CPC50210 Diploma of Building and Construction (Building)

BSBPMG505A

Manage Project Quality

Learner Resource

Version: VI-1

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These materials were developed by Learning Innovation and Development, a department of Holmesglen.

Project manager: David Scannell

Writer: David Scannell

Instructional designer: Lee-ann Phillips

Technical editor: Peter Furlong

Graphic artist: Matt Morris

Template design/Administration: Grisel Arancio

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All enquiries to:

Advanced Building Technology (Distance Education)
Holmesglen
PO Box 42
HOLMESGLEN VICTORIA 3148
AUSTRALIA

Telephone: +61 3 9564 1612

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BSBPMG505A Manage Project Quality

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Introduction to unit BSBPMG505A

Previously BSBPMG505A

Welcome to the Learner Resource for *BSBPMG505A Manage project quality.* This unit forms part of the CPC50210 Diploma of Building and Construction (Building), which is a qualification designed to meet the needs of builders and managers of small to medium-sized building businesses.

The builder may also be the appropriately licensed person with responsibility under the relevant building licensing authority in a particular state or territory. Builder licensing varies across states and territories, so additional requirements may be required to become licensed in the particular state or territory.

Occupational titles may include:

- builder
- construction manager.

This unit of competency specifies the performance outcomes, skills and knowledge required to manage quality within projects. It covers determining quality requirements, implementing quality assurance processes, and using review and evaluation to make quality improvements in current and future projects.

This unit applies to an individual who is clearly and solely responsible for the management and leadership of a complex project, either as an employee of an organisation or an external consultant.

In the context of this unit a complex project is defined as a project which involves:

- the need for a comprehensive and multi faceted project plan
- the need for a formal internal or external communications strategy
- a dedicated and diverse project budget
- multiple administrative components
- multiple operational components
- a wide range of stakeholders
- a project operations team.

The functions performed by a program manager to manage quality within multiple projects are addressed in *BSBPMG605A Direct quality management of a project program*.

A copy of the full unit of competency is included in Appendix 3 of this Learner Resource together with a list of all the units required to complete the CPC50210 Diploma of Building and Construction (Building).

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Note: The unit of competency in this Learner Resource was current at the time of publication.

References

This Learner Resource is to be used with reference to other texts, such as the Building Code of Australia and Australian Standards. These will be included in the printed materials provided.

About this course

This Learner Resource is one of a set of resources that you will use to complete the CPC50210 Diploma of Building and Construction (Building).

Flexible delivery

This Learner Resource is used to provide you with everything you need to complete this unit. You are about to embark on a type of training that is called flexible learning, which means that you do not need to attend formal classes.

Flexible learning is a good option for this level of learning as it allows you to undertake the course at your own pace and in your own time. When undertaking flexible learning it is important to:

- set and document clear timelines to read and understand a topic and to complete all the learning activities and assessment tasks
- be motivated and don't let distractions impact on your progress
- undertake one topic at a time. You should work through the topics in the order they are presented in this Learner Resource
- submit your assessment tasks on or before the due date and time
- not wait until you finish all the reading and learning activities before you attempt the assessment tasks – undertake them when you feel you are confident about the topics they address
- make sure the assessment task that you send to be assessed is clearly labelled by completing and attaching the assessment task cover sheet with your name, assessment task title, date, etc.

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What you will study

This Learner Resource contains three topics that you should work through step by step. The topics are:

1. Determine quality requirements
2. Implement quality assurance processes
3. Implement project quality improvements

There are also learning activities that you should complete before moving on to the next topic. These are provided to help you apply and reinforce what you have learnt in each section. If you have trouble answering any of them you should contact your tutor.

Icons

The following icons are used throughout this Learner Resource.

	**Learning activity** These activities help you consolidate your learning and may be used to build a portfolio of evidence.
	**Assessment task** These must be submitted to your tutor and will be used to assess your knowledge and skills in each competency.
	**Information** Note or key points are used to alert you to additional information or critical points that need to be understood.

Your time commitment

It should take about 40 hours to complete this unit. However, depending on your circumstances or prior knowledge, you may find that it takes a little less or more time to finish the work.

Activities and assessment

Throughout this Learner Resource there are activities to help reinforce the learning associated with a new topic. Your tutor may require you to forward your responses to these activities to them as part of your formal assessment. If this is required you will be advised by your tutor. The assessment tasks are provided at the back of this Learner Resource.

The assessment tasks can be attempted as you work through the Learner Resource. You don't have to wait until you have completed all the activities before attempting an assessment task.

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There are four assessment tasks for this unit that you must submit to your tutor on or before the agreed date and time. The titles of the assessment tasks are:

1. Advantages and disadvantages of benchmarking
2. Applying the Plan-Do-Check-Act quality management tool
3. Quality management system
4. Develop a quality management plan

Make sure that all work you submit is your own and that you appropriately acknowledge and reference source materials. When you have completed an assessment task, send it to your tutor who will assess your work and provide appropriate feedback about whether you have satisfied the requirements of the assessment task. If you have any questions about your assessment results please contact your tutor.

Satisfactory completion of the unit

You will be deemed competent for this unit on the basis that you can provide evidence of:

- successfully managing project staff so that quality outcomes were achieved on multiple complex projects
- knowledge of a range of quality management tools, techniques and methodologies.

Employability Skills

Employability Skills are the generic skills required not only to gain employment but also to progress within the workplace. These skills help you to achieve your potential and to successfully contribute to the strategic directions of an organisation or your business.

Employability Skills are embedded within every competency and included in all assessments. The Employability Skills within this unit are presented in a table in Appendix 1 of this Learner Resource, mapped against the assessment activity that addresses the skill.

Getting started

It's now time for you to start working through this Learner Resource. We wish you all the best with your study in this unit and all the other units required to complete the CPC50210 Diploma of Building and Construction (Building).

Remember, if you have any questions about your study please contact your tutor for clarification.

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1. Determine quality requirements

Like any task in the construction industry, the first part of managing project quality requires that you determine the needs of the jobs. In this case you will be determining the quality requirements.

1.1 Today's workplace

Although the workplace of today is largely different to that of the 1700s, 1800s and early 1900s it must be recognised that some of the de-skilling and dehumanising scientific management practices of F W Taylor and adopted by Henry Ford and many others, still exist. This is a fact noticed by Weisbord (1992), who believed that elements of managerial practices still exist deep in the culture of many current systems. Weisbord argues that the later generations of managers of Taylor's theories threw away Taylor's values and only focused on his techniques. Although the managers found these techniques useful and appropriate to their management style, these practices do not recognise the individual differences and value of each employee.

However, changing attitudes have gone a long way to make sure of the replacement of management control over workers in workplaces which imposed greater discipline, time domination, emphasis on productivity and the de-skilling of process work (Jones 1986).

Management is now realising the importance of taking on a leadership role and becoming less dictatorial. Guidance and encouragement is gradually taking the place of previously dehumanising practices that have seen workers perform the same difficult and repetitive tasks day after day, week after week with little consideration for their personal development or values.

The workplace is now a mix of social, political and economic forces together with a range of attitudes, beliefs and behaviours. In this mix, there is also a desire and the need to maintain a client focus which requires a focus on quality.

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1.2 What is quality?

Quality is a term which people and organisations often use to describe their products and processes. Quality products are perceived to be:

- marketable
- user-friendly
- capable of longevity.

Quality is often declared to have been achieved when the product or service meets the needs of the client, was delivered on time and within budget. However, the measure of quality should be when the deliverables exceed client expectations.

Quality is often based on perception of one's own excellent practices. It is entirely premised on product, processes and outcomes which the person offering a quality product believes in. There are no external or internal checks to this quality and it is not possible to verify.

In the building construction industry, a product is deemed to be a quality product based on construction experience, previous work, reputation as an artisan or similar experience in project management.

Despite the fact that a project team may construct a building which complies with all standards, codes and regulations, and meets the requirements of statutory inspections, final inspections by relevant parties and numerous other checks, there still remains no check by an external verifying organisation.

Quality is also linked to competitive advantage. It is not enough to just satisfy a customer's needs of today. There is constant pressure on organisations to exceed the quality standards of their competitors and provide customers with new and improved products and services. In other words, the need for ongoing quality improvements can be seen as a race without a finishing line.

Turbit (2005) states that there is a difference between judging the project deliverables and judging the project process. Turbit believes that a quality project may still deliver low quality outcomes and vice versa. It is more likely however, that a high quality project will deliver high quality deliverables. From this, you can see that if you are evaluating project quality, you would look at completely different aspects than if you were looking at the quality of outcomes.

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The following points help to explain some of the key terms related to quality.

Big step and incremental models of quality improvement

Most organisations have now adopted the idea of continuous improvement. Improvements can occur through:

- occasional big steps, also known as innovation
- regular little steps, also known as increments, or the Kaizen model.

1.2.1 Big step improvements (innovation)

The big step model is most closely associated with the American model of management and relies on single steps in performance. These steps often occur as a result of new technology or new ideas. For example, business process re-engineering solves problems by starting from scratch, rather than tinkering around with improving the current system. While a large initial investment in new technology and training is often needed, little effort is required to maintain the change. However, the main problem with this big step model is that performance can decline while people wait for the next big step forward.

1.2.2 Incremental improvements (Kaizen)

By way of contrast, Japanese managers favour the Kaizen, or incremental model that uses regular and less dramatic changes to gradually improve overall performance. It relies on people to apply simple analytical techniques and common sense to continually upgrade performance in an organisation. Although little capital investment is required at the beginning, this approach requires continuous effort and motivation to keep the improvements happening.

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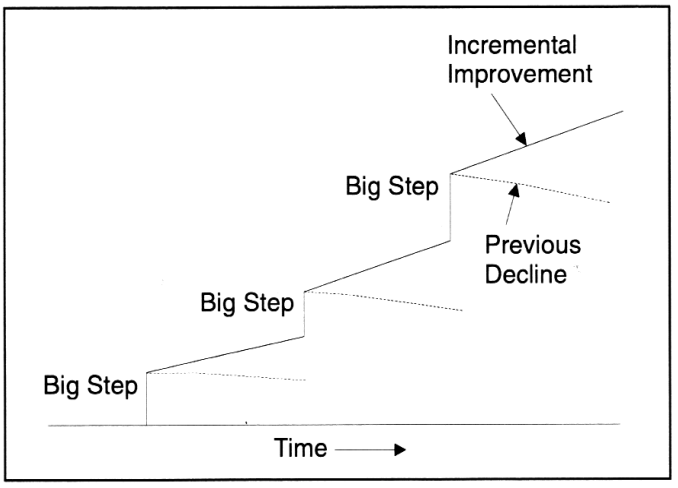
1.2.3 Combined improvement model

Not surprisingly, the most powerful approach to quality improvements is to combine Kaizen and innovation, as seen in the following example.



Combination of Kaizen and innovation approach to quality improvement

You will notice that in the combined improvement model, the repeated small steps between each big step make sure that gradual improvement continues with no backsliding. Just as important though, the periodic big step improvements make sure that the overall rate of improvement is faster than provided by Kaizen alone.

1.3 Improving quality by reducing variation and waste

The aim of most quality improvements is to reduce variation and waste.

It has been estimated that 30% of the cost of Australian goods and services are made up of waste and errors. Some 15% of all clerical time is spent correcting errors.

All systems suffer from variations since nothing remains constant for long. For example, during any week at any workplace, people work at different rates, slight differences occur in the products being made, and the overall volume of output varies daily.

Variations (and errors and waste), fall into two kinds which W Edwards Deming calls special cause and common cause.

Special cause variations

Special cause variations result from a particular worker, machine, or particular location in the workplace. The solution is to provide the individual with further training and the tools to solve the problem.

Common cause variations

Common cause variations result from a fault in the system. They are common to all workers and can only be reduced by changing the way work is performed by everyone. Because major changes are often required, the solution is to tackle problems one at time. This allows the causes and effects to be measured, improvements to be trialled, and the system to be controlled more closely.

It may surprise you to know that special cause variations create only 15% of variations, errors and waste. The remaining 85%, or majority of problems, result from common causes. This means that most quality improvements result from changing the system and the way work is organised.

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Activity 1 – Importance of continuous improvement to limit variation and waste from a workplace

1. Why is it important to have continuous improvement?

2. Why is it important to address common causes of waste and variations in quality?

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

1.4 Quality control

Quality control can be defined as the operational techniques and the activities used by an organisation to keep the quality of outcomes to the expected specifications.

1.5 Quality assurance

Quality assurance refers to the strategic efforts of senior management to make sure appropriate quality procedures are in place and are being followed so that quality outcomes are achieved.

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Activity 2 – Quality control and quality assurance: What's the difference?

Explain the difference between quality control and quality assurance.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

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1.6 Standards

According to Turbit (2005), standards are instruction documents that detail how a particular aspect of the project must be undertaken. There can be no deviation from standards unless a formal variation process is undertaken and approval granted.

Developing a construction organisation which has both quality control and quality assurance involves formulating a set of policies and procedures, and also employing qualified personnel who can assume such responsibilities. Such an organisation would become well respected within its industry given that it has adopted a quality control/quality assurance plan and has a focus on satisfying client needs.

1.6.1 Standards Australia

Recognised as Australia's peak standards body, Standards Australia is an independent organisation whose role is to prepare and publish the majority of technical and commercial standards in Australia. The Australian Government has entered into a memorandum of understanding with Standards Australia to make sure there is a national approach to quality.

1.6.2 Australian Standards

Australian Standards are the documented benchmarks of compliance developed through a process of consultation with key stakeholders from government, industry and consumers. As these standards reflect the latest scientific and industry experience, they require ongoing review and evaluation to make sure they reflect changes in technology and processes.

1.6.3 International Standards Organisation

The International Standards Organisation (ISO) was founded in 1946 with a view to improving quality within the manufacturing and trade communication industries. Many parts of the ISO 9000 and subparts ISO 9001, 2, 3 and 4 relate to construction. They involve basic quality management principles, such as contract review, management responsibilities, document control and quality records.

Close cooperation and input from Standards Australia informs development of International Standards that in return, informs the development of Australian Standards. This makes sure that Australian organisations are able to compete in the global marketplace.

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Activity 3 – Importance of standards

Explain the importance of standards in making sure of quality outcomes in the building and construction industry.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

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1.7 Quality assurance systems

By adopting a quality assurance system, an organisation can guarantee the customer that their purchase will give and continue to give complete satisfaction for the period of its working life.

Quality assurance systems must be audited both internally by the organisation, and also by an external organisation. As part of the quality assurance system, quality assurance compliance certificates are issued to demonstrate compliance.

There are several reasons why an organisation may choose to comply with a standard such as ISO 9001 Quality management systems, an international quality standard, and they are listed as follows:

- Rework and waste is reduced.
- All construction work is done correctly the first time.
- Quality assurance gives credibility to the organisation.
- Efficiency and overall job effectiveness is improved.
- The organisation will have a marketing advantage over competitors.
- A systematic and well planned organisation is created through use of quality systems.

According to AS/NZS ISO 9001 Quality management systems – Requirements, ‘the adoption of a quality management system should be a strategic decision of an organisation. The design and implementation of an organisation’s quality management system is influenced by:

- its organisational environment, changes in that environment, and the risks associated with that environment
- its varying needs
- its particular objectives
- the product it provides
- the processes it employs
- its size and organisational structure.’

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All quality systems should be verifiable from other recognised and legitimate sources. In terms of building and construction, quality assurance should include:

- a systematic review of the project management process to make sure of compliance with organisational policy and guidelines
- a project finalisation process that proves to capture lessons learned and enable continuous improvement.

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Activity 4 – Importance of a quality assurance system

Explain why a quality assurance system is important to the success of a building project.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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1.8 Total quality management

Total quality management is a management concept introduced by W Edwards Deming (1900 – 1994). Deming was considered to be the originator of the modern quality movement. The focus of total quality management is to:

- reduce the errors produced during the production or service process
- increase customer satisfaction
- streamline supply chain management
- aim for modernisation of equipment
- make sure that employees have the appropriate training and skills to undertake their tasks as effectively as possible.

Part of the rationale of total quality management is that people must be given encouragement to be involved with the organisation to achieve the best possible outcomes.

Based on behavioural theories by Maslow, Herzberg and Moller, a series of charts can be developed by the organisation which outline ideal performance satisfaction levels and other graded assessments which give an accurate perspective of personal quality.

The preferred model/system in construction management is the total quality management model and although quality is a generic term, the company mission statement should give a clear indication of the vision and culture the organisation has chosen to pursue.

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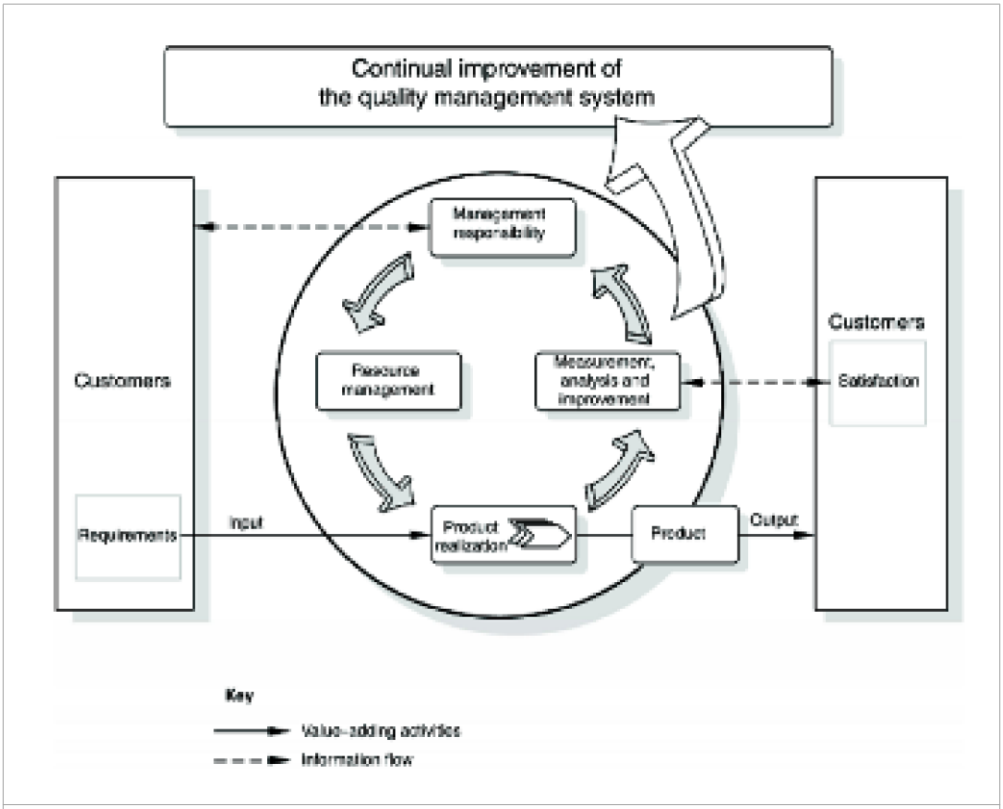
The following is a quality systems model presented by AS/NZS ISO 10005 Quality management systems – guidelines for quality plans.



Model of a process-based quality management system

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Activity 5 – Importance of customers

Review the previous model of a quality management system and explain the importance of the customer in achieving quality project outcomes.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

1.9 Not a new concept

Despite changes in management practices, the concept of quality is not new. During the middle ages, trade guilds played an important role in society. Guilds were made up of groups of people practicing the same trade. Members were required to undertake long periods of training designed to make sure of a high level of quality.

Guild members were required to work through three different stages of their trade.

1. ***Apprenticeship*** – As an apprentice, the individual was required to work for a master. Although they received no wages, apprentices received food, a place to sleep and training. Depending on the trade, an apprenticeship could last more than five years. For a period of time, an apprentice was not allowed to marry until they had finished their apprenticeship.

2. ***Journeyman*** – This was a time when the tradesperson could prove themselves and were paid for their work. They were also required to create their masterpiece that would be judged by guild masters to determine if the journeyman had the required skills and knowledge to be deemed a master.

3. ***Master*** – Once deemed to be a master craftsman by a guild, the master was allowed to set up their own organisation and take on apprentices of their own.

Although guilds fixed prices and prevented outside competition, rules of membership made sure that high quality standards were maintained. Members often checked the work of other members with expulsion from the guild a penalty for identified breaches of the guild code. As membership was an honour and a requirement to undertake work, expulsion meant individuals would be banned from working in a particular town.

Guilds still exist today although they don't have the same powers. For example, in the United Kingdom, the City and Guilds Group, established in 1878, is an organisation that offers a broad range of vocational qualifications in a range of trades. The organisation is underpinned by an independent Quality and Standards Committee that make sure of the quality of the Guild's services.

Today, quality has become a vision for the majority of organisations in the building and construction industry, but sadly, not all. The focus of quality is on three areas of business operations:

- products and/or services they produce and/or deliver
- operational processes
- expectations of their customers.

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Despite this intensifying focus, quality issues are still experienced by building and construction organisations. Their products or services may not be of a satisfactory standard because of the processes in place to monitor the production of them. This ultimately results in the outcomes not meeting the expectations of their customers.

1.10 Importance of quality

Managing all three areas of quality described in the previous section is an essential part of the overall organisational strategy for a building and construction organisation. Implementing a working and effective quality system will improve operations within your organisation. Making sure that there is a high level of quality service and/or products should be an important consideration of any organisation wishing to grow, remain profitable or at the very least, stay in business. A quality system contains standards that support a goal of an ongoing high level of professionalism and service.

AS 10006 stresses that leadership and the involvement of people are vital to the success of any quality management system.

1.11 Importance of leadership

Quality applies equally to managers and business operations. Total quality management requires managers and supervisors to become leaders. They need to have excellent knowledge of the operations they supervise. To keep up continual improvements, they also need to involve their staff, value their input, and communicate effectively. Above all, they have to lead by example.

Leaders can establish unity of purpose and direction of the organisation. They should create and maintain the internal environment in which people can become fully involved in achieving the organisation’s objectives.

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AS10006 requires that a project manager be appointed as early as possible. The project manager is the individual with the defined responsibility and authority for managing the project and making sure that the project's quality management system is established, implemented and maintained. The authority delegated to the project manager should be a similar level to the assigned responsibility.

The senior management of both the originating and the project organisations should assume leadership in creating a culture for quality by:

- setting the quality policy and identifying the objectives (including the quality objectives), for the project
- providing the infrastructure and resources to make sure that project objectives are achieved
- providing an organisational structure conducive to meeting project objectives
- making decisions based on data and factual information
- empowering and motivating all project personnel to improve the project processes and product
- planning for future preventive actions.

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Activity 6 – Need for leadership

Explain what might happen to project quality if there is no strong leadership in the organisation undertaking the project.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

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1.12 Importance of involving people

AS10006 also states that people at all levels are the essence of an organisation and their full involvement enables their abilities to be used for the organisation's benefit.

Personnel involved in project organisation should have well-defined responsibility and authority for their participation in the project. The authority delegated to the project participants should correspond to their assigned responsibility.

Competent personnel should be assigned to project organisation. In order to improve the performance of the project organisation, appropriate tools, techniques and methods should be provided to personnel to enable them to monitor and control the processes.

In the case of multi-national and multi-cultural projects, implications of cross-cultural management should be addressed.

1.13 Improving quality through teamwork

One person can make useful quality improvements in their own work area. However, work processes are generally too complicated for an individual to have enough knowledge to understand them fully. Therefore, most significant quality improvements occur as a result of pooling the skills, knowledge and experience of a group of people who are close to the problem.

In other words, a team approach usually works best.

The main advantage of teams over individuals is the ongoing support that working together brings. When people work alone, it is too easy for them to lose enthusiasm and be overwhelmed by the difficulty of the problem. Another advantage is that teams drawn from all levels of the organisation and different sections help to break down barriers and encourage everyone to contribute to the challenge of improving quality.

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1.13.1 Who should be in the team?

In any quality improvement team, there are three key people in addition to the project team members themselves.

- A manager approves the project and defines its limits, supports the project team's activities and clears the way for them in the organisation.
- A quality adviser is familiar with quality improvement tools and provides advice and training for team members. They may also assist as a facilitator by promoting good communication within the team and helping the team when it gets stuck.
- A team leader runs the team, organises meetings, maintains all records and correspondence, and keeps the project on time and on budget. As well as being a full team member, they also provide the link between the team and the rest of the organisation via the manager.
- Project team members carry out tasks and trial improvements and are usually directly affected by the process or problem being examined. The team could be made up of people who work in the area where the problem arose (natural work group or functional team). Alternatively, where the problem cuts across division boundaries, the team could involve people of various trades, classifications, shifts, work areas (cross functional team).

When selecting team members, it is too easy to focus on people with task oriented skills, such as collecting and analysing data, making decisions and keeping records. However, these individual task skills won't count for much if a team is experiencing conflict and power struggles, or has difficulty sharing information.

It is vital to include some people who can show the rest of the team how to encourage equal participation, resolve conflicts effectively, make compromises and reach consensus on important issues.

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1.13.2 How do teams develop?

Most, but not all, teams go through predictable stages of development. These stages are called forming, storming, norming and performing.

Forming

At the beginning, it is important to allow time for team members to come to grips with the current task and the group's operating rules. There is likely to be a mixture of excitement and anxiety about the project and tentative interactions between members who don't know each other very well. Often, discussion is wide ranging and vague while some members will raise complaints about the organisation and focus on the obstacles confronting the team.

Because there is so much to take in at the beginning and so many distractions, don't expect your team to achieve too much at first.

Storming

This is probably the most difficult time for the project team. Some members may panic as they realise that the project is different, or more difficult, to what they first thought. They may become impatient about the apparent lack of progress and begin blaming others. Others may try to take control, set unrealistic goals and force decisions based on their personal experience. These behaviours are usually the result of inexperience and lack of knowledge about group decision making and the use of quality improvement tools.

Your role at this stage is to help team members understand each other and to introduce them to quality improvement concepts as the opportunity arises.

Norming

As team members begin to get used to working together, they begin to cooperate instead of competing. You will notice that team members are more able to give and receive constructive criticism and have some sense of belonging to the team. They also begin to share a common view of where they are heading and start to see how the project may work out. Above all, they begin to agree on the ground rules and boundaries for how they are going to operate as a team (ie they agree on the norms).

As a team leader, you are also probably beginning to relax, now that the team members have begun to work out their differences and put more of their energy into working on the project itself.

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Performing

As team members begin to understand each other better and become more confident about their task, they begin to work more effectively together. They understand each other's strengths and weaknesses, they have the skills to work through problems, and they begin to gain satisfaction from the team's progress.

As a team leader, you will know when the team has reached this stage. It will be getting more work done and progress will be much faster than before.

Your team may not go through all of these stages of development. However if they do, knowing about these stages should help you to estimate where your team is up to and help to reassure you that the member's behaviour is normal.

When difficulties arise, get advice from your manager or quality adviser.

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Activity 7 – Team start-up problems

List two things you could do as a team leader to help the team overcome start-up problems.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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1.13.3 How do you run effective team meetings?

It is very important to try and run effective meetings from the start of any project for several reasons. Firstly, much of the work of a quality improvement team takes place in meetings. Secondly, you will have to convince those team members who may dislike meetings that team meetings don't always have to be waste of time!

Some general rules for running effective meetings are listed in the following.

1. Have an agenda

   Team members should be given an agenda before each meeting. The agenda should provide the:

   - start and finish time and location of the meeting
   - names of who should attend
   - numbered items for discussion.

   There should also be time allowed for:

   - introductions or warm up activities
   - a quick review of the agenda
   - a break if the meeting is lengthy
   - any discussion at the end of how well the meeting went.

   For each agenda item, you should provide the following information:

   - a brief description of the item
   - the name of the presenter(s) and time allowed
   - details of whether the item requires a decision, follow-up action, or whether it is just information.

2. Have a chairperson

   The job of a chairperson is to keep:

   - the meeting moving
   - track of the time
   - the discussion on track.

   They should encourage everyone to participate equally, prevent side conversations and help to summarise the discussion whenever necessary.

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As team leader you could do the job, or, the team could agree to rotate the responsibility so that everyone has the chance to develop their meeting skills.

3. Avoid disruptions to the meeting

   Once the meeting has started, make sure everyone gives it their full attention. Encourage people to turn off their mobile phones. If you manage to keep the meeting short and to the point, you will have more chance of getting the team's agreement that no one should be called out unless there is an emergency.

4. Take minutes

   At each meeting, one person should keep a record of the items discussed and the main points raised during discussion. All decisions must be recorded together with any follow-up actions required and the names of the people responsible for carrying them out.

5. Sum up at the end

   Review the tasks assigned to team members and agree on the form of the agenda for the next meeting. Review how the meeting went and discuss how to improve future meetings.

1.14 Quality control and quality assurance

When people discuss aspects of quality, it is generally in the context of quality control and quality assurance. Despite this relationship, there is a considerable difference between the two. In his book '*Profitable customer care'*, Alfred Tack (1994) in a simplistic example stated that quality control can be thought of as sorting the goats (non-conforming products), from the sheep (conforming products), while quality assurance prevents them mixing in the first place.

Therefore, quality control is a reactive (after the event) approach, and quality assurance is a proactive (before the event) approach, to operations in an organisation. When taking the proactive pathway, you will be asking questions such as, 'Are we building the house the correct way and to specifications?' instead of, 'Did we build that house to specifications?' If you take the reactive approach, it will be too late when you find out that you have not met customer expectations on the day of handover. As a manager in the building and construction industry, you must therefore focus on preventing problems before they occur and not focus on controlling problems that should not have happened in the first place.

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Quality assurance requires a team approach to work effectively, ie the cooperation from everyone in your organisation. The importance of a team approach is discussed later in this Learner Resource.

1.15 Total quality management

To complete the hierarchy of quality management, another element needs to be added, this being total quality management which provides a focus on continuous improvement. Total quality management allows an organisation to quickly change to adapt to local and global trends. In the total quality management system, the customer is paramount and all activities are targeted at satisfying their individual needs. Customers may be internal or external to the organisation. Total quality management is not a one-off activity, it is an ongoing continuous cycle of improvement. Best practice is the starting point for continuous improvement.

Deming developed 14 points for management which he believed were equally appropriate for managing quality within a range of organisational contexts. These points are as follows.

1. Constancy of purpose. Create constancy of purpose for continual improvement of products and services. Plan for the long-range view of becoming competitive, to stay in business and to provide jobs.

2. Adopt the new philosophy. Transformation of Western management style is necessary because we are in a new economic age created by Japanese methods.

3. Eliminate the need for mass inspection. Build in quality to all parts of an organisation from the start.

4. End the practice of awarding contracts on the lowest price. Insist your suppliers guarantee quality and reduce the number of suppliers.

5. Constantly improve every process all the time. It is management's job to aim to continually improve every aspect of the system and thus, continually lower costs.

6. Institute on the job training. New skills are required to keep up with constant changes in technology.

7. Encourage effective two-way communication and drive out fear which leads to lower productivity.

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8. Break down barriers between departments. Work in multi-disciplinary teams.

9. Encourage and adopt leadership aimed at helping people do a better job. Concentrate on quality improvement.

10. Eliminate the use of posters, slogans and pressure for the work force to achieve zero defects. This creates adversarial relationships. The problem is with the system and not the workforce.

11. Eliminate quotas and numerical goals, instead use aids and helpful leadership to achieve continual improvement.

12. Permit people to take pride in their workmanship. Change attitudes from achieving numbers to achieving quality.

13. Provide education and encourage self-improvement for everyone.

14. Management must be permanently committed to improving quality and productivity. Support is not enough, it requires action!

Source: www.deming.org

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Activity 8 – Importance of total quality management

Explain why total quality management is important for the successful completion of a building project.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

1.16 Poor practices

According to the UK Department of Trade and Industry (DTI), some of the poor practices must be recognised and corrected to be able to become a total quality organisation. These practices may include:

- leaders not giving clear direction
- not understanding, or ignoring competitive positioning
- each department working only for itself
- trying to control people through systems
- confusing quality with grade
- accepting that a level of defects or errors is inevitable
- fire fighting, reactive behaviour
- the ‘it’s not my problem’ attitude.

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Activity 9 – Poor practices

Review the previous list of poor practices and list those that you have encountered in your work or when dealing with an organisation.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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The DTI also believe that the task of implementing total quality management can be daunting. The following is a list of points which are a refinement of the various beliefs of some of the quality gurus that they believe organisation leaders should consider to make sure of quality outcomes:

- The organisation needs a long term commitment to continuous improvement.
- Adopt the philosophy of zero errors/defects to change the culture to ‘right first time’.
- Train people to understand the customer/supplier relationships.
- Do not buy products or services on price alone – look at the total cost.
- Recognise that improvement of the systems must be managed.
- Adopt modern methods of supervising and training – eliminate fear.
- Eliminate barriers between departments by managing the process – improve communications and teamwork.
- Eliminate goals without methods, standards based only on numbers, barriers to pride of workmanship and fiction – get facts by studying processes.
- Constantly educate and retrain – develop experts in the organisation.
- Develop a systematic approach to manage the implementation of total quality management.

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Activity 10 – Meaning of quality

Explain what quality means to you by giving examples of where you have used quality practices in the workplace or in a previous activity.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

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1.17 Determining quality objectives

As part of the first stage in meeting your quality objectives, you will need to determine exactly what it is, and the purpose, of what you are trying to achieve.

1.17.1 What is the purpose of developing quality objectives?

A quality management system is developed and implemented because the organisation needs to demonstrate its ability to provide products and services that consistently meet customer and regulatory requirements applicable to their industry.

Underpinning the quality management system is a number of quality objectives developed to enable conformity to the specific requirements of your customers and regulatory authorities. Under ISO 9001 Clause 5.4.1, organisations must have specific quality objectives for each of the relevant functions/levels within the organisation. For example, in a construction organisation, this means there must be separate quality objectives for the design, purchasing, finance, human resources and sales departments. There must also be quality objectives for the organisation as a whole.

An example of a quality objective in the purchasing department might be to '*reduce the number of approved, quality endorsed suppliers from 120 to 75 within the next three years*'.

In the purchasing department, the quality objectives should make sure that purchased products conform to specified requirements. This will be achieved by implementing procedures and processes that:

- specify how you evaluate and select suppliers based on criteria for selection, evaluation and re-evaluation
- allow you to determine the type and extent of control applied to the supplier and the purchased product or service
- enable you to perform product verification at the supplier's site
- specify documentation requirements.

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Activity 11 – Quality objectives

Develop a quality objective for the finance department of a home building organisation.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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1.18 A manager's role

As a manager within a building and construction organization,, managing quality is a very important aspect of your role. This responsibility also extends to managing the quality of safety systems implemented for the project. Defects in the quality of materials will lead to poor quality construction and inadequacies in safety systems may lead to injury or the death of employees. The decisions you make during the planning stage of the project will impact greatly on the outcomes. During these early stages, specifications of materials, the systems implemented and the skill of the employed labour shape the ultimate outcome. Decisions related to quality that you make during the project will mainly be related to using established systems and compliance with standards and decisions made earlier in the planning stage of the project.

1.19 Senior management responsibility

Quality objectives must be developed based on what is included in the organisation's quality policy statements. Developing a quality management system is a strategic business decision undertaken by senior management who provide the vision, direction and leadership required to develop the high level goals and objectives for the proposed system. Customer requirements and the codes and standards of regulatory, licensing and industry bodies will also influence decisions made by senior management about the quality management system.

Different size organisations will have different personnel responsible for managing the quality function. In small organisations, the owner will most likely be the person responsible. Depending on their workload, they may need to employ an external consultant to manage the quality system of the organisation. Medium-size organisations may employ a quality manager who is responsible for the day-to-day operation of the quality system.

All reporting will be done to this manager who will inform their manager of details and issues that will be required to make strategic planning decisions.

In large organisations, you are likely to find a department with the primary role of implementing and maintaining the quality management system. The department will comprise a number of quality system specialists and support administrative staff.

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No matter what the size of the organisation, there needs to be one manager who is in charge of all quality functions within the organisation. They must be the focal point for all operational decisions relating to quality processes. This manager must coordinate and monitor the quality system and instigate prompt and effective action when needed.

Senior management, either directly or through the quality manager, must review the quality system on a planned regular basis. This review must include analysing the outcomes from the results of audits.

The quality manager is responsible for maintaining and adjusting the audit schedule, then reporting findings back to senior management.

It is the role of senior management to make sure that all functions of the organisation work holistically and that quality strategies are consistent with the overall direction of the organisation. This includes policies, procedures and processes applied in day-to-day business transactions. For example, it is not advisable to undertake a massive expansion program if it will put a drain on finances, which in turn may lead to purchasing materials from the cheapest supplier without regard for the quality of their product.

Senior managers must make sure of buy-in and ownership of all quality objectives to facilitate their deployment and achievement across the whole organisation. An integrated holistic approach will enable the organisation to achieve its strategic goals.

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Activity 12 – Auditing

Explain what you would expect to find after undertaking a review or audit of the processes of an organisation.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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1.20 Quality policy statements

For every statement in the quality policy you must develop at least one quality objective. In some circumstances when the quality statement covers a broad range of organisational operations, you will need to develop quality objectives for each area impacted by the policy statement.

The following is an example of a quality policy statement by John Holland Group which is publicly available on their website: www.johnholland.com.au/Documents.asp?ID=5244&Title=Quality+Policy+Statement.

> *As a primary obligation, John Holland is committed to meeting the needs and expectations of our clients by the capable implementation of the tried and proven quality management system. This is achieved by:*
>
> - *complying with statutory obligations, standards, specifications and codes of practice relevant to quality management*
> - *maintaining, monitoring, reviewing, auditing and continually improving the quality management system consistent with certification requirements of AS/NZS ISO 9001*
> - *providing sufficient and suitable resources to implement and maintain the quality management system*
> - *engaging suitably qualified, skilled, and experienced people*
> - *educating and training in order to continually improve the skills of our people, awareness and knowledge of quality issues and practices*
> - *identifying, reporting, investigating and resolving all non-conformances and taking action to prevent recurrence*
> - *establishing, reviewing and communicating performance measures and taking action to improve outcomes*
> - *monitoring and evaluating the quality performance of consultants, subcontractors and suppliers and implementing effective communication with them on quality and compliance issues.'*

As can be seen previously, the quality statement related to John Holland's quality management system is supported by more than one quality objective. This is because different departments within the organisation will be responsible for making sure that the goals of the statement are met.

1.20.1 Who should be involved in developing and achieving quality objectives?

The following table shows how the different stakeholders make sure that quality objectives are developed and achieved.

Stakeholder	Responsibilities
CEO/Senior management	• Provide the leadership and direction for quality management within an organisation • Develop appropriate mission and organisational goals • Demonstrate commitment to continuous improvement • Establishment of quality objectives should be part of the organisation planning or quality management system planning processes • Make sure that sufficient resources are available to support change and ongoing continuous improvement • Provide opportunities for all personnel to upgrade their skills to achieve continuous improvement aims
Middle management	• Take responsibility for own learning • Implement professional development programs • Review technological developments to identify opportunities for implementation into current processes • Support personnel and provide positive feedback on achievements • Distribute resources to enable continuous improvement processes to be implemented
Staff	• Take responsibility for continuous improvement in their own areas • Actively participate in improvement teams • Undertake training • Address customer needs • Take responsibility for own work outputs • Provide feedback to managers about quality issues and opportunities for improvement

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Stakeholder	Responsibilities
Suppliers	• Provide goods and services, plant and equipment as and when, required • Make sure that the quality of goods and services, plant and equipment is as expected by their client • All practices comply with codes, standards and legislation
Clients	• Focal point of all activities • Help facilitate seamless interface with your organisation • Make sure their quality goals are compatible with your organisation
Regulators	• Provide accurate information • Make sure that information about compliance is available when required • Provide an appeals process • Make sure regulations keep pace with industry requirements
Architects/ Designers	• Provide plans, specifications and design service to suit client needs • Make sure all designs and specifications comply with codes, standards and legislation • All practices comply with codes, standards and legislation

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1.21 Project teams

Everyone in the construction organisation is working as part of a team. These teams are also teams for quality improvement. As a member of a project team, individuals must take responsibility for quality improvement in their work area. Being part of a project team is part of their job. Team members should therefore not be afraid to ask questions during team meetings or put forward suggestions.

As part of the team, individuals have a responsibility to carry out tasks associated with quality improvement. These tasks may involve:

- gathering data
- drawing charts and diagrams
- observing processes
- completing documentation.

1.22 Quality management methods, techniques and tools

There are three constraints that are most likely to impact on the level of quality of your project outcomes. These are time, cost and scope.

Time

Time is the set period allocated to complete the project. Time management is an important part of project management because missed deadlines may lead to missed deliverables and an unsatisfied customer.

Proper control of the schedule requires the careful identification of tasks to be performed, an accurate estimation of their durations, the sequence in which they are going to be done, and how people and other resources are allocated.

Cost

No commercial project can proceed without an appropriate budget. However, all costs detailed in the budget must be monitored to make sure that overruns do not impact on the approved budget for the project. Expenses must be minimised, however, sufficient money must be available to make sure of the desired quality outcome.

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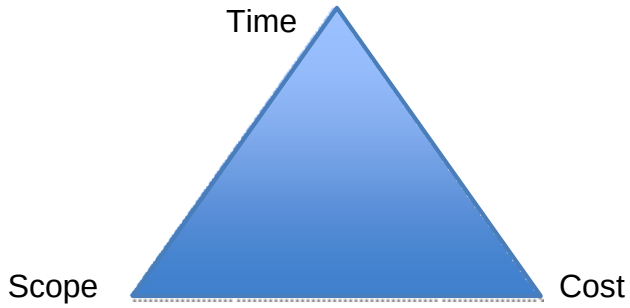
Scope

The scope of a project is what it is trying to achieve (its purpose), and includes all the processes and work required to achieve the desired outcomes.

These constraints are constantly competing against one another to impact on your project. For example:

- an extension to the scope will usually lead to increased time and increased cost
- a tightening of time may lead to increased costs and reduced scope
- a limited budget may lead to increased time and reduced scope.

In the following example that shows a triangle with equal sides, any changes to any of the sides of the triangle can cause a change in any or both of the other sides. The triangle is then out of balance.



Project management triangle

If a building developer needs to add an extra 15 car parking spaces and a security access gate to the original plan, then this will increase the scope. You will therefore need an increase in time and budget to complete. If the budget remains the same, then there will be a reduction in quality of the scope.

As the project manager, you will be constantly applying your skills and knowledge to lead the project team to make sure that these constraints remain evenly balanced and do not negatively impact on your project.

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According to AS ISO 10006 Quality management systems, when determining the balance between time or cost and product quality, potential impacts on the project's product should be evaluated, taking into consideration customers' requirements. To achieve this, there are a number of quality management methods, techniques and tools that you can use. These measure the effectiveness of your processes for delivering a quality product or service.

Although widely used, some of these are more appropriate for specific circumstances, such as assembly line processes in manufacturing organisations. Because this Learner Resource is focussing on quality in a building and construction context, we will only discuss the quality management methods, techniques and tools which are more appropriate to the building and construction industry.

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Activity 13 – Control of time, costs and scope

Explain why it is important to control the time, cost and scope of a building project.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

1.23 Benchmarking

Benchmarking is the process of comparing your organisation's processes and outputs with a standard (benchmark). The process of benchmarking is not focused on measurements against a fixed standard, such as a length, volume or weight. It involves identifying other organisations, sometimes a competitor, embracing best practice and using these as the basis for comparing your organisation.

The standards against which you measure your organisation's performance can be internal or external to the organisation. For example, an internal benchmarking activity might involve comparisons of building and construction projects you are undertaking in different states.

Although harder to undertake, you can also benchmark your organisation against:

- a competitor
- an organisation operating in a different market, such as an interstate organisation where you only operate in a different state
- an organisation that is similar to yours but they operate in a different sector of the industry. For example, if you only undertake residential building projects, you might wish to benchmark against an organisation that only works in the commercial sector.

The outcomes from a benchmarking activity will help you to assess your progress over time and the level of effectiveness of the continuous improvement processes in your organisation. They also enable you to determine if the rate of improvement in your organisation is equal to that in other organisations.

The following is a simple step by step flow chart that shows the steps required to undertake a benchmarking activity, according to the Australian Quality Council.

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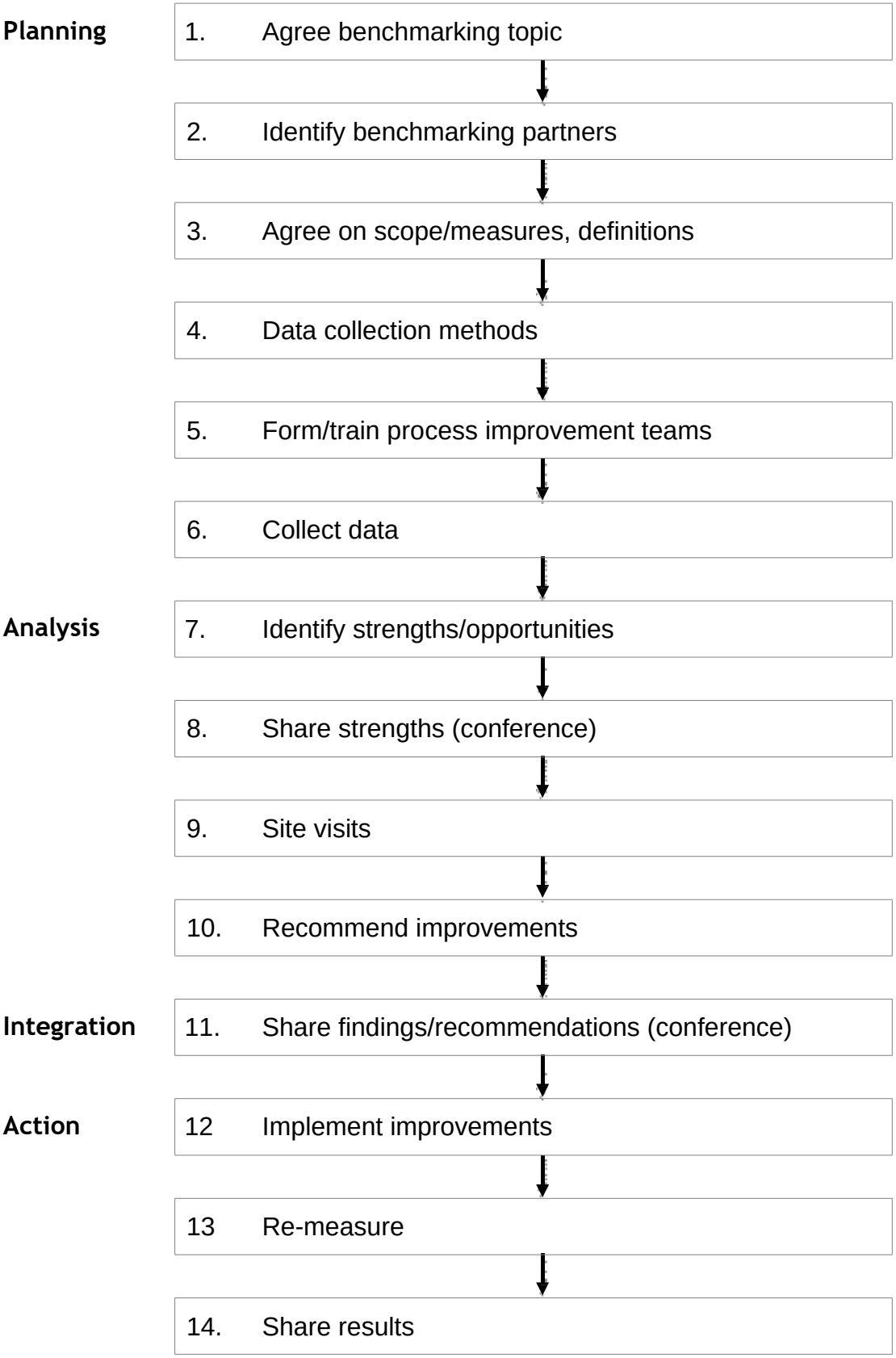
Planning
1. Agree benchmarking topic
2. Identify benchmarking partners
3. Agree on scope/measures, definitions
4. Data collection methods
5. Form/train process improvement teams
6. Collect data
Analysis
7. Identify strengths/opportunities
8. Share strengths (conference)
9. Site visits
10. Recommend improvements
Integration
11. Share findings/recommendations (conference)
Action
12 Implement improvements
13 Re-measure
14. Share results

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Activity 14 – Benefits of benchmarking

Explain how undertaking a benchmarking activity can benefit the outcomes of a building project.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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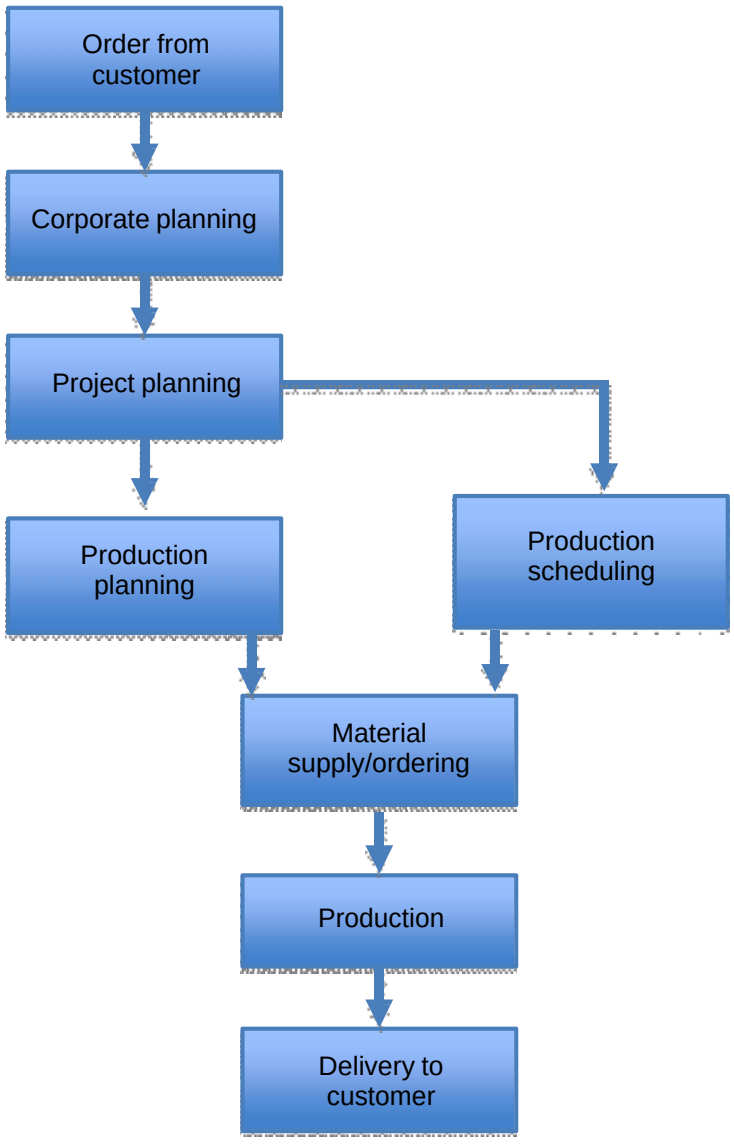
1.24 Flow charts

Probably the most widely used project management tools are flow charts. They can be simple or complex depending on the requirements of the user. Flow charts are a pictorial representation of a process that show the steps required to complete the process. They can show the different paths that can be taken depending on the decision made at a particular point.

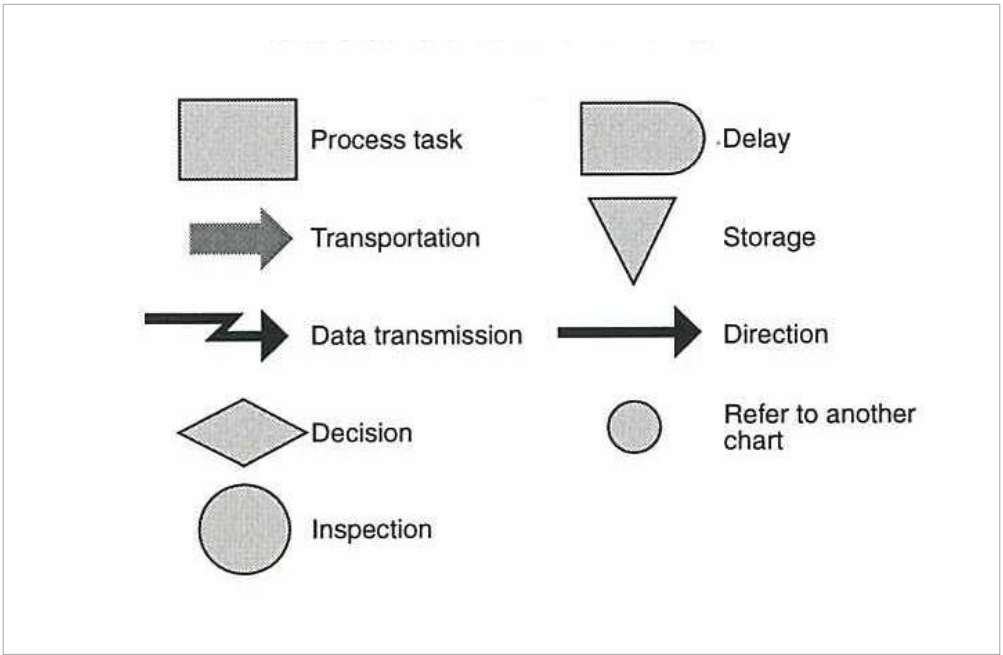
You can draw flow charts using special software or you can use flow charting tools in programs, such as Microsoft Excel or Word.

The following is an example of a simple flow chart for a customer order process.



Simple flow chart for a customer order process

The following are the standard symbols you should use to create more detailed flow charts.



Standard flow chart symbols

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Activity 15 – Create a flow chart

Choose a work activity from the building and construction industry. Draw a flow chart for the processes associated with the activity in the space below.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

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1.25 Brainstorming

Brainstorming is a group activity that helps organisations pull apart problems and suggest possible solutions. It can also be used to generate ideas for future development and how to meet customer needs.

Brainstorming involves people contributing their ideas, no matter how crazy or far-fetched they might be, in a group forum. All the suggestions are recorded for further discussion. Brainstorming sessions are a means of generating a lot of ideas to solve a problem or issue – they do not analyse each suggestion because this may discourage people from contributing.

The recorded suggestions are evaluated for applicability and practicability and the most appropriate ones are implemented.

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Activity 16 – Brainstorming

Explain how a brainstorming session between project personnel can support quality initiatives for the project.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

1.26 Surveys

Surveys are used to collect information about what customers, or potential customers, want or how they rate your products and services.

It is difficult to design surveys that are simple to follow, provide clear choices to the reader, and collect reliable information. Your team should not attempt to do this alone. You should consider getting expert help from a consultant who knows about market research.

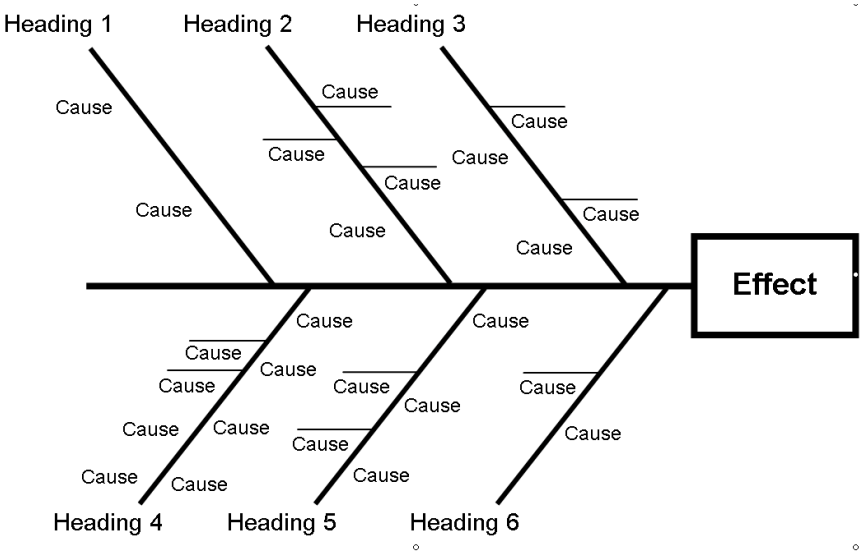
1.27 Cause and effect diagrams

Because of their shape, these diagrams are also referred to as fishbone charts. A cause and effect diagram shows the relationship between a particular effect and its associated causes.

The main branch represents the effect. Each feeder branch is then labelled to show a cause that directly impacts on the effect. The diagram can also include minor branches that show details of causal factors.

A cause and effect diagram is best prepared by a group of people who are familiar with the problem under discussion. Information may come from a brainstorming session as discussed previously.

After identifying the problem, causes are grouped together in a logical manner and added to a diagram as shown in the following example.



Cause and effect diagram

© Holmesglen

1.28 Work breakdown structure

A work breakdown structure (WBS) is an outline of the project. Using the project goals as a guide, the project is broken down into milestones. The tasks required to achieve the milestones are then determined. The tasks become the next level in the WBS. The number of levels used in a WBS depends on the size and complexity of the project. A typical WBS may have the following categories:

WBS level	Definition
1	Overall project
2	Major milestones
3	Task
4	Subtask
5	Individual processes or actions

The larger the project is, the more levels are represented in the WBS.

WBSs can also be divided according to the team doing the work. For example, level one would be the overall project, but level two may be a division or a department. Each level below that would indicate the tasks that department needs to complete in order to achieve the overall project.

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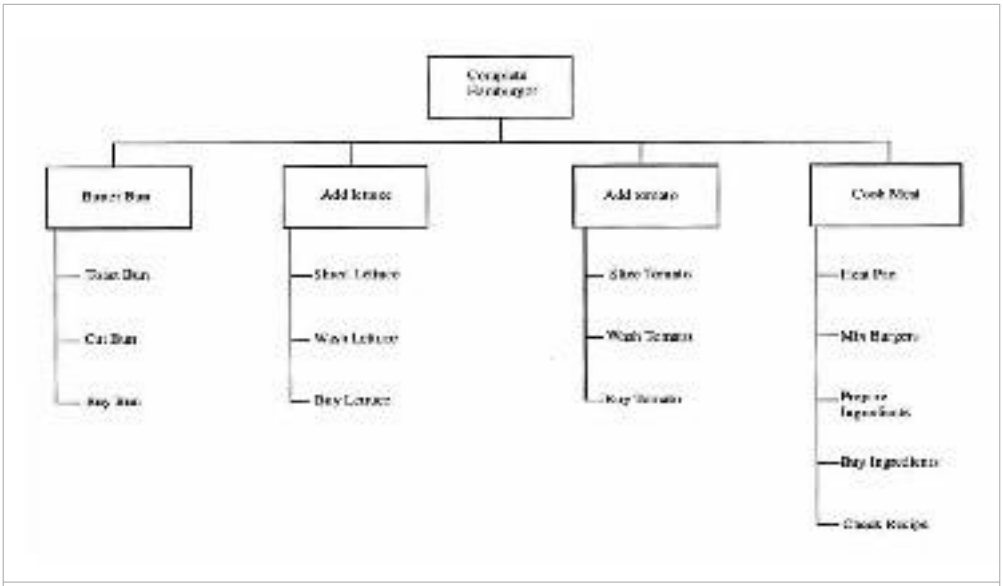
The following example shows a WBS for making the burger eaten by many tradespeople during their lunch break.



Work breakdown structure for making a burger

1.29 Network diagram

A network diagram allows the relationship between tasks to be mapped. A WBS shows only the hierarchical relationships, not the sequence of events. A network diagram shows the workflow, not just the work. When planning projects, it is best, but not essential, for you to create a WBS before a network diagram.

There are two main concepts to understand when creating network diagrams:

Precedence

If one task needs to be completed before another can be started, the first task has *precedence* over the second. For example, in the burger example in the previous explanation of the WBS, the ingredients need to be purchased before any of them can be prepared. Therefore, the purchase of ingredients has *precedence* over the preparation of the burger.

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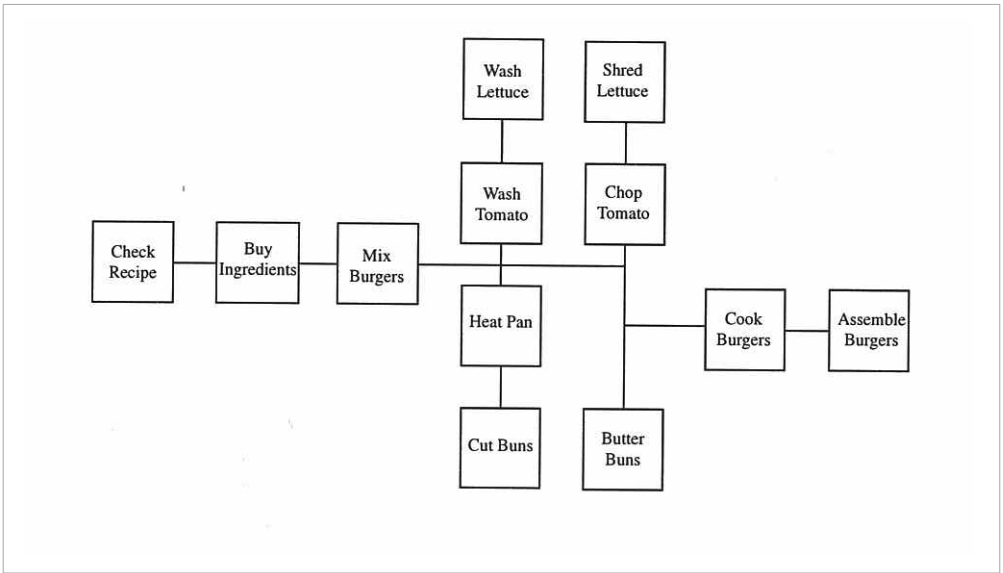
Concurrent (parallel)

These are tasks which can be worked on at the same time. Using the burger example again, the tomato, lettuce, buns and burger ingredients can all be purchased at the same time. Further along the process, the lettuce can be shredded and the tomato chopped while the pan is heating. These tasks can be performed *concurrently*.



Concurrent activities

1.30 Cost/benefit analysis

By continually reviewing charts and determining trends in data after changes have been made to processes, comparisons can be made to determine the success, or otherwise, of particular changes. Costs to quality can then be analysed.

An overall analysis can be done by comparing costs before and after improvement projects. More specific analysis can be done to pinpoint particular areas where breakdowns or faults are costing more than necessary. Cost/benefit analysis reports should be generated regularly and distributed throughout the organisation to the key people who require the information. By doing this, everyone concerned can see the benefits associated with continuous improvement projects.

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Activity 17 – Importance of a cost/benefit analysis

Explain why it would be important to undertake a cost/benefit analysis before employing extra staff to complete a project that is falling behind its time schedule.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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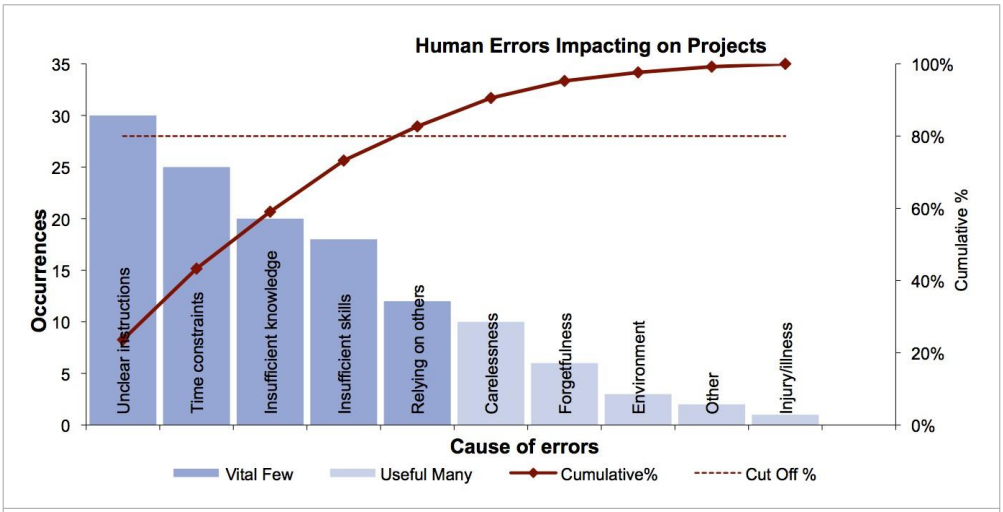
1.31 Pareto charts

The best way to explain a Pareto chart is to use an example. The following Pareto chart shows the number of human errors that have impacted on projects for a particular organisation. The chart shows that the major cause of errors is through unclear instructions. Out of the total of 127 recorded occurrences, 30 were the result of unclear instructions which is 24% of all errors. Next are time constraints which at 25 errors account for 20% of all errors. Together, these two errors account for 44% of the errors.

From this, you can determine that nearly half the causes of human errors associated with projects for the organisation are related to poor instructions and unrealistic time frames. These should then become the focus of your continuous improvement processes.

If, however, the manager is working to the 80/20 principle, their efforts should be focused on addressing the first five causes because these account for just over 80% of all errors.



Pareto chart

The most effective way of working with Pareto charts is to focus on the issue associated with the first bar and work on it until it is no longer a priority. You should then redraw the chart and focus your attention on the new priority item.

Activity 18 – Creating a Pareto chart

In the following space, create a Pareto chart based on the following data related to defects encountered at handover of the building to clients.

Defects	Occurrences
Dirt/Dust	21
Marks on walls	18
Chipped paint	14
Incorrect materials	12
Sticking doors	10
Wrong colours	8
Incorrectly fitted hardware	6
Stains on carpet	2
Other	2
Cracked tiles	1

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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1.32 85-15 Rule

Joseph Duran was the founder of the 85-15 Rule that you should not confuse with Pareto's 80-20 Rule. Juran's 85-15 Rule states that at least 85% of problems can only be corrected by changing the system which is largely under management control, and less than 15% of the problems are under the workers' control. This leads to people not questioning what the work is doing is wrong, but what is wrong with the system and finding ways to improve it.

1.33 Continuous improvement

A term you hear a lot about in today's economic world is the strategy of *continuous improvement*. The strategy underpins processes that make sure that continuous (ongoing) improvements are part of all activities in an organisation. You will also see continuous improvement referred to as Kaizen, which is the Japanese word for continuous improvement. Put simply, continuous improvement is a way of looking at how you can do your work better.

Although there are many different approaches, methodologies and tools supporting continuous improvement, the objective is always the same. This is to continuously improve customer satisfaction by applying ongoing and incremental improvements to the organisation's policies, procedures and processes.

Some of the most common continuous improvement methods include:

- Lean

  This approach centres on preserving or improving customer value with less work (doing more with less). Quality goods and services are delivered by using fewer resources, such as time, capital and human space.

- Six sigma

  This approach aims to improve the output quality by identifying and removing the causes of defects/errors and minimising variability in manufacturing and organisational processes. Mostly used for manufacturing applications, a six sigma process is one in which 99.99966% of the products manufactured are statistically expected to be free of defects. For a screw manufacturer, this equates to 3.4 defective screws for every million screws they produce. Think about this the next time you purchase 50 mm screws in a bucket of 500 and you can't use ten of them because they are defective. If the manufacturer was applying six sigma processes, then you would need to purchase 588 buckets (294,000 screws) before you found one defective screw.

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- Lean six sigma

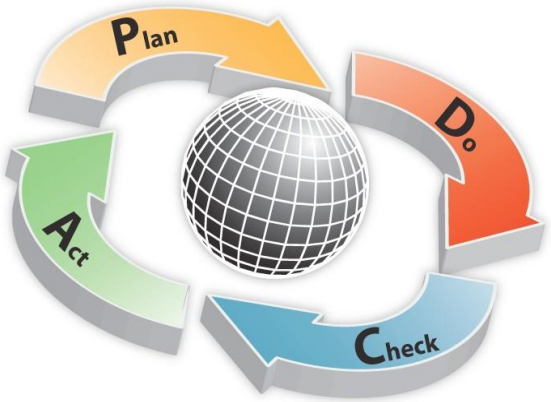
  This approach is a combination of lean and six sigma that emphasises that speed is directly tied to excellence. The integrated methodology brings about significant change and improvement in quality, increased speed of processes and a higher level of customer satisfaction while at the same time, reducing the cost of operations.

- Total quality management

  This approach is a management concept developed by Deming and focuses on the reduction of errors produced during manufacturing or service provision, increased customer satisfaction and streamlining supply chain management. The approach also includes the provision of ongoing training for employees and the modernisation of equipment.

- Plan-Do-Check-Act model

  Also developed by Deming, the Plan-Do-Check-Act (PDCA) model is an approach to continuous improvement consisting of four phases and associated steps, Plan-Do-Check-Act. The approach highlights the need to start quality improvement programs with careful planning, which must be followed up by effective action and review. This approach is implemented as a continuous cycle of planning, doing, checking and acting on what is found.



Plan-Do-Check-Act model

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Plan

The first step in the continuous improvement cycle is planning. You must develop plans that document the processes and any related problems or issues related to your building and construction projects. Your plan must state possible solutions to the problems or issues that need attention or improvement. It is important that all key stakeholders contribute to quality planning. These include work colleagues and customers. At this stage, you should:

- develop the issue
- specify the objective
- determine the measures
- carry out analysis of the key processes
- develop the solutions
- decide on the actions
- allocate the responsibility
- schedule the time or date to meet the first target.

Do

The second step requires you to make changes to the way your organisation operates. These changes must be implemented in small steps. This makes sure that the change is kept in place long enough to determine its impact and the difference it makes. It is recommended that you make only one change at a time and that you record what you have done. Some activities you may need to undertake at this stage are:

- carry out the plan for the specified period
- educate and train all the people to be involved
- carry out a trial or pilot if necessary
- gather the data
- hold team briefings to explain the changes to operations that may occur under a new quality system and how they will affect individuals
- nominate a start date and publicise it in your workplace so that people know that change is coming
- communicate details of changes to all colleagues who will be involved
- explain changes to the procedures with employees and make sure they know what they have to do
- be seen as a leader and involved in the change process
- if necessary, seek guidance from a quality system consultant.

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Check

The third step involves evaluating what has been done. You need to gather data and analyse results. The tools you use to gather the data were discussed previously in this Learner Resource.

You use any information gathered about the change implemented to determine if it has reduced the problem or eliminated it completely. After you have checked the results against the outcomes that your organisation had determined are acceptable, you can make a decision if the change was suitable or not.

The checking stage requires you to follow two steps.

1. Checking the system using the following methods:
    - Measuring the results of activities related to quality against the determined requirements.
    - Quality audits and reviews: This is a critical examination of each aspect of the system including such things as policy, training processes, operating procedures, documents and decision making.
    - Quality surveys of major key areas, such as sites, plants, procedures, or other areas which have common problems.
    - Quality inspections which check standards and working practices of a section or department against agreed procedures or guidelines.
    - Surprise inspections (tours) of work areas to see that standards are acceptable and that agreed working practices are maintained.
    - Quality sampling which measures the error potential of a process by random sampling.
2. Investigating and following up problems or defects which may include:
    - collecting evidence and information about the problem or defect
    - checking the validity of the evidence
    - analysing the evidence and deciding the most likely cause
    - recording the findings and results
    - notifying the person responsible for taking corrective action.

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Act

The fourth and final stage of the PDCA cycle is to act on the outcomes from the previous Check stage.

If you determine that a small change has produced the desired result, then you can implement the change on a larger scale. You can now start the cycle again with a new project.

If the result was unacceptable, you will need to return to the Plan stage of the cycle and reconsider different ways to approach and solve the problem.

At this final stage, you should:

- standardise good solutions
- update the plan with new knowledge
- develop counter-measures for things which didn't work
- reassess the plan.

1.33.1 Importance of continuous improvement

According to the Kaizen Consulting Group, the most important objective of implementing any continuous improvement methodology and tool is to develop an organisational mindset. This mindset focusses on continuous improvement and a culture that will improve productivity, quality, reliability, process cycle times, while reducing cost, waste, resource consumption and cycle time.

Kaizen believe continuous improvement programs benefit organisations by:

- reducing waste or non value add activities
- reducing cycle times
- improving quality
- improving productivity
- reducing cost of operations
- improving throughout
- improving customer satisfaction
- improving profits.

The purpose of undertaking an audit is to measure the effectiveness of the system by obtaining facts, not just data. Masses of data are not meaningful unless they lead to accurate and timely information that stakeholders can use to make informed decisions. There is no place for personal opinions, exaggeration and mistaken impressions.

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You should approach each audit from three perspectives:

- Intent – do the processes adequately express the intended approach?
- Implementation – do the work practices demonstrate compliance with the stated intent?
- Effectiveness – do the results of the process show that the desired outcomes have been achieved?

Skymark

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Activity 19 - Effective vs efficient

Explain why quality assurance requires an effective system, not just an efficient one.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

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1.34 Strengths, weaknesses, opportunities and threats analysis

Although generally used as a strategic planning tool, by undertaking a strengths, weaknesses, opportunities and threats (SWOT) analysis, you can identify problems and areas for potential improvement likely to be encountered during the project lifecycle.

By using a SWOT analysis, you can identify the strengths, weaknesses, opportunities and threats associated with your project.

- Strengths are a positive aspect of your project and have an internal focus.
- Weaknesses are a negative aspect and are also internal.
- Opportunities are positive but rely on external input.
- Threats are negative and are externally controlled.

1.35 Identifying and measuring quality criteria

According to the Australian Standards, quality objectives must be measurable and can be achieved through quantitative or qualitative measures.

Quantitative measures are expressed in terms of definite numbers or amounts. They are generally more objective in determining whether conformity or effectiveness has been achieved.

Qualitative measurements are performance measures that cannot be recorded numerically. They include data, regarding what people do, say, or think about your product, service or the organisation.

Quality objectives should be specific and relevant to the needs of your organisation, to make sure that the expected outcomes are understood and meaningful to all stakeholders responsible for their achievement. The objectives must also be realistic and achievable with the available resources.

Achieving quality objectives does not have an unlimited time allocation. They must be achieved within a defined time period to make sure of accountability. Your quality planning process must determine what is an acceptable time period that must be communicated to all stakeholders responsible for its achievement.

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When you have developed the quality objectives for your organisation, they must be appropriately documented. Details may be contained in:

- quality manual
- quality management system processes and procedures
- quality plans.

1.36 Higher project authorities

Management commitment to quality is generally seen through the approach they take and the resources they allocate to the development, implementation, review and maintenance of the organisation's quality management system.

Although in some large organisations a dedicated team of specialists administer the quality management system, it is still the responsibility of all personnel, including senior management to participate in the management and review processes of the quality management system.

Senior management of the organisation will develop the strategic objectives, targets and priorities related to quality. These will be incorporated in strategy statements and quality plans. Lower level managers will develop the processes to support the implementation of the plans and the achievement of the associated objectives, targets and priorities. This level of management will also be responsible for the development and implementation of processes required to monitor and review progress towards achieving the desired outcomes.

Based on feedback from the review process, senior management will advise on improvements they believe will be required to continually improve operations within the organisation.

As a project manager in a large construction company, you will generally encounter high-level decisions being made by a member of the senior management team. In smaller organisations, the project manager may be regarded as being senior management, so will therefore have a high level of authority associated with a range of business activities, including quality management.

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The following is a list of senior management positions from whom you may need to seek agreement before you implement different aspects of the quality management system during a construction project.

- Director
- Managing Director
- Chief Executive Officer
- General Manager
- Project Director
- Finance Director
- Quality manager
- Operations manager
- Human resources manager
- Sales/marketing manager

Organisations that may be undertaking multiple projects will need all of these senior managers to work collaboratively to achieve the desired outcomes across all areas of the organisation.

Different organisations will assign different levels of responsibilities to these positions, so you should check these when you begin work with the organisation.

In the following pages is an example of the responsibilities of a quality manager as specified by efficient quality management system.

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Activity 20 – Informing senior management

Explain why it is important to inform senior management about the processes and outcomes from a quality management system.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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1.36.1 Quality manager

The quality manager is responsible for the administration of the quality plan and has the authority to manage all work affecting quality. The quality manager will provide leadership for the development, implementation, communication and maintenance of quality systems, policies and procedures for the organisation according to the approved quality system. A primary goal is to achieve a high degree of joint ownership of quality and compliance strategies with all of the major operational stakeholders in the organisation, while addressing regulatory requirements in an effective, timely and responsible manner.

Responsibilities

- Formulate and manage the development and implementation of goals, objectives, policies, procedures and systems pertaining to the quality assurance and regulatory functions.
- Develop, implement, communicate and maintain a quality plan to bring the organisation's quality systems and policies into compliance with quality system requirements.
- Manage documentation related to quality system guidelines.
- Quality assurance project lead for cross-functional projects, including determining quality assurance timelines, plans and position strategies.
- Manage and maintain the quality aspects of the Design Control Program, including but not limited to, design input and output documentation, applicable risk analyses, verification and validation activities and formal design reviews.
- Provide leadership for developing and directing quality assurance and quality improvement initiatives (cost-of-quality reductions, audit system, corrective action preventative action (CAPA system), etc) for all products, processes and services.
- Manage and maintain the organisation's internal quality audit program and assess improvement initiatives resulting from all quality audits – internal and external.
- Effectively interact with production and development teams to maintain product supply and help introduce new products.
- Manage training of all organisation personnel in the requirements, documentation and maintenance of the corporate quality system.

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- Manage and maintain the organisation's quality inspection and product release programs for incoming and in-process materials and components, processes and finished goods.
- Establish an auditing program and lead compliance audits of third party suppliers, manufacturers and distributors.
- Report on timely basis to executive management on the performance of the quality system, any non-compliance issues and recommended actions.

Qualifications

- Minimum of five years of quality systems supervisory/management experience within a related industry.
- Experience interacting with regulatory authorities.
- Experience in quality management systems.
- Experience in quality system audits.
- Working knowledge of design control processes.
- Experience with statistical sampling plans and trending analyses.
- Knowledgeable about electronic data management.
- Professional certifications.

Skills

- Ability to lead projects and programs with a positive get it done attitude.
- Organised, attentive to detail and able to prioritise and handle multiple projects with competing deadlines.
- Works efficiently both on independent basis and as part of a team.
- Ability to deal effectively with all levels within the organisation as well as with external parties, including regulatory bodies.
- Proven strong problem solving ability with attention to root cause.
- Maintains a personal and professional continuous improvement philosophy.
- Excellent written and verbal communication skills, strong interpersonal skills.

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The quality manager should be familiar with management tools for problem solving, process management and various metrics. Quality managers use problem solving tools to determine root causes and suggest solutions from various perspectives using data to make decisions.

Additional quality manager skills include:

- customer relationship management to make sure of partnerships and alliances
- energising internal customers to improve products, processes and services
- identification and prioritisation of customer needs and expectations using a range of tools measurement of customer satisfaction and loyalty using complaints, surveys, interviews, warranty data, value analysis and corrective actions
- conflicting requirement resolution and management of resources.

1.37 Quality requirements in the project plan

Project Management Organisation, PM4DEV, states that defining quality partly involves developing a quality plan and a quality checklist that will be used during the project implementation phase. This checklist will makes sure the project team and other members are delivering the project outputs according to the quality requirements.

Once the project has defined the quality standards and quality characteristics, it will create a project quality plan that describes all the quality definitions and standards relevant to the project and also will highlight the standards that must be followed to comply with the requirements of all stakeholders.

The quality plan also describes the conditions that the outcomes must have to satisfy the needs and expectations of the project stakeholders. It describes the situations or conditions that make an output fall below quality standards. This information helps the project team to identify what is above and what is below a quality standard. It also helps the team to gain a common understanding.

The quality plan also includes the procedure to make sure that the quality standards are being followed by all project staff. The plan includes the steps required to monitor and control quality and the approval process to make changes to the quality standards and the quality plan.

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As with any work activity, careful planning will go a long way to making sure. It is certainly an important element of establishing and maintaining a quality management system. This planning will require you to:

- identify organisational processes
- makes sure of compliance with codes and standards
- determine the sequence of processes, their relationships, interaction and dependency
- apply the processes throughout the organisation
- determine the criteria and methods for effective operation and control of the processes
- make sure there are sufficient resources, data and information available to support the operation and monitoring of processes
- make sure processes are regularly monitored, measured and analysed
- continually review and improve processes.

To develop a quality plan, you need the answers to the following key questions:

- What is the purpose of the organisation?
- What is the vision for the organisation?
- What is the organisation's mission? (How is it going to achieve its vision?)
- What factors does achieving the mission depend on?
- What are the values of the organisation?
- What are the objectives of the organisation?

According to the University of Wisconsin system, to develop a quality management plan you need to include the following components. For this, you will need to involve all stakeholders.

- Quality objectives
- Key project deliverables and processes to be reviewed for satisfactory quality level
- Quality standards
- Quality control and assurance activities
- Quality roles and responsibilities
- Quality tools
- Plan for reporting quality control and assurance problems

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The following table shows you what you need to do to develop the plan.

Set overall quality objectives	
What to do	**How to do it**
Identify the overall quality objectives for the project	• State the quality objectives in terms of the project objectives and/or organisation objectives. • Determine quality objectives for the product with the customer. • There may be overall organisation quality objectives or policies that the project can reference.

Plan for quality project deliverables – quality control	
What to do	**How to do it**
Identify the key project deliverables that will be subject to quality review	• The key objectives are the results that need to be delivered fit-for-purpose as identified in the project charter. Example project deliverables: – project charter – the web application – system design – building blueprint.
Identify the standards that will be used to evaluate the quality of project deliverables	• Identify the relevant deliverable quality standards, or measures used to determine a successful outcome for a deliverable. • Ideally your organisation has identified quality standards to be applied. If not, determine what you will use for your project. Example industry quality standards/methods: TQM, six sigma, quality gates, SPC, zero defects, quality circles, continuous improvement, ISO 9000. Example quality standards for a project deliverable: – project charter format – web interface standards – documentation standards.

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What to do	How to do it
Identify the completeness and correctness criteria	• Completeness and correctness criteria are defined from the customer's point of view. Work with the customer to define a complete and correct deliverable. The deliverables are evaluated against these criteria before they are formally approved. Example criteria for project charter: – standard template was used for the project charter – project deliverables are clearly defined. Example criteria for a product: – 95% defect free – all regulatory requirements are met – all reports and online displays tie out and balance.
Describe the quality control activities the project will use to make sure that quality standards for project deliverables are met	• Quality control makes sure the results of what you have done are what you expected. Quality control is product oriented. • Quality control activities are associated with the creation of project deliverables. Quality control prevents and resolves errors in project deliverables. Quality control verifies that deliverable quality standards and the completeness and correctness criteria established. • For each deliverable, describe the quality control activities you will execute. Example quality control activities: – quality control checklist – deliverable review – structured walkthroughs – statistical sampling – testing process.

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What to do	How to do it
Determine how often or when the quality control activity will be performed	• Establish the time frame or recurring frequency for performing the quality control activity. Examples: – deliverable review – at final delivery – structured walkthrough – at each module completion

Plan for quality project deliverables – quality control	
What to do	**How to do it**
Identify the critical project processes that will be subject to quality review	• Critical project processes are the activities that must be undertaken correctly and effectively to create the deliverables. Example project processes: – change management process – communication process – testing process – version release process.
Identify the relevant process quality standards for evaluating the quality of the project processes	• Identify the relevant process quality standards, or measures used to determine a successful outcomes for a deliverable. • Ideally your organisation has identified quality standards to be applied. If not, determine what you will use for your project. Example industry quality standards/methods: TQM, six sigma, quality gates, zero defects, quality circles, continuous improvement, ISO 9000. • A written procedure is also a ‘standard’ that defines the steps to execute a process.

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What to do	How to do it
	• Example standards for a project process: – the project management framework – issue resolution completed in five business days – change control procedure – version control procedure.
Identify stakeholder expectations for project processes	• Work with the project stakeholders to define what it means for a project process to meet their expectations. The project process is then evaluated against these expectations. Example stakeholder expectations: – project status will be communicated monthly – business subject experts will participate in all requirements – gathering sessions.
Describe the quality assurance activities to be used to make sure that the quality standards for project processes are met	• Quality assurance makes sure you are doing the right things, the right way. Quality assurance is process oriented. • Quality assurance refers to the internal work processes used to manage and deliver the solution. Quality assurance activities make sure project processes used to manage and deliver the project's product or service are effective and being applied. Quality assurance can be performed by a manager, customer or third-party reviewer or separate quality assurance group. Example quality assurance activities: – quality assurance audit – quality assurance checklist – quality assurance checkpoints. Example quality audit questions for process to create the project charter: – has the right sponsor been identified and has the sponsor formally approved the charter? – did key stakeholders participate?

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What to do	How to do it
	Example quality audit questions for project reporting process: – does each team member produce regular progress reports? Example quality audit questions for product transition process: – did the support team receive training on the new product or service?
Determine how often or when the quality assurance activity will be performed	• Establish the time frame or recurring frequency for performing the quality assurance activity. Example: – quality assurance audit – monthly – quality assurance checklist – at end of each stage.

Identify quality roles, tools and problem reporting procedures	
What to do	**How to do it**
Identify the quality control and quality assurance roles and responsibilities for the project and actual resources assigned	• The quality roles and responsibilities were identified in the project charter, and actual resources were assigned in the staffing plan.
Identify any quality-related tools used to support quality	• Identify the tools you will use and their purposes or uses. Example: – version control tool.
Define the quality control and quality assurance problem reporting plan	• Describe the plan to itemise, document and track to closure items reported through the quality control and quality assurance activities. • All problems must be tracked to closure and feedback provided to appropriate stakeholders and the project team concerning the status of the problem.

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Activity 21 – Importance of a quality plan

Explain why it is important to develop a quality plan for a building project.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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1.38 Review and acceptance of the quality plan

According to Australian/New Zealand Standard AS/NZ ISO 10005 Quality management systems – guidelines for quality plans, the quality plan should be reviewed for adequacy and effectiveness. It should also be formally approved by an authorised person or a group that includes representatives from relevant functions within the organisation.

In contractual situations, a quality plan may need to be submitted to the customer by the organisation for review and acceptance, either as part of a pre-contract consultation process or after a contract has been awarded. Once a contract is awarded, the quality plan should be reviewed and, where appropriate, revised to reflect any changes in requirements that may have occurred as a result of the pre-contract consultation.

Where a project or contract is conducted in stages, the organisation may be expected to submit a quality plan to the customer for each stage, prior to the start of that stage.

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Activity 22 – Reviewing quality plan effectiveness

Explain why it is important to review the effectiveness of a quality plan.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

2. Implement quality assurance processes

There are some very important considerations that should be taken into account to maximise the benefits of implementing a quality assurance process.

2.1 Plans

A quality plan is important to the success of a project because it specifies the elements required to make sure of the desired project outcomes. Your quality plan must include the specific requirements of your client and all other stakeholders and specify the processes that must be implemented and followed if the project is to be delivered on time, within budget and to the agreed standard.

The following information about implementing a quality plan is as stated in Australian/New Zealand Standard AS/NZ ISO 10005 Quality management systems – guidelines for quality plans. You should read this standard. Contact your local library and ask if they have a copy.

In the implementation of the quality plan, the organisation should give consideration to the following issues.

- Distribution of the quality plan

  The quality plan should be distributed to all relevant people. Care should be taken to distinguish between copies that are distributed under document control provisions (to be updated as appropriate), and those that are supplied for information only.

- Training in the use of quality plans

  In some organisations, for example, those engaged in project management, quality plans may be used as a routine part of the quality management system. However in others, quality plans may be used only occasionally. In this case, special training may be needed to assist users in applying the quality plan correctly.

- Monitoring conformity with quality plans

  The organisation is responsible for monitoring conformity with each quality plan that it operates. This may include:

  – operational supervision of the planned arrangements

  – milestone reviews

  – audits.

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Where many short-term quality plans are used, audits are generally undertaken on a sampling basis.

Where quality plans are submitted to customers or other external parties, these parties may establish provisions for monitoring conformity with the quality plans.

Whether carried out by internal or external parties, such monitoring can assist in:

- assessing the commitment of the organisation to the effective implementation of the quality plan
- evaluating the practical implementation of the quality plan
- determining where risks may arise in relation to the requirements of the specific case
- taking corrective or preventive action where appropriate
- identifying opportunities for improvement in the quality plan and associated activities.

As stated previously in this Learner Resource, you may already be following a quality plan as part of your organisation's day-to-day operation. However, you will need to determine the specific requirements for each project you are managing to determine their impact on the project. Your organisation's quality plan may need to be amended to address these differences or you may need to develop a separate plan for the project. If you are developing a separate quality plan for a particular project, you must make sure that it also reflects the intent of the organisation's quality plan. You must not be working in an environment where two quality plans are in conflict with each other.

2.2 Knowing your customers

In the building and construction industry, the level of quality provided is based on the requirements of your customers. Everything you, do before, during and after a project, must add to the value of the product or service you provide.

There are three types of customers you will deal with during your work. They are:

- External customers are the people outside of your organisation who enter into contracts with you to purchase a building or some other service you provide.

  A person who contracts your building organisation to construct five shops is an external customer. So too, is the architect who designed the buildings.

- Internal customers are the people within your organisation who work directly with you on the project or work in some other support capacity, such as the finance or human resource departments. Each of these people rely on each other to do their job and provide the level of quality expected.

  It is important to remember that everyone within your organisation is working to achieve the same goal and that the attitude of 'that's not my job' is not appropriate. Everyone is part of the same team.

- Potential customers are those people who may become an external or an internal customer of your organisation at some point in the future. A person who is thinking about applying for a job at your organisation or contracting your services for a project is a potential customer.

According to Whiteley and Hessan, there are four customer relationship types:

- **Transactional** – customers who have low needs for a business relationship and low needs for information.
- **Relational** – customers who have high needs for a business relationship and feel understood.
- **Informational** – customers who have high needs for information however, they have a low need for a relationship.
- **Partnership** – customers who have high needs for both a relationship and information.

All customers have expectations related to the project you are managing for them. They expect a particular level of service and quality outcomes. If your client (external customer), is not happy with the quality of work on any aspect of the building, you will be required to undertake rectification work that takes time, reduces profit and may damage the reputation of your organisation.

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2.2.1 Determining customer quality requirements

To stop the need for rectification work, the first step in developing the quality plan for the project is to determine the expectations of your client. This must not be done verbally. Everything must be documented so that there is no chance in the future of misunderstanding.

Making sure you document requirements also applies to finding out about the requirements of internal customers. For example, it is important to determine the requirements of the accounts department. If you are not aware of cut-off dates for paying accounts, you may delay sending through details that are required for issuing a cheque. This may lead to the supplier withholding delivery of material required to complete a particular stage of the project, which in turn, may hold up a progress payment from the client. As cash flow is critical to the success of any organisation, this type of delay is unsatisfactory.

In the building and construction industry, the quality requirements of projects are usually based on architects, plans and drawings, engineers' computations and materials specifications that detail the types and quality of materials to be used, the types of finishes to be applied and the overall appearance of the job. These enable the builder to meet the specific client requirements.

The plans and specifications are not just thrown together by architects, designers and engineers in order to just get the job done. They are carefully developed based on a range of Acts, legislation, regulations and codes that must be complied with to make sure of a quality outcome. They also make sure that work is carried out safely.

Examples of these standards for the building and construction industry are:

- Australian Standards
- Building Code of Australia
- Local council planning and building laws
- Occupational Health and Safety Act
- Building Commission regulations.

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2.2.2 Gathering information on customers' quality requirements

When you want to find out about the quality requirements of your customers, the best way to get the information is to ask them.

Gathering information can be done informally, just by chatting to your customers when you have the opportunity, that way you will know what to include in the next quality plan you develop.

Information may be gathered informally by having a face to face discussion with them or you may take a more formal approach by using tools, such as questionnaires or surveys. These questions can be asked face to face, by telephone, by email or ask your customers to complete and return the questionnaire or survey.

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Activity 23 – Customers and their needs

Explain why it is important to fully understand your customers and their needs.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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2.3 Measuring and documenting results of project activities

Quality control is vital to the success of any project, so as a project manager, you must make sure that appropriate quality control processes are in place to underpin all stages of the project lifecycle. Defects and delays, no matter how minor, will impact negatively on project timelines and budget. In some instances, poor quality can result in personal injuries or fatalities.

Major decisions regarding quality are generally made during the project design and planning stages. The processes required and outcomes expected are documented in the project plan. During the construction stage, quality control efforts are generally focussed on conformance to the original plan.

Although conformance to original design decisions, specifications and processes are the main focus of quality control during construction, there are often exceptions that must be allowed for. These may be design changes, process changes or other unforseen circumstances. In these instances, you may need to re-evaluate your quality processes accordingly.

According to Chris Hendrickson (2008), with the attention to conformance as the measure of quality during the construction process, the specification of quality requirements in the design and contract documentation becomes extremely important. Quality requirements should be clear and verifiable, so that all parties in the project can understand the requirements for conformance.

2.3.1 Benefits of measuring quality performance

There are a number of benefits coming from measuring your organisation's quality performance during the work process. These include:

- focusing the attention and effort of those involved on the criteria that are being measured
- results based on factual data which is objective, rather than based on personal opinion, which is subjective
- establishing a starting point from which to measure your improvement
- using the data for future project planning and costing
- predicting future occurrences confidently
- being better able to achieve the continuous improvement of processes.

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2.4 Quality management systems

A key to measuring and documenting the results of project activities is for your organisation to have implemented a working quality management system (QMS). The QMS must include four levels of documentation if it is to be successful. Although these documents have their own functions, they are all interrelated.

- Quality manual
- Procedures
- Work instructions
- Records/forms

2.4.1 Quality manual

The quality manual is the document in which the organisation's quality policy is stated. The manual describes an organisation's overall approach to quality management. It includes details of the quality policies and supporting procedures that have been developed to assure quality within the workplace.

To compile a quality manual for your organisation, you need to include information, such as:

- the purpose of the organisation
- the vision for the organisation
- the organisation's mission and how it is going to be achieved
- the factors that achieving the mission depend on
- the values of the organisation
- the objectives of the organisation
- authority and responsibilities
- policies and procedures.

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The following is an example of a table of contents for a quality manual that is commercially available. Not all systems will have exactly the same information, however, the intent is the same.

1. Purpose

2. Scope

2.1 Exclusions

3. Relation to ISO 9001:2000

4. Our company quality management system

4.1 General requirements

4.2 Documentation requirements

4.2.1 General

4.2.2 Quality manual

4.2.3 Control of documents

4.2.4 Control of records

4.2.5 Referenced procedures

5. Management responsibility

5.1 Management commitment

5.2 Customer focus

5.3 Quality policy

5.4 Planning

5.4.1 Quality objectives

5.4.2 Quality management system planning

5.5 Responsibility, authority, and communication

5.5.1 Responsibility and authority

5.5.2 Management representative

5.5.3 Internal communication

5.5.4 Referenced procedures

5.6 Management review

5.6.1 General

5.6.2 Review input

5.6.3 Review output

5.6.4 Referenced procedures

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6. Resource management

6.1 Provision of resources

6.2 Human resources

6.2.1 General

6.2.2 Competence, awareness and training

6.2.3 Referenced procedures

6.3 Infrastructure

6.4 Work environment

7. Product realisation

7.1 Planning of product realisation

7.2. Customer related processes

7.2.1 Determination of requirements related to the product

7.2.2 Review of requirements related to the product

7.2.3 Customer communication

7.2.4 Referenced procedures

7.3 Design and development

7.3.1 Design and development planning

7.3.2 Design and development inputs

7.3.3 Design and development output

7.3.4 Design and development review

7.3.5 Design and development verification

7.3.6 Design validation

7.3.7 Design changes

7.3.8 Referenced procedures

7.4 Purchasing

7.4.1 Purchasing process

7.4.2 Purchasing information

7.4.3 Verification of purchased product

7.4.4 Referenced procedures

7.5 Production and service provision

7.5.1 Control of production and service provision

7.5.2 Validation of processes for production and service provision

7.5.3 Identification and traceability

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7.5.4 Customer property

7.5.5 Preservation of product

7.5.6 Referenced procedures

7.6 Control of monitoring and measuring devices

7.6.1 Calibration activities

7.6.2 Referenced procedures

8. Measurement, analysis, and improvement

8.1 General

8.2 Monitoring and measurement

8.2.1 Customer satisfaction

8.2.2 Internal audit

8.2.3 Monitoring and measurement of processes

8.2.4 Monitoring and measurement of product

8.2.5 Referenced procedures

8.3 Control of non-conforming product

8.3.1 Non-conforming product actions

8.3.2 Referenced procedures

8.4 Analysis of data

8.4.1 Quality management system evaluation

8.4.2 Referenced procedures

8.5 Improvement

8.5.1 Continual improvement

8.5.2 Corrective action

8.5.3 Preventive action

8.5.4 Referenced procedures

Bizmanualz Inc. (2010)

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Activity 24 – Importance of a quality manual

Explain why it is important for a quality manual to be developed for a building project.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

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2.4.2 Standard operating procedures

A standard operating procedure (SOP) is a written document showing how to perform a certain task. SOPs can be used to help replacement staff, auditors and so on. These procedures would only be registered as part of the quality system if they were covered under the elements of the international standard. SOPs should be in writing and accessible to all employees. They could be:

- in a book
- on loose pages or cards
- on computer

and should be:

- kept somewhere everyone knows about
- displayed in the work areas they relate to.

2.4.3 Why have standard operating procedures?

SOPs are important because they describe the specific instruction for completing a task or activity. They are the ‘who’, ‘what’, ‘when', ‘where’ and ‘how’ of a particular activity. In particular they:

- help new workers adapt to their new job
- make job rotation easier
- can be used when putting together a position description for a job in your workplace
- allow you to compare your procedures with those used in other workplaces
- contribute to safety and reliability
- reduce variation between individual workers.

There are two types of procedures which would normally be documented:

- office (managerial)
- project (technical).

The detailed procedures are indexed in the quality manual but are often kept in different folders, offices or sections depending on what the activity the procedures relate to. It is also a good idea to keep your procedures in an electronic file where everyone can access them. This way you can make sure that everyone is looking at the most current version.

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2.4.4 Quality procedures

Quality procedures support the quality system. They detail the specific actions required to control and verify that quality is achieved at all stages of an organisation's operations. Procedures provide an operational framework in which events occur in a planned and systematic manner.

Procedures should be logical and easy to read. They should be brief, while giving enough information to provide adequate control.

There is no specific format for these procedures but they need to contain all the information required to make sure they are easily understood and complied with.

The following table shows an example of a quality procedure document.

Drawing Register/Transmittal Procedure	
Responsible	**Operations Administrator**
Purpose	• To keep track of the latest set of drawings for each job. • Record all drawings received. • Record what drawings each of the subcontractors have been sent.
Procedure	Incoming drawings When the first set of drawings or revisions are sent to the office for quoting, a drawing transmittal is set up. Each time a new set of drawings or revisions are sent to the office, the register is to be updated. Outgoing drawings When drawings are sent to subcontractors for quoting, a drawer register is to accompany the drawing. Whenever there is a change to the drawing after construction has started, the site foreman and relevant subcontractors are to receive a copy of the drawings and transmittal.
Failure to complete	The fit-out will be completed incorrectly and will have to be rectified at a cost to the organisation.
Computer file	The drawing register/transmittal form is to be saved under each of the computer job files: *job No. Drawing register – rev_*

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2.5 Identifying causes of unsatisfactory results

According to Peter E D Love (2002), to have good construction work, it is necessary to have a good design. He states that each error costs ten times more to fix in development, than it does to fix in planning, and 100 times more if the error actually reaches the customer. Therefore, quality starts with the design.

The following are some factors which may impact on project quality:

- Misunderstanding the clients' requirements
- Changing design or technical requirements
- Using incorrect, inaccurate or out of date information
- Lack of coordination between stakeholders
- Poorly documented specifications
- Poor document version control.

Albert P C Chan and C M Tam (2000) completed a research study, which was undertaken to determine the underlying factors affecting the quality of building projects in Hong Kong. They reviewed the outcomes from 110 completed building projects and determined that the generally perceived factors that influence quality performance can be grouped under the headings of:

- Client

  As you might expect, it was found that clients who had built a range of different projects previously and specialised clients who repeated similar buildings had a better chance of success with their projects, than clients undertaking construction for the first time. Other attributes of the client, such as the nature of client (public or private sector), clarity of project mission, their competency in terms of ability to brief, make decisions, define roles, etc, were shown to influence the quality of a project.

- Project

  Project characteristics have a significant role to play in affecting quality, these being project scope, nature of project and complexity of project. Project scope refers to the type of project, the number of storeys and the sophistication of the project. The nature of the project defines whether it is a new works project or a refurbishment project. Some projects are more expensive to build than others, for example, refurbishment works usually have a higher unit cost than new works. Project complexity can be measured in terms of site access, design, design coordination, site conditions and quality management.

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- Project environment

  The project environment can be defined as all the external influences on the construction processes which can be grouped as physical, economic, socio-political and industrial relations. They may impact from a national, state or local level, and in different ways in the public and private sectors. Changes in the environment create uncertainty and reluctance by investors to support construction projects.

  Positive change in government policy may also stimulate demand for buildings. For example, the First Home Owners Scheme is a national scheme funded by the states and territories and administered under their own legislation. Under the scheme, a one-off grant is payable to first homeowners that satisfy the eligibility criteria. Although criticised by some because it led to higher prices, the scheme generated an increase in new home construction.

- Project team leaders

  As a project manager on a construction project, you must work with people from many different groups, such as client, client representative, designers, suppliers, subcontractors together with everyone on the construction management team.

  A positive working relationship between each of these stakeholders requires the application of specific skills, knowledge and experience of the project team leaders. If the working relationship between these stakeholders breaks down, then the quality of the project is compromised. Strong leadership is therefore vital, to the success of the project.

- Project procedures

  A procedure is a specified series of actions, steps or operations that have to be executed in the same manner in order to accomplish an end. They make sure that the actions, steps or operations always obtain the same result under the same circumstances and hopefully to the same quality.

  For example, the purpose of tendering a procedure is to make sure that offers and tenders are documented, sourced, assessed and approved, in accordance with organisational requirements.

  Poorly written or inadequate procedures will not provide a solid framework on which day-to-day operations can take place. Individuals will have no guidance and any actions taken in ignorance may have OHS or quality implications.

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- Project management actions

  Chan and Tam state that an integral element of the managerial task is organisational decision making – choosing an overall strategy, setting specific objectives, designing structures and processes, selecting people, delegating responsibility, evaluating results and initiating changes. They also highlight the importance of detailed documentation and administration of a system of regular meetings, monitoring and inspections.

In summary, Chan and Tam determined that the main factors affecting quality performance on a construction project are:

- effectiveness of design team leader
- effectiveness of client's project manager
- complexity
- effectiveness of construction team leader
- project scope
- support from parent company
- nature of client
- environment
- competency of client
- client's emphasis on quality
- project management actions
- procurement method
- client's emphasis on cost
- client's emphasis on time
- nature of project
- client size.

A breakdown of any of these factors will lead to a breakdown in overall project quality. As a project manager, you must be constantly aware of the effectiveness of the processes associated with these factors and make sure that everything you do focuses on achieving a quality outcome.

When an issue is found, it must be immediately addressed and when required, reported to the appropriate stakeholders. For example, an increase in costs of materials that is not in the budget needs to be reported to the client, purchasing department and finance department. Senior management may also need to be advised because if the increase is not going to be charged to the client, then the profit of the project will be reduced. This will impact on

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organisational cash flow and budgets, the effects of which will need to be considered at the strategic level of senior management.

Activity 25 – Impact of putting an emphasis on time

Explain how a client's emphasis on time can impact on a building project.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

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2.6 Compliance of quality standards to overall quality objectives

It is often hard for organisations to determine if their projects have been successful or have been less than satisfactory. One of the best ways to find the level of project success is to determine what needs to be achieved at the start of the project. By identifying the project targets at the start will help you to obtain quantifiable evidence to determine whether or not the project was a success.

Undertaking audits and measuring performance on its own is a waste of time if nothing is done with the data once it is collected. Data and information must be critically analysed as part of the review of quality processes.

2.6.1 Quality management audits

A type of audit that you will most likely be familiar with is a financial audit. This is when accounts of the organisation are checked to make sure that everything is above board and that all financial transactions have been legitimate. You might also be familiar with an audit by the Taxation Office to make sure that you have paid all the tax you are required to pay. Other types of audits are:

- environmental audits
- safety audits
- technical audits.

Quality management audits are another type of audit that is a way to identify the cause of problems within a QMS. These audits must gather a range of evidence through an unbiased and systematic review to determine instances of non-compliance and identify areas for improvement in the system itself. If a QMS is not operating effectively, it will not be supporting objectives and also puts the organisation at risk.

Every system has potential for improvement, so audits need to be scheduled regularly and outcomes acted on accordingly.

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Auditing projects

According to project management provider PM4DEV, quality audits are structured reviews of the quality management activities that can help you identify lessons learned to improve the performance on current or future projects. Specially trained project staff or consultants should perform audits with expertise in specific project quality management areas.

The purpose of a quality audit is to review how the project is using its internal processes to produce the products and services it will deliver to clients. The goal of the audit is to find ways to improve the tools, techniques and processes that create the products and services. If problems are detected during a quality audit, then corrective action will be necessary to the tools, processes and procedures used to make sure of quality.

A part of the audit may include a review of the project personnel's understanding of the quality processes and how they contribute to the operation of the QMS.

If corrective actions are needed, then these must be approved through the appropriate processes of the organisation which will require senior management involvement.

Source: pm4dev

Recording and reporting results

The outcomes from audits and quality conformance in your organisation must be adequately recorded so that information can be reported to the appropriate people. While it is exciting to report on positive results that demonstrate quality requirements have been achieved, you must also report on the shortfalls in quality outcomes that your organisation experiences. Remember that this is the basis of continuous improvement. If a process didn't work so well this time, you need to determine how it can be improved in future.

Your organisation may have standard documentation that you should use to report the information to senior management and colleagues.

Quality audit reports

These are the records of an independent examination to obtain evidence or confirm that your organisation's quality system and/or work produced, conforms to the specified requirements.

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When the audit has been completed, you must develop an audit report which should include:

- the detailed audit plan
- a review of the evidence that was collected
- a discussion of the conclusions that were drawn
- a list of the non-conformities that were identified
- a judgment about how well the quality system complies with all quality system requirements
- an assessment of the quality system's ability to achieve quality objectives and apply the quality system policy.

The lead auditor, or yourself as the project manager/supervisor taking on the lead role, must sign and date the audit report and submit the document to senior management as required by the procedures of the organisation. The department being audited must also receive a copy. You may also be required to submit a copy to other stakeholders as required.

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Activity 26 – Need for audits

Explain why it is important to undertake quality audits.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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2.7 Maintaining a quality management system

According to the Department of Trade in the UK, a QMS can be defined as:

> *'A set of coordinated activities to direct and control an organisation in order to continually improve the effectiveness and efficiency of its performance.'*

The department believes that these activities interact and are affected by being in the system, so the isolation and study of each one in detail will not necessarily lead to an understanding of the system as a whole. The main thrust of a QMS is in defining the processes, which will result in the production of quality products and services, rather than in detecting defective products or services after they have been produced.

A fully documented QMS will make sure that two important requirements are met:

- the customers' requirements – confidence in the ability of the organisation to deliver the desired product and service consistently meeting their needs and expectations
- the organisation's requirements – both internally and externally, and at an optimum cost with efficient use of the available resources – materials, human, technology and information.

These requirements can only be truly met if objective evidence is provided in the form of information and data, to support the system activities, from the ultimate supplier to the ultimate customer.

A QMS enables an organisation to achieve the goals and objectives set out in its policy and strategy. It provides consistency and satisfaction in terms of methods, materials and equipment and interacts with all activities of the organisation, beginning with the identification of customer requirements and ending with their satisfaction, at every transaction interface.

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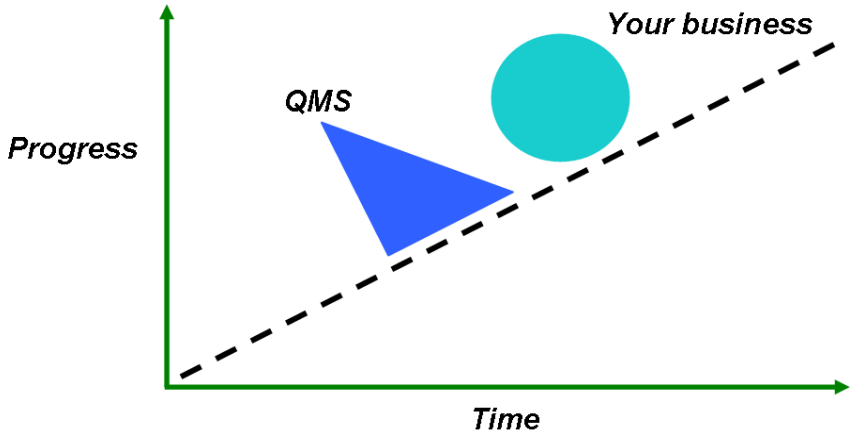
It can be envisaged as a 'wedge' that both holds the gains achieved along the quality journey, and prevents good practices from slipping:



Quality management system

A good QMS will therefore:

- set direction and meet customers' expectations
- improve process control
- reduce wastage
- lower costs
- increase market share
- facilitate training
- involve staff
- raise morale.

Source: Department of Innovation and Skills (DIS) United Kingdom

2.7.1 Documentation

The QMS must include documentation that include:

- strategic planning, operation and control of processes
- organisational quality policy and quality objectives
- a detailed and controlled quality manual (electronic or print based)
- current procedures to make sure of compliance
- all records required by regulatory authorities.

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The following is a list of records/documents required to comply with ISO 9001 which although is comprehensive, is not to be taken as a complete list of all required documents. Individual organisations will have specific requirements related to documentation, so the list will vary between organisations. Also, single documents may contain more than just one of the listed documents under a different title, however, their contents and intent are the same.

- Management reviews
- Education, training, skills and experience
- Evidence that the realisation processes and resulting product fulfil requirements
- Design and development inputs relating to product requirements
- Results of design and development reviews and any necessary actions
- Results of design and development verification and any necessary actions
- Results of the review of requirements related to the product and actions arising from the review
- Results of the review of design and development changes and any necessary actions
- Results of supplier evaluations and any necessary actions arising from the evaluations
- Results of design and development validation and any necessary actions
- The unique identification of the product, where traceability is a requirement
- Customer property that is lost, damaged or otherwise found to be unsuitable for use
- As required by the organisation to demonstrate the validation of processes where the resulting output cannot be verified by subsequent monitoring or measurement
- Validity of the previous measuring results when the measuring equipment is found not to conform to requirements
- Results of calibration and verification of measuring equipment
- Internal audit results and follow-up actions
- Indication of the person(s) authorising release of product.

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- Basis used for calibration or verification of measuring equipment where no international or national measurement standards exist
- Nature of the product non-conformities and any subsequent actions taken, including concessions obtained
- Results of corrective action
- Results of preventive action

The full extent of a construction organisation's documentation will depend on the size of the organisation and the number and type of its activities. These factors will also impact on the complexity of the organisation's processes and their interrelationships.

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Activity 27 – Importance of documentation

Explain why it is important to keep documentation related to project quality.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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3. Implement project quality improvements

The aim of quality improvement is to make sure that high standards are maintained by regular assessments using quality indicators.

3.1 Reviewing quality objectives

AS 10006, 5.3.1 requires the project organisation's management to review the QMS at planned intervals to make sure of its continuing suitability, adequacy and effectiveness. This review shall include assessing opportunities for improvement and the need for changes to the QMS, including quality policy and quality objectives. Results of management reviews must be fully documented and acted upon.

Management reviews should be held at least once a year however, it is preferable to do them more often.

Australian Standards require progress evaluations to cover all the project's processes and provide an opportunity to assess the achievement of the project objectives. The outputs from progress evaluations can provide significant information on the performance of the project as an input into future management reviews. According to the standards, progress evaluations should be used to:

- assess the adequacy of the project management plan and how the work performed complies with it
- evaluate how well the project processes are synchronised and inter-linked
- identify and evaluate activities and results that would adversely or favourably affect the achievement of the project objectives
- obtain inputs for remaining work in the project
- facilitate communication
- drive process improvement in the project, by identifying deviations and changes in risks.

The planning for progress evaluations should include:

- the preparation of an overall schedule for progress evaluations (for inclusion in the project management plan)
- the assignment of responsibility for the management of individual progress evaluations
- the specification of the purpose, assessment requirements, processes and outputs for each progress evaluation

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- the assignment of personnel to participate in the evaluation (eg the individuals responsible for the project processes and other interested parties)
- making sure that appropriate personnel from the project processes being evaluated are available for questioning
- making sure that relevant information is prepared and is available for the evaluation (eg the project management plan).

Those performing the evaluations should:

- understand the purpose of the processes being evaluated, and their effect on the project QMS
- examine relevant process inputs and outputs
- review the monitoring and measuring criteria being applied to the processes
- determine if the processes are effective
- look for potential improvements in process efficiencies
- develop reports, or other relevant outputs, with the progress evaluation results.

Once a progress evaluation has been performed:

- the outputs of the evaluation should be assessed against the project's objectives, to determine whether the performance of the project against the planned objectives is acceptable
- responsibility should be assigned for actions resulting from the progress evaluation.

The outputs of progress evaluations can also be used to provide information to the originating organisation, for continual improvement of the effectiveness and efficiency of the project management processes.

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Activity 28 - Need to review quality objectives

Explain what might happen if you do not review project quality objectives.

Check your findings with the correct answer in the back of this Learner Resource under 'Learning activity answers'.

* Retain this learning activity as part of your portfolio of evidence.

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3.2 Reviewing project outcomes

It is important to review outcomes of projects throughout the life of the project. Two ways in which this can be done are as follows.

3.2.1 Project debriefings

Project debriefings may occur after completion of projects or at any stage during projects. Debriefings provide an overview of the aspects of the project that are working well, based on the reported results of monitoring the PDCA cycle. Debriefings also highlight the weaker aspects of the operation where improvement is definitely required. In order to continuously improve, both the strengths and weaknesses of an organisation must be focused on.

Project debriefings are a good way you can contribute to the continuous improvement of your organisation. You will probably be required to report on the results of your projects, together with others, to senior managers of the organisation.

3.2.2 Customer feedback

Customer surveys and interviews are a good way of gathering information on the quality requirements of your customers during the planning stage of your quality management project. However, they are also useful tools to use at the end of projects to review the performance of your organisation. The feedback of your customers at this point is a very important guide to the continuous improvement of your organisation.

3.3 Recommending improvements

According to Ask Art Solutions (2009), using quality objectives to improve your QMS and organisation can be a powerful tool if used the right way. Here are some common mistakes in setting quality objectives they believe you should avoid:

- using quality objectives superficially as a way to fulfil ISO 9001 requirements instead of using them as effective tools for decision making and strategic management
- using objectives that do not relate to the organisation’s mission and business strategies
- using objectives that are not measurable
- not assigning specific accountability for achievement of objectives

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- not providing adequate resources
- using objectives that are confusing, ill-defined or feel-good
- allowing process owners and functional managers to define objectives without guidance and coordination, resulting in objectives that are inconsistent with each other or with other organisational strategies and objectives
- not providing training to personnel in understanding quality objectives and using the measurement tools to achieve them
- just collecting the data on performance to objectives and not using the data
- not conducting periodic review of progress and removing obstacles to achieving quality objectives.

Source: Askart solutions

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Activity 29 – Importance of reviewing a project

Explain why it is important to review project outcomes.

Check your findings with the correct answer in the back of this Learner Resource under ‘Learning activity answers’.

* Retain this learning activity as part of your portfolio of evidence.

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3.4 Revision of the quality plan

The following information covers what should be done by an organisation to revise their quality plan (AS 10005):

a) to reflect any changes to quality plan inputs, including:

- the specific case for which the quality plan is established
- the processes for the realisation of the product
- the organisation's QMS
- statutory or regulatory requirements

b) to incorporate agreed improvements to the quality plan.

An authorised person or persons should review changes to the quality plan for impact, adequacy and effectiveness. Revisions to the quality plan should be made known to all those involved in its use. Any documents that are affected by changes in the quality plan should be revised as necessary.

The organisation should consider how and under what circumstances the organisation would authorise a deviation from the quality plan, including:

- who will have the authority to request such deviations
- how such a request will be made
- what information will be provided and in what form
- who will be identified as having the responsibility and authority to accept or reject such deviations.

A quality plan should be treated as a configuration item and should be subject to configuration management.

Senior management are responsible for developing the organisation’s quality management strategy. Decisions are made based on the organisation's mission and business strategy. Defining the organisation's mission is the first step in planning its operations and is the foundation underpinning the organisation’s quality strategy. If the mission is weak and meaningless, then everything it supports will be shaky. The mission must be serious and look to the future. It is the responsibility of senior management to communicate to all personnel the meaning of the quality objectives and how each person can work together to achieve them.

Following a review of the QMS, senior management need to be fully informed of outcomes so that they can review current quality objectives and determine if there is a need for change.

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3.5 Project closure

According to AS 10006, whatever the reason for project closure, a complete review of project performance should be undertaken. This should take into account all relevant records, including those from progress evaluations and inputs from interested parties. Special consideration should be given to feedback from the customer and other relevant interested parties. This feedback should be measurable where possible.

Based on this review, appropriate reports should be prepared, highlighting experience that can be used by other projects and for continual improvement.

At the closure of the project, there should be a formal handover of the project product to the customer. Project closure is not completed until the customer formally accepts the project product and this will not occur unless the level of quality is what the customer expected. As the level of quality is controlled by the efficiency of a QMS, you must always be working towards continuous improvement in all aspects of your organisation’s operations.

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Learning activity answers

Your answers should include reference to the following key information. You may have included extra detail based on personal experience or further research into the topic however, as a minimum, the key information must be included.

If you are having difficulties with any of the learning activities you should contact your tutor for guidance.

Activity 1 – The importance of continual improvement

1. Continuous improvement of quality will improve the performance of both projects and the construction business.
    - Higher profits
    - Less rework
    - Improved client relationships
    - Improved future projects due to an improved system
2. Common waste and variations from quality account for 85% of issued encountered when managing quality outcomes. As a result it is vital to identify these and control the quality, waste and variation issues in order to improve the productivity of both projects and the construction company.

Activity 2 – Quality control and quality assurance: What's the difference?

Your answer should include discussion about quality control being a reactive approach, whereas quality assurance is a more effective proactive approach.

Activity 3 – Importance of standards

Your answer should include discussion about standards specifying the benchmark for compliance and reflecting the latest scientific and industry experience.

Activity 4 – Importance of a quality assurance system

Your answer should include discussion about:

- how rework and waste is reduced
- all construction work being done correctly the first time
- how quality assurance gives credibility to the organisation
- improving efficiency and overall job effectiveness
- the organisation having a marketing advantage over competitors
- creating a systematic and well-planned organisation through use of quality systems.

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Activity 5 – Importance of customers

Your answer should include reference to customers having specific needs that must be addressed. The builder must determine what these needs are to fully understand the desired outcomes.

Customers are also important as a source of information about how the job met their expectations. This feedback (positive and negative) will inform future decisions and possible amendments to the QMS and work processes of the organisation.

Activity 6 – Need for leadership

Without strong leadership, different individuals and teams may work towards different goals and with different agendas. This will result in a lack of cohesion and possible delays in the project and reduced quality.

Activity 7 – Team start-up problems

There are number of different responses to this activity, however, your answer may include reference to keeping the team informed about expectations and keeping them focussed on the desired outcomes. These are key requirements in making sure of team harmony.

Activity 8 – Importance of total quality management

Your answer should include reference to total quality management, making sure of a continuous improvement approach to all project activities and maintaining a focus on best practice at all times in order to achieve customer satisfaction.

Activity 9 – Poor practices

Depending on the example you choose, your answer may include discussion about:

- leaders not giving clear direction
- not understanding, or ignoring competitive positioning
- each department working only for itself
- trying to control people through systems
- confusing quality with grade
- accepting that a level of defects or errors is inevitable
- fire fighting – reactive behaviour
- the ‘it’s not my problem’ attitude.

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Activity 10 – Meaning of quality

Your answer should include reference to quality being a range of concepts that lead to increased productivity, reduced liability, minimal rework and above all, a client focus in an environment of continuous improvement.

Activity 11 – Quality objectives

The following is one example. You may have written something different, however, whatever you have developed needs to be specific and achievable.

Conduct an evaluation of possible new accounting software to determine suitability for all day-to-day financial operations of the organisation by <date>.

Activity 12 – Auditing

Your answer should include discussion about an audit:

- revealing defects or irregularities
- suggesting improvements and checking on the effectiveness of all levels of management
- making sure that management objectives and methods are achieving the desired results
- making sure that benefits of the reviews are practical and have a considerable bearing on the profitability of the organisation and customer satisfaction.

Activity 13 – Control of time, costs and scope

Time, cost and scope are the three main constraints that might impact on a building project. If they are out of balance, there may be cost overruns and reduced quality.

Activity 14 – Benefits of benchmarking

Your answer should include discussion about benchmarking providing an opportunity to compare and evaluate effectiveness of work practices and systems to inform decisions relating to change.

Activity 15 – Create a flow chart

Your flow chart should include all the main steps in the process you have selected. If you are still unsure, refer to the example in this Learner Resource.

Activity 16 – Brainstorming

Your answer should include reference to different people having a range of opinions and ideas. These can be evaluated to inform management decisions about the effectiveness of systems and processes and possible change.

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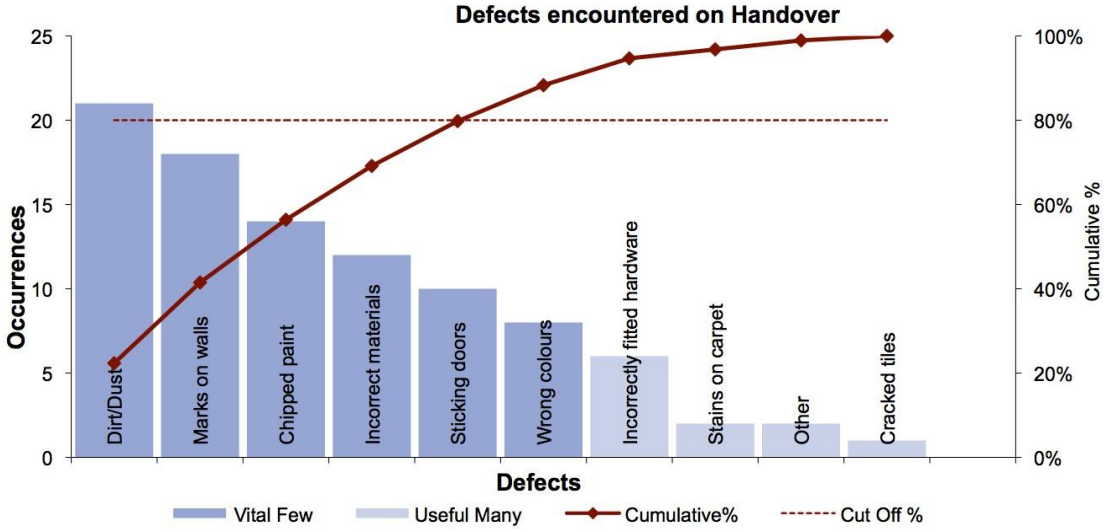
Activity 17 – Importance of a cost/benefit analysis

Your answer should include reference to extra staff getting the job finished, however, the extra cost may not have been included in the budget. This may lead to reduced profit.

Activity 18 – Creating a Pareto chart



Activity 19 – Effective vs efficient

An efficient system may work well, but unless it is effective in achieving the desired result (eg making sure of quality outcomes), then it is pointless implementing the system.

Activity 20 – Informing senior management

Your answer should include reference to management needing feedback and information to make sure that the systems they endorse/develop support the overall vision and goals of the organisation.

Activity 21 – Importance of a quality plan

A quality plan documents the what, when, why, where and how, associated with the implementation of quality within the organisation.

Activity 22 – Reviewing quality plan effectiveness

It is important to review the quality plan to make sure that it is achieving what it was developed to achieve, that is best practice and continuous improvement.

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Activity 23 – Customers and their needs

It is important to fully understand your customers and their needs because it is the only way to know exactly what their expectations are and how to make sure these are met.

Activity 24 – Importance of a quality manual

The quality manual conveys the organisation's approach to quality to all stakeholders. It documents a commitment to best practice and continuous improvement.

Activity 25 – Impact of putting an emphasis on time

Wanting the project completed too quickly may lead to personnel taking shortcuts which will result in reduced quality and possible dangerous work practices.

Activity 26 – Need for audits

Audits enable you to obtain evidence about the effectiveness of the systems of the organisation and whether there is a need for change.

Activity 27 – Importance of documentation

Documents related to project quality provide evidence of compliance. They record and communicate outcomes of audits. Some documents are also required for legal reasons.

Activity 28 – Need to review quality objectives

Your answer should include discussion about quality objectives becoming outdated and not reflecting current direction and needs of the organisation.

Activity 29 – Importance of reviewing a project

Your answer should include discussion about determining if the outcomes have met expectations of all stakeholders.

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Appendices

Appendix 1 – Employability Skills

Appendix 2 – Qualification structure

Appendix 3 – Unit of competency

Appendix 1 – Employability Skills

The following table shows the Employability Skills embedded within this unit together with the appropriate assessment task that assess these skills. Note that not all the Employability Skills in the qualification are assessed in this unit. Assessments for other units will cover the remaining Employability Skills.

Employability Skills	Evidenced by	Assessment task
Communication	Oral and written communication skills that contribute to productive and harmonious working relations between co-workers, customers and other stakeholders	Task 1 Task 2 Task 3 Task 4
Teamwork	Skills that through cooperation and collaboration contribute to productive working relationships with others to achieve the desired outcomes of the project	Task 3 Task 4
Problem solving	Appropriate analytical skills that contribute to timely completion of tasks and productive outcomes	Task 1 Task 2 Task 3 Task 4
Initiative and enterprise	Skills that contribute to innovative outcomes, within scope of responsibility	Task 3 Task 4
Planning and organising	Task management skills that support the attainment of project goals and objectives and the strategic planning of the organisation	Task 3 Task 4
Self management	Skills to manage personal reactions to responsibilities and challenges in the workplace and contribute to self-satisfaction and growth	Task 3 Task 4
Learning	Skills that contribute to ongoing professional development	Task 1 Task 2
Technology	Skills that contribute to effective execution of tasks using a range of appropriate technological options and a willingness to embrace emerging technologies	Task 1 Task 2 Task 3 Task 4

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Appendix 2 – Qualification structure

This Learner Resource, *BSBPMG505A Manage project quality* forms part of the CPC50210 Diploma of Building and Construction (Building) qualification.

BSBOHS504B	Apply principles of OHS risk management
BSBPMG404A	Apply quality management techniques
BSBPMG505A	Manage project quality (previously BSBPMG505A)
BSBPMG517A	Manage project risk (previously BSBPMG505A)
BSBPMG522A	Undertake Project Work (previously BSBPMG510A)
CPCCBC4001A	Apply building codes and standards to the construction process for low rise building projects
CPCCBC4003A	Select and prepare a construction contract
CPCCBC4004A	Identify and produce estimated costs for building and construction projects
CPCCBC4010A	Apply structural principles to residential low rise construction
CPCCBC4013A	Prepare and evaluate tender documentation
CPCCBC5001B	Apply building codes and standards to the construction process for medium rise building projects
CPCCBC5002A	Monitor costing systems on medium rise building and construction projects
CPCCBC5003A	Supervise the planning of on-site medium rise building or construction work
CPCCBC5007A	Administer the legal obligations of a building or construction contract
CPCCBC5008A	Apply structural principles to the construction of medium rise buildings
CPCCBC5009A	Identify services layout and connection methods to medium rise construction projects
CPCCBC5010A	Manage construction work
CPCCBC5011A	Manage environmental management practices and processes in building or construction
CPCCBC5018A	Apply structural principles to the construction of medium rise buildings

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Appendix 3 – Unit of competency

BSBPMG505A Manage project quality

Unit descriptor

This unit describes the performance outcomes, skills and knowledge required to manage quality within projects. It covers determining quality requirements, implementing quality assurance processes, and using review and evaluation to make quality improvements in current and future projects. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.

Employability Skills

This unit contains employability skills.

Application of the unit

This unit applies to an individual who is clearly and solely responsible for the management and leadership of a complex project, either as an employee of an organisation or an external consultant.

In the context of this unit a complex project is defined as a project which involves:

- the need for a comprehensive and multi faceted project plan
- the need for a formal internal or external communications strategy
- a dedicated and diverse project budget
- multiple administrative components
- multiple operational components
- a wide range of stakeholders
- a project operations team.

The functions performed by a program manager to manage quality within multiple projects are addressed in BSBPMG605A Direct quality management of a project program.

Sector

No sector assigned.

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Element	Performance Criteria
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the range statement. Assessment of performance is to be consistent with the evidence guide.
1. Determine quality requirements	1.1 Determine ***quality objectives*** and ***standards*** with input from stakeholders
	1.2 Document in a ***quality-management plan*** the quality metrics for project and product output
	1.3 Select established ***quality-management methods***, ***techniques and tools*** to resolve quality issues
	1.4 Distribute, discuss and support quality requirements with project team and stakeholders
	1.5 Include agreed quality requirements in the project management plan and implement as basis for performance measurement
2. Implement quality assurance processes	2.1 Undertake ***quality-assurance audit*** of project processes for compliance with agreed plans
	2.2 ***Assess quality control*** of project and product output according to agreed quality specifications
	2.3 Identify causes of variance to quality metrics and undertake remedial action
	2.4 Maintain a quality management system to enable accurate and timely recording of quality audit data
3. Implement project quality improvements	3.1 Review processes and implement agreed changes continually throughout the project life cycle to ensure continuous quality improvement
	3.2 Review project outcomes against performance requirements to determine the effectiveness of quality-management processes and procedures
	3.3 Identify and document lessons learned and recommended ***improvements***

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Required skills and knowledge

This section describes the skills and knowledge, and their level, essential for this unit.

Required skills

- Literacy skills to develop quality objectives and criteria
- Communication and leadership skills to motivate staff, convey expectations and ensure outcomes are met
- Analytical skills to monitor achievement of project outcomes against quality criteria
- Coaching and mentoring skills to boost performance

Required knowledge

- Quality management theory, techniques, tools and methodologies
- Roles and responsibilities in project management
- Methods for managing and improving performance
- Relevant legislation codes and national standards:
  - award and enterprise agreements and industrial instruments
  - industry codes of practice
  - legislation from all levels of government that affects business operation, especially in regard to occupational health and safety and environmental issues, equal opportunity, industrial relations and anti-discrimination

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording in the performance criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Quality objectives may include:

- negotiated trade-offs between cost, schedule and performance
- requirements from a higher project authority
- requirements from the client and other stakeholders
- those quality aspects which may impact on customer satisfaction.

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Quality management plan may include:	• authorisations and responsibilities for quality control • continuous improvement • established processes • quality assurance.
Quality management methods, techniques and tools may include:	• benchmarking • brainstorming • charting processes • control charts • defining control • flow charts • group work activities • histograms • pareto charts • processes that limit and/or indicate variation • ranking candidates • run charts • scattergrams • undertaking benefit/cost analysis.
Quality control may include:	• monitoring conformance with specifications • monitoring of regular inspections by internal or external agents • recommending ways to eliminate causes of unsatisfactory performance of products or processes.
Improvements may include:	• formal practices, such as total quality management or continuous improvement • improvement by less formal processes that enhance both the product quality and processes of the project, for example client surveys to determine client satisfaction with project team performance.

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Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Evidence of the following is essential:
  - demonstrated evidence of successfully managing project staff so that quality outcomes were achieved on multiple complex projects
  - knowledge of a range of quality management tools, techniques and methodologies.

Context of and specific resources for assessment

- Assessment must ensure:
  - access to project documentation which includes quality criteria and evidence of quality monitoring and improvement practices
  - consideration of feedback from project stakeholders regarding project quality management.

Method of assessment

- This unit applies to an individual who is clearly and solely responsible for the management and leadership of a complex project, either as an employee of an organisation or an external consultant.
  - direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate
  - oral or written questioning to assess knowledge of strategies for managing project quality and their application to different situations
  - analysis of candidate responses in addressing case studies and scenarios which present project quality management issues and problems
  - review of project plan quality requirements
  - review of implementation of agreed changes
  - evaluation of review of project outcomes against performance criteria.

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Guidance information for assessment

- Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:
  - other units from the Diploma of Project Management.

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