PRiSM™

Projects integrating Sustainable Methods

The GPM® Reference Guide to
Sustainability in Project Management

Version 1

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GPM® Evolving the Discipline
of Project Management

Dedication

This reference guide is dedicated to the profession of project management, to all who have served to mold and shape it as a discipline, and to its evolution through the integration of sustainability as a cornerstone of its purpose.

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Sustainability in Project Management

Project Management is essentially about change. By slightly altering the way we view the delivery of projects, we can realize a global system that preserves its natural resources, positively impacts society, and strengthens the global economy.

Organizations are embracing corporate social responsibility and their business practices are changing to adopt new models.

By applying a simple framework of sustainable methods that align with international standards, organizational goals, and ethics, project management can deliver greater value at the macro level.

GPM's goal and the purpose of this guidebook is to evolve the discipline of project management and to improve delivery capability without compromising the ability of future generations to meet their own needs.

The approach embraces current working practices with a focus on five key areas; these specific areas are known as P5™ or the "Ps" to sustainable project management through PRiSM, Projects integrating sustainable methods as the mechanism to carry them out.

The establishment of a method that formulates the steps to success through an increased awareness of the eco-environmental, financial, and societal impacts that project processes and resulting products allows companies to scale their commitment to change by understanding their own constraints, from a project perspective, and aligning it with the overall organizational strategy.

Sustainability starts with Project Management.

PRiSM™ – Projects integrating Sustainable Methods

PRiSM™ (Projects integrating Sustainable Methods) is the sustainability based project delivery method which incorporates tangible tools and methods to manage the balance between finite resources, social responsibility, and delivering "green" project outcomes. It was developed for organizations to integrate project processes with sustainability initiatives to achieve business objectives while decreasing negative environmental impact.

PRiSM is a structured project management methodology that highlights areas of sustainability and integrates them into the traditional core project phases which, when understood and effectively addressed, can reduce negative environmental impacts in all types of projects while maximizing opportunities to manage sustainability and finite resources. PRiSM is cut from the same cloth as the globally accepted standards for professional project management. These standards are the "books of knowledge" as they are known to project managers. PRiSM establishes a framework of considerations derived from ISO 21500, ISO 14001, ISO 26000, ISO 50001 and ISO 9001, focuses on specific areas and incorporates best practices to practically answer the question: **"How do I apply sustainability to my projects?"**

This handbook covers key aspects of sustainability, project management concepts and the approach that GPM and our global practitioners use to integrate sustainability with project management.

The concepts we present are ever evolving and we are excited to bring this reference guide to benefit the project community at large.

Sustainability

Sustainability is about:
1. Balancing or harmonizing social, environmental and economic interests
2. Both the short term and the long term
3. Local and global
4. Consuming income, not capital
5. Transparency and accountability
6. Personal values and ethics [1]

Corporate social responsibility (CSR, also called corporate conscience, corporate citizenship, social performance, or sustainable responsible business/ Responsible Business) [15] is a form of corporate self-regulation integrated into a business model. CSR policy functions as a built-in, self-regulating mechanism whereby a business monitors and ensures its active compliance with the spirit of the law, ethical standards, and international norms. CSR is a process with the aim to embrace responsibility for the company's actions and encourage a positive impact through its activities on the environment, consumers, employees, communities, stakeholders and all other members of the public sphere who may also be considered as stakeholders.

Companies today face increasing demands for corporate social responsibility (CSR). Correspondingly, they have important new opportunities to build business value through judicious choices and actions to improve social and environmental conditions in the communities in which they do business. Whereas firms once might have been able to prosper by concerning themselves almost exclusively with financial results, most now find it at least prudent— and many are finding it directly valuable— to manage a wider array of the impacts that they generate (or can influence), from environmental conditions to employee health and safety to social conditions like the quality of public education.

Sustainability Reporting

The Global Reporting Initiative (GRI) [9] is an organization whose purpose is to promote the development of sustainability reporting in all types of organizations.

GRI produces a comprehensive framework for the preparation of Sustainability Reports, which are widely used worldwide. The Framework, including the Guide for the preparation of reports, sets out the principles and indicators that organizations can use to measure and disclose their economic, environmental and social.

Sustainability reporting is a broad term considered synonymous with others used to describe reporting on economic, environmental, and social impacts (E.g., triple bottom line, corporate responsibility reporting, etc.). A sustainability report should provide a balanced and reasonable representation of the sustainability performance.

Reports can be used for the following purposes, among others:
– Benchmarking and assessing sustainability performance with respect to laws, norms, codes, performance standards, and voluntary initiatives;
– Demonstrating how the organization influences and is influenced by expectations about sustainable development;
– Comparing performance within an organization and between different organizations over time.

Why do we need guidance on Social Responsibility?

Organizations around the world, and their stakeholders, are becoming increasingly aware of the need for and benefits of socially responsible behavior.

An organization's performance in relation to the society in which it operates and to its impact on the environment has become a critical part of measuring its overall performance and its ability to continue operating effectively. This is, in part, a reflection of the growing recognition of the need for ensuring healthy ecosystems, social equity and good organizational governance.

The perception and reality of an organization's Social Responsibility performance can influence:

- Competitive Advantage
- Reputation
- Ability to attract and retain workers or members, customers, clients or users
- Employee morale, Commitment and Productivity
- View from Investors, Donors, Sponsors and Financial Community
- Relationship with Companies, Governments, Media, Suppliers
- Peers, Customers and the Community in which it operates

The UN Global Compact

The Ten Principles [19]

The UN Global Compact's ten principles in the areas of human rights, labour, the environment and anti-corruption enjoy universal consensus and are derived from:

- The Universal Declaration of Human Rights
- The International Labour Organization's Declaration on Fundamental Principles and Rights at Work
- The Rio Declaration on Environment and Development
- The United Nations Convention Against Corruption

The UN Global Compact asks companies to embrace, support and enact, within their sphere of influence, a set of core values in the areas of human rights, labour standards, the environment and anti-corruption:

Human Rights
- Businesses should support and respect the protection of internationally proclaimed human rights; and
- Make sure that they are not complicit in human rights abuses.

Labour
- Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
- the elimination of all forms of forced and compulsory labour;
- the effective abolition of child labour; and
- the elimination of discrimination in respect of employment and occupation.

Environment
- Businesses should support a precautionary approach to environmental challenges;
- Undertake initiatives to promote greater environmental responsibility; and
- Encourage the development and diffusion of environmentally friendly technologies.

Anti-Corruption
- Businesses should work against corruption in all its forms, including extortion and bribery.

Guidelines and Standards

Guidelines
ISO 26000
ISO 21500

Normative Standards
ISO 9000
ISO 14000
ISO 50001

What are the Benefits of ISO International Standards?

ISO International Standards ensure that products and services are safe, reliable and of good quality. For business, they are strategic tools that reduce costs by minimizing waste and errors and increasing productivity. They help companies to access new markets, level the playing field for developing countries and facilitate free and fair global trade

For more visit www.iso.org

ISO 26000

What ISO 26000 is not.

– A management system standard.
– Intended or appropriate for certification purposes or regulatory or contractual use.
– Intended to provide a basis for legal actions, complaints, defenses or other claims in any international, domestic or other proceeding.
– Intended to be cited as evidence of the evolution of customary international law.
– Intended to prevent the development of national standards that are more specific, more demanding, or of a different type.

What ISO 26000[5] is:

– Intended to assist organizations in contributing to Sustainable Development.
– Intended to promote common understanding in the field of Social Responsibility.
– Intended to complement other instruments & initiatives for Social Responsibility *and* not to replace them.
– Intended to provide organizations with guidance concerning Social Responsibility and can be used as part of public policy activities.

> **Note:** ISO 26000 contains no requirements and therefore the word "shall", which indicates a requirement in ISO language, is not used but does contain 386 "shoulds"

The ISO 14000 Family

Is a series of guidance documents and standards to help organizations address environmental issues. [3]

The following ISO's deal with EMS.

- 14001: Environmental Management Systems
- 14004: EMS General Guidelines
- 14010: Guidelines for Environmental Auditing
- 14011: Guidelines for Auditing of an EMS
- 14012: Auditing - Qualification criteria
- 14064: Greenhouse Gases

ISO 14004 is guidance on how to implement ISO 14001
14010, 14011, and 14012 relate to auditing of the 14001 standard.
The ISO 19011 replaced 14010, 14011, and 14012 and has been revised to provide auditors, organizations implementing management systems and organizations needing to conduct audits of management systems an opportunity to re-assess their own practices and identify improvement opportunities**.**

"Compared to the 2002 version, the standard adds the concept of risk and recognizes more explicitly the competence of the audit team and individual auditors. Also, the use of technology in remote auditing is acknowledged, for example, conducting remote interviews and reviewing records remotely."

ISO 14064-1:2006

Greenhouse Gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.

Greenhouse Gases--Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.

ISO 14001 Key Elements

- Policy Statement.
- Identification of Significant Environmental Impacts and Environmental Legal Requirements.
- Establishing Environmental Programs, Objectives and Targets
- Emergency Plan.
- Operating Control to meet the Environmental Objectives and Targets.
- Role and Responsibilities. Training. Communication
- Internal Assessments. Corrective actions.
- Management Review (by Directors).

What is an EMS?

- Systematic way of managing an organization's environmental affairs.
- Based on Plan-Do-Check-Act Model (PDCA).
- Focused on Continual Improvement of system.
- System that addresses immediate and long-term impact of an organization's products, services and processes on the environment.
- A tool to improve environmental performance.

Why implement an EMS?

- Helps to identify the causes of environmental problems.
- Better to make a product right the first time
- Cheaper to prevent a spill or other accident
- Cost effective to prevent pollution
- Trade and competitive issues
- Inconsistency in environmental regulation and enforcement
- Many individual parts may already be in place – just need to unify under the EMS umbrella!

The steps in each successive PDCA cycle are [3]:

— **PLAN** Establish the objectives and processes necessary to deliver results in accordance with the expected output (the target or goals). By establishing output expectations, the completeness and accuracy of the specification is also a part of the targeted improvement. When possible start on a small scale to test possible effects.

— **DO** Implement the plan, execute the process, and make the product. Collect data for charting and analysis in the following "CHECK" and "ACT" steps.

— **CHECK** Study the actual results (measured and collected in "DO" above) and compare against the expected results (targets or goals from the "PLAN") to ascertain any differences. Look for deviation in implementation from the plan and also look for the appropriateness and completeness of the plan to enable the execution, i.e., "Do". Charting data can make this much easier to see trends over several PDCA cycles and in order to convert the collected data into information. Information is what you need for the next step "ACT".

— **ACT** Request corrective actions on significant differences between actual and planned results. Analyze the differences to determine their root causes. Determine where to apply changes that will include improvement of the process or product. When a pass through these four steps does not result in the need to improve, the scope to which PDCA is applied may be refined to plan and improve with more detail in the next iteration of the cycle, or attention needs to be placed in a different stage of the process.

ISO 50001

Energy Management Systems [2]

ISO 50001 provides organizations the requirements for energy management systems (EnMS).

Framework
–   Industrial plants
–   Commercial
–   Institutional and governmental facilities
–   Entire organizations to manage energy

ISO 50001 — Why is it important?
–   Energy is critical to organizational operations and can be a major cost to organizations, whatever their activities. An idea can be gained by considering the use of energy through the supply chain of a business, from raw materials to recycling.

–   In addition to the economic costs of energy to an organization, energy can impose environmental and societal costs by depleting resources and contributing to problems such as climate change.
–   The development and deployment of technologies for new energy sources and renewable sources can take time.
–   Individual organizations cannot control energy prices, government policies or the global economy, but they can improve how they manage energy.
–   Improved energy performance can provide rapid benefits for an organization by maximizing use of energy sources and energy-related assets, thus reducing both energy cost and consumption. The organization will also make positive contributions toward reducing depletion of energy resources and mitigating worldwide effects of energy use, such as global warming.
–   ISO 50001 is based on the management system model that is already understood and implemented by organizations worldwide. It can make a positive difference for organizations of all types in the very near future, while supporting longer term efforts for improved energy technologies.

Primary Energy Sources
– Renewable: Solar, Water, Wind, Biomass
– No-Renewable: Oil, Gas, Carbon and Nuclear fusion

Secondary Energy
– Electric, mechanic, Thermic, Hot Water, Compressed Air, Biodiesel and Fuel in general

Final Use
– Lighting, Refrigeration, Heating and Process

ISO 50001 establishes a framework for industrial plants; commercial, institutional, and governmental facilities; and entire organizations to manage energy.

Key Terms and Definitions
– **Quality -** Degree to which a set of inherent characteristics fulfills requirements. Requirement: Need or expectation that is stated, generally implied or obligatory (ISO 9000:2000).

– **Environment** - Surroundings in which an organization operates, including air, water, soil, natural resources, flora, fauna, humans and their interrelation. (ISO 14001:2004)

– **Occupational Health and Safety (OHS)** - The conditions and factors that affect, or could affect the health and safety of employees, temporary workers, contractors, visitors and anyone else who is in the workplace. (OHSAS 18001:2007)

Common elements of Quality, Environment and Health and Safety Management Systems:
– Legal and other requirements
– Objectives and Programs
– Resources, Responsibility, Authority
– Training, Awareness and Competence
– Communication
– Documentation and Control of documents and records
– Operational Control
– Monitoring and Measurement
– Conformity Assessment
– Internal Audit
– Management Review

ISO 9001

Principles of Quality Management [*6*]

– Customer Focus
– Leadership
– Involvement of people
– Process Approach
– System approach to management
– Continuous Improvement
– Factual approach to decision making
– Mutually beneficial supplier

The principles embodied in ISO 9001 have been developed with the intention that management can lead the organization towards improved performance.

Internal Audits Definitions (ISO 9000:2005)

– **Audit Evidence:** Records, statements of fact or other information relevant to the audit criteria and verifiable.
– **Audit Criteria**: A set of policies, procedures or requirements.
(They are used as a reference against which we compare the evidence of the audit)

Audit Principles

– Ethical conduct: trust, integrity, confidentiality, and discretion.
– Fair Presentation: report truthfully and accurately.
– Professional Care: application of the audit. Necessary competence.
– Independence: the basis for the impartiality and objectivity of the conclusions.

> Look for this again during Project Quality Management!

What must be assessed during an audit?

– That process has been operating as planned: sequence of activities, conformity procedures, and operational control.
– Those critical resources of each of the processes are under control: HR, environment and equipment.
– That the documents of each of the processes are under control: management manual, procedures, instructions, and records.
– Processes that are under control and produce the expected results: process indicators, monitoring and control, and control variables. Corrective and preventive actions.

    —   Processes are being improved and will reach planned objectives: objectives and policy, plan management, monitoring and review.

Project Management

What is Project Management?

More specifically, what is a project and why does it matter? It's a temporary group activity designed to produce a unique product, service or result. It can be as individual as a small wedding, as unique as half-bath remodel, or it can be as involved and difficult as getting a man to the moon and back. A project is temporary in that it has a defined beginning and end in time, and therefore defined scope and resources.

A project is unique in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal. Because they are temporary endeavors, a project team often includes people who don't usually work together – sometimes from different organizations and across multiple geographies. The development of software for an improved business process, the construction of a building or bridge, the relief effort after a natural disaster, the expansion of sales into a new geographic market — all are projects. And all must be expertly managed to deliver the on-time, on-budget results, learning and integration that organizations need. Project management, then, is the application of knowledge, skills and techniques to execute projects effectively and efficiently.

It's a strategic competency for organizations, enabling them to tie project results to business goals — and thus, better compete in their markets. It has always been practiced informally, but began to emerge as a distinct profession in the mid-20th century. The real question then becomes: How will these organizations gain skilled team members who can leverage competency in project management.

What is a Project Manager?

A project manager is an individual responsible for accomplishing the stated project objectives. Key project management responsibilities include developing clear and attainable project objectives, documenting the project requirements, and managing the constraints of the project's finite resources to successful completion.

What is a Green Project Manager?

A Green Project Manager (GPM®) embodies the commitment to act as an agent of change by managing and directing efforts to maximize sustainability within the project life cycle, improving the construct and delivery of goods and services produced as a project deliverable. A GPM thoroughly considers the environmental, social, and economic impacts in the project management roles assigned using measurable standards.

ISO 21500

ISO 21500 Guidance on Project Management [7]

This International Standard provides guidance on concepts and processes of project management that are important for, and have impact on, the performance of projects.

The target readership for this International Standard is the following:
– Senior managers and project sponsors, in order to provide them with a better understanding of the principles and practice of project management and to help them give appropriate support and guidance to their project managers, project management teams and project teams;

– Project managers, project management teams and project team members, so that they have a common basis upon which to compare their project standards and practices with those of others;

– Developers of national or organizational standards, for use in developing project management standards, which are consistent at a core level with those of others.

Scope

> **Any type of organization**
> - ✓ Public
> - ✓ Private
> - ✓ Community organizations
>
> **Any type of project, irrespective of:**
> - ✓ Complexity
> - ✓ Size
> - ✓ Duration.

ISO 21500 provides guidance for project management and can be used by any type of organization, including public, private or community organizations, and for any type of project, irrespective of complexity, size, or duration.

The International Standard provides high-level description of concepts and processes that are considered to form good practice in project management. Projects are placed in the context of programs and project portfolios; however, this International Standard does not provide detailed guidance on the management of programs and project portfolios. Topics pertaining to general management are addressed only within the context of project management.

Project Life-Cycle
Projects are usually organized into phases that are determined by governance and control needs.

These phases should follow a logical sequence, with a start and an end, and use resources to provide deliverables. To enable efficient management of the project during the entire project life-cycle, a set of activities should be performed in each phase. Project phases are collectively known as the project life-cycle.

The project life-cycle spans the period from the start of the project to its end. The phases are divided by decision points, which can vary depending on the organizational environment.
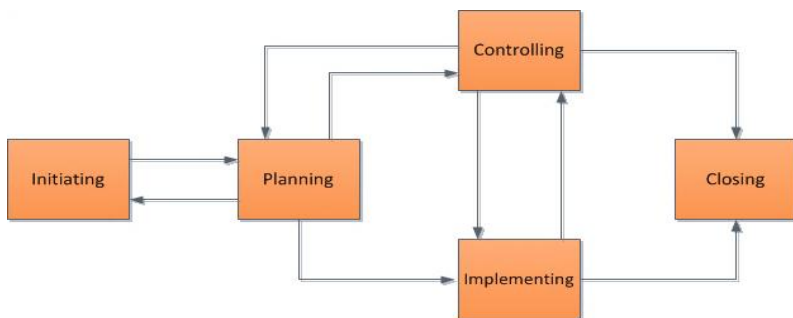
Figure 1

The decision points facilitate project governance. By the end of the last phase the project should have provided all deliverables.

To manage a project throughout its life-cycle, project management processes should be used for the project as a whole, or for individual phases for each team or sub-project.

Process Groups Interactions

The process groups are normally repeated within each project phase to drive the project to completion. All or some of the processes within the process groups may be required for a project phase. Not all interactions will apply to all project phases or projects. In practice, the processes within the process groups are often concurrent, overlapping, and interacting in ways that are not shown in Figure 1.

Figure 2 depicts the interactions among the process groups inside the boundaries of the project including the representative inputs and outputs of processes within the process groups. With the exception of the controlling process group, linkages between the various process groups are through individual processes within each process group.

While linkage is shown in figure 2 between the controlling process group and other process groups, the controlling process group may be considered self-standing because its processes are used to control not only the overall project but also the individual process groups.

New project

Business case

Contract

Statement of work

Project charter

Project plans

Corrective actions

Progress reports

Approved changes

Previous phase results

New phase

Lessons learned from previous projects

Project charter
Stakeholder register

Initiating

Project plans

Planning

Project plans
Risk registers

Approved changes
Progress reports

Project plans
Risk registers

Controlling

Approved changes

Progress reports
Project completion reports

Project or phase closure report

Closing

Change Requests
Issue log
Progress data

Implementing

Issue log
Lessons learned

Lessons learned

KEY

Key project information
Labels along arrows · Information passing between process groups
Dotted lines · Representative inputs and outputs
Solid lines · Interactions between process groups

Figure 2

- Each subject group consists of processes applicable to any project phase or project.
- These processes are defined in terms of purpose, description and primary inputs and outputs and are interdependent.
- Subject groups are independent of application area or industry focus.
- Not all process interactions are shown.
- Any process may be repeated.

Integration

The integration subject group includes the processes required to identify, define, combine, unify, coordinate, control and close the various activities and processes related to the project.

The PRiSM™ Pre Project/Initiation Phase
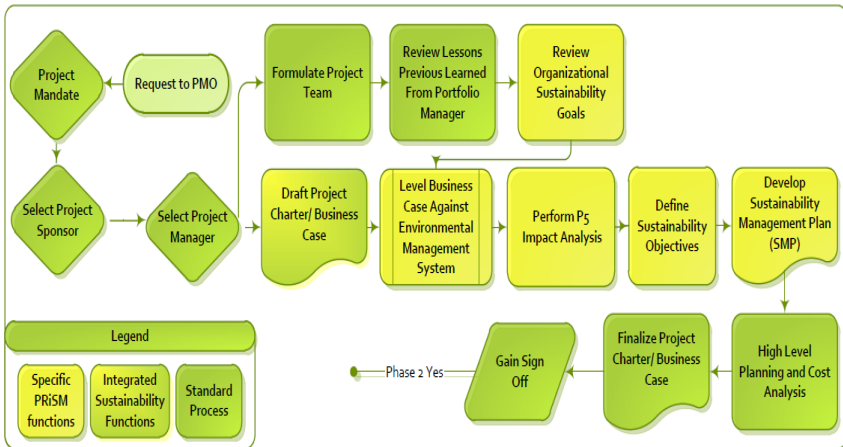
Figure 3

The PRiSM pre project/initiation phase (Figure 3) is one where the ideas are formulated and the business reviews whether this is a feasible project or element of a project to be included within the portfolio of projects that it is currently running.

The Purpose of Business Case/ Project Charter
The key deliverable within this phase is the Business Case or Project Charter as the value of the sustainability elements are housed here.
In addition, to support the charter, the delivery has to be leveled against the organization's environmental management system (or whatever Integrated Management System according to ISO 14001, ISO26000, ISO 50000 and ISO 9001) allowing for:
– Justification of the project;
– To obtain authorization for the project and its funding;
– Used to give direction to a project team;
– Baseline document for phase and stage reviews;
– Used in evaluation of change requests;
– Baseline document for benefits reviews;
– Used by organization to facilitate lessons learned.

The Business Case/Project Charter is a key document for any project. Without a detailed and authorized business case a project should not be allowed to proceed.

It is also a document that lives beyond the Project Life-cycle into the operations phase where the Benefits Realization Review takes place, conducted by the Project Sponsor and any additional and useful stakeholders that can assist him or her in the identification and verification of the benefits.

Throughout the entire project life-cycle and beyond, the Business Case has many purposes.

It is there to justify the meaning of the work being carried out. It is used as an authorization for a project to proceed or obtain its funding.

In the early stages of a project team's development, it can be used by the Project Manager to give direction and purpose to the team.

It is the baseline document to all project activities to gauge performance and progress against the original plan of benefits.

It is used as an evaluating tool for any formal Change Control requests that may be submitted to a project to assess them against the potential alteration to the perceived benefits.

Within the Operations Phase it is used as the benchmark for Benefit realization.

After all project reviews it can be used to facilitate the future improvements to a project team and its organization by being using to learn from lessons within its project.

Contents of the Business Case / Charter

The first element to the document should be the reason or justification for the project.

– A statement of Success and Acceptance Criteria should be shown within the Business Case to allow the Project Manager to identify from these the Quality Standards that he or she will be expected to achieve in their project goals.

– The identification of what benefits the organization will gain by the project so that anyone reading the document can see the reason and result of the project within one area.

– The Project Manager will also need to know what they are being asked to produce as an end product. The project's product needs to be clear and precise so that a scope of work to match the deliverables can be developed.

– An Investment Appraisal which will give financial support to the project giving the true value of a project to the organization.

It is important to list the options or approaches available or being considered and this must also include the option of not doing the project and its relevant impact.

The Business Case is the driving force behind the project and so at every review it must be present for consideration as to whether or not the project should proceed or be halted as the justification or benefit cannot now be realized.

The Business Case should include references to:
   – Corporate Sustainability Governance
   – Regulatory Compliance
   – Goals and Objectives
Project Managers should always review the Business Case or Charter from a CSR Perspective by leveling the deliverables against the EMS or together with the CSR Officer.

The Triple Bottom Line

The term "the triple bottom line" was first coined in 1994 by John Elkington [16], the founder of a British consultancy called SustainAbility.

His argument was that companies should be preparing three different (and quite separate) bottom lines. One is the traditional measure of corporate "profit"—the "bottom line" of the profit and loss account.

The second is the bottom line of a company's "people" account—a measure in some shape or form of how socially responsible an organization has been throughout its operations. The third is the bottom line of the company's "planet" account—a measure of how environmentally responsible it has been.

The triple bottom line consists of profit, people and planet. It aims to measure the financial, social and environmental performance of the corporation over a period of time. Only a company that produces a TBL is taking account of the full cost involved in doing business.

The challenge with project management is that in order to apply TBL principles, it must adapt to the project life-cycle. This is where P5 comes into play.

The GPM® P5™ Concept

P5™ or People-Planet-Profit-Process-Products expands on the theory to allow for project management integration and is an adaptation of a sustainability checklist that was developed at the 2010 IPMA® Expert Seminar, "Survival and Sustainability as challenges to projects."

At the seminar, one of the goals was to 'translate' the concepts of sustainability to practically applicable tools for project management professionals. The participants of the seminar developed a 'Sustainability Checklist' for projects and project managers. The maturity model presented in research by Gilbert Silvius and Ron Schipper adopted this checklist as operationalization of the criteria of sustainability.

About P5™

- Five measureable elements to sustainability
- Each measured individually and as a complete package
- Planet (Environmental aspect)
- People (Social aspect)
- Profit (Financial aspect)
- Process (Governance aspect)
- Product (Technical aspect)
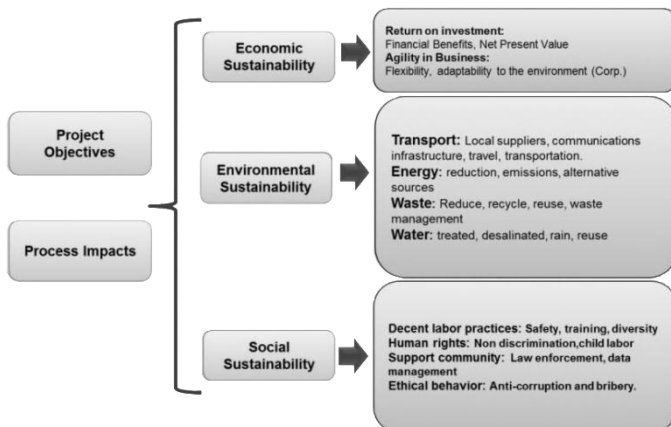
Figure 4 Derived from A checklist for integrating sustainability in projects and project management [4]

The P5™ Impact Analysis
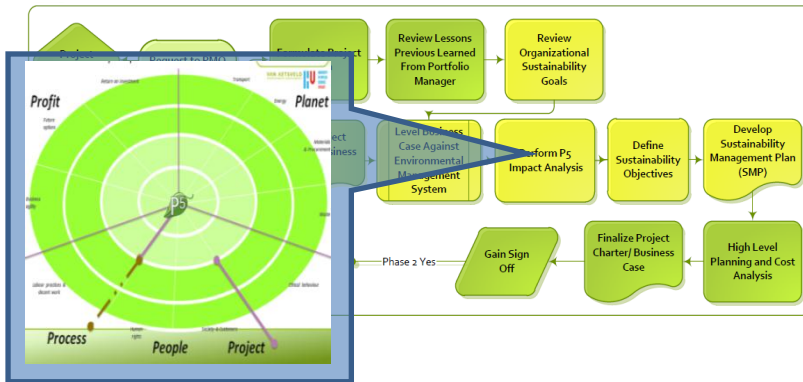
Performing an Impact analysis begins with mapping your project deliverables up by each category. This matrix is designed to allow project teams to measure the impact of their project against P5. The outer two rings represent the impact that product objectives and effects have on each Indicator. The Inner two rings indicate the impact from a project process and resource perspective.

Potential areas of impact
– Project context
– Stakeholders
– Project content
– Business case
– Materials and procurement
– Project reporting
– Risk management
– Project team
– Organizational learning

Note: A complete view of the P5™ Integration Process is available on the GPM Website. www.greenprojectmanagement.org/p5

*The full diagram and P5 Matrix are at the end of the book.

PESTLE

PESTLE is an analytical tool which considers external factors and to assist in determining impacts

The term PESTLE has been used regularly in the last 10+ years and its true history is difficult to establish. From our research, the earliest known reference to tools and techniques for 'Scanning the Business Environment' appears to be by Francis J. Aguilar (1967) who discusses 'ETPS' – a mnemonic for the four sectors of his taxonomy of the environment: Economic, Technical, Political, and Social.

- – Is a useful tool for understanding the "big picture" of the environment in which you are operating
- – By understanding your environment, you can take advantage of the opportunities and minimize the threats.
- – Provides the context within which more detailed planning can take place to take full advantage of the opportunities that present themselves.

Factors in a PESTLE Analysis
- – P – Political The current and potential influences from political pressures
- – E - Economic The local, national and world economic impact
- – S - Sociological The ways in which changes in society affect the project
- – T - Technological How new and emerging technology affects our project / organization
- – L - Legal How local, national and global legislation affects the project
- – E – Environmental Local, national and global environmental issues

PESTLE encourages you to think about the wider environment and what might be happening now and in the future which will either benefit or be of disadvantage to the organization, individual etc.

The Sustainability Management Plan (SMP)

Green Project Management® or Sustainability in Project Management in short addresses the impact of a project's delivery on the environment (ecological), society, and the economy. There have been several theories for integration identified over the past several years but none that can be adopted as repeatable processes to provide governance and deliver consistent and measurable results.

In order for green/ sustainability in project management to take a permanent foothold, a new set of activities that focus strictly on the sustainable aspects of an initiative through project governance is required. The SMP addresses this need.

The Construct- High Level

The SMP is used to govern the benefits of the project and belongs either as part of or as an attachment to the Business Case. When it is accepted that the business case is the driving document of all projects, then it would be surmised to believe that sustainability could exist without some sort of impact with the business case.

With the understanding that the business case must align itself with the strategy of the organization, having an SMP and Environmental Management System (EMS) in place ensures the organization's approach to project management are in alignment. It is important to note that the inclusion of sustainability in the business does not ensure sustainable outcomes each and every time. The inclusion of sustainability elements within the business case do ensure justification for decisions to be made in support of a sustainable delivery process.

Steps:
— Develop the Sustainability Management Plan.
— Separate off the sustainable objectives
— Develop your own WBS
— Identify what work is needed to be accomplished
— Assign responsibility for the tasks
— Integrate your WBS with the overall Project Management Plan
— Align the needs and the deliverables

Usage:
— A foundational document to promote visibility and governance
— Establish the communication plan to broadcast the gains in management of finite resources and minimizing waste
— Indicate and enhance focus to the shared connections with the next projects in the queue
— Highlight opportunities for external stakeholder communication identifying increased controls in process as well as positive environmental impacts
— Reinforce that sustainability equates to profitability

What to include in an SMP:
The Sustainability Management Plan (SMP) is used to allow an "in principle" decision to be made of those projects which fit strategically upon the Aims & Priorities of the organisation with regards to its policies and guidance on environmental and sustainability governance. This will add value to what is already provided (whether this is via partners or suppliers and the investment is likely to offer financial value.

The SMP should provide sufficient information to allow for an assessment of the investment proposal's viability and support before committing resources and approving the development of the project.

Each SMP should have an Executive Summary
A brief outline of how sustainability touches the project and what the key measures are in the project and how they will be measured and maintained.

The Project Sustainability Objectives Section
Outline the methods that will be employed and how they tie to organizational goals and standards. Here the key objectives can be realized and then the total scope of work clearly understood.

Key Measures and Performance Indicators (Qualitative and Quantitative Measures) just as outlined in the impact analysis.

Key Performance Indicators Environmental:
– Energy
– Waste
– Transport
– Water Usage
– Materials and Resources

Key Performance Indicators Financial:
– Return on Investment
– Business Agility

Key Performance Indicators Products:
– Lifespan of Product
– Servicing of Product

Key Performance Indicators Processes:
– Maturity of process
– Efficiency and fairness of process
–
Key Performance Indicators Personal:
– Labour Practices and Decent Work
– Human Rights
– Society and Customers
– Ethical Behaviour
Environmental Impact Assessment results.
– A summary of the planned environmental impact and steps that will be taken to decrease the effects or increase the opportunities identified.

Scope Exclusions:
— Any known areas that the plan will not include, if any.

Sustainability Risk Management:
— Methods explained as to the approaches to identification, analysis and response to sustainability risks within the project being used.

Reviews and Reporting:
— Steps to take in a project audit regarding sustainability and how sustainability metrics will be reported throughout the project.

Stakeholder Management and Organization Roles

The project stakeholders, including the project organization, should be described in sufficient detail to enable project success. The roles and responsibilities of stakeholders should be defined and communicated based on the organization and project goals. Typical project stakeholders are shown in figure 5.

Stakeholder interfaces should be managed within the project through the project management processes.

The project organization is the temporary structure that includes project roles, responsibilities, and levels of authority and boundaries that need to be defined and communicated to all stakeholders of the project. The project organization may be dependent on legal, commercial, interdepartmental or other arrangements that exist among project stakeholders.

The project organization may include the following roles and responsibilities
– Project manager – leads and manages project activities and is accountable for project completion
– Project management team – supports the project manager in leading and managing the project activities
– Project team – performs project activities

Project governance may involve the following
– Project sponsor – authorizes the project, makes executive decisions, and solves problems and conflicts beyond the project manager's authority.
– Project steering committee or board – contributes to the project by providing senior level guidance to the project.

Additional Stakeholders
– Customers or customer representatives – contribute to the project by specifying project requirements and accepting the project deliverables
– Suppliers – contribute to the project by supplying resources to the project
– Project management office may perform a wide variety of activities including governance,

Standardization, project management training, project planning and project monitoring
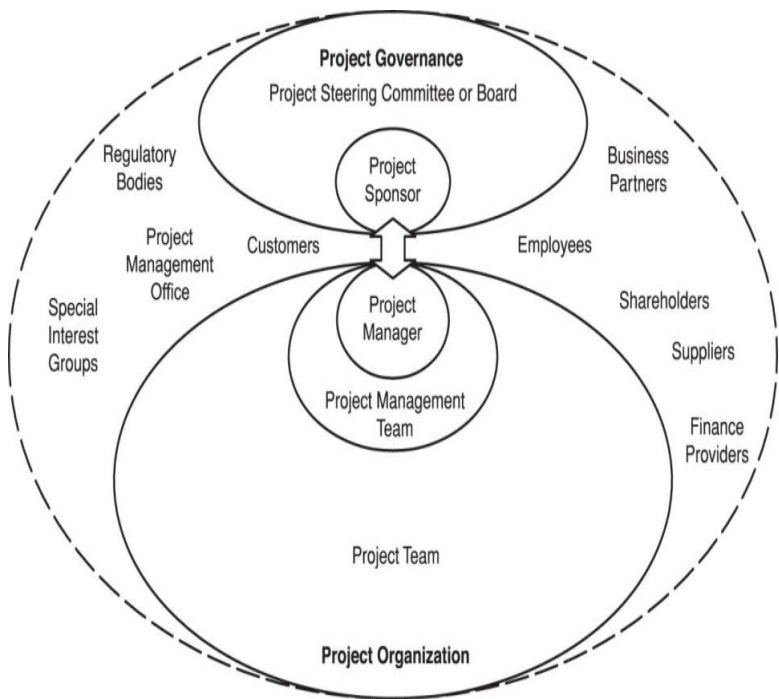

Figure 5, The ISO standard for a project organization.

Individuals and Groups with a Vested Interest in the Project

Stakeholder analysis establishes the individuals and groups with a vested interest in the project, and prioritizes their relative importance in terms of interest (needs) and power (degree of influence) on key decisions and activities.
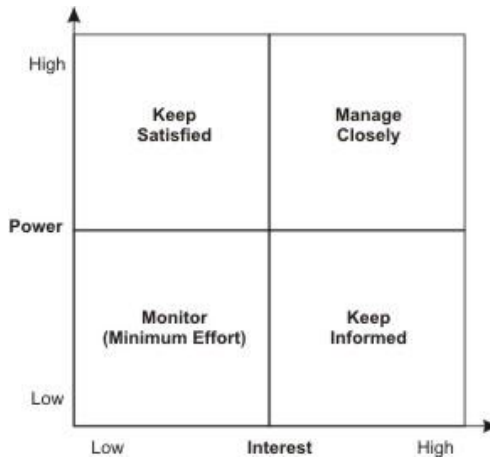
Figure 6

Figure 6 displays stakeholder identification in four 'blocks' of behavior in the XY grid above with low to high power running on the vertical axis and low to high interest running along the horizontal axis.

- **High Power – High Interest Stakeholders:** These are identified in the upper right block. These people are key to your success, and are not necessarily high ranking executives on your management team. These stakeholders should be fully engaged in external and internal rollout planning and decisions.

- **High Power – Low Interest Stakeholders:** Represented in the top left hand quadrant on the stakeholders chart, these people need less information and less involvement than the high interest stakeholders. But, because they do have power within the organization—formal or informal—to impact the change, it is important to keep them connected and satisfied on progress, but not to overwhelm them with details.

- **Low Power – High Interest Stakeholders:** Represented on the lower right hand quadrant, these are individuals that may have great knowledge of the company but have low influence on organizational change. It is important to keep them well informed so that you can get their valuable feedback. They can help you solve problems when they arise or guide you on how to avoid them in the first place. Keep them informed.
- **Low Power – Low Interest Stakeholders:** In the lower left quadrant are the members of the organization that need only minimum information. The key here is that you are able to make the right determination of who is in this quadrant and that what defines minimal information

It may also prioritize stakeholders according to the degree they are affected by the project or its outcome.

Stakeholders may have varied interests and influence on the project. Some may be opposed to the project while others are for it. Some stakeholders may introduce threats and others provide opportunities.

Stakeholder involvement may be passive or active. (environmental lobbyists and demonstrators are an example of active).

It is becoming increasingly important to recognize and manage the way stakeholders participate in projects in order to reduce negative impacts and enhance opportunities.

Stakeholder Management can be regarded as management of people risks and should consider external and internal stakeholders at all levels in the project.

Stakeholder Analysis Process
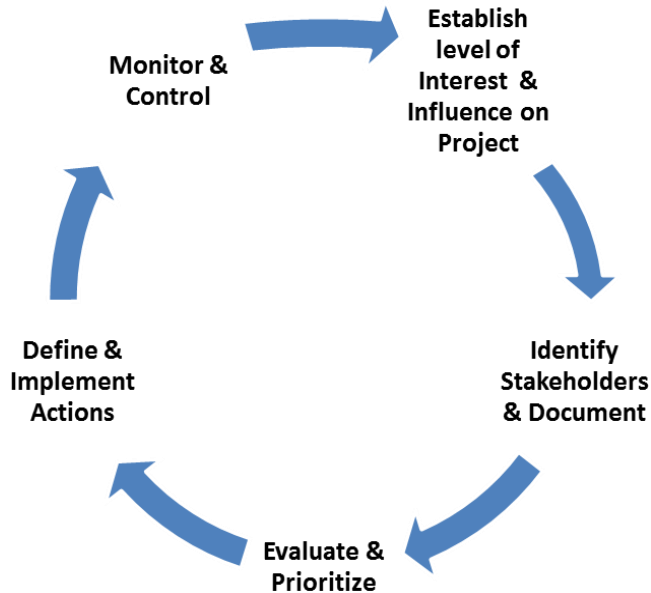
Figure 7

Stakeholder Management is a pre-requisite for many planning activities including integration, communication, information management and risk management.

The process involves identifying the stakeholders, and gathering information on their interest (needs, aims) and power (influence) on the project.

Stakeholder Analysis is a pre-requisite for planning:
– Integration
– Communication
– Information Management
– Risk Management
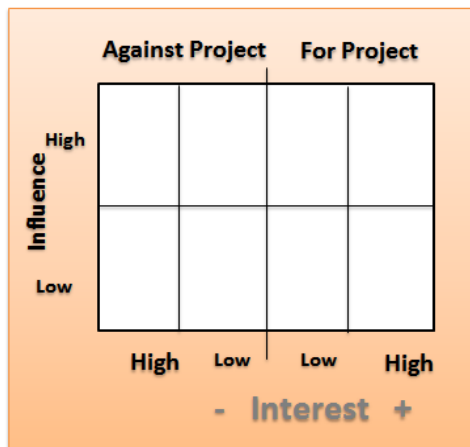
Figure 8

The various interests and power levels are evaluated in order to establish the potential effect on the project. Stakeholders may be prioritized to show those that have greater power or interest in the project. This analysis helps with response planning, in particular communication management.

Action plans are developed and implemented to deal with each stakeholder appropriately. These are monitored and controlled to ensure effectiveness.

The composition and influences of project stakeholders continually change as the project progresses, and more significantly at the boundaries of key phases and stages. The process is therefore applied continuously.

The table [figure 8] above shows a simple framework for stakeholder analysis.

Interest may be positive or negative. Potential negative interests may be viewed as possible risks. The level of interest can be scored using a simple qualitative scale for example high or Low. A complete analysis would typically show appropriate actions to involve stakeholders positively in the activity, or in the case of negative interests, to apply countermeasures to eliminate or reduce any possible threat.
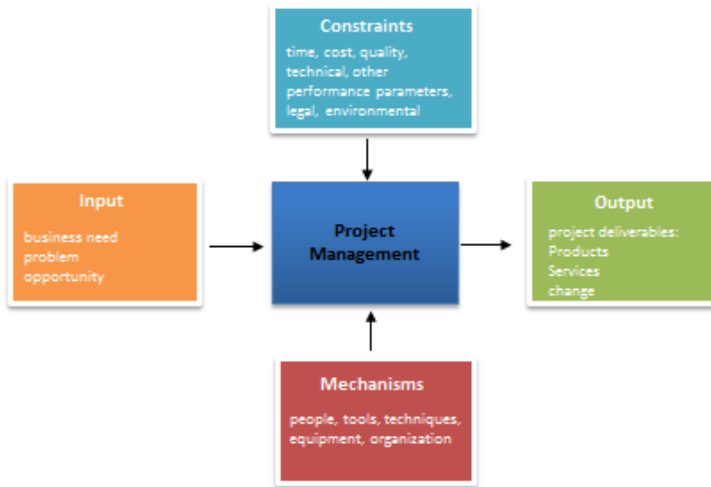
Figure 9

Project Management as defined by ISO 21500 [7]

Projects
– A project consists of a unique set of processes consisting of coordinated and controlled activities with start and end dates, performed to achieve project objectives. Achievement of the project objectives requires the provision of deliverables conforming to specific requirements. A project may be subject to multiple constraints.
– Although many projects may be similar, each project is unique. Project differences may occur in: deliverables provided; stakeholders influencing; resources used; constraints; and the way processes are tailored to provide the deliverables.
– Every project has a definite start and end, and is usually divided into phases.

Project Management
– Project management is the application of methods, tools, techniques and competencies to a project.
– Project management includes the integration of the various phases of the project life-cycle.
– Project management is performed through processes. The processes selected for performing a project should be aligned in a systemic view. Each phase of the project life-cycle should have

specific deliverables. These deliverables should be regularly reviewed during the project to meet the requirements of the sponsor, customers and other stakeholders.

Project management concepts and processes
—   Project management is accomplished through processes utilizing concepts [knowledge] and application [competencies.]
—   A process is a set of interrelated activities. Processes used in projects are generally categorized into three major types.
  —   Project Management Processes - specific to project management and determine how the activities selected for the project are managed
  —   Delivery Processes - not unique to project management, result in the specification and provision of a particular product, service, or result and vary depending on the particular project
  —   Deliverable Support Processes - not unique to project management, provide relevant and valuable support to product and project management processes in such disciplines as logistics, finance, accounting and safety

The ISO 21500 standard addresses only project management processes. However, it should be noted that product, support and project management processes might overlap and interact throughout a project.

Key challenges in CSR strategy and sustainability management include:
  —   Managing in an integrated manner the full lifecycle of CSR strategy formulation, implementation, evaluation and evolution incorporating stakeholder participation; Aligning responsibility strategy to corporate strategy focusing on:
    —   Rationalizing and harmonizing the economic, compliance, ethical, and sustainability dimensions of corporate responsibility and sustainability in the context of stakeholder requirements;
    —   Managing non-financial risk, particularly to brand, reputation, local license to operate and to performance instability as an integral part of corporate sustainability management;
    —   Integrating eco-design and other sustainability requirements into product and service offerings;

- Managing the sustainability performance optimization process to continually increase stakeholder satisfaction;
- Developing strategic responsibility and sustainability capabilities.

Portfolio Management as defined by ISO 21500 [7]

Benefits of Portfolio Management
- Creates a strategic link between projects and business as usual making them more responsive to environmental change.
- Efficiency of common resources and dealing with scarce or limited resources.
- Prioritization of resources where most beneficial, by determining timing issues and capacity bottlenecks.
- Balancing organization risks with returns
- Lessons Learned to encourage continuous improvement
- Shared technology, processes, learning to lower costs
- Common resources
- The organization can share resources across similar projects, with savings in recruitment, training and utilization. Specialist experience can be developed within a particular sector.
- Prioritization
- The portfolio manager can assign resources to the project with greatest need or benefit (profit and growth) to the organization.
- Risks vs. Returns
- Portfolio managers are able to conduct trade-offs between innovation risks and business as usual to optimize performance.
- Performance Improvements
- Lessons learned and experience gained by each project may be shared to enable development of more effective processes.

Governance Environment

Governance of project management is a responsibility of corporate management requiring the support of project sponsors, project managers and project teams. Effective governance of project management will ensure that the organization's projects are: aligned to organization's strategic objectives delivered efficiently / sustainable.

The relationships between management responsibilities are shown above. This shows that the activities involved in the governance of project management is a subset of corporate governance. It shows that most project management activities are outside the responsibility of corporate governance. This suggests that the control of projects must be shared between corporate governance and project management.
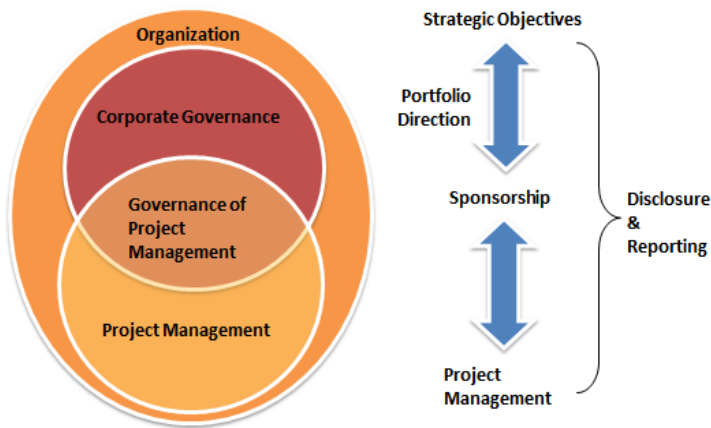

Figure 10

Project Governance
Governance is the framework by which an organization is directed and controlled.

Project governance includes but is not limited to those areas of organizational governance that are specifically related to project activities.

Project governance may include subjects such as defining the management structure; the policies, processes and methodologies to be used; limits of authority for decision-making; stakeholder responsibilities and accountabilities; and interactions such as reporting and the escalation of issues or risks.

The responsibility for maintaining the appropriate governance of a project is usually assigned either to the project sponsor or to a project steering committee. (ISO 21500 Section 3.6)

Project Sponsors
- Own, Develop and Maintain Business Case
- Monitor Project Environment for Risks and Communicate to Project Manager and External Stakeholders
- Review the viability of a Project against Critical Success Criteria at Stage and Phase Gates
- Acceptance of Project Deliverables at Handover and Project Sign Off
- Conduct Benefits realization Reviews

Typical activities performed by the Project Sponsor during the project life-cycle include:
- Developing and maintaining the Business Case, assigning the Project Manager and authorizing the project management plan and any updates.
- Monitoring the project environment for risks, communicating with the Project Manager and other project stakeholders to identify any changes required.
- Reviewing progress against critical success criteria and checking that the planned business benefits will be achieved. Depending on progress the sponsor may decide to stop, change or continue the project.
- Accepting the project deliverables, signing off the project and handing the products to the operating authority.
- Conducting benefits realization reviews during the Operations Phase.

The PRiSM™ Planning Phase
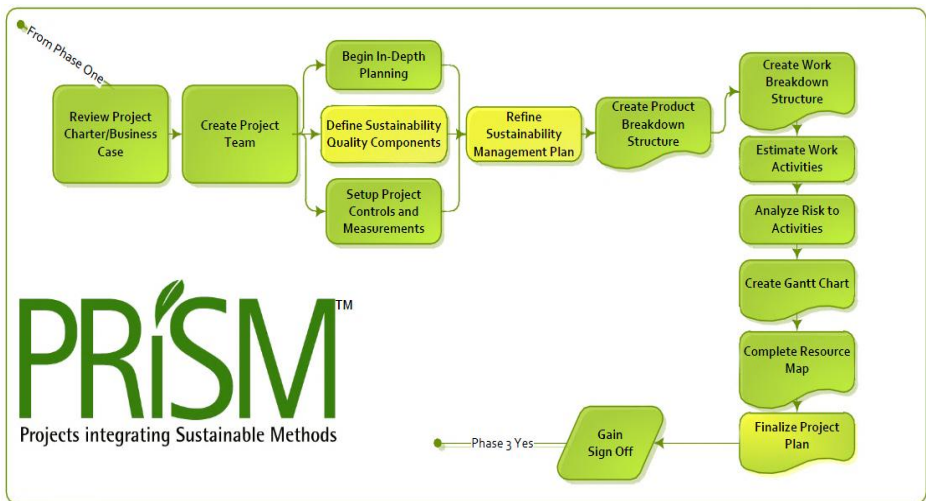
Figure 11

Planning

The planning phase is the moment when the project starts to come to life.

Here the project manager needs to gain a real understanding of what the client or organization is looking to achieve so that they can plot the best way to deliver the project, its main deliverables and the planned benefits in the most sensible and safest manner to benefit all parties involved.

Why Plan?

Project management can be said to comprise of two elements, planning and control. In the first, we decide what we intend to do and how we intend to do it, while in the second, we actually carry this out.

Planning is the foundation of control. Without any plans we have nothing to control and no targets to aim for.

Because planning is such a major and fundamental part of project management there are numerous opinions about how it should be structured and performed. Unfortunately, the terminology that surrounds the subject varies from one source to another.

Plans are statements of intent, they define what the project is intended to achieve and how we intend to achieve it. That simple statement means that they have to cover a great deal of information. However, remember a plan is exactly that a Project Manager should be prepared and flexible enough to change and update it as the project progresses.

Document Properties
– Owner/Author
  – Project Manager
– Authority
  – Project Sponsor
– Audience
  – Project Team, Stakeholders and interested parties
– Development
  – Ongoing throughout the whole project lifecycle keeping it 'live' to all changes

Owner/Author
The owner of the Project Management Plan is the Project Manager. Additionally, the PM is responsible for writing and updating the plan as the project matures and becomes subject to changes.

Authority
The role of authority of the Project Management Plan falls to the Project Sponsor. The Sponsor approves the plan initially in the Definition Phase then reviews it and approves any changes or at Phase or Stage reviews.

Audience
The Project Management Plan should be available for reading and reviewing by all members of the Project Team, all internal and external Stakeholders and in addition any interested parties that are cleared to read this information. Dependent upon the type of the project, the material that is placed inside the plan may need to have a restricted access policy.

Monitor and control
How achievement of benefits is to be measured, managed and monitored.

Development

The Project Management Plan cannot have a defined list of personnel that help develop it. It is important that the Project Management Plan includes all the team members and specialist knowledge that is available to the Project Manager as this will not only mean that the project will not only be developed with the best opportunity of success but also the document will be used as a bond for the team to feel part of the team and to give them all the direction needed to deliver the project objectives most effectively.

Scope Definition

The purpose of **Define scope** is to achieve clarity of the project scope including objectives, deliverables, requirements, and boundaries by defining the end state of the project.
The definition of project scope makes clear what the project will contribute to the strategic goals of the organization. The project scope statement should be used as the basis for future project decisions, as well as for communicating the importance of the project and the benefits that should be realized by performing the project successfully.

Acceptance Criteria

- – Defined as part of requirements gathering
- – Reviewed constantly but rigorously in the early phases
- – Agreed between the customer and the Project Manager
- – Approval by Project Sponsor within project plan
- – Planned Process of Acceptance

Acceptance Criteria are the requirements of the Customer by which the project's delivery success will be gauged. They must be measureable and unambiguous. They are identified as early as possible by the Project Manager so that it will help with accuracy when planning work and estimating costs and schedules. The use of loose descriptions or phrases will inevitably lead to disputes over the interpretation of the product delivery at some stage during the project. Criteria must be achievable within the scope and budget of the project. They will be unique to the project.

Product Breakdown

The Product Breakdown Structure (PBS) is a hierarchical breakdown
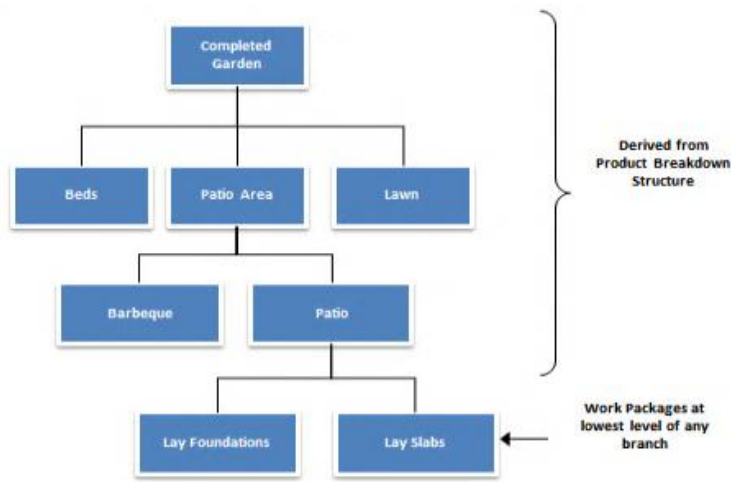
Figure 12

of the products that are to be produced by the project. Typically the final solution for the project is shown at the highest level, with major products that make up that solution shown at the next highest level.

The components of each product (or sub products) will typically be shown at lower levels. The higher levels are used to support development of the Work Breakdown Structure, asking what needs to be done to complete each product. Products are easily identified on a breakdown structure, as they are nouns or naming words. The PBS also used in the identification of the items to be used in configuration management and on change impact assessments.

The PBS provides a high level view of the key products and is useful for the project stakeholders who are more likely to be focused on products than the work to be accomplished.

Work Breakdown

The Work Breakdown Structure provides a hierarchical structure showing the tasks to be undertaken in a project. The preferred and

```
        ┌─────────┐
        │   1.0   │                         Level One
        └─────────┘

┌───────┐ ┌───────┐ ┌───────┐
│  1.1  │ │  1.2  │ │  1.3  │               Level Two
└───────┘ └───────┘ └───────┘

            ┌─────────┐ ┌─────────┐
            │  1.3.1  │ │  1.3.2  │         Level Three
            └─────────┘ └─────────┘

        ┌───────────┐ ┌───────────┐
        │  1.3.1.1  │ │  1.3.1.2  │         Level Four
        └───────────┘ └───────────┘
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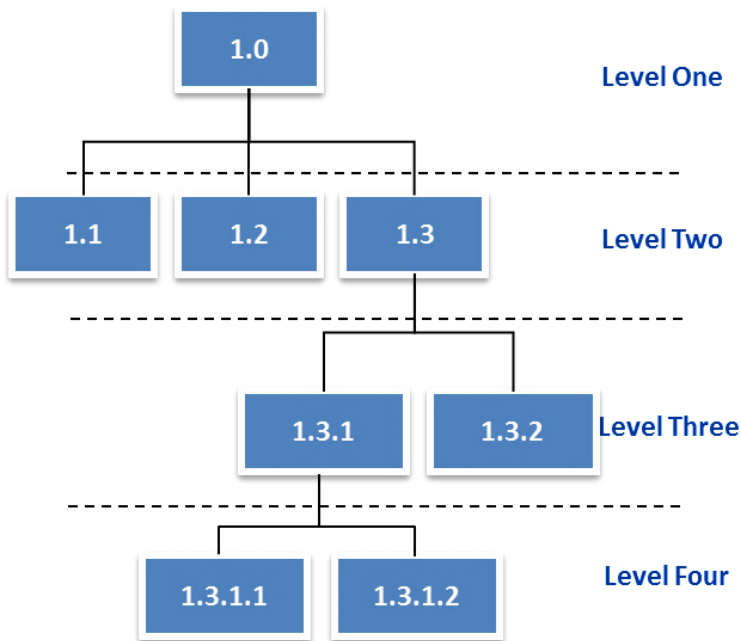
Figure 13

most common form is based on the breakdown of products as shown above. Once this has been done, task decomposition breaks the products into manageable units of work.

The decomposition is continued until an appropriate level is reached. This level is decided by the Project Manager dependent upon the team he has and the experience they have. This will allow him to decide what level of control he will need to take and therefore the depth of detail in which the WBS must be taken. Elements at the lowest level in any branch are called the work packages. The elements are easily recognized by the use of verbs (action words) to describe them, rather than the nouns found in a PBS.

The WBS should enable members of the project team to define their tasks to a meaningful level of detail.

Numbering System

It is important to provide a unique numbering system to ensure that each element of the product or work breakdown structure can be referenced.   The system should maintain the hierarchical relationship, as shown above.

Considerations that may need to be taken into account when deciding the level of breakdown are:

Single point accountability – when one person can be assigned to manage an appropriate manageable level of work, and no one person controls too many work packages.

Clear definition of work – when work has been defined into clear deliverables, objectives and critical success criteria.

Performance Measurement – when the same methods of performance measurement can be used for activities within a work package (particularly important for earned value management).

Cost – that cost can be allocated to the work package. This may depend on the level and type of cost involved, for example sub contract work, high cost materials.

Criticality or risk – where critical and risky activities may need greater visibility, further decomposition may be appropriate and advantageous.

External contracting - the possibility of controlling external work through contracts can reduce the need for detailed breakdown. In this way areas of the PBS/WBS can be 'blocked off' and allocated to the contractor for their own structure to be developed.

Organizational Breakdown

One structure derived from the WBS is the Organization Breakdown Structure (OBS). This is regularly seen as an Organization Chart in most industries, as shown above. It shows the roles and titles of the team members (related to the work they are managing), their span of control and the approved reporting structure.

The project OBS is used with the WBS to form the Responsibility Assignment Matrix.

To produce the Organization Breakdown Structure, the work breakdown and tasks are analyzed. Typically, team leaders or co-ordination roles are assigned to individuals in order to manage groups of tasks.
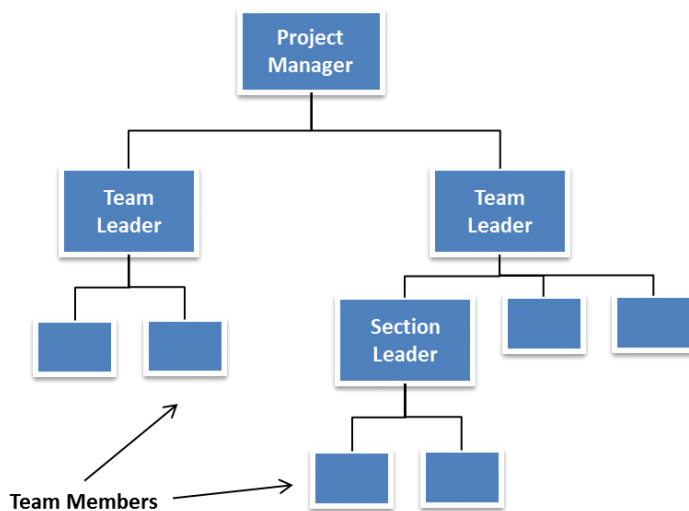
Figure 14

The criteria used to decide on management levels for groups may be:
- size and nature of the tasks
- complexity in terms of interdependencies
- criticality and risks

    The Project OBS identifies key decision making authorities and ownership of work areas. It therefore supports communications, performance monitoring, control, and reporting.

Responsibility Matrix
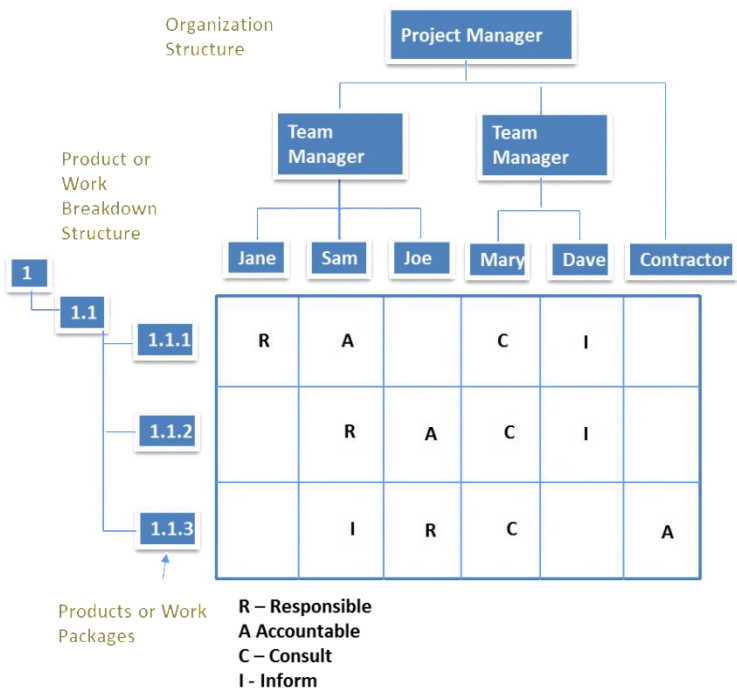
Figure 15

The **Responsibility Assignment Matrix** (RACI) is used to define the accountability, role and responsibility of each team member. It is developed by combining the WBS (or PBS) and the OBS.

The completed matrix shows who is:
–   Accountable
–   responsible for performing the work
–   responsible for product delivery
–   may be involved and their particular role and contribution.

Cost Breakdown
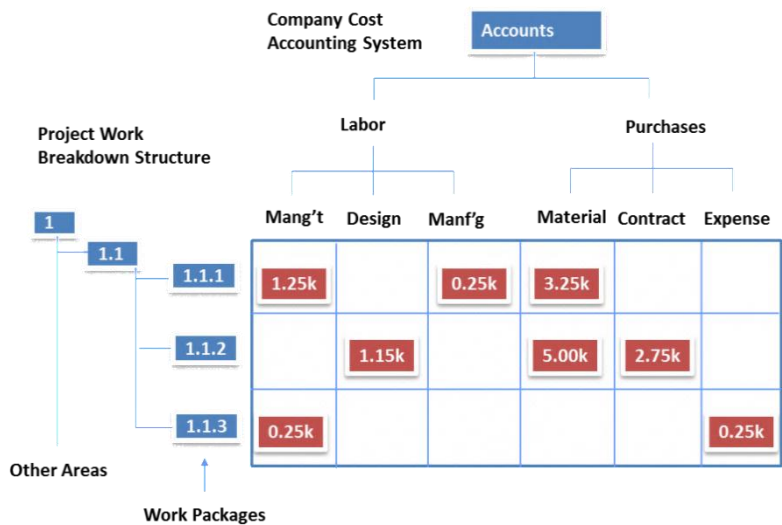
Figure 16

Another useful breakdown that can be derived from the WBS is the Cost Breakdown Structure (CBS). It important that costs for each work package are broken into elements since different types requires different monitoring and control processes. For example, in-house labor may be controlled through time sheets, materials through purchase orders and contracts used to control sub-contracted work. Some cost categories will need to be isolated if earned value is to be used for cost control.

The Cost Breakdown Structure is derived from the company system of allocating costs and the WBS. Typically, budgets (estimates) for each work package are broken down into cost elements corresponding to the company system of accounts. Actual costs charged to each work package are detailed at cost element level. This enables work package managers to compare actual costs with baseline work package budgets to pinpoint variances and problem areas, allowing them to take any corrective action.

Estimating Accuracy
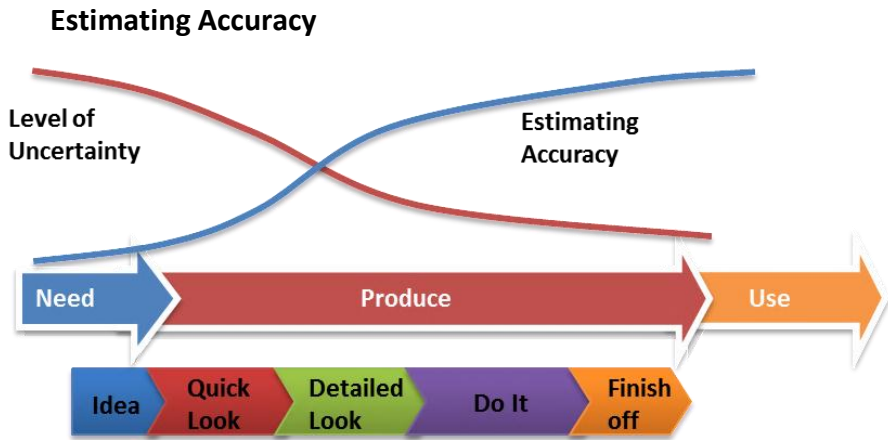
Figure 17

Estimates in projects are quantified assessments of resources and time required to complete part or all of a project. They are used to support Investment Appraisal and support project Go/No Go decisions. They are also used throughout the project to support performance assessments and predictions.

Estimating accuracy will vary through the project lifecycle depending on the level of uncertainty and the quality and availability of information.

Generally, information during the concept stage is likely to include only high level designs and strategies; consequently its accuracy is likely to be in a 'rough order of magnitude' due to the uncertainties and lack of defined information.

As more data becomes available during definition, estimating accuracy should be sufficient for the approval of the business case. Accuracy will continue to improve at the beginning of implementation as detailed designs, scope of work and detailed plans are produced. This is necessary to control cost, time and performance during implementation since unreliable estimates could cause management problems and reduce team morale.

Estimating accuracy should improve throughout implementation sub stages as more details and results of work are defined and

recorded. At the end of each sub stage, information and lessons learned will help to improve estimating accuracy by the use of these actual costs and tasks being completed.

The reliability of estimates is likely to influence decisions to continue or terminate the project at the end of each project stage and sub stage.

Resource Management

Resource management consists of resource planning, with the identification and allocation of resources with the appropriate capabilities. It also includes optimizing the way resources are utilized in the time schedule, their impacts as well as the continuous controlling of these resources according to what is outlined in the Sustainability management plan.

Resource Types:
– **Consumable**
  – Raw materials
  – Money
  – Natural Resources
– **Non Consumable**
  – Machinery
  – Technology
  – Facilities
  – Test equipment
  – People
  – Knowledge

Resource Process
The three basic steps:
– Allocation (Assignment)
– Aggregation
– Scheduling

There are two main types of resources in Project Management; those that can be consumed during work and those that can be reused and are non-consumable. For example, the fuel that goes into a car is a consumable while the car is re-usable.

The most valuable resources that you have is people as they are the most re-useable assets that any Project Manager will ever have.

It is also important to understand the impacts that resources have on the project's outcome from a direct objective perspective and from a sustainability point of view.

The effective application of Resource Management by the Project Manager increases the opportunity for the project to:

- Be more efficient in the utilization of resources, this is vitally important when the resource is specialized or scarce.
- Have greater confidence that the schedule is more realistic in what is really required and how it fits in terms of the resources available.
- Have early indication of any resource bottlenecks or conflicts that will need managing.
- Support the businesses approach to environmental challenges; using the UN Global Compact's Ten Principles
- Undertake initiatives to promote greater economic, social, and environmental responsibility; and
- Encourage the development and usage of environmentally friendly technologies and techniques for resource consumption

A critical aspect to resources from a sustainability aspect is to ensure that resources, consumable and non-consumable are measured and accounted for during a P5 Analysis to assist in determining the overall project impact from sustainability perspective. (refer to page 31 and the chart at the end of the book).

Taking the results of the impact analysis and using the Sustainability Management Plan (SMP), Project Managers can employ precautionary approaches to environmental, social, and economic challenges, raise awareness of them to organizational leadership and or flag them as risks.

Quality

- Outputs and processes of project meet needs of stakeholders
- Fit for purpose
- Degree of conformance

Figure 11

Key points:
1. The requirements for quality are defined in measureable terms as acceptance criteria.
2. Outputs and processes can only be fit for purpose if the purpose is understood.
3. Definition of requirements enables the project manager to trade-off between scope, time, cost and quality.

Also from ISO 9001 on Quality Management

- Customer Focus
- Leadership
- Involvement of people
- Process Approach
- System approach to management
- Continuous Improvement
- Factual approach to decision making
- Mutually beneficial supplier

Quality Responsibilities
- Management responsible for creating an environment for achieving project quality (organization & project)
- Organization responsible for improving project processes – learning from experience (continuous improvement)
- Quality covers products and management processes

Management is responsible for creating an environment for quality for the project. This is shared by the organization and project (ISO 10006, Section 5, and Quality in project management processes).

The objectives, responsibilities, processes and methods for achieving quality at an organizational level are typically defined in the organization's Quality Management System.

The Project Manager is responsible for creating and implementing a quality management system for the project. This is defined in a Project Quality Management Plan.

The Plan sets out specific quality practices, resources and the sequence of quality management activities required to achieve the project objectives. It will also refer to processes and requirements defined in the organization's quality management system.

Quality Environment

The Quality Environment essentially covers four processes:

Quality Planning – defining standards, criteria to be achieved, appropriate actions to ensure the required quality is achieved. The Quality Plan provides guidance to project stakeholders on how quality management will be performed on the project. It includes a statement on stakeholder expectations, success criteria, and standards applicable, how they will be applied and how quality will be assured through specific actions, e.g. auditing.

Quality Assurance – this involves pre-planned, regular reviews & independent audits to verify that work is being carried out consistently in accordance with defined procedures, and to provide confidence to stakeholders that the project will satisfy relevant quality requirements and standards.

Quality Control – the process of monitoring project results, evaluation to verify results are compliant with relevant standards and taking corrective action to eliminate causes or address unsatisfactory performance. Typically includes visual inspection, testing or trials to verify that the project deliverables conform to specification, that they are fit for purpose and meet stakeholder's expectations.

Continuous improvement – focusing on specifying requirements tightly and meeting them as effectively and efficiently as possible. In order to measure success organizations use maturity models.

Quality Control Tools
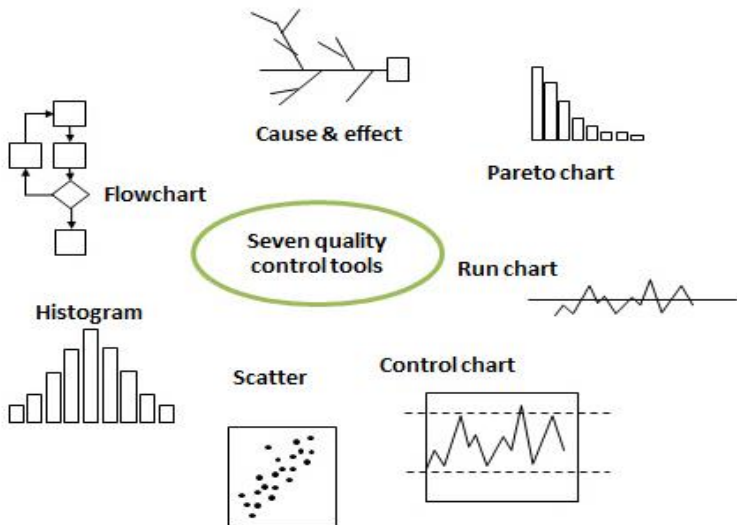
Figure 19

Cause & Effect (Ishikawa) – is simply a graphical technique to help develop an understanding of how certain causes may lead to a particular effect.

Pareto – a type of histogram that orders the information in a particular way. This gives rise to the Pareto principle that 80% of the problems are the result of 20% of the causes. This enables us to direct problem solving where it will be most effective.

Run Chart – plots the history of a single variable. For example if a key performance criteria for a project was the variance between actual cost and budget cost, this variable could be plotted over time to track its variation and identify trends.

Control Chart – plots value for each of a number of outputs of the same process. It also sets tolerances for the values measured. This allows us to identify if the process is in or out of control.   For example plotting the results of a test on each weld on the ship to ensure our welding process was within acceptable control limits.

Scatter – used where there are two variable and we want to see if there is a relationship between them. E.g. the strength of a number of cubes against recorded outside temperatures may show relationship between strength and temperature.

Histogram – plots frequency of variables. The height of the bar shows how often a particular result occurs and the number of bars indicates the range of results.

Flowchart – a graphical representation of a process showing activities and decision points. A flow chart is used to show how different parts of a system interrelate. It can help the project team identify where quality problems may occur or redesign a process to correct problems.

Costs of Quality

Whether it is technical excellence or customer satisfaction there must be some cost in achieving high standards.

The often heard slogan "quality is free" goes back to the book written by Crosby in the late seventies. The principle is that money invested in quality up front will produce a reduction in costs longer term.
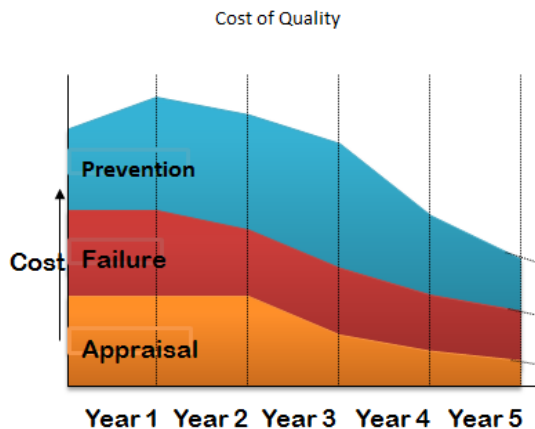

Figure 20

Quality costs are broken down into the three following categories, prevention, failure and appraisal.

Prevention

These are the costs associated with any action designed to reduce the incidence of defects and failures. The correct training of an individual and the use of suitable and well maintained equipment helps with this.

Failure

This can be further broken down into internal failure and external failure. Internal failure costs are those of investigating the cause, wasted materials, repairs and rework. External failure costs relate for example to the damage to reputation, your customer relationships and liability costs.

Appraisal
This is also called inspection costs, these relate to the costs of sampling and testing products, checking specifications and supervising staff.

Sustainability and Quality Components

In Quality Management, Project Managers utilize constraints that will deliver the intended result. Quality Management "involves determining quality policies, objectives, and responsibilities so that the project will satisfy the need for which it was undertaken". In a simpler description, Quality Management is accountable for making sure that any work performed is done so correctly the first time to avoid rework and wasted energy or resource. Sustainability convergence points are contained within each process of the quality management knowledge area.

The Quality Planning activity defines the inputs and controls for quality assurance activities. The inputs from ISOs 14001, 26000, 9001, and 50001 set the level of influence that the standards will have on defining "quality".

Quality standards will be used in the development of a baseline and as the basis for monitoring within the Quality Assurance and Quality Control processes. The PMIS system will monitor thresholds set by the quality management plan and help in developing changes for the change management process.

Quality Management has a direct relationship with Green Project Management. Ensuring that the right standard or specification to a product or a piece of work is carried, first time all of the time, means that your wastage costs are minimized. Quality costs as we stated before fall into three brackets; the first of these is the cost of prevention.

Preventing failure or reducing the number of quality failure reviews through prior planning and a strong control method, ensures that all project work is given greater confidence in its ability to be delivered to the needs of the sponsor in the most cost efficient manner.

The second of the cost elements is that of quality appraisal, or the checking of the products or procedures as the project progresses through its full lifecycle. By ensuring the right checks are done by the right people when it is most beneficial to carry out the checks, means that the organization will keep strong supervision and accountancy for the delivery without having excess resource wasted. The third and final cost for quality is that of the cost of failure, both internally and externally.   What is the cost to a company if it has products being returned or being subjected to enquiries? Cost of failure goes beyond the wasted material and the time needed for re-work, all the way to the cost of reputation and therefore future contracts and repeat work.

Time Management

The processes required to manage the timely completion of a project commonly includes the definition of project activities, their sequence, resources estimation, activity duration and development of a control schedule.

Overall, Time Management from a sustainability perspective is to ensure the organization employs the right people and then carries out the right methods to get from point A to point B in the most efficient manner to gain the most effective results.

Examples

Rolling Wave Planning: This method is used when information is less defined and therefore progressive elaboration is employed. When doing so, the work packages are sometimes broken down to the milestone level. When you have the flexibility to do so, consider the following:

Decomposition: As an input technique, breaking down project work into activities, is a common way to create waste. This is why assembling a good project team is vital and have a clear understanding of the requirements of the customer are paramount. On complex projects, to employ a green strategy by using decomposition is to involve the project team members to improve the accuracy and in so doing reducing the failure rate of quality and the need for rework.

Expert Judgment: This is one of the most useful methods when employing a sustainable strategy. Gaining insight from a subject matter expert with specific knowledge on a method, product, service or system can reduce the time spent on developing the scope statements as well as reducing the chances of rework through failure at quality review checkpoints.

The PRiSM™ Executing and Controlling Phase
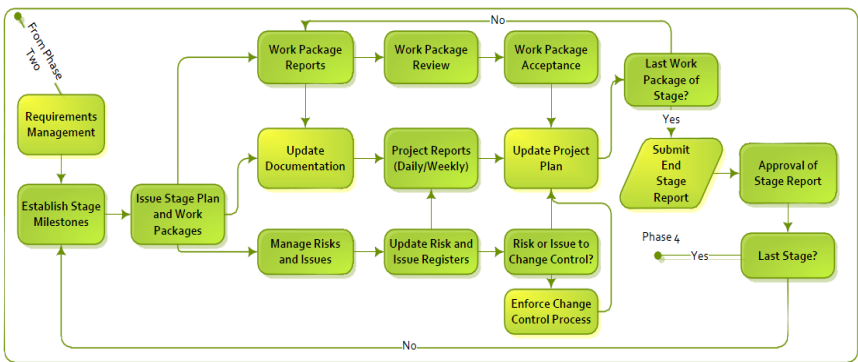
Figure 21

The executing (implementing) processes are used to perform the planned activities from the planning phase, and to support the provision of the project's deliverables according to the project plan.

The controlling processes are used to monitor, measure, and control project performance against the project plan, so preventive and

corrective actions may be taken and change requests made when necessary to enable the achievement of project objectives.

Requirements Lifecycle

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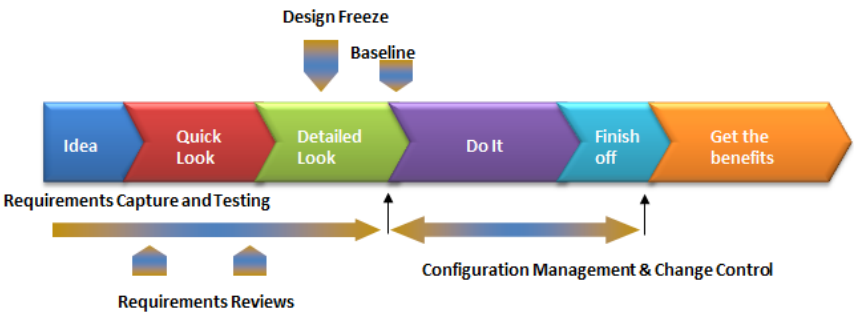
Figure 22

</div>

The existence of a product specification is essential at the commencement of the implementation stage. This may initially only define requirements such as physical features, performance aspects and key acceptance criteria. To ensure the development of the design will achieve the objectives and benefits a series of reviews are conducted. This enables the design to be compared to the requirements in order to identify and address any deviations or shortcomings. A requirements review may be conducted during design to check that designers understand and can achieve the stated requirements.

As the product design develops, further reviews are carried out to check that the design will meet the product requirements. At the end of development the design is reviewed prior to build. As the design develops further, acceptance criteria, plans and methods are fully defined. These, the designs and production readiness are typically reviewed prior to the release of the design to production. This will check that the test methods are appropriate and will ensure that the product is adequately tested in line with the requirements.

Tests and inspections are typically carried out during the acceptance stage to verify that the deliverable products meet the requirements. If satisfactory, the product is formally accepted and signed off.

Throughout the development, the requirements, product specification and associated documentation are controlled using a formal change control and configuration management process.

Risk Management

Risks are present in all projects, whatever their size or complexity and whatever industry or business sector. Risks exist as a consequence of uncertainty. In project management terms, risks are those factors that may cause a failure to meet the project's objectives.

"The exposure to a potential event that could adversely impact on business benefits or project critical success criteria."

While risks are, according to the dictionary, associated with the possibility of failure, they may also be associated with opportunities. Risk management should balance the upside opportunities with downside risks, doing so in an open, clear and formal manner. A wider definition of risk is therefore:

"Combination of the probability or frequency of the occurrence of a defined threat or opportunity and the magnitude of the consequences of that occurrence"

The definition indicates a relationship between risks and opportunities. Both factors are possible future events and therefore have degrees of uncertainty.

FACT! Risk occurs at every level and in all aspects of any organization.

Risks from one level can affect other levels and it can be difficult to identify precisely at what level a risk should be managed. The reason for allocating different levels of risk is to

Figure 23

clearly assign who is best placed to take responsibility for its management.

Strategic
All companies face risks to their business strategy. This can range from currency fluctuations to threat or opportunity of takeovers. Risks of this level are typically handled by the Board of Directors.

Program
Major changes that are required to realize the business strategy are often achieved through the management of many diverse projects as a program. Risks that occur at this level can be due to factors such as the interdependencies of component projects, resource conflicts or project priorities. These risks are managed by the Program Management Team.

Project
Risks at this level are threats to the achievement of the objectives agreed for time, cost and quality. These may well arise from threats or opportunities at another level, but must be placed at this level so that they can be managed by the Project Management Team.

Operational
Day to day activities have their own risks such a Health and Safety or Industrial relations. The whole emphasis of projects and programs is to bring about change and so this may introduce new or eliminate existing risks from the work place. The operational readiness to change will affect the project or program risks. Pure operational risk must be managed by the operational managers but they should always be working closely with the relevant project and program management teams

Sustainability in Risk Management

Risk Management
In the Risk Management knowledge area, a Project Manager will identify any and all possible risks to the project and establish an effective method to address them. Risk Management involves "planning, identification, analysis, responses, monitoring and control". In other words, it is the Project Manager's responsibility to address the possible detractors, identify the causes and situations of the risk, analyze the hurt or impact it will create should

it occur and then develop work around to protect the project in the best manner. The convergence point for ISO 14001 and EMS within risk management fall under the Risk Management Planning, Risk Identification, and Risk Monitoring and Control process areas.

The objective of the Risk Management Planning process area is to define and document how the project will deal with risk, set tolerance levels, thresholds, reporting requirements, roles and responsibilities.

The objective of the Risk Identification process is to identify, classify and rank the risks that could both negatively and positively affect the project.

What risks exist with Green and Sustainability in Project Management; how can something that can create value be a risk to the project?

Sustainability /Green Project Management is way of identifying the positive elements of risk within a project. These positive elements of risk are also known as Opportunities. The information that is captured in the Risk Identification process is used to develop an effective risk response plan and to define action items, thresholds and metrics for the Risk Monitoring and Control process.

The risk data captured within the Risk Identification process can also be used to estimate the project's impact and likelihood of risk occurrence. ISO 14000 and EMS will guide the Project Manager through identifying environmental issues that can be affected by the risks in the complete life-cycle.

> **Note:** What has been outlined reflects actions during regular conditions. As stated earlier, in an emergency situation the contingency plan or the Environmental Emergency Contingency Plan should be followed.

Practical Application
Include in your requests for quotations or proposals that vendors and suppliers include with their response how they might meet your green criteria.

Risk Balance vs. Sustainability

The benefits of Risk Management are significant, but it is often the case that it is the drawbacks that people focus on.

Benefits can be broken down into two styles hard and soft.

Hard
These comprise direct benefits to the project plan such as having the ability to make better more informed decision making, being less likely of accepting unsound projects, increased likelihood of project adherence to its plan and provision of data that assists with future lessons learned.

Soft
The softer benefits are less tangible but include a better understanding of the project by the stakeholders, being able to have the management team focus on the most significant risks and to assist in the distinction between being a good manager and a lucky one.

The drawbacks of Risk Management are also broken down into two specific aspects qualitative and quantitative.

Project risk management recognizes a formal approach to the process as opposed to an intuitive approach. Risks, once identified and assessed, should be managed in order to minimize or completely mitigate their effect on a project.
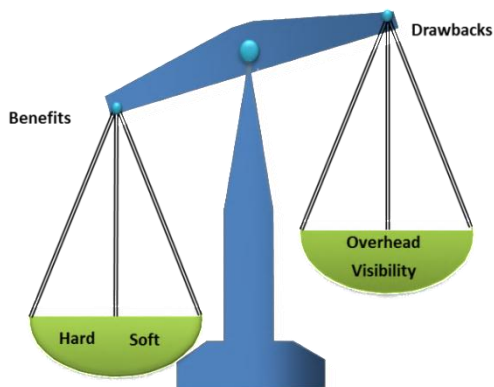
Figure 24

Key steps in the risk management process shown above are as follows:
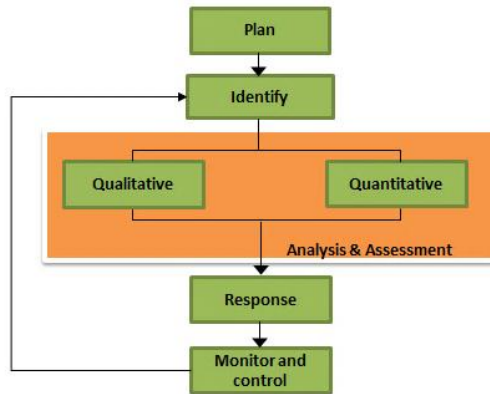
Figure 25

Plan – a Risk Management Plan is developed to provide guidance on how risk management will be carried on the project.

Identification – aims to identify all significant risks that may impact on project objectives, and gather all relevant information for analysis. The possibilities of new risks are investigated throughout the life of the project.

Analysis – qualitative methods are typically used to determine the probability and impact of each risk. The information is used to prioritize risks and decide appropriate responses. Quantitative methods are used to determine the effects of uncertainties and risks on project objectives.

Responses – appropriate responses are considered, selected on the basis of overall benefit, authorized and implemented.

Monitor & Control – current risks are monitored and corrective action taken for adverse trends. Action Plans are monitored to ensure progress and effectiveness. The overall process is audited and reviewed typically at end of phases to ensure effectiveness.

Strategy >> Organization >> Budgets >> Tools/Techniques >> Templates

The typical contents of a Risk Management Plan can be categorized into five areas:

Strategy
In this area it is important to note the approach the project is taking to risk and how risk is planned to be accepted into the process. In addition, any points for escalation and the criteria that the risks will fall into for escalation will need to be explained.

Organization
Within this section, the roles and responsibilities of the Project Team with regards to what tasks and what skill sets are needed and who is being placed into these positions need completing.

Budgets -In this section, the budget allocation for the resources handling the risks will need to be mentioned and then also the allowance for contingency for each of the risk individually should this is applicable.

Tools and Techniques- Within this section it is important to describe the method by which the risks are being identified and then which tools or equipment is being used and which style of assessment is being planned to analyze the risks.

Templates- The final section of the plan is the templates department; this will give examples of any Risk Entry Forms and the Risk Register with explanations of how each can be completed to help anyone wishing to submit entries into the project.

Risk Identification Methods

Brainstorming - interactive, open format group method to identify and rank risks. Strengths: quick and inexpensive; easy to use. Useful as startup activity and for team building. Weaknesses: requires expert involvement for reliable inputs; unreliable for identifying high level risks in complex scenarios.

SWOT Analysis - A specific brainstorming technique using Strengths, Weaknesses, Opportunities and Threats as main focal points.

Threats and Weaknesses indicate risks, Opportunities and Strengths support definition of responses. Strengths: encourages 'big picture' view; can stimulate thinking; others as for brainstorming. Weaknesses: may miss important areas of uncertainty; others as for brainstorming.

Assumption Analysis - check assumptions in project documents for validity. If invalid, check significance in terms of impact on project success criteria. If significant determine nature of risk and decide appropriate response. Strengths: helps to reduce uncertainty; can be easily integrated into routine everyday procedures. Weaknesses: time consuming; requires disciplined and consistent action.

Delphi Technique - For use where you have a number of experts with differing opinions. This technique uses a facilitator to gather opinions, summaries them and then redistribute for further consideration. The range of opinions gradually narrows until an agreed consensus is arrived at.

Interviews - Interviews with stakeholders and experts to identify risks and possible responses. Strengths: relatively quick and inexpensive; often provides information on preventive actions. Weaknesses: may not be relevant to current situation; requires good interviewing technique.

Prompt and Check Lists - Open and specific structured questions to identify risks. Strengths: useful for gathering information; reduces need for expert involvement; easy to use. Weaknesses: may not include new risks; may not be relevant (therefore unproductive).

Post Project Reviews – Use of historical records that describe how a risk has been handled previously. This can be beneficial if the risk is similar again although the context of the project must be taken into consideration before the response is selected.

The Risk Register   .

The Risk Register – is a record of identified risks including results of analysis and planned responses.

The simple register above contains the recommended minimum set of information that is required. Most registers contain more detail on the nature of the risk such as who may be affected, changes in risk status and the status of the risk.

It is important to record ownership of risks, where a risk owner is generally considered to be the person best placed to manage a particular risk through the process. Other people may also be responsible for undertaking specific actions and responses.

It is a live document used to communicate risks and their status to stakeholders. A data entry form is typically used to gather detailed information on each risk.

A risk register should be opened as soon the first risks are identified and updated as new information emerges or on a regular basis if the current risks are the only records. This is essential even though it may be earlier than implementation (e.g. during Feasibility) and before a full risk management plan has been developed. New risks will arise throughout the life of the project and the risk register is used to capture these, show ownership and ensure they are communicated and tracked through the whole process. It is therefore applied as soon as possible and for the duration of the project.

Qualitative – These techniques will be used for the majority of risks identified. They involve subjective assessments of the probability and impacts of risks. The key element to this style of risk assessment is that it involves the need for judgment.
Quantitative – These focus on the numerical analysis of risk and range from statistical assessment of variations in activity duration or cost, to decision making tools. Examples include Monte Carlo techniques.

Probability and Impact Grid

Risks may be plotted on probability-impact charts for analysis, as shown above. Categories such as High, Medium and Low Values are typically used for probability and impact scales.
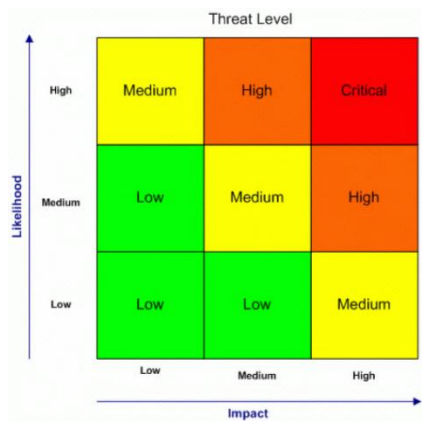
Figure 26

These categories represent ranges. For example, a high cost impact may be greater than $100K, a medium between $50 - 100K, and a low impact less than $50K. The purpose of these definitions is to ensure consistency throughout project teams in risk estimates.

The benefits of probability impact charts are:
– useful for plotting & comparing risks in order to decide priorities
– can show cost, time and quality factors
– provides bands for escalation
– provides bands for RAG reporting
– scales are directly related to project critical success criteria
– highlights the difference between Low Impact- High Probability and High Impact - Low Probability risks
– visual easy to understand
– ensures consistency

While probability-impact charts are an ideal way to show risk priorities, there may be other considerations that affect priority decision such as when the risk is likely to occur, or the cost of risk reduction.

PERT (Program Evaluation Review Technique)

- Estimates are uncertain
- Based on three point estimates
- Assumes a Beta distribution
- Generates a single result

The Program Evaluation Review Technique (PERT) takes into account uncertainty in task estimates to produce a more realistic forecast of the project out turn. (Three Point Estimating) It can be used for costs, schedules and technical parameters. It is commonly used to evaluate project timescales.

Critical path analysis is usually carried out with a single value for all task durations, PERT uses three estimates: Optimistic, Most Likely and Pessimistic.   Most analyses assume a Beta type of probability distribution as the profile for the range of probable durations, although other profiles can be used. The formula below provides the   mean   for   a   Beta   distribution.

Mean = <u>Optimistic + 4x Most Likely + Pessimistic</u> / 6

The mean for each task is used in place of the single point estimate to produce the Critical Path Analysis. As a result, the overall project duration will be weighted according to the degree of pessimism and optimism in task estimates and is generally more realistic.

The quality of the data used is obviously important and will affect the overall reliability of the result. Obtaining reliable three point estimates may be difficult and depends on the experience of the estimator and availability of historical data. If PERT is going to be used in calculating the project duration, this should be explained and used from the start and not once subjective estimating has started as this tends to cause confusion from the team. This is because PERT Analysis has the capability of affecting the Critical Path Analysis work.

The PERT Process

Three point estimates:
– Optimistic
– Pessimistic
– Most likely

Calculate mean duration:
= optimistic + (4 x most likely) + pessimistic
                              6

In PERT analysis we make three estimates for each task:
– Optimistic – O (very unlikely that the task will take shorter than this)
– Pessimistic – P -(very unlikely that the task will take longer than this)
– Most likely - L (this is what we really think it will take)

These are then used to calculate a mean duration based on a Beta distribution.

Mean Duration = Optimistic + (4 x Most Likely) + Pessimistic
                                        6

Or to show it more formally:

Mean Duration = $\dfrac{O + 4L + P}{6}$

For task B, it may be that although we think it is likely to take 5 days, there is a possibility that it could be done in 4 but there could be problems causing it to take as long as 12 days.

Its Mean Duration is therefore: $\dfrac{4 + (4 \times 5) + 12}{6} = 6$

Risk Threat Responses

- Avoid
- Transfer
- Reduce
- Accept

Response plans can be developed and implemented once the risks have been assessed and prioritized. There are a number of generic response strategies.

Avoidance - an alternative approach is taken to avoid the risk.

Transfer - assign contractual responsibility to for example, a sub-contractor better placed to manage the risk. Another example of this is insurance where another party provides compensation in event of risk impact.

Reduction - proactive measures to reduce likelihood, impact or both ideally reduction measures should be taken for high level risks.

Acceptance - where the risk impact is low or cost of mitigation too high. This is sometimes known as absorption.

Risk Opportunity Responses

- Exploit
- Enhance
- Share
- Reject

Exploit – This method is carried out when an opportunity materializes that allows you to truly gain from it in the fullest way.
Enhance – This is where the project team put in place pro-active measures to maximize the likelihood of a situation occurring. Opposite to the reduce response.

Share – This is a chance where not only your project but any other relevant projects that can use the situation make sure that the opportunity is fully communicated to gain the most companywide.

Reject – This is a response that can be chosen should the situation not be right for the project at the time for financial or perhaps storage reasons and so no matter the fact that a saving could be made it is passed over on this occasion.

Contingency - A fall-back plan that will be implemented if the risk occurs. Additionally we can add an allowance included in estimates for events that cannot be predicted with any degree of reliability.

Monitor and Control- We should periodically review the Risk Response Plan to identify changes in status of any of the existing risks or to review and identify new risks. This will link closely to other forms of control such as Change Control where the assessment of change requests will naturally include a review of risk from identification through to planning responses.

Risk Happens- Hopefully, our threat avoidance or reduction measures will prevent the threats from occurring but inevitably some will still happen. Conversely, we hope that enhancement actions will cause opportunities to occur.

Implement Planned Response- If the risk had been identified, we should implement our planned response. This may be as simple as claiming on the insurance we took out to transfer the risk or as complex as implementing an extensive contingency plan. However, if we had accepted the risk, or a risk arises that we had not identified we need to take immediate action. Because the risk has now happened there is no element of uncertainty so strictly speaking it is not a risk. The next two steps are therefore often referred to as Issue Management. An issue is something that has no uncertainty and must be dealt with by a higher authority than the Project Manager.

Response plans can be developed and implemented once the risks have been assessed and prioritized. There are a number of generic response strategies that are shown below:
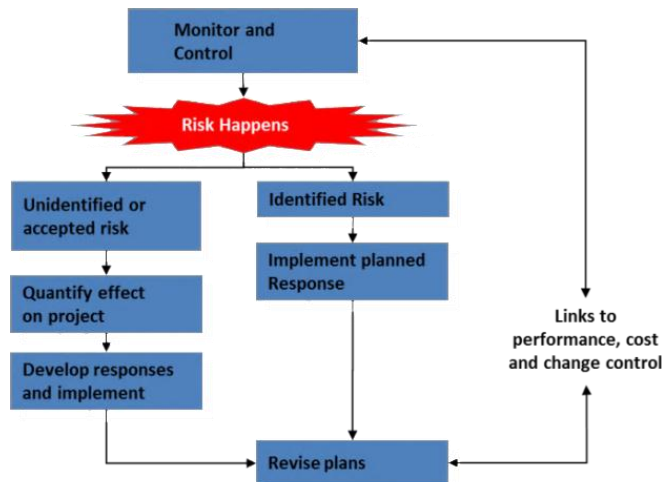
Figure 27

Issue Management

– Threat to project objectives that cannot be resolved by Project Manager
– Problems are day to day concerns
– Risks may not happen
– Issues have already occurred and must be escalated
– Outside the direct control of the Project Manager
– Project Sponsor has the option to further escalate
– Poor Issue Management is a major source of project failure

An issue is defined as a threat to the project objectives that cannot be resolved by the Project Manager.

Issues should be differentiated from problems, which are the day to day concerns that a Project Manager has to deal with case by case. In addition, risks should not be confused with issues. Risks are uncertain in that an event may not occur, whereas issues have already occurred and are therefore not uncertain.

The importance of Issue Management in projects is that issues are outside the direct control of the Project Manager.

It is the Project Manager's responsibility to ensure that all issues are escalated to the Project Sponsor, who can then assess and decide on the next course of action. If the Project Sponsor deems that it requires further escalation then they can further escalate the issue to the Project Steering Group.

Issues that remain unaddressed or unresolved are the cause of many project failures. Therefore, it is the Project Manager's responsibility to ensure all issues are correctly identified, registered, appropriately escalated and then resolved.

Issue Escalation Route

Figure 28

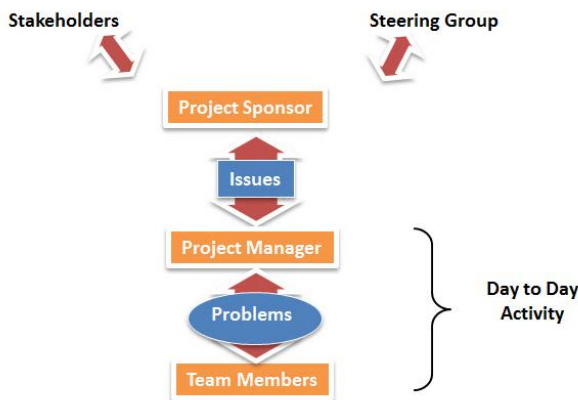Problems and risks are managed on a day to day basis by the project team.

A concern that threatens the project objectives becomes an issue when it cannot be controlled by the project manager. In such situations, the project manager must escalate the issue to the project sponsor. The sponsor will then seek a resolution by engaging the stakeholders as appropriate and/or involvement of the project steering group.

Issue management is a fundamental purpose of the steering group and the appropriate membership of the group will impact on their ability to resolve issues.

Reporting on the development or progress of an issue is performed by the project manager until it has been successful concluded.

Common problems in issue management are:

- The Project Manager incorrectly identifying problems as issues and therefore diverting senior management's attention away from other important tasks.
- Failing to escalate issues in a timely manner when the resolution owner has been unable to resolve the issue.

Issue Log – Contents

No	Description	Raised by:	Date of issue	Impacts	Possible resolution	Resolution owner	Final outcome	Closure date

Figure 29

The issue log is used to communicate and track progress through life, support project reviews and lessons learned exercises.

It should be maintained throughout the whole of the Project Life Cycle and then should be closed off formally by the Project Manager as part of the closure of the project and any outstanding actions or issues transferred to the product owner within the Operations phase.

Organizational Structure
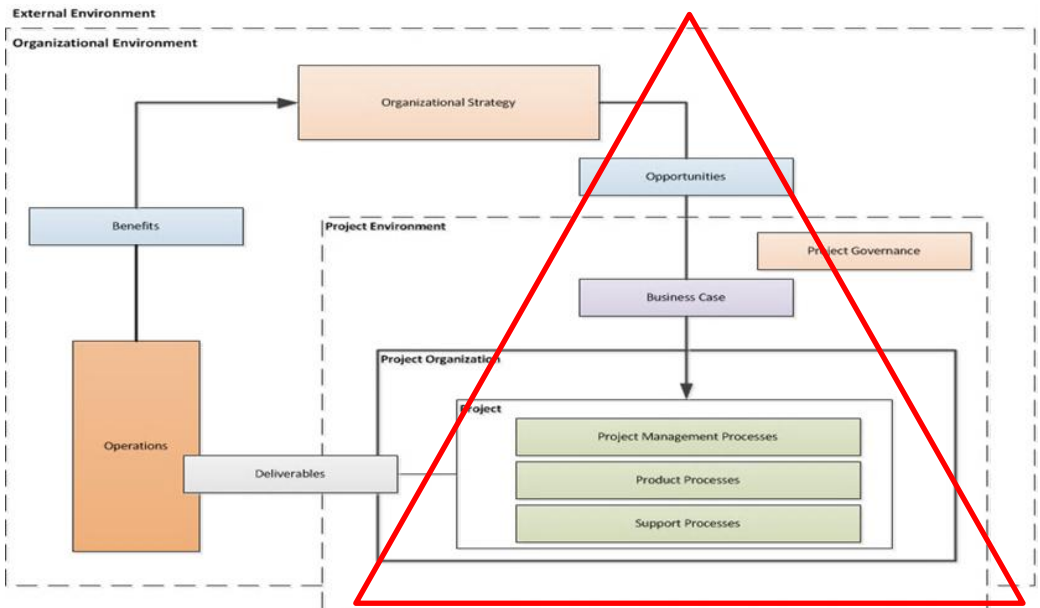
Figure 30

The Project Environment

Project Environment per ISO 21500 [7]

General
The project environment may impact project performance and success.

- factors outside the organizational boundary such as socio-economic, geographical, political, regulatory, technological and ecological*; (PESTLE Analysis)*

- factors inside the organizational boundary include such things as strategy, technology, project management maturity, resource availability, organizational culture and structure.

Factors outside the organizational boundary - may have an impact on the project by imposing constraints or introducing risks affecting

the project. Although these factors are often beyond the control of the project manager, they should still be considered.

Factors inside the organizational boundary - a project usually exists inside a larger organization encompassing other activities. In such cases there are relationships between the project and its environment, business planning and operations. Pre-project and post-project activities may include activities such as business case development.

Sustainability management is most commonly viewed from the perspective of business operations and pertain to infrastructure, operational procedures, and human capital management. From a product management perspective, costing, supply chain, and logistics are the key points of focus. Figure 30 on the previous page depicts the Organizational environment per ISO 21500. The areas inside the triangle are with maybe the occasional exception of opportunities, are often outside the view of corporate social responsibility.

Project Success and Benefits Management

What is Success?

Product Delivery
This is the area that has been historically recognized as being the judge of whether a project has been a success or not. It is concerned with the delivery of the final product within the budget set, within the timescales agreed and to the required specification.

Business Objectives
It is important to define and quantify benefits that are derived from the project in line with corporate strategy. These benefits are realized mainly after the project's end product has been delivered and the project team disbanded.

Even if the project has done all it was asked to do in terms of the end product, the project may still be regarded as a failure if we do not eventually get the benefits that were used to justify the project in the first place.

Management Process

Delivering the project within its specific constraints is one aspect of success, but delivering it using the defined processes within a governed system and administering the project in a set prescribed manner is another. Imagine a long car journey that gets you to the correct destination on time and within budget, but the driver takes very rough dusty roads, almost has an accident and never stops for a comfort break. The driver may consider the journey a great success as it achieved its product delivery objectives. But feeling dusty, car sick and tired in the back, you may have a very different view.

Continuous Improvement

The three previous areas of potential success relate to individual projects. This area is about achieving success time after time as efficiently as possible.

Footprint Reduction

As was discussed earlier, the natural by-product of successful green and sustainability in project management occurs when the four aforementioned criteria results in a reduction to your organization's carbon footprint or dependency on natural or non-renewable resources.

Product Delivery Success

The common link to all constraints within project management.

The three major constraints that are placed upon a project are time, cost, and performance or quality. These constraints and how they are approached determine not only if the objectives are met but to what degree of success they will be. The
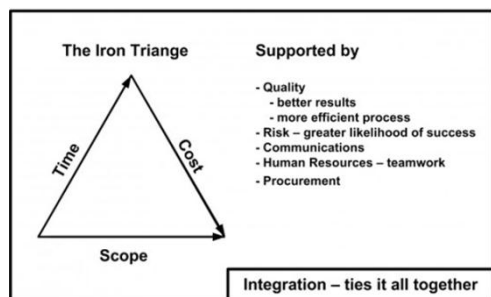

Figure 31

understanding of these limitations early is crucial to assisting with project success.

Success Criteria

Success criteria are measurable at the end of the project, the way that the project delivery is judged. These are typically broken down into three areas.

Time- this parameter is the simplest but you should just bear in mind that sometimes delivering the product early can be as undesirable as delivering it late. Some sources refer to this parameter as the schedule.

Cost - the cost of a project is the thing that customers most often want to fix. But it is also the parameter that is most often exceeded. This inevitably occurs because people do not understand the relationship between the project cost and the other two parameters. One of the major reasons for project cost overrun is a lack of understanding of the true scope of the work involved.

Scope - This parameter is given various names by various sources. Traditionally it has been called Quality and more recently Performance or Specification. Whatever you call it, it is fundamentally about the definition of the end product. The early stages of requirements management are crucial in understanding the needs of the customer.

The use of the term Scope fits better with the modern approach to the subjects of Scope Management and Quality which deals with a lot more than just the specification of the end product.

Throughout the lifetime of a project these three parameters are likely to conflict. The role of the project manager can be depicted as a juggler, trying to balance the conflicting demands for an extensive and ever changing scope in a short timescale at minimum cost.

For any project, priorities must be set and it is a useful exercise to place a project within this triangle to indicate the relative flexibility, or lack of it, in any of the three parameters. The closer the project appears to one of the corners, the more important and therefore less flexible that parameter is. Naturally, the tendency is to want to show that all three parameters are fixed, but as you move the

project towards one corner it naturally gets further away from the others.

Dr. Martin Barnes, Past President of the Association for Project Management (APM), stated in a keynote at the second-day plenary session of the 26th IPMA World Congress on October 30th titled "We can and should raise the standards". [20]

Dr. Barnes's keynote was very engaging and focused on how standards are more than processes. He shared that project management standards are frameworks for activities and provide benchmarks for performance. He shared the story behind the "iron triangle" which has been understood as time > cost > scope = quality

Dr. Barnes, the originator of the "iron triangle" asked everyone in the audience to replace quality with performance going forward as quality was not an appropriate component– performance would make a much better component as projects are so much more about the outcome.
He used a metaphor to make his point.

If a Surgeon contacts a patient after completing a procedure and explains that he accomplished a successful surgery even though it did not cure the patient's illness. As it was on time, in scope, and in line with his fees, it was a quality procedure.

He further simplified his point saying that project success should be determined by the outcome matching the intent. "Does it work?

Success factors

— Senior management support
— Clearly defined goals
— Good communications
— Team motivation
— Strong leadership
— Supports the direction of the organization
  — Financial, Environmental, Social

Success factors are elements of the project context (environment) and management processes that will enable success – or reduce the chance of failure.

Some research suggests that the absence of such factors is more likely to lead to failure and therefore the project sponsor and project manager should identify and address any weaknesses and build on their and the team's existing strengths.

Measuring Sustainable Success.

- Important to trend sustainable impact
- Set baselines
- View projects as cyclical
- Drive sustainability through projects
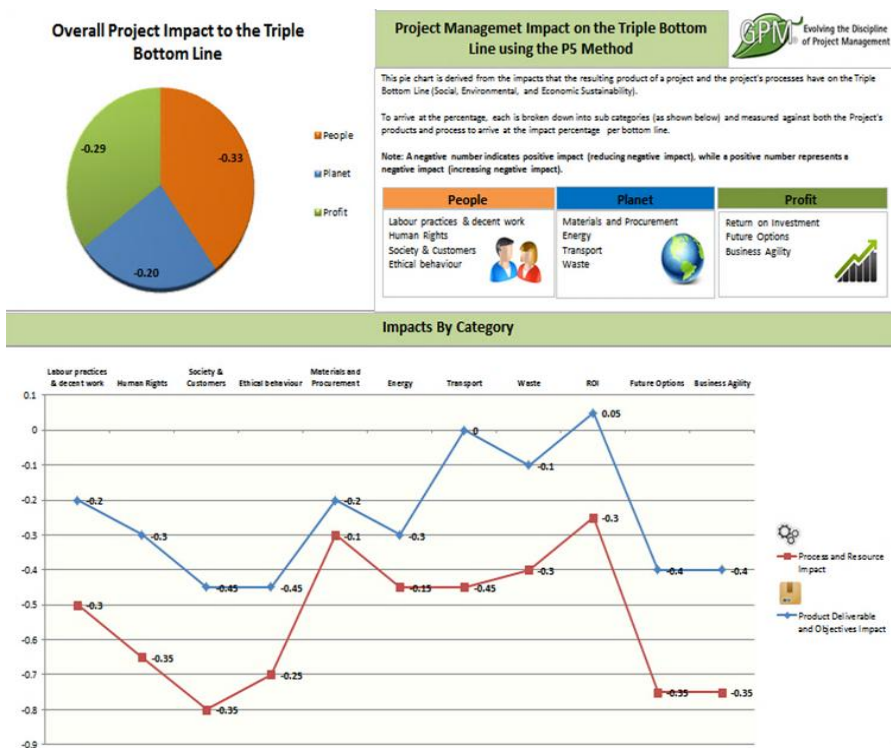
Figure 32

Benefits Management
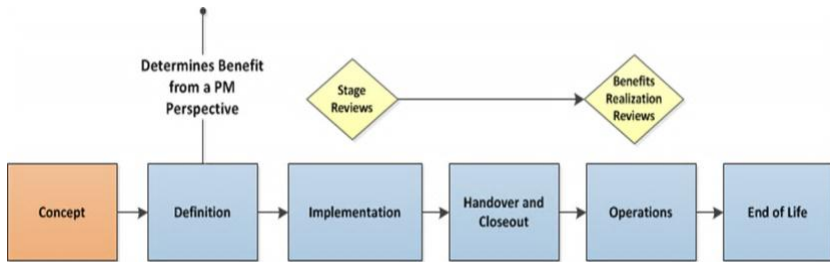
Figure 33

Examples
- Increased market share
- Increased turnover and profit
- Greater output capacity
- larger product portfolio
- Improved security
- Increased staff satisfaction
- Higher Brand position
- Decrease in Carbon Footprint

Benefits Management

Benefits realization is generally the responsibility of organizational management, which may use the deliverables of the project to realize benefits in alignment with the organizational strategy. The project manager should consider the benefits and their realization as they influence decision making throughout the project life-cycle.

The benefit of a project is the quantified and measured improvement resulting from completion of the project deliverables. This will typically be in monetary values but not necessarily. Again, project stakeholders will judge the success of the project in meeting the planned benefits.

The Benefits Management Plan

- Benefits
- Benefits profiles
- Roles and responsibilities
- Tracking and controlling
- Benefits realization reviews
- Supporting methods

The typical contents of a benefits management plan are as follows:

Benefits - The results expected from project deliverables during operation. These should be tangible, quantifiable and measureable.

Benefits Profile- Showing when, where and how the benefits will be realized.

Roles and Responsibilities- The sponsor is responsible overall for achievement of benefits, however other stakeholders will be involved including those working in the business as usual activities. The plan defines the specific roles and responsibilities of each participant.

Sustainability and Benefits Management

Understanding Organizational Goals
- Project Managers must have an understanding of organizational goals beyond project objectives.
- Projects or deliverables that do not align with organizational goals need to be weighted for risk.

Easy ways of staying current are:
- Follow your corporate blog or website
- Subscribe to a news feed.
- Social Media

Team Skills

Team Attributes

> – Focus
> – Motivation
> – Defined Roles
> – Cohesion and trust
> – Shared responsibility
> – Shared values

Team work is when people work together towards a common goal, but cannot achieve the goal alone and must therefore work in collaboration with others.

The project team can be supported by working groups which are delegated work through a single individual. The groups may not share the same objectives as the team. For example: a contractor organization could be managed as a working group or as part of the team.

The management requirements would be different depending on the approach decided in such a case.

The project manager should therefore decide on appropriate teaming arrangements during the planning stage of the project.

Teams tend to develop mutual accountability rather than individual accountability which might be the case in a working group. An effective team is cohesive, aware of the objectives and motivated towards achieving them. Typically, team members are likely to support each other, communicate well, share information, make decisions and work together. When a group develops into a cohesive team they are more likely to outperform other groups.

However, some teams can also become too cohesive, which runs the risk therefore of losing focus on their purpose and objectives.

Team Development

Reinforce Goals
Performance Measurement
Control &Co-ordination

Give Direction
Kick off Meetings
Business Case

Performing   **Forming**

Norming   **Storming**

Reinforce Goals
Develop PMP & WBS
Assign roles
Define plans

Define Goals
Manage Conflict
Teambuilding Workshops
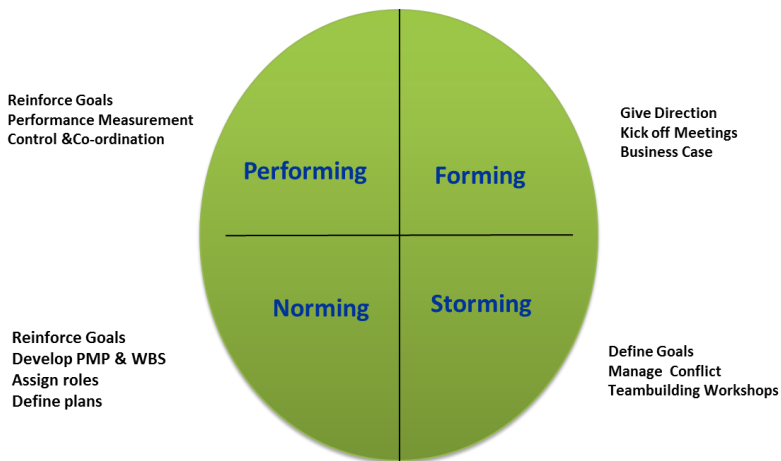
Figure 34

[18]The Forming – Storming – Norming – Performing model of group development was first proposed by Bruce Tuckman in 1965, who maintained that these phases are all necessary and inevitable in order for the team to grow, to face up to challenges, to tackle problems, to find solutions, to plan work, and to deliver results. This model has become the basis for subsequent models.

Tuckman suggested that groups go through stages during development as discussed below. The model shows how a group typically develops. In the beginning they are a group of individuals with different values, goals and expectations. Eventually a group can develop into a team with shared values and expectations.

Key stages are as follows:
Forming – the group is established. Individuals are anxious about their personal identity, role, the impression they make, the attitudes and backgrounds of others.

Storming – conflicts emerge between individuals as they sort out their roles, revealing differences. It is characterized by hostility and disruption.

Norming – the group develops ways of working together, closer relationships are created and camaraderie. The organization, roles and working rules (norms) are established. The framework enables group members to relate to each other and deal with performance issues.

Performing – the group matures and becomes productive. Some groups may get bogged down in earlier stages and never achieve maximum effectiveness.

Adjourning - eventually the group disbands or reforms. In projects this may be triggered by a change. Some may be planned, for example the completion of a stage and will require the cycle to be repeated.

[12] Belbin Team Roles

Strengths and ALLOWABLE weaknesses
As well as the strength or contribution they provide, each Team Role also has an associated allowable weakness: a flipside of the behavioral characteristics, which is allowable in the team because of the strength which goes with it.
For example:
− Plants could be unorthodox or forgetful
− Resource Investigators might forget to follow up on a lead
− Monitor Evaluators could be overly critical and slow moving
− Coordinators might over delegate leaving themselves little work to do
− Implementers might be slow to relinquish their plans in favor of positive changes
− Completer Finishers could be accused of taking their perfectionism to the extremes
− Team workers might become indecisive when unpopular decisions need to be made

R. Meredith Belbin studied teams working on management games and experimented with different mixes of people. He found that teams based on selected high performing individuals did not perform as well as control teams of mixed abilities. Further studies identified that a high performing team requires a complementary mix character roles, each providing specific non-technical skills. Each role type has strengths and allowable

- Shapers could risk becoming aggressive and bad-humored in their attempts to get things done
- Specialist may have a tendency to focus narrowly on their own subject of choice

Human Resource Management

Human Resources Management focuses on the allocation of resources and how to manage them effectively. This knowledge area distinguishes itself in its management of organizational resources, (e.g. training, compensation, stakeholder buy-in) to verify that the appropriate people are placed in the right positions due to their knowledge and experience so that they have the right tools they need to succeed. Human resources management involves "organizing and managing the project team".

This element of project and man management involves developing the suitable roles and responsibilities for each project team member by identifying the needs and qualification requirements of a particular post to manage their work to be completed. These requirements are completed in the Human Resources Planning, the Project Team Acquisition and the Development and Management process areas. The primary role from an environmental or a green project management standpoint in the 'Acquire Project Team', 'Develop Project Team' and 'Manage Project Team' process areas is to provide input and guidance for the areas of training and the qualifications of the right person to manage sustainability concerns based on your EMS and the guidelines set forth in ISO 14001 as well as standards such as ISO 26001, 50001 and 9001.

Ensuring that the correct understanding of the benefits a sustainable approach will make allows the whole team to gain a greater appreciation of allocated resources that otherwise could be considered an expense or a waste.

Projects Controls Principles
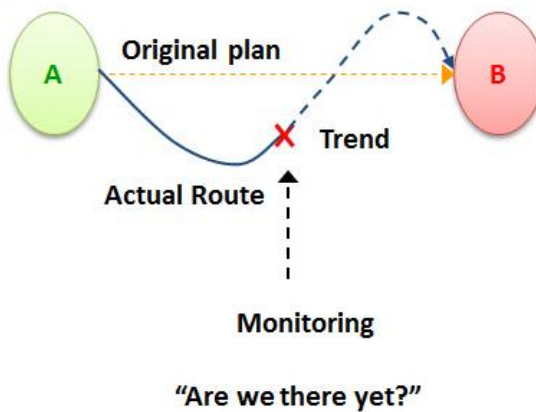
Figure 35

Variances are useful in showing where the project is at any point in time and how far away the project is from the baseline plan. Variances alone will not show how well the project will meet its objectives.

By comparing the current variance with the plan the pro rata effect on the overall parameters can be assessed allowing the completion dates, costs and quality to be forecasted. However, this assumes that the past performance will continue. Also the simple analysis may be misleading if the intervals between measurements are too large.

By tracking performance more frequently, trends can be developed and these may give a more realistic view of performance, allowing the development of corrective action plans.

Earned Value Analysis (covered later) is a particularly useful method since it provides variances, trends and allows the development of what if scenarios.

Projects Controls Process

Effective control involves the comparison between actual performance and the baseline plan. Changes to baseline plans must therefore be controlled.

The purpose of monitoring is to establish deviations and evaluate their impact. Tolerances may be set to enable work to continue with minor deviations.

Control and co-ordination involves the planning and implementation of corrective actions to address adverse situations. Alternatively, it may involve re-planning if the original plans appear to be unworkable or unrealistic.

On completion of all project work, the project is formally accepted. The key control and co-ordination cycle and associated processes are shown in more detail above.

Reporting – the status of the project is reported in accordance with requirements defined in the project management plan and agreed between the project sponsor and project manager.

Monitoring and Evaluation – measuring achievement, identifying variances between the CSCs, problems and establishing the current position.

This enables further analysis to determine trends and predict the final result based on current performance. It is therefore important to establish the root causes of problems and variances to enable appropriate corrective action to be taken. Such analysis can be done by specific techniques such as Critical Path Analysis (time) and Earned Value Analysis.

Corrective Action - there are typically four options depending on the situation:
- if performance is outside the specification but within agreed tolerances, corrective action is taken to improve performance
- if the original plan is no longer representative, the baseline plan may be changed

- if performance is outside the specification (off spec), the variance is escalated to a higher authority
- if the variance is due to unauthorized scope changes, the change process is invoked retrospectively.

Tolerances and Triggers
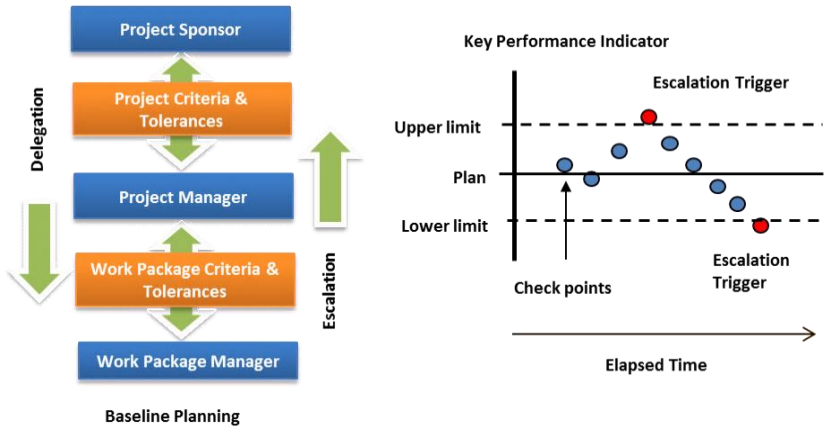
Figure 36

From Figure 36 above, it can be seen that control will be virtually impossible unless objectives are clearly defined and cover all Critical Success Criteria (CSC) including time, cost and quality. For each CSC, Key Performance Indicators (KPI) based on measurable parameters, are defined to support monitoring and reporting. For example, the ratio of the planned completion and forecast completion dates will indicate the health of the project in achieving the time CSC. Tolerances or control limits are defined for each CSC and KPI to provide triggers for escalating off specification situations to higher authorities.

These methods enable work to be delegated to the project team within certain limits. This allows a work package manager to make decisions locally and raise 'off-specification' reports by exception. For example, the project sponsor is chiefly concerned with the business case, benefits and overall CSCs. Outside of regular, scheduled meetings the project sponsor would not be involved in day to day control decisions unless the business case is threatened. By establishing tolerances at the beginning of the project, the project sponsor can leave day to day operations to the project

manager, while being assured that important issues will be escalated to enable intervention as appropriate.

Likewise, the project manager can define CSCs and tolerances when delegating responsibilities to work package managers. This will enable a work package manager to take decisions locally and to escalate off-specifications to the project manager as soon as they arise.
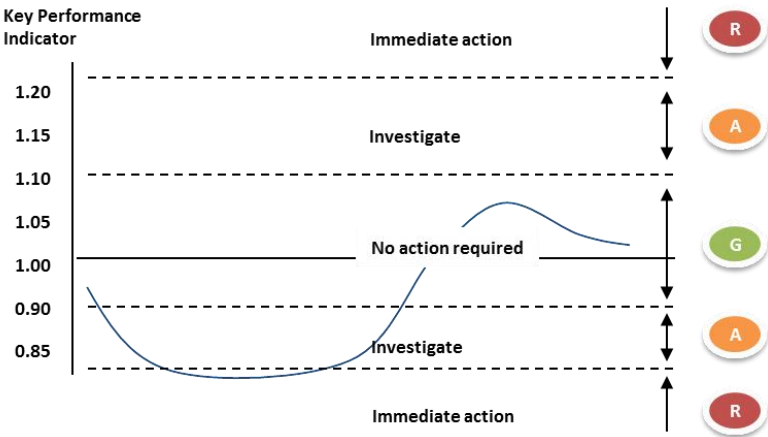
Figure 37

The Key Performance Indicator and tolerances may also be used to indicate appropriate action as shown above.

In this case tolerance zones have been defined and identified through a color coding system. This is sometimes referred to as RAG reporting after the colors of traffic lights.
Within certain limits the status is green. Greater movement away from the original plan gives a status of amber (A) and high deviation shows red (R), often known as stoplight.

Methods and the Life Cycle

- – Process descriptions for each phase of a Project Life Cycle
- – Inputs and Outputs for each process
- – Documentation guidelines and templates
- – Guidelines for organization design, accountability, responsibility and communication
- – Role definitions for all those involved in the Project, including the Project Team
- – Procedures to be used throughout the Life Cycle, for example Value Management, Risk Management, Quality Management, Issue Management, Change Control and Configuration Management.

The use of a Standard Method or Procedure has a variety of Benefits:

- – Providing a consistent approach to all projects within the organization, leading to a better development of projects and governance of Project Management.
- – Creates an environment for developing Continuous Improvement in Project Management processes.
- – Gives common understanding of roles within the Project Team and Stakeholders.
- – Consistency and Continuous Improvement.
- – Common Understanding between the Project Team and Stakeholders.

Procurement Management

- Acquisition
- Contracts
- Firm Fixed Price, Fixed Price
- Cost plus Incentive
- Cost plus Fixed Fee
- Cost - reimbursable
- Changes & Variation Orders

Procurement is the process of acquiring new services or products. It covers the financial appraisal of the options available, development of the procurement or acquisition strategy, preparation of contract documentation, selection and acquisition of suppliers, pricing, purchasing, and administration of contracts. It may also extend to storage, logistics, inspection, expediting, transportation, and handling of materials and supplies. It may cover all members of the supply chain. Operations and maintenance, for example, often need to be supported by a 'supply chain' management process.

There are a number of general types of contract and payment structures:
- Firm fixed price
- Fixed price
- Cost plus incentive fee
- Cost plus fixed fee
- Cost-reimbursement

Although these are general definitions, most contracts include specific clauses defining cost and profit/fee payment terms.

Procurement Process
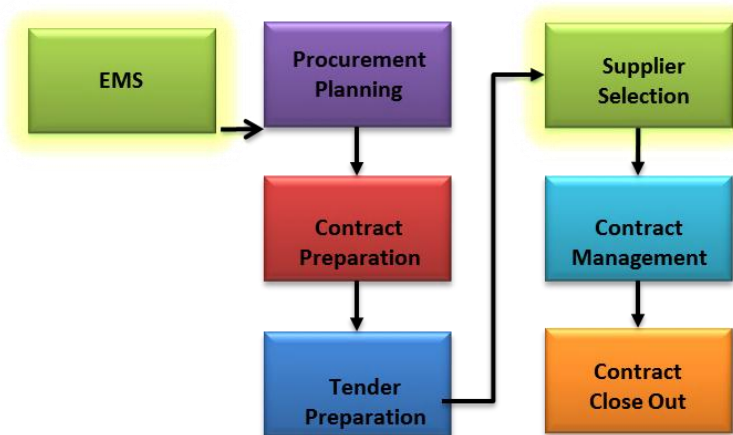
Figure 38

The procurement process starts with the decision of whether to procure goods or services and finishes with the closure of the contact. In principle, it is a relatively simple and intuitive process but it requires sound commercial and legal skills. Getting it wrong even at this early phase could spell disaster for your project.

Procurement Planning

As with any other aspect of project management, the first thing you need to do is plan your approach. The host organization may already have existing policies for procurement and where at all possible the project or program should adhere to these. The best case scenario is to have organizational standards as well as an environmental management plan that complement each other.

Contract Preparation

There are many different approaches to the customer/supplier relationship and you will need to consider which one is best for each contract based on its own individual merits. This will include how you would like the contract to be priced and what form of legal contract you will employ.

Supplier Selection

Selecting the right supplier is obviously of vital importance to the success of your project or program. Tenders can be assessed qualitatively or quantitatively. Whichever method you choose, the cost must be balanced against value and this should include whole life costing, that guarantees insurances, rather than just the initial price.

Appointing a supplier will inevitably include contract negotiations for which the project manager needs to have at least a basic understanding of contract law but in general should seek assistance by employing legal specialists within this area.

Tender Preparation

The first steps in preparing a tender include ensuring that we have the clearest possible statement of requirements for all the suppliers to bid against while having also decided the categories and how best to evaluate the tenders.

Contract Management

Once your supplier is in place, you will need to manage the contract. This can include all the negotiation, leadership and conflict management skills that you use to manage an in-house team but will also need the legal awareness to understand the relationship between the different parties.

Contract Close Out

Throughout the project, contracts will eventually come to an end. When they do, these need to be formally closed with the final accounts being paid and any follow on actions agreed and having any maintenance arrangements in place.

Contract vs. Risk
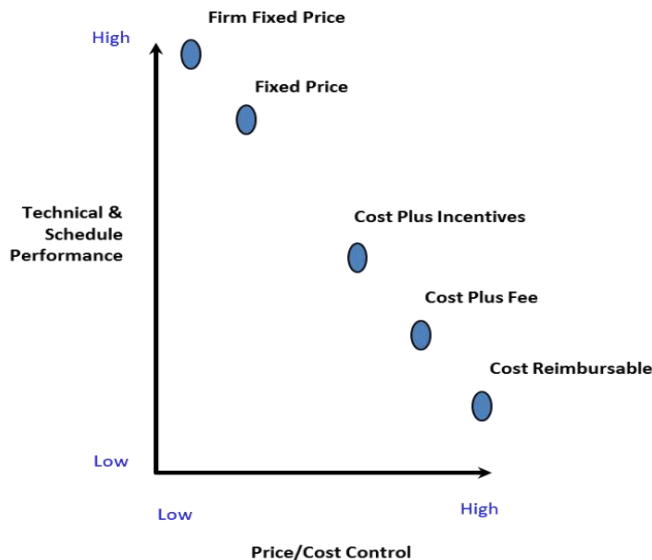
Figure 39

The trade-off between contract pricing terms and their associated risks are shown in the diagram.

Firm and fixed price terms will minimize the risk of price changes. However, technical and schedule performance are at greater risk since a contractor is likely to de-scope work or change delivery schedules to minimize the impact of overspends.   Additional contract terms may be needed to prevent changes to scope and timescales.

Cost plus and Cost reimbursable contract terms allow price changes to accommodate variations due to technical and schedule factors. For example, additional work to ensure that a product achieves a certain specification, additional costs such as premiums to ensure materials are delivered by a certain date. Contracting organizations using these contract terms generally need visibility of the contractor's detailed costs, changes and methods used to ensure an appropriate level of control.

The type of contract used should be selected on the basis of the risk to project critical success criteria and their relative importance. For

example, Firm and Fixed Price contracts work best for off-the-shelf products where the technical risk is low. Cost Plus contracts are useful where the technical scope is uncertain and risks unknown. Cost are typically controlled within spend limits and by using stage gates to authorize release of funds progressively to the project.

Procurement Plan

— Strategy
— Products Required
— Quality Requirements
— Supplier/Contractor Selection & Control
— Quality Planning Requirements
— Regulatory Requirements

The Procurement Management Plan shows how acquisitions, materials and services will be managed during the project life-cycle. The project manager owns the procurement management plan, which typically forms part of the project management plan.

It should indicate:
— The overall procurement strategy: make/buy; competitive tendering; supply chains and relationships; etc.
— Key products to be purchased, their source; acceptance criteria and relevant quality assurance requirements
— Methods used to evaluate, select and control suppliers and sub-contractors
— Contractual terms and conditions including typical clauses such as: product acceptance and delivery terms; payment terms; compensation terms e.g. liquidated damages; intellectual property rights (IPR); change control; indemnity; dispute and termination
— Requirements for and reference to supplier and sub-contractor quality plans where appropriate
— Types of pricing and methods of reimbursement
— Methods to be used to satisfy legal and regulatory requirements which apply to purchased goods

Procurement Selection Process

- – Define Procurement Strategy & Requirements
- – Research the market & identify potential suppliers
- – Check track record/capability & shortlist
- – Invite Tenders
- – Evaluate Tenders
- – Select Supplier & Negotiate Contractual Terms

Procurement Strategy and Requirements – decide an appropriate strategy, such as competitive tendering, partnering, collaboration, etc. Define requirements including quality, time and price parameters.

Research market & Identify Potential Suppliers – identify potential suppliers. Research methods: mail-shots, business directories, industrial libraries, trade journals, networking.

Check track record/capability & shortlist – investigate supplier's ability to achieve the procurement requirements. Develop a shortlist to reduce tender evaluation effort and costs, using criteria such as price, quality, delivery time scales, support capability, contractual terms and arrangements, and risks.

Invite Tenders – request suppliers submit proposals and tenders. Any subsequent technical or contractual questions from suppliers will be answered. The tender evaluation team is likely to decide the final criteria for selection.

Evaluate Tenders – against the pre-defined criteria. It may be necessary to ask suppliers follow up questions to validate or cover missing information, understand risks, etc.

Select and Negotiate Contract Terms – selected supplier(s) will be invited to negotiate a contract. A final decision on the supplier will be taken and the contract agreed and signed.

Evaluation and Selection Criteria

The main criteria for evaluating bids would be drawn from the project Critical Success Criteria, Specific Procurement Requirements and Performance required from the supplier.

Examples:
– Price – linked to the overall project cost budgets
– Quality – requirements of project deliverables
– Timescales – linked to overall project timescales
– Supplier delivery dates
– Contractual Terms -including payment arrangements
– Incentives and Guarantees
– Cost of in service support - such as spares and maintenance
– Risk Management capability
– Resource and mobilization capability
– Quality Management capability
– Responsiveness to changes
– Sustainability Factor

Green Supplier Selection Criteria

Decision Model	Weight	vendor 1		Vendor 2		Vendor 3		Vendor 4		Vendor 5		Legend	
Criterion	Weight	Rating	Score	Rating	Score	Rating	Score	Rating	Score	Rating	Score	Description	Rank
Amount of recycled materials in their products	0.2	1	0.2	3	0.6	2	0.4	1	0.2	1	0.6	Not thinking to	0
Products can be recycled	0.3	2	3	2	0.6	2	0.6	2	0.6	0	0	Not yet but workin	1
Products are energy efficient	0.1	4	0.4	4	0.4	4	0.4	4	0.4	2	0.8	Somewhat	2
Product is harmful to the environment	0.2	1	0.2	1	0.2	3	0.6	3	0.6	3	0.6	Most	3
Has an active environmental management policy	0.1	2	0.2	0	0	1	0.1	2	0.2	1	0	Yes!	4
Customer Service Capabilies	0.1	2	0.2	3	0.3	2	0.2	1	0.1	3	0.9		
Total	100%	12	4.2	13	2.1	14	2.3	13	2.1	10	2.9		

Figure 40 The Green Vendor Scorecard

Green supplier selection criteria may be developed with intent of focusing on meeting government regulations, focusing on process improvement, and focusing on buying company's environmental policy.

Quantitative environmental criteria:
These criteria are based on the cost in monetary terms. A potential supplier may incur costs investing in environmental management of its processes or it may be a source of environmental costs because of its destructive processes.
– Pollutant costs/effects: Representing environmental costs caused by a potential supplier.
– Improvement cost: Represent the degree of commitment the supplier has in environmental management.
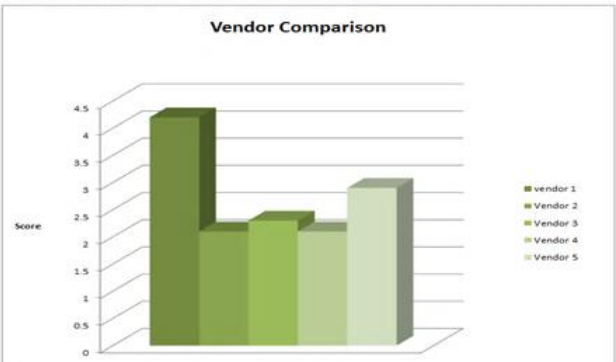
Qualitative environmental criteria:

Figure 41

These are more subjective criteria and their application depends on the weight given to each one depending on its importance to the organization or industry and total points score obtained on the bases of the measured parameters.

– Management competences
– Green image
– Design for Environment (DFE)
– Environment Management Systems
– Environment competencies

Assigning a scoring method to different aspects of EVM based on Environmental factors will provide a model of projecting and measuring project performance based on sustainability. If you are analyzing cost, simply rate your suppliers based on environmentally impacting criteria to arrive at what would be the best value. The criteria could be different depending on the industry. In the chart, Vendor #5 had the highest rating. By choosing this vendor, each dollar spent will have a sustainability rating of 2.6 Not too bad.

On the flip side
If ABC Car Company built hybrid automobiles that got an estimated 60 miles per gallon and could run on electricity for 100 miles between charges it would be the world's foremost "green" car. If the same manufacturer purchased parts from suppliers that had sustainability factor per this chart of 0 even though another supplier had equally comparable products from a performance standpoint but scored a 3.

Contractual Relationships

Figure 42

- To control adverse impact of uncontrolled changes
- To enable beneficial changes
- To communicate changes to stakeholders
- To maintain baselines for effective control

Organizations may have long standing supplier relationships both informal and formal that may need to be taken into account by the project.

The project may introduce the organization to new procurement relationships and constraints.

Terms:

- Alliancing
- Partnering
- Prime or lead contractor
- Private Finance Initiative
- Public Private Partnership
- Sub contract
- Supply chain management
- Turnkey contract

Cost Management
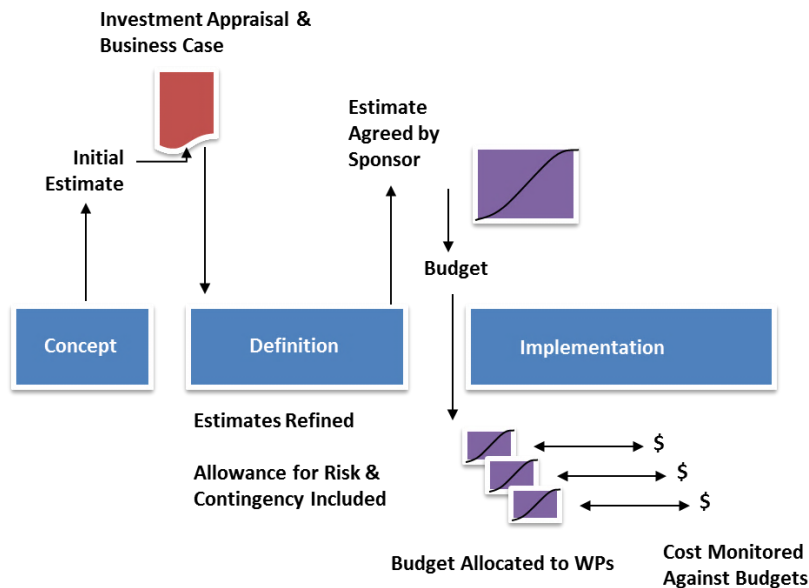
Figure 43

Figure 43 shows an overview of the process for developing budget from estimates and monitoring costs.

Initial estimates are used to support investment appraisal during the Concept phase. These are refined during definition as more detailed information becomes available. This is typically an iterative process which is done alongside the development of baseline plans. When the estimates have been accepted by the sponsor, they become the budget.

This budget is allocated to the work packages in a project in line with estimates. During implementation costs are monitored against the budgets and controlled.
The cost breakdown structure is a hierarchy typically derived by mapping the work breakdown structure against the organization's system of cost accounting.

The integrated structure allows costs budgets to be allocated to each work package in line with the work to be undertaken and the time and quality objectives to be achieved.

Summary levels are produced to show the overall project spend profile corresponding to the cost breakdown structure.

The system enables costs for each work package to be broken down into each cost type to provide greater visibility and control, such as labor types, materials and expenses.

Project Cost Plan

A project cost plan (or phased cost plan) shows planned spend against time, usually based on a fully resourced bar chart which includes material purchases, sub contract and labor expenditure.

Spend Profile – the project timescale is divided into financial periods (typically months). Estimates for different cost categories are spread against each project activity. The values of each cost category are summed for each financial period (Period Costs). The period costs are accumulated for each financial period to produce a spend profile ('S' curve).

Cost Categories	Project Months						
	1	2	3	4	5	6	Total
Resource A	50	75	75	100	100	40	440
Resource B	30	40	40	40	40	20	210
Resource C	50	100	100	50	50		350
Total labour	130	215	215	190	190	60	1000
Materials		50	50	50	50	100	300
Sub Contracts		30	100	250	150	50	580
Expenses	10	20	20	20	20	20	110
Period Costs	140	315	385	510	410	230	1990
Cumulative Cost	140	455	840	1350	1760	1990	

Budget at Completion

The plan is typically produced at work package level. Summary levels are produced to show the overall project spend profile corresponding to the cost breakdown structure.

Planned Committed Costs – are costs that have been formally committed and which will eventually be included in the final project cost. For example, orders placed for which goods have not yet been received or invoiced. A cost plan may also show the planned commitments based on the expected dates that orders will be placed. This can help to determine the level of financial exposure at any time and is useful in risk analysis and decisions.

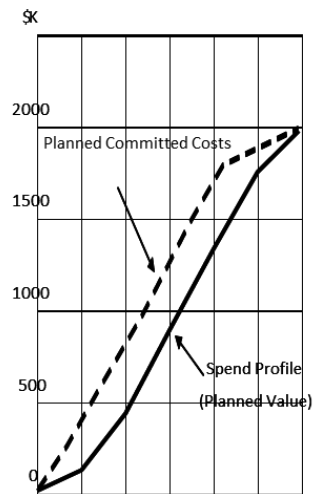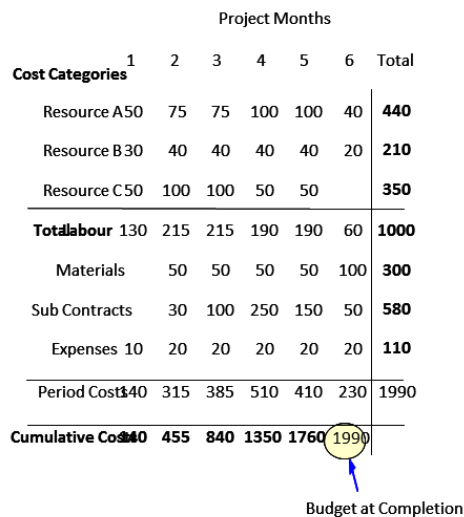The spend profile (S curve) is used to monitor cash flow and expenditure.

Figure 44

The S curve - shows the amount of spend up to the total budget against the project timescales. Thus the planned spend at any time in the project can be determined by reading the appropriate cost value at the corresponding time.

Actual Costs – are costs that have been charged to the project. For example, invoices paid to contractors, bills paid for materials purchased; charges for labor. Actual costs are monitored and compared to the S curve.
On the above example, actual costs exceed the spend profile at time now (the reference date for the analysis, e.g. end of financial period). This may indicate that the project is overspending. However, it could also indicate that work is being done more quickly than planned. To understand the current status and predict the outcome requires an understanding of the useful work being accomplished for the costs incurred, which can be done effectively through Earned Value Analysis.

Benefits of Cost Management
- More likely to achieve Budget
- Control expenditure within Ability to Pay
- Control cash flow
- Learn Lessons
- Improve Estimating Accuracy

Project Costs

There are typically four types of costs that will be incurred by a Project Manager as they work through the logical network of work packages.

These are:
- **Committed Costs** – Where a placement for an order for work to be done has been made, but the work is yet to be started. This money has already therefore been allocated to the resource and cannot be used by the project for anything other than that payment.
- **Accrual** – Work that has been done by the contractor, but for which the project has not yet paid but will be doing in the near future.
- **Actual** – Real expenditure that has left the budget and has already been spent.
- **Forecast Out-turn** – The total of Committed Costs, Accruals and Actual costs plus the estimate of the costs remaining in the work packages left to complete the project.

Earned Value Management

Pre-Requisites to EVA

- WBS
- Defined responsibilities
- Distributed budgets as WBS
- Authorized work scheduled
- Method for measuring achievement
- Budget phased over time
- Baseline plans
- Cost recording
- Performance data collection and analysis methods
- Forecasts for remaining work

For Earned Value Management to be carried out most effectively, many pre-requisites must be in place before attempting to carry out the calculations, measurements or reports.

These include:
- A detailed and robust WBS where the budgets have been distributed correctly.
- Defined responsibilities for all the team members involved within the EVM activity.
- A baseline plan with a fully authorized work schedule.

- A recognized method for measuring achievement of the task being carried out for EVM.
- A budget phased over time within the work packages.
- Baseline Plans fully authorized
- A cost recording mechanism in place.
- Performance data collection and analysis methods.
- Forecasts for remaining work must be in place and methods to do so.

Earned Value Parameters

Earned Value

Value of useful work achieved at specific time based on performance measurements

Planned Value

Value of work planned at specific time taken from baseline estimates and schedules

Actual Cost

Costs for work accomplished – i.e. bills, invoices, etc.
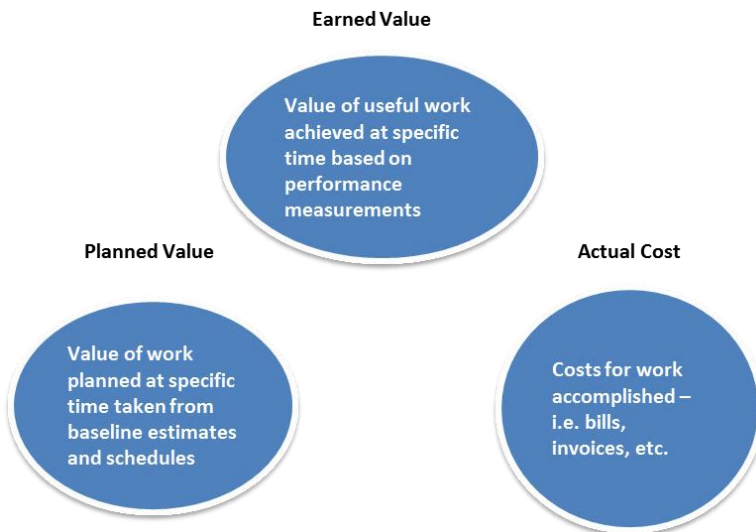
Figure 45

Earned Value Analysis (EV) uses the measurement of useful work (earned value) that has been accomplished to enable comparison with the planned value and actual costs at any time in the project. This provides an instant health view of the project and enables variances to be established showing areas that are under achieving in terms of cost and schedule. It also enables schedule and cost efficiency to be calculated in terms of useful work as a ratio of planned work and actual costs incurred. Performance Indices can be used for trend analysis and prediction of forecast completion dates and costs.

There are three key parameters in Earned Value Analysis:
Planned Value – this is developed by scheduling activities and their budgets against project timescales. The Planned Spend is typically represented by a spend profile or 'S' curve that shows the planned spend against time.

Actual Cost – the actual costs charged for the work accomplished. Actual costs are taken from bills, labor booking and invoices for materials, sub contract work etc., as recorded in operating accounts.

Earned Value – a measured value of the work completed (or performed) based on the percentage progress and the budget for the completed activity.

All three parameters must be **synchronized to the 'Time Now' date** to prevent inaccuracies.
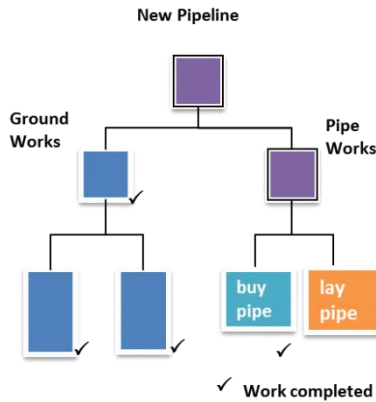
EXAMPLE

Figure 46

The principles of Earned Value Analysis can be illustrated through a simple example as shown.
The project objectives are to lay a new pipeline. The work has been broken down into two areas: Ground Works and Pipe Works. Ground works has been completed. There are two work packages in the Pipe Works. The first, 'Buy Pipe' has been completed and the

pipe has been delivered to site. The other work package 'Lay Pipe' has been in progress for two weeks.

Here are the key objectives and parameters for the 'lay pipe' work package:

Estimated cost for laying pipe	**= $100 per meter**
Length to be laid	**= 1000 meter**
Thus total budget allocated	**= $100K**
Duration for WP	**= 8 weeks**
Quality	**= No leaks**

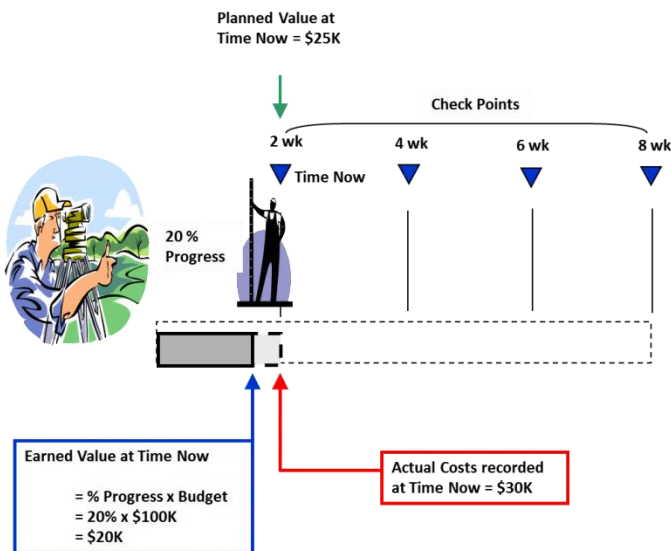## Earned Value Measurement

Figure 47

Based on the Image above:

After two weeks (Time Now) the work package manager reviews progress.

The manager is expecting 25% of the work to be completed at Time Now. This is based on the estimated spend over two weeks. Since

the budget for all of the work is $100K, the value for 25% of the work is $25K assuming a linear rate of spend.

At Time Now the manager also checks the accounts and finds that $30K has been charged to the work package. However, also at Time Now, the manager checks the surveyor's report which shows that 20% progress has been achieved.

From this initial inspection and measurement we can now identify several key pieces of information that are needed for our EVM calculations.

Earned Value Measurement - Example
Total Budget: $100k
Total Duration: 8 weeks
EV: $20k
PV: $25k
AC: $30k

The manager can now complete the analysis.

The first task is to calculate schedule variance. This will indicate how much the project is off-spec in terms of time.

Schedule Variance   = Earned Value – Planned Value (SV = EV – PV)
               = $20K - $25K
               = - $5K

The next task is to calculate the cost variance. This will show how much the project is off-spec in terms of cost.

Cost Variance   = Earned Value – Actual Cost (CV = EV – AC)
            = $20K - $30K
            = - $10K

Note that the formula in both cases begins with Earned Value and that negative values reflect under achievement.

From the above we can see that the project is behind schedule and overspending. Further analysis will provide predictions of the time and cost at completion.

The variance calculation will have given the Project Manager a good idea of what state his work package is in, but it is restricted to that work package and cannot be used to compare across other work. An alternative and more acceptable method of measurement is based on performance indices. In this case the likely outturn in time and cost terms may be calculated by applying the ratios of useful work done to planned values and actual costs, to the original

planned duration and overall budget. These ratios are called the schedule and cost performance indices (or indicators).

The performance indices are calculated as shown above. Note that in each case Earned Value is the quotient (on top).

The following formula will enable the forecast duration to be determined, based on current performance:

Forecast duration = Total Duration / SPI

= 8 weeks/0.8

= <u>10 weeks</u>

Similarly, the estimated cost at completion may be derived from:

Forecast Cost   = Total Budget / CPI

= $100K/0.67

= <u>$150K</u>

Future Performance

Nature of future work is different to completed work

Future activities are easier or more difficult than completed activities

Future performance may be different to current performance

Proactive measures are taken to recover variances

Completed work includes non-recurring elements

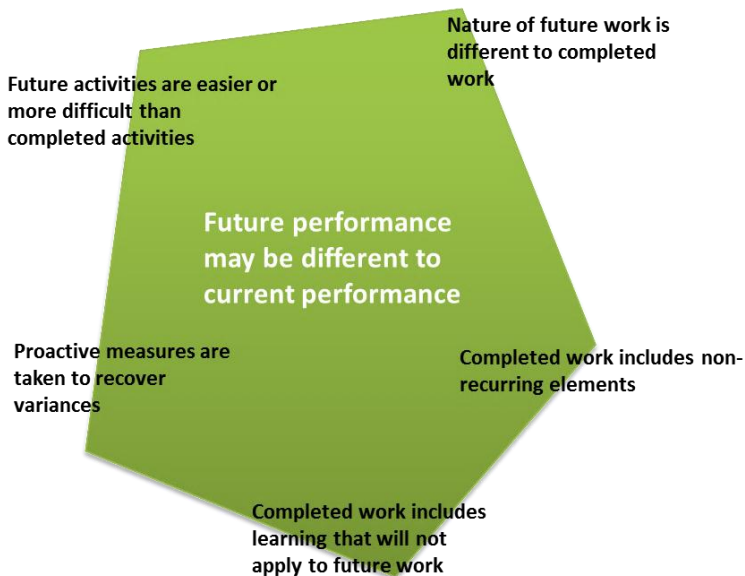Completed work includes learning that will not apply to future work

Figure 48

Past performance may in some cases be an appropriate indicator of future performance. However, this is not always the case as the

nature of the work may have changed or you may have completed the more difficult tasks in the early stages. In these cases it will be necessary to use a different Performance Index for future work compared to that derived from completed work.

For example, the Estimated Cost at Completion can be calculated as follows:

EAC = Actual Cost + Estimated Cost to Go / CPI

In these examples you can either be given the CPI as a guide to see how this could affect the outcome of the project, or alternatively you could be asked to calculate the cost efficiency needed to come back on budget.

Advantages of EVM

- Measures the efficiency of work in progress
- Provides auditable and repeatable answers to:
    - Current performance
    - Future out-turn predictions
    - Future performance improvement needs
- Provides reliable information to aid decision making
- Facilitates trend analysis
- Provides data for future estimates of similar work

There are a number of advantages that can be gained by the correct use of EVM.

It provides an application to measure the efficiency of work in progress.

As well as an auditable and repeatable answer to:

- The project's current performance
- How the project is predicting to be completed (Future out-turn)
- A guide to the Project Manager as to the future performance improvement needs
- Quality EVM provides reliable information to aid with decision making
- It facilitates trend analysis to see how things are starting to change and how this may change the end result

– Provides data for future estimates of similar work so therefore helping with lessons learned and continuous improvement

Disadvantages of EVM

– Because the technique takes a whole view, over-performance in one area may hide under-performance in another
– EVM requires considerable data administration and effort
–

Change Control

The Need for Change Control

– To control adverse impact of uncontrolled changes
– To enable beneficial changes
– To communicate changes to stakeholders
– To maintain baselines for effective control

Uncontrolled change is seen as one of the major causes of project failure. It is inevitable that changes to the project will be required because the environment has changed or that a better solution to the original problem has been identified.

Change should not be stifled but it should be controlled. Uncontrolled changes will undermine the validity of baseline plans and forecasting. Any proposed and authorized changes should be clearly and swiftly communicated to the stakeholders to ensure that there is no misunderstanding on what versions or what specifications the project is working to. This is why Change Control is so closely linked with Configuration Management.
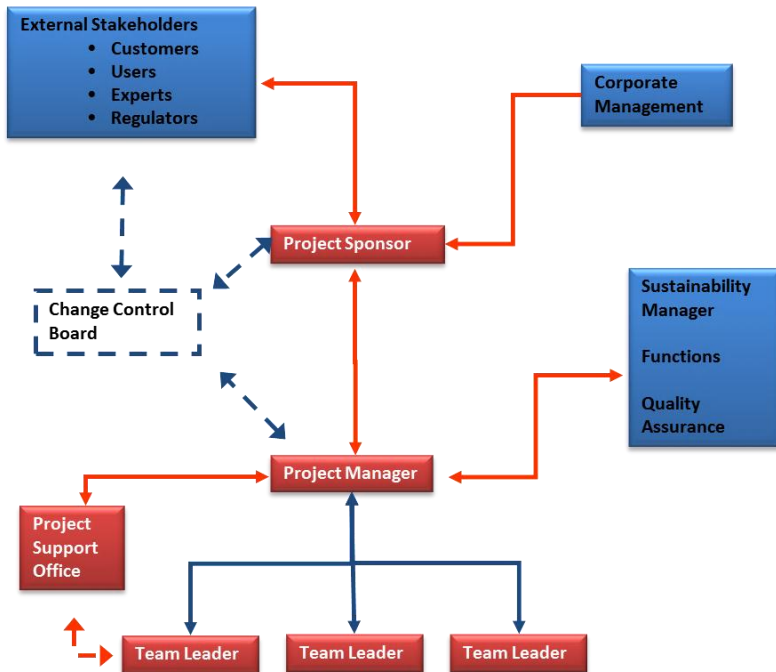
Roles and Functions

Figure 49

Project Sponsor – has overall responsibility for authorizing changes internal changes and for co-coordinating external changes. External changes may be raised by clients, or arise through a change in the organizations overall business strategy through other external stakeholders such as regulators.

The sponsor may delegate some authority to a Change Control Board or the project manager.

Change Control Board – in complex projects involving many key stakeholders it may be appropriate to establish a team with responsibility for approving or evaluating changes and making recommendations for approval.

Project Manager – is responsible for defining the change and configuration management process for the project and for agreeing authorization limits, tolerances and priority categories with the

sponsor. The project manager wills co-ordinate and control changes throughout the implementation phase.

Project Team – may raise changes where appropriate to address problems, be involved in change management activities such as assessment and will implement the changes as approved.
Project Support Office – are likely to carry out the day to day change management processes, provide support during impact assessment, planning and implementation.

Change Control Process

Figure 50

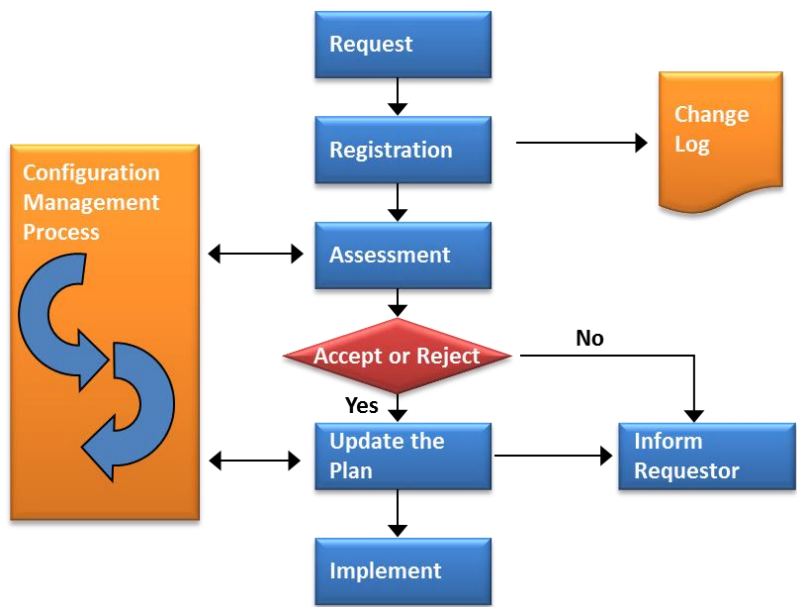**A simple change control process is shown in Figure 50.**

Request may come from any project stakeholder. Changes requested by external stakeholders may be subject to contract conditions or agreements.

Registration - requests are usually formally made on a change request form and recorded in a change register (log). This records

key information such as requestor, date, description of change and priority.

Assessment – changes are assessed for impact on project objectives using the Project Management Plan and the Business Case as a baseline, and effects on configuration items (through the Configuration Management Process). The costs of processing the change itself should be taken into account. This stage will produce an estimate of cost, time and quality impacts.

Acceptance – the change is evaluated, accepted, rejected or deferred. The authority for this decision may rest with a special group called the Change Control Board – a group of stakeholders that may be given responsible for approving, rejecting or recommending changes. The terms of reference for this group should be defined in the Change Management Plan. Changes may be authorized by the Project Sponsor, the Project Manager or others as defined in the terms of reference and depending on the nature, priority and impact of a change.

Updating Plans & Implementation – baseline plans are updated to record changes to management and implementation documents, and the approved change is implemented.

Change Request

The two main forms used are the Change Request Form that documents the history of a change from origination to conclusion, and the Change Register or Log that records summary details of all project changes in order to communicate their current status to stakeholders.

The Change Form is typically completed in four stages.

Figure 51

Change Description - is completed by the originator and contains title information, description of the change, originator details, the date raised, and priority. The benefits and reason for the change are also included in this part.

Impact Assessment -is completed by change assessors to detail the impact of the change in terms of cost, time and quality, and propose recommended actions to implement the change. Further information may include any consequential risks arising, implications for project stakeholders, or any effects on delivered items.

The assessment should be completed against the P5 Matrix.

Authorization -records the approval including authorization signatures and any conditions or additional comments on the change.

Summary information - entered in the change form is read across to the risk register to inform project stakeholders of progress.

Configuration Management

Purpose
- To define the physical and functional characteristics of deliverable and management products, including their components and related documentation
- To control changes to products and their components to ensure physical and functional compatibility and integrity

The configuration of an item defines what it is (physical characteristics) and what it does (Functional Characteristics). Configuration Management is the planning and control of product configurations including functional and physical characteristics.

Configuration Management begins as the first products are identified and produced and continues throughout the life of the product. Configuration Management continues through the Implementation, Operational and Termination stages of project.

The purpose of Configuration Management is to ensure integrity of the products in terms of their description (specifications), their physical form and their functionality. It covers components of a product and their configuration control to ensure that each component performs its function within the product.

Configuration Management Plan – owned by the project manager, and developed as part of the Project Management Plan to provide guidance on the configuration policy, objectives and processes.

Configuration management is undertaken alongside the change control process and involves four main activities: Identification, Control, Status Accounting and Auditing.

The Configuration Process
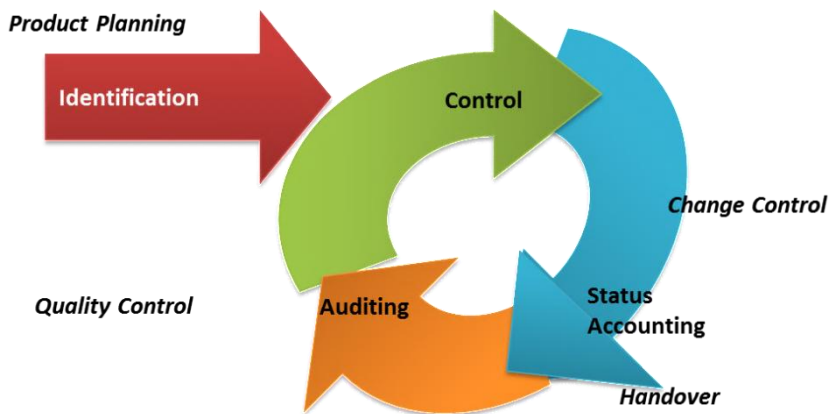
Figure 52

Configuration Identification – products that are to be controlled are called configuration items. The Product Breakdown Structure is used to identify configuration items. Each item is given a unique reference number.

Control - once the configuration item comes under control, it is 'Frozen'. This commonly used term means that the change process must be applied before the configuration of the item can be changed. Changes will only be made if authorized. This prevents ad hoc changes and ensures that changes can be traced during the life of the configuration item.

Status Accounting – once a change is approved the status of the product is recorded as it changes through any modification or changes. A log is used for the purpose of recording and tracking the

history of all changes to the item. The task is normally performed by a configuration librarian.

Auditing – This involves quality checks to ensure that all items conform to each other. For example, that each product conforms to a technical specification; each component in a system is compatible with others. It also ensures consistency and that relevant quality assurance procedures have been implemented.

There are two main groups of products: deliverables that are used during operation and **management products** that are produced during the project for development and management purposes, but not delivered to users.

The items to be controlled are identified by the project team and approved by the project manager. Other stakeholders may also be involved in identification including operators and users.

A **Configuration item** is a product or component controlled by the configuration management system. A configuration item can only be changed through the formal change process.

The example shows how the deliverable system is broken down into its components. At each level the component characteristics are defined in a component specification. Configuration management must ensure that all components will work effectively as part of the system, that the system achieves its performance and that each specification accurately describes the characteristics of each product.

Communication Skills

Communication Planning

> — Information Requirements
> — Communication Mechanisms
> — Frequency of Distribution
> — Information Sources
> — Information Processing and Collation
> — Roles & Responsibilities

Primary forms of communication
— Verbal
— Body language
— Written

Environment
A Project Manager depends on a communication network. This may be formal or informal.

Channels of communication
— Active
— Passive

When developing a Communication plan, the first step is Stakeholder analysis. It is important to know what your audience wants to know, when they want to know it, how they want it presenting and how often they want it.

The Project Manager must understand where their information is coming from and if they are receiving any assistance in collating or collecting the information. One last consideration is to understand how as a Project Manager you will approach the dissemination of unexpected information. The majority of this time the news is bad, knowing your team and trying to anticipate their reaction needs many hours of team development and understanding by the Project Manager.

Barriers to Communication
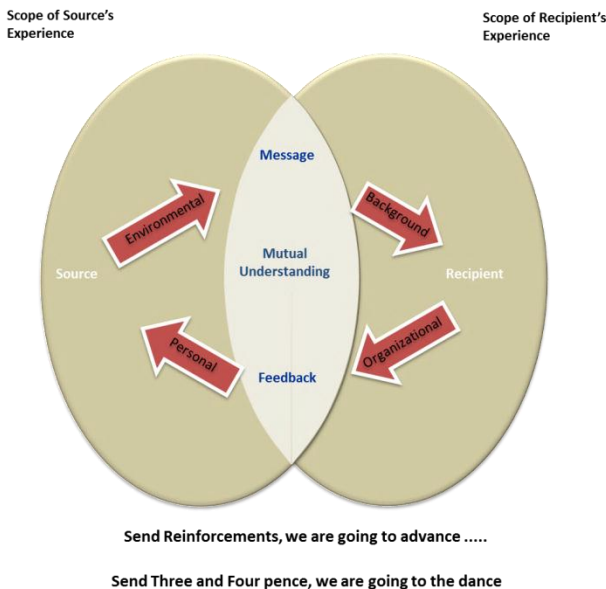
Figure 53

Barriers to communication
In the model above there are in effect four potential barriers.

Environmental - Noise, temperature and air fall into this category

Background – individuals are influenced by their technical, social and educational backgrounds. It is also important to consider social and cultural differences.

Personal - Tiredness, hunger, thirst, etc. any affect ability to communicate well. Permanent or temporary loss of vision, sight, hearing, etc. can have an impact on sending and receiving communications. Personal prejudices also have an impact.

Organizational - The relative position or status of the individual will clearly have an impact. For example, individual to peers, individual to boss, individual to subordinates. These relationships may affect the quality of the communication process.

Communication Responsibilities

Benefits
Risks
Environmental Factors
Users
Corporate Management
Business Case
Changes

Achieving Success Criteria
Key Performance Indicators
Project Risks
Improvements
Focus & Motivation
Integration & Co-ordination

Sponsor

Sustainability Manager

Longer Term

Day to Day

Figure 54

The main communication responsibilities for the Project Sponsor and Project Manager differ.

In essence the Project Sponsor is mainly concerned with the longer term, i.e. achieving the benefits whereas the project manager is actively managing the project on a day to day basis.

The project sponsor is more likely to be communicating with project external stakeholders such as users, corporate management and regulators. The project manager on the other hand is more likely to be concerned with project internal communications and keeping the project moving to achieve its critical success criteria.

Effective communications between the project sponsor and project manager is therefore crucial to the successful management of the project.

Information Management

- Ensures information is available to support decision making in a timely manner.
- Controls the quality, use and maintenance of information throughout the project life-cycle and after.
- Supports communication processes.

Reliable information is required by project stakeholders to enable them to make effective decisions, anticipate and respond to future events such as risks and opportunities and take into account uncertainties and current problems.

Information management is required to ensure that appropriate information relevant to and generated in the course of a project, is made available to project stakeholders in a timely manner to help with more improved decision making.

A project information management plan defines how information will be managed during the life and after the project, the purpose and scope of information products, their ownership, formats, distribution, control, processing, storage and disposal.

The Plan will address the following:
- Information Management Objectives
- Roles and responsibilities
- The process
- Documentation and Information Product specifications
- Links to the communication plan and process

The way in which information is managed should be established as early as possible in the project. Typically this would be part of the communications strategy in the project management plan.
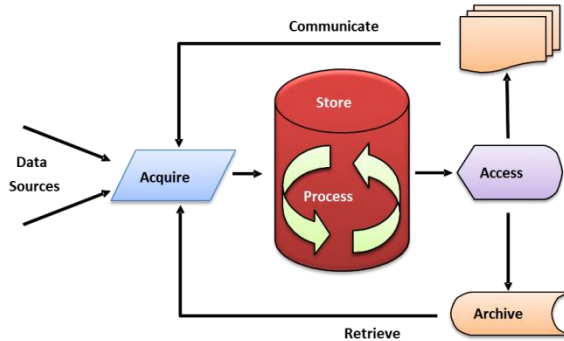
Information Process

Figure 55

The process defines how information will be acquired, accessed, stored, communicated, disposed of and archived. The Communication Plan will define stakeholder information requirements in terms of scope and timing, the source of the information, the media and format, distribution and ownership.

Sources - data received during the life of a project is varied and may be collected in many ways, for example through meetings, from reports on progress and so on.

Distribution - information needs to be recorded if relevant and communicated. Key questions such as the level of information needed and who needs to be informed must be answered.

Recording and storage - records may be handwritten or created electronically. Whichever method is used, records must be maintained to support the project and for auditable purposes.

Access – dependent upon the project and the sensitivity of the data, many organizations will have restrictions on certain data access. Team members will need to be able to have information that allows them to complete their tasks, but some information will be protected from some stakeholders.

Key Information Products

Business Case
Product Specifications

Requirements
Plans
Reports

Project Management Plan
Baseline Plans
Handover Plan

- **Reports (Highlight, End of Stage and Closure)**
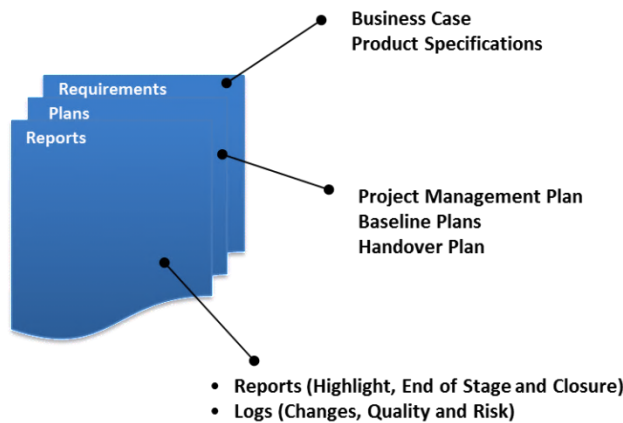- **Logs (Changes, Quality and Risk)**

Figure 56

Documents used to define requirements include the Business Case and Product Specification. These are typically defined during Concept and Definition and updated in the course of the project. Stakeholders involved in these documents are likely to include the project sponsor, project manager, users and operators, external client and corporate management.

Planning documents include the project management plan, supporting plans such as quality, change and risk management plans, and implementation plans such as project networks. These are mainly used by the project team and other stakeholders such as resource managers, to define and control day to day activities.

Control documents include routine progress reports, exception reports, various logs such as quality, change, risk and configuration logs. These are used for both day to day activities and at major milestones to record and communicate status on progress to project stakeholders.

Negotiation Skills

Meeting Pre-Requisites

- – Understand differences between Stakeholder Interests
- – Are there different Views or Approaches
- – What Authority exists
- – Is there any Power or Influence
- – What are your Tolerance Limits
- – What is the impact of Failure and Success

All projects involve negotiations. The art of negotiation in projects is to balance the needs of the project with the needs of the stakeholders involved in the negotiations.

In projects therefore, the aim of negotiations should be to develop a 'win-win' solution that is in line with the overall project objectives and needs of the stakeholders.

A pre-requisite stage for any negotiation is to conduct a stakeholder analysis in order to anticipate the needs of the stakeholders involved, their authority (e.g. are they able to make formal agreements), their relative power and influence.
It is also important to understand the negotiation limits and impact on the project in terms of success or failure.

Negotiation Process

The major part of the negotiation process is broken down in four distinct areas.

Preparation – the selection and briefing of the negotiation team on the definition of objectives, consideration of the other party's objectives, defining the variables, and a strategy including opening offer, bargaining limits and concessions that can be made.

Opening – introductions, objectives should be stated by both parties, an agenda and the rules of the negotiation should be agreed.

Figure 57

Bargaining – collaborating to achieve a win - win solution. Present offers, evaluate responses, bargain and seek agreement.

Closing – conduct final trade offs before starting to closeout, summarise the findings of the negotiations and record and approved all agreements made, follow up actions needed to be taken before future meeting and conclusions reached. Agree the timetable for any further negotiations if necessary.
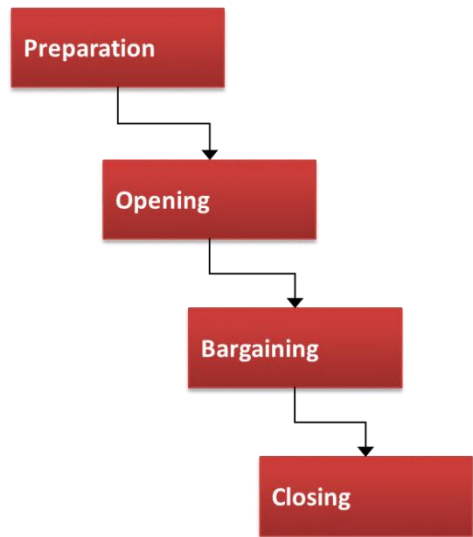
Negotiating Power

Having done the pre requisite research that helped you prepare for the negotiations, you may have identified a potential edge that you could have during the meeting. These types of advantage or edge can come in various forms of power.

Figure 58

Reward Power - ability to dispense rewards to entice the other party, such as bonuses.

Coercive Power - threat of taking something away if one party does not accede to the desires of the other.

Legitimate Power – one party has genuine authority over the other.

Informational Power – an advantage gained because one party has access to relevant key information that the other party does not have.

Expert Power – experience that provides an advantage.

Referent Power – derived from reputation for fair dealing, development of long term relationships and trust.

Parties may use various tactics during bargaining to achieve their objectives. Tactics can be used positively or negatively.

Pressure Release – a concession may be offered as a way of apparently breaking a stalemate. Stand firm and hold the planned limits. Do not concede unless the concession is beneficial. Make a counter offer or take time out if further consideration is required.

Coercion, intimidation – ignores any emotive aspects and maintains focus on the key objectives. Maintain an assertive approach and continually remind the other party of the overall objectives. Agree rules at the beginning to reduce the possibility of coercion and intimidation. Use an expert negotiator/facilitator.

Unbalanced Concessions – making concessions that have much greater value to one party than the other. Maintain awareness, or make rough assessments of the value of the offer. Explain your perception of the concession to the other party.

Challenging – the right amount of challenging can be constructive, too much can be destructive. Keep positive and acknowledge the other party's position. Keep focused on the objectives and take time out to consider appropriate responses with your team.

Time out – the parties break into their teams to discuss the situation and tactics privately. Time outs are useful when the negotiation team experiences fatigue, loss of concentration, or gets 'bogged down'. Over use of time outs can be disruptive. Only agree to Time out requests if beneficial. Agree time scales and rules for taking time out, prior or during the introduction stage.

Conflict Management

Causes of Conflict
  – Differences
  – Opinion, Interpretation, Perception
  – Stakeholders
  – Destructive and Constructive
  – Facts and Feelings

Resulting Behavior

Consequences of resulting behavior

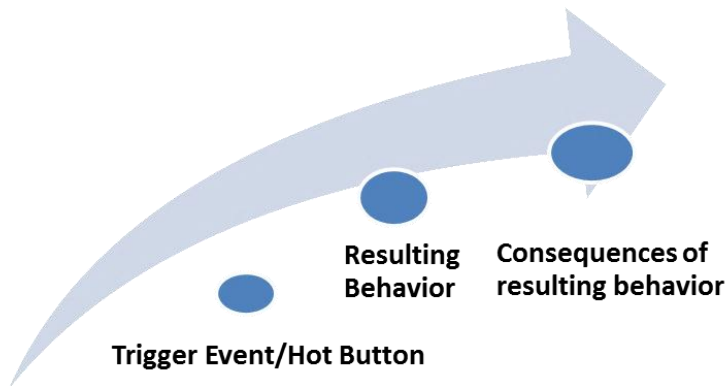Trigger Event/Hot Button

Figure 59

Conflict exists where there are differences between individuals or groups and must be managed throughout the project life-cycle.

Conflict may occur between stakeholders throughout the life-cycle. Project managers should anticipate potential conflicts and their significance and deal with them before they cause negative impacts on the project.

Often conflict is caused through lack of understanding, lack of facts or because individuals have different interests, beliefs and values.

Conflict may either be destructive (having an adverse effect on a project) or constructive (positive benefit). For example, if the cause of a conflict is due to a technical misunderstanding it is beneficial to bring this into the open and involve all interested parties. Conversely, destructive conflict typically occurs due to differences values, beliefs, feelings and background. Because these are usually

emotively based they are more difficult to resolve and require sensitivity and empathy.

If conflicts cannot be resolved, they may need to be escalated to higher authorities, or specialist facilitators.

– Conflict is the emotional, verbal, written or physical expression of differences regarding wants, needs or expectations between two or more individuals.
– Conflict directly impacts behavior, decision-making and the ability to complete assigned tasks.
– Conflict is inevitable in the workplace; it cannot be eliminated.
– The key to a functional workplace is the ability to minimize the escalation of conflict and ultimately resolve the differences.

Conflict Management Model

Root Causes

Cause and
Effect Analysis

Causes

Conflict

Resolution

Stakeholder
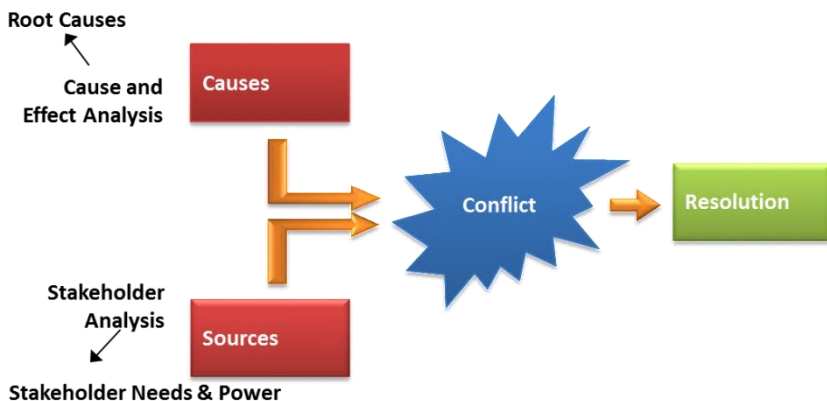Analysis

Sources

Stakeholder Needs & Power

Figure 60

The model is based on the work of Blake and Mouton [21] and provides a framework for understanding and resolving conflict.

Causes - the subjects such as timescales, or priorities, changes.

Sources - the people involved in the conflict.

Conflict – the nature of the problem or issue, and its intensity. Intensity may be defined as the combination of magnitude (say impacts on project objectives) and frequency (how often the conflict occurs).

Two techniques that support conflict management are:
Cause and Effect Analysis – establishing the root cause will help to determine how often it is likely to occur and will enable conflict intensity to be determined. Root causes often lead to the definition of preventive measures.

Stakeholder Analysis – understanding the needs and influences of the stakeholders will help to prevent conflict situations arising, or in the event of conflict, it will enable effective management strategies to be used.

Preventing conflict may also be covered by appropriate risk management.

A number of methods may be used to manage conflict such as formal negotiations, mediation and workshops, depending on the nature of the conflict and stakeholders involved.

	Concept	Definition	Implementation	Handover & Closure
Cause	Ideas Benefits Options Funding	Benefits Requirements Options Funding Success Criteria Risks	Schedules CSC priorities Resources Changes Tech & Performance Issues Risks	Acceptance Snags Demobilisation Handover Activities Risks
Source	Sponsor Corporate Management Sponsoring bodies	Sponsor Users Corporate Management External Customers	Sponsor Project Manager Project Team Sub Contractors Resource Managers	Sponsor Operators End Users Project Team Acceptance Authority BAU groups

Project Life Cycle ⟶

Figure 61

Conflict occurs throughout the project. The nature and scale of conflict is directly related to the activities undertaken and the stakeholders involved.

Understanding where and who might be involved in the conflict will help the Project Manager in its early identification and resolution.
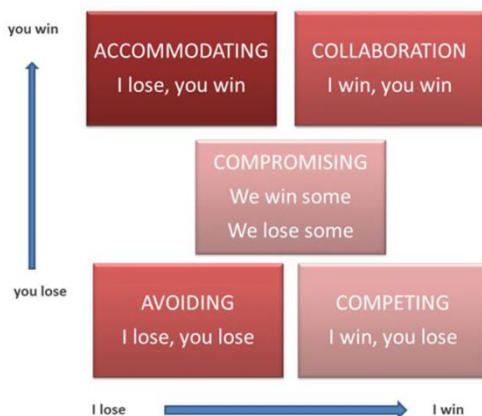
Conflict Resolution

Figure 62

The diagram above based on Thomas Kilmann Model [22], shows strategies for managing conflict.

Competition (Win/Lose) – where one party drives to meet their own interests and disregards the other's interests.

Avoidance (Lose/Lose) – withdrawing from conflict; where one party is unable to influence the more dominant party and wishes to avoid conflict.

Accommodation (Lose/Win) - the party is prepared to submit or comply to the other's interests.

Compromise (Win/Win – Lose/Lose) – parties trade gains against losses.

Collaboration (Win/Win) - typically found in high performing teams, a problem solving style where parties confront issues and seek solutions that meet the interests of both parties.

Leadership

Developing Strong Roots
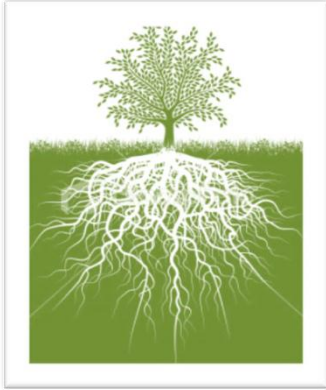
> **"People who cease to grow can't inspire others. Leadership begins with challenging oneself."**
> – Daisaku Ikeda

Leadership is the ability to establish vision and direction, to influence and align others towards a common purpose, and to empower and inspire people to achieve project success. It enables the project to proceed in an environment of change and uncertainty.

When you stand at the base of a 100 year old oak tree and look up, one can't help but be awestruck by its size and strength. What makes this tree so strong though is its foundation. People, are the same. Without a solid foundation, as a tree can sway with the wind, people can lose their way and become misguided.

Project Management is a challenging but rewarding profession. The difference between a good project manager and a green project manager is the foundation and principles by which one adheres to and their ability to impart that into others thus fostering global citizens.

Management is doing things right; leadership is doing the right things!
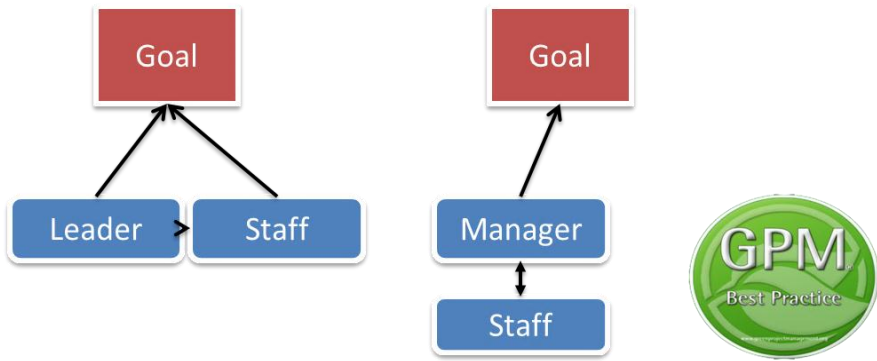
Leadership Best Practice

Figure 64

The fundamentals of management are required to have success at any levels of project management whereas leadership is a skill that requires the ability to understand the overall goal and inspire others to work alongside you to achieve it.

Can you be a successful Project Manager without having strong leadership skills? Absolutely. Different parts of project management appeal to different people. While one person may excel at building the perfect Gantt chart but due to their personality, isn't the type that you would send in to a question and answer session when you are bidding on a project. Is this person valuable? Yes.

The same question can be asked in terms of leadership. The long and short of it is that a leader should have the abilities to do the standard project management tasks as well as inspire the team to work towards a shared goal. This is the mark of a true Green Project Manager.

Does this describe you?

- Genuinely interested in other people's ideas;
- Do you smile? An old Chinese proverb states "A man without a smiling face must not open up a shop."
- Are you a good listener?
- Do you make the other person feel important and do it sincerely?
- Focused
- Manages conflict
- Good team Motivator
- Flexible & adaptable using the right appropriate styles
- Good Risk Taker
- Influencer & Problem Solver
- Delegates & Communicates
- Gives and Receives Constructive Feedback

Key attributes of successful leaders:

Focus -gives clear direction and provides the vision, is fully committed to the project critical success criteria and able to maintain focus throughout the project life.

Manages conflict – a good leader is able to identify conflict, establish its impact on the project and resolve quickly.

Good team motivator – recognizes need to manage motivational factors such as recognition, job satisfaction, reward. Recognizes success and gives credit.

Flexible and adaptable - able to use an appropriate leadership style to suit the circumstances.

Good risk taker- having situational awareness, so they are able to weigh up the pro's and con's and make effective decisions.

Good influencer – able to obtain commitment to project goals from the project stakeholders, including the external and internal team, end-user and subcontractors.

Good problem solver - able to deal with uncertainty through innovation.

Able to delegate – defines clear objectives, empowers, gives authority and responsibility – ensures individual is competent, defines effective rules for escalation, and provides adequate supervision and support.

Good communicator - good networker able to maintain constructive relationships with all project stakeholders and ensure effective communications throughout.

Gives Feedback - able to provide constructive criticism and feedback

Leadership Focus

John Adair [8], one of the world's leading authorities on *leadership* and *leadership* development identified three overlapping areas of core responsibility: Task, Team and Individual.

Effective leaders are able to balance their focus in these areas according to the situation. If there is too much focus in one area it will have a detrimental effect on the others. Conversely, each area has a positive influence on the others if properly balanced. For example a well thought out Project Management Plan provides effective guidance to the individual and the team. However, a well thought out plan can only be achieved through awareness of the team and individual's needs.

Task - the leader has to ensure that the required task is achieved. This requires the setting of task objectives, control and co-ordination. The leader must maintain focus on the objectives until completion.

Individual - good leaders recognize that each individual has needs that are fulfilled through the task. They understand the needs, strengths and weakness of individuals, and are able to apply the leadership style appropriate to the situation. They are able to produce the motivation and commitment needed for the individual to perform their task.
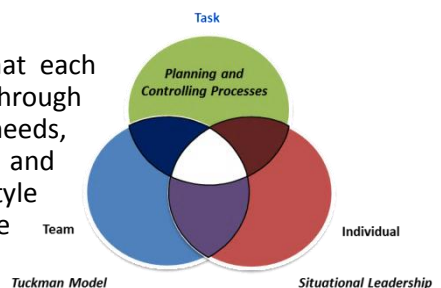
Figure 65

Team - an effective leader recognizes that the team is an entity that also requires direction, information, performance feedback and support, as well as the individuals within the team.

Follower Readiness
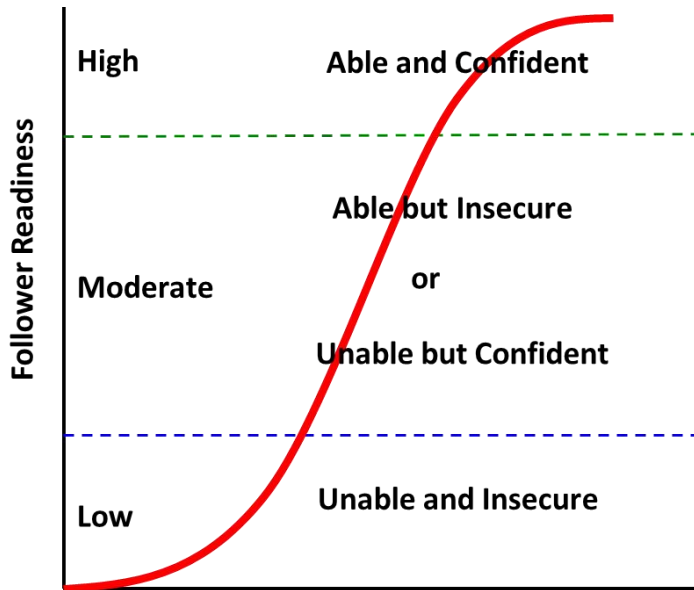
<p align="center">**Figure 65**</p>

Supporting
As the individual develops high levels of competency and motivation, greater delegation and group decision making is possible. The leader concentrates on developing relationships with individuals.

Delegating
Finally a point is reached where team members are confident in their ability, trusted to get on with the task and have a good relationship with the leader. Both task and relationship behavior drop to low levels. Complacency on the part of the leader is now, perhaps, the greatest danger.

The parallel development of the individual through these stages can be viewed in a different way. Hersey and Blanchard also identify something called Follower Readiness which is a combination of Ability (knowledge, experience and skill) and Confidence (willingness, commitment and motivation).

A new team member may not have all the necessary ability or confidence. It is the leader's job to develop both in the individual as they move through the four stages.

The PRiSM™ Closure Phase and Reviews
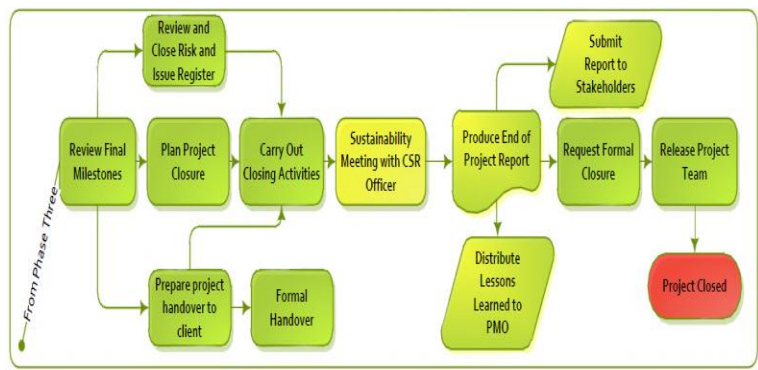
Figure 66

The final phase of the project is the closure phase. The project manager has many activities to deliver in this phase and must ensure that they have planned the closure in a structured and organized manner to make sure that everything is truly accounted for within the project.

Carrying out a review of the project once it has been delivered is essential for learning for future development. The green matters of the project should be included as part of the project review, however early maturity or highly mature organizations may choose to hold the sustainability element of the review separately from the remainder of the post project review.

This is a personal choice; however the most important thing is that a review is carried out, the lessons are captured and that the organization then uses these lessons to develop in the future.

Handover

- – Product Delivery
- – Acceptance Criteria
- – Transfer of Ownership
- – Handover and Acceptance Process
- – Key Stakeholders present
- – Start Up requirements and operator training
- – Review of risks and issues to be transferred into operations phase with deliverable

The Handover Milestone is a significant point in the project life-cycle that allows the project to enter into an operational environment. At this point the ownership of all project deliverables is transferred from the project manager to the sponsor and users.

A punch list is generated during handover to address any minor shortcomings identified during acceptance. Typically rectification actions will be agreed between the sponsor, project manager and operators as appropriate.

It defines handover objectives, identifies the stakeholders involved, and explains how acceptance and handover will be achieved for each deliverable.

Key stakeholders likely to be involved include:
Project manager – achievement of acceptance and delivering products

Project sponsor – formal acceptance of product and handover to operators/users

Project team – conducting acceptance testing and handover activities.

Quality assurance – monitoring and auditing acceptance and certifying results.

Users – (including those people involved in the business as usual activities) witness acceptance testing, taking delivery and starting up product operation.

The handover plan will include tasks to be undertaken by the project implementation team to complete acceptance and delivery of the products, and tasks that need to be carried out by the sponsor and stakeholders (most likely operators and users), to receive, start up and operate the deliverables safely in their final operation mode. Handover may be an instantaneous, gradual or phased process.

The handover stage also includes the transfer of any live risks, actions or issues associated with the product. This allows the customer or the Project Sponsor to have a defined and precise view of potential problems that may exist with the product throughout its whole life-cycle.

Closure

- Closure Report
    - Compared to Success Criteria
    - Transfer/close outstanding Risks and Issues
- Carry out audits, close documentation
- Contract review and closure
- Asset disposal and team redeployment
- Carry out Post Project Review
- Project Sponsor Formal Sign Off

Project closeout will normally occur when all of the products have been delivered and the implementation stage is complete. In certain circumstances such as changes in viability or requirements, projects may be closed before planned completion.

Project closeout involves completion of all product and project handover activities in a controlled manner. Product handover activities are included in the previous discussion covering product handover.

A closure report is produced by the project manager to record the final outcome of the project against the Success Criteria, any issues outstanding and actions arising from closure.

Actions specific to project closure include:

- Identification and disposal of non-deliverable materials and documents. For example, product design data may need to be archived to enable retrieval at a later date.
- Demobilization, including arrangements for disbanding the project team and supporting infrastructure; conducting performance appraisals; completion of technical and quality audits.
- Contract and purchase order closure and arrangements for any continuing contractual obligations such as technical support during operation.
- all project accounts are finalized
  Before project closure, the project manager should conduct the Post-Project Review, record lessons and recommend improvements. Finally, when all closure tasks have been completed, the sponsor will formally sign off the project to release the project manager.
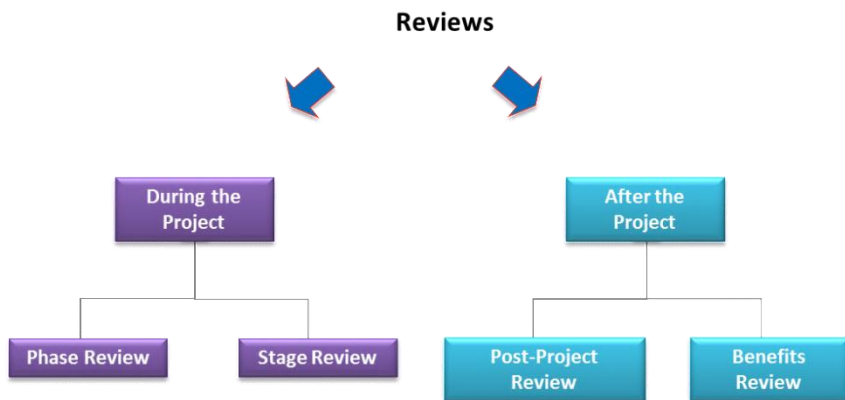
Project Reviews

Figure 67

Project Reviews take place throughout the Project Life Cycle to check the likely or actual achievement of the objectives specified within the Project Management Plan (PMP) and the benefits detailed in the Business Case.

Additional reviews will take place following handover to ensure that the benefits are being realized by the Organization.

Reviews should be planned throughout the whole Project Life Cycle to allow the Project Manager and the Project Team to reflect objectively on the current performance and any forthcoming work.

The Aims of a Project Review are:

- Evaluate the Project Management processes used.
- Establish Lessons Learned and actions arising from them.
- Raise any concerns and agree corrective actions.
- Review the likely technical success of the Project.
- Validate overall progress against the plan, schedule, budget, resources and quality.
- Consider Stakeholders relationships and perceptions.
- Sustainability Manager to hold separate review.
- Ensure sustainability part of Post Project Review.
- Complete a thorough Findings Report.
- Ensure findings disseminated throughout the business to enhance lessons learned.

Quality Reviews

The fifth review is the Quality Review.

After a point of testing for a product or as a request from the Project Sponsor or Project Manager, a review of the quality of the product that has been tested or of the project's ability to follow the processes is held.

Here, the findings of the audit or test are explained and the Project Manager can gain a clearer understanding of how their project and their team are progressing.

There are typically three outcomes from a Quality Review:

- First that the item being tested or team being assessed has passed and that everything should continue as planned.
- Second, the item or team could still pass the review; however a few minor defects or areas for improvement have been identified and must be carried out to ensure that all quality requirements are adhered to.
- The third and final option is that the item or team has failed the test or assessment and will not be allowed to proceed until the areas of failure have been rectified and have been re-tested and have passed another formal review.

Post Project Review
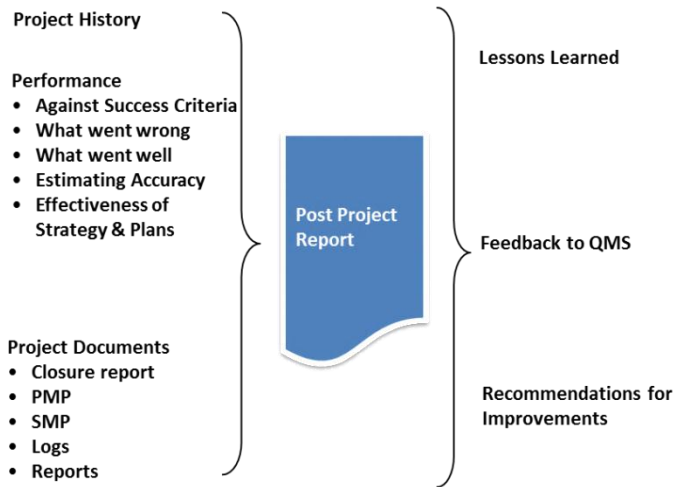
<div align="center">**Figure 68**</div>

The Post Project Review (or Evaluation) is a structured audit and review of how the project went. The output is a report that lessons learned for the future including recommendations for process improvement and training.

Review Objectives - the main objectives are to:
– Identify strengths and weaknesses in the performance of the project
– establish the key lessons learnt
– to make recommendations for improvements (methods and competences)
– Scope - the Post Project Review addresses:

History of the Project – what major problems occurred during the project and how well they were dealt with?

Performance - how well the organization and team performed? Areas such as decision making, team leadership and development, team working, single point accountability.

Effectiveness of the project strategy - how well it was implemented, what went wrong, and what went well?

Estimating Accuracy – how accurate was the original estimate? Were sufficient provisions made to cover uncertainties, changes and risks?

Effectiveness of specific Processes - such as change control, risk management, control and co-ordination. How well did these processes control specific aspects of the project?

Review Preparation - The project manager is typically responsible for organizing the meeting and ensuring that any preliminary audits and reviews is carried out. Stakeholder attendance is typically decided by the Project Sponsor and Project Manager. The review meeting should aim to get views from as many stakeholders as possible, both within the project team and from outside. It is not always practical for all stakeholders to attend the review. In such cases, their contributions may be obtained prior to the meeting through for example, interviews, workshops or correspondence. These inputs may then be included in the meeting.

Implementation - Ideally an independent facilitator should chair the meeting to prevent the review from being dominated by subjective and 'blaming' issues.

Facilitators are often provided by functions within the organization with responsibility for improvement and maintenance of standards, for instance Quality Assurance or Project Office.

During the meeting it is necessary to document the review and record the results and actions that arise. This is typically undertaken by an individual from the Project Office.

Findings - The project manager or facilitator is typically responsible for co-coordinating and issuing the report covering the lessons learned and recommendations for improvement to relevant stakeholders. Distribution may include the project team, other project managers within the organization, the internal organization, external sponsors, and external suppliers.

Stakeholder Review Roles
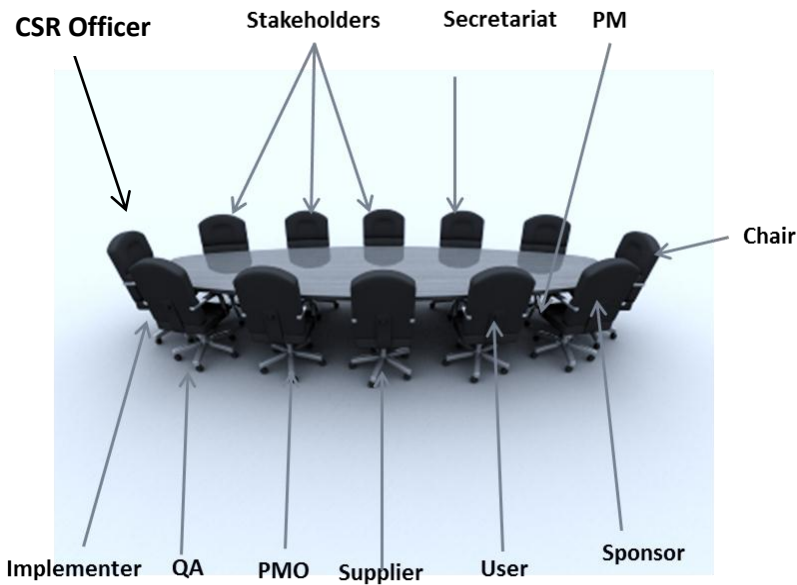
Figure 69

Figure 69 is a typical representation of a Post Project Review and their key inputs are listed below as follows:

Chair – maintains focus on review objectives; ensures objectivity/no blame process; ensures effective participation of stakeholders.

User – inputs on aspects such as: how well users were involved; quality of product specifications; change implementation; product acceptance and handover.

Quality Assurance - quality planning and execution processes; audits and reviews; conformance to standards & procedures; quality variances.

Implementer – successes and problems arising in the planning and execution of work; the technical strategy; changes; risks and issues; team working; motivation.

Project Sponsor – quality of requirements definition; accuracy of estimates; quality of reporting; involvement; quality of decision making; management of stakeholders and environmental factors; achievement of CSC's; issues, changes, variances and risks.

Project Manager – achievement of CSC's; decision making processes; project planning and control including issues, changes and risks; effectiveness of the project strategy; management processes; leadership and team working.

Supplier – procurement processes; supplier performance in meeting specifications, cost and time requirements; supplier risk management.

Project Management Office – effectiveness of project planning and control methods; issue management; change implementation; reporting processes and risk management.

CSR Officer - prepares and presents the corporate social responsibility report for the company and regulatory financial statements, helps to implement an open, transparent communication policy that serves to formulate the company's management policies.

P5 Impact Matrix Enlarged from page 31

This matrix is designed to allow project teams to measure the impact of their project against P5.
- The outer two rings represent the impact that **project objectives** and **effects** have on each indicator.
- The inner two rings indicate the impact from a **project process** and **resource** perspective.

Profit
- Future options
- Business agility
- Return on Investment
- Transport

Process
- Labour practices & decent work
- Human rights

People
- Society & Customers
- Ethical behaviour

Product

Planet
- Energy
- Materials & Procurement
- Waste

P5 Impact Matrix

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Potential areas of impact
- Project context
- Stakeholders
- Project content
- Business case
- Materials and procurement
- Project reporting
- Risk management
- Project team
- Organizational learning

The P5 Integration Matrix

P5 Integrators		Sustainability Categories	Sub Categories	Elements
P5 Integrators		**Sustainability Categories**	**Sub Categories**	**Elements**
Product Sustainability	Objectives and Efforts >>	**Economic Sustainability**	Return on Investment	Direct financial Benefits
Process Sustainabilitiy	Impacts >>			Net Present Value
			Business Agility	Flexibility/ Optionality in the Project
				Increased business flexibility
Product Sustainability	Objectives and Efforts >>	**Environmental Sustainability**	Transport	Local Procurement
Process Sustainabilitiy	Impacts >>			Digital Communication
				Traveling
				Transport
			Energy	Energy Used
				Emission / Co2 from Energy Used
			Waste	Recycling
				Disposal
				Reusability
				Incorporated energy
				Waste
Product Sustainability	Objectives and Efforts >>	**Social Sustainability**	Labor Practices and Decent Work	Employment
Process Sustainabilitiy	Impacts >>			Labor/ Management Relations
				Health and Safety
				Training and Education
				Organizational Learning
				Diversity and Equal Opportunity
			Human Rights	Non-Descrimination
				Freedom of Association
				Child Labor
				Forced and Compulsory Labor
			Society and Customers	Community Support
				Public Policy/ Compliance
				Customer Health and Safety
				Products and Services Labeling
				Market Communications and Advertising
				Customer Privacy
			Ethical Behavior	Investment and Procurement Practices
				Bribery and Corruption
				Anty-Competition Behavior

Extract this page to include in your project toolkit!

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Joel is the President of GPM Global, a project management professional development organization dedicated to the advancement of project management practices that decouple socio-environmental degradation and economic growth.

He has over 15 years' experience in project delivery and program management, working and consulting in both the private and public sectors for organizations in Banking/Finance, Energy, Legal, Technology, as well as Local Government.

He is the co-author of the PRiSM project delivery method and works primarily to support training providers, academic institutions, and organizations around the world as a speaker and advocate for sustainability.

Joel has been recognized globally for his work with to promote Peace, Culture, and Education and has received the Liberty and Humanitarian Award from the SGI. He serves as the Director of Standards for the asapm (IPMA-USA) is on the Executive Board for Science Central, a regional science center in Northeast Indiana as well as the board of a government led technology coalition focused on empowering youth to engage in science, technology, engineering, and mathematics.

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Monica Gonzalez, MBA, GPM, PMP

Monica is an Industrial Engineer with over 25 years of experience with electrical companies, in both public and private sectors. For the past 13 years, her work as a Project Manager has involved developing, establishing, implementing and the maintenance of organizational (and Integrated) management systems according to International Management Standards, such as ISO 9001, ISO 14001, ISO 26000, ISO 50001, OHSAS 18001 and the Argentinean Resolution ENRE 057/2003 Public Safety for Electric Power Transmission in High and Medium Voltage.

Monica is a founding member of the PMI Nuevo Cuyo Argentina Chapter, and supports the PMI Educational Foundation as a Liaison.

She was engaged with the PMI Global Sustainability Community of Practice from early 2010 to 2012, as she had a clear understanding of sustainability´s criticality as a global imperative to focus on changing the values that impacted elements of society. Her mission is to help businesses to become more sensitive and responsive to the sustainability of the environment and society (or multiple societies) in which business is conducted.

She also serves as a committee member for the PC/ISO 236 and for the ISO/TC 258.

Since October 2012, Mónica has been a core member of the Green Project Management Executive Consortium, and she is the Lead Assessor for the GPM® Certification in South America and Spain.

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Jeff Hodgkinson, GPM®, CAPM®, CCS, CDT, CPC™, CIPM™, CPPM–Level 10, CDRP, CSM™, CSQE, GPM-b®, GPM®, IPMA-B®, ITIL-F, MPM™, PME™, PMOC, PMP®, PgMP®, PMI-RMP®, PMI-SP®, PMW Jeff Hodgkinson is a career program/project manager with over 32 years of practitioner experience. He is an expert at program and project management principles including best PM practices and is applying his PM competency and expertise to promote the adoption of energy efficient practices and the proliferation of alternative energy sources. He received the 2011 GPM® Sustainability Award for his work in this field. Jeff is the third most recommended person on LinkedIn with 610+ recommendations, and is ranked in the top most networked LinkedIn persons.

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