to bore them with excessive information. We should not invest too much effort in them, unless their influence or interest increases. Our project website may satisfy their needs.



The category for a stakeholder can change as our project progresses. Also, new stakeholders will be identified during the project lifecycle. The process is continuous.

Another common stakeholder analysis grid puts stakeholders into four quadrants based on their level of trust and agreement. The stakeholder quadrants are labelled comrades, allies, opponents and adversaries. Also, stakeholders might be categorised as internal and external, or primary and secondary. And the gap between influence and support needs analysis.

Understanding Key Stakeholders

We need to find out about our key stakeholders. In particular, we need to know about their attitude towards our project, how best to engage them, and how best to communicate with them. Some questions that can help us understand our stakeholders are:

- What specific financial or emotional interest, stake, claim or right do they have, or believe they have, in our project? Is their interest positive, negative or neutral? Why are they interested?
- What are their main motivational drivers – political, advancement, image, religious, recognition, environmental, status, cultural, economic, security, achievement, challenge, self-development etc?
- What information do they want or need from us? Do they have hidden agendas?
- What opportunities or threats do they pose for our project? How might our project affect them for better or worse?
- Could they seriously hinder or block our project? What resources do they possess?
- What obligations or responsibilities do we have towards them?
- What are their strengths and weaknesses, and likely strategies to achieve their objectives?
- How do they prefer to receive information from us – visits, meetings, telephone calls, website, or email?
- What has been their attitude and behaviour towards previous projects of this nature?
- Who do they really listen to? Who influences their opinions, and should these people also be regarded as stakeholders?
- If they are opposed to the project, what might win them over?
- How will we know if we are successfully managing them?
- If they are unlikely to be converted, how will we manage their opposition?

Perhaps the best way to answer these questions is to talk with stakeholders directly. People are often open about their views, and asking them for their opinions may help quickly build successful relationships with them. It's important that we are proactive in establishing contact. Should we wait until they react, they may not be so amenable to discussion and negotiation. They may resent that they were not consulted at project conception, when their opinions were likely to have more influence on our project plan, deliverable(s) and benefits. Surprise is a short-sighted strategy.

It's not usually practicable or even desirable, to get all stakeholders in a room together. Nevertheless, a series of meetings might be appropriate with the various stakeholder groups or representatives. And as we solicit input from our stakeholders, we will almost certainly elicit conflicting priorities. For example, 'time to market' is critical to one stakeholder; 'functionality' to another. Thus, it may be useful to facilitate a discussion about priorities and help develop strategies that satisfy everyone to some extent. Usually stakeholders are quite cooperative and creative when we really listen to them and conscientiously involve them in the process. Perhaps the fundamental answer is to treat key stakeholders as partners, to engage them in planning, problem solving and decision making, and to keep communications with them open and honest at all times.

Information about stakeholders can be gathered from a wide variety of sources – project team members, key managers, business publications, websites, professional associations, consumers and users, trade associations, local press, corporate reports, public meetings, interviews, surveys, questionnaires, government sources, and even paid informants who might spy on protest groups!

Primary and Secondary Stakeholders

Stakeholders, often classified in a variety of ways including ‘internal’ and ‘external’, might also be classified as:

- **primary stakeholders** who have a contractual or legal obligation to our project
- **secondary stakeholders** who usually have no formal contractual relationship, but have, or believe they have, a stake in our project or its outcome.

The key authority and responsibility of the primary stakeholders, such as our sponsor, steering committee and PMO include:

- providing leadership to our project team
- allocating resources for use in the design, development and construction (production) of our project deliverable(s)
- building and maintaining relationships with all stakeholders
- managing the decision context in the development and execution of strategies to commit project resources
- by example, set our project’s cultural ambience, which emphasises the best of people in providing high-quality professional resources to the good of our project
- maintain ongoing and effective oversight of project progress in meeting the cost, schedule, and technical performance objectives, and where necessary reallocating and rescheduling resources as needed to keep our project on track
- periodically checking the efficiency and effectiveness of our project team in doing the job for which they were hired.

Secondary stakeholders can be difficult to manage. Some of the more obvious characteristics of these stakeholders include:

- there may be no limits to where they can go and with whom they can talk to influence our project
- their interests may be real, or perceived to be real, as our project and its results may infringe on their territory
- their membership on our project team is ad hoc – they stay so long as it makes sense to them in gaining some advantages or objectives involving our project
- they may team up with other stakeholders temporarily to pursue their common interest for or against our project
- the power they exercise can take many forms such as political influence, legal actions such as court injunctions, emotional appeal, media support, social pressure, local community action, petitions, parades, demonstrations, strikes, and even scare tactics

- they have a choice of whether or not to accept responsibility for their strategies and actions.

Worksheets to help with secondary stakeholder analysis and management are at Figure 4.4. These templates should be amended as necessary.

Informing Stakeholders

We need to determine with each stakeholder their reporting needs:

- **what information** – cost, percent complete, resource use, risks, etc
- **what level of detail** – summary task, task, subtask, sub-subtask
- **what format** – narrative, template, graph
- **how often** – weekly, fortnightly, monthly, quarterly, milestones, exception etc.

The PMO (project management office) can play a major role in gathering, collating and disseminating information about stakeholders and to stakeholders.

Given the likely volume and complexity of information, it is useful if we project managers construct a communications plan. See Figure 4.5. It's a written strategy, which forms part of our project plan, for getting the right information to the right people at the right time. One of the biggest contributors to project failure is lack of communication or poor communication with stakeholders. We need to use plans, agreements, meetings, and status reports to communicate with stakeholders and management.

Stakeholders have different information requirements. If everyone has all the information needed, schedule slippages and cost overruns do not come as a surprise. In fact, because good communication means that stakeholders are more aware of project status, they can often help us pre-empt problems and get things back on track. Guidelines for developing our communication plan include:

- **Use short, concise status reports.** Obese reports are overwhelming for busy stakeholders. Determine what should go into a status report by asking the target audience what they care about. Different stakeholders may want status on separate factors in the project. Try to keep the report to one page, but not at the expense of clarity.
- **Have an escalation procedure.** These are guidelines for elevating a problem to higher management – probably our project sponsor in the first instance.
- **Make the information timely.** The CEO may need reports less frequently than our sponsor and immediate manager. Check this with them.
- **Make sure regular status meetings are included in the plan.** Many stakeholders want to have status meetings only as needed, meaning only when there is a big problem. By including the scheduled meetings in the communication plan, customers and higher level managers are agreeing to be more informed about the project, which helps to avoid unpleasant surprises.
- **Be consistent with other projects.** As much as possible, our project documentation should have the same look and content as other projects in our organisation. If there are PMO standards, we should use them. If not, find good examples from other projects that have the same stakeholders.

Figure 4.4: Stakeholder Management Worksheets

External or Secondary Stakeholders – Analysis Worksheet

Stakeholder	Nature of their Stake	Attitude to Project	Level of Influence		Category/Priority	Other Details
			On Project	By Project		
1.	<div>Suppliers, contractors, consultants, media, press, community, interest groups, government, customers, competitors</div>	<div>Interest/need/role/expectations</div>	<div>adversary resistor neutral supporter champion</div>			
2.						
3.						

support
control
consult
mitigate
involve
inform
partner
convert
cultivate
neutralise
monitor

External or Secondary Stakeholders – Management Plan

Stakeholder Groups	Contact Details	Nature of Stake	Category/Priority	Preferred Comm Method	Management Strategy & Messages	Primary Stakeholder Responsible	Current Relationship Status	Remarks
1.				<div>email meetings telephone</div>				
2.								

Figure 4.5: Communications Plan – Internal or Primary Stakeholders

Role or Appointment	Contact Details			Reporting Requirements			Meetings			Remarks
	Name	Phone	Email	Type	To	Frequency	Type	Date	Venue	
Client/Owner	legal commitment to project			progress status highlight earned value variance trend exception audit site visit		daily weekly fortnightly monthly				
Customer/User										
Sponsor										
Steering Committee										
Project Manager	employees contractors consultants suppliers/ vendors									
Project Team										
PMO										
Programme Manager										
Line Managers										

- **Use multiple channels of communication.** Websites, newsletters, and project bulletin boards can all be used to post information of interest to all stakeholders. These communication mediums complement status and progress reports because they can provide wider scope of information. Finally, realise what we say in the written report may come across differently when we present it verbally, so we might consciously include face-to-face meetings in our communication plan.

Projects don't fail from over communication. However, they can suffer when subject to unorganised, unfocused blasts of project data. Thoughtful, conscious, coherent and clear communication is essential to maintaining a unified direction and happy stakeholders. Such communication must be planned.

Stakeholder Strategies

As mentioned earlier, stakeholders might be supportive or adversarial. Both types need to be managed in order to:

- strengthen our project by gaining continuing support
- avoid or reduce the adverse impact of stakeholders on our project.

Assessing their strengths and weaknesses is essential to determining their likely strategies. Their success will be largely influenced by their access to resources, their public and political support, the quality of their strategies, and dedication of the stakeholder members. Once we understand stakeholders' strengths and likely strategies, we can predict their behaviour, which for example might include:

- direct engagement of the type we might expect from anti-whaling activists
- boycott by consumers of a new product due to social, economic or environmental factors
- prohibiting access in order to protect local historical or scarce resources (eg, native trees)
- stopping work until safety and other issues have been satisfactorily resolved
- political support for local development work.

Managing Angry Stakeholders

Sometimes stakeholders may be angry about our project. Managing such stakeholders may benefit from the following commonsense practices:

1. Listen actively:

- Use eye contact.
- Take notes.
- Show interest with facial expressions.
- Make sounds of interest and understanding.

2. Apologise:

- If it is our fault.
- If it is someone else's fault.
- If it is our organisation's fault.
- If it is no one's fault.
- Even if it is their fault.

3. Sympathise:

- That they are upset.
- That they have been inconvenienced.
- That a complaint has been necessary.
- That they are disappointed.
- That their expectations have not been met.
- That they have been placed in an awkward position as a result.

4. Ask questions:

- To confirm details.
- To gain any additional information.
- To gain time to think.
- To show them we care.

5. Analyse and decide:

- Immediate action.
- Further investigation.
- Time and costs.
- Their preferences.
- Agreeable date and time.

6. Action:

- Do exactly what we have promised.
- Delay now could be fatal.
- Decide how might this issue be prevented or managed in the future?
- Is the stakeholder satisfied?

7. If the stakeholder is the project client (owner):

- Don't make excuses.
- Don't respond in anger.
- Don't make promises we can't keep.
- Don't tell them they're wrong.
- Don't say "*Calm down*"
- Don't say "*To put it simply*" or "*What you really mean is*" or anything else that sounds patronising.

Stakeholder Resistance

Projects can cause considerable change. Resistance to change can take many forms within a project, and it is important to identify resistance to change as soon as possible and take appropriate action to resolve it. Common examples of stakeholder reluctance, resistance or obstruction include:

- continually asking for more detail before attempting to make a decision
- disseminating so much detailed information to the project team that no one has a chance of analysing or understanding it and making a decision based upon it
- assuring others that the project is important, yet not allocating any real time to it

- communicating the need for realistic solutions, but dismissing every proposal as unrealistic and impractical
- disregarding serious project issues with responses such as *"I'm not surprised,"* effectively deflating the importance of the message
- 'head in the sand' attitude towards bad news, often demonstrated by the display of aggression or defensiveness towards the messenger
- staying silent, implying that consent has not been given – thus bringing the whole decision-making process within a project to a halt by a stakeholder unwilling to provide positive affirmation
- refusing to commit staff and resources to the project, either because they are too busy or because the project is not seen as having a higher priority than their current business-as-usual assignments.

Dealing with Resistance

Stakeholder resistance is almost always characterised by the lack of effective communication, such as stalling tactics and information overload. The best practice to overcome such resistance is to employ the principles of effective communication. In particular, it is important to understand both verbal and non-verbal signals from the stakeholder. The following three-step approach is one method of identifying and clarifying stakeholder resistance:

1. Identify concern.

- Where the messages received from verbal communication conflict with non-verbal communication signals (body language, tone, posture, etc.), trust the non-verbal signals. Trust what we see, not what we hear, and we will gain a better understanding of the root causes prompting the resistance.
- Watch out for frequent repetition or tell-tale phrases.
- Trust our instincts.

2. Confront stakeholder.

Inform the stakeholder of the problem, using words and phrases they understand. Do not use jargon, acronyms, catch-phrases or buzz-words – these can all lead to a failure to effectively communicate. If the issue isn't addressed it won't be resolved.

3. Hear their reaction.

Once the stakeholder has understood the consequences of their resistance, it is crucial to stop talking and let the stakeholder respond in detail. We should not be tempted to fill the silence with our own voice – that will let the stakeholder off the hook and will not help us resolve the fundamental problem.

Stakeholder Communication

We need open communication with our stakeholders to keep them apprised of progress and problems in an honest way. This will give them incentive to play straight with us in return. All our attempts to influence stakeholders must of course be legal and ethical. This applies to both negative and positive stakeholders for three main reasons:

- We can win over some negative stakeholders and get them on our side.

- In our next project our positive and negative stakeholders may change roles.
- Our open communication will affect the respect with which others regard us. We have shown probity, professionalism, transparency, integrity and honesty.

Our stakeholder communication plan as a minimum needs to include:

- prioritised list of stakeholders
- frequency of communication
- preferred method of communicating
- content and purpose of communication
- who is responsible for communicating
- who is responsible for maintaining the relationship.

Internal stakeholders are usually influenced by organisational politics. It is therefore important that we understand this subject and use politics to our advantage. It's unlikely we will be able to avoid it or change it. It's part of our organisation's culture.

Internal Politics

Political behaviour exists in all organisations because of the presence of hierarchical structures, power, influence, and human beings. Indeed, whenever we do something to affect other people's perceptions of us and our work, or to gain power and credibility in our organisation, we act politically. Politics is all-pervasive, working constantly beneath the surface. As project managers we need to learn to play this game. There are essentially two types of politics:

- **The dirty politics** is the scheming and self-seeking that advance's our career or interests regardless of what's best for our organisation.
- **The acceptable politics** is the struggle between individuals and groups who all have the best interests of our organisation at heart, but disagree on what those interests are and/or how they might best be served.

We project managers need to continually develop our political awareness by seeing and hearing what happens in our organisation, and by seeking answers to such questions as:

- Who makes the decisions?
- Who comes up with the ideas?
- Who are the risk-takers and the risk-avoiders?
- Who is the competition?
- Who are the fence-sitters?
- Who supports whom, and why?
- Who are the opinion leaders?
- Who are the 'in' crowd and who are not?
- Who's got the real power?

By being observant and patient, we can learn to recognise and use behaviour politically advantageous in our own project work. Some frequently mentioned positive political behaviours that we might master to become more effective project managers are:

- **Be subtle.** If we blatantly try to gain power or influence others, we usually meet with resistance. Subtlety makes political behaviour successful. For example, we'll have more success in promoting our pet project by lobbying in the corridors and exchanging positive comments about it over coffee than by trying to bludgeon it through a staff meeting. Subtlety is always more persuasive than blatant use of power.
- **Work hard.** If we can't justify our claim to power, no amount of politicking will help. We earn our spurs by showing that we can work hard, help others, and accept unpleasant tasks; that we are tolerant, principled, trustworthy, courteous, and caring. People who lack these qualities may resort to character assassination, skulduggery, nepotism, and treachery – and sooner or later their sins will no doubt catch up with them. Until then, they're forever looking over their shoulders. Competence alone won't guarantee success, but it's essential in the long run.
- **Build relationships.** Politically astute project managers build sound alliances according to the principle of reciprocal favours. Maxims such as 'one good turn deserves another' illustrate the ethic of political reciprocity. We should build healthy relationships with managers and colleagues, and treat subordinates with respect and fairness to foster their loyalty and support. We don't always know when we might need them. Our aim is to build up a reservoir of good will.
- **Negotiate.** Knowing when to make concessions, when to compromise, and when to hold out is part of the political process. Negotiation includes subtle attempts to influence others to achieve our goal or to gain power.
- **Keep power brokers on our side.** It is political suicide to alienate those in power. Never disagree with them in public; find ways to make them look good; let it be their idea; allow them to take credit; follow the chain of command; be a team player and, don't create problems that make them look bad. But we need not agree with absolutely everything they say—that may damage our credibility. We must, though, support and remain loyal to those who can help us most.

Power and Influence

Perhaps the project manager's main sources of power are 'who we know' and 'what we know'. We often have limited legal authority.

A distinction is sometimes made between de facto (earned) authority (knowledge, skills, expertise etc), and de jure (legal) authority (positional, formal, official, conferred) such as contained in our project charter or letter of appointment. Common sources of authority are:

- **Legitimate.** Formal authority vested in a position or conferred with appointment.
- **Evaluation.** The ability to assess, document and report team members' performance (attitude and aptitude) over the period of their involvement on the project.
- **Reward.** The ability to compensate or give rewards.
- **Coercive.** The ability to punish, threaten, or withdraw privileges.

- **Personal.** The appeal of individuals—being respected or liked for personal characteristics, charisma, mana, trust, loyalty, friendliness, good humour.
- **Social Capital.** The value created by fostering connections between individuals. It's political reciprocity – one good turn deserves another.
- **Expert.** Superior knowledge, ability and skills.
- **Information.** Access to information that others find valuable.
- **Referent.** Identification with powerful supporters, key among whom we hope is our project sponsor and senior management.
- **Precedence.** If other project managers have done a similar project before and it has worked, we may be able to use this precedent as a source of personal power. Having a history of success invariably helps.

Enthusiastic and committed project managers strive to get things done by exerting influence, a process that involves the use of power. If we have power we can influence the behaviour of others and get people to do what we want them to do. Project managers often have limited formal power or authority—sometimes rather less than our responsibilities require. However, there are ways in which we can accumulate power:

- **Get promoted.** Power and influence are normally part and parcel of the formal authority vested in a managerial position. But remember, as well as using our recognised title and role in our organisation, we may need to bolster this legitimate coercive power with other forces to increase our influence over others.
- **Control resources.** We will gain additional power over others if we are in a position to approve their requests for essential resources such as money, equipment, space, staffing, transport, or facilities. Unfortunately, project managers don't usually own resources – they borrow them.
- **Control information.** People rely on access to information to do their jobs; so the more we know about what's going on, the better we can decide how to use that information to influence others. Find out what is going on through formal channels and through our own informal networks. Get ourselves on to the right committees and distribution lists. And if we know what's going on behind the scenes by accumulating privileged information, all the better—we can then act far more effectively than those who are not in the know.
- **Possess knowledge.** Expert power can be ours when others choose to act as we suggest because they acknowledge that we know more than they do. So we need to build our knowledge about project management, and of the running of our organisation, so that others rely on our expertise and defer to our judgement.
- **Establish credibility.** We can build up the trust of our employees and colleagues and, in time, their dependence, by earning a reputation as a performer, one who delivers, and who keeps promises. Perhaps the quickest way for us to dent our credibility and trust is by failing to deliver on our assurances. Be careful what we promise.
- **Help others.** Get others to feel obligated to us in some way so that their gratitude is a natural

consequence. Good project managers can do so without any sinister Mafia-type underpinnings because it's good business and makes sense. Usually our organisation benefits from such favours, but remember that we can also gain influence over others by doing them a good turn or two.

- **Get powerful allies.** One of the smartest organisational strategies is to get to know the boss's personal assistant well – because that person has the boss's ear and is, for that reason alone, in a position of power. Why? Power also comes from having direct access to someone with power. Proximity or a direct line to the powerful obviously gives us more scope to exert influence, real or perceived. So we need to:
 - Identify our organisation's opinion leaders and power brokers – and they're not all higher level people. What would these people welcome in terms of 'favours' (help with their project, more resources, respect, coaching, etc)?
 - Willingly provide such favours, if doing so is not being illegal, unethical or disloyal to colleagues.
 - Very importantly – antagonise no one unless some greater purpose is at stake.
- **Get some charisma or mana.** If we have a powerful physique or a deep and resonant voice that could impress, unnerve or even intimidate others, we are well on our way to having others defer to our wishes. But nature has blessed few of us in this way. We can influence others, however, if we possess or develop some kind of charisma, mana, presence, self-confidence or sense of mission that persuades colleagues and employees to agree with us. Try to make ourselves personally compatible with people at all levels in our organisation. And, if necessary, create the illusion of power by attending to the way we look, dress, and furbish our work space or office. The company we keep is also important. And who knows – such strident politicians might benefit from plastic surgery or eventually genetic engineering!! Fake it until we make it!

Getting 'Buy-in'

Listed at Figure 4.6 are some reasonable strategies that may help us as project managers obtain 'buy-in' and commitment to our project by developing a sense of project ownership with stakeholders. The three most frequently identified strategies to achieve 'buy-in' are:

- get their involvement and participation
- sell them on the benefits to themselves
- invoke a common goal or vision.

Also, we could read through the ideas at Figure 4.6 and consider the likely effectiveness of these and use them to secure others' commitment for our project. One technique that might help us win over senior management or anyone is to invite their advice on the appropriateness of alternatives that we have identified (any of which we could accept) when problems arise. Welcome their choice and apply it. Now they are part of the solution and their credibility is at stake. They are now more likely to help us should other project problems arise. If we had not involved them at all, they may just watch us founder. Getting them involved usually works wonders. Perhaps it's an ego thing. Let it be their idea.

Figure 4.6: 'Buy-in' Strategies

Possible Strategies	Likely Effectiveness		
	High	Medium	Low
Establish a project vision, which if practicable encompasses individual stakeholder goals.			
Clarify individual values, expectations, assumptions, perceptions, and anticipate hidden agendas and covert objectives.			
Recognise, welcome and use individual expertise.			
Provide timely, frequent, specific, objective, useful and balanced feedback on their performance.			
Encourage their participation in planning, problem solving, decision making, coaching and information sharing.			
Be positive ourselves about the project and use our personal power. Don't 'white ant' our own project.			
Prepare for objections and talk to objectors in person.			
Enlist the support of those already committed to the project. Use logical persuasion.			
Get project advocates or champions.			
Invite the CEO to sign our project charter and distribute it widely. It's a tangible expression of executive support.			
Have senior management repeatedly demonstrate their support for our project – walk the talk!			
Encourage effective communication: use listening skills use interpersonal skills avoid jargon develop empathy and interest be friendly and approachable be open and honest be interactive provide and welcome feedback.			
Capitalise on common interests – work and perhaps non-work related.			
Reward team behaviours and evidence of buy-in.			
Have a project newsletter. Use the intranet.			
Do things together outside our project. A meal perhaps.			
Be a competent project manager with a history of success.			
Make it fun or at least enjoyable/interesting. An opportunity to do some cool stuff.			

Figure 4.6: cont'd

Possible Strategies	Likely Effectiveness		
	High	Medium	Low
Sell our project's benefits (WIIFM): high profile useful experience personal development challenge achievement recognition credibility teamwork performance bonus enjoyment flexible work hours.			
Facilitate collaborative solutions and decisions.			
Manage conflict positively.			
Release individuals from their outside (ie, non-project) commitments. Talk with their line managers about this.			
Provide deserving project members with positive evaluations, reports, references, letters of commendation, future job assignments.			
Involve and win over their line managers – exchange concessions.			
Recognise, publish and celebrate project and individual successes – provide testimonials.			
Review teamwork effectiveness often and take early remedial action as appropriate.			
Establish a conveniently located and well-equipped project office. Co-locate our team. Agree team rules.			
Develop a team logo, nickname, T shirt, inspired project name, business cards, wrestle in rubber suits, fly to Taupo for a bonding spend-up...			

Some More Considerations

1. **Involve stakeholders in planning benefits delivery.** Identify all stakeholders who will need to be involved in the project in order for it to contribute the anticipated benefits to our business. This will help ensure that the scope of the project includes all activities necessary to satisfy our project stakeholders.
2. **Avoid being against—instead be for.** For example, instead of being against the sponsor's proposal for outsourcing project work, be for it – so we can focus on improving outsourcing. Instead of being against our company policy on purchasing, be for an improved policy. What happens is that, whatever we are against works against us. We begin fighting it and become part of the problem. But when we state what we are for, we begin focusing on the potential for positive change – and, in the process, get a reputation for progress and solution-thinking rather than for negativity and resistance to change. It's taken me years to learn this simple tactic.
3. **When real conflict occurs.** Some successful practices when the going gets really rough are:
 - Arrange for the presence of a witness to some conversations. This can be an effective self-protective measure.
 - Keep good records, as legal proof, for when recollections fades. Have our reservations about important decisions recorded in the minutes.
 - Comprehensive diaries, journals and minutes of meetings are important records of incidents, places, dates and decisions. Keep a personal project diary.
 - If we are aware of an offence, report it immediately. Don't use it to advance our own position. Blackmail is a criminal act.
4. **Use our legitimate power.** Power has a legitimate basis if it comes from expertise, positional authority, or personality. But power is illegitimate if it is ultra vires (beyond what is officially authorised); if it arises from nepotism or unlawful benefits; if it is based on blackmail of colleagues, superiors or subordinates; if it is unconscionable because of a difference in the strength of position; or if it involves deceit and misrepresentation.
5. **Use our influencing skills.** Influencing others isn't about manipulation or the misuse of power. When we establish and maintain good working relationships so that other people will be receptive to our ideas and willing to consider our suggestions, we are using influencing skills. When we present our concepts logically and persuasively (and truthfully) so that people can understand and appreciate the value of our proposals, we are also using influencing skills.
6. **Admit our concerns.** This is a very powerful influencing technique. By admitting mistakes, uncertainty, and asking for others' assistance, we can often get people to change their position. *"Look, I'm very nervous about undertaking this project without your expert input. I am sure that the project will go much better if you could help please."*
7. **Use common vision.** Most experts agree that this is the most powerful of all influencing styles. By invoking a common goal or by emphasising the positives, we can often get people to change their views: *"We all want this project to succeed. We'll all have a much more secure future if this project produces this product on schedule. By joining us, you'll become part of this important team and help us win."*
8. Finally, three key practices for savvy project managers that need emphasis are:

- **Manage stakeholder expectations.** All of the tools of project management can be employed to communicate clearly what is possible and what will be done.
- **Control who becomes a stakeholder.** Among managers and customers, there is no shortage of people eager to influence the project. However, if they don't have the right to this influence, push back.
- **Manage upward.** Many of the stakeholders, including the sponsor, functional managers, and customers, have more formal authority than we the project manager. But we must actually lead them. They need us to ask the hard questions, provide feasible alternatives, confront them with facts, and continually motivate them toward action with knowledge, persistence and enthusiasm.

Leading Change

Project management is change management. To stakeholders change can be exhilarating or unsettling. It depends on their perspective. Simply announcing the change that the project will cause is seldom enough. Stakeholders are inclined to resist change when it's forced on them without their timely input and with no understanding of why the change is needed. So, when introducing change, we need to:

- Explain the reasons for the change and the resultant benefits.
- Share the problems, pressures and concerns.
- Share both the good and bad news in a timely manner.
- Seek people's reactions, ideas and input.
- Build employee feedback into our change process.
- Go for cooperation, not compliance. *"We're all in this together"* not *"Do it or else"*.

Change can be about taking stakeholders from the known to the unknown—frightening and threatening. Change often violates cherished group norms and routines. People may be anxious about having to work harder, work with new people, learn new skills or work methods, or become used to new routines or work areas. They may fear the loss of their old job, which they liked, or fear that their new job will be less skilled, less interesting or too demanding. They may resent the implied criticism that the way they have been doing the job is not good enough. They may dislike the thought of outside interference in their jobs or fear loss of control. As a result, the working climate, motivation levels, confidence, and morale may suffer.

Because of the uncertainties it creates, change may cause feelings of dismay, abandonment, anxiety, stress, anger, bewilderment, confusion and a whole host of other emotions. These can lead to such responses as sleep disturbances, absent-minded behaviour, withdrawal, depression and restless over-activity. Some of the emotional consequences of change are summarised at Figure 4.7.

Figure 4.7: Consequences of Change

The downsides	The upsides
Misery Uncertainty Vulnerability Anxiety Frustration Doubt Confusion Anger Loss	Learning Challenge Innovation Growth Excitement Creating better ways Possibilities Fun Gain

Resistance to change can surface in at least three main ways:

1. **Passivity.** People may just ‘give up’ and go through the motions, withholding their energy, efforts and commitment.
2. **Malicious compliance.** People may comply in a way they know will result in undesired outcomes.
3. **Vocally.** People may air their concerns openly, either positively and constructively, or negatively and destructively. They may air them to us, the project manager, or behind our back, to their workmates and friends.

The underlying concerns for stakeholders regarding change usually include:

- **Uncertainty about the change and its results.** People seek to avoid uncertainty; no one enjoys walking in the dark where unknown dangers may lurk. Lack of information or understanding can leave a vacuum that is filled by rumour, speculation, insecurity and anxiety.
- **Disruption of routine.** Many people prefer the well known, familiar and predictable past ways of doing things and don’t give them up easily, especially if they worked well for them and they don’t know whether the new way will work.
- **Loss of existing benefits.** Change might come at an individual cost that is not balanced by greater benefits resulting from the change. People will resist change that threatens the continuity of their environment, their employment, their career prospects, wages or benefits, or that threatens increased job demands.
- **Threat to position, power and security.** There is often an emotional loss associated with change. Any change that causes a person or group to lose power, status, mana or prestige will usually be resisted. Those who have the most to lose will be the most likely to resist.
- **Disturbance of existing social networks.** Friendships, social cliques, informal groups etc are often threatened by changes. Typically, the stronger the group ties, the greater the resistance.
- **Challenges to group norms and culture.** A group will strongly resist any changes to its norms or culture.

Figure 4.8: Change Characteristics

Successful Change	Unsuccessful Change
<ul style="list-style-type: none"> • clear and measurable objectives and outcomes • realistic and limited in scope • constant, honest and clear communication with change leaders – project managers • appropriate strategies used to introduce and manage the change • good timing – fast enough to give a sense of progress yet not exceeding people's ability to absorb and control it • participation in the change • support from key power groups • use made of existing power structure • majority support • competent staff support • integration of changes with the rest of the system and formal/informal rewards structure • adequate rewards for those adopting the change • maintained momentum • visible successes throughout the organisation • continuing modification and adaptation in the light of experience. 	<ul style="list-style-type: none"> • fuzzy, idealistic or grandiose objectives • unrealistic and constantly changing scope • inadequate information, insufficient warning or involvement • unclear details in implementation plans so people don't know precisely how to make the desired changes happen • inappropriate strategies, pre-packaged programmes, inadequate resources • poor timing: too quick, and people can feel out of control; too slow and cynicism and disillusionment can result • authoritarian direction pushing people into changes they don't understand, feel ready for or are not committed to • lack of support from critical power groups • lack of management support; only a few senior managers understand the change and the reasons for it • people find it hard to give up the old ways, or they fall back into them, because there is no incentive for them to move forward • ignoring or glossing over resistance • insufficient staff support or other resources available • change not integrated into day-to-day operations and the system as a whole • people perceive that the changes impose additional work • Too many changes at the same time.

As project managers we need to know how to lead and manage change, and support stakeholders through the change process. Among other things this means that we should provide frequent communication about:

- the purpose and reasons for the change
- an understandable and convincing picture of the desired outcome
- over what period and how the change will take place
- each individual's part in the change and how the outcomes will affect them.

The characteristics of successful and unsuccessful change are summarised at Figure 4.8.

Sometimes there will be changes that we can't couch in positive terms. A factory, shop, department, business unit or branch may close or down-size, for example, and people may be made redundant. The more those affected personally identify with what is changing, the more their responses will resemble grief over the loss of a loved one.

When announcing such changes, we should avoid blaming anyone or any thing or exhorting people to see 'the big picture'. We need to be as empathetic and supportive as possible and offer whatever assistance we can on behalf of our organisation (counselling, outplacement consulting, further training, etc). We need to provide some form of closure that helps people say 'goodbye' so they can move forward at their own pace.

Figure 4.9 shows a simple model for predicting the impact of change. The more significant or fundamental the change and the more it affects the way people carry out their business-as-usual work, the more resistance we can normally expect to our project.

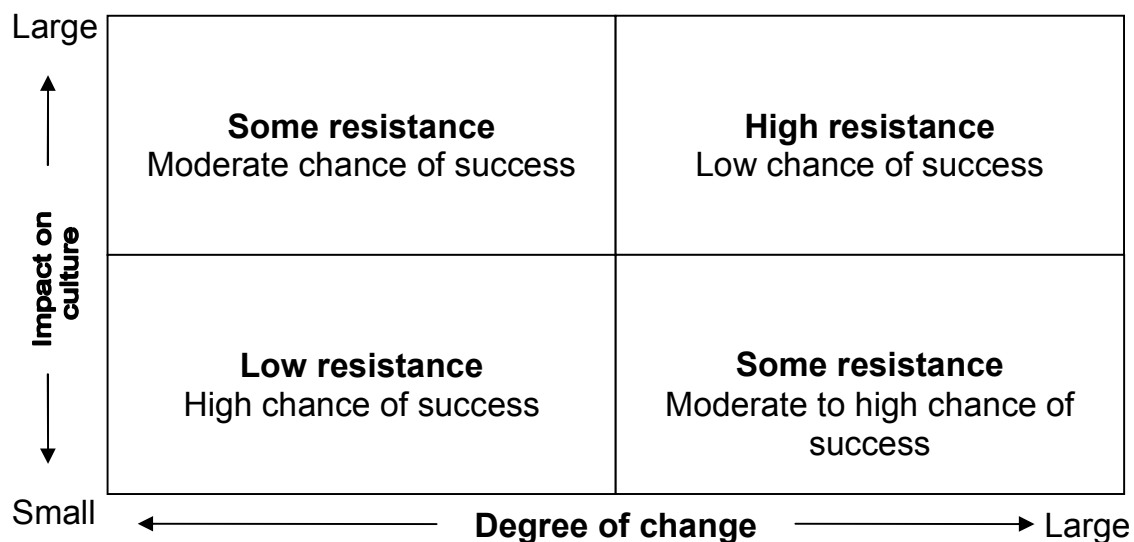
Some stakeholders will be determined to hold on to their resistance, for a variety of reasons. Some ideas that might help overcome or convert ongoing resisters are:

- **The road-blocker.** This is a nice, clean type of resistance where the employee just says "no" in one form or another, usually without giving reasons. We should help such employees to be more specific about their objections. Ask "*What specifically worries you?*" or "*What in particular do you object to?*" This will tell us what we are dealing with and give us a point at which to begin discussion. Fully examine the resistance by listening actively and asking questions to clarify. Be sure we have heard and explored fully what the employee has to say before moving on to action planning. When we move to action planning, ensure the employee has clear goals and timelines to achieve. Ideally, it should be their action plan.
- **The passive resister.** These people say, in effect: "*Tell me exactly what you want me to do.*" This is a hidden form of resistance. If we fall for it, the resister can comply with the bare minimum, but not the spirit, of what we want. We might ask "*Are you quite clear about what is being asked and expected of you?*" This may force the resister to accept more responsibility for good performance.
- **The delayer.** "*I'll get on to it first thing Monday morning*", says the delayer. And then, of course, something more important always crops up. If we think this is a resistance tactic rather than an honest response, try asking: "*Is there anything preventing you from beginning now?*"
- **The reverser.** This form of resistance can be tricky. But if we find ourselves being surprised

by someone's enthusiastic response ("Wow! What a great idea!"), look for a quick delay as a follow-up. If this happens, we can be fairly sure the employee is telling us what we want to hear but intends to do nothing in particular about it. Say something like, "I'm really glad you think it's a good idea. What do you like about it?"

- **The dodger.** "Let Jane do it eh" switches the responsibility on to someone else or even another department. If our request is reasonable, don't fall for this tactic. Let dodgers know that it is from them personally that we are expecting action.
- **The threatened.** These resisters imply that their line manager (or someone else) won't approve. This may or may not be true, but don't discuss it now. Say something like: "I appreciate your concern and I'll check it out. Meanwhile, what I'd like you to do is ..." or "I'll bear that in mind, but what objections do you personally have?"
- **The sympathy seeker.** These people try to make us feel guilty for asking them to alter their ways and try something new. Empathise with their problem, use active listening techniques and, unless their reasons are very sound, repeat our request assertively.
- **The traditionalist.** This character says: "But we've always done it the other way." Sometimes the old way is the best way, but most often the appeal to tradition is straightforward resistance of the 'better the devil we know' variety. Try saying, "I understand the old way worked very well; however, this situation is unique." Or "Yes, the old approach worked well – how might we adapt it to this new way?"
-

Figure 4.9: Resistance to Change



Final Points

Politics is inevitable on projects. It is the process whereby attempts are made to achieve goals through accommodation and the exercise of influence.

Project environments, especially the matrix organisation, are excellent breeding grounds for rampant politics. This is mainly because project managers do not 'own' their resources. Team members are borrowed from functional areas, so they 'belong' to someone else. A significant part of the project manager's job is to wangle these resources from functional managers. Often we are competing with functional managers and other project managers for very scarce resources.

An important feature of contemporary project management is that the stakeholders call the shots. The view that the project manager knows what's best is usually seen to be paternalistic and self-serving. Thus, we must develop good people skills so that we can interact productively with project stakeholders.

To manage relationships we need to:

- identify stakeholders, looking both at what each one needs from the project as well as their significance to it
- assess each stakeholder's influence based on their power and proximity, which may change
- develop communication plans tailor-made for each individual to suit current circumstances.

In terms of project stakeholder management and communication we need to know:

- **who** needs information?
- **what** information is needed?
- **where** is it needed?
- **when** is it needed?
- **why** is it needed?
- **how**, or in what format, is it needed?

Also, not all changes caused by our projects will be seen as positive, so we can expect some resistance from some stakeholders in most project endeavours. We need to be able to manage the change. Project management is change management. Most people dislike change.



Chapter Five

CONCEIVE PROJECT



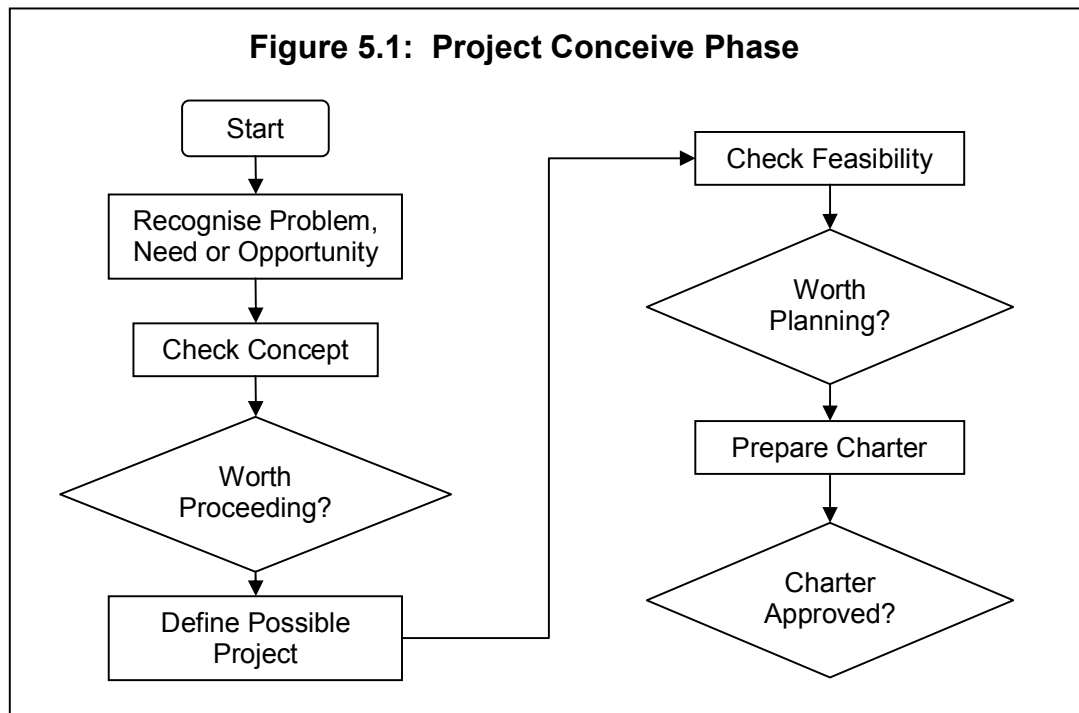
“In the beginning, God created the universe. All subsequent projects have been of smaller scale.”

Projects arise out of needs. The whole project management process begins when someone somewhere has a need to be fulfilled. Since resources are invariably limited, we cannot develop projects to address all needs. Choices have to be made. With project selection, we make our choices. We select some projects and reject others.

Project selection decisions are very important, because they involve us in making a commitment to the future. They tie up resources, sometimes for days, sometimes for years, and therefore the appropriateness of continuing to proceed with costly and long-term projects must also be periodically reviewed. Projects have opportunity costs—by selecting one project over another, we forego the benefits of the project or projects not selected.

Framework

The steps that occur during the project Concept phase are shown at Figure 5.1, the culmination of which is the approval and publication of a Charter that describes the project, formally appoints the project manager, authorises the project Develop phase, and provides planning guidance. In this framework the Charter is a comprehensive document—the equivalent of a Project Proposal, Terms of Reference or Project Brief.



Recognise Problem, Need or Opportunity

The first step in our project management framework involves the identification of a need, problem, or opportunity. Projects have various origins:

- Projects may be **top-down** in origin as a result of normal business planning processes. Business goals are established and these become the basis for projects. Such projects usually contribute directly to the realisation of our organisation's strategic vision.
- Project may be **bottom-up** in origin when employees may suggest ways of overcoming performance problems that frustrate or limit their work effectiveness and efficiency in some manner. Ideas for such projects need to be encouraged, given there's no progress without projects.
- Projects may also be **external** in origin as a result of a request from a client or customer, the need to comply with new legislation, or the wish to take advantage of an opportunity such as new technology. Many government projects are compliance requirements.

Essentially, the need for a project arises from a problem or circumstance (internal or external) that either threatens the organisation or presents it with a valued opportunity. Incidentally, a problem doesn't necessarily mean something negative. It could simply be the gap between good and better. This need may be written up by the client in a request for proposal (RFP) through which the client asks for providers to submit proposals on how the problem might best be solved. Should one such proposal be accepted a project is born and a contract is normally negotiated with the selected provider.

To help ensure project ideas are appropriate and worth proceeding with, it is useful for organisations to publish project selection criteria against which project ideas can be assessed. There are usually more ideas in the business than there is time and other resources to implement them. And not all ideas are good ideas. A rating checklist is a tool to help screen project ideas. Those ideas and requests that meet all or most threshold criteria are identified for further definition and analysis. Such a checklist is at Figure 5.2. Organisations need to develop and widely communicate their own concept checklist, which enables a relatively informal review to eliminate the more obvious duds. Assuming the possible project passes this first filter, the idea is then more precisely defined or 'scoped' at a high level, yet sufficiently detailed to allow a formal feasibility study to be undertaken.

It is not usually acceptable to wait until needs emerge. Needs must be searched for, recognised and documented, otherwise no action will be taken to satisfy them. Conscious effort is needed, especially when employees are heavily loaded with business-as-usual work. People in organisations must therefore frequently ask:

- What are our needs?
- What are our client's needs?
- What are our clients' customers' needs?
- Where could our performance be improved?
- How might technology be used to advantage?
- What are our competitors doing?

The answers to these questions might give rise to ideas or requests for worthwhile projects.

Figure 5.2: Project Concept Check Template

PROJECT CONCEPT CHECKLIST

The project idea or request is _____

Does the project idea or request appear to be in harmony with:

- | | |
|-------------------------------------|--------|
| • our business purpose? | Yes/No |
| • our core values? | Yes/No |
| • our long-term goals? | Yes/No |
| • our current and pending projects? | Yes/No |
| • our existing policies? | Yes/No |

Is it a sustainable development? Yes/No

Is the risk of proceeding likely to be worth the investment? Yes/No

Is the project idea likely to be technically feasible? Yes/No

Are sufficient resources likely to be available? Yes/No

Are the benefits of implementation likely to exceed the costs? Yes/No

Is there likely to be sufficient support and demand to proceed? Yes/No

Is implementation likely to enhance our public image? Yes/No

Many project problems are rooted in the poor recognition and articulation of needs. Two common pitfalls in defining needs are:

- **Needs are dynamic and ever-changing.** The reason for the dynamic nature of needs is that the modern business environment is undergoing continual change – technological, legislative, economic, social, and political. Unless this reality is recognised, projects may not accommodate changing circumstances.
- **Needs are misunderstood.** Clients sometimes operate on the basis “*I’m not sure what I want, but I’ll recognise it when I see it.*” There are real needs, but they may only be vaguely perceived. In these circumstances clients require guidance. Care must be taken not to ‘gold-plate’ their needs, selectively filter them, jump to conclusions, or assume that we know best. Clients’ needs are inclined to evolve.

Typically, needs, opportunities or problems might include, for example, demand for a new product or service, use of new technology, introduction of a new process, compliance with new legislation, accelerating product development, etc. Whatever the need it must now be turned into a concrete definition of what the project is going to be – an image of how the project will look on completion.

Define Possible Project

The development of a project's definition is a vital step to its success. A clear, accurate and comprehensive definition should be developed from the start. It will normally be further refined as planning proceeds and stakeholder needs clarify.

A project is usually defined or scoped in terms of its purpose or rationale, goal, work scope, and cost, time, quality or performance, stakeholders, benefits, assumptions, risks and issues. The goal is the short global statement of output towards which all project work is directed. The goal serves the following functions:

- It defines the project deliverable in terms of the end product, process or service.
- It is the constant point of reference against which to identify work, establish priorities and make decisions, and ensure unity of effort.
- It is the target that allows planning to proceed, for project work to be kept on track, and ultimately for project management success to be determined.

The goal statement should be action-oriented, short, simple, and readily understandable. Some examples are:

- *"Design and complete pilot testing of a software package that performs basic financial analysis for small businesses."*
- *"Move the IT section to Stewart Island within three months at a cost not exceeding \$450,000."*
- *"Set up a computerised inventory management system for the hospital pharmacy."*
- *"Prepare and conduct a conference for our organisation during 3-5 November."*

The project scope is the work that must be undertaken to achieve the project goal. It is a statement of what must be done and also what is not to be done. The latter is particularly important if unneeded work might otherwise reasonably be assumed into the project. If, for example, we don't require a roof on the building, this should be clearly documented as an 'exclusion', given that otherwise a roof would quite reasonably be assumed into the scope. Scope is usually the first parameter to be defined.

As discussed in Chapter Two, scope, cost, time and quality are intimately related. If they are unrealistic the project goal will not be realised. It is normal to identify one objective (scope, cost, time, or quality) as the dominant objective or the 'driver' which is last of the constraints to be compromised should the project run into problems. Ideally, the client should prioritise the constraints. This priority needs to be reconfirmed periodically with the client.

When defining the project some planning assumptions will need to be made. These must be recognised, documented, and their validity questioned throughout the project lifecycle. Should an assumption (ie, a forecasting, estimating or planning premise) prove to be wrong, it is usually appropriate to revisit the plan. Some updating of the plan will therefore be needed periodically as the project proceeds.

Project benefits should also be documented, since a successful project is one where the benefits are realised. They should be expressed as targets, not as predictions or effects. An initial risk and issues list might also be developed. An example project definition is at Figure 5.3. Its main purpose is to help focus attention on the parameters within which the project must be completed. The clearer and

more realistic these parameters are, the greater is the likelihood of project success. The client, sponsor and project manager (if identified) might prepare this initial document together. And at this stage more questions might be raised than are answered. The definition evolves. Some key aspects to be defined are:

- **Project Purpose** is the reason for undertaking the project – the rationale – some compelling, value-adding beneficial change or positive outcome presumably. It's the 'value proposition'.
- **Project Goal** is the required deliverable, output or result. It should be clear and achievable. It helps ensure unity of effort. It is the focus for planning. It determines what's relevant.
- **Product Description** is a description of the project deliverable or deliverables, which may be a service, product or process.
- **Project Scope** at this early stage is usually a high-level narrative description of the work that must be undertaken to achieve the project goal. It is the basis for the subsequent work breakdown structure (WBS).
- **Cost** is either a conceptual estimate or a statement of maximum permissible expenditure. It is a basis for the budget. Usually expressed as a range.
- **Time** is either the date for completion, project timeframe, or a conceptual estimate of duration. It is a basis for the schedule.
- **Quality** is the functionality and performance required of the final deliverable or deliverables. It is a basis for the product specification.
- **Key Stakeholders** are those who have or will have a significant stake in the project.
- **Benefits** are the advantages or positive outcomes to be gained from the project deliverable. They will be identified more specifically in the business case. Should recognise project purpose.
- **Assumptions** are factors we take as true, real, or certain in order that planning may proceed. Their validity needs to be checked. They can masquerade as facts. They involve some degree of risk. They should be reasonable. And we should not make assumptions when the facts are accessible. Assumptions are usually about things outside our control.
- **Risks** are things that might prevent a successful result. They are potential problems and the basis for risk management.
- **Issues** are current constraints, problems or risks that have materialised, if any.

Project Classification

Some organisations find it useful to classify their prospective projects for selection and management purposes in terms of strategic importance, stakeholder cohesion, cost, size, risk, novelty, complexity, number of disciplines, interfaces or people involved, technology, etc. Estimated cost is most frequently the criterion. It's readily measured and compared. Typical classification criteria and indicative measures are shown at Figure 5.4. Organisations need to determine their own project classifications, which might be Large = 15%, Medium = 25%, and Small = 60%. See also www.globalpmstandards.org for international information on project classifications.

Figure 5.3: Example Initial Definition Statement

INITIAL DEFINITION STATEMENT

Version:	1.0 dated 1 February.
Prepared by:	John Smith, Business Analyst, Marketing
Project:	Customers' Newsletter.
Purpose:	To keep our customers up-to-date with our products, services and special offers.
Goal:	To develop and publish a monthly newsletter for our customers.
Product:	<p>The newsletter will be attractively presented. It will describe what our customer would like to know about our goods, services and special offers.</p> <p>The newsletter will also be suitable for direct sales, tradeshow and conferences.</p>
Scope:	<p>The work required will involve design, preparation, printing and distribution. Customer input to be sought during design and an impact study to be undertaken after the first issue.</p> <p>Other than the initial publication, ongoing publication would be a business-as-usual activity that is outside the scope of the project.</p>
Cost:	Likely to cost \$10,000 to \$15,000 for research and development, \$2,000 to \$4,000 for the initial publication, and \$1,000—\$2,000 for impact survey. Ongoing publication costs would be an operational expense.
Time:	First newsletter to be published during the first week of June, and thereafter monthly (or perhaps every two months).
Quality:	<p>Some key performance criteria to be:</p> <ul style="list-style-type: none">• A4 size of about 4 pages• physically distributed and/or electronically, including accessible from our website• written in simple 'reader friendly' language, and clearly illustrated.
Stakeholders:	Organisation marketing department, customers and publishers.
Benefits:	Increase in sales and customer awareness, and improved organisation image.
Assumptions:	Some 1,500 to 2,000 customers will require or access the newsletter.
Risks:	Insufficient contributions or customer interest to sustain regular publication.
Issues:	None evident at this time.

Figure 5.4: Example Project Classification

Criteria	Small	Medium	Large
Cost	<\$100K	\$100-500K	>\$500K
Duration	<2 months	2-6 months	>6 months
Work Effort	<40 days	40-100 days	>100 days

Notes:

1. If any criterion is large, the project is large. If any criterion is medium, but none are large, the project is medium. The classification may change during the project life, as uncertainty is resolved.
2. **Cost** includes the estimated cost of all materials, components, equipments, supplies, and other resources including labour – both employees and consultants/contractors, based on salaries, schedule of rates, or hourly rates as appropriate.
3. **Duration** is the number of work days from project approval to completion.
4. **Work Effort** is the estimated total project staff days based on an eight-hour workday. For example: (3 people x 4 hours) + (2 people x 6 hours) = 24 work hours or 3 staff days.

Projects might also be classified or categorised in terms of the work they involve or their goals, including for example:

- To **develop** new products, services and processes.
- To **enhance** existing products, services and processes.
- To **install** new products, services and processes.
- To **terminate** existing products, services and processes.

Once projects have been defined, and classified if required, there is then a common basis for further evaluating them as part of the selection process. A project should be sufficiently defined to enable its feasibility to be competently and confidently determined.

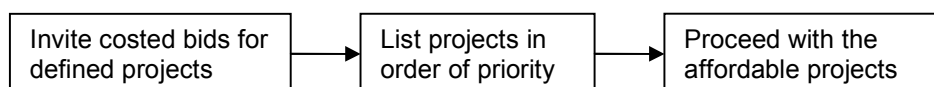
Check Feasibility

Feasibility is about whether the project goal can be achieved given the specified constraints of scope, cost, time and quality. The availability of suitable technology and resources will also be factors. Once it is confirmed that a project can be done, the question is whether it should be done. This is commonly described as a feasibility study, which in work effort is sometimes a separate project of some months' duration.

An organisation's typical zero-budgeting project selection process is shown in Figure 5.5. Possible projects are listed in order of priority and a cut-off line drawn where project funds are depleted. Low

priority, but above the line projects may be in jeopardy if the high priority projects later experience cost increases. For this reason low priority projects are usually more difficult to manage, yet are usually assigned to less experienced project managers! All projects need to be prioritised. And they're not all in the A-1 category. To be properly prioritised, projects are rank-ordered, not simply categorised. Re-prioritising may also be appropriate when circumstances change.

Figure 5.5: Project Selection Process

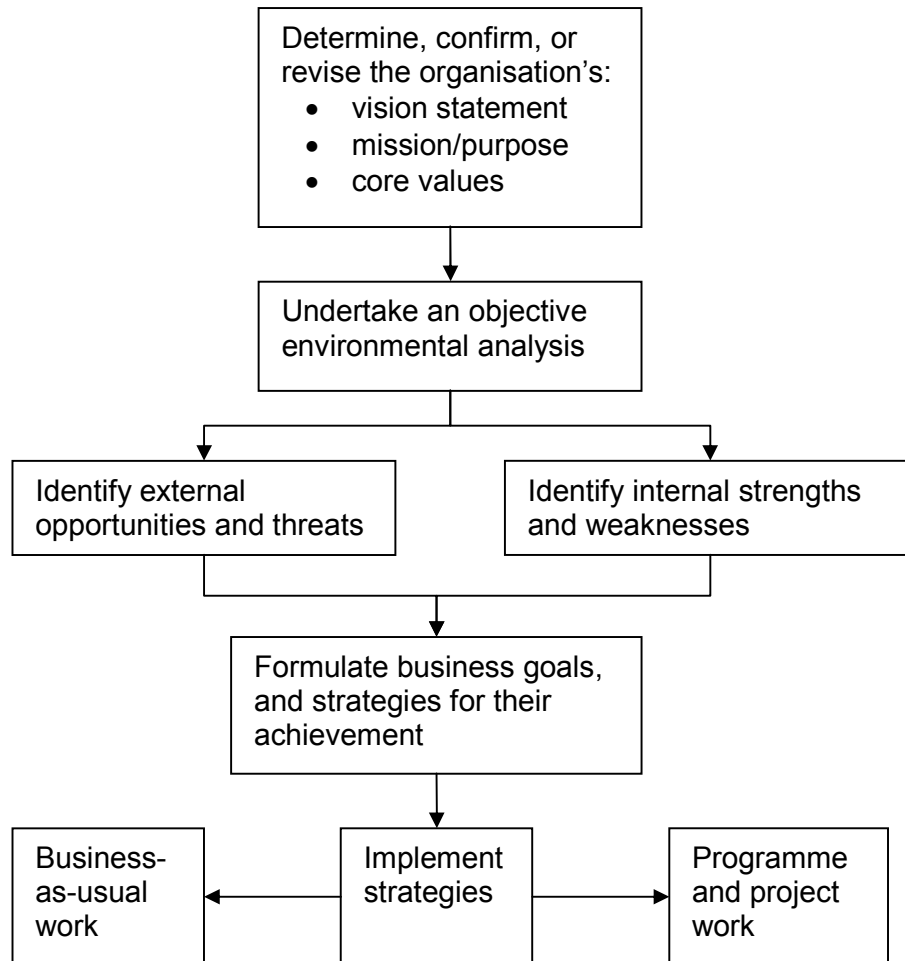


SCHEDULE OF PROJECTS			
Identification Number	Description	Priority	Cost (x000)
A/01	New computer system	1=	\$80
A/02	Refurbish office	1=	\$200
M/01	New product (A)	2	\$240
M/02	New product (B)	3	\$200
HR/01	EMA procedures	4	\$60
M/03	Tradeshow in Wellington	5=	\$80
A/03	Replacement fleet	5=	\$600
M/04	ISO 9000	6	\$80
OP/01	Annual conference	7	\$60
HR/02	Performance management	8	\$30
M/05	Marketing video	9	\$75
B/01	Sponsorship ABC	10=	\$40
A/04	Security system	10=	\$20
OP/02	Outsource R and D	11	\$850
M/06	Market survey	12	\$100
HR/03	In-house magazine	13	\$20

Strategic Fit

Executives have often viewed project management as a tactical or operational endeavour. But in recent years this view has changed. Project management has been propelled to the top of many CEOs' agendas. The reason is simple – strategic goals are realised through projects. If we can't do projects well, we won't meet our strategic goals. The contemporary view is that we project managers are the tactical leaders who deliver strategic success. The first requirement for a project to proceed beyond the definition step is that it has 'strategic fit' – the project promises to deliver on the organisation's vision and associated goals and strategies. This important alignment is illustrated at Figure 5.6. If the project idea doesn't support an organisation's vision, is the organisation prepared to steer itself in this new direction to support this new project? Also, saying we want to produce product X is not a strategic goal, but capturing 10 percent of the market share for that product by 2016 is a strategic goal.

Figure 5.6: Strategic Alignment



Project management is the means used by organisations to turn their strategic vision into reality. It's the way to transform business processes. Thus, project managers are tactical leaders who deliver strategic success.

Strategic alignment also requires that the prospective project is consistent with, or doesn't contradict, our organisational core values. Values don't provide strategic direction, but they do enable us to check the appropriateness or correctness of our projects and methods for their execution. Practised values create organisational culture.

If our organisation has no clear vision of its future against which to assess the suitability of prospective projects, the development of such a vision would be a very appropriate first project.

Business Benefits

Once we are assured that the project will contribute to the achievement of business goals, we need to ensure that it will add measurable value, which is summarised by the following formula:

$$\text{Value} = \text{Benefits} \text{ minus Costs}$$

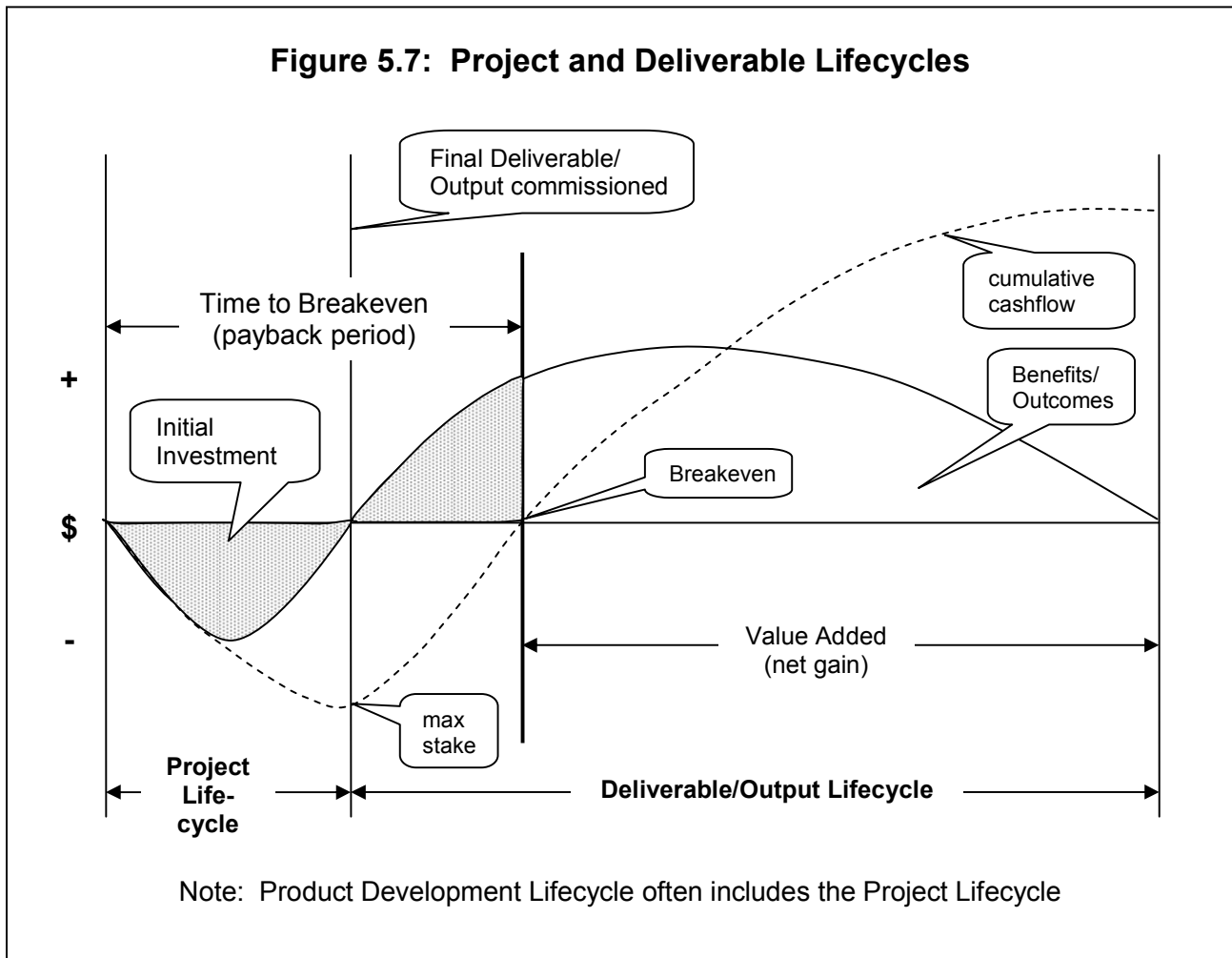
A benefit is an intended or unintended positive outcome or result for key stakeholders. Value is usually derived from sustained benefits over time. Projects must deliver benefits beyond the project deliverables typically identified in the project charter. A project can deliver its stated product, service or result at the right level of quality within allocated time and cost and still be unsuccessful from a business perspective. Associated with this concept, we can identify three generations of project management:

1. **First generation project management** was seen as the management of scope with focus on the traditional quality—time—cost triangle, which can be described as deliverable-focused project management. A process emphasis.
2. **Second generation project management** focused on ‘soft’ skills and emphasised processes such as communication, stakeholder management, leadership and teambuilding, which is people-focused project management. People and process both deemed important.
3. **Third generation project management**, an era that we are now entering, has project managers facing the paradox of delivering clear and product-focused deliverables within set parameters, while considering the bigger organisation picture. The focus is now on ‘value creation’. But this doesn’t diminish the importance of delivery and people-focused project management.

For projects that deliver a well-defined product designed to fit within an organisation’s culture, a technical product-centric perspective is valid because the project requires only minimal business awareness beyond quality, cost and time. But when projects must deliver new or innovative products, services or results that have an impact beyond a limited area of the organisation, a promise- (or benefit-) centric perspective is required. Project managers must consider a much wider range of business benefits. This means taking into account people issues, learning to weigh stakeholders’ multiple, often conflicting needs and expectations, while allowing for the power and politics of the organisation. Projects and programmes of this type can be successful only if project managers take a holistic view of the system and win executive support.

The benefits delivered by our project, determine ‘project success’. However, a key measure of ‘project management success’ is whether the final deliverable is built as per specifications, and produced on time, within budget. The benefits, as contained in the project business case, are hopefully achieved during the deliverable lifecycle. See Figure 5.7. Thus, in the short term, project managers produce nothing for the organisation. On the contrary, they incur costs. Yet invariably these costs represent investments aimed at producing a project deliverable that in turn eventually results in benefit to the organisation. Such bottom-line benefits might include an enhanced business reputation, customer loyalty, competitive advantage, new customers, increased market share, attraction and retention of talent, improved business processes, eliminated waste, reduced energy use, improved sustainability,

costs reduced, new opportunities accessed, improved risk management, avoidance of non-compliance penalties, etc.

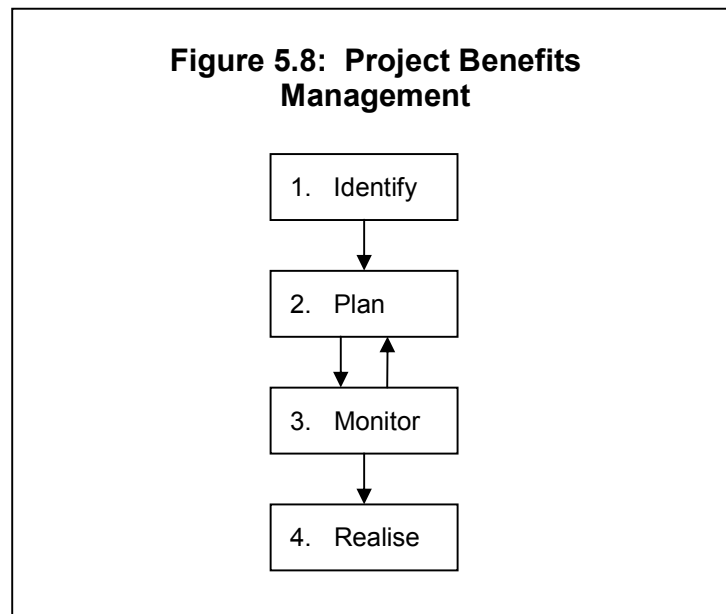


Benefits Management

Obtaining some form of benefit, whether financial, economic or otherwise, is the reason for undertaking a project. If no worthwhile benefits are identified, the project should not proceed. Project management plays a vital role in meeting delivery targets but, ultimately, it is the realisation of expected (and sometimes unexpected) benefits that will determine project success, and of course that those benefits comfortably outweigh the costs of achieving them.

Throughout the life of a project, the benefits realised will change. Some originally identified benefits may not occur and additional benefits, not originally expected, may be identified later. During the project there are sometimes opportunities to discover new benefits, which may enhance the project. Accepting the principle that benefits may change over time, reinforces the need for a benefits management process to identify and track benefits throughout the project and deliverable lifecycles.

The key steps in project benefits management are identifying, planning, monitoring, and realising. See Figure 5.8. The process recognises that some re-planning of benefits may be needed as the project proceeds.



There is strong agreement that project managers tend to focus on managing deliverables, rather than the benefits that should result from their use. This is entirely understandable, since:

- Project managers' success and rewards are often measured purely in terms of the triple constraints.
- Few organisations have a formal process for managing the benefits of projects.
- Benefits arise after the project lifecycle.

The table at Figure 5.9 helps us differentiate between deliverables (ie, outputs) and benefits (ie, positive outcomes) and shows their connection. Benefits might be categorised as follows:

- **Operational savings** include all changes resulting from the business solution that contribute to cost savings to the business. This area will often be a primary focus of our project.
- **Improved customer satisfaction.** This includes all changes from the business solution that improve our customers' experience with our services and products.
- **Increased revenue and market share.** Many business changes including reengineered processes contribute to increased revenue and market share or improved customer retention. If a direct link can be made between changes in the process and increases in revenue or market share, then these benefits can be included in a financial returns calculation. If a clear link cannot be established, then we usually mention these improvements in our business case as qualitative benefits only (eg, the connection of customer satisfaction with customer retention may be listed as a qualitative benefit since an exact calculation may not be defensible for our specific change).
- **Improved employee satisfaction.** Improved employee satisfaction is often the result of new processes and tools. Overall improvements for employees should be cited in our business case under qualitative benefits. Sometimes, however, employee satisfaction will directly affect productivity. If a direct link can be established between employee satisfaction and improved

productivity, then this may be included in the quantifiable operational benefits.

Figure 5.9: Deliverables produce Benefits

Deliverables	Benefits
<ul style="list-style-type: none">• new product• new technology• updated code of ethics• new OSH procedures• revised HR protocols• new sustainability processes• software training programme• revised strategic plan• reduced cycle time	<ul style="list-style-type: none">• increased revenue• reduced costs• improved image• improved safety• reduced turnover• reduced wastage• improved productivity• better teamwork• time saved

Benefits might be immediate, short-term or long-term, direct or indirect, and tangible or intangible – all with different likelihoods of occurring. This latter category is further analysed below:

- **Tangible benefits** are those which can be stated in quantitative terms. They can be measured, even though they may be expressed in financial or non-financial terms:
- **Financial benefits** usually relate to profit enhancement and cost reduction. For example, ‘savings’ through staff redundancies can often be accurately estimated in dollar terms.
- **Non-financial benefits** describe the value to our organisation that is directly attributable to the project, but which cannot be expressed in dollar terms and may include such benefits as increased customer satisfaction and fewer stress-related staff problems.
- **Intangible benefits** are those that are difficult to measure or quantify, yet still represent a return on our project investment, such as improved use of resources, faster decision-making, happier staff, improved public image etc. However, whenever possible we should try to express intangible benefits in more tangible ways. For example, happier staff might translate into reduced staff turnover and less time off for stress-related health problems. Both of these could be expressed as dollar savings.

Some organisations are moving away from a single method of measuring benefits. For example, the ‘triple bottom line’ approach recognises:

- **Economic or financial benefits** calculated through cost-benefit analysis, net present value, internal rate of return, and economic value added techniques.
- **Social and community benefits** encompassing health and safety, cultural, functionality, sustainability, welfare and environmental impact.

- **Corporate benefits** including revenue, profitability, innovation, growth, market share, shareholder and stakeholder value, community perception, and ethical and probity benefits.

Benefits Identification Process. Given a general understanding of the categories of benefits that can be derived from a project, it is appropriate to identify specific benefits for our particular project. One approach to benefits identification is:

1. **Choose a facilitator and form a team.** Form the benefit analysis team from members of the stakeholder community (including all key members of the project team so that everyone has a common understanding of the benefits, and how they are linked to the project). In fact, we might identify all stakeholders who will need to be involved in our project in order for it to contribute benefits, including line managers, and enlist their support to identify these benefits.
2. As a team, **brainstorm the benefits that our organisation will see** from our project. Using a group for this exercise helps ensure that we do not overlook something about the solution that produces a benefit. Remember that we are looking for hard returns in terms of cost savings and incremental revenue, and also looking for qualitative benefits such as increased customer satisfaction and employee satisfaction. Having stakeholders and line managers participate in this exercise builds their commitment to the business case.
3. As a team, **read through our list of benefits.** Combine areas that are similar and eliminate any duplication and redundancies. Categorise the items into groups. We may elect to use the same benefit groups identified above or we may elect to make up our own more specific to our project.
4. **Identify gaps and oversights.** Compare the benefits we identified with the original rationale or purpose for the project. Identify any gaps that emerge from this comparison.

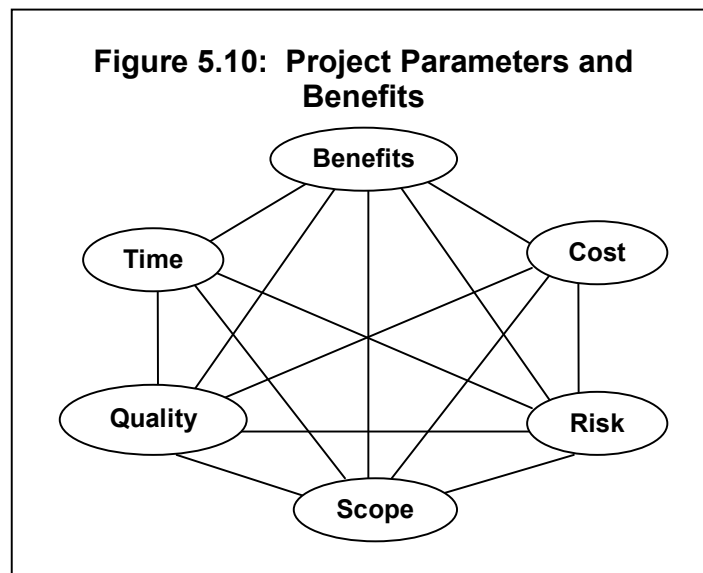
We should be careful not to overstate benefits to gain project approval, or identify only efficiency benefits. We should think in terms of best and worst case benefits. It is also important that we focus on higher-level effectiveness benefits, such as creating strategic advantage. A narrow focus on efficiency benefits (eg, enhance employee productivity, save money, reduce costs, improve reliability, comply with legislation etc) may undermine the potential for stakeholder satisfaction in terms of achieving business benefits. Also, we should shoot those who champion dead projects – ones without benefits.

Planning Benefits Realisation. Project sponsors, users and other stakeholders usually want convincing evidence that project benefits have been identified and delivered. Good benefits planning also requires we set KPIs for benefits and identify how they will be realised and who will be responsible for their achievement. If there's no clear responsibility on an individual to deliver the benefits claimed at project conception, it is likely that this issue will be forgotten once the project is finished. That is, until the organisation performs a post-project audit and realises that their projects have not actually delivered any measurable benefits. Managing change is a key part of the plan. Unless there is a clear advantage to be gained, stakeholders will resist the change and fail to support it. The plan should articulate *"What's in it for me?"* Also, care needs to be taken to ensure multiple individual projects are not claiming the same benefits – double dipping. And be sure that the original benefit still is a benefit.

Monitoring Benefits. Monitoring the progress of the benefits plan is an important activity that is performed in conjunction with project execution activities. It is useful if the sponsor appoints a

benefits manager to the project as early as possible to ensure that importance is placed on achieving benefits as much as achieving on-time project delivery. We also need to recognise that changes to the project parameters and unprepared for risks could readily affect benefits as shown at Figure 5.10. For example, an external risk (ie, political, economic, social, technological, competition, legislative and environmental) may impact our forecast benefits for better or for worse. For example, the introduction of a capital gains tax may diminish the value of our property investment.

Realising Benefits. The post-project benefits review must identify what benefits have and have not been achieved as a result of the project. It's at this stage in the benefits lifecycle that the benefits achieved can be compared against the forecast benefits. Reviewing the outcome of the benefits plan is vital to ensure that lessons learnt from the investment are made available to the rest of our organisation. Stakeholder involvement in this benefits review is important. If benefits haven't been achieved stakeholders can help determine the cause and possible remedial action. One reason for not reviewing the achievement of benefits is that such a review consumes resources that some would argue can be better deployed on more pressing management concerns and projects.



Benefits and Responsibilities. The role of the project manager can sometimes include responsibility for delivery of benefits, thereby expanding considerably the scope of traditional project management. However, a more appropriate approach would be to recognise what part or parts of our organisation will be able to employ the deliverables and ultimately gain benefits from the product or service delivered by the project. A line manager from that part of our organisation then works alongside us project managers to help ensure that decisions made within the project context are always likely to ensure and enhance benefits to our organisation, and a smooth transition to operations occurs.

The formal process of benefits management is a relatively new concept and most organisations have no formal benefits management methodology. This suggests there is still a great need for promoting and training people in benefits management. Nevertheless, most organisations now realise they must manage the benefits as well as the costs in order that the project adds value, and that formal benefits management is needed from project conception through the project lifecycle and post-project until the benefits of the project have been as fully realised as possible. In summary we should:

- identify and quantify planned benefits, and determine how these will be tracked
- identify and assign responsibility for benefit realisation to the project sponsor and appropriate line managers and include this requirement in their performance agreements
- design the project to obtain optimum trade-off between benefits, scope, time, cost, quality and risk
- only consider the project to be fully finished when planned benefits are obtained
- measure benefits against a known baseline
- make benefits tangible whenever possible
- acknowledge that there could also be some 'disbenefits' or negative outcomes
- continue to review and forecast benefits (and costs) throughout the lifecycle of our project and beyond.

Business Case

We invest time, money and resources in projects in the basic belief that benefits will outweigh costs. This assessment is the basis of the business case, which is a 'living' document to be reviewed by the sponsor over the life of the project. In fact a project should be stopped if the viability of the business case disappears for any reason.

The purpose the project business case is to document the justification for undertaking the project based on the estimated cost of development and execution against the risks and the anticipated business benefits and savings to be gained. The sponsor, who 'owns' the business case, will be keen to monitor the ongoing viability of the project against the business case. The sponsor will need to use the business case to link project deliverables to corporate strategies.

Despite the wide range of possible projects, we can usually trace business benefits back to one or more of the following:

- **increased revenues**, which might be from a new product or service
- **decreased costs**, which might be from less resource use or more efficient resource use
- **decreased capital** by reducing money tied up in assets such as inventory, plant, buildings and equipment
- **compliance with legislation** such as health and safety regulations and thus avoid injuries, fines and litigation
- **reduced business risk** that contributes to uncertainty in future costs and revenue.

There may be other types of benefits, but most can be linked back to above five categories. However, perhaps the most obvious reason for the business case is to justify the resources and capital investment needed to bring the project to fruition. Yet the business case is more than a simple financial assessment. It's the one document where all relevant facts are recorded and linked into a cohesive story that tells us:

- why the project is needed
- how it will solve the problem, take advantage of the opportunity, or enable us to comply with legislation
- what is the recommended solution and how that will achieve the desired benefits
- what will happen to the organisation if the project is not undertaken
- when the solution will be implemented
- how much time, money, people and other resources will be needed to deliver the solution and realise the benefits.

While justification is needed for all projects, given the work effort involved, a formal business case may only be needed if our proposed project exceeds a certain cost and/or risk threshold. Usually the project sponsor would decide whether a formal business case is required and allocate responsibility for its preparation. The contents and size of the business case will depend largely on the proposed project's value, risk, duration, cost and contribution to the organisation's goals. The cost of preparing the business case must be balanced against the benefits of improved decision making.

The structure of the business case may vary. One basic format is outlined here:

1. **Overview** which sets the context and provides a brief description of the proposed project, its intended purpose, and its strategic alignment.
2. **Assumptions** on which the business case is based are identified and documented. These may change as reality unfolds.
3. **Options** are viable alternative strategies by which the project purpose may be achieved.
4. **Cost-benefit Analysis** evaluates the above options against economic, social, environmental and other considerations as appropriate to the organisation's purpose and the circumstances in which it operates. Each organisation is likely to have a standardised list of such considerations, some of which may be more important than others. Thus, a weighted-attributes decision model is usually appropriate if project options are to be accurately assessed, and a range of outcomes from optimistic to pessimistic to most likely recognised.
5. **Risk Assessment** that identifies key risks to the success of the project. Each risk is rated by impact and probability, and mitigation strategies identified as appropriate.
6. **Benefits Realisation** is an integral part of the business plan. Elements usually included in benefits realisation are:
 - strategies to achieve each identified benefit
 - risk to achieving identified benefits
 - assigning accountability to develop and implement strategies to achieve benefits
 - timeframes and how benefits will be monitored and measured.

The business case lies at the heart of any project. It exists throughout the project lifecycle, and needs to be regularly re-appraised to ensure the project is still a worthwhile investment and that a compelling

business need still exists. This re-appraisal would occur at least before project execution, whenever project parameters change significantly (ie, beyond tolerance levels) throughout execution, and during the project Finish phase. Such re-appraisals must ignore the effort and cost already expended. These are historical and we can't change them. Economists call them 'sunk costs' and accountants refer to them as 'irrelevant information'. The only thing we can plan to do is influence the future, so that's where our focus as sponsors and project managers must be. We can't manage what has already happened.

Cost-benefit Analysis

Of course, the most compelling business argument for our project will be if we can show that the benefits significantly outweigh the costs using hard numbers. The benefits that result from our project are likely to be spread over time. Overly optimistic or pessimistic assumptions about the size or the timing of costs and benefits can lead to poor investment decisions. We need to remain neutral or realistic when making such forecasts. Typical financial techniques for quantifying the benefits of projects in a consistent way are:

- return on investment (ROI)
- breakeven analysis
- net present value (NPV)
- internal rate of return (IRR)
- payback period.

As the name implies, a cost-benefit analysis seeks to identify all the 'hard' and 'soft' benefits of the proposed project. If aggregate costs exceed aggregate benefits, the project would not normally be considered further. The difficulties with such an analysis usually are:

- identifying all costs and all benefits
- knowing how certain are the costs and benefits – assured, probable, possible or unlikely
- converting costs and benefits to dollars
- identifying who will pay and who will benefit
- deciding how wide the analysis should be – to what extent are indirect costs and indirect benefits to be considered
- deciding how far into the future the analysis should reach
- deciding at what rate future cashflows should be discounted
- 'paralysis by analysis' is also a distinct possibility.

A simple example of a cost-benefit analysis is shown at Figure 5.11. For detailed information www.greenbook.treasury.govt.uk describes how we can make economic assessment of the social costs and benefits of proposed projects.

A cost-benefit analysis might be preceded by a force-field analysis, which is a brainstormed list of forces or reasons for and against the project.

Figure 5.11: Example Cost-benefit Analysis

Proposed Project

The sales director is deciding whether to implement a new computer-based sales processing system. The department has only a few computers, and the salespeople are not entirely computer literate. However, computerised sales forces are able to contract more customers and give a higher quality of reliability and service to those customers. They are more able to meet commitments, and can work more efficiently with fulfilment and delivery staff. Is this IT project worthwhile?

Estimated Costs

New computer equipment:

- 10 network-ready PCs with supporting software @ \$1,225 each
- 1 server @ \$1,750
- 3 printers @ \$600 each
- Cabling & Installation @ \$2,300
- Sales Support Software @ \$7,500

Training costs:

- Computer introduction – 8 people @ \$400/day
- Keyboard skills – 8 people @ \$800 each
- Sales Support System – 12 people @ \$500 each

Other costs:

- Lost time: 40 man days @ \$200 each
- Lost sales through disruption: estimate: \$10,000
- Lost sales through inefficiency during first months: estimate: \$10,000

Total Costs: \$69,200

Estimated Benefits

The measurable benefits are estimated to be:

- Tripling of mail shot capacity: estimate: \$30,000/year
- Ability to sustain telesales campaigns: estimate: \$20,000/year
- Improved efficiency and reliability of follow-up: estimate: \$25,000/year
- Improved customer service and retention: estimate: \$20,000/year
- Improved accuracy of customer information: estimate: \$10,000/year
- More ability to manage sales effort: \$20,000/year

Total Benefits: \$125,000/year

Decision

Payback time: $\$69,200 / \$125,000 = 0.55$ of a year = about 28 weeks.

Unavoidably, the estimates of a benefit given by the new system are somewhat subjective. Despite this, the Sales Director is very likely to proceed with the project, given the short payback time.

Key Points

Cost-benefit Analysis is a powerful, widely used and relatively easy tool for deciding whether to make a change.

To use the tool, first work out how much the change will cost to make. Then calculate the benefit from it.

Where costs or benefits are paid or received over time, work out the time it will take for the benefits to repay the costs.

Major NZ roading projects, including the controversial Transmission Gully are typically assessed using a formula which pits the total costs of the project against the economic value of the projected benefits. Benefits include how many lives might be saved, how much time might be saved, and environmental effects such as reduced carbon dioxide levels. All these are converted to a dollar figure. At the time of writing this book NZ Transport Agency applied a price tag of \$2.7 million for each human life. One hour of work time was worth \$23.85, non-work time was worth \$6.90, and commuting time was worth \$7.80 per hour.

Recognising the difficulty of identifying and quantifying costs and benefits may encourage a worst-case and best-case cost-benefit analysis, and/or a sensitivity analysis where various 'what-if' scenarios show which assumptions/variables will have the strongest impact on the outcome. Time until benefits equal costs (ie, break-even point) is also important in a rapidly changing marketplace.

Perhaps the main value is that such an analysis encourages those involved to take a wider and longer-term view of the prospective project. The immediate and longer-term financial, economic, competitor, social, political and environmental consequences are more likely to be assessed.

Some typical reasons for not proceeding with a project are:

- it is not financially viable (ie, costs exceed benefits)
- lack of resources – time, people, skills, money, equipment
- project goal is in conflict with the organisation's vision, strategies, long-term goals or core values
- lack of support and sponsorship
- violates policy or legislation
- unable to be implemented quickly enough
- conflicts with existing projects or proposed projects of higher priority
- excessive uncertainty and risk.

A cost-benefit analysis identifies and compares the estimated costs and benefits of a possible project. The resultant ratio provides a measure of expected project profitability:

$$\text{Profitability Index} = \frac{\text{Revenue}}{\text{Costs}}$$

A ratio or index of 1.0 means expected benefits and costs are equal, a ratio of less than 1.0 means that costs are likely to exceed benefits, and a ratio of more than 1.0 indicates a potentially profitable project. The higher the ratio, the more profitable the project is likely to be, but uncertainty may mean we would need a ratio of at least 2 and preferably 4 or greater if uncertainty is high.

Before undertaking a cost-benefit analysis there are some questions that need to be considered, key among which are:

How far into the future should we estimate future cashflows, recognising their diminishing value and increasing uncertainty with time, therefore the need to discount them back to present day values (ie, Net Present Value calculations). Usually some preference is given projects with a quicker return on investment (ROI). Time to BEP (breakeven point) or payback period is often a consideration. Some industries may not consider an investment which doesn't show a positive return within say six months

(eg, software products). In other situations, such as projects that deliver policy and legislation, the resultant benefits may not be obvious for some years. Also, some major engineering projects have a considerable life expectancy during which period benefits will accrue.

How holistic or broad should be the analysis? Should we only concern ourselves with financials, or should the analysis also take into account wider economic, safety, environmental and social consequences? Private industry needs to consider these wider issues in so much as relevant legislation requires, whereas government is likely to assess such issues in more depth and further into the future. A difficulty with non-financial costs and benefits is to quantify them to facilitate a comparison.

To what extent should we attempt to 'dollarise' the various costs and benefits involved? These include:

- **direct and indirect** costs and benefits, where direct costs are more easily identified and indirect costs may occur as a consequence of direct costs and benefits (ie, a chain reaction situation where one benefit produces another one)
- **tangible and intangible** costs and benefits, where tangible costs and benefits are readily expressed in dollar terms, and intangible costs and benefits often defy such convenient quantification, despite their obvious significance
- **immediate and longer-term** costs and benefits, where the immediate are usually more obvious and certain than are the longer-term, but not necessarily more significant.

Thus, the scope of a cost-benefit analysis needs to be carefully determined. Clearly a more comprehensive analysis takes longer to complete, and sometimes the limited time available to exploit an opportunity might only permit an analysis of the readily quantifiable, immediate and direct costs and benefits. Incidentally, both costs and benefits need to be equally assessed in terms of the scope of the analysis. It would be an inappropriate comparison to include only immediate costs, but immediate, intermediate and longer-term benefits. This would make for an unbalanced and biased analysis. Thus, before embarking we need to decide:

- How far into the future to look?
- Whole-of-life costs?
- To what extent will indirect costs and benefits be considered?
- How wide will our analysis be in terms of:
 - business consequences?
 - political consequences?
 - health and safety consequences?
 - environmental and sustainability consequences?
 - social and cultural consequences?
 - technological consequences?
 - regulatory consequences?

Also, it is not always immediately clear whether a cost or a benefit is quantifiable. Benefit likelihood

ranges from auditable to identifiable:

- An **auditable benefit** is immediately related to money, such as \$60,000 per annum salary saving redundancy.
- A **quantifiable benefit** is one that can be measured absolutely, such as a 5 percent increase in market share, or 10 percent fewer complaints.
- A **measurable benefit** is one that can be measured relatively, but not absolutely, such as sales information may be available a week earlier, or a process has fewer activities than previously.
- An **identifiable benefit** is when it can be agreed that a change for the better will or has occurred, but it can't be measured, such as more attractive documentation, or a more easily read website.

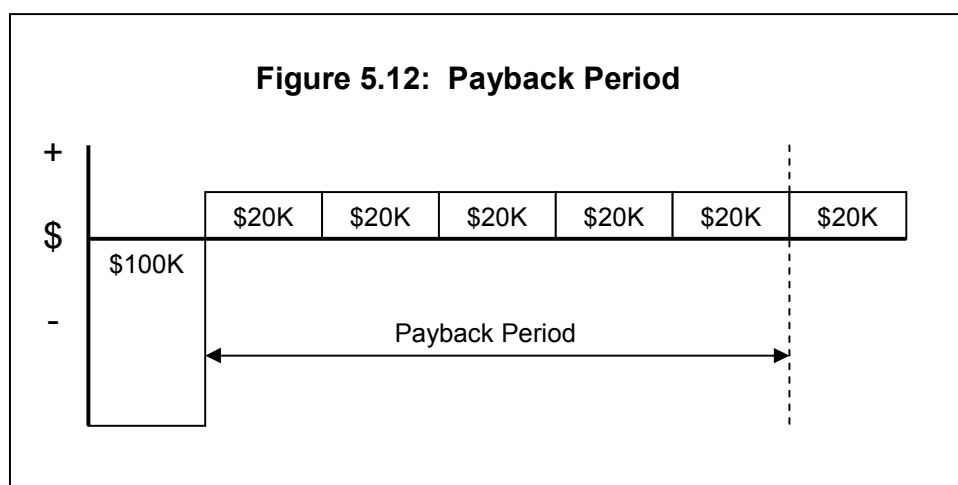
Some organisations will only accept auditable and quantifiable benefits for investment analysis purposes. Others may accept non-quantifiable benefits that are expressed as qualitative statements. A benefits likelihood distribution over time can also be prepared.

Another consideration is how certain or otherwise benefits are. Low-probability benefits are not usually included in the analysis.

A completed cost-benefit analysis is essential to the project business case, which may also form part of the project charter. The business case should be reviewed periodically, particularly if costs and benefits change. Ultimately the client will assess the success of the project in terms of 'value added' (ie, benefits minus costs).

Payback Period

A simple measure of financial attractiveness is the project payback period. This is the measure of how long from the product launch it takes for the project costs to be paid back by the project benefits. At figure 5.12 is a project with a required investment of \$100,000 in year one, and in each subsequent year there are net benefits of \$20,000 each year. Thus, the payback period is five years.



Projects with a short payback period are usually more attractive, given the increasing uncertainty

associated with cashflows beyond the first two or three years of the deliverable lifecycle. Some organisations require that prospective projects have a maximum payback period of say three years. However, for high-tech products this period is often considerably less. The payback period depends on the type of project. Conversely, a three year limit for major infrastructure development projects is unlikely to be realistic. Their economic life might be 40 to 50 years minimum.

Return on Investment

The example at Figure 5.12 shows a total revenue of \$120,000 and an investment of \$100,000. This allows us to calculate the Return on Investment (ROI), which is the ratio of the net return to the cost of the investment expressed as a percentage:

$$\begin{aligned}\text{ROI} &= \frac{\text{Net Return} - \text{Investment}}{\text{Investment}} \\ &= \frac{\$120,000 - \$100,000}{\$100,000} \\ &= \frac{\$20,000}{\$100,000} \\ &= 20 \text{ percent}\end{aligned}$$

Although payback period and ROI are relatively easy to calculate, they both ignore the time value of money. Time value is reflected in two more sophisticated financial models – net present value (NPV) and internal rate of return (IRR), which discount cashflows.

Net Present Value (NPV)

The principle underlying NPV is the ‘time value of money’ which recognises that a dollar we receive today is worth more than a dollar we will receive in the future. The reason? Even assuming no inflation, the dollar we receive today can be invested to earn a return over the remaining years. The same is not true for a dollar received five years from now.

If we receive \$100 today and invested it at 5 percent per year compounding interest, that dollar would be worth \$128 in five years. Thus, receiving \$128 in five years’ time is the equivalent of receiving \$100 today.

Once a project’s future cashflows have been estimated, these cashflows need to be discounted to determine their present value. The discount rate may also be referred to as the hurdle rate, the required rate of return, the weighted average cost of capital (WACC), or the cost of capital. To determine the discount rate we have to estimate the risk of the future cashflow. The same discount rate is applied across the entire life of the project. Essentially, the risk attached to the dollar in the future determines how much it’s worth today. The discount rate is synonymous with risk.

The first task is to estimate future cashflows (costs and revenue) over the period of the project and the product or deliverable lifecycle. The difficulties in estimating these cashflows include:

- it’s much easier to estimate one year out than say five years out
- often there is no history on which to base the estimate, since the product or service is new
- a project champion is more likely to overstate future revenue or product demand/volume in order to get the project approved

- all future cashflows are based on huge assumptions about the future – competition, customers, economics, politics, stability etc – which could prove to be wrong (and necessitate a financial reassessment).

The discount rate is included in the formula for determining compound interest:

$$Y = P(1 + I)^n$$

Y is future income
I is interest rate or discount rate
n is number of years
P is present value

$$P = \frac{Y}{(1 + I)^n}$$

Applying this formula enables us to develop a table showing discount factors with which to multiply future cashflows to determine present value over the period of the deliverable lifecycle. See Figure 5.13 where **n** is years. An example showing how the discount rate is applied to future cashflows is at Figure 5.14. In this project the discount rate is 10% and the required payback period is three years.

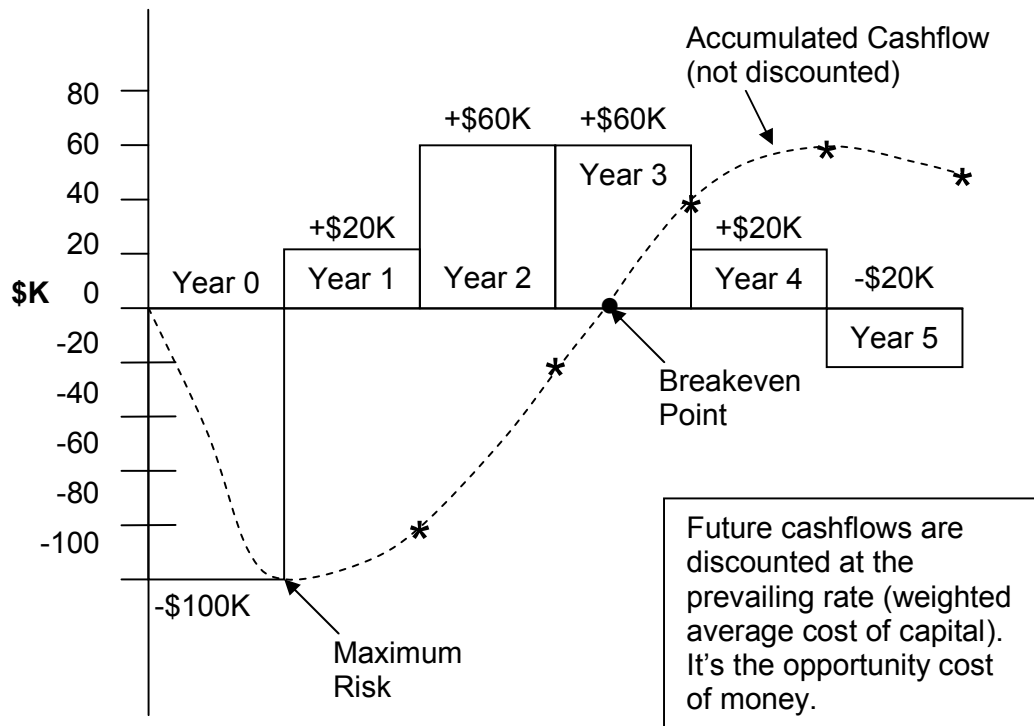
Figure 5.13: Discount Factors

n	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	.9259	.9174	.9019	.9009	.8929	.8850	.8772	.8696	.8621	.8547	.8475	.8403	.8333
2	.8573	.8417	.8264	.8116	.7972	.7831	.7695	.7561	.7432	.7605	.7182	.7062	.6944
3	.7938	.7722	.7513	.7312	.7118	.6931	.6750	.6575	.6407	.6244	.6086	.5934	.5787
4	.7350	.7084	.6830	.6587	.6355	.6133	.5621	.5718	.5523	.5337	.5158	.4987	.4823
5	.6806	.6499	.6209	.5935	.5674	.5428	.5194	.4972	.4761	.4561	.4371	.4190	.4019
6	.6302	.5963	.5645	.5346	.5066	.4803	.4556	.4323	.4104	.3898	.3704	.3521	.3349
7	.5835	.5470	.5132	.4817	.4523	.4251	.3996	.3759	.3538	.3332	.3139	.2959	.2791
8	.5403	.5019	.4665	.4339	.4039	.3762	.3506	.3269	.3050	.2850	.2660	.2490	.2326
9	.5002	.4604	.4241	.3909	.3606	.3329	.3075	.2843	.2630	.2434	.2255	.2090	.1938
10	.4632	.4224	.3855	.3522	.3220	.2946	.2697	.2472	.2267	.2080	.1911	.1756	.1615
11	.4289	.3875	.3505	.3173	.2875	.2607	.2366	.2149	.1954	.1778	.1619	.1476	.1346
12	.3971	.3555	.3186	.2858	.2567	.2307	.2076	.1869	.1685	.1520	.1372	.1240	.1126
13	.3677	.3262	.2897	.2575	.2292	.2042	.1821	.1625	.1452	.1299	.1163	.1042	.0935
14	.3405	.2992	.2633	.2320	.2046	.1807	.1597	.1431	.1252	.1110	.0985	.0876	.0779
15	.3152	.2745	.2394	.2090	.1827	.1599	.1401	.1229	.1079	.0949	.0835	.0736	.0649
16	.2919	.2519	.2176	.1883	.1631	.1415	.1229	.1069	.0930	.0811	.0780	.0618	.0541
17	.2703	.2311	.1978	.1696	.1456	.1252	.1078	.0929	.0802	.0693	.0600	.0520	.0451
18	.2503	.2120	.1799	.1528	.1300	.1108	.0946	.0808	.0691	.0592	.0508	.0437	.0376
19	.2317	.1945	.1635	.1377	.1161	.0981	.0829	.0703	.0596	.0506	.0431	.0367	.0313
20	.2145	.1784	.1486	.1240	.1037	.0868	.0728	.0611	.0514	.0433	.0365	.0261	.0221

Another worked example is for a possible construction project, with a deliverable life of 10 years and a product salvage value of \$35,000 in year 11. The table at Figure 5.15 shows estimated cashflows over the period. These have been discounted at the prevailing rate of 20 percent. The result is a negative NPV. Thus, from a financial viewpoint, the proposed project is not at present a viable investment. Calculations are to the nearest \$1000. Such NPV assessments might be run with both pessimistic and optimistic values, and Monte Carlo simulation employed.

Figure 5.14: Discounted Cashflows

NPV recognises the time value of money. Future net cashflows need to be discounted to present day values for valid comparison with the initial investment cost. This example is based on a discount rate of 10%.



This organisation requires that a positive NVP be achieved within three years after product launch, which these calculations support.

Year	Cashflow	Discount Factor	Present Value
0	(\$100,000)	1.000	(\$100,000)
1	\$20,000	0.9091	\$18,182
2	\$60,000	0.8264	\$49,584
3	\$60,000	0.7513	\$45,078
NPV =			\$12,844

Figure 5.15: NPV Worked Example

Year	Cashflow (\$K)			Discount Factor	Net Present Value
	Positive	Negative	Net		
0	0	125	-125	1.0000	-125
1	0	100	-100	0.8333	-83
2	0	90	-90	0.6944	-62
3	50	0	50	0.5787	29
4	120	15	105	0.4823	51
5	115	0	115	0.4019	46
6	105	15	90	0.3349	30
7	97	0	97	0.2791	27
8	90	15	75	0.2326	17
9	82	0	82	0.1938	16
10	65	0	65	0.1615	10
11	35	0	35	0.1346	5
					-\$39K

Figure 5.16: Internal Rate of Return Calculation

What is the IRR, given the organisation's cost of capital is 15%, the relevant cashflows, and an initial investment of \$500,000.

Year	Inflow	Factor	Present Value
1	100,000	.8696	86,960
2	120,000	.7561	90,732
3	150,000	.6575	98,625
4	190,000	.5718	108,642
5	250,000	.4972	124,300
			\$509,259

Initial Investment	=	500,000
Net Present Value	=	9,259
IRR	=	16% (15.77%)

Internal Rate of Return (IRR)

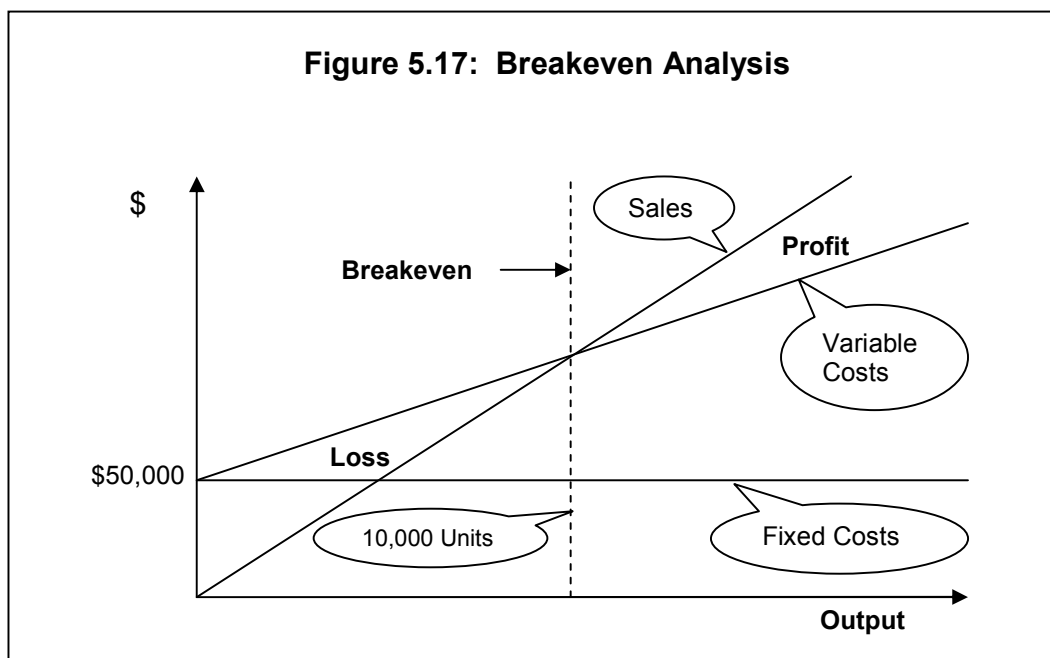
The internal rate of return (IRR) is a discounted cashflow technique that effectively provides the breakeven required rate of return. Conversely, if the discount rate equals the cost of capital, the NPV is zero. See Figure 5.16. The advantages of this technique are that it allows for comparison of projects of different size, it recognises the time value of money and takes all relevant cashflows into account. However, an assumption is made that all cashflows occur at the end of each year.

Breakeven Analysis

A breakeven analysis is not the same as a cost-benefit analysis. The breakeven analysis enables us to see how profit varies with volume. It's also useful for comparing the cost effectiveness of mutually exclusive projects. For example, a company makes products that sell for \$10 each. The variable cost per unit is \$5. This covers labour and materials, and leaves \$5 per unit as a contribution towards fixed costs. If the fixed costs total \$50,000 per annum, which covers all the overhead costs, the breakeven point is reached when the contribution equals fixed costs:

$$\begin{aligned}\text{Breakeven Point} &= \frac{\text{Fixed Costs}}{\text{Contribution per Unit}} \\ &= \frac{\$50,000}{\$5} \\ &= 10,000 \text{ units.}\end{aligned}$$

In this example, if output is less than 10,000 units, the project would result in a loss, while a greater output would make a profit. See the characteristic graph at Figure 5.17.



Other Project Evaluation Tools

A formula for assessing project acceptability is the **Pareto Priority Index (PPI)** where:

$$\text{PPI} = \frac{\text{Estimated Revenue} \times \text{Probability of Success}}{\text{Estimated Cost} \times \text{Years to Complete}}$$

An example of this formula applied to five different projects to determine their priorities is shown at Figure 5.18. Revenue and cost figures have been discounted.

Figure 5.18: Pareto Priority Index						
Project	Revenue (x 1000)	Probability	Cost (x 1000)	Time (Years)	PPI	Project Ranking
A	\$100	0.7	\$10	2	3.5	5
B	\$50	0.7	\$2.0	1	17.5	3
C	\$30	0.8	\$1.6	0.25	60	1
D	\$10	0.9	\$0.5	0.5	36	2
E	\$15	0.6	\$1.0	0.1	9	4

Another project selection formula is **Index of Attractiveness** where projects are rated using the following calculation:

$$\text{Project Rating} = \frac{T \times C \times P}{D}$$

- Where:
- T = probability that the project deliverable will be successfully produced
 - C = probability that the project deliverable will perform successfully or be a commercial success
 - P = profit if successful
 - D = cost of project.

The higher the rating the more attractive the project is likely to be. The values of T, C, P and D are subjective estimates. See the worked examples at Figure 5.19.

Figure 5.19: Index of Attractiveness

Project	T x C x P / D = Rating					Ranking
A	0.8	0.6	5000K	200K	12.00	1
B	0.6	0.9	1000K	500K	1.08	4
C	0.6	0.8	10000K	700K	8.00	2
D	0.9	0.7	11000 k	3000K	2.31	3

Opportunity Cost

Opportunity cost is the cost of choosing one among several alternatives (projects) and, therefore, giving up the potential benefits of another or others. If an organisation chooses Project A (to manufacture a product that has an identified buyer and will generate a profit of \$500,000) instead of Project B (to develop an experimental product with no identified buyer and a potential of \$800,000), the organisation is knowingly giving up potentially \$800,000 for the more secure \$500,000 profit. In selecting a project, the company commits finite resources, time, and energy. Therefore, it is important to take selection seriously. Making poor choices in approving projects can cause the company to miss out on better opportunities. However, resources could be redirected if better opportunities arise.

Project Risk and Success Probability

Success probability is the reciprocal of risk, which needs to be weighted against potential return. Some factors that influence success probability in most projects are listed at Figure 5.20. This tool could be used to compare prospective projects. However, we should appreciate that some of these success factors will be more important than others, and the assessment scale would need to be adjusted to reflect these differences. An organisation will not necessarily decline a project with a higher risk profile providing a higher return is likely. In practice, competitive organisations manage a portfolio of projects, some with high risk/high return characteristics, but most are likely to be of the low risk/moderate return variety. The mix varies with the industry, organisation culture, and our risk tolerance.

Obviously a risky project should only be undertaken when the potential benefits and chances of success safely exceed the remedial costs of project failure. We shouldn't lose sight of the basic reason for taking a risk – to gain a specific reward.

Figure 5.20: Success Probability Checklist	
SUCCESS ATTRIBUTE	HIGH ← SUCCESS PROBABILITY → LOW
1. Project Definition	<div>Precise</div> <div>Vague</div> <div>5 4 3 2 1</div>
2. Project Novelty	<div>Low</div> <div>High</div> <div>5 4 3 2 1</div>
3. Level of Innovation	<div>Low</div> <div>High</div> <div>5 4 3 2 1</div>
4. Level of Complexity	<div>Low</div> <div>High</div> <div>5 4 3 2 1</div>
5. Project Duration	<div>Short</div> <div>Long</div> <div>5 4 3 2 1</div>
6. Stability of Technology Used	<div>High</div> <div>Low</div> <div>5 4 3 2 1</div>
7. Geographical Spread	<div>Low</div> <div>High</div> <div>5 4 3 2 1</div>
8. Project Disruptive to Business-as-usual	<div>Low</div> <div>High</div> <div>5 4 3 2 1</div>
9. Availability of Suitable Backup Product/Service/Process	<div>Assured</div> <div>Unavailable</div> <div>5 4 3 2 1</div>
10. Number of Functional Areas, Contractors, Stakeholders, and Consultants Involved.	<div>Few</div> <div>Many</div> <div>5 4 3 2 1</div>
Success Probability Score	<div>High Medium Low</div> <div>50 40 30 20 10</div>

Consider a project where revenue from sales of the product is estimated at \$500,000, the likelihood of success is 80 percent (given the various risks), and the project cost is likely to be \$200,000:

$$\begin{aligned}
 \text{Expected gains} &= \$500,000 \times 0.8 \\
 &= \$400,000 \\
 \text{Expected losses} &= \$200,000 \times 0.2 \\
 &= \$40,000 \\
 \text{Net gain} &= \$360,000
 \end{aligned}$$

Thus, from a risk versus reward perspective this project would seem to be acceptable. However, if the estimated profit from sales was only 10 percent of gross revenue, project costs would exceed benefits by 5:1 as follows:

$$\begin{aligned}
 \frac{\text{Benefits}}{\text{Costs}} &= \frac{\text{Revenue} \times \text{Profit} \times \text{Success Probability}}{\text{Costs}} \\
 &= \frac{\$500,000 \times 0.1 \times 0.8}{\$200,000} = \frac{\$40,000}{\$200,000} = \frac{1}{5} \\
 &= \text{Negative profitability index}
 \end{aligned}$$

Selection Criteria

Possible criteria or attributes against which our organisation might evaluate project acceptability and determine project priorities are:

1. Strategic Acceptability

- Is the project consistent with our organisation's core business and values?
- Will the project contribute to realising our organisation's vision and business goals?
- Does the project promise to exploit our organisation strengths and avoid our weaknesses?
- Is the project compatible with our existing and pending projects and routine business?
- Will the project enhance our public image?
- Will shareholders and the share market react positively to the investment?

2. Investment Appraisal

- What size investment is needed?
- Will there be sufficient return on the investment?
- Is the level of financial risk acceptable?
- Will the rate of return, payback period, profitability index, and index of attractiveness be acceptable?
- Will there be a positive net present value after future cashflows are discounted? Best case? Worst case?

- Will the benefits of proceeding sufficiently exceed costs?
- What will be the costs, including operating and maintenance costs?
- What opportunities would we forego?

3. Technical Feasibility

- Is the necessary technology currently available?
- Is the necessary expertise and methodology available?

4. Risk Assessment

- How precise is the project definition?
- How novel and complex is the project?
- How accurate are the estimates?
- How realistic are the project performance standards?
- How proven are the technology and methodology?
- Is appropriately experienced expertise available?
- How dependent is project success on uncontrollable external factors?
- How united are stakeholders?
- How supportive is senior management?
- Are risk mitigation measures available?

5. Market Factors

- Will consumers find the product acceptable?
- What demand is expected?
- What market share is expected?
- What is the 'time to market'?
- Are tariff and non-tariff barriers prohibitive?
- What product lifespan is envisaged?
- What effect will the product have on existing suppliers and products?
- What will be the promotion and launch costs?
- What supply chain costs are anticipated?
- Are other value-added features or spin-offs possible?
- What will be our competitors' reactions?

6. Legislative Compliance

- Will the project comply with existing law and regulations?
- What penalties apply for non-compliance?
- Will the project comply with pending and projected law and regulations?

- Is a change of government imminent?

7. Resource Availability

- Is funding available?
- Will our creditworthiness enable loan money to be raised?
- Will sponsorship be available?
- Will labour and expertise be available?
- Will training be needed?
- Will materials and supplies be available?
- Will machinery and equipment be available?
- Will storage and work sites be available?
- Will technology, information systems, methods and processes be available?
- What are our current and projected resource commitments?
- Will external contractors and consultants be needed?

8. Other Factors

- Is this a sustainable development?
- What will be the environmental impact (eg, mauri, carbon footprint, climate pollution)?
- What will be the social impact (eg, iwi reaction)?
- What will be the political impact?
- How easy will the project be to implement?
- What would be the cost and other consequences of not doing the project?
- Are there patent, trademark, research and development, privacy, copyright and intellectual property implications?

Sustainable Development

Sustainable development requires that we be more prudent with resources and minimise waste. Essentially, sustainable development is about meeting the needs of the present without compromising the ability of future generations to meet their own needs. Although sheer population growth is a factor, sustainable development often seems to be over-shadowed by the market economy model driven by the principles of maximum production and profit. Most discussions on this topic focus on political or policy level issues and global concerns. However, sustainability is just as important at local project level. Essentially, we need to avoid projects that lead to unsustainable development. We also need to remember that sustainability is becoming much more important to our project clients and other stakeholders. It's a matter of corporate responsibility. Sustainability also needs to be considered after project approval.

Sustainability and improving the bottom line don't have to contradict. The two goals are not mutually exclusive. Also, we can't always put a number on the advantage of having a green reputation, ahead of regulations. The cost of failing to embrace sustainability as a business principle and as a project

selection criterion, exposes organisations to such risks as consumer backlash, potential loss of stakeholder confidence and support, and loss of employee engagement.

With regard the cost or consequences of not doing the project, there might for example be a loss of market share, an increasing cost of maintenance, or heavy legal penalties for non-compliance with new laws and regulations. Such consequences of **not doing the project** might be compelling reasons to proceed.

The above list is not exhaustive. An organisation needs to develop its own list of project selection criteria and an appropriate selection model as a basis for deciding each project's acceptability and priority, and for selecting between mutually exclusive projects. There are two basic types of project selection models:

- **numeric models** which are mostly financially based and quantify the prospective project costs and benefits
- **non-numeric models** which consider a wider range of selection criteria that are important but sometimes defy ready quantification.

Selection Models

Our organisation might base their project selection and prioritising on perhaps five or six key criteria sometimes using a decision matrix to quantify the process. See Figure 5.21. Using such a selection model usually involves the following steps:

1. identify and clearly define selection criteria
2. list them in order of importance
3. assign them a weighting (numerical value) that depicts their relative importance
4. grade each project against each of the weighted criteria
5. multiply each grade by each criterion weight to score each proposed project against each of the selection criteria
6. total the resultant scores for each project in order to rank them
7. if some total scores are equal, gather further information about the top criteria in order to decide, rather than introduce new criteria (ie, apply the Pareto principle or 80:20 rule).

Figure 5.21: Project Selection Matrix

Selection Criteria	Criteria Weight	Project A		Project B		Project C	
		Grade	Score	Grade	Score	Grade	Score
Strategic Fit	10	3	30	2	20	3	30
Rate of Return	8	2	16	3	24	2	16
Success Probability	6	3	18	3	18	2	12
Customer Demand	6	2	12	3	18	1	6
Resource Availability	5	2	10	3	15	2	10
TOTALS			86		95		74
Order of Acceptability		2 nd		1 st		3 rd	

Where:

Grade 3 is high
 Grade 2 is medium
 Grade 1 is low
 Criterion Weight x Grade = Score

Use decimal points if necessary to more accurately grade each project.

Notes:

1. Consider each project horizontally against each criterion in rank order of criteria.
2. Should ties need to be resolved, gather further information about existing criteria, rather than introduce new criteria.

The completed matrix provides a clear summary of the decision-making process. Such a record is useful for review and audit purposes. The same process could be applied to all decision-making situations where alternatives need to be accurately and objectively evaluated against common criteria. Such a process helps ensure that the right decision is made first time. Other occasions when the decision matrix might be used are when selecting project team members, contractors and consultants, when evaluating alternative proposals, suppliers, tenders and strategies for the achievement of project objectives, and when evaluating alternative solutions to project implementation risks and issues.

A variation on the above model, which allows us to assign probabilities, is at Figure 5.22. The probabilities are estimates determined by the project selection group. The total score can be compared with other possible projects to establish project priorities. The evaluation attributes might also include non-financial factors. In the example at Figure 5.22, the Cost-benefit Ratio for example is assessed at 60% Good, 30% Fair and 10% Poor, where, for example:

- Very Good (5) means a ratio of benefits in excess of costs of 4.
- Good (4) means a ratio of 3—4.
- Fair (3) means a ration of 2—3.
- Poor (2) means a ratio of 1—2.
- Very Poor (1) means a ratio of under 1.

Figure 5.22: Project Selection Scoring Card

Evaluation Criteria	Probability Spread					Score	Weight	Total Score
	Very Good (5)	Good (4)	Fair (3)	Poor (2)	Very Poor (1)			
1. Contribution to Business Goals	0.2	0.8				4.2	10	42.0
2. Benefit/Cost Ratio		0.6	0.3	0.1		3.5	8	28.0
3. Payback Period		0.5	0.5			3.5	7	24.5
4. IRR								

Project Charter

Our project's been proposed, defined, passed through a selection committee, and approved or at least approved in principle. The final step in the project Conceive phase is the preparation of the project charter, which PMBOK® describes as *"a document issued by the project initiator or sponsor that formally authorises the existence of the project, and provides the project manager with the authority and guidance to apply organisational resources to project activities."*

While the charter, which is the project initiation document, is usually signed by the project sponsor, chief executive or client (ie, project owner), it may have been prepared by the newly appointed project manager. Should another project manager be appointed during the project, a new charter should then be prepared and issued. It's always in our interests as project managers to have a formally approved charter. It's our contract and an expression of senior management support.

Other project management methodologies may refer to the project charter as a proposal, project brief, terms of reference or even business case. In some instances the contract agreed between the client and contractor would be the equivalent of the charter when project completion has been outsourced.

The primary purpose of the project charter is essentially twofold. It acknowledges that project detailed planning should begin and it assigns the project manager. But, let's look a little closer at the project charter purposes:

- **Acknowledges that the project should begin.** The charter announces to all the stakeholders that the project proposition has received approval and been endorsed by upper management. It serves as official notification to the functional business units that their cooperation is needed and expected. It's a clear decision that the organisation commits to the project.
- **Commits resources to the project.** The project charter commits the organisation's resources to the work of the project. This includes time, materials, money and human resources. Although the precise schedule is yet to be determined and project plan implementation yet to be approved.
- **Ensures that everyone is on the same page.** This may seem obvious, but we would be

surprised by how many projects get started without a project charter or its equivalent and very few documented requirements. Perhaps half of the stakeholders think the purpose of the project is to upgrade the network, and the other half think the purpose of the project is to move the servers in the computer room to a new location. That might be a stretch, but see the point. When the purpose, objectives, overview of the project, reporting arrangements, and guidelines provided for the project manager are written down and agreed upon, everyone understands the purpose and approach from the beginning and confusion is eliminated.

- **Appoints the project manager.** In some cases, the project manager is known prior to the creation and publication of the project charter. However, the project charter serves as the official notification and appointment of the project manager. The project sponsor formally assigns authority and responsibility for the day-to-day management of the project to the project manager. This means that line managers and other resource owners are put on notice that we'll soon be requesting resources from their areas. Also, stakeholders and team members alike know that we're calling the shots on project issues. Does this mean that we're automatically born leaders and everyone is going to do what we say? No way. Just because we have the authority doesn't mean that people will respect (or respond to) that authority.
- **Provides an overview of the project and its goal.** The project charter is the first detailed stab at describing the project purpose, overview, goal, high-level deliverable(s) and outline work scope, estimated cost and time frame, tolerances, milestones, upward reporting needs, and other essential details as a basis for detailed planning. All this points us back to good communication skills. A well-documented project charter keeps the team on track and helps maintain the focus on the purpose of the project. However, a concise charter is much preferred to a 30 page document with attachments. A thoughtful charter describes the ends, but not the means.

A template to help us with charter preparation is at Appendix Three. I think we should prepare a project charter, whether or not this is our organisation's normal practice, and have our sponsor or CEO release it. If you are at present managing a project for which there is no charter, my advice is prepare one now for your sponsor's release as soon as possible. Give it a wide distribution. It's an important source of authority for us. And, ideally to avoid the 'grenade-over-the-wall' syndrome, the relevant line manager(s) might also be involved in its preparation, or at least sent a copy for timely comment.

Although the project manager may not have been much involved during project conception, the next phase of the project lifecycle considerably involves us. We are the key participant in the Develop phase, which in this framework commences with the detailed documentation of the project's work scope guided by the description in the charter. Any activities, expenses, benefits and changes contemplated that are outside those documented in the charter must first be approved by the project sponsor and the charter then updated to reflect these authorised changes as need be. Version control is needed.

Summary

Some key questions concerning the viability of a project are:

- Does it fit our strategy?
- Will its benefits sufficiently exceed its costs?
- Will the risks be acceptable?
- Will funding and other resources be available?
- Is it a sustainable development?

Better selection decisions are possible when organisations:

- Adopt a rational decision-making process.
- Train employees in the use of that process and its associated tools and techniques.
- Improve employees' understanding and use of the process through practice.
- Improve the process through feedback on its actual effectiveness.

Sustainability, carbon footprint, food miles – these terms are becoming more common as we assess the impact of our projects on our environment including climate and biodiversity consequences. See www.sustainability.govt.nz.

Finally, benefits realisation, whether financial, economic or otherwise, is the reason for undertaking a project. If no benefits are identified, the project should not proceed. Benefits management is now regarded as an essential process for project success. It seems likely that PMI® will soon include benefits management as a PMBOK® knowledge area.

Although the project manager may not have been involved in project selection processes, it's very useful that we familiarise ourselves with it, since success in large part is about delivering on promised benefits. The decisions we make can later be assessed against project benefits realisation. These benefits will be realised after the project lifecycle and during the product or deliverable lifecycle or lifespan. A benefits review allows us to validate the business case and recognise how we might prepare a better business case (cost-benefit analysis) next time. Of course, during the project, benefits need only justify remaining costs, otherwise we may be throwing good money after bad.

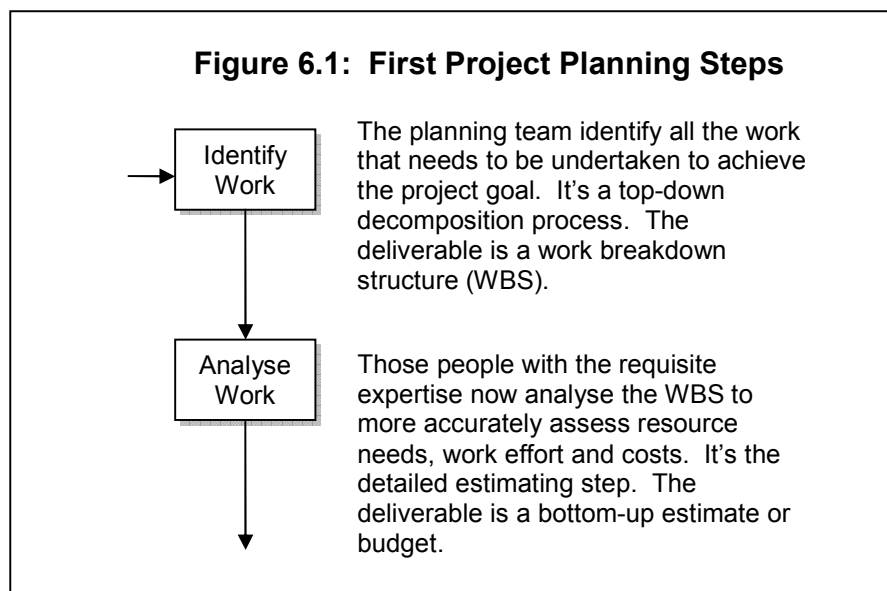


Chapter Six

IDENTIFY AND ANALYSE WORK



Once the green light is given for the project Develop phase to proceed, us project managers, who lead the planning process, will typically secure a project office and gather our core project team, have a kickoff session (teleconference or videoconference if need be), seek unanimous understanding of the charter, agree behavioural norms, and undertake the necessary planning. The sponsor usually attends at the start of this meeting to emphasis the importance of the project and answer initial queries. This chapter discusses the first two vital steps in this planning process. See Figure 6.1.



Some people may argue that planning is a waste of time. No sooner is the plan completed than someone wants to change it. However, a project plan is indispensable as a basis for change. No project is likely to be implemented exactly according to its first plan. As reality unfolds, the plan must be updated. There is no value in adhering stubbornly to a plan that is proving to be unsatisfactory. We must expect the plan to change. A project plan is therefore a dynamic and 'living' document. There are three main benefits to developing a project plan:

- **Planning reduces uncertainty.** Even though we would never expect the project work to occur exactly as planned, planning the work allows us to consider likely outcomes and where necessary to put preventative measures in place before implementation.
- **Planning increases understanding.** The mere act of planning gives us a better understanding of the goal and parameters of the project. Even if we were to discard the plan, we would still benefit from having worked through the process. Planning also enhances the commitment of

those involved.

- **Planning improves efficiency.** Once we have defined the project plan and the necessary resources to carry out the plan, we can schedule the work to take advantage of resource availability. We also can schedule work in parallel; that is, we can do tasks concurrently, rather than in series. By doing tasks concurrently, we can shorten the total duration of the project. We can maximise our use of resources and complete the project work in less time than by taking other approaches. Planning helps ensure best use of our resources.

It's sometimes said "*The more we plan, the luckier we get.*" However, there's a diminishing return associated with planning and we reach a point where further planning is not cost-effective – the benefits of doing so no longer exceed the costs involved. Nevertheless, some 20 percent of the total project work effort may typically be devoted to planning. By systematically thinking through and analysing our project, we gain valuable knowledge and insight, and develop commitment from those involved. A common cause of project failure is insufficient planning.

The plan is a description or road map that details how we intend to achieve the project goal. The plan not only tells us that we will do something; it also explains how we will do it. Like Kipling's six honest serving men, the plan contains the why, what, who, when, where and how of the project. The basic purpose of the plan is to enable effective and efficient implementation of the project.

Identify Work

Project scope or work scope is the work that must be done in order to produce the project deliverable with the features and functions required by the client as documented in the project service description or specification. It is also important to specify what the project will not deliver, particularly when it is something that might otherwise be readily or reasonably assumed into the project. The scope statement puts boundaries on the project in such a way that it will be absolutely clear if extra work is added later.

An important start point in scope definition therefore is to prepare the product or deliverable description, which documents the characteristics of the product or service that the client requires and that the project is undertaken to create. The description of this final deliverable or deliverables usually becomes more clear, detailed and specific as project planning proceeds and the client's requirements crystallise.

In order to develop the project scope it is necessary to identify the work needed to achieve the product scope. Essentially this means preparing a list of the elements or chunks of work to be completed. For example, if the final deliverable (ie, product or service) is a new house, the required work may include such elements as the purchase of land, preparation of building plans, selection of builders, etc. Each of these may be further sub-divided in order to more fully describe the project scope and thus enable detailed planning to proceed. It is a top-down decomposition of work needed to realise the project goal.

Project work elements are often best identified through group brainstorming. By including others, we solidify their commitment, and the result is generally a more accurate solution. The resultant mind-map or list is then reviewed, refined and published (often in chronological order) as a project work-list, a simple example of which is shown at Figure 6.2.

Figure 6.2: Project Work List

Project: publish newsletter

Summary task: design newsletter

- Task: select designer
- Task: prepare concepts
- Task: approve design

Summary tasks: prepare articles

- Task: assemble ideas
- Task: draft stories
- Task: approve stories

Summary tasks: print newsletter

- Task: decide stories' layout
- Task: proof read
- Task: print newsletter

Summary tasks: distribute newsletter

- Task: prepare mail list
- Task: label newsletter
- Task: mail newsletter

Project problems can be caused by forgotten work; not just inaccurate estimates. We need to remember to include less obvious work such as:

- | | | | |
|-------------|---------------|------------------|----------------|
| • planning | • management | • fixing defects | • teambuilding |
| • approvals | • reviews | • training | • consultation |
| • meetings | • inspections | • testing | • travel |

It is very useful to describe the work elements (ie, tasks and subtasks) with a verb first – the ‘imperative’ format. This helps distinguish work from an event (which is the start or finish of an element of work) and from the resultant deliverables. An important event is often identified as a milestone which might be the completion of an important interim deliverable. The relationship between these terms is summarised at Figure 6.3, which shows two levels of breakdown and where for example ‘newsletter designed’ may also be designated a milestone.

There is no commonly agreed terminology for successive levels of work breakdown. However, in its simplest structure project scope may be described as a number of activities or summary tasks each of which consist a number of tasks. Work breakdown is the process by which the project work is divided and further subdivided. Such a breakdown facilitates detailed project planning, budgeting, scheduling, work assignment, and control.

Figure 6.3: Scope Terminology

Work Elements (verb then noun)	Events (noun then verb)	Deliverables (noun)
design newsletter <ul style="list-style-type: none">• select designer• prepare concept• approve design	newsletter designed <ul style="list-style-type: none">• designer selected• concept prepared• design approved	newsletter design <ul style="list-style-type: none">• designer• concept• design

Work Breakdown Structure

The project work list may also be depicted in family tree format, called a work breakdown structure (WBS). See Figure 6.4 for a simple example. There need not be a uniform level of work breakdown and the lowest level of work breakdown is usually referred to as a ‘work package’.

Thus, the WBS defines and organises the total work scope for the project. It is the basis for detailed project planning. It turns one very large piece of work – the project – into many small manageable chunks of work. The reasons for breaking the project down or chunking it in this manner are:

- to further define project scope and codify work elements
- to allow for more accurate cost, work effort and duration estimates
- to enable the development of a schedule of work
- to facilitate progress measurement by elements of work
- to more precisely identify resources needed for the project
- to assign clearly defined elements of work (often illustrated by a responsibility assignment matrix) and identify outsourcing needs
- to enhance commitment through team participation in building the WBS.

A top-down mind-mapping approach using 3M Post-it™ Notes is usually an effective way to develop the WBS. ‘Top-down’ in this context means that successively smaller elements of work are identified by the team. Work is not necessarily broken down to a common lower level. For example, some level two work may not need to be further broken down. The extent to which project work is broken down (ie, lowest level of work breakdown) is influenced by considerations such as:

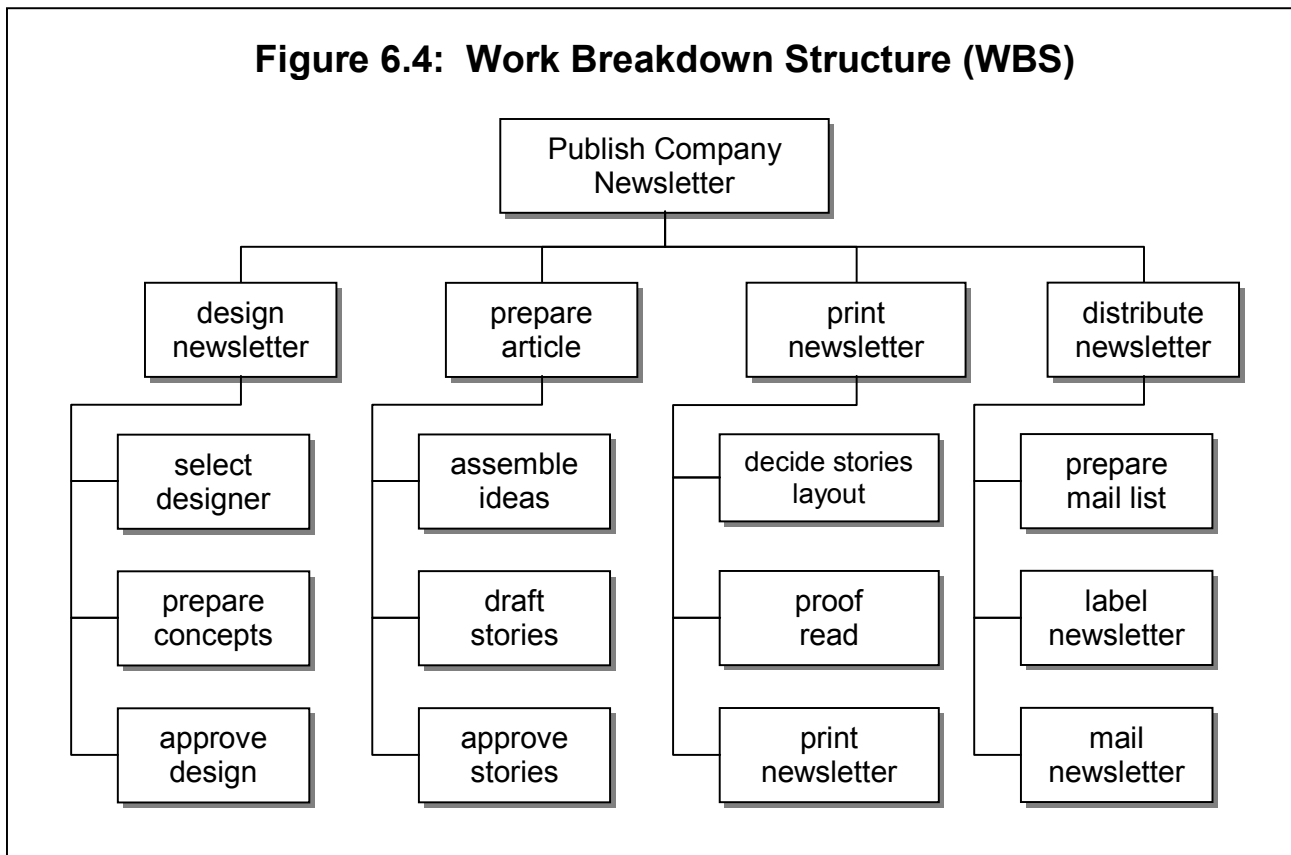
- Milestones previously assigned – that is, a milestone plan of dates by when important elements of work are to start or finish. Milestones often designate the completion of project interim deliverables.
- The size of the project. A large project is likely to be broken down further than is a small project. Thus, the extent of work breakdown is often a function of project size. A mega-project may have some six levels. For most projects three or four levels is sufficient.
- The 8/80 rule suggests no task should be smaller than 8 hours or larger than 80 hours. This translates into keeping work packages between 1 and 10 days’ duration. All work packages

are mutually exclusive. They don't overlap. However, the 8/80 rule is very much a guideline only and there will be several occasions when work elements are bigger and smaller than these sizes.

- The project work should not be broken down below the level where each element is a clearly definable independent entity, its start and finish and resource needs readily apparent and its completion measurable.
- No task should be longer than the time between status meetings. If project status meeting are held fortnightly, then no task should be longer than a fortnight. However, the frequency of meetings and progress reporting can of course be readily altered if we don't like the default option. Thus tasks may be reported as either complete (100 percent), started (50 percent), or not started (0 percent), unless progress can be more accurately assessed.
- When project completion time is fixed, the work timetable (ie, schedule) will need to be carefully controlled. This may require that no work package (ie, lowest level of work breakdown) exceeds a certain duration. Thus, the need to carefully control time may influence the level of breakdown.
- When the project budget is fixed, expenditure will need to be carefully controlled. This may require that no work package exceed a certain cost. Thus, rigid funding/expenditure limits may also influence the level of breakdown.
- The need to delegate coherent chunks of work may require that work is broken down until the different skill needs emerge. There is usually no need to further breakdown work assigned to an individual or organisation. They will break the work down as they need to, otherwise project managers can appear to be directing people, more technically skilled than themselves, how to do the work (ie, micromanagement). However, if a detailed breakdown is required, the project manager should develop this in consultation with the appropriate experts.
- The resultant WBS should be compatible with the performing organisation's structure. When deciding the composition of work packages the project manager should consider the performing organisation's breakdown structure (OBS) to allow assignments of suitable work packages to match appropriate functional groups.
- Containing risk. There is no need to take the WBS down to a common level. The lowest level of WBS may vary according to risk. A risky element of work may be further broken down to help contain the risk. A non-risky piece of work may not need to be broken down further, at least not for risk containment purposes.
- While the lowest level of breakdown will depend largely on project size, it would often be a waste of time and effort to plan say a five year project in detail, other than for the first year perhaps. Thus, more immediate work might be further broken down than is subsequent work. This is the 'rolling-wave' or 'progressive elaboration' strategy. The project manager prepares in detail for the next stage only when project continuation is confirmed and sufficient information is available.

The WBS provides a global, yet detailed, view of the project. In this way, the WBS becomes the basis for time, resource, cost, risk and quality planning, and for work allocation, control and reporting. The WBS allows for layered planning and control.

Figure 6.4: Work Breakdown Structure (WBS)



Thus, the WBS is the tool that allows all projects to be broken down into smaller, more manageable projects. When developing the WBS, we should involve the people who will have to do the work. They will know what's involved with every job and how those jobs can be decomposed into manageable chunks. And check the WBS by looking at all the chunks and ensure they add up to their 'parent' chunk. Each lowest level chunk or work package should have one person overall responsible for its completion. This 'single point responsibility' should permeate the entire WBS.

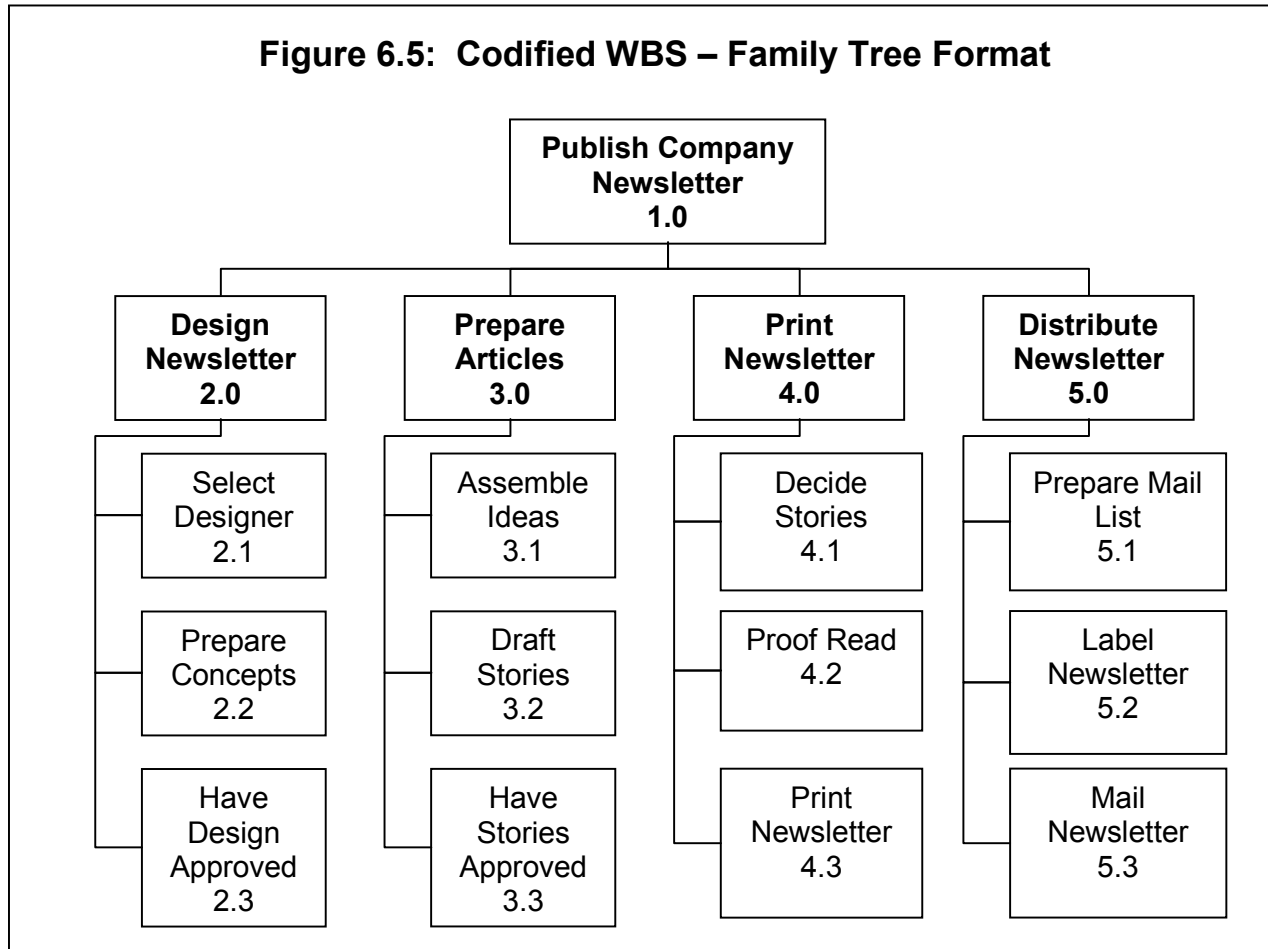
The WBS may be developed in family tree format, but is often published in an indented format and codified for ready reference. See codified WBS at Figures 6.5 and 6.6. WBS version control is also important.

Each WBS element can be assigned an identification code which indicates its level and component group. The WBS code ensures all project participants work to a common baseline. Most projects need only three or four levels of breakdown. Too many levels amount to micro-management. The second or summary level may sometimes be components, disciplines, skill sets, functions, stages or locations and is not work to be executed, but is a convenient grouping, summation or category of like work items. Summary tasks are unlikely to be undertaken sequentially unless they represent project stages.

Mindjet software has a programme called MindManager that allows us to create a mind-map on the computer and then export it directly to Microsoft Project, Microsoft Word, Outlook, and PowerPoint. Being able to export directly to Microsoft Project saves us entering the data twice and also allow us to proceed with project planning in the correct sequence. That is, we develop our WBS first, then export

it to the scheduling software. Trying to create our schedule and WBS simultaneously by just entering data into Microsoft Project is definitely not a good way to go about it. You may wish to check out the 30 day evaluation package at www.mindjet.com.

Figure 6.5: Codified WBS – Family Tree Format



Some further important considerations for a useful WBS are:

- The WBS is developed from the top down. Tasks are subsets of summary tasks (or activities as they are sometimes described). No task is mentioned more than once. All tasks produce a deliverable or deliverables.
- Tasks must add up to summary tasks. The summary tasks are mainly for communication purposes. They aren't actually executed; they are simply the summation of related tasks. Only tasks are assigned resources.
- Task names should include both a verb and a noun. The noun gives the task a clear output. A verb or noun by itself is an inadequate description.
- Each task must be clearly defined such that its completion is obvious. One individual is unambiguously responsible for the successful completion of the task. And all work within the task should occur within a sequential timeframe.
- If breaking down work further doesn't make it easier to estimate, assign or track – then don't break it down!

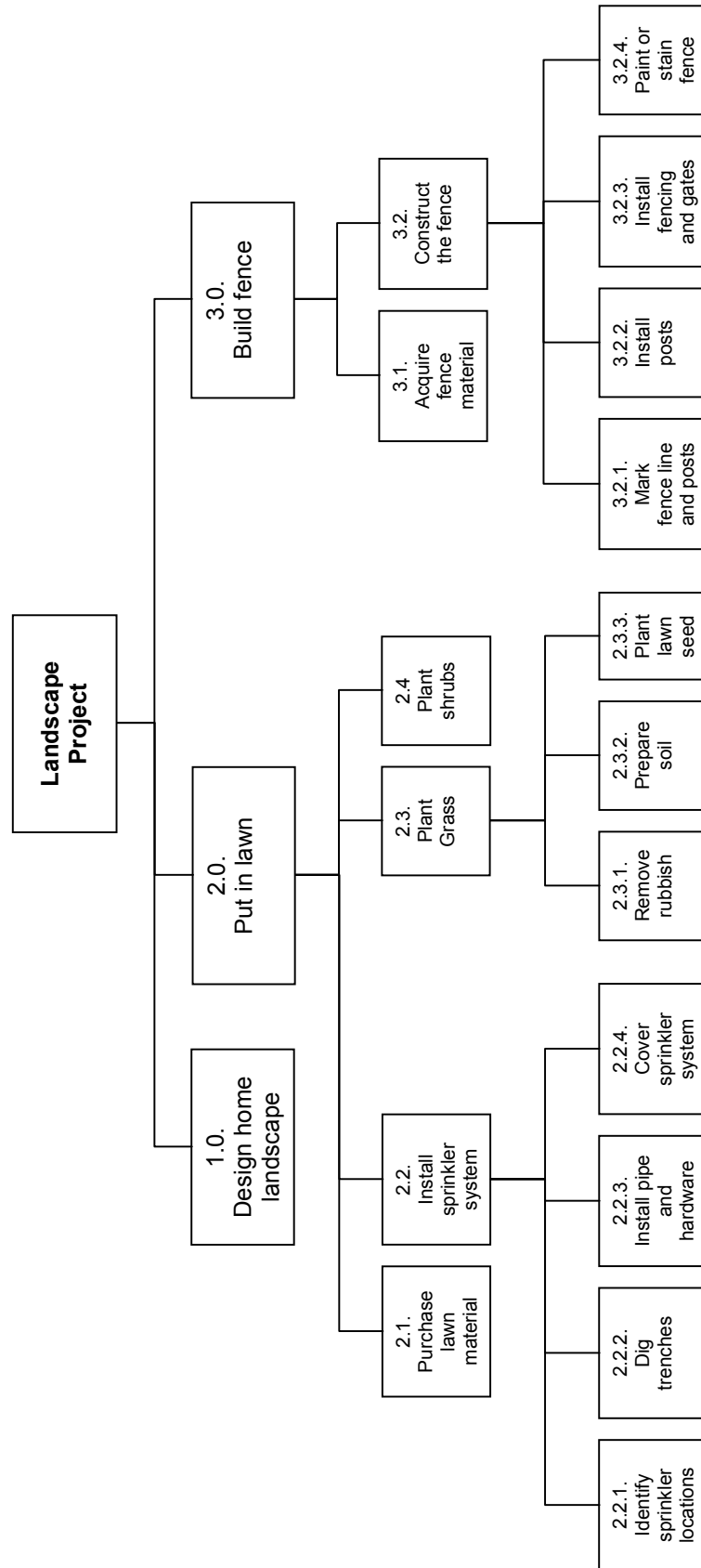
Figure 6.6: Codified WBS – Indented Format

- 1.00 Publish company newsletter**
- 2.00 Design newsletter**
 - 2.1.0 Select designer
 - 2.2.0 Prepare concepts
 - 2.3.0 Approve design
- 3.00 Prepare articles**
 - 3.1.0 Assemble ideas
 - 3.2.0 Draft stories
 - 3.3.0 Approve stories
- 4.00 Print newsletter**
 - 4.1.0 Decide stories' layout
 - 4.2.0 Proof read
 - 4.3.0 Print newsletter
- 5.00 Distribute newsletter**
 - 5.1.0 Prepare mail list
 - 5.2.0 Label newsletter
 - 5.3.0 Mail newsletter

**Figure 6.7: Landscape Project WBS
– Indented Format**

- 1.0. Design home landscape**
- 2.0. Put in lawn**
 - 2.1. Purchase lawn material**
 - 2.2. Install sprinkler system**
 - 2.2.1. Identify sprinkler location
 - 2.2.2 Dig trenches
 - 2.2.3. Install pipe and hardware
 - 2.2.4 Cover sprinkler system
 - 2.3. Plant grass**
 - 2.3.1. Remove debris
 - 2.3.2. Prepare soil
 - 2.3.3. Plant lawn seed
 - 2.4. Plant shrubs**
- 3.0. Build fence**
 - 3.1. Acquire fence material**
 - 3.2. Construct the fence**
 - 3.2.1. Mark fence line
 - 3.2.2. Install posts
 - 3.2.3. Install fencing and gates
 - 3.2.4. Paint or stain fence

Figure 6.8: Landscape Project WBS – Codified Family Tree Format



Other WBS examples are at Figure 6.7 and 6.8. These depict the work to be completed in a landscaping project. In this instance the project itself 'Landscape Project' is not codified. It's important that no two chunks of work have the same codification, and that the codification system is expandable since work is often added as the project proceeds. Sometimes codification may not be completed until the network diagram or schedule is prepared. Codification is for reference purposes.

There will be projects for which the normal WBS may seem difficult to develop. In such cases it may be helpful to decompose the project by deliverables (ie, nouns), by business unit, by geographic location, or by department, according to skills needed, or based on equipment or material availability.

Sometimes it is useful to include cost estimates for each element of work in the WBS. This may be called a costed work breakdown structure (CWBS) which provides for a 'bottom-up' estimate. Also, project scope is not an uncommon source of conflict. Differences of opinion will arise over what is within scope, what is outside scope, how the work should be done, how much work should be done, or to what level of quality the work should be done.

Once the initial WBS is established and agreed it becomes a basis for change. Change to the scope will occur as our client's needs evolve, new technology becomes available, costs escalate, etc. Such changes or variations need to be carefully managed and their costs and other consequences determined and explained to the client and other stakeholders as appropriate. To help minimise and manage such changes, the following principles should be observed:

1. Agree and document the initial requirements explicitly and have the client sign off on them.
2. Be realistic and appreciate that if requirements can be misinterpreted they will be. Check interpretations. State requirements unambiguously. Try to be specific, precise, concrete, and definite. Adjectives and adverbs are best avoided.
3. Recognise that there will be changes. Scope change is inevitable in all except perhaps very low-risk, short-duration projects. Thus, avoid excessive rigidity in formulating requirements, and anticipate changes.
4. Include wherever practicable, pictures, photos, drawings, graphs, models, prototypes and other non-verbal exhibits to help ensure requirement clarity.
5. Establish an agreed process to register, approve and implement all variations, and monitor their outcome. Meticulous records of changes are invariably useful. Sometimes the costs and other consequences are profound and widespread. We shouldn't implement a variation beyond our authority until it is approved by the sponsor or client.

During project planning and execution it may be necessary to reduce project scope as a means of achieving the project time and cost objectives. This may reduce the functionality of the final deliverable. For example, a building might be of less floor space. The key to reducing the scope without reducing product performance is to re-evaluate the business requirements. Reducing functionality means that some tasks are not now needed. Project scope might also be reduced to eliminate a risk.

Analyse Work

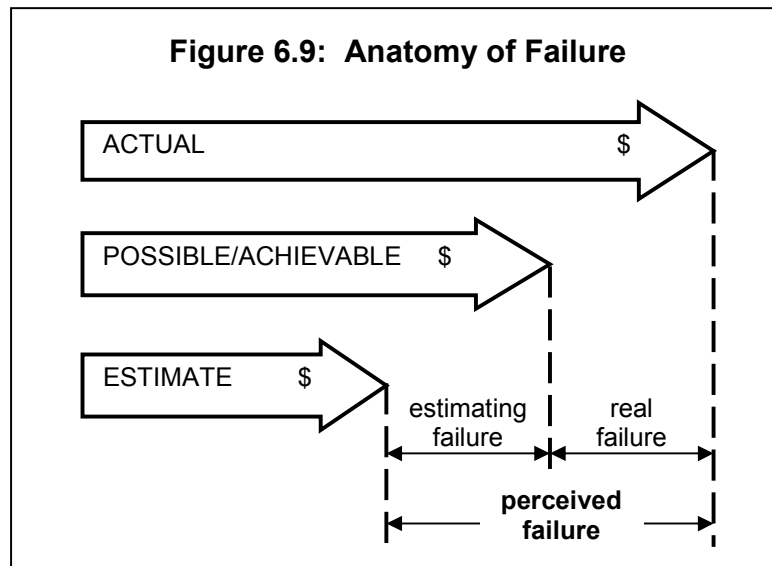
Once the work that needs to be undertaken has been identified and documented, there is a need to analyse this work in order to prepare the bottom-up budget, which is a costed WBS.

Our project management career may receive a severe blow if our project comes in late or over budget, regardless of what benefits are eventually realised as a result of the project investment. By the time the benefits contained in the original business case have been achieved, our fate has already been determined, mainly against estimates of duration and cost, which sometimes we had no hand in setting!

Thus, in the interests of our own survival and credibility, we might carefully check imposed estimates and their rationale, and if appropriate make recommendations for their relaxation to give ourselves a fighting chance of success, or at least document our concerns. Remember, no one will recall at the end of the project our earlier verbal remonstrations about insufficient budget or time. Establish an audit trail right from the start, which is where projects often fail.

This situation is particularly true for the private contractor who may have secured the work with the lowest quote and requires their project manager to also create and preserve a margin that was foregone in the anxiety to buy the work. Quality may then be a casualty.

For us project managers, perceived success is often variance – the gap between estimate and actual. True project management success is arguably the gap between the estimate and what was realistically achievable or possible. See this simple truth at Figure 6.9.



A 2007 PMI survey of 114 US companies revealed that the top measures of project success still very much include 'completed on time and completed within budget'. See Figure 6.10. We should remember that caveats like *"These are only rough numbers"* will be ignored by our executives who will instantly carve it in stone and publish it widely as a realistic target. Any future deviation is then viewed as a gross violation of a solemn personal promise. We need to resist pressure for unjustified optimism, which is sometimes best achieved by involving them in our scope definition and limitation

process. So, like it or not, our performance is considerably determined by estimates. In fact we are often seen to be as good as our last estimates. Note that 'adds business value' only scores 70%!

Figure 6.10: Project Success Criteria

Project Success Criteria	Usage
Meets client's needs	95%
Completed on time	90%
Completed within budget	88%
Contributes to business goals	75%
Adds business value (ie, benefits exceed costs)	70%

Of course, 'gut-feel' is not the most accurate method of estimating. Our client and sponsor usually prefer we employ some more rational approach, even if we are brilliant intuitive estimators. We might check our own guesstimating ability using the exercise at Figure 6.11. Incidentally, if our 'gut feel' is not a good feel, we should further research the facts. That's the value of 'gut feel' – a warning canary.

Some general factors that may diminish the initial accuracy of estimates include:

- estimators' lack of experience and expertise
- insufficient time available to prepare the estimate
- unsuitable estimating methodology used
- poorly defined scope of work (inclusions and exclusions)
- failure to account properly for risk
- costs for some items not included
- unrealistic estimating assumptions.

Project Costs

The summation of project cost estimates provides the project budget. The accuracy of the project budget usually improves as the project scope develops and clarifies.

In order to develop a budget, the project team must forecast what resources the project will need, their required quality and quantity, when they will be needed, and how much they will cost – including the effects of inflation and changing rates of exchange where applicable. Uncertainty is involved in any forecast. As project planning proceeds, uncertainty is reduced, and cost estimates generally improve as shown at Figure 6.12, which includes the PMBOK® standards of accuracy.

Figure 6.11: Estimating Exercise

“They couldn’t hit us at this dis....”

The final estimate and last words of General John Sedgewick who was shot overlooking the parapet in 1864 during America’s Civil War.

Yes, our intuitive or ‘gut feel’ estimates can be very inaccurate, and if a series of inaccurate estimates are related they can have a compounding effect to produce an estimating disaster. Without using any tools or looking ahead, record our estimates or guesstimates in column b. Then determine the actual figures relating to this book.

Item	Your Guesstimate	Actual	Variance		Percent Accurate 100 - e
			Size b - c	Percent $\frac{d \times 100}{c}$	
a	b	c	d	e	f
Number of Pages					
Gross Weight					
Height of Book					

To determine our total estimating accuracy, or the compounding rather than compensating effect of inaccurate estimates, we multiply percent accuracies. For example, answers in column f might be 100%, 80% and 60%. Thus, total accuracy is only 48%:

$$1.0 \times 0.8 \times 0.6 = 0.48 \text{ (ie, 48\%)}$$

Wow! 70 - 100%

Great 60 - 69%

Good 50 - 59%

Oops 0 - 49%

$$x \quad x \quad =$$

The message is that we shouldn’t rely on intuition. Rather we should research the facts and use the appropriate estimating tools. For example, it’s difficult to estimate temperature without a thermometer, or weight without scales. Ultimately, our estimate may even have to withstand legal scrutiny. ‘Gut feel’ isn’t a great defence. Nevertheless, if our ‘gut feel’ tells us an estimate is wrong, then we should do some research and reassess our estimate. And always get others’ opinions.

Figure 6.12: Project Estimate Development

Planning Event	Type of Estimate	Estimating Method	Indicative Accuracy
Concept Approved	Order-of-Magnitude Estimate	Top-down (Parametric)	-25% to +75%
Charter Approved	Budget Estimate	Detailed Description of Work	-10% to +25%
Project Plan Approved	Definitive Estimate	WBS and Quotations	-5% to +10%

Top-down estimates are usually based on the judgements and experiences of management, and available historical data from similar projects. Bottom-up estimates are constructed by totalling the estimates for each work element contained in the WBS. Added to these direct costs will be fixed or indirect costs (ie, organisational overheads), a project reserve for contingencies, and sometimes a profit margin, to arrive at a budget estimate. The main advantage of the bottom-up approach is that people closer to the work are apt to have a more accurate idea of precise resource requirements than will senior management or others not personally involved. The suspicion is of course that bottom-up estimates will be overstated to compensate for anticipated budget cuts! In practice a compromise budget, somewhere between the top-down and bottom-up estimate, is often determined. Sometimes both best-case and worst-case budgets are prepared.

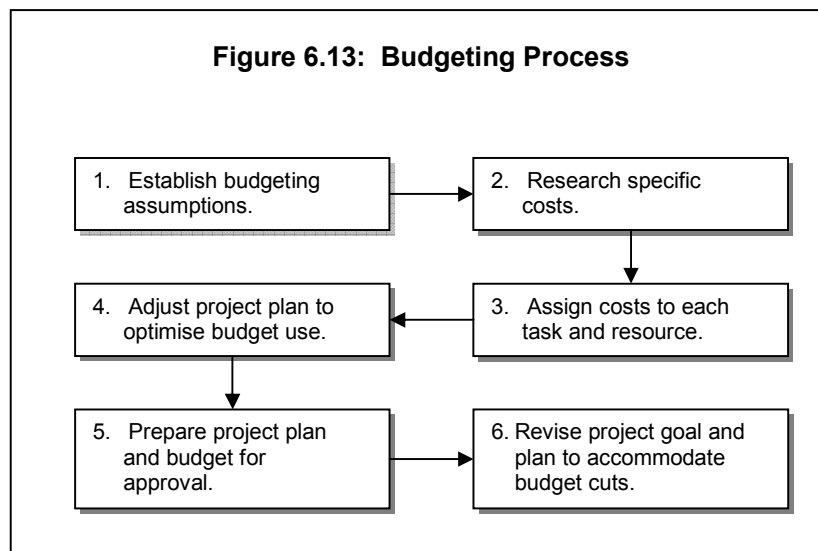
Budgeting

Before the definitive budget can be produced the project plan must be completed. The definitive budget is usually the final important deliverable from planning. In fact, the definitive budget is the 'dollarised' plan, which should be within the originally approved conceptual estimate range.

Let's consider the problems that can occur during the budgeting process. Although the things that can go wrong with budgets are countless, these are some common problems that can be avoided or minimised:

1. The learning curve is not always considered when scheduling people. This results in an inadequate budget for labour as well as an inaccurate schedule. Therefore add project tasks for training and teambuilding to account for this requirement and budget for them accordingly.
2. Managers sometimes play games with the budget. Because in the past estimators have 'padded' their budgets, an arbitrary amount is subtracted from the amount allocated to our project to compensate for this practice, even though our budget was not padded. The solution is to encourage project managers to provide accurate budgets, and through honest interaction, to convince those involved that estimates are not inflated. Determine and discuss the consequences of budget reductions.

3. Waste and spoilage are sometimes not considered when ordering materials. No project uses exactly the amount of materials estimated. Be sure to budget for realistic waste and spoilage.
4. Easily measured costs are inclined to get exact budgets, and difficult-to-measure costs get little attention. This is the opposite of what should happen, but because it takes more time, we may guess about the amounts we do not know. The difficult-to-measure significant costs should get additional research so the amounts allocated to them will be more accurate. There are also problems in budgets that are not predictable, due to changes in the environment of business. Some of these errors in budgeting must be tolerated, because there is no way to predict them with certainty. They may include:
 - Outside supplier or material costs increase during the course of the project.
 - Unexpected environmental conditions, such as poor weather, may cause expensive delays.
 - A key person leaves the project and must be replaced with an expensive consultant or a higher-priced employee, not overlooking the disruption cost.
 - The economic or corporate climate changes along with the priority of the project.
5. Sometimes internal labour costs are ignored. Even though employees are usually on salary they aren't free. Also, their actual cost (charge out rate) may be two or three times their salary expressed as an hourly rate.



A basic six-step budgeting process is summarised at Figure 6.13 and explained briefly below:

1. Project assumptions may influence timeframes, quality, and quantity of materials needed.
2. Information on specific costs can come from expense histories of other similar projects, industry norms, team estimates, schedule of rates, expert advice, and quotations. A database needs to be maintained.
3. Specific estimates need to be assigned to the project tasks.
4. It may become apparent that work can be reordered or reassigned to optimise the budget.
5. Once the budget estimates are made and the project plan is revised, all elements of the budget are

integrated for final approval.

6. During the approval process, budget constraints may be applied which will require that the project goal, scope, schedule and performance standards be reassessed.

An example of a completed budget or project costing worksheet for a small building project is shown at Figure 6.14, where price equals cost plus profit, and overheads in this instance are shown at 25 percent of labour costs. Contingency is contained within the cost of each task on this occasion.

Many things can contribute to inaccurate budgets, but the following are the most frequently identified culprits:

- scope creep (ie, unofficial scope increases)
- deliberate underestimating to secure funding
- resource needs not accurately determined
- task durations and work effort underestimated
- changes to resource prices and exchange rates
- insufficient allowance for waste and spoilage
- lack of expertise, data and methodology
- insufficient allowance for contingencies.

If a budget is to include a contingency fund, the purpose of this fund should as far as practicable be specified if only to ensure we are aware of the consequences should it be removed from our budget.

One definition of contingency is that money set aside to pay for those things that were unknown and unknowable during estimating. Contingency is not for errors of omission or errors of budgeting. Also, the percentage of contingency used should not normally exceed the percentage of project completed. That is, if the project is 50 percent complete, only about 50 percent of the contingency fund should have been used. Otherwise there could be some irresponsible spending towards the end of our project.

Commonsense Estimating

Estimating has been described as a stepchild in project management. Project management literature, seminars, and organisational policies and procedures have tended to avoid the subject. This tendency can be explained, in part, by the discipline-specific nature of estimating.

It's difficult to develop a set of universal rules that are equally applicable to the IT development project, the engineering project, the new product development effort, and other organisational undertakings. There are, however, some commonsense considerations that can be applied, regardless of the substance of the project:

- **Use the right people.** The estimators should be experienced with the work they are estimating. The people who will actually perform the work should also be involved in estimating it. They will understand their own limitations. For example, they will know just how much time their schedule will allow them to work on the project. Most important, when people make an estimate for their own work, they are usually more motivated to achieve it than when the estimate is imposed.

- **Establish a definition of 'best estimate'.** Sometimes an estimator is unaware of the organisation's concept of 'best estimate'. Some organisations consider the lowest-cost/shortest-duration estimate to be the best estimate. Yet the lowest-cost/shortest-duration estimate may have only small probability of being achieved. The best estimate cannot be one that has no possibility of being overrun or late because, under estimating guidelines, it's doubtful that such a project would be approved in the budgeting process; the cost would simply be too high. The best estimate, under most circumstances, is a middle-of-the-road estimate, with an equal probability of being overrun or under run. An exact estimate is an oxymoron.
- **Direct the estimator to provide an estimate that reflects management's priorities.** If the project manager knows that the schedule is most critical, ask the estimators to provide minimum time estimates. If keeping the cost down is management's primary goal, ask the estimators for minimum cost estimates. If cost and schedule are of equal importance, ask for an estimate that reflects a balance between time and cost. Don't ask for estimates without providing guidance to the estimators. Without guidance, the result will often be an amalgam of whatever is most convenient for each estimator, making it impossible to evaluate the potential for altering the plan through negotiation. If we lack insight with respect to senior management priorities, we should ask for clarification from our sponsor.
- **Ensure that estimates are prepared and reviewed by those responsible for performing the work.** Develop commitment to the estimates, motivation to meet planned targets, and a sense of ownership of the plan through participation. These attributes will be lacking if those responsible for the execution of the work do not participate in the development of the estimate. It's difficult and somewhat unreasonable to hold people accountable for their performance when they had no input in determining the performance measurement targets.
- **Estimate at the appropriate level of detail.** Estimates rendered at a global level suffer from inaccuracy. Overly detailed estimates cost too much and take too long to develop. See Figure 6.15. Over time, guidelines based upon experience should be developed to indicate what level of detail in task definition yields estimates that are accurate yet cost-effective. If projects are within a few percentage points only of their planned performance, the level of detail in estimating may have been too great!
- **Consider inherent time/cost/resource trade-offs in the estimates.** Linear thinking can be an enormous problem in the development of estimates. A task that can be performed by one person in 20 days cannot necessarily be performed by two people in 10 days or by four people in five days or by 20 people in one day! Few tasks are so perfectly partitionable that they can be performed in any of these combinations. Equally, few tasks are entirely non-partitionable; it's rare to find a task that takes one person 20 days, which cannot be shortened at all. In reality, most tasks are partitionable, but they follow a non-linear pattern of parameter trade-offs. Thus, one person may do the task in 20 days at a cost of 160 staff hours. Two people may perform the same task in 12 days at a cost of 190 staff hours. The additional 30 staff hours are for communication and coordination. Three people may get the job done in ten days at a cost of 240 staff hours. Communications and coordination time usually goes up geometrically as the number of people assigned to the task increases. The nature of the task must be considered in the estimating process, as must the formula for the geometric increase in staff hours caused by adding staff.

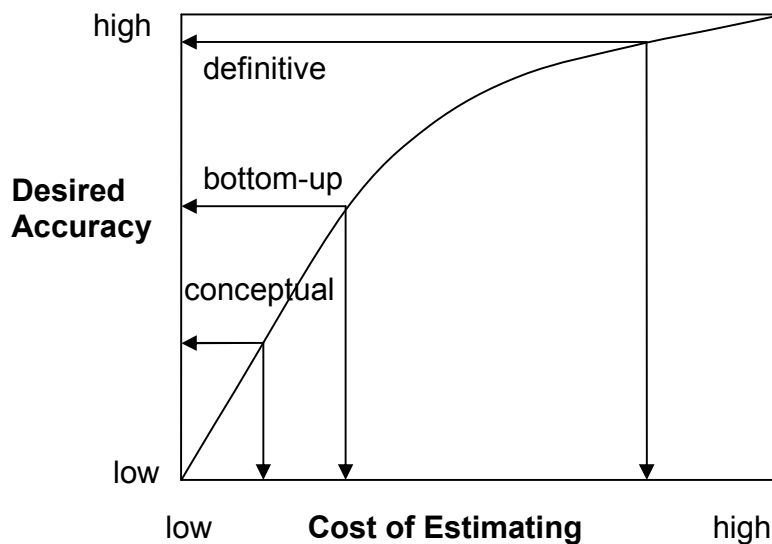
Figure 6.14: Project Costing Worksheet
(all figures in dollars)

ID	Task Description	Labour Hire	Overhead Cost	Materials Purchase	Supplies Purchase	Equipment Hire	Other Expenses	Profit Margin	Total Price
1.0	Complete working plans	300	75		50		25	50	500
2.0	Obtain building permit						50		50
3.0	Pour foundation	500	125	1,300	100	100	125	250	2,500
4.0	Install windows	500	125	1,500	75	300	150	300	2,950
5.0	Install roofing	400	100	500		75	50	125	1,250
6.0	Install exterior siding	700	175	1,800	100	500	150	375	3,800
7.0	Paint exterior	160	40	25		50		25	300
8.0	Install heating	300	75	1,175			75	175	1,800
9.0	Install wiring	300	75	175			25	75	650
10.0	Install insulation	300	75	300				75	750
11.0	Complete plastering	400	100	300			25	75	900
12.0	Install doors	200	50	350			25	75	700
13.0	Paint interior	200	50	25		50		25	350
14.0	Install electrical fixtures	50		100					150
15.0	Install floor coverings	100	25	200			25	50	400
16.0	Cleanup	100	25		25				150
Totals		4,510	1,115	7,750	350	1,075	725	1,675	17,200

- **Factor productivity into the estimates.** If the normal workday is eight hours, is it possible to get eight hours of project work completed in a day? The organisation's environment does not usually allow it. Productivity varies from organisation unit to unit, based upon the responsibilities of the unit. Productivity may also be seasonal. Each functional manager should be responsible for developing guidelines to be used by their units in preparing estimates. These guidelines ought to be reviewed periodically to determine their continuing relevance. We will probably achieve some 6.5 hours of productive work in an eight hour day (ie, about 80 percent productivity).
- **Do not overload the task.** In scheduling key undertakings there is a tendency to apply additional resources to the effort, to the point at which it is overstaffed. Not only is this a waste of funds and human resources, it may also lengthen the period of performance of the project. Too many resources can get in each other's way, impede progress, and cause accidents, which leads to rework. While some level of effort above the optimum team size may on occasions be appropriate, excessive effort should be avoided.
- **Determine the work-effort required for each task.** It is essential that there are good guidelines to assist in deriving this figure. It is also important to remember that about 20% of each working day is usually lost to breaks, interruptions and administrative activity. To compensate for this, estimated work-effort might typically be multiplied by 1.25.
- **Determine resource unavailability.** The planner must make allowance for annual leave, statutory holidays, sick leave, and training, all of which will reduce the availability of project team members. This may be as much as 20% or more (eg, 20 days' annual, 11 days' statutory leave, 10 days' training and 5 days' sick leave = 9 weeks per year). For high-level planning (top-down) multiply the calendar effort from the previous step by a further 1.176 to convert estimated effort to elapsed days. Thus, the average working week is four days.
- **Contingency time if needed might better be allocated to a sequence of tasks, rather than to individual tasks.** If contingency or buffer time is included with every task, then each sequence of tasks may contain too much total contingency, recognising that delay to every task is most unlikely, and that delays are usually passed on, whereas time gained is seldom passed on. Work tends to expand to fit the time available. Also there is often a tendency to leave starting a task until the last possible moment. The solution may therefore be to assign contingency time to a sequence of tasks, rather than to every individual task. This helps ensure that wasted time within tasks is eliminated. An aggregated buffer if required may be included at the end of each sequence of tasks. Should we adopt this approach, then estimated task durations should contain no contingency time. Ultimately this may ensure a more quickly completed project. Critical Chain Project Management (CCPM) endorses this practice.

Appendix Four contains a variety of useful estimating tips, and Appendix Six provides a comprehensive estimating checklist designed to alert us to practices that may improve our ability in this important discipline. Also, Appendix Five describes probabilities, the PERT formula, and the Wide-band Delphi Technique.

Figure 6.15: Estimating Cost versus Accuracy



Estimating Methods

The five most common estimating approaches are analogous, parametric, bottom-up, simulation, and phased.

Analogous Approach (Top-down). The analogous approach uses the actual costs and durations of previous, similar projects as the basis for estimating the current project. It uses historical information from the organisation as well as industry standards. It is also called a top-down estimate, because it relies on information from the top level of activities in the work breakdown structure. It can be used to estimate projects with a limited amount of detailed information. For example, a project to implement a new accounts payable process in one company might be estimated by reference to a similar accounts payable process that was recently implemented in another company. Such an analogous approach is generally less costly than other approaches, but is also generally less accurate. It's a 'ball park' figure.

Parametric Modelling. Parametric modelling uses mathematical parameters to predict project costs. An example is residential home construction that is often estimated using a certain dollar amount per square metre of floor space. Complex examples can be found in the software development industry where one model uses thirteen separate adjustment factors, each of which has five to seven points. The cost and accuracy of parametric estimates vary widely. Sometimes called a rough order of magnitude (ROM) estimate.

Bottom-up Estimating. This approach estimates the cost and duration of the individual work packages from the bottom level of work items in the work breakdown structure, then totals the amounts up to reach an estimate for the total project. This approach can produce a much more accurate estimate, but at a higher cost. It's a detailed estimate.

Simulation. In this approach, a computer calculates multiple costs or durations with different sets of assumptions. The most common is the Monte Carlo analysis, in which a range of probable results is defined for each activity and used to calculate a range of probable results for the total project. Simulation can be more accurate than other types of estimates, and is principally used on large or complex projects.

Phased Estimating. Project costs can be estimated one phase or stage at a time. This can be used with both top-down and bottom-up estimating. Earlier stages can usually be estimated more accurately. We allow greater tolerance for later stages.

Underestimating

Managers often underestimate, and projects then run over budget and over schedule. Here are some reasons:

- Team members are usually optimistic and desire to please. They might say what they think the project manager wants to hear.
- People might underestimate the amount of non-productive time in a day (such as personal distractions, fatigue, interruptions, meetings, administrative tasks, sick leave, vacations, training, crisis management, and so on), and management activities are often ignored.
- Workers might be overly optimistic about the number of calendar days it takes to complete the number of work hours estimated.
- People tend to have incomplete recall of previous experience. They remember successes better than failures and tend to forget the pain involved. We are inherently optimistic.
- Team members might not be familiar with the complete scope of the project when they make their estimates.
- Workers might have no relevant experience to draw upon, and the organisation hasn't maintained an estimating database.

Before beginning the estimating process, it may be helpful to discuss these issues with all who will be involved so they can deal with them appropriately. Peer reviews during the process may also help identify underestimating.

Overestimating

Novice project managers might be tempted to inflate estimates so they can come in ahead of schedule and under budget. However, from the point of view of resource use, projects running ahead of schedule may be as bad as projects running behind schedule. If a new office building is complete six months ahead of schedule due to an inflated estimate, the building may sit vacant until tenants are able to occupy it. The owners may lose months of rental revenue that otherwise they could have received had they known when the building would be available and had scheduled the tenants for occupancy sooner. Inflating the estimates defeats the purpose of planning. Expert project managers have a few projects that come in ahead of schedule and under budget, a few behind schedule and over budget, and many that come in close to the plan.

Project managers should estimate what they think their project will actually cost, then add a reasonable contingency amount for unknown variables. The percentage of contingency varies depending on the type of work, environment, and degree of risk. There is no magical percentage

to plan as a contingency. 10 to 15 percent contingency might be appropriate for unusual work that has several unknowns. Managers can establish a contingency reserve within the project to be drawn upon to reduce the impact of missing cost or schedule objectives.

An important challenge for a contractor when submitting a proposal or tender for project work is to present the prospective client with a price that is competitive yet contains sufficient margin to ensure the contractor's continuing financial viability. This topic and further guidance about estimating is given at Appendices Four and Six.

Type of Contract

When estimates depend on the performance of outside suppliers or contractors, the type of contract is critical. For example, a fixed-price contract provides greater confidence in the estimate than does a cost-plus contract. Different types of contracts might be appropriate in different circumstances. There are two basic types of contracts: fixed-price and cost-plus.

Fixed-price Contract. With a fixed-price (also called as a 'lump sum') contract, the supplier agrees to do the total work for a fixed price. The supplier assumes the risk of unforeseen problems in exchange for a larger profit. This type of contract is appropriate when dealing with an unknown supplier or when the project manager anticipates the work is risky.

Cost-plus Contract. With a cost-plus contract, the supplier agrees to do the work for the cost of time and materials, plus an agree-upon amount of profit. Cost-plus contracts, also called 'time-and-material' contracts or 'cost-reimbursable' contracts, are used when dealing with in-house providers or trusted suppliers over whom we have good control. With these contracts, the project manager assumes the risk of unforeseen conditions, but is usually able to complete the project at a lower cost than for fixed-price contracts.

These basic types of contracts are discussed in detail at Chapter Ten.

Value Analysis

Value analysis is a cost reduction technique, which identifies unnecessary cost elements in a project component or product by the analysis of its function and design. A typical value analysis sequence would be:

1. Define the function of the product.

- What is its purpose?
- What does it do?
- What does the client expect from it?

2. Identify the number of components. The more components the greater the potential for cost reduction. Are they all needed?

3. Brainstorm alternatives. Alternatives might include changes in design, specification or method of manufacture/installation that will reduce costs without affecting functionality. Some useful questions might be:

- What could be eliminated?
- What could be simplified?
- What alternative materials could be used?

- Is there a local substitute?
 - Would a standard part be satisfactory?
 - Is this design feature needed?
 - Is this function needed?
 - What would be the consequence if the feature or function was excluded?
 - Is there a cheaper manufacturing or installation process?
 - Is there an alternative design to facilitate manufacture/installation?
 - Could this be purchased rather than specially made?
 - Are the component tolerances unnecessarily tight?
4. **Evaluate alternatives.** Evaluate the ideas generated from the cost savings' viewpoint and implement as appropriate.

Value analysis is a commonsense and systematic method of reducing project costs and should be a practice common to all projects.

Project Time and Productivity

Projects often operate within tight constraints of time, which is not usually a bad thing. Duration is significantly affected by resource assignment. For example, two people working together may be able to complete a task in about half the time it takes either of them individually, while a person working half-time on a task may take about twice as much time as the same person working full-time. The task duration will also be influenced by the capabilities of the people and material resources assigned to them.

Some helpful considerations when estimating task durations are:

- Ask the experts and know their tendencies – optimist, pessimistic or inconsistent.
- Review relevant post-project reports. Hence the need for comprehensive documentation and a standard filing system.
- Consult published productivity data and standard schedules of rates. Historical information may also be available commercially.
- Check with project team members, contractors and vendors.
- Apply the Delphi technique where, without collusion, each member of the group is asked to estimate the task duration. Results and reasoning are then shared and the process is repeated until a single figure is determined.
- Allow additional time for the unexpected – sickness, natural disaster, industrial accidents, employee turnover, etc.
- Identify all the factors that will affect time – weather, holidays, weekends, work hours, skills levels, learning curves, setup time, interruptions, distractions, fatigue, machine variations, material availability, etc.

There are basic formulae for factoring productivity into task duration estimates. At its simplest, it is a function of dividing the total number of hours at 100 percent productivity by the percentage of productivity being applied. A 10 hour task performed by someone who is 70 percent

productive would be calculated as follows:

$$\frac{10}{0.7} = 14.3 \text{ hours}$$

This calculation provides a realistic expectation.

The average project worker is usually productive for little more than six and one-half hours in an eight-hour workday. The reason for this 80 percent productivity level is due to:

- phone calls
- emails
- lack of clerical support
- late appointments
- impromptu tasks
- drop-in visitors
- providing explanations
- congestion
- casual conversations
- waiting for information
- unproductive meetings
- fatigue

PMI studies over 1,700 project people demonstrate that project team member productivity usually averages 75-85 percent.

Overtime can help ensure that challenging dates are achieved. However, prolonged overtime results in employees' output in twelve hours being only what they would produce in a normal eight-hour day. Also paid overtime may create extra work. We shouldn't normally plan to do overtime.

To take reasonable account of the likely time variations in which to complete a project task, it can be useful to make three estimates of time:

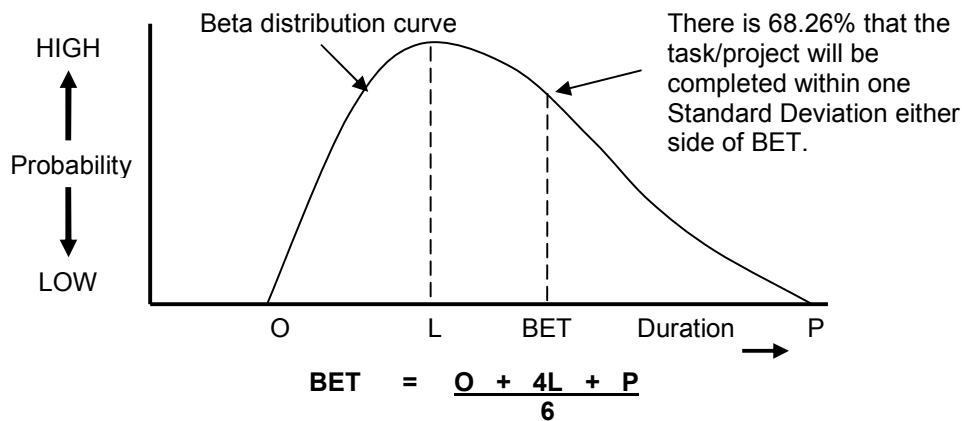
1. optimistic completion time (O) when everything goes right (best case)
2. pessimistic completion time (P) when everything goes wrong (worst case)
3. most likely or normally expected time (L).

These three estimates will often come from interviewing people whose experiences and expertise is valued, in relation to the specific task. Given these three estimates the weighted-average or best estimate of time (BET) for a task is given by the formula at Figure 6.16. This formula recognises that:

- 68.26% of the time the task will be completed within the range of BET +/- one standard deviation.
- 95.44% of the time the task will be completed with the range of BET +/- two standard deviations.
- 99.73% of the time the task will be completed within the range of BET +/- three standard deviations.

Figure 6.16: PERT Formula

PERT means 'Programme Evaluation and Review Technique'. It's used to predict task or project durations, which recognises that an estimate is a statistical probability.



Where:

BET	= Best Estimated Time (or cost)
O	= Optimistic (best case)
L	= Likely (normal circumstances)
P	= Pessimistic (worst case)

For a particular task where $P = 14$, $L = 6$, $O = 4$ and time units are days, BET would be 7 days calculated as follows:

$$BET = \frac{14 + (4 \times 6) + 4}{6} = 7 \text{ days}$$

The weighting assigned the various estimated times may be altered if experience shows that this is appropriate.

Figure 6.17 shows this weighted average formula, also call the 'PERT formula' (Programme Evaluation and Review Technique), applied to each task involved in a conference project. The amount of uncertainty is indicated by the difference between optimistic and pessimistic estimates of time. The larger the variance the greater is the uncertainty. The difference between BET and L is contingency time.

Figure 6.17: PERT Time Estimates for Conference

Task Description	Time (Weeks)				Source of Uncertainty
	O	L	P	BET	
Set conference date	1	2	3	2	achieving consensus
Establish programme	2	5	8	5	agreeing priorities and timings
Select conference site	4	5	6	5	evaluating options
Obtain speakers	4	6	8	6	unavailability
Develop brochure	3	10	11	9	printing delay
Obtain mailing list	3	4.5	9	5	clearance to use
Mail brochure	1	2	3	2	delivery times
Obtain speaker materials	3	3.5	7	4	punctuality
Receive registrations	4	6	8	6	incomplete documentation
Confirm all arrangements	0.5	1	1.5	1	communication problem
Prepare conference kits	1	2	3	2	production delay

The PERT formula, which may also be used for cost and effort estimating purposes, usually results in durations that are slightly longer than the most likely estimate, given that when things go wrong they usually go very wrong. Furthermore, there is no limit to how long a task might take.

Estimating Spreadsheet

The calculations shown at Figure 6.17 can be completed using the free spreadsheet at www.lewisinstitute.com.

An estimating spreadsheet can also be used for budget development. An example spreadsheet template is at Figure 6.18. Typically project tasks are listed and each task is analysed in terms of its labour and non-labour costs, and contingency sums added. Again, version control is important.

Figure 6.18: Estimating Spreadsheet Template

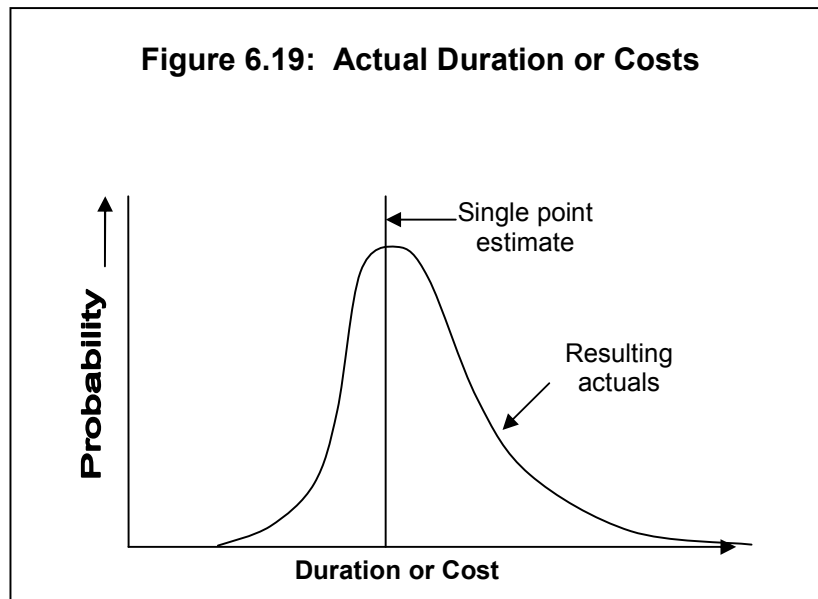
Project:		Estimator:			Accuracy:		Date:	
ID	Task	Labour	Materials	Supplies	Equipment Hire	Contingency	Total Cost	Price
	Description							
1.1	Prepare plan	\$3750		\$500		\$300	\$4550	\$5460
1.2	Obtain permit	\$500	\$300			\$200	\$1000	\$1200

Notes:

1. Labour (\$ per hour depending on skill sets) usually includes direct costs plus fixed or overhead costs. Labour is work-effort involved.
2. Contingency is an allowance for risk.
3. Margin will depend on a variety of mainly market considerations. 20 percent in this instance.
4. Estimating assumptions need to be documented.
5. Accuracy is usually expressed as +/- percent or as a range.
6. Actual costs should be recorded in a similar format to enable later variance analysis.
7. Do figures include or exclude GST?

Single-point and Range Estimates

Traditionally, when estimating the cost or duration of a project work element, one number is generated – a single-point estimate. There are problems with this approach. A single number doesn't take into account the variable nature of work. Perhaps the assumption is that each single point estimate is the mean of a normal distribution and given enough work elements, the 'overs' and 'unders' will cancel out over time. However, experience shows us that the overs are considerably more likely than the unders, creating the skewed distribution pattern shown at Figure 6.19.



In order to counteract this 'on-time-or-late' behaviour we need to change communication dynamics. This begins with a change in our estimating method. Each work element (ie, activity, task, work package) should have its own cost and duration range estimate. Developing a range estimate is best done using historical data or by thought exercise.

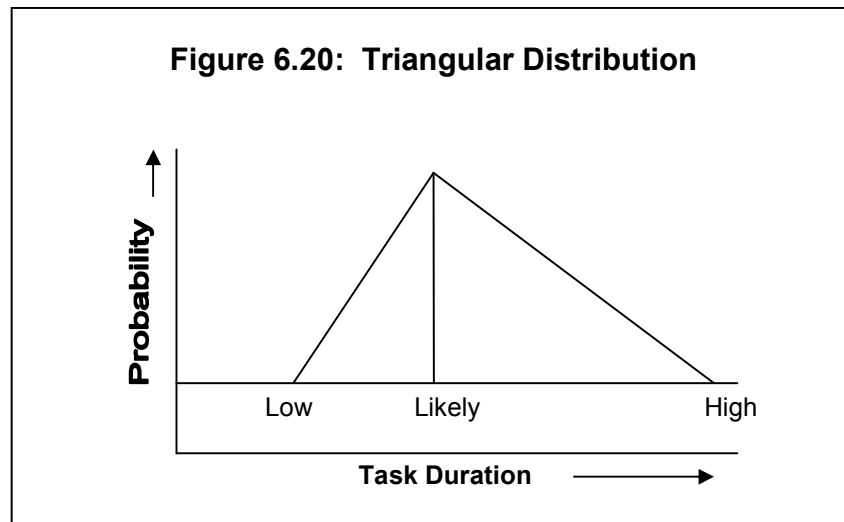
Start by drawing the triangle shown at Figure 6.20 on a sheet of paper, whiteboard, or flip chart. We label the low, likely, and high points on the triangle. Next, we select a task from our project. We then ask ourselves, *"How long is it likely to take to complete this task?"* We write this estimate below 'likely'.

Now we ask ourselves, *"If things go well, what is the shortest reasonable duration to complete this task?"* We write this below 'low'.

And finally, we ask ourselves, *"If things go poorly, what is the longest reasonable duration to complete this task?"* We write this estimate below 'high'.

After generating the 'high' duration estimate, we should re-examine the 'likely' duration. If our triangle is equilateral, then our high estimate is probably not high enough.

Now we can calculate the mean, which equals $(\text{low} + \text{likely} + \text{high})/3$. This mean value, unlike a single point estimate, is the point at which the highs and the lows will cancel out over time.



The next step is to add up the individual activity (ie, task) costs and durations to generate the project estimate. The calculations for this (easily done with a spreadsheet) follow the equations shown here. Sample project calculations are illustrated at Figure 6.21.

Figure 6.21: Project Mean Duration and Standard Deviation

Task ID Critical Path	Durations				Task Variance
	Low	Likely	High	Mean	
A	3	5	10	6	2.2
B	2	4	8	4.7	1.6
C	3	5	9	5.7	1.6
D	2	4	12	6	4.7
E	2	4	8	4.7	1.6
Project Mean (Sum of activity means) = 27					
Project Standard Deviation = 3 (rounded)					

<i>Activity mean (μ)</i>	$= (low + likely + high)/3$
<i>Activity variance (σ^2)</i>	$= [(high-low)^2 + (likely-low)(likely-high)]/18$
<i>Mean project cost</i>	$= \Sigma \text{ activity mean cost}$
<i>Mean project duration</i>	$= \Sigma \text{ activity mean duration (use only critical path tasks)}$
<i>Project variance</i>	$= \Sigma \text{ activity variance}$
<i>Project standard deviation</i>	$= \sqrt{\text{project variance}}$

Using the results of the calculation in Figure 6.21 we can generate a project duration estimate bounded by the normal distribution. See Figure 6.22.

From Figure 6.22 we can see that the mean project duration of 27 days has a 50% chance of being met. The project duration one standard deviation below the mean (24 days) has a 16% chance of being met, and the project duration one standard deviation above the mean (30 days) has an 84% chance of being met.

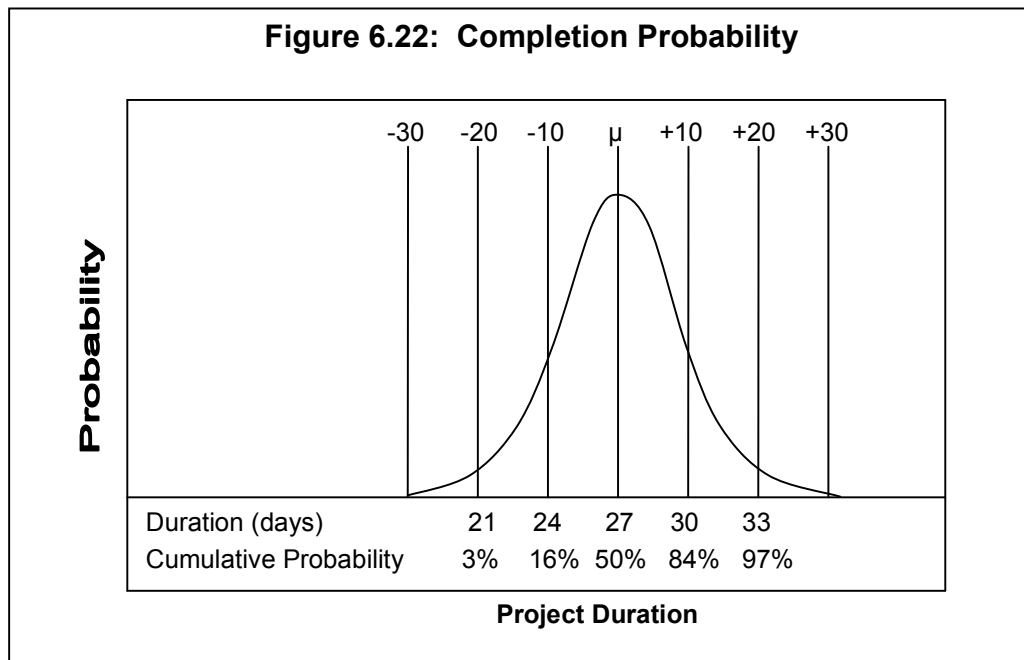
Consider delivering a reviewed product specification in four weeks (20 days). If we assume the data from Figure 6.21 and 6.22 represent the project, we can see why the project manager was frustrated. Based on the calculations, the cumulative probability of completing the project in 20 days is more than 2 standard deviations below the mean or less than 3%!

Imagine going to our stakeholders with this information. It will change the conversation dramatically. Instead of feeling at the mercy of our stakeholders we can use our good estimate to begin a constructive negotiation. *"I understand that you would like the work completed in four weeks. However, my calculations suggest that we have less than a 3% chance of meeting that deadline."*

If our stakeholders are listening, they will want to know more (like how we arrived at this probability). We can explain to our stakeholders why they might wish to adjust their deadline or present shortcuts and the consequences of those shortcuts. In effect, we can discuss risks and how to avoid them.

Range estimating is a simple technique. With practice, it takes little more time than single-point estimating. The technique allows us to account for the uncertainty and variability inherent in project work. It also allows us to generate a risk adjusted project estimate. By sharing the range-based estimate with our key stakeholders, we can begin the process of discussing project risks and rational risk taking. For more on estimates, risk and probabilities see Appendices Four and Five.

It is usually helpful to involve others in the estimating process. This principle is endorsed by James Surowiecki in his book 'The wisdom of Crowds' in which it is persuasively argued that if you want to make a correct decision, large groups of people are smarter than the expert.



Summary

In summary, some useful points about the estimating process that we need to understand are:

- Better estimates need better information. An essential step in this regard is the creation of the work breakdown structure (WBS) agreed to by the client and project manager.
- Never estimate alone. It's useful to have several people involved. The Wideband Delphi Technique is one approach where experts develop their own estimates without consulting each other, sometimes with a consensus discussion to finalise the process.
- Better to be about right than absolutely wrong. Range estimates tend to be more realistic than single-number estimates, especially at project conception when there is considerable uncertainty.
- A standard process yields improved estimates. The process selected must be workable, logical and consistently applied, so that we can become adept at its use.
- Overly optimistic estimates cause trouble. Whether it's time, money or resources, the actual project seldom ends up as hoped. Avoid the pressure to produce optimistic estimates. Realistic and reasonable estimates are better. When we ask for estimates, don't tell them the deadline or available budget.
- Estimates need risk assessments. Without an allowance for risk the estimate will be unrealistic. Robust estimates result from a clear deliverable definition, detailed scope of work, accurate historical results, and an appropriate adjustment for risk.
- First we estimate work-effort (eg, staff-hours) and then we estimate cost and duration (ie, how long in days, weeks, etc).
- Learn from estimates. Because many tasks repeat from project to project, we need to capture

and archive the actual work-effort and use this information on the next project. An ideal repository being a project management office, if we have one.

The topic of estimating is further examined at Appendices Four, Five and Six. As more information becomes available the estimates may need to be revisited. Estimates are statistical probabilities.

The next steps in the Develop phase of our project lifecycle are to prepare a network diagram and schedule.

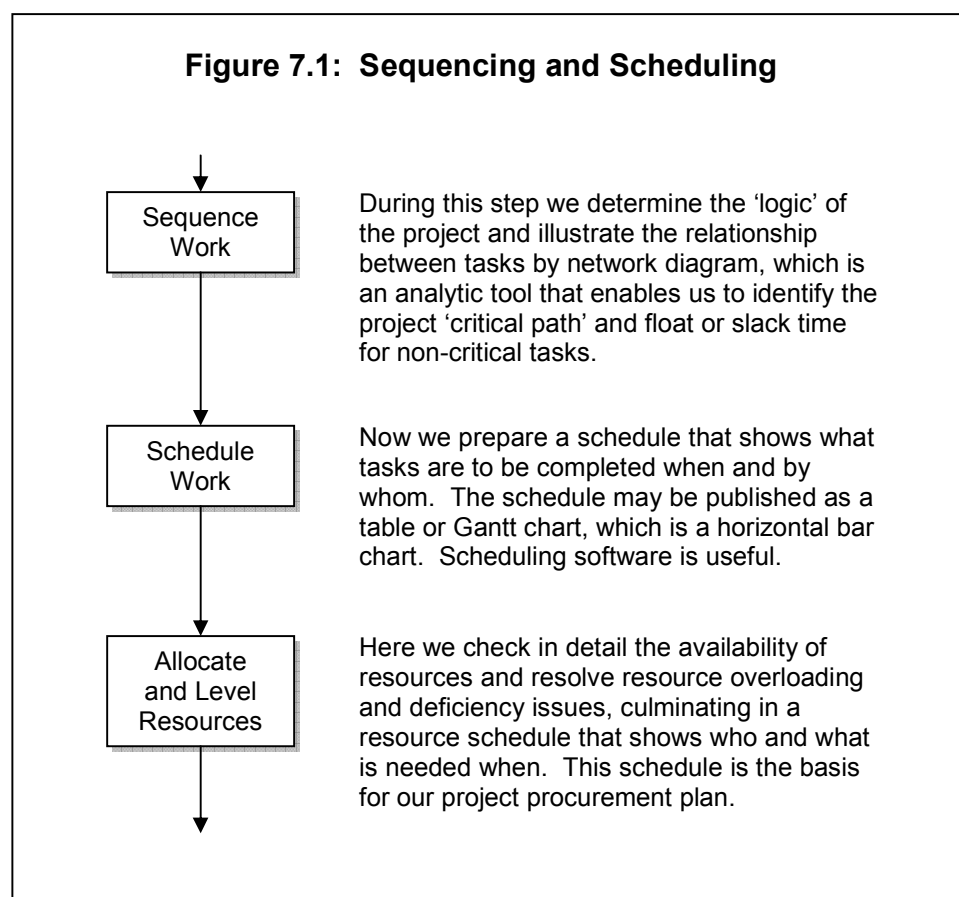


Chapter Seven

SEQUENCE AND SCHEDULE WORK AND RESOURCES

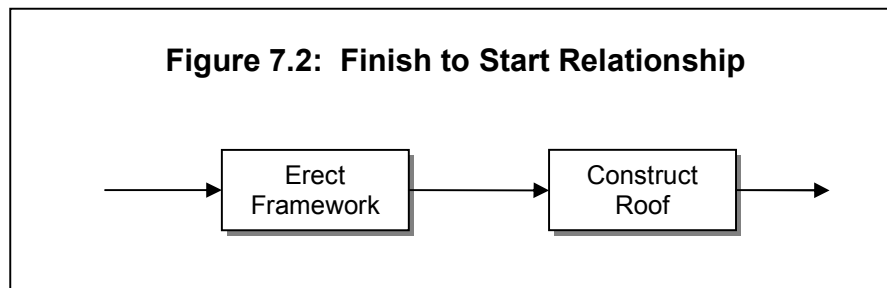


The next three steps in the framework are 'Sequence Work', 'Schedule Work', and 'Allocate and Level Resources' as shown at Figure 7.1.



Sequence Work

The sequence in which the work that comprises the project is completed is mainly determined by the relationship between tasks. It requires we recognise that before we undertake a task there is usually another task (or tasks) that needs to be completed. For example, it's not practicable to construct a roof until the framework is in place. This simple relationship may be illustrated as shown in Figure 7.2, which depicts a finish to start situation or dependency. There is no lead or lag time between the two tasks.



The relationship at Figure 7.2 can be part of a much larger diagram that shows all the tasks required to complete the project and their relationships. The resultant network diagram is a very useful planning tool, which enables the project manager to graphically illustrate relationships among project tasks. The network diagram illustrates task dependencies and facilitates a number of scheduling calculations. It's a logical representation of tasks that define the sequence of work in a project.

Such diagrams, first used in USA and Europe during the 1950's, are referred to by a variety of names, including:

- Critical Path Method (CPM) and Critical Path Analysis (CPA)
- Programme Evaluation and Review Technique (PERT) Chart
- Dependency Network
- Precedence Diagramming Method (PDM).

The main purposes of a network diagram are to enable the project manager to:

- graphically depict project task interdependencies
- illustrate the sequence in which tasks must be completed
- identify the critical path and thus estimate project duration
- identify and eliminate unnecessary tasks and dependencies
- determine early and late start and finish times for tasks and complete other scheduling calculations
- provide a model for estimating the consequences of varying task durations and task dependencies
- provide a basis for task and resource scheduling
- provide a basis for reporting progress.

At this early stage of planning, the network diagram is based on reasonable assumptions about those resource availabilities that influence estimated task durations. The more complex a project is, the greater is the value of the network diagram. It's not usually needed for small, simple projects.

Network Diagrams

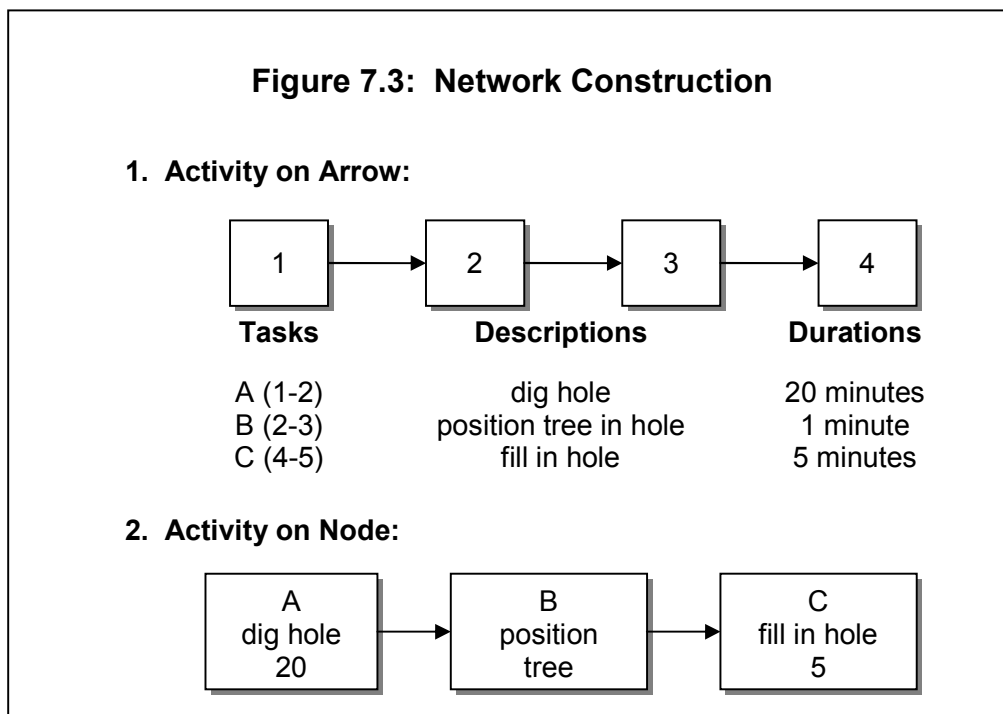
There are two main types of network diagram:

1. **PERT** **Programme Evaluation and Review Technique Chart** was developed by the US Navy for the Polaris missile project. PERT uses three estimates of time per task to determine the task's Best Estimated Time for higher duration uncertainty situations:
 - Optimistic Time
 - Most Likely Time
 - Pessimistic Time
2. **CPM** **Critical Path Method** was developed by a civilian firm. CPM relies on a single time estimate. CPM is best used when time can be accurately estimated. It is more widely used than PERT.

In recent years these two types of network have blended into one. CPM is normally used, but may include some PERT time estimates. 'PERT/CPM' is a common expression. However, the generic expression is 'network diagram'.

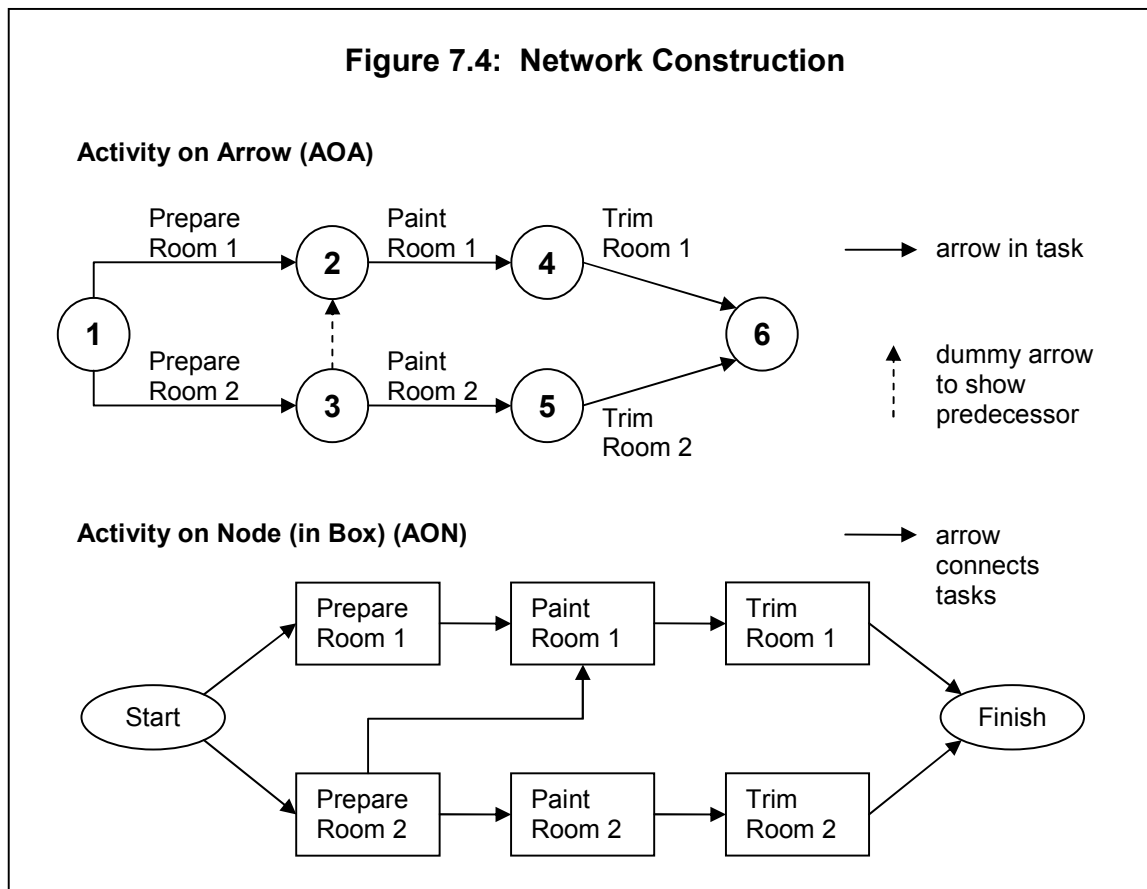
Network Construction

The network may be drawn in the two ways illustrated at Figure 7.3 – Activity on Arrow or Activity on Node:



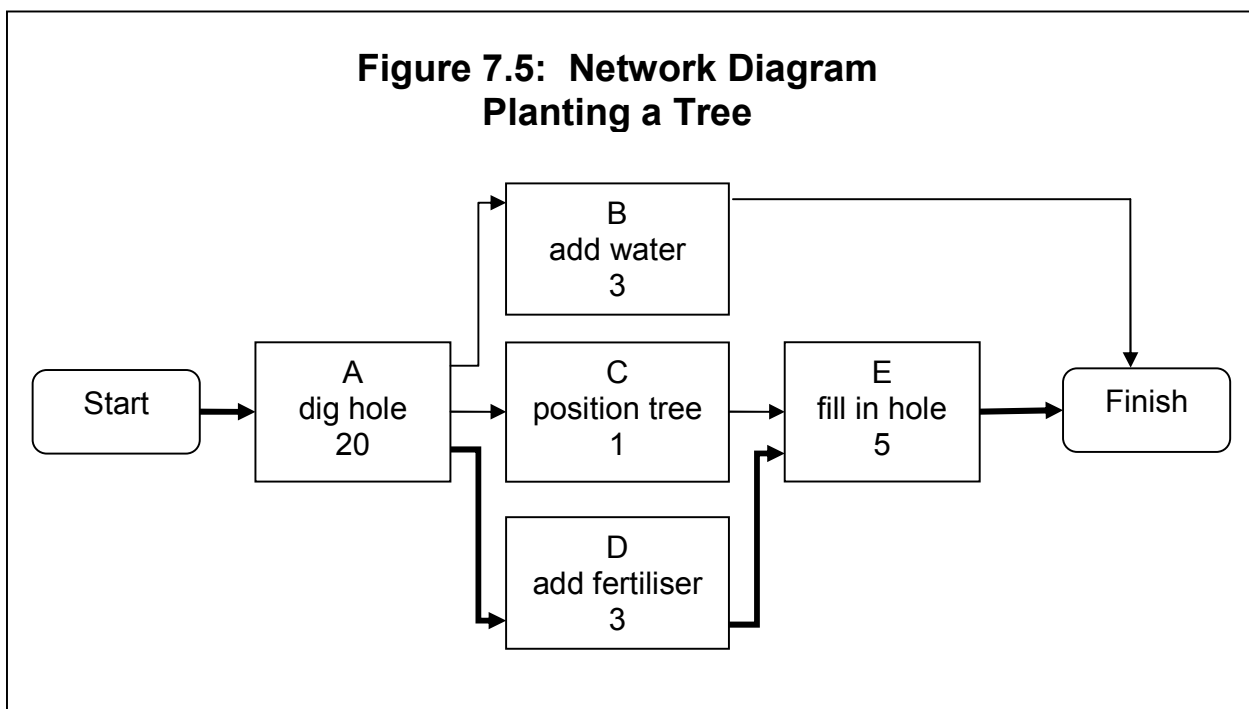
1. **AOA** **Activity on Arrow** is where the arrows represent the tasks and the boxes represent event nodes (ie, the start and finish of tasks).
2. **AON** **Activity on Node** is where the nodes represent the tasks and the arrows shows the sequence of tasks – the paths through the network.

Figure 7.4 shows another example of these two ways of drawing the network diagram. AOA requires the use of 'dummy arrows'.



AON or box diagram method, now more popular, is the type of network diagram that is used by all modern scheduling software packages and we will focus on this. A very simple AON example is shown at Figure 7.5, which includes both sequential and concurrent (or parallel) tasks. The critical path is shown by bold arrows. Normally a project this simple needs no diagram, but in this instance it helps me explain the basics.

**Figure 7.5: Network Diagram
Planting a Tree**



The main information that Figure 7.5 conveys is:

1. The project consists of five tasks, their sequence for completion is depicted by the arrows. Task E, for example, cannot commence until both tasks C and D have been completed. These tasks are 'immediate predecessors' to task E, and task E is the 'immediate successor' to tasks C and D.
2. The longest time route through the network (A-D-E) is the 'critical path' which governs the project duration. In this instance the project duration is 28 minutes. Tasks on the critical path (A, D and E) are referred to as 'critical tasks' in that any change to their durations is likely to change the entire project duration. Critical tasks (ie, tasks on the critical path) are not necessarily the most important or most expensive tasks. They are critical in terms of time. The critical path might also be denoted by double arrows, coloured arrows, or shaded boxes, depending on personal preference or software used.
3. Tasks B and C are 'non-critical tasks' and as such possess 'float time' (or 'slack time') which is a useful characteristic as it provides scheduling flexibility. Float is calculated by comparing the relevant part of the critical path with the non-critical path. For example, there is a three minute window of opportunity during which task C may be undertaken, and task B may be undertaken within an eight minute timeframe (tasks D and E). The float therefore for task C is two minutes, and is five minutes for task B.

Thus, float (AON) or slack (AOA) is the spare time available before or after a task is completed. It occurs on non-critical paths and may be employed to optimise the use of resources.

Not every project has an obvious critical path. If a project finish date allows more than enough time to complete the project, all tasks will have float. In these circumstances the critical path might be described as the path with the least float.

There are two types of float:

- **Total Float** The difference in time between the Earliest Time a task can finish and the Latest Time that a task can finish. It is the spare time that exists within a pathway and can be shared among all tasks on that pathway.
- **Free Float** The spare time that one task has within a pathway. It is the spare time that exists between tasks that can be used without affecting other tasks on that pathway.

A project may have more than one critical path. For example, in Figure 7.5 if task B took 8 minutes to complete, then path A-B would also be critical, and only task C would be non-critical. Also, depending on actual task durations the critical path may shift as project implementation proceeds. Near-critical paths and tasks might become critical, depending on actual task durations.

Incidentally, it is unlikely that we would prepare a network diagram for such a simple project. However, the design principles involved are the same at all levels, although task duration is more likely to be expressed in days, weeks or months, whichever unit of time is appropriate.

Some common design conventions when drawing a network diagram are:

- The length of the arrow is irrelevant. There is no time scale; arrows don't show duration, only relationships between tasks.
- Arrows normally start and finish at nodes, but can be joined providing the diagram doesn't then become ambiguous. See Figure 7.6.
- Avoid crossing arrows where possible in the interests of clarity. Use symbols such as those shown at Figure 7.7 where necessary, if the software permits.
- Diagrams flow typically from left to right and occasionally vertically.
- Each task is assigned a unique identification code from the WBS.
- Unless already codified, tasks are usually codified left to right, top to bottom of the network. Normally tasks are codified when the WBS is developed.
- Common time units are used throughout the network – usually work days.
- To ensure a clear start and finish there is one start and finish node for each network. Sometimes these two events are not shown, depending on software used.
- Nodes vary in their complexity. A more comprehensive format is shown at Figure 7.8. This template could be printed onto Post-it Notes.
- There can be no looping sequences of tasks. A loop is appropriate in a decision tree or flowchart, but illogical in a network diagram, which depicts dependencies. Repetition is shown in sequence.
- There should be no redundant arrows.
- There should be no 'dangling nodes'. This would break the rule of dependency which governs the logic of the network. Every task must be linked with an arrow back into the diagram.

Figure 7.6: Options with Arrows

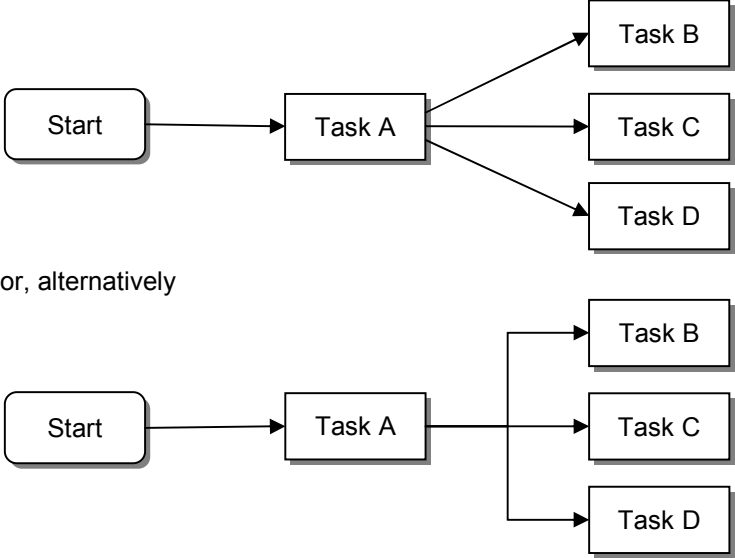


Figure 7.7: Arrows Not Joined

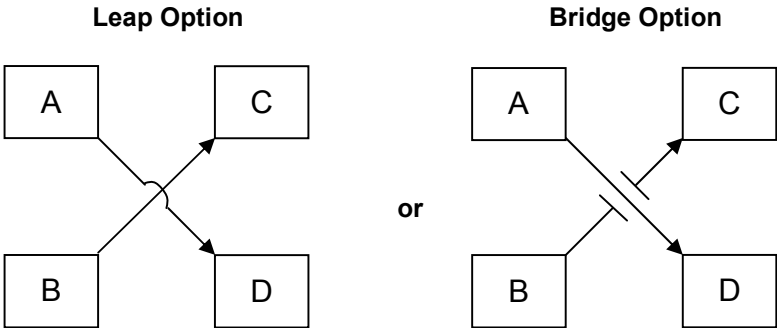
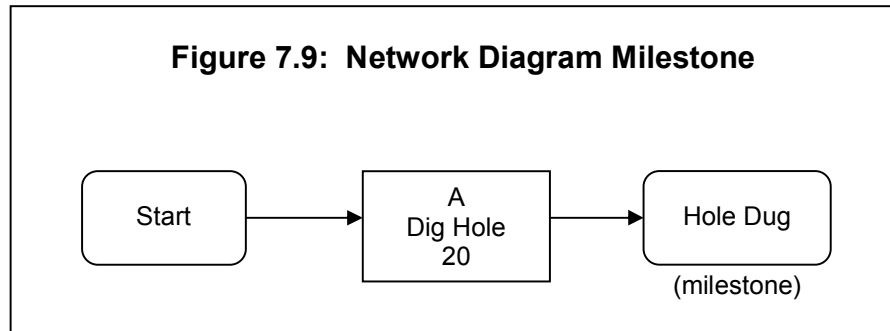


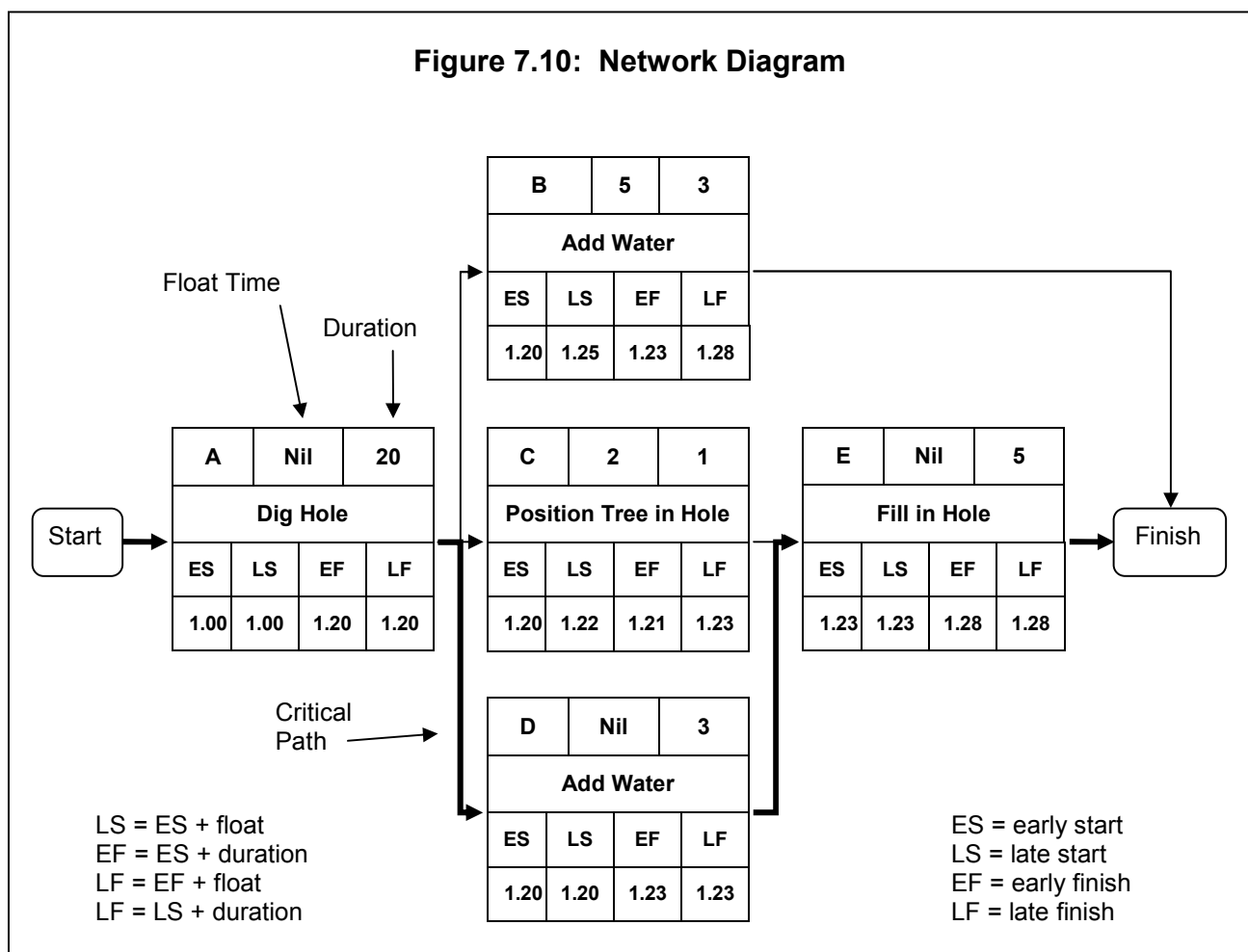
Figure 7.8: Detailed Task Node

Project:	Task ID:
Task Description:	
Duration:	Float:
Early Start:	Early Finish:
Late Start:	Late Finish:

The 'Start' and 'Finish' nodes are 'event nodes' rather than 'task nodes'. A significant event node is a milestone and may be shown as a nil duration task node of different shape such as a diamond, oval or as shown in Figure 7.9 or by placing a flag at the start or finish of a task.



The network diagram at Figure 7.5 could be further analysed to also include the earliest and latest start and finish times for each task. If the tree planting project was to start at 1:00 pm it would be completed at 1:28 pm assuming resources are available and can operate concurrently where shown. See Figure 7.10.



Earliest and latest start and finish mentioned in Figure 7.6 are defined thus:

- **Earliest Time** is the earliest time at which a task can be started or finished. It is calculated by working forward through the network summing the durations.
- **Latest Time** is the latest time at which a task can be started or finished. It is calculated by working backward and subtracting duration from the latest event time.

An effective way for a team to develop a network diagram is to use a whiteboard or flipchart and 3M Post-its™ as nodes printed up as shown at Figure 7.8. These can then be sequenced according to their dependencies and once in their correct positions the arrows connecting the nodes may then be drawn, the critical path(s) identified, and other timings determined. The minimum information needed to develop a network diagram is:

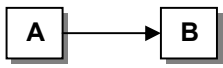
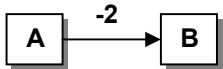
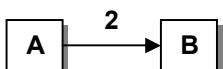
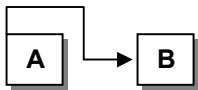
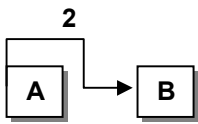
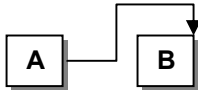
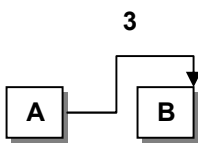

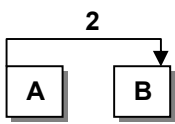
- task list for the project
- immediate predecessors for each task
- task durations
- project start time/date.

The durations and immediate predecessors for our simple tree-planting project are shown at Figure 7.11.

Figure 7.11: Task Predecessor List			
ID	Task Description	Duration	Predecessor(s)
A	Dig Hole	20 minutes	Nil
B	Add Water	3 minutes	A
C	Position Tree	1 minutes	A
D	Add Fertiliser	3 minutes	A
E	Fill in Hole	5 minutes	C and D

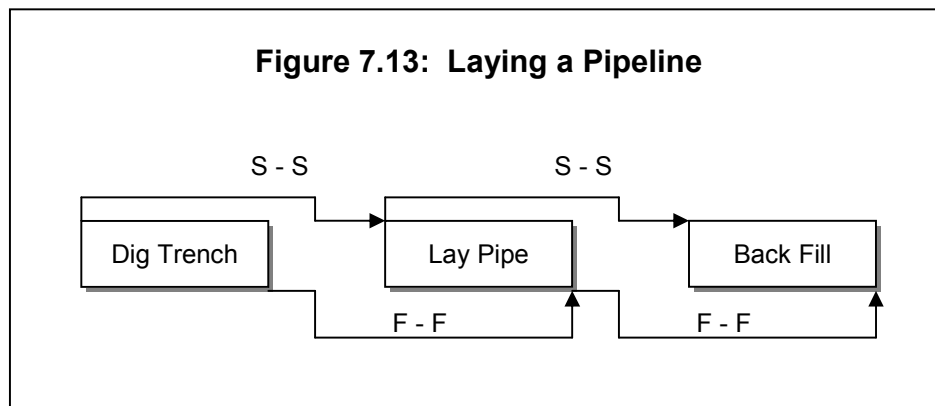
The most common relationship between successive tasks in a project is 'finish to start'. That is, one task must be completely finished before the next task can start. However, sometimes tasks can overlap or there may be need for a delay between tasks. The various types of relationships are summarised at Figure 7.12. An example of Finish to Start with Lag Time is when task A is to pour concrete. The delay time allows for drying before task B commences.

Sometimes we don't take enough care determining dependencies and end up with schedules that are either overly optimistic because they assume that tasks can be done in parallel when in fact they cannot, or pessimistic because they do not take advantage of those tasks that can be done in parallel.

Figure 7.12: Task Relationships		
Relationship	Diagram Examples	Remarks
1. Finish to Start		Task B starts when task A is completed. Most common situation.
2. Finish to Start with Overlap		Negative lag time or lead time. Serve dinner – prepare dessert.
3. Finish to Start with Lag Time		Task B starts two days after task A is completed.
4. Start to Start	 	<p>When task A starts, task B may start.</p> <p>Task B starts two days after task A has started. Can be shown as negative time. It's an overlap situation. Fast-tracking.</p>
5. Finish to Finish	 	<p>When task A finishes, task B may finish.</p> <p>Task B finishes three days after task A is finished.</p>
6. Start to Finish	 	<p>When task A starts, task B may finish.</p> <p>Task B finishes two days after task A starts. Uncommon relationship.</p>

An example of a Start to Start relationship is when task A doesn't need to be completed before task B commences, such as when laying a pipeline as illustrated at Figure 7.13. We recognise that it is not necessary to dig the entire trench before starting to lay the pipeline and backfill. This overlapping or 'fast tracking' is a useful technique for achieving challenging completion deadlines. While

overlapping reduces project duration it may increase risk and cost, and its practicality may depend on resource availability.



Some key considerations that help us to determine the logical sequence in which to schedule tasks are:

- **Technical constraints** such as the need to construct framing before pouring concrete, to market test before product launch, and to proofread before publishing.
- **Safety constraints** such as the need to disconnect power before repairing the fuse-box.
- **Resource constraints** such as the need to schedule computer installation when the appropriately skilled technician is available.

Types of task relationships or dependencies are:

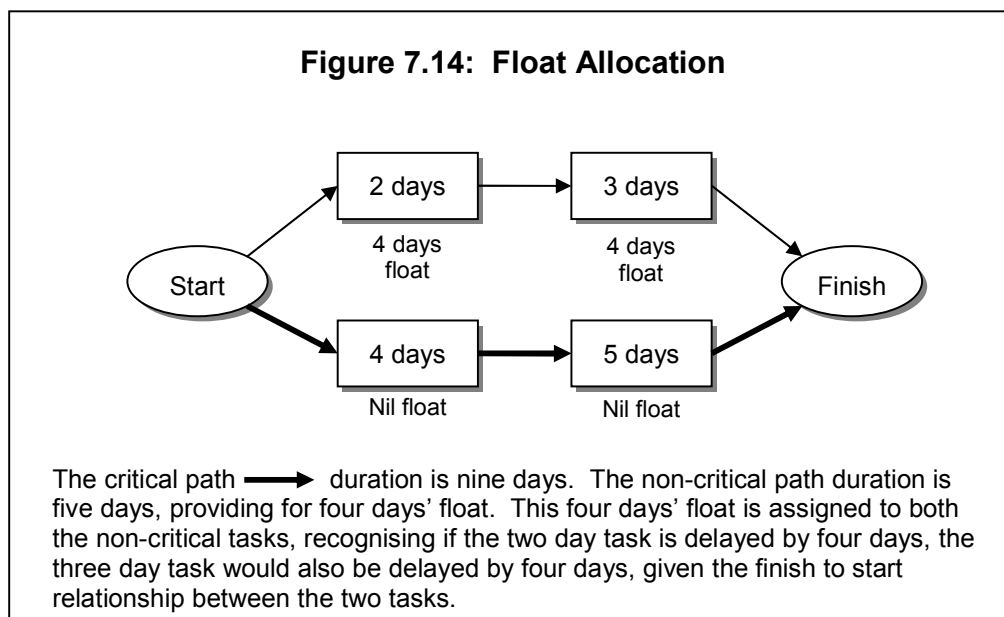
- **Mandatory.** We must build the foundations before the framework. Also called hard dependencies or hard logic. For example, the invitations must be printed before they can be posted.
- **Preferential.** It's more efficient to install the electric cables after the plumbing has been completed.
- **Discretionary.** The owner wants the driveway completed before the deck is constructed. The bridesmaids to arrive at the reception before the newly married couple.
- **External.** We must complete replenishment before the road closes for repairs. The decoration of the hall depends on the earlier wedding party being out of the reception hall on time.

Thus, in summary, the process for constructing a network diagram is:

1. Identify each task. See WBS.
2. Estimate the duration of each task in common time units assuming average or normal resource availability and efficiency. Use PERT formula if necessary. Remember, duration is not effort, which is the actual time spent on the task. We often underestimate.
3. Determine task predecessors.
4. Prepare Post-it Notes for each task.
5. Arrange the Post-it Notes on a large sheet of paper or on a whiteboard according to task dependencies/predecessors.

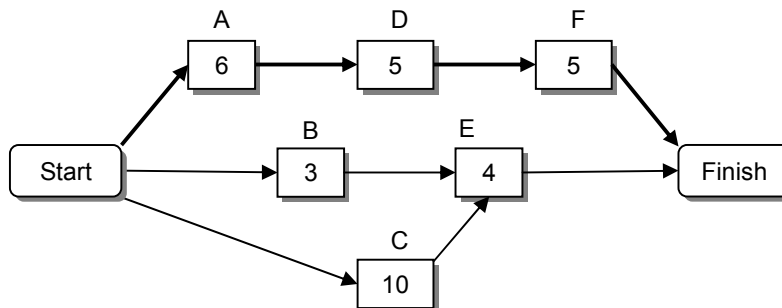
6. Draw in the arrows depicting the relationships between tasks.
7. Codify tasks if this has not already been done at the WBS development step.
8. Insert milestone flags or nodes to depict important events, such as the start of a task with several immediate predecessors (ie, at merge or burst points).
9. Determine the critical path(s) and calculate the project duration.
10. Calculate float times for non-critical paths/tasks.
11. Determine early and late start and finish dates for each task.
12. Check again the logic of the network and the timings, and commit the network to the computer for easy analysis and updating.

Float time is calculated for non-critical paths and the same float time is then assigned to each task on that non-critical path as shown at Figure 7.14. If a non-critical task appears to have more than one float time, then the smaller or smallest float time is assigned. See Figure 7.15. One thing we need to keep in mind is that the critical path approach may not fully recognise that project timing is also driven by the availability of resources as well as by task dependencies.



There are two different meanings of the term 'hammock task.' It may be a task that continues throughout the project (eg, maintaining the issues log and communicating with shareholders), or it may be a summary task.

Figure 7.15: Dual Float Time Problem

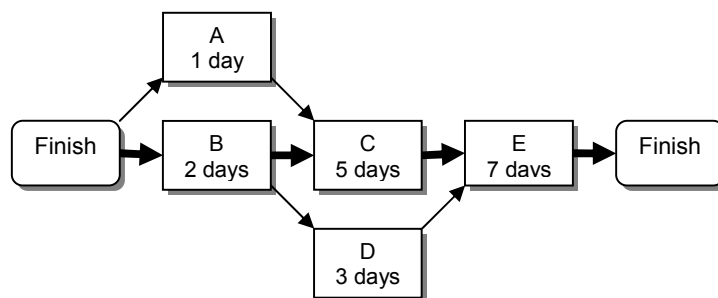


In this situation, task E has nine days' float when compared to the critical path ($16 - 7 = 9$) and two days' float when the lower path is compared to the critical path ($16 - 14 = 2$). Thus task E appears to have two float times. The correct float time for E is the smaller figure (ie, 2 days). Task B has nine days' total float.

Network Diagram Analysis

The analysis of a network diagram enables the project manager to prepare a schedule of tasks showing early and late, start and finish times, for each task. An example is shown at Figure 7.16. Sometimes float ownership (ie, which task manager has access to the float) is an issue. Best practice is that the project manager owns and manages all float. Task managers are simply advised of their early schedule. Otherwise their work tends to expand to absorb the float or they start late.

Figure 7.16: Network Diagram and Basic Schedule



Tasks	Duration	Float	Start		Finish	
			Early	Late	Early	Late
A	1	1	0	1	1	2
B	2	0	0	0	2	2
C	5	0	2	2	7	7
D	3	2	2	4	5	7
E	7	0	7	7	14	14

This schedule could then be converted to calendar dates; taking care to allow for non-working days such as weekends and holidays, and recognising whether finish dates are inclusive or exclusive.

The critical path (ie, longest route through the network diagram) is critical because:

- Its combined duration (length) determines how long the project will take.
- It has no float! Each task must start immediately when its predecessor is finished, and consume no more than its allotted time.
- Delay of any critical path task will delay the completion of the entire project.

A more complicated example is shown at Figure 7.17 and Figure 7.18. The project is to establish a small factory. Figure 7.17 shows the WBS tasks, their relationships or precedences and estimated durations in workdays or project days. Figure 7.18 is the resultant network diagram.

Figure 7.17: Task Analysis Information

TASKS	PREDECESSORS	DURATIONS
1. Perform production requirements analysis.	Nil	3
2. Select and lease a building.	1	15
3. Select a manager.	Nil	5
4. Relocate the manager.	3	20
5. Place advertisements.	1	5
6. Order equipment.	1	1
7. Receive equipment.	6	25
8. Check equipment.	7	10
9. Move/install equipment.	8, 11	3
10. Develop layout.	2	5
11. Secure electrical and plumbing services	10	10
12. Order materials.	2	1
13. Receive materials.	12	10
14. Interview and select personnel.	5, 4	10
15. Train personnel.	13, 9, 14	10

Figure 7.18: Network Diagram for Factory Project

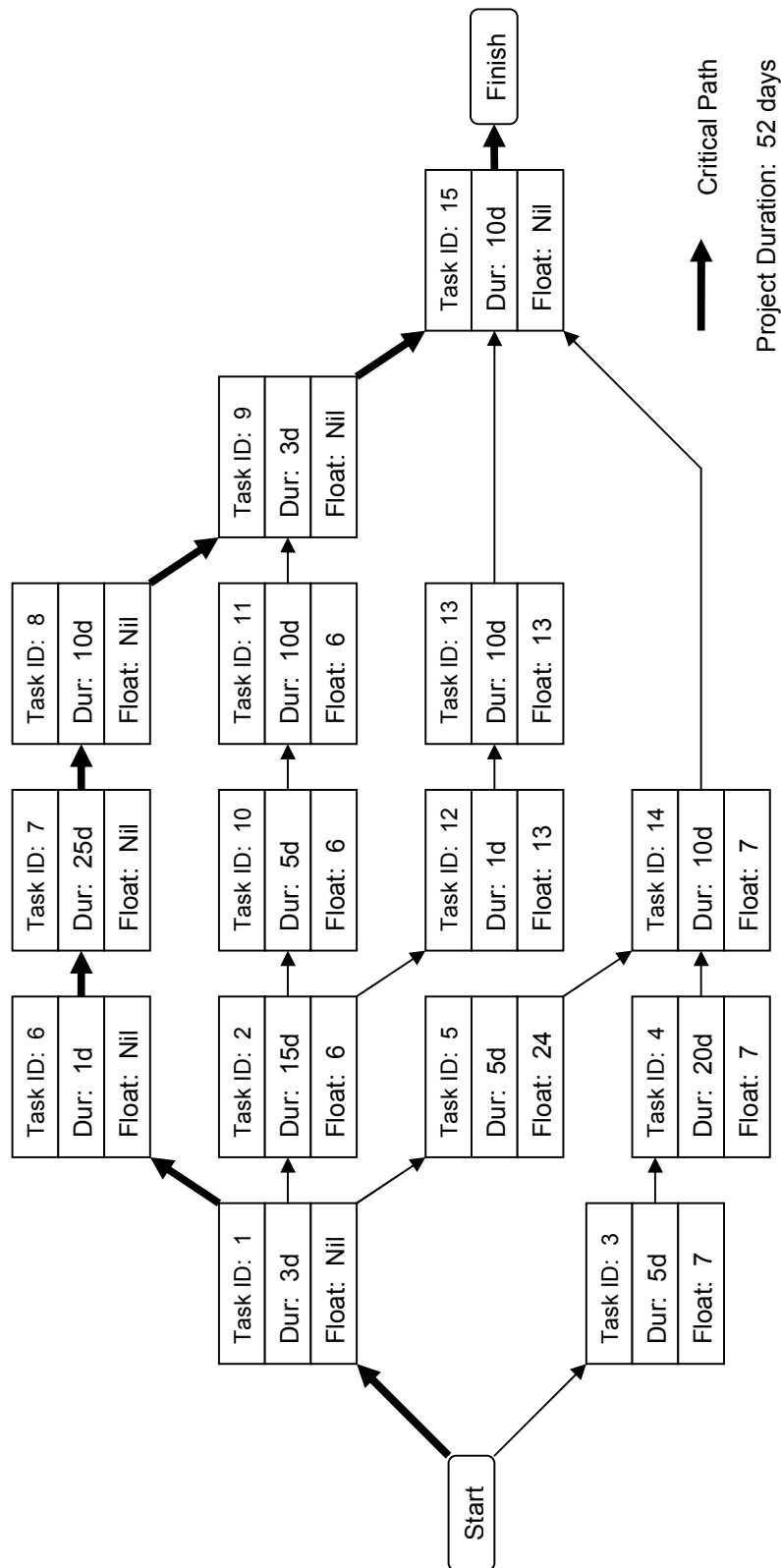


Figure 7.18 is best developed using Post-it Notes onto a flipchart or whiteboard. Once completed, the planning team can analyse the diagram, asking question such as:

- Are all the durations realistic and reasonable appreciating the difference between work-effort and duration?
- Are all dependencies appropriate? Non-essential (preferential or discretionary) precedences are inclined to increase project duration.
- If we were to accelerate the project, perhaps to beat the competition, which critical path tasks might we examine? Generally, the answer is to accelerate:
 - earlier tasks rather than later tasks
 - longer duration rather than shorter duration tasks
 - tasks that precede multiple tasks
 - tasks that are cheaper to accelerate (ie, lowest cost-time ratio), which are usually those tasks with fewer labour resources, where the addition of a few additional resources can considerably reduce task completion time, while material use usually remains much the same regardless of duration.
- What would happen if we reduced labour resources and thus extended duration of tasks? Often for non-critical tasks this merely reduces float, but has no impact on the project completion date.
- How could we accelerate critical task completion times? More resources? More productive resources? Better processes? Improved technology? Longer work days?
- If resources are sufficiently multi-skilled, is there a more cost-effective distribution of resources? Should we transfer resources to critical path tasks?

Essentially, the network diagram facilitates sensitivity analyses, where we can alter durations and dependencies to assess the impact of such changes on the project as a whole. This process is most easily completed using scheduling software, but developing the network diagram in the first instance is better done using Post-it Notes.

A further example is shown at Figure 7.19 and Figure 7.20. In this example, the project duration is 77 work days or project days. The easiest way to convert this to a completion date is simply to count off calendar dates in our diary, keeping in mind that weekend and statutory holidays are not normally work days.

Also , I reiterate - float is one of the few resources available to the project manager and should not be made available to anyone else. Work package managers are simply given a start date and a finish date.

Figure 7.19: Task Analyse Information

TASKS	PREDECESSORS	DURATIONS
A	Start	10
B	A	15
C	A	5
D	B	25
E	C	31
F	D	10
G	D	8
H	D, E	12
I	E	17
J	F, G, H	10
K	J	5
L	I	7

PERT Chart and Probabilities

When task duration is considerably uncertain the PERT weighted average formula may be used to establish a single time estimate. The three time estimates involved also allow for the calculation of completion probabilities. This somewhat academic subject is discussed rather fully at Appendix Five.

Project Planning Process

The project planning process itself may be depicted as a network diagram. See Figure 7.21. This network and others may have durations reduced through:

- **Crashing** – in which cost and schedule trade-offs are analysed to determine ways of reducing task durations. It's a compression or concertina process. Risk and cost may increase.
- **Fast Tracking** – doing tasks in parallel (or overlapping) rather than sequentially, but may result in reduced quality, rework, and considerably increased risk.

Figure 7.20: Network Diagram

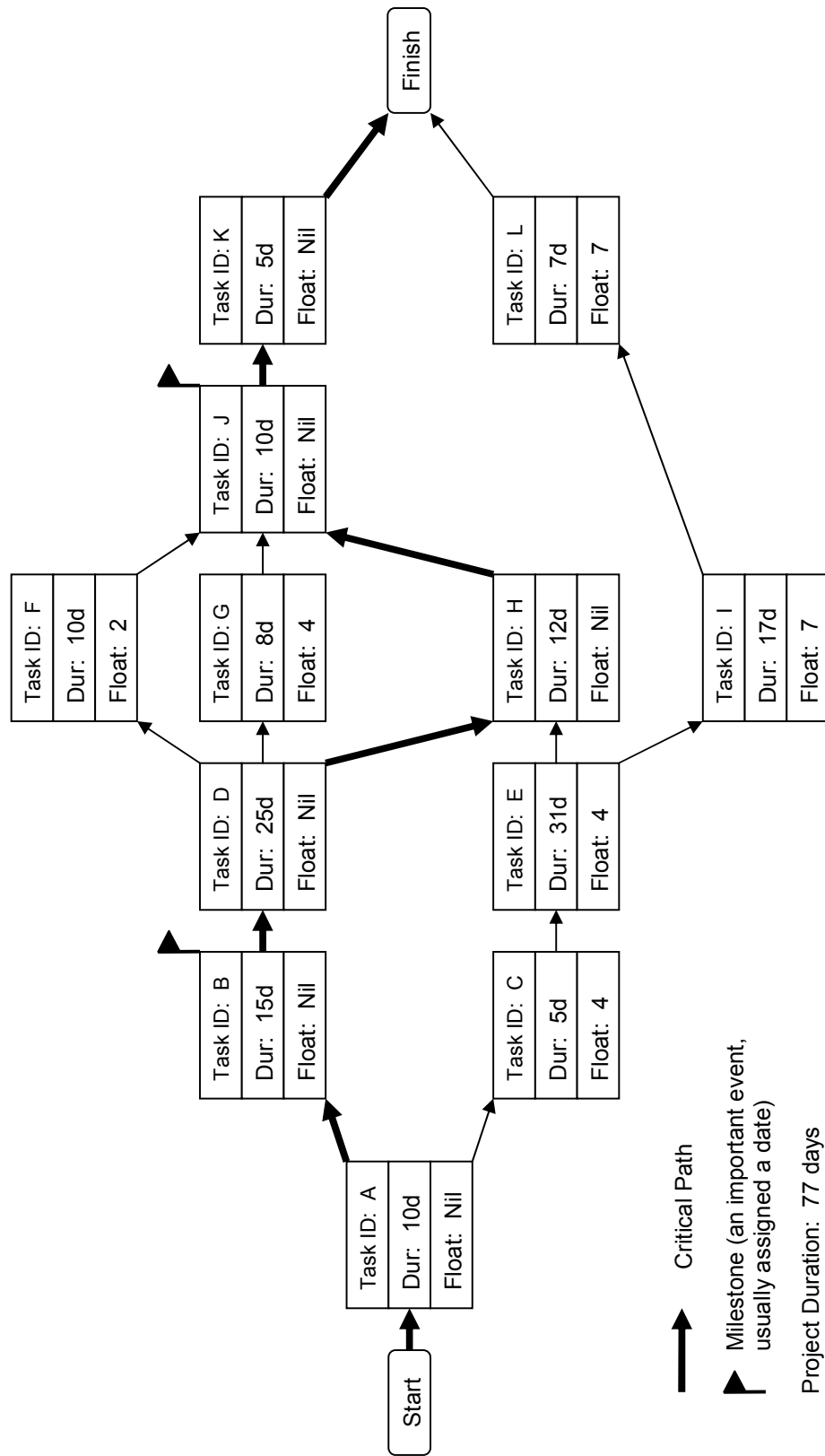
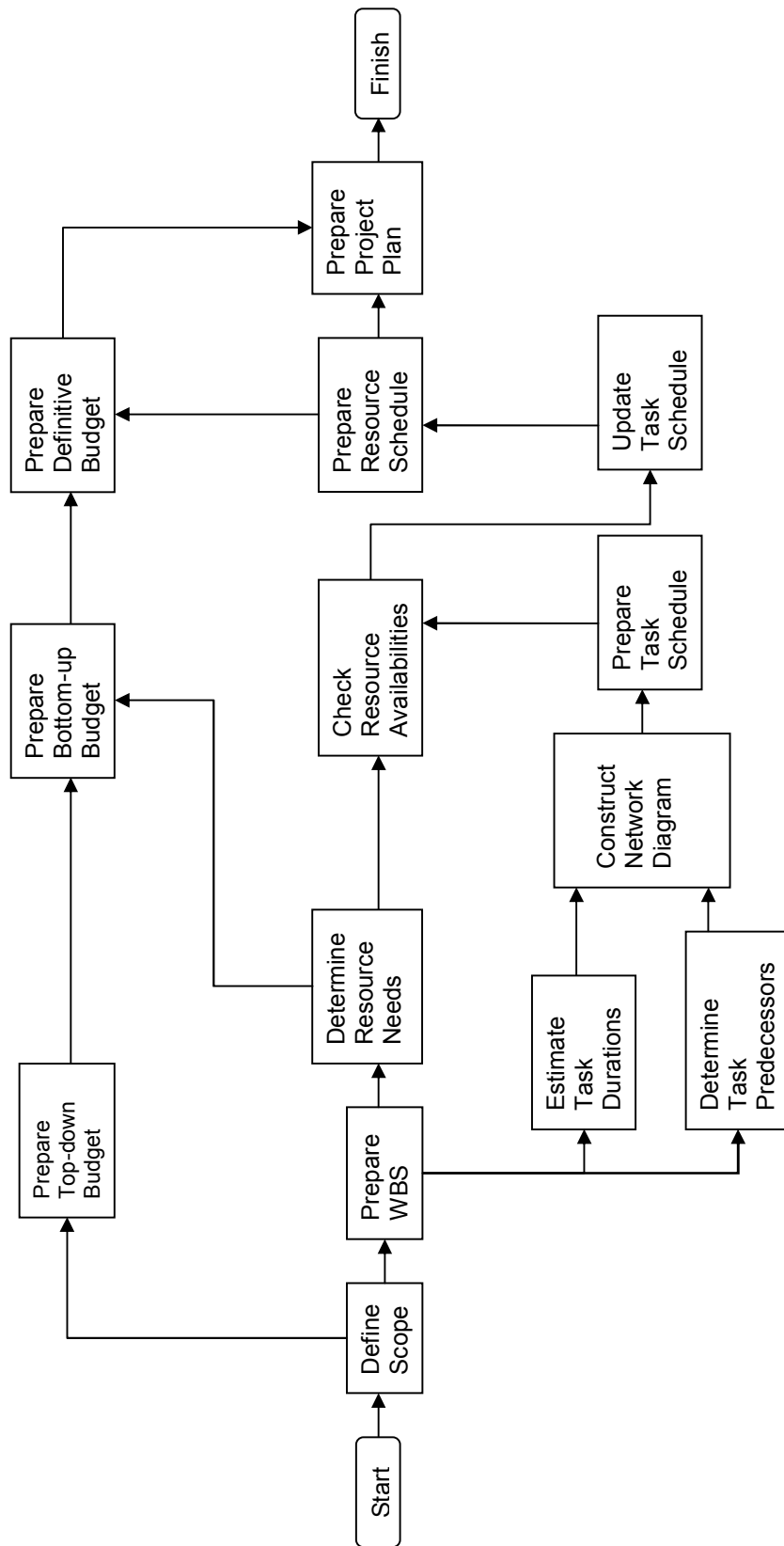


Figure 7.21: Basic Project Planning Process



Project Duration

Once the project is illustrated by network diagram, it is then easier to identify how project duration might be reduced, by measures such as:

- transfer resources from non-critical to critical tasks
- eliminate selected tasks (ie, reduce scope)
- add more resources to critical tasks
- complete more tasks concurrently or overlap tasks
- shorten critical tasks through more efficient work practices
- increase work hours per day on critical tasks.

The project duration can only be reduced (ie, project accelerated) by reducing the duration of critical path tasks. However, as the critical path duration is reduced, non-critical paths may then become critical and these too would then need to be reduced in duration if the project is to be further accelerated.

A network diagram can be produced manually or using a computer. All modern project management software packages use AON (ie, activity in box).

Project management software is widely used to assist with network analysis. It is usually preferable to construct the network using Post-it Notes and then computerise the network diagram for easy amendment and 'what-if' analysis. For a simple project the computer will not be required. For a complex project it will be essential.

Using MS Project we can enter the tasks and durations, print the network diagram, which will be unconnected task nodes since dependencies have not yet been entered. Cut out the task nodes and fix them to Post-it Notes. Develop the network diagram on a whiteboard and then computerise.

A network diagram is a schematic display of project tasks and shows the logical relationships (dependencies) among them.

Project task lists can be converted to network diagrams once the following questions have been answered:

- What task or tasks immediately proceed each task?
- What task or tasks immediately follow each task?
- What task or tasks can be done concurrently with each task?
- What is the duration of each task?

The project network diagram is the deliverable produced from the 'Sequence Work' step in the project lifecycle process. It enables the project manager to prepare a schedule of tasks with calendar dates, expressed in table or Gantt chart format, confident that dependencies are correct.

The 'critical path' is the set of tasks that determines total project duration. It's the longest path through the project, and any delays along it will delay completion of the entire project.

The 'critical chain' method, which is occasionally touted as a modern alternative to the critical path

method, is explained briefly in the following paragraphs.

Critical Chain Project Management

Projects with challenging completion dates are becoming increasingly common as product lifecycles shorten and organisations strive to get their products to market first. Time-based competition.

Ambitious completion dates are often achieved by a combination of:

- task overlapping (ie, fast tracking or concurrent engineering)
- task concertina effect (ie, accelerating or compressing).

However, some observers argue that the estimated completion times for projects and project tasks usually contain considerable unnecessary contingency time (a doubtful assertion perhaps), which if unused is seldom passed on. They argue that work expands to fill the total time available for each task. Thus, delays are passed on, which seems reasonable.

Critical Chain Project Management (CCPM) has been proposed as a solution to the above problems. CCPM, which is yet to be fully validated, departs from normal project management network diagram scheduling practice as follows:

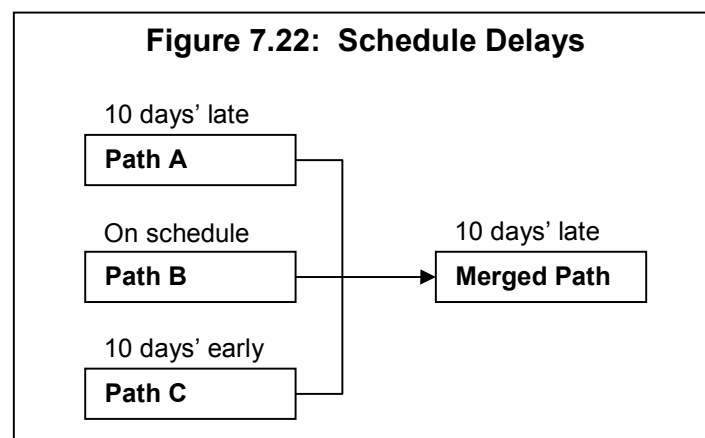
- CCPM specifies a 'critical chain' rather than a critical path.
- CCPM uses only 50 percent probable task duration, and aggregates allowances for uncertainty into buffers at the end of task chains.
- CCPM uses buffer size as a measure to monitor and control project performance.
- CCPM seeks to change some common project team behaviours, encouraging people to report early task completion and avoid multi-tasking.

CCPM employs four theories as the basis for improving conventional project performance, namely:

1. **Theory of Constraints.** Goldratt first described TOC in *The Goal* (1984) which states that every system has a constraint, otherwise its output would increase without bound. Goldratt identifies the project constraint as the critical chain which is the longest chain of sequential tasks in the project, more conventionally known as the critical path.
2. **Common Cause Variation.** Deming described common cause variation as a cause for variation that is inherent in a system. In a project it is the variation in the duration of tasks from optimistic to pessimistic. Every task has some inherent uncertainty in terms of its estimated duration.
3. **Law of Aggregation.** The statistical law of aggregation recognises that project variance is the sum of the individual task variances along the critical path or chain, and that aggregation of contingencies reduces the overall estimated time for a sequence of tasks.
4. **Central Limit Theorem.** The Central Limit Theorem states that as sample size increases, the distribution of the sample about the mean becomes closer to the normal distribution. Many individual project tasks have a skewed duration probability distribution. The central limit theorem means that a sequence or chain of tasks will have a more symmetrical distribution – the typical bell curve.

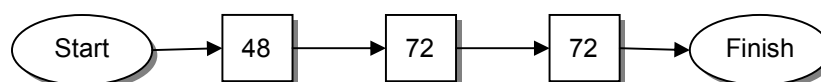
Also, CCPM advocates argue that conventional critical path theory has some potentially undesirable effects, namely:

1. **Excessive Duration Estimates.** Most project managers, the argument goes, include contingency time within each task estimate to account for individual task common-cause variation. Contingency is said to be the difference between the 95 percent probable estimate and the 50 percent probable estimate, although the amount of contingency time is not usually separately specified.
2. **Lack of Positive Variation.** Because many people wait until a task gets really urgent before they work on it, any contingency time is eliminated before the task commences. This is sometimes called the 'student syndrome'. Thus, tasks are either completed just in time or late, but never early.
3. **No Incentive to Finish Early.** Since there is usually no reward for finishing a task early, especially for 'time and materials' contracts where hourly rates may apply, finished early often means more work without additional reward.
4. **Delays by Non-critical Tasks.** Most projects have several task paths which merge into the critical path. Such merging tends to eliminate positive variations and only pass on the longest delays. See Figure 7.22 where Path A determines project duration.
5. **Multi-tasking.** Multi-tasking is doing more than one task at the same time. This might mean working on two projects in the morning and another three in the afternoon. This practice maximises the duration of all projects. Also, it usually takes some time to refocus with each change of project (ie, set-up time). Multi-tasking increases overall work effort.

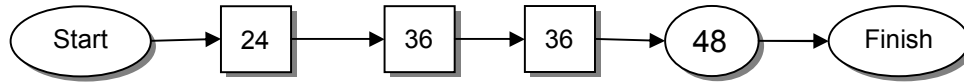


The CCPM process for developing the project schedule observes the following steps:

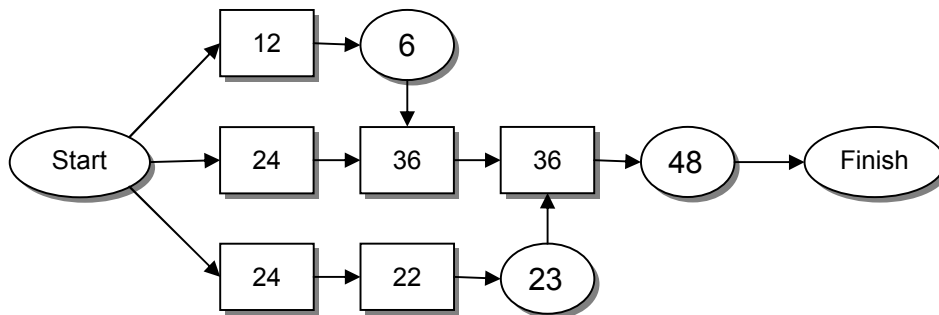
1. Plan our project as normal with maximum 'concurrency' of tasks illustrating relationships by conventional network diagram.
2. Estimate task durations in the usually manner and include normal contingency time:



3. Then simply halve task durations and add a project buffer at the end of the critical chain(s). This buffer is half the sum of the total saved contingency throughout the critical path or chain:



4. Similarly, we develop critical chain feeding buffers to protect the critical chain from delays to feeding chains (ie, non-critical paths):



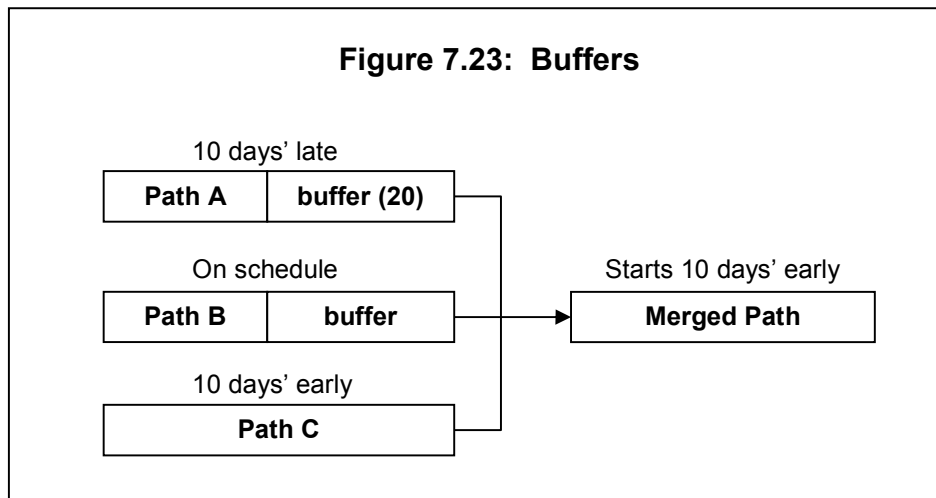
5. Early-book key resources and where necessary add resource schedule buffers to help ensure critical chain resources are available when needed and the project is not delayed due to resource shortfalls.
6. Ensure all resources perform their tasks in a focused manner as if in a relay race.
7. Use 'buffer management' to control the project.
8. Thus, in CCPM every task in a project precedes either a feeding buffer or the project buffer. If any task needs more time than estimated the corresponding buffer is consumed. Conversely, if any task needs less time, the corresponding buffer is replenished. By continuously tracking both the size of a buffer and the total days of work that precede the buffer we might assess the likelihood that the buffer will be completely consumed.

Buffer size becomes an important performance measure. When a resource is needed simultaneously by three projects the resources are prioritised according to the following rules:

- Priority is given to critical chain tasks.
- If two or more of the tasks happen to be critical chain tasks, the task whose project buffer is in greater jeopardy gets priority.
- The same holds true for two or more feeder tasks – the task whose feeding buffer is in greater jeopardy gets priority.

Figure 7.23 shows how critical chain feeding buffers might absorb delays.

Figure 7.23: Buffers



A considerable challenge with the critical chain method is to preserve resource-scheduling flexibility. There must be an ability to quickly reassign resources should task durations change. Float times still apply to non-critical or feeding paths.

Critical chain project plans might only provide dates for the start of task chains and the end of the project buffer. This enables the project team to focus on completing the project as soon as possible, and helps avoid date-driven behaviour.

Figure 7.24: Network Comparison

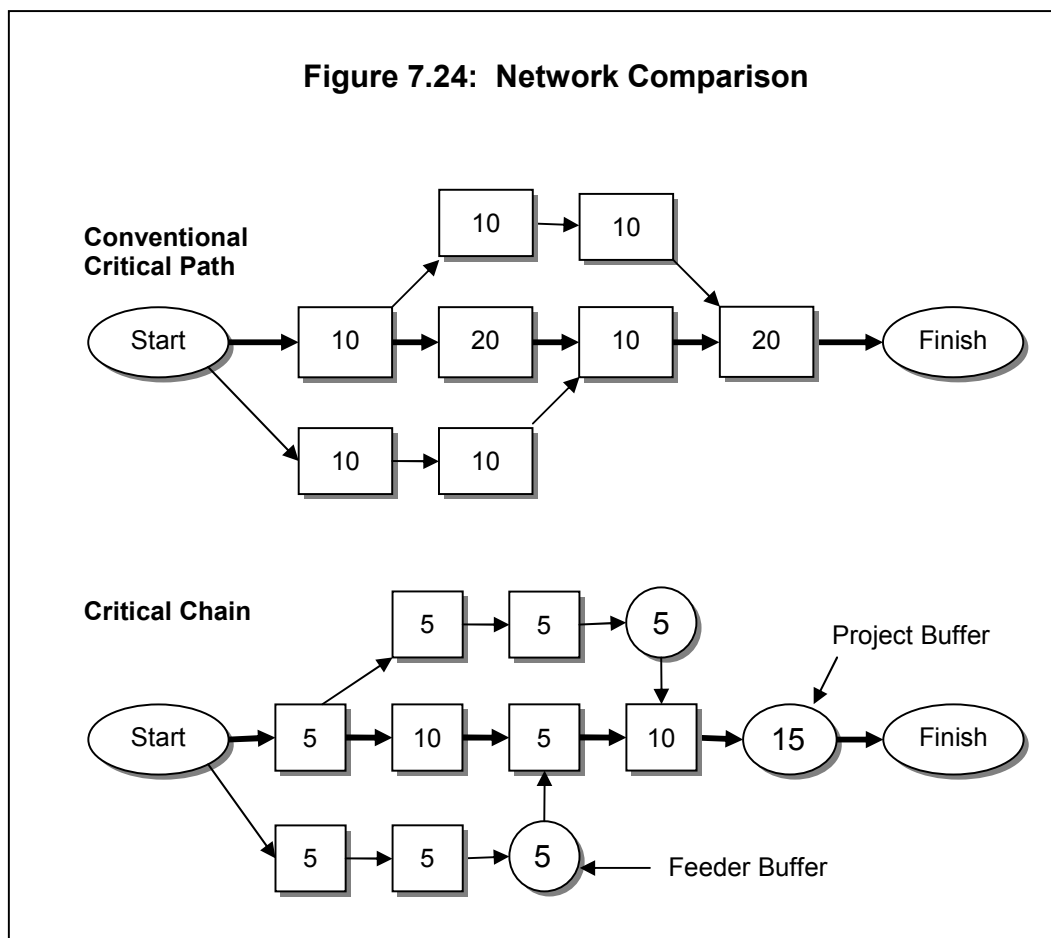


Figure 7.24 shows the same sequence of tasks illustrated in the conventional CPM manner and in the critical chain manner.

Support to date for the critical chain method of planning project has been very limited, but promising its advocates might say. Successful implementation means reducing time estimates to eliminate 'just-in-case' time and use '50/50' time, which means that some half of the project tasks will take longer than estimated. Buffers must be carefully managed and multi-tasking of people eliminated or reduced as much as practicable.

Project Management Software

Creating a detailed project plan and keeping it up to date for a complex project can be very time consuming if completed manually. The complexity of including holidays, weekends, early starts, and other factors can be overwhelming to someone inexperienced in project management techniques or short on pencils. The details involved in producing work breakdown structures, network diagrams and schedules seem daunting, and assembling a budget can be tedious at best.

Just producing the schedule is a lot of work for a large project. And, as we have perhaps concluded by now, project management entails more than creating a schedule. Successful project management requires information to be continuously obtained, analysed, reviewed, and communicated in a timely manner. Ongoing presentation and analysis of project data must be completed to provide advance warning of imminent problems. This information is then used to assess the impact of changes on other activities, resources, and schedules. Ultimately, alternative plans are developed to keep the project on track towards meeting its defined goal. Producing the reports, updating the charts, and incorporating changes to a project plan along the way add to this complexity and paperwork. Of course, if we need to manage other projects at the same time, the quantity of calculations, graphs and reports can seem impossible.

Project management programmes, or project management information systems (PMIS) as the software is sometimes called in corporations, range in capabilities from simple scheduling programmes that produce Gantt charts to prodigious mainframe applications that are integrated with a corporation's budgeting, marketing, manufacturing, human resources, and other management information systems.

Depending on the capabilities of the software, we enter task dependencies, resources, dates, and costs, and the computer calculates or modifies the schedules, budget, or resource use for us.

In addition to assisting us to calculate schedules and costs, project management programmes can produce a wide variety of reports—from simple to comprehensive. If we have a special project management requirement like a customised report or chart, there is probably a programme out there with a capability of producing the output required.

Project managers have a large array of software available to help in the difficult task of scheduling, tracking, and controlling projects. Though it is clear that even the most sophisticated software package is not a substitute for competent leadership and skilled decision making, and by itself does not correct any task related problems or people conflicts, project management software can be a terrific boon to the project manager. The software can track interrelated variables, schedules, resources, costs, and tasks that come into play particularly in multi-project management. Though not all software programmes do all the following things, common capabilities of project management programmes include the ability to:

- Graph costs, schedules, and resource use by Gantt charts, histograms, diagrams, tables, and a variety of other visual displays.
- Create standard and customised reports for communicating progress.
- Maintain resource and project calendars that record the availability of staff and equipment and determine optimum schedules. This feature allows us to establish weeks based on actual workdays and specify non-work periods such as weekends and holidays. The project calendar can usually be printed out in detail or in summary format.
- Make schedule changes based on a variety of resource levelling parameters and priority scheduling attributes.
- Maintain skill inventories that match resources to task requirements.
- Track and schedule multiple projects at the same time. Some packages feature a single, comprehensive database, which enables cross-project analysis and reporting. Cost and schedule modules may share common data files, which allow integration among projects and minimise problems of schedule inconsistencies and redundancies.
- Allow different people to access, input, and report on project data at the same time.
- Collapse the view of projects by work breakdown structure or organisation structure, summary task, subproject or milestone.
- Calculate and display the critical path and its duration for a network.
- Display alternative schedules, task assignments, and cost criteria, so the immediate impact of schedule, sequence, and resource changes, actual or possible, can be evaluated.
- Assign early warning parameters that let the programme inform us of potential trouble, including schedule problems, resource conflicts with other projects, and overruns.
- Integrate with procurement, purchasing and accounting systems to assist in the timely ordering of materials, supplies, and equipment.
- Produce presentation quality graphics for making effective reports to our sponsor, steering committee, clients and other stakeholders on the plans and status of our project.
- Display actual and planned data simultaneously to highlight variance.
- Summarise data in a variety of ways, including expenditure, schedule, and performance data.

One of the most powerful benefits of using software to assist in the implementation of project management is the 'what-if' analysis facilitated by interactive software products. Changes to the time estimates of individual tasks can be made and a new schedule is immediately displayed for review. The sequence of tasks can also be changed and then put back the way it was, almost instantaneously. The same thing can be done with costs and resources. Imagine trying to do that with pencil and rubber. It would take hours or days. With a computer, it takes seconds.

To facilitate 'what if' analysis, many programmes can establish a separate, duplicate project database before changes are entered. The software then performs a comparative analysis and displays the new against the original project schedule in tabular or graphical form. This makes it fast and easy for project managers to review the impact of possible changes and make better, more informed decisions.

Most of us can manage a small project without project management software. But what determines project size? A project's size and complexity might be measured by:

- number of people and other resources involved
- number of tasks needed to achieve the goal
- project duration and/or work effort
- size of the budget
- degree of difficulty, uncertainty and risk.

These are somewhat subjective factors. However, software should prove useful if our project meets any one of the following conditions:

- involves more than three people
- includes more than 20 tasks
- takes longer than 20 days.

In general, if we need to communicate the project plan with others, track progress, or use shared resources, the software will help. Whatever the project's size, the software enables us to more quickly illustrate the results of changes or possible changes than we could with the proverbial stubby pencil. Also, the software is particularly helpful in our management of multiple projects. We can link tasks between projects, when a task in one project is dependent on a task in another project, and we can create a resource pool to make it easier to share resources among projects. We can even level resources across multiple projects.

As powerful and efficient as project management programmes are, many aspects of the project management process are not yet within the computer's realm. Using computer assisted project management streamlines administration, reporting, and analysis, but the following are things the computer can't and shouldn't be allowed to do:

- **Project management software can't gather data.** We will have to decide how much and what type of information we need to manage the project. We or members of our team will still need to gather and input data regarding the project status. The computer only helps compute and display the information after it is gathered.
- **Project management software can't make decisions.** The computer can make it easier and faster to look at alternatives, but it is ultimately us and our project team who will have to make the choice between the alternatives and take responsibility for the decisions.
- **Project management software can't solve problems that require subjective judgements.** Sometimes human intuition is the most important ingredient in project management, especially when dealing with people. People require understanding. Software is programmed logic and not intuitive. It reports back only what we put into it. We will still have to manage the conflicts and solve the problems and use our own judgement.
- **Project management software can't find the errors in our input.** If we input biased, incomplete, and erroneous project data, we can't blame the computer for human error. The best way to eliminate this problem is to check the reports before they are distributed.

- **Project management software can't do our communication for us.** Software is great at producing reports that look good and contain a wealth of detailed information, but there is more to reporting on a project than sending out the report. We still need to communicate with people face to face, and listen to what is going on around us.
- **Project management software won't save money by reducing the need for project personnel.** Automation almost never reduces the personnel costs on a project. The software can make us more efficient and make decision making more effective because the information is better, but project management software seldom saves on people.

Essentially, project management software comes in two varieties. The most powerful packages at present come from the likes of Microsoft, Niku, Primavera, and Welcom. And a small group of vendors sell standalone scheduling tools that typically include basic project management features such as scheduling and resource management. They are geared to people without special project management skills. Products in this latter category include Milestones from Kidasa Software, FastTrack Schedule from AEC Software, Delegator from Madrigal Soft Tools, and Niku's free programme, Open Workbench www.openworkbench.org. In fact, the venerable Gantt chart is rapidly moving outside the project office to the desktops of executive, managers and rank-and-file staff. Now it's easy to take a Gantt chart snapshot out of such software and put it in a PowerPoint presentation.

Open Workbench is free. It conforms to and supports the underling ideas of project management while presenting information in an intuitive and easy to learn format. Using Open Workbench, we can create projects, populate them with tasks, create dependencies on tasks that are internal and external to the project, and assign resources. We can also import data, such as tasks, from other projects. We can display project data in variety of ways, including spreadsheet views, Gantt charts, and CPM networks. Open Workbench provides standard views that we can use as-is or modify to meet our needs.

Additionally, Open Workbench allows us to save and share projects in a central database repository when Open Workbench is connected to a portfolio management system. To learn more about these and other features in the Clarity portfolio management system from Niku, visit www.niku.com/go/owb.

In summary, project management software is essential for larger and more complex projects. However, familiarity with the software doesn't make us a project manager, nor does it ensure project success. There are at present some 2000 different packages available, each with their unique features and functions. The most popular package is currently MS Project. Its 2007 version is now available. As the leading package, virtually all software training centres provide both training and support in this product. Regardless of the package, with such software we can develop more than a pretty plan. We can schedule tasks, assign resources, track actual hours, durations, and costs to keep our project on track. Further information on specific packages is available at various websites. For quick links to some popular software vendors, see www.dmoz.org/Computers/Software/Project_Management. Free software may be downloaded at www.openworkbench.com. Also, a self-learning online programme for MS Project is available free at www.iil.com/righttoolforthejob. Excellent software training is provided by Auldhouse - www.auldhouse.co.nz. Tell Craig that Jim sent you!

Schedule Work

Once the sequence of work has been determined, and a network diagram prepared if the project size and complexity warrants this, then the work is scheduled. A schedule may be in table format or shown as a horizontal bar graph or Gantt chart. A schedule usually shows what tasks are to be completed on what dates. While critical tasks cannot be delayed without risking a delay to the project completion date, non-critical tasks have float (or slack) which means they can be assigned both early and late start and finish dates. There are two basic types of schedules:

- **Time-limited.** Occurs when tasks are scheduled to be completed by a specified or mandatory date. Time-to-market is fixed. It is time, not resources usage that is critical. Essentially, tasks are then scheduled to achieve deadlines. The consequence might be increased expenditure.
- **Resource-limited.** Occurs when tasks are scheduled within specified levels of resource usage. Completion time is of secondary importance. Essentially, tasks are scheduled when resources are available. The consequence might be schedule slippage and extended project duration.

The initial schedule is usually based on the assumption that resources will be available. However, the initial schedule must then be adjusted according to actual resources availabilities. And once published as part of the project plan the schedule will need to be further adjusted as resource availabilities and estimated durations change during project execution.

In practice, the range of time and resource variability is usually limited and the aim will normally be to finish our project as soon as possible, using as few resources as possible. Occasionally, both time and resources may be considerably limited, but in this case, the project scope/quality cannot also be fixed. If all parameters are fixed the system is 'over determined' and we project managers have no flexibility to perform the trade-offs necessary for successful completion of our project. Of course, it is hoped that all variables might be fixed at levels that allow the project manager reasonable room for manoeuvre.

The schedule, usually shown as a Gantt chart, is a very important part of the project plan for the execution of the project work. It is a baseline against which progress and performance can be measured and reported. As I mentioned earlier there is a variety of project scheduling software available.

Schedule – Table Format

One way to publish a task schedule is in a table format. Figure 7.25 shows a network diagram, which has been converted to a tabular schedule at Figure 7.26. The typical steps involved are:

1. Identify the project critical path.
2. Plot the critical path dates into the table.
3. Plot the non-critical task dates into the table, recording both early and late, start and finish dates.

Care should be taken to show dates as either inclusive or exclusive and be consistent in this decision throughout the schedule.

Schedule – Gantt Chart

The most common way to publish a task schedule is by Gantt chart, named after Henry Gantt who developed the tool in 1917. It's usually described as a horizontal bar graph. Some key points are:

- it's an effective communication tool
- a Gantt chart can show project status, estimated durations, and task sequences
- it's the main view for scheduling software
- tasks are shown as horizontal timelines or bars
- length of the timelines represents task duration
- more than one level of work can be shown
- time axis may be expressed in days, weeks, shifts or months as appropriate
- the popularity of the Gantt chart stems for its simplicity, its ability to show the big picture at a glance, and the capacity to superimpose progress
- timelines show duration not work-effort
- vertical arrows depict dependencies
- tasks are usually listed top-down in order of their start dates
- critical tasks are usually separately identified
- float (or slack) may be shown as a dotted horizontal line
- actual progress can be superimposed to show variance
- milestones are usually shown as triangles or diamonds:



planned milestones



milestone achieved.

Milestones can help us measure project progress and increase the motivation and productivity of team members as they attain short-term goals and celebrate successes. Furthermore, a missed milestone date can alert us to the possibility that our project might not finish on time. This provides an early opportunity to take corrective action and recover the schedule.

We should name a milestone in a way that makes it clear when the milestone is reached. For example, 'Loan Approved', 'Report Published', 'Foundations Complete'. Such milestones are useful checkpoints to help us track and control the schedule. We should include milestones only down to the level of work we want to monitor.

Figure 7.27 shows an example Gantt chart. Also, included is the WBS and network diagram, which are the basis for the Gantt chart. Further examples are provided at Figures 7.28 to 7.33. In each instance, to convert the network diagram to a Gantt chart without the use of software, the following steps are typically required:

1. Identify the critical path.
2. Draw the critical path task timelines on the Gantt chart, depicting the appropriate relationships

between tasks.

3. Draw the non-critical path task timelines on the Gantt chart, usually starting each task as soon as possible, unless resource constraints dictate otherwise.
4. Float (or slack) can be shown as a dotted line at the end of each non-critical path.
5. Milestones can be shown as diamonds representing important events (ie, start or finish of a task; usually a critical task).

MS Project for Scheduling

MS Project is the most widely used software scheduling and planning tool for project managers, providing easy-to-use tools for putting together a project schedule and assigning responsibilities. Project (as it is often referred to) also gives us useful tools to take us through to the end of our project. Some comments on its use seem appropriate. After we have defined the work scope for a project, we can start putting Project to use. Project is a helpful planning tool for enabling us do the following:

- Organise the project plan and think through the details of what must be done.
- Schedule deadlines that must be met.
- Schedule the tasks in the appropriate sequence.
- Assign resources and costs to tasks and schedule tasks around the availability of resources.
- Fine-tune the plan to satisfy time, budget and resource constraints or to accommodate changes.
- Provide links between elements of the project (tasks, resources, and assignment) and related project management documents in other applications.
- Collaborate with other project stakeholders by reviewing the schedule and by notifying resources of their assignments.
- Initiate and track discussions and resolutions of issues related to the project.
- Prepare professional-looking reports to explain the project to stakeholders such as owners, sponsor, senior management, employees, subcontractors, and the public.
- Review the portfolio of all projects in the enterprise to analyse the impact of adding a new project on resource usage and cashflow.
- Use portfolio modelling to optimise resource assignments across all enterprise projects.
- Publish the project on a server for other project managers to access and for stakeholders to review, via internet browsers.

If we don't have a project management software package, we can use a spreadsheet package to create our Gantt chart, and after all the pyramids were designed and built without any software. MS Excel provides a useful way of showing the project schedule, resource loading and cashflow all on the one page.

Figure 7.25: Network Diagram

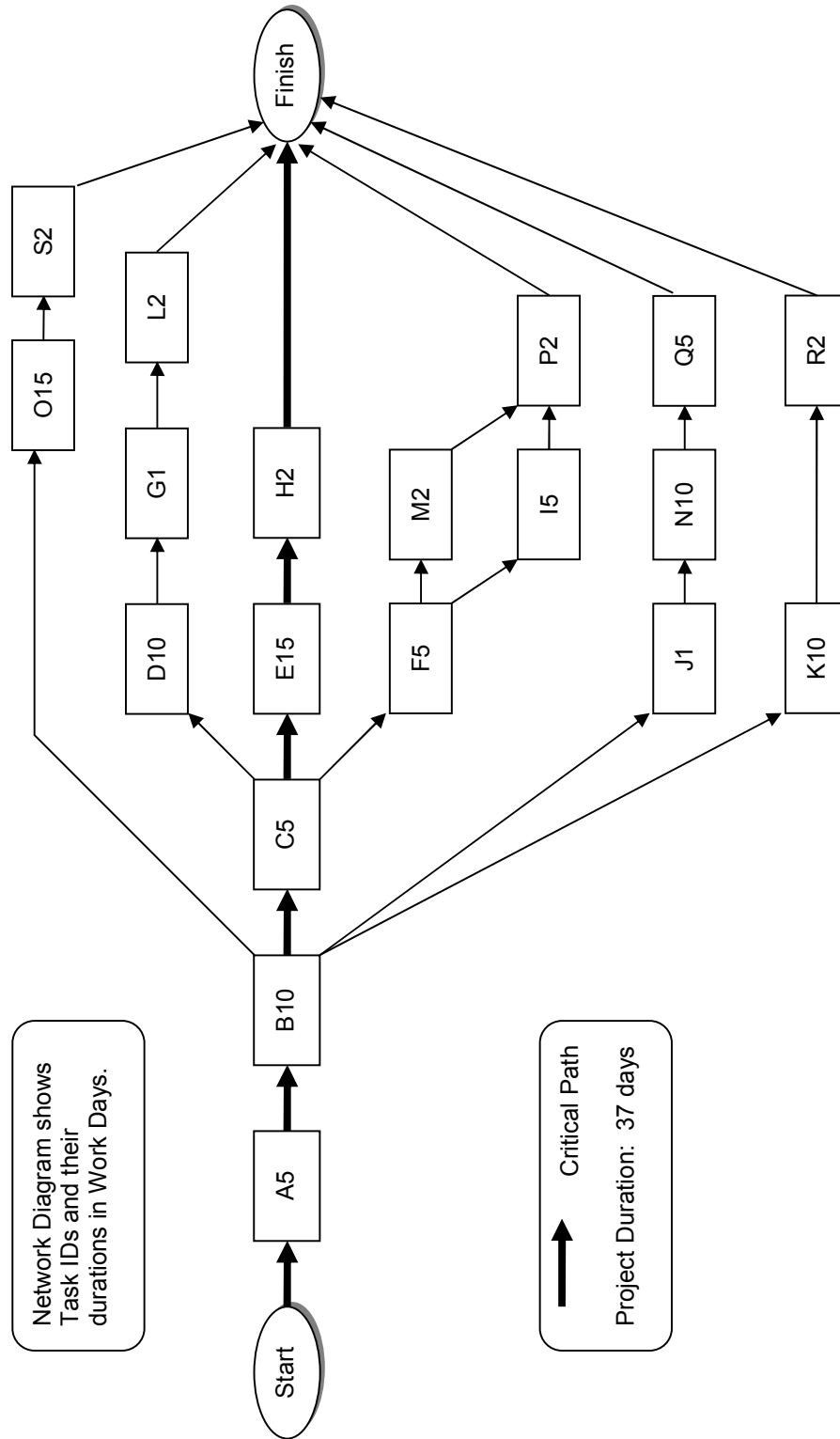


Figure 7.26: Task Schedule – Table Format

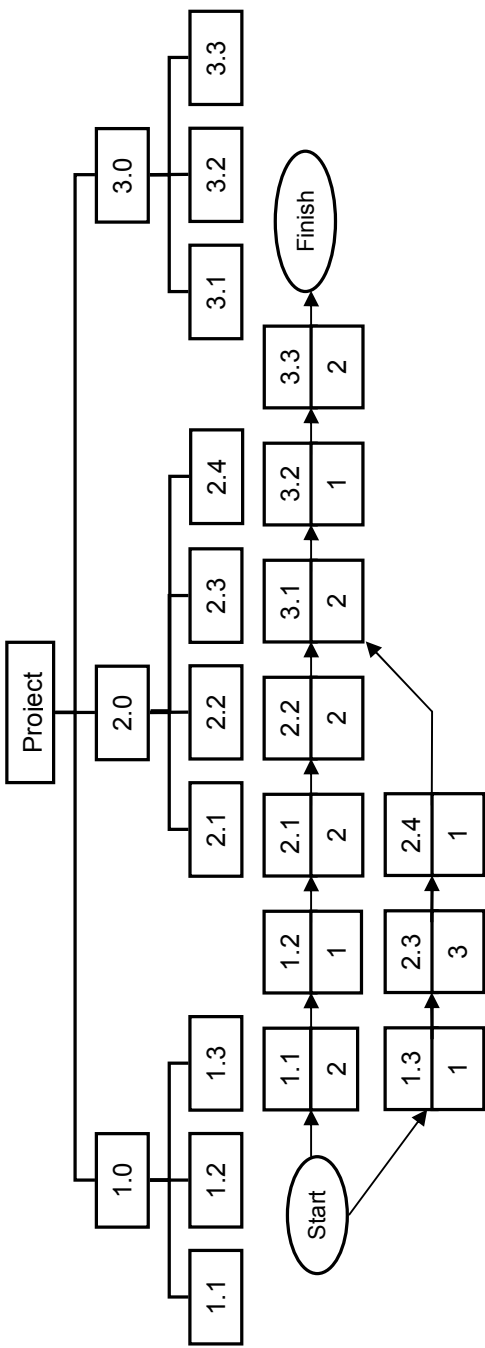
Task	Resource	Duration	Float Time	Early Schedule		Late Schedule	
				Earliest Start	Earliest Finish	Latest Start	Latest Finish
A	Dipsy	5	Nil	4 Mar	8 Mar	4 Mar	8 Mar
B	Laa Laa	10	Nil	9 Mar	18 Mar	9 Mar	18 Mar
C	Po	5	Nil	19 Mar	23 Mar	19 Mar	23 Mar
D	Tinky Winky	10	4	24 Mar	2 Apr	28 Mar	6 Apr
E	Nu Nu	15	Nil	24 Mar	7 Apr	24 Mar	7 Apr
F	Homer	5	5	24 Mar	28 Mar	29 Mar	2 Apr
G	Lisa	1	4	3 Apr	3 Apr	7 Apr	7 Apr
H	Bart	2	Nil	8 Apr	9 Apr	8 Apr	9 Apr
I	Burns	5	5	29 Mar	2 Apr	3 Apr	7 Apr
J	Smithers	1	6	19 Mar	19 Mar	25 Mar	25 Mar
K	Flanders	10	10	19 Mar	28 Mar	29 Mar	7 Apr
L	Moe	2	4	4 Apr	5 Apr	8 Apr	9 Apr
M	Sponge Bob	2	8	29 Mar	30 Mar	6 Apr	7 Apr
N	Patrick	10	6	20 Mar	29 Mar	26 Mar	4 Apr
O	Squidward	15	5	19 Mar	2 Apr	24 Mar	7 Apr
P	Plankton	2	5	3 Apr	4 Apr	8 Apr	9 Apr
Q	Mindy	5	6	30 Mar	3 Apr	5 Apr	9 Apr
R	Mr Krabs	2	10	29 Mar	30 Mar	8 Apr	9 Apr
S	Dennis	2	5	3 Apr	4 Apr	8 Apr	9 Apr

Notes:

1. All task dates are inclusive.
2. Work dates include weekends and statutory holidays.
3. When task dates are inclusive, float is simply added to ES to give EF.

Apologies to the Telly Tubbies etc.

Figure 7.27: WBS, Network Diagram and Gantt Chart



Tasks		Weeks												
ID	Description	1	2	3	4	5	6	7	8	9	10	11	12	13
1.0														
1.1		Jack												
1.2				Mary										
1.3		Fred												
2.0														
2.1					Bill									
2.2							Jack							
2.3			Dave											
2.4						Fred								
3.0														
3.1									Mary			Jane		
3.2														
3.3												Emma		

Figure 7.28: Task Analysis

TASKS	PREDECESSORS	DURATIONS
A	Start	4
B	A	6
C	B, U, V, N	3
D	C	2
E	C	2
F	C	7
G	C	7
H	D, E	4
I	Start	2
J	I, R	1
K	J	1
L	K	2
M	L	1
N	M	1
O	N	2
P	O	1
Q	Start	4
R	Q	1
T	Start	1
U	Start	2
V	T	2

Figure 7.29: Network Diagram

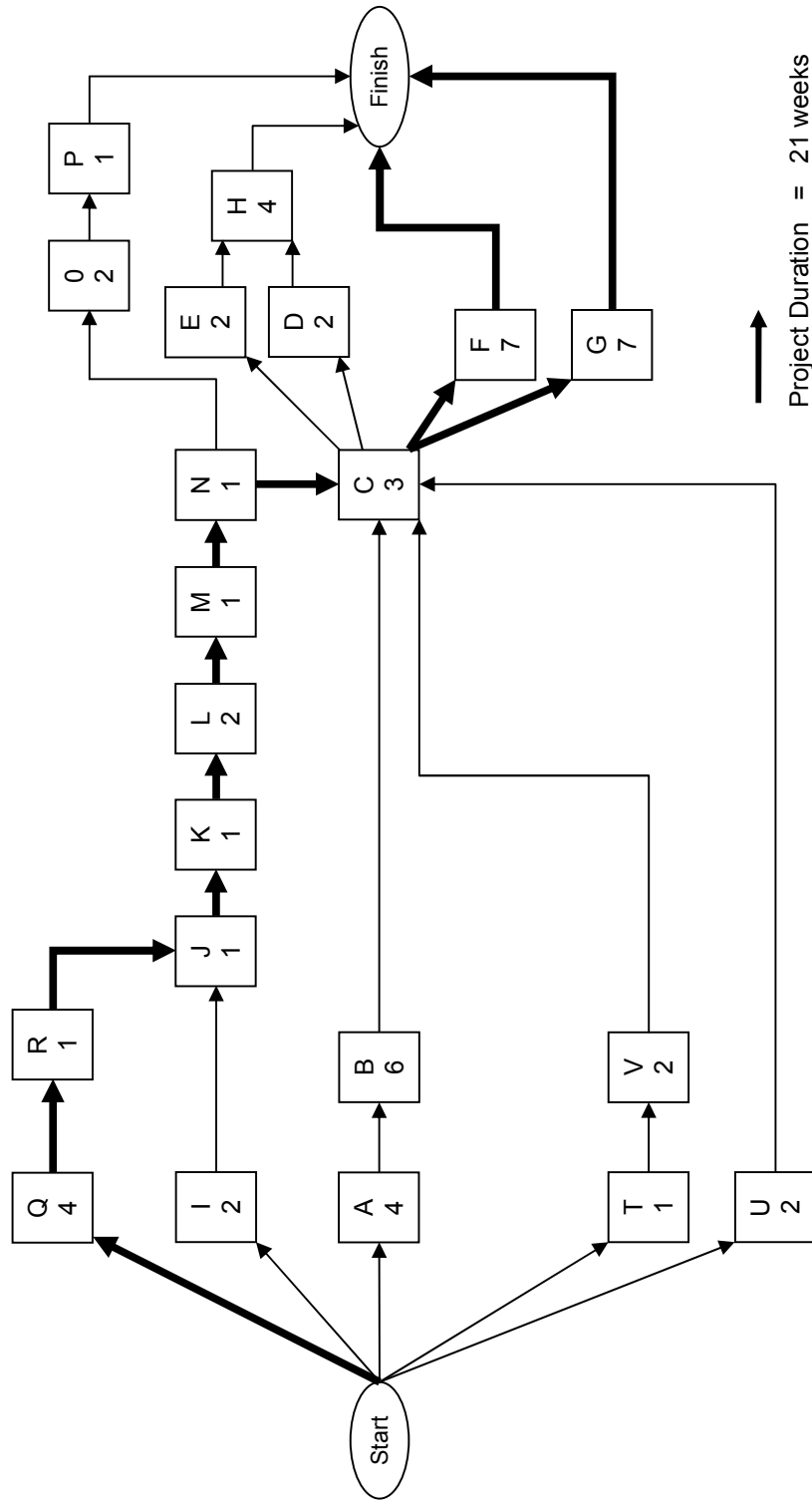


Figure 7.30: Task Schedule – Gantt Chart

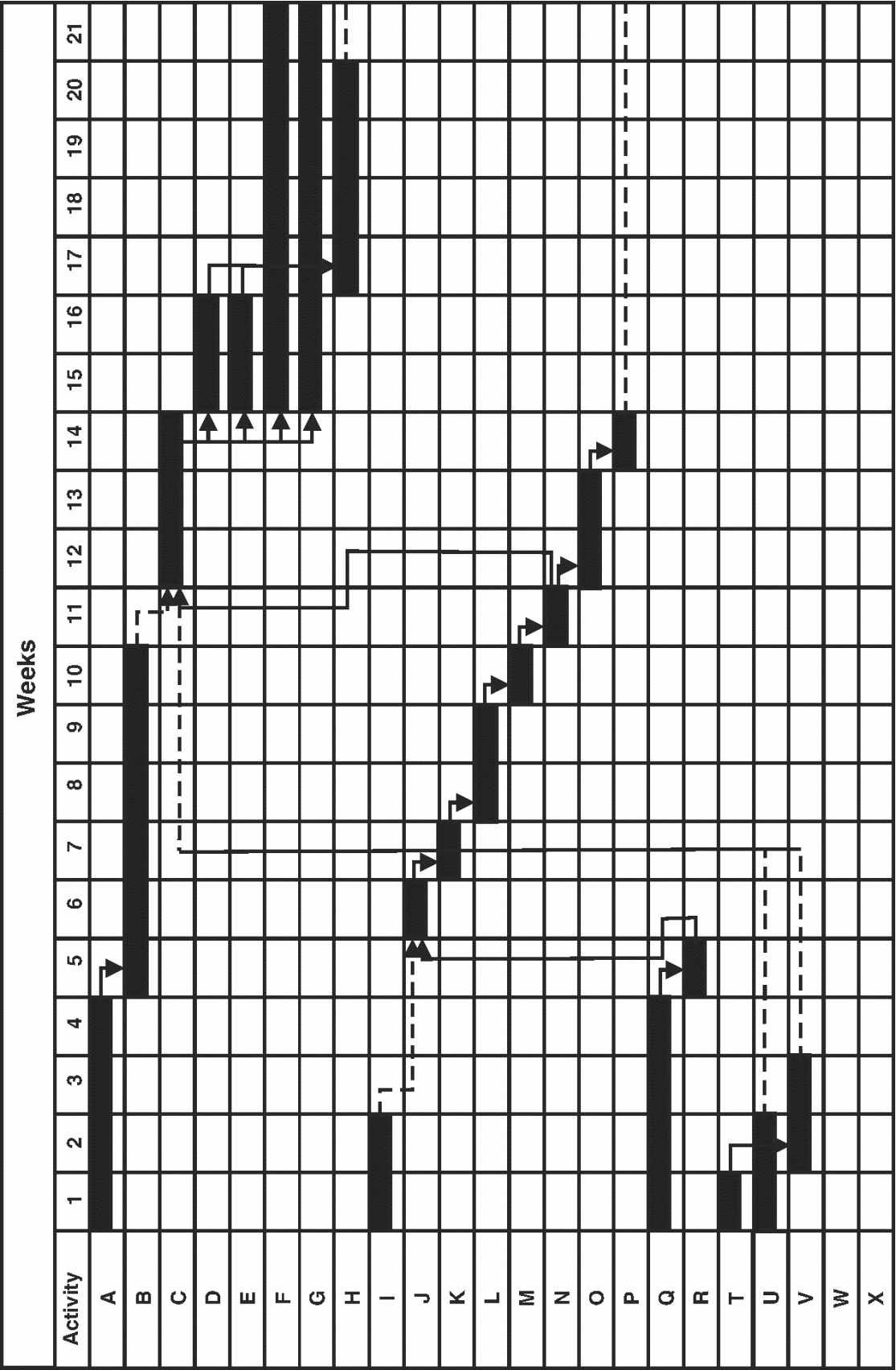


Figure 7.31: Task Analysis Information

TASKS	PREDECESSORS	DURATIONS
A	Start	3
B	Start	3
C	Start	5
D	Start	4
E	A	3
F	B	4
G	C	6
H	D	2
I	E	2
J	F	5
K	G	3
L	H	10
M	I, J	4
N	J, K	4
O	K	2
P	M	3
Q	N	3

Figure 7.32: Network Diagram

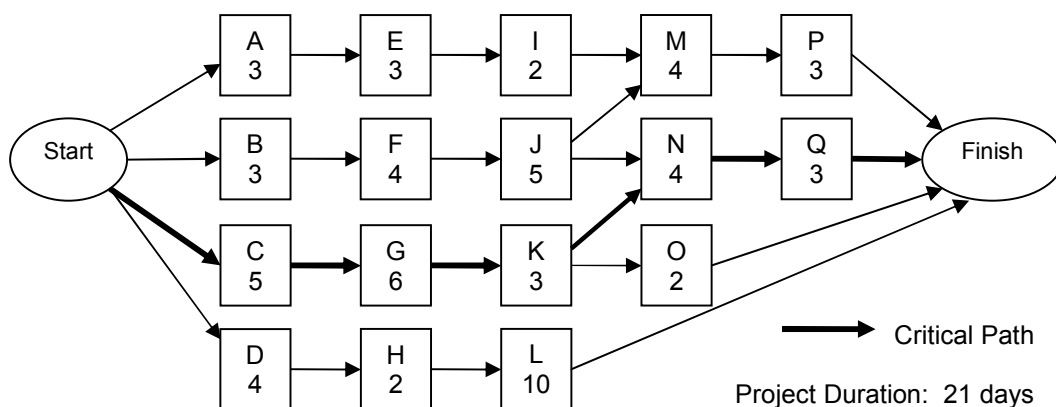
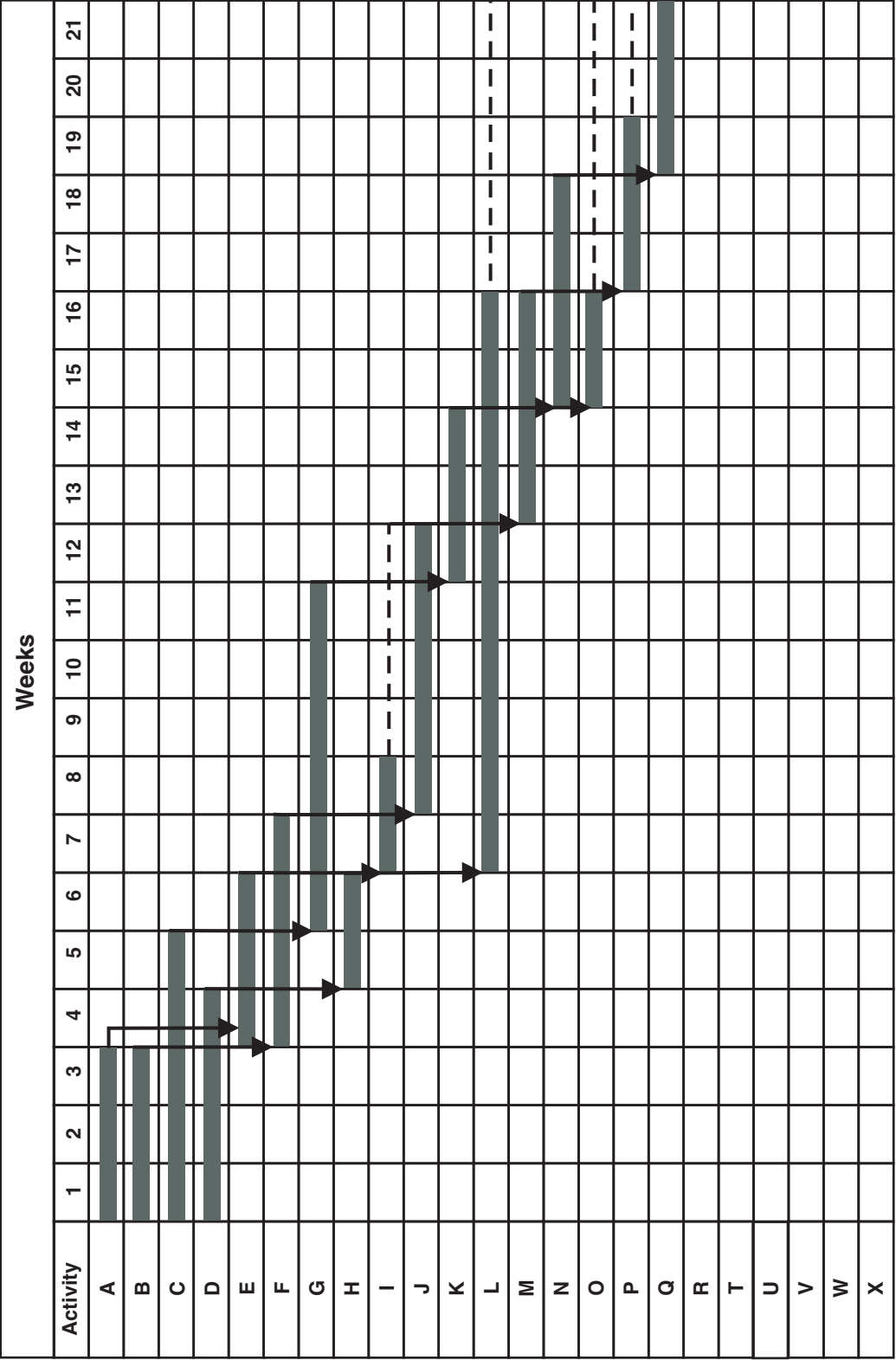


Figure 7.33: Task Schedule – Gantt Chart



Resources

Resources are people, equipment and material that are drawn on to accomplish the project work and more specifically include:

- **People** are the most obvious and important resource. They are usually classified according to their skills – programmers, carpenters, supervisors etc.
- **Materials** include chemicals, concrete, timber, survey data, paper etc. Their timely delivery is important if the project is to run to schedule.
- **Equipment** includes machinery, tools, plant etc. Again, their build, purchase or hire must be arranged in a timely manner.

When the number of people or amount of materials or equipment is insufficient to meet schedule requirements, and it is not possible to obtain more, the project manager faces a resource-constrained situation, which may typically be resolved by measures such as:

- scheduling resources with priority to critical tasks or those tasks with minimum float
- rescheduling non-critical tasks within available float to periods when resources are available
- extending non-critical tasks within available float to reduced daily resource needs
- splitting non-critical tasks within available float to avoid scheduling work when resources are unavailable
- working longer hours and weekends to make maximum use of permanently assigned resources, although productivity may suffer
- breaking some dependencies or inserting lead or lag times between tasks to allow for more flexible scheduling.

Some methodologies call resource-constrained tasks 'resource-driven' or 'effort-driven' tasks.

Resource Loading

Resource loading describes the quantity of individual resources required to support an existing schedule of tasks. Such resource requirements may be shown in either table or graph form (resource histogram). Figure 7.34 refers. Resource needs might also be shown in resource spreadsheet format showing the need for various resources for different periods of time. By summing up the resource needs, for each time unit, the total resource requirements for the project can be determined. See Figure 7.35. By computerising the resource spreadsheet, project staff can create and evaluate different 'what-if' scenarios.

Figure 7.34: Resource Loading

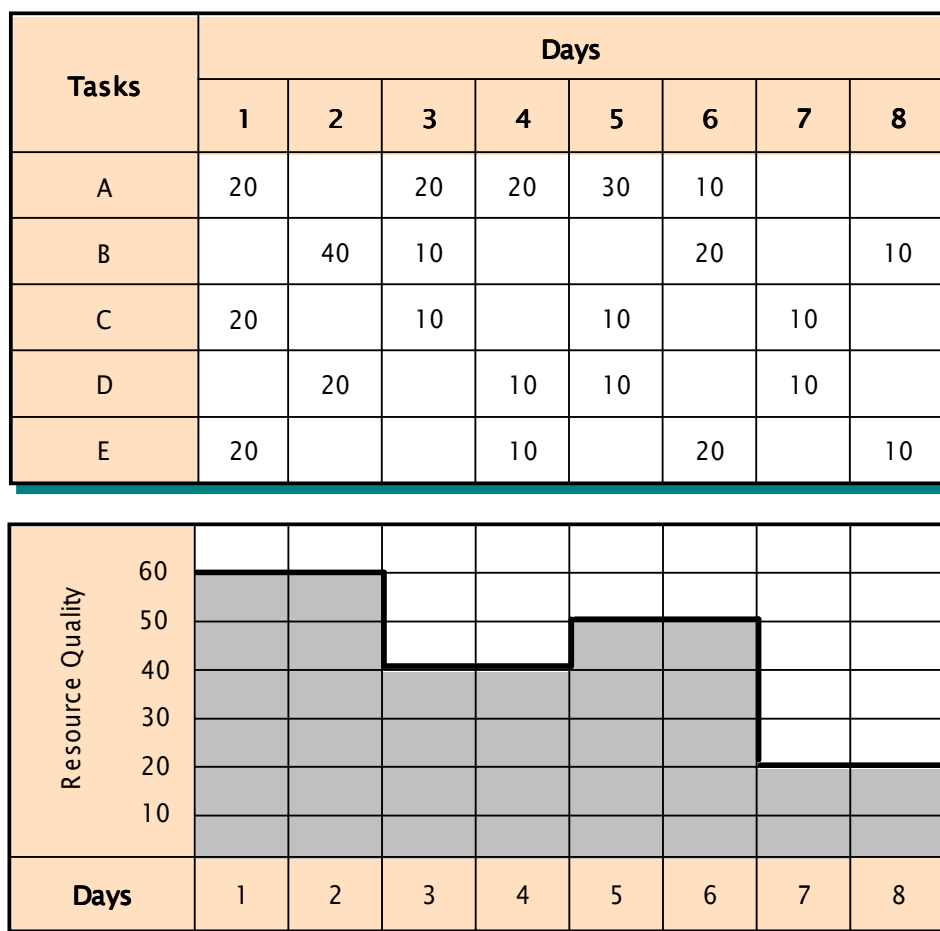


Figure 7.35: Resource Spreadsheet

Resources	Days										Total Resources
	1	2	3	4	5	6	7	8	9	10	
Analysts	1	1	1	2							5
Planners	1	1	2	2	4						10
Developers			2	2	2	2	2	2			12
Auditors							1	1	2	2	6
Totals	2	2	5	6	6	2	3	3	2	2	33

Resource Levelling

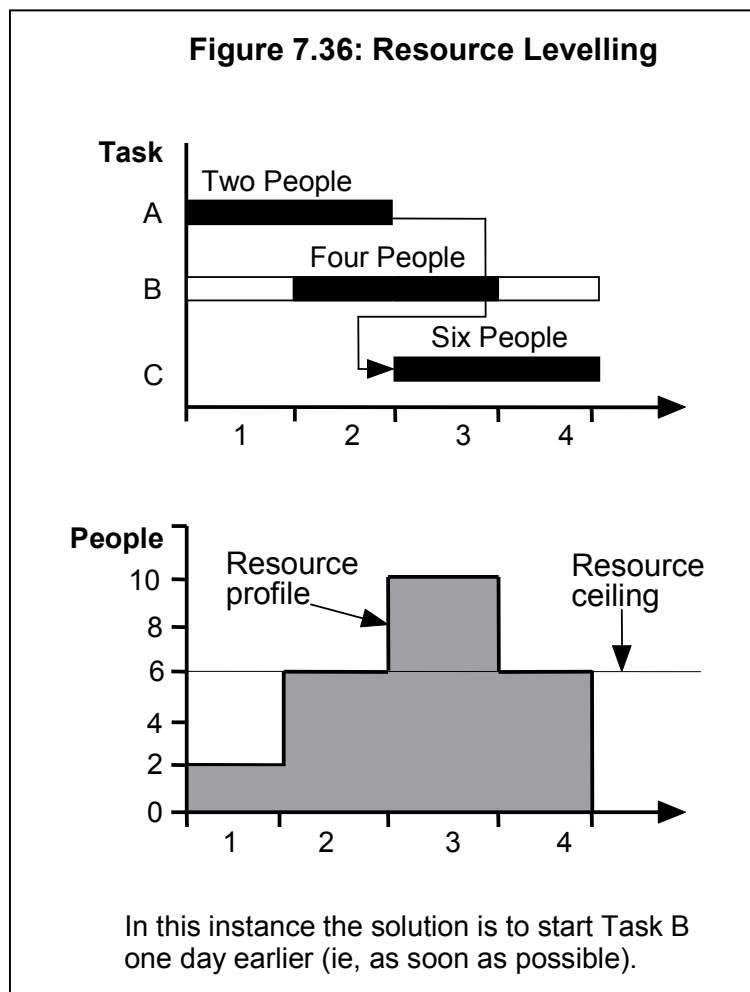
Resource levelling is an activity that can create problems due to situations such as:

- Committing people to more than they can reasonably handle in the given time-frame.
- Changing project priorities and considering the impact such decisions have on existing resource schedules.
- Insufficient measurement and monitoring of the resource pool and the extent to which it is already committed to other projects and business-as-usual work.
- Employee turnover that is not accounted for in the resource schedule.

Resource levelling is the process we use to schedule how each resource is allocated to tasks in order to accomplish the work within the timeframe. It's about optimising the use of people and equipment. The resource schedule needs to be levelled for two reasons:

- To ensure that no resource is over-allocated. That is, we don't schedule resources for more than 100 percent of their available time.
- We want to smooth the number of resources to follow a logical pattern throughout the project rather than the number fluctuating wildly from day to day or from week to week.

Resource levelling or resource smoothing aims to minimise period-to-period variations in resource loading by rescheduling tasks within their float time, the purpose being to smooth resource use and thus make for easier resource management and achieve associated cost-efficiencies. The purpose of resource levelling is to optimise the use of resources assigned to the project. The principle of resource levelling is illustrated at Figure 7.36 where only six people are available each day.



Resource levelling can be used for all projects, whether or not resources are constrained. If the project is small and there are few resources, the levelling process can be done manually through trial-and-error. For larger projects and for a portfolio of projects, involving multiple resources, resource levelling becomes very complex, and project management software is essential. This is potentially the best application for project management software – the next generation perhaps.

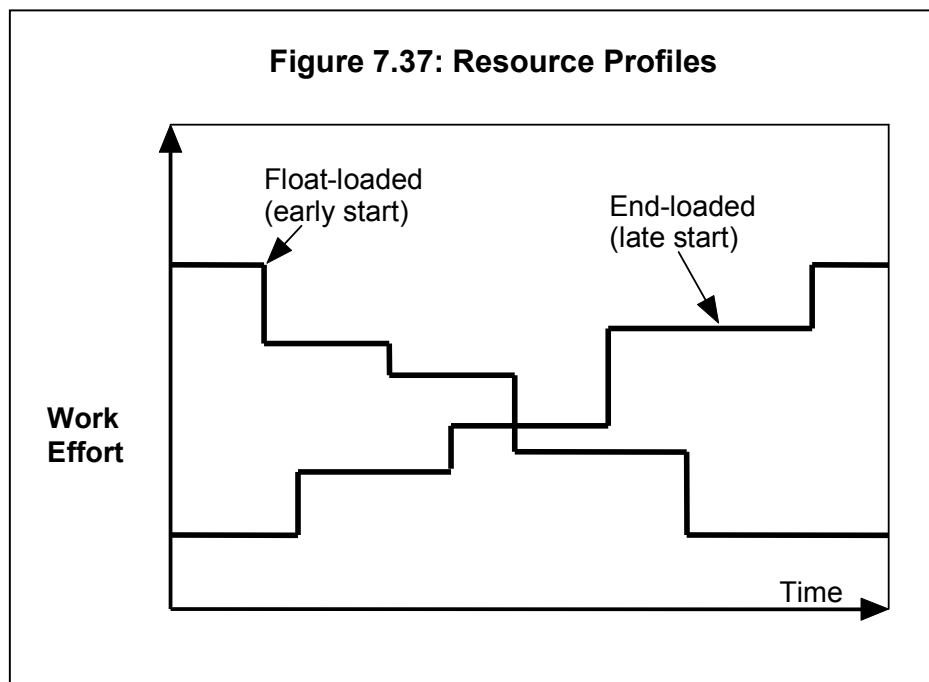
Resources are of course the people, equipment and raw materials needed for the project. Resource levelling focuses only on the people and equipment. The materials needed are dictated by the specifications. Resource levelling begins with the initial schedule and work package (task, sub-task) resource requirements. The levelling consists of four steps:

1. Forecast resource requirements throughout the project for the initial schedule. The best tool for this is a resource spreadsheet such as shown at Figure 7.35, from which we can determine all people and equipment needed on each day of the project.
2. Identify the resource peaks, using the resource schedule and the resource histogram (Figure 7.34) to find periods where there are unrealistic or uneconomical resource amounts.
3. At each peak we delay non-critical tasks within their float. This will not delay the project, but will help fill in the valleys of the resource histogram. A smoother profile usually ensures most efficient

use of resources.

4. To eliminate the remaining peaks, we might re-evaluate the work package estimates. For example, rather than have two people work together on a task, consider if just one person could do the work over a longer period. Usually the next option is to accept a later project completion date.

Resource profiles can take a variety of shapes including front-loaded, back-loaded, peak, late-peak, early-peak, double-peak, bell-shaped, etc, two basic examples of which are illustrated at Figure 7.37.



Rescheduling Options

Resource rescheduling is usually undertaken as follows:

1. Prepare an early start resource profile. That is the resource loading when all non-critical tasks are started as soon as possible.
2. Compare this early start resource profile with actual resource availability on an hourly, daily, weekly basis as appropriate, and identify resource shortfall periods.
3. Where the resource requirements exceed the resource availability, the following options may resolve or lessen the problem:
 - Reschedule non-critical tasks, within their float time, to when resources are available.
 - Extend non-critical task durations to encompass some or all float time and thus reduce resources needed at any one time.
 - Split non-critical tasks within float time to avoid using resources over shortfall periods. Not all tasks are partitionable and multi-tasking can be unproductive.
4. Where shortfalls still occur it may be necessary to break dependencies, obtain additional resources on a temporary basis, work longer hours, improve productivity, reduce project scope, accept

partial or phased delivery of the final output, and/or accept some degradation in quality and/or extend the project completion date. Most of these measures will increase expenditure. They involve trade-offs, which if outside previously agreed tolerances, typically published in the charter, must be approved by the sponsor and/or client.

Studies show that after people have worked 10 to 15 hours of overtime each week for several weeks in a row, their productivity drops back to what it was at 40 hours, and their error rates go up. However, it is possible to work overtime for one week and gain productive output. But people get tired after several weeks of this, and fatigue takes its toll on performance and safety. For that reason, it is bad practice to plan for long stretches of overtime. There is a need to 'sharpen the saw'. Also, of course, if overtime means a better rate, then people may be inclined to stretch their work out.

In some instances there may be savings if resources are scheduled for certain times, perhaps when demand for them is low and discount rates are available. Normally the purchase of materials should be such that delivery is just-in-time to minimise inventory costs, but delivery delays can delay our project.

Most project management software packages will reschedule tasks to eliminate or minimise resource shortfalls based on one or more of the following rules of priority:

- as soon as possible (allows for unexpected)
- as late as possible (defers cash outflows)
- shortest task first (maximises number of tasks completed)
- most resources first (simple)
- minimum float task first (reduces likelihood of schedule delay)
- tasks with most successors first (minimise subsequent delays).

Usually, project management software contains a primary resource allocation rule (or heuristic, as it is sometimes called), with a secondary rule to break ties. The most widely used package, MS Project, uses 'early start date' as the primary rule, and 'minimum float' as the secondary rule. More sophisticated packages, such as some Primavera products, offer several ways of resource levelling. The 'minimum float' rule means that resources are assigned to those tasks with the least float until resources are exhausted. Usually this results in the minimum amount of project schedule slippage, the best use of facilities, and the minimum total duration. Thus the minimum float rule means that resources are devoted first to critical or nearly critical tasks. However, commercial packages usually do not automatically create optimum schedules when resource levelling is needed.

Also, the computer must be programmed to do either time-limited or resource-limited levelling. Under time-limited scheduling, once a task runs out of float, the computer will stop moving it, since to do so would slip the end date for the project. Working overtime might be one option to solve such a problem.

Usually shortfalls occur with only one or two specific resources; often people with highly specialised knowledge and skills. If there is a resource shortfall, we might negotiate project changes to time or scope to align with available resources (ie, resource-constrained scheduling), acquire additional staff, or contract out work. And all resource issues that are not resolved might be added to the project risk list.

Worked Example

Consider the project tasks at Figure 7.38. In this instance the task durations are fixed, and resource availability totals 30 for the first four days, and thereafter 60 per day. How quickly can the project be completed?

To determine the minimum duration for the project, we might first construct the network diagram to identify the critical path and non-critical tasks. The resultant network diagram is shown at Figure 7.39.

The critical path A-C-E-G suggests project duration of 10 days. All non-critical tasks (B, D and F) have four days' float.

The next step is to construct a Gantt chart and resource table. See Figure 7.40. Each task is scheduled to start as soon as possible.

Figure 7.38: Project Tasks

Task	Predecessor	Duration (days)	Resource Needs (each day)
A	Nil	2	30
B	Nil	3	30
C	A	4	30
D	B	2	40
E	C	1	30
F	D	1	40
G	E	3	20

Figure 7.39: Network Diagram

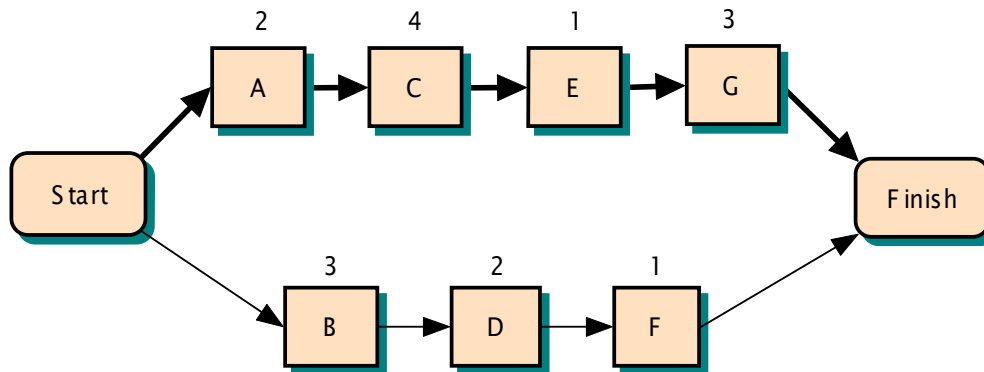
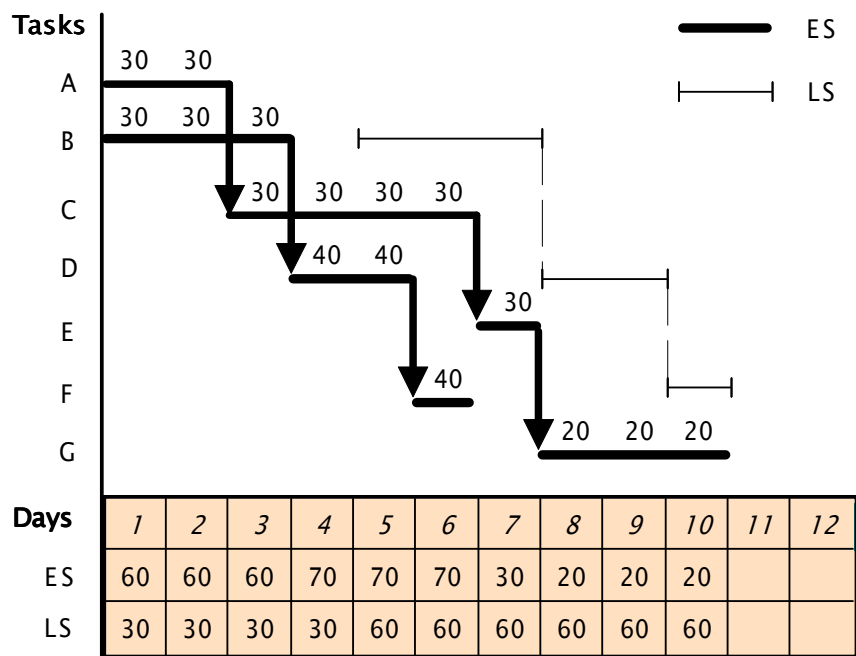


Figure 7.40: Gantt Chart and Resource Table



Starting each task as soon as possible is not practicable given the resource constraints. However, by delaying non-critical tasks and starting them as late as possible the project can indeed be completed within 10 days. In this instance the resource availability ceiling coincides with the late start profile.

Resource Schedule

The scheduling process results in the publication of the project resource schedule which shows what and who are needed when. It must be in complete agreement with the project task schedule. Human resources might be specified by skill sets and/or names. An example was shown earlier at Figure 7.35. A further example is shown as Figure 7.41.

Figure 7.41: Resource Spreadsheet or Schedule

Resources	Project Workdays												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Business Analysts	2	2	2	2									
Programmers				3	3	3	1						
Evaluators						1	1	1				1	1
Computers						4	2	1	1	1	1	1	1
Work sites	1	1	1	5	5	2	2	1	1	1	1	1	1
Statisticians	1	1	1	2	2								
Publishers	2	2							2	2	2	2	1
Totals	6	6	4	12	10	10	6	3	4	4	4	5	4

Multi-project Resourcing

Often resource allocation occurs in a multi-project situation where the demands of various projects need to be reconciled. Thus, organisations need to establish procedures for multi-project resource scheduling. Such procedures must take particular account of the priority assigned each project, the interdependencies among projects, and the consequences of resource non-availabilities and delays. Centralised resource pooling and scheduling usually makes it easier to identify potential resource bottlenecks and plan for their prevention. Solutions might include delaying some projects, acquiring additional resources, and/or outsourcing project work. Essentially, the priority assigned a project determines its access to the resource pool.

Summary

Given the initial schedule and resource requirements for each task in a project, a resource schedule can be developed showing the loading for each type of resource with time. This can be 'levelled' by rescheduling work within float allowances to fill troughs, or by extending the duration of the project. The resulting schedule is frozen as the baseline project schedule.

A network diagram is useful for calculating the project schedule. The resultant schedule is then communicated as a Gantt chart. Actual progress and revised schedules can also be tracked on the Gantt chart.

There is no denying that resource allocation decisions are difficult. How do we make good decisions in a high risk, technically complex business when the information we need to make these decisions comes largely from the project champions who are often competing against one another for resources? The answer is to determine priorities based on each project's promised contribution to the organisation's strategic vision, strategies and business goals, decided by decision matrix rather than by the political and advocacy skills of project champions. Projects should be managed at an enterprise level as part of a portfolio to help ensure optimum use of our organisation's resource pool.

The most common rule for assigning resources is the 'minimum-float' rule, where we assign resources to those tasks that have the least float, then the next-smallest amount, and so on, until resources are exhausted. Then those tasks that have float and no resources can slip without (hopefully) impacting the completion date.

The resources (ie, expertise, equipment and materials) needed for some project work may not be available within the organisation, in which case project work may need to be outsourced and supply contracts arranged. Chapter Ten discusses the process of outsourcing project work and procuring materials.

The next chapter recognises that we now have a basic plan that will benefit from stakeholder scrutiny and thus pre-empt many potential problems before project execution.



Chapter Eight

PRE-EMPT PROBLEMS



“In hindsight, it’s better to have foresight.”

Many New Zealanders seem to be terrible investors because they are poor judges of risk. One theory is that many of our ancestors, Maori and Pakeha, must have been hopelessly optimistic to sail huge distances to try and carve out a life in a strange and hostile land. As a result it is part of our genetic heritage to focus on the upside and ignore the possibility that something could go wrong – the ‘she’ll be right’ attitude often prevails. This is possibly better than a ‘who cares’ attitude that some might associate with those of convict heritage!

Pre-empting problems, or risk management, is one of the most difficult activities in the framework. After all, risk management is planning for the expected yet unexpected – those things that could happen, and have happened previously, but may not happen in our particular project.

While this chapter is headed ‘Pre-empt Problems’, which is a step in the framework designed to future-proof the project plan through a ‘what if’ analysis, risk management is an integral part of project management practice and a rationale for the framework itself. All projects have risk.

In recent years the importance of project risk management has increased considerably, due in large part to our rapidly changing world and thus the difficulty of predicting the future based on history. Exponential change is now with us, evidenced by:

- diminishing planning horizons, lead-times, and product lifecycles
- obsession with speed, service, sustainability, creativity, and innovation, driven by new technology and customers’ ever-challenging expectations and loyalties, which require that organisations continually reinvent themselves and their products and services
- burgeoning workloads – exacerbated through reduced staff numbers, staff changes, flattened hierarchies, global competition, and fully impossible timeframes which seem to have us move on before we comprehend or fully benefit from the last change
- greater cross-functional interdependence and teamwork, ‘outsourcing’ of non-core business, and increasing use of temporary workers
- continuous streams of new knowledge to be captured, managed and shared.

Some 20 years ago when I facilitated strategic planning, the business planning horizon was often 20 years ahead, whereas today I notice several organisations have problems identifying with clarity where they will be or want to be in 3 to 5 years. This uncertainty challenges those organisations contemplating long-term investments and favours the selection of those projects that promise a quick return (perhaps within the CEO’s tenure). However, 20 years ago the strategic planning process culminated in the production of a glossy that was sometimes quickly consigned to the bottom drawer and had minimal influence on business activities. Today we are more likely to prioritise work

according to its contribution to our business strategies and goals, and its consistency with our core values. Strategic alignment is now essential.

With appropriate risk management the following outcomes are usually realised:

- Projects cost less and take less time.
- More projects are completed on time and on budget.
- Project benefits, which justify project investment, are more likely to be realised to the satisfaction of stakeholders.
- Better project selection and prioritising decisions are made, increasing the value of the organisation's project portfolio, while eliminating projects with unacceptable risk profiles.

Definitions

There is no universal agreement about the definition of project risk management terminology. Risk itself is variously described as:

- *"An uncertain event that has a positive or negative effect on at least one of the project parameters."*
- *"Risk is an event that may affect a project time, budget, quality or the ability to deliver the benefits. It can be positive or negative."*
- *"A discrete occurrence that may affect the project for better or worse."*
- *"Uncertainty of outcome."*
- *"A potential problem that might delay a project, increase its cost, or otherwise harm the project."*
- *"The chance of an undesirable result."*
- *"What might prevent us realising the project goal."*
- *"Project management's top four-letter word." (author)*

Important is that a risk is potential, not actual, and is commonly described as an occurrence that might affect our project for better or for worse. It might also be an opportunity. For example, the risk of smaller than expected demand for a new product might be a threat, whereas greater than expected demand might be an opportunity. However, it's widely acknowledged that the negatives are likely to out-number the positives or opportunities. There is generally more that can go wrong than can go right.

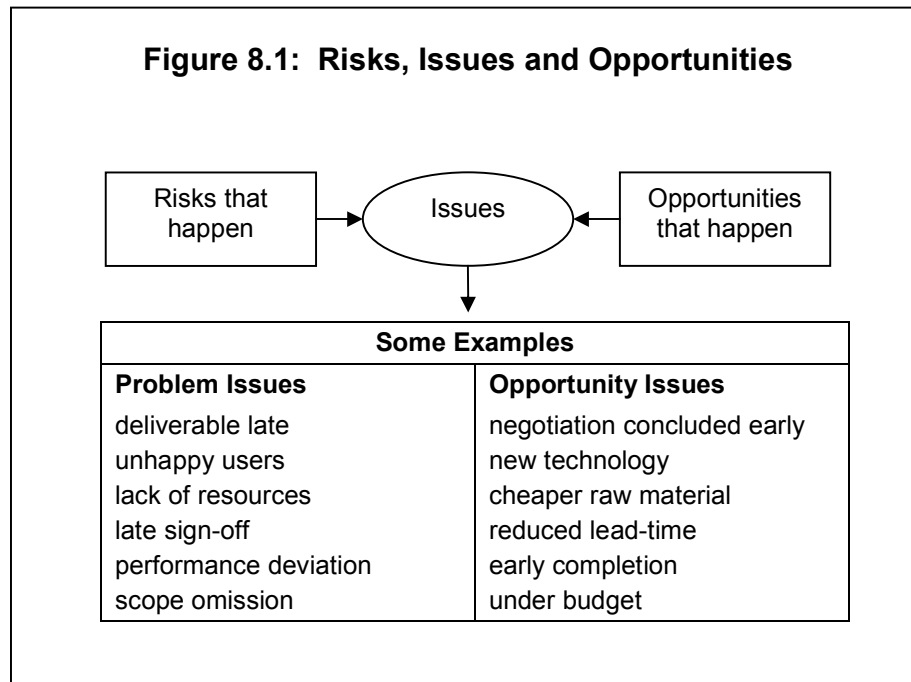
Risk management can be defined from either a process or purpose perspective:

- *"To identify, analyse, respond and control risk." (PMBOK®)*
- *"To manage a project's exposure to risk." (Prince2®)*
- *"To manage uncertainty to increase the likelihood of project success." (author)*

Essentially, risk management is undertaken to reduce uncertainty and increase the chances of project success. Whereas a risk is a potential problem or opportunity, an issue is a here and now situation – a risk that has happened. See Figure 8.1

Other risk terms are included in the glossary at Appendix One.

Figure 8.1: Risks, Issues and Opportunities



Project Risk Factors

Factors, common to any project, which can often be a source of risk are summarised at Figure 8.2. A comprehensive risk list is Appendix Seven. There will be other risks though. Risks might also be external in origin. These risks are outside the organisation's direct control, yet will influence project success. Occasionally, they might conspire to ensure unexpected success, but usually they create problems. Some examples are:

- **Natural disaster.** A dormant volcano erupts, preventing the completion of a new ski resort until after the upcoming winter ski season.
- **International currency.** The exchange rate for \$500,000 worth of software being purchased overseas increases significantly between the time the cost is estimated, the budget is approved, and the order is placed. A sudden surge of inflation can invalidate our project cost estimate.
- **Environment.** The appropriate authorities require time-consuming public consultations and submissions and a formal hearing before granting resource consents and building permits for the construction of a wind-turbine farm. A recent concern is hilltop mauri reduction.
- **Illness.** A financial consultant who has spent several weeks auditing project accounts suffers a serious illness and withdraws from the job.
- **Financial problems.** The company that has received an advanced payment for producing marketing brochures goes bankrupt before the printing begins.
- **Broken contract.** A farmer, who has given permission for access across his property for a pipeline to be laid, withdraws his support when stock is injured after being spooked by a large truck.
- **Unforeseen physical conditions.** Excavating a building site, an underground stream is discovered.

- **Lack of commitment.** The main Team New Zealand sponsor backs out 12 months into the yachting project.
- **Climate change.** As climate change continues, the world will experience more extreme weather, bursts of heat, torrential rain and prolonged drought. Such unpredictable weather delays the completion of a major infrastructure project.
- **Government action.** Treasury increases interest rates, causing a loan repayment problem that results in a company's insolvency.
- **Historical/cultural issues.** During a site excavation, an ancient Maori burial ground is unearthed, causing indefinite delays as archaeologists, elders and kaumatua are called in for their opinions.
- **Company organisation.** The client company is purchased by another company and the priority of some projects is downgraded.
- **Political issues.** Political unrest, government change, contract misunderstanding, financial instability due to language differences or corruption.
- **Accident.** The ship carrying thousands of tonnes of steel sinks and loses all the material needed for the project.

Figure 8.2: Project Risk Factors

Risk Factors	How They Effect Risk
Project Effort	Risk increases with total work effort
Project Duration	Longer the project the higher the risk
Estimates	Less accurate the estimates the greater the risk
Complexity	More complex the project the greater the risk
Novelty	More novel the project the greater the risk
Organisation Support	Less supportive the organisation the greater the risk
Inter-Project Dependencies	Greater the reliance on other project outputs and/or shared resources the greater the risk
Scope Definition	More poorly defined the project the higher the risk
Project Manager and Sponsor	Lesser the experience, ability, and commitment, the greater the risk
Number of Contractors	More contractors, suppliers and subcontractors the greater the risk
Stakeholders	More diverse stakeholders' needs, the greater the risk

When identifying external risks, the acronym PESTLE may help with the brainstorming process, where:

- P = political risks
- E = economic and competitor risks
- S = social and cultural risks
- T = technological risks
- L = legal risks
- E = environmental risks.

Risk Tolerance

Individuals and organisations have different levels of risk tolerance or risk appetite. The three basic categories being: risk-taker, risk-neutral, and risk-avoider as shown at Figure 8.3. Private enterprise is more likely to be in the risk-taker category than would public sector organisations that are understandably more likely to be risk-avoiders or risk averse. Interestingly, studies show that losses create more distress than happiness created by equivalent gains. Whereas conventional economists believe people are risk-averse, it's probably therefore more accurate to say most people are loss-averse.

Figure 8.3: Risk Tolerance

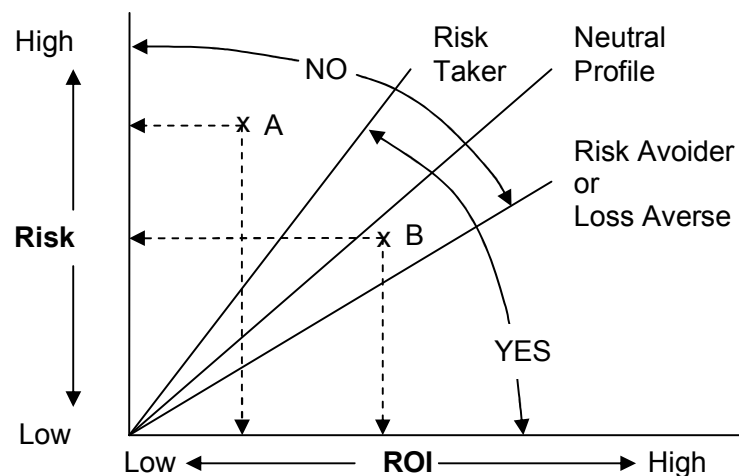
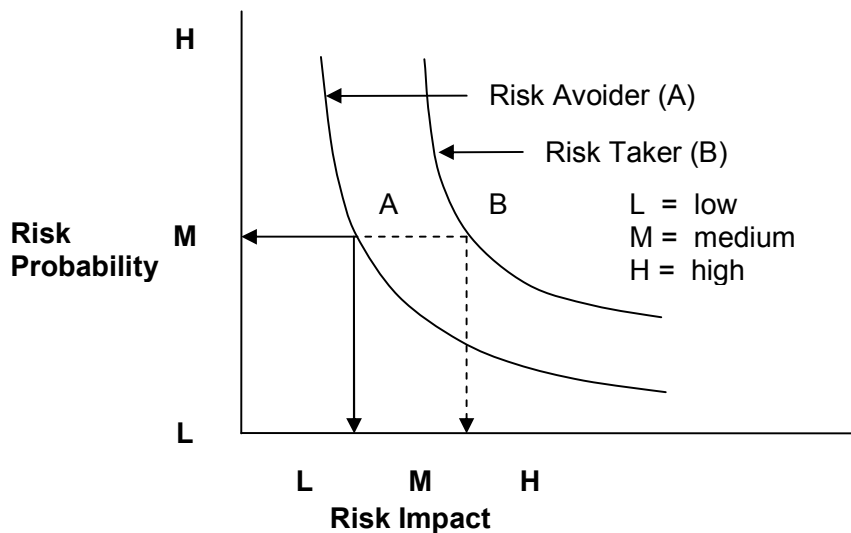


Figure 8.3: Risk Tolerance

Alternatively, risk tolerance might be assessed against risk probability and impact:



Generally, the higher the potential rewards, the greater the risks we are willing to incur. The risk-reward trade-off is evident in all projects. Organisations typically set higher hurdle rates (ie, required return) for high-risk projects than for low-risk projects.

Risk Management Principles

Proactive. It's about assuming control of potential problems before they occur. Unless we pre-empt risks, we will find ourselves reacting to risks as they arrive. This is a very expensive approach. Prevention is usually better. Maintain a risk log and always keep the top 10 risks visible is my advice.

Continuous. Risk management is not a one-time effort; rather it's an ongoing, never-ending process continued through the entire project lifecycle from project conception to finish. Furthermore, some risk responses create new risks that in turn also need to be managed. Known risks are watched and new risks are identified.

Decision-making and problem solving. Whenever throughout the project lifecycle it's necessary to evaluate alternative solutions, commencing with project selection, risk should be an attribute against which each option is evaluated.

Culture. Organisations that wish to be risk-focused need to adopt values and behaviours that encourage project players to discuss potential problems, and recognise that Murphy is a factor in all projects. Management need to walk the talk. Their appropriate behaviours are essential if risk management is to be an integral practice. Risk attitudes and tolerances may be expressed in policy statements or revealed in actions. In particular:

- Results of risk analyses need to be incorporated into the procedures for project selection.
- Support those project managers who communicate openly about project risks, and who

recommend reviewing the need for projects whose risks are not commensurate with anticipated returns.

- Increase awareness of project risk management and gain visible support for its disciplined application.
- Ensure any punishment-reward paradigm is designed to encourage risk management best practices.
- Avoid what I call “*dead projects walking*” – risky projects that should already have been terminated. Macho-style senior management can be complicit in keeping these disasters going. And instead of commending project managers who recommend early closure, at best they view these project managers as pitifully inadequate; at worst they are replaced.
- Ensure consistent, uniform use of project risk management across all portfolios, programmes, projects and functional areas.

History. Review previous project problems, historical data, lessons learned, and databases containing risk information. Thus, a sensible practice is to document risks and how they were managed. PMO risk databases need to be maintained. Risk information may be from within the organisation or from external sources.

Participation. Stakeholders who have different perceptions of risk should also be involved in the process of risk management. Recognise too that different people and organisations have different levels of risk tolerance. We should validate risk tolerances and other project assumptions with our stakeholders. When project teams hold planning meetings to develop risk response plans, attendees should include stakeholders where practicable. Risks jeopardise their expectations.

Cost-effective. The benefits of risk management should exceed the costs if we are to add value as project managers. In particular, it may not be cost-effective to avoid or mitigate risks of low impact-low probability. In these circumstances we may decide to accept the risk, proceeding with no particular predetermined risk response.

Pervasive. Risk management application is the primary job of the project manager. And every project management tool and technique employed is effectively a risk management measure. Some tools reduce the risk of being late. Others reduce the risk of over-running the budget. All techniques try to increase the satisfaction of every stakeholder and increase the chances of success. The entire project management framework is a risk management tool.

Critical attitude. The art of identifying risk begins with a critical attitude – the critical evaluator. Because we’re trying to find problems before they occur, it’s appropriate at first to adopt the Murphy philosophy ‘anything that can go wrong, will go wrong.’ However, there’s a big difference between grumbling and disciplined risk identification. The project manager sets the tone.

Ownership. Just as every task in the project schedule has an owner, every key risk should be someone’s responsibility. That person should monitor the assigned risk, sound the alarm if it appears to be moving from potential problem to real problem, and take charge of the consequences.

Risk profiles. One of the best ways to ensure project success is to apply lessons learned from past projects. History continues to be the best predictor of the future. A risk profile is a list of questions that addresses traditional areas of uncertainty on projects. These questions have been gathered and

refined from previous, similar projects. The keeper of the risk profile (usually the PMO) participates in post-project implementation reviews. Useful risk profiles are likely to be:

- industry-specific
- organisation-specific
- address both project management and project risks
- predict the magnitude and likelihood of the risks.

Foresight. Sometimes it seems that for every risk solved, a new risk appears. For instance, if we contract out specialised work, this can reduce risk by transferring it to the subcontractor. But subcontracting can reduce control over the work and increase communication difficulties. This means that we need to weigh the advantages and disadvantages of each proposed risk strategy. Some solutions cause new problems (ie, secondary risks).

Caution. Generally we shouldn't take a risk when:

- The exposure to the consequence is too great.
- The odds aren't in the project's favour.
- The organisation can't afford the loss.
- Contingency plans are not in place.
- The benefits can't be identified.
- The project isn't worth it.
- The benefits are minimal.

Dispel misconceptions. Appreciate the following practices:

- Risk identification cannot begin without having inputs into the process. These may include the creation or identification of scope, WSB, team members, stakeholders, network diagram, budget, and schedule.
- Risks should not be evaluated as they are identified. Risk qualification and quantification should be done later in the process. Evaluating risk at the wrong time decreases the number of total risks identified. It's like premature proofreading. Better to write the script first.
- The risks identified are not really risks. A risk is an event that is uncertain! If our project has too few resources, this is not a risk; it is a fact and must be addressed in the project plan.
- Risks are not properly stated. A risk of 'poor communication' is not specific enough to be very useful in the risk management process. Risks should be described more fully. For example, 'poor communication of customer's needs regarding installation of system XXX' is a more useful statement of a risk event. It's clear, detailed and specific. Avoid sweeping generalisations.
- Whole categories of risks are missed. We might focus on only technology risks, cost risks, etc when there are also project management-related risks as well as risks relating to the specific department, lack of knowledge, the market place, or any number of other risk categories. We need to think holistically and involve others with different perspectives.

- Only one method is used to identify risk (such as only using a checklist), rather than a combination of methods of risk identification. A combination of methods helps to ensure that more risks are identified.
- The first risk response strategy identified is selected without looking at other options to determine the best option or combination of options. Often more than one strategy can be used to combat a single risk. And sometimes one strategy mitigates several risks.
- Team meetings talk about everything but what should they talk about—risks!
- Contracts are risk mitigation tools and must not be created and signed until a risk analysis is done.
- We forget that risks are both good and bad things, not just bad. They are sometimes called risks and opportunities. The good things must be improved and the bad things must be diminished.
- Sometimes we equate risk management with padding the project time and cost figures. Proper risk management will result in a contingency, based on analysis and calculation that can be justified.

Risk Mismanagement

When project risk management is done ineffectively, or (as is sometimes the case) not at all, we might call this project risk mismanagement. Below are some indicators characteristic of an organisation that suffers from project risk mismanagement:

- Projects are selected and approved without consideration of their risk.
- The corporate culture rewards project champions who strive to sell the investment, and thus risks are not discussed openly, fully, and realistically. Talking about risk is seen as negative.
- Management 'punish' project managers whose projects are over-time and over-budget. Thus project managers simply pad estimates to avoid such punishment.
- Management rejects the concept of contingency in the belief that contingency discourages good planning. The contingency is then buried in the estimates. Or, a five percent contingency is always shown and the rest is buried.
- Projects are evaluated independently, rather than as part of a portfolio or programme. Placing more focus on portfolio or programme performance means that risks are shared and better performance metrics are used.
- There is no common language. Terms such as risk, uncertainty, contingency, management reserve, estimate accuracy, probability of success, etc are not properly defined, understood or used in a consistent manner.
- There is no common, consistently applied process for determining and setting cost and schedule contingency, and everyone has their own way to estimate and determine such contingency.
- There is no common, consistently applied method for determining and communicating estimate accuracy.
- There is no common, consistently applied method for identifying, assessing, and analysing

risks. There is no formal process.

- There is no common, consistently applied method for risk mitigation (ie, reducing uncertainty).

Risk and Project Parameters

Project parameters or objectives are usually known in advance. They are fixed, representing constraints within which the project must work. The feasibility of doing so will depend considerably on what impact risk has on these parameters. Thus, one way of assessing the impact of a risk event is to evaluate it in terms of the project parameters, where:

- Scope risks arise from changes to product or project scope.
- Quality risks arise from failure to complete work to the specified performance standards.
- Schedule risks arise from failure to complete work within estimated time limits.
- Budget risks arise from failure to complete work within estimated cost limits.
- Benefit risks arise from failure to realise stakeholders' positive expectations and outcomes.

Many identifiable risks will have an impact on one or more of these parameters, particularly on both schedule and budget. One way of assessing and distributing the impact of risk among project parameters is to develop a risk impact table. To be more useful the relative importance of these parameters first needs to be established. For example, a risk event that impacts schedule is particularly important if the project is deadline-driven.

Risk Management Process

The basic risk management process is illustrated at Figure 8.4. The four main steps are:

- Risk Identification
- Risk Analysis
- Risk Response
- Risk Control.

The top four characteristics of any risk management process are that it be:

- Proactive
- Continuous
- Concurrent
- Cost-effective.

'Concurrent' recognises that at any point in the project lifecycle all four steps in the risk management process are probably being undertaken simultaneously:

- New risks are being identified, some of which may have arisen as a result of risk response measures. Risk workshops occur periodically throughout the project lifecycle.
- Identified risks are being analysed to assess their impact, probability and priority.
- Risk response measures (proactive and reactive) are being applied to manage risk.

- Effectiveness of risk response measures is being evaluated.

Step One: Risk Identification

Step One is about determining and categorising risk that might affect the project. There are several ways to identify risks. Some more common methods are described in the following paragraphs.

Document Reviews. Review all project documentation produced to date, including:

- historical information (risk profiles, risk management plans, risk logs, post-project reports)
- project business case that has been prepared to justify the investment
- contracts, agreements and charters
- project work breakdown structure (WBS)
- project network diagram
- project task schedule (Gantt chart)
- communication plan
- procurement plan
- supply contracts
- deliverable specifications
- documented assumptions
- stakeholder management plan.

Brainstorming. This is probably the most popular and most effective technique. Stakeholders may attend a meeting for this purpose, to answer the questions:

“What threats exist?”

“What might go wrong?”

or, more specifically:

“What might go wrong that could impact:

- | | |
|-----------------------|-------------------------------------|
| • <i>Schedule?</i> | • <i>Scope?</i> |
| • <i>Cost?</i> | • <i>Benefits?</i> |
| • <i>Performance?</i> | • <i>Stakeholder satisfaction?”</i> |

Of course, beware the ‘dopeler’ effect, as I call it, whereby stupid ideas seem much smarter when they come at us rapidly!

Delphi Technique. Effectively, this is anonymous brainstorming where we avoid compromise, groupthink, shyness, dominance, intimidation, peer pressure etc. There’s no collusion. An initial list, composed without discussion, is circulated for comments and additions. It’s also a useful tool when the project team and other stakeholders are geographically dispersed and rely primarily on electronic communication.

Other Techniques. Other common risk identification techniques include:

- Crawford slip method
- expert interviews
- root cause identification
- SWOT analysis
- predetermined checklists.

Risk Log

Once identified, all risks should be recorded in a project risk log or register to help ensure their subsequent analysis. Rather than record *“the project will be late”* which is more like an impact or effect, we need to be specific *“we have underestimated the duration of Task E.”* The risk log is an excellent control tool for the project manager, providing a quick reference to the key risks (and their status) facing the project.

Creating anonymous risk reporting channels can also be appropriate. Better we know about all risks even if we don’t know from whom they came. Also, many of the risks we identify will be too improbable or too low in their impact to worry about. However, these risks should not be entirely ignored since they can grow in probability and impact as time goes on. Thus, such risks should also be logged and periodically reviewed. A risk log template is at Figure 8.5 and an associated risk registration form is at Figure 8.6. The risk administration process is summarised at Figure 8.7. Sometimes the risk log might be combined with an issues and opportunities log.

Figure 8.4: Risk Management Process

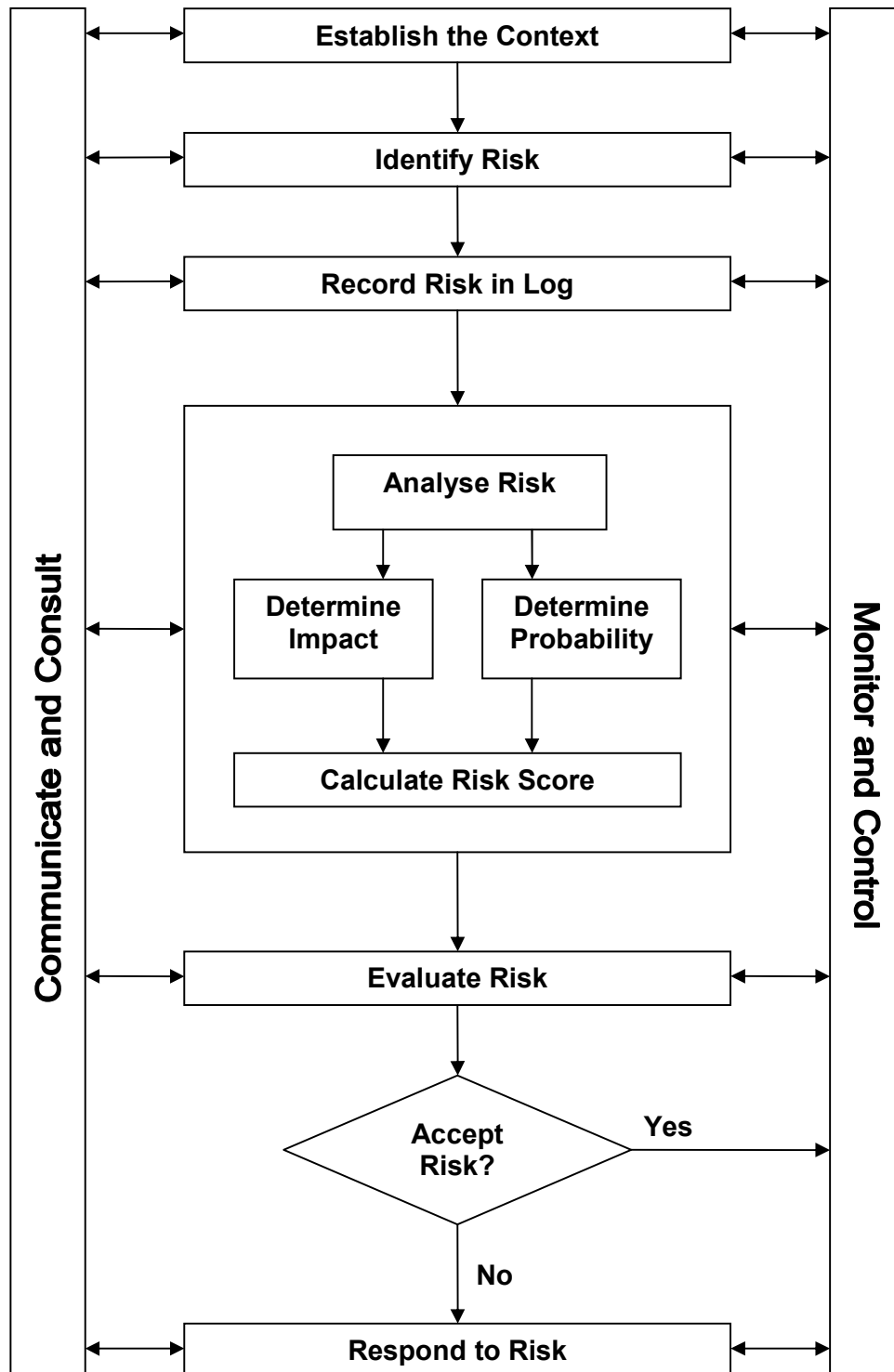


Figure 8.5: Risk Log Template

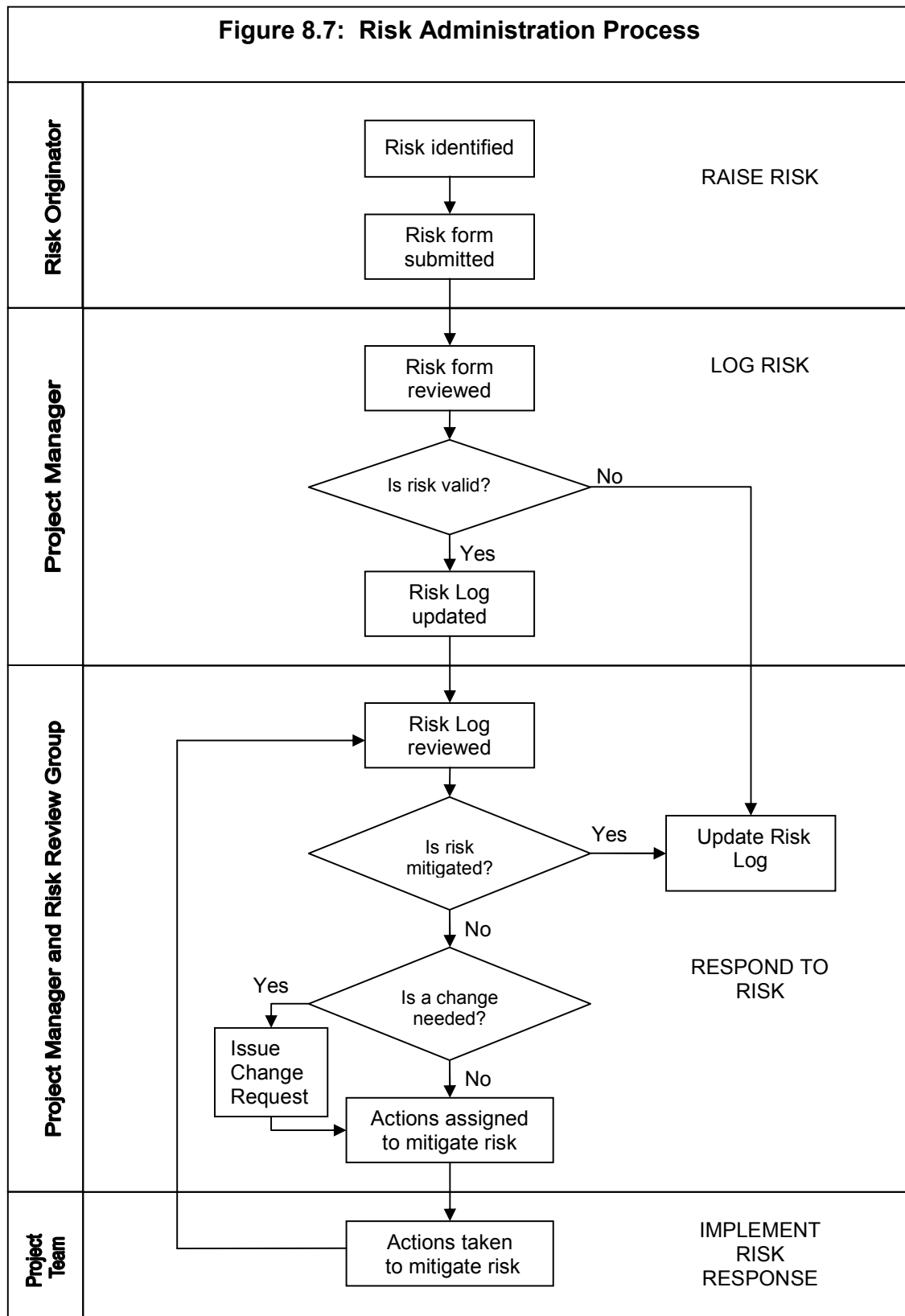
The risk log or register provides a repository of information about project risks, their analysis, mitigation strategies and status. There are a variety of formats. The log may be a hard book or intranet entry. It should be readily accessible for all stakeholders.

RISK LOG					Project:		Page:		
Risk ID	Risk Event Description	Risk Trigger	Date Found	Author	Gross or Absolute Priority	Risk Response	Net or Residual Priority	Risk Owner	Current Risk Status & Date
						<div>Guidance</div> <div> If in doubt record risk anyway. Describe the risk as clearly as possible. Only one risk per entry. Anonymous entries welcome. </div>			

Figure 8.6: Risk Registration Form

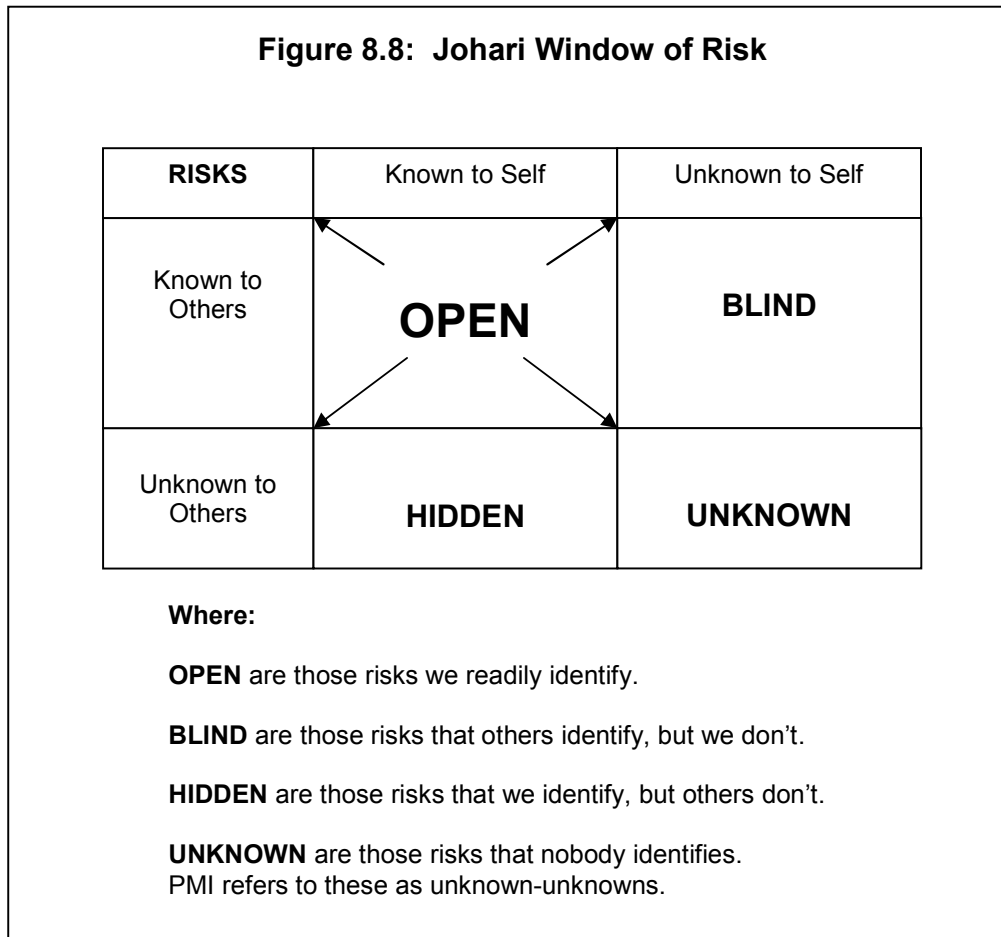
Sometimes a separate template may be used to document and analyse each risk. A typical template for this purpose is shown here.

PROJECT DETAILS		
Project Name:	<i>Name of the project to which the risk relates</i>	
Project Manager:	<i>Name of the project manager</i>	
RISK DETAILS		
Risk ID:	<i>Unique identifier assigned to this risk</i>	
Raised By:	<i>Name of person who is raised the risk</i>	
Date Raised:	<i>Date on which this form was completed</i>	
Risk Event Description: <i>A brief description of the risk.</i>		
Risk Probability: <i>Describe and rate the likelihood of the risk eventuating (Low, Medium or High).</i>	Risk Impact: <i>Describe and rate the impact on the project if the risk eventuates (Low, Medium or High).</i>	Risk Score:
RISK RESPONSE		
Recommended Preventative Actions: <i>A brief description of any actions that should be taken to prevent the risk from eventuating.</i>		
Recommended Contingent Actions: <i>A brief description of any actions that should be taken, in the event that the risk happens, to minimise its impact on the project.</i>		
APPROVAL DETAILS		
Supporting Documentation: <i>Reference any documentation to substantiate the risk</i>		
Signature:		Date:
_____		____/____/____
PLEASE FORWARD THIS COMPLETED FORM TO THE PROJECT MANAGER		



Johari Window of Risk

At Figure 8.8 I've applied the famous Johari Window concept to demonstrate the value of involving others in risk identification to enlarge the 'OPEN' quadrant.



Risk Categories

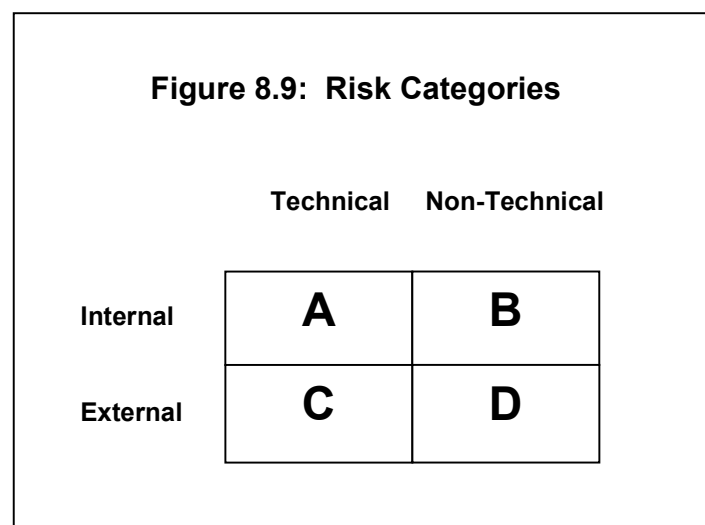
It can be useful to identify potential problems by working through different categories of risk. Alternatively, sometimes after risks have been identified, they may be categorised prior to their further analysis. Some categories may be more relevant to our project.

Common risk classifications are:

- external and internal
- business and project risks (where 'project risk' is inherent to the project and may cause it to fail, and 'business risk' is exposure of the organisation if and when the project fails or the deliverable fails to produce the anticipated benefits)
- scope, time, cost, quality, and benefit risks (ie, benefits reduced or delayed, timeframes extended, costs increased, output quality reduced)
- commercial, economic, legal, organisational, political, environmental, and technological.

The most common classification is illustrated at Figure 8.9, where:

- **Internal risks** are those that arise within the project or the organisation. They will usually be controllable by the organisation.
- **External risks** are those that arise outside the organisation and will generally be beyond the organisation's ability to control or influence.
- **Technical risks** are concerned with technology, processes, components, materials, supplies, plant, equipment, but exclude human resource risks.
- **Non-Technical risks** are concerned with human resources – their selection, availability, attitude, aptitude, skill levels, co-operation, conflict, motivation, morale etc.



Step Two: Risk Analysis

Risk analysis is concerned with estimating risk impact, probability and priority.

There are a variety of tables that help us analyse or evaluate risk. The two main factors that determine the priority to be accorded a risk are:

- **Impact** is the affect the risk will have on the success of the project. We might ask *"To what extent would this risk, should it occur, frustrate us achieving the project goal?"* Impact is sometimes described as risk consequence or significance.
- **Probability** is the likelihood or expectation of the risk occurring during our project. It is usually based on historical frequency. However, records may be lacking and history is not always a good indicator of probability given our rapidly changing environment. We might ask *"What is the chance of this risk occurring?"*

Basic Matrix. The most fundamental table for determining risk priorities has only nine categories. See Figure 8.10. A risk with medium impact and low probability is assigned priority 7. The smaller the number, the higher the priority (importance or severity). This table recognises that a remote chance of a catastrophe warrants more attention than a high chance of a hiccup.

Figure 8.10: Basic Risk Analysis Map

		IMPACT		
		HIGH (major)	MEDIUM (moderate)	LOW (minor)
PROBABILITY	High (likely)	1	3	6
	Medium (possible)	2	5	8
	Low (unlikely)	4	7	9

Where usually 1, 2, 3 are unacceptable, 4, 5, 6 are undesirable and 7, 8, 9 are acceptable (see risk tolerance line).

Sometimes a dollar figure or dollar range can be applied to IMPACT being an estimate of money lost plus the cost to put things right if the risk happens. And PROBABILITY might be defined by percentages, such as: High = 51% or higher, Medium = 10 to 50%, and Low = 9% or lower.

Risk Calculation. A more comprehensive analysis might take three factors into account:

$$\text{Risk Score} = \text{Impact} \times \text{Probability} \times \text{Detectability}$$

Detectability is included on the basis that the more difficult it is to detect a risk, then the higher priority the risk should be accorded. For example, hurricanes can be foreseen for several days as they develop, but a tornado can form and wreak havoc virtually without notice. And sometimes further allowances are made for the 'risk exposure period' and risk 'proximity'. Typical tables associated with this calculation are at Figures 8.11, 8.12 and 8.13. Perhaps impact deserves a higher weighting. In practice it can be difficult to quantify risk probability and impact. In these circumstances a qualitative word scale, such as that at figures 8.11 and 8.12, may be more appropriate.

To determine the risk score, the risk event is quantified in terms of impact, probability and detectability. Some examples are:

Risk Event	Impact	x	Probability	x	Detectability	=	Score
<i>Bad Weather</i>	3	x	2	x	4	=	24
<i>Loss of Key Team Leader</i>	2	x	8	x	8	=	128
<i>Technology Fault</i>	6	x	10	x	8	=	480

Whichever assessment matrix is used, the same matrix should be used throughout the project.

Figure 8.11: Risk Impact Table

Risk Impact	Description	Rank
Hazardous – no warning	Project severely impacted, possible cancellation, with no warning.	10
Hazardous—with warning	Project severely impacted, possible cancellation, with warning.	9
Very High	Major impact on project schedule, budget, or performance, may cause considerable delays, overruns, or degradation of performance.	8
High	Project schedule, budget, or performance impacted significantly, job can be completed, but client will be dissatisfied.	7
Moderate	Project schedule, budget, or performance impacted slightly, client likely to be dissatisfied.	6
Low	Project schedule, budget, or performance impacted slightly, client will be mildly dissatisfied.	5
Very Low	Some impact to project, client will be aware of impact, but not concerned.	4
Minor	Small impact to project, average client will be unaware of impact.	3
Very Minor	Impact so small that it would be noticed only by a very few highly discriminating clients.	2
None	No perceivable effect on project.	1

Figure 8.12: Risk Probability Table

Probability of Occurrence	Percentage	Rank
Very High: Occurrence is most likely.	Over 50%	10 9
High: Repeated occurrences possible.	26 – 50%	8 7
Moderate: Occasional occurrences.	11 – 25%	6 5 4
Low: Relatively few occurrences.	1 – 10%	3 2
Remote: Occurrence is unlikely.	Less than 1%	1

Figure 8.13: Risk Detectability Table

Detection	Rank
Almost uncertain	10
Very remote	9
Remote	8
Very low	7
Low	6
Moderate	5
Moderately high	4
High	3
Very high	2
Almost certain	1

Risk Impact and Project Parameters

The impact that a risk has on the project will depend largely on how risk affects the project parameters (ie, objectives or constraints). Some parameters are likely to be more important than others. It is therefore useful to understand the priority accorded parameters. For example, if the project driver is time, then any risk that affects the schedule is likely to have a significant impact on project success. Or with a cost-driven project, any risk that causes extra cost is likely to have significant impact. Also, it is possible to trade off any of the other project parameters against risk. For example, delivering the project faster is likely to increase risk and reduce success probability.

Step Three: Risk Response

There are five universal approaches to responding to risk:

- **Acceptance** requires that we understand the risk, its impact, and probability, and we chose to do nothing about it. We accept or tolerate the loss. If the risk occurs, the project team will react. This is a common strategy when the impact and probability are minimal. As long as the consequences are cheaper than the cure, this strategy makes sense. Should the risk occur, a 'workaround' is usually developed and applied. Acceptance doesn't mean we ignore the risk.
- **Avoidance** requires re-planning to prevent or eliminate the risk. Under avoidance the plan is changed to eliminate the risk. We might not do part of the project. We might use another supplier. It's about 'fool-proofing' the project. It might mean padding the schedule with rain delay days, or using parallel design strategies. We simply don't do an activity that carries risk or we do it differently to eliminate the risk or reduce it to an acceptable level. However, we should remember that changing the project scope may affect business risk. Project benefits might be jeopardised.
- **Mitigation** (or treat, abate, reduce, minimise, counter, contain) requires that measures are taken to reduce risk impact and/or probability to an acceptably lower score. Air bags in cars are literally designed to reduce impact. To second-source project resources is another example.
- **Transference** (or deflection, shift, share or spread) requires that the risk be passed on to someone else. There are three basic ways of transferring or deflecting risk to another party:
 - **Insurance** where a third party accepts an insurable risk given the payment of a premium. Insurance companies understand and practise risk management better than most project managers. However, financial compensation may be of cold comfort.
 - **Bonding** where one or both parties deposit money into a secure account so that if either defaults the aggrieved party can take the bond in compensation. A bond is usually a bank guarantee.
 - **Contracting** is when the risk is transferred, spread or shared among owner, contractor, and subcontractors. Usually the risk is assigned to the party most able and motivated to control it. Retentions, warranties, guarantees, bonds or penalties might also be contained in such contracts. Key questions that may help us decide how to allocate risk are:
 - Which party is the source of the risk?
 - Which party can best control the risk?
 - Which party can best manage the risk?
 - Which party can best sustain the risk impact?
 - Which party will get the rewards?
- **Contingency** is where an allowance is made for the risk by adding a buffer – perhaps extra time or budget sum. Contingency plans are pre-defined actions to counter risk events should they occur. Trigger events or circumstances are identified in advance. A fire evacuation plan is a contingency, usually implemented when the fire alarm is sounded. A fall-back plan is what we employ if the contingency plan is ineffective. Contingency reserves account for identified risks (ie, known unknowns).

In addition to these five responses, if the risk involves opportunity, the appropriate responses might also include enhance or exploit.

The appropriate response measure will be considerably influenced by the risk priority or score. For example, if we use the basic matrix at Figure 8.10 the following is a guide:

Risk Score	Possible Response
1	Avoid/Eliminate/Prevent
2-3	Mitigate/Transfer/Reduce
4-6	Contingency
7-9	Accept

For example, some possible responses to risks associated with a team member recruiting project are shown in the risk response worksheet at Figure 8.14. The tasks that comprise the project are:

- conduct job analysis
- prepare job description
- prepare person specification
- decide remuneration range
- advertise position
- shortlist replies
- arrange and conduct initial interviews
- conduct applicant testing
- arrange and conduct final interviews
- check with referees
- make job offer
- negotiate contract
- advise the unsuccessful.

Figure 8.14: Risk Response Worksheet

Risk Event		Score 1-9	Risk Response Strategy
ID	Description		
1.	Inadequate job analysis	3	Obtain expert help.
2.	Inaccurate job description	2	Validate before finalising.
3.	Inappropriate remuneration range	3	Check market salaries.
4.	Insufficient response to advertising	4	Advertise more widely and for longer period.
5.	Referee has no current information	3	Mention that referees must have current knowledge.
6.	Job offer not accepted	4	Approach next most appropriate candidate.

Risk Response Effectiveness

But how can we tell if our risk responses are likely to be good enough? Can we assess their potential effectiveness before we decide to implement them? Here are some criteria by which we can test our planned risk responses:

- **Appropriate?** The correct level of response must be determined based on the risk priority or score. This ranges from crisis response where the project cannot proceed without the risk being addressed, through to a 'do-nothing' response for minor risks. We should not spend large amounts of time or effort developing responses for minor risks.
- **Affordable?** The cost-effectiveness of risk responses must be determined, so that the amount of time, effort and money spent on addressing the risk does not exceed the available budget or the degree of risk exposure. Each risk response should also have an agreed contingency sum determined and assigned.
- **Actionable?** An action window should be determined, defining the time within which risk responses need to be completed in order to address the risk. Some risks require immediate action, while others can safely be left until later. We must be careful not to leave it too late before we act. Identifying trigger or risk response points is useful.
- **Achievable?** There is no point in describing risk responses that are not realistically achievable or feasible, either technically or within the scope of our capability and responsibility. If our planned response is 'Change the Government' or 'Invent a radical new solution', we may be disappointed.
- **Agreed?** The consensus and commitment of relevant stakeholders should be obtained before confirming responses, especially if the proposed response might affect a part of the project in which they have an interest.
- **Allocated and Accepted?** Each risk response should be owned by a single person (and accepted by them) to ensure a single point of responsibility and accountability for

implementing the appropriate response. Allocating risk responses requires careful delegation, including provision of the necessary resources and support to allow effective action to be taken in a timely manner.

Each proposed risk response might be assessed against these six criteria before it is accepted. A sound response will pass all these tests, and it is more likely to achieve the desired effect than a response which has not been properly evaluated in advance. Another such checklist might include simple, cheap, enduring, effective, and quick. And what priority might we accord these characteristics?

Outsourcing Risk

While we might contract out risk, in doing so we usually expose the project to other risks. We aim to avoid or reduce these secondary risks by proper selection and appropriate contractual terms. A written contract is primarily a risk management tool. Some main types of contractual arrangements and their allocation of risk between client and contractor are shown at Figure 8.15.

Figure 8.15: Contracts and Risks					
Scope Definition	Minimal		Partial		Complete
Level of Uncertainty	High		Moderate		Low
Degree of Risk	High		Medium		Low
Likely Risk Allocation	Client			Contractor	
Contract Type	CPPF	CPIF	CPFF	FPPI	FFP

Where: CPPF—Cost Plus Percentage Fee (reimbursement)
CPIF —Cost Plus Incentive Fee (to minimise cost)
CPFF—Cost Plus Fixed Fee
FPPI — Fixed Price Plus Incentive
FFP — Firm Fixed Price (lump sum)

Risk Responsibilities

Responsibility for risk is sometimes passed on to others with the comment *“That’s not my worry.”* This attitude is very dangerous since one of the major strategies for controlling risks is assigning and accepting responsibility for them. We usually assign responsibility for a risk to the party who can best control the risk. Those with this responsibility usually include the sponsor, steering committee, project management office, project manager, line managers, contractors, suppliers, client and customers.

Ultimate responsibility for identifying risks to a project and their subsequent treatment rests with the project sponsor. The very threat posed to the successful achievement of the objectives, as described in terms of scope, quality, time, cost and benefits should be sufficient reason for the sponsor to recognise

this responsibility. The project sponsor makes at least six important contributions:

- Maintains an adequate contingency and management (or sponsor's) reserve to account for risks – known and unknown.
- Holds the project manager accountable for sound risk management.
- Promotes a climate that recognises the value of risk management.
- Knows the relationships among scope, time, cost, quality, risk and benefits.
- Confirms and intervenes where necessary to ensure the project receives appropriate resourcing.
- Approves as appropriate risk response measures beyond the project manager's delegated authority.

Once project parameters have been established, the project manager becomes responsible for navigating the project within these to successful completion. Thus, the project manager is primarily responsible for carrying out risk management activities. In summary, it's appropriate to emphasise that like quality, health and safety, all project players have responsibility for risk management. Such responsibility needs to be clearly defined.

Risk and Probability

The budget contingency for a project can usually be rather less than the sum of the estimated financial impacts of all identified risks, because there is little likelihood of all identified risks occurring. See Figure 8.16. In this example, the contingency allowance for each risk has been determined using 'expected monetary value' which is a relatively simple tool for weighing the risks of failure against the opportunity for success. Perhaps the main points about risk and probability theory can be illustrated by a project that has two risks (A and B), which are mutually exclusive (ie, statistically independent), and have the following probabilities of occurring: Risk A = 5% and Risk B = 15%. In these circumstances:

- **Likelihood of One Risk Occurring**
 $5\% \text{ (Risk A)} + 15\% \text{ (Risk B)} = 20\%$
- **Likelihood of Both Risk Occurring**
 $5\% \text{ (Risk A)} \times 15\% \text{ (Risk B)} = 0.75\%$
- **Likelihood of Neither Risk Occurring**
 $95\% \text{ (Risk A)} \times 85\% \text{ (Risk B)} = 0.95 \times 0.85 = 80.75\%$

Figure 8.16: Contingency Calculations

Project Risks	Impact		Probability		Contingency Allowance
A	\$10K	x	0.3	=	\$3.0K
B	\$5K	x	0.4	=	\$2.0K
C	\$8K	x	0.3	=	\$2.4K
D	\$6K	x	0.4	=	\$2.4K
E	\$9K	x	0.5	=	\$4.5K
F	\$7K	x	0.4	=	\$2.8K
G	\$10K	x	0.5	=	\$5.0K
H	\$5K	x	0.2	=	\$1.0K
I	\$8K	x	0.3	=	\$2.4K
Total Contingency Fund				=	<u>\$25.4K</u>

Monte Carlo Simulation

When the critical path could readily change during project execution, a Monte Carlo simulation may be used to produce the probability distribution of project duration and cost possibilities. Monte Carlo simulation is the basis for @Risk, which is an Excel and MS Project add-on that enables us to answer such questions as:

“What is the chance of the project being completed by 12 June?”

“What is the chance of the project costing \$280,000 or less?”

A free @RISK evaluation disc is available from www.palisade.com.au

Risk Response Plans

A risk response plan documents the risks and appropriate pre-determined responses and typically includes the following information about each risk event:

- Risk ID Number
- Risk Description
- Root Cause
- Risk Category
- Risk Originator

- Risk Owner
- Probability
- Impact
- Expected Monetary Value (Risk Score or Rating)
- Risk Proximity (How soon risk is expected?)
- Risk Symptoms or Triggers (that indicate risk is imminent)
- Contingency Trigger (or risk threshold, when contingency is implemented)
- Response Cost
- Resources (needed to implement plan, which might include materials, expertise, insurance etc).

The response plan for each risk should be accessible by all project players, especially the risk owner. Obviously, unknown risks with unknown consequences (ie, unknown unknowns) are risks that don't exist on the risk log and have no response plans. These risks are hopefully managed when they occur, financed from the Management Reserve (or Sponsor's Reserve) rather than from the Project Contingency Fund. The Management Reserve is for new work—scope change. Poor performance bites into the margin, not the Management Reserve. Before project execution, we should be able to confidently say “yes” to each of the following ten questions:

- Is there a process in place for identifying and documenting risks?
- Has the priority for each identified risk been determined?
- Has a mitigation strategy been identified where appropriate for each risk?
- Has a contingency been identified where appropriate for each risk?
- Has a trigger been established for each contingency strategy?
- Does the project plan include provision for regular risk meetings and active monitoring for risk?
- Is there a process for tracking and reporting on risk response effectiveness?
- Has the project team been trained in risk management?
- Have we assigned each risk an owner?
- Does everyone know how to access and use the risk log?

Step Four: Risk Control

Managed risks need to be monitored on a regular basis to assess the effectiveness of our risk response measures. Reassessment needs to be carried out whenever new risks are identified and sometimes ‘workarounds’ will be needed. These are unplanned responses to unanticipated risks.

Planned risk responses that are included in the project management plan may be executed during the lifecycle of the project, but the project work should be continuously monitored for new and changing risks. Also, there may be secondary risks – those that arise after implementing risk responses.

Risk Control is the process of identifying, analysing, and planning for newly arising risks, keeping

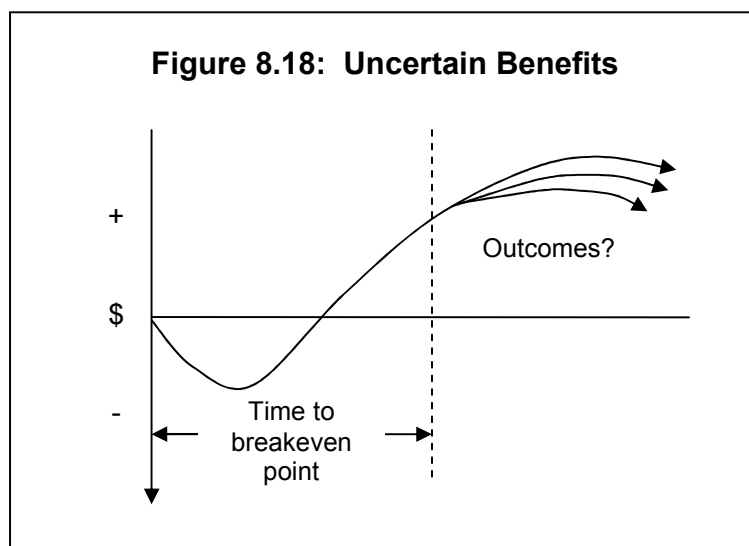
track of the previously identified risks and those on the watch-list, reanalysing existing risks, monitoring trigger conditions for contingency plans, monitoring residual risks, and reviewing the execution of risk responses while evaluating their effectiveness. Residual risks are those risks remaining after risk planning. The Risk Control process applies techniques, such as variance and trend analysis, which require the use of performance data generated during project execution. Risk Control, as well as the other risk management processes, is ongoing for the life of the project. Other purposes of Risk Control are to determine if:

- Project assumptions are still valid.
- Risk, as assessed, has changed from its prior status, with analysis of trends.
- Formal risk management policies and procedures are being followed.
- Contingency reserves of cost or schedule are satisfactory.

Risk Control can involve choosing from alternative strategies, executing a contingency or fallback plan, taking corrective action, and modifying the project management plan. The risk response owner reports periodically to the project manager on the effectiveness of the plan, any unanticipated effects, and any mid-course corrections needed to handle the risk appropriately. Risk Control also includes updating project lessons-learned databases, risk management profiles and templates for the benefit of future projects. The basic process to implement contingency plans is shown at Figure 8.17.

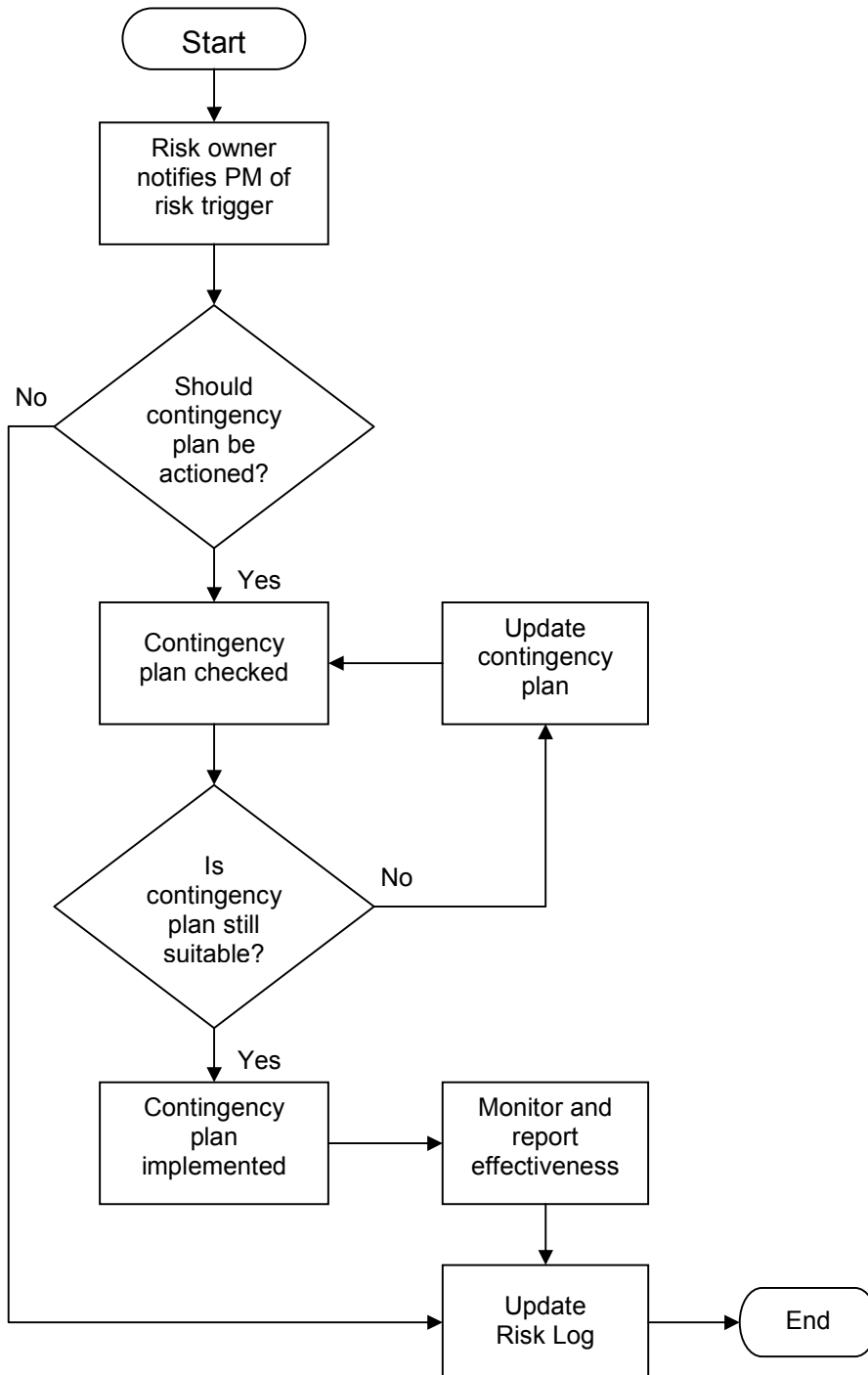
Risk and Time

Another dynamic of risk is time. The further off an event, the less certain we are of its benefits or outcomes. In projects the highest level of risk is found at the onset, when we face a long and uncertain future. See Figure 8.18.



And as time goes by during the project, we commit more and more human and material resources. Our stake in the project thus increases. In the early stages, we have invested little, and find it easier to walk away. However, if we walk away from a project when we are far into the lifecycle, we may stand to lose a great deal. See Figure 8.19.

Figure 8.17: Contingency Implementation Process



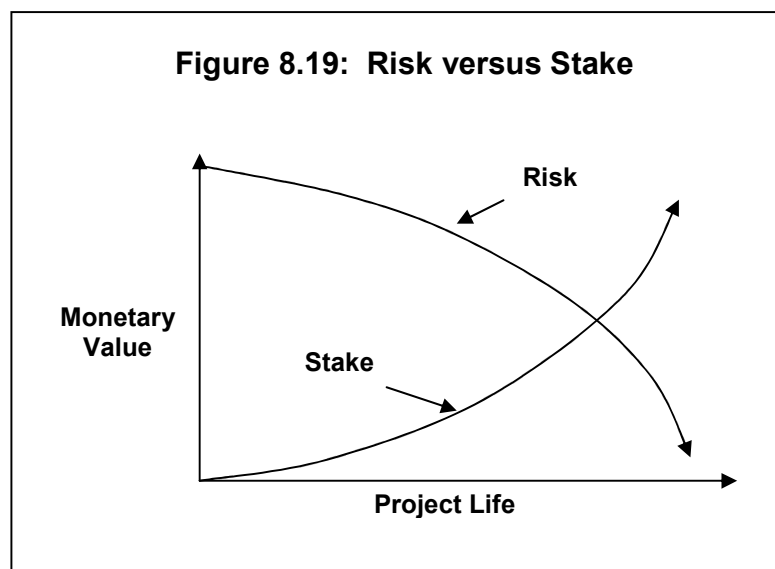
Then again, it would be foolish to stay with a losing project. Better we recognise that future benefits do not now justify the costs and risks involved, and as a minimum question the wisdom of continuing to throw good money after bad.

*"You've got to know when to hold,
Know when to fold,
Know when to walk away,
Know when to run."*

The Gambler
Kenny Rogers

Project Risk Tolerance

Once risk has been more precisely described, we might then quantify the relevant risk events in terms of project parameters and illustrate the result as shown at Figure 8.20. This graph depicts a time-driven project, in which quantified risks are within permissible risk tolerance limits, except for time, where there could be excessive slippage. The diagram doesn't show 'benefits', but could be readily amended to do so. Appropriate mitigation measures might then 'shrink' the estimated risk profile to within all tolerable limits.

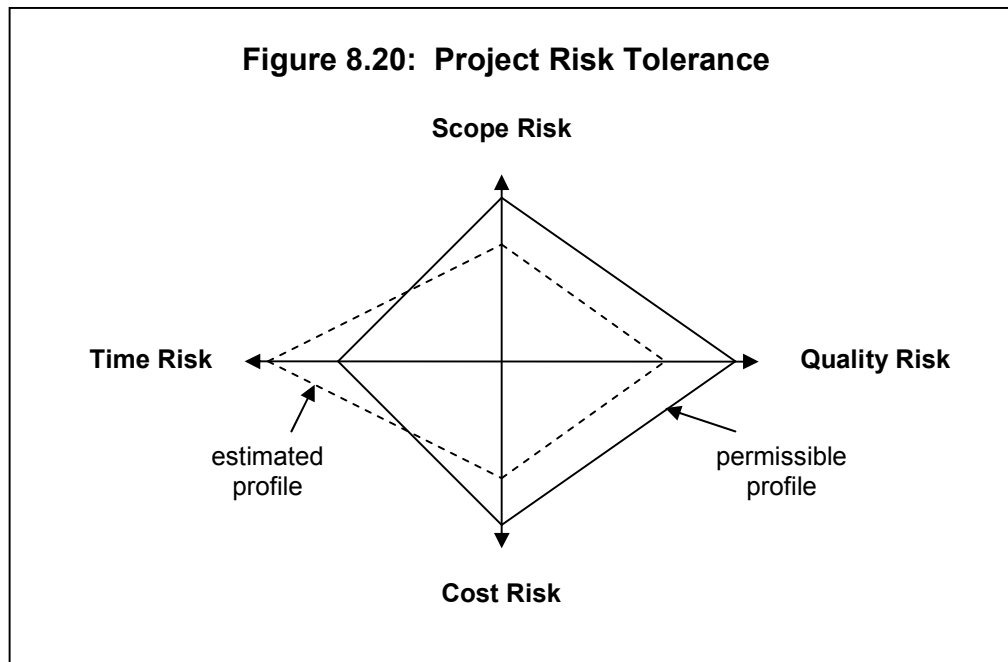


When Risks Become Issues

Issues management is the process of recording and handling any event or problem that either threatens the success of the project or represents an opportunity to be exploited. As project manager we ultimately own the issues and must drive their resolution. The issue process usually follows the following sequence:

- Issue is recorded in the issues log or register:
 - description of issue
 - record of who brought it up and when
 - issue priority.

- Decide and agree who will be accountable for managing issue resolution. Record this information in the register:
 - issue owner
 - date for issue resolution.
- Regularly update resolution status or progress in the register.
- Once issue is resolved, record the method and date of resolution.



A large number of issues may be raised during the life of our project. Some will need our immediate resolution, some will need to be escalated to our sponsor, and others will await our regular project meetings.

The power of the issues register is its ready accessibility. Some tips on using an issues register are:

- write up the issue as a question since this helps focus us on solutions
- have only one issue per entry since grouping several issues makes it more difficult to identify solutions
- do not add to existing issues, rather record as a new issue
- keep all issues visible and share them with the project team and, where appropriate, with other stakeholders.

Resolving issues usually follows this sequence:

- Declare we have an issue. Don't hide the issue. Putting it in the register is usually not enough.
- Clarify the precise issue. Exactly what happened or didn't happen. Distinguish between assumptions, facts and rumours.

- Decide what the resolution of the issue would achieve. What would resolution make possible? Need the issue be resolved? Should it be rejected, deferred, escalated, resolved or further investigated?
- What actions might be taken to resolve the issue? What's the true cause? Also, think laterally and involve others.
- Decide appropriate action and assign responsibility for this. Record progress.

Post-implementation Risk Evaluation

Strictly speaking there is no risk in the past, since it has already occurred (although we may remain uncertain about what actually happened and what it means!). But someone once said, *"Those who cannot remember the past are condemned to repeat it."* So we should review the past in order to learn for the future. In risk management this means addressing the following questions:

- What types of risk can be identified on our project? Are there any generic risks that might affect similar projects?
- Which identified risks actually occurred and why? This includes problems, which could have been foreseen as threats and missed opportunities that could have been captured.
- What preventative actions could have been taken to minimise or avoid threats? What proactive actions could have been taken to maximise or exploit opportunities?
- Which identified risks did not occur and why not? Which responses were effective in managing risks and which were ineffective?
- How much effort was spent on the risk process, both to execute the process and to implement responses?
- Can any specific positives be attributed to the risk process, such as reduced project duration or cost, increased business benefits or client satisfaction etc?

The results from this type of lessons-learned exercise can be used to update risk identification techniques, to incorporate preventative risk response strategies into future projects, and to improve the effectiveness of risk management.

Miscellaneous Risk Matters

All risks have **causes**. For example, a project may take longer to complete than we estimated. This risk may for example be caused by delayed consent. And all risks have **uncertainty** associated with them – they may or not occur. Also all risks have an impact associated with them. Such impacts can decide project success.

Risks are justified by the **benefits** that come as a result of taking them. And unless these project benefits exceed the project risk, it's unlikely the project should be undertaken.

Risks can have a **positive or negative effect**. They can produce loss or gain for the project. The PMBOK® defines a risk event as *"a discrete occurrence that may affect the project for better or worse."*

There are a variety of types of risk, often grouped according to their origins. Two common groups of risks are:

- **Business risks** which are threats that affect the organisation as a whole in some way that may

impact the project success and the exposure of the organisation if the project fails. Selecting the right project is business risk.

- **Project risks** which are inherent in the project that may also impact project success. Managing uncertainty to meet the project goal is project risk.

Despite a variety of terms, there are only **five methods** to handle identified risks:

- **Prevent** (avoid, eliminate)
- **Reduce** (mitigate, contain, counter, minimise, abate, treat)
- **Transfer** (shift, spread, deflect, share, insurance, contract out)
- **Contingency** (fallback plan, budget allowance, counter measure)
- **Accept** (retain, assume).

The **severity** with which a risk event may affect a project is determined mainly by its **impact** (significance, magnitude, consequence) and **probability** (likelihood), which is the usual basis for analysing, scoring, prioritising, and ranking risks.

Companies and individuals have **risk tolerance levels**. We either tend to be gamblers (risk-takers) and are willing to take chances to achieve rewards, or we tend to be conservative (risk-avoiders, risk-averse) and less willing to take chances. It's important to be risk-aware.

Every estimate, forecast and project is based on **assumptions** (premises). Risks lurk in each assumption. Thus, we must not make assumptions when the facts are available, and ensure that assumptions are reasonable (ie, low-risk). And periodically ask, *"What if the assumption's wrong?"*

Insurance companies understand and practise risk management better than most project managers because they realise that it's their **primary business**. Not many project managers realise that it is also their primary task, but those who do have an edge.

The project management **framework or methodology**, and all project management activities, tools and techniques can be seen as managing risk, since each in its own way tries to prevent something bad from happening, whereas risk management is a specific process we consciously apply to identify and manage project risks.

We can't hope to identify all the risks in a project. It would be too expensive to do so. We would spend more than the risk would cost if it did happen. We are usually satisfied to find an **acceptable level of risks** (a practical number), which is a function of our risk tolerance.

Risk probability assessments can be influenced by personal consequences, bad news aversion, proximity or recency, and manageability (ie, tendency to underestimate probability if risk can be controlled).

Remember that the **project parameters** (scope, cost, time, quality and benefits) are also related to risk. For example, a strategy to change a parameter may increase or reduce project risk. When the sponsor has the project manager adopt a more aggressive schedule, that executive is in effect asking the project manager to add risk. Thus, we might classify risks as:

- scope risks
- budget risks

- schedule risks
- performance risks
- benefit risks.

Another way to divide risks is between business risks and insurance (or pure) risks:

- **Business risk** has the opportunity for gain as well as loss.
- **Insurance risk** only has the likelihood for loss and one obvious strategy for managing such pure risk is to take out insurance.

Murphy's Law notwithstanding, we might expect random risk events to distribute themselves more or less evenly between good luck and bad luck, but unfortunately this is not what experience suggests. There is usually **more that will go accidentally wrong** than will accidentally go better than expected.

When a project fails, instead of 'fixing the blame' we do better '**fixing the process**' by which risks are managed. It's inevitable that some projects will be successful and others will not be.

Projects are particularly susceptible to risk because each project is **unique** in some measure. The uniqueness can vary dramatically. Uniqueness means that the past is an imperfect guide to the future.

The more significant the business or project risk, the higher should be the level of project **governance** – the more senior the sponsor.

Sometimes distinction is made between theoretical risk, which is possible risk, and **practical risk**, which is probable risk.

The opposite of risk management is **crisis management** whereby we react to events as they occur without any forethought regarding their probability of occurring or their impact. Risk management is a proactive possess. It keeps us in control and prepared.

Risks aren't problems. They are potential problems. 'Problems' is present tense. Thus, a problem isn't a risk – it's an issue, some of which are crises. A risk or an opportunity will become an issue if the risk event occurs.

Communicating **risk status** is as important to the health of the project as is communicating schedule and cost status. Thus, status reports should also address risk.

Risk is concerned with **variability**. Thus standard deviation (a measure of dispersion or variability) can also be seen as a measure of risk. The larger the standard deviation of an estimate (of quantity, time etc), the greater its variability in results.

When **information** is lacking, as at the start of the project lifecycle, uncertainty will be high. This leads to greater risk. Planning, which involves the identification and collection of relevant information, reduces uncertainty and thus enhances the likelihood of success, which is the reciprocal of risk. With total certainty there is no risk, since there is not variability in results. Certainty only occurs with project completion.

A major feature of external or environmental risks is that they are largely **uncontrollable**. At best, we strive to identify them so that we can be prepared to deal with them. We still need to keep an eye open for them and consider their impact and probability.

In general, there is a positive correlation between level of risk and projected **time horizon**. Longer-term projects have greater uncertainty given the accelerating rate of change. In our own lives we can predict what's likely to happen tomorrow, but we are much less certain about what's likely to happen in 12 months' time. The same is true of projects.

Risk decreases as the project progresses towards completion. However, due to resource commitments, our stake increases. The size of the stake is called **risk-exposure**.

Prioritising too highly the risk management process could potentially keep an organisation from ever completing a project or even getting started. And spending too much time analysing and managing unlikely risks can divert resources that could be used more profitably. Prince2® suggests that:

- 1-3% of the project budget should typically be spent on risk management prior to project execution.
- 2-4% of the project budget should be typically spent on risk control following project implementation.

"If anything can go wrong...."

Murphy's Law is attributed to an Air Force captain who created this now famous phrase when a series of errors and problems kept occurring in a California Air Force base missile site. Murphy was an electrician who frequently wrong-wired things. These are some of the items to which most people will relate:

- Left to themselves, things tend to go from bad to worse.
- Whenever we set out to do something, something else must be done first.
- Nothing is as easy as it looks.
- Everything takes longer than we think.
- If there is a possibility of several things going wrong, the one that will cause the most damage will occur.
- Nature always sides with the hidden flaw.
- It always costs more and takes longer than first estimated.
- It is easier to get involved in something than it is to get out of it.
- Every solution breeds new problems.
- If you try to please everybody, somebody will be disappointed.
- It is impossible to make anything foolproof, because fools are so clever.
- If you tinker with anything long enough, it will break.
- If there is a 50 percent chance of success, that means there is a 75 percent chance of failure.
- Interchangeable parts won't.
- In any computation the figure that is obviously correct will be the source of error.
- Blame will never be placed if enough people are involved.

- Nothing is lost until we begin looking for it.
- If in the course of several months only three worthwhile social events take place, they will all fall on the same evening.

Defeating Murphy

John Mowen in his book 'Judgement Calls' identifies 14 tactics to minimise Murphy's influence:

- Think realistically when making a decision and act confidently when implementing it.
- When unsure, select the alternative that would result in the least negative outcome, should we happen to be wrong.
- Give decision-makers frequent feedback on the accuracy of their assumptions and predictions in order to reduce their overconfidence.
- Avoid entrapment—doggedly pursuing a losing course of action. Don't throw good money after bad.
- To avoid entrapment, create milestones, which if not achieved, will result in the review or cancellation of the project.
- Sunk costs should have no influence on future decisions. A sunk cost is the investment that we cannot recover if a project is abandoned. If future benefits do not outweigh future costs, it is time to quit.
- If endurance is paramount, burn our bridges and commit ourselves to the project.
- Identify the underlying cause, not just the obvious symptom, in order to solve problems.
- Avoid the tendency to attribute bad outcomes to uncontrollable situational factors and good outcomes to our own brilliance.
- Do not assume that big problems result from single, big causes.
- We usually exaggerate in hindsight what we anticipate in foresight.
- Use reason to analyse problems and emotion to enhance action.
- Leave intuitive decisions to the experts when time is short and facts are lacking.
- Have a fall-back position for when plans go wrong.

We don't have to be project managers to take responsibility for risk. In fact, everyone involved in the project has a part to play in defeating the notorious Murphy.

Project Manager's Challenge

To be an effective project manager in terms of risk we need to:

- Recognise the importance and benefit of risk management.
- Use risk management terminology correctly.
- Apply the risk management process – identify, analyse, respond and control.
- Apply the principles of effective risk management, with focus on prevention throughout the project lifecycle.

- Identify risks to our project and understand common sources of risk.
- Assess the impact of risks to our project's scope, cost, quality, time and benefit objectives.
- Recognise risks with contracting out project work.
- Categorise risks – internal, external, technical, non-technical, and legal.
- Analyse risks to determine their impact, probability and ranking.
- Respond appropriately to risk – accept, avoid, mitigate, transfer, or contingency.
- Determine and cost risk contingency measures.
- Establish a risk/opportunity register.
- Conduct a post-implementation risk assessment.

Organisation Challenges

In the last decade risk management frameworks have evolved rapidly. Much is now written about the need for sound risk management. Perhaps a major concern should be that we don't seem to be benefiting from our hard-earned and often expensive lessons about risk. My research suggests that some useful risk audit questions for us to ask might therefore be:

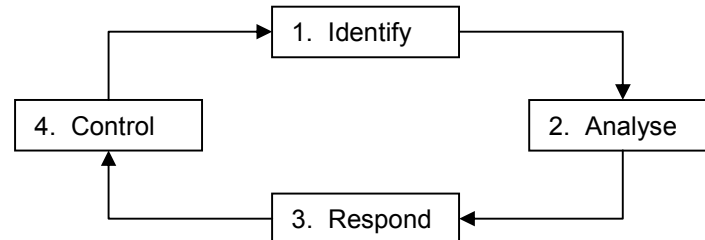
- Does our organisation foster a culture where open, honest and timely discussion about risk is encouraged as a positive practice?
- Does our organisation employ a risk management process that:
- Is under continuous review to ensure it always reflects best practice (which admittedly can be somewhat fleeting) and is 'owned' by a single person or PMO to whom suggestions for its amendment can be submitted?
- Includes risk as a project filtering, selection, categorising and prioritising criterion?
- Requires the business case, which justifies the project investment, to address risk and our tolerance to it?
- Allows for risk in our estimates, and permits a realistic project contingency and management or sponsor reserve?
- Recognises the need to 'future-proof' the project plan, through stakeholder scrutiny, before we implement the project?
- Ensures the ongoing identifying, documenting, analysing and appropriate response to risks – political, business and technical – as assumptions prove wrong, reality unfolds and unexpected things go bump in the night?
- Requires that the project post-implementation evaluation assesses how well risk was managed in order to continue to learn and improve, and update our risk management process, project risk profiles and databases accordingly?
- And, of course, does our organisation properly train our project people in risk management?

Yes, in project management, a little paranoia is healthy. We don't just suspect that risks lurk behind every bush, corner and door. They really do! The prevalence of risk was clearly acknowledged by Murphy's wife, who presumably knew him well, when she told us, "*Murphy was an optimist*" –

Murphy's Wife's Law!

Summary

There is always a risk that projects will not turn out as expected, arising often from their uniqueness. Successful completion requires that project risk be managed. Risk management is the process by which the probability of risks occurring and/or their impact on the project is reduced. The basic steps are:



If we anticipate problems, and plan appropriate contingencies, the project will not be disrupted when those problems occur. If the unexpected also occurs, we will then have time to contend with this without detriment to project progress.

This risk management process is sometimes referred to by different names – contingency planning, feed-forward, scenario planning, future-proofing, fool-proofing, pre-empting problems, what-if analysis, etc. From one perspective, everything a project manager does is risk management. Essentially, if risks are controllable we deal with their causes, and if they are not controllable, we deal with their effects.

The framework contained in this book identifies one particular step when the project team pre-empts problems. This is when the tentative plan is subjected to careful scrutiny before it is submitted for final approval. However, risk management is also an on-going process, since different risks arise at different times during the project lifecycle. As the project progresses some identified risk events will occur and some will not, and new risks will also arise.

Sometimes it seems that, for every risk solved, a new risk appears. For example, we may reduce risk by contracting out certain specialised work. But this solution can reduce our control over the project and increase our communication difficulties. Thus, the advantages and disadvantages of proposed risk responses need to be carefully weighted. And it's important to routinely update the risk list and status of risks. Don't take a risk unless there is promise of a commensurate reward or return.

Also, at project closure, the project risk experience should be integrated into the organisation's project management knowledge repository. This knowledge base can then serve as a starting point for risk identification on future similar projects.

For more on risk see Appendices Five and Seven.



Chapter Nine

PREPARE PROJECT MANAGEMENT PLAN



"No project is better than its plan"

This relatively short chapter describes the composition of our project plan, the purpose of which is to enable the successful implementation of our project. Planning is one of the classic and first functions of management. It's a process that begins with an understanding of our current 'as-is' state and goes on to realise our desired future 'to-be' state. The plan bridges the gap, and in the process answers questions such as:

- *"Why should we do it?"* The answer results in a business case.
- *"What's to be done?"* Results in a project goal.
- *"How should we do it?"* Results in a work breakdown structure (WBS).
- *"In what sequence?"* Result is a network diagram.
- *"When should we do it?"* Results in a schedule.
- *"Who should do it?"* Results in a resource schedule.
- *"What equipment and materials are needed?"* Results in a procurement plan.
- *"What might go wrong?"* Results in a risk management plan.
- *"How much will it cost?"* Results in a budget.
- *"How will we measure progress?"* Results in an earned value plan.
- *"How will we make changes?"* Results in a change management process.
- *"How will we keep people informed?"* Results in a communication plan.

The detailed plan is to the project team what a map is to a traveller—a basis to guide and measure progress and a tool to prepare for the journey ahead. More precisely, the project management plan is a formal, approved document that defines how the project is to be executed, monitored, controlled and closed down. Writing up the project management plan is not a difficult task. Some techniques that help us prepare the plan are:

- **Use a template**, either from this book or from somewhere else. It's essentially a checklist.
- **Make a template**. If we do not have one, we should find an example of a successful project plan. Use similar headings.
- **Draft it, then rewrite**. There's no need for us to get the plan right first time. In fact attempting to do so will probable result in 'paralysis by analysis'. The rough draft will benefit from rewriting and reviewing with others. Ambiguity can lead to misunderstandings, conflict, disappointment, and expensive rework later.

- **Involve others.** Talk with those who will do the work to ensure the plan is realistic. This is the first rule of planning. Brainstorming together is helpful and develops commitment. Include their ideas in the plan.

We do a lot of planning early to get things as right as possible, as early as possible. The later change happens in a project, the more it costs. This reality is captured in the 1:10:100 rule. It's always least expensive to plan well, and resolve problems in the Conceive and Develop phases. Experience suggests that it costs 10 times as much to resolve the same problem during the Execute phase, and 100 times as much to resolve the problem when the deliverable is in service. Let's get it right first time and allow ourselves sufficient time to do this.

In circumstances of limited resources and time, planning is the only way to get things under control and to optimise our activities. Planning also has additional benefits:

- the process of preparing the plan forces us to think carefully about what is involved – to think the project through in detail and build commitment
- it allows scheduling and best use of our scarce resources
- it describes the roles and responsibilities of key project players
- it provides a basis against which we can assess progress, detect variance, and take action before the situation becomes critical
- a properly thought out plan is the best defence against unrealistic deadlines, budgets and other unreasonable expectations
- breaking the project down into separate elements or work packages, allows us project managers to effectively delegate or contract out coherent chunks of work
- a plan is a communication tool, which provides customers, suppliers, team members and other stakeholders with confidence and a common understanding of how the project will be executed and controlled
- it provides the basis for a definitive budget
- without a plan, things will be forgotten, started late, wrongly assigned, and/or problems not pre-empted.

Some might argue that project plans are invariably changed and we shouldn't therefore put too much effort into our baseline plan. However, the likelihood of change doesn't preclude careful planning and simply means that our plan is a basis for change. We will need to continuously update it as reality emerges. And given that the plan will need to change, emphasises the need for us to keep it simple. A simple plan is usually easy to communicate, understand, and update. All versions of our plan over the project lifecycle should be retained for later analysis.

In previous chapters we discussed some essential steps relating to project planning. We defined the project scope, developed an appropriate and tailored work breakdown structure (WBS), sequenced the work in a network diagram, obtained estimates from subject matter experts, and prepared a task schedule and resource schedule. This chapter describes the composition of a typical project plan. The final step in our Develop phase culminates in the management decision on whether or not to proceed with the Execute phase of the project.

An integrated project management plan is often a set of separate but linked documents. It's likely to include a number of related plans or sub-plans. A comprehensive integrated project management plan may include some or all of the following items, although not necessarily in this order:

- Title Page
- Version Number and Date
- Contents
- Executive Summary
- Project Purpose
- Project Goal
- Planning Assumptions
- Scope
- External Dependencies
- Deliverables
- Project Constraints
- Key Stakeholders and Appointments
- Organisation, Roles and Responsibilities
- Benefits Realisation
- Network Diagram
- Schedule
- Work Packages
- Procurement
- Monitoring, Control and Variations
- Quality Management
- Budget
- Cashflow Forecast
- Risks and Issues
- Stakeholder Communication
- Public Relations
- User Training
- Project Closure
- Document Control
- Approvals.

Each of these items is further explained in the following pages. Whether they are all relevant to our particular plan and the amount of information contained under each heading will depend largely on our organisation requirements, and the size and complexity of our project. A template or guide for a project management plan is at Appendix Eight.

Three further important points about the project management plan are:

- Much of the information about managing our projects may be contained in the organisation's standard framework/methodology or standard operating procedures (SOPs), and therefore doesn't need to be reproduced in the project plan, unless some changes to these usual procedures are proposed. Also, you might check www.projectconnections.com and www.versatilecompany.com / forms for templates.

- Remember that a plan is dynamic. It needs to be adjusted as reality unfolds. The original plan usually needs to be updated periodically, often dictated by external constraints over which we have no control.
- An effective plan is detailed enough to assign, delegate, monitor and control work, but still allow some reasonable discretion as to how the work is to be done.

Executive Summary

This should ideally be no more than one page and is designed to give an overview of the project. It should only include matters contained in the plan and can't be written until the plan is completed. Although brevity is important, this should not be achieved at the expense of clarity. The summary might contain mention of:

- project purpose, goal and benefits
- project strategic alignment
- high-level project work scope
- timeframe and cost estimates
- key appointments
- main risks.

Project Purpose

Purpose is an explanation about the rationale for the project. Why it is being undertaken. Typically the generic purposes for a project are:

- to solve a problem
- to realise an opportunity
- to comply with legislation.

However, our purpose would need to be stated in specific terms. The purpose recognises the benefits, as contained in the project business case that justifies the project.

Project Goal

Our project goal is usually to:

- develop a new product, service or process
- redevelop or enhance an existing product, service or process
- install a new product, service or process
- terminate an existing product, service or process.

The goal statement should conform to 'SMART' characteristic (ie, specific, measurable, agreed, realistic, and time-bound). It's the basis for the plan. Everything in the plan should contribute to the achievement of the project goal. If our plan contains information that doesn't contribute to achieving the project goal, the likelihood is that the information is irrelevant. Relevance is the first rule for brevity, and that usually helps us achieve clarity.

Planning Assumptions

It's important that we document the main premises on which our plan is based. Usually assumptions need to be reasonable and of low risk. Also, they are likely to be outside our control. If they are within our control they might better be listed as targets or tasks we need to attend to. Once documented, we can periodically review our assumptions to ensure they are still valid. Should they become invalid, we usually need to revisit the plan. Sometimes the big fallacy in our assumptions is that the world will stand still while we execute the project.

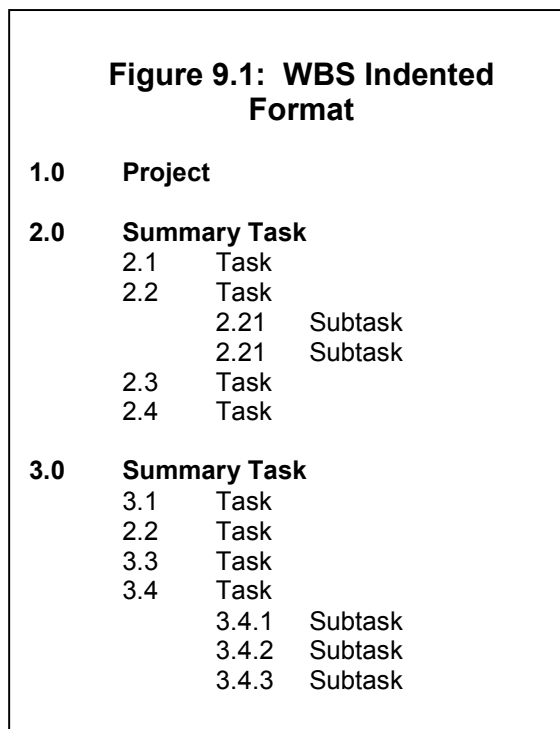
The PMBOK describes assumptions as *'factors that, for planning purposes, are considered to be true, real, or certain without proof or demonstration.'*

Usually during the project planning process, we record assumptions whenever they need to be made, and publish them on an assumptions flipchart page that all involved can see to ensure everyone's planning is based on the same understanding.

During the risk management process it is useful that we periodically undertake an 'assumption analysis' to decide the accuracy of our assumption list and identify risks to the project from inaccurate, inconsistent, or incomplete assumptions, revealed during the project lifecycle.

Scope

The scope of our project is the sum of the products, services, and results to be provided by the project. More specifically project scope or work scope is all the work that must be performed to deliver a product, service, or result with the required specified features and functions.



The work breakdown structure (WBS) is the tool that organises the project scope into a family tree format. The WBS is decomposed into work packages. Our plan must include a project WBS, usually published in indented-list format as shown at Figure 9.1, perhaps as an appendix to the plan given the considerable detail that's sometimes needed.

It is also useful to list what's outside scope, which is usually those items that might otherwise be assumed into the project.

The clearer the scope is defined, the more likely it is that the budget and schedule will be realistic, and the less likely that variations will be needed once the project is implemented.

External Dependencies

Projects seldom stand alone. They often have interdependencies with other projects and operational activities. Key external dependencies should be identified in the plan.

Deliverables

The project final deliverable(s) is what remains behind after project completion – a unique and verifiable product, service or result.

Our plan should list the final deliverable(s) sometimes with a narrative description of their key features and functions, and, if appropriate, their specification(s) – these perhaps attached as an appendix.

A specification is a document that specifies, in a complete, precise, verifiable manner, the requirements, design, behaviour, or other characteristics of the deliverable(s) – product, service, or result. Specifications might be expressed in three different ways (or a combination of these). The options are:

1. **Design Specifications.** *'The match is to be made of wood, be 8 cms long, and have a 1 gm phosphorous head.'* Details physical characteristics of final deliverable.
2. **Performance Specifications.** *'The match is to burn at 250°C for at least 10 seconds.'* Describes measurable capabilities of final deliverable.
3. **Functional Specifications.** *'The match is to light birthday cake candles.'* Expresses how the final deliverable will be used.

Project Constraints

These are restrictions that may influence the way in which work is undertaken or completed, and which the project plan must be developed to work around. For example, the following may be among the constraints associated with our project:

- milestones to be achieved by certain times (to fit in with other projects for example)
- certain equipment and contractors that can or must be used
- personnel available and times
- standards to be met or adhered to
- technology to be used
- budget constraints
- materials to be used, their availability, etc
- business-as-usual work to continue without disruption
- environment and culture in which all work is to be carried out
- procedures to be followed.

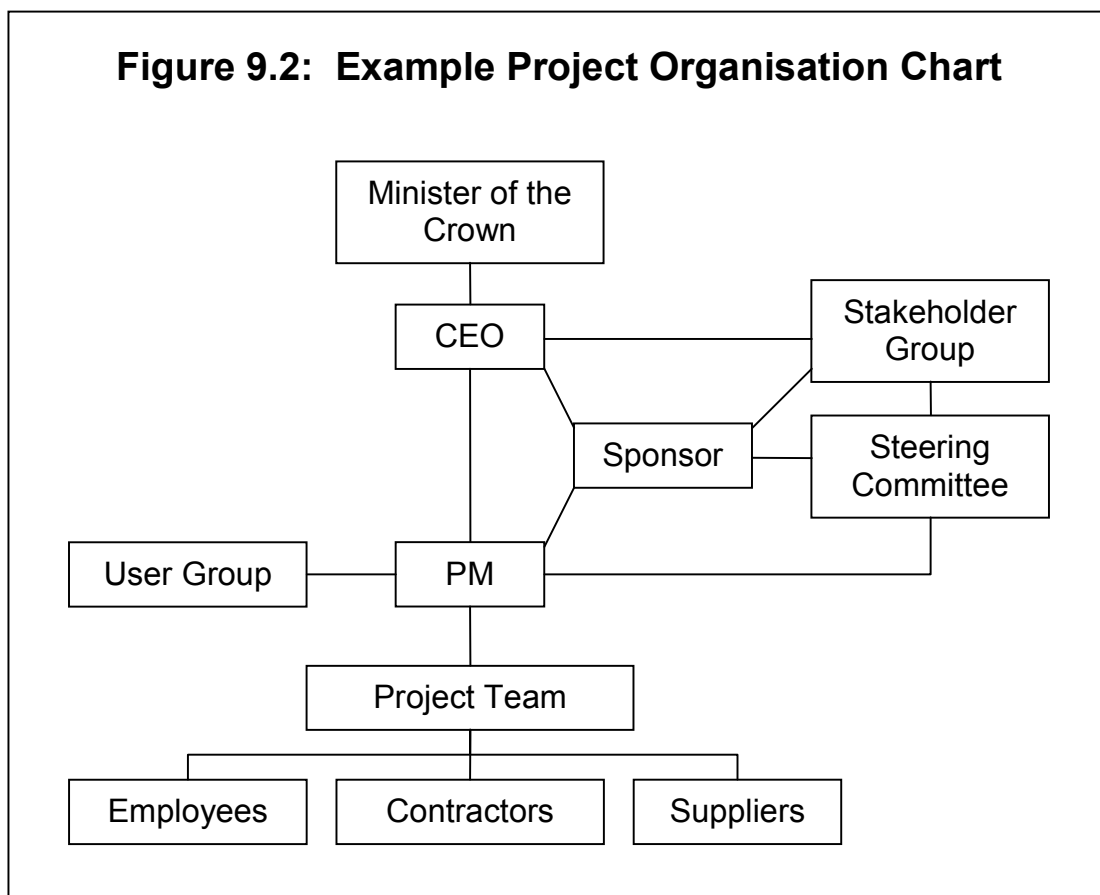
Key Stakeholders and Appointments

Stakeholders are people and organisations that are actively involved in our project, or whose interests are affected by the execution or completion of our project. They may also exert influence over our project and its deliverables.

Key stakeholders on practically every project include:

- **Client.** The person or organisation who owns the project.
- **Sponsor.** The person who provides the funding for the project and owns the business case.
- **Project Manager.** The individual responsible for day-to-day managing of the project.
- **Customer.** The person or organisation that will use the project deliverable(s).
- **Performing Organisation.** The organisation whose employees are most directly involved in doing the project work.

We may also identify in the project management plan other important stakeholders including project team members, project steering committee, and line managers who contribute resources, and the project management office (PMO).



Organisation, Roles and Responsibilities

Our plan should include an organisation chart that graphically depicts the project team players and their interrelationships for our specific project. An example chart for a larger public project is shown at Figure 9.2.

A useful way to show fundamental responsibilities is to publish a responsibilities assignment matrix (RAM) that relates the project organisational breakdown structure (OBS) to the work breakdown structure (WBS) to demonstrate how each component of the project's scope of work is assigned to an individual. A simple example is shown at Figure 9.3. However, it is sometimes more precise to place a statement in each box.

The RAM can also be a useful basis for developing job descriptions, which more comprehensively describe each person's role, responsibilities and authority. Job descriptions for key players (eg, sponsor and project manager) may be included as appendices to the plan, but more commonly are contained in our organisation's project management methodology/framework document.

Benefits Realisation

A benefits realisation plan is a more contemporary requirement for our project plan. Project benefits or positive outcomes, usually achieved after the deliverable is produced, might include items such as:

- decreased material costs
- increased sales
- decreased labour costs
- decreased inventory costs
- decreased accidents
- decreased maintenance costs
- decreased delivery time
- increased morale.
- The benefits realisation plan might contain information on:
 - specific benefits
 - strategies to achieve benefits
 - those responsible for developing and implementing the strategies
 - timeframes and how benefits will be monitored and measured.

In effect, the scope of the project plan has to encompass a benefits delivery plan that shows not only what benefits will be achieved and when, but also who will be responsible for ensuring that they are delivered – usually line management.

While project managers are charged with delivering specified products or services, project sponsors are responsible for ensuring that benefits are harvested. Their role extends beyond reviewing project progress; it includes ensuring that line management and the operating departments of our organisation are ready to receive the deliverable and operate it so that the benefits assumed in the business case are achieved. Thus, as a minimum the project management plan should identify the line

manager(s) responsible for operating the deliverable(s). It's their job to realise the benefits after handover. They should be involved in the planning.

Figure 9.3: Responsibility Assignment Matrix

RACI Chart	Person				
Task	Jim	Esme	Emma	Jane	David
Define	A	R	I	I	I
Design	I	A	R	C	C
Develop	I	A	R	C	C
Test	A	I	I	R	I

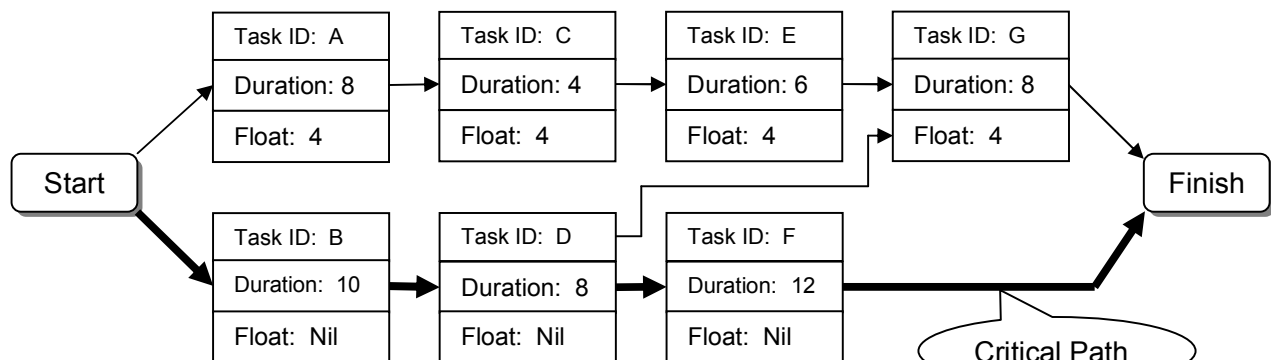
Where: R = Responsible
A = Accountable
C = Consult
I = Inform

Traditionally, line managers have been preoccupied with functional management activities, rather than also worry about future developments.

Network Diagram

The network diagram for our project is a graphic representation of the work that comprises our project, showing the relationships among work packages. Usually the critical path is highlighted. Figure 9.4 shows a simple activity-on-node (AON) network diagram.

Figure 9.4: AON Network Diagram

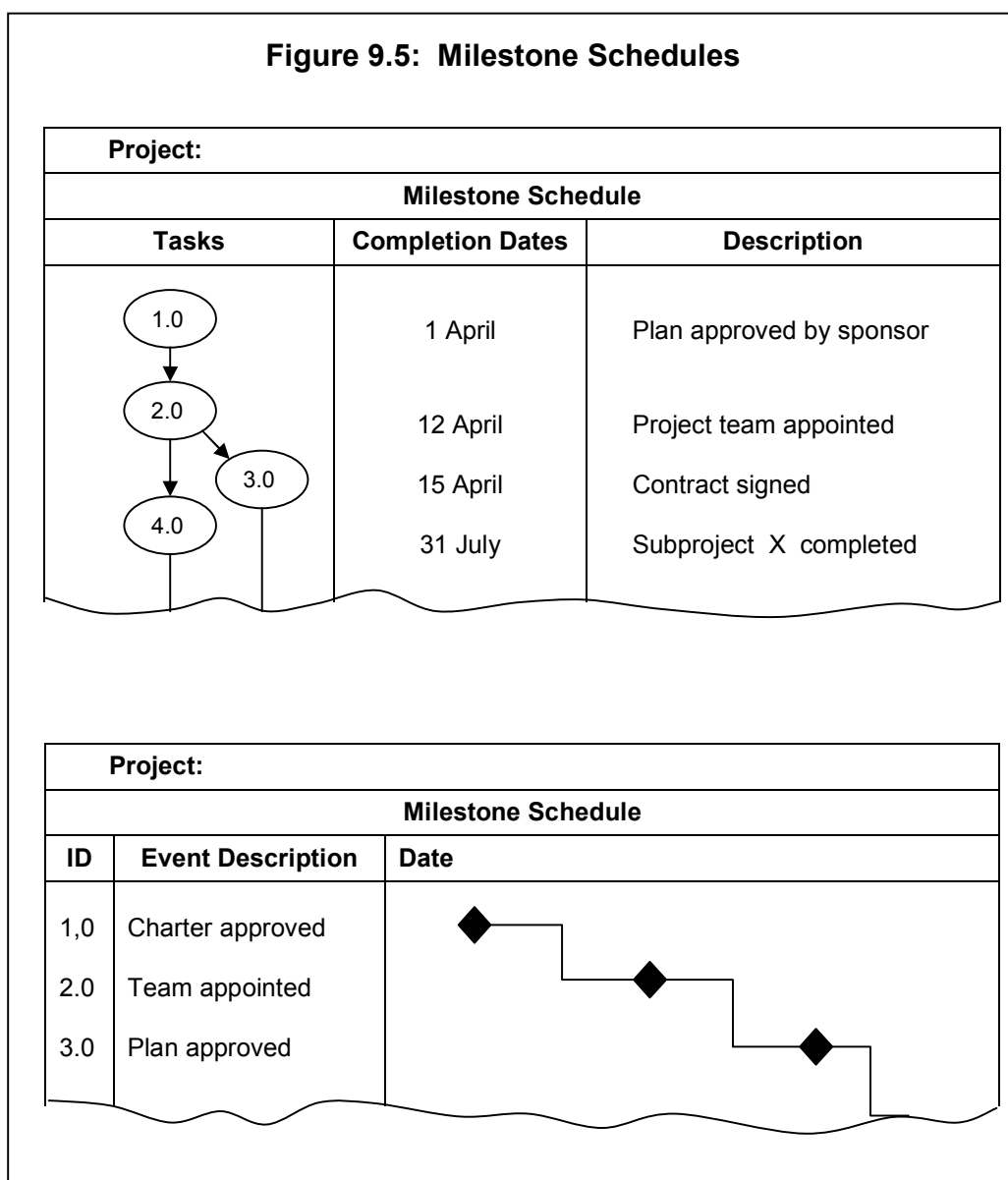


Schedule

An essential item, the project schedule includes at least our planned start and finish dates for each work package (ie, task or subtask). The schedule may be presented in a variety of formats:

- **Milestone Schedule**, sometimes referred to as the master schedule, usually shows the start or completion of major deliverables and key external interfaces. Examples at Figure 9.5.
- **Table Schedule**, which typically shows early and late start and finish dates for our project tasks. See Figure 9.6. Float and milestones might also be shown.
- **Gantt Chart**, which has horizontal timelines or bars representing tasks, shows task start and finish dates, as well as expected durations. Such charts are relatively easy to read and are frequently used in presentations. See Figure 9.7. They can also be used to show progress during the Execute phase.

Figure 9.5: Milestone Schedules

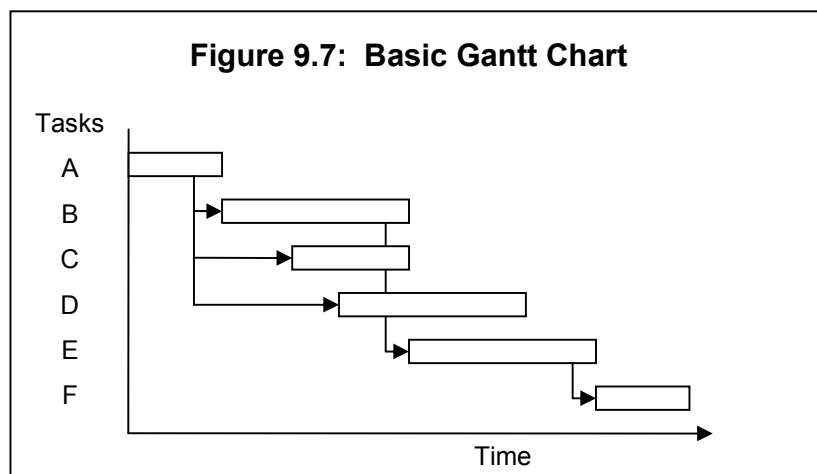


To prepare a Gantt chart, we list the project tasks down the X-axis, and decide an appropriate linear time scale for the Y-axis. The scale might be expressed in hours, shifts, calendar dates, project days, weeks, months or even years – whatever is appropriate—usually days or weeks. Tasks are typically listed in chronological sequence of their start dates. Alternatively, it may be useful to show critical path tasks separately at the top of the chart. Scheduling software is useful here. However, there is then a tendency to start out by building the Gantt chart. Software encourages this premature behaviour. And a Gantt chart by itself is not of course a project plan.

Figure 9.6: Table Schedule

ID	Task	Duration (days)	Early Start	Late Start	Early Finish	Late Finish
1.0	Define software needs	5	1 Nov	1 Nov	5 Nov	5 Nov
2.0	Prepare flow chart	1	1 Nov	12 Nov	1 Nov	12 Nov
3.0	Modify database	7	8 Nov	8 Nov	15 Nov	15 Nov
4.0	Define hardware needs	14	8 Nov	15 Nov	22 Nov	29 Nov

Figure 9.7: Basic Gantt Chart



Work Packages

A work package is the lowest level of WBS, which might be a task, subtask or sub-subtask (MS Project terminology) or activity (Open Workbench terminology). Essentially each work package is a mini-project that is assigned to a specific project team member for completion. Thus, the work package brief needs to be clear and comprehensive, but would not usually describe how the work is to be undertaken. A fully described work package might contain all the information shown at Figure 9.8.

Figure 9.8: Work Package Brief

Task/Subtask No:
Task/Subtask Name:
Version No/Date:
Assumptions:
Predecessor(s):
Successor(s):
Deliverable Description:
Deliverable Specification:
Human Resources:
Material/Supplies/Equipment/Plant:
Duration:
Start Date (early and late):
Finish Date (early and late):
Milestone(s):
Cost Estimate:
Risks:
Assigned To:
Progress Reporting:

Work package briefs, if included in the project management plan, would usually be attached as an appendix or separate document. Essentially they are mini charters.

Procurement

Our procurement plan identifies equipment and material needs, quantities, dates, places and suppliers. It is the basis for subsequent supply and construction contracts. Often procurement commences before the project plan is formally approved. However, until the project plan is formally approved, we should warn suppliers that the plan is not yet approved and avoid entering into binding contracts with them. See Figure 9.9.

Once contracts are finalised, a contract management plan may also be included as a subsidiary plan to the project management plan. Usually organisations have well established policies, processes and procedures for procurement—probably referred to in the project management plan, but not usually reproduced there in any detail.

Monitoring, Control and Variations

Control is the process of comparing actual project performance with planned performance, analysing variances, and taking corrective actions if needed. See also Figure 11.33 for a possible status report template.

Management includes identifying, documenting, approving or rejecting, and controlling variations to the project parameters – benefits, scope, time, cost, risk and quality. The project management plan should explain the change control process, and also identify how it's intended to monitor project progress, measure and report the status of the project. A Change Log template is at Figure 9.10. It contains summary information about every change to the project.

Figure 9.9: Procurement Plan Template

Project:		Date Prepared:	
Completed by:			
Requirements	Quantities	Delivery Dates	Supplier or Contractor
Materials: 1. 2. 3.			
Equipment: 4. 5. 6.			
Supplies: 7. 8. 9.			
Services: 10. 11. 12.			

Figure 9.10: Change Log Template

No	Description of Change	Originator	Date	Impact	Approval			Comments
					Yes/No	Who	Date	

Quality Management

Quality is about conformance with specifications, which are determined by the client.

The quality management plan describes how the project team will implement the performing organisation's quality policy. The plan should address quality control (QC), quality assurance (QA), and continuous process improvement for the project. Alternatively, the plan may make reference to the organisation's project methodology, which would normally include quality management requirements. Clear acceptance criteria for deliverables is an essential minimum.

An inability to clearly define quality usually indicates that the deliverables are inadequately understood.

Budget

The project budget or cost plan is the approved or definitive estimate for our project. As a minimum, the budget should show a breakdown of labour and materials (ie, non-labour) costs by tasks. See Figure 9.11. This template assumes that contingencies are contained within each task estimate, otherwise a further column would be needed.

Figure 9.11: Project Budget Template

Task ID	Task Description	Labour Costs	Material Costs	Equipment Costs	Other Costs	Total Costs

Cashflow Forecast

It's usually important to know when money will be spent. A cashflow forecast or schedule shows the estimated flow of money in and out of the project. The timeframe is usually monthly and combines the WBS, the estimate and project schedule. A simple example is at Figure 9.12.

Figure 9.12: Example Cashflow Forecast

Project:	Date:					
Items	Jan	Feb	Mar	Apr	May	Jun
Brought Forward	\$10,000	\$17,000	\$30,000	\$24,000	\$37,000	\$29,000
Income/Funding	\$15,000	\$15,000	\$15,000	\$15,000	\$20,000	\$10,000
Total Available	\$25,000	\$32,000	\$45,000	\$39,000	\$57,000	\$39,000
Labour Expenses	\$5,000	\$1,000	\$15,000	\$1,000	\$20,000	\$20,000
Material Expenses	\$3,000	\$1,000	\$6,000	\$1,000	\$8,000	\$6,000
Total Expenses	\$8,000	\$2,000	\$21,000	\$2,000	\$28,000	\$26,000
Closing Balance	\$17,000	\$30,000	\$24,000	\$37,000	\$29,000	\$13,000

Risk and Issues

The Risk Management Plan describes how project risk management will be undertaken on the project. A key requirement is a Risk Log or Register into which project team members and other stakeholders record potential problems. A typical format for this template is at Figure 9.13.

Figure 9.13: Risk Log Template

Project:								Page:	
Risk ID	Risk Event	Risk Category	Date Found	Author	Initial Priority	Risk Response	Residual Risk	Risk Owner	Current Status

An issue is a point or matter in question or in dispute, or a point or matter that is not settled and is under discussion for which there are opposing views or disagreements. A typical format for an Issues Log is at Figure 9.14. The plan might also describe the issue escalation procedure.

Figure 9.14: Issues Log Template

Project:				Page:		
Issue ID	Issue Description	Date Logged	Author	Response	Issue Owner	Current Status

Stakeholder Communication

This important document describes the communication needs and expectations for the project. It also details in what format information will be communicated, when and where each communication will be made, and who is responsible for providing each type of communication. A simple example is at Figure 9.15.

Public Relations

Public relations concerns organisation-influenced publicity, usually directed at promoting or protecting its image and products. Public relations include public speaking, trade show presence, event sponsorships, guided visits to the project site, and media coverage. A well-designed project public relations plan can provide high and positive visibility for a modest cost. Additionally, a positive comment or write-up by a neutral party has considerable credibility. A big, high profile project may warrant its own public relations officer who would no doubt prepare the project public relations plan. We should remember, however, that regardless of our preparations, bad news always sells faster than good news. It's unlikely our typical low-cost, low-profile projects need a public relations plan beyond our organisation's normal practices. Minimum is to identify a contact person – perhaps the sponsor, which would free the project manager to manage the project with one less distraction.

User Training

New products and services often require that the users receive timely training. Such training might be part of the project scope and involve formal training courses, coaching, on-the-job training etc. Our plan should include details of any user training designed to familiarise people with the new products, processes and services. Training is an important component of good change management. Sometimes the user training is undertaken as a separate project after handover.

Figure 9.15: Communications Plan

Stakeholder	Information Needs	When	How
Sponsor	<ul style="list-style-type: none"> High-level cost, schedule, quality performance Problems and proposed actions 	Weekly	Written report and meeting
Project Steering Committee	<ul style="list-style-type: none"> Detailed cost, schedule, quality performance Problems, proposed actions, assistance required 	Monthly	Written report and meeting
Client executive	<ul style="list-style-type: none"> High-level cost, schedule, quality performance Problems and proposed actions Required action by client 	Monthly	Meeting with project sponsor Published meeting minutes
Client contact	<ul style="list-style-type: none"> Detailed cost, schedule quality performance Problems and proposed actions Required actions by client Coordination information for client action 	Weekly	Written report and meeting Include in project team meeting
Project team	<ul style="list-style-type: none"> Detailed cost, schedule quality performance Problems and proposed actions Coordination information for next two weeks News from client and sponsor 	Weekly	Project team meeting Published meeting minutes

Project Closure

A comprehensive project management plan also addresses project closure, and may provide directions for:

- getting our client to accept deliverable(s)
- ensuring deliverable(s) are properly installed
- ensuring documentation is in place

- ensuring that there is provision for on-going repair, maintenance, debugging and updating of deliverable(s)
- getting client sign-off
- conducting a post-implementation audit
- celebrating success and completion.

Chapter 14 addresses project closure (Finish phase) in detail. Once sign-off has been obtained, closing down a project is a project in itself and is often the most neglected phase of the lifecycle.

Document Control

This section describes the version control and filing system to be used for project management documentation of which there can be a great deal. The essential criterion is that filed information can be readily retrieved by anyone authorised to access it. A standard document control system also helps avoid problems when key project players depart during the project, which of course is not uncommon in long-running projects. Whether the project file is paper-based or automated, it should as a minimum:

- produce all required information in a timely manner
- provide information needed for any audit purposes
- provide information needed for lessons learned analysis.

MS SharePoint is useful for project document management. The project manager can securely store and organise all project documentation in one central location for ready access for project planning, problem solving, decision-making, and information dissemination purposes.

Reality Check

Once the draft plan is completed, it is useful to check it against the charter and also do the following:

- Using the network diagram, match the tasks, durations and dates with the schedule.
- Match the procurement plan to the schedule.
- From the network diagram, match the tasks to those shown in the WBS.
- Re-total budget numbers to ensure they match the estimate.
- Study the tasks on the critical path. Are there any that need more time?
- Verify that any milestones make sense as a means of summarising the main stages of the project.
- Check that start and finish dates are still realistic. Also ensure allowance has been made for holidays.

After finding errors or omissions, if any, we must amend the plan to eliminate them.

Remember that much of our plan's detail may be standard operating procedures (SOPs) contained in our organisation's project management methodology. In which case, reference to the standard methodology should suffice, unless our particular project requires something different.

Our project plan is finished, right? Wrong! One of the most important yet frequently overlooked

facets of successful project management is the ability to pre-empt implementation problems.

The draft plan should now be subjected to the careful scrutiny of others, preferably by team members and other key stakeholders, who might ask the follow questions:

- *“Where do we anticipate problems?”*
- *“Where will problems impact the success of the plan most in terms of cost and performance?”*
- *“Where is work most complex?”*
- *“Where will something new be attempted?”*
- *“Where will new employees be involved?”*
- *“Where have we failed before?”*
- *“Where is responsibility shared or unsure?”*
- *“Where are estimates least certain?”*

Having identified potential problems we consider each possible cause, one risk at a time, then identify preventative actions where appropriate. For those problems that can't be prevented, we consider what might be done to minimise the damage. These are contingency measures for which triggers are needed. A trigger warns us the potential problem has occurred, and, if need be, initiates the contingency action.

The draft plan is then modified with the addition of preventative actions, contingent actions, and triggers. If necessary, we change the WBS and resource requirements to reflect the additional or reduced work. The budget may need to increase and perhaps the project revalidated. Is it still worthwhile?

After looking into the future to identify what might go wrong, consider what could go better:

- Ways the plan could be completed more effectively.
- Ways the plan could be completed at less cost.
- Additional benefits that could result from the project.
- Places where small improvements in time, money or performance could yield useful benefits.

Essentially, this process is an opportunities analysis, where we identify potential opportunities and actions that will capitalise on them should they arise. We should also identify triggers to alert us that an opportunity is about to occur.

Project Plan Approval

The approval process is not a formality. Rather it is a deliberate decision to commit the organisation to an investment, sometimes millions of dollars.

Usually the project manager will submit the completed project management plan to the project sponsor for approval. The sponsor may also require an interactive presentation of the plan, at which the steering committee, CEO and client may also be present. The results of this presentation might be:

- plan approved in total

- plan approved, subject to some alteration
- plan for stage one approved, and appropriateness of proceeding with subsequent stages to be determined later, perhaps depending on the results of stage one
- plan approved in principle, but project implementation postponed, perhaps due to changing priorities
- project cancelled, perhaps due to excessive risk, competitors' activities, or in order to release resources to work on better investment opportunities.

If the project approval process has caused significant delay, the project management plan may need revamping before going for final approval.

The approval or baselining of the plan usually authorises the project manager to start the project Execute phase, perhaps with a special kick-off event.

Finally, it is worth reiterating that in reality, plans cannot be completely rigid. We don't have perfect knowledge of everything that will happen, and new information usually emerges that means we need to change our plan. We shouldn't plan in more detail than we can properly manage. Updating the plan to reflect current information is an important part of project management. We should retain copies of all plans for later analysis. Sometimes new information will cause our sponsor to check the wisdom of proceeding, and sometimes the project will be terminated early so that resources can be liberated for other uses.



Chapter Ten

PROCURE RESOURCES AND ASSIGN WORK



The first step in the Execute phase of the project management framework, once the green light is given the project plan, is to procure resources and formally assign work to our 'Work Package Managers' (ie, employees, contractors, consultants, suppliers, etc). In practice, resource procurement activities may have commenced before this phase and as soon as resource needs became evident. However, contracts cannot be finalised until authority has been given by the sponsor to proceed with project execution, and, of course, work should not commence until contracts have been signed.

Essentially, there are three ways to complete project work – do it personally, delegate it, and contract it out or in. While delegation is discussed later in the book, procurement of goods and services or contracting is addressed rather thoroughly in this chapter. This detailed attention recognises that to an increasing extent project work is completed outside the client organisation under contractual arrangements. Of course our entire project might be outsourced.

Thus, in many projects, we must acquire goods and services from outside our own organisation. This could range from petty cash purchases, contracts for the provision of bulk supplies and construction work, to contracts for assistance from consultants.

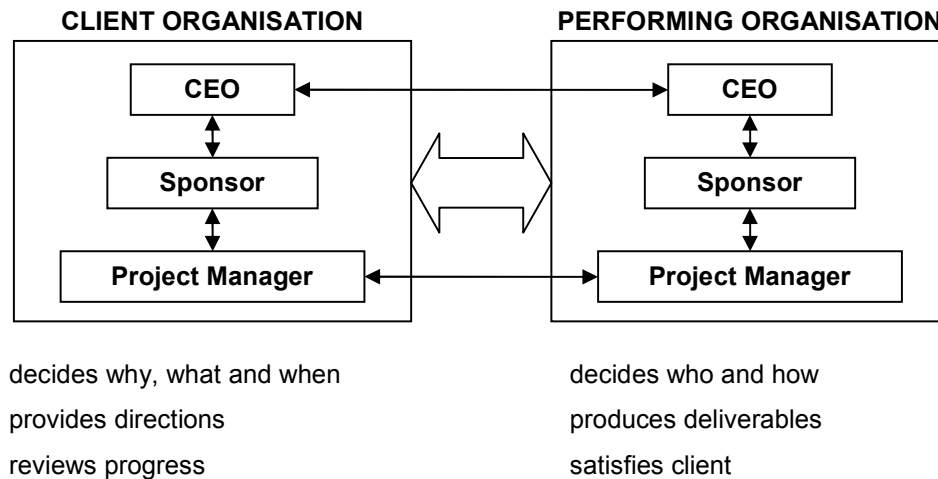
Procurement, the process of acquiring goods and services, is sometimes called contracting. No matter the title, we project managers should understand the fundamentals of procurement and the associated contracts and their management, since the success of our project will depend in part on timely access to appropriate resources, some or most of which might come from outside our organisation. Also, some or most of the project work might be completed outside our organisation. In this situation, we could be working with two or more companies, perhaps with different agendas, procedures, and cultures, but all keen to make money from our project no doubt.

A large number of projects are carried out entirely under contractual arrangements. Construction projects, for example, may be based on a contractual agreement between a developer, who organises the funding, and a principal or prime contractor, who oversees the construction effort. The contractor usually works with subcontractors, each of whom specialises in a particular area, such as roading, concrete work, plumbing, electrical wiring, heating, carpentry and landscaping and so on, depending on the type of project.

Any project or any part of our project could be contracted out ('outsourced') when required specialist input or work is not available from within our organisation. Such work would normally be completed under contract by a consultant or contractor as appropriate.

Organisations now realise that much of their work can be done more cost-effectively by outsiders. Outsourcing has allowed organisations to 'downsize' or 'right-size' being the current euphemism. And to an increasing extent the client is now outside the performing organisation. A simple structure to illustrate this arrangement is shown at Figure 10.1 where there has been an integration of various parties through appropriate lines of communication.

Figure 10.1: Mutually Beneficial Relationship



In larger projects there may be dual leadership – a project manager from the client organisation and a project manager from the performing organisation who jointly carry out the project management responsibility. Respective responsibilities must be clear. The contract manager is responsible for the working relationship with the contractor without restricting the authority of the project manager.

Employees or Contractors

Under New Zealand law, employees have a 'Contract of Service' and contractors and consultants have a 'Contract for Service'. As a New Zealand (NZ) employer we have additional responsibilities for employees. Also, it is important that we understand the employment differences between employees and contractors. Typical questions asked by the NZ Inland Revenue Department (IRD) to distinguish between the two types of employment are listed at Figure 10.2.

Types of Providers

The providers of goods and services for our projects are usually described as sellers, contractors, suppliers, consultants and subcontractors defined as follows:

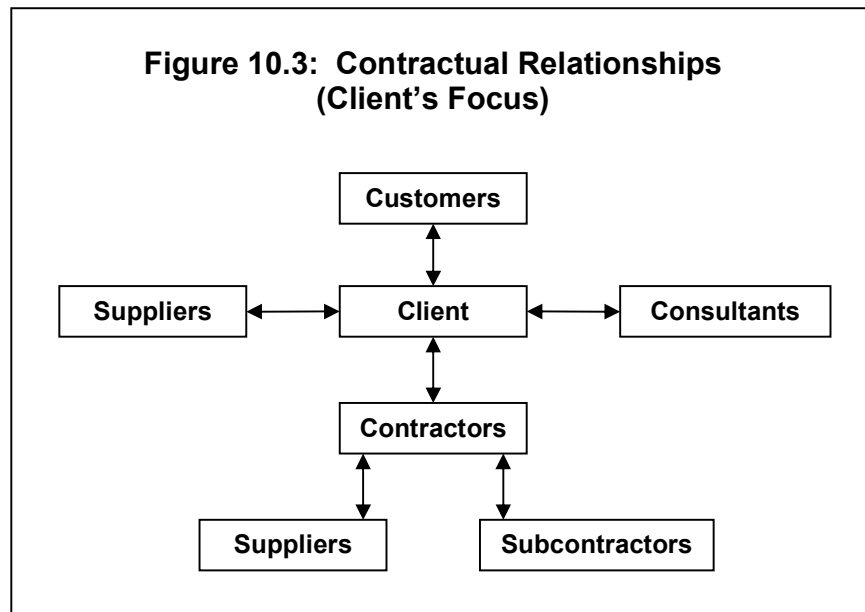
- A **contractor** is often associated with construction or maintenance work, and as such is an individual, partnership or company, possessing the knowledge, skills, materials and equipment needed to produce a specialised product or service required by a client, either on a one-off project basis, or as required over an agreed period (contractual term).
- A **supplier** or vendor (not a vending machine) is an individual, partnership or company who provides a finished product, material or component to a client usually on an as required basis over an agreed period (contractual term).
- A **consultant** is an individual, partnership or company, possessing particular expertise, whose advice is required by a client on an as required basis or on a one-off assignment basis.
- A **client** is the individual, partnership or company who requires the services of a contractor, supplier or consultant. Often the term client is synonymous with owner, employer, consumer, user and buyer.

- A **subcontractor** is an individual, partnership or company who provides specialised services to a contractor, usually with the client's concurrence.

Figure 10.2: Contractor versus Employee

CHECKLIST	Contractor	Employee
Control		
Our organisation decides their work content, place of work, method of work and hours of work.		✓
Independence		
They own the tools, equipment, facilities, plant, premises.	✓	
They have other clients.	✓	
They pay their own expenses, insurances, and professional levies, ACC, FBT, PAYE and GST.	✓	
Organisation		
They are a permanent part of our organisation.		✓
They are employed continuously by our organisation.		✓
They have access to the personal grievance procedure.		✓
They receive paid leave.		✓
Intention		
Did the parties envisage an employee or contractor relationship? What does the contract state?	?	?
Business		
They are in business on their own account.	✓	
They bear the risk and receive the rewards.	✓	
They engage resources and deliver outputs.	✓	
The Consumer Guarantee Act applies to them.	✓	
They have insurance against loss of income and negligence.	✓	

Possible contractual relationships are shown diagrammatically at Figure 10.3. Also, if we consider a project from a contractor's perspective, we often find that large projects are contracted for by some 'buying' organisation. The project manager in the 'selling' organisation manages the contract to meet the demands of the buyer. In this sense, the project manager is a contract manager, and the project lifecycle encompasses the contracting lifecycle. Additionally, the seller typically subcontracts out portions of the project work, and in this instance acts in the capacity of a buyer. It is important, therefore, that the project manager understands the basics of contracting and both sides of the contract management relationship.



In many instances what we call a project is in fact a contract. The end of the project frequently coincides with the conclusion of the contract. In these circumstances, the project manager is in effect a contract manager, whose performance is assessed according to how well the contract is managed. A key concern of the project manager is often to identify and acquire goods and services required to implement and complete the project. Thus, the successful project manager also needs to have some knowledge of the procurement process.

During a major project the contractor is likely to have a number of contractual relationships to manage such as shown at Figure 10.4. Such relationships are each regulated by a contract, the legal definition of which is an agreement between two or more persons which is intended to be enforceable at law. It's a legally binding agreement, or a promise or set of promises, which the law will enforce. The key word being 'agreement' – mutual understanding and assent is essential for a binding contract.

Effective Relationship Benefits

Contemporary practice is to establish a cooperative relationship between parties. This is likely to produce substantial mutual benefits, such as those listed in no particular order at Figure 10.5.

Procurement Options

When expertise, materials, labour, equipment, plant and facilities are needed beyond what our organisation possesses, the procurement process is typically undertaken. The selected procurement option may depend on cost, timeframe, market forces, availability of providers, and novelty of the requirement. The basic process and more common procurement options are shown at Figure 10.6.

Larger organisations are likely to have a separate procurement section that will undertake the procurement actions on behalf of the project manager.

Figure 10.4: Contractual Relationships (Contractor's Focus)

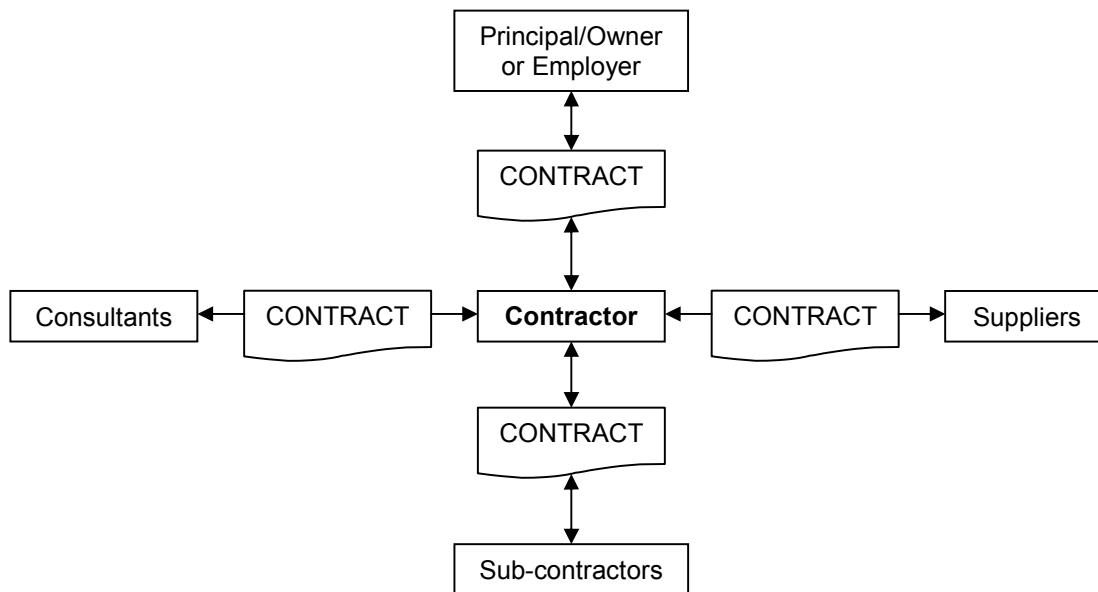
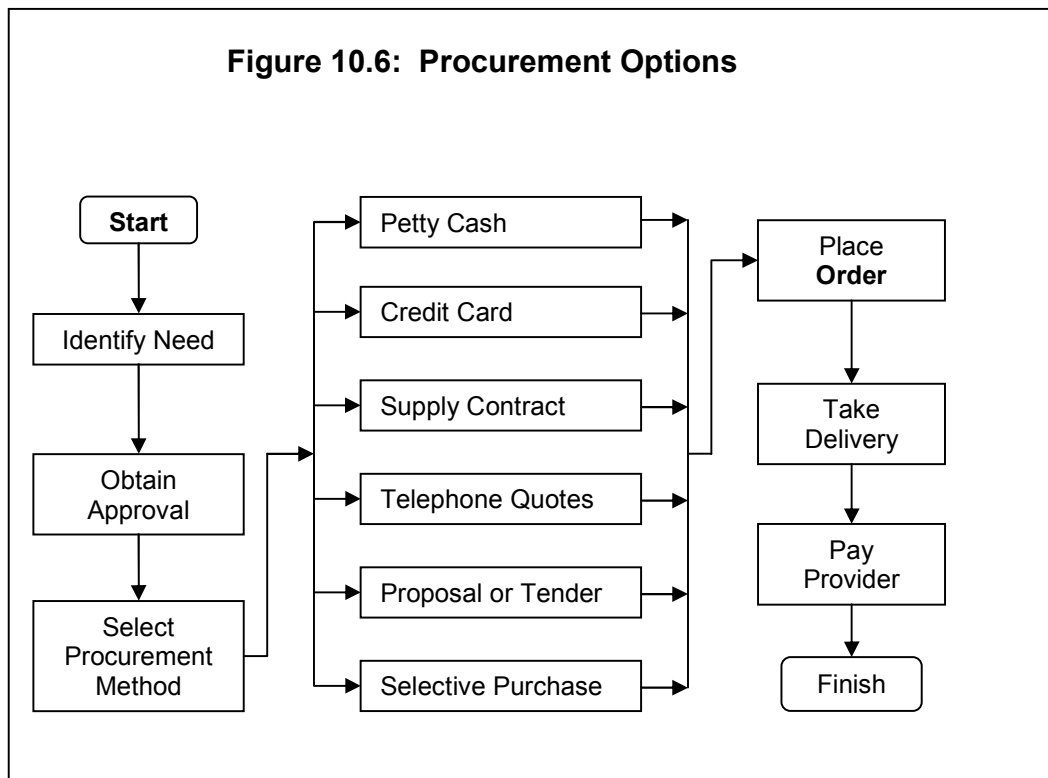


Figure 10.5: Effective Relationship Benefits

CLIENT	CONTRACTOR
<ul style="list-style-type: none"> • improved quality • lower costs and prices • shorter lead-times • improved reliability • less inventory • improved profitability • increased market-share • business goals achieved • no litigation • reduced cycle-time • improved health and safety • improved risk profile • few misunderstandings • greater transparency • greater levels of innovation • fewer hassles and less frustration 	<ul style="list-style-type: none"> • longer-term stability • better forecasts • reduced cycle-times • lower costs • assured margins • fewer complaints • less waste and rejects • greater value for money • increased market-share • improved responsiveness • preferred status • no litigation • greater transparency • improved health and safety • greater levels of innovation • more referrals and repeat business



Procurement Decision Flowchart

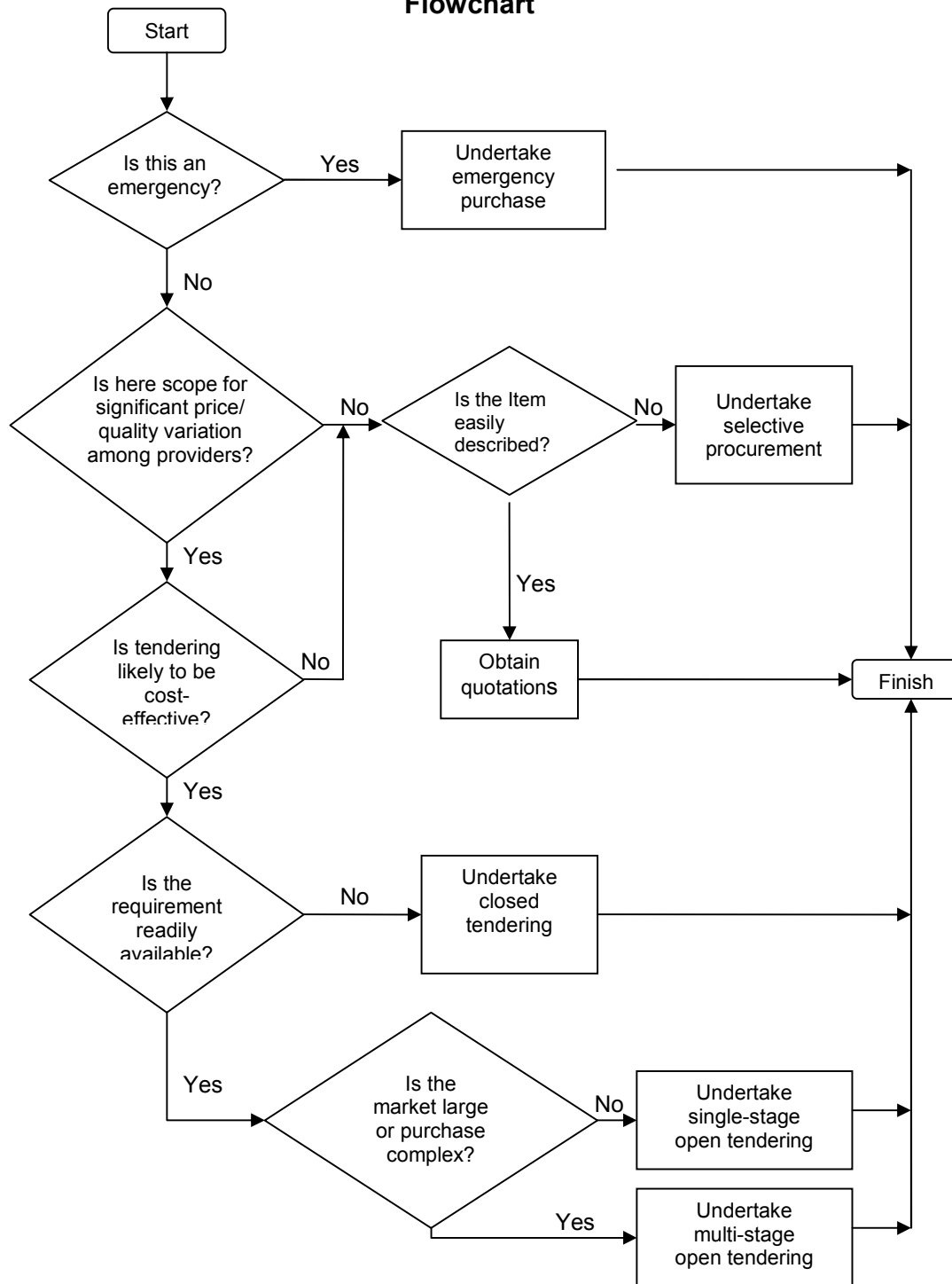
Figure 10.7 shows the typical steps involved in reaching a decision about procurement options, where:

- **Emergency purchase** dispenses with most steps in the normal procurement process to enable quick action in unforeseen events. It isn't of course a substitute for proper planning or forecasting.
- **Selective procurement** is from a specific supplier when tendering is not cost-effective and/or goods are available from only one supplier. Sole source justification may be needed.
- **Quotations** are usually an economic means of procuring items of low quality/value. Quotations are a quick way to explore the market. They might be invited over the phone. Responses should be documented.
- **Closed tendering** invites tenders from a predetermined shortlist of suitable suppliers (ie, preferred contractors).
- **Open tendering** provides all potential suppliers the opportunity to supply. It is usually not applied when there is only one source of supply, an emergency situation exists, or when it's not cost-effective. Not usual for smaller tenders; say under \$100,000.
- **Single-stage tendering** dispenses with pre-qualification. There may be a direct request from the client for a proposal (RFP) or a request for tender (RFT) depending partly on how well defined is the requirement. An RFP often invites bidders to identify options.
- **Multi-stage tendering** allows for pre-qualification of suppliers based on an assessment of their capacity to fulfil any subsequent contract. Once suppliers have been short-listed, the supplier is determined by normal tender processes. Obtaining a Registration of Interest (ROI) or an

Expression of Interest (EOI) is the start of the pre-qualification process.

- **Pre-qualification** is the process to establish that a provider has the capability and capacity to successfully complete the contract.

Figure 10.7: Procurement Decision Flowchart



Procurement Principles

Some important principles or best practices that apply to procurement generally are described briefly below:

- **Foresight.** Forward planning and sound anticipation helps ensure we have the right goods and services, in the right amounts, at the right time, from the right place, at the right cost and quality. Supply problems also need to be foreseen.
- **Simplicity.** Procurement processes and procedures should be kept as simple as possible to help ensure they are readily understood, properly implemented, controllable, and sufficiently flexible to manage agreed changes. Complex processes can readily go wrong!
- **Economy.** Cost-effectiveness (ie, value for money) in procurement processes and purchases will help ensure that benefits are realised. Competitive selection usually enables a cost-effective solution. Syndicated procurement is sometimes appropriate when economies of scale are achievable. And inventory levels need to be kept at a minimum consistent with service levels. And value for money, doesn't necessarily mean cheapest.
- **Measurement.** Procurement processes and contractual performances need to be measured to help ensure deviations are quickly identified and remedied. Performance targets must be unambiguously defined. Progress and performance are tracked regularly and an audit trail maintained. Continuous improvement is practised. A standard filing system is needed so that information can readily be retrieved by those authorised.
- **Cooperation.** Successful procurement requires willing cooperation between contractual parties, where adversarial practices and behaviours are avoided, and problem solving and alternative dispute resolution measures are preferred.
- **Communications.** Open communications between contractual parties is essential to maintaining effective partnering relationships. Both parties to the contract need to exchange relevant information, good and bad, in a timely and honest manner. Reports, meetings, reviews and visits are commonly employed to check progress, pre-empt problems, resolve issues and avoid surprises.
- **Contract.** Underpinning procurement there needs to be a legally binding written contract or charter that clearly sets out the required work and deliverables, agreed roles and responsibilities, and rights and obligations of each party.
- **Training.** Those responsible for procurement and contract management need to be properly trained in the skills of the discipline – both the hard and soft variety. Also, the contract manager should be familiar with the contracted goods and services, and needs organisational authority and support.
- **Ethics.** Procurement must be conducted ethically to enable buyers and sellers to deal with each other on a professional basis of mutual trust and respect, and conduct business fairly, reasonably and with integrity. Ultimatums, emotional outbursts and threats are best avoided. Conflicts of interest are readily declared and satisfactorily resolved. Shared information is accurate, impartial and not used for personal gain. Transparency is important. PMI has published a Code of Ethics available at www.pmi.org that articulates ideals to which professional project managers aspire concerning responsibility, sustainability, respect, fairness, honesty and loyalty.

Contract Manager's Responsibilities

As project managers we might also be contract managers, and while there's no universe job description for contract managers, our responsibilities and activities might include:

- obtain funding for the procurement / prepare business case
- be familiar with the goods or services subject to procurement
- consult interested or affected stakeholders
- prepare procurement schedules and plans
- produce effective solicitation documents
- evaluate proposals and tenders fairly, consistently and reasonably
- sign agreements or arrange for their signing
- debrief unsuccessful suppliers
- be prepared to justify selection decisions
- negotiate win : win agreements
- pre-empt procurement and contractual risks
- identify health and safety hazards
- monitor contract progress and contractor's performance
- arrange third-party reviews
- implement contract obligations
- seek legal advice as needed
- promptly resolve issues
- manage variations
- resolve disputes
- comply with all applicable legislation
- manage retentions
- maintain a preferred providers' lists
- approve or appoint sub-contractors
- maintain and retain contract documentation
- take joint responsibility for relationship wellbeing
- report progress to senior management/sponsor
- build trust, respect and credibility with all parties involved
- maintain effective business relationships
- approve claims and progress payments
- evaluate deliverables/results/outputs
- maintain confidentiality
- don't be bull-dozed by contractors/consultants/vendors
- use the contract, don't hide it
- arrange periodic and post-contract evaluations
- implement post-contract recommendations as appropriate.

Ethical Behaviour

Contract managers must work within the law, and may also be guided by a code of conduct, values or ethics, which in New Zealand might comply with such principles as:

- **Probity.** In legal terms the criterion is whether a reasonable person would consider the conduct of those involved to be acceptable. Sometimes a probity plan will be needed before the tender process starts.
- **Declaration of Interest.** Contract managers must declare any personal interest that may affect (or could be perceived to affect) their impartiality in carrying out any aspect of their work.
- **Business Gifts and Hospitality.** Contract managers should not accept gifts or hospitality from contractors, subcontractors and suppliers if this could be perceived by other providers as likely to influence a business decision or prejudice independent judgement. Sometimes its accepted cultural practice. Maoris call it koha, Samoans call it meaalofo. Sometimes gifts are simply backhanders, provided for services rendered or in anticipation of a service to be rendered. In some countries it's how business is done. In cases of doubt advice from our relevant senior manager or sponsor is best sought. The short and safe answer is – don't accept gifts.
- **Providing Accurate Information.** Information given by contract managers in the course of their work must be accurate, impartial, and not designed to mislead. And they should only perform services when competent to do so. Potential suppliers are treated equally and must have the same opportunity to access information and advice.
- **Maintaining Supplier Confidentiality.** Contract managers must respect the confidentiality of information provided by contractors, subcontractors and suppliers, and must not use that information for personal gain or to influence other providers. The security and confidentiality of intellectual property and proprietary information is preserved.
- **Preparing and Issuing Invitations to Tender.** Specifications and Requests for Tenders should be sufficiently general to allow a variety of contractors to tender. They should not be designed specifically to exclude or include individual providers or specific products.
- **Fairness.** Neither carelessly nor intentionally doing anything to injure the reputation, image, brand or business of others. Fair, equitable and reasonable is the mantra.

Procurement by Tendering

As a general rule, there should be competition in the tendering process with proposals or tenders sought from at least three competent contractors whenever practicable. Whether or not the full tendering process is appropriate may depend on:

- size and importance of the project
- urgency – the full process may take months
- project risk, uncertainty and complexity
- availability of suitable providers
- public interest factor
- confidentiality
- cost-effectiveness of the process.

On some rare occasions it may be useful to have tenders submitted when there is only one contractor involved. Cost-effectiveness needs to be considered.

The main **advantages** of competitive tendering are:

- establishes best terms through market forces
- invites alternatives
- ensures fair treatment
- avoids client capture
- provides chance to review current contractor.

The main **disadvantages** of competitive tendering are:

- procurement delayed
- time and cost involved to all parties
- heightened exposure to litigation
- confidential information released
- existing contractual partnerships may be upset.

The comprehensive procurement is shown at Figure 10.8. However, the process may be more dynamic than the flowchart suggests, with a need to revisit some steps as reality unfolds. The main procurement phases are:

- **Planning.** To start the procurement process, the goods and services needed must be identified, justification for their purchase established (ie, business case), financial authority obtained, and a procurement plan prepared. This plan is based on a procurement list developed from the project's scope of work and includes what, how much, when, and how to procure. And the procurement schedule then integrates the procurement list and the project schedule, with allowance for delivery lead times.
- **Soliciting.** The requirements, evaluation criteria, and specific terms and conditions for the contract are the basis for a procurement document, which is sent out to prospective providers. The client waits for responses. This is a key area of complaint from providers, since clients sometimes provides insufficient warning of their needs, making it difficult for providers to prepare accurate proposals. An Expression of Interest is usually a forerunner of a Request for Proposal or Request for Tender.
- **Selecting.** Once the contractor has had reasonable time to review the client's requirements, the buyer may hold a bidders' conference (ie, pre-bid conference), which is an interactive meeting that enables both parties to discuss expectations. This step helps reduce risk and ensures better proposals. Due diligence might then be undertaken, which provides both parties with an opportunity to review the other's capacities and capabilities.
- **Managing.** Once the contract has been agreed and signed, work commences (ie, supply, construction, advice etc). Matters to be managed include conflicts, meetings, changes, and reporting, as with any project. Typically, the project manager manages the contract. However,

sometimes, the contract manager will be in charge of managing performance as it pertains to the contract, while the project manager will handle completion of the scope of work.

- **Closing.** Finally, the work is finished, approvals are received, final payments made, and a lessons-learned document is completed. The contract document might also be updated if the contract is to be renewed or used as a basis for procurement in the future.

The relationship between the contractor and project manager (and/or contract manager) should be nurtured to ensure that the project doesn't start out with major problems. Also, the project manager must be able to fit the contracting process into the project schedule effectively. To properly perform these functions, ideally the project manager for both organisations will be assigned before any contract is signed. This allows the project managers to do timely risk analysis. The problem is that most contractors bid for many contracts to win only a few. It is not always practicable, under these circumstances, to assign a project manager to every prospective job. However, an experienced project manager should at least be consulted during proposal preparation.

Solicitation Process

Procurement needs are contained in a procurement document, which may take the form of a Registration of Interest (ROI), Request for Proposal (RFP), Request for Tender (RFT), Invitation for Bid (IFB), or Request for Quotation (RFQ), the three most common of which are described briefly below:

Registration of Interest. This is best used for significant purchases (say those over \$50,000) where the market is big and changing and/or the requirement is complex or novel. The ROI helps identify interested providers and enables pre-qualification to be undertaken to establish a short-list of those who will be invited to participate in the next stage of procurement, which might be an RFP or RFT.

Request for Proposal. An RFP document invites prospective providers to prepare a proposal to meet the need. There may not be detailed specifications available. The RFP aims to gather relevant information on the providers' ability to fulfil the need. The expected outcome of an RFP is a contract for the provision of the required work, goods, and service etc – the deliverable(s). There will usually be negotiations about detailed terms and condition to be formalised in the contract document.

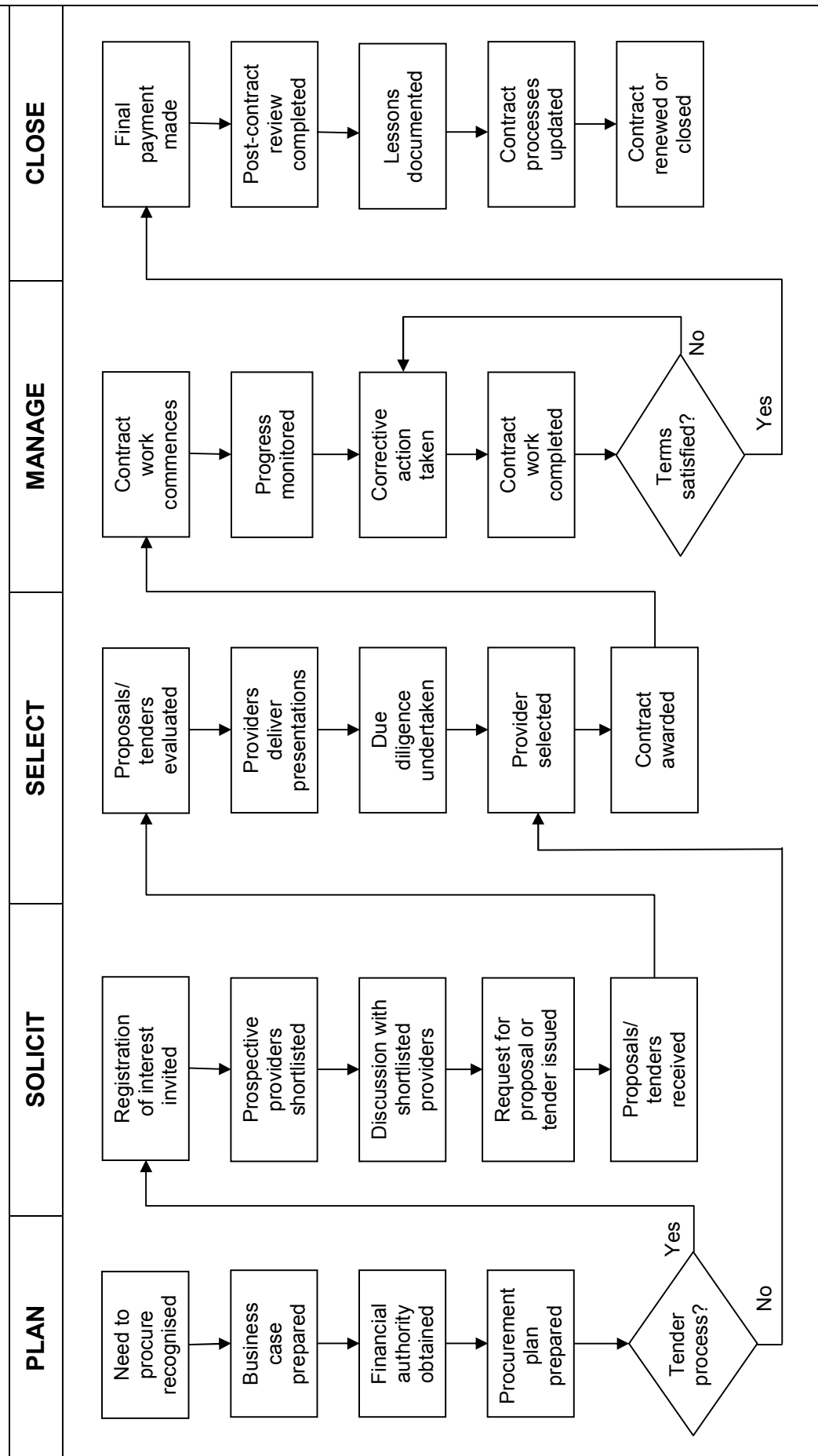
Request for Tender. An RFT is the most precise of the three methods. The RFT document clearly specifies the required scope and outcome. All suppliers submit tenders to conform to the detailed specification provided. Options are not allowed, unless stated otherwise. An RFT usually consists of:

- conditions of tender
- detailed specification of the required goods/service
- tender evaluation and selection method.

The Request for Proposal (RFP) is merely an invitation to make an offer – something prior to and short of the offer itself. Only tenders are regarded as definitive offers and no contractual obligation arises until a tender is accepted. However, the RFP is sometimes treated as a definitive offer. So be careful, an RFP may commit us to a contract before we realise it! Thus, our RFP should explain:

- the selection process
- the selection criteria/attributes
- the substance of the project.

Figure 10.8: Comprehensive Procurement Process



Some useful standard clauses to include in our RFP are:

"This request is an invitation to treat. It is not an offer."

"The lowest or any tender will not necessarily be accepted."

"Alternative tenders will also be accepted."

"We reserve the right to reject all and any tenders."

"The tender can be re-negotiated with selected tenderers without the need to:

- *retender, or*
- *submit an altered RFP to all tenderers."*

"The cost of preparing and submitting a tender shall be borne by the tenderer."

The whole process of tendering is subject to NZ Contract Law and The NZ Fair Trading Act, which require that neither party engages in conduct which is misleading or deceptive or likely to mislead or deceive. The law also requires that tenders be evaluated strictly in accordance with the attributes provided in the RFP. The key point is, what we include in the RFP may bind us. Thus, the contract process effectively begins long before a contract is negotiated and signed.

Conditions of Tender

The conditions of tender normally include:

- when and where tenders close
- deposit details (seldom required)
- contact person for questions
- a clause stating that *"The lowest or any tender may not necessarily be accepted"*
- information on how and when suppliers will be advised of the decision.

Specifications can be either technical (ie, precise description of required solution) or functional (ie, defines the problem and the characteristics of an appropriate solution, inviting providers to propose specific solutions).

Evaluation criteria may be prioritised and weighted (percentage) to define their relative importance. Such selection criteria or attributes might include:

- experience and track record
- technical and managerial skills
- conformance with requirements
- commercial competitiveness
- methodology to be used
- technical acceptability (both mandatory and desirable features)
- equipment and material resources
- delivery timeframe

- value for money (quality, whole-of-life costs, after sales service, guarantees, ease of communicating with provider, versatility, lifespan, up-gradability, ease of repair, etc).

Evaluating Contractors and Suppliers

Some considerations that may be relevant (ie, mandatory or advisable) when we are evaluating the suitability of contractors, consultants and suppliers are listed below:

- company profile and code of conduct
- experience / expertise of company and individuals
- track record / references / reliability / reputation / testimonials
- financial circumstances / claim history
- compatibility (interests, culture, values, understanding)
- knowledge and skill of people involved / quality of staff
- nationality / country / locality
- creativity / innovation / objectivity
- availability / accessibility (now and projected) / work commitments
- cost / affordability / fee structure / level of fees
- capacity / resources / back-up
- communications (effectiveness)
- control (ease or otherwise)
- management skills (subcontractors)
- long-term viability
- health and safety record / attitude / procedures
- quality assurance / accreditation / conformance with standards
- willingness to guarantee result / warranties
- discreteness / confidentiality / site security
- insurance cover
- independence
- qualifications
- conflicts of interest
- after sales service
- initiative / creativity / flexibility
- availability of spares and technical support
- responsiveness
- methodology employed
- acceptability of trade-ins
- understanding of our situation and culture
- equipment and plant (quantity, type and condition).

Content of Proposals

Proposals should contain information in sufficient detail for the client organisation to accurately assess the bid against selection criteria, usually including:

- **approach** by the contractor to the problem and any particular difficulties they foresee. This information should be in sufficient detail to disclose their approach to the problem and how they propose to solve it. Their approach should include procedures they intend to use such as surveys, review of literature etc.

- **experience** – a list of relevant professional affiliations and experience with similar assignments
- **timing** – expected duration, including a firm undertaking on starting and completion dates if necessary and project plan showing resources, milestones and decision points may be required for larger projects
- **resources** – contractors should provide a list of staff to be used on the project along with other staff available if needed. Details about the key staff might include their curriculum vitae with particular reference to relevant experience
- **cost** – this should cover payment terms, charge-out rates of staff; and whether the price is fixed or on a time-and-materials basis
- **referees** – the contractor should provide independent referees both for the individuals or subcontractors proposed and for the firm as a whole. These should be current and relevant to the proposed assignment
- **quality control** – how they propose to monitor and evaluate progress, and ensure high quality work is delivered, consistent with health and safety and other relevant legislative requirements
- **subcontracting** – whether the contractor intends to subcontract any part of the project and to whom, and how subcontractors will be managed.
- **conflicts of interest** – information on any potential conflicts of interest.

The evaluation of contractors/consultants should address both the firm and the individuals or subcontractors identified to do the work, as both must measure up.

Some useful reference checking questions might include:

- When did you last use them?
- Would you use them again without hesitation?
- What did they achieve while working with you?
- Have you used them again since?
- How do they compare with others in the field?
- Did they fit well with your staff and culture?
- Did they complete their work on time and within budget?
- Where do their strengths and weaknesses lie?
- Was their self-management satisfactory?
- Are there any other issues we should be aware of?

Interviewing Contractors

Once we have a shortlist, or have chosen one contractor that looks the best, meeting those involved will help with assessing their capacity, capability and compatibility. We should remember that asking open questions is often the most effective way of eliciting relevant information. At such an interview we might:

- Invite them to tell us about similar work they have done. Actual experience provides a better

predictor for future performance than hypothetical descriptions.

- Ask what they think are the similarities and differences between our organisation's requirements and culture and the other organisation they have described and their own organisation.
- Clarify their values and attitudes on relevant issues, which might include equal employment opportunities, cultural issues, concern for the environment and social responsibility.
- Clarify who, within the providing organisation, will do the actual work. That is, seek assurance that their experienced people will have ongoing substantial involvement. Ask for names.
- Clarify the contractor's approach to health and safety, and where appropriate, environmental diligence and vigilance.
- Ask if there would be any possible problems that might prevent timely completion, how they might avoid such problems, and contingencies if such problems do arise.
- See if there is evidence that they are able to commit sufficient resources to completing the work.
- Review the outline of their approach to the assignment, including a work plan that breaks the assignment into stages, objectives, tasks, outputs and key considerations affecting each stage, showing completion of the work by an acceptable date.
- The proposed fee levels relative to the value of services to be provided. We should confirm fee levels for defined types and quality of work, and confirm that these would also apply should variations occur.

We need to schedule sufficient time for a full discussion. They too may wish to ask us questions. The selection process is important since it enables us to avoid risks and threats. Residual risks can usually be managed by the contract. However, prevention is better than cure.

What is a Contract?

A contract is a formal agreement between two parties wherein one party (the contractor) obligates themselves to perform a service and the other party (the client) obligates themselves to do something in return, usually in the form of a payment to the contractor.

A contract is more than just an agreement between parties. A contract governs the relationship between the parties involved. It defines the responsibilities, spells out the conditions of its operation, defines the rights of the parties in relationship to each other, and grants remedies to a party if the other party breaches its obligations. A contract attempts to spell out in specific terms the transactional obligations of the parties involved as well as contingencies associated with the execution of the contract. An ambiguous or inconsistent contract is difficult to understand and enforce.

Contracts are risk management tools. In any contractual relationship, there are benefits we wish to secure and risks we wish to avoid or minimise. Some of these potential benefits and risks from the client's perspective are summarised at Figure 10.9. The contract contains terms to secure the desired benefits or opportunities and avoid the undesirable risks or threats. However, good selection of the contractor as previously described is key to ensuring success, rather than post-award reliance on

contractual penalties, rights and obligations.

Tender Evaluation

Tenders may be evaluated by a variety of methods, key among which are:

- lowest price method
- two envelope method
- rating formula
- weighed-attribute method.

The **two envelope method** requires that the bid be submitted in two sealed envelopes – one envelope contains the price (and perhaps detailed breakdown of costs, cashflow and payment schedule), and the other envelope contains all non-price attributes. Assessment is first based on non-price attributes, providing price doesn't exceed our allowable estimate.

The **rating formula** is designed to adjust the quotation received in accordance with the provider's rating – a performance figure based on previous experience with that provider. See Figure 10.10. The quote is inflated according to the provider's performance rating. In this instance Provider C would be selected. The rating often takes into account claims history.

Weighted-attribute Method

First step in the weighted-attribute method is to identify and prioritise the tender selection attributes. This should be completed before requesting tenders. The paired-comparisons tool at Figure 10.11 should help with deciding attribute priorities. Score is the frequency with which each item is identified in the comparison process.

Second step is to decide the weighting for each attribute and develop a matrix to help ensure an objective decision based on the relative importance of the attributes (ie, selection criteria). See Figure 10.12. Some further points are:

- Intuition or 'gut feel' is not usually appropriate, but may encourage us to search for more factual evidence.
- If evaluation scores are the same, we don't take non-attributes into account, but rather we request further information, especially about the higher weighted attributes (Pareto principle) or base the decision on the top few attributes.
- The decision must be able to withstand legal scrutiny. They are occasionally challenged.

While intuition has a place in decision making it is usually better to take more tangible factors into account first, especially if we wish to convince others and reduce the likelihood of our decision being challenged. If the total scores are the same, we should then re-total options against the most important factors (ie, apply the Pareto principle). We may need to obtain more information to clearly differentiate. We don't resort to new attributes and considerations unless all tenderers are advised and given the opportunity to respond to this additional information. Also, we should explain in our RFP/RFT how the selection process is to be applied and then adhere to it.

Figure 10.9: Potential Opportunities and Threats of Contracting

Potential Opportunities	Potential Threats
<p>Accountable for quality results</p> <p>Fixed cost/accurate pricing</p> <p>Experience/expertise</p> <p>Fresh perspective and ideas</p> <p>Easier to hire and fire</p> <p>Frees up own resources</p> <p>Avoid undesirable jobs</p> <p>We can learn from them</p> <p>Allows us to concentrate on core work</p> <p>Impress our client</p> <p>Contract penalties available</p> <p>No capital investment from us</p> <p>Only pay for what is used/done</p> <p>Avoid obsolescence</p> <p>They look after tax</p> <p>Innovation likely</p> <p>Save on overheads</p> <p>More likely to meet deadlines</p> <p>Encourages a disciplined approach to QA</p> <p>Increased certainty of success</p> <p>Forces us to think through projects</p> <p>We can be choosy/selective</p> <p>Reduce inventory</p> <p>Transfer/share risk</p> <p>Partnership synergy</p> <p>We can 'squeeze' contractors!</p> <p>They want future contracts</p> <p>Less work-in-progress</p> <p>Someone to blame!</p> <p>Independent viewpoint</p> <p>Builds our credibility</p> <p>Objective and non-political</p> <p>Proven tools and techniques</p>	<p>We don't challenge them</p> <p>Their ability may be overrated</p> <p>Lack of flexibility/more complexity</p> <p>Administrative costs (eg, tenders)</p> <p>Security concerns/confidentiality</p> <p>Short term costly</p> <p>Demotivates own staff/redundancy</p> <p>Loss of corporate knowledge</p> <p>Increased dependency/client capture</p> <p>No priority attention</p> <p>Less control (subcontractors)</p> <p>Not compatible with own culture</p> <p>Solvency problems</p> <p>Market vulnerability</p> <p>Lack of emergency response</p> <p>Divided loyalties</p> <p>Legal costs (eg, contracts)</p> <p>They learn at our expense</p> <p>Need our administrative support</p> <p>Hidden/unexpected costs and expenses</p> <p>Time to brief/learning curve</p> <p>Space and resource needs</p> <p>Disruption/bad influence</p> <p>Lack of subsequent maintenance</p> <p>Location inconvenient</p> <p>Lack of familiarity with our business</p> <p>Scope creep and variations encouraged/claims</p> <p>Little long-term accountability</p> <p>Security risk</p> <p>Lack of rapport</p> <p>Doing other work in our time</p> <p>High monitoring and evaluation cost</p> <p>Exchange rate risks</p> <p>May undermine our reputation</p> <p>They become more competitive</p> <p>Risk of litigation</p> <p>Dated knowledge and techniques</p> <p>Claims</p>

This doesn't pretend to be a complete list and not all items are relevant on every occasion.

Figure 10.10: Rating Formula Method

$$\text{Evaluation Price} = \text{Tender Quote} \div \text{Provider's Rating}$$

Provider	Quote	Rating	Evaluation
A	\$40,000	0.90	\$44,444
B	\$50,000	0.80	\$62,500
C	\$42,000	0.98	\$42,857

$$A = \frac{\$40,000}{0.90} = \$44,444$$

$$B = \frac{\$50,000}{0.80} = \$62,500$$

$$C = \frac{\$42,000}{0.98} = \$42,857$$

Figure 10.11: Deciding Attribute Priorities

Rank	Score	Attribute	5	4	3	2	1
5 th	0	Price 1	5	4	3	2	
4 th	1	Methodology 2	5	4	3		
1 st	4	Track Record 3	3	3			
3 rd	2	Health and Safety 4	5				
2 nd	3	Capacity 5					

Figure 10.12: Example Contractor Evaluation Table

The following example shows the use of a decision matrix to decide on the most appropriate transport contractor for a large freight haulage project.

Attributes	Weight	Providers					
		A		B		C	
		Grade	Score	Grade	Score	Grade	Score
Cost	10	x3	30	x1	10	x2	20
Capacity	9	x2	18	x2	18	x2	18
Availability	7	x3	21	x2	14	x3	21
Speed	5	x1	5	x3	15	x3	15
Frequency	5	x1	5	x2	10	x3	15
Safety	3	x2	9	x1	3	x3	9
Reliability	3	x2	6	x1	3	x3	9
Total Score			94		73		107
Place/Priority			2nd		3rd		1st
Where Grade: 1 = least attractive 2 = reasonable 3 = most attractive				Notes: The grade range might be extended to say 1 to 5 or even 1 to 10. In this instance the selection is clear cut and a contract might now be negotiated with Provider C.			

Pricing the Contract

The cost of the product is what we pay for it and the price is what they sell it for. Consider the basic supply chain at Figure 10.13. Mark-up is usually higher for labour than it is for material.

When tendering, contract price is usually a major factor. The contractor's dilemma is to achieve the right trade-off between the profit and the chance of winning the contract.

Before evaluating tenders the contract manager needs to estimate the price. The time needed to complete this estimate will depend on the required level of estimate accuracy. See Figure 10.14.

Figure 10.13: Supply Chain

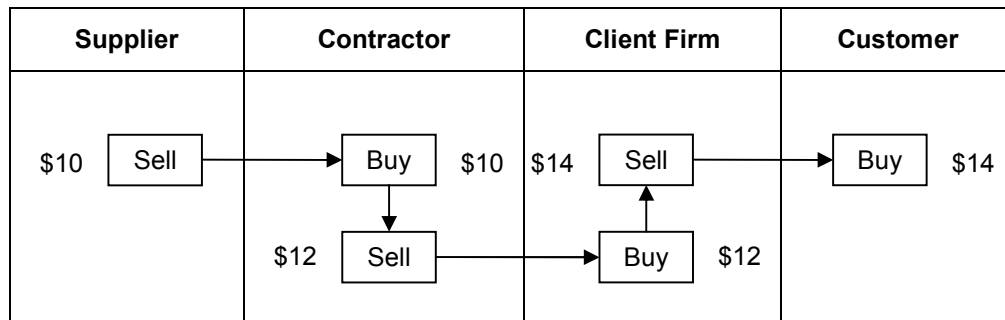
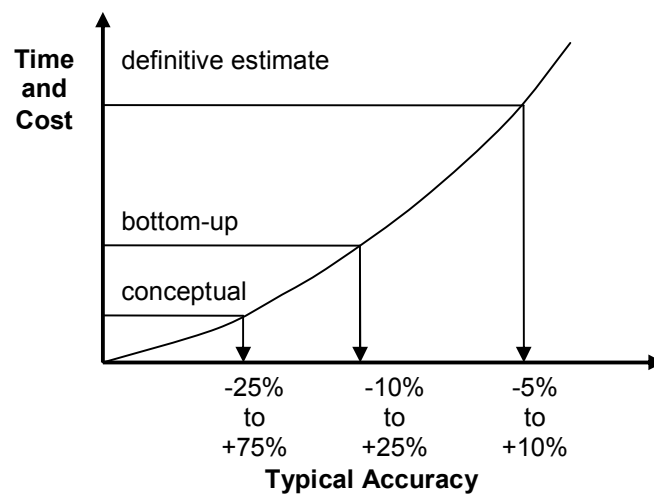


Figure 10.14: Cost versus Estimate Accuracy



Should we not allow sufficient time for the contractor to prepare a proper estimate, their estimate is likely to contain a considerable margin for error and uncertainty, resulting in a higher quote than if we had allowed them sufficient time. Also, if we are vague about our requirements, variations will likely proliferate.

Tendering Procedures

Our organisation should not agree to a request by an individual tenderer to extend the time for submitting tenders, unless there are most exceptional circumstances.

In such a case, the extension should be advised in writing and given to all tenderers with sufficient notice to enable all to benefit.

Our organisation should have procedures concerning:

- recording of the date and time of receipt of each tender
- safeguarding the security and confidentiality of tenders.

As a general rule:

- tenders should not be opened until after the nominated closing time
- on opening, each tender should be included in a tenders' register which records the tender numbers, the names of the tenderers, and the number of responses.

The tender solicitation documents should state whether late tenders will be received, and on what basis. As a general rule, our organisation should accept late tenders only if:

- we can be certain that there is no possibility of collusion or the late tenderer having knowledge of the other tenders
- the late tender conforms to the requirements set out in the tender documents.

Our procedure for dealing with late tenders may include:

- labelling an accepted tender as 'late tender', time and date stamped
- keeping a late tender that does not meet the criteria on the tender file with the accompany envelope, so that it is not considered further
- advising the tenderer if their tender was received late and whether it is to be considered.

Tenders should be recalled if:

- tenders received are non-compliant – whether contractually or technically
- the tenders received cannot be adequately or fairly compared
- there is evidence of collusion between tenderers
- there has been a significant change to the requirement.

All tenderers should be formally advised that tenders have been recalled, and the reasons for the decision.

Our organisation should take steps to ensure that wherever possible, the information provided in the tender remains confidential. An appropriate clause to this effect should be included in the tender.

If a 'tag' is justifiable, and shows an unforeseen circumstance, it may be appropriate to invite all tenderers to nominate what extra cost they would propose if such conditions had to be met. However, it is usually better to avoid such post-tender negotiations.

Legal Considerations

Some legal considerations that we need to be aware of when undertaking the contracting process are:

- pre-qualification is not an offer
- if the call for tenders is merely to 'test the market' this could be deemed fraudulent misrepresentation
- invitations to tender are not typically offers – they are invitations to treat
- offers can be revoked by the offerer at any time before they are accepted (and deposits returned) including those offers on which we have based our own tender
- all tenders properly submitted must be considered – they are offers
- tender rules must be adhered to (if not, we may be liable for tendering costs and possibly the loss of profit suffered by unsuccessful tenders)
- we have no obligation to consider non-conforming or alternative tenders, unless this has been specifically included in the tender rules:
 - *“non-conforming tenders will be accepted”*
 - *“alternative tenders accepted”*.
- the acceptance of a tender must be unconditional (eg, *“acceptance subject to negotiating a suitable contract”* is not binding)
- use of subcontractors does not remove the principal contractor's liability to the client
- unless specified otherwise in the contract, the contractor can subcontract the work
- all tenderers must be advised promptly of any changes to tendering rules and deliverable specifications
- if a tenderer asks for further information it is good practice to provide that additional information to all tenderers (in writing)
- the contract occurs when the contractor's offer is formally accepted, and a 'letter of intent' is not a formal contract
- if a particular 'tag' is unacceptable, but the tender is otherwise good, the tenderer may be invited to remove their tag
- the contract period usually starts on acceptance of the offer, unless a date is specified.

Due Diligence

Formal due diligence is usually unnecessary for routine procurements. Our organisation should only undertake due diligence in respect of a tenderer if:

- the expected benefits of doing so outweigh the costs
- the risks of performance failure are high
- their selection is probable.

The organisation should take special care to avoid inadvertently creating a contractual obligation during the due diligence process.

Due diligence provides both parties with an opportunity to test their expectations and understanding of the procurement.

A common alternative to due diligence, if the cost of the process is too high, is to evaluate references and require the successful tenderer to provide a performance bond.

The tender documents should:

- say whether due diligence may be undertaken
- set out the anticipated timing of the process and details of the person or people responsible for undertaking it.

The procurement organisation needs to establish formal procedures to facilitate:

- the collection, collating and indexing of relevant material
- making the appropriate personnel available
- responding to requests for information by tenderers.

Contract Negotiations

The style of the negotiation (ie, competitive or cooperative) may depend on whether the parties desire a short-term or long-term relationship. The process doesn't need to be confrontational. Where only one conforming tender is received, the client usually preserves the right to negotiate with the tenderer.

Experience suggests that unsuccessful tenderers need to be advised before negotiations commence, otherwise they may consider that other tenderers are receiving preferential treatment. A letter of intent (LOI) may be sent to the selected contractor. Some frequently identified negotiation principles and suggestions are:

- *"Or-near-offer"* weakens our bargaining position.
- Don't give discounts to people who need our business.
- The negotiator's most useful two-letter word is "if". We might preface our positions with *"If you agree to this, then I will agree to that"*.
- There is no such thing as a fixed price:
 - What about a trade-in?
 - How much off for cash?
 - How much off if I combine purchases?
- Packaging is the best defence to a price challenge. Don't change the price, change the package.
- Perhaps the worst thing we can do is to accept a negotiator's first offer.
- Don't state a grievance; negotiate a remedy.
- In conceding, behave more like Scrooge than Saint Francis.
- Never concede anything without getting something in exchange.
- Nothing, absolutely nothing, is given away free.
- We can't afford to 'split the difference'.

- If they want something from us, it ought to cost them.
- How do we educate our opponents? Put a price on their demands.
- If we haven't got a principle – invent one! However, be ethical.
- Summarise often to confirm the situation thus far. Don't proceed until the record is agreed.
- Don't intimidate, give ultimatums or be intimidated ourselves.
- Don't act outside our formal authority.
- Before starting, draft a list of the issues, perhaps including prices and features.
- Start high and don't be shy about asking for concessions right from the start.
- Don't make the first concession. More often than not, the loser concedes first.
- If the other party makes an unreasonably high demand, do not make a counter-offer; insist on a reduction in their demand first.
- Concessions don't have to be matched in kind. A concession now may lead to another concession later in the negotiating process.
- Keep careful track of the kinds of concessions we have made. This list can provide leverage later in our negotiation.
- State that concessions are tentative, based on reaching an overall mutually satisfactory agreement, including price. Nothing is agreed, until everything is agreed.
- Don't make assumptions. Do the preparation and planning. Ask questions.
- Don't treat it as a win-lose situation. And avoid lose-lose outcomes.
- Don't pitch too low. Know the 'bottom-line.'
- Don't get personal. Manage the issues.
- Don't score points.
- Don't walk out. Patience is a virtue!
- Don't make the other party feel like losers.
- Don't negotiate if we don't have to.
- Don't over-commit.
- Don't be intimidated – take a break, seek advice and review.

Negotiation Items

Common contractual items open for negotiation may include:

- product and information ownership/security
- after sales service and maintenance
- penalties and rewards
- warranties and guarantees
- payment arrangements:

- deposits
- advanced payments
- progress payments or lump sum
- monthly cost reimbursement payments
- pro rata payments made evenly over the life of the contract
- retentions, liquidated damages, bonds
- fee structure/schedule of rates
- price escalation procedure
- schedule of deliveries
- use of subcontractors
- variation management
- events that constitute Force Majeure
- dispute settlement procedure
- reporting arrangements, sampling and testing.

A wide variety of contracts may be agreed, some examples of which are:

- FBOOT finance, build, own, operate and transfer
- BOO build, own and operate
- BOL build, operate and lease
- DBOM design, build, operate and maintain
- DBOT design, build, operate and transfer
- BOD build, operate and deliver
- BOOST build, own, operate, subsidise and transfer
- BRT build, rent and transfer
- BTO build, transfer and operate
- DBFM design, build, finance and maintain
- ROT rehabilitate, operate and transfer
- BOT build, operate and transfer.

However, there are essentially two main different kinds of contract. The first is the 'fixed-price' contract in which a price is agreed upon in advance and remains fixed as long as there are no changes to scope or provisions of the agreement. The second is a 'cost-plus' contract in which the contractor is reimbursed for all or some of the expenses incurred during the performance of the contract. Unlike the fixed-price contract, the final price is not known until the project is completed. Within these two types of contracts, several variations exist.

Fixed-price Contract. When the scope of work can be clearly defined, and the project duration is limited, a fixed-price (or lump-sum) contract is normal. The contractor quotes a firm fixed price for

the work. This quote will usually include all labour and material costs plus an allowance where appropriate for risk and inflation. The contractor assumes full risk, but keeps 100 percent of any cost savings, thus encouraging efficient performance. Some variations to fixed-price are:

- **Firm Fixed Price (FFP)** pays a specified price on delivery.
- **Fixed Price with Adjustments (FPA)** allows for price adjustments due to labour and/or material cost changes. More likely to be used for longer-term contracts and/or when the market is unstable.
- **Fixed Price Incentive (FPI)** offers the contractor an additional reward for exceeding performance standards.

Under a fixed-price (FP) or lump-sum agreement, the contractor undertakes to perform all work specified in the contract at a fixed price. Clients are able to get a minimum price by putting out the contract to competitive tender. Advertising for tenders (RFP, RFT, RFI, IFB) that list customer requirements usually results in low bids. Prospective contractors can obtain RFP/RFT notices through various channels. In the case of large business organisations and government agencies, potential contractors can request to be included on the client's list in the area of interest. In other cases, invitations can be found by scanning appropriate industry media such as newspapers, trade journals, and the internet (eg, www.trademe.co.nz, www.tenderlink.com, which is privately run, and www.gets.govt.nz). In some cases, the client will put restrictions on potential bidders, such as requiring that they be ISO 9000 certified.

With fixed-contract bids, the contractor needs to be very careful in estimating the target cost and completion schedule because once agreed upon, the price cannot be adjusted. If the contractor overestimates the target cost in the bidding stage, they may lose the contract to a lower-priced competitor. However, if the estimate is too low, they may win the job but make little or no profit – sometimes described as 'buying the work'.

Fixed-price contracts are usually preferred by both clients and contractors when the scope of the project is well defined with predictable costs and low implementation risks. Such might be the case for producing parts or components to specifications, executing training programmes, or organising a banquet. With fixed-price contracts, clients do not have to be concerned with project costs and can focus on monitoring work progress and performance specifications. Likewise, contractors often prefer fixed-price contracts because the client is less likely to request changes or additions to the contract. Fewer potential changes reduce project uncertainty and allow contractors to more efficiently manage their resources, especially across multiple projects.

The main disadvantage of a fixed-price contract for clients is that it is more difficult and more costly to prepare. To be effective, design specifications need to be spelled out in sufficient detail to leave little or no doubt as to what is to be achieved. Because the contractor's profit is determined by the difference between the bid and the actual costs, there is some incentive for contractors to use cheaper quality materials, perform marginal workmanship, or extend the completion date to reduce costs. The client can counteract these by stipulating rigid deliverable specifications and specific completion dates, and by closely supervising work. In many cases, the client will hire a consultant who is an expert in the field to oversee the contractor's work and protect the client's interest.

The primary disadvantage of a fixed-price contract for contractors is that they run the risk of underestimating. If the project gets into serious trouble, cost overruns may make the project unprofitable, and, in some cases, may lead to bankruptcy. To avoid this, contractors have to invest significant time and money upfront to ensure that their estimates are accurate.

Contracts with long lead-times such as large construction and production projects may include escalation provisions that protect the contractor against external cost increases in materials, labour rates, or overhead expenses. For example, the price may be tied to an inflation index, so it can be adjusted to sudden increases in labour and material prices, or it may be adjusted as actual costs become known.

To alleviate some of the disadvantages of a fixed-price contract while maintaining some certainty as to final cost, some fixed-price contracts contain incentive clauses designed to motivate contractors to reduce costs and improve efficiency. For example, a contractor negotiates to perform the work for a target price based on a target cost and a target profit. A maximum price and maximum profit are also established. If the total cost ends up less than the target cost, the contractor makes a higher profit up to the profit maximum. If there is a cost overrun the contractor absorbs some of the overrun until a profit floor is reached. It's about sharing the pain and the gain.

In this situation, profit may be determined according to a formula based on a cost-sharing ratio. A ratio of 75/25, for example, indicates that for every dollar spent above target costs, the client pays 75 cents and the contractor pays 25 cents. This provision motivates contractors to keep costs low since they pay 25 cents on every dollar spend above the expected cost and earn 25 cents more on every dollar saved below the expected cost. Fixed-price incentive contracts tend to be used for long-duration projects with fairly predictable cost estimates. The key is being able to negotiate a reasonable target cost estimate. Unscrupulous contractors have been known to take advantage of an ignorant client to negotiate an unrealistically high target cost and use performance incentives to achieve excessive profits.

Cost Plus Contract. Under this arrangement the contractor's costs are reimbursed, in addition to which is added a fixed fee or percentage profit. This contract is best used when scope cannot be clearly defined and design changes are anticipated such as for a development contract. However, once scope is finalised the type of contract may change from cost plus to fixed price, assuming both parties are agreeable. Cost plus contracts provide little incentive to the contractor to save costs and increase productivity. There is a risk of cost overruns. It is up to the client (ie, project manager) to closely monitor the contractor's performance. The client may provide an incentive to the contractor to save costs – perhaps agree to share cost savings. Some variations to the cost plus contract are:

- **Cost plus Fixed Fee (CPFF)** reimburses the contractor for allowable costs and pays a fixed fee, which doesn't vary with actual cost.
- **Cost plus Incentive Fee (CPIF)** offers the contractor a higher fee when costs are minimised. A target cost is negotiated. The cost savings are shared.
- **Cost plus Award Fee (CPAF)** allows for subjective judgements to be included in determining awards. They may take into account subjective factors, such as the contractor's attitude.
- **Cost Sharing Contract** in which the contractor receives no fee but settles for other commercial benefits from performance.

Under a cost-plus contract the contractor is reimbursed for all direct allowable costs (materials, labour, accommodation, travel etc) plus an additional fee to cover overheads and profit. This fee is negotiated in advance and usually involves a percentage of the total costs. On small projects this kind of contract comes under the rubric 'time and material contract' in which the client agrees to reimburse the contractor for labour cost and materials. Labour costs are based on an hourly or daily rate, which includes direct and indirect costs as well as profit. The contractor is responsible for documenting labour and material quantities and costs.

Unlike fixed contracts, cost-plus contracts put the burden of risk on the client. The contract does not indicate what the project is going to cost until the end of the project. Contractors are supposed to make the best effort to fulfil the specific technical requirements of the contract but cannot be held liable, in spite of their best efforts, if the work is not produced within the estimated cost and time frame. These contracts are often criticised because there is little formal incentive for the contractors to control costs or finish on time because they get paid regardless of the final cost. Perhaps the major factor motivating contractors to control costs and schedule is the effect overruns have on their reputation and their ability to secure future business.

The inherent weakness of cost-plus contracts may be compensated for by a variety of incentive clauses directed at providing incentives to contractors to control costs, maintain performance, and avoid schedule overruns. Contractors are reimbursed for costs, but instead of the fee being fixed, it is based on an incentive formula and subject to additional provisions. This is very similar to fixed-price incentive contracts, but instead of being based on a target cost, the fee is based on actual cost, using a cost-sharing formula.

Even if our project has several contracts, they don't all have to be the same type. Most contracts are concerned with the negotiated cost of the project. However, given the importance of speed and timing in today's business world, more and more contracts involve clauses concerning completion dates. To some extent schedule incentives provide some cost-control measures because schedule slippage typically, but not always, involves cost overruns. Schedule incentives/penalties (or liquidated damages) are stipulated depending on the significance of time to completion for the owner. For example, the contract involving the construction of a new stadium is likely to contain stiff penalties if the stadium is not ready for opening day. Conversely, time-constrained projects in which the number one priority is getting the project completed as soon as possible are likely to include attractive incentives for completing the project early. For example, a software firm that is anxious to get a new product to market may offer a testing firm a sizable bonus for each day the tests are completed ahead of schedule.

The important principle is that we should only reward the contractor for those things that are of benefit to us, the client. And of course whatever we do reward is likely to become the focus of the contractor's attention.

Contracts and Risk

Contractual terms and conditions have significant effect on risk reduction and allocation as shown at Figures 10.15 and 10.16. Contracts involve some risk in their performance, with consequent financial liability. Taking risks, and assuming liability for them, costs money. There must be some proportionate allowance in the price. On the other hand, tender prices are likely to be reduced if the employer is prepared to assume certain of these risks such as any rise or fall in the costs of selected materials. One main function of a contract is to allocate risks.

The type of contract selected should reflect several things, including:

- the degree of difficulty in providing the goods and services
- whether it involves hazardous materials or methods
- whether there will be future use for the goods and services
- whether the deliverable is well defined and unlikely to change.

Usually we would select the contract that represents acceptable risk to both parties, recognising who can best manage the risk.

New Zealand Contract Law

With increasing emphasis on negotiated terms, standard 'take-it-or-leave-it' contracts are becoming less relevant. We might view them only as a negotiation start point. In today's dynamic business environment, contracts tailored to meet both parties needs, are becoming the new standard, although NZS 3910 is widely used as a basis.

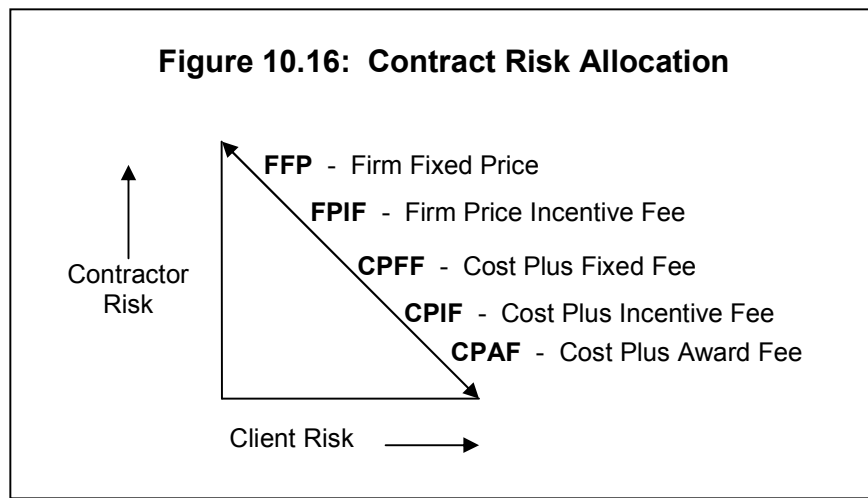
Most business is transacted by contract. We are involved in contracts every day when we purchase a newspaper or a litre of milk, a bus or train ticket, hire a taxi, courier a package, or enter a hire purchase agreement.

Figure 10.15: Contract Characteristics and Risk Allocation

Scope Definition	minimal		partial		complete
Number of Variations	many		several		some
Level of Uncertainty	high		moderate		low
Degree of Risk	high		medium		low
Suggested Risk Allocation	<div><div>Client</div><div>Contractor</div></div>				
Contract Type	CPPF	CPIF	CPFF	FPIF	FFP

Where:

CPPF	-	Cost Plus Fixed Fee (reimbursement)
CPIF	-	Cost Plus Incentive Fee (to minimise cost)
CPFF	-	Cost Plus Fixed Fee
FPIF	-	Fixed Price Incentive Fee
FFP	-	Firm Fixed Price (lump sum)



New Zealand (NZ) law considers that some agreements are not contracts. These are usually social agreements, such as our promise to marry someone, attend the neighbour's barbeque or to give the neighbour a lift to work in our car. Such agreements are not legally binding.

Contract Criteria. A valid contract under NZ law must meet six criteria:

1. **Intention** of the parties to create a legally binding agreement.
2. An **offer** by one party and **acceptance** by the other.
3. Each party must have made some contribution, called a **consideration**.
4. Both parties must have the legal right or **capacity** to make a contract.
5. The parties must have reached true and genuine **consent**.
6. The agreement must be **legal** in nature.

Intention. Parties must intend to be legally bound. It is this criterion which sets apart a contract from domestic or social agreements. For example, an invitation to lunch is not seen as legally binding. However, agreements of a business nature are presumed to be legally binding. Parties to a business agreement can suspend intention with such expressions as:

- *"binding in honour only"*
- *"this agreement shall not give rise to any legal relationship"*
- *"subject to a written agreement"*
- *"a gentlemen's agreement"*.

Offer and Acceptance. An offer is a definite undertaking by one party setting out the terms which they are prepared to negotiate with the other party. Acceptance must be communicated to the offeror. Silence is not acceptance. However, in some circumstances the existence of a contract can be inferred from the parties' conduct. For example:

- When a person hands an article to a shop assistant and the shop assistant accepts payment.

- A nod or wave at an auction is an offer to buy the item being auctioned.

Invitations to deal (or treat) are not offers. Such invitations include catalogues, mail-outs, and goods on display with price tags. Legally the goods are not being offered for sale. The seller can refuse to sell them to us. In general, a price list is an invitation to treat, not an offer.

"I will sell you my car" is not sufficiently specific to be an offer. However *"I will sell you my Dodge Caliber on 21 December this year for \$30,500"* is likely to be considered a proper offer.

Some contracts include exclusion clauses, but to be legal:

- the offeree must have had reasonable notice of the exclusion
- where the parties have had similar dealings in the past with exclusion clauses always included, then this is considered reasonable notice
- when the exclusion clause is on a sign it must have been legible and appropriately displayed before or at the time the agreement is reached, but not afterwards
- the offeree cannot plead illiteracy unless this was readily apparent to the offeror at the time.

Nowadays notices such as *"all care and no responsibility"* are illegal under the NZ Consumer Guarantees Act 1993. *"Let the buyer beware"* no longer applies except for used products. Restraint of trade clauses may only be enforceable if they are justified on the grounds of reasonableness. An offer can be brought to an end by:

- acceptance
- rejection
- lapse of offer deadline
- death of the offeror
- offer withdrawn before acceptance.

The following are not acceptances:

- counter offers
- cross offers
- conditional acceptance
- silence
- acceptance by unauthorised person
- partial acceptance.

Consideration. The consideration exchanged should be real and of some value, or a promise of such consideration. For example, under an employment contract we exchange wages for work. Interestingly, the consideration does not need to be fair or adequate. For example, if the parties agree, ten dollars could be the legal consideration for a new car.

Past consideration is invalid. Should Smith today promise to give us \$100 for work we performed last month, we cannot then insist on payment. Also the consideration must be legal. Paying for services with a stolen TV is not.

The payment of a lesser sum than the amount due does not of course discharge the original debt.

Outsiders cannot sue to enforce contracts to which they did not provide consideration.

Capacity. Most people have full capacity to enter contracts. Major exceptions are:

- people below the age of 18 (other than employment contracts, life insurance contracts, and married minors)
- where a person is extremely intoxicated (ie, *“possesses no business sense”*)
- where a person is of unsound mind (due to insanity, senility, or drugs).

Consent. If free will and consent is missing, or is not real, the contract is void. Consent may be absent due to:

- misrepresentation (false statement) which persuades the offeree to enter the contract and causes loss
- mistake in fact of law
- unfair pressure due to undue influence (eg, mental domination) or duress, which is actual or threatened harm to the parties or their immediate family.

Legality. A contract is void if it is for an illegal purpose such as an agreement to commit fraud, prejudice the nation, interfere with justice, or of course deprive the government of tax.

Form of Contract. Contracts may be written, oral, or both. Certain contracts, including those for hire purchase and real estate agreements, must be in writing. Many organisations (banks for example) use standard form contracts to remove the element of negotiation. However, such practices are increasingly questioned. This also applies to clients, contractors and subcontractors, unless the rights and obligations in the contract are specifically transferred to another party.

Parties to the Contract. Only the parties to the contract can enforce it. Third parties cannot be sued for obligations imposed on them. For example, a retailer must claim against the wholesaler, not the manufacturer. This also applies to contractors and subcontractors, unless the rights and obligations in the contract are specifically transferred to another party. Also, in New Zealand, the only people who can sign and execute Government Contracts are those authorised under the Government Contracts Act.

Terms. Sometimes it is necessary to read into the contract further terms to clarify the agreement. Courts only read in terms that are *“so obvious they go without saying”*. If in doubt put it in writing is the sensible precaution.

Contract Conclusion. The contract can finish when:

- the parties fulfil their obligations
- the parties agree to release each other from their obligations
- an external event makes performance of the contract impossible
- breach of contract and failing to rectify – deliberate or unintentional
- death of one party
- bankruptcy of one party
- time limit for legal right to sue expires (usually 6 years).

A simple flowchart for quickly checking contract validity is at Figure 10.17.

Written Contracts

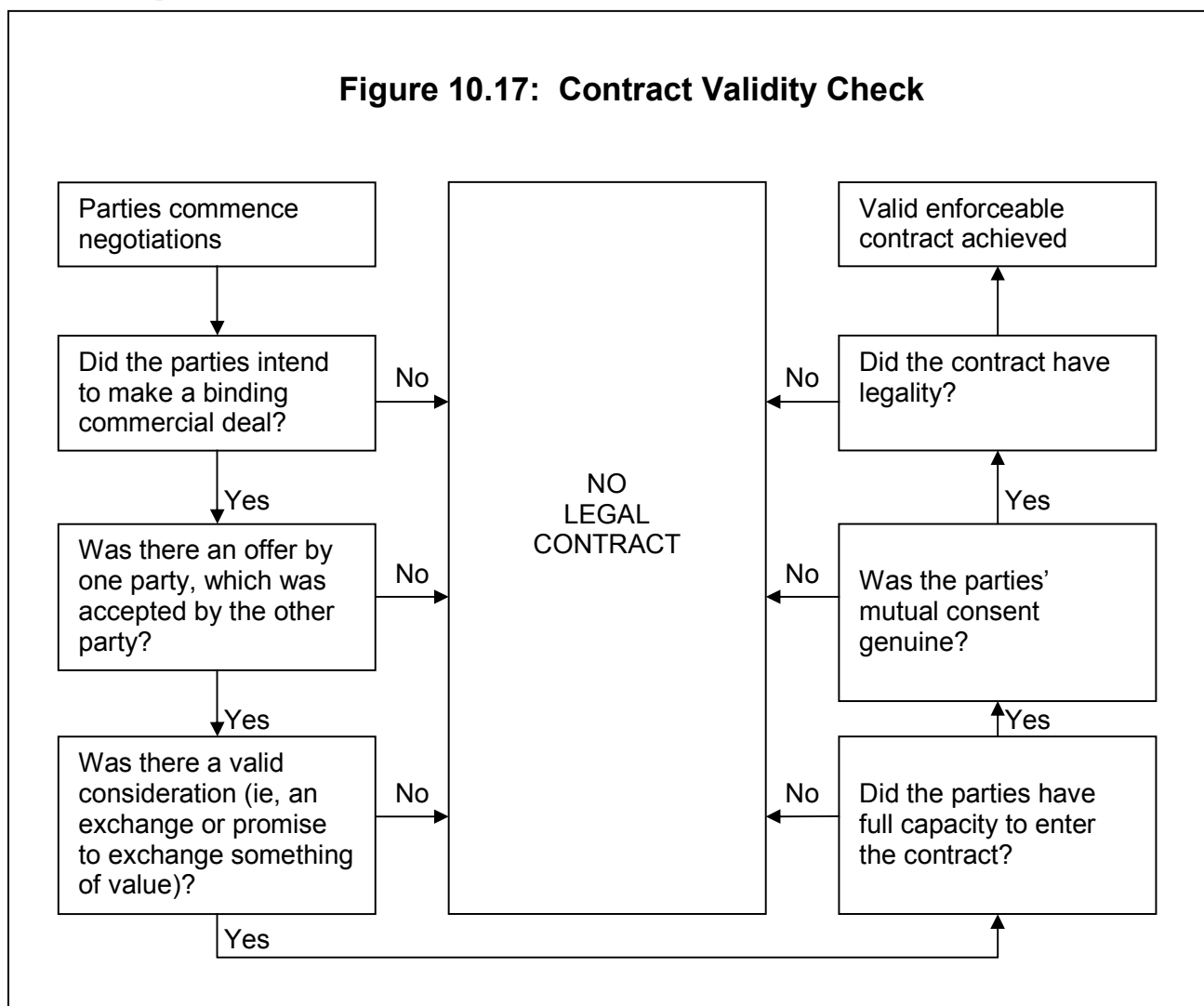
It's an important contract principle that whatever is agreed is put in writing and the agreement be signed by both parties before work starts. It isn't always done.

Written contracts help avoid confusion. A clause sometimes found in written contracts states that:

"The interpretation of this agreement shall be by reference to the clauses, schedules and appendices of this contract which shall constitute the entire agreement between the Parties."

The purpose of this standard (or boilerplate) clause is to specifically exclude from the agreement any advice, comments, information, sales talk and other 'sugar coating' or explanations and descriptions that may have been given orally or in writing **prior** to the final draft. Obviously, both parties need to carefully check the final draft to ensure that nothing of significance to them has been omitted or is open to interpretation, especially if the other party drafted the contract and thus largely determined the scope of the agreement, or if standardised international (eg, FIDIC) or national (eg, NZ 3910) contract templates have been used.

Figure 10.17: Contract Validity Check



Apart from providing a (hopefully) clear, accurate and comprehensive permanent record of what the parties agreed, written contracts can have some further advantages, namely:

- they provide a checklist of rights and obligations
- they provide evidence to support investment proposals
- they provide an agreed framework for changes, dispute resolution, indemnity, liability, Force Majeure, and other legal provisions
- they provide some protection against competition
- they reduce business risk and the chances of litigation
- they help cement longer-term partnerships.

However, the importance of the written contract varies from culture to culture. For example, in NZ, Australia, South Africa, USA, Canada and UK written contracts are almost always upheld, whereas oral contracts are quite often broken. In Japan, in contrast, oral contracts are considered to be as binding as written contracts. And in some Muslim countries the written contract is regarded as offensive as it reflects on their perception of honour and trust. Some South American countries might view a written contract as a statement of intent or ‘wish list’ and not necessarily as legally binding. Chile would be an exception. Globalisation has highlighted such differences and difficulties, including the need to specify under which law the contract will be interpreted.

Also, since the obligations of the contractor or subcontractor (ie, provider or supplier) are usually more onerous than those of the employer (or client, owner, purchaser), it makes a lot of sense for the provider to take the initiative in drafting the contract, but again recognise that there’s no such thing as a ‘take it or leave it’ contract, and these should simply be regarded as a basis for negotiation.

Drafting the Contract

The drafting of the contract might take place after the negotiating phase, or a draft contract might be the basis for tendering or negotiation. One approach is to use a standard industry contract and confirm which terms are applicable and which are not, including additional or alternative wording as appropriate. Such standard contracts help ensure that everything is addressed, and their clauses have usually been validated through usage.

But a word of warning—because no two contractual arrangements are ever identical, we shouldn’t simply change names and dates on the last contract for use in our new circumstances. Thus, some do’s and don’ts about contract drafting are:

- **Make it look professional.** It’s the company image that we are projecting.
- **Avoid fine print.** All text should be same size since it’s all important. However, liberal use of headings in bold is suggested for easy reference purposes.
- **Have a Table of Contents.** For ease of reference have a Table of Contents with page numbers (and/or clause numbers) at the start of the document.
- **Prepare a complete document.** If reference is made in the body of the contract to such items as Standards, Pay Awards, Department of Statistics information etc, then where practicable include these documents as appendices or attachments to help ensure completeness, clarity, convenience and coherence. But also try and minimise the number of appendices.
- **Make use of definitions.** Definitions often allow for brevity and clarity. For example ‘Scope of Agreement’, once accurately defined, means that the complete list of products and services

doesn't need to be repeated on each occasion. We usually place the list of important definitions at the front of the contract document. A glossary might also be included.

- **Ensure clauses are in harmony.** In search of a speedy accord, it is easy to end up with clauses that are in conflict with one another, which then become the basis for misunderstandings and disputes. Further, it is important that proposed changes be properly coordinated. The possibility of conflict between clauses increases if more than one person is responsible for drafting the contract or we alter one clause in isolation.
- **Keep the language simple.** Lawyers have a penchant for French and Latin expressions, long complicated words, sentences and paragraphs, and a dislike for punctuation. The answer is to keep the sentences in our contract short. This measure helps us avoid the pitfalls of punctuation, syntax and grammar. Our writing becomes readable. Try not to perpetuate inappropriate expressions and styles. 'Reader friendly' is the objective. Words such as 'vehicular' suggest the contract hasn't been updated for some decades.

Layout of Contract

A contract should be likened to a simple, precise, logical story. It shouldn't read like a John Le Carré thriller, written out of chronological sequence with the impact of obscure clauses apparent only at the third or fourth reading.

So despite the mass of information that may form the subject matter of a contract, it aids both parties if the contract follows a logical, predictable layout such as follows:

Section One. Introduction

- title page
- amendment history
- table of contents
- preamble/general description
- definitions, interpretations and document precedence
- contract details and agents.

Armed with this information the reader is able to better understand the next section.

Section Two. Main Commercial Terms

- responsibilities
- scope of agreement
- specifications and drawings
- term of agreement
- statement of work
- schedule of work and drawings
- prices, schedules of rates, fees, and taxes
- target price
- price variation provisions
- claims and invoices
- disputed and unclaimed invoices
- payments and milestones
- late payment default interest

- reports and meetings
- conflicts of interest
- variations
- user training, commissioning
- termination
- dispute resolution
- access rights
- acceleration
- defects and liability period
- permits
- customs
- delivery.

The above section is the guts of the contract, where the main obligations and rights of the parties are set out.

Section Three. Performance Standards

- rates of supply
- mode of supply
- forecasting
- quality standards
- quality assurance
- guarantees and warranties
- service standards
- sampling and testing
- tests on completion
- audits and inspections
- statutory obligations
- failure to perform, delays and extensions
- incentives
- quality assurance
- health and safety, environment, clean-up, pollution, waste, spillage
- alcohol and drugs
- disturbance, nuisance and inconvenience
- site conditions and security
- industrial relations
- confidentiality and nondisclosure
- waivers and modifications
- notices and certifications.

It is this section immediately above that often exhibits the greatest variation from contract to contract. This section customises the contract to reflect the uniqueness of the agreement.

Section Four. Legal Provisions

- liquidated damages, penalties, consequential losses, damages
- liability, indemnity

- insurance
- Force Majeure
- hardship
- mediation
- arbitration
- subcontracting
- retentions
- bonds
- intellectual property and copyright
- good faith
- ownership change
- independent contractor status.

The construction of this section is traditionally left to lawyers, but in reality the law is not so complicated that an informed layperson cannot draft and interpret these provisions. Nevertheless, always best to consult a contract lawyer when unsure.

Section Five. Administration

- maintenance of records
- law of agreement (applicable law), language, currency and time zones
- permits, approvals, licences, parking
- notices, correspondence, public announcements, advertising and promotion
- signatures (including witnesses), dated, initials
- distribution of copies.

Contracts may consist of two parts – general conditions (boiler-plate clauses) and special conditions specific to a particular contract. Some typical contractual terms are defined at Appendix One.

Force Majeure

A Force Majeure clause excuses a party from liability for non-performance where that non-performance is the result of an event of Force Majeure (ie, circumstances beyond that party's control).

It is important to note that Force Majeure clauses are excuse clauses, not compensation clauses. While a party might be excused from non-performance, they will not become entitled to any compensation from the other party due to the event of Force Majeure' (unless the contract specifically says so).

If there is no Force Majeure clause in a contract then the parties apply the legal doctrine of frustration, which does not cover exactly the same ground as Force Majeure.

The consequences of a contract being legally frustrated can be drastic. It discharges both parties from any further performance and terminates the contract. Nevertheless, the NZ Frustrated Contracts Act 1944 does provide for some compensation for performance rendered up until the point where frustration kills the contract.

Force Majeure clauses are flexible. The parties themselves can agree in advance on the events which will excuse performance, and also the consequences of those events occurring.

Force Majeure clauses primarily benefit the party whose obligation to perform requires something other than payment. For example, under a building contract a Force Majeure clause will usually

benefit the builder. However, there are also benefits to the party whose obligation is simply to make payment. The aim of the Force Majeure clause is to achieve a fair distribution of risk for unforeseeable events beyond the parties' control. Any contract which contains an unfair allocation of risk is ultimately likely to result in an increase in price, or the parties ending up in dispute.

What events? Because of the uncertain meaning of the term Force Majeure it is useful to pre-define the events which will excuse performance. Most standard form contract will refer to *"any act or event beyond the control of the parties, including a standard list of events such as earthquakes, floods, tsunamis, terrorism, wars and civil unrest, meteorites, nuclear events, nationwide strikes, lockouts, sabotage, fire etc"*. It is however important to consider the nature of the particular contract and time and place of performance. Different events will be relevant to a building contract in New Zealand than to a supply of goods contract between parties in Asia.

Obviously in New Zealand physical events such as earthquakes and volcanic eruptions may be relevant, and the possible affect of weather patterns such as La Nina and El Nino may also have to be considered. The key is not to rely on standard clauses drafted for a different type of contract in a different part of the world, but rather to consider the particular circumstances of the contract, time, and site at hand.

What obligations should be excused? Generally Force Majeure clauses excuse non-performance of obligations other than the obligation to make payment. However, the obligation to make payment should be covered under some contracts such as international transactions where there is a risk of governments imposing exchange controls or blocking off-shore payments.

Notification requirements. Some Force Majeure clauses are drafted to operate automatically once a Force Majeure event occurs. It is better to provide that the clause can only be relied on if the party has given written notice to the other party of the occurrence of the event and its intention to apply the Force Majeure clause.

Obligation to mitigate. A party must take all reasonable steps to mitigate the adverse consequences of a Force Majeure event.

The effect of 'Force Majeure'. The great advantage of a Force Majeure clause is it enables the parties to agree on the effect of the occurrence of an event of Force Majeure. The primary effect is usually to excuse performance which is prevented by the event.

Often the effect will be to extend the time for performance (but not to provide compensation for the delay). It is also prudent to include a clause entitling either party to terminate the contract if an event of Force Majeure or the consequences of its occurrence, is ongoing and prevents performance for greater than a specified length of time.

We might list those events which both parties agree are covered by Force Majeure and those that aren't. Foreseeable events (eg, annual flood) are not usually included. Exceptional adverse weather could be included. A strike by the contractor's workers may not be a Force Majeure event if the contractor's actions or inactions caused the strike.

Contract Interpretation

While a contract is a legally binding agreement, some contracts or contract clauses are ambiguous. In which case they are interpreted according to the following legal principles:

1. **The courts will not look outside the contract.** The only exception is when a contract is silent on a point. Otherwise the content of the contract is paramount.
2. **Intention of the parties is key.** This intention is objectively not subjectively assessed.
3. **All language is given its ordinary meaning.** Where a word has both an ordinary and a specialised meaning, the ordinary meaning will apply unless it is proved that the parties intended the specialised meaning would apply. Technical definitions should therefore be included in the contract.
4. **The contract as a whole is considered.** Contracts are interpreted as a whole when determining the intention of the parties even though the problem may be the meaning of a single clause. The clause is interpreted in context. And any obvious mistake in spelling, grammar or punctuation will either be ignored or corrected by the Court.
5. **The terms of the contract must be certain.** Contract terms must be definite, precise and specific, otherwise the contract may be declared unenforceable. Avoid adjectives and adverbs. Be more precise. Use numbers if possible.
6. **The circumstances surrounding the contract are relevant.** No contracts are made in vacuum. There is always a setting or context in which they take place. It is appropriate to interpret the contract according to the market in which the parties are operating.
7. **Pre-contractual conduct or negotiations are not usually relevant.** For example, draft contracts are not usually binding or admissible unless they help determine the intention of the parties.
8. **Where ambiguous, the document will be interpreted against the party who prepared it.** This is the 'contra proferentem rule' when interpretation is genuinely ambiguous. Ambiguities are interpreted against (contra) the party who proffered (proferentem) the clause. It is especially applicable to exclusion clauses.
9. **Ejusdem Generis Rule.** A word at the end of a list is strictly confined in its meaning to the words preceding it. For example, a lease containing a provision for a reduction in rent if the premises were "*destroyed by fire, flood, storm or other accident*" the other accident cannot be interpreted as an act by the contract parties (eg, bath tub overflows). Best to be specific.
10. **Terms can be implied into a contract.** However, such terms can only be included by implication where it is:
 - necessary in order to give business meaning to the contract
 - so obvious it goes without saying
 - consistent with any express condition in the contract
 - reasonable and equitable.
11. **Exclusion clauses must be clear.** An exemption clause will not relieve a party from liability for negligence unless it does so expressly and clearly.
12. **Reference to other documents.** Where this occurs, the full text of the other document is part of the contract. We should therefore be familiar with all such documents before we sign a contract.

13. **Validate the contract.** Where wording is ambiguous or doubtful, the Court will give a meaning to the words, if possible, which supports rather than invalidates the contract.
14. **Unsigned contracts.** Where past dealings by the parties have consistently complied with the unsigned contract terms, the unsigned or verbal contract is binding.

It can be useful to expose areas of potential misinterpretation in advance by using a pen to highlight all adjective and adverbs in the contract. Can we substitute figures?

Treaty of Waitangi. We are confused because our Treaty contract uses language that means anything we want it to mean. For example, those demanding oil and gas reserves rate them as a 'treasure' recognised by the Treaty's blanket use of the word 'taonga' to cover anything the signatories considered valuable or might consider valuable at some future date – the perils of vague expressions.

The Sunday Star Times
25 May 2006

Managing the Contract

So the contract has been signed. Now it must be managed. Some points to remember when doing so are:

- **Housekeeping.** When the final version of the contract is signed, recall the drafts. Also keep the signed contract in a safe place for six years or whatever statutory period prevails.
- **Appoint a Contract Manager.** The contract manager, who may also be the project manager, is responsible for all aspects of contract administration. We may delegate some responsibilities, but it is then our job to ensure such people clearly understand what is required of them and know how and when to implement the contract provisions.
- **Managing Disputes.** While written contracts reduce the chances of litigation, disputes still arise. Most disputes arise over work performance, delays and payments. The process for resolving disputes should be included in the contract. The options in order usually are:
 - negotiation/problem solving
 - mediation
 - arbitration
 - litigation.
- **Managing Variance.** Variance is the difference between planned performance and actual performance. The detection of variance depends on establishing effective control arrangements including reports, visits, meetings, audits, sampling and testing, and surveys. The main concerns are keeping to schedule and within the budget, while meeting our other contractual obligations.

- **Managing Variations.** Variations are changes. They may be initiated by any stakeholder, but need to be approved by the owner before they are implemented. The contractor's job will be to price the variations and recognise and advise other contractual consequences. Large or unusual variations may be the cause of dispute. Remember:
 - **changes** to the work create
 - **delays** that cause
 - **disruption** to on-going work that
 - **impact** tasks
 - **compress** tasks
 - **accelerate** tasks, and cause
 - **overruns** leading to
 - **claims** and **disputes**.

Typical variations include:

- increase or decrease to quantity of existing work
 - change of character or quality of any such work
 - additional new work.
- **Submitting Claims.** A claim is a request for compensation not covered by normal payments. The contractor should submit claims for payment under the contract in a timely manner. The contractor must be able to prove the cost impacts were caused by actions or requests by the owner. Most claims are legitimate and do not give rise to disputes. Delays are the main cause of claims. Critical path methods are well suited for delay analysis. Before accepting a change order, the contractor should update the contract schedule. Avoidance of claims is the best approach by all parties. As we can imagine, fixed price contracts usually attract more claims than cost-reimbursable contracts.
 - **Progress Payments.** The contractor will check and pay subcontractor's invoices for satisfactorily completed work usually on a monthly basis as provided for in the contract. Provisions such as "*pay when paid*" in contracts between contractors and their subcontractors, once prevalent in the building industry, no longer apply under NZ law.
 - **Preserving the Margin.** Fundamentally, contractors sell their time, supplies, labour, plant, equipment and expertise. The efficient use of these assets will determine their profit margin – the primary reason for undertaking the contract. Such efficiency (ie, productivity) is achieved through good project management.

Contractor's Perspective

As a project manager, it's very useful to understand the contractor's perspective, where the following best practice guidelines are frequently applied:

- Maximise the profit (price less cost) without performance loss.
- Get agreements in writing – clear, complete, correct, and specific.
- Ensure the job is in a known financial state at all times.
- Monitor and maintain progress against the contract schedule.
- Appropriately document all communications.

- Notify and claim variations as they arise – don't let them accumulate.
- Enhance longer-term client relationships, but not by conceding every issue.
- Always behave in a legal and ethical manner.
- Set up and maintain a readily accessible contract file.
- Meet (but don't exceed) obligations under the contract.
- Comply with all statutory requirements – national and local laws.
- Understand contractual terms and the basis for the price.
- Settle concerns, disputes and issues properly and promptly.
- Ensure all required insurances are in-place before work starts.

Working Relationships

The working relationship between an owner and a contractor is one of the most important determinants of contract and project success.

A positive relationship can help overcome the issues which inevitably arise. Conversely, small problems can become insurmountable if the relationship is poor.

Some factors that will influence this relationship are:

- **Type of Contract.** Under cost-reimbursement contracts, the owner takes most of the risks, has more control, and therefore has more say about how the work is done. Under a fixed price, the contractor has agreed to perform a given scope of work for a fixed sum. The owner must be specific about what is to be done.
- **Supervision.** The extent to which the owner wishes to check on contractor performance may help or hinder their relationship. An effort should be made to make best use of both owner and contractor resources. However, this needs to be done carefully to avoid 'snoopervision', demotivation, duplication of effort, and compromise of the contractor's responsibilities.
- **Key People.** The responsibilities of key managers on the project have an influence on project success. The owner and contractor project managers are among the most critical. Hopefully their personalities are compatible. And the manner in which individual team members interact is also important. Ideally both teams are capable, show mutual respect, and understand and perform their respective roles in a professional manner.
- **Scope of Work.** The less defined the scope, the greater the need for owner-contractor cooperation and communication. The size of the project also impacts the relationship. The larger the scope, the greater the need for effective communications. Vague descriptions cause confusion, variations and conflict.
- **Third Parties.** Managing the relationship between owner and contractor becomes more difficult when a third party (eg, engineer or architect) becomes involved. If we were to poll contractors and ask them, above all else, what would they like to see happen in contract administration, don't be surprised if they answer *"To have a contract characterised by timely, unbiased and reasonable action by the engineer."*
- **Contractual liabilities.** The more liability the contractor accepts for technical errors, poor

workmanship, and consequential damages, the greater the potential for an adversarial relationship, particularly under a reimbursement contract.

Partnering

Relationships between contract parties were historically antagonistic, with each party defending its corner vigorously while simultaneously trying to squeeze one more concession out of the other party. Tensions are heightened in recession markets and in periods of low margins and high competition. But companies are often now taking a more conciliatory approach to their dealings with contractors, believing that more profitable results can be gained from a win-win negotiation than from hard bargaining.

Partnering is not a new concept – it has been around for years in the form of strategic alliances and joint marketing, to name but two incarnations. But the kinds of partnerships being entered into now incorporate a long-term vision and a level of formality greater than the casual arrangements of the past.

Partnering may be defined as client and contractor agreeing to work closely together to leverage their combined resources. Partnering aligns strategies, systems and resources to improve mutual efficiencies while enhancing the offer to the consumer. A fundamental of effective partnering is the recognition that both parties' performance, productivity and profitability goals are complementary.

Figure 10.18 summarises some main relationship differences between traditional contracting and contemporary partnering.

Alliancing

Alliance relationships are best suited for providing services that are difficult to define or are likely to change substantially over time, critical to an organisation's performance or requiring innovative solutions from the provider and creative management by the purchaser. They are also useful where the industry from which the goods or services come has only limited experience, such that providers are not able to adequately predict the price of goods or services. They are also beneficial for long-term, strategic contracts where each party relies absolutely on the performance of the other.

Alliance relationships are perhaps the pinnacle of contractual cooperation. They demonstrate a shared vision by the contracting parties and an understanding of each other's operations including mutual reliance and a determination to achieve the best for each other and related stakeholders.

Figure 10.18: Contractual Relationships

Traditional (adversarial)	Partnering (cooperative)
confrontational short-term litigation distrust need-to-know 'snoopection' many providers arms-length win-lose bureaucratic intimidation and penalties directs and orders explains what takes credit long hours stressed mistakes punished risks transferred	friendly long-term problem solving trusting open communications empowerment fewer providers close commitment win-win mutual success simple and innovative incentives and rewards seeks agreement explains why gives credit focus on performance problems solved risks shared

Some key elements of alliance relationships include:

- a no-blame, no disputes philosophy
- open-book or transparent accountability, including detailed performance or outcome terms with incentive-based remuneration linked to measurable KPIs
- team development, based on best for job allocation of resources and the efficient use of expertise
- co-located project premises for both purchaser and provider to facilitate the sharing of information, knowledge and skills
- communication and quality training
- contractor usually involved prior to contract negotiations
- trust and alignment of objectives across all participants
- use of SLA's with regular reviews of strategic direction, and performance for them clearly allocated
- the open identification and appropriate allocation of risks.
- risk-reward philosophy with a willingness, as appropriate, to share losses and profits.

One obvious risk to address and manage in alliance relationships is that the parties get too close. This is natural convergence but may present risk for all concerned if it is not managed.

Health and Safety

The NZ Health and Safety in Employment Act requires that the client *“take all practicable steps to ensure that no employee of a contractor or subcontractor is harmed while doing work they were engaged to do.”*

The client therefore needs to ensure that the selected contractor:

- is competent to undertake the work
- has appropriate health and safety policies and procedures
- is made aware of inherent hazards of the owner’s worksite.

Also, the client must monitor the contractor’s safety performance and take action if unsafe practices are observed.

Depending on the level of risk associated with the contract work the successful tenderer may be required to:

- submit a safety plan
- regularly report on safety issues
- attend a site familiarisation visit
- report on any accident which did or could have caused serious harm.

The following wording might be included in contracts:

“The Contractor shall ensure all employees and Subcontractors are aware of and comply with their duties and responsibilities under the Health and Safety Act and its Regulations.”

The Act requires employers to take *“all practicable steps”* to ensure the safety of employees while at work. Employers must:

- provide and maintain a safe work **environment**
- provide and maintain **facilities** for health and safety
- ensure that **plant** is designed, made, operated and maintained in a safe condition
- ensure that employees are not exposed to **hazards**
- develop **procedures** for dealing with safety emergencies
- ensure that employees **know**:
 - what to do in an emergency
 - possible workplace hazards
 - how to minimise the likelihood of harm (eg, safe use of equipment)
 - how to access safety clothing, devices, equipment and materials.

And employers can be liable for any failure of their employees to comply with the employer’s safety arrangements and procedures. The principle is that the employer has ultimate responsibility and this responsibility cannot be discharged by merely employing a safe contractor.

In the case of contractors, the principal contractor on the worksite is deemed to be the *‘person in control’* and thus retains overall responsibility for the safety of all workers on the site, including those

employed by subcontractors.

The Act also requires that employees take all practicable steps to ensure their own personal safety and that nothing they do (or fail to do) causes harm to others.

From the employer's perspective, the Act raises some concern regarding stress:

- how to recognise and manage employee stress
- prospect of instant fines and heavier penalties
- prospect that any change to workplace responsibilities, procedures, processes or practices may cause stress
- how much employee stress is attributable to the workplace (ie, work-related) and how is it measured.

However, stress management is a shared responsibility. For example, employees are to advise employers if they are suffering stress to a level that may result in workplace injury.

Managing Disputes

An unambiguous and fair contract should help minimise the likelihood of disputes. Nevertheless, it is sensible to decide in advance how disputes might best be managed. The process may occur as per Figure 10.19 and a comparison of mediation, arbitration and litigation means of dispute resolution is summarised at Figure 10.20.

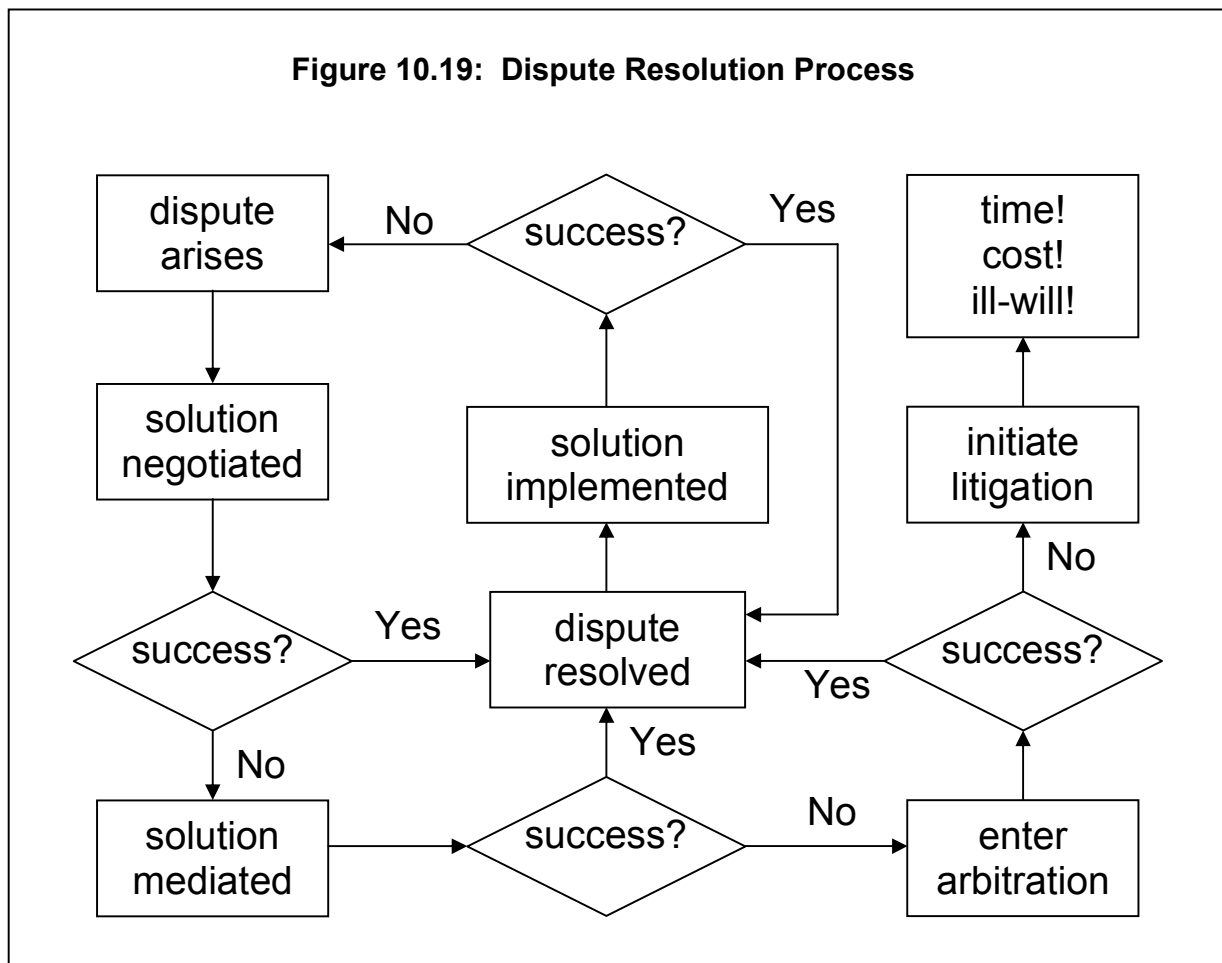
Litigation and its attendant expenses is sometimes subject of complaint by contract managers. The main causes of concern are:

- poor quality of contract documentation including errors, omissions and ambiguities
- attempting to 'fast track' the contract
- selecting the lowest bid when evaluating tenders
- allocating risks however unforeseeable to the contractor
- using unsuitable subcontractors
- prolongation of claims by the contractors, subcontractor or supplier
- variations to the contract.

The above reasons are exacerbated by the:

- untimely presentation of claims
- poor quality claims
- inadequate dispute resolution procedures.

Figure 10.19: Dispute Resolution Process



Focusing on the lowest price alone to determine the successful contractor is usually very short-sighted. The lowest bid may have a profit margin of five percent or less, yet most projects are pioneering endeavours and need a margin for unforeseen risks, disruptions and delays. The lowest price might also invite scope and quality issues once work is underway.

Perhaps bids as much as 15 percent below a properly determined estimate or the next lowest tender price should be rejected unless the contractor is able to establish that the price is reasonable and realistic. The work requirement may have been misinterpreted.

A better criterion is 'lowest acceptable' price in view of the contractor's financial capacity, track record, claims history and the tender programme. 'Value for money' needs to be emphasised.

Clients complain that a large 'end of contract' claim is difficult to verify, but conversely, where the contractor must give a warning of a claim and comply with notification limitations, these provisions increase the client's administration costs and may prompt the contractor to 'snow' the contract manager.

Figure 10.20: Dispute Resolution Methods

Characteristic	Litigation	Arbitration	Mediation
Confidentiality	No	Yes	Yes
Choice of Adjudicator	No	Yes	Yes
Range of Issues	As Pleased	As Specified	Open-ended
Flexible Procedure	Low	Moderate	High
Delay Potential	Moderate	Low	Very Low
Control of Parties	Low	Moderate	High
Susceptible to Tactics	Moderate	Low	Very Low
Control over Witnesses	High	Moderate	Low
Power to Compel	Yes	No	No
Binding Decisions	Yes	Yes	No
Cost	High	Moderate	Low
Time	High	Moderate	Low
Partnership Preserved	Doubtful	Moderate	Highly Likely

Contractor's complaints are inclined to focus on:

- The inability or refusal by the client to provide timely and relevant information.
- The client's failure to accept justified tender qualifications (ie, tags) or to consider problems which may occur after commencement of the project.
- The client's lack of appreciation of the contractor's financial vulnerability to matters such as delays or claims by subcontractors.
- The client's refusal to negotiate on claims forcing matters into dispute where the legal process is used to delay or avoid meeting claims.

Errors or ambiguities in contract documentation and its late delivery are perhaps the greatest cause of claims, disputes and litigation. Getting the documentation right means, among other things:

- Ensuring that the client's commercial objectives and performance requirements for the project are adequately defined.
- A fair allocation of contractual obligations and risks, and ensuring the contract documentation accurately records this allocation.
- Trying to anticipate delays and delay costs.
- Documenting how disputes are to be resolved. In particular this means considering possibilities such as providing for negotiation as a preliminary step in the resolution of any

disputes, providing for a contract mediator to resolve disputes, or including provisions such as delay costs.

It is surprising how often the parties to substantial projects fail to allocate the necessary time, money or professional advice to getting the contract documentation right at the outset. Uncertainty through poor documentation increases the risk to all parties. And hopefully the contract document does not languish in the bottom drawer. Rather it should be a 'living' document, which is frequently referred to by the parties and further refined with experience.

Construction Contract Act

This Act requires, in the absence of an agreed payment schedule, that contractors have a right to be paid on a monthly basis. It also sets up a fast-track adjudication process for payment disputes. Some parts of the construction industry would like clients to put up bonds to ensure contractors get paid. The rationale being that the principal contractor shouldn't have to bear the entire risk to be taken from subcontractors. The Act contains some measures designed to protect subcontractors:

- **First**, a dispute has to go to adjudication within 28 days. Contractors have the right to appeal an adjudicator's decision against them, but they have to pay the subcontractor money owing immediately, and then try and get it back through legal action. This is designed to stop spurious counter-claims.
- **Second**, the legislation outlaws 'pay if or when paid' type clauses. Contractors cannot withhold payment on the grounds someone up the chain hasn't paid them.
- **Third**, a subcontractor who hasn't been paid on time is allowed to stop the job, and the contractor is not allowed to keep it going by contracting it out to another subcontractors.
- **Fourth**, the legislation reintroduces liens, but in compromise form. An adjudicator has the power to allow a contractor to place a lien over the land on which a construction is being built. The developer is not able to sell while the dispute remains unsettled. This provision protects only major contractors not subcontractors; not yet, anyway.

Mediation

When a negotiation reaches or appears to be approaching an impasse, the parties may wish to make use of a mediator. The mediator functions as a facilitator, assisting the conflicting parties to move towards a resolution but not attempting to impose their agreement. This is the crucial difference between mediation and arbitration – a mediator is a go-between whereas an arbitrator is a decision-maker. An arbitrator can recommend and/or impose a solution on the parties. Arbitration is common in US.

Mediation can be viewed as a negotiation that has the assistance of an outside person who is, or at least should be, skilled in the negotiating process. Besides knowing and practising good negotiating, a mediator may observe the following guidelines:

- Serve as the communications channel between the parties when necessary. Often, a mediator is used because of an inability of those in conflict to communicate in a productive manner. However, if a longer-term relationship is to be established and maintained, the mediator must attempt to build the direct communication channels between the parties by insisting that whenever possible they communicate directly.
- Gain the trust of both sides. The mediator must be scrupulous in respecting the confidentiality

of information received from each side. The first time the confidentiality is broken, the mediator loses their effectiveness. It is not uncommon for the mediator to be tested by planting false information.

- Restate positions to make them more acceptable or, at least, less objectionable. A position can often be stated in many ways without distorting its essential content. A good mediator can also work with one side at a time encouraging them to reconsider their stand and perhaps get them to appreciate that their position must be modified. This is the essential character of 'shuttle diplomacy' in which the parties are physically apart – but joined in the process by a travelling mediator.
- Develop a positive climate. Put a damper on emotional outbursts that are aimed at hurting or embarrassing the other side. Such techniques as reflecting their behaviour back to them, calling time-out, or exercises in role reversal may be effective in some situations. Even such obvious things as choosing a neutral location can improve the climate. Encourage the parties by summarising points of agreement and highlighting progress.
- Be a good listener. Help the parties by giving them a sounding board for their positions and a place to vent their frustrations. This may result in a clarification of their positions and the reduction of the barriers to an agreement.
- Handle the logistics. If the mediator can look after the details of location, coffee, etc, the parties can concentrate on the content issues. The agenda is a particularly effective tool for controlling the process and should be prepared through consultation with both sides in the dispute.
- Educate the parties in the nature of the negotiating process. Help them become more independent and thus better able to find their own agreement.

From the points listed above it is clear that the mediator must have all the attributes of a skilled negotiator with an emphasis on observation and listening skills. They must be creative, sensitive, fair, flexible, and excellent communicators. A good mediator also has a power base built on reputation, expertise, information, and association.

Payment Arrangements

Contracts can be classified according to their agreed payment arrangements:

- lump sum
- schedule of rates
- hourly rates
- labour only
- cost reimbursable.

Lump Sum. A firm fixed price for the work is agreed at the start. This is appropriate when the specification is detailed and specific, and where the requirement is a standard deliverable. Client is less involved, and the provider assumes most risk.

Schedule of Rates. A schedule of rates often shows the cost per hour to do various specific types of work. It is useful when the overall contract package cannot be sufficiently identified to produce an accurate lump sum. An example would be a rubbish collection contract with a set price per standard

bag collected. The schedule of rates allows for payment of units of work satisfactorily completed, rather than for time taken. There is therefore some incentive for the provider to work efficiently in terms of time. An agreed schedule of rates also allows for the ready and standardised costing of variations.

Hourly Rates. Consultancy services are often paid for on an hourly rate. There is little protection for the employer against excessive time spent on the project. Long term contracts on this basis are usually inappropriate. The employer needs to be assured that the contractor uses people with the necessary experience and expertise.

Labour Only. The hourly rate contract usually includes materials, equipment and other incidentals. A 'labour only' contract is just that. We provide the equipment and facilities. Employers need to ensure that 'labour only' contractors are not, in law, deemed to be employees.

Cost Reimbursable. A cost-reimbursable contract with a fixed fee structure ('cost plus') is appropriate when the scope of the work cannot be clearly defined. The fixed fee element would normally cover the contractor's overheads, risk and profit. One disadvantage might be the lack of incentive to minimise costs. The contractor is unlikely to lose money albeit their profit is modest.

If invoices can't be paid, receivership is a likelihood. And receivers can't satisfy everyone. The sequence for payout in cases of receivership is:

1. receiver's fee
2. debenture holders (usually a bank)
3. preferential creditors employees' wages, salaries, holiday pay to maximum of \$6,000 per employee, GST and PAYE owed to IRD
4. unsecured creditors (suppliers, contractors, consultants, employees' redundancy, wages, salaries and holiday pay above \$6,000)
5. shareholders (preference then ordinary shareholders).

Good idea to check out their solvency before signing the contract. A client's bankruptcy doesn't absolve the contractor from paying suppliers and subcontractors. And if suppliers and subcontractors go into receivership our contract could be in jeopardy. Screwing them down to the last dollar may not help. They too need some profit.

Cashflow

The key to managing cashflow is simply to ensure cash comes in faster than it goes out, because if sufficient cash isn't available to meet expenses, money must be borrowed (or not used elsewhere) which adds to the project cost through interest charges.

Ideally, the contractor might prefer to be paid the full price at the start of the project, and the client would no doubt prefer to pay only on satisfactory completion of the entire project. The compromise is usually progress payments routinely (normally monthly) throughout the project life for satisfactorily completed, clearly identifiable, pieces of work. Unless there is a significant deposit at the commencement of the project, it is unlikely that any profit becomes evident until the end of the project. Incidentally, the law does not require an initial deposit.

Thus, most contracts call for monthly reimbursement for work completed, less retentions if these are

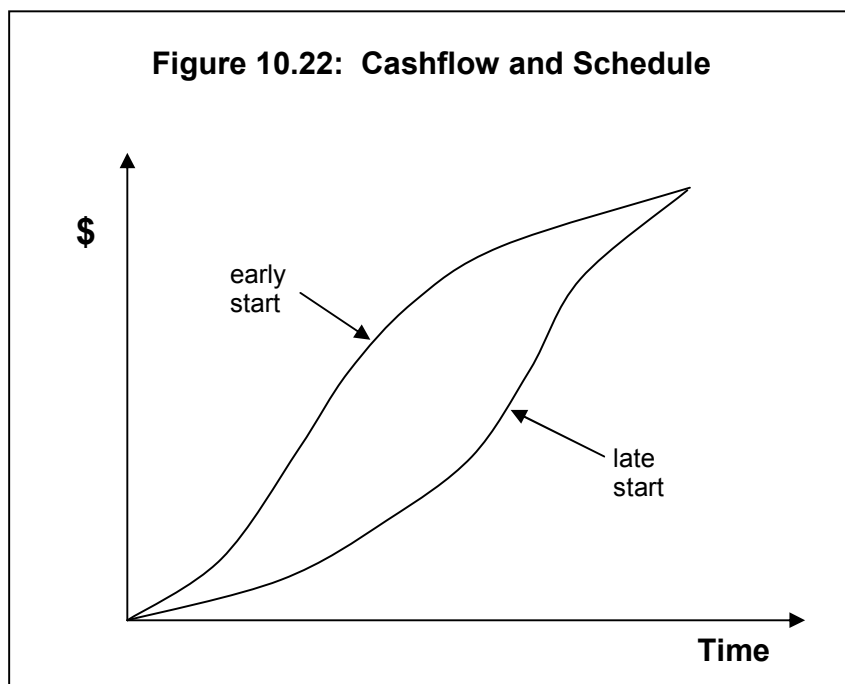
applicable. Retentions might apply when it's difficult to verify the quality of work completed until the end of the project or later. Labour costs are usually paid in the month they are used. Material costs vary from an up-front payment, cash on delivery, or 30 to 120 days credit. The income from the client (up-front payments, stage payments or progress payments) is usually one month after invoice. Cashflow is illustrated at Figure 10.21.

Figure 10.21: Cashflow Example

Time Period	Contractor's Expenses	Client's Payments	Net Cashflow
1	\$3,782	Nil	-\$3,782
2	\$7,458	\$6,473	-\$985
3	\$10,425	\$9,334	-\$1,091
4	\$14,736	\$13,348	-\$1,388
5	\$11,420	\$16,832	+\$5,412
6	\$5,679	\$15,538	+\$9,859
TOTAL	\$53,500	\$61,525	\$8,025

The banana curve (or envelope) at Figure 10.22 indicates the difference in cashflow depending on whether the schedule is based on early start or late start. The former is more able to accommodate delays. However, that often means a negative cashflow until late in the project. Some strategies to help ensure a positive cashflow or at least minimise any negative cashflow consequences are:

Figure 10.22: Cashflow and Schedule



- delay payments if practicable, but not unreasonably
- arrange longer, interest-free, credit periods
- arrange for more frequent income payments with early payment discounts
- ask the client to pay suppliers directly (although we may lose our mark-up and discount) and seek deposits before work commences
- delay work on non-critical tasks
- if possible avoid retentions (where some 5-10% per month is withheld against defects for a liability period, sometimes up to 12 months after commissioning)
- require periodic adjustments for inflation and escalation
- longer-term cashflows to be discounted to present day values for realistic assessments to be made
- avoid waste
- reduce lead times
- collect bad debts
- hand-deliver invoices
- sell off excess inventory
- use cheaper technology
- buy cheaper materials (no 'gold-plating')
- reduce testing and checking to an acceptable minimum.

And remember our ability to influence costs and cashflow diminishes as the contract proceeds.

Penalties

Liquidated Damages. The damages sum specified in the contract may either be liquidated damages or a penalty. The latter includes some punitive amount to encourage on-time completion, which the courts will not always enforce. The sum assessed should be reasonable in relation to damage caused. A percentage of the price is unlikely to be a valid method.

Performance Bonds. Bonds are held against a contractor's financial inability to meet a claim. Insurance cover may be another option. Some types of bonds are:

- **Bid Bonds.** Guarantee that a bidder will, in fact, upon award, enter into the contract at the bid price and at that time furnish the specified performance and payment bonds. The issue of a bid bond in itself serves to give the client the additional security of knowing the contractor has satisfied a very comprehensive prequalification review by the surety of the contractor's finances, previous experience, and capacity to perform the contract.
- **Performance Bonds.** Protect the owner from financial loss caused by the failure of the contractor to build the project in accordance with the terms and conditions of its contract. For the money lender, the bond provides assurance that if the contractor is paid, the project that secures the loan will be completed in accordance with the terms and within the time frame to the contract.

- **Payment Bonds.** Guarantee that all the labourers, subcontractors, and suppliers who furnish labour, services, equipment, and/or materials to the contractor for the performance of the contract will be paid even if the contract defaults.

Other Remedies. Sometimes a percentage of payment is retained for an agreed period as insurance against product defects. For example:

- 10% for first \$200,000
- 5% for first \$800,000.

Most contracts require the contractor to rectify any defective work within a specified period following completion; perhaps three months, unless agreed otherwise, may be a fair maintenance period. Sometimes a bonus for early completion may apply, if this is advantageous to the client. To be an incentive the bonus would need to reasonably exceed any additional costs an accelerated schedule incurs.

Extension of Time

The time for the completion of project work is usually specified in the contract. If not then there is an expectation that work will be completed within a 'reasonable' time and proceed with 'reasonable' diligence.

Failure to complete by a specified date is a breach of contract which usually gives rise to a claim for compensation. Contracts usually include provisions for time extensions and for damages in the event of delay. At the time of entering into the contract, the parties may provide for a specified sum of money to be payable by the party in default in the event of late completion.

The likelihood of delays can be avoided if contractors have the opportunity for their input on time required for the project. A tight timetable will discourage contractors from bidding, particularly if substantial liquidated damages are involved. When timing is tight, milestone dates might be specified with liquidated damages attached. The following are typical causes of delay:

- client supplied items
- contractors' error (eg, equipment failure)
- inclement weather
- Force Majeure
- labour shortages
- material shortages
- change orders.

There is usually only a time extension if works are delayed. The extent of the delay is the extent to which the critical path is delayed. The critical path needs to be updated as the project proceeds. If the responsibility for delay is unsure, the contractor is usually given the benefit of the doubt.

Contract Termination

There are a number of ways in which a contract may be brought to an end, and often the contract itself will contain specific provisions relating to termination. For this reason it is important to read the contract before we take any action to terminate.

Termination by Occurrence of Specified Event. This is where the contract specifies that it will terminate on a specific event occurring or not occurring. A common example is the agreement for the

sale and purchase of property, which often contains special clauses making the contract conditional on certain things being achieved, such as arranging finance or the prior sale of a house. These are conditional contracts.

Discharge by Agreement. Both parties may mutually agree to bring a contract to an end. Where the parties are yet to meet their obligations under a contract this is generally no problem – a party simply agrees to release their rights under the contract in consideration of a similar release by the other party. Where one party has wholly or partially discharged their obligation, then if the parties are to agree to end the contract, it must be under seal or supported by other consideration to be binding. This latter form is called ‘accord and satisfaction’.

Frustration of Contract – Force Majeure. Where, before the performance of a contract has been completed, a disastrous event occurs, which is beyond the control of either party, which renders further performance of the contract impossible or substantially impossible. In such cases the contract is said to be ‘frustrated’ and the parties will be discharged from their obligations. In practice, parties often insert provisions in their contracts in an attempt to deal with these occurrences, known as Force Majeure or hardship clauses. The principles which apply to such clauses are derived from the common law doctrine of frustration. Consequence of frustration is that it automatically brings a contract to an end, without further obligation. It doesn’t make the contract void, but terminates future obligations as to performance. This has led to some injustices where a party had partly performed a contract when the frustrating event occurred. So, in New Zealand, what happens next is now governed by the Frustrated Contracts Act 1944. The Act does not alter any of the common law on this doctrine, but regulates the consequences of it.

Misrepresentation, Breach of Contract, and Cancellation. Other than for the sale of goods, cancellation of contracts is governed in New Zealand by the Contractual Remedies Act 1979. In New Zealand, the rules of cancellation of a contract are the same in respect of breach of contract and misrepresentation (inducement).

Post-contract Evaluation

The post-evaluation process needs to be undertaken in consultation with all relevant stakeholders and resultant lessons are documented for future reference. Some useful questions are:

- Were solicitation documents satisfactory?
- Can all selection decisions be supported if challenged?
- Was satisfactory attention given risk management?
- How does the contractor now perform against original selection criteria?
- Were all contract documents properly maintained?
- Were contract terms complied with?
- Were the number and size of variations acceptable and were they properly managed?
- Were issues promptly and properly resolved?
- Was the final deliverable produced as per specifications, on time and within budget?
- How suitable were the contract documents? What changes would be needed should the contract be extended or repeated?

- Is the final deliverable providing the required benefits that justified the contracting decision?
- What lessons were learned?
- What improvements might be made to the procurement process?
- Would we use the contractor again?

Final Points

Outsourcing has a long tradition in project management and every project manager needs to understand the process, the essence of which is realising the associated advantages of outsourcing, and avoiding or minimising the potential disadvantages. Once we decide to contract out a project or part of a project, the basic challenges are:

- to unambiguously define our requirement
- to find someone who can and will do the job
- to agree performance standards
- to ensure they perform.

Some widely embraced key requirements, endorsed by Government, are:

- Give preference for best value for money over the whole of life.
- Open tendering is the norm for procurements over \$100,000.
- Planned procurements and open tenders to be advertised on GETS.
- Give fair and full opportunity for domestic suppliers.

There is no perfect contract management system. Given the inherent uncertainty involved in most project work, no contract can handle all the issues that emerge. Formal contracts cannot replace or eliminate the need to develop effective working relationships between the parties involved that are based on mutual goals, trust, open communication and cooperation. For this reason, the earlier discussion of project partnering and win-win negotiating is very important.

While some understanding of contract law is most appropriate, project and contract managers should not hesitate to take legal advice as required during the preparation and execution of contracts. A lawyer's timely involvement can save much conflict and confusion.

Once contracts are signed, project work normally commences. The next chapter concerns project execution, which is typically the phase where most work effort occurs during the project lifecycle. However, we should remember von Moltke's dictum that *"No battle plan survives first contact with the enemy."* Having a project plan is essential, but with execution comes the need for regular evaluation, adjustment, and sometimes even retreat is necessary.

For more on this topic I recommend 'An Introduction to the Law of Contract in New Zealand' by Chetwin and Graw, Edition 3, Brookers which is written for general readers. And Harry Mills' 'Artful Persuasion' MG Press 1999, bulges with shrewd advice for negotiators. See also www.acquisitions.gov/far.



Chapter Eleven

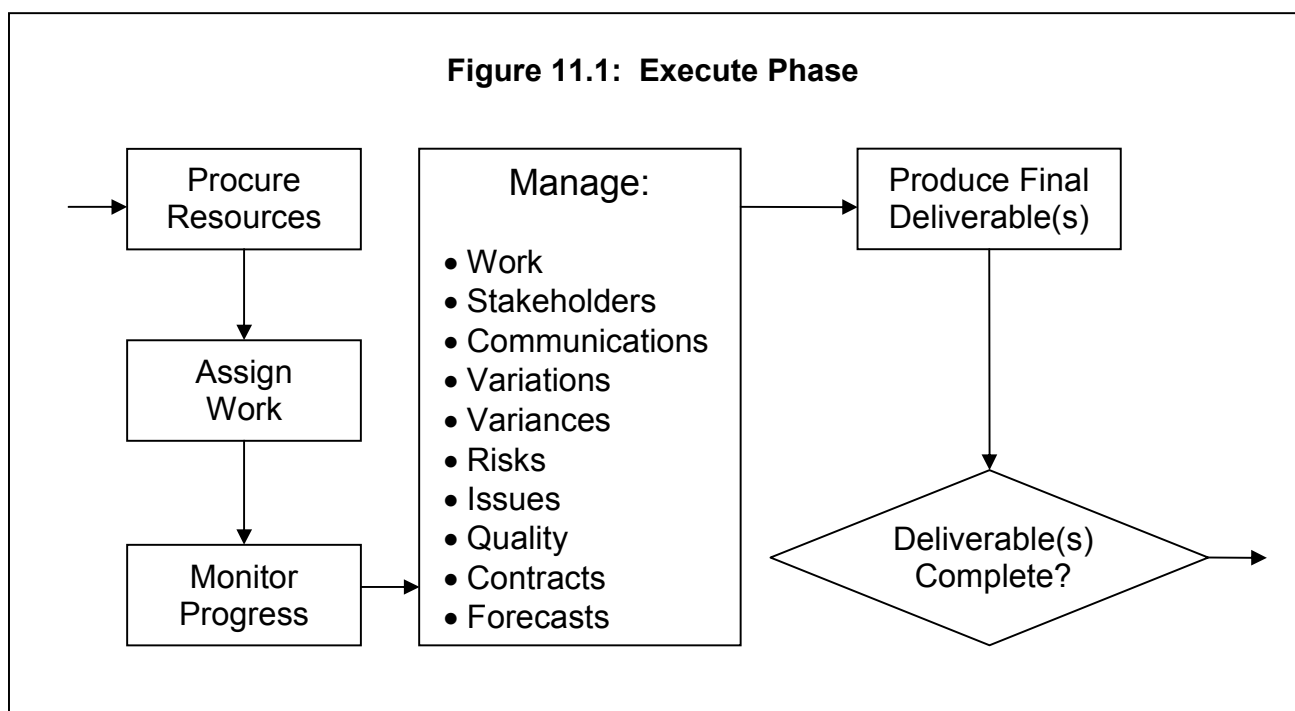
CONTROL PROGRESS



"There is a time in the life of every problem when it is big enough to see, yet small enough to solve"

Mike Leavitt

The Execute phase is typically the biggest phase of the project (in terms of work effort, cost and duration). It's the phase when the final deliverables are completed and made ready for sponsor or client acceptance. To ensure that acceptance requirements are met, the project manager monitors and controls the activities, resources and expenditure required to complete the deliverables throughout the execution phase. A number of management control processes are undertaken to ensure that the project proceeds as planned. The key steps involved in the Execute phase of our framework are shown at Figure 11.1. Chapter Ten has addressed Procure Resources.



Perhaps the first thing to emphasise about execution is that a project plan is often best viewed as a basis for change and improvement as the realities of the project are revealed during its execution.

The widely used quote about planning and plans is taken from the poem 'To a Mouse', by Robert Burns, Scotland's national poet, *"The best-laid schemes o' mice an' men / Gang aft a-gley."* This rich, original phrasing is interpreted two ways: directly, as 'the best-laid plans of mice and men often go awry'; and in a more prosaic way: 'No matter how carefully a project is planned, something may still go wrong with it.' By now, we should be accustomed to this sentiment.

Project Manager's Activities

Of course we project managers cannot relax now that we have produced the plan and arranged contracts in the belief that our hard work is over. Typical activities with which we will be considerably involved during project execution include:

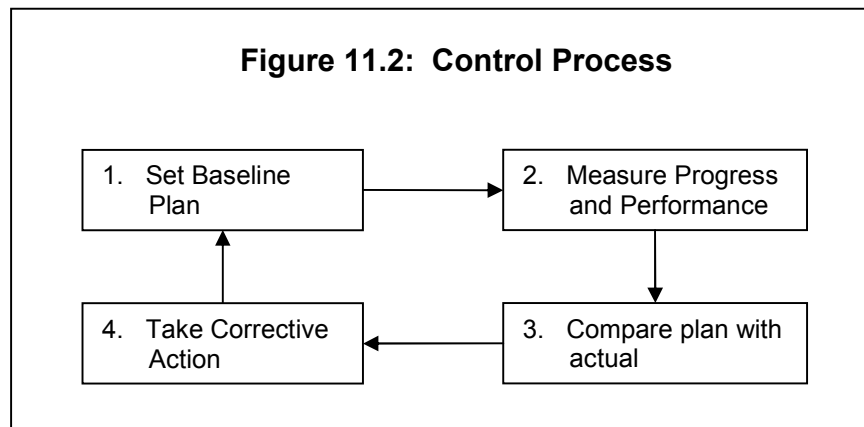
- allocate work
- analyse reports
- approve payments
- arrange audits
- arrange contracts
- assess performance
- build relationships
- celebrate successes
- check time sheets
- clarify roles
- coach and mentor
- communicate
- control
- coordinate resources
- counsel
- delegate
- evaluate proposals
- forecast
- hold meetings
- implement change
- keep project diary
- lead team
- maintain control
- maintain files
- make decisions
- manage conflict
- manage issues
- manage risk
- measure quality
- monitor variance
- negotiate
- practise politics
- praise
- prepare reports
- procure resources
- produce deliverables
- provide advise
- re-estimate
- re-negotiate
- report progress
- revise plans
- reward and recognise
- schedule work
- share learning
- smooth resource use
- solve problems
- track performance and status
- visit stakeholders

Project Control

The key purpose of project control (not in the authoritarian sense) is to keep the project on track by keeping track of the project. There are four basic steps involved in the project management control process:

1. set a baseline plan
2. measure progress and performance
3. compare plan with actual
4. take corrective action as needed.

This basic process is illustrated at Figure 11.2. Corrective action is anything done to bring expected future performance into line with the project plan or baseline. These four key steps are briefly described below:



1. **Set baseline plan.** The baseline plan provides us with the elements for measuring performance. The baseline is derived primarily from the work breakdown structure (WBS) database. The WBS defines the work in discrete work packages that are tied to deliverables and organisation units. In addition, each work package defines the work, duration, and budget. From the WBS the project schedule is used to time-phase all work, resources, and budgets into the baseline plan.
2. **Measure progress and performance.** Time and budgets are quantitative measures of performance that readily fit into an integrated information system. Qualitative measures such as meeting customer's technical specifications and product function are most frequently determined by onsite inspection or actual use. Measurement of time performance is relatively easy and obvious. That is, is the critical path early, on schedule, or late; is the float of near-critical paths decreasing to cause new critical tasks? Measuring performance against budget (eg, money, units in place, labour hours) is more difficult and is not simply a case of comparing actual versus budget. A concept called 'earned value' is necessary to get a realistic estimate of performance against a time-phased budget. Earned value is described in detail later in this chapter. It links schedule and budget.
3. **Compare plan with actual.** Because plans seldom materialise exactly as expected, it becomes imperative to measure deviations from our plan to determine if action is necessary. Periodic monitoring and measuring the status of our project allows for comparisons of actual versus expected performance. It is crucial that the timing of status reports be frequent enough to allow for early detection of deviations from the plan and early correction of causes.
4. **Take corrective action.** If deviations from our plans are significant, corrective action will be needed to bring the project back in line with the original or revised plan. In some cases, conditions or scope can change, which, in turn, will require a change in the baseline plan to accommodate new circumstances.

Despite the reactive appearance of this process, the measurement of performance against the plan should, as far as is practicable, be done on a forward-looking basis. Trends are extrapolated and variations are anticipated and early action is then taken to avoid or restore the situation.

Control is mainly focused on scope, risk, benefits, time, cost and quality. Accordingly, the main control documents are the work breakdown structure (WBS), the risk management plan, the benefits plan, the schedule of tasks, the budget, and the specification/performance requirements of the final

deliverable, which may be a product or service.

The project manager's main job during project execution is to navigate the project to a successful result within the key parameters of scope, time, cost and quality. Thus, the more clearly these parameters are defined in the first instance the easier it will be to identify variance. Some variance may be acceptable. Remember nebulous work cannot be managed to tight tolerances (ie, variance thresholds).

The project manager can solve variance and other problems for team members beyond what they can solve for themselves providing they have told the project manager about the problems. Good communication with the team is essential. We don't want people to hide problems because they are too scared to tell us about them. We need to know how problems arose to ensure they're not repeated, and we need to know how to solve the problem, which our sponsor will surely ask. To solve it easily, we must detect it early.

Effective Control Systems

There are five basic characteristics that controls must have in order to be effective:

1. **Controls must be understandable.** The manager who uses the controls must know how they work. It sounds obvious, yet some managers receive information that they don't know how to interpret.
2. **Controls must register deviations quickly.** In order to have a workable control system, controls must indicate deviations without delay. Controls are forward-looking. Since we cannot control the past, the sooner we are aware of deviations, the sooner we can take corrective action. Ideally, we should become aware of deviations before they occur. This can happen in the planning stage if we apply risk management practices.
3. **Controls must be appropriate, adequate and economical.** Those who make up control systems say it is possible to control everything. But we must ask ourselves. *"Do I need to control everything?"* The answer is *"no."* We only need to control the essentials. This involves knowing what is important in our project. The controls we use must measure what is important. For example, many managers say they would like to be able to control how their staff spend their time, when really what they are trying to control is how much their staff produce. A control must be necessary and achieve what it is designed to achieve. Also it must not cost more than it is worth – in other words, it must be cost-effective.
4. **Controls must be flexible.** Our project is constantly changing. People, equipment and materials change. People change – new people may need more control than experienced workers. Therefore control systems must be flexible enough to cope with changing demands and problems.
5. **Control systems must point to corrective action.** Without this aspect being included, our control system is useless. All we are doing is recording history. The control should tell us what went wrong (history) and how we should respond quickly and appropriately to bring performance back to the standard required.

General Points on Control

Some points that help ensure effective project control are:

- establish clearly defined, appropriate and measurable objectives as soon as practicable

- avoid punishing people for bringing us bad news, although ensuring public accountability at progress meetings is not usually a bad thing
- check progress frequently in order that we always know the project status in terms of:
 - work completed and work still scheduled
 - budget versus expenditure
 - performance against specifications and standards
 - authorised scope
 - benefit delivery
 - potential problems and opportunities
 - issues.
- facilitate periodic external reviews of project performance
- use milestones to monitor and celebrate progress
- empower team members to exercise self-control
- routinely test assumptions as we tend to be overly optimistic
- act on trends when they are evident rather than await crises
- don't rely exclusively on written reports, they often suffer from editorialising and delays
- build in a minimum time buffer to cope with the unexpected, and stay flexible
- avoid fire-fighting, maintain a longer-term focus, and don't over-react
- those variances that will require immediate action have already been defined and communicated before project execution
- remember that only work that can be accurately measured can be controlled to tight tolerances
- a day lost at the start of the project hurts as much as a day lost at the end, and there are plenty of ways to lose a day, but no way to get one back
- people under pressure don't think faster or better
- extended overtime reduces productivity
- manage by exception, don't monitor trivia or things that never go wrong
- have a thought-through disaster plan
- avoid paralysis by analysis; don't tolerate inaction
- never be too busy to discuss project progress, performance and problems
- don't use more contingency than the percentage of work already completed.

The causes of variances, the reasoning behind the corrective action, and other lessons learnt from the control process should be documented as an historical database to help with future planning and problem solving.

Project management software has the ability to keep track of planned dates and costs versus actual dates and costs, and to forecast the effects of schedule and budget changes, real or potential.

Cost-effective Project Control

There is a trade-off between cost to monitor and value of resultant information. The need to monitor a project or a task may be determined by factors such as:

- project priority
- resource commitments
- cross-project dependencies (ours may be an enabling project that must be completed properly and on time to allow a dependent project to then proceed)
- risk and uncertainty
- acceptable tolerance limits (cost, schedule, quality, risk)
- previous experience with similar work, contractor and employees
- critical task where completion time is fixed
- legislative requirements and penalties.

Also, we need to be selective about what we monitor. Our checklist of what to monitor includes:

- planning premises and assumptions
- risks (symptoms of those we predict and need to be alert for the unpredicted)
- interim and final deliverables (as per specifications)
- variances and trends with our schedule, budget and scope
- resources (quality, quantity and timely availability of people, materials, plant, equipments etc)
- processes operating properly for stakeholder management, communications, variations, conflict resolution, quality, health and safety, contract payments, decision-making, problem solving, procurement, benefits management, and risk and issues management
- risk, issues, opportunities, and lessons learned registers
- relationships
- protection of intellectual property
- security
- cashflow.

Scope Control

Scope control is concerned with ensuring the agreed scope is achieved – no more and no less. The work breakdown structure (WBS) defines the project's scope baseline. A scope change is any modification to the agreed WBS. Performance reports provide information on scope performance such as which interim deliverables have been produced and which have not. And change requests or variations to scope are usually the result of:

- external events (eg, legislation)
- failure to include required functions or features in the original product scope
- value-added changes (eg, new technology)

- implementation of a contingency plan or workaround to respond to a risk.

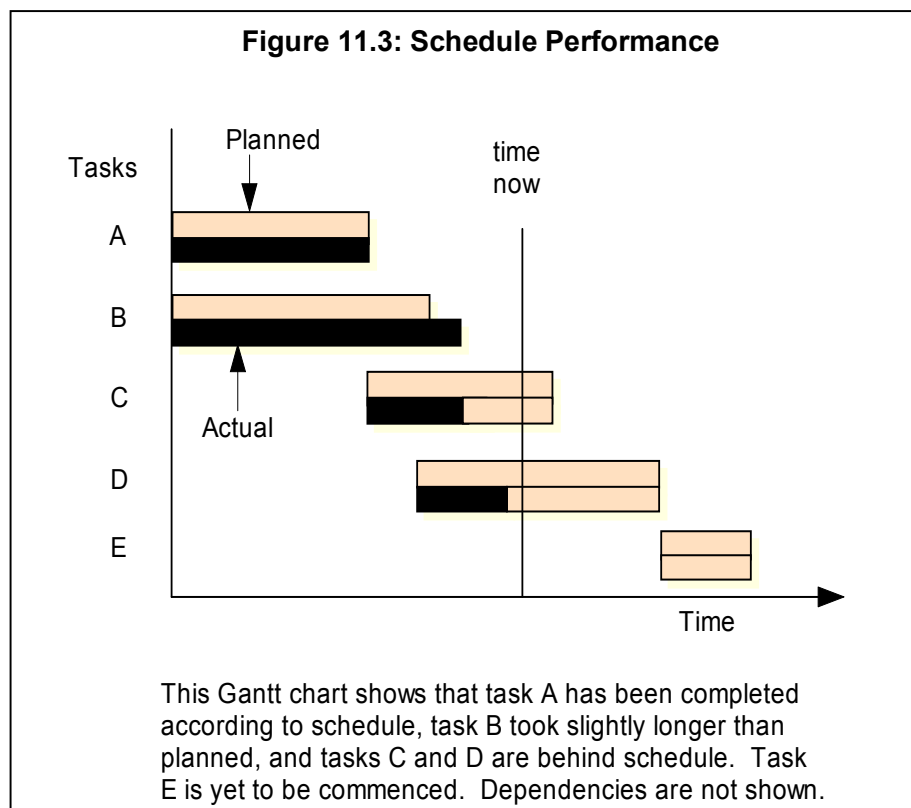
The client's requirements often evolve. Thus, changes to scope are common, but they all need to be approved, documented, and the cost, quality, time and other consequences analysed. Scope changes often require adjustments to cost, time, quality, benefits and risk. An integrated approach is required. Clients need to be made aware of the consequences of proposed scope changes.

Schedule Control

The approved project task schedule is the baseline against which progress is measured and reported. The most frequently used tool for schedule control is the Gantt chart on which can be plotted both planned and actual progress. An example is shown at Figure 11.3. Gantt charts are especially useful for showing schedule variance, since they communicate project slippage rather dramatically. The schedule might also be superimposed with the required corrective action (ie, revised schedule).

During project execution it may be necessary to issue a schedule update, which is a modification to the schedule information used to manage the project. Revisions are a special type of schedule update. They are changes to the schedule start and finish dates in the approved project schedule. Some schedule delays may be so considerable that rebaselining is needed.

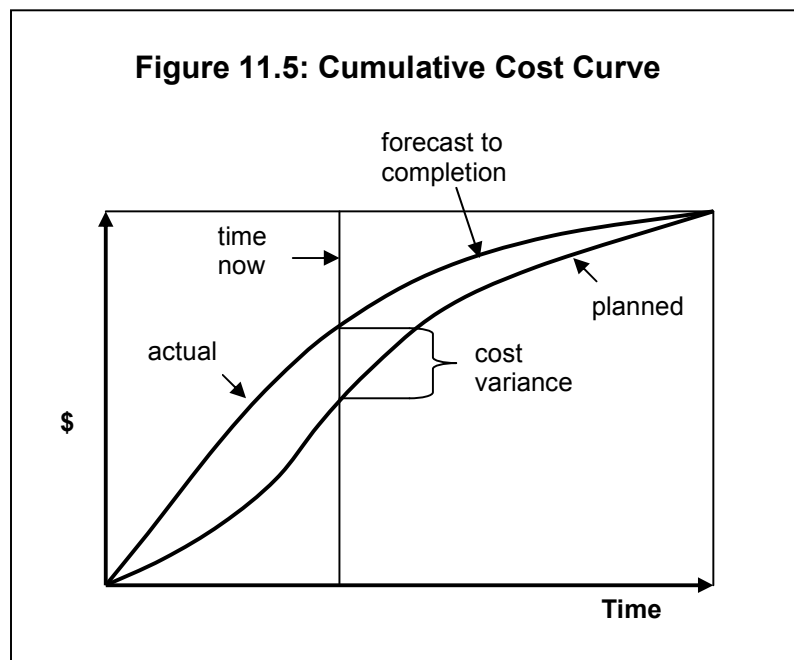
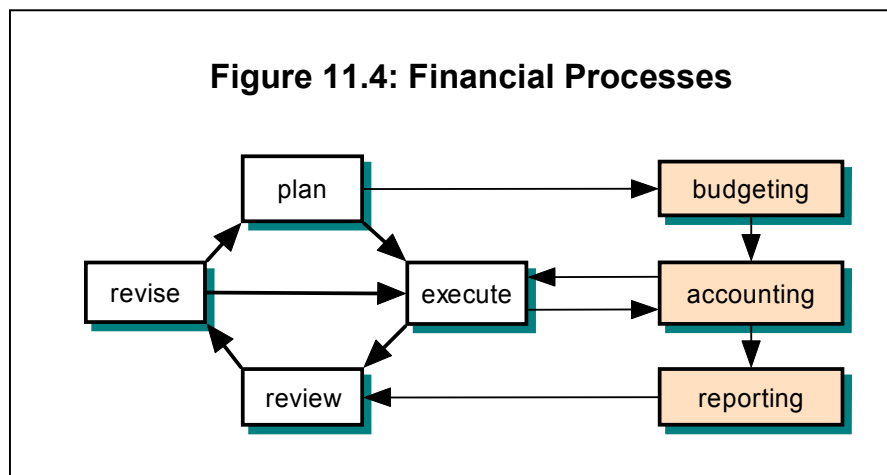
When reporting percentage of work completed the 50:50 rule is often applied. At the moment a task begins, it is assumed to be 50 percent complete up until it is actually completed, at which time the task is reported as 100 percent complete. However, if a task is clearly partitionable, more accurate measurement is possible, assuming always that doing so is cost-effective from the control perspective.



Cost Control

Cost control mostly involves monitoring expenditure to detect variance from the plan, and taking remedial action where needed. The key tool is the budget—the cost baseline. This relationship is illustrated at Figure 11.4. A useful practice is to develop accumulative cost curves for planned and actual expenditure. Cumulative cost curves (often called S-curves) are useful for monitoring cost variances at a glance. See Figure 11.5. In this example the budget is at present over-expended.

The difference in height between the planned and actual cost curves represents the monetary value of variance at any given time. Such a graph is a useful performance monitoring and reporting tool.

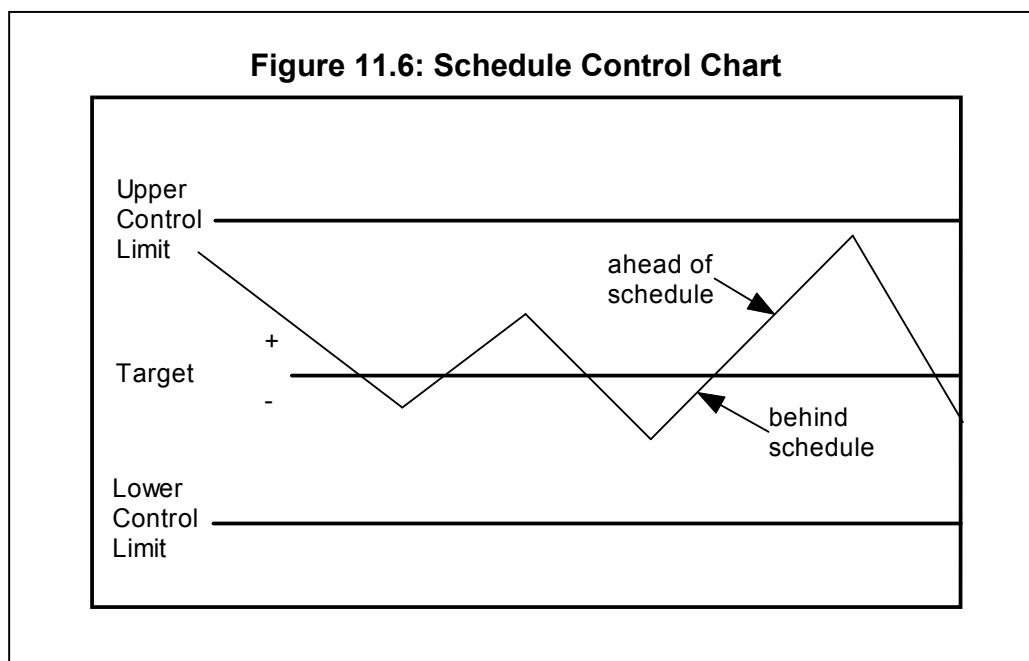


Quality Control

Quality control involves monitoring interim and final deliverables to determine if they comply with the relevant performance standards and identifying ways to eliminate causes of unsatisfactory results. Essentially, quality is conformance to the client's specifications.

Common tools and techniques for quality control include:

- **Inspection** which involves measuring, examining and testing to determine whether results conform to requirements. Inspections are variously called evaluations, assessments, reviews, audits and structured walk-throughs.
- **Control charts** are graphic displays of results over time. They are used to determine if the process is in control, and are particularly useful for ensuring that cost and schedule variances are within acceptable limits. Figure 11.6 is a control chart for schedule performance.
- **Pareto diagram** is a histogram, which might show frequency with which various problems or causes of schedule slippage occur. The problems or causes are rank-ordered to guide corrective action. Figure 11.7 is a Pareto diagram showing causes of schedule slippage for a particular project.
- **Statistical sampling** which involves choosing part of the population of interest for inspection and testing.



- **Flow-charting** is using a flowchart (which shows how elements in a system relate) to help identify how problems occur. A simple process is shown at Figure 11.8. See also Figure 10.8
- **Trend Analysis** involves using mathematical techniques to forecast future outcomes based on historical results.

Figure 11.7: Example Pareto Diagram

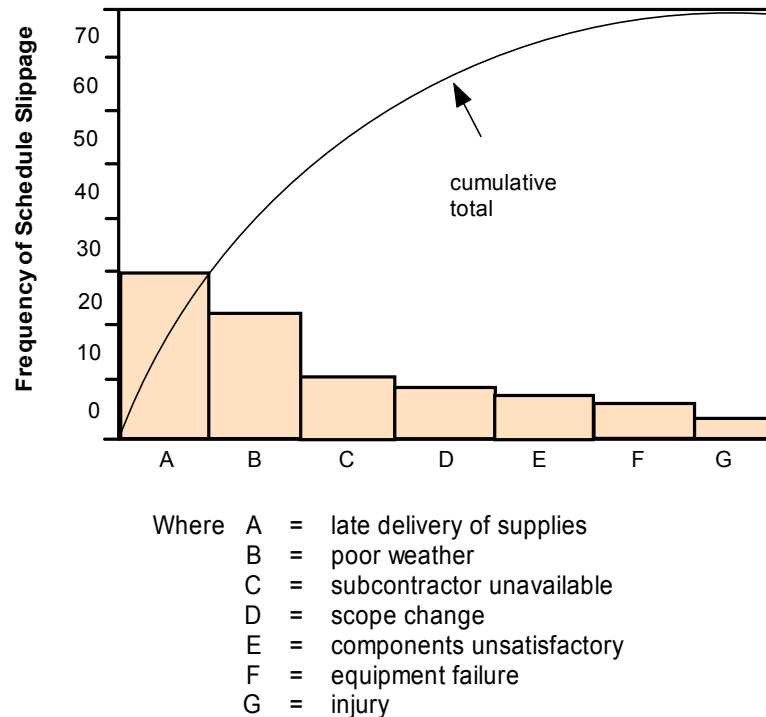
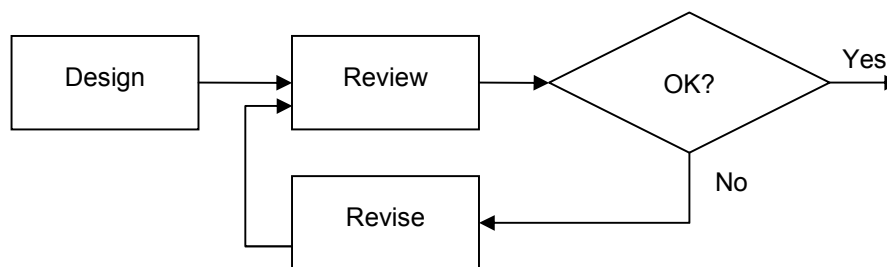


Figure 11.8: Process Flowchart



Control Planning

There is a trade-off between cost to monitor and value of resultant information. That is, the cost of control should not exceed the value of control.

When planning a project control system, cost-effectiveness is an important consideration. Cost of control generally increases exponentially as the degree of control increases. Some other control planning considerations are:

- Should control be undertaken in too much detail, innovation is likely to suffer. Avoid 'snooping' as it stifles initiative.
- Control should be directed towards error detection and correction, rather than towards blame and punishment.
- Wherever practicable establish and allow reasonable variance tolerance. Don't control to unnecessarily tight tolerances. Allow reasonable latitude.
- Insistence on strict adherence to budgets and deadlines can be dangerous when uncertainty is high; it can make people ignore or conceal problems, as well as miss valuable opportunities.
- The control system should be relevant, simple, timely, accurate, and cost-effective.
- If in doubt about performance, then control more closely initially, with a view to reducing controls as they prove to be unnecessary.
- Don't collect data that isn't to be analysed. Check on the need for the collected data and how useful it really is.

Monitoring, Measuring and Reporting

The main items to be monitored during project execution are:

- **Project Parameters:**
 - scope against work breakdown structure
 - expenditure against budget
 - work completed against schedule
 - performance against specifications
 - benefits against client's expectations.
- **Project Resources:**
 - people (their quantities, cost, inter-relationships, motivation, skill levels)
 - materials (cost, quantity, quality, timely delivery)
 - components and sub-assemblies.
- **Project Processes:**
 - stakeholders management
 - communication
 - variations or changes
 - issue management
 - quality assurance
 - risk management
 - procurement of resources
 - forecasting/estimating
 - contract administration
 - dispute resolution
 - problem solving and decision making
 - benefit realisation.

Other items that may need to be monitored depending on their importance include confidentiality,

health and safety, environment, cultural considerations, physical security, and documentation. Planning assumptions also need to be monitored to confirm their continuing validity. If an assumption proves to be wrong some replanning may be required.

The extent to which these items are monitored may be influenced by:

- Project priority, resource commitment, risk analysis, relationship with other projects (ie, cross-project dependencies).
- Level of acceptable variation or tolerance between planned and actual (expenditure, schedule, and performance) usually expressed as +/- percent of a target figure.
- Legislation and regulation requirements such as health and safety, and ISO 9000 compliance.
- Previous experience on similar projects and/or using same resources (eg, subcontractor performance).

There are a variety of ways of monitoring and reporting project progress. Some of the more commonly used tools and techniques are:

- **Reports** submitted at an agreed frequency or on specified occasions including:
 - **progress reports** which usually provide an historical summary of progress to date
 - **status reports** which usually focus on the current expenditure and schedule situation – they provide a snapshot of project performance
 - **variance reports** which identify the difference between planned and actual performance, and may be part of progress and status reports
 - **other reports** including surveys, exception reports, highlight reports, earned value reports, cashflow reports, change order reports, special reports, (daily) site visit reports, trend reports, audits and reviews.
- **Visits** by the project manager and other stakeholders to the project site and/or to team members, recognising the value of personal contact. Visits might also involve demonstrations, presentations and structured walk-throughs. Visits help overcome report editorialising.
- **Meetings** and focus groups are probably the most common means of tracking progress. They also provide an excellent opportunity for team building through participatory planning, problem solving, decision making and information sharing. Effective meetings are properly planned. Also I suggest we keep meetings small by making it safe for unnecessary people not to attend.
- **Other monitoring techniques** include, where appropriate, the use of interviews, questionnaires, sampling, testing, prototypes, trial runs, peer interviews, checklists, document tracking, simulation and benchmarking.

Throughout the life of the project there are various reviews that may be conducted:

- **Status Reviews** – might be cursory (say weekly), or comprehensive (say monthly or exception where deviations are greater than predetermined variance thresholds). Status reviews should always be conducted in a problem-solving mode.

- **Design Reviews** – whether a new product, writing software, developing a new service, or planning to move a facility, the design review is conducted to ensure that the final deliverable is on track in terms of being able to do what it is supposed to do. Such reviews might be conducted at project milestones.
- **Process Reviews** – focus on how we are doing what we are doing. Can work processes be improved? Usually conducted about every three months. The review might be conducted by the project manager or by an outside facilitator. All process should be subjected to continuous improvement. And some say if a process can not be improved, it may be time for a new process.
- **Benefits Reviews** – are undertaken to check the validity of the business case and update the associated forecast of benefits as execution reveals reality. Where future benefits don't now exceed future costs, regardless of sunk costs, the wisdom of proceeding with the project would need to be confirmed with the sponsor/client.

Variance

Variance is a quantifiable deviation, departure, or divergence away from our known baseline or expected value. Not to be confused with a variation, which is a change.

It is not enough to simply monitor progress in a project. When a significant deviation from the plan occurs, something must be done in response. There are three basic responses that we can make:

1. Accept the deviation.
2. Take corrective action to get back on target.
3. Revise the plan.

Note the word significant – what is meant by significant should be determined in the planning stage of a project. In general, a deviation should exceed at least 5 percent to be considered significant, as most control systems cannot maintain a tighter tolerance.

When a variance exceeds our acceptable tolerance or threshold, we need to search carefully for what is causing it. Understanding its cause will help us assess whether the variance will have a short-term or long-term impact on our project. Typical causes of variances include:

- **Poorly defined parameters.** The original parameters, scope statement, and/or requirements definition were incorrect or incomplete. This typically means that the scope of the project deliverable and the magnitude of the work required to create this deliverable were underestimated. As the project is evolving, the inadequacies of these up-front definitions are coming to light and causing variances.
- **An incomplete or ineffective plan.** The project plan was either created too quickly and included improper historical data, or was prepared by uninformed people. In either case, the original baseline is incorrect. Consequently, variances should not be a surprise. Incompleteness of the plan is the most common cause of variances and we should consider this possibility first.
- **Inadequate communication.** The project players have not been keeping each other informed, or the coordination of the work among the project players has been faulty. This could show itself by people working from different premises and therefore spending time creating

deliverables that do not fulfil the expectations of other project stakeholders.

- **Poor estimates.** The estimates were wrong in the first place. Either the wrong people were consulted or the right people did not have enough information to provide accurate estimates.
- **Changes of scope.** Given more information and more time, the people who envisioned the project deliverable have changed their minds. They see it differently now, and they want the requirements and specifications changed to accommodate their shift in vision.
- **Inadequate skills.** The people who have been assigned to the project do not have the technical or social skills that are needed to do the job. The original plan and estimates were probably based on an assumption that competent players would produce the project. Consequently, the variances have resulted from an incorrect assumption.
- **Political problems.** Political agendas and/or corporate power battles have reared their ugly heads. This situation is difficult, if not impossible, to predict. Fighting political battles takes time and diverts the attention of the project players. Slippages in the baseline then become inevitable.

In general, the shorter the reporting period, the better are our chances of identifying variance and other problems early and taking effective corrective actions. If variance is too great, it may be difficult to resolve the situation without sacrificing the scope, budget, schedule, quality or benefits.

Monitoring Considerations

Some considerations when monitoring project progress are:

- Implement independent inspection, testing and quality reviews of completed work and work-in-progress.
- Have deliverable acceptance criteria been established and agreed?
- Is the quality of interim deliverables checked while they are produced?
- Are measurement, assurance and inspection mechanism in place to ensure the deliverables will attain the required level of quality?
- Employ 'Management by Walking Around' (MBWA), which enables direct input, immediate feedback and on the spot resolution of small issues and other matters.
- Is the team awaiting resources, approvals, or information? Is this affecting progress of work or limiting the quality of deliverables?
- Are changes required to improve progress or quality of output?
- Is there a mechanism for team members to raise issues?
- Record actual effort expended and forecast estimates to complete.
- Use a time recording system involving a time sheet with a current task list for each team member.
- Use a cost and scheduling tool with time sheet data to track progress.
- Measure progress. Where progress is not directly proportional to work effort, measure work progress by milestones or benefits attained, percentage tasks complete, etc.

- Determine the causes of variances and performance problems. Consider the following:
 - Is variance caused by lack of employee motivation or poor morale?
 - Are team members insufficiently skilled to effectively perform their assigned tasks?
 - Are documents defining the assignment constantly changing (is quality or performance variance being driven by scope or design changes)?
 - Is the team using the current version of these documents?
 - Is variance caused by staff availability problems such as absenteeism or non-released resources?
 - Have the team adequate tools and other resources to work effectively?
 - Are factors beyond the control of the project causing performance variation (environmental factors, economic circumstances, computer performance)?
 - Was the original estimate correct?
 - Are inadequate processes, procedures, standards, methodologies or equipment causing productivity problems?
 - Are dependencies delaying work or causing quality problems?
 - Is quality of deliverables being compromised by poorly defined acceptance criteria?
 - Are appropriate procedures, standards and methodologies being employed to produce quality deliverables?
- Determine the significance and the impact of the above variances and performance problems on future work, and if this problem or the trend continues, what will be the impact on deliverables, quality, benefits, risk, budget and schedule?
- Run status meetings (weekly or fortnightly) with project team members. Assess progress with respect to effort to date and milestones reached.
- Assess deliverables' quality and conformance to standards and acceptance criteria.
- Verify that items outside the project's scope are not being worked on.
- Identify new project risks.
- Identify issues requiring resolution.
- Identify the need for change, decision, direction or information to address outstanding matters.
- Take immediate corrective action.
- Conduct lessons learned surveys monthly or at completion of significant milestones. Consider both problems and successes of past work so others can benefit from the experience. Perhaps consider the following:
 - Are requirements adequately defined?
 - Are resources employed sufficient for the work? Are they used effectively? Are resource providers releasing resources to the project in a timely manner? Is the relationship with

resource providers strong?

- Which staff are particularly effective contributors and why? Is team structure, compatibility and morale particularly strong or weak and why?
- Have issues raised been resolved in a timely and effective manner?
- Which implementation matters cause concern? Which approaches to design, development or implementation are particularly successful?
- Are there any deficiencies arising out of the use of the framework?
- Are appropriate measurements, assurance mechanisms, inspection, review, checking or other requirements in place to ensure the interim and end deliverables meet the required quality?
- Should points arising during quality reviews have been caught earlier and how?

Problem Finding

Our life as project managers will be much better if we are clever enough to uncover potential problems before they find us, because they most assuredly will! Assume that, like Murphy's Law, *"If it can go wrong, it most likely will!"* There are several ways to do this:

- **Get out of our office.** Go where the action is. Look in on people engaged in critical tasks. Ask how things are going. Ask if they anticipate any difficulties. Ask how we can help. Observe progress first hand. Request frequent updates. Make it clear that we are not prying but sincerely trying to help.
- **Listen more closely to people.** If the stress level seems to be rising, things aren't going well. Encourage people to bring up concerns. Bring up what-ifs and carefully observe the responses.
- **Check our Gantt chart.** See which tasks should be starting soon. Ask team members directly if they expect any hold-ups or have any concerns about being able to start or finish tasks on time.
- **Read our 'CC' messages.** These are copies we receive for our information of emails sent to other team members or others related to the project. Sometimes they are disguised cries for help. They present opportunities to ask questions and stimulate anticipatory thinking.
- **Reinforce team members' accountability.** Doing so raises concerns and anticipates problems; one of the differences between a good team and a great one. Treat concerns as gold nuggets rather than a bother, or worse yet, a vote of non-confidence. When problems are discovered, question people on how they could or should have been anticipated. Point out the missed opportunities for earlier resolution. Do this in 'training' not 'blaming' mode, but showing team members what to look for in the way of problem detecting.
- **Be inquisitive and encourage everyone else to do the same.** In short, ask, ask, and ask some more.
- **Resolve problems on the spot.** Potential problems can become very real very quickly. Deal with them now.
- **Facilitate resolution at the source,** where problems would develop. This affords the best

chances for quick resolutions or workarounds.

- **Raise flags to all concerned**, to those whose activities will be affected and whose resources will be involved. Remember to include those who may be tapped for help.
- **Hold immediate discussions** with those concerned. Have mini-standup meetings. Get quick consensus on approach and responsibility for action. Many decisions are made on the fly, but it is imperative that they be communicated to all parties. The project meeting presents a good opportunity to communicate them.
- **Involve technical experts** in the selection of workaround action.
- **Ask:** *“Where will the extra time needed be found and where will the extra resources be found?”*
- **Negotiate tradeoffs.** Act as intermediary facilitator. Provide recommendations based on our unique view of the project status.
- **Close the loop.** Inform affected parties of the decision made and the changes needed or anticipated.
- **Keep a running schedule daily.** Continuously reflect progress in our tracking schedule. Keep a copy with us to use in problem solving sessions.
- When decisions are made that affect the schedule, **supply all concerned with the new schedule**, but keep a copy of previous schedules for later review.

Reporting Variance

Some variance is usually permissible. It's difficult to manage work to tight tolerances. Our job is to keep within the tolerance box, performance envelope or corridor, the size of which will be agreed with our sponsor and will vary with each project and may get smaller in size as the project proceeds and uncertainty diminishes. See Figure 11.9. If a project is forecast to go outside the tolerances agreed by the sponsor, and the situation cannot be rectified within those tolerances, the project manager has no further mandate to carry on with the work. The issue must be escalated promptly to the sponsor for resolution together with recommendations.

Figure 11.10 shows some conventional ways of reporting variance. However, a project could be progressing on schedule, but over budget, or on budget, but behind schedule. To link these measures of performance, earned value analysis is a very appropriate technique.

Earned Value

Two common ways of tracking project performance are:

1. to compare planned cost (budget) against actual expenditure
2. to compare planned schedule of work (ie, what has to be done by when) against actual work performed.

Taken in isolation either of these performance measures could mislead us about how well the project is progressing. For example, being on budget is not such good news if the project is well behind schedule, and being on schedule is not such good news if the budget has been exceeded.

Thus, for sensible assessment of project performance we need to consider both cost and schedule performance in relation to each other. Earned Value achieves this. Earned Value (EV) is a system of

assessing project performance which recognises the link between scope, cost and schedule.

Some don't use EV in the mistaken impression that it is too complicated. But aside from the several acronyms, it's not difficult and it can help us answer questions like, *"Is there enough money left in the budget?"* and, *"Will we finish on time?"*

The key terms used in earned value calculations are:

- **Budgeted Cost of Work Scheduled (BCWS)** also termed **Planned Value (PV)** is the budgeted cost of work scheduled to be done in a given time period, or the level of effort estimated to be expended during that period. It's a baseline against which project progress can be measured.
- **Budgeted Cost of Work Performed (BCWP)** also termed **Earned Value (EV)** is the budgeted cost of work actually performed in a given period, or the budgeted level of effort actually expended. BCWP or EV is a measure of the dollar value of work actually accomplished in the period being monitored.
- **Actual Cost of Work Performed (ACWP)** also termed **Actual Cost (AC)** is the amount of money (or effort) actually spent in completing work actually performed in a given period.
- The most frequently used earned value measures of project progress and performance are:
- **Cost Variance (CV)** which is the gap between the budgeted cost of work performed and the actual cost of performed work.
- **Schedule Variance (SV)** which is the gap between the budgeted cost of the work scheduled and the budgeted cost of the work performed.

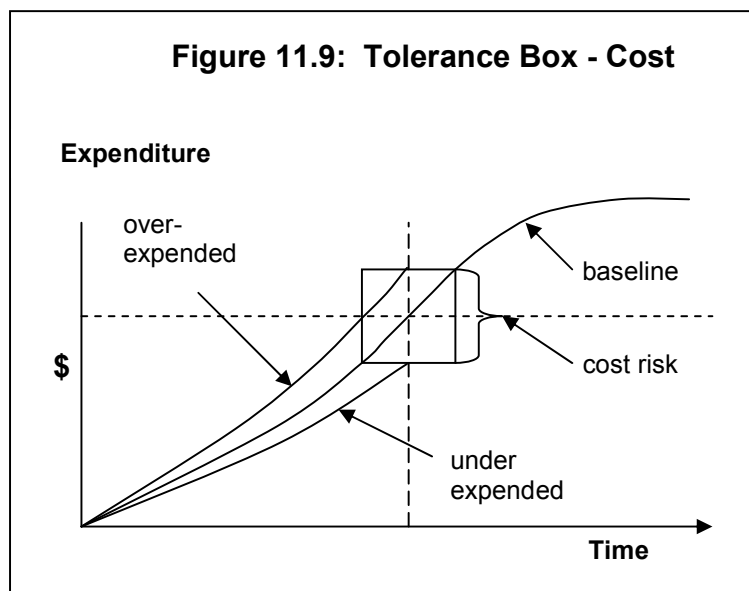


Figure 11.9: Tolerance Box - Time

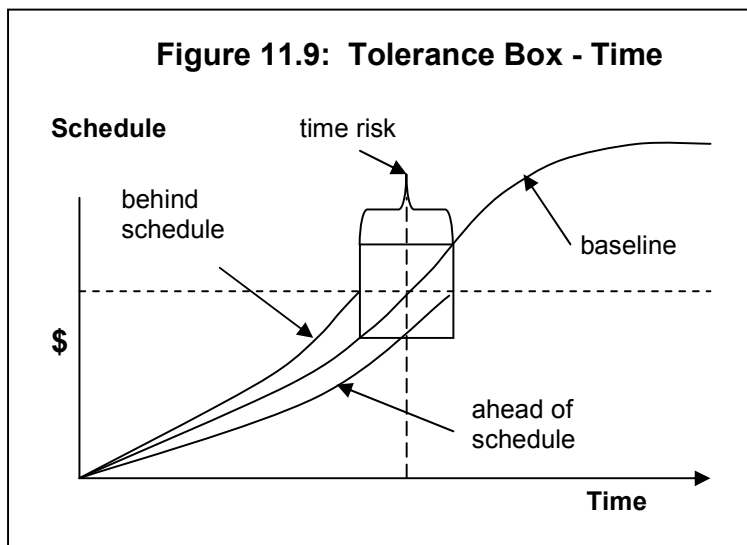


Figure 11.10: Reporting Variance

Cost Variance (\$)			
Work Packages	Baseline Cost	Actual Cost	Costs Variance
2.0 Office Equipment	30,000	35,000	5,000
2.1 Identify Needs	2,000	3,000	1,000
2.2 Place Order	28,000	32,000	4,000
2.3 Receive Order	Nil	Nil	Nil

Time Variance (days)			
Work Packages	Baseline Duration	Actual Duration	Duration Variance
2.0 Office Equipment	20	18	-2
2.1 Identify Needs	10	10	Nil
2.2 Place Order	3	4	1
2.3 Receive Order	7	4	-3

Work Variance (person-hours)			
Work Packages	Baseline Work	Actual Work	Work Variance
2.0 Office Equipment	300	350	50
2.1 Identify Needs	20	50	30
2.2 Place Order	270	285	15
2.3 Receive Order	10	15	5

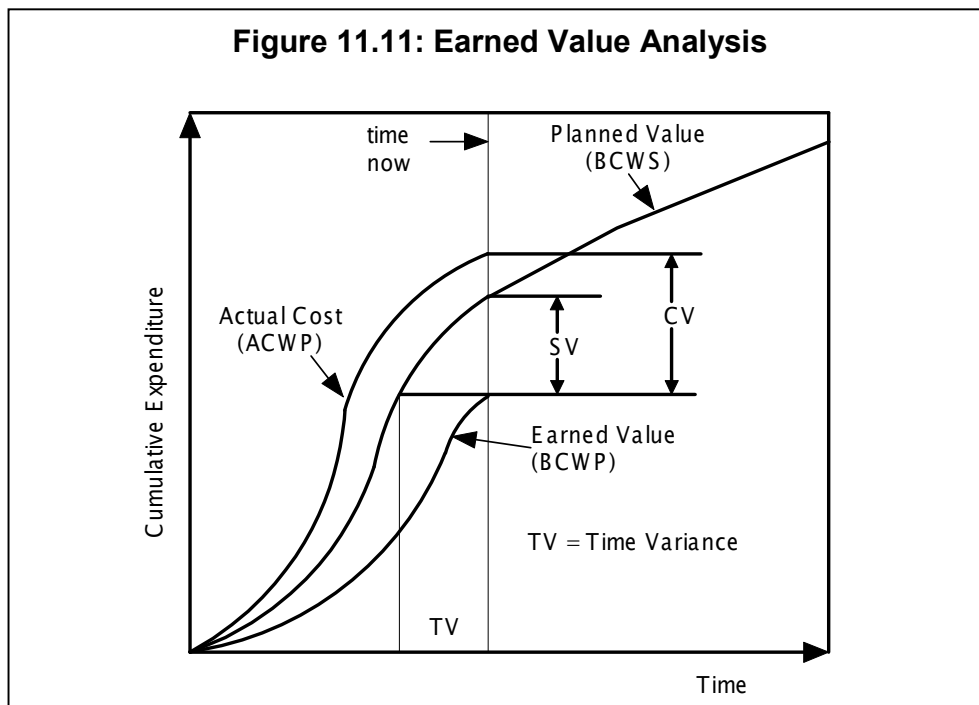
Variance thresholds can be established to define the level at which exception reports must be raised.

The key relationships are:

- Cost Variance (CV) = BCWP – ACWP = EV – AC
- Schedule Variance (SV) = BCWP – BCWS = EV – PV

BCWS (baseline), BCWP and ACWP can be graphed to clearly show cost and schedule variance. See Figure 11.11.

Consider the performance curves shown in Figure 11.11. The BCWS or PV is the baseline. Comparing BCWS, ACWP and BCWP shows that in this instance the project is both behind schedule and overspent. SV is given in monetary terms, but time variation (TV) can also be determined. The typical tabular format for earned value reports is shown at Figure 11.12.



In reality the performance curves at Figure 11.11 are likely to be much closer and even cross each other as the project proceeds. Variance would hopefully have been detected and rectified much earlier than the graph suggests.

Figure 11.12 : Earned Value Report Format

EARNED VALUE REPORT

Project: _____ Date: _____

WBS Element	Planned (BCWS) \$	Earned (BCWP) \$	Actual (ACWP)	Variance (\$)	
				Schedule	Cost
A	10,000	9,000	9,500	- 1000	- 500
B	8,000	8,500	8,500	+ 500	0

Some guidelines for interpretation are:

1. **CV greater than 0.** This means EV is greater than AC representing a better productivity than planned (if we prefer it can be interpreted as greater speed or work).
2. **CV = 0.** This means EV=AC representing the planned productivity.
3. **CV lesser than 0.** This means EV is less than AC representing less productivity than planned (if we prefer it can be interpreted as lesser speed of work).
4. **SV greater than 0.** This means EV is greater than PV representing more work done than planned.
5. **SV = 0.** This means EV = PV representing that same work done as initially planned.
6. **SV lesser than 0.** This means EV is less than PV representing less work done than initial planned.

Acceptable variance depends on the nature of the project. For a well-defined project, acceptable variance might be only 3 to 5 percent. However, 30 to 50 percent might be more realistic for a research and development project when there is usually considerable uncertainty.

When tasks are not readily partitionable, the earned value approach normally uses the 50:50 rule. That is, as soon as a task begins it is assumed to be 50 percent complete and half of the BCWS value for the task is entered into the project account books. Only when the task is completed is the remaining half of the BCWS value is entered into the accounts.

The size of work packages plays an important role in calculating schedule variance accurately. The smaller the work packages in terms of their duration and cost, the more accurate will be variance calculations. Timely, accurate and frequent reporting is also important if the information to be of value.

Most project management software packages, including MS Project 2007, have an earned value analysis capability.

Some other related performance measures are percentage variance and performance indices:

Percentage Variance

$$CV\% = \frac{CV \times 100}{BCWP} = \frac{CV \times 100}{EV}$$

$$SV\% = \frac{SV \times 100}{BCWP} = \frac{CV \times 100}{EV}$$

Values under 100% indicate that the project is over budget or behind schedule. Acceptable levels of variance may be established. They would vary from industry to industry and from project to project.

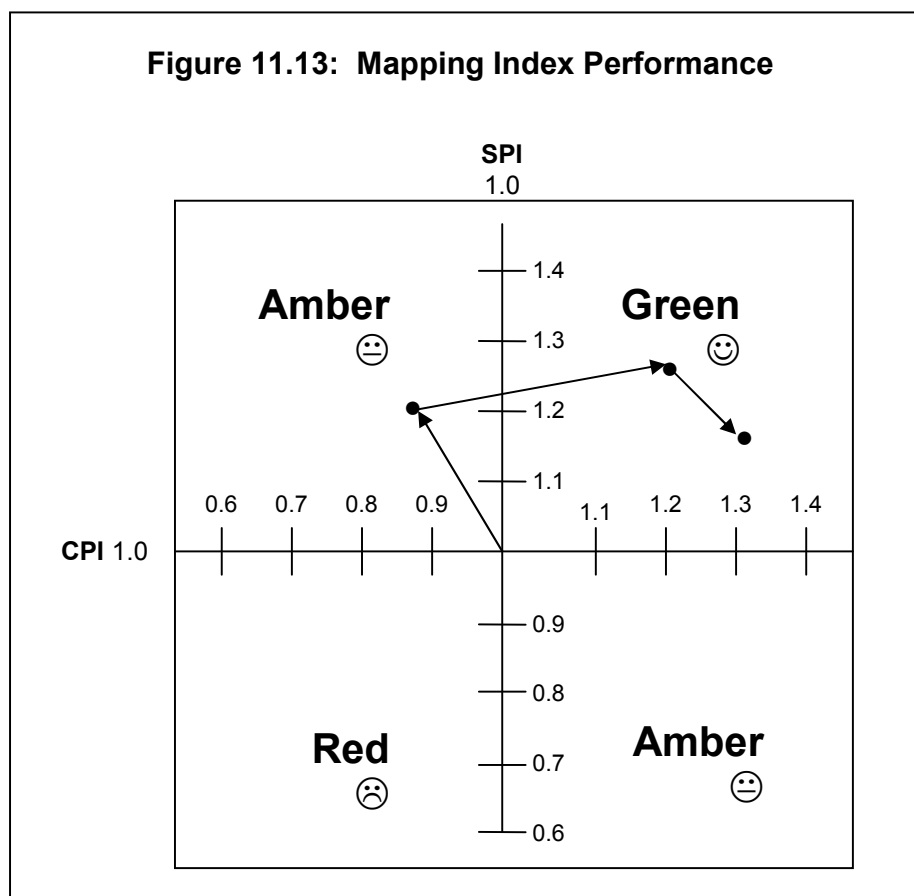
Indices

$$\text{Cost Performance Index (CPI)} = \frac{BCWP}{ACWP} = \frac{EV}{AC}$$

$$\text{Schedule Performance Index (SPI)} = \frac{BCWP}{BCWS} = \frac{EV}{PV}$$

An index of less than one indicates over-expenditure or schedule slippage.

The standard deviations of a Schedule Performance Index (SPI) and a Cost Performance Index (CPI) are useful measures to gauge our ability to schedule and estimate costs accurately. Figure 11.13 shows one way of mapping performance by indices.



Critical Ratio

The critical ratio (CR) is the product of CPI and SPI:

$$CR = CPI \times SPI$$

The ratio should be 1.0 if all is going according to plan. If CR exceeds 1.0 project performance is better than planned. If CR is less than 1.0 performance is less than planned. It is an overall single figure measure of project performance. CR performance can be mapped as shown at Figure 11.14.

An example chart showing a variety of EV calculations for a particular project is at Figure 11.15. A spreadsheet is available at www.lewisinstitute.com for earned value calculations. Also, a variety of graphs, showing the various possible states of a project using EV is at Figure 11. 16.

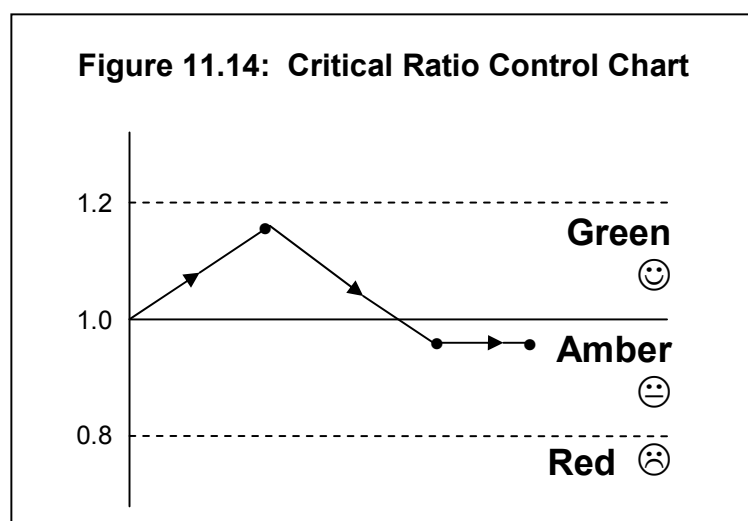
Earned value indicators that are variances or ratios can help us determine if there is enough money left in the budget and if the project will finish on time.

Variances, such as a cost variance (CV), can be either positive or negative:

- A positive variance indicates that the project is ahead of schedule or under budget. Positive variances might enable us to reallocate money and resources from tasks or projects with positive variances to tasks or projects with negative variances.
- A negative variance indicates that the project is behind schedule or over budget and we need to take action. If a task or project has a negative CV, we might have to increase our budget or accept reduced profit margins.

Ratios, such as the cost performance index (CPI) and the schedule performance index (SPI) can be greater than 1 or less than 1:

- A value that's greater than 1 indicates that the project is ahead of schedule or under budget.
- A value that's less than 1 indicates that we're behind schedule or over budget. For example, an SPI of 1.5 means that we've taken only 66.6 percent of the planned time to complete a portion of a task in a given time period, and a CPI of 0.8 means that we've spent 25 percent more time on a task than was planned.



Economic Value Added

EVA (Earned Value Analysis) also stands for Economic Value Added. Sometimes the two expressions are confused. The latter may be used to evaluate the acceptability of a prospective project, where:

$$\text{EVA} = (\text{ROC} - \text{WACC}) \times \text{Project Investment}$$

A positive EVA means that the project will create value, and a negative EVA means that value will be destroyed. ROC is return on capital (after tax) and WACC is the weighted average cost of capital, which is the minimum rate of return on capital to compensate for the investment risk. It's also called the discount or hurdle rate.

MS Project 2007 and Earned Value

If you have access to MS Project 2007 we can specify whether to use each task's percent complete value or physical percent complete value for earned value calculations related to EV or BCWP. (Remember, other values are calculated from BCWP, so our decision affects the entire earned value analysis). Two key points:

- Percent complete may be calculated by MS Project or entered directly by us, depending on how we track actual work.
- Physical percent complete is always entered directly by us. Use physical percent complete when percent complete would not be an accurate measure of real work performed or remaining.

Here's a simple example of how the two values may differ. A project of building a stone wall that consists of 100 stones stacked 5 high. The first row of 20 stones can be laid in 20 minutes, but the second row would take 25 minutes because we have to lift the stones up one row higher, so it takes a little longer. The third row would take 30 minutes, the fourth 35 minutes, and the last row would take 40 minutes to lay – 150 minutes total. After laying the first three rows, the project could be said to be 60 percent physically complete (we laid 60 to 100 stones). However, we only spent 75 of 150 minutes; so in terms of duration, the job is only 50 percent complete.

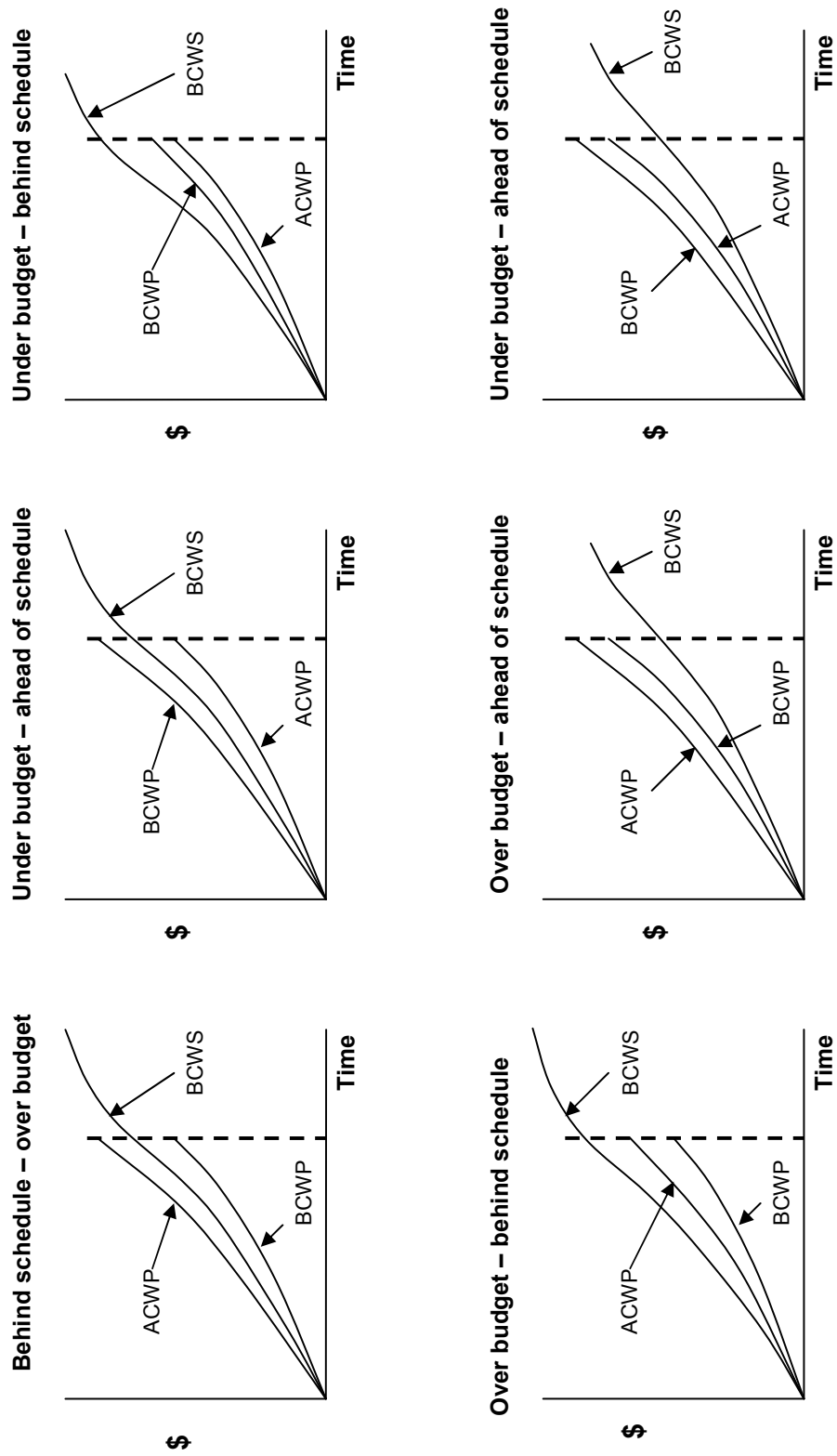
Depending on how we get paid for the work – how the value is earned (by the stone or by the hour) – we may choose the percent complete value or the physical percent complete value to properly reflect this in the earned value analysis. With MS Project we can show:

- Actual cost of work performed (ACWP or AC) shows actual costs incurred for work already performed by a resource on a task, up to the project status date or today's date. Normally MS Project correlates actual costs with actual work. Only if we enter actual costs independent of actual work or change resource pay rates will actual costs be out of step with scheduled cost.
- Budget at completion (BAC) shows an estimate of the total project cost.
- Budgeted cost of work performed (BCWP or EV) shows how much of the budget should have been spent given the actual duration of the task. BCWP is also referred to as 'earned value'. Note that MS Project calculates BCWP at the task level differently than it does at the assignment level. For best results, use the task-level BCWP values, which are the values MS Project rolls up to summary task and the project summary task BCWP values. This value is calculated for each individual task but analysed at an aggregate level (typically at the project level).

Figure 11.15: Earned Value Calculations

Task	BCWS or PV	BCWP or EV	ACWP or AC	SV	CV	SPI	CPI	CR	Schedule Status	Cost Status
1	\$1000	\$1000	\$1000	0	0	1	1	1	On Time	On Cost
2	\$2000	\$2000	\$1000	0	1000	1	2	2	On Time	Under Cost
3	\$1000	\$1000	\$2000	0	-1000	1	0.5	0.5	On Time	Over Cost
4	\$1000	\$2000	\$2000	1000	0	2	1	2	Ahead	On Cost
5	\$1000	\$2000	\$1000	1000	1000	2	2	4	Ahead	Under Cost
6	\$2000	\$1000	\$1000	-1000	0	0.5	1	0.5	Behind	On Cost
7	\$1000	\$2000	\$3000	1000	-1000	2	0.67	1.34	Ahead	Over Cost
8	\$3000	\$2000	\$1000	-1000	1000	0.67	2	1.34	Behind	Under Cost
9	\$2000	\$1000	\$3000	-1000	-2000	0.5	0.33	0.165	Behind	Over Cost
10	\$2000	\$2000	\$3000	0	-1000	1	0.67	0.67	On Time	Over Cost

Figure 11.16: Earned Value Graphs Interpreted



- Budgeted cost of work scheduled (BCWS or PV) shows how much of the budget should have been spent in view of the baseline cost of the task, assignment, or resource. BCWS is calculated as the cumulative time phased baseline costs up to the status date or today's date. (Budgeted cost values are stored in the baseline fields, or if we've saved multiple baselines, in fields Baseline1 through Baseline10.)
- Cost variance (CV) shows the difference between the budgeted cost of work performed (BCWP or EV) on a task and its actual cost (actual cost of work performed or ACWP or AC). If the CV is positive, the cost is currently under the budgeted (or baseline) amount; if the CV is negative, the task is currently over budget.
- Schedule variance (SV) shows the difference between the budgeted cost of work performed (BCWP or EV) and the budgeted cost of work scheduled (BCWS). If the SV is positive, the project is ahead of schedule in cost terms. If the SV is negative, the project is behind schedule in cost terms.
- Variance at completion (VAC) shows the difference between the budget at completion (BAC) and the estimate at completion (EAC). In MS Project, the EAC is the Total Cost field and the BAC is the Baseline Costs field from the associated baseline.
- Cost performance index (CPI) is the ratio of budgeted, or baseline, costs of work performed to actual costs of work performed (BCWP/ACWP or EV/AC).
- Cumulative cost performance index (CPI) is the sum of the BCWP or EV for all tasks divided by the sum of the actual costs of work performed (ACWP or AC) for all tasks. Cumulative CPI is often used to predict whether a project will go over budget and by how much.
- Schedule performance index (SPI) is the ratio of work performed to work scheduled (BCWP/BCWS) or EV/PV. SPI is often used to estimate the project completion date.
- Estimate at completion (EAC) is the expected total cost of a task or project, based on performance as of the status date. EAC is also called forecast at completion, and is calculated like this: $EAC = ACWP + (BAC - BCWP) / CPI$ or simply BAC / CPI .
- To complete performance index (TCPI) is the ratio of remaining available budget to be spent to the remaining scheduled cost as of the status date. TCPI is calculated like this:

$$TCPI = (BAC - BCWP) / (BAC - ACWP)$$

- A TCPI value greater than 1 indicates good projected performance for remaining work; less than 1 indicates poor projected performance.

With MS Project we can see earned value information in any sheet view by applying the Earned Value table or the Earned Value Cost Indicators table, were:

- The Earned Value table shows us BCWS, BCWP, ACWP, SV, CV, EAC, BAC, and VAC. We use this table to see consolidated earned value information, including the key variance fields. Use EAC, BAC, and VAC to evaluate the difference between your scheduled and budgeted costs. Compare CV, which shows the difference between our budgeted and actual costs of work, with SV, which shows the difference between the budgeted cost of work and the actual cost of work.

- The Earned Value Cost Indicators table shows us BCWS, BCWP, CV, CV%, CPI, BAC, EAC, VAC, and TCPI. We use this table to analyse cost variances. Check the CPI and TCPI to see how the project is progressing against its budget and how the rate of work compares with the expected rate. If CPI is less than 1, we are getting less work per dollar than planned. The TCPI tells us how much of an increase in performance we'll need on the remaining tasks in order to keep budget.

Another useful measure is Estimate at Completion (EAC), which enables us to forecast the total cost of the project at its completion, assuming current performance continues. The formula is:

$$\text{Estimate at Completion} = \frac{\text{Budget at Completion}}{\text{Cost Performance Index}}$$

$$\text{EAC} = \frac{\text{BAC}}{\text{CPI}} = \frac{\$10,000}{0.94} = \$10,638$$

An example, showing EAC is at Figure 11.17, where the total cost of the project is likely to exceed BAC and requires some project contingency or management reserve funding. VAC is variance at completion, which could be a measure of cost or schedule. If we extend EV we can also forecast project slippage. And ETC (estimate to completion) is the sum needed to complete the rest of the project (ETC = EAC – AC).

Reporting Progress

An important part of the control process is progress reporting. As project managers we need correct, timely and relevant information about the progress of work in order to satisfactorily navigate the project and provide reports to our project sponsor and other key stakeholders. Typical information flows are shown at Figure 11.18, which has the project manager looking somewhat like the proverbial meat in the sandwich.

Exactly what information is required from whom, by what means, how frequently, and in what format will need to be agreed and published before the project starts. A schedule of returns would be appropriate. Project management computer reports can usually be customised to suit each project. A schedule of reports might take the format shown at Figure 11.19, where WPM is work package manager. WPM reports would be summarised for upward reporting.

Responding to Variances

It is not enough simply to detect a variance. The next step is to understand what it means and what caused it. And then us project managers must decide what action if any is required to correct this deviation. Some possibilities are:

To overcome **schedule slippage** we might consider the appropriateness of the following measures:

- take less experienced people off the project
- postpone non-critical administrative work and duties
- renegotiate milestones and project completion date
- outsource work
- work overtime, but watch for burnout
- shun excess perfection
- compress tasks (ie, crash the schedule)
- overlap tasks where practicable (ie, fast-tracking)

- transfer resources to critical path tasks
- introduce faster processes and technology
- negotiate a reduction in project scope
- deploy more resources
- shift work to the client
- employ more productive resources
- accept partial delivery to ensure work continues
- offer incentives for earlier or on-time completion
- consider penalties for late delivery
- reduce product scope (ie, fewer features and functions).

To resolve **over-expenditure** we might consider the appropriateness of the following measures:

- avoid 'gold-plating' and settle for 'fit for purpose'
- emphasise getting it right first time and thus eliminate rework
- work overtime to reduce overheads
- ask for a budget increase
- use contingency funds
- sell off excess inventory
- offer cost-saving incentives
- renegotiate contracts
- revise the schedule where this would save costs
- accept cheaper substitutes
- improve processes and work methods
- reduce project and /or product scope.

Is the real reason for pressure and overtime to make us look better when our project fails?!

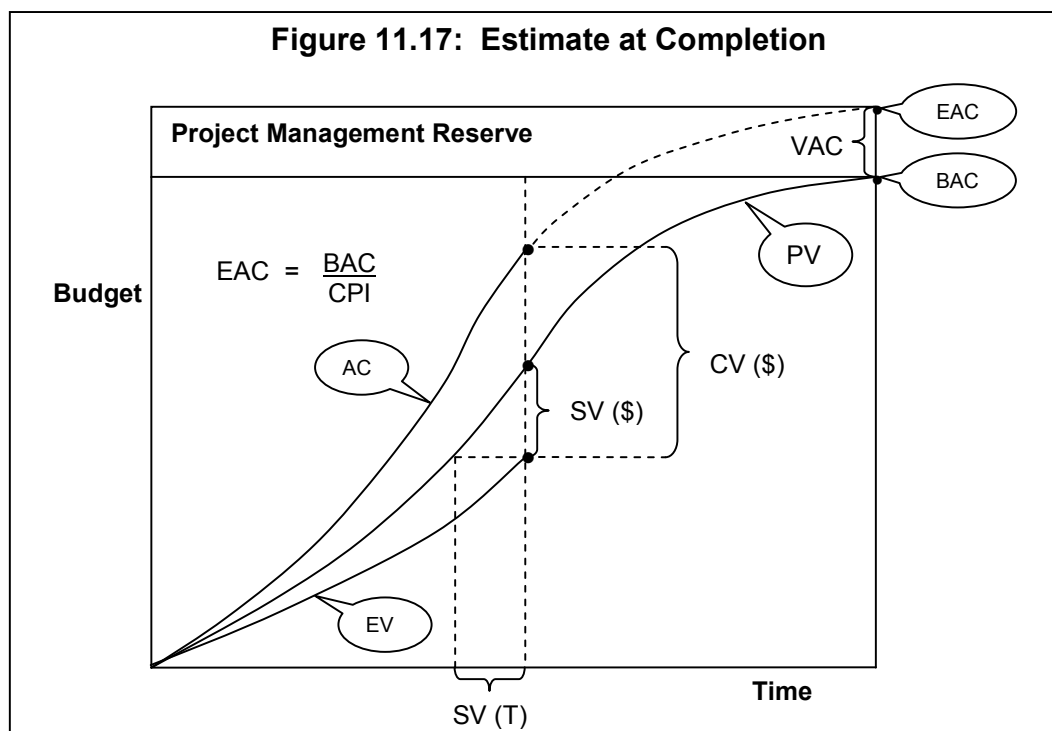


Figure 11.18: Information Flows

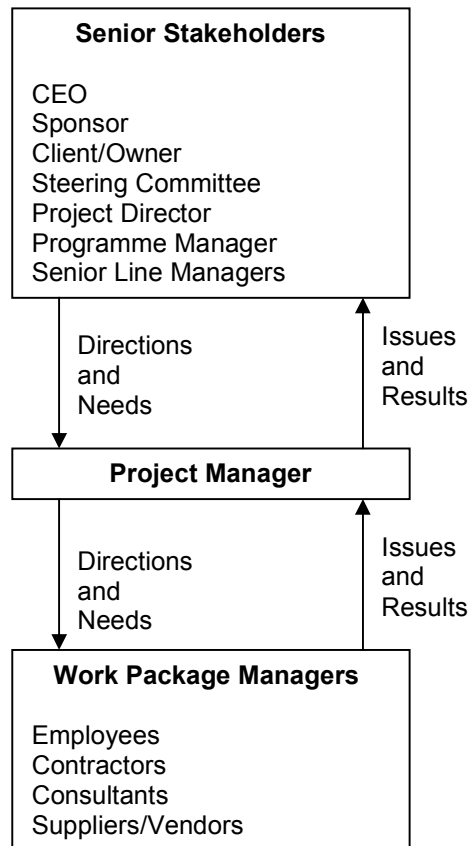


Figure 11.19: Schedule of Reports

Possible Communications	To	From	When	Format	Comments
Status Report Progress Report Variance Report Exception Report Trend Report Site Visit Report Audit Report Change Request Change Order Evaluation Report Meeting Agenda Meeting Action Plan Update Project Plan	<i>PM</i>	<i>WPM</i>	<i>Weekly</i>	<i>Standard</i>	<i>E-mail</i>

In summary, when we monitor progress, we ask three basic questions:

1. What is the actual status of the work?
2. When there is a deviation, what caused it?
3. What should be done to correct any deviation that exists?

To answer question 3, there are only four basic responses we can make to a deviation. They are:

1. Accept the deviation.
2. Take steps to get back on track (ie, solve problem).
3. Revise the plan to show that the deviation cannot be recovered.
4. Cancel the project.

Trade-off Analysis

During project execution the project manager may need to propose trade-offs among project cost, time, risk and quality, and sometimes scope. A common trade-off is between cost and time (ie, budget and schedule). The relative importance of the project parameters may vary during the project life. Typical causes for such trade-offs include:

- reduced funding
- increased costs
- altered completion date
- changed scope/specification.

The relationship between project parameters is seldom linear. The typical time and cost relationship at Figure 11.21 shows how cost typically increases when the project is crashed or unduly delayed. Earlier completion may require the use of more expensive resources, increased supervision costs, and reduced cost-effectiveness or productivity due to factors such as congestion. Delayed completion may cause an increase to accumulated overheads and expose the project to new risks.

To crash a project is to complete it as soon as practicable by reducing the duration of critical tasks. This is usually achieved by employing additional resources. Some reasons for crashing a project are:

- avoid late finish penalties
- realise early finish incentives
- release resources earlier for re-employment
- reduce project indirect costs (eg, supervision, equipment hire, and lease of facilities).

Thus, crashing or accelerating the project often reduces indirect costs and increases direct costs. The optimum project duration from a cost perspective is when the sum of these two types of costs is minimised. The procedure for crashing a project is as follows:

1. Obtain an estimate of normal and crash times, and the cost of each, for all tasks.
2. Determine the durations of all paths and their float times.
3. Identify those tasks on the critical path.
4. Crash lowest cost critical tasks first.

There will be occasions when two or more non-critical paths become critical as the original critical path becomes shorter.

Accelerating the Project

There are a variety of techniques to consider if project duration is to be reduced:

- check if current task estimates are realistic
- re-negotiate task durations with those who are to undertake the work
- use additional or more productive resources on tasks
- reduce project or task scope
- overlap tasks
- combine tasks
- break dependencies
- remove 'gold-plating'
- work longer days
- work weekends and statutory holidays
- outsource work
- introduce new methods and technologies.

Remember these measures are applied to the critical path. However, the critical path might change as these measures are applied and as execution realities arise.

Brooks' Law

Earlier I mentioned that Brooks' Law states that adding extra people to a late software project makes it later. The law is also described as 'Nine women cannot have a baby in one month.' Not to be confused with Brook's Law used by NZ Transport Agency for tender evaluation.

A commonly understood implication of Brooks' Law is that it will be more productive to employ a smaller number of very talented (and highly paid) programmers on a project than to employ a larger number of less talented programmers, since individual programmer productivity can vary by a factor of ten between highly talented and efficient and less talented programmers. However, Brooks' Law does not mean that starving a project of resources by employing fewer programmers beyond this point will get it done faster.

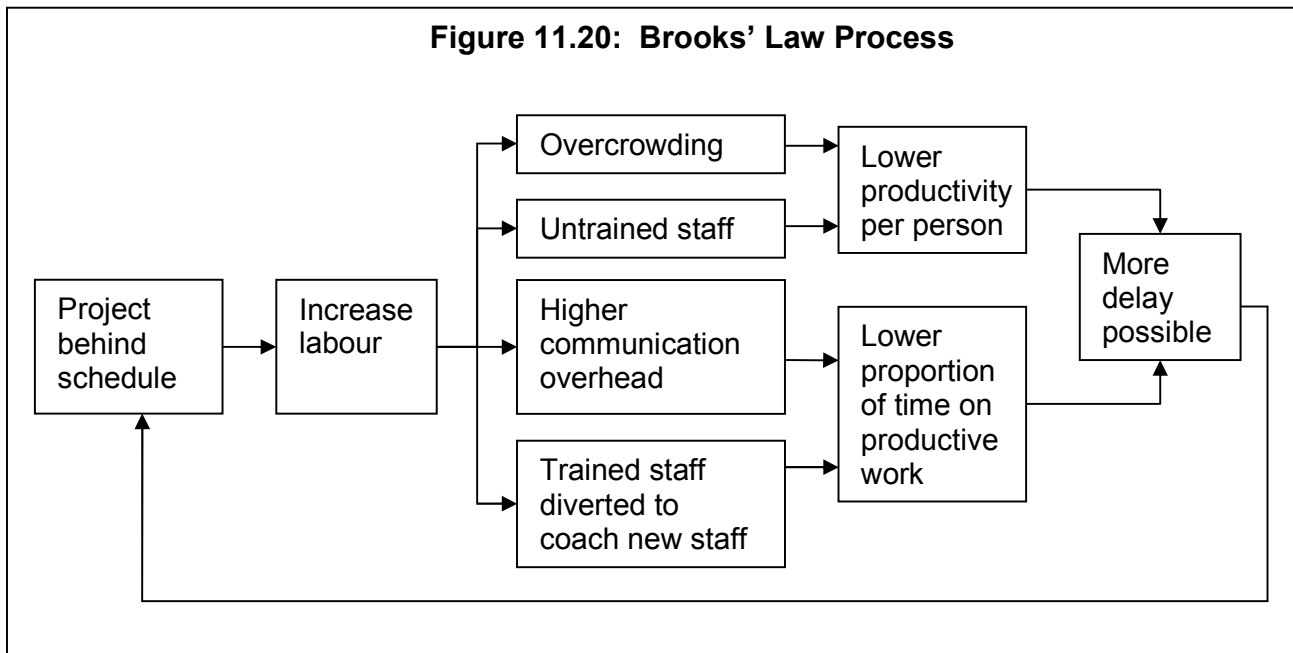
A common way around the constraints of Brooks' Law is to segment the problem into smaller sub-problems, each of which can then be solved by a smaller team, and to have a top-level team that is responsible for systems integration. However, this method relies on the segmentation of the problem being correct in the first place; if done incorrectly, this can make the problem worse, not better, by impeding communication between programmers working on parts of the problem which are actually closely coupled, even when the project plan has decreed that they are not.

Some would claim the programming practices associated with open source software (OSS) development may allow open source projects to appear to defy the predictions of Brooks' Law, but this is not true. A late OSS project will become even later if additional developers are added for the reasons addressed above. Also, some OSS projects have no schedule, so 'late' and 'later' have no meaning.

Brooks' Law applicability to other disciplines varies depending upon the nature of the work. In any area where the work products are commodities, the Law does not apply. For example, on a late

construction project, one can employ additional dump trucks to haul waste faster, without suffering the time penalty. The function of hauling waste can be performed by anyone who possesses a minimal level of skill and a truck. Nothing differentiates one truck from the next, and no additional communication or training is required to do the hauling. The requirement to get the new truck drivers up to speed is minimised and the resultant additional communication channels do not exist (truck drivers do not need to talk to other truck drivers in order to haul the waste).

The diagram at Figure 11.20 shows the possible consequence of adding additional people to a behind-schedule project.



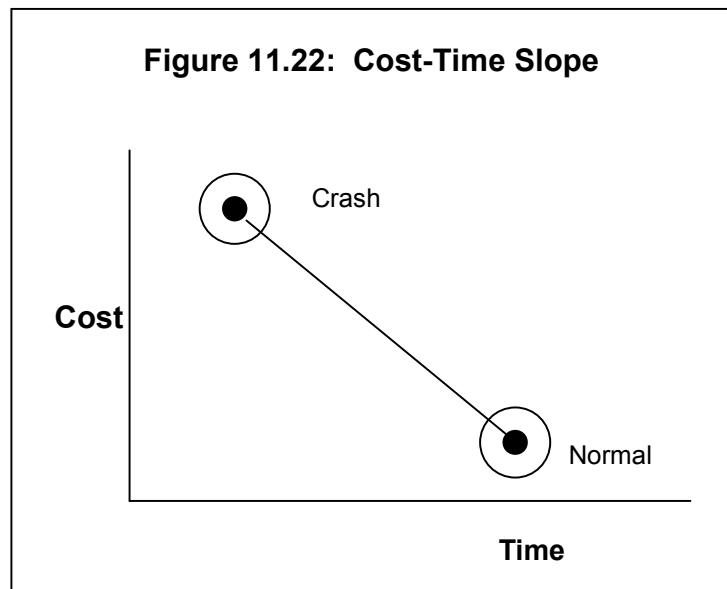
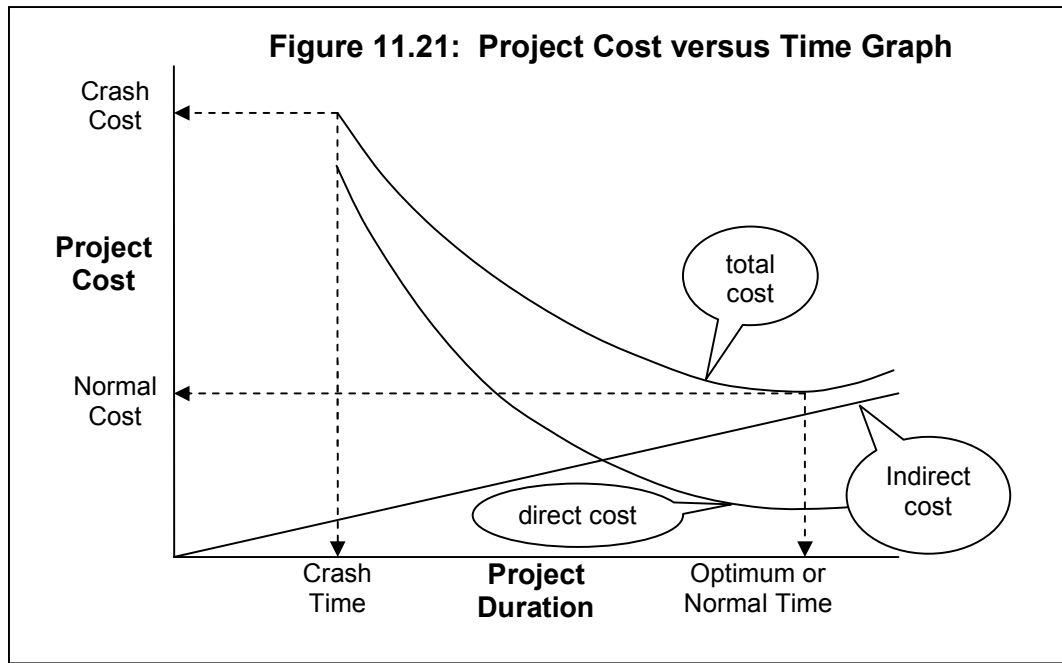
Cost versus Time

In scheduling, the duration of each task is estimated. These estimates are usually the most financially economical durations for the tasks. Together with the duration, we can estimate the cost of each task, allowing for labour, material and equipment requirements. This economical duration can be labelled 'normal' time and the cost involved 'normal' cost. This 'normal' time is usually accepted as the maximum duration because increasing it further will usually increase cost rather than reduce it, and no client is likely to pay more for a slower job. It is however, possible for any task to have a range of durations less than the normal time. This reduction of time is usually achieved only at higher cost.

Such higher costs, incurred during project acceleration, may be due factors such as overtime, shift-work, larger but less efficient work-teams, earlier delivery of materials at higher prices, and sometimes the use of more expensive plant and alternative methods. There will however be a practical time limit for each task beyond which it cannot be shortened further. Any additional labour or plant will then result in increasing cost without a corresponding decrease in time. In fact time might increase. This minimum duration is called the 'crash' time and the cost associated with it the 'crash' cost.

The typical time-cost curve for a project usually takes the form shown at Figure 11.21, ranging between 'normal' (minimum cost and maximum time) and 'crash' (minimum time and maximum cost) values. The slope of the curve, shown at Figure 11.21, steepens from right to left, showing that

time savings become progressively more expensive. The plotting of such a curve depends on sufficient data being available to produce intermediate points between crash and normal values. This is difficult to do for many projects, nor is it always necessary. In most cases the time-cost curve can be represented by a straight line joining the crash and normal points as shown at Figure 11.22.



This approximation is sufficiently accurate for most estimating and costing purposes. The slope of the line represents the rate of cost increase. It can be determined as follows:

$$\text{Slope} = \frac{\text{Crash Cost} - \text{Normal Cost}}{\text{Normal Time} - \text{Crash Time}}$$

To illustrate the above, the project represented at Figure 11.23 is analysed by those familiar with the work to produce the table cost Figure 11.24 and the graph at Figure 11.25.

Figure 11.23: Network Diagram

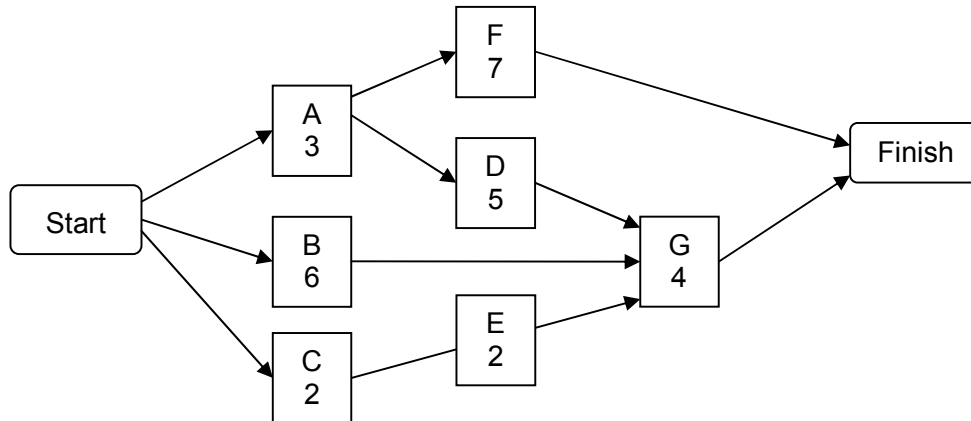


Figure 11.24: Cost-Time Data

Task ID	Description	Immediate Predecessor	Normal		All Crashed		Extra
			Weeks	\$K	Weeks	\$K	Cost/Week
A	Produce materials	Nil	3	5.0	2	10.0	5.0
B	Prepare site	Nil	6	14.0	4	26.0	6.0
C	Prepare request	Nil	2	2.5	1	5.0	2.5
D	Prefabricate and deliver	A	5	10.0	3	18.0	4.0
E	Obtain Council approval	C	2	8.0	2	8.0	N/A
F	Install connecting lines	A	7	11.5	5	17.5	3.0
G	Erect building	B, D, E	4	10.0	2	24.0	7.0
Project Duration and Cost			12	61.0	7		

The present project cost is \$61K. According to the data at Figure 11.23 and the network diagram at Figure 11.24, the project duration can be reduced to seven weeks most economically by:

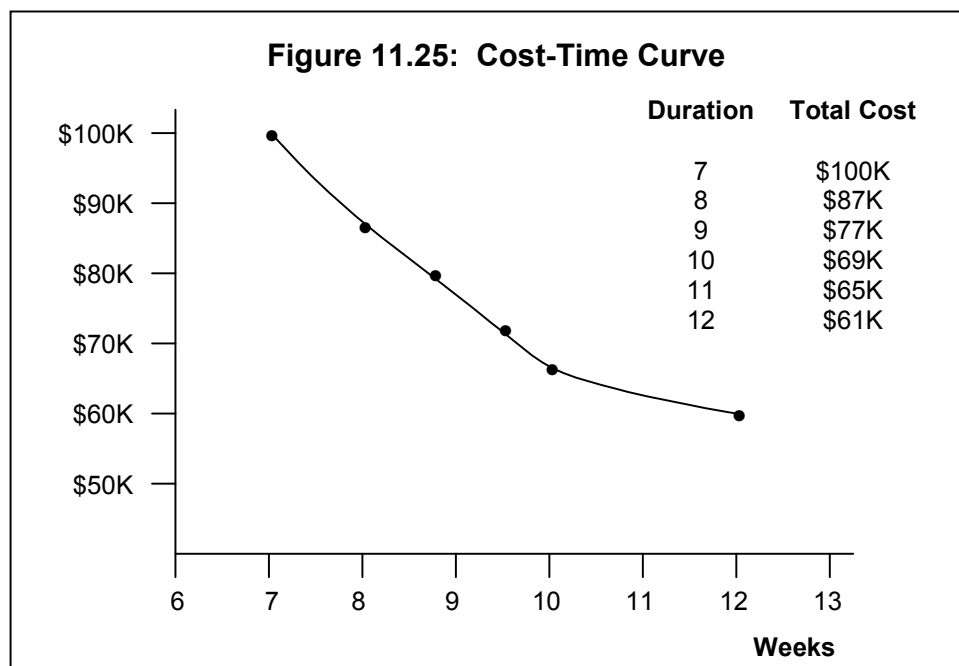
Reducing A to 2 days	=	\$5 K extra
Reducing B to 5 days	=	\$6K extra
Reducing D to 3 days	=	\$8K extra
Reducing F to 5 days	=	\$6K extra
Reducing G to 2 days	=	\$14K extra
		<u>\$39K extra</u>

Thus, economically-rescheduling results in a seven-week project at \$100K. There will now be three critical paths: B-G, A-F-G, and A-D-G. There is no need to crash C and E. To do so would incur unnecessary costs.

In practice, the critical path is first examined and those tasks with flat cost slopes are progressively expedited until all float in one or more of the other paths is used up. A new parallel critical path is then created, and the process is repeated. This heuristic reduction of project duration continues until the crash schedule is achieved when no further reduction of time is possible.

Generally speaking, lengthening the project completion time beyond its 'normal' duration will increase its cost rather than decrease it. The reasons for this are a lost of efficiency and therefore higher costs, and also because direct costs, which have not so far been included, invariably increase with time. Again, some reasons for crashing a project include:

- avoid late finish penalties
- gain early finish incentives
- release resources earlier for re-employment
- reduce project indirect costs such as:
 - cost of supervision
 - equipment hire
 - lease of facilities.



Indirect costs generally represent overhead costs such as supervision, administration, consultants, and interest. Indirect costs cannot be associated with any particular work package or task, hence the term. Indirect costs vary directly with time. That is, any reduction in time should result in a reduction of indirect costs. For example, if the daily cost of supervision, administration, and consultants is \$4,000, any reduction in project duration would represent a savings of \$4,000 per day. If

indirect costs are a significant percentage of total project costs, reductions in project time can represent very real savings, assuming the indirect resources can be used elsewhere.

Direct costs commonly represent labour, materials, equipment, and sometimes subcontractors. Direct costs are assigned directly to a work package and task, hence the term. The ideal assumption is that direct costs for a task time represent normal costs, which typically mean low-cost, efficient methods for a normal time. When project durations are imposed, direct costs may no longer represent low-cost, efficient methods.

Costs for the imposed duration date will be higher than for a project duration developed from ideal normal times for tasks. Because direct costs are assumed to be developed from normal methods and time, any reduction in task time should add to the costs of the task. The sum of the costs of all the work packages or tasks represents the total direct costs for the project.

There are three major steps required to construct a project cost-time graph:

1. Find total direct costs for selected project durations.
2. Find total indirect costs for selected project durations.
3. Sum direct and indirect costs for these selected durations.

The most difficult task in constructing a cost-time graph is finding the total direct costs for specific project durations over a relevant range. The central concern is to decide which tasks to shorten and how far to carry the shortening process. Basically, we need to look for critical tasks that can be shortened with the smallest increase in cost per unit of time.

In summary, shortening a task is called accelerating or crashing. The shortest possible time a task can realistically be completed in is called its crash time. The direct cost for completing a task in its crash time is called crash cost. Both normal and crash estimated times and costs are collected from those people most familiar with completing the task.

Keeping on Track

In restoring or balancing a project that's missing its time, cost or quality objectives, there are some basic things we can do:

- **Re-estimate the project.** This means double-checking things to make sure the estimates are really valid. We don't just give in to management to reduce the cost or schedule estimate; instead, we look for opportunities to do things better or differently to achieve the same goal. For example, we may be able to take advantage of the float in the schedule to resequence non-critical tasks. If we do the review of the project correctly, our new estimates should provide an even firmer foundation for meeting project expectations.
- **Add more resources to the project.** Beware of this simple-sounding solution. As we add more personalities, people can lock horns in what is called 'creative conflict.' This can bring work to a standstill until the mess sorts itself out or a team member stomps off for good in self-righteous disgust. Only add people if people will actually help get things done faster. Look for other means to improve productivity. If we scoped out the work and selected a good team in the first place, we may need to change objectives instead of the team.
- **Reduce the scope of the project.** Sometimes the best way to get a project done is to scratch

some of the work from the list. This can turn an impossible list of tasks into a doable (and scoped-down) project. Before promising to do less as a way of dealing with change, however, we need to make sure the downsized project is really worth doing. Also make sure the sponsor and key stakeholders agree to the downsizing. If not, we'll need to negotiate what we really need – more time or resources or a bigger budget – to get the project done properly.

- **Increase productivity.** Some people are simply more productive than others. By reassigning people, we may still be able to meet our original cost and schedule performance. Sometimes this is a good solution for the project but a bad one for the organisation. For example, it's not always a good idea to put all the best people on one project; the other projects may suffer as a result. Some of these people might end up doing work for productivity's sake that's well below their capabilities. We must be sure there isn't a better way to make the staff more productive such as training people or prudently using new technologies.
- **Use outside resources.** Assign part of the project to a contractor who can manage and complete it within our original guidelines. This is called outsourcing. This moves the work to outside experts who will hopefully be more productive. However, this may create more risks in terms of lost in-house control and the gamble that the outside experts will actually be able to do what they say they can.
- **Use overtime.** Use it prudently, however. It can backfire in lost productivity and morale problems if this option becomes the default action. If we're using hourly employees as opposed to salaried ones, it can end up pushing the budget out of control. And paying overtime may encourage more overtime, particularly if we are paying a higher rate.
- **Shift some of the work to the client.** If a project is high on cost or short on people resources, this can be a good choice – if the client agrees to it. We and the client should identify tasks that the client's staff can perform. This only works if the client agrees with the plan and has adequate resources to take on the tasks. It can also cause political problems between our project organisation and that of the client. Be careful when we consider this option; it needs to be done in a way that preserves the integrity of the project and our authority as project manager.
- **Crash the schedule.** This involves compressing the tasks on the critical path to reduce the time required to meet the desired finish date. We'll need to produce a cost-schedule trade-off analysis, which can help us analyse the cost of reducing the schedule. Sometimes the increase in cost to get things done faster will outweigh the need for speed.
- **Adjust the profit requirements.** A reduced profit margin can free up cash for needed resources. If the project won't bring in enough money for the company to survive, however, this is a bad idea. A decision to reduce profit is clearly the territory of the company executive – not the project manager.
- **Adjust the project goal.** This is like playing on thin ice. Although it may be appropriate to reduce some of the functionality or scope of the project end results, it's not usually a good idea to reduce the performance characteristics (quality) of the project. We might remove some of the functionality only when it doesn't affect the performance of the product overall and resultant benefits.

Variations

A variation is a change, which normally arises as a response to a project problem or as a request to expand or reduce the project scope, modify policies, processes, plans, or procedures, alter budgets, or revise schedules. Only formally documented requests for change should be processed and only approved changes are implemented. A typical change control process is shown at Figure 11.26. An audit trail is important. The purpose of the change control process is to:

- manage and control changes to scope, costs, resources and timeframes
- provide a framework for assessing and approving changes
- ensure the changes are reasoned and their impact determined and understood before they are included in the project
- provide an audit trail and accountability through a record of the changes
- help minimise the number of changes to a project
- provide assurance to management and stakeholders that proposed changes have been discussed and agreed.

All changes to scope, cost, schedule and quality must be documented and agreed to, then signed-off by the project sponsor. We might feel bad about applying a formal process to small changes. However, ignoring the proper process can have the following undesirable consequences:

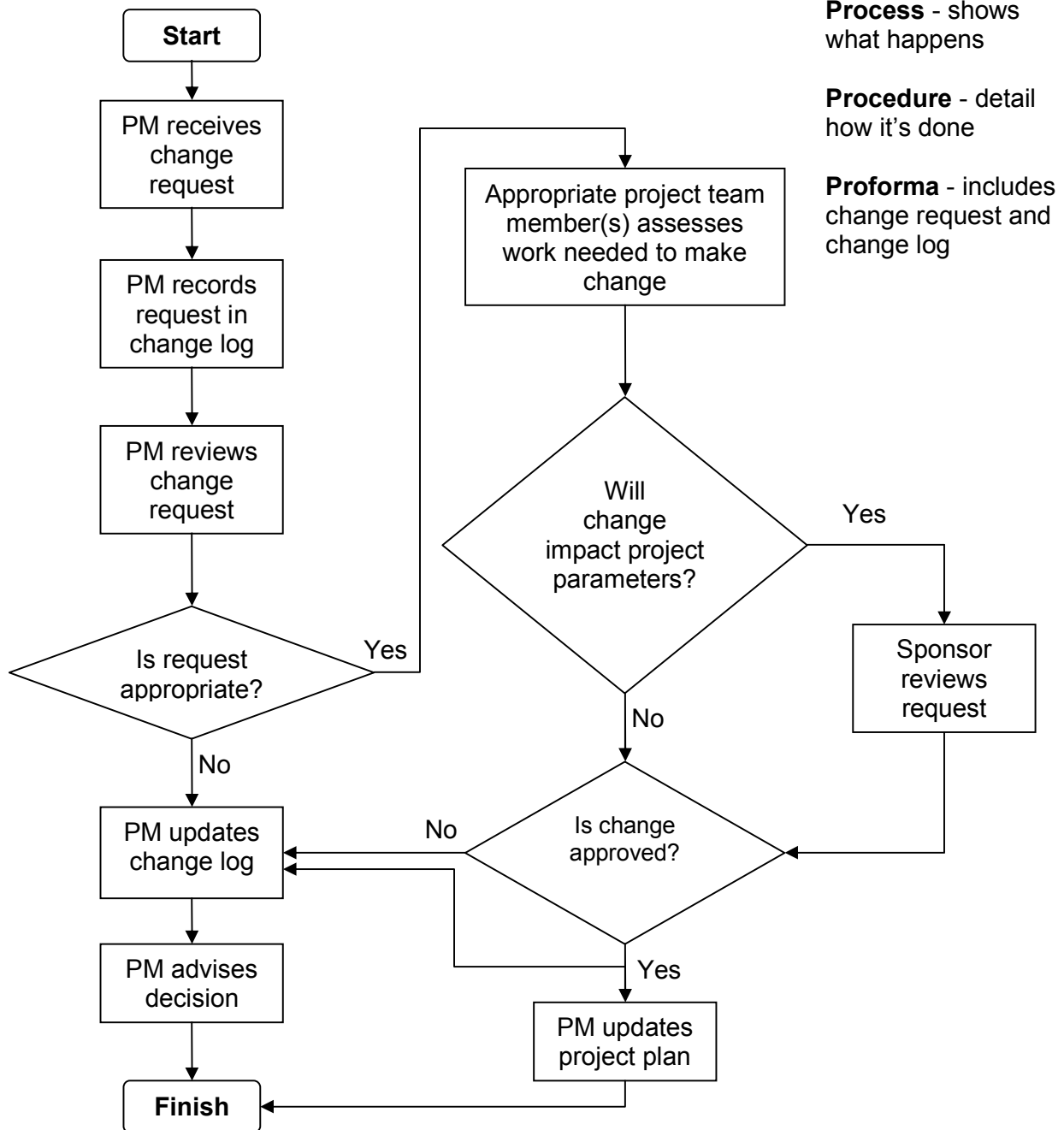
- an unfortunate precedent for managing change is set
- client/owners forget we accommodated these changes and goodwill is lost
- unintended consequences can bite us later
- little changes can accumulate into big consequences, such as reduced benefits, over time.

It's a good idea to practise the change process up front to work out the kinks, show its value, and get stakeholders comfortable with it.

The change control system requires that we:

- review all requested changes to the project (both content and procedures)
- identify all task impacts
- translate these impacts into project performance, cost, and schedule
- evaluate the benefits and costs of the requested changes
- identify alternative changes that might accomplish the same ends
- accept or reject the requested changes
- communicate the changes to all concerned parties
- ensure that the changes are implemented properly
- prepare periodic reports that summarise all changes to date and their project impacts.

Figure 11. 26: Change Control Process



The following simple guidelines, applied with reasonable rigor, can be used to establish an effective change control procedure:

1. All project contracts or agreements must include a description of how requests for a change in the project's plan, schedule, and/or deliverables, will be introduced and processed.
2. Any change in a project will be in the form of a change order that will include a description of the agreed-upon change together with any changes in the plan, budget, schedule, deliverables and benefits that would result from the change.
3. Changes must be approved, in writing, by the client or sponsor and if appropriate by a representative of senior management of the firm responsible for carrying out the project.
4. The project manager must be consulted on all desired changes prior to the preparation and approval of the change order.
5. Once the change order has been completed and approved, the project plan should be amended to reflect the change, and the change order becomes part of the plan. All relevant project players must be advised promptly about the change. Some changes will impact back down the supply chain.

A typical change request template is shown at Figure 11.27. Also, a change log should be maintained that documents the change, the originator, date, impact, and approvals.

Figure 11.27: Change Request Proforma

From:	
To:	
Date:	
Project/Task:	
Proposed Change:	
Reason(s) for Proposed Change:	
Change Number:	Date Received:
Consequences of Proposed Change:	
Project Manager: Approved/Not Approved	Date:
Recommend/Not Recommend	Date:
Sponsor: Approved/Not Approved	Date:

Project Cashflow

Cashflows in and out of a project are much like blood flows in and out of specific organs of our body to nourish it. So the key to healthy cashflow is a balance between what comes in and what goes out. We need cash available to pay the bills.

Even with a profitable project there can be a temporary shortage of cash caused by increased expenses, delayed payments by the client, delayed funding by the sponsor, or several major expenses coming due at the same time. Such temporary problems can usually be anticipated by projecting the cash we expect to flow in and out each week or each month for the duration of the project.

With advanced warning, we can try to save up for these temporary cashflow demands. And sometimes our creditors will permit us to renegotiate the terms of payment. We should explore this option before considering a temporary bank loan, which will mean interest payments. The best insurance against short-term cashflow problems is to maintain a cash reserve. The challenge for the project manager is to maintain a positive cashflow – money must flow in at least as fast as it goes out.

The cashflow statement is a document which models the flow of money in the project. In a project the income would normally come from monthly progress payments, while expenses would be wages, materials, overheads, interest, and bought-in services. The cashflow statement is usually structured as shown at Figure 11.28.

Figure 11.28: Cashflow Statement

Cash Flow Items	January	February	March
Opening Balance	0	20 000	33 000
Income	60 000	60 000	60 000
Total Available	60 000	80 000	93 000
Overheads	4 000	4 000	4 000
Materials	30 000	35 000	40 000
Labour	6 000	8 000	10 000
Total Expenses	40 000	47 000	54 000
Closing Amount	20 000	33 000	39 000

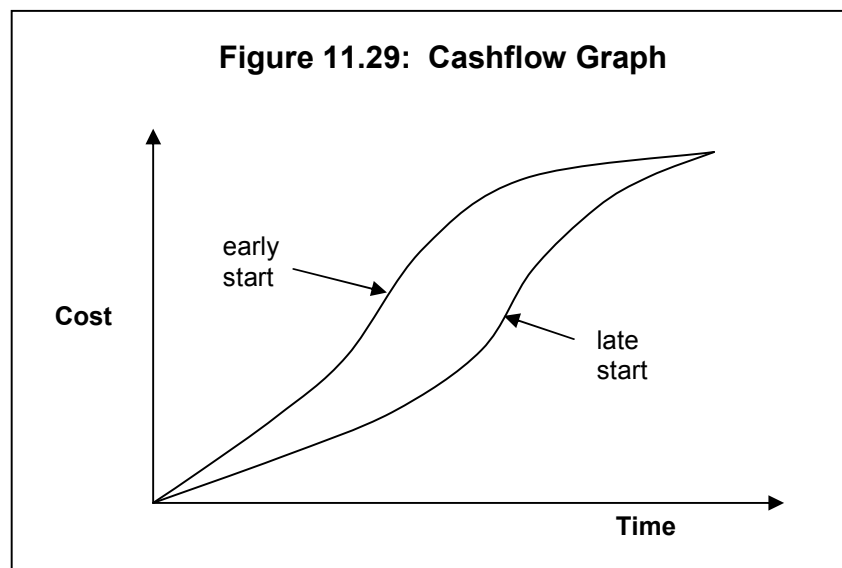
Note that assets do not appear on the cashflow statement as they do not represent a movement of cash. Although appreciation and depreciation may present a flow of value, they do not present an inflow or outflow of money physically. This also applies to the revaluation of property and the value of company shares.

When the project manager is faced with a negative closing amount, we might try to:

- delay expenditure payments
- arrange longer credit periods
- bring forward income payments
- have client pay suppliers directly
- arrange bank loan
- delay working on non-critical tasks.

A contractor's cashflow may be put at risk if retentions apply and sub-contractors are to be paid promptly regardless of whether the client has paid the contractor promptly. The 'pay when paid' practice is now illegal in New Zealand. Thus, contractors would prefer a substantial initial deposit. Conversely, clients would prefer to pay after the work has been satisfactorily completed. Progress payments are the compromise.

The 'banana curve' at Figure 11.29 illustrates the different timings of the cashflow for the early start schedule and late start schedule. Project managers usually schedule tasks starting as early as possible to ensure that maximum float time is available as a hedge against unexpected delays. However, it's not always useful to tell those who do the work that their tasks have float. This information may encourage delays. Float is used at the project manager's discretion.



Managing Conflict

Conflict can occur at all levels in projects, largely because there may be many different parties working together with their own separate aims, agendas and values which at some point collide, or diverge. Projects and contracts can very easily engender conflict. Some of the main sources of conflict are:

- Disagreements about the timing, sequencing or scheduling of project work.
- Conflicts about the relative importance of one project or task over another.
- Disagreements about the availability, allocation, grouping or scheduling of people and other resources.
- Disagreements about technical issues, performance standards, and work methods.
- Conflicts about how the project is managed, such as role definition, reporting arrangements, responsibilities, leadership, and levels of authority.
- Conflicts over estimates, allocation of funds, and payments.
- Interpersonal differences – personality conflicts.

Because some people have never been taught how to sit down and work out their differences, even a small conflict may soon escalate into a major problem. Therefore, the project manager may need to provide timely training in interpersonal skills for team members. Below are listed various methods of handling conflict, ordered from the most effective (listed first) to the least effective (listed last).

- **Problem Solving.** This is a rational, fact-based approach where disputing parties solve their differences by focusing on the issues, looking at alternative approaches, and selecting the best alternative. Problem solving may contain some elements of compromising and smoothing. This is usually the most effective way to handle conflict. It helps parties learn to work together to confront and resolve differences and find solutions that are not based on emotion or power plays.
- **Compromising.** Compromising involves bargaining and searching for solutions that bring some degree of satisfaction to the parties involved. Since compromise yields less than optimum results, the project manager must weigh such actions against the project goal.
- **Smoothing.** Smoothing seeks to maintain friendly relations by emphasising common areas of agreement and de-emphasising areas of difference. Although it may not address the real issues, it may be effective because identifying areas of agreement may put the disagreement in clearer perspective. Thus, project work can often continue in areas where there is agreement.
- **Forcing.** Forcing involves a straightforward use of authority power in resolving the conflict by exerting one's viewpoint over others. This method should be used only as a last resort or in very urgent situations because it may cause resentment and further deterioration in the work climate.
- **Withdrawing.** Withdrawing means retreating from the conflict issue. In this method, the person purposely ignores the conflict because they want to avoid causing problems, or they withdraw from it out of fear, perhaps feeling inadequate to resolve the issue. This method may be precarious because if the issue at hand is important to the other party, withdrawing or ignoring it may intensify the situation. However, it may be a temporary strategy to allow the other party to cool off or to buy time to study the issue further. Yet, what we ignore we endorse.

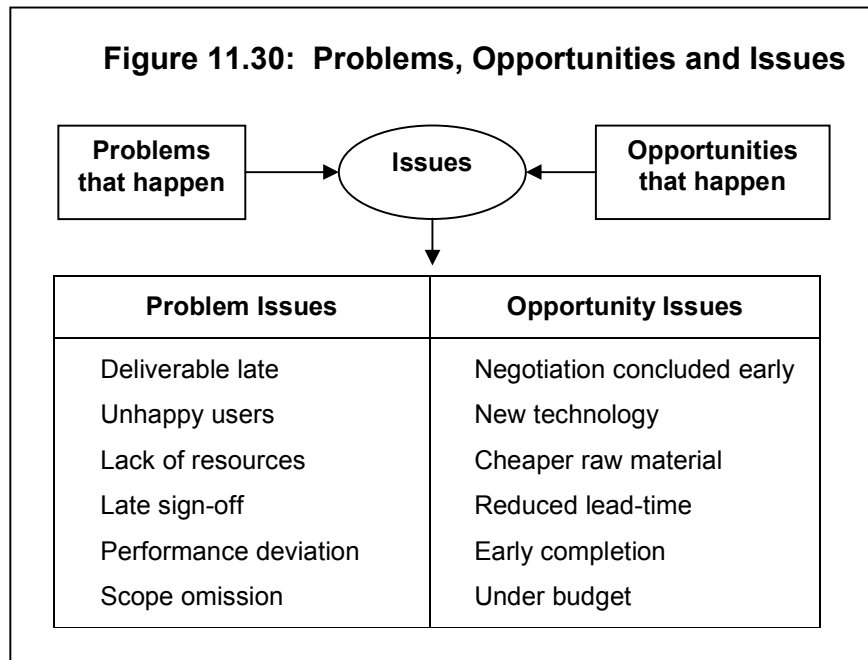
Issues Management

Issues management is the process of recording and handling any event or problem that either threatens the success of the project or represents an opportunity to be exploited. As project manager we own the issues and must drive their resolution. Issues arise from problems and opportunities as shown at Figure 11.30.

The issue management process usually follows this sequence:

1. Issue is recorded in the issues log or register.
2. Decide, agree and record, who will be accountable for managing issue resolution. Record in the register:
 - issue owner
 - date for issue resolution.
3. Regularly update resolution progress in the register.

4. Once issue is resolved, record the method and date of resolution.



A large number of issues may be raised during the life of the project, some will need immediate resolution and others can await regular meetings.

The power of the issues register is its ready accessibility. Some tips on using an issues register are:

- allow people to record issues anonymously if necessary
- write up the issue as a question since this helps focus us on solutions
- have only one issue per entry since grouping several issues makes it more difficult to identify solutions
- do not add to existing issues, rather record as a new issue
- keep all issues visible and share them with the project team and, where appropriate, with other stakeholders.

Resolving issues usually follows this sequence:

1. Declare we have an issue. Don't hide the issue. Putting it in the register is not always enough.
2. Clarify the precise issue. Exactly what happened or didn't happen. Distinguish between facts and rumours.
3. Decide what the resolution of the issue would achieve. What would resolution make possible? Need it to be resolved? Should it be rejected, deferred, escalated, resolved or further investigated?
4. What actions might be taken to resolve the issue? Also, think laterally. What's the true cause?
5. Decide appropriate action and assign responsibility for this task. Record progress.

An issues register template, which is usually set up as a spreadsheet, is at Figure 11.31. We should develop a template to suit our project management framework. The issues register should be subject to version control to help ensure that everyone has a common understanding of the project issues. At the end of the project this register will be a useful record of how the project proceeded, and why various decisions were made.

Project Audit

Periodically our project should be audited. Such an audit is in our interests as project manager. Sometimes we can't see the 'wood for the trees'. The auditor may be a colleague whose expertise we respect, or there may be an audit team, internal or external in origin, who usually manage the audit as a project. We should welcome their expert and objective assessment. The chances of a successful audit will be enhanced if the following principles are observed:

- First and foremost, the philosophy must be that the project audit is not a witch-hunt. Modern auditors are not here to assign blame. The audit is not a tool to identify poor performers. We look for problems not troublemakers. Nor is the audit used to serve political objectives. The existence of problems should not be construed to indicate incompetence.
- Comments about individuals or groups participating in the project are no no's. Keep to project issues, not what happened or by whom.
- Audit activities should be intensely sensitive to human emotions and reactions. The inherent threat to those being evaluated should be reduced as much as possible.
- The project manager should be notified of the impending audit. Surprise audits suggest a lack of trust.
- Accuracy of data should be verifiable or noted as subjective, judgemental, or hearsay, and the audit must not be conducted in an arbitrary and capricious manner.
- Senior management should announce support for the project audit and see that the audit group has access to all information, project participants, and (in most cases) project client.
- The attitude toward a project audit and its aftermath depend on the modus operandi of the audit leadership and group. The objective is not to prosecute. The objective is to learn and conserve valuable organisation resources where mistakes have been made. Friendliness, empathy, and objectivity encourage cooperation and reduce anxiety.
- The audit should be completed as quickly as is reasonable with minimum disruption. Yet sometimes audits do contribute to schedule and cost overruns.
- The audit leader should have access to senior management and the project sponsor.

Figure 11.31: Issues Register

ID	Issue Description	Date Raised	Raised by(name)	Issue Owner	Resolution Date	Priority	Comments Progress/Outcome
1	We don't have the skills to properly complete the installation task. How do we ensure this task is properly done and on time?	1 June	Peter	Peter	20 June	High	Task outsourced. Issue resolved 5 June.
2	No budget or time allowed for teambuilding. How can we ensure project team effectiveness?	2 June	Paul	Mary	30 June	Medium	Teambuilding day scheduled. Issue resolved 25 June.

The purpose of periodic project audits is to enable the project manager to:

- Improve project performance and the management of the project.
- Ensure that quality of project work does not take a back seat to schedule and cost concerns.
- Identify areas where other projects, current or future, should be managed differently.
- Keep clients informed of project status. This can also help ensure that the completed project will meet the needs of the client.
- Reaffirm the organisation's commitment to the project for the benefit of the project team members and other stakeholders.

Ideally, a project audit should be conducted by a suitably qualified independent examiner who can remain objective in the evaluation of information. The audit should be conducted in a spirit of learning, rather than in a climate of blame and punishment, which usually encourages people to hide problems. Audits come in different formats – comprehensive, partial, formal and informal. A formal and comprehensive audit should be followed by a written report that as a minimum, mentions:

- **Current project status** which is sometimes best shown by employing earned value analysis.
- **Future status** is a forecast of what outcome is expected. Will there be significant deviations in planned schedule, cost, performance, or scope?
- **Status of important tasks** particularly those on the critical path should be reported. Tasks with high levels of risk should also be given special attention, as should those being performed by outside contractors or subcontractors over whom the project manager may have limited control.
- **Risk assessment** to identify those risks that have potential for monetary loss, project failure, or other liabilities.

In general, the simpler and more straightforward a project audit report, the better. Information should be organised so that planned and actual results can be readily compared, and significant deviations identified and evaluated. The frequency with which a project audit is conducted may be influenced by the answers to the following questions:

- What is the project's expected duration?
- How experienced is the project manager?
- How certain are the project outcomes?
- How familiar are we with managing projects of this nature?
- How important are the project outcomes?
- What are the client's expectations?

The collection of relevant information may be undertaken by administering questionnaires, conducting interviews, direct observation, and by review of project documentation. The information gathered must give a true representation of progress and then be compared to a model or standard of best practice. This standard may be an up-to-date procedure manual, framework, or checklist used by the organisation. From the strengths and weaknesses we can identify areas where improvements can

be made. When the audit report and recommendations are released, there should also be a review of the audit process to identify improved auditing methods. And is the best practice against which the project is evaluated still best practice? It can be a transient model.

The selection of the auditor or audit team is important to the success of the process. The size of the team will generally be a function of the project's size and complexity. The main role of the audit team is to conduct a thorough and complete examination of the project or some pre-specified aspect of the project. To be effective the audit team must have ready access to all relevant information. Most of the information will come from the project team's records. Preparing for the audit includes:

- estimating the timeframe and cost for the audit and making provision in the project budget for this
- selecting the auditor
- establishing the auditor's reporting level
- agreeing on the audit terms of reference, scope and audit report format
- notifying the project manager of the audit and agreeing the dates for the audit
- advising the project manager what information is needed in advance of the audit.

Project auditing can have obstacles. The project team may be defensive and reluctant to cooperate. The auditor's style will have a major impact on the level of cooperation. In particular, the emphasis should be on improving the project, rather than accusing or blaming project team members.

Out of professional courtesy, the project manager is usually permitted to see the audit findings first. The project manager may identify inaccuracies in the findings or items taken out of context. Such comments from the project manager can help ensure the integrity and usefulness of the report. Sometimes the conclusion might be to terminate the project. A flowchart showing a possible termination process is at Figure 11.32.

Structured Walk-through

The structured walk-through (SWT) is a gentle yet effective audit and was developed by IBM in the late 1960s as a relatively friendly approach to periodically evaluating project performance. In the case of evaluation, one significant problem can be that the negative aspects of evaluation discourage project staff from partaking forthrightly and readily in the evaluation process. The structured walk-through deals with this issue by giving the people who are being evaluated greater control over the evaluation process.

The structured walk-through might also be used to evaluate a contractor's performance where a partnering relationship exists. In this instance the contractor controls the evaluation process and objective evaluation is undertaken by a third party whose appointment is acceptable to both the project manager and the contractor.

The key principles for conducting a structured walk-through are explained in the following paragraphs. These rules reflect the original rules developed by IBM, as well as some modifications to them that have evolved over recent years, as summarised by Professor J D Frame ('The New Project Management'):

- **Those being evaluated choose the evaluators.** This reduces the sense of threat sometimes felt by those being evaluated. If they choose the evaluators, they are less likely to complain that the evaluation team was selected in a vindictive or arbitrary fashion. They also can be assured that the team was not chosen in accordance with some hidden political agenda. And they can select an evaluation team made up of people who are already familiar with the organisation and the type of work involved. By doing so, they reduce the amount of time they must dedicate to bringing the evaluation team up to speed.

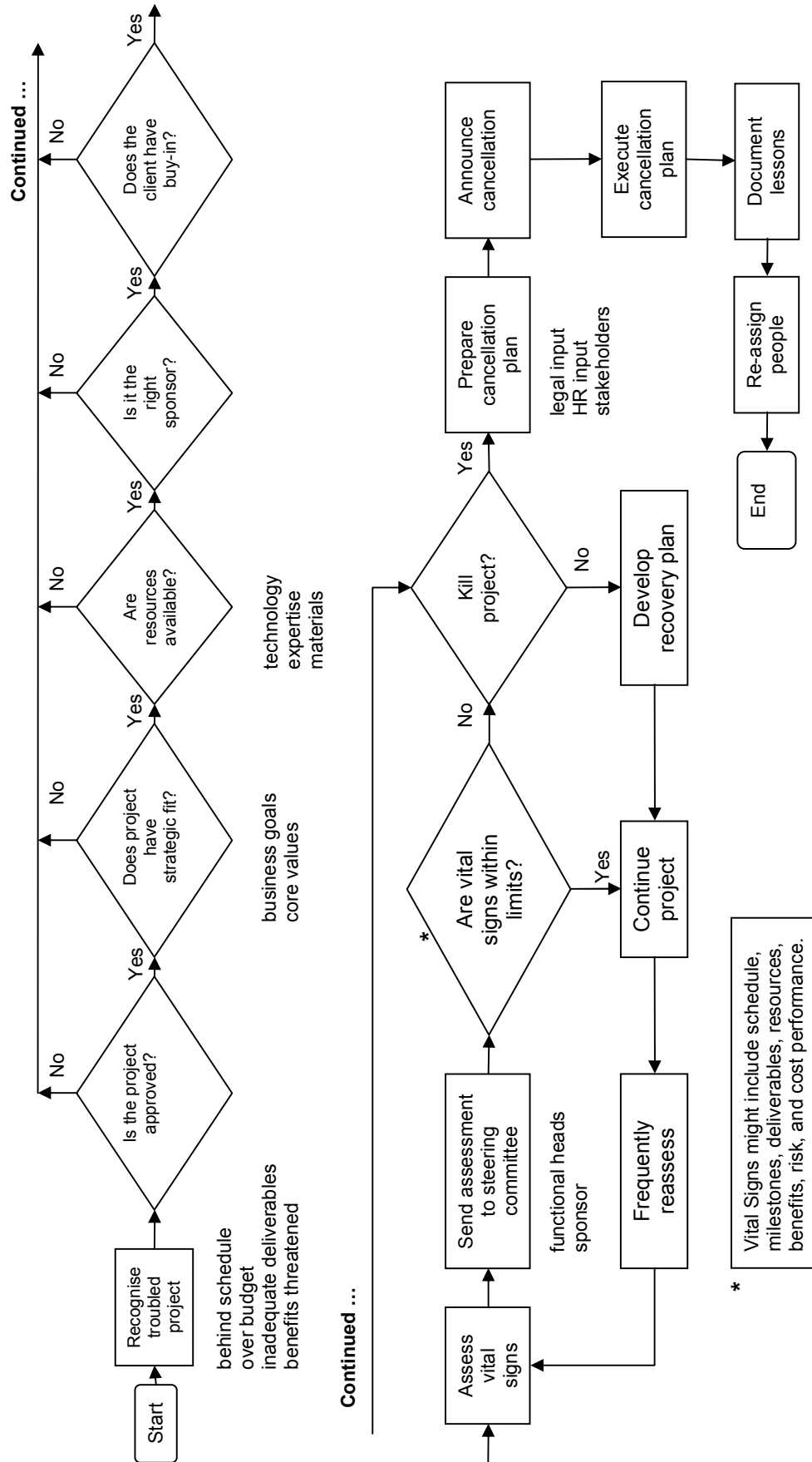
Obviously, there is some concern that those being evaluated will rig the jury. That is, they will choose evaluators who are their close associates and who may be reluctant to criticise them too harshly. In practice, this potential abuse of privilege does not appear to be a serious problem. The properly conducted structured walk-through usually creates a sense of trust, and the people being evaluated are reluctant to violate this trust. They recognise that it is a greater crime to distort the walk-through process than to avoid adverse feedback.

In addition, in some organisations, the project team being evaluated is not given full latitude in choosing its evaluators. Rather, it is given the opportunity to select its evaluators from a list of candidates who have been pre-approved by the project sponsor or PMO.

- **Those being evaluated determine the rules.** The people being evaluated continue to control the process by establishing the rules of the game. They identify the evaluation scope and criteria. They send terms of reference to the evaluation team members. They set the agenda for the evaluation. There is the possibility that this rule can be abused. Specifically, those being evaluated could create rules that steer the evaluation team away from problem areas. However, they usually realise that by avoiding problems, they are defeating the purpose of the evaluation. In addition, in some organisations, the rules the team establish are governed by a set of guidelines provided by the project sponsor or project office.
- **Those being evaluated run the evaluation meetings.** The evaluation review usually occurs through one or more meetings. This constitutes the actual walk-through. The people being evaluated run the meetings. They determine who talks, when they talk, and how long they talk. Typical concerns are:
 - The people running the meetings are not experienced facilitators – they conduct the meetings in an amateurish fashion.
 - The meetings do not stick to the agenda – for example, technical evaluators tend to go off on a technical tangent.
 - The evaluation meetings can provide a forum for different groups to grind their political axes. Thus, in selecting evaluators, it is important that the people selected are open-minded and willing to cooperate.

These complaints are not directed at the structured walk-through process itself. Rather, they are more concerned with lack of skills some of us may have in running a meeting.

Figure 11.32: Killing a Troubled Project



- **No senior manager should be present.** The whole point of the structured walk-through process is to create an environment that engenders openness, honesty and trust. How honest will employees be if they are asked to discuss their project problems in the presence of those individuals who assess their performance? Several people report that they are not pleased with senior management presence and that they find it stifles the free flow of ideas.
- **Clients should not be present.** Those who have experienced the presence of a client or customer during a walk-through session strongly recommend that they be excluded. How honest will people be in uncovering and discussing risks and issues when the client is present? Furthermore, there is the danger that the client may actively join in the criticism process and use the occasion to change project requirements.

This principle may sound as if it is anti-client. It is not. Stakeholder satisfaction remains a key objective of project management. However there are other avenues through which we can obtain timely input.

However, there is one growing class of projects where we cannot exclude customers from the structured walk-through: those projects that involve partnering between customers and project staff. In these cases, the customer is already aware of the inevitable difficulties that arise on projects, so their presence during evaluation sessions should not be disruptive.

- **Maintain good documentation.** Virtually everyone believes that the structured walk-through will not be effective unless the whole process is documented accurately and comprehensively. In particular, notes should be taken of comments and decisions made during the evaluation meetings, and action items should be created from these notes. These action items detail what should be undertaken by whom and by when. Follow-up checks should be made to ensure that the action items have been adequately addressed.

Organisations that employ the structured walk-through for project evaluation are satisfied with the results they achieve. It is not a panacea and can be a bit painful to carry out. However, the alternative approach is to bring in outsiders who project team members may not trust – the consequence of which may be an ineffective evaluation and also one that those evaluated find hard to accept.

Status Report

The precise template for a status report is best determined by the project manager. A typical status report template is at Figure 11.33.

Status reports vary in their format, contents and frequency. They might be submitted on a weekly basis from Work Package Managers to the Project Manager, who might consolidate them into a monthly report for the project sponsor and other key stakeholders. Some considerations are:

- keep them simple, concise and reader-friendly
- adapt them to the needs of our project and readers
- use a consistent format, yet be prepared to adjust the report to suit the message
- use graphics and tables where appropriate to help get the message across
- file copies of reports to record the project's progress and history
- the bottom line – provide required information to the appropriate people in a timely manner.

Figure 11.33: Status Report Template

Project Name:		Project Sponsor:		
Project Number:		Date of Report:		
Project Manager:		Report Period:		
Project Status (tick box)	Description			
Green 😊	All on target, no major issues or risks being realised, no deadlines missed.			
Yellow 😐	Issues, risks etc have arisen but will not impact or delay project, the issues are being managed, changes to scope have been approved, etc.			
Red ☹️	Issues have arisen and will impact the delivery of the project.			
	Status	Commentary		
Overall:				
Time:				
Budget:				
Benefits:				
Risks:				
Issues:				
Scope:				
Stakeholder Communications:				
MILESTONES				
Description	Planned Date	Forecast Date	Actual Date	Commentary
1.				
2.				
3.				

A sudden reluctance to provide a status report may itself be a warning that all is not good. It is always worth following up these situations. There may be emerging problems. Nevertheless, there can be some editorialising with status reports, so they are useful, but are no substitute for visits and one-on-one discussions.

Project Manager's Notebook

It is useful to maintain a personal notebook / journal / diary throughout the project. Such a record of issues, incidents, ideas, thoughts and observations is an exception to the hearsay rule and could be used in a court of law. It's the equivalent of a police officer's notebook. It can be particularly helpful for our own learning, periodic reviews and post-implementation evaluation. However, it is not a substitute for formal documentation and filing. Project files need to be maintained properly and be readily accessible to all players, largely to enable audits and ensure continuity during staff changes.

Meetings

Keeping a project on track requires regularly scheduled meetings to both share information and make decisions. A good project status meeting achieves a lot of communication needs within the project team. Status meetings give us an opportunity to:

- Increase team cohesion; status meetings are often the only time the entire team gets together. Some teambuilding exercise may also be appropriate.
- Keep the team informed about project developments from sources external to the team, such as from the sponsor, client, customer or management.
- Identify potential problems or share solutions to common problems.
- Ensure that the team understands the progress of the project and works together to determine any necessary changes to the project plan.
- Make sure that the entire team shares the responsibility of meeting all the project objectives. Those responsible are held publicly accountable. Also recognise achievement.

Project status meetings rely on a participative management style. They build on the team's involvement in planning the project; the manager should encourage the same kind of involvement to keep it on track. This attitude is based on the philosophy that involvement leads to ownership, and ownership leads to greater commitment and accountability. In addition to the basic rules for running an effective meeting the following are useful guidelines for running a project status meeting:

- Be prepared. In addition to the agenda, everyone attending the meeting needs to have a task report prepared before the meeting begins. It lists any tasks that should have been completed but weren't, and the tasks scheduled for the next two reporting periods. A reporting period is defined as the period between status meetings. If we have a status meeting every week, then the reporting period is one week.
- Include the part-time team members who have been working on project tasks or who will be working on them during the next two reporting periods.
- Use the meeting to disseminate decisions made by management or customers. Be sure to pass on any positive feedback from these stakeholders.
- Keep meetings small by making it safe for unnecessary people to stay away.

- Using the open task report, get the status of every task that should have been started or completed since the last status meeting. The person responsible for each task will report on its completion status (not started: 0 percent; started: 50 percent; completed: 100 percent) and the amount of labour spent on the task. Using only these three completion states assumes that we are breaking down the work into packages that won't span more than two reporting periods. Small work packages both simplify progress reporting and make it more accurate.
- Take advantage of the fact that the entire team is available to consider what action needs to be taken, be sure that we write it down. Either add a task to the project plan, or an action to the issues log. Every action should have a due date and a person responsible for its completion.
- Don't try to solve problems that are too big for the meeting or don't include everyone present. If a problem takes more than say five minutes to resolve, assign it as an action item.
- Review readiness for future tasks. Are the right people assigned? Are there any known obstacles to performing the tasks as planned?
- Review project logs including issues, risk, opportunities, and lessons learned logs. Are the issues and risks being resolved, or do they need to be escalated to our sponsor? Have opportunities been explored?

The basic rules for effective meetings are:

1. Pass out an agenda in advance. The minimum is at least one full working day. Encourage people to add new items to the agenda prior to the meeting rather than bringing them up during the meeting. Meetings must have purpose. Focus is essential.
2. Begin and end on time. We need to avoid 'drift' and marathons.
3. Every agenda topic has one of three goals; to pass on information, to come to a decision, or to gather information. Stick with the agenda. Allow time for discussion, but stay on the course.
4. Draw people out. Don't assume silence is consent. Practise collegility and mutual respect.
5. Record decisions and action assignments. Check the action list for completion at the next meeting.

As with all meetings, a scribe should take minutes from the status meeting. Our job is to direct the meeting and to understand what is being said.

During the status meeting, each participant should provide the following information:

- tasks started during the previous time period
- tasks that were supposed to be started and were not, and why they were not
- tasks completed during the previous time period
- tasks that were supposed to be completed and were not, and why they were not
- work to be started, continued, or completed in the next time period
- the amount of work and/or duration expected on the non-completed tasks
- any current problems or pending problems that need addressing.

Meeting Time Control. Some ideas to help us keep time under control during meetings are:

- Before finalising the agenda, discuss and agree time needed with participants who wish to lead on various items.
- Construct the agenda with items in order of priority to ensure that the most important matters are properly dealt with first.
- Consider listing agenda items such that the more verbose talk last.
- Remind participants at the start about the time constraint and how we intend to impose it. Reiterate the importance of being concise and relevant in terms of the purpose/objectives.
- Omit unnecessary background discussion. Background papers can be read prior to the meeting. We want dialogue not monologue.
- Avoid repetition/covering previous ground. Beware of the 'previous minutes' pitfall. Why not deal with matters outstanding separately.
- Encourage people to come to the point immediately:
 - *"Is there an action point?"*
 - Suggest what's on their mind.
- Exclude 'wafflers' from our meeting or at least confront them prior to the meeting with their inappropriate behaviour.
- Use the 'idea park/bank' to note useful but not currently relevant matters which should/could be addressed later.
- Position a clock strategically.
- Warn participants that they have X minutes to go.
- Solicit others' cooperation in managing the time. Talk with them one-on-one prior to the meeting.
- Defer matters that are only relevant to a few.
- Remove whole processes to sub-groups.
- Cancel items where background research and preparation has not been done.
- Continually focus the group on potential action points.
- Mention our time concern in the agenda and stipulate start time, item timings, and finish time, to ensure that the relevant people are there as required. Do start on time. Don't go overtime.

Mobilise the Quiet People. Some ideas for mobilising the quiet people are:

- Invite them to put their ideas in writing prior to the meeting.
- Quieten down the noisy.
- React to participants' body language.
- Target people, but don't make them feel uncomfortable.
- Use a 'round robin' approach.
- Ask questions—open, closed, probing as appropriate to stimulate them.

- Call for contributions. *"Anything you would like to add?"*
- Accept some repetition (establishes emphasis).
- Use positive reinforcement techniques. All contributions are welcome.
- Talk with them prior to the meeting about their possible contributions.
- Keep numbers small and/or use sub-groups.
- Set the scene for them *"John, given your experience in this matter, you may wish to make a point."*
- Each participant could be allocated an agenda item for research.

Manage Conflict. Some ideas to manage conflict during meetings are:

- Allow each person an opportunity to put their viewpoint without interruption.
- Ensure everyone agrees on the problem. Useful to record this on the whiteboard to help ensure focus.
- Remove the problem from the personalities.
- *"Is this relevant or should we deal with it later?"* Make specific arrangements to do so.
- Participants can help the chairperson by identifying other options/solutions that the protagonists have not seen to break deadlocks.
- Isolate the protagonists.
- Talk to them at a break. Create a break to do so.
- Brainstorm possible solutions. Get the ideas out first. Consider applicability second.
- Evaluate options objectively. Use a model or decision matrix in order to depersonalise the process.

Eliminating Separate Conversations. Some ideas to eliminate separate conversations are:

- Keep numbers small.
- Don't physically isolate.
- Avoid 'them and us' expressions.
- Change seating occasionally.
- Ensure everyone can be heard and seen by everyone else.
- Arrange seating to enhance communications.
- Exercise tolerance/patience.
- Use humour.
- Maintain eye contact/read body language.
- Avoid disruptive/bad body language.
- Include entire group.
- Have frequent breaks.
- React quickly and effectively to stop separate conversations developing.

Dealing with Ineffective Chairpersons. Some ideas to manage ineffective chairpersons are:

- Rotate the role. It's a useful personal development opportunity.
- Encourage the chairperson to invite specific feedback about how their performance might be improved. Develop a feedback sheet.
- Suggest they take an appropriate course of learning and/or observe other chairpersons in action.
- One-on-one talk in private about the concerns. Offer coaching.
- Talk with other participants prior to the meeting. Solicit their help.
- Bring in the 'non-combatants' (ie, third person feedback).
- Reinforce the positive.
- *"Chairing is hard. How do you find it?" "How might I deal with"*

Project Transfer

A change of project manager may be unexpected or it may have been planned. Sometimes different project managers are appointed for different phases of a project. The reason for the change may influence the hand-over process. Nevertheless, the general process for project hand-over is:

1. clarify the reasons for the change of project manager and what our precise responsibilities will be
2. familiarise ourselves with project records including the original charter and baseline project plan
3. gather information about the current state of the project and interview project team members (including the outgoing project manager if practicable)
4. evaluate gathered information and confirm, change or halt current practices as appropriate, and make recommendations about those matters beyond our authority to change.

During this audit we should read, listen, encourage, take notes, visit, implement questionnaires, interviews, tests, etc. But don't make promises.

The communication needs to be open to help ensure people feel involved and appreciated, rather than disenfranchised and suspicious. Our handover strategy should be communicated freely to ensure no surprises. Remember that the project team may have considerable ownership for the existing plan. Thus 'new broom' approaches are best avoided in other than very serious situations where immediate action is needed. If the project is progressing satisfactorily our takeover should cause minimum disruption. Conversely, if things are in bad shape, we may need to recommend a temporary stop while the project is reassessed.

As a 'new comer' we are likely to see the project more objectively than those currently involved. Yet it may be politic to keep our initial impressions, reservations and ideas for improvement to ourselves, and resist predictions, promises and pronouncements at this early stage. However, keep an open mind, don't jump to conclusions, and encourage people to comment. Thank them for doing so.

When assuming responsibility for the project ensure we document the existing situation and verify rather than assume or accept, especially if we are required to sign-off on anything. We should not be

rushed since once we do sign we are responsible. This is the best occasion to request changes to the project resourcing, procedures, timeframe, budget, etc. Such requests are usually seen as a condition of hand-over, especially if the project is in jeopardy. Essentially we are an intermediate owner conducting an interim audit.

In some respect it is easier to take over a project that is not performing well. In these circumstances our changes and requests are more likely to be approved. So don't hesitate to ask. Ask now, before our negotiating power evaporates! And even if the project still founders we've done our best to salvage the situation. It would be a foolish or brave sponsor or line manager to disregard our requests when it is recognised that project performance is unsatisfactory. Anyway, if the project is going well, it is more likely that the new project manager will be appointed from within the existing team.

Some appropriate behaviours:

- assure people that their comments will be respected (and do so)
- don't interrupt; rather pause, keep quiet, listen, and look expectantly—they will fill the conversation gap
- keep people fully informed
- be approachable
- visit them
- welcome all ideas.

Find out what priority has been assigned the project. How important is it? Is it being supported?

It's easier to recommend stopping a project when we first arrive. To stop it later may mean admitting we goofed and consume more time and other resources without need. A temporary halt now will allow us to reapply resources to rectify, replan, and then restart. We would only suggest a stop to a project that is heading for disaster. It's a tough recommendation, but the pause will allow for a proper reassessment, undisrupted by ongoing work. There will be a cost consequence, but arguably less waste and cost than continuing on the current wrong path.

Our influence on the project will depend on how far it has progressed. There is less opportunity to influence matters as the project proceeds, but at least there is also less uncertainty and risk. It's always challenging to implement someone else's project plan. However, some project managers are better expeditors or implementers than they are planners or initiators. It's also about leadership style.

It's also important to document project progress and keep people updated and involved to ensure that our untimely departure doesn't cause unnecessary disruption. When an autocrat departs, confusion may reign! Identify a deputy—someone who can readily assume our role in our absence. Coach and mentor them. An effective filing system helps.

Recognise also that other project team members will depart the project prematurely for all sorts of reasons. Plan for this contingency. Have understudies, encourage cross-training, document processes and identify and clear possible replacement members.

Once we assume responsibility, keep an eye on those matters that have caused problems thus far, but be aware that:

- the solution to a problem often breeds new problems
- history is not necessarily a good forecast
- something else is sure to go wrong if we focus only on those matters which have given concern previously.

Inheriting a stalled project can be a great opportunity. There is some history. Issues have clarified. And additional authority to implement our solutions is often forthcoming, given our hand-over review and recommendations.

This chapter has addressed the management of our project during its implementation, and the management role is solely ours, whereas the leadership responsibility belongs to a wider group of people including our project sponsor. However, leadership is certainly needed on the project by the project manager. In fact 'project leaders' may be a more appropriate expression, given the importance of the people factor. It's an important project management competency that the next chapter examines.

Project execution is where we flip the ON switch and keep an eye on things, When things aren't going according to plan, we step in and adjust things, resolve the issues and replan as need be, remembering to ask those who do the work for their input.



Chapter Twelve

PROJECT LEADERSHIP



"A leader is someone who gets the best out of everyone."

Peter Blake

In general management theory there are many definitions of leadership. None quite fit the project situation. My preference is:

Leadership is inspiring and enabling others to succeed.

However, in some instances, project leadership might better be described as influencing by positive means. Or perhaps, a more realistic definition might be 'removing obstacles to team members' excellent performance'. After all, the team members are usually discipline experts who simply need the right conditions. Project leaders would also need to ensure that they weren't personally an obstacle! Thus, an effective project leader inspires and enables. True leadership often means getting out of the way – once direction and responsibilities are established – and then helping and encouraging. It's about serving the team or servant leadership where we provide the team with the environment they need to succeed.

Leaders and Managers

Hopefully a project manager is a leader and visa versa. The terms 'project leader' and 'project manager' are sometimes used interchangeably. It's often a matter of organisational preference, rather than significant differences in roles and responsibilities. The difference may be one of style as summarised at Figure 12.1.

A common way to differentiate is to describe leaders as those concerned mainly with effectiveness (ie, doing the right thing; heading in the right direction) and managers as those concerned mainly with efficiency (ie, doing the thing right; establishing appropriate policies, processes and procedures). In practice those responsible for driving projects need a combination of both leadership and management attributes – both people and process focused.

Literally

Manager is from the French word 'ménagerer' meaning to mind the horses behind the line of battle.

Leader is from the Norse word 'löder' meaning the person who knows how to read the lodestone (ie, crude compass) to ensure the right direction.

Figure 12.1: Leaders and Managers

Leaders	Managers
Selling Longer Range Democracy Enabling Developing Challenging Originating Inspiring Risk Taking Partnering Effectiveness Visions and Strategies People Personal Skills Right Things Innovation Coaches Values-focus Align Progress Involve Participate Encourage	Telling Shorter Range Autocracy Restraining Maintaining Complying Imitating Instructing Risk Avoiding Directing Efficiency Action Plans and Budgets Tasks Formal Authority Things Right Repetition Controls Structure-focus Organise Status Quo Solve Delegate Monitor

On balance, perhaps the expression ‘project leader’ is more appropriate than ‘project manager’ given projects are inclined to be risky, unique, innovative, one-time endeavours that seem more allied to leadership than business-as-usual work, which is usually secure, on-going, repetitive, stable and established. Project size might also be a factor in leadership-management balance.

Leadership Challenge

Perhaps the main leadership or management challenge in the project situation is a lack of 'legitimate' organisation authority—the formal power to direct resources. Project leaders may not be granted formal authority commensurate with their responsibilities. In such instances the project leader must depend on other sources of power and influence, such as those listed at Figure 12.2. The challenge in the matrix organisation is that the project team members are assigned based on their expertise but they report to another manager. This means that the project manager must exercise very good leadership and diplomacy to get the job done.

A further challenge is that the project team membership changes. New people are continually being assigned and others are leaving. Perhaps the top sources of influence for project managers responsible for cross-functional teams are 'what you know' about project management, and 'who you know' of influence within the organisation. The latter is about networking, internal politics and referent authority where the project manager uses another person's authority. The project charter helps establish both formal and referent authority.

Figure 12.2: Project Leader's Power Base

A distinction is sometimes made between **de facto** (earned) authority (knowledge, skills, expertise etc), and **de jure** (legal) authority (positional, formal, conferred) authority usually contained in a project charter or letter of appointment.

Legitimate	Formal authority vested in a position or conferred with the appointment.
Performance	Authority from assessing and documenting team members' performance (attitude and aptitude) over the period of their involvement.
Reward	The ability to compensate or give rewards.
Coercive	The ability to punish or withdraw privileges.
Personal	The appeal of individuals, being respected or liked for personal characteristics, charisma, mana, trust, loyalty, courage, commitment.
Social Capital	The value created by networking and fostering connections between individuals.

Leadership Credentials

Leadership is crucial in project management. Generally, project managers have to exercise considerable leadership. Management may be defined as the art of getting others to do what one cannot necessarily do oneself, by organizing, controlling and directing resources. Leadership is about setting goals and objectives and generating enthusiasm and motivation amongst the project team, and stakeholders, to work towards those objectives.

Project leadership should be distinguished from the more particular roles of the project champion, who espouses the project and secures for it necessary support and resources, and the project sponsor, who is pre-eminently concerned with the business case.

The credentials required for successful project leadership depend on the nature of the project, the phase of the project, and the people involved. Leadership in the project situation is in the eyes of the

followers. What the team members regard as appropriate credentials is perhaps the important issue. Four of the most frequently identified credentials, competencies or qualities for successful project leadership are:

- an effective communicator
- an effective motivator
- an effective delegator
- an effective teambuilder.

Your personal view of the ideal leader might also include qualities such as approachable, charismatic, committed, confident, self-aware, courageous, decisive, dependable, empathetic, sensitive, empowering, enthusiastic, honest, inspiring, organised, proactive, reliable, tenacious, trusting, integrity, resoluteness, reliability etc. These too are of course fine qualities. And our ideal manager might be described in terms of skilfulness in negotiating, controlling contractors, managing conflicts, etc. Figure 12.3 identifies the project leadership qualities that the Association for Project Management (APM) regards as particularly important.

Increasingly, networks get work done, not hierarchies. And research indicates that women are better at using networks. So will women have greater opportunity to really show their project leadership stuff over the next 10 years? What's fairly certain is that leading virtually, laterally and with a multicultural workforce will continue to stretch everyone's abilities.

Communications

One of the most important skills for a project manager is the ability to communicate well. Although effective communication is not a panacea for all problems, it is essential in running a successful project. When there is conflict or dissatisfaction in the project team, it can often be traced to difficulties in communication.

Communication is a function of trust. When trust is high, communication is usually very effective. It is important for project teams to communicate well in all forms: verbal, nonverbal, writing, and listening. Studies show that improving communication is perhaps the most critical improvement needed in most organisations. A written communication plan for our project can help us focus on communication issues. We should develop a communication plan for each project. This plan describes what information is communicated to whom, how, and how often.

As an effective project leader our challenge is to establish an environment or climate in which people involved with the project feel free to communicate both the good and the bad news, in an honest, complete and timely manner. Once this situation is attained the people aspects are largely under control. However, good communications are not simply a matter of sending clear messages. Good communications, from a project manager's perspective, is mostly about effective listening. The chances are that most project managers have few problems conveying their messages, either verbally or in writing. The obstacle can be an inability to 'hear', especially those comments that challenge our own thinking. Evidence, which doesn't support our own point of view, can be easily dismissed. Yet in the project situation, new ideas are essential. Projects are often pioneering endeavours, which stand to benefit enormously from new ideas. The project manager should want new ideas to flourish. They should be encouraged, recognised, and rewarded. Thus, some expressions that might be banned are:

"We've never done it that way before. I'm sure it won't work."

"We tried that once before and it failed."

"Good idea, but this project is different."

"Hey, someone else would have already suggested that if it was any good."

"That's fine in theory, but I'm sure it won't work in practice."

"Sorry, can't do that. It's against company policy."

"We've done it this way with satisfactory results for 20 years. This is not the time to risk a change."

"What idiot thought that up? They obviously haven't been here long. Anyway, it's not in the budget."

Figure 12.3: APM Leadership Qualities

- **Attitude** - an open positive 'can do' attitude which encourages communication and motivation, and fosters co-operation.
- **Common sense** - the ability to spot sensible, effective, straightforward, least risky, least complex solutions. That is - 90% right on time is better than 100% too late!
- **Open mindedness** - an approach where one is always open to new ideas, practices and methods and in particular gives equal weight to the various disciplines involved on the project.
- **Adaptability** - a propensity to be flexible where necessary and avoid rigid patterns of thinking or behaviour, to adapt to the unfolding requirements of the project, the needs of the sponsor and client, its environment and people working on it – to ensure a successful outcome.
- **Inventiveness** - an ability to discover innovative strategies and solutions from within oneself or by encouragement with other members of the project team, and to identify ways of working with disparate resources to achieve project objectives.
- **Prudent risk taker** - willingness and ability to identify and understand risks but not to take a risky approach in an unwise or reckless fashion.
- **Fairness**—a fair and open attitude which respects all human values.
- **Commitment**—an over-riding commitment to the project's success, owner and user satisfaction and team working. A strong orientation towards goal achievement.

Source: APM BOK Edition 4, 2004

The top effective listening behaviours are described briefly below:

1. **Practise listening.** Make our conversations with our friends, our colleagues, our family, and the people who serve us in the places where we buy, a chance for improving our listening skills—for ‘sharpening our inner ear’.
2. **Switch off our own problems.** This isn't always easy but personal fears and worries, not connected with the conversation, form a barrier that can block the speaker's message. Relax!
3. **Concentrate.** Focus our mind on what is being said. Practise shutting out distractions. Avoid disruptions. Stop reading. Stop writing. It's hard to concentrate, but essential. Commit ourselves.
4. **Listen for ideas—not just words.** We need to get the whole picture, not just isolated bits and pieces. English is not everyone's first language.
5. **Take notes.** Selective note taking will help us remember key points. But trying to note down everything which is said can result in things being missed.
6. **Ask questions.** If we don't understand something, or feel we may have missed a point, clear it up immediately or it may embarrass us later.
7. **Limit our own talking.** We can't talk and listen properly at the same time. ‘Listen’ contains the same letters as ‘silent’.
8. **Don't interrupt.** A pause—even a long pause—doesn't always mean someone has finished saying everything they wish to say.
9. **Limit interjections.** An occasional “yes” or “I see” shows the speaker we are still listening, but don't overdo it or interrupt with meaningless comments.
10. **Practise empathy.** Their needs are important and we will understand a conversation and retain it better if we keep the speaker's situation in mind. Empathising means sensing how someone feels. Empathy is not sympathy—sharing the feelings. Empathy is the ability to see things from their point of view.
11. **Prepare in advance.** Remarks and questions prepared in advance, when possible, free our mind for listening.
12. **Listen for overtones.** We can learn a great deal about the speaker from the way things are said; the way they react to the things we say.
13. **React to ideas—not the person.** Don't allow irritation at emotive or silly words or mannerisms to distract us.
14. **Predict or speculate about what is being said.** Get involved. But be flexible and open-minded. Try to guess what is going to be said next. But remember not to let our own assumptions supersede what is really said!
15. **Think about the purposes of what is being said.** Why is it being said? What are the real concerns and issues?
16. **Look at the speaker.** Good listeners give the speaker their undivided attention. This doesn't mean staring at her or him, just making eye contact. This makes the speaker more comfortable (people tend to mistrust people who don't look at them) and also contributes to transmission of

the total message. Most of a message tends to be conveyed nonverbally, through voice tone, facial expression, and body posture. All of these are clues to the underlying message. Being responsive and attentive to the speaker is flattering, helps create rapport, improves communication, and improves their self-esteem.

17. **Use thought speed.** Because we think some ten times faster than we speak, poor listeners use the intervening time to daydream, especially with slow speakers. Good listeners also listen between the lines for further clues to what the speaker means to convey.
18. **Reflect back.** Paraphrase and restate the message as feedback to which the sender can respond. Let them know that their feelings are also recognised. Test our understanding.
19. **Don't annoy the speaker.** We may cause the other person to conceal ideas, emotions and attitudes by arguing, criticising, etc. Be aware of the effect we have on the speaker. Adapt to the speaker.
20. **Don't discriminate.** Give them a fair hearing. Don't discriminate on grounds of sex, marital status, religious beliefs, race, colour, nationality, age, political opinion, employment status, education etc. Try to neutralise our biases.
21. **Right place/time.** Sometimes we can select the place and/or time to ensure that disruptions and distractions to our effective listening are avoided or minimised. On occasions it may be appropriate to postpone a discussion to a mutually convenient time.
22. **Avoid distracting behaviours.** Don't frequently look at our watch or out the window. Avoid shuffling paper, playing with our pen, looking at our watch, and any other actions that suggest we are bored or uninterested. Turn off the cellphone.
23. **Control distractions.** Don't tolerate distractions. These can be external distractions, such as telephones, background noise, smells, seating, heating, lighting—or internal distractions, such as headaches, hunger, thirst, fatigue, or thinking about other matters.

Of the above, the most frequently identified good listening behaviours are:

- concentrate
- don't interrupt (needlessly)
- ask questions (to confirm and clarify)
- support the speaker (demonstrate our interest, positive body language, the occasional “yes”, “I see”, “sure” can be encouraging, be responsive, look at the speaker, adapt to them)
- hear the message (don't be distracted by emotive or silly words, paraphrase and restate, don't discriminate on irrelevant grounds, don't let our assumptions supercede what is actually said, and don't forget that even people we don't like can have good ideas).

However, listening properly is hard work. It is all too easy to ‘switch off’ or listen only with ‘half an ear’ when we have other things on our mind. Typical reasons for ineffective listening are:

- We're not really interested in what the other person is saying.
- We ‘turn off’ because we don't like the speaker or the message.
- We assume in advance that what someone has to say is uninteresting or unimportant.

- We know what they are going to say. It's all predictable.
- We ignore what they say because it is in conflict with what we already 'know' or believe.
- We filter what we're hearing to select only the bits we want to hear.
- Distractions stop us from giving our full attention to the speaker.
- Our concentration wanders and we lose the thread of the message.
- We are merely waiting for a break in their talk so that we can speak.
- We are mentally rehearsing what we will say as soon as the other person draws breath.
- We are waiting for flaws in the other's argument that we can pounce on.
- We are mentally criticising the speaker's delivery instead of hearing the real message.
- We become angered or upset when we disagree with something they say.
- We overreact to certain words or phrases.
- We focus only on trying to get our own point of view across.
- We'd rather be speaking than listening because we then feel more 'in control' of the communication.
- We listen only for facts and not the feelings behind the facts.
- We pretend to be attentive while thinking about something else, day-dreaming or clock-watching.

Recognising that status reports may be subject to some editorialising and delay, it is important that the project leader also fosters good communications through personal visits—management by walking around (MBWA) although hopefully with a purpose in mind rather than aimlessly. Approachability is an important requirement which goes beyond "*my door is always open*" expressions. One-on-one communications are particularly important when we wish to pre-empt project problems or at least 'nip them in the bud'. Depending on our reaction, people are unlikely to volunteer bad news. Rather than assign blame, bad news should be welcomed, analysed and the problem resolved with the people concerned, and thus develop a learning culture, rather than one where problems are buried and mistakes are punished.

Our challenge might be to mobilise the quieter team members, recognising that they too have something important to contribute. This might be achieved by keeping meeting numbers to a minimum, 'round robin' techniques, and the Crawford slip process whereby comments are written down on pieces of paper and gathered up.

Communication in the project environment is challenging given the usually tight time constraints, flat project organisation structure, and the variety of stakeholders involved, each of whom may have their own agenda. Generally, a proactive approach is more productive than waiting for questions or reacting to issues after the event. Stakeholder management and change management are mostly about proactive communications—pre-empting problems. As a project manager we must be the great communicators, keeping all informed.

Motivation

Motivation is a system of forces and relationships, originating both within and outside the individual that influences behaviour. It causes people to behave in certain ways. Motivation flows from a need that people have – something that they want from the organisation and from the project team. It is of course a major field of study in management thought and theory.

If we dig deeply into any organisational problem, there is a high probability that we will come to people problems. In the management of projects, the matter of motivation takes on special significance since the project manager, and the project team, have to deal in some way with the challenges of motivating many individuals – the stakeholders in particular, over whom we have limited de jure or legal authority. In these circumstances, the interpersonal skills of the members of the project team take on special importance.

Motivation has always been considered a mystery because it cannot be observed directly. Some fundamental considerations about motivation are:

- motivation is about people's needs which determine how they behave
- motivations vary and change over time
- well-motivated project team members are usually more committed and productive
- we can't motivate people—they motivate themselves
- we can develop a motivating environment—one in which people have the opportunity to achieve what's important to them.

One practical approach to motivation is for the project manager to conduct a motivation survey, where using paired comparisons, team members individually prioritise their motivators and assess the extent to which these are being met. This assessment provides a job satisfaction quotient. A typical motivation survey tool is shown at Figure 12.4. The team member compares each motivator against each other motivator and records which of the two in each instance is more important to them. The frequency with which each motivator is identified is recorded as the score. The top ranked motivator would have the highest score. This survey results in an individual hierarchy of motivational needs.

Team members should be encouraged to complete the questionnaire as honestly as possible and not to answer in what they believe might be the most acceptable manner. Once the matrix has been properly completed the individual may then determine their 'satisfaction quotient' using the assessment at Figure 12.5. This is a simple, yet very useful tool that is much easier to apply than most traditional motivation theories, although it doesn't pretend to be a highly scientific instrument.

Figure 12.4: Motivation Survey (partly completed)

Rank	Score	Individual Motivators		10	9	8	7	6	5	4	3	2	1
		Advancement/Promotion	1	1	9	8	7	6	5	4	3	2	
		Development/Learning	2	2	9	8							
		Pay/Financial Reward	3										
		Job Security	4										
		Variety of Work	5										
		Challenge	6										
		Achievement of Purposeful Work	7										
		Recognition	8										
		Relationships	9										
		Autonomy/Freedom/Balance	10										
Total =				45									

Figure 12.5: Individual Satisfaction Quotient

EXTENT MET SCORE	
1. Hardly at all	
2. To some Extent	
3. Mostly Met	
4. Considerable Extent	
5. Almost Completely	

↓

TOP FIVE JOB NEEDS	PRESENT SITUATION
1.	
2.	
3.	
4.	
5.	

↓

16 - 20	Mostly Satisfied
11 - 15	Reasonably Satisfied
5 - 10	Mostly Dissatisfied

What are you going to do about it?

Suggest how my job might be made more rewarding (ie, job expansion or enrichment)?

Request a tour of duty elsewhere (ie, job rotation) or apply for a more satisfying position?

Once the survey and satisfaction quotient has been completed, the project manager then has a basis for a useful rewards/performance discussion with the individual. Together we may identify how to develop a more motivating environment for the individual. It is important to remember that the things that get rewarded get done. Knowing what motivates helps with the development of an appropriate reward system. Common identified motivators, demotivates and symptoms of demotivation are listed in no particular order in Figure 12.6.

Figure 12.6: Motivation Checklist		
SOME MOTIVATORS	SOME DEMOTIVATORS	SYMPTOMS OF DEMOTIVATION
Job security	Dissatisfaction with pay	Absenteeism
Promotion	Poor working conditions	Complaints
Pay and bonuses	Poor communication	Poor quality work
Sense of achievement	Management by criticism	Low productivity
Feeling of belonging	Management by threat	Staff turnover
Learning new skills	Wrong for the job	Poor time-keeping
Challenge	Poor induction	Resistance to change
Sense of usefulness	Poor training	Apathy and fatigue
Status	Unproductive rivalry	Uncommunicative
Power	Unattainable targets	Uncooperative
Personal growth	Unclear standards	Unsafe practices
Relationships	Little chance for promotion	Tension and irritability
Recognition	Lack of recognition	Interpersonal conflict
Participation	Poor work relationships	Back stabbing
Clear goals	Threat of redundancy	Negative comments
Physical environment	Conflicting priorities	Job hunting
Work-life balance	Too much/little work	Disloyalty
Equality	Favouritism	Don't care attitude
Vision	Personality clashes	Clock watching
Fear of failure	Too many rules	Unhappy
Social activity	Inconsistent boss	Sick days
Time off	Lack authority	Cynical gossip
Autonomy	Over control	Avoid responsibility
Prizes	Poor communications	Poor listening
Work variety	Unimportant work	Depression
Balanced feedback	Over managed	No smiles

Remember too that a team member's self-concept has a considerable bearing on their motivation. The three important components of self-concept are:

- **Self Ideal.** What the person aspires to be. It is influenced by corporate values and role models.
- **Self Image.** The way a person thinks he or she is viewed by others. It is influenced largely by feedback.
- **Self Esteem:** How much a person likes himself or herself.

Some practices that will help ensure a high level of motivation and productivity within our project team are briefly discussed below:

1. **Get the right people.** Proper selection is the first law of good project management! Hire as much for attitude, personality and character as for job skills. Take our time in hiring. Apply the law of three—interview at least three candidates at least three times under three different conditions. Use the SWAN criteria to select suitable employees:

S	=	Smart
W	=	Work hard
A	=	Ambitious
N	=	Nice

Avoid problem people. They poison the attitudinal climate and demotivate other team members. And we won't have time to turn attitudes around during the project.

2. **Start them off right.** New team members are often the most willing and are open to positive influences. The number one requirement for job satisfaction is often challenging work. Keep them productively busy. The second major component of job satisfaction is often interesting work. Match the person to the job. Start the new employee, contractor and consultant with hands-on orientation. Assign a key person to 'show them the ropes'. Good induction is essential whenever new people arrive on the project.
3. **Communicate clear expectations.** A major reason for demotivation is 'not knowing what's expected.' People want to feel like winners. A key role of the project manager is to help them feel like winners. People need clear goals to aim at. Otherwise, they feel like losers. Be specific when we delegate or assign work. Set measurable performance standards, and mutually agree them. What gets measured gets done! Set deadlines for all assignments. Inspect what we expect. Monitor, check, reassign the person if necessary.
4. **Practise participative leadership.** Participative leadership is a powerful tool to build involvement, commitment, loyalty and ownership for the project. Hold regular meetings to discuss project progress, work to be done. We should act as a mentor, coach or partner in the work. Ideally, the team members should discuss and agree on work assignments, schedules, standards. Their commitment to quality work is in direct proportion to their involvement in setting goals and standards.
5. **Use the three R's to motivate.**
 - **Recognition:** Celebrate achievement, large and small successes, throughout the project.
 - **Rewards:** Provide tangible and intangible rewards for performance.
 - **Reinforcement:** Praise people for a job well done.

So whatever we want more of we must recognise, reward and reinforce!

6. **Manage by values.** People need to know why they are doing what they are doing. Define and describe work in terms of its meaning and significance to others. Explain how the work will benefit others, contribute to their lives and work. Aim to instil a sense of meaning and purpose in work—this serves as a powerful motivator. Give people the 'big picture'. Always

explain the reason for the project and their tasks.

7. **Manage by objectives.** Use management by objectives (MBO). Jointly agree the desired outcome of their task, not the specific process to be followed. Agree to the objectives, measures and time schedules for task completion. Leave the team member free to determine the method and approach. They are discipline experts. Review progress at prearranged intervals.
8. **Management by exception.** Management by exception is a valuable management tool to be employed at every opportunity. It means not intruding when goals are being achieved. It's best only used with people of proven competence. Assign the work clearly and specifically. Ensure understanding. Set specific times for review. However, do recognise achievement.
9. **The Pareto principle (the 80-20 Rule).** According to the Pareto principle, 80 percent of the value of what we do comes from 20 percent of our activities. Repeat and reaffirm the 80-20 rule continually—in every part of the project. Focus on the vital few tasks, rather than on the trivial many. Set clear priorities for team members, so they are always working on what represents the most valuable use of their time. Encourage each person to set priorities in their own work.
10. **Train our team.** A key responsibility is teaching and training our team members. Take time to explain, instruct, coach. Remember, our job is also to 'grow' people. Multiply ourselves by teaching others how to do our work.
11. **Build positive self-concepts.** Positive self-concept is the key to peak performance. Give people jobs that make them stretch. Give them sufficient autonomy to work without close supervision. Set regular times for review and feedback. Essentials are:
 - **Respect:** Listen to others' opinions, even if we don't act on them.
 - **Warmth:** Treat people in a friendly manner.
 - **Success experiences:** Give people jobs that they can perform successfully at their levels of ability.
 - **Positive expectations:** Continually tell people that we believe in them and that we expect them to do well. Expectations are self-fulfilling prophecies.
12. **Require zero defects.** Make a project-wide commitment to excellence. Set high standards of quality for everyone. Adapt the internal and external customer philosophy. Reward and recognise quality work at every opportunity. Set an example of quality in our own work. Continuously improve.
13. **Lend a helping hand.** Become a guide, a counsellor, a mentor to team members. Individual attention is a major motivator of performance. Personal attention builds self-esteem. Mentoring improves the self-image of the team member and builds self-confidence—the antecedents to successful performance.
14. **Lead by example.** A very powerful way to motivate team members is to be the kind of person they admire and respect. Essentials are:
 - **Personality:** Be warm, friendly, and supportive.
 - **Work habits:** Be conscientious about what has to be done. Work efficiently, punctually,

ourselves.

- **Time usage:** Set an example by setting priorities and concentrating on high-value tasks.
 - **Courage and decisiveness:** Be willing to take positions, stand up for our team, and make firm decisions. Our team members listen to what we do!
15. **Listen to team members.** Listen attentively; don't allow interruptions. Listening builds trust between people. Listening builds self-esteem in the person listened to. Be patient, unhurried, relaxed—as though we have all the time in the world. Remember, sometimes people need time to get to the point. Keep an open mind. Concentrate. Block out distractions.
 16. **Be friendly.** The quality of the interaction between the project manager and the team member is a key determinant of motivation and performance. The friendship is based on three Cs: consideration, caring, courtesy. And practise golden rule management: Treat other people the way we would like to be treated by them and our superiors.
 17. **Keep going for it!** Our success as a project manager will be determined by our ability to elicit extraordinary performance from people, by our ability to build a winning team, by motivating others to give their very best toward the achievement of the project goal. To the degree to which we are successful at this, we will be given even greater responsibilities and larger projects to manage and to lead.

Are we motivating leaders? The following may be a useful self-assessment checklist. Could we answer yes to all ten questions?

1. I **listen** to my team member's needs, aspirations, frustrations, successes.
2. I **empower** team members to celebrate their skills, empower when I delegate, enabling them to establish practices that create a feeling of belonging.
3. I **appraise** and interview in a two-way, open, honest process, offering frequent balanced feedback and the opportunity for their personal development as well as realistic targets.
4. I **deliver** responses and react positively to new ideas from team all members, and whenever possible involve them in decision-making and problem solving.
5. I **encourage** team members to work in a way that develops their potential and gives them job satisfaction.
6. I **respect** team members with different ideas, attitudes and working practices and respond by recognising their strengths, even when we agree to differ.
7. I **stimulate** team members into taking reasonable risks and trying out new ideas, ensuring that I support them in their success or failure.
8. I **help** team members when they may temporarily be demotivated, whether through not achieving what they want in the project, or through family or personal concerns.
9. I try to **inspire** my team member's by my positive attitude, and encourage them to recognise how their work and contributions are valued.
10. I **praise** team members and find it easy to do this in a genuine, timely and specific way when they have done something well.

Delegation

As the project team leader there is a need for us to delegate project tasks to team members. The main reasons for delegating are:

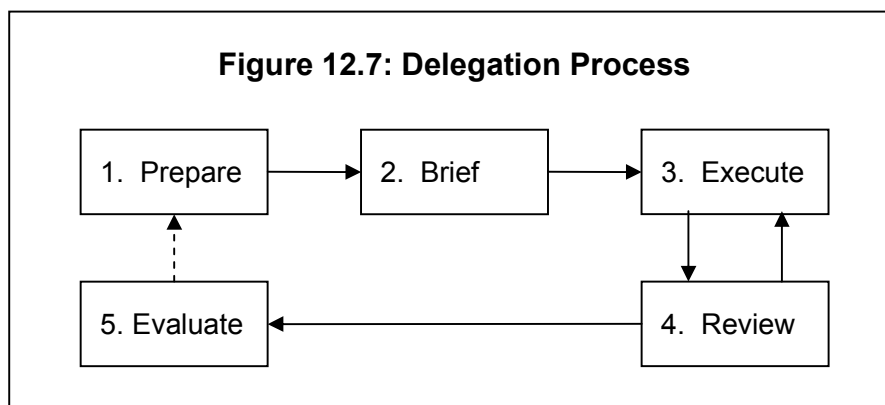
- It's important to use available resources and keep people productively involved.
- We haven't time to do it all ourselves, and if we attempt to, our performance will quickly deteriorate.
- Delegation helps ensures concurrent activity and thus enables challenging deadlines to be achieved.
- Other people have the knowledge and skills to do it even better than us.
- New ideas and methods will be introduced.
- Helps with others' learning and development.
- It's an effective coaching medium.
- Allows us to tackle more challenging tasks, which help with our own development and motivation.
- Frees us up to get on with more appropriate work—say planning, pre-empting problems and relationship building.
- The pursuit and completion of delegated work can be motivating and rewarding. People normally wish to contribute usefully.
- It's usually cost-effective.
- Someone can then deputise in our absence.
- We make better decisions by involving others.

The essentials of effective delegation include:

- **Choose the right person.** We make the best match we can between talent and task. Remember, though, that part of the purpose of delegation is education. Do not automatically reject a person with minimal experience in the particular kind of task; we could be robbing them of valuable training.
- **Give clear instructions.** Make it clear what we expect as a final outcome, and any intermediate requirements. Define standards of what will constitute an acceptable job, and discuss them fully. Be thorough; explain all critical points. Ask the person to repeat the task, so we are sure that both of us understand things the same way. Perceptions about tasks can vary enormously.
- **Give commensurate authority.** Assigning someone the responsibility for a task is one thing; giving them the authority to accomplish it is another. To be effective we cannot do one without the other. Make sure the person has the authority to obtain whatever is needed to do the job—financial resources, clerical assistance, equipment, information, or anything else.
- **Follow up.** Work out a system of regular progress checking with the individual who will be doing the job. This will ensure that if anything goes off track, we will not be surprised and know it in time to make corrections.

- **Support and coach as needed.** Throughout the work, make ourselves available for questions, advice, or any other assistance that may be needed. Remember this is to be a learning experience; be a good teacher. At the same time, do not over control. If our people feel us looking over their shoulder at every moment, their motivation, and their creativity, will shrink. And they won't feel trusted.
- **Resist upward delegation.** This problem is sometimes also called 'reverse delegation' — team members bring to us the problems they themselves should be handling. This is especially easy to do with a project manager who is tempted to think 'I can do it better myself.' The core concept of delegation is appropriate decision level. Each decision should be made at the lowest possible level where the necessary facts are available and the required judgement and skills exist.
- **Don't assign joint responsibility.** Joint or group assignments usually result in one person doing all the work. Do assign individual accountabilities. Decompose the work further if need be to achieve this. Single point responsibility is the principle.

A simple delegation process is shown at Figure 12.7. The least applied step is the evaluation. Often people are too concerned with the next task and miss this learning opportunity.



Preparing includes selecting the appropriate person for the job given their attitude and aptitude towards the task.

Briefing includes agreeing outcomes, performance standards and resource needs. Understanding must be confirmed. Sometimes when the task is risky the outline plan will be discussed.

Executing is allowing the team member to get on with the job. The project manager should provide support, show trust, and avoid 'snoopervision'.

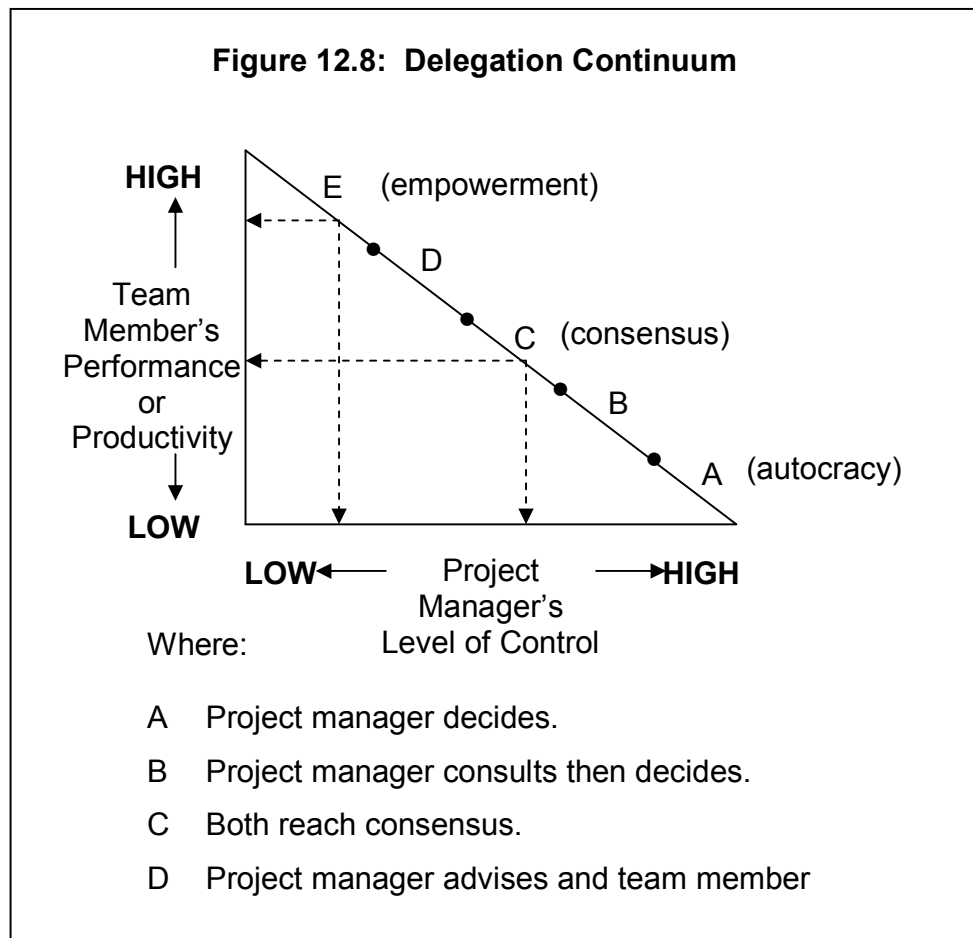
Reviewing is about checking progress at agreed times, providing feedback, and revising the approach as appropriate.

Evaluating is determining how successful the delegation is proceeding or has proceeded. Praise, recognition and credit is given, and mistakes analysed to ensure learning occurs. It is also appropriate to identify what must be done differently next time to ensure improvement.

The extent to which a team member is authorised to decide will depend largely on our assessment of the member's productivity (a combination of their attitude and aptitude towards the task). A simple

performance-based delegation continuum for this purpose is at Figure 12.8.

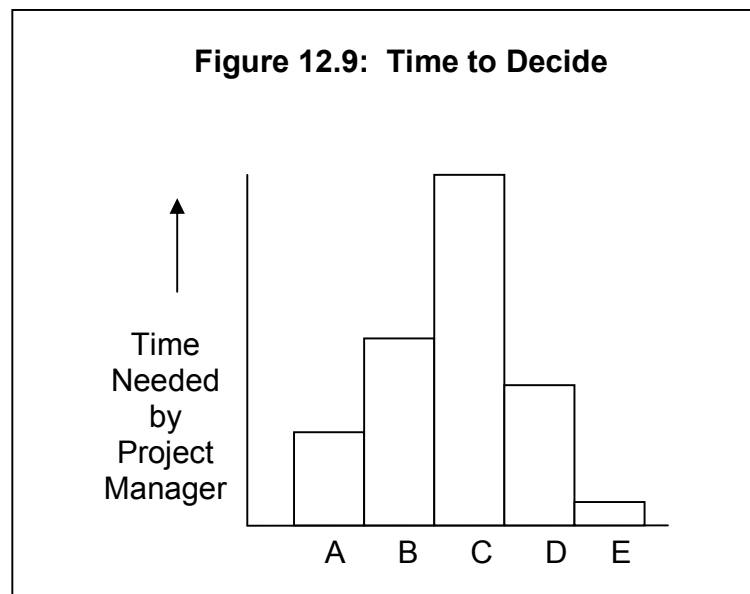
This continuum recognises that there are degrees or levels of delegation. A member with very low productivity towards the task will be given no discretion—the project manager will decide how the task is to be accomplished. However, the project manager has a responsibility for developing the member in terms of their productivity. In practice, project team members may possess very high productivity and can readily decide for themselves.



In the application of this delegation model, as with project management generally, it is usually safer to err towards more control at first if unsure. It's also important to remember that:

- the more authority given the team member, the higher level of commitment or 'buy-in' they are likely to have towards the decision
- the higher their commitment or 'buy-in' the more likely they are to properly address and resolve 'teething problems' when the decision is implemented.

One further point about this delegation model is the time typically needed for each decision mode. Figure 12.9 illustrates that an autocratic decision is usually quick since the project manager need only consult themselves. However, option C represents serious meeting time as parties strive to achieve consensus. Thus in a time-driven project or in an emergency situation we may on these occasions favour A and E options. Obviously the model needs to be applied with discretion, taking particular account of the team member's aptitude and attitude towards the specific task.



Sometimes team members don't properly undertake the delegated task. Some typical reasons for this being:

- They don't know what they are supposed to do.
- They don't know how to do it.
- They don't know why they should.
- There are obstacles beyond their control.
- They don't think it will work.
- They think their way is better.
- They are not motivated.
- Don't have the necessary skills.
- Not enough time for them to do it.
- They are working on wrong priority items.
- They think they are doing it (no feedback).
- Personal problems.

Also, how effective are we at delegating? Not all project managers are good delegators. The following checklist might help:

1. Does our team have a clear understanding of the results expected?
2. Does our team have all the resources needed to accomplish what was delegated?
3. Do we focus on the results we expect from team members, rather than on the details of how they do their work?
4. Do we have an agreed system to follow-up and monitor progress?
5. Do team members understand how and when they are to let us know how they are progressing and when to seek our advice?
6. Does our team understand how progress will be measured and evaluated?
7. Can our team speak freely to us about problems, without fear of criticism?

8. Do team members feel they have the freedom to perform their work without us over-managing them?
9. Do team members feel they can perform their work without fear of making a mistake?
10. Do we encourage team members to make decisions within the level of authority we delegated to them?
11. Do we arrange coaching as needed?
12. Do we encourage and are we supportive of their suggestions?

And do we resort to any of the following excuses in order to avoid delegating and justify doing it all ourselves?

- No one can do it as well as I can.
- I cannot trust anyone.
- No one has the skills.
- It's my responsibility.
- It takes too long to explain the task.
- It is quicker doing it myself.
- I have been let down too often.
- I like doing it.
- People expect me to do everything.
- I have more flexibility if I do things myself.
- I work better on my own.
- No one has any spare time.
- No one will accept the work.
- I prefer to make the decisions.
- I like to keep control.
- I have no time to keep chasing people.
- It is more bother than it's worth.
- I cannot afford a mistake.
- They've got wacky ideas.
- I'll be blamed for the mistakes.
- It might be done better.
- I like to keep my hand in.
- Don't know how to delegate properly.
- I want to be liked.
- I want to impress the sponsor or client.
- Knowledge is power.
- They don't like my directives.
- They won't perceive it my way.
- I'm helping them.
- I want to demonstrate my ability.
- I've always done this job.
- I'll be criticised for passing the buck.

None of the above stand real scrutiny. They mostly reflect on us. And if we have concerns about our

life:work balance as a project manager the quiz at Appendix Nine might help. It's all too easy as a project manager to consistently work prolonged hours – a recipe for reduced productivity, greater stress, and diminished motivation. Effective delegation is one way to avoid burnout through personally working excessive hours. And, if we're on the receiving end of a delegated task, we hare off and do it immediately. Right? Uh uh. Bad move. What we really want to do first, is to understand what we're being asked to do. Six questions that may help us are:

- How will we know when we're finished?
- What point in time constitutes its end point?
- What physical things will be produced?
- How will the quality of those things be determined?
- What things are part of this?
- What things are not part of this?

A common cause of problems in managing projects is a breakdown in the balance of responsibility, accountability, and authority. Therefore, it is important that we understand these issues and how to keep them in balance because they can have a dramatic effect on how well we execute the delegation function .

Responsibility is an agreement between two or more people for the purpose of achieving a desired result. A project manager is responsible for accomplishing the project; however, the manager might assign all or part of that responsibility to other people on the team. It is important to remember, though, that even when the manager has passed along all or part of the responsibility for completing tasks associated with the project, the project manager still retains full responsibility for the final result. The project manager must be sure the assigned responsibility is clearly stated and the expected results are mutually understood and accepted by all parties.

Accountability is a consequence of assigned responsibility. When a project manager assigns responsibility to another person, the manager must hold that person accountable for achieving the desired result. The accountability must be consistent with the responsibility assigned. For example, if a manager assigns a contractor to remodel an office, the manager should hold the contractor accountable for the schedule, and completing the job within budget. However, the manager should not hold the contractor responsible for lost productivity when workers moved to a temporary office before the remodeling began, because this was outside the control of the contractor and not part of the responsibility of the project.

Authority is the power given to complete the assigned responsibility. It includes the appropriate access to resources to complete the job, such as access to personnel or signature authority for the expenditure of funds. Authority must be commensurate with the responsibility assigned and appropriate to the accountability. For example, given the office remodeling job, the manager should give the contractor the appropriate authority to complete the work. This may include a budget and access to the building appropriate to the size and scope of the remodeling job.

If a team member has little experience or skill in a particular area, the project manager might need to give them authority in increments and do more checking up at the beginning of the project. Then, as skill level and experience increase, the manager can grant more authority and check up less often, until full authority is warranted as per Figure 12.8.

Project managers must maintain good balance in assigning responsibility, delegating authority, and holding people accountable. The authority must be appropriate for the responsibility and the accountability must be commensurate with the authority and responsibility.

Successful organisations have written policies and procedures that define responsibility, accountability, and authority work in the project management environment. It is important to define, in writing, the specific responsibilities and authority the project manager will have in terms of personnel, equipment, materials, and funds. Will the project manager have authority to hire and terminate team members or will the functional managers handle these responsibilities? What purchase authority will the project manager have over equipment and materials necessary to the project? What signature authority will the project manager have over the other project expenditures? These limits should be clearly stated in the project charter document.

Team Building

Effective teamwork is generally at the heart of effective project management. The project manager should be familiar with the process of forming a group of people into a project team that is to work together for the benefit of the project. This can be achieved in a formal manner by use of start-up meetings, seminars, workshops, etc, and in an informal manner by getting the team to work well together. Motivating and resolving conflicts between individual members of the team are important aspects of developing teamwork. Cultural characteristics of the team are also important elements of teamwork. Cultural characteristics of the team members should be given full consideration. Different cultures and values create different working needs.

Individuals brought together to work on a project don't automatically become a team the day the project begins. It takes time and energy to transform a group of people into a team. The individuals likely come from varied backgrounds and they may have different reasons for being involved in the project. They may represent different levels (positions) from various departments within the company, or come from other organisations altogether. There may be cultural, linguistic, religious, or social diversity among team members, and it may take time for them to get to know each other and understand each other's motivations. Even if they are all committed to the project, they will likely have different reasons for that commitment and different perspectives on what constitutes success in the project. For example, it may be difficult for managers representing information technology, purchasing, and sales to all agree on the right mix of quality, cost and schedule.

It is widely accepted that teams go through several development stages before achieving productive maturity:

1. **Forming.** The focus in this stage is on bringing the people together and establishing the team's purpose. It can take some time to get the group defined and brought up to speed.
2. **Storming.** The focus in this stage is typically on defining the basic ground rules and debating the team's purpose and approach. Personalities clash, problems surface, and differing views of the project are argued over. In theory at least, this period of discord is helpful as it brings everything to a boil. The alternative is for people to just shrug their shoulders and say, "*Yeah, whatever,*" which usually means they are not really very involved with the team or concerned about the work.
3. **Norming.** In this stage, things finally begin to click and the team members learn how to work productively with their various styles of work to accommodate the requirements of their

members and the task itself. Who does what, when, and where, and how meetings and discussions are conducted – all those details of cooperative relationships have to be worked out so that the team can communicate well and share work effectively.

4. **Performing.** In this stage, the team is in theory, well-ordered and cohesive and ready to move forward and perform at or near its potential. But note that the team had to go through a kind of 'trial by fire' development process in order to get here. The key point of this model is that we cannot expect teams to perform well upon formation. It takes additional work and time to bring them up to speed and turn them into real teams. Watch for 'deforming'.

Given that project teams are temporary it is appropriate to add a further stage to this traditional model, namely:

5. **Adjourning.** In this stage, the team commences to break up as their project duties are completed. Contracted members go first, then core members. Sometimes called the 'mourning' phase; sometimes followed by 'reforming'.

This traditional model may not be entirely appropriate for a project team. The project manager would rather avoid a long, unproductive, and possibly unpleasant development cycle for the project team. Ideally, a self-organising team is required where the team has the capacity to restructure itself as it goes in order to stay well-organised for whatever challenges it may face. Great project teams are characterised by members who are involved with each other and with the team's project. When everyone is at this level of involvement, true collaboration and teamwork is not only possible but it is inevitable.

Teams generally start out with relatively low involvement. Members are not engaged with each other or with the team's work to start with. To be effective, they need to achieve in both these dimensions as soon as possible. As a leader, our task is to get everyone involved in the team at a high level. We must find ways to throw the members together and encourage them to get to know and care for each other. We must also ensure our team members know all about the team's project.

Teambuilding activities can vary from a five-minute agenda item in a status review meeting to an off-site, professionally facilitated experience designed to improve interpersonal relationships. Some group activities, such as developing the WBS and network diagram, may not be explicitly designed as team-building activities, but can increase team cohesiveness when these planning activities are structured and facilitated well. It also is important to encourage informal communication and activities because of their role in building empathy, trust and establishing good working relationships. Teambuilding strategies are particularly valuable when team members operate virtually from remote locations, without the benefit of face-to-face contact.

Teambuilding is of course more than getting individual team member 'buy-in'. Important also are the following considerations:

- The team needs a common goal to strive for. The goal needs to be achievable, challenging and worthwhile. Shared goals are vital. They create unity of purpose.
- Team members need to know what is going on. Good communications to and from the team and within the team are essential.
- Teams need to do things together and not only their prime task, but also occasional social or

sporting get-togethers with which they are comfortable. Commando weekends and bonding spend-ups aren't usually needed! Avoid excessive structure.

- Team members need to feel they can speak their minds, and share their ideas, problems, opportunities, and interests. Some conflict is helpful, but does need to be resolved.
- Differences are best resolved by consensus seeking techniques rather than the majority rules approach which can be divisive.
- Team members must have respect and empathy for each other.
- All team members need to participate and be involved in deciding issues that directly affect the team. 'Nothing about us, without us' is usually appropriate.
- Team members need to develop a healthy respect for each member's contribution. Members must recognise their interdependence.
- Team members need to be team people, not strongly individual, but people who fit in. The team should have some say in its membership if practicable.
- Team members must recognise each other's good performance, and give thanks, praise and encouragement when appropriate.
- Team members need to develop a healthy attitude towards mistakes by other team members and where appropriate provide coaching assistance. This is a reciprocal arrangement. Team members are then not apprehensive about the possibility of making mistakes. We can all learn through mistakes. Tolerance is important.
- Team members need to be able to cope successfully with personal conflict and feedback—both negative and positive. Individuals must also recognise their limits.
- The rewards of good team performance need to be shared fairly among the members of the team.
- Team members do not make personal attacks on other members behind their backs. Communications are open. Feedback is encouraged.
- Teams do not allow cliques to form within the team. All members are of equal importance.
- Team members take an interest in the health, well-being, morale and welfare of other team members. Caring and helping are important.
- The team continues to function effectively when the leader is absent for a period.
- Teams need appropriate resources and a suitable work environment.

There are many definitions of a team. An appropriate one I have adapted for the project situation is:

*A project team is a temporary group of people, with various skill sets,
who collaborate to achieve the project goal.*

For team members to work together cooperatively, their individual efforts must be coordinated. In sports, coordination is directed by the coach and coaching staff. It is mostly achieved through practice sessions. However project managers are rarely all-powerful and the unique and transitory nature of projects does not make project team members amenable to repetitive drills.

Project teams, like projects themselves, come in a great variety of shapes and sizes. One important task of project managers is the development of some sense of team identification. The stumbling block is often that people working on projects are typically on loan and may have little opportunity or motivation to develop a commitment towards the project. Those of us lacking exceptional mana, charisma or technical powers must work hard at developing a sense of project identity among project staff. Three strategies that help project teambuilding efforts are:

- make the team tangible
- build a reward system
- develop team spirit.

Making the Team Tangible

People are not usually easily motivated by intangibles, so it stands to reason that project managers should aspire to make their teams as tangible as possible. This is difficult on projects that depend on borrowed people. Actions that make such teams more tangible include:

- **Effective use of meetings** can help establish a concrete team identity. During the meeting, team members get to see that they are not working alone. The project 'kick-off meeting', when all project team members assemble at the start of the project, is an excellent opportunity to identify individual expertise, roles and responsibilities, to develop ground rules, etc. Another important meeting is the periodic 'status review' meeting at which work performance is reviewed. These reviews offer team members a chance to get together and reaffirm their commitment.
- **Colocation of team members** means having the team work in a common space. In a sense this would be a 'war room' or project office which contains significant project documentation. Walls might be covered with various project planning and control charts serving as a tangible sign of project effort.
- **Creation of a team charter** is a very common and most effective way of making the team more tangible. A typical team charter is at Figure 12.10. The team name and team logo might also be affixed to such things as stationery, T-shirts, coffee mugs, caps, and even socks. Establishing ground rules or 'norms of behaviour' is an important mechanism to get the team to perform as we want them to perform. If we alone set the ground rules, the team may not buy-in, so be careful to make this a participative process. It is worth spending time at the start to get this right. However, some team building is focused on conformity, whereas dissenting views are often characteristic of the best teams.

Building a Reward System

So long as project managers lack the carrots and sticks needed to catch people's attention, it is difficult for them to motivate team members. Lacking the standard organisational rewards and punishments, they must invent their own reward systems, which might include:

- letters of commendation
- meal and concert tickets
- public recognition for good work
- future job assignments
- flexible work time
- new equipment

- bonus recommendations
- book voucher
- bottle of wine
- DVD voucher
- certificate
- dinner out
- flowers
- gift basket
- Lotto ticket
- magazine subscription
- movie ticket
- phone card
- trophy
- Koro Club membership
- cell phone
- professional subscription
- gym membership.

Figure 12.10: Project Team Charter

Team Rules

We all agree to adhere to the following positive practices:

- We are all of equal rank, and everybody is important
- We celebrate milestones
- We look for opportunities for learning and professional development
- We are realistic in what we can achieve and are determined to avoid burnout
- We solve conflicts fairly and with the person concerned
- We are open for feedback, learning from each other and open exchange
- We keep each other informed
- We contribute to the project team to the best of our ability and deliver what's required
- We catch up regularly, prioritise work and record relevant items
- We are positive, have fun and good food
- We will not have project meetings before 9 am.

Team Spirit

Part of developing project team spirit is the effective use of the personal touch—the one-on-one relationship between the project manager and our borrowed staff. Some measures to help establish

and maintain this productive rapport include:

- provide both physical and psychological support
- empower team members to try things out
- provide clear expectations and meaningful feedback
- learn something about their personal interests and past accomplishments
- publicly acknowledge their good performance
- celebrate special occasions which might include birthdays, anniversaries with the organisation, and special achievements
- do our share of the less desirable but necessary work
- be accessible to team members and encourage them to offer their views on project issues.

Virtual Teams

The use of virtual teams creates new possibilities when acquiring project team members. Virtual teams can be defined as groups of people with a shared goal, who fulfil their roles with little or no time spent meeting face-to-face. The virtual team format makes it possible to:

- Form teams of people from the same company who live in widespread geographic areas.
- Add special expertise to a project team, even though the experts are not in the same geographic area.
- Incorporate employees who work from home offices.
- Form teams of people who work different time zones, shifts or hours.
- Include people with mobility difficulties.
- Move forward with projects that would have been ignored due to travel time and expenses.

Two of the biggest challenges involved in managing the virtual project team (ie, geographically dispersed) are developing trust and effective communications. And we can't have a coffee together over the internet. Ideally, a face-to-face meeting at the start of the project should be organised, otherwise there needs to be an exchange of social information, clear individual roles need to be set, and frequent use made of conference calls, project chat rooms, videoconferencing, etc. Some further tips for managing virtual teams are:

- Communicate too much rather than too little. Wherever possible use group communication (eg, bulletin boards, group emails, conference calls) rather than one-on-one communication. This makes people feel less like they are missing out on things and more like they are all hearing the same message.
- Establish simple email protocols. This may include what we write (and how we write it), ways of expressing disagreement, ways of giving feedback and criticism, frequency of writing or checking emails, policies about priorities and which emails require response and how decisions are made etc. It may also include consideration of etiquette for expressing strong emotions or for humour – these things can much more easily be misinterpreted on electronic media.

- Let each other know if we have a period of unavailability coming up. Share schedules.
- Keep private any private discussion we have with individuals unless we have their express permission to share it with the broader group. This includes sending on their e-mails.
- Celebrate each achievement in some way, no matter how small, remember people are not around each other to give pats on the back.
- Schedule in some face-to-face time and make attendance compulsory – this is where the relationships are properly formed and reinforced, so we need everyone there. Use face-to-face time wisely: it is for teambuilding, discussing culture, discussing and resolving problems and misunderstandings, building commitment and energy, and celebration. We can also use the time for learning new skills and welcoming in new people. Do not flood the meetings with too much task.
- We might need to do more travelling than most project managers. We may be able to manage tasks via the phone and email, but we cannot manage people well in this fashion. See them regularly and more often on their patch than on ours. Talk about what is going on for them; their successes and frustrations. Use the time to inspire, to reinforce focus and commitment and to coach and mentor. We must of course schedule these visits or they won't happen.
- Occasionally, we will come across someone who has been unable to make the transition to virtual working. Recognise if it is not working. Work out if the situation could be improved with some investment of time and energy – and be willing to make that investment. But if things are still not working, we may need to reassign the person (eg, back to a conventional office-based arrangement) or terminate the relationship. Do not be tempted to leave matters; a poor performer or a negative influence will eventually contaminate our whole team. Good selection pre-empts such problems.

In addition to the above, the following ideas were developed during a recent brainstorming session with a virtual project team:

- Send digital pictures of each team member to other members.
- Include digital pictures on all emails from the team.
- Send materials for all meetings well in advance so that attendees can review them.
- Start each meeting with a story. People like stories and a story will therefore encourage their complete attention for the meeting and their on-time arrival.
- Share the story telling with the team. Begin each meeting with someone telling a story from their location, country or from their part of the project.
- Always respect time zones.
- Ask all team members for the best time to hold teleconferences and video conferences.
- Respect cultural differences and realise that they can make the project more interesting and productive.
- Make certain the impact of a virtual team environment is analysed as part of the project risk assessment.

- Invest more time carefully creating the project communication plan.
- Expect and plan for delays caused by miscommunication.
- If we can get together only once, do so to create the WBS, network diagram and risk management plan.
- If they cannot travel to us, we must plan to visit them.
- Spend more time validating understanding when we cannot see or interpret facial expressions – paraphrase and confirm often.
- Use video conferencing or the latest video technology.
- Give earned recognition often and copy in their bosses.

It's a growing trend worldwide for teams to be physically distributed in different places. We now find that not every team member is suited to this virtual environment, and not every project manager can adapt their style accordingly. However, we can ensure that the appropriate technologies and policies are in place to support a virtual environment. In particular:

- Communication and electronic technologies need to be sufficiently flexible and have sufficient capacity to make virtual working easy.
- There will still need to be some face-to-face meetings. Is there a budget and an appropriate space for this to occur?
- Do performance management policies suit virtual working? How do we measure performance? How do we reward it? How do we identify and deal with non-performance issues?
- We may need to hire additional or replacement team members during the project. How are these people going to be inducted and trained?
- Finally, physical presence isn't always necessary, but it's better. In particular, administrative tasks can be done remotely, while those involving leadership demand physical presence.

Cross-functional Teams

Within our organization our project team may come from different business units, functional areas or departments. Some of the factors that lead to poor communication among cross-functional project team members include:

- Lack of appreciation of the contributions of other functions. For example, in telecommunications projects, some technicians may not value the input provided by psychologists.
- Plain old-fashioned turf battles. In a silo-dominated structure some departments play out their competitive games on the field provided by the cross-functional team project.
- Different jargon. For example, line department users often do not understand the terminology and technology employed by computer programmers.
- Different work orientations. For example, researchers tend to take a long-term view and have an informal work climate; operational people are perhaps more short-term and formal; and salespeople are usually informal and have a short-term focus. While we may argue with these

generalisations, it is clear that each department or function develops its own work style and culture, which may clash with other styles from other functions.

- Different degrees of interest in the project's outcome. Some cross-functional team members are simply more interested in the team's purpose and may have more to gain from a successful outcome.
- Mistaken goals. Some team members mistakenly see harmony as a goal of cross-functional teamwork. As a result, they are afraid to express a contrary point of view for fear that it will destroy the positive feelings among team members. The result is a false consensus (ie, groupthink) and a less than satisfactory outcome.

While these factors explain lack of trust and communication on cross-functional teams, they do not excuse it. Members of cross-functional project teams are there because they have something to contribute. They must be allowed and even encouraged to share their ideas, information, and opinions without restrictions. Open communication is an absolute requirement for successful cross-functional teamwork. The concept of the cross-functional team is that the project outcome – the product, the system, the service – will be better because it has been created by the combined expertise of people from a variety of functions. Viewing a problem or an issue from many vantage points is the strength of the cross-functional team. However, the value of divergent views can only be realised when there is a free flow of information.

Developing Trust

Trust is essential in a good project team. We can create and maintain trust if we observe these behaviours:

- Openly express our feelings and thoughts, especially when asked. Present them as statements about ourselves, not criticism of others; for example, *"I don't agree with that suggestion"*, not *"That sounds a stupid idea."*
- Listen to others' self-disclosure caringly; give them our full attention and avoid being judgemental or identifying with them; for example, *"I know how you feel, that happened to me"* (only it was worse for me).
- Let others know when we are uncertain or fearful. Ask for help when we need it; for instance, *"I am really anxious about discussing the project status at this public meeting."*
- Give praise freely when it is earned; for example *"I think you did a wonderful job on that task."* Feedback is not just for giving constructive criticism.
- If we want to offer feedback, check that it's wanted, so preface it with, *"Would you like some feedback?"*
- Give feedback when asked. Present it as a gift for growth; offer only feedback that can be used to improve performance. For example, *"I think you presented your views with great conviction. And, I believe it would have been even more effective if you had ..."*
- Invite feedback from others. Ask *"How am I doing?"* Thank others when they give us feedback, even if we don't agree with it or like it. Try not to justify our behaviour. Just listen to what they are saying. It is their true perception of us.
- Treat everything said to us as confidential unless it is clearly public knowledge; say *"I will treat*

what you have told me about your situation as confidential. If asked, I shall tell people to ask you."

- Check for the hidden agenda. Do so openly; for instance, *"During the meeting I sensed that you were angry with me. It might be my imagination, but I'd like to check it out with you."*
- Remember that most people do what they do for positive reasons. Look for positive intent and acknowledge it, even if we disagree with it; say *"I am sure that your intentions were good, thank you for trying to solve the problem."*

Personally I have reservations about developing trust by falling blindfold into the arms of Peter from HR, or letting him push me (attached to a cable) out of a helicopter. Better, I think, to take the team out for a meal – with or without a hug.

In summary, building trust requires that we:

- **Be open.** Mistrust comes if we don't communicate.
- **Be fair.** Consider how our actions will affect others.
- **Speak our feelings.** People who talk only about facts and figures don't come across as very human.
- **Tell the truth.** Integrity is critical to trust.
- **Be consistent.** Predictability helps build trust. Mistrust comes from not knowing what to expect.
- **Keep promises.** Trust requires that we be dependable.
- **Keep confidences.** We trust people who are discreet.

Conclusion

Larger projects are carried out through teams, but these teams are typically fragmented and poorly defined, owing to the nature of matrix management. They do not look like ordinary teams. They are temporary teams built from borrowed resources. And sometimes they are geographically dispersed.

The project manager must create a team structure where no discernible structure exists. Perhaps this is the toughest challenge of all. We need to schedule and budget for teambuilding. Teambuilding tasks should be included in our WBS and budget.

As project managers we will play a crucial role in building the project team and then in maintaining its effectiveness. Some of this teambuilding work will be high-profile and visible, but much of it will be behind the scenes, self-effacing work that receives no recognition and often little credit – our reward will be the private knowledge that without such work the team would not be so effective.

Incidentally, I suspect that teamwork comes more naturally to New Zealanders than many other cultures, mainly due to our sports background and our team-oriented nature, in which one of the most valued traits is the camaraderie and friendship of one's mates – perhaps a product of our pioneering history. Once we have mastered the tools and techniques of project management, it is always the people that make the difference.



Chapter Thirteen

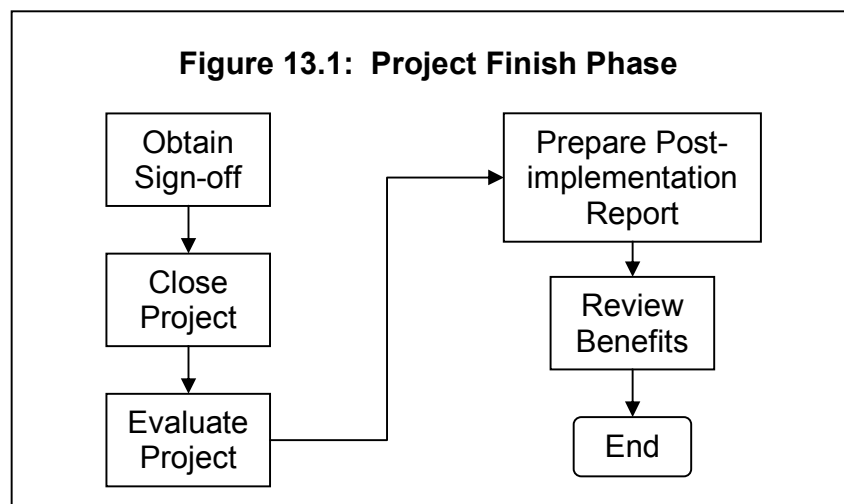
FINISH PROJECT



“Well, we knocked the bastard off!” – Sir Ed.

Projects always come to an end. Sometimes this is abrupt and premature. When projects finish, the project manager's responsibilities continue to ensure that the project is properly closed off. This final phase of the project lifecycle is often tedious; documentation can be rampant, many minor problems arise and need resolution, and resources need to be reassigned. It is often harder to finish a project than to start it. The proper completion of a project is a project itself.

This chapter examines the project Finish phase (which consists of the steps shown at Figure 13.1) including evaluation, which also occurs periodically throughout the project life. The exception to this finish process would be when the project is terminated prematurely, usually when some parameter has been violated, when performance is inadequate, when the project is no longer needed, or when the resources can be better used elsewhere. In this situation there would not be a hand-over, although there must still be a planned closure. And in situations where the project cannot deliver the complete product by the deadline, there is a possibility of phased or partial delivery, which is sometimes preferable.



It is important to ensure that a project is properly closed for two reasons. Firstly, there is a tendency for projects to drift on and become, or develop into, other projects. Secondly, it is important to ensure that the work of the project team is acknowledged and that the lessons to be learned from the project are formally determined and recorded for use on future projects.

The tendency for projects to run on must be avoided. It leaves everyone feeling dissatisfied and unrewarded for the work (often extra work) that they have done. Often, nobody checks that all the project's objectives have been completed or exceeded. They may notice that the project is under spent and spend the remaining budget on something else or the project may just drift into over-expenditure

and then be considered an unsuccessful project.

By carefully monitoring and maintaining the project plan, the project will not only be under control but may be officially closed at the end. It is at the end of a project that we see the benefits of tight control. The time and effort spent ensuring that any extra work was specified, budgeted, resourced and fully authorised will be rewarded by an 'on time-on budget' project. Similarly, any dissatisfaction can be dispelled (or at least reduced to silence) when the project report reveals that the project delivered all that it was designed to do, but not of course those elements that were authorised to be removed from the project so that it could deliver its product/service/result by the defined date and within budget.

Early Termination

The decision to terminate a project early is difficult. Sometimes projects take on a life and momentum of their own independent of their successfulness. Some relevant questions that might help an organisation with the termination decision are:

- Is the project still consistent with organisational/business goals?
- Is it practical? Useful? Purposeful? Will it still add value?
- Is management sufficiently enthusiastic about the project to support its continuation?
- Is the scope of the project consistent with the organisation's financial strength?
- Is the project consistent with the notion of a 'balanced' programme in all areas of the organisation's technical interests?
- Does the project have the support of all the departments (eg, finance, manufacturing, marketing, etc) needed to implement it?
- Is organisational project support being spread too thin?
- Is support of this individual project sufficient for success?
- Does this project represent too great an advance over current technology? Too small an advance?
- Is the project still innovative, or has it gone stale?
- Can the new knowledge be protected by patent, copyright, or trademark?
- Could the project be outsourced without loss of quality?
- Is the current project team properly qualified to continue the project?
- Does the organisation have the required skills to achieve full implementation or exploitation of the project?
- Has the subject area of the project already been thoroughly worked over?
- Has the project lost its key person or champion?
- Are future benefits still likely to exceed future costs?
- Is the project team enthusiastic about success?
- Can the potential results be purchased or subcontracted more efficiently than developed in-

house?

- Does it seem likely that the project will achieve the minimum goals set? Is it profitable? Timely?
- Has the project been obviated by technical advances or new product/services developed elsewhere?
- Is the output of the project still cost-effective?
- Is it time to integrate or add the project as a part of the regular, ongoing operation of the parent organisation?
- Would we support the project if it were proposed today at the current time and cost required to complete it?
- Are there better alternative uses for the funds, time, and people involved in the project?
- Has a change in the environment altered the need for the project?

In the case of normal termination, the motivation is three-fold. First, the thought of leading the initiation of a new project is much more exciting than doing cleanup work on the project that is nearing completion. Certainly, it is much more interesting to move to the conception phase of a new project than to manage the mundane details of cleaning up the odds and ends of the project approaching completion. Frankly, most people would find this last phase to be boring.

Second, project participants are on the lookout for new project opportunities, recognising that their current assignment is coming to an end.

Third, several projects are delivered late, over budget, and with less scope than originally designed. Who wants to be around when the blame is allocated?

In the case of pre-completion termination, we have to deal with the psychology of failure. There is a prevalent stigma that the project which does not reach satisfactory completion is a failed project. Therefore, the thought of premature termination is purged from our minds, as we blindly forge ahead with what may be, in reality, a failed project.

Considering abnormal termination is a bit like dealing with risk. Sometimes, we resist performing a risk evaluation because we may find that there is a potential downside and we have difficulty facing such negative aspects of the project. For many of us, it may be heretical to consider cutting a project short of its planned conclusion. Saving face becomes preferable to making a profit or satisfying a client. Nevertheless, there are times when it becomes prudent to end a project short of its normal completion.

A possible process for killing off a troubled project is shown at Figure 11.32. While terminating a project before its normal completion could often be called a failed project, this is not always the case. When it becomes evident that the project objectives cannot be satisfactorily met, it often makes sense to reach a negotiated closure. The key operative here is 'negotiated'. An aborted project generally means a loss for most stakeholders. Just about everyone ends up with less than they had expected from the successfully completed project. So now, the objective is to preserve as much of the planned gains, for all involved, with some balance for all stakeholders.

In summary, if our project is prematurely stopped, we should:

- evaluate ways to save the maximum benefits from the work already done
- evaluate the potential to create a new, revised project from the remains of the current one
- negotiate revised set of project financials, based on what actually was accomplished or delivered
- identify what went wrong that necessitated early termination and record this as 'lessons learned'.

Closedown Activities

The first step in the normal closure of a project is to verify that we are, in fact, finished. We do this by reviewing our project deliverables, comparing them to the deliverables listed in our project plan, and making sure that each matches the quality and completeness requirements also noted in our plan.

If there are deliverables that are not yet complete, then we and our team need to go back and finish them. If we find any quality problems in the completed deliverables, then we need to go back and fix them. It may take additional time and/or cost to finish the deliverables or to fix quality problems. Sometimes this is accounted for in our schedule as a separate task, or it may have been accounted for in the original estimates for the tasks associated with each deliverable. Even if we did not allocate enough time or budget for this rework, we need to perform it. Why? Because we should not proceed to the next step unless our deliverables meet the appropriate quality and completeness measurements. Turning over substandard products is often worse than not delivering anything at all.

If a project product is being phased in at different locations or in different departments, we may turn over some deliverables earlier than others. In this case, the project would not be complete until all deliverables have been turned over to all areas.

After we and our sponsor are satisfied that the deliverables are complete and that they meet the quality standards, we turn the products and/or services over to the client. In a software project, this is when the new software package goes 'live', that is, when staff start to use it for production. In a training development project, this is where the pilot test has been completed and the training department starts offering the course on a regular basis. In a building project, this is where the client moves into the new or restored building.

When a project has contracts, these need to be closed according to the terms in the contract. In general, the contract ends when the contractor has submitted a final invoice and we have paid it. But double-check the contract, or discuss this with legal staff to verify how closing contracts works.

Paying the final invoice is the last financial obligation in our project. Invoices need to be paid according to the schedule in our contract. If invoices are paid later than the contract requires, our project may incur unnecessary additional charges. And some of these late payment charges can be high enough to send our project over budget at the last minute. This is one of the few additional costs we can avoid, making it important we do so.

If our project product or service was something that might require warranty or on-going support, we should have included a warranty or support period in our completion plan. Warranty and support periods can range from a week to months or even years depending on the project. The warranty portion of the agreement generally covers any quality-related problems with the project product. In a software project, for instance, it may include fixing minor bugs and the like. In a building project, it

may be repairing seams that cracked on drying, tightening a loose plumbing fitting, and so on.

A comprehensive generic closedown checklist is at Figure 13.2. We might consider which of these activities is relevant, what they involve, and determine a schedule for their implementation if this is not already in the project plan. Or, the plan may need to be updated.

Project Handover

In the project phase-out effort, the project manager must remember that a satisfied client is final proof of project success. Client satisfaction depends as much on supporting documentation, training, and provision of spares, on-going support, and other services, as on the major deliverable. In practice, the client decides when the project is finished.

The project hand-over or commissioning is the process of substantiating to the client's satisfaction the capabilities of the deliverable to function as specified. This may involve a demonstration, a trial run by the users, or acceptance testing that may require feature-by-feature sign-off.

Some key issues in transferring the project deliverable to the client are:

- There should be a clear understanding of how responsibility for the deliverable is to transfer from the project manager to the client.
- At the end of the project the client must be given the opportunity to agree that the deliverable meets specifications. A completion certificate should be signed by the client to accept the deliverable.
- Users may need to be trained in the use of the deliverable. This task would usually have been planned as part of the project.
- The transition and signed completion/acceptance certificates should result in a definite cut-over or phased rollout strategy at which responsibility is transferred and final payment made.

Once the hand-over of the project deliverable and support services has been satisfactorily completed, the project manager can then commence the project finish procedure. This is a routine process once the client has approved the deliverable.

Hand-over is usually different for service projects or with an event project. We plan it, run it and then present the client with the results (income, evaluations, etc) after the event has taken place. With services, we provide the service and present the results.

Closure Meeting

We should invite key individuals to a meeting at which the project is formally approved for closure by the project sponsor. By drawing the group together, the project manager has an opportunity to:

- acknowledge the team and celebrate
- assign accountabilities for outstanding issues
- ensure feedback reflects the differing viewpoints of those involved.

The quality and sharing of feedback is always greater when done in a group than when conducted in isolation. A possible agenda for a closure meeting might be:

1. Deliverables.

2. Outstanding issues.
3. Benefits and business plan.
4. Post-implementation review.
5. Acknowledgements.
6. Formal closure.
7. Lessons learned.

The draft project closure report, which should be circulated prior to the meeting, provides a briefing for the attendees. See template at Appendix Eleven. This will be amended based on the discussions and feedback received at the meeting. If the project is small or if the project sponsor and project manager do not believe a meeting will add value, formal closure might be agreed by the project sponsor after a review of the closure report by the relevant individuals. It may be advisable to hold two meetings for larger projects; the first to cover agenda items 1 to 6 and the second to cover item 7. This is particularly of value when it is known that the project can contribute greatly to the company's corporate learning.

The lessons learned meeting, which might be preceded with the circulation of a project review questionnaire, should include all aspects of the project; objectives review, performance criteria, financial criteria, resource use, slips and gains of time, quality of work, adherence to the project definition and plan etc. Every aspect you can think of and the ones that will only arise from a group discussion need to be explored.

Allow the team time to reflect on and prepare for the review. And ensure there is plenty of time for group discussion. Keep the meeting positive, don't overly dwell on negatives, but ensure that the positive lessons are brought out from any negative event. Doing better next time is the theme of the review rather than delving into the minute detailed reasons for each perceived failure. Start with what we did right and were pleased with and then move on to what went less well (or was a total unmitigated disaster).

Closure Issues

What has just been described is common knowledge and common sense, but is sometimes far from common practice. Here's what actually happens all too often:

- Getting paid, or getting closure, drives all closeout actions. Unresolved issues and incomplete tasks that frustrate customers and end-users drag on while the project manager hopes they will eventually go away.
- Acceptance becomes acrimonious, with the project team doing the minimum they have to in order to get the signature, the client signing an acceptance certificate (or its equivalent) only grudgingly, and relationships ultimately being soured or severed.
- Companies feel that they don't have time to complete post-implementation reviews fully. The project team is busy on the next urgent project, and there never seems to be time to fit the meeting into a crowded schedule.

Figure 13.2: Closedown Checklist

Confirm planned closedown procedures and schedule closedown activities, including:

- Finalise all contractual commitments.
- Letters of thanks prepared and distributed.
- Make final payments. Refund retentions.
- Reassign people to their functional areas or new projects.
- Release resources, such as equipment, plant and materials, so these can be disposed of or used for other work.
- Complete the final financial accounting for the project.
- Document the results of the project and make recommendations for the future.
- Decide distribution of project documentation.
- Hold a closedown meeting. Make close-out assignments.
- Terminate reporting arrangements.
- Close risk and issues logs.
- Identify issues for further study and follow-on work.
- Arrange customer/end-user training/user manuals.
- Finalise delivery instructions.
- Audit final changes.
- Complete project diary or journal.
- Obtain client acceptance of project work.
- Tidy worksite. Return stores.
- Ensure all deliverables have been installed or properly implemented.
- Integrate deliverables into business-as-usual. Initiate warranty period.
- Conduct post-implementation evaluation. Confirm benefits realisation plan and reviews.
- Update lessons learned database.
- Collect all debts.
- Close all project sites and project office.
- Arrange photographs for records and publicity.
- Prepare as-built drawings. Update asset register. Photograph deliverable.
- Complete test certificates.
- Prepare spares lists.
- Arrange maintenance contracts for deliverable(s).
- Disposal of waste material.
- Close project accounts.
- Audit final accounts.
- Index and archive records.
- Celebrate, party, dinner, gala.

- The task of completing project records is assigned such low priority that drawings are never completely finished, archives are never closed off, and so on.
- Lessons learned may be noted, recorded, and even filed, but they aren't learned. Sometimes a politically correct story about the project gains acceptance in corporate folklore.

Why it should be this way becomes understandable when the following formidable array of barriers to effective project closeout management is considered:

- Completing records is a distraction. There are already too many important activities that more obviously add value and that clamour for prior attention.
- Closeout activities cost money, and in the final stages it is easy to see that money can be saved simply by not doing them. If the project lost money or cost more than expected, why should good money be thrown after bad? If the project went well, there probably isn't much to be dealt with, anyway.
- One big problem in regard to termination is that at this point in the project lifecycle most of the interesting work has been done, and few – if any – engaging challenges remain. In fact, as mentioned earlier, wrap-up work is generally tedious: documentation is rampant (systems documentation, training material, user manuals, budgets) and dozens of annoying problems inevitably arise as a project is being closed out. It is tempting for project staff to drift away in search of more interesting and challenging assignments. Consequently, loose ends often are not tied up, leading to post-project problems.
- There is a widespread myth that learning is a personal activity, and so the lessons to be learned from the project will be available to the organisation informally through the experience of the project manager and project team members.
- While many project organisations pay lip service to the importance of project closeout management, there are rarely any tangible or emotional/psychological rewards given to people who pay particular attention to this aspect of project management. The folly of 'asking for X while rewarding Y' may be acknowledged, but instances of it abound.
- Effective project managers are often very task-oriented people with a strong commitment to the project and a desire to deliver results. They prefer to organise tasks for action rather than sitting in meetings reflecting on events that they can no longer influence. Preferring practice to theory, they tend to know what they have concluded from the recent project and have now moved on, in their thinking, to their next challenge.
- While many organisations acknowledge the importance of projects and their success, they frequently underestimate the extent of the difference necessary between thinking about projects on the one hand and either operations (repetitive processes) or tasks (simple activities) on the other hand. Because operations are by their very nature repetitive, they do not require specific closeout; a philosophy of continuous improvement is more relevant. Because tasks, which may or may not be repetitive, lack the complexity of projects, they often lend themselves to simple and straightforward analysis and a philosophy of 'just do it'. Consequently, there is often insufficient attention paid to the unique difficulties of creating organisational learning in a project environment, where circumstances guarantee that every experience contains unique elements.

The following emotional issues may concern the project stakeholders, especially team members:

- **Fear of no future work.** Is there more work available? If not, some project staff may start 'foot-dragging' to prolong their employment.
- **Loss of interest.** Project start-up is challenging and interesting. Project close down often

means familiar and tedious work. Some staff may refocus their attention elsewhere. Motivation and teamwork then diminish, as does productivity.

- **Loss of identity.** During project closedown, long-term project members may be assigned elsewhere and team identity is lost or diminished.
- **Client's attitude changes.** The client and other stakeholders may lose some interest as new projects prove more exciting, challenging and important.

Some strategies to counter these essentially emotional issues are:

- appoint a project termination manager
- treat the project finish phase as a project—give it an identity
- schedule more regular project team get-togethers
- make each reassignment decision a conscious, deliberate choice, and farewell their departures as they leave the project
- retain an agreed percentage of payments (retentions) to contractors until the satisfactory performance of the final deliverable is clearly established
- include contract penalties and rewards to encourage on-time deliveries.

Project Success

What constitutes project success? Just as beauty lies in the eye of the beholder, often project success, or failure, lies in the eye of the stakeholder. Some points on this topic are listed below:

- The traditional view is a project that has been completed on time, within budget, and to specification, is successful. Success is staying within the 'iron triangle'.
- A large percentage of a project's value is derived from intangibles that traditional metrics don't capture. Hence the growing popularity of balanced scorecard or triple bottom-line assessment.
- The main inadequacy with the triple constraint is that it does not properly address client satisfaction – arguably the single most important determinant of project success. Even a project disaster can be completed on time, within budget, and to specification.
- Project success is defined by the perceptions of others. Maybe it's whatever the client says it is on completion. Also, the perceptions of project success may change over time.
- Perhaps project success is best defined as meeting or exceeding the needs and expectations of project stakeholders. Thus the client is the principal evaluator of project success.

Frequently identified reasons why projects do succeed are:

- A realistic plan has been built and agreed upon with stakeholders through careful analysis of the requirements involved. Success criteria are set at the start.
- Conflict is quickly accelerated to the project manager's office for resolution.
- The project manager is a strong leader and clicks with both team members and senior management.
- Goals and objectives are clear and concise. Team members fully understand them.

- Careful reporting and monitoring are in place for tracking the project from start to finish.
- The right people in the right numbers are available at the right time to handle each and every task.
- Ninety-eight percent of task and resource requirements were successfully identified and budgeted for before the project start date.
- The project manager participates routinely with team members to help out, to listen to their problems, and to see first-hand what needs to be done to address them.
- Similar projects are studied to learn what problems to expect and how to handle them.

While project success is usually confined to the traditional metrics (time, cost, quality and perhaps safety), these are actually indicators of project management success. To fully assess project success would require that we consider such factors as: benefits realised, stakeholder satisfaction, usage rates, ease of use, problems now solved, and improvements (or complications) to processes and procedures. A successful project also creates business successes – cost savings, cost reductions, return on investment, competitive advantage, operating efficiencies, further opportunities, improved core competency, enhanced productivity, reduced bureaucracy, fewer manual processes, increased accuracy, better customer service, increased sustainability, and greater flexibility. Projects bring together resources, skills, ideas and technology to achieve business goals and deliver business benefits. Good project management helps ensure that these are achieved within budget, within time, and to the required quality.

Project Failure

Some frequently identified reasons for project failure are:

- Inadequately trained and/or inexperienced project managers.
- Health and safety infringements.
- Failure to set and manage stakeholder expectations.
- Poor leadership at any or all levels.
- Failure to adequately identify, document and track requirements.
- Poor plans and planning processes.
- Poor project management.
- Poor effort, time, and cost estimation.
- Cultural and ethical misalignment.
- Misalignment between the project team and the business or other organisation it serves.
- Inadequate or misused project management methodology or framework.
- Inadequate communication, including progress tracking and reporting.

The diagram at Figure 13.3 shows the likely consequence of an unsatisfactory project management framework and a poor understanding of where the organisation is heading strategically.

Client Debrief

It's important that the project client/owner is also debriefed at the completion of the project. Typical debrief questions are:

- What were your expectations for this project?
- Were these project expectations met? If not, why not?
- Was project information communicated to you in a timely manner? If not, why not?
- Were project meetings you attended a valuable use of your time? If not, why not?
- What did you see as the project manager's role in this project?
- Was he or she effective in this role? If not, why not?
- Are you satisfied with the end deliverable(s) of this project? If not, why not?
- Do you believe this project was successful? Why or why not?
- Do you have any other comments you'd like to share? If so, what are they?

Project Evaluation

The framework identifies two evaluation steps:

- **Project evaluation** is the evaluation that's completed immediately after deliverable handover. This evaluation is essentially concerned about the project and project management throughout the lifecycle – that is **project efficiency**, which measures how well the project achieved its goal and objectives.
- **Benefits review** is the evaluation that's completed some 3, 6 and/or 12 months after product/service launch. This evaluation is essentially concerned with the extent to which business case benefits that justified the project investment have been achieved – that is **project effectiveness**, which measures how well the project contributes to business goals.

The fundamental purpose of these final evaluations is to improve future projects. They are ultimately focused on the project itself and how it was conducted. Data on the project and its outcomes are available in the many interim reports, audits and evaluations conducted during the project's life. But information on the process will come largely from the project manager's recollections. Helpful therefore is a project journal or diary—often an informal collection of thoughts, reflections, and commentaries on project happenings. Project documentation is useful for future projects, providing it is in a readily retrievable form. Typical contents of the project historical file include:

- project business case
- project charter
- project plan (ie, budget, schedule, etc)
- minutes of project meetings
- copies of progress and status reports
- copies of risk, issues, opportunities and lessons learned logs
- copies of change notices
- client acceptance certificates
- evaluation and audit reports.

In developing the project database, we recognise that history is not a perfect forecast of the future in

today's business environment. It would be naive of us to slavishly apply yesterday's lessons to today's problems.

The answers to whichever of the following questions are relevant should allow for a very comprehensive, objective and valid project assessment and report:

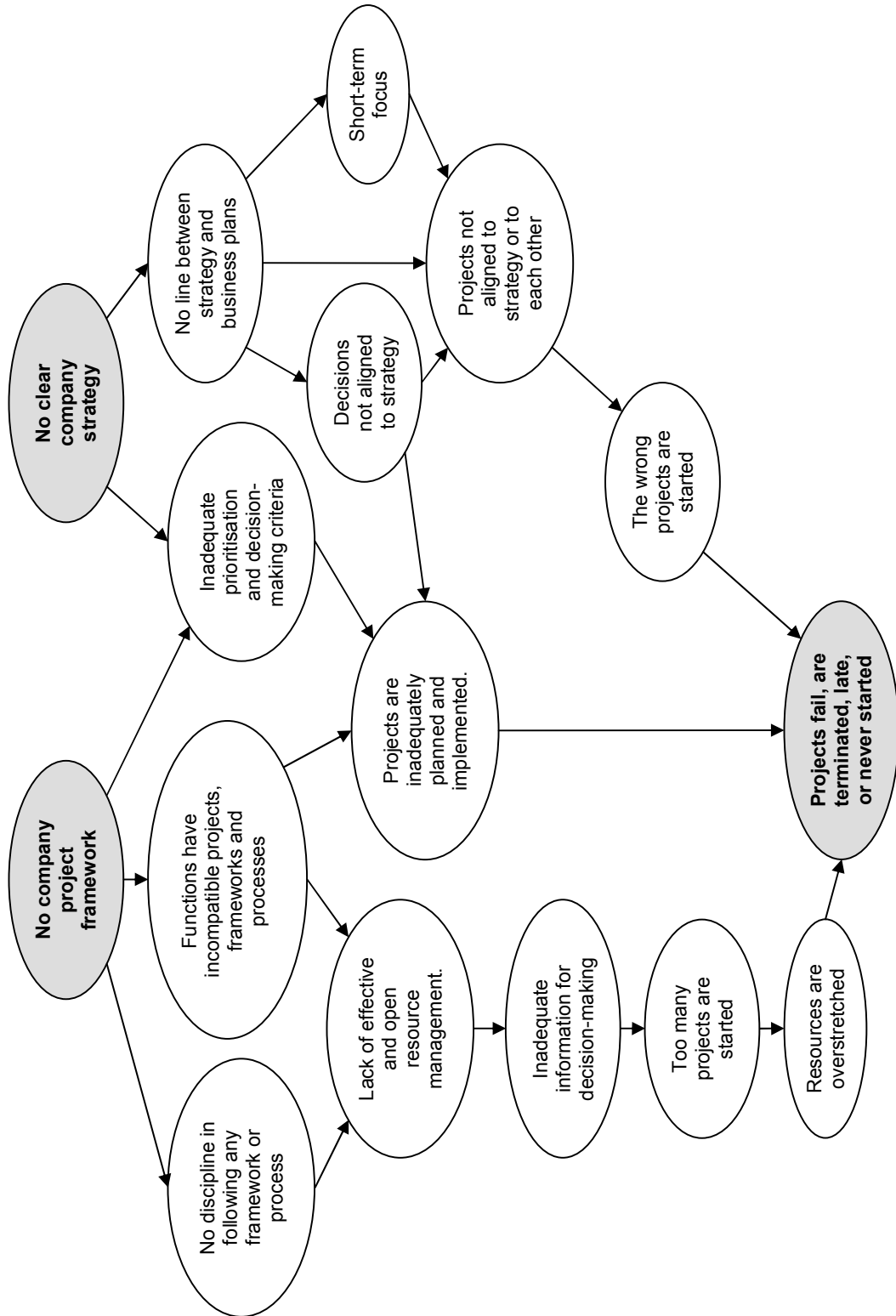
General

- Why are we evaluating the project?
- Who should be involved in this evaluation?
- What should be the scope of the evaluation?
- Is there an organisation template for this evaluation?
- What changes should be made to the project management framework?

Stakeholders

- Were needs correctly identified initially?
- Was the project purpose statement correct?
- Was the project goal correct?
- Did needs change during the project due to unforeseen events?
- Were benefits correctly identified and satisfied by the project?
- Were expected results obtained?
- Were unexpected results obtained?
- Is there a follow-up need to be satisfied in subsequent projects?
- Were all stakeholders identified at the outset?
- Did new stakeholders appear during the project?
- Were stakeholders managed effectively?
- Did stakeholders interfere unnecessarily with the detail?
- Did any stakeholders fail in their obligations?
- Was every effort made to make the client a participant in the success of the project?
- Was the client asked on a regular basis about the level of satisfaction with the progress of the project?
- Were there regularly scheduled face-to-face meetings with the client?
- Was the client informed of potential problems in a timely manner and asked to participate in the problem-solving process?

Figure 13.3: How to Ensure Project Failure



Requirements

- In what way were requirements initially gathered?
- Did the requirements, as specified, meet the client's business needs?
- From whom were the requirements gathered? Were these the right people? In other words, were the operational clients and the strategic clients considered as well?
- Was a methodology for defining requirements used? Explain how it was used and the lessons learned.
- How were the requirements documented?
- How detailed did the requirement document become? Was it sufficient to prevent unnecessary work? Who was involved in specifying, collecting, and documenting the requirements?
- Were any particular techniques for defining requirements (especially quantitative techniques) used? Were they successful?
- How were the requirements documented and communicated to the project client, to the team, and to other stakeholders?
- What recommendations would we make for future projects regarding:
 - how requirements were gathered
 - from whom requirements were gathered
 - the level of detail of the requirements
 - how requirements were documented and communicated?

Deliverables

- What product or service was produced?
- What were the quantifiable success criteria on which the product or service was to be measured?
- When the project was complete, did the project deliverable meet success criteria without additional work? If additional work was required, describe it. Why was the additional work needed?
- Did the product or service produced meet the business need that justified the project?

Design Issues

- Were there design changes? How many? Was there differentiation as to small, medium, and large design changes?
- What were the guidelines for decisions on which design changes to approve and which ones to reject? How and when were these guidelines developed?
- What formal design methodologies were employed, if any? How did they work?
- Would you recommend this same design methodology for future projects? Why or why not?

- How could this (or another) methodology be better managed in future projects?
- How was usage of the methodology enforced? Would alternative enforcement techniques work better in future projects?
- How were design changes documented and communicated to stakeholders?
- What recommendations would we make for future projects regarding:
 - guidelines for approval of design changes
 - formal design methodologies used
 - enforcement regarding the use of formal methodologies
 - documentation and communication of design changes?

Project Lifecycle

- Was there a feasibility study carried out?
- Who defined the project purpose?
- Who defined the project goal?
- Was the project manager appointed at the outset?
- Were responsibility, authority and accountability clearly defined for the project manager?
- Were realistic timeframes established for the project?
- Were project constraints or objectives clear and understood?
- Were all tasks clearly established with accurate durations?
- Was the plan logic (ie, network diagram) correct?
- Were project resources correctly estimated?
- Were task briefs for each team member clearly established?
- Were all team members aware of their responsibilities and authority?
- Were all resource commitments honoured?
- Were all milestones clearly established?
- Were project review meetings built into the plan?
- Were all resource constraints identified and resolved?
- Were risks identified and regularly monitored?
- Was there a documented control system understood by everyone?
- Were there clear lines of communication for monitoring and providing feedback?
- Did the reporting process work effectively?
- Did project meetings achieve their purpose?
- Were the issues resolved properly and promptly?

- How was individual performance measured and communicated?
- Was the budget communicated to everyone?
- Was cost and expenditure information monitored regularly and reported to the team?
- Were the end-users satisfied with the results?
- Were the client and customers involved in the design of an acceptance process?
- Were the team and project manager satisfied with the results?
- Are there follow-up and maintenance activities?
- What actions are required to close the project files?
- What have we all learned from this project that will assist management in future?

Performance

- Did the project sponsor fulfil his or her obligations?
- Did the steering committee work well?
- Were there delays caused by any stakeholders?
- Did any stakeholder avoid their responsibility?
- Did the team meet regularly?
- Did the team work well together?
- Was individual performance appraised and advised regularly?
- Were failures to meet personal targets subject to investigation?
- Were conflicts and grievances dealt with promptly?
- Did the team and project manager review their performance regularly?
- Have additional training needs been identified as a result of performance assessment?
- Is recognition of performance appropriate?
- What recommendations can be made to improve future performance?
- How did the final project costs compare with the original project budget and with the last project budget, which included any relevant changes in project scope?
- If there was a fixed-price contract, was it profitable, or did the project organisation lose money?
- If there was a cost-reimbursement contract, was the project completed within the customer's budget?
- Were there any particular work packages that overran or underran their budgets by more than 10 percent? If so, why?
- What were the causes of any cost overruns? Were the cost estimates realistic?
- How did the actual project schedule compare with the original schedule?

- If the project was late, what were the causes?
- Was performance on the schedule for each work package?
- Were task duration estimates realistic?
- Was the project planned in sufficient detail?
- Were plans updated in a timely manner to incorporate changes?
- Was actual performance compared with planned performance on a regular basis?
- Were data on actual performance accurate and collected in a timely manner?
- Was the planning and control system used on a regular basis by the project team?
- Was it used for decision-making?
- What was the planned completion date of the project? Based on what constraints?
- What was the planned completion date of each phase and/or key milestones? Based on what assumptions?
- How close to the scheduled completion date was the project actually completed? Was the schedule fixed?
- What factors enabled the team to stay on schedule? What factors caused delays?
- Was the WBS developed down to a level of detail that was appropriate for driving an accurate schedule?
- Were task estimates based on an effort and duration estimating model? Were updates on-going? Were they based on new knowledge and project changes?
- Did the team effectively use a variety of dependency relationship types to optimise the schedule? If so, how did the team develop the dependency model?
- Was the baseline updated when schedule delays made the original plan unachievable? If so, was a record of baseline changes kept?
- How were schedule changes documented and communicated?
- What recommendations would we make for future projects on:
 - developing and effective WBS
 - task estimating processes and models
 - use of task dependencies to generate the schedule
 - setting and updating the schedule baseline
 - documenting and communicating schedule changes?

Technical

- Were the original objectives technically feasible and realistic?
- Were the client's technical needs accurately specified?
- Did the client accurately present the user's requirements?

- Did the technology exist?
- Did new technology have to be developed as part of the project?
- Were the right skills available to develop this new technology?
- Was specialised training necessary for the project?
- Were the products variations or derivatives of existing products?
- Was new equipment required?
- Did new equipment have to be developed?
- Were new test procedures required?
- How were these developed?
- Was specialised test equipment developed?
- How were technical difficulties resolved?
- Were consultants involved?
- Are any new designs and technology protected?
- Should we patent any of the developments?
- What is the confidence level of the technical performance?
- Have additional opportunities for improvements been identified?
- Can any technical developments be used on other projects?
- Are there possibilities identified for other products?
- Has all essential documentation been completed?
- Who else needs to know about the technical results obtained?
- How did the final scope of the work compare to the scope of the work at the start of the project?
- Were there many changes to the work scope?
- Were the changes handled properly in terms of approvals and documentation?
- What impact did the changes have on project costs and schedule?
- Was the work scope totally completed?
- Were the project work and deliverables completed in a quality manner, and did they meet the expectation of the customer?

Teamwork

- How well did the core team work together? Did the core team members collaborate and support each other? If not, what were the barriers to full collaboration?
- Did the project have the right people with the right skills sets?
- Were there conflicts among team members? If so, what were they? What conflict resolution

process was used? Was it accepted as fair by the team?

- What were the interpersonal skills and behaviours that contributed to the success of the project? How were these skills developed and/or reinforced during the project? How were behaviours addressed so that their negative effects were minimised?
- How were decisions made within the team? How could that decision-making process be improved for future projects?
- Was overtime required of the project team? Was the overtime excessive? In future projects, would there be a way to reduce the overtime required and/or to position overtime in such a way as not to cause negative reactions and possible burnouts?
- Was there turnover in the project? Was it planned or unplanned?
- Who left the project and under what circumstances?
- Which types of turnover had the most negative effect on the project? Why? Are there any approaches that would combat turnover and/or negative impacts of turnover?
- What recommendations would we make for future projects regarding:
 - creating a collaborative team
 - matching skill sets with the team assignments
 - managing conflict within the team
 - developing and reinforcing interpersonal behaviours within the team
 - using an effective decision-making process
 - managing and reducing overtime
 - managing and reducing turnover?

Cross-functional Teams

- What was the cross-functional team's makeup? Was there a core team plus extended teams? If so, how were the roles and responsibilities assigned?
- Was the makeup of the team constant throughout the project, or did it change? If there were changes, what impact did they have on the project? Would there have been a way to minimise the changes and/or the impact of the changes – and if so, how?
- What was the average number of people on the team? Were there too many? How could the size of the team be limited?
- Did a single person lead the team, or did the leadership rotate? If a single person led the team, what made him or her a successful or unsuccessful leader? What additional characteristics would help the manager of the project to be more successful?
- If the leadership rotated, what were the criteria for choosing the new leader? How often did the leadership rotate? If team leadership were to rotate on future projects, how, if at all, could it be orchestrated to be more efficient and effective?
- Was the team rewarded for good performance? If so, how?

- How were team roles and responsibilities documented and communicated among the team members and to stakeholders?
- What recommendations would we make for future projects on these topics:
 - organising a cross-functional team
 - managing team changes
 - maintaining the optimal number of people on the team
 - choosing and rotating leadership
 - rewarding teams for good performance?

Budget

- How close was the actual budget to the planned budget? Was the budget fixed?
- What factors enabled the team to stay within budget? What factors caused overruns?
- Did the manager of the project, and the full team, use accurate cost rates?
- Did the manager of the project identify and use all appropriate cost categories?
- Was the WBS developed in sufficient detail to provide accurate cost estimates?
- Was an estimating model used? If so, how effective was it in generating accurate budget estimates?
- Was the baseline budget reforecast when project changes made the original budget unachievable?
- How were budget changes documented and communicated?
- On future projects, what recommendations would we make regarding:
 - developing an effective WBS for better budgeting
 - cost estimating processes and models
 - setting and updating the baseline
 - documenting and communicating the budget?

Change Control

- Were the project deliverables and their success criteria sufficiently detailed to provide a basis for a formal change control process?
- Were the requirements ever frozen? If so, when? Was the freezing of requirements effective in controlling scope changes? If not, why not?
- Was there a change control process? Describe it.
- Did stakeholders use the process? Describe how the process was adapted to motivate the cooperation of stakeholders.
- Who monitored and controlled the process?
- How was the impact of each change evaluated?

- What were the thresholds that triggered different authorisation requirements to approve or disapprove changes?
- How were the changes and the impact of the change communicated to relevant individuals / departments?
- For future projects, what recommendations would we make regarding:
 - specification of project requirements and success criteria
 - timing and effectiveness of freezing project requirements
 - type of change control process
 - control and monitoring of change control process
 - how the impact of change was evaluated
 - documentation and communication of changes to stakeholders?

Risk Management

- Was there a formal risk analysis performed? When was it performed, and by whom? How (if at all) did the risk assessment influence the original plans of time, resource requirements, and budget?
- Was there a risk abatement planning process conducted? If so, how and by whom? What response plans had to be implemented during the project, and in what circumstances?
- What events occurred that did not have a response plan in place?
- What should the response plan have been?
- For future projects, how might the risk abatement planning process be improved?
- Did the structure or goals of the parent organisation change during the project? If so, how did the changes affect the project?
- What approaches were used (or could have been used) to maintain equilibrium and continuity?
- What recommendations would you make for future projects regarding:
 - the use of formal risk assessment
 - the application of formal risk assessment data to the schedule and budget
 - the development and use of response plans
 - the management of changes in the structure or goals of the parent organisation to maintain project stability?

Historical Metrics

- In what ways did the project draw on experience from similar past projects?
- What were the sources of that history? How valid did you find that history? If invalid, how did you discern what was invalid and how did you compensate for the invalidity?
- For future records, by what percentage or absolute figure did overall project performance vary

form initial estimates: budget, quality, schedule, benefits, risks and resources?

Communication Infrastructure

- How was communication across multiple locations and work groups accomplished?
- Were the majority of project team members aware of the full scope of the project and its various components? If not, did that have a negative impact on the success of the project? How could scope have been better communicated to the project team members?
- Were there ways in which intra-project communication could have been enhanced?
- How were results communicated to upper management? Was the communication adequate? How could it have been improved?

The above is simply a checklist and not all points will be relevant to every project. One interesting point – why don't we seem to learn from the mistakes made by our hapless colleagues? It's a curious phenomenon eh? We seem to have to learn it ourselves.

Documentation

All knowledge learned during the project should be documented so it becomes part of the historical database of the organisation, usually held by the PMO.

Formally reviewing what we have done and developing strategies to behave differently based upon those insights is the essential framework for adult learning. Where we don't review, or we don't take action based upon the review, we don't learn. We may, in the moment, recognise that the way we are approaching a particular project problem isn't particularly effective. Unless we then take the time to reflect on this observation, develop an alternative approach and actually test out that approach, a change in how future projects are conducted is unlikely. When faced with the same challenge again, we will respond in the same way because our instincts and experience guide us that way.

Ensuring that project reviews are conducted is a role that the PMO is well suited to deliver. The way in which this role is performed can vary. The PMO may simply provide the follow-up support and process guidance to ensure that reviews happen, they may actually facilitate the lessons learned exercise, or they may conduct an independent audit or project review. As reviews are conducted, the PMO serves as the best repository for lessons learned information – as suggestions for specific types of projects or best practices to address specific situations or challenges, or as a compiled set of planned changes to the project management framework.

Conscious review is how we learn, as individuals and organisations. For the PMO to be an advocate for organisation learning, they need to start with ensuring that the lessons offered by our current experiences are embraced. Each project that we do is a learning opportunity, whether the project is a runaway success or an abject failure.

We need to take advantage of those opportunities by ensuring we build the time into the projects to review. We also need to make certain the value of this investment is realised, by consciously committing to do something with the review results. We need to embrace the opportunity to learn, rather than viewing project reviews as one more thing to check off on our project finish schedule.

We may scan records and store them electronically, but will we have the software and hardware to access these records in the future?

Benefits Review

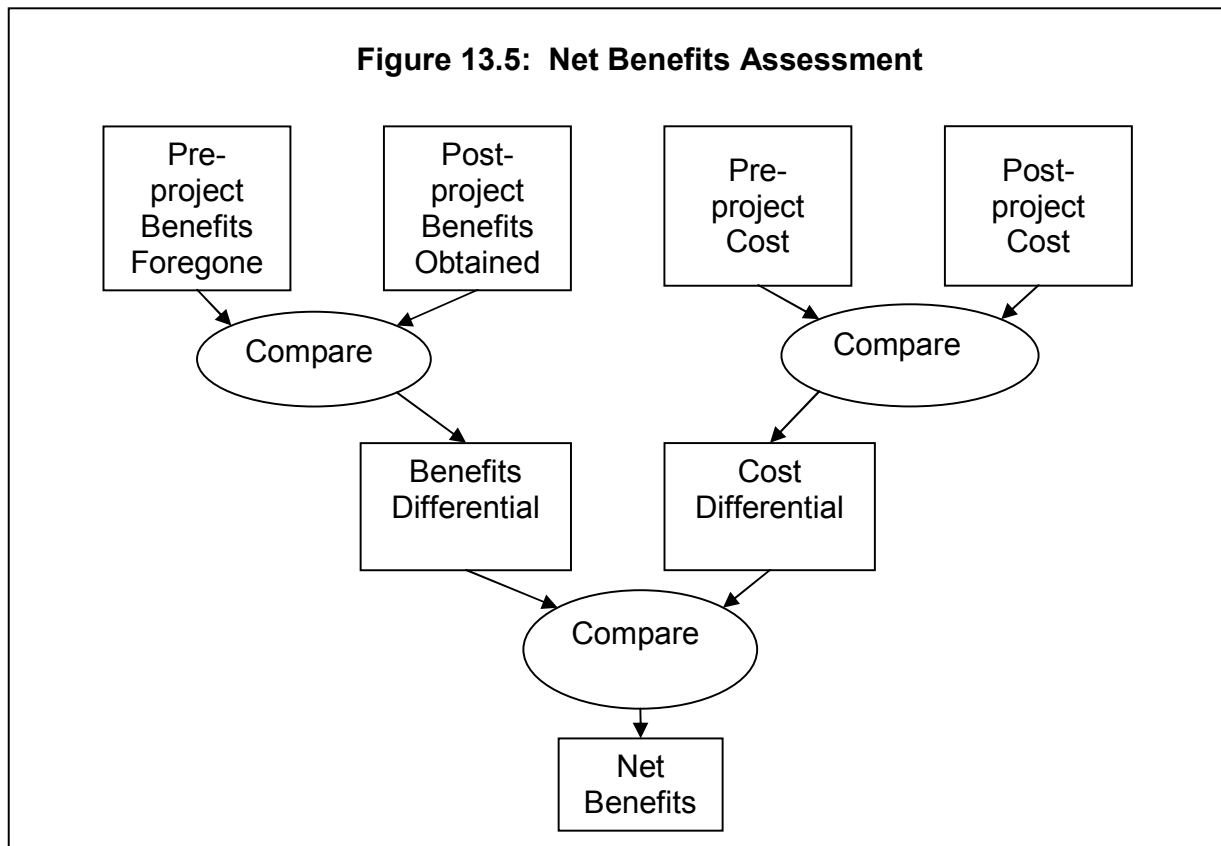
Perhaps the main question at the conclusion of a project concerns success and what constitutes a successful project? The tradition view is that a project, which has been completed on time, within budget, and to specification, is successful. The tradition view is more appropriate in project situations where time, cost and quality can be clearly defined. The main inadequacy with the triple constraint evaluation is that it does not adequately address client satisfaction—arguably the single most important determinant of project success. Even a project disaster can be completed on time, within budget, and to specification. Conversely, delayed and over-spent projects may later prove to be enormously successful in terms of their benefits (eg, Sydney Opera House).

Perhaps project success is best defined as meeting or exceeding the needs and expectations of project stakeholders. Thus the client is the principal decider of project success. And such success may not be immediately evident. One approach to evaluating success is to list stakeholders' expectations in order of priority and then compare these with a list of the project's accomplishments.

The summary at Figure 13.4 identifies typical project success criteria and successful outcomes. Perhaps client satisfaction might best be assured by benefit delivery and return on investment (ROI). However, this would not usually be evident until some time after project completion. Hence the need for the benefits review. The diagram at Figure 13.5 summarises one approach to determining project net benefits. Also, we need to be assured that the benefits are from our project alone. Sometimes several projects claim the same benefits.

Figure 13.4: Success Criteria and Outcomes

Success Criteria	Success Outcomes
satisfied owner	increased revenue
completed within schedule	decreased costs
completed within budget	improved image
completed within resources	improved profitability
satisfied stakeholders	improved morale
product performance	new business opportunities
end-user acceptance	reduced wastage
exceeds quality standards	improved productivity
satisfied team members	improved teamwork
improved cycle time	time saved



Deliverable Maintenance

After a service or product has been designed and implemented, it must be maintained. Maintenance can take several forms: it may involve debugging problems inherent in the deliverable/output, making so-called enhancements to the output, integrating the output with other outputs, and periodically testing the output to determine whether it is still performing the way it should be. Deliverable maintenance is very important. It has been estimated, for example, that roughly 60 to 70 percent of the lifecycle cost of computer systems is devoted to maintenance.

Although maintenance is crucially important, it is not usually included in the project lifecycle for a good reason. Projects, it should be recalled, are efforts that occur within a finite period of time. They have clearly defined beginnings and ends. Maintenance, on the other hand, is ongoing and of an indefinite duration. A specific act of maintenance—for example, revision of corporate purchasing guidelines—may be viewed as a project, but it is a separate and distinct undertaking from the initial project that produced the original guidelines.

Closure Event

Always have a closing event to formally round off the project. A party, a dinner, a night out at the pub, an outing to the theatre or restaurant—some kind of reward for work well done needs to be held. Ensure some money is put into the budget for this event.

Even if the project was unsuccessful, over-ran and brought shame to those who were responsible, it should be formally closed and the team, who worked hard for its success, rewarded with a wake for the project's passing. Why reward failure? Because we are not rewarding failure, **we are rewarding effort**. There is no universal cure for cancer but there are many excellent drugs that have resulted from projects to find a cure. What scientists strive to do is learn the lessons for the next project – for the next step forward. That is what we must do as organisations, as project teams and as individuals. This event might also be an appropriate opportunity to thank people and acknowledge their work. We might use rewards and recognition as positive reinforcement for deserving project players.

Final Report

The final report is both a history of the project and a final evaluation of performance. While this report for a small project may be no more than a two-page memo, the report for a large project may be 100 or more pages in length. If we kept proper records and a project diary or journal, producing the final report will be relatively easy. A suggested template is at Appendix Eleven.

All of the topics covered in the project report for a simple project should be included in the final report for a large project, but they should be covered in more detail. These are some possible items to include in the final report:

- An overview of the project including revisions to the original plan.
- A summary of major accomplishments.
- Analysis of achievements compared to original goals for the project.
- Final financial accounting and an explanation of variances from the budget.
- An evaluation of administrative and management performance.
- The team's performance (this section should be confidential when it applies to specific individuals and their performance).
- Issues or tasks that require further investigation.
- Recommendations for future projects of this type.
- Special acknowledgements to team members.
- In addition, the following elements are appropriate to include in the final reports for more complex projects:
 - A summary of performance issues, conflicts, and resolutions.
 - The results of each phase of the project including actual versus forecast dates and the budget versus actual expenses (budget use, additions etc).
 - Recommendations for changes to future projects so they will run more smoothly and be more compatible with the sponsoring organisation.
 - An analysis of reporting procedures and recommendations for improvements.
 - An analysis of the project management framework as a whole.

Summary

Projects ultimately come to an end. Sometimes this end is abrupt and premature, as when a project is killed-off early. It is hoped, however, that the project will meet a more natural ending. In any event, when projects end, the project manager's responsibilities continue; there are assorted wrapping-up duties to be performed. The precise nature of these duties is dependent on the character of the project. If equipment was used, this equipment should be accounted for, and possibly reassigned to new uses. Similarly, project staff members should be given their new assignments. On contract projects, a determination must be made as to whether the project deliverables satisfy the contract. Final reports usually have to be written. Users should be contacted to determine their satisfaction with the deliverables. And so on.

Closing a project can be more difficult than initiating one. Closing tends to be neglected due to the pressure of new projects. The major tasks of project completion are:

- ensure all deliverables are properly completed
- obtain client acceptance
- document the project
- conduct the post-implementation evaluation
- issue the final report
- celebrate closure and we trust—resounding success.

The rationale for terminating a project is:

- to formally close contractual relationship with contractors, suppliers, consultants
- to formally terminate project team members' appointments
- to obtain client acceptance of the project deliverables
- to ensure all deliverables have been completed according to time, budget, and specifications
- to ensure that adequate project documentation and baseline information are in place to facilitate future needs or changes
- to issue and receive sign-off on the final evaluation report(s)
- to terminate all external and internal project relationships.

Finally, a word of warning—project success is about delivering what is needed. Large projects that take a long time often deliver what was specified, but what was specified is not capable of meeting the current need. The answer is to periodically confirm and where necessary update the need and user requirements for the project. Finally, three top activities for project success are:

- agree a clear project goal
- develop a plan that shows an overall path and responsibilities, which is also used to measure progress
- ensure effective communications among all involved.

The project ends with the confirmation of the sponsor/client that everything expected has been delivered to the correct level of quality and that it is in a state where it can be used, operated, supported and sustained. Hopefully our investment proves worthwhile. A project is a means to an end.



Chapter Fourteen

FINAL COMMENTS



People have been undertaking projects for millennia, but it was not until recent times that we began to approach project management in a disciplined manner. The world has changed. In all areas of business, what served us well in the past is only marginally pertinent today. Project management is no different.

Seat-of-pants project management practices no longer work. Modern project management is more than merely parcelling out work assignments and hoping desired results will be accomplished. Our new work environment demands that project managers have a comprehensive understanding of the discipline and its implementation in a wide variety of challenging circumstances.

Coupled with the need for a professional approach to managing projects is the reality that more people in the workplace are responsible for a larger number of projects than ever before, with less time at their disposal. More and more organisations are relying on project managers to take care of their business. We are the tactical managers who deliver strategic results.

Framework

Project management is a process designed to bring goals to successful fruition. The framework contained in this book consists of a simple, systematic process, based on the generic project lifecycle. The book takes the various tools and techniques that litter the project management landscape and assembles them into a rational framework. This framework is broad enough to be flexible, detailed enough to provide clear direction, yet simple enough to be readily understood and applied. The framework also includes guiding principles and a variety of readily adaptable tools, templates and checklists.

Although the framework is explained in some detail, it is not intended that it be slavishly applied. A concern is that inexperienced project managers may apply the process too meticulously, regardless of cost and without sufficient consideration of benefits. The process must be adapted and modified as appropriate to meet the peculiar needs of each organisation and project. Nevertheless, the benefits of this standardised framework should not be under-estimated:

- There is no need to 'reinvent the wheel' on each occasion.
- It provides a useful basis for learning.
- The project deliverable is likely to be of predictable quality on each occasion.
- The common frame of reference and vocabulary helps ensure effective communication and creates a professional image.
- It enables meaningful comparisons and evaluations of different projects.
- It helps guard against project management complacency and malpractice, where malpractice means failing to follow a professional methodology.

Also, it is not intended this framework remain unchanged. Its effectiveness needs to be frequently reviewed and improvements made. Arguably, there are no 'best practices' or 'state-of-the-art' project management practices, rather they continue to evolve in relation to the environment in which they are applied. There are many environmental factors that determine how effective a practice is. Perhaps appropriate practices or good practices are better terms.

This same methodology can be applied with good results to small, medium and large projects. The process and principles are the same. The main difference is the time, the amount of documentation required, and the applicability of the various specialist tools as projects grow in size, cost, complexity and uncertainty.

A project manager may have good skills, yet fail to meet the conventional triple constraints. On the other hand, a poor project manager may easily meet basic objectives. This may be because the estimates on which the project is based are sometimes just best guesses, unavoidably so due incomplete, unclear, and unstable knowledge. It therefore makes greater sense to evaluate the project manager on the effectiveness with which they apply the project management framework. And the success of the project is determined by the success of the final deliverable as judged primarily by the owner and users who with others will assess the extent to which business case benefits are realised and value is added.

Communications

No matter how advanced the technologies involved the human element will always make or break a project. This book recognises that communication blocks arising from the personality and emotional characteristics of the project stakeholders are often a major problem. The challenge for the project manager is to develop a climate in which all involved readily communicate the good and the bad news in a candid, thorough and timely manner. Only by being properly informed can the project manager make appropriate decisions. And of all the elements of communication, it is the ability to listen effectively that will minimise those unwelcome surprises. Perhaps our greatest hurdle is to hear evidence that doesn't support our assumptions and premature conclusions. An 'open-mind' is needed.

Project Management Office

The project management phenomenon has seen the establishment of the project management office (PMO) mostly within larger project-oriented organisations (ie, where projects are often the majority of business activity).

PMOs are all about putting improved practices into practice. In fact, a good mission statement for a PMO might be: 'Identify, stimulate and support the use of good project management practices so that the organisation can effectively implement its strategies and achieve its strategic goals.' And since there's no other logical spot in an organisation to take on this critical role, PMOs – no matter what their power base may be – are faced with spreading the word and making sure organisations apply good project management practices. Key to this is a standard project management framework.

Of course, we know that PMOs are all over the map when it comes to size, scope and influence in an organisation. Even the names range widely, from the classic Project Management Office to dozens of other titles like: Programme Office, Programme Support Office, Project Support Office, Organisational Support Project Office, Project Management Centre of Excellence, Project Management Competency Centre, Project Control, and Virtual Programme Management Office. Some of these PMOs can push the cause from a strong power base while others may have to make use of persuasion,

influence and grass-roots politics to get the job done; nevertheless, the good-practices cause needs to be performed to the degree possible by all types of PMOs.

The establishment of a PMO within our organisation might be justified when some or all of the following circumstances apply:

- Scope keeps changing throughout our projects.
- Extra expertise is necessary to manage this change.
- Our company is managing multiple projects from one resource pool.
- Whenever we have multiple projects or multiple initiatives using the same resources, we need centralised control to optimise resource allocation.
- Multiple contractors and suppliers are necessary because of the complexity or size of the project or as a condition of the tendering process.
- We need a centralised view of the solution and can help manage contractors and suppliers across multiple projects or the enterprise.
- It is necessary to provide consolidated reports and metrics across all projects.
- It is necessary to provide a single source for communications to our client or clients.
- Whenever 'time to market' is a critical factor in completing our programmes or projects.
- Whenever services are being implemented across diverse geographic regions.
- Whenever limited resources need to accomplish multiple tasks.

A dedicated PMO provides the oversight and coordination to deliver projects on time and on budget by managing and reporting on our total schedule, risk, cost, quality, scope and resources across all projects. The PMO provides expertise tailored to our business requirements while taking responsibility for all projects included in our company, enterprise or programme. A PMO provides extra focus and resources for project management excellence for companies of all sizes. A truly effective PMO not only delivers projects on time and on budget, but also ensures that projects are aligned with overall business goals to set business strategy in motion and propel our business forward.

The PMO has a business integration activity. It isn't intended that it replace business functions or departments, but rather work within the organisation to facilitate or adapt business functionality in the project management environment. The responsibilities of the PMO vary, and might include:

- facilitate project start-up workshops
- development, implementation and on-going refinement of the project management framework
- provide a focal point for project information and planning data
- help ensure the proper integration of project work across functional lines
- maintain project contract documents and monitor contractual performance
- support planning, conflict resolution, decision making, staffing, and problem escalation
- establish training objectives for project managers and teams and administer project training to

realise these objectives

- provide hands-on help to project managers and provide experts to assist project managers
- benchmark projects and evaluate their performance.

Organisation Structure

The project's organisation structure defines the reporting structures, processes, systems and procedures of the project. Issues typically important in the structuring of a project include the degree of project-functional orientation, the extent of the project management (office) authority, collocation of project members, and allocation of resources, work packaging and interface management, and the definition of control, authorisation and reporting procedures and systems. There are three basic kinds of organisation structure:

- **Functional** – where resources are controlled totally from within their respective functional unit.
- **Project** – where resources are allocated on a dedicated basis to a project, from where they are controlled.
- **Matrix** – where resources are controlled functionally by their functional head and concerning their project requirements by the project manager.

The choice of structure should take account of cultural and environmental influences and could change as the project evolves through the project lifecycle and because of different types and conditions of contract.

Project Sponsorship

This book recognises the growing importance of good project sponsorship. In most projects the sponsor is the person with formal authority who is ultimately responsible for the project. A sponsor may be a senior manager or a junior manager depending on the project – its dollar value, priority, and who the client is. The sponsor 'owns' the business case. They are benefits focused.

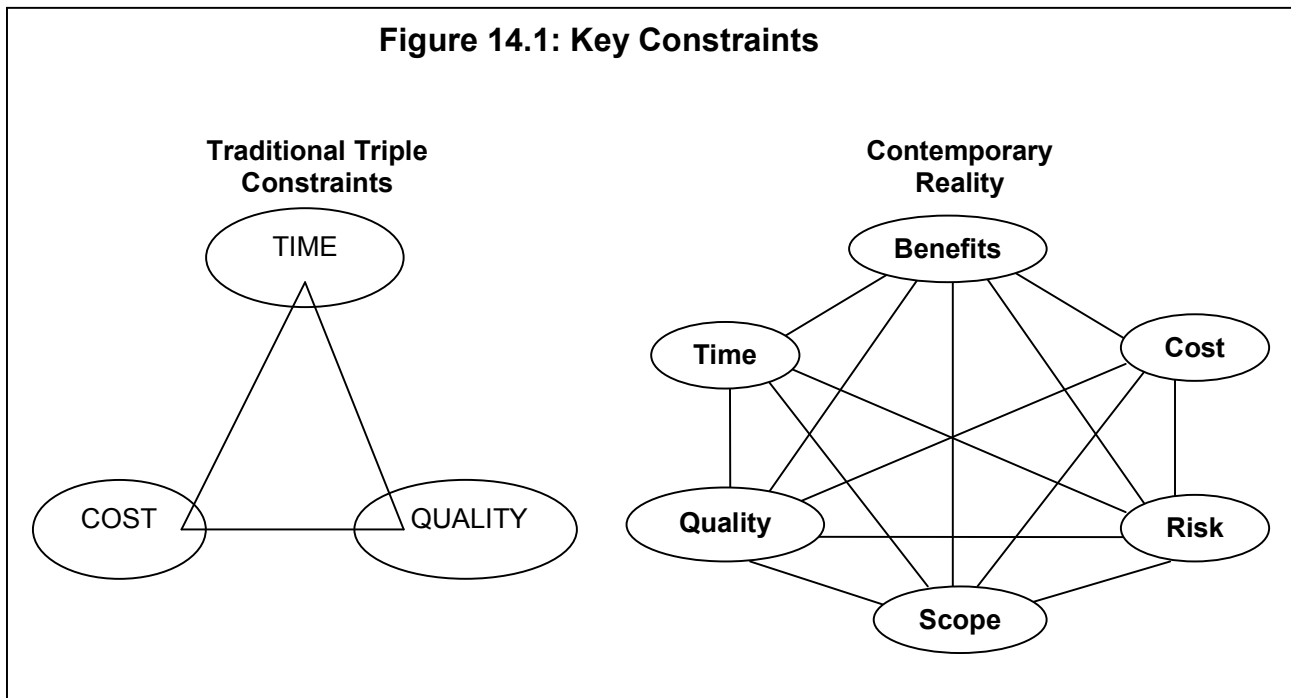
The sponsor's position and authority in the organisation are independent of the project. This enables the sponsor to act as the connection between the project and the organisation. The sponsor might use her or his authority on behalf of the project manager, provide advice, and influence project priority. The sponsor provides the formal authority that the project manager often lacks.

The best sponsors appreciate that they aren't just sponsoring the project; they are also sponsoring the project manager and the project team. They might be regarded as project team champions. They provide behind-the-scenes assistance and can be especially useful in time of crisis.

Project Constraints

Project key constraints are parameters or objectives within which the project manager must navigate the project to completion. Traditionally these constraints have been limited to the triple constraints of time, cost, and quality. Colloquially, they are often referred to as fast, cheap and good – pick two. More recently project scope (ie, magnitude or size of project) has been identified as an essential constraint, and contemporary project success is also considerably influenced by risk and value or benefits. This makes for a rather more complicated picture than the simple, and perhaps simplistic, triple constraints diagram, but better recognises the now important status of risk and benefits. See Figure 14.1.

Figure 14.1: Key Constraints



With regard benefits, we might check that our organisation:

- defines project benefit targets as part of the initial business case
- links project benefits to specific organisation goals and strategies
- assigns each benefit to an owner tasked with achieving the benefit target
- links benefit owner's success to their performance evaluation and compensation.

This book identifies several potential advantages and disadvantages of outsourcing, and contends that an effective contract capitalises on the relevant advantages and contains measures (selection and contractual) to avoid or minimise the potential disadvantages, encapsulated in a 'partnering' relationship, which is one based on open communications, collaborative problem solving, trust, and honesty.

Synergy

The pursuit of synergy pervades the management of organisational projects. Cross-functional teams proliferate. Unless project people cooperate effectively project success is jeopardised.

Functional managers are custodians, not owners, of functional resources. They are responsible for ensuring that capable resources are available to fulfil project needs. When functional managers think of themselves as owners, relationships become strained. They may arbitrarily set priorities and dictate terms under which resources and services are supplied.

This book emphasises that project managers and functional managers are partners in the business of making projects succeed. An organisation's goal must be to promote and support collaborative relationships. A holistic effort is needed to improve project performance. No one aspect of the organisation and its performance can be addressed in isolation. Critical to such cooperation is an overarching strategic plan, which enables priorities to be assigned in a consistent manner throughout

the organisation.

When project teams are formed, members are usually recruited from functional departments. In pure matrix form, they do not leave their departments, but stay where they are and report directly to their functional manager and indirectly to the project manager. In this situation project managers must be skilled at communicating with functional managers to minimise conflict and clarify goals. Nevertheless, as more and more work is being tackled from the project perspective, attitudes are changing. Functional departments are being seen to exist primarily to ensure that projects succeed. By making projects priority, functional managers have to think seriously before they shuffle resources from one project to another or pull resources from multi-functional projects to get functional work done. Thus, in many organisations the balance of power is shifting in favour of the project manager.

Stakeholder Management

One definitive confirmation of project success is satisfied stakeholders. Thus, identifying and involving stakeholders is a first step to getting a project properly under way.

Stakeholders are those individuals and organisations who share a stake or interest in the project. They are often actively involved in the project. Their interests may be positively or negatively affected as a result of the project. Thus, project team members, contractors, subcontractors, suppliers, shareholders, clients and users are invariably relevant. However, there are others who have an interest in the project and by definition are also stakeholders. This latter group is often outside the authority of the project manager. They too can have a marked influence on the project.

Project stakeholders, who are sometimes called interveners, are those who can affect the project and/or be affected by it. They have a vested interest in the project. This book suggests a process for the management of project stakeholders. Key stakeholders include the project manager, the project team members, the client (owner), the customer (user), the performing organisation, and the sponsor.

External stakeholders can be very influential and certainly have been in recent years in economic, social and ecological issues which projects may highlight. The extent to which projects achieve their goals may be influenced by the strategies pursued by key stakeholders. Managing stakeholders' expectations can be very difficult because they often have very different goals that may come into conflict.

Essentially project stakeholder management (PSM) is designed to encourage proactive management for curtailing stakeholders' activities that might adversely affect the project and for facilitating the project team's ability to take advantage of opportunities to encourage stakeholder support. The basic PSM process is shown at Figure 14.2. The project team identifies stakeholders, determines their needs, and then manages and influences those needs to help ensure a successful project.

There are a number of reasons why the general public may need to be involved in the development of public projects and sometimes private-enterprise projects. These include:

- to foster community ownership and acceptability of the solution
- to recognise the rights of the public and the value of their timely input
- to take advantage of a wide range of experience, expertise and opinion
- to identify further issues and risks.

Consultation can take several forms. These include:

- written submissions
- advisory groups
- seminars, hui, fono
- focus groups
- customer surveys
- freephone responses.

Project Success

The most frequently used definition of project success is when the project meets its scope, costs, time and performance targets. This book recognises the trend towards more realistic additional measures for the evaluation of project success, which include applying questions such as:

- Does the project deliverable perform as required by the client?
- Does the project deliverable provide the benefits that originally justified the project's approval?

Given these two questions, judgements about success are subjective; they are coloured by personal perceptions and expectations. The answer is of course that measurable criteria (ie, figures not adjectives) be developed and agreed by all stakeholders as definitions of success before projects are started.

Nevertheless, project success will also hinge on the definition of realistic parameters. Dutifully accepting unreasonable objectives abrogates the project manager's responsibility. The project manager must assess the project's time, cost and quality objectives, and give timely input regarding their appropriateness.

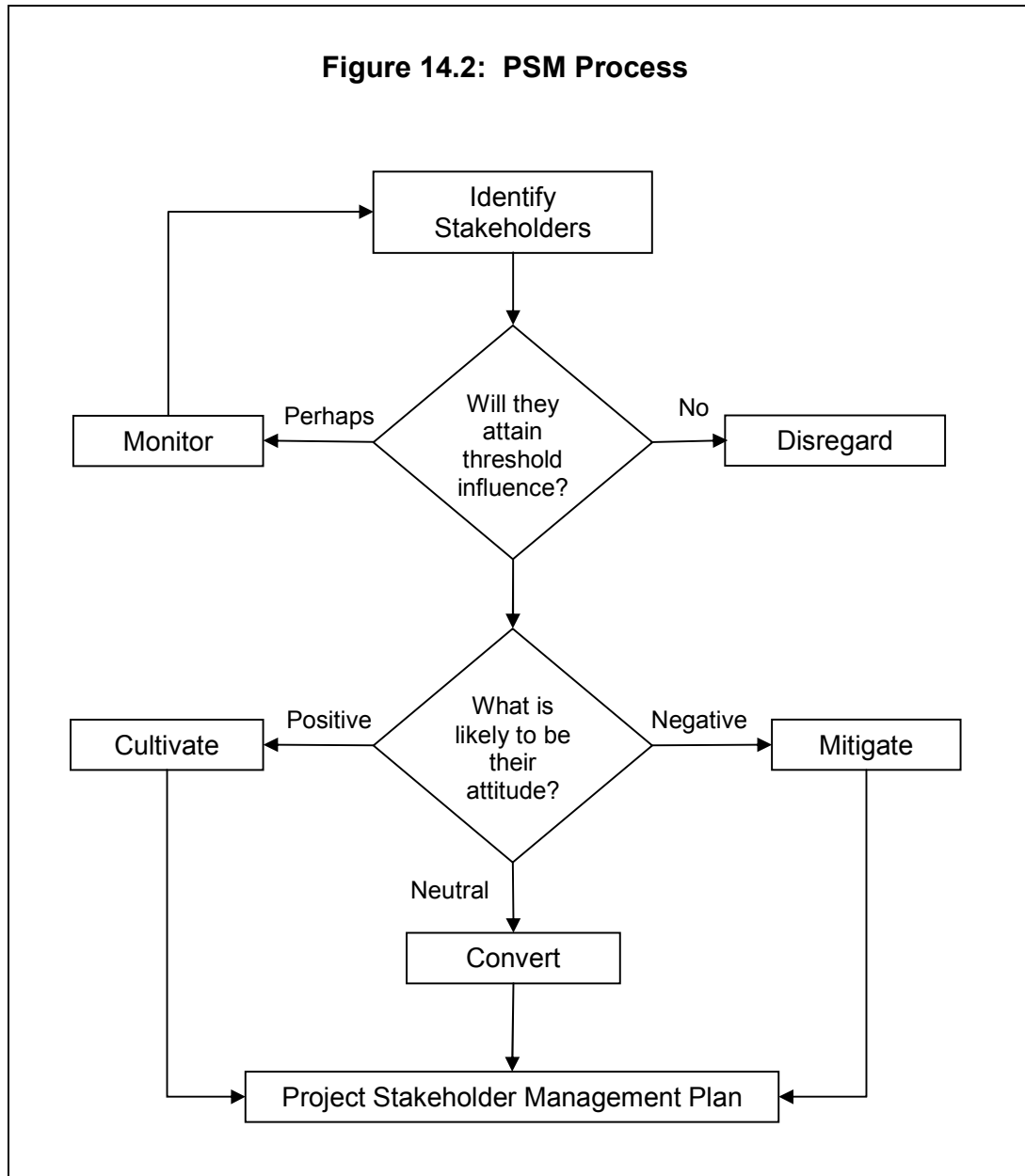
Politics

Managing internal stakeholders usually involves some politics. Good project managers have political savvy. Being political, doesn't mean being devious or indulging in back-biting behaviour. It means getting our views recognised and accepted. It isn't usually blatant behaviour. Typical strategies used by those who wish to develop their influence include:

- help if you wish to be helped
- listen and observe how things work
- understand personalities
- build on partnerships
- develop networks
- learn to negotiate
- don't alienate people
- develop loyal followers
- be patient and tactful
- avoid arguing with extremists
- choose our battles
- analyse our stance before we get involved
- prepare our case in advance.

Multi-project Management

This book is about managing a single project. However, multi-project management is the workplace reality, which is about managing a portfolio of projects – both related projects (ie, programmes) and independent projects.



The best structure for managing multiple projects is probably the matrix organisation, since the traditional structure doesn't provide the necessary project management oversight, and the pure project structure doesn't ensure the most efficient use of resources.

There is of course more complexity involved in the management of a portfolio of projects than of a single project. Three reasons for this are:

- **Portfolios are administratively more complex than single projects.** To see this, one need merely consider the differences in managing a single \$1 million project versus ten \$100,000 projects. While the \$1 million project has one project manager, the portfolio of smaller projects will have several managers. With the \$1 million project, there is only one project to plan and track; with the smaller projects in a portfolio, there are ten projects that must be followed. In general, the ten smaller projects will collectively have more administrative overhead associated with them—more forms to be filled out, more project review meetings—than will the one larger project.
- **Optimisation of the portfolio's performance will require sub-optimisation of individual projects.** The portfolio manager's objective is to optimise portfolio performance, and this invariably requires him or her to make resource allocation and scheduling decisions that benefit high-priority projects at the expense of low-priority projects. While sub-optimisation of individual projects may be necessary to enhance the good of the portfolio, this is small consolation to the manager of the sub-optimised project, whose credo may be 'Get the job done—on time, within budget, and according to specifications'. Consequently, portfolio managers are likely to face unhappiness and resistance from some quarters of their portfolio staff.
- **Portfolios run the risk of falling victim to the tyranny of large projects.** It is difficult to maintain a balanced perspective on large and small projects that may coexist in a portfolio. Large projects, by definition, have a more pronounced profile than small projects; they are more visible. They tend to have access to the best of scarce resources. Furthermore, when large projects run into trouble, small projects in the portfolio often get lost in the shuffle. Their few resources may even be diverted away from them and directed toward the large projects. When that occurs, we may find not only the large projects in trouble but the small ones as well.

Scheduling and allocating resources to multiple projects is more complicated than for the single project situation. Imagine the machinations involved in determining the most appropriate and cost-effective scheduling of several limited resources among a wide variety of projects. Where the projects are independent of each other, such challenges might be resolved by prioritising the projects according to their future costs and benefits and accepting that those of lower priority may suffer resource shortfalls. However, projects within a programme are linked and therefore the following difficulties may arise:

- The slippage of one project may have a ripple effect, causing other projects to slip. This could result in penalty costs and reduced profits.
- Expediting one project in order to prevent its slippage may cause resource shortages for other projects in the programme were projects compete for the same limited resources.

The most common approach is to treat the projects within the programme as if they were each activities or tasks within a single project, and resource smoothing is achieved by:

- Resource-limited scheduling, where there are resource ceilings that cannot be exceeded, planned projects are delayed until sufficient resources can be assigned. If this process delays a critical project the end date of the programme will be extended.

- Time-limited resource scheduling is used when the end date of the programme cannot be exceeded. In which case any resource overloads will have to be addressed by increasing the resources when they are needed.

A checklist to evaluate our ability as multi-project managers is at Appendix Ten.

Mega-projects

Mega-projects, the expression coined from projects in the billion-dollar class, such as NASA's space shuttle programme and the Olympic Games, have the same parameters as smaller scale projects – a quality outcome, delivered on time, within budget to secure measurable benefits.

What constitutes a mega-project? Size, certainly. In fact size is the main prerequisite, and complexity is often the main difference. Managing a mega-project is a formidable challenge. However, mega-project managers tell us not to be frightened by the scale, and to remember that a mega-project is just a normal project magnified. It's change management on a grand scale. What at operational level is a project becomes a project task at the mega or strategic level. The principles and processes are the same.

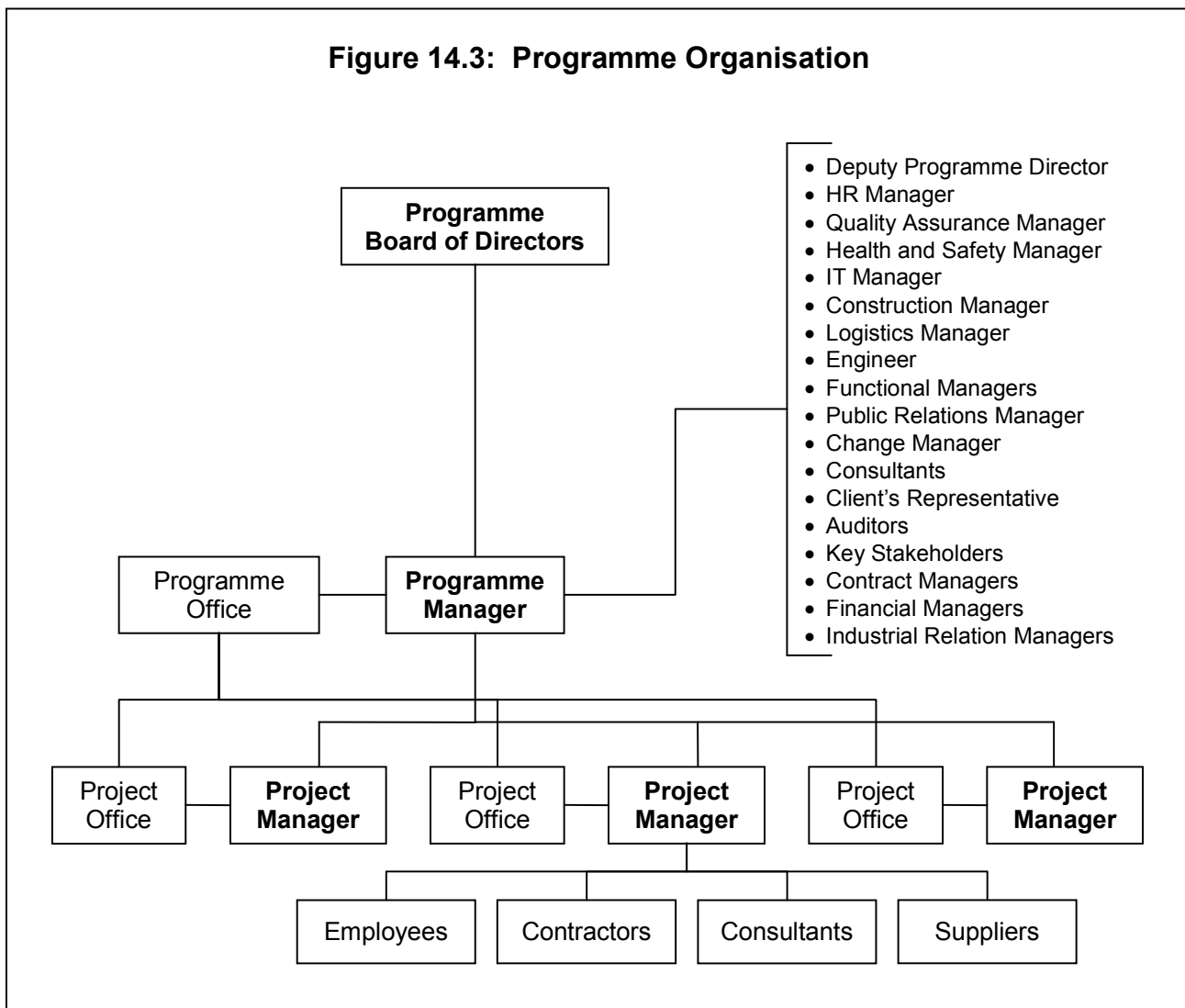
Managing the mega-project requires strategic thinking, which is different than operational or tactical thinking, but they are complementary skills. Programme success needs both attributes. The major difference is the planning horizon. Strategic thinking is long-term.

Managing the mega-project means hands off and some organisation hierarchy is usually established. The mega-project manager is often remote from the workplace. Thus, delegation of authority is essential. Project managers must be empowered to achieve their goals. Vertical and horizontal lines of communication need to be established. Project managers need ready access to relevant information and resources. The programme organisation to facilitate this might be structured as shown in Figure 14.3.

The programme management office is essentially the war room, serving as a control centre, chart room, conference room, and in general is the focus of all programme activity. The office staff provide administrative support. The programme manager's office is usually nearby. The project management offices serve the same function at an operational level.

New Zealand's larger scale projects are generally infrastructure endeavours – roads, railways, stadiums, telecommunications, electricity generation and transmission, schools, hospitals and other such facilities. However, we seem to take a somewhat piecemeal approach to our infrastructure development. Yet, internationally, resources are becoming much more expensive, there are worldwide labour shortages, and oil, cement and steel prices are rapidly rising. If we are going to get the best bang for our buck as a small and relatively isolated country, we might benefit from better long-term infrastructure planning and more effective central coordination of the projects involved. For some 25 years we have relied on individual parts of government to evaluate their particular needs. Perhaps it's time to revive the old Ministry of Works?

Figure 14.3: Programme Organisation



Organising for Project Management

Given we can't save our way to prosperity, profitable growth companies are superior at project management. These skills are simply the table stakes for playing in today's game. Although the challenges of technology and of understanding customer needs remain, these companies have organised for project management. This has allowed them to win consistently against competitors with equal technical skills.

For many organisations core business means project management. Even some repetitious activities may usefully be managed as projects, with each repetition seen as a unique endeavour and opportunity for further improvement.

As more and more work is tackled as projects, and as advantages of doing so are realised, organisations may seek to further facilitate the project process. These next few paragraphs identify how such 'projectisation' might be achieved. It's often called enterprise project management.

The organisation's culture may need to be reoriented towards support of project management values. Such values are likely to emphasise sensible risk-taking, innovation, creativity, teamwork, challenge,

client focus, etc. The cultural change would need to be top-down. Senior management should 'walk the talk' and champion the change through:

- proactive communication of benefits
- encouraging wide participation
- monitoring the change process and ensuring benefits are realised and made known.

Part of the projectising process is to formalise the link between strategic and business planning and the organisation's portfolios, programmes and projects. Only those projects, which contribute to realising vision, are likely to proceed. Projects are the means by which business goals are achieved. Such goals are assigned to programme or project managers together with appropriate budgets. Project managers are the tacticians through which organisation strategic success is achieved.

There will be a need to redefine organisation roles and responsibilities to reflect some shift in authority from functional managers to project managers. Essentially the balance of power may be transferred to project managers. They may have priority access to resources, which were formerly allocated at the discretion of line management. Resources assigned to a project would be accountable to the project manager, and project managers would have ready access to the resources they require. Resource conflicts are resolved in favour of higher priority projects. Some resistance to such changes might be expected from line management who may feel that their authority is being eroded.

Business-as-usual work might be outsourced in order to further free up organisational resources to focus on project work. There are potential advantages and disadvantages of outsourcing. However, one important advantage is that the organisation can then concentrate on its core business undisturbed by non-core work, which is often better undertaken by other organisations whose core work it is. Some people formerly employed in non-core work may find themselves or their positions redundant. Other new positions may need to be established.

Recognising the advantages of a consistent approach to project management throughout the organisation will require the development, implementation and continuous refinement of a framework for the management of all projects that exceed a certain threshold cost. Typically, such a framework, published perhaps on the organisation's intranet, will include:

- guiding principles to help ensure project management success
- a systematic process by which projects are properly conceived, developed, executed and finished
- mandatory templates for the standardised presentation of project concepts, business cases, charters, plans, reports, audits, evaluations, etc.

A project management office (PMO) may be required. It is a permanent facility designed to provide administrative support to the organisation's programmes and projects. The office may be the 'centre of excellence' responsible for maintaining and promoting project performance standards throughout the organisation. The office's authority comes largely from its expertise in project management. The office handles the routine or mechanical jobs such as updating project plans, budgets and records. It is the focal point for project information and planning data. The office might also maintain a pool of project analysts and managers, and have a project auditing and evaluation function.

The establishment of a central database to assist with time and cost estimates should help the organisation's project managers prepare realistic project plans. The database needs to be kept up-to-date and must be readily accessible. The database might also include historical business cases, feasibility studies, project charters, plans, audit reports, risk profiles, etc.

An appropriate project management software package may need to be identified and installed for use organisation-wide. Some organisations find there is a need for more than one package to ensure the appropriate range of capabilities not available from one package. Some organisations have customised packages. All project players are provided with software training and have ready access to the necessary computer hardware and software for project management purposes.

The projectised organisation also appreciates the need to recognise, publish and celebrate project management successes. And employees are provided with on-going training and development in project management. Project management career paths might be established. Some projectised organisations require professional qualifications and certification as a promotion prerequisite.

Project Management Maturity

Much has been written lately about project management maturity. While there are arguments over the single best way to measure project management maturity, some basic tenets apply:

- Managers at all levels should advocate project management disciplines and best practices.
- Formal project management training and development programmes should be in place, delivered in-house or externally.
- A standard project management framework (principles, process, and templates) should be in place and its continuing suitability periodically reviewed.
- Project management software to assist with planning, scheduling, estimating, budgeting and cost tracking is readily available.
- Projects should be selected and prioritised at top level using standardised evaluation attributes.
- Project sponsors, project managers and line managers should be held responsible for project results.

The enterprise approach to managing projects is an organisation-wide managerial philosophy based on the principle that business goals are achievable through simultaneous projects. Critical to the development of an organisation's project management maturity is the creation of a career structure. Such a strategy achieves three purposes:

- It provides an incentive for junior project managers to remain with the organisation.
- It enables the organisation to match a project manager's competency to the difficulty and importance of the project.
- It demonstrates to project managers that any investment they make in developing their professional skills is likely to be rewarded.

The main roadblocks for moving an organisation 'projectward' are sometimes the stakeholders. Although lack of resources can also be an obstacle, it's the people factor that usually presents the major challenge. Commitment needs to be top-down. Failure to properly implement enterprise

project management may be due to a lack of top-level support, underestimating the dimension of the change, lack of methodology for managing projects, and insufficient effort to develop competent project professionals. It's a significant cultural change, which should be undertaken as a project.

Future of Project Management

Some observations about the immediate future of project management are:

- Project management will continue to mature from a skills-based discipline to a true profession that is comprised of formal academic learning, a defined and evolving body of knowledge developed through research and experience, adoption of ethical principles, an emphasis on sustainability, and the introduction of professional standards of conduct.
- Participation in and application of project management will continue to grow very rapidly, while at the same time the complexity of projects and their uncertainty will both increase, placing greater demands on our organisations.
- With globalisation, free trade, the increasing rate of change in markets, and shortening product lifecycles, the importance of projects and project management will continue to increase. We're competing with everyone from everywhere for everything!
- The locations, compositions, cultures and communications of project management teams will also continue to change dramatically, becoming more complex, even as the velocity of change itself increases. It's a Google-ised and globalised world.
- 'Soft' knowledge and skills, or people skills, will continue to be of increasing significance for successful project management particularly in 'projectised' organisations.
- Technology will also continue to advance exponentially and enhance greatly the support available for project management. For example, Moore's Law tells us that computing power doubles every 19 months, and so far it's holding true.
- We live in a world where change and the rate of change is constantly increasing. In order to survive and prosper, organisations need to continually modify their products and services. Project management will continue to be a means by which these innovations are effected.

Meanwhile, project management is more and more being recognised as a discipline that is distinct from general management. Certificate, diploma and degree programmes in project management are now under way throughout the world. The Project Management Institute (PMI) continues to grow at a rapid rate, especially with China's interest. Corporations are endorsing the certification of project managers. It is now hard to imagine organisations getting by without something like project management. Indeed, project management may become the main route to CEO positions. It's certainly another career stream for the upwardly mobile.

Given that projects are strategically essential to an organisation, it makes sense that CEO would be a logical destination on a project manager's career path. Yet, at present, there aren't many project managers in executive ranks. Because of their cross-functional experience and ability to meet goals systematically and consistently, project managers should make great executives. Perhaps to the world, project management still remains a technical pursuit or discipline, or even another bizarre management initiative and is not perceived as a profession. Thus, project managers with an eye on advancement must demonstrate their inspirational leadership capabilities and also their ability to think strategically. Functional experience in human resources, marketing and finance in particular

will remain important.

Tail Piece

I've enjoyed updating this book. It's been a challenging project mainly because the subject seems to be evolving faster than I can research, comprehend and record it. Perhaps this is now universal – we are moving on before we fully understand the last change or have time to fully contemplate its consequences. Technology seems to be setting the pace. Indeed, there seems little point in attempting to forecast the future when in a few years technology and other influences may have changed things beyond recognition. So this edition could have a short half-life! Trust you have found it useful or at least thought-provoking.

While there is an air of finality about publishing, I'm well aware of the wealth of new insights, examples and information that will now rapidly come to my attention. This is of course another example of Murphy's famous law, which is evident in all projects!



Appendix One

GLOSSARY



Having a big vocabulary is not a requirement for being a successful project manager, but being able to speak the language of the discipline is certainly helpful.

Acceptance	Formally accepting delivery of a product or service.
Acceptance Criteria	A list of criteria that the final deliverable(s) must meet.
Activity	An element of project work or effort. May equate to a task or work package.
Assignment	When a person is assigned to a work package, the work package may be referred to as an assignment.
Assumptions	Factors, for planning purposes, considered to be true, real, or certain. Assumptions usually involve some risk.
Audit	Systematic retrospective examination of the whole, or part, of a project to measure conformance with predetermined standards.
Balanced Matrix	An organisation where functions and projects have the same priority.
Bar Chart	A scheduling tool (also called a Gantt chart) where project work is shown as horizontal timelines denoting durations, and work start and finish dates.
Baseline	A plan, fixed at a specific point in time, used as a basis for tracking project progress.
Benefits	Positive outcomes that a project is undertaken to deliver. Might include enhanced effectiveness, economy and efficiency of future business delivered by a project.
Brooks' Law	Adding resources to a late project makes it later.
Budget	Planned cost for a project or work package.

Business Case	Study used to justify the commitment of resources to a project. It involves gathering both financial and non-financial costs and benefits of the best options.
Business Owner	The person or group who initiated the project and who will own the deliverable(s).
Business Goals	Underlying basis for which a project is undertaken.
Business Risk	A risk containing opportunity for gain as well as for loss.
Buy-in	Commitment to the project from others.
Champion	Someone who takes personal responsibility for a project's success. They act as an advocate for the project.
Change Order	A written order directing changes to a project or contract.
Claim	Contractor's request for an extra payment beyond the contract amount.
Client	An organisation or person for whom the project is undertaken. They own the project. They commissioned the work and will benefit from the end results.
Commissioning	Activities performed to substantiate the capability of the project deliverable to function as designed.
Concept Phase	First of four sequential phases in the generic project lifecycle.
Configuration Management	Process of ensuring that the project delivers all it's supposed to.
Constraints	Restrictions within which a project is managed. They may also be termed objectives or parameters, and may include resource, work, time, cost, quality, technical, legal, risk, culture, health and safety, and environmental limits.
Contingency	A provision for potential problems. Financial provision for anticipated risks that may materialise as the project is implemented.
Contingency Budget	Sum of money required to implement a contingency plan.

Contingency Plan	A plan that identifies alternative strategies if the project doesn't go as expected. Measures to be taken if a defined risk should occur. Only invoked if risk materialises.
Contract	A legally binding agreement.
Contract Management	A process by which external resources are acquired and employed for the project. Also termed procurement management.
Contractor	A person or company who holds a contract for carrying out work or supplying goods and services.
Control	A process of comparing actual and planned performance, analysing the difference and, if appropriate, taking corrective action. Not to be confused with power.
Cost Curve	Graph plotted against a horizontal time scale and a vertical cumulative cost scale.
Cost Estimating	Forecasting the cost of a project.
Cost Management	Financial control of a project.
Cost of Quality	Costs incurred to ensure quality.
Cost Overrun	Amount by which a contractor exceeds the estimated cost or cost ceiling of a contract.
Cost Performance Index (CPI)	Value earned per unit of actual cost. $CPI = BCWP/ACWP$.
Cost Variance	Difference between budgeted and actual cost of work performed.
Cost-benefit Analysis	An evaluation of a proposed project, where estimated costs and benefits are compared. Often stated as a ratio.
Crash Time	The shortest duration a project, task or work package can take, given unlimited resources.
Crashing	Accelerating project completion, usually by adding resources to critical path tasks.

Critical Path	The series of tasks that determines project duration. Longest path through the project network diagram. Shortest project completion time. A project may have more than one critical path.
Critical Success Factors (CSFs)	Measurable factors that when present are conducive to project success (eg, fine weather).
Critical Task	A task on the critical path.
Deflection	Transferring all or part of a risk to another party, usually by some form of contract.
Delegation	Assigning authority and responsibility for project work to the project manager and, from the project manager to individual project team members.
Deliverables	Product, services, processes, solutions or plans created as a result of a project or work package. The result or output of project work. There are 'final' deliverables and 'interim' deliverables. Deliverables are what remain behind after work is completed. They can be measured and proved.
Delphi Technique	An estimating method based on an anonymous survey of multiple experts.
Dependency	The relationship of one project, task or work package with another. Also termed precedence.
Develop Phase	Second of four sequential phases in the generic project lifecycle, when a project plan is prepared.
Deviation	Any variation from planned performance. Could be in terms of schedule, cost, performance, benefits, or scope of work. Also described as variance.
Direct Costs	Costs clearly charged to a specific work package or project, including labour, materials, plant and equipment.
Driver	The project parameter that must be met. It is the parameter that matters most to the client.
Duration	The time to complete a project or work package. Usually expressed in number of days worked. Excludes non-working weekends and statutory holidays.

Earned Value	Value of project work actually performed.
Earned Value Analysis	A method for measuring project performance.
Effort	Number of work-hours needed to complete work, often expressed in person-hours. Not to be confused with duration or elapsed time.
Elapsed Time	Calendar period during when a project or work package is undertaken. It includes work days, weekends and statutory holidays. Sometimes called 'span' or 'calendar time'.
Escalation	Cost increase due to inflation. Also, taking an issue to the next highest level for resolution.
Estimate	A statistical probability, prediction or forecast of a quantitative result usually applied to project work-effort, costs, durations, and resource needs. Estimates can be categorised according to their accuracy or method used.
Event	Completion or beginning of a project or work package. Has zero duration. An important event is a milestone.
Exclusions	Work or outputs not included in the project.
Execute Phase	The third of four sequential phases in the generic project lifecycle. Sometimes expressed as 'Execute and Control'. The phase when the project deliverable(s) is produced.
Expected Value	The probability of a risk multiplied by the anticipated impact of that risk.
Expenditure	A charge against available funds.
Fast-tracking	Reducing the project schedule by overlapping phases or tasks to achieve concurrent activity.
Feasibility Study	Study to decide project viability.
Float	Difference between time available for performing a task and time required to complete it. Time by which a task can be delayed without delaying project finish. Originally the term 'float' was used for CPM diagrams, and 'slack' for PERT charts.

Forward Pass	A means of calculating early start and finish dates for a project task.
Framework	A documented method for managing projects. Also called methodology.
Functional Manager	A manager responsible for activities in a specialised department or function. Resource manager. Line manager.
Funding	Fund allocation to enable payment for the completion of project work.
Gantt Chart	A horizontal bar graph. Work package durations are shown by horizontal time lines. Named after its originator Henry Gantt.
Goal	Something to be achieved. Might be expressed in terms of the project deliverable. <i>'To organise a hui.'</i> <i>'To build a house.'</i>
Grade	Performance level of product or service features.
Handover	Completion of project deliverable to the satisfaction of the client. Commissioning.
Histogram	A graphic display of resource usage over time.
Hurdle Rate	Minimum rate of return demanded on a project investment. Discount rate or weighted average cost of capital.
Indirect Costs	Costs that cannot be traced to a particular project or work package. Overheads.
Input	Resources needed for a process to produce outputs.
Issue	A matter of current concern. A risk event that has occurred.
Key Performance Indicators (KPIs)	Measurable criteria used to report project progress and success (eg, ROI).
Lag Time	Amount of waiting time after one task is started or finished before the next task can be started or finished.
Lead Time	Amount of task overlap or time that the successor task is worked on before its predecessor task is finished.

Lessons Learned Log	An informal collection of good and bad lessons learned and documented as the project progresses.
Levelling	Resolving resource conflicts or over allocations by delaying, spreading or splitting tasks, to avoid large peaks and valleys in their usage.
Loading	Quantity of resource use, shown by work per unit of time.
Logic	The interdependency of work packages or tasks as shown in a network diagram.
Management Reserve	A sum of money to allow for future project situations which are impossible to predict. Usually under sponsor's control.
Master Schedule	Schedule of summary tasks and/or milestones.
Matrix	An organisation structure in which project managers share responsibility with functional managers.
Methodology	Documented method for managing projects. Usually consists of processes, principles, templates and a glossary of terms. Framework.
Milestone	An important event in the life of a project, which indicates progress. Usually the achievement of a key deliverable. Reviews may be at milestones. So might celebrations.
Mitigation	Lessening risk by reducing its impact or probability of occurring.
Monitoring	Collecting and reporting of actual performance for comparison with targets for project scope, quality, time, benefits and cost.
Multi-project Management	Managing projects interconnected by shared resources.
Network Diagram	Schematic display showing the logical sequence or dependencies of project tasks or work packages.
Opportunity	The opposite of risk. May enhance project benefits.
Opportunity Cost	What could have been done with the time and resources allocated to a project.

Output	Project deliverables, products, services etc.
Outsourcing	Contracting for the use of external resources.
Overrun	Increased time or cost compared to the plan.
Partnering	A cooperative relationship between the parties to a contract.
Phase	A logical group of related steps in the project lifecycle.
Pilot	Trial to test a new development before full release.
Post-project Review	One or more reviews held after closure to determine if expected benefits have been obtained.
Portfolio	A group of projects that are managed collectively.
Predecessor	A work package or task that must be completed (or partially completed) before another work package or task can begin.
Process	Set of actions needed to produce an output.
Procurement	Process of acquiring goods and services.
Product	Output or deliverable from a work package or project.
Product Scope	The features and functions of a product.
Programme	Broad effort encompassing related projects.
Programme Director	The senior manager responsible for programme success.
Progress Payment	Interim payment for satisfactorily completed work.
Project	A temporary endeavour undertaken to create a unique product, service or result.
Project Calendar	Calendar that defines project work and non-work periods.
Project Charter	Document advising a new project has been approved, describing the project, formally appointing the project manager, and providing planning guidance.
Project Culture	General attitude towards projects within the organisation.

Project File	Record of project data and documentation.
Project Lifecycle	Sequential phases through which projects proceed. Each phase may consist of several steps.
Project Management	Providing leadership, planning and control to achieve the project goal.
Project Manager	Person responsible for managing the project.
Project Organisation	Orderly structuring of project participants.
Project Plan	A document describing how the project goal is to be achieved.
Project Scope	Description of work needed to produce the project's deliverable(s).
Project Success Criteria	Measures that describe how the project will be evaluated.
Project Team	A temporary group of people, with various skills, who collaborate to achieve the project goal.
Quality	Features and characteristics of a deliverable that bear on its ability to satisfy a client's needs. Conformance with specifications or client's needs.
Quality Assurance	Actions taken to ensure that a deliverable will satisfy given quality standards. It's preventative action.
Quality Control	The process of monitoring project results to determine if they meet required standards and taking curative action.
Request for Proposal (RFP)	A bid document used to solicit proposals from prospective providers.
Requirement	A need, function, feature or attribute wanted by a customer.
Reserve	A provision in a project plan to mitigate risk.
Resource Allocation	Assignment of resources to project work packages or tasks.
Resource-driven	A project in which resource availability determines the schedule. Resource-constrained.
Resource Schedule	Timetable showing when project resources are required.

Resource Smoothing	Rescheduling project work packages or tasks within their float to ensure resource needs comply with resource availabilities without delaying project completion.
Resources	Items required to complete the project. Includes people, plant, equipment, materials, facilities, space, and services.
Risk	Chances of an uncertain outcome, whether a positive opportunity or negative threat.
Risk Event	A specific risk.
Risk Log	Contains all information about the risks, their analysis, countermeasures and status. Also known as Risk Register.
Risk Management	The identification, analysis, response and control of risks.
S Curve	Graphical display of accumulative costs, work-hours or other quantities plotted against time. A performance curve, which is typically 'S' shaped.
Schedule	Timetable for completion of project work.
Schedule Performance Index (SPI)	A measure of schedule performance. $SPI = BCWP/BCWS$.
Schedule Variance	Difference between planned and actual completion time of project work packages or tasks.
Scope	The sum of the products, services and results to be provided by the project.
Scope Change	Change to the project scope.
Scope Creep	Continual addition of unplanned work to the project.
Scoping	Defining the project in terms of purpose, goal, deliverable, work, time, cost, quality, stakeholders, risks, assumptions etc. Preparing a scope statement.
Sensitivity Analysis	Method of determining the effects on the project of changing the values of an important variable, such as task time or cost.
Sequence	The logical and practical order of work.
Sign-off	Formal acceptance of a deliverable.

Slippage	Amount of time a work package or task has been delayed from its original baseline plan.
Specification	Documentation prescribing performance standards for a deliverable.
Sponsor	Project funder. Owns the project business case. Has a governance function and executive responsibility for the project's successful completion. The primary risk taker.
Stakeholder	One who has a stake or interest in the project. They may affect the project and/or be affected by it.
Statement of Work	High-level description of work to be performed.
Status Report	A report about the condition of the project, work package or task as at a certain date.
Steering Committee	Formal group, representing the owner or client, who approve, prioritise and monitor projects, and provide direction to the project manager. Project Board.
Subtasks	Breakdown of work involved in a task.
Success	Stakeholder satisfaction, among other criteria.
Sunk Costs	Costs already incurred.
Sustainability	Means meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.
Target Finish Date	Imposed finish date for a project, work package or task.
Task	Element of project work. A specific, concrete activity. Work package.
Teambuilding	Influencing and enabling a group of individuals to cooperate to achieve a common goal.
Team Members	Individuals, who report either part-time or full-time to the project manager, who are responsible for some aspect of the project work.
Termination	The premature closure of a project.

Time Compression	Reduction of time for a project, task or work package. Usually accomplished by adding resources, or working overtime.
Tolerance	Permitted cost and schedule variance within project manager's authority, without the need to escalate the issue.
Tracking	Collecting actual time, cost, benefits and resource information and comparing with the plan.
Trade-off	Allowing one aspect to change, usually for the worst, in return for another aspect of a project getting better or remaining constant.
Triple Constraint	The three traditional key project objectives that must be simultaneously accomplished, namely, the performance specification or quality, schedule, and budget.
Validation	Proof that a system or process meets its needs.
Value	Expressed in terms of costs vs benefits or investment vs outcome.
Variance	Difference between actual and planned performance, schedule, cost, or project scope. May be an increase or decrease.
Variation	Change to a contract, specification, or project scope.
What-if Analysis	Evaluating the consequences of possible risks, changes, strategies or scenarios.
Work Effort	Effort to complete a project, task or work package, usually expressed in resource hours, and used for costing purposes.
Workaround	An alternative solution to a problem.
Work Breakdown Structure (WBS)	Work needed to complete a project, arranged in a hierarchical structure of successively smaller elements of work to facilitate accurate estimating of work effort, durations, resources, and costs.
Work Package	A generic term for the lowest level of work breakdown for contracting and delegating purposes. Comprises tasks, subtasks and sub-subtasks as appropriate. Has a unique, measurable deliverable.

Working Day

A calendar day other than a Saturday, Sunday, statutory or public holiday. Also referred to as a project day.

Appendix Two

ACRONYMS



AC	Actual Cost
ACWP	Actual Cost of Work Performed
ADM	Arrow Diagramming Method
ADR	Alternative Dispute Resolution
AIPM	Australian Institute of Project Management (AS)
ALAP	As-Late-As-Possible
AOA	Activity On Arrow, or Activity On Arc
AON	Activity On Node
APM	Association of Project Management (UK)
ASD	Actual Start Date
ASAP	As-Soon-As-Possible
AV	Accounting Variance
BAC	Budget at Completion
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
CBS	Cost Breakdown Structure
CPFF	Cost Plus Fixed Fee Contract
CPI	Cost Performance Index
CPIF	Cost Plus Incentive Fee Contract
CPM	Critical Path Method
CR	Critical Ratio
CV	Cost Variance
CWBS	Costed Work Breakdown Structure
DBS	Deliverable Breakdown Structure
DU	Duration
EAC	Estimate at Completion
EF	Early Finish Date
EMV	Expected Monetary Value
ES	Early Start Date
ETC	Estimate to Completion
EV	Earned Value
FF	Finish to Finish
FFP	Firm Fixed Price Contract
FP	Fixed Price Contract

FS	Finish to Start
FPPIF	Fixed Price Plus Incentive Fee Contract
HR	Human Resources
IFB	Invitation for Bid
IRR	Internal Rate of Return
ITT	Invitation to Tender
KPI	Key Performance Indicator
KSI	Key Success Indicator
LF	Late Finish Date
LOE	Level of Effort
LOI	Letter of Intent
LS	Late Start
OBS	Organisation Breakdown Structure
PDM	Precedence Diagram Method
PERT	Project Evaluation and Review Technique
PM	Project Manager, Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute (US)
PMP	Project Management Professional
PMO	Project Management Office
PRINCE	PRojects IN Controlled Environments
PSO	Project Support Office
PV	Planned Value
QA	Quality Assurance
QC	Quality Control
RAM	Responsibility Assignment Matrix
RFI	Request for Information
RFP	Request for Proposal
RFQ	Request for Quotation
RFT	Request for Tender
SF	Start to Finish
SLA	Service Level Agreement
SOW	Statement of Work
SPI	Schedule Performance Index
SS	Start to Start
SV	Schedule Variance
SWOT	Strengths, Weakness, Opportunities, and Threats
T&M	Time and Materials
TQM	Total Quality Management
VAC	Variance at Completion
WBS	Work Breakdown Structure

Appendix Three

PROJECT CHARTER TEMPLATE



Item	Description
Version / Distribution	Document amendment history and copy distribution.
Project Name	Select a relevant, unique and concise title by which the project will be referred.
Background	Explain the situation, circumstance, opportunity, or problem that has lead to the need for the project.
Purpose/Benefits/Justification	Explain the rationale for the project – what it is designed to accomplish, what benefits (positive outcomes) will be achieved. Why do the project? In what ways will the project make things better than they would be without the project?
Approach	How is the project work to be done? Purchased off the shelf? Made to measure? Develop in-house? Outsourced?
Goal	Express the project output as a single target.
Final Deliverable(s)	Describe the basic features, functions, user-requirements and performance standards (outline specification) required of the final deliverable(s) High-level product description..
Success or Acceptance Criteria	Identify measurable criteria the achievement of which will result in project success from the client's and key stakeholders' perspectives.
Scope	Prepare a statement of work perhaps in narrative form, which describes the main work that must be undertaken to realise the project goal. Also list the exclusions – work outside scope on this occasion that might otherwise be reasonably assumed to be part of the project. Product scope dictates project scope.
Related Projects	Identify any other proposed or approved projects that might be related to or impact the project and where coordination might be required.

Item	Description
Business Alignment	Identify which current business goals and strategies the project will contribute towards achieving. Describe linkage with the organisation's business plan.
Business Case (Cost-benefit Analysis)	<p>Refer to an objective analysis of the proposed project to demonstrate that it will add value. This analysis may address such considerations as:</p> <ul style="list-style-type: none"> • economic acceptability • technical feasibility • social acceptability • environmental acceptability. <p>The analysis might consider direct and indirect, short-term and long-term, and tangible and intangible costs and benefits (quantified wherever practicable) and their probabilities as appropriate.</p> <p>While all investment needs to be justified, some organisations don't require a formal business case unless the project exceeds a certain threshold cost – perhaps \$60,000 for example.</p>
Client, Customer(s) and Sponsor	Identify specifically who will own the final deliverable, who will use it, and who will fund the project. Might also identify the project champion.
Project Manager	Identify who is to manage the project, their main responsibilities, limits on their authority, and possibly provide a brief profile of their project experience and expertise.
Other Stakeholders	List other individuals or groups who could significantly affect project success and have a stake in the project and its outcome.
Roles and Responsibilities	Briefly describe roles and responsibilities for key stakeholders—client, steering committee, and sponsor, usually referring to SOPs for PM.
Communications	Describe the frequency, format and medium for progress reporting from the project manager to project sponsor and perhaps other key stakeholders.
Assumptions	Document key premises on which the project is based.
Risk Analysis	Identify larger impact risks to project success and possibly suggest broad mitigation measures.

Item	Description
Constraints	Anything that dictates, restricts or constrains the actions of the project manager. For example, the availability of a contractor, or the completion date is fixed.
Timeframe	Identify when the project is to be undertaken, any key interim milestones, and an estimated (or mandated) completion date. May include a summary milestone schedule.
Plan Preparation	Estimate the work-effort, duration, completion date and resource costs to prepare a detailed plan for project implementation.
Total Cost	Estimate the total cost for the entire project and show the level of accuracy (+/- percentage or range) of this estimate. It's the approved budget.
Other Matters	Include under this heading any other relevant matters, not separately identified above.
Approvals/Authorisations	Sign-offs from appropriate people, especially the sponsor.

The charter in this book/framework is the equivalent of a proposal, terms of reference, project initiation document, or project brief, sufficiently detailed to enable the project manager to proceed with the preparation of a detailed plan for the implementation of the project. The charter is the plan for the plan.

Not all above items will be applicable, and in addition our completed charter might include a cover page, contents page, executive summary, with detail relegated to appendices as appropriate. A foreword might be included—an expression of support written by the CEO or client perhaps, emphasising the importance of the project, endorsing the suitability of the project manager, and encouraging stakeholders to support the endeavour. The sponsor usually signs and releases the charter, which may have been prepared by the project manager. It may be useful to hold a meeting with key stakeholders to discuss the charter before sign-off, which may include their signatures.

Appendix Four

ESTIMATING TIPS



In the fantasy world of our client, the cool and God-like project manager keys in a few secret algorithms and confidently announces:

“The project will be completed on 15 December but not until 2.30 pm and will cost exactly \$1,234,567.89. And I’ll stake my life on those numbers.”

In the real world of the project manager, we find that estimating project durations and costs is more like driving in rush-hour traffic with road-enraged, fist-shaking lunatics in four-wheel-drives, while we attempt to see through a filthy windscreen during a downpour, when the kids in the back seat keep asking *“When will we get there?”* Unfortunately, the voice is more likely to be the client, or some other impatient and influential stakeholder.

In these circumstances, our truthful, but infuriating answer might be:

“I’m 90 percent sure that we can finish the project within six to eight months at some \$50K to \$80K. I’ll be able to give you a more accurate estimate as work proceeds, but only when the project is completely done will I be able to give you exact figures on duration and cost.”

Yes, an exact estimate is an oxymoron. More likely an estimate has a 50/50 chance of success. This is reality in the uncertain world of project management.

Types of Estimates

The accuracy of our estimates depends considerably on our knowledge and skill and our attention to detail. However, the accuracy of our estimates is also influenced by many other factors, important among which is having timely access to accurate and relevant estimating data and information about the intended project. Things that make estimating difficult for us are:

- our lack of estimating expertise and experience
- insufficient time to research and prepare an estimate
- unsuitable estimating processes and lack of estimating data
- poorly defined project scope and performance standards for deliverables
- unrealistic estimating assumptions and failure to account properly for risk.

Estimates are often categorised according to their level of accuracy. Although there are no universally-accepted standards of accuracy, some typical categories are shown below. The only purpose of an order-of-magnitude estimate would be to decide whether it would be useful to get a more accurate estimate.

Types of Estimates		
Estimate Type and Level of Accuracy	How Estimate Usually Determined	When Estimate is Used
Level 1		
Order-of-Magnitude -25% to +75%	Based on metrics and previous projects.	Evaluation of an idea for a possible project. Concept check.
Level 2		
Budget Estimate -10% to +25%	Based on a detailed description of likely work needed.	Preparation of project business case, charter, or proposal.
Level 3		
Definitive Estimate -5% to +10%	Based on the project work breakdown structure and quotes for work packages.	Preparation of detailed project implementation plan and baseline for performance reviews.

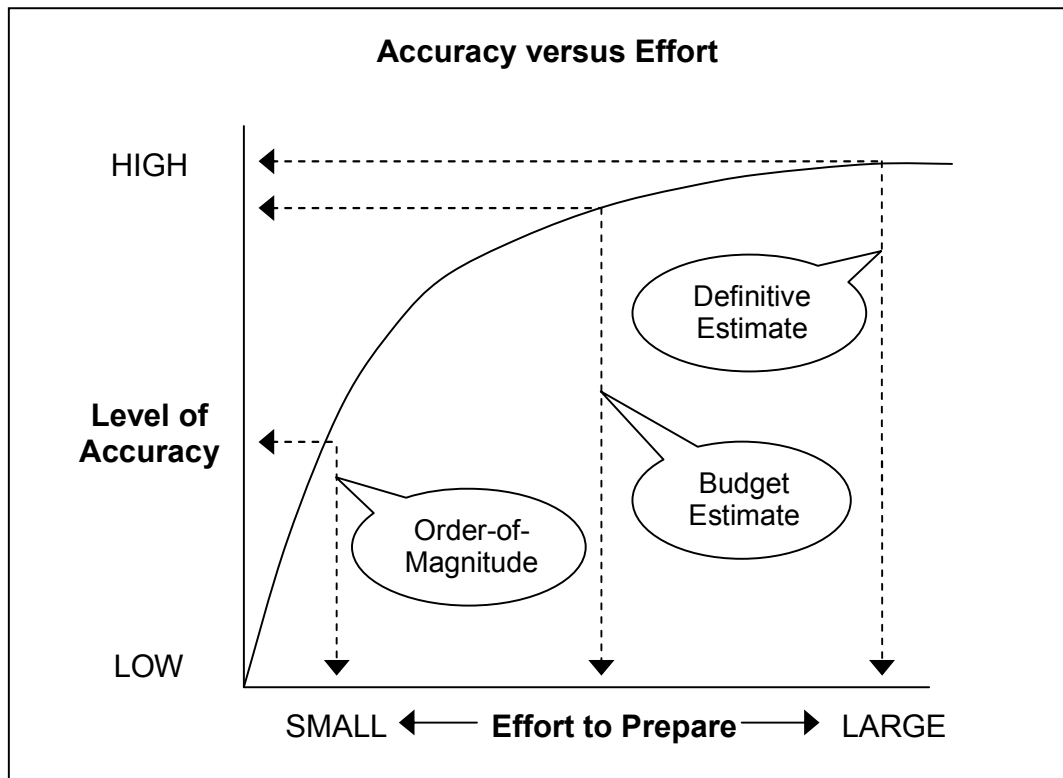
We may wonder why the range of values in the table is lopsided. This is simply realistic. If we estimate the cost to do something to be \$50 it would be impossible for us to be more than \$50 overestimated but it is quite possible for us to be \$50 or more underestimated. Same applies to work effort and duration estimates.

However, accuracy takes effort. The binomial theory states that to double the accuracy of an estimate requires some four times the effort. Thus, if we are asked for an estimate, our first response might sensibly be, *“When do you need that by?”* or perhaps *“What level of accuracy do you require?”* recognising that accuracy is a function of work effort.

Also, beware of blurting out to our client or CEO, when we’re in the lift together, some optimistic ‘seat-of-the-pants’ estimate to impress them. This figure is of course then used to make firm commitments and our original wild arse guess (WAS) becomes an albatross around our necks.

We should at least qualify our estimates with some indication of their accuracy. Although, come to think of it, the client only hears our optimistic figure. Better still, put it in writing together with the assumptions on which it is based, one of which might be that it’s only good for today! Circumstances may have changed tomorrow.

Remember too, that estimating language can be confusing! For example, an order-of-magnitude estimate might also be referred to as an analogous, parametric, top-down, ballpark, conceptual or preliminary estimate. It’s therefore useful that we establish and use a common and unambiguous estimating language.



Don't Pad the Estimate

Adding time or money to our estimate just to bring our project in early and under budget is not productive since:

- Our project may not be approved. Its artificially high estimate makes it look like a poor investment.
- If our project is approved with its inflated budget, funding may not then be available for another potentially valuable or more valuable project.
- And generally we'll find some way to use up the extra time and money without adding value – the 'student syndrome' and Parkinson's Law apply.

Use the Right People

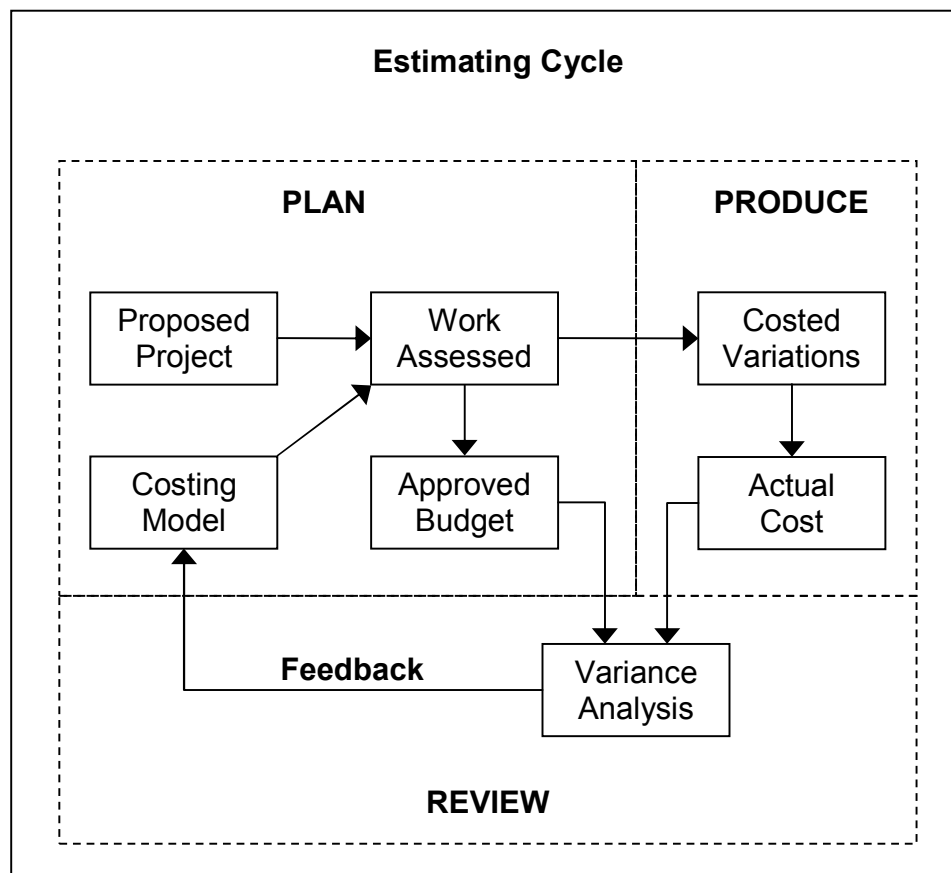
Three main factors help us decide who to consult on time and cost estimates:

- People who are recently experienced with the work involved. They understand the labour and material needs and the risks involved.
- People who are to do the work should be involved in its estimating. They best know their strengths, weakness and productivity, and will develop some 'buy-in' or ownership for the resultant figures.
- People who understand how to estimate realistically.

History Helps

Even though no two of our projects will be precisely alike, there are often sufficient similarities to warrant us consulting performance data from previous projects. Our organisation's estimating

database should be continuously updated with experience. To achieve this we need accurate, specific, relevant and timely feedback on project actuals. Estimating is a cyclical process. Variance analysis is essential if we are to learn from each occasion.



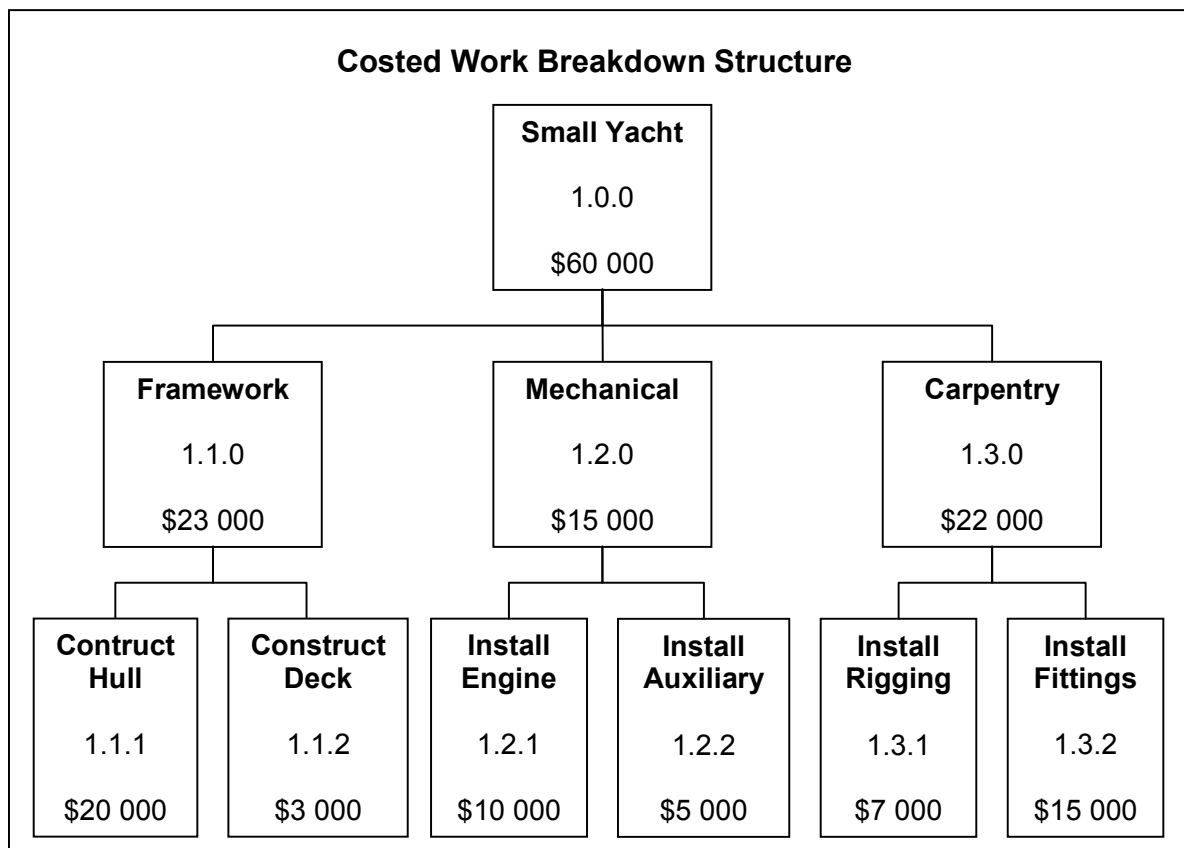
However, we need to be wary, since the future is unlikely to be a mere extrapolation of the past. If we think forecasting is easy, imagine driving our car blindfolded and following directions given by a person who is looking only out the back window!

Nevertheless, previous history is still the best way to estimate future work. If our organisation keeps track of actual effort hours from previous projects, we may have information that will help us reasonably estimate new work. In this method, the characteristics of the prior work, along with the actual effort hours, would be saved in a PMO database or other medium that could be quickly accessed for new projects. A person who is estimating new work could describe the characteristics of their project to see if similar work was done in the recent past. If so, he or she could review these earlier results to get a good idea of the effort required to do the new work.

Work Breakdown Structure

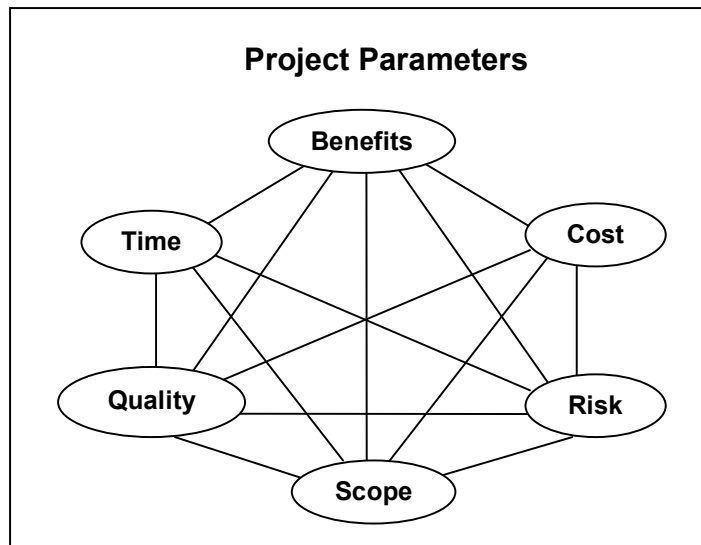
A work breakdown structure (WSB) is a family tree of work needed to achieve the project deliverable(s). Each chunk of work is broken down into smaller pieces. One of the reasons for doing this is to more easily and accurately estimate the work. We may look at a large piece of work and have difficulty estimating the effort required. However, as the work is broken into smaller pieces, the individual components will be easier to estimate. When we have estimated the pieces, we add them together for the overall effort. If we take time to create a good WBS, we usually end up with a

reasonable estimate. If we use multiple estimating techniques, one of them should be the WBS approach.



Parametric Modelling

In this technique a pattern exists in the work that allows us to use an algorithm or metric to drive the overall estimate. For instance, if we know that we can build one kilometre of flat two-lane highway for one million dollars, we could easily calculate an estimate for ten kilometres of flat four-lane highway (20 million dollars). Or, if we are asked to create 40 new reports, first estimate the effort for an 'average' report (perhaps the average of a small, medium and large report). Then multiply the average effort for a report by 40 for an overall estimate. Another example might be the \$1500 per square metre metric that our builder uses to capture our attention! Such a technique is suitable for determining order-of-magnitude estimates and is sometimes called a Scientific Wild Arse Guess (SWAG) – scientific because it uses a metric.



Negotiate the Equilibrium

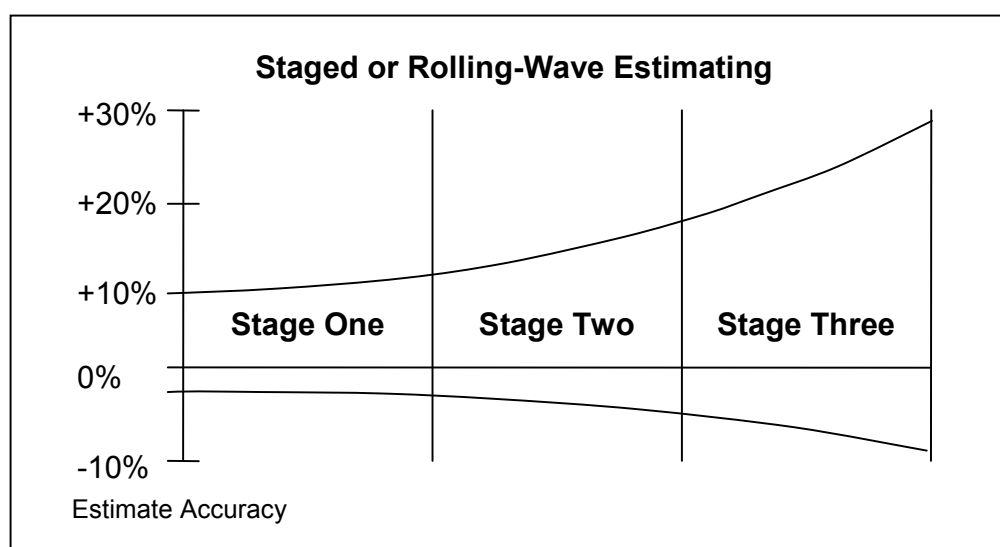
A useful defence when our estimate of cost is challenged is to show how it is inextricably linked to our project's other parameters.

Thus, any reduction to our estimated cost would need to be compensated by some commensurate adjustment to one or some of the our other project parameters.

Staged Estimating

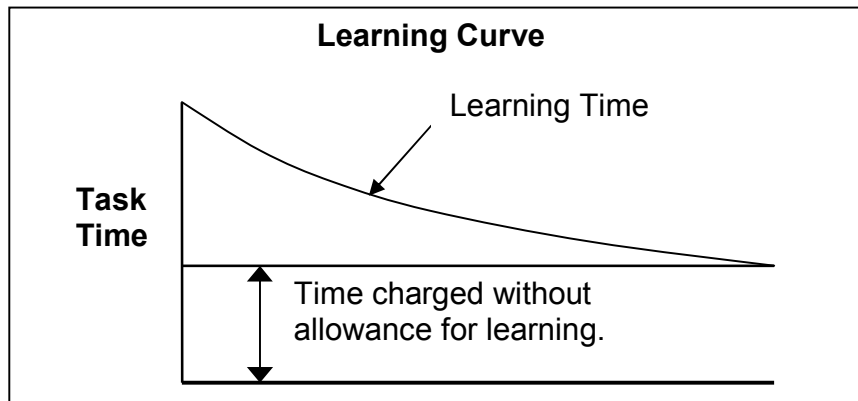
Staged or phased estimating (rolling-wave technique) requires cost and schedule commitments for only one stage of the project at a time. We only need look as far as the 'realistic planning horizon'. And as reality unfolds we then can more accurately estimate the next stage and so on.

However, our client may prefer a firm fixed estimate for the entire project as their safeguard against a runaway budget. Our client is more likely to accept the staged approach when they understand that each new stage provides them with an opportunity to reassess the investment. There are no premature design freezes. Essentially, staged estimating allows our project to be directed by several small, informed decisions rather than one big premature decision. Some call it real-time planning.



Learning Curve Allowance

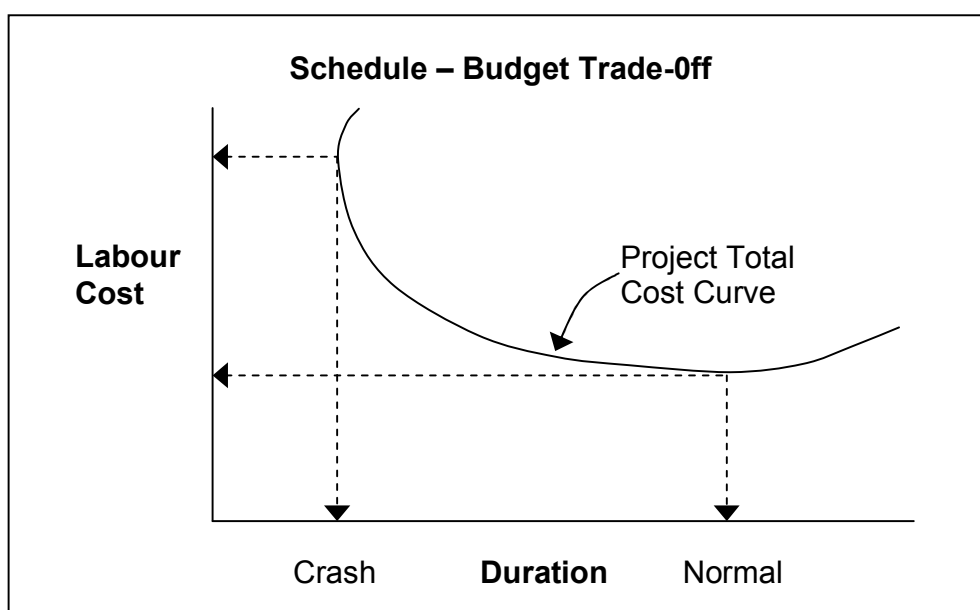
The learning curve is based on the observation that the amount of time needed to do a task decreases at a fairly constant percentage every time the task is repeated. Should we pay for a contractor's learning time? They usually learn at our expense and while their productivity improves, such improvement may benefit their next client and not us. Good selection and induction will minimise learning curve costs.



Beware the Mythical Man-month

Our assumption that the number of workers and time are closely related may be untrue. Thus, adding more labour doesn't necessarily mean the task is completed sooner, despite the extra spending. Adding extra workers to late projects often makes them even later (Brooks' Law), given the challenges of supervision, coordination, communication and congestion. There can be a rapidly diminishing return when we add extra labour. Crashing a project can be an expensive practice.

The 'crash' duration is the fastest time in which we can complete our project without jeopardising the quality of the final deliverable. Interestingly, due to fixed costs, the cost of the project may also increase if delayed. Thus, there's an optimum project duration from a cost perspective. This is the 'normal' duration.



Some Contractors

Some contractors may deliberately underestimate the cost of our job in order to get the work, counting on variations and other opportunities once the work is underway to restore their margin. This could happen if the project definition is unclear. There will then be continuous arguments over scope. Better we sign-off on a clear scope (inclusions and exclusions), agree what rates will apply to variations, and decide a change management procedure, all before work starts. We should obtain a firm fixed price wherever practicable, but appreciate some contingency will be added to the price to safeguard the contractor against the cost risk we have now transferred. Retentions, bonds, liquidated damage clauses, and guarantees also add to the price.

Such a practice was once common with government work where 'the lowest priced conforming tender' was invariably awarded the contract. However, the contemporary emphasis is now on 'value for money' with greater significance given to non-price attributes.

Contractors of course occasionally will be content to forego their margin in order to 'buy the work' and thereby get a new client, keep their workers employed during a period of economic downturn, maintain skills, exclude competitors, or introduce a new product.

As a rough guide for contractors, the level of accuracy for their quotation (ie, contingency) should be at least the same as, or better than the job's profit margin, otherwise there may be no profit at completion when actual costs become evident.

Heed the Mob

"Under the right circumstances groups are remarkably intelligent, and are often smarter than the smartest people in them," says James Surowieki, a business columnist for the *New Yorker* who has recently published a thought-provoking book 'The Wisdom of Crowds'.

To illustrate this point, I cite the results of a recent experiment. I asked 15 project management students to estimate the shortest distance by road between Wellington and Auckland. While their estimates varied, amazingly the average of their estimates, after extremes were discarded, was only ten kilometres less than the official NZ Automobile Association figure!

Apparently, the studio audience of the TV show 'Who Wants to be a Millionaire' recently guessed the right answer 91 percent of the time; but the carefully chosen so-called 'expert' advisors only scored 65 percent right. The principle is – consult widely!

Allow for Murphy

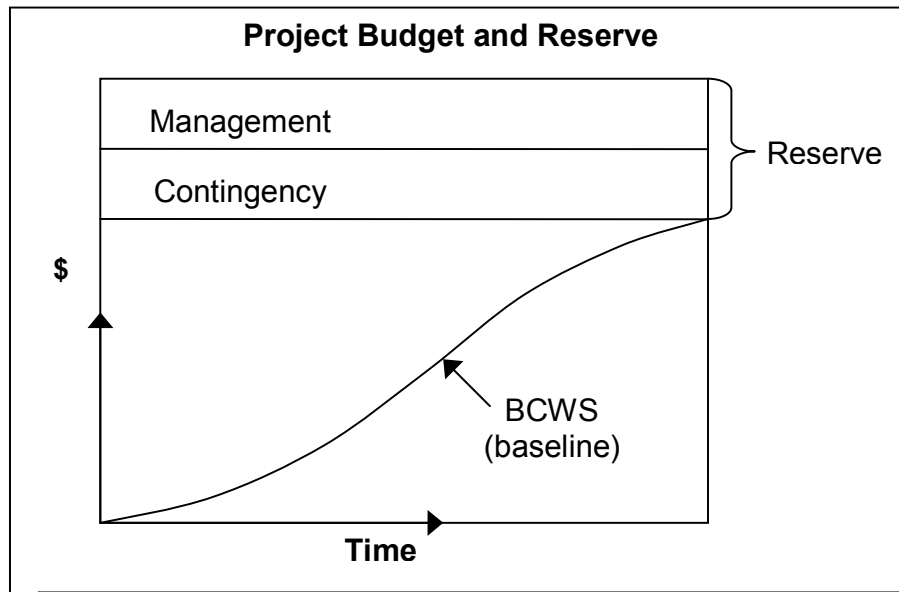
Our estimate should include some project reserve, of which there are two types:

- A **contingency reserve** to cover identified risks. It's the sum of the expected risk values, and is usually under the project manager's control. It's time and/or money.
- A **management reserve** to cover unidentified risks (unknown unknowns). It's usually a percentage of the project and proportional to the contingency reserve. This reserve is normally under the project sponsor's control. It's time and/or money.

Reserves are in addition to the project's operating budget. In practice both reserves might be reduced as the project progresses beyond exposure to the various identified risks (for which there is a contingency) that don't materialise.

Sometimes contingency is defined as the extra amount required to bring the estimate to the point at

which it has a 50/50 chance of overrun or underrun.



Use the Delphi Technique

In ancient Greece if we wanted to know the future we consulted the oracle at Delphi. Today we ask our knowledgeable colleagues to separately give us their estimate. We discard the extremes and average the remaining estimates and repeat the process until we narrow the estimate to an acceptably small range. There is no collusion among colleagues in this process.

Apply the PERT Formula

The statistically-based PERT formula (programme evaluation and review technique) provides a weighted-average estimate. The PERT approach can be combined with the Delphi technique – the wide-band Delphi technique when we obtain three estimates (optimistic, most likely, and pessimistic) from each expert.

PERT Formula

$$\text{BET} = \frac{P + 4L + O}{6}$$

Where:

BET is the best estimated time (or cost or effort)

P is the pessimistic (worse case) estimate

L is the most likely estimate, based on experience

O is the optimistic (best case) estimate

Utilisation and Productivity

Utilisation recognises that we don't work a full eight-hour day. An adjustment factor needs to be applied. A number of things affect how long it actually takes us to do work. These include learning curves, set-up time, fatigue and skill levels. Set-up time is a function of how many times our task gets interrupted. It's reorientation time. Productivity is a measure of how much faster or slower we are from the normal resource. Typically we might expect some 70-80% productivity.

Burdened Labour Rate

The true cost of our labour includes salary, benefits, tax, and overheads usually expressed as an hourly rate. In practice our charge-out rate might be some three times our salary as illustrated below. We should recognise the actual cost of our labour, whether or not we are contractors, to ensure our realistic estimates and financially-sustainable outsourcing decisions where opportunity costs also need to be considered.

Indicative Charge-out Rate		
If we are to simply cost our labour based on our salary – I suggest we STOP and consider this acronym to obtain a better estimate:		
\$40K Salary (net)	{	floor space hire \$10K
\$20K Tax		equipment \$10K
		facilities \$2K
\$40K Overheads		materials \$3K
		expenses \$10K
		administration \$5K
<u>\$60K Profit (value)</u>		<u>\$40K</u>
<u>\$160K</u>		
Assuming an 8 hour day and 200 working days per year, our charge-out rate might then be some \$100 per hour .		

Unchecked Optimism

The impact of unchecked optimism on project cost and time estimating can be enormous. For example, if benefits are overstated, costs understated, sales overstated and risks understated, these inaccuracies can have a disastrous compounding effect. To check our unreasonable optimism we might:

- have a prudent colleague review our estimate
- develop a range estimate rather than a single figure
- identify the implicit assumptions we apply
- accept we want realistic estimates
- understand the problems of understated cost and time
- get stakeholders to play 'devil's advocate'.

Before We Estimate

There are a few things we should consider before we attempt to estimate time and cost:

1. We need a clear picture of the work that is to be undertaken.
2. Decide who should be involved in the estimating process.
3. Identify any estimating constraints such as deadline (time-boxed), level of accuracy expected, budget, etc.
4. Employ multiple estimating techniques if possible. If our results are close, we'll have more confidence in our numbers. If our estimates are far apart, we'll need to review the numbers and ensure our assumptions are similar.

Check Project Priority

Only the top few projects are likely to have ready access to required resources. Lower priority projects make do with what's available. In practice this means that work schedules for lower priority projects often don't proceed as planned, aggravated if higher priority projects need further resourcing. Thus, high priority projects are likely to run on time. Low priority projects may be delayed through resource shortages. If such delays are unacceptable, more expensive resources may be needed.

Use an Estimating Process

It's useful to establish a standard estimating process (sequential steps) as this will:

- reduce the learning curve for new estimators
- limit complacency by experienced estimators who may otherwise take shortcuts
- safeguard us from accusations of unprofessionalism (provided our process is valid) and improve stakeholder confidence in our figures
- help ensure a predictably consistent level of accuracy
- allow for a meaningful comparison of estimates, benchmarking and sensitivity analysis
- provide an audit trail and demonstrate transparency
- provide a basis for continuous improvement following variance analysis.

The chosen process should be workable, logical, cost-effective, accurate, flexible, consistently applied, and allow for improvement as actuals are recorded and compared with estimates.

Expected Monetary Value

The Expected Monetary Value (EMV) is a quantitative risk analysis technique that allows us to calculate the project contingency reserve. It's a simple yet effective tool. Usually we can estimate impact more accurately than probability, which is primarily based on historical frequency.

Risk Contingency Calculation			
Risk	Probability	Impact	Contingency
A	0.8	\$10K	\$8K
B	0.3	\$30K	\$9K
C	0.5	\$8K	\$4K
D	0.1	\$40K	\$4K
E	0.3	\$20K	\$6K
F	0.25	\$10K	\$2.5K
Total Contingency		\$118K	\$33.5K

While the potential total impact is \$118K the likelihood of all risk occurring is small. However, should risk D occur (impact \$40K), some \$6.5K at least may then need to come from the management reserve. Of course before establishing the contingency we would have adjusted our project plan to avoid, reduce and transfer higher priority risks.

Changes are Inevitable

Tomorrow will bring unexpected weather, competitor activities, human resource issues, new legislation, business changes, management changes, new ideas, new technology and host of other things. Anything that changes the nature of our project will impact our estimates.

Changes must be predicted where possible, tracked and managed, expectations must be set upfront when change occurs, and the estimates should be revised. There is little point in attempting to adhere to an inaccurate budget and schedule. A new baseline is needed. Sometimes the continuing viability of the project will then need to be checked and confirmed.

Beware Bias

A bias is a partiality, or prejudice, underlying our decision making.

While it's useful for us to consult with others, especially those more familiar with the work involved, we need to know their tendencies – to watch for bias in their and our own estimating, such as:

- **Overconfidence** being the tendency to overestimate our abilities and underestimate the effort we need to put into a task.
- **Confirmation** being our tendency to find information that supports our initial estimate and ignore information that doesn't.
- **Anchoring** is when we are so wedded to our original estimate that we make insufficient adjustments from that anchor in subsequent estimates despite changing circumstances.
- **Prudence** bias recognises that we are over-cautious when estimating high-profile projects that are likely to be the subject of considerable scrutiny.

Estimates that are too generous invite work to expand to fit the time and budget available. Time saved is seldom passed on. Time wasted is usually passed on.

If estimates are biased in a consistent manner, we can predict this bias and make an appropriate adjustment to the estimate.

And project managers often feel they must fend for themselves when developing estimates. It is therefore important to involve others because each of us approaches the process with personal blinders, assumptions, filters and biases based on our experience. The Delphi technique is an excellent inclusive practice. Multiple, independent estimates help.

More information means more certainty, which then requires less personal judgement and thus reduces the impact of bias.

Top-down and Bottom-up

Top-down estimates are based on experience and may employ various metrics. They make useful order-of-magnitude estimates and are only sufficiently accurate for initial project selection decisions. Top-down may involve 'analogy' where we look for similar projects as a basis for this high-level assessment. Ratios or metrics may also be used. For example, the work effort to complete a software installation for the Wellington office was 500 hours driven mainly by the fact that there were 100 people in the office. If there are twice as many people in the Auckland office, we might conclude that the work would take 1000 hours there.

Bottom-up estimates require rather more work, but are more accurate. As the name implies, all the work that comprises the project is separately estimated and then combined or 'rolled-up'. The best basis for such an estimate is the project work breakdown structure (WBS).

Pricing

Estimating cost involves developing an assessment of a likely quantitative result. However, pricing is a business decision:

$$\text{PRICE} = \text{COST} + \text{MARGIN}$$

Our marketing people might decide the price, which could be influenced by their assessment of the value of the deliverable to the client or what the client might accept given other quotations. Cost is only one determinant of price. Margin or mark-up can vary considerably.

Validate Old Estimates

Usually a project team is formed to define the project, develop the plan, and then execute the project. However, sometimes the effort and duration of a project is estimated very early, perhaps because the information is needed as part of the annual budget cycle. In these cases, a project team may later be put together and asked to deliver based on the high-level estimates that were done much earlier. If that happens, one of the first jobs of the new project team is to validate the original estimates. We don't want to be in a position of having to deliver against someone else's out-dated estimates. On the other hand, if we don't validate or challenge the estimates early, the expectation is that we think they are accurate. If we agree with them, then we proceed to deliver against them. If we don't, now is the time to raise the red flag. Also, we may find out that if our estimate is higher, the project investment no longer makes financial sense. Again, it is better to find that out earlier rather than later when the sum at stake or risk exposure has increased.

Client Reaction

After we have prepared our estimate, we may need to defend it if the client or sponsor thinks that the numbers are too high. We should be able to firstly defend the estimate by explaining the estimating techniques used, the process followed and the assumptions made. If the client still thinks the numbers are too high, or cannot afford the solution at that cost, there are a few options:

- Determine if the client has any additional information that would allow us to revise our assumptions and perhaps revise the estimate. For instance, if a critical end date now has some flexibility, perhaps the estimate can be revised based on this new information.
- Determine whether high-level requirements and functionality can be scaled back. In some cases, the original set of features and functions is more of a wish list. After seeing a price tag, it is very possible that the client can live without certain features. A prioritised list of costed features is useful for such negotiations.
- If we included a high contingency to reflect a high estimating risk, ask the client for more time to gather more detail for the estimate. This may result in there being less uncertainty and risk, and allow us to reflect this with a smaller contingency.
- Restructure the project to only include the detailed analysis phase. After the full analysis is completed, re-estimate the remainder of the project, based on a confirmation of exactly what is being requested. The total effort and cost may or may not be lower, but at least we will have more detailed information to back up our estimate.

Estimating Package

The next time we are asked to provide an estimate for a major piece of work, consider presenting a packet of information. This does not have to be a thick document. It is meant to show the rigor that we went through. We should especially consider this if the work is political or if we think that our estimate will not be accepted. Rather than just providing a final estimate, or an estimate range, we might provide the following extra information:

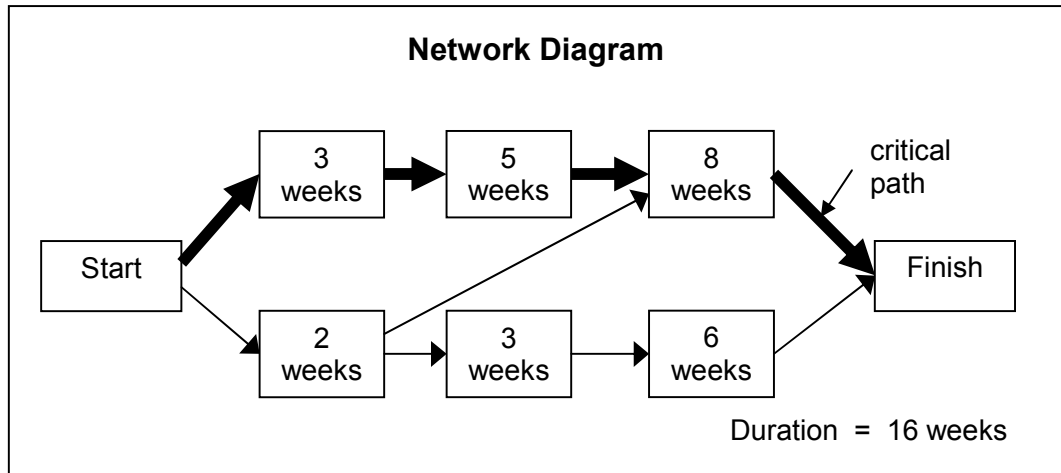
- Our understanding of the work that was requested.
- The process we used to prepare the estimate.
- The estimating technique(s) we used and who we consulted.
- The actual estimate of the work effort (and duration and cost, if applicable).
- The detailed estimating information in case stakeholders would like to review our figures. For instance, if we did a work breakdown structure, we can include our detailed work estimates.
- The assumptions we made in developing the estimate.
- The level of uncertainty in the numbers that is reflected in the contingency or the size of the estimating range. (More uncertainty is reflected in a wider range.)
- The period for which the estimate range or accuracy is likely to remain valid.

Duration

Duration is the number of work periods, excluding holidays and weekends, required to complete a task or project usually expressed as work days or work weeks. Duration estimates should include also some indication of their accuracy. For example, a task might have a duration of two weeks +/-

two days, which means the task will take at least eight work days and no more than 12.

Once task durations have been estimated a network diagram can be prepared. This tool enables us to estimate project duration, which is represented by the project critical path.



When estimating a task's duration we need to take into account:

- the number of productive hours per day
- the number of resources needed or available to complete the task
- weekends, holidays and any other days when resources will not be available
- multi-tasking productivity loss, which is productivity lost when a resource must switch to another project, projects, or operational work
- delays and lag-times while we await approvals and deliveries.

Elapsed time is duration plus non-work days. Thus, work effort could be 20 person-hours, duration could be five days, and elapsed time might be seven days (includes a weekend). Sometimes the terms 'duration' and 'elapsed time' mean the same.

Assumptions

Estimates are based on assumptions. Some examples of assumptions are that : 'Resources will be available when needed'. 'It will be easy digging for the entire trench'. 'It will be fine weather for the duration'. There is some risk associated with assumptions. They are factors that for estimating or planning purposes we consider to be true. Estimating assumptions need to be recognised, documented, and validated. If an estimating assumption proves to be wrong we may need to update the estimate.

If an event is within our control, such as having a task completed by a specific date, then it's not an assumption. If an event has a 100 percent likelihood of occurring it's probably a fact not an assumption, since there's no uncertainty.

Simulation

Simulation can help with our estimating. Simulation involves calculating multiple durations and costs with different sets of assumptions. The most common simulation technique is Monte Carlo

Analysis in which a distribution of probable results is produced using a computer. A basic spreadsheet can be used to run a simulation. Check MS Excel.

Estimating Costs

Project costs are estimated by considering labour and non-labour items. The cost of labour is usually derived by multiplying work effort by an hourly rate. Non-labour costs might include hardware, software, travel, training, teambuilding, facilities, insurance, equipment, materials, components, floor space, supplies etc.

Estimating should also include project meetings and collaboration time. We might also consider including client time – time to review and approve deliverables, provide requirements, attend meetings etc.

Should we employ a contractor or consultant then agree with them exactly what will be their chargeable expenses or disbursements (phone calls, internet use, parking, meals, travel, accommodation etc) before they start the work.

Spreadsheet

We can prepare a spreadsheet using MS Excel. Some points to note are:

- **Labour Contingency.** Under normal circumstances the task might take three hours of work at \$50 per hour, totalling **\$150**. However, if there's a 20 percent chance that the job will take an extra two hours, then our cost plus contingency would be $(\$150 + 2 \times 0.2 \times \$50)$ **\$170**. The adjusted work effort is then **3 hours 24 minutes**. And GST may need to be added.
- **Non-Labour Contingency.** If the material component for the same work package includes items costing \$100 each that only have a 90 percent likelihood of functioning properly and 10 such items are needed for the work, the total non-labour cost including contingency would be $(\$1000 + \$100)$ **\$1,100**. Again, GST may apply.
- **Total Contingency.** The total labour and non-labour contingency is **\$120**, and the total cost for the task is now **\$1270** (plus GST).

Parkinson's Law

Work is inclined to expand to fit the time available, often due to additional refinements to make the work better, or perhaps people delay delivering the completed work until the deadline because they believe they will simply be 'rewarded' with more work if they complete the work earlier. Or they may be worried about setting a precedence. In such circumstances we seldom get the benefit of work completed early. Only delays are passed on.

Appendix Five

PROJECT RISK AND PROBABILITY



There are several statistical techniques available to the project manager that can help in assessing project risk. This appendix describes the use of PERT (programme evaluation and review technique) simulation, software for which is readily available, including Risk Plus. This is a risk analysis tool that integrates with MS Project to quantify the cost and schedule uncertainty associated with our project plans.

Project probability analysis enables us to answer questions such as:

"What are the chances of completing this project by 25 December?"

"How confident are we that the costs will be below \$500K?"

"What duration (or sum) will assure us a 85 percent likelihood of schedule (or budget) success?"

"What are the chances that this task will end up being on the project critical path?"

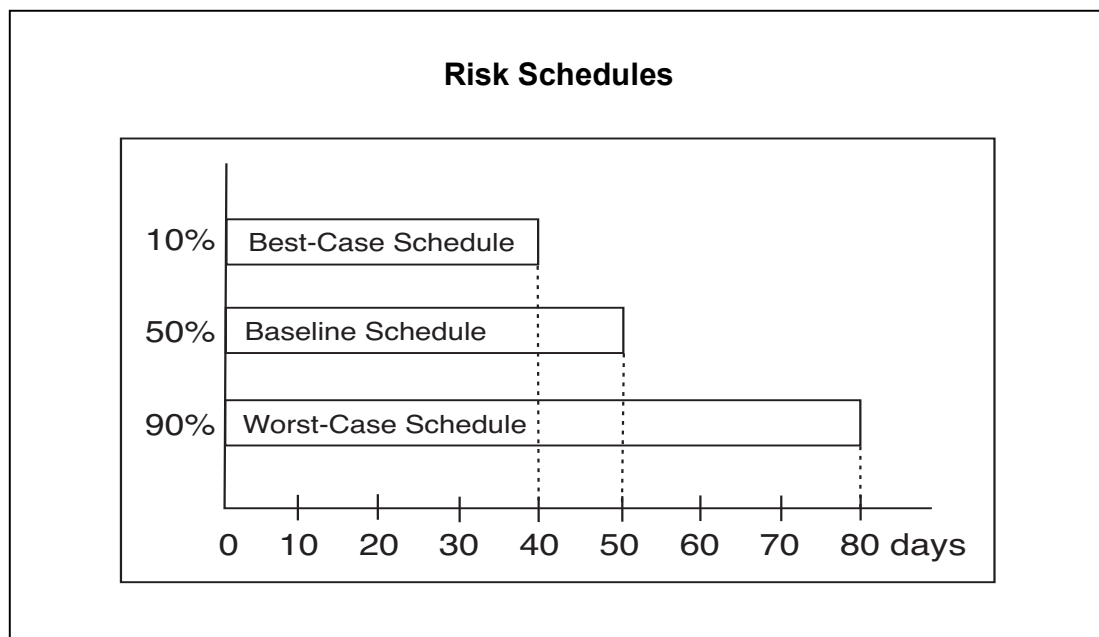
This appendix describes the basic theory on which risk analysis software operates, and illustrates how the basic calculations can be completed without the use of such software—although a calculator with memory and square root functions is very helpful.

Important to understanding the concept, is that a baseline schedule estimate typically represents average time and implies there is a 50/50 chance of completing the project schedule early or late. In fact, it would be useful to check that our estimators are 90 percent confident that the schedule's duration is about average.

Our estimators might then be asked to prepare a best-case schedule and confirm that they are 90 percent confident that there is at least a 10 percent chance that the best-case schedule can be achieved if all goes well.

Next, our estimators might develop a worst-case schedule, which implies that identified risks will occur. Murphy's Law will dominate, and our estimators are asked to confirm they are 90 percent confident that there is a 90 percent chance of meeting the worst-case schedule if the risks arise.

The resultant three hypothetical durations for the project are usually known as 10, 50 and 90 percent schedules as illustrated in the diagram. Always useful to involve others in the process.

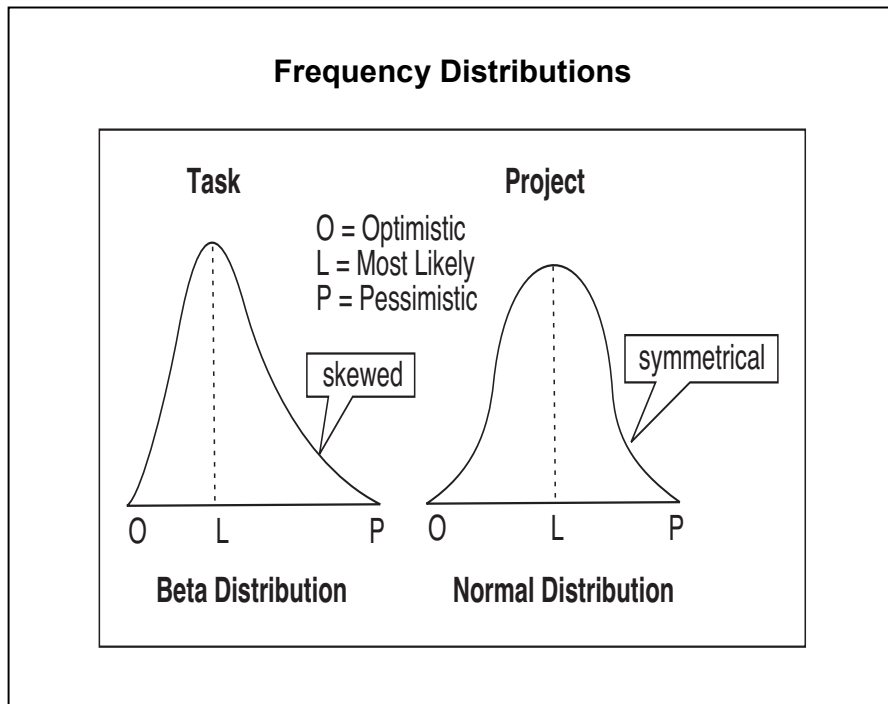


Our three estimates are the basis for PERT simulation, which recognises that duration for a project task, or for our entire project, can range from an optimistic time to a pessimistic time, and a weighted average time can be calculated. Knowing the weighted average and variance for each task allows us to compute the probability of meeting different project durations.

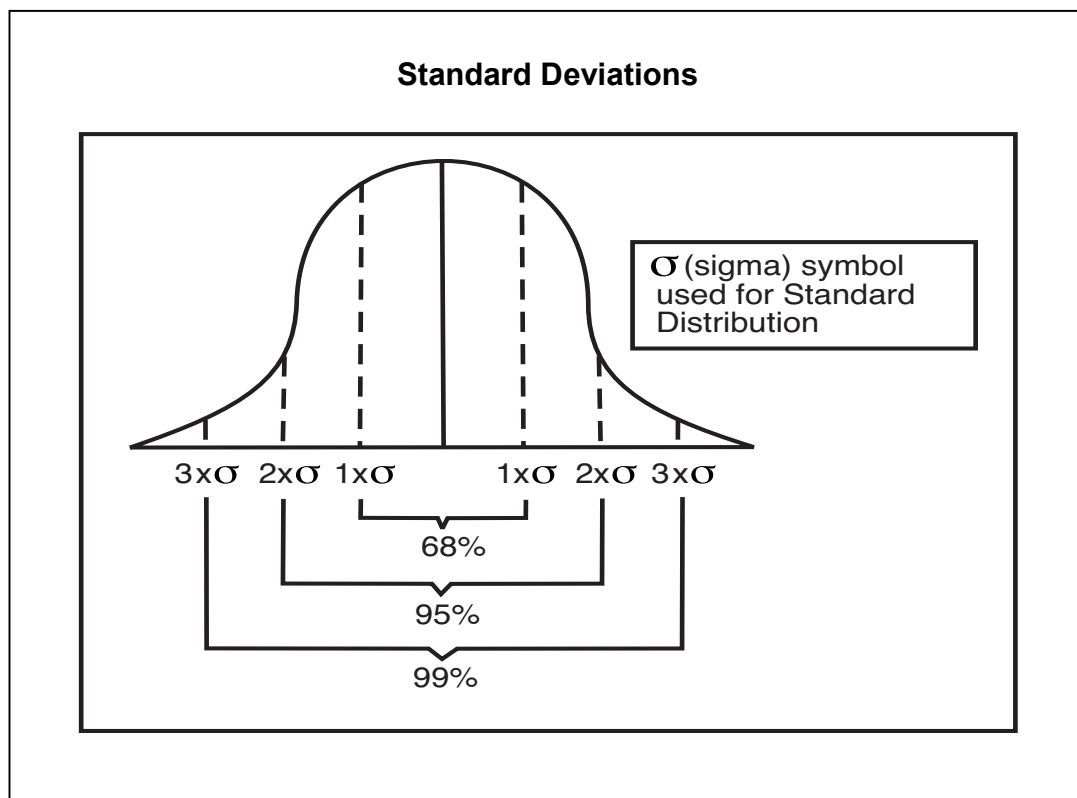
The time frequency distribution for a single task is likely to be an approximation of a **beta distribution**, which means that when things go wrong they are likely to go very wrong (ie, work tends to stay late or get later once it is behind). Also, the cost or time to complete a task can only be a limited amount below expectations, but could be an unlimited amount over expectations. However, the time frequency distribution for the entire project is more likely to conform to the normal symmetrical bell-shaped curve due to the application of the Central Limit Theorem that states as sample size increases (ie, number of tasks along the critical path increases) the distribution about the mean becomes closer to the normal distribution.

This is a well-proven statistical theorem showing that the distribution of the means of other distributions tends towards the normal distribution (even if the other distributions are non-normal) as the number of means increases. So even if the distribution of possible timings of each individual task is heavily skewed, the distribution of timings for the entire project will be symmetrical.

Frequency distributions might be skewed or normal and their spread measured in standard deviations. Statistical theory shows that there is about 68 percent likelihood that a project will be completed within one standard deviation either side of the mean. Standard Deviation is a measure of dispersion.



The formula for calculating a normal distribution depends on only two factors—the mean value and the standard deviation. The mean value locates the peak or middle of the curve. The standard deviation shows whether the curve is clustered tightly around the midpoint or whether it is loosely clustered.



The PERT weighted average formula was developed and used by the US Navy for the Polaris missile development project in 1958:

$$\begin{aligned} \text{BET} &= \frac{(16\% \times O) + (68\% \times L) + (16\% \times P)}{100} \\ &= \frac{O + 4L + P}{6} \end{aligned}$$

Where:

BET = best estimate time
O = optimistic time (best-case)
L = most likely time (normal conditions)
P = pessimistic time (worst-case)

Thus, if estimated durations for a task are 10 weeks (O), 14 weeks (L) and 36 weeks (P), the BET is calculated as follows:

$$\begin{aligned} \text{BET} &= \frac{O + 4L + P}{6} \\ &= \frac{10 + (4 \times 14) + 36}{6} \\ &= 17 \text{ weeks} \end{aligned}$$

This distribution is illustrated in the diagram, which also identifies possible contingency and reserve allowances. The area to the left of the given duration expresses probability.

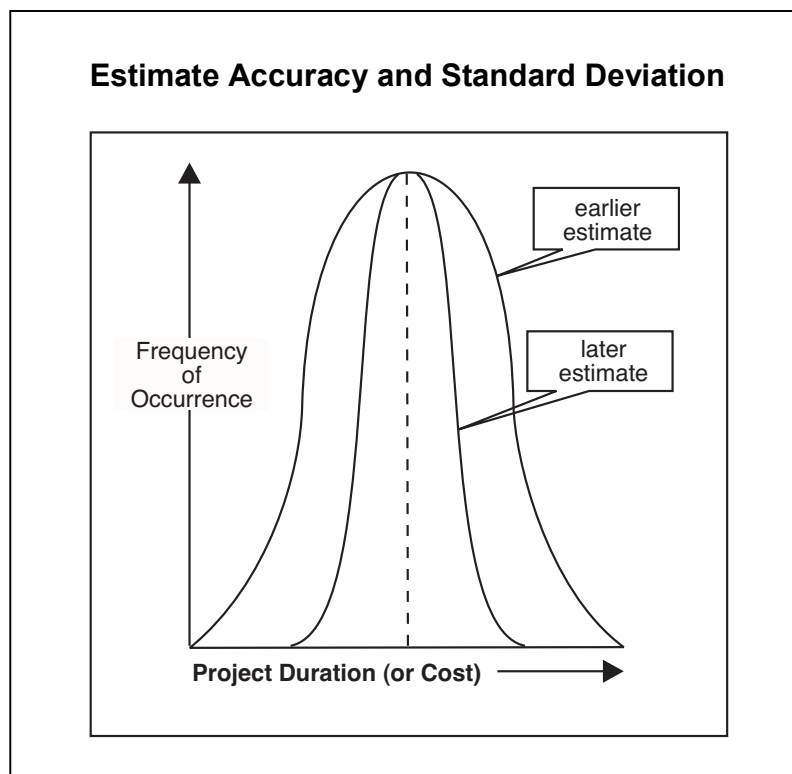
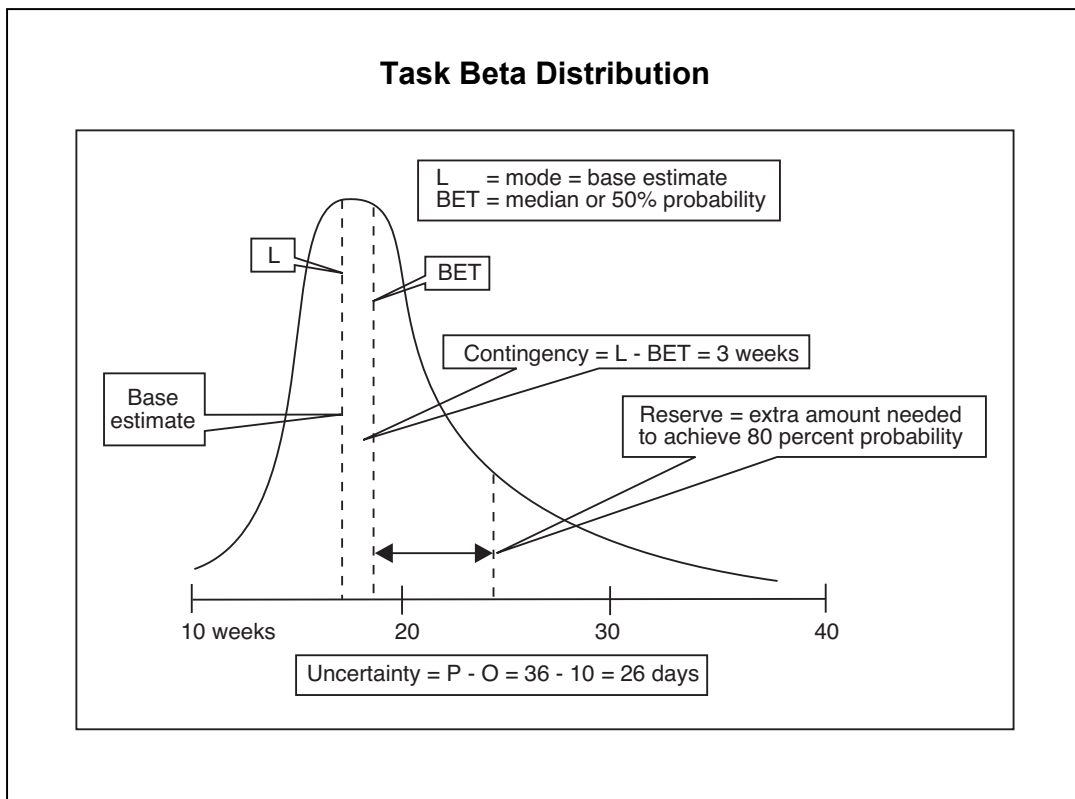
Presenting project duration as a probability is a useful argument to resist pressure from management to commit to delivering the project at the expected duration. The expected duration is only 50 percent likely and the time required for 95 percent confidence of delivery is sometimes significantly more.

Risk and uncertainty are directly related to the difference between pessimistic (P) and optimistic (O) durations. Indeed, if there is no uncertainty, then $P = O = L = \text{BET}$ and the standard deviation would be zero. In the previous example, the standard deviation (SD) is calculated as follows:

$$\begin{aligned} \text{SD} &= \frac{P - O}{6} \\ &= \frac{36 - 10}{6} \\ &= 4.7 \text{ weeks} \end{aligned}$$

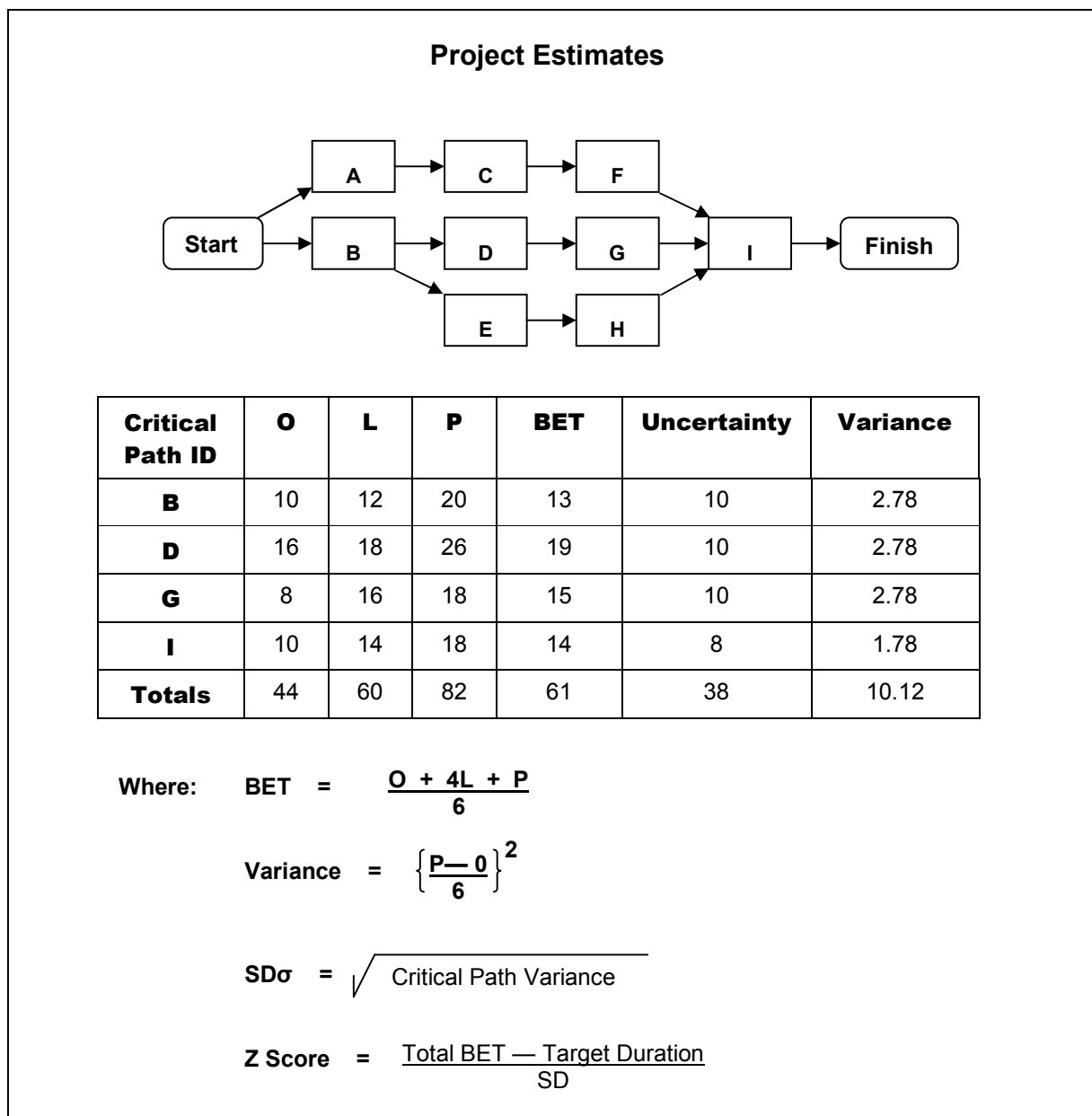
If the standard deviation is large, the estimate accuracy is poor and the probability is great that actual duration will be at significant variance from the base estimate. Conversely, if the standard deviation is small, the estimate accuracy is high, and there is only small probability that significant variation from the base estimate will be experienced.

Usually, as the project progresses, the accuracy of estimates improves, reflected in a reducing standard deviation. This concept is illustrated below.



Clearly if we are very unsure about a duration (or cost), this will be expressed as a large standard deviation, low accuracy, large contingency, and a high probability of significant overruns. The risk mitigation plan is often a useful way to reduce uncertainty to a more tolerable range.

Let's consider a worked example, given the network diagram and estimates shown in the diagram. What would be the probability that this project would be completed within 64 days, and within 58 days?



The Z Score is the number of standard deviations from the mean, which in turn, tells us the probability of completing the project in the time specified. See the probabilities table.

Normal Probability Distribution

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0735
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4816	.4817
2.1	.4812	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986

The probability of completing the project within 64 days is determined as follows:

$$\begin{aligned}
 SD &= \sqrt{2.78 + 2.78 + 2.78 + 1.78} \\
 &= \sqrt{10.12} \\
 &= 3.18
 \end{aligned}$$

Given that BET = 61, the probability of completing the project in 64 days requires the calculation of the Z Score:

$$\begin{aligned} \text{Z Score} &= \frac{64-61}{3.18} \\ &= 0.94 \end{aligned}$$

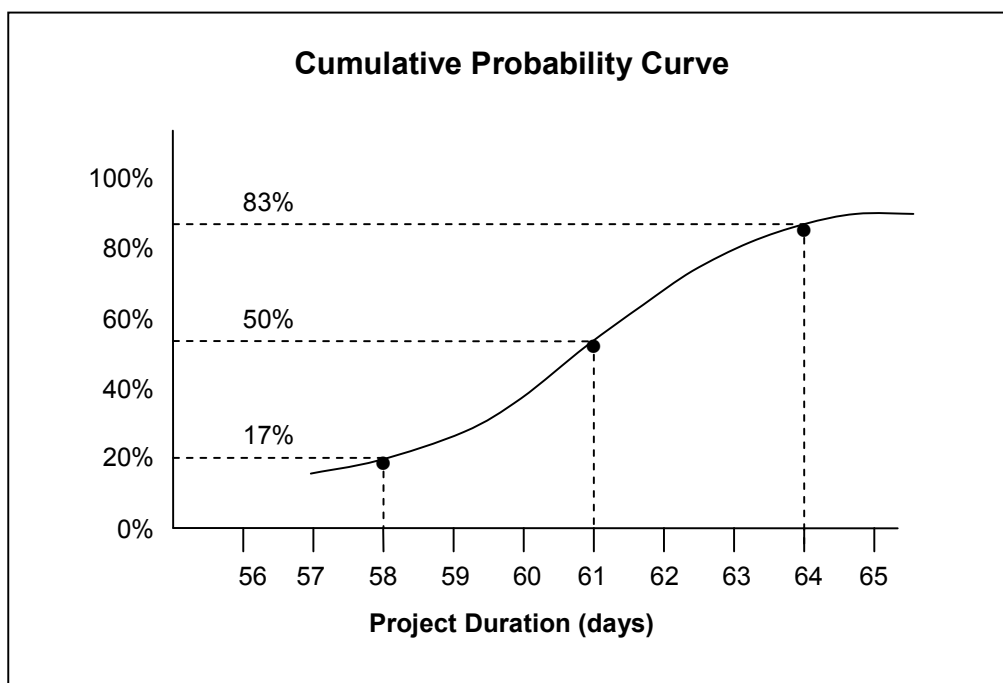
The Z Score, read from the table, is 0.3264. Given that 64 days is of greater duration than BET (61 days), we add 0.3264 to 0.5. The resultant 0.8264 is the probability (ie, **83 percent**) that the project will be completed within **64 days**.

The probability of completing the project in 58 days is determined as follows:

$$\begin{aligned} \text{Z Score} &= \frac{61-58}{3.18} \\ &= 0.94 \end{aligned}$$

The Z score is again 0.3264. However, in this situation, where 58 days is less than BET (61 days), we subtract 0.3264 from 0.5 to obtain 0.1730, which is **17 percent** probability that the project will be completed within **58 days**.

The results can be shown on a cumulative probability curve.



This cumulative probability graph is the typical output achieved using Monte Carlo simulation software from which contingency, accuracy and other decision-support information can be gained.

A Monte Carlo simulation is a simulation of the project network diagram repeated many times so as to build up a picture of the average variability or probability distribution for the project duration. In each run of the model the duration of each task is chosen randomly according to the distribution parameters estimated for each task. The model should include all of the task dependencies, and so some tasks will be delayed by others just as in the actual project. After one thousand simulations the observed distribution of simulated project durations will give a fair idea of the probability distribution for the overall project duration. This simulation also provides a list of potential critical paths and their respective probabilities of occurring. Having this information can help with the identification and assessment of schedule risk. However, the answer is only as accurate as the input data.

When the original time estimates are determined for each project task, the Delphi technique might be used. For example, as project manager, we have pulled together a group of subject-matter experts to estimate task durations for several key tasks on a software development project. We have asked each of them to separately provide an optimistic, pessimistic, and most likely estimate. The resultant data is shown in the table for just one of these key tasks.

Individual Estimates (Weeks)

Estimator	Optimistic	Most Likely	Pessimistic
Expert 1	1	3	12
Expert 2	2	6	18
Expert 3	3	6	16
Expert 4	3	10	13
Expert 5	1	4	24
Expert 6	2	5	20
Expert 7	5	6	23

To summarise the steps involved in the wide-band Delphi method:

1. Assemble the estimators.
2. Identify the task to be estimated.
3. Each person provides an optimistic, pessimistic, and most likely estimate, without collusion among estimators.
4. Individual estimates are displayed for all estimators to see while preserving anonymity.
5. Each person explains the assumptions and rationale underlying their estimates.
6. Individuals then revise their estimates based on the explanations.
7. Extreme estimates are discarded (ie, biggest and smallest).
8. Averages are calculated.

In this instance, expert 7's optimistic estimate of 5, and expert 4's most likely estimate of 10 should be discarded. The resultant averages would then be:

$$\begin{aligned}
 \text{Optimistic} &= 2 \text{ weeks} \\
 \text{Most Likely} &= 5 \text{ weeks} \\
 \text{Pessimistic} &= 18 \text{ weeks} \\
 \\
 \text{BET} &= \frac{2 + (4 \times 5) + 18}{6} \\
 &= 6.7 \text{ weeks}
 \end{aligned}$$

This figure may then need to be adjusted to account for holidays and weekends, time spent on other work, and time lost through interruptions, meetings, administration, waiting and switching (ie, time lost switching between multiple tasks and other projects).

The PERT formula can also be applied to determine best estimates for work effort, costs and resource quantities for each task, to allow us to then assess total costs and resource needs for our entire project.

Worked Exercise

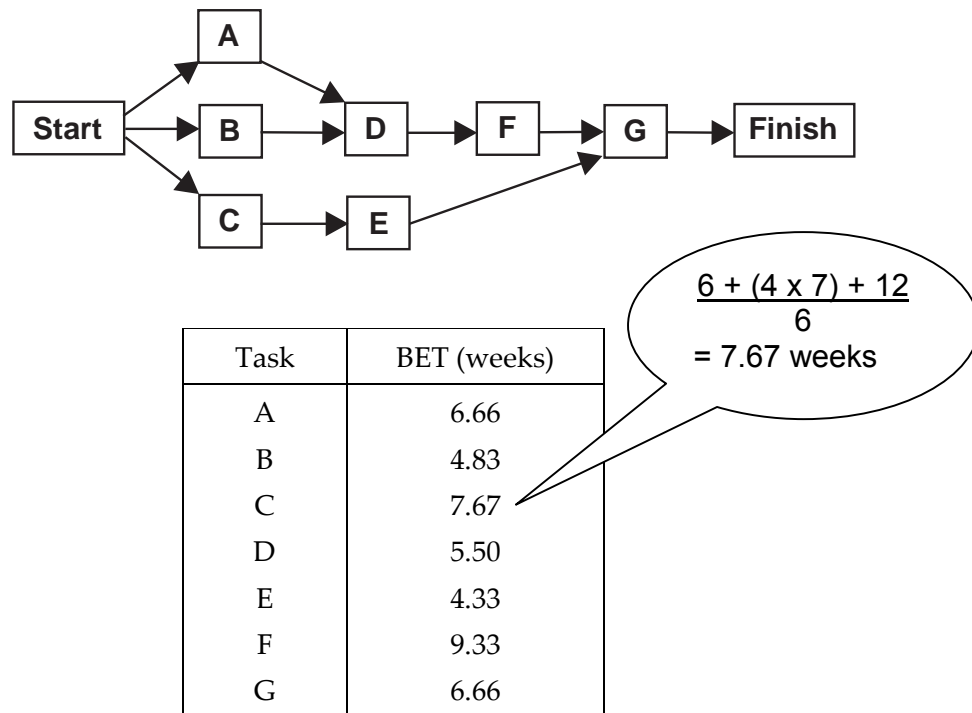
What is the likelihood of completing the following project within 30 weeks, and within 25 weeks?

Task	Predecessors	Estimated Durations			
		O	L	P	BET
A	Start	4	6	12	
B	Start	3	4	10	
C	Start	6	7	12	
D	A, B	3	5	10	
E	C	2	4	8	
F	D	6	9	14	
G	E, F	4	6	12	

The suggested approach is:

1. Draw the network diagram.
2. Identify the critical path using BETs. If there are two or more critical paths in the network, select the one with the largest variance.
3. Determine project duration.
4. Calculate the standard deviation along the critical path.

Solution



Variance Calculations	
A	$= \left(\frac{8}{6} \right)^2 = 1.78$
D	$= \left(\frac{8}{7} \right)^2 = 1.78$
F	$= \left(\frac{8}{6} \right)^2 = 1.78$
G	$= \left(\frac{8}{6} \right)^2 = 1.78$
Total Variance = 6.70	

Project Duration

The duration is the sum of the critical path BETs, which totals 28.15 weeks.

Standard Deviation

$$\begin{aligned} \text{SD} &= \sqrt{6.70} \\ &= 2.59 \end{aligned}$$

Probability for 30 weeks

$$\begin{aligned} \text{Z Score} &= \frac{30 - 28.15}{2.59} \\ &= 0.7143 \\ \text{Probability} &= 0.5 + 0.2612 \\ &= 0.7612 \\ &= 76 \text{ percent} \end{aligned}$$

Probability for 25 weeks

$$\begin{aligned} \text{Z Score} &= \frac{28.15 - 25}{2.59} \\ &= 1.22 \\ \text{Probability} &= 0.5 - 0.3888 \\ &= 0.1112 \\ &= 11 \text{ percent} \end{aligned}$$

Incidentally, those critical path tasks with greatest variance have the greatest uncertainty or risk and are therefore top priority for mitigation measures to avoid or minimise the likelihood of schedule slippage.

Appendix Six

ESTIMATING CHECKLIST



Questions	Yes	No
<ol style="list-style-type: none">1. Before I undertake an estimating job I always find out the level of accuracy required for the estimate.2. Before I prepare an estimate I always clarify the project scope of work.3. I always include contingency in my estimate to allow for predicted risks, but never to compensate for my lack of estimating aptitude.4. I always compare my estimates with actuals in order to validate or improve my estimating technique, assumption-making and database knowledge, and I don't react defensively to differences.5. When I have insufficient time to complete a comprehensive assessment, I focus on the bigger or more expensive chunks of work, recognising the wisdom of the Pareto Principle or 80:20 Rule. I don't major in the minors.6. My completed estimates are always accompanied by documented assumptions on how they were derived. I don't make assumptions when the facts are available, and my assumptions are always reasonable (ie, low-level risks) and concern matters outside my control.7. Should my client wish to alter the project scope, I always advise them the impact of such changes on the project estimates of time and cost, and don't undertake the change until my client formally approves the additional estimated expenditure or new completion date.8. I base my estimates on normal numbers of people completing each task, and don't overload the job or plan that my team work overtime or weekends.9. My estimates are always accompanied by an indication of their accuracy (range or percentage), and a date until when the estimate remains valid. I realise estimates are a statistical probability.		

Questions	Yes	No
<p>10. I proactively seek feedback about the accuracy of my estimates, avoid contributing poor results to 'uncontrollable situational factors' and good results to my own brilliance, and always attempt to uncover the true cause of my estimating errors in order that I might continuously improve.</p> <p>11. I consistently apply a standard and valid estimating process, which I update with experience.</p> <p>12. I'm sensitive to my estimating biases and common mistakes, and always seek colleagues' opinions, appreciating several viewpoints provide some safeguard against my excessive optimism or pessimism.</p> <p>13. I'm familiar with the use of the following tools and techniques which can help me with estimating, and apply them when appropriate:</p> <ul style="list-style-type: none"> • work breakdown structure (WBS) • trade-off analysis • networking diagram and sensitivity analysis • expected monetary value (EMV) • learning curve • parametric modelling • phased estimating • PERT formula and range estimates • Delphi technique • wide-band Delphi technique • estimating spreadsheet • bottom-up and top-down techniques • Monte Carlo analysis. <p>14. I realise that a person doesn't work at 100 percent productivity and 80% is a more realistic expectation.</p> <p>15. I understand the difference between elapsed time, duration and work effort.</p> <p>16. I can determine the true cost of employees' labour and express this as an hourly rate for accurate work effort costing.</p>		

Questions	Yes	No
<p>17. I realise that resources who work multiple projects take longer to complete tasks due to time lost switching between projects.</p> <p>18. I realise that adding resources will not necessarily reduce duration. There is at least a diminishing productivity return and an increasing cost. Brooke's Law.</p> <p>19. I realise that only by reducing the duration of critical tasks will I complete my project earlier, and I appreciate that some tasks are cheaper to accelerate than others.</p> <p>20. Wherever practicable I involve the people who will actually do the work in the estimating process.</p> <p>21. I always review my estimates whenever the following occur:</p> <ul style="list-style-type: none"> • scope changes (variations) • risks events happen • new risks arise • assumptions prove to be wrong • new completion dates are advised • deliverable specifications change • overheads, labour or material costs escalate • exchange rates alter. <p>22. I always allow myself time to undertake proper estimating or negotiate sufficient time to achieve the required level of estimate accuracy.</p>		

Evaluation

Should we have marked any question 'NO' then we might consider the usefulness of the suggested practice and try it out next time.

Productivity

Given that the average person's productivity is about 70-80 percent, how long would it take to complete a 10 hour task performed by someone who is 70 percent productive?

Unless we know specifically, we might expect people to take 20 days' annual leave, 11 days' public holidays, 10 days' training, and 5 days' sick each year.

Appendix Seven

RISK LIST



Because not everything is under our control, risk is an unavoidable characteristic of project management. A risk is a potential problem, which may or may not occur. The potential seriousness of a risk depends largely on which of the project's constraints it impacts, and the relative importance of those constraints. If risk threatens our project's driver, it's far more serious than if the risk threatens our project's weaker constraints.

This appendix contains a list of risk events with appropriate emphasis also given to human factors. Some may occur, others may not. And, even more certain, there will be risk events not on this list that will also show up. I'm sure you could add to the list.

Accelerated schedule	Denial of risks
Acts of God	Dispersed team
Benefits reduced or delayed	Earthquake
Best case estimates	Employee injuries
Blame transference	End-users not committed
Blaming culture	End-users not consulted
Budget cuts	Estimates based on overtime hours
Changed priorities	Excessive planning
Change in sponsorship	Exchange rate changes
Change orders	Extended working hours
Change to team membership	Extreme weather
Client changes	Failure to delegate
Client rejects deliverable	Feature creep
Commodity price increases	Frequent priority changes
Competitor activities	Frequent scope changes
Complexity	Funding delays
Complicated deliverables	Funding priorities unclear
Confidentiality infringement	Groupthink
Contractor bankruptcy	Hidden agendas
Contractor claims	Hostile organisation culture
Corruption	Ignoring risk
Cross-project dependencies	Inaccurate reporting
Delayed approvals	Inadequate functional support
Delayed sign-offs	Incomplete designs

Inconsistent expectations	No risk management plan
Inexperienced project manager	No risk profiles available
Issues not logged	No risk register
Insufficient authority	No written contracts
Insufficient resources	No validated methodology
Intellectual property disputes	Novel or pioneering project
Labour strike	Organisation changes
Lack of accountability	Other projects and operational work
Lack of client contact	Overbooked resources
Lack of commitment	Over governance
Lack of expertise	Political interference
Lack of motivation	Poor communication
Lack of stakeholder involvement	Poor quality
Lack of top management support	Poor relationships
Late status reports	Poor role definition
Law suits	Poor teamwork
Loan rate increases	Poor weather
Long duration project	Processes undocumented
Mandated completion dates	Project benefits unclear
Material delivery delays	Project complexity
Missed milestones	Project players unavailable
Mistrust	Property damage
Natural disasters	Resource consent delays
Negative cashflow	Resource shortage
New projects	Rework
New technology	Risk impact wrongly assessed
No audit trail	Risk likelihood wrongly assessed
No backups for key players	Risk responsibilities unclear
No business case	Risks not specifically defined
No change process	Role conflict or confusion
No contingency plans	Roles and responsibilities unclear
No feasibility study	Safety infringements
No historical data on risk	Schedule changes
Non-compliance with regulations	Scope changes
Non-performing components	Sheer size
No periodic reviews	Site accident
No project priority	Staff turnover

Stakeholder conflict	User needs unclear
Stock shrinkage	Unrealistic estimates
Strikes	Unrealistic expectations
Subcontractors poor performance	Unrealistic performance standards
Taxation increases	Unreliable suppliers
Terrorism and sabotage	Unstable requirements
Theft	Uncertain estimates and arbitrary deadlines
Unlawful activities	Unclear project goal
Unproved technology	Unclear scope
Unproven contractor	Unclear specifications
Unexpected overtime	Under qualified people
Unhelpful sponsor	Vague success criteria
Uninterested sponsor	Vandalism
Unstable work environment	Wage rate increases
Untrained users	Wrong assumptions

Developing a list of risks on a project is the first challenge in risk management. We will find it hard to manage risks that have not been identified. A list of typical risk for various types of projects might be maintained by our PMO.

Appendix Eight

PROJECT PLAN TEMPLATE



Item	Description
Title Page	Should mention what the document is about ('Project Plan for...'), who prepared it, who it's for, and date. Might also include confidentiality markings, distribution, copy number, and the organisation's logo.
Version Control	A page to keep track of document versions and amendments by date. Revision history.
Contents	A page that lists the document headings and page numbers, including appendices.
Executive Summary	About one page that concisely describes project purpose, approach, goal, parameters, key appointments, and perhaps main risks. Don't sacrifice clarity for brevity.
Project Purpose	An explanation as to why the project is to be undertaken, what problem it will solve or avoid, and what benefits (positive outcomes) will be realised.
Project Goal	A brief statement about what is to be delivered.
Planning Assumptions	A shortlist of key planning premises.
Scope	A work breakdown structure (WBS) in family tree or indented format. A high-level description in the plan, with a detailed coded list as an appendix perhaps. And scope exclusions also need to be documented.
External Dependencies	An explanation of interdependencies, internal and external, with other projects and operational activities.
Final Deliverable	Description of project final deliverable(s) and acceptance criteria, perhaps with detailed specifications attached as an appendix.

Item	Description
Project Constraints	List any restrictions that may influence the way in which the project is to be undertaken, such as programme dictates, resource limitations, contractual provisions, other than project parameters.
Key Stakeholders and Appointments	Names of client(s), sponsor, project manager, customer(s)/user(s), and other key stakeholders.
Organisation, Roles and Responsibilities	A project management organisation chart and Responsibilities Assignment Matrix (RAM) might be included here, with job descriptions perhaps included as appendices. Alternatively, reference might be made to the organisation's PM SOPs.
Benefits Realisation	This sub-plan might specify intended benefits, strategies for their achievement, tracking, responsibilities, timeframes, and measures. Important but neglected.
Network Diagram	A high-level graphic depiction of work element relationships and sequence, which might be prepared using appropriate PM software.
Schedule	Might include a milestone schedule. Would include a table schedule, and/or Gantt chart to show by calendar dates when project work is to be undertaken. Essential item.
Work Packages	Might be included as an appendix or appendices, describing each work package – scope, responsibilities, reporting, time, budget, quality and risks, with tolerances.
Procurement	A plan or sub-plan that identifies resource needs, quantities, dates, places and suppliers as a basis for arranging supply contracts for goods and services.
Monitoring, Control and Variations	List measures to monitor and control project progress – meetings, reports, visits, reviews, surveys, sampling and testing. Also, a process for managing changes. Could be covered by PM SOPs.
Quality Management	Measures to ensure that the final deliverable(s) is produced as per specifications, as determined by the client.
Budget	A comprehensive breakdown of the project costs, showing as a minimum labour and non-labour components.

Item	Description
Cashflow Forecast	A table showing the estimated flow of money in and out of the project, usually on a monthly timetable.
Risk and Issues	A risk management plan (or sub-plan) that describes how project risks and issues will be managed. Minimum requirements will be a Risk Log and an Issues Log (or Register). Include templates and explain process.
Stakeholder Communication	Description of communication needs and expectations. Detail what media, formats and frequencies will apply. Usually published as a table.
Public Relations	Minimum is to identify a contact person.
User Training	What arrangements, if any, we need for training users in the operation of deliverables, or is this outside scope?
Project Closure	List key activities to be undertaken to ensure that the project is properly closed down and the deliverable supported during its lifespan. Client/sponsor sign-off essential. A PM SOP might apply.
Document Control	Describe the project filing system, which may be paper-based and/or electronic.
Approvals/Authorisations	Sign-offs from appropriate authorities.

The project plan may not conform precisely with this template. It is offered as a checklist. Health and safety measures might also be included. Essentially the plan communicates how the project will be executed, monitored, controlled and closed. It may repeat some information provided in the project charter. Some items might be irrelevant or repetitive. Some items will be contained in our organisation's PM SOPs. Once completed, the plan needs to be edited and proofread, then presented to the sponsor/client for approval.

During project implementation, the plan will need to be updated periodically depending on actual progress and changing circumstances. Copies of all versions of the plan should be kept for later evaluation purposes.

Appendix Nine

JIM'S LIFE AND WORK BALANCE QUIZ



There's a difference between the conscientious project manager who sometimes burns the midnight oil and the driven individual who is addicted to project work.

Work addiction or workaholism seems to be on the rise. Project workaholics are inclined to eschew mental health and social intimacy for the fix of project deadlines, productivity goals and long hours.

Technology has furthered the problem. Modern communications mean that project work follows the workaholic project manager everywhere all the time.

Some project workaholics are in denial. They recognise the symptoms in others project managers, but never seriously in themselves. They need to listen to what their colleagues, friends and family members are saying about their work habits. However, long hours, challenging deadlines, organisation downsizing, less job security, and performance-based pay and bonus opportunities, which are all particularly prevalent in project management, allow project workaholics to hide or rationalise their addiction.

A project workaholic's life is out of balance. Our lives are made up of at least five main areas—project, personal, family, community and social. Personal includes our health, intellectual and spiritual pursuits. If we spend insufficient time in any area, our lives may be out of balance. Project workaholics' pursuits are almost exclusively project-related.

Are we a project workaholic or in danger of becoming one? Answer the following quiz honestly and assess our result. Don't worry, it won't take us too long and it could be very useful.

Being a project workaholic isn't necessarily a bad thing. Working long hours won't kill us. It's why we work those long hours that results in tragedy or joy. Are we a 'work addict' or a 'work enthusiast'?

Technology can be the project workaholic's worst enemy. With cell-phones and laptops we can now work 24/7 and some sponsors and project stakeholders seem to expect this.

And finally why are we spending so much time on the project? Is it to avoid our home life? Maybe we won't go there.

Anyway, give the quiz a go.

However, if we're putting in those extra hours and meeting tight deadlines for unappreciative stakeholders, perhaps we shouldn't soldier on regardless. A little stress can be beneficial for our health and career, but working relentlessly against the clock can be mentally and physically destructive. In the final analysis, our well-being beats promotion!

To what extent are the following statements likely to be true of our work habits?

Try to be objective and circle the appropriate score.

1. I pass notes to project team members under the toilet door.

Unlikely ← extent → Likely
1 2 3 4 5

2. I keep working on the project even when I am sick.

Unlikely ← extent → Likely
1 2 3 4 5

3. I work on the project during weekends and holidays.

Unlikely ← extent → Likely
1 2 3 4 5

4. I don't take my full annual leave entitlement.

Unlikely ← extent → Likely
1 2 3 4 5

5. I have no substantive hobbies or regular social life.

Unlikely ← extent → Likely
1 2 3 4 5

6. I have problems relaxing. My mind is always on the project.

Unlikely ← extent → Likely
1 2 3 4 5

7. I always say 'yes' to more project work and tighter deadlines.

Unlikely ← extent → Likely
1 2 3 4 5

8. I add to my project 'to do' list whenever I wake at night.

Unlikely ← extent → Likely
1 2 3 4 5

9. I have an inordinate desire to please stakeholders, my sponsor and other higher-ups.

Unlikely ← extent → Likely
1 2 3 4 5

10. I phone project team members who are sick or on holiday.

Unlikely ← extent → Likely
1 2 3 4 5

11. I am so project-engrossed that I miss taxis and flights.
- Unlikely ← extent → Likely
1 2 3 4 5
12. I take project work with me on holidays.
- Unlikely ← extent → Likely
1 2 3 4 5
13. I talk only about my project.
Not interested in other stuff.
- Unlikely ← extent → Likely
1 2 3 4 5
14. I work more than 8 hours per workday and that includes most weekends.
- Unlikely ← extent → Likely
1 2 3 4 5
15. I usually underestimate time to do my project work and attempt to do too much.
- Unlikely ← extent → Likely
1 2 3 4 5
16. I will disappoint stakeholders if I don't work hard and long.
- Unlikely ← extent → Likely
1 2 3 4 5
17. I'm irritated when they tell me to get a life or take a break.
- Unlikely ← extent → Likely
1 2 3 4 5
18. I think about project work when driving and always work on trains and planes.
- Unlikely ← extent → Likely
1 2 3 4 5
19. I fall asleep thinking about my project and I think about it immediately I wake up.
- Unlikely ← extent → Likely
1 2 3 4 5
20. I think about my project work when others are talking to me.
- Unlikely ← extent → Likely
1 2 3 4 5
21. I wouldn't know what else to do if it wasn't for my project.
- Unlikely ← extent → Likely
1 2 3 4 5

22. Project work causes me to miss family and social events.
- Unlikely ← extent → Likely
1 2 3 4 5
23. I do prioritise my project worklist but do everything anyway.
- Unlikely ← extent → Likely
1 2 3 4 5
24. I only read project work stuff. Never read novels.
- Unlikely ← **extent** → Likely
1 2 3 4 5
25. I think about project work in the shower, and would like a waterproof tape recorder.
- Unlikely ← **extent** → Likely
1 2 3 4 5
26. I read project correspondence during meals.
- Unlikely ← **extent** → Likely
1 2 3 4 5
27. I do project work stuff when watching TV.
- Unlikely ← **extent** → Likely
1 2 3 4 5
28. I talk mostly about my project at social outings.
- Unlikely ← **extent** → Likely
1 2 3 4 5
29. I worry about how they are coping when I'm not there.
- Unlikely ← **extent** → Likely
1 2 3 4 5
30. I work through morning tea, lunch and other breaks.
- Unlikely ← **extent** → Likely
1 2 3 4 5
31. I couldn't reduce my work hours without compromising project productivity.
- Unlikely ← **extent** → Likely
1 2 3 4 5
32. I cancel family events to meet self-imposed milestones.
- Unlikely ← **extent** → Likely
1 2 3 4 5
33. I'm lost without my cell phone, especially when driving.
- Unlikely ← **extent** → Likely
1 2 3 4 5

34. I double-push the lift buttons to speed my progress.
- Unlikely ← extent → Likely
1 2 3 4 5
35. I hate waiting and I hate slow-moving queues. I use queue surrogates.
- Unlikely ← extent → Likely
1 2 3 4 5
36. I have no time to keep physically fit.
- Unlikely ← extent → Likely
1 2 3 4 5
37. I only eat if someone else gets it or it can be microwaved in less than 5 minutes.
- Unlikely ← extent → Likely
1 2 3 4 5
38. I drum my fingers impatiently when the Google search goes past 10 seconds.
- Unlikely ← extent → Likely
1 2 3 4 5
39. I get irritable with those who waste time.
- Unlikely ← extent → Likely
1 2 3 4 5
40. I prefer to do it myself rather than ask for help or delegate.
- Unlikely ← extent → Likely
1 2 3 4 5
41. I am in a race against the clock. No minute can be lost. Every second is precious.
- Unlikely ← extent → Likely
1 2 3 4 5
42. I am rude with those who interrupt my project work.
- Unlikely ← extent → Likely
1 2 3 4 5
43. I host project conference calls at midnight and when I'm on holiday.
- Unlikely ← extent → Likely
1 2 3 4 5
44. I feel very guilty when not working on the project.
- Unlikely ← extent → Likely
1 2 3 4 5

45. I get really upset when I make mistakes.
- Unlikely ← extent → Likely
1 2 3 4 5
46. I make decisions before I have all the facts. No time.
- Unlikely ← extent → Likely
1 2 3 4 5
47. I want everything done right now.
- Unlikely ← extent → Likely
1 2 3 4 5
48. I continue to work after others quit.
- Unlikely ← **extent** → Likely
1 2 3 4 5
49. I get upset when I'm not in control.
- Unlikely ← **extent** → Likely
1 2 3 4 5
50. I lose my cool when things don't go my way.
- Unlikely ← **extent** → Likely
1 2 3 4 5

Total the scores and read the analysis on the next page. Most New Zealand project managers seem to score in the 100-149 bracket. Any score greater than this is probably excessive if we value a balanced life.

To help ensure a more objective assessment we might invite a work colleague or family member to also analyse us using the test or comment on our test result. Hey, maybe they could do it for us while we get on with that project work.

Work-habits Quiz: Analysis of Results

The quiz does not pretend to be a highly scientific instrument. Rather it is designed to alert us to possible project workaholic tendencies. Check comments on next page.

Behavioural scientists tell us that workaholics are addicts. We may overwork to enhance our self-esteem. This can play out as a sacrifice of intimacy (with partner and family), a need to be in control, inflexibility and ultra-perfectionism. Workaholics often get their sense of worth, value and importance from their work.

We need to acknowledge workaholism as a social disorder instead of a badge of honour. We should also watch for these tendencies in our project team members. Productivity is best enhanced by improving our effectiveness (doing the right thing) and efficiency (doing the right thing), not by working ever-longer hours.

Total Score	Commentary
50-99	We have a few workaholic habits, but we have no addiction to project work, unless of course we told porkies. Our friends and family recognise us at a glance and speak of us in the present tense. Our life is in balance. Our health is not jeopardised by our project work habits. We aren't corporate slaves.
100-149	We have some workaholic symptoms. Addiction is a possibility if current trends continue. Remember to take regular breaks from the project work and don't consistently work an extended day.
150-199	Our project work habits may be setting us up for some mental and physical health problems. We can still turn the cell phone off on occasions. However, we are likely to look for the modem plug in the hotel room! We should reflect on our results and identify specific measures to reduce our score. If we don't improve it will be some smiley, botoxed consultant telling us to split our time into six-minute units (just as they do in law firms) so we can better track our time. Worse still, it will be the five-minute massage by Barbara complete with <i>"You have the posture of an 80-year-old, love. Wow, you're so tense! Do you get any exercise? Do you sleep properly?"</i>
200-250	We are project workaholics. We no longer have any friends, just colleagues. When we need time out we grab a couple of winks at the red lights! Quitting time is when everyone else has long left. We shower every week whether we need it or not. Our family doesn't recognise us. They may believe we are dead. Drastic remedial action is needed immediately before our next breakdown. Unfortunately, these results are academic since we never had time to do this frivolous quiz! Seriously though, our score is twice that which is healthy for a balanced life. A formal project plan to lower our score is recommended. In short, we need to get a life!

Appendix Ten

MULTI-PROJECT MANAGEMENT REVIEW QUIZ



How do I rate as a multi-project manager? Circle my response to each statement, add my results to determine a total and check my assessment. Plan remedial action if needed.		Disastrous: Unsatisfactory: Adequate: Good: Excellent:		1-10 11-20 21-30 31-40 41-50		Not Applicable	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1	All of the projects I'm working on are authorised and prioritised.					0	1	2	3	4	5
2	All of my projects have clearly defined goals, parameters, deliverables and benefits.					0	1	2	3	4	5
3	All of my projects have approved budgets and expenditure is accurately monitored.					0	1	2	3	4	5
4	All of my projects have sufficient resources for their proper and timely completion.					0	1	2	3	4	5
5	All people involved on my projects are appropriately skilled and well motivated.					0	1	2	3	4	5
6	Potential problems with my projects are identified in advance and appropriate action taken to minimise or eliminate them. And new risks are dealt with as they arise.					0	1	2	3	4	5
7	I'm always clear on the current status of all my projects.					0	1	2	3	4	5
8	I keep sponsors, clients and all those involved in my projects well informed.					0	1	2	3	4	5
9	Project changes are clearly communicated to all project participants.					0	1	2	3	4	5
10	My projects are consistently completed on time, within budget, and to specification.					0	1	2	3	4	5

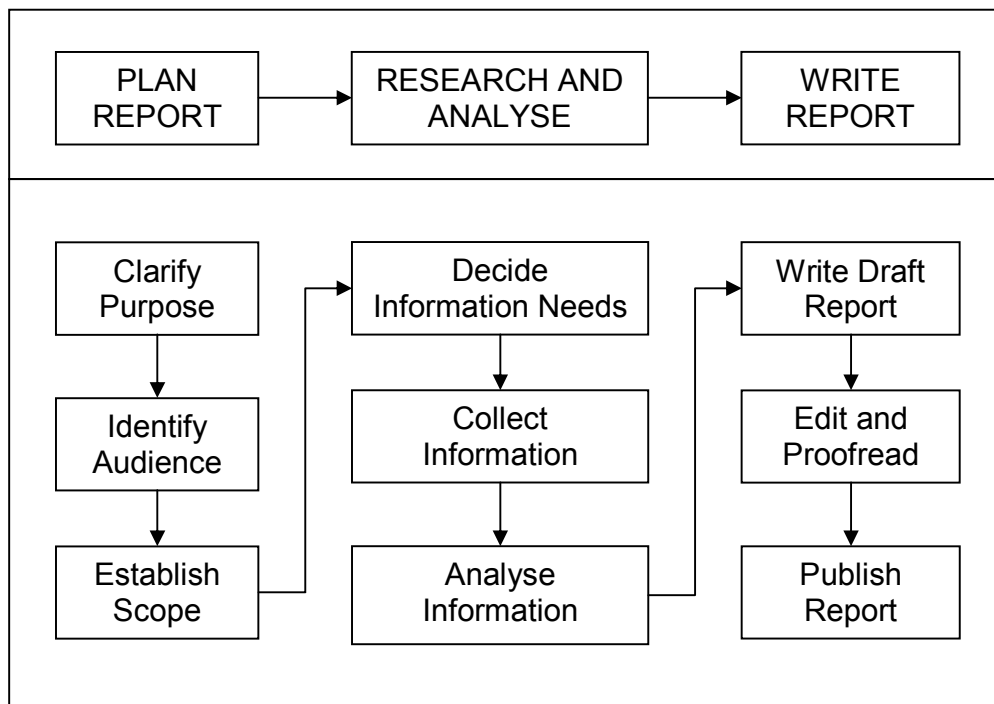
Appendix Eleven

POST-PROJECT REPORT



The evaluation of completed projects is not always undertaken in a conscientious and comprehensive matter. This author places considerable emphasis on such an evaluation, recognising that we will only improve if we identify and learn from our project management failures and successes, and I suggest that we document our evaluation in a post-project report.

The project evaluation and report writing process is summarised in the following flowchart:



The report is usually prepared for the sponsor. However, there may be a wider audience (CEO, steering committee, senior management etc) that could influence the report's format, content and presentation. 'Reader-friendly' is an important formula.

Sources of information may include any and all project stakeholders and project files including various registers (risk, opportunities, issues, learning, variations, accidents etc), progress reports, interim evaluation reports, minutes of meetings, email traffic, and any other documented information.

The report structure or format might typically comply with the following template:

Item	Description
Covering Letter	Usually identifies the report topic, acknowledges any assistance, may identify on-going issues, and shows report's distribution.
Title Page	An eye-catching first encounter. A photograph might help. Usually contains a confidentiality marking if report classified, mentions report title, who wrote it, for whom, and date of publication. Corporate logo might also be included.
Version/Distribution	Record amendment history here.
Contents	Separate page that lists key headings contained in the report and page numbers (and sometimes paragraph numbers). Also lists appendices if any.
Summary	Provides a quickly read version of the report – purpose, main findings, main conclusions and key recommendations. One or two pages only. Call it an Executive Summary, Precis, Abstract, Synopsis or Epitome if you like. It's sure to be read. It's written last.
Introduction	Secures the reader's attention. Orientates the reader, describes context, project rationale, background, and/or origin. About one page.
Purpose	Explain briefly and clearly what the report aims to achieve – presumably to evaluate your project.
Methodology	Explain briefly how you tackled the evaluation process, method of research, scope of the report, sources of information, assumptions, and limitations if appropriate.
Evaluation	<p>This is the largest section of the report – typically some 60 percent of the report excluding appendices. It might also be termed findings, analysis or discussion, and may be structured in a variety of ways including:</p> <ul style="list-style-type: none"> • Sequential or project lifecycle analysis of each project phase – conceive, develop, execute, finish. • PMI Project Management Knowledge Areas – include integration, scope, time, cost, quality, human resources, communication, risk, and procurement. www.pmi.org • Five P's Analysis:

Item	Description
	<ul style="list-style-type: none"> • People – internal and external stakeholders, expectations, skills, issues, performance, politics. • Parameters – scope, cost, time, quality, risk, benefits. • Product – performance. • Processes – for estimating, and managing risk, variance, variations, issues, communication, control, reviews, reporting. • Purpose – extent to which benefits have been achieved thus far. • Hybrid. Some combination of the above formats. <p>Whatever the selected format, the analysis needs to be clear, objective, relevant, coherent and comprehensive. Headings are important as are photographs, graphics and tables. Unwieldy but relevant data is usually put into appendices.</p>
Conclusions/Lessons	<p>These are the result of the evaluation and follow logically from the evaluation section. Lessons learned should be unbiased and clearly stated. There is usually no discussion in this section nor is there new information.</p>
Recommendations	<p>Recommended follow-up actions and suggested changes to methodology, policy, practices, processes and procedures. Recommendations follow logically from conclusions. They are capable of implementation, action-oriented, and look to the future. They may be goals. They could result in more projects!</p>
Appendices	<p>Attachments, supplementary detail, glossary etc. They are there to substantiate or amplify. Useful if tagged for easy reference.</p>