Risk Assessment and Quality Project Management

RISK ASSESSMENT AND QUALITY PROJECT MANAGEMENT

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ACKNOWLEDGEMENT OF COUNTRY

James Cook University is committed to building strong and mutually beneficial partnerships that work towards closing the employment, health and education gap for Australian Aboriginal and Torres Strait Islander peoples. Our students come from many backgrounds, promoting a rich cultural and experiential diversity on campus. We acknowledge the Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the Australian lands and waters where our staff and students live, learn and work. We honour the unique cultural and spiritual relationship to the land, waters and seas of First Australian peoples and their continuing and rich contribution to James Cook University and Australian society. We also pay respect to ancestors and Elders past and present.

Kassandra Savage (JCU Alumni), 'Coming Together and Respecting Difference', acrylic on canvas, 2014, 90cm x 90cm. © Kassandra Savage, reproduced with permission of the artist

PREFACE

This freely available eBook focuses on the *Project Management Body of Knowledge (PMBOK)*, 7th edition, by the Project Management Institute (PMI), USA to provide comprehensive coverage of the fundamentals of project quality management and risk management. It makes breakthroughs in project quality by combining risk project management with quality management processes. This eBook provides a short summary of current best practices in project risk management while introducing the connection and relevance of quality project management, so that practitioners, students and those responsible for managing risk and quality in projects may do so successfully.

Projects are inevitably risky by nature, and contemporary approaches to project management acknowledge that risk management and quality management are both inherent aspects of the project management discipline. Risk assessment and quality project management in projects presents management processes in their appropriate perspectives in the world of project management and beyond, and emphasises the essential principles necessary to comprehend why and how risk and the right quality management approach should be applied to all projects of all sizes, in all sectors, and in all nations.

ABOUT THE AUTHORS

Associate Professor Carmen Reaiche

From Hong Kong Disneyland to the Australian Public Service, a career in project management has taken JCU Associate Professor Carmen Reaiche across disciplines and around the globe. Carmen first began her journey into project management over 25 years ago while she was working for an international oil refinery in South Australia. With a Bachelor of Business and a Master of Business Administration, Carmen was originally hired as a systems analyst. She has held a number of management positions where she has designed, programmed and supervised the implementation of project management systems and strategic plans for businesses such as General Electric, Mobil, Centrelink and Business SA.

Dr Reaiche holds an MBA from the University of Adelaide and a PhD from the University of South Australia in the area of project management/soft systems self-organisation. Beyond her research successes (including more than fifty papers to date and others in preparation) Dr Reaiche has obtained several research grants and a wide range of cross-cultural teaching and supervisory experience (teaching and supervising research students in Australia, Venezuela, Singapore, Hong Kong, China, Singapore and Malaysia). Her present research interests include project management, innovative systems, digital transformation, cross-cultural leadership and social network aspects of business management models. Prior to joining the College of Business, Law and Governance at JCU she was the Associate Head (Teaching and Learning) in the Entrepreneurship, Commercialisation and Innovation Centre at the University of Adelaide.

Dr Samantha Papavasiliou

Samantha Papavasiliou holds her PhD in business innovation and digital transformation in government and public sector agencies. She also holds her Master of International Trade and Development, Master of Applied Project Management (Project Systems), Bachelor of Social Science (with Honours) and Bachelor of Psychological Sciences from the University of Adelaide. In addition, Samantha is currently undertaking her Diploma of Modern Greek.

Samantha is a Certified Associate in Project Management, and is currently a Project Manager and Data Analyst at the Australian Taxation Office. Her work focuses on service review and redesign and the implementation of significant and fundamental changes to support lodgement and payment operations. Previously, she was a data scientist with a focus on predictive analytics and real time analysis, used to support the lodgement program.

Samantha is also an Adjunct Senior Research Fellow at James Cook University in the College of Business, Law and Governance. In her role, she is supporting the development of the Graduate Certificate of Project Management. Additionally, her areas of research interests are in supporting digital transformation, understanding digital and complex project management and stakeholder management and engagement within these complex projects. Samantha also teaches project management at the postgraduate level, teaching classes ranging from fundamentals, to control methods and complex project management.

Dr Francesco Anglani

Dr Francesco (Frank) Anglani has pursued a career in project management from Europe to Australia, working as a project engineer and program manager in the public and private sector. Frank has also held academic positions at the Queensland University of Technology, University of South Australia, Central Queensland University, and most recently James Cook University, where he has been an Adjunct Senior Research Fellow in the Business, Law and Governance College since 2021.

Frank holds several international project management certifications, including a CAPM from the Project Management Institute, CPPP from the Australian Institute of Project Management, and SFC from ScumStudy. He is also a Certified Project Director at the Institute of Project Management where he also works as a trainer and assessor. Frank is also part of the Project Management Institute, Queensland Chapter, as Deputy Director of the Digital and Transformation portfolio, and was nominated as Deputy Director of the Membership portfolio.

Frank holds a Bachelor and Master of Science in Engineering Management, a Master by course work in Energy Management, and a PhD in Energy and Process Engineering. When he moved to Australia, Frank was involved in the Australian ASTRI institute, an international joint research collaboration worth $87 million, as a research scientist and primary investigator of innovative and effective operations and maintenance solutions for CSP plants. Frank was also involved in a European solar project as a research investigator.

Frank is a passionate project manager, and his research interests focus on the role of Cultural Intelligence and Digital Transformation in the project management domain and their effects on team performance.

ACKNOWLEDGEMENT OF CONTRIBUTIONS

We thank Levi Mitchell FGIA, GAICD, CCRP, FANZIIF for assistance with providing the case study for Module 5 titled “Enterprise risk management and its impact on project management”. Levi is an experienced non-executive director and governance, risk and compliance executive.

We thank Saad Masood Butt BS(SE), MS(SE), PhD(CS), M(IEEE), M(AIDH) for assistance with providing the case study for Module 6 titled “Software quality management for small IT companies that revolves around reliability, performance, security, and maintainability”. Saad is Senior Software Developer at APTISSIO and Adjunct Researcher at James Cook University, Australia.

We thank Shaun Kelly, Chief Ethics Officer and Vice President, Global Compliance Office for Crawford & Company for assistance with providing the case study for Module 9 titled “Quality costs (in many ways!)”.

MODULE 1. INTRODUCTION TO RISK ASSESSMENT AND QUALITY PROJECT MANAGEMENT

This introduction to project risk assessment and quality project management is aligned with the PMI Global Standard for project management, namely the *PMBOK Guide, 7th edition.*

According to *The guide to the project management body of knowledge* (PMBOK@ Guide), a risk is an uncertain event that, if it occurred, has an effect on at least one of the project objectives.

Learning Outcomes

- Contextualise what risk assessment and risk management encompass.
- Analyse the process of risk management.
- Determine the importance of quality management for a project.

Conducting a risk assessment is not uncommon. But please note that this is a step that needs to take place prior to the project manager engaging in the process of managing the risk. Risk assessment and risk management differs; however, it is clear that these are integrated. Risk assessment in project management is the systematic process of detecting hazards, uncertainties and barriers and analysing any related risks, followed by implementing appropriate control measures to eliminate or mitigate them. These control measures directly reflect the management process for the risk.

The project risk management strategy addresses the risk assessment process and creates a blueprint for the project manager and the project team that allows them to identify, classify, prioritise, and mitigate risks. Overall, the technique known as risk management includes an assessment of the risks involved; therefore, it becomes critical for the project manager to understand and master this process in the early stages of the project life cycle. If the risk assessment process – the beginning of a health and safety management approach – is not conducted effectively or at all, it is doubtful that the required preventive actions will be identified or implemented. Consequently, the project outcomes become compromised.

With the risk assessment procedure, the project manager examines the project activities to:

- identify procedures and circumstances that have the potential to create harm, and especially impact the success of the project completion
- determine the likelihood of each risk occurring and the severity of its potential repercussions
- determine what measures can be adopted to prevent the occurrence of or to mitigate these risks.

It is essential to distinguish between uncertainties, hazards and risks. A hazard is anything that has the potential to cause harm, such as workplace accidents, emergency situations, poisonous chemical substances, employee disputes, stress and so on. In contrast, a risk is the likelihood that a danger may produce harm. Uncertainties are considered triggers to potential risks and/or hazards. As part of the risk assessment plan, the project manager will identify the various uncertainties that can impact the activities of the project, identify hazards, and then quantify the probability or risk of their occurrence.

Depending on the project field, the objective of a risk assessment strategy is to assist businesses to prepare for and minimise risks. Other objectives include:

- provide an evaluation of potential project variation
- prevent variation of project specifications
- meet legal obligations
- develop a precise listing of accessible assets
- justify the expenses of risk management
- determine the budget for risk mitigation
- understand the return on investment of applying a risk management strategy.

Before introducing new processes or activities, businesses should conduct a risk assessment.

It is important for risk assessments to be adapted to each individual organisation and project field. Although there is no policy that 'fits all', there are certain fundamental concepts that we may follow to establish appropriate risk assessment methods and develop a robust risk management approach. The following modules in this book will discuss some of these processes in details.

Why is risk management important in project management?

An unmanaged risk can make it difficult for a project to meet its goals and may even make it impossible for the project to be successful. Risk management is essential during the start, planning, and execution phases of a project; when risks are well managed, the probability of a successful project considerably increases.

Project managers can determine the strengths, weaknesses, opportunities, and hazards that are associated with the project by using effective risk management methods. As a project manager, you might be better prepared to deal with uncertainties if plans are made for these and the project team is guided to mitigate

them as well. It is important to define how as project managers we can deal with any risks to ensure the successful completion of our projects. This will enable us to recognise, minimise or eliminate problems as they arise. Successful project managers are therefore aware of the significance of risk management. This is because the success of a project depends on factors such as planning, preparation, outcomes, and assessment, all of which contribute to accomplishing strategic goals.

Putting together a plan for success

Establishing a list of both internal and external risks is one of the ways in which risk management strategies help with project success. This strategy will normally include the risks that have been identified, along with their associated probabilities, potential impacts, and recommended countermeasures. Events with a low risk typically have a minimal or no effect on the budget, the schedule, or the performance. A moderate amount of risk might result in a small but noticeable increase in costs, a disturbance of the schedule, or a decline in performance. Events with a high probability of occurring are very likely to result in a substantial increase in the budget, a disruption of the schedule, or performance issues. Regardless, it is the responsibility of the project manager to establish a plan for the project success and managing risks can be the start of this journey.

Effective project managers also communicate their strategy to the project sponsors, stakeholders, and team members to guarantee that projects are carried out without a hitch. Stakeholders who supply financial support and whose lives are influenced by the results will have expectations as a result of this. Therefore, engaging stakeholders early in the project guarantees that the project is carried out efficiently so that the transition from one phase to the next is uninterrupted. By establishing clear and transparent communications it can be guaranteed that the whole project team will be able to respond successfully to issues that arise and call for action by recognising possible risks in advance, taking steps to minimise them, and dealing with those that do arise.

Proactivity vs reactivity

If the project host organisation has a risk management strategy in place, as a project manager you won't have to spend time continually putting out fires since you'll be able to be proactive and take measures to limit any damages before they even occur. The team working on the project will have the ability to turn the risks that have been identified into practical activities that will lower the possibility of these occurring. These actions are then recast as backup plans, which ideally won't need to be implemented. In the case that a risk event takes place, the contingency plan may be developed quickly, which will reduce the amount of time that a project is potentially delayed.

Project managers can potentially increase the likelihood of the organisation's success by reducing and removing the risks prior to these eventuating. Project success can more likely be achieved by proactively minimising or eliminating risks so that projects can effectively be completed on time, under budget and meet the required specifications. In other words, by acting proactively and not reactively, projects managers

can efficiently and effectively deliver projects. When an organisation doesn't have specific techniques for risk management, proactive initiatives don't exist, leaving the organisation exposed to challenges and becoming reactive and susceptible to failure. Organisations can maximise earnings while minimising costs associated with operations that don't yield a return on investment because of effective risk management tactics. Effective project managers use extensive proactive analysis to determine whether current effort should take priority depending on the results achieved, regardless of the uncertainties or challenges faced.

Overall, risk management is essentially a technique in which we investigate, identify, and assess the risks that might influence our projects and then take measures to reduce those risks. The successful completion of our project depends on our ability to effectively identify, assess and manage the associated risks, which makes risk management an essential component of project management. A plan of action comprised of several stages that are carried out to guarantee that the risk is removed is what is known as risk management. As project managers we proactively respond to risks. However, if we are dealing with risks that are beyond our ability to manage, one option is to devise a plan of action that can lessen the impact of the risk, given that it is impossible to eliminate the risk entirely and given that it is unprofessional to react to the risk rather than to plan an effective response.

The role of project managers

Project managers with a good knowledge of risk assessment and management are those who are fully aware of all that is needed around risk management processes, regardless of the organisation type or project field, and aware of the many strategies to reduce them. There is no doubt that project managers are responsible for managing risks. As we are now living in the age of uncertainties and multitasking, different organisations demand project managers to also be risk managers in addition to their other responsibilities. In fact, a significant number of organisations specialising in project management now provide project managers with training in risk management.

In the field of project management, risk management is of critical importance. It enhances the organisation's chances of becoming successful in every project endeavour. When working on a project of any kind, planning and putting into action an effective risk management strategy is beneficial in a number of ways. As project managers you will:

- assist in avoiding any major risk effects
- provide the project team with the right tools to attain project management satisfaction
- ensure the timely and profitable completion of the project
- evaluate new opportunities on an ongoing basis.

How to manage project risks

The right risk management approach helps enhance the chances of project success and keeps the project

schedule and cost deviation near to zero. But how to manage the process? There is a lot of literature describing various processes of risk management. In this module we will provide you with an overview of the steps involved in applying such systems. However, in later modules we will address each component in detail and provide you with various methods and application techniques.

Figure 1 shows the entire flow of the process, along with relationships and dependencies among each of the highlighted steps. The process starts with developing the risk management plan, followed by a risk assessment, identifying specific risks to the project, performing a qualitative analysis, performing a quantitative analysis if required, and planning the risk response.

Figure 1. Example responsibility matrix, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0

Overall, the process of risk management plays an essential part in the effective management and successful completion of a project. It is of critical importance in this process to conduct a risk analysis when establishing the scope of the project and planning accurate estimates, all of which contribute to effective project planning. Information on the feasibility of the project and information to enhance project planning are both made available through the process of identifying and analysing project risks. As discussed earlier, one of the main goals of project risk management is to identify probable risk events and circumstances and to keep all stakeholders fully informed about these. The most important result of effective project risk management is increasing the chance that the project's value will be optimally realised and that the project will have a successful end.

A failure to undertake project risk management to an acceptable level might have unfavourable consequences. It is possible to arrive at the erroneous conclusion that all potential risks have been

eliminated and that there are no additional issues to be concerned about. It is also possible that it could lead to the project being terminated unnecessarily, which would result in the loss of the opportunity to take advantage of any potentially beneficial risks. The organisation and the project manager must also be well aware that risk management does not come for free; in most cases, it adds major expenses and time to the completion of the project. Therefore, appropriate funding needs to be allocated to this process if an effective outcome is expected. Only then can the organisation see the value of investing in the process and hope to prevent long-term impacts and project failure.

Quality project management

It is impossible to stress how essential *quality* is to successful project management. The project team will be able to reliably offer high-quality goods and services if the project manager is also able to implement an effective project quality management strategy. Therefore, we have decided to combine both risk and quality management processes in this book. So, let's now talk about what quality project management encompasses.

The methods and actions that are used to determine and attain the quality of the deliverables produced by a project are included in the scope of what is known as 'project quality management'. However, quality is often difficult to pin down. How can one define quality? When it comes to project management, quality refers to the client's or other key stakeholders' requirements for the deliverables of the project.

We can summarise quality as:

> the degree to which a collection of intrinsic features fulfills standards.

To be able to expand the definition of quality, it is necessary to understand the following terms.

Validation: confirmation that the service/product satisfies the agreed scope requirements.

Verification: conformity with specifications.

Precision: the exact outcome to the agreed scope requirements.

Accuracy: the proximity to the agreed scope requirements.

Tolerance: acceptable range of outcome variation.

In the late 1980s, project management incorporated quality management. No one can dispute the fact that project management is now quality-driven. Everyone chooses 'quality' project delivery above mere project completion (Rever, 2007) . A project quality management strategy is implemented under the direction

of project managers, but the exact definition is given by the degree of flexibility in the project outcome requirements. Again, the primary objective is to produce a product or service according to the customer's or stakeholder's standards. This requires good knowledge and understanding of quality management concepts. There are 3 main concepts:

1. Satisfaction of customers

Without client satisfaction, quality cannot exist. Even if a delivery satisfies all of the customer's or stakeholder's requirements, if the process itself was not satisfying, there is still an issue. Obviously, the deliverable must fulfill these standards, otherwise, the project has failed since neither the project's outcome, nor its management, has met the customer's or stakeholder's expectations. The project must deliver what was promised in order to fulfill the customer's requirements. The project team must identify the clients, comprehend their explicit and implicit requirements and then transform their requirements into practical solutions. The *PMBOK* defines it as 'conformance with requirements' and 'usability'.

Implementing quality control therefore requires controlling both procedures and people. Meeting regularly with the project customer(s) or key stakeholder to provide updates is a great quality management approach.

2. Prevention

The quality of a project is planned, not examined. It is always less expensive to avoid errors than to repair them. The Cost of Quality (COQ) is the amount of money paid during and after a project ends to address issues and correct errors. Minimising COQ is the number one priority for the project manager. COQ is divided into two categories: conformance and nonconformance costs. We will discuss these in more detail in later modules; however, Table 1 provides a brief example of each.

Table 1. Cost of Quality (COQ) examples

Conformance costs: considered preventative costs	**Nonconformance costs:** considered as internal failure costs
Documentation procedure	Process/task/objective discard
Training	Process/task/objective revision – rework
Equipment needed	Warranty work
Testing time evaluations	Organisation losses
Product/service inspections	Liability

3. Continuous improvement

The concept of excellent project management entails an ongoing commitment to improve outputs throughout the duration of the project. Whether these improvements are done on a small scale, as gradual changes or massive ones, the chance to recognise and respond to change needs to be present in the day-

to-day activities of the project work breakdown structure and the project manager's daily management approach.

The concept of continuous improvement needs ongoing monitoring and adequate forms of documentation of any issues faced, so that the lessons learnt may be applied to the management of future initiatives and serve as the basis of quality management. However, for this to work, the project host organisation must be dedicated to developing and implementing well-defined processes as well as allocating resources to have the right continuous improvement system in place.

Prior to planning for quality, a project manager must understand the quality expectations. What are the quality standards of the organisation executing the project, and which quality standards apply to the specific nature of the project? As part of the planning process, the project manager and project team must establish the needs, determine how a stakeholder's requirements may be fulfilled, and identify the expenses and time needed to satisfy those requirements. We will discuss these fundamental processes in later modules.

Overall, it is valid to state that the key stakeholders in a project define the quality attributes. The most prevalent quality attributes are performance, usability, appropriateness, dependability, and consistency, among others. The quality levels of these phrases are measured in accordance with project and organisational criteria and overall strategy. From project start to project completion, quality standards should be applied at each step and phase of the project life cycle. Thus, quality management should be implemented from the beginning to the finish of a project.

Now let's review our knowledge:

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/pmriskquality/?p=5#h5p-1

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/pmriskquality/?p=5#h5p-2

Key Takeaways

- The project risk management strategy addresses the risk assessment process and creates a blueprint for the project manager and the project team that allows them to identify, classify, prioritise, and mitigate risks.
- When you begin the process of preparing for a project, one of the first things you need to think about is what may possibly go wrong with the endeavour.
- In order to get started with risk management, it is essential to begin with a crystal clear and specific explanation of the project's expected final outcome.
- Project quality management is the practise of managing and maintaining quality throughout a project.
- The immediate result of paying insufficient attention to quality is more rework and faults.
- Any modifications made to the parameters of the project should also result in a quality check being performed by the project manager and their team.
- The project manager should devise a strategy to ensure that procedures are continuously improved and put into action.

References

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MODULE 2. PROJECT RISK MANAGEMENT: STAKEHOLDERS' RISKS AND THE PROJECT MANAGER'S ROLE

Learning Outcomes

- Differentiate the roles and responsibilities required within risk management processes.
- Articulate key factors for good stakeholder management.
- Analyse the critical skills required to carry out successful risk management.

There are a number of key roles and responsibilities within project risk management. In many cases the most important role is that of the project manager. Within project risk management the importance of understanding stakeholders cannot be ignored.

The project manager's role

A project manager's scope of work is vast, from day-to-day project work, to end-to-end planning, to monitoring. A good project manager needs strong skills and capabilities to complete project outcomes within budget and schedule (PMI 2021, 2019; Kendrick 2019). This includes capabilities in project scoping, planning, budget control, resourcing and communication. A project manager also needs to identify, document, and treat risks, which means that they must have skills in forecasting the potential consequences and likelihood of identified risks, and how to best respond if they arise to ensure that no negative consequences impact the project objectives.

The primary responsibility of a project manager is to understand organisational knowledge and new trends in technology to better assess and mitigate risks related to the project (PMI 2021, 2019; Kendrick 2019). Projects can be significantly impacted by risks and issues which cause delays, cost overruns and scope creep. The project manager and project team need to be prepared for any potential scenario and put contingencies in place. Contingency and mitigation plans need to be supported with stakeholder buy-in and assistance, and this can be achieved by maintaining ongoing stakeholder communication and engagement.

Through the risk identification process, the project manager gathers and documents issues, negative feedback from clients and stakeholders, potential defects, and the project team members' perspectives on

the current state (PMI 2021, 2019; Kendrick 2019). Therefore, to achieve the goal of risk assessment, the process should include:

- forecasting the project's next steps, including identifying risks
- assessing risks through assessing the likelihood and impact of identified risks
- planning responses to manage risks before they occur
- implementing responses to minimise adverse effects
- measuring effectiveness of the plan against identified threats
- monitoring activities which may trigger a risk.

The project manager is key to minimising the chance of risks occurring and mitigating them where possible. Their role as a risk manager will differ depending on the project scope, stakeholders, budget, schedule and industry. The project manager needs to understand the intricacies of the project to appropriately assess the risk and mitigate it accordingly.

Project team

With the support of the project manager, the project team are responsible for working collaboratively to achieve project goals and outcomes. 'Project team members collectively have a diverse range of skills, with each having a specific skill set that meets the project's needs (PMI 2021, 2019; Kendrick 2019). The project team is essential to project outcomes. They are often divided into 4 groups, depending on the project type:

- **Functional teams**: these are the permanent teams which fit within the broader organisational structure; their skills are used in the project space.
- **Project team:** a dedicated team who is responsible for developing a specific project. At the end of the period, the team is disbanded.
- **Cross-functional team:** this includes individuals from various departments, who come together for the duration of the project and return to their business-as-usual role after the project is complete.

- **Self-managed and virtual teams:** these are often temporary teams who come together for specific tasks or activities within the project.

The project team has a significant role in helping the project manager to identify, assess and respond to project risks. This role is ongoing throughout the life of the project (PMI 2021, 2019; Kendrick 2019). Both informal and formal risk assessments should be completed at each phase of the life cycle, and the frequency will depend on the scope of the project. A formal risk assessment incorporates built-in steps to identify and measure risks and track progress. While informal assessments are process-driven, information is obtained through the infrequent monitoring of circumstances where formal assessments are not deemed necessary. The project team members will often share the responsibility for creating the risk documentation, along with the updates.

Skills for risk management

Project teams, managers and stakeholders require numerous skills to manage risk. These include:

- **Communication:** ability to communicate the importance of understanding risk across all stakeholders, team members, sponsors and managers.
- **Organisational understanding:** an understanding of the current organisational strategic direction, goals and risk appetite.
- **Creativeness:** ability to act under pressure and respond to risks as required.
- **Preparedness:** ability to establish a risk management process that is easy to follow and action throughout.
- **Solutions driven:** ability to solve problems and develop solutions to respond to identified project risks.

Stakeholders

Stakeholders play a fundamental role in all aspects of project success. Stakeholders are defined as anyone who is (or perceive themselves to be) affected by or can affect a decision, project, strategy or process (Freeman 1984). A stakeholder can be an individual, organisation, or department within an organisation, and the role may change throughout the process.

There are 3 primary questions which lay the groundwork for understanding both stakeholder management and its link to risk management (PMI 2021, 2019; Kendrick 2019):

1. Who is affected by or interested in the project?
2. What are the stakeholders' concerns with the project?
3. What measures or treatments are being applied?

These questions will help the project manager understand the different stakeholders and assist with taking actions to include and engage stakeholders in the process, particularly because projects are rife with uncertainties that include stakeholder roles, behaviours, and requirements (PMI 2021, 2019; Kendrick 2019). Stakeholders can impact the project through behaviours that are negative, destructive, irritating, damaging to reputation, supportive, positive or encourage project outcomes.

Stakeholders need to be engaged throughout the project and risk management process to ensure that they are aware of the potential risks, their outcomes and (where necessary) provide information about the risk (PMI 2021, 2019; Kendrick 2019). By engaging stakeholders, there are opportunities for the project team and manager to understand the different perspectives, obtain expertise and develop appropriate risk mitigation or treatment responses.

Stakeholder roles and interests change throughout a project, and this is also similar for their role in risk management. There are numerous roles which they can hold (Ndlela 2019), including:

- Understanding: understanding the elements of the risks being discussed.
- Informing: provide specialist support or information to respond to a risk.
- Training: where education is required (for staff or clients), training can support risk mitigation.
- Identification: identifying the specific risks within a project.
- Communication: sharing information with other stakeholders or seeking subject matter expertise to understand the risk generally, mitigation processes and likelihood or consequence.

To engage the different stakeholders, consultation is required early on. By starting early, the process can establish the context of risks within a project, identify the risks and understand how stakeholders can provide support. Throughout the process, the stakeholders may be re-consulted to support evaluation and treatment, and throughout the monitoring and controlling processes.

Risk stakeholders

There are numerous people who are considered risk stakeholders. These include the stakeholders who can support the risk management process on one or more occasions – for example, subject matter experts, stakeholders, clients, legal departments, accounting, etc. By engaging with risk stakeholders throughout, the risk monitoring process can have a positive effect on the risk action or response plan.

Risk stakeholders can help develop strategies and analyse the risk management process. There are certain risk management processes which risk stakeholders can sign off on, and others where they can take on the responsibility through transferring the risk (Ndlela 2019). Stakeholder relationships are complex, including the dynamic relationship between multidimensional groups and individuals. 'An organisation must develop and maintain strong relationships with their stakeholders, and effectively manage the stakeholders, their interests and perspectives' (Zsolnai 2006). This is not distinct from the risk management process, as there are numerous benefits of engaging with stakeholders, including increased trust, collaboration, quality information, informed decision-making, broad understanding of external stakeholders, potential risks, and consideration of stakeholders' interests. By collaborating with stakeholders, improved understanding of risks and opportunities can occur.

By engaging stakeholders, an organisation and a project manager can determine the influence of social and cultural networks that could affect the outcomes. Stakeholders have their own perceptions and opinions about risks which can be subjective. The subjective nature of opinions and perceptions affects objective assessments of risks, which can differ between the subject matter experts, project managers and technical support (Collier et al. 2004). Therefore, by engaging stakeholders, project managers are better able to interpret risks considering more than social norms, emotions and networks. Barnes (2002) stated that experienced risk managers are more scientifically and technologically sophisticated in their approach to managing and measuring risks. Whereas inexperienced risk managers will rely on cultural and social

components to identify, assess and respond to risks. Therefore, organisations who employ experienced risk managers will significantly reduce the 'blind spots' because they understand the contextual experience of risk and the issues which cause problems (Loosemore et al. 2005).

There are 3 steps for incorporating risk stakeholders (PMI 2021):

1. **Stakeholder identification:** identify the potential stakeholders.
2. **Stakeholder response plan:** outline what stakeholders require and develop a collaboration plan.
3. **Continuous stakeholder management and engagement:** execute the plan, appropriately engaging the stakeholder throughout the project.

This 3-step process is parallel across the risk management plan and the stakeholder management plan. Therefore, by following this 3-step process, stakeholder management can be proactive rather than reactive.

Let's go into the 3 steps in more detail.

Step 1: Stakeholder identification

Stakeholder identification involves using multiple techniques.

Brainstorming

This requires bringing the project team together, including the sponsors, managers and technical team members (PMI 2021). Brainstorming can help team members determine:

- who is invested in the project
- who has influence over the outcomes of the project
- who will be affected by the project.

Each person is given a stack of sticky notes or space on a whiteboard. They are given 10 minutes to list any stakeholders they can think of, using a single sticky note per group or individual stakeholder identified. Then the names identified are brought to the group, creating a list where duplicate names are removed.

Stakeholder role profile

Stakeholder roles are often predictable in projects. Stakeholder role profiles identify stakeholders who are either historical or common to a project type (PMI 2021). By answering the questions below, the project team is better able to consider the different roles, perspectives and stakeholders. This improves the likelihood that all key stakeholders are identified.

Where the project team later identifies key stakeholders that have been missed during the identification process, a team member will be responsible for updating the stakeholder register. The stakeholder register

outlines the roles and, like the risk register, will outline the specifics of the stakeholders (e.g., role, responsibility, contact details). To develop the stakeholder role profile, each question below needs to be answered:

- Who approves the project budget?
- Who approves the functional requirements or tasks?
- Who approves the technical components?
- Who approves designs?
- Who approves changes (including changes to schedule and budget)?
- Who approves procurement?
- Who is the sponsor?
- Who approves each iteration?
- Who are the users of the services or project deliverables?
- Who sets the organisational strategic direction?
- Who manages the project?
- Who assigns resources?
- Who performs the work?
- Who changes the systems or processes?
- Who identifies laws and policies that affect the project?
- Whose work will be impacted by the project?

Decision trail

Projects require ongoing decision-making and authorisations. Therefore, the project manager and team need to understand all their decision and authorisation points, considering who each of the decision-makers are, including who has the right to cancel or veto the project.

Identify secondary stakeholders

Secondary stakeholders include individuals or groups who have an indirect relationship with a project, but who do not have direct power over the outcomes. The role of these secondary stakeholders can change to primary stakeholders throughout the project life cycle or in response to a risk arising. The most common secondary stakeholders include the community, associations/social groups, media groups, regulators and the general public.

Organisational process assets

Identifying stakeholders can also be completed through a review of Organisational Process Assets (OPAs). These include the documentation held by the organisation which supports project management and historical project information (PMI 2021). OPAs incorporate project plans, organisational policies, procedures, and governance guidelines. These documents can be used to understand who previous

stakeholders were in historical project information and who stakeholders could be, based on other organisational resources.

These stakeholders are documented within the stakeholder register. This outlines all of the information related to the project and risk stakeholders. An example of a stakeholder register is provided in Table 2.

Table 2. Stakeholder register example

Name	Contact	Project role	Communication medium	Frequency	Power	Influence	Internal /External

Identifying stakeholders is an important step in understanding the project risks. The stakeholder register supports the documentation of who each of the stakeholders are, how they link back to risks and project deliverables.

Step 2: Stakeholder response and analysis

Every stakeholder has a different level of power and interest, and they leverage this to support the project, mitigate or treat risks and in some cases negatively influence the outcomes (PMI 2021). Through analysing stakeholders, the project team and managers are better able to understand their stakeholders, including their concerns, interests, risks and opportunities. The response plan needs to consider methods and frequencies for communication and engagement to ensure that stakeholders are included in the risk response. The analysis process includes the following.

Stakeholder prioritisation

The stakeholder management process undergoes a similar prioritisation process as that undertaken for risk management (PMI 2021). Stakeholders are ranked by interest and power, as shown in the model in Figure 2. There are 4 primary categories or quadrants within this model: Keep Satisfied, Manage Closely, Monitor, and Keep Informed. These quadrants assist with prioritisation and help with understanding the influence/power of each stakeholder.

Figure 2. Stakeholder power interest matrix, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0

Stakeholder priority analysis

Stakeholders who have high power and high interest are defined as high impact stakeholders (Smith 2000). The project manager and team must understand:

- what the stakeholders are interested in
- how the project aligns to their other areas of interest
- the areas of subject matter expertise
- how can they support project risk management.

The aim of understanding the highest impact stakeholders is similar to understanding the highest ranked risks – it helps the project team understand what matters, how stakeholders can provide support and where gaps in the process are.

RACI matrix

The RACI matrix stands for Responsible, Accountable, Consulted, and Informed. It is a way of classifying stakeholders by their roles or required level of engagement for individual project tasks, risks or deliverables (Blokdyk 2021). It can be used to support the risk management approach, whereby stakeholders can be given responsibility to respond to a risk if it arises or accountability to implement contingencies. In addition, there is consideration of which stakeholders need to be consulted and which need to be informed

of the occurrence of a risk. An example of a RACI matrix is provided in Table 3. There are a few rules associated with applying the RACI:

- There is only one accountable party and this stakeholder is accountable for making the decisions.
- Minimise how many stakeholders are responsible for taking actions to prevent 'too many cooks in the kitchen'.
- Not all stakeholders need to be consulted – there are circumstances where it is better to inform certain stakeholders.

Table 3. Example of a stakeholder RACI matrix

	Stakeholder 1	**Stakeholder B**	**Stakeholder C**	**Stakeholder D**	**Stakeholder E**
Risk 1	R	C	A	C	I
Risk 2	A	R	C	I	C

Stakeholder engagement assessment matrix

In each row, the stakeholder engagement assessment matrix outlines each stakeholder's current compared to desired level of engagement. The columns outline the level of engagement which, according to the *PMBOK* includes unaware, resistant, neutral, supportive and leading (PMI 2021). An example is provided in Table 4. The current state can occur in any of the columns; however, the desired state should be Neutral, Supportive and Leading. This is important, as project managers do not want resistant or unaware stakeholders.

Table 4. Example of stakeholder engagement assessment matrix

	Unaware	Resistant	Neutral	Supportive	Leading
Stakeholder 1		C	D		
Stakeholder 2	C				D
Stakeholder 3			C	D	
Stakeholder 4				C&D	

This matrix can be used for specific risks, deliverables and tasks, which can support project risk management.

Step 3: Ongoing stakeholder engagement and management

The ongoing stakeholder engagement and management process occurs throughout the project. This includes who we engage with, through what medium, the required messages and who in the project team is involved. There are 2 key documents that can help the project team to communicate with stakeholders and how they can interact with stakeholders in response to risk.

Stakeholder communication plan

The communication plan outlines the requirements for communicating with key stakeholders, including what information needs to be shared, when, through what format and how frequent (PMI 2021). Through the identification and planning stages of stakeholder and risk management processes, this evaluation helps determine the requirements for communication with key and secondary stakeholders about different risks and deliverables within the project. An example of the communication plan headings, incorporating risks, is provided in Table 5.

Table 5. Communication plan common headings

Communication requirement	Stakeholders	Purpose	Risk	Frequency	Medium	Owner

A communication plan is about ensuring that communication and engagement is proactive rather than reactive. This is especially important for risk management processes.

Decision-making framework

The decision-making framework in project management is also referred to as the DACI. This acronym refers to Driver, Accountable, Contributor, and Informed, stipulating specialist roles for each project team member and key stakeholders (Kendrick 2006). Within the DACI model, the Driver is the leader across the project life cycle for certain risks, activities or deliverables within a project. The Approver is the final decision-maker who has the authority to reject or approve decisions impacting the project, including implementing risk contingencies or mitigation processes. Contributors are stakeholders who have high power or interest within a project team's decisions. They can be used to support the decisions through information sharing and consultation. Finally, the Informed stakeholders are those who do not require consultation but who do need to be made aware of decisions made. There should only be one Driver and one Approver to avoid confusion. Table 6 provides an example of the DACI decision-making framework.

Table 6. Example of the DACI decision-making framework

	Risk 1	Risk 2	Activity 1	Deliverable 1	
Project Manager	D	C	D	D	A
Sponsor	A	A	A	C	
Project Team	I	C	C	C	
Stakeholder 1	C	D	I	I	
Stakeholder 2	I	I	C	C	

The value of using the DACI decision-making framework is reducing the confusion over who has what role in the decision-making for each risk, activity or deliverable. Each is assigned clear authority and responsibility for the key deliverables, activities or high exposure risks across the life cycle of the project.

Other roles in project risk management

For larger or more complex projects, the risk roles are often allocated as independent roles and responsibilities of the project manager and project team. Where risk is extensive, there are opportunities to seek support from the organisation's enterprise risk management teams and expertise (Ndlela 2018). This includes the allocation of the following roles.

Project risk manager. This person is solely responsible for understanding and responding to the risks and opportunities that are identified and analysed at any stage of the project life cycle. Where there is a project risk manager, the project manager collaborates with the risk manager to set expectations and validate the proposals for actions to be made in response to potential risks arising.

Project risk profile owners. These are the owners of each risk. These individuals or groups are identified to help create and implement the plans to treat and mitigate risks. These owners are often subject matter experts or approvers for implementing risk response processes.

Overall, there are numerous roles within project risk management. Along with the project manager and sponsors, there are key project team members who play important roles in risk identification, analysis

and response planning. These roles often include an understanding of the support and information that can be provided from different stakeholders. People are key to project outcomes, and as there are many uncertainties which can arise from interactions between these people, there is a need to understand what opportunities or threats these relationships offer. It is important to note that people are the decision-makers, workers, leaders and so forth within projects, and the resulting risk management process needs to take people and stakeholders into consideration.

Now let's review our knowledge:

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/pmriskquality/?p=92#h5p-3

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/pmriskquality/?p=92#h5p-4

Key Takeaways

- Stakeholder roles and interests change throughout a project. This is also similar for their role in risk management.
- Through analysing stakeholders, the project team and managers are better able to understand their stakeholders, including their concerns, interests, risks and opportunities.
- The primary responsibility of a project manager is to understand organisational knowledge and new trends in technology to better assess and mitigate risks related to the project.
- People are key to project outcomes, and as there are many uncertainties which can arise from interactions between these people, there is a need to understand what opportunities or threats these relationships offer.

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MODULE 3. RISK MANAGEMENT PROCESS BY LIFE CYCLE PHASE

Learning Outcomes

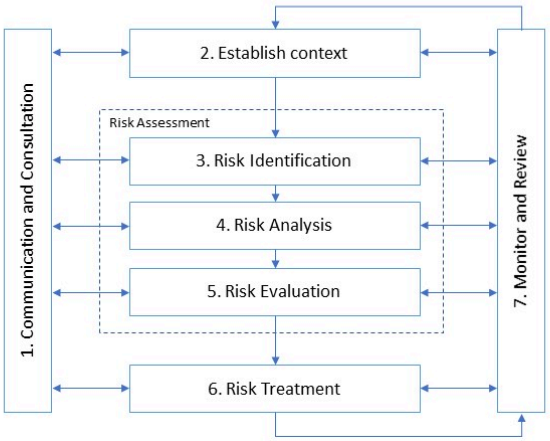
- Contextualise risk analysis categories within the project or organisation.
- Analyse the life cycle of risk management.
- Determine the importance of ISO 31000 risk management for a project.

The project life cycle commonly consists of 5 key phases: initiation, planning, execution, monitoring and controlling, and closure/handover. Project risk management occurs throughout the life cycle and the process differs depending on the phase.

ISO 31000 Risk management

Risk management within a project is a process of identifying any potential risks prior to project commencement and creating a plan to mitigate risks and/or prevent them from occurring. Therefore, risk management requires taking an informed approach to understanding a project's risk appetite. The most common approach to managing risks is using the International Organization for Standardization (ISO) 31000 approach (ISO 2018). The ISO 31000 considers that all organisations face numerous internal and external factors and influences which add uncertainty to achieving objectives (ISO 2018). The ISO 31000 is outlined in Figure 3.

Figure 3. ISO 31000 – authors' interpretation based on the ISO 2018 source, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



The process for the ISO 31000 (ISO 2018) is outlined below.

1. **Communication and consultation**. This step assists the project team and stakeholders to understand the risk (ISO 2018). This process seeks to promote awareness and understanding of risks, using consultation to obtain feedback to inform decision-making. Collaboration between stakeholders will assist in obtaining factual, timely, relevant, accurate and understandable information. Both internal and external stakeholders need to be part of the steps within the risk management process.
2. **Establish context.** Context within the risk management process needs to be established by developing an understanding of the internal and external environment in which the organisation operates (ISO 2018).
3. **Risk assessment.** This is the process of identifying, analysing and evaluating risk. Risk assessment needs to be systematic, iterative and collaborative, using the stakeholders' knowledge. It should be based on the most recent information and supported by further research as required.
4. **Risk identification.** This is the process of finding, recognising and describing potential risks which can support or threaten a project achieving its objectives (ISO 2018). The project team should use a wide range of techniques to identify risks which affect one or more objectives.
5. **Risk analysis.** This is a comprehensive analysis of risk, based on its characteristics (ISO 2018). This involves considering risks generally, their sources, consequences, likelihood, triggers, contingencies, controls and control effectiveness. A key consideration is the risk exposure, which is the risk

likelihood and consequence levels. A risk can have numerous causes and consequences and affect multiple objectives or goals.

6. **Risk evaluation.** This process is used to support decision-making. It involves comparing the results of the risk analysis process to the pre-defined risk criteria which outlines when further action is required (ISO 2018). This can lead to a decision to transfer, avoid, treat/mitigate, approve, or reject.
7. **Risk treatment.** This requires selecting and implementing options to address different risks. It includes determining risk treatment options, implementing the treatment, reviewing effectiveness, determining if the remaining levels of risk are acceptable and, where necessary, taking further action (ISO 2018).
8. **Monitor and review.** This is the assurance process which determines the improvement of quality and effectiveness in the design, implementation and outcomes (ISO 2018).Iterative reviews of risk management processes help determine if the treatments that are used in response to risk are effective or not.

The ISO 31000 is an iterative process which helps the project team establish strategies and informed decision-making for risk (ISO 2018). Each activity associated with risk management requires interactions with stakeholders, considering internal and external contexts, the effectiveness of treatments and the overarching completeness of the identification process. Let's look into the different risk management processes across the project life cycle.

Phase 1: Initiation

The project initiation phase is the start of the project. This requires establishing why a project is underway, its value, and how buy-in from the organisation and sponsors will be obtained (PMI 2021). This phase is critical to developing a successful project. There are a number of failures, issues, problems and risks which can occur in this phase. Approximately 65% to 75% of projects fail due to risks or issues which occur during the project initiation process (Andriole 2021).

The project initiation phase requires consideration of unknown issues that could arise. There are more unknowns at the beginning of a project, as many of the deliverables, requirements and outcomes are unclear. Risk analysis at the initiation phase requires weighing up the potential risks compared to the potential benefits, which will support an understanding of whether or not the project is worthwhile.

The most common risks:

- **No clear business or organisational strategy.** The benefits for the project do not clearly link back to the organisational objectives, future plan or strategies.
- **Lack of capabilities, skills and resources.** Organisations do not always have the right resources, skills and capabilities required for their proposed project.
- **Lack of stakeholder support.** Ensuring that key stakeholders are aware of the project, its value and why it is underway is vital to success.

A risk management framework should be reviewed and tailored to outline specifics within the project risk management plan in the initiation phase (PMI 2021). The risk management plan should include at a minimum:

- possible risk sources and categories
- identification of project risks
- documentation within an influence and likelihood matrix
- risk response and action plan (also referred to as contingency plan)
- risk threshold and metrics during closure.

These elements will be detailed in Phase 2: Planning, below.

Phase 2: Planning

Once a project has been agreed to or approved, it moves onto the planning phase. A key component of the planning phase involves expanding on the risk identification process.

The planning phase of the project requires the project manager and team to document in detail the objectives, goals and requirements that the project seeks to achieve (PMI 2021). These are called the Critical Success Factors (CSF), which are the elements within a project deemed critical to the project achieving its goals (Bennet 2017). By describing these factors or requirements, project team members, stakeholders and sponsors have a consistent understanding of what they are aiming towards.

Risks are things which can threaten, prevent or support the completion of the CSFs within the project. Risks can be positive or negative. A positive risk is an event which poses an opportunity for a project, whereas a negative risk presents a challenge or issue which needs to be overcome (Bennet 2017). Keeping this in mind, risk planning involves identifying the important risk events (either positive or negative), their prioritisation and evaluation, and the process of developing responses.

There are 3 primary steps which occur during the project planning phase for risk management.

Step 1. Identification

The risk identification process requires creating the risk register and the risk breakdown structure (RBS) and completing a risk analysis (PMI 2021). However, the process starts with identifying potential risks:

- Ask ‘what if?’ questions.
- Work with subject matter experts and project stakeholders to brainstorm.
- Analyse previous similar projects, looking at what risks and issues arose for them.
- Analyse the organisational process assets to understand the current organisational processes and any shortfalls or potential gaps.
- Make clear any assumptions and develop task dependencies within the project scoping discussions.

- Look at previous project experience.
- Consider and discuss the worst-case scenarios.

Table 7 outlines some of the primary sources of risk identification.

Table 7. Risk sources

Risk Source	Description
Risk repository	A risk repository outlines historical data for risks that occurred within previously completed projects.
Risk identification checklist	Risk identification checklist outlines questions which assist in identifying any gaps or risks within the project space.
Subject Matter Expert (SME) Judgment	Brainstorming and/or interviewing with SMEs. This can include experienced project team members, stakeholders and technical experts.
Project status	Status meetings, reports, progress reports, quality metrics. This provides information on the current state of the project, issues/risks faced, and violations to baselines.

In addition to risk sources, risks can be identified by exploring the different risk categories (Lavanya and Malarvizhi 2008). The risk category list is outlined in Table 8. It shows key areas which are prone to risks occurring, outlining the technical and organisation risks with a set of standard categories based on the project type.

Table 8. Risk categories

Project Risk Management	Organisational Risks	Technical Risks	Commercial Risks	Environmental Risks
Scope	Leadership	Requirements	Contracts	Politics
Complexity	Responsibility	Technology	Resources	Law
Schedule	Support	Software	Suppliers	Competitors
Budget	Commitment	Interface	Financials	Clients
Communications	Resources	Performance	Profits	Stakeholders

These techniques can help us to identify risks early in the planning phase and are documented within the risk register. Table 9 provides an example of a risk register and suggested headings.

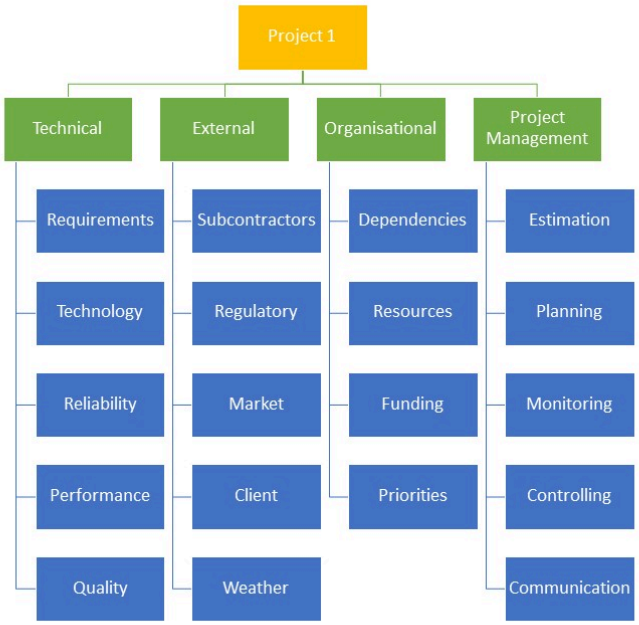
Table 9. Example of headings within a risk register

ID	Date	Risk description	Likelihood	Consequence	Severity	Owner	Treatment
No.	[date]		Low	Medium	High		Actions to mitigate

The risk register includes an itemised list of the identified risks, and it is a primary component of the project risk management plan (PMI 2021). The identification process requires the project manager and the project team to consider what the potential risks are, how they could affect the projects CSFs and when they could occur. Project teams can go overboard on the number of risks identified. It is recommended that only risks which have more than a 5% chance of occurring are noted.

Additional documentation around risk management can include the creation of an RBS. This requires breaking the risks into key categories, which systematically sorts potential risks (PMI 2021). An example of an RBS is outlined in Figure 4.

Figure 4. RBS example, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Not all risks are identified within the planning phase. Project stakeholders, sponsors and managers are aware that it is not possible to identify all risks – that is why it is necessary to have a process in place if an unplanned for risk arises in order to respond appropriately.

Step 2. Evaluation and prioritisation

The next step is evaluating the likelihood and consequence of each potential risk and prioritising these risks. The most common way to determine the risk likelihood and consequence is:

Risk = Likelihood x Consequence

Both probability (likelihood) and impact (consequence) need to be understood and prioritised. This process requires prioritising risks to ensure that stakeholders understand where their identified risks fit (Hillson and Hulett 2004). Where risks have been identified, they need to be evaluated, either qualitatively or quantitatively, to determine their level of influence and consequence on the project. This will ensure that appropriate steps can be planned to mitigate or treat them. The list below outlines the probability (likelihood) of risk occurring and the risk impact (or consequence).

There are a number of ways to assess the likelihood and consequence of a potential risk. Qualitative risk assessment tools include:

- **Impact of the risk on the total project.** Consider the effect of the risk on the entire project – for example, identify if the risk impacts an activity along the critical path of the project.
- **Combined impact of risks.** Consider the likelihood and consequence of related risks on activities within the critical path.
- **Risk assessment surveys.** Complete data collection surveys to obtain subject matter experts' opinions about their perceived level of likelihood or consequence of risks.
- **Impact assessments.** Consider the likelihood and consequences of the risk's occurrence across different scenarios.

Qualitative risk assessments can be done in isolation or completed with the support of quantitative risk assessments. Quantitative risk assessment tools include:

- **Sensitivity analysis.**This is a technique which helps understand the risks with the highest likelihood to impact the project. This analysis reviews the level of ambiguity of project components because these can affect the project objectives when all other parts of the project are meeting their planned baseline.
- **Expected Monetary Value (EMV) analysis.**This is a mathematical model which calculates the consequence of future scenarios which could happen (*EMV = Risk Probability * Risk Impact)*.
- ***Decision tree analysis.*** A schematisation and calculation method for gauging the consequences of a chain of multiple choices in the presence of ambiguity.
- ***Simulation.*** A project model interprets the risks quantified by their likely consequence on project objectives. These link back to the total project objectives. Project simulations follow computer models to evaluate risk, and these determine the likelihood and consequence on budget or schedule. Simulations often use the Monte Carlo analysis.
- ***Empirical benchmarking methods.*** Historical project data is used to determine triggers and factors causing risks. These are used to determine contingencies which were used in similar historical projects.

The most common approach to understanding risk likelihood and consequence involves making a judgement call. This call includes determining the likelihood or probability of the risk occurring as a percentage, and can be broken down into 4 categories (Lavanya and Malarvizhi 2008):

1. High probability of occurrence: >80%
2. Medium-high probability of occurrence: <80% and >60%
3. Medium-low probability of occurrence: <60% and >30%
4. Low probability of occurrence: <30%

Alternatively, the consequence or impact of the risk occurring can be ranked. These can be broken down into 3 categories (Lavanya and Malarvizhi 2008):

1. High: catastrophic impact on outcomes or deliverables (Rating A – 100).
2. Medium: critical impact on outcomes or deliverables (Rating B – 50).
3. Low: marginal impact on outcomes or deliverables (Rating C – 10).

Table 10 Provides a guideline for likelihood and consequence within the risk matrix. This is broken into the 4 elements of the Iron (or project management) Triangle.

Table 10. Impact classification guideline

Project objective	Rating C (10)	Rating B (50)	Rating A (100)
Budget	Budget increase >0% or $0	Budget increase between 5% and 10% or >$50,000	Budget increase >10% or >$100,000
Schedule	Schedule delay >0 days	Project schedule delay >1 week (7 days)	Project schedule delay >2 weeks (14 days)
Scope	Unnoticeable decrease in scope	Minor scope impact	Scope changes require approval and discussion
Quality	Unnoticeable quality reduction	Minor quality reduction (does not impact functionality)	Quality changes require approval

A risk score or rating represents the thresholds or classifications for risks. This is based on normal conditions; however, there are circumstances where an upgrade is needed. This includes when critical factors could impact the likelihood or consequence, for example:

- Who is the client? What level of importance is placed on the specific stakeholder?
- Is the project or risk management process vital to the long-term relationship between the organisation and stakeholder?
- Is the risk already of concern to the stakeholders or clients?
- What are the potential penalties of not delivering the project in its current form? Or for deviations from scope?

Once the risk has been analysed, the exposure level or risk score needs to be outlined. The risk scope can be determined through the multiplication of the 'Impact/Consequence Rating' with the 'Risk Probability or Likelihood' (Lavanya and Malarvizhi 2008). This is shown in Table 11.

Table 11. Risk exposure scores, also referred to as the Impact-Probability or Likelihood-Consequence Matrix

	Probability/Likelihood				
		1 = high (>80%)	**2 = Medium high (<80% and >60%)**	**3 = Medium Low (<60% and >30%)**	**4 = Low (<30%)**
Consequence/ Impact	**Rating A High (100)**	Exposure – Very High Score 100	Exposure – Very High Score 80	Exposure – High Score 60	Exposure – Moderate Score 30
	Rating B Medium (50)	Exposure – High Score 50	Exposure – Moderate Score 40	Exposure – Moderate Score 30	Exposure – Low Score 15
	Rating C Low (10)	Exposure – Low Score 10	Exposure – Low Score 8	Exposure – Low Score 6	Exposure – Low Score 3

Colours within the matrix outline the urgency of the risk response required as part of the planning and it documents the reporting levels.

Once the urgency and exposure risks have been identified, the next step is to identify the risk occurrence timeframe (Lavanya and Malarvizhi 2008). The most common timeframes are identified as:

- Near: could occur between now and the next month.
- Mid: could occur within the following 2 to 6 months.
- Far: could occur in a period of greater than 6 months.

In addition to the above risk analysis process, it is important to understand the classification of risks and their impact on project budget, schedule, scope, and quality. This will help create a risk response process.

Step 3. Risk response

The final step in the risk management process is developing the risk response or treatment plan. This is added to the risk register and provides vital information for what actions need to be taken if a risk occurs or is occurring (Lavanya and Malarvizhi 2008). As risks can be triggered at any stage of the project, the treatment plan requires an appropriate level of detail. The risk response plan requires numerous components, including:

- risk description associated with the risk analysis and assessment

- planned action to respond to the risk arising
- owner of risk response actions
- commitment date required to finalise actions.

The level of detail required for risk management plans will differ depending on their likelihood or consequence (Lavanya and Malarvizhi 2008).

- For the most significant risks (e.g., high likelihood and consequence), a detailed action plan is necessary.
- For medium risks (e.g., medium likelihood and consequence), a brief action plan will do.
- For small risks (e.g., low likelihood and consequence), no action plan may be required at all.

It is important that all risks within the action plan be allocated to a person who can take the actions required to respond to the risk. The action plan includes the following.

1. **The response plan**

Each risk identified must be documented within the risk register and these need to be discussed with the project sponsors and stakeholders. The process needs to be understood by the project manager.

Action or response plans are not necessary for all risks. There are different responses which can be applied to the risks identified (Kendrick 2019), including:

- **Avoid:** threat to be eliminated or removed.
- **Transfer:** shift the risk to a third party.
- **Mitigate/treat:** take actions to reduce the probability or impact of the risk occurring.
- **Accept:** where necessary, it may be important to proceed and accept the risk.

The risk response plan needs to consider the impact on schedule and budget. Therefore, when planning a risk response schedule, a budget needs to be outlined as precisely as possible. By being precise in the risk response plan, alternative actions can support the implementation of integrated changes.

Once the response plan is successfully implemented, risk scores can be lowered or adjusted based on the current environment.

2. **Risk triggers**

Each risk trigger needs to be documented within the broader risk register. The triggers can be used to identify the causes or warning signs. Furthermore, understanding triggers can support identifying risks that are about to occur, or provide an indication about certain risks that are likely to occur. Table 12 outlines an example of the risk triggers.

Table 12. Risk trigger examples

Risk Event	Risk Trigger
Schedule delay due to weather	Confirmed extended forecast showing adverse weather is set to occur
Limited resource availability	Unexpected leave due to illness

3. Risk ownership

Every risk must be allocated an owner and this person must be documented within the risk register (Lavanya and Malarvizhi 2008). A risk owner is the person or position who can monitor the risk and undertake actions in the response plans. This risk owner reports changes to risk status and takes necessary actions.

An example of a risk register is outlined in Table 13, showing the different triggers and response plans. The risk register needs to be updated throughout the risk management process and across the project management life cycle.

Table 13. Risk register example

Risk Description	Likelihood	Consequence	Priority	Owner	Trigger	Response Plan
Late delivery due to weather	Low	Medium	Medium	Project Manager	Extended weather forecast	Treat: Add contingency into schedule to allow for delays
Inferior quality materials arrive	Low	High	Medium	Project Manager and Site Foreman	Site foreman inspects material upon arrival and decides	Transfer: Insurance or, Accept: Send back for a complete refund

Phase 3. Execution

The project moves into the execution phase when work begins to meet the project goals and objectives (PMI 2021). As the project progresses, more information becomes available, and more risks can be identified and support response planning. This highlights the importance of updating the risk register as new information comes to light.

Phase 4. Monitor and control

The process of monitoring and controlling within project management and risk management is an iterative process which requires ongoing performance and status reporting (PMI 2021). These reports outline the current state of deliverables or outcomes in comparison to the baseline or planned/expected deliverables or outcomes. This is a point-in-time analysis, which is supported by a status report (e.g., quality, progress, follow-up and risk reporting).

Within risk management, the process of monitoring and controlling risk includes:

- identifying new risks
- planning responses for new risks as they arise
- ongoing assessment of current risk status
- documenting any triggered risk conditions
- monitoring whether risks are becoming more likely or consequential over time

- considering long-term planning and management of risk treatment plans.

Key actions required within the monitoring and controlling process include risk reporting and reclassification. Risk reclassification refers to risks which are not ready to be closed, but whose likelihood and consequence decreases over time (due to responses within the action plan). However, not all actions will have been sufficient to address the risks, and more actions may be needed. Next is risk reporting, which is where risk registers require updating. This includes going through risk identification, planning and responses and status updates. The risk register is the primary risk tool and needs to be accessible by all key stakeholders.

The monitoring and controlling process is mandatory in risk management – it is part of milestone and regular project meetings. The frequency of risk management meetings can be altered to meet the needs or risk level of the overall project.

As part of the monitoring and controlling process, the risk thresholds may change. This includes the different priorities, where risks change from higher to lower exposure rates. Risks may decrease in risk thresholds or priorities, and lower ranked exposure risks can then be removed from response plans.

Phase 5. Closure

When the project closure occurs, there needs to be agreement across the stakeholders, sponsors and project team/manager that the risk management plans can be finalised along with the project (PMI 2021). All the risks that occurred need to be documented, and their impact needs to be assessed and documented. Table 14 outlines a documentation example for the close out of a risk management process and corresponding risk register.

Table 14. Close out process of risk register

Risk	Mitigation	Closure
Late delivery due to weather	Use contingency reserve in the schedule to allow for delays.	Confirm the amount of contingency used in the timeframe.
Inferior quality materials arrive	Send back inferior quality materials for a complete refund.	Confirm the delays associated with sending back the inferior quality materials.

A risk score or rating represents the thresholds or classifications for risks (Lavanya and Malarvizhi 2008). This is based on normal conditions; however, there are circumstances where an upgrade is needed, including when critical factors could impact the likelihood or consequence.

Within the closure phase, additional lessons can be learned from the risk management process across the project management life cycle (PMI 2021). For risk management, this includes assessing the efficiency

measures for risk metrics and the auditing processes. Risk metrics refer to the overall efficiency of the risk analysis and management. This is measured by capturing key metrics throughout the project, including:

- number of risks that arose
- number of risks identified
- percentage or number of risks recurring
- how the risks, issues or problems faced within the project differed from the plan.

Each of these metrics are documented within the lessons learned and support future project and risk planning.

Risk audits are a process by which an independent analyst assesses the risks and provides recommendations on how to improve maturity or effectiveness of organisational/project risk management processes (PMI 2021). This process includes:

- understanding how good the project team are at identifying risk
- checking how complete the list of risks identified was
- checking the effectiveness of the response plan
- checking for links between the project and organisational risks.

Risk audits are not the adherence to process type audit; instead, they specifically aim to improve risk identification and analysis processes. Through the audit, organisations can set a benchmark for best practices in risk management processes.

A risk audit is comprised of a group of technical or subject matter experts brought together via documentation reviews and interviews. Key outcomes of a risk audit include:

- checklists for evaluating project risks
- identifying the importance of risk analysis categories within the project or organisation
- documenting the key risk categories and triggers
- adding any additional risks which were identified during the risk assessment process and which were missed in early planning
- listing the top 10 project and organisation risks which required the most attention.

Overall, risk management occurs throughout the project life cycle. However, project uncertainty can be hard to predict, and through an end-to-end risk management process, organisations and projects can learn from mistakes or previous projects. Within a project life cycle, appropriate use of risk management supports mitigating crisis situations and improves the chances of successful project completion.

Now let's review our knowledge:

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An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/pmriskquality/?p=107#h5p-6

Key Takeaways

- The ISO 31000 considers that all organisations face numerous internal and external factors and influences which add uncertainty to achieving objectives.
- The risk identification process requires creating the risk register and the risk breakdown structure, and completing a risk analysis.
- A risk score or rating represents the thresholds or classifications for risks.
- When the project ends, all the risks that occurred need to be documented, and their impact needs to be assessed and documented.

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MODULE 4. MITIGATION AND CONTINGENCY RISK PLAN

A risk response strategy outlines both the mitigation and contingency risk plans and forms a key component of the overall risk management plan. The *PMBOK* refers to a risk response strategy which is undertaken by a project team or manager. This plan aims to decrease the probability of a risk occurring, and/or lessening the consequence or impact of a risk (PMI 2021). As outlined in previous chapters, there are numerous steps that make up the risk response plan, including identifying, evaluating and analysing risks, and creating treatment plans. However, the overarching aim of each of these steps is to decrease the levels of exposure or likelihood of a risk and its overall consequence.

Learning Outcomes

- Compose a mitigation risk plan.
- Compose a contingency risk plan.
- Optimise monitoring and controlling risk processes.

Information collected and documented within the risk register **is used to develop a risk response plan**. Each identified risk and opportunity is outlined, along with the level of likelihood and consequence and the project risk tolerance threshold. Understanding this information, the project manager and project team are responsible for determining appropriate risk responses.

Treatment options need to be developed and actions need to be implemented to enhance opportunities and decrease the impact of risks on project objectives. Therefore, a response plan fits within the project plan and outlines actions required. This plan increases the likelihood and outcome of the identified opportunities, while decreasing the impacts of risks.

The response plan is a strategy used to consider proactive actions, whereby risk responses are about preventing risk rather than cancelling the project all together. Within the *PMBOK*, there are 2 types of risk response plans: contingency and mitigation.

Contingency plan

The contingency response plan outlines the responses and actions to be implemented if or when a risk occurs (Heimann 2000). Triggers are defined as the cues to execute contingency risk plans. It is mandatory

to track and define the risk triggers to develop the risk contingency responses. As different triggers occur in the environment, the reserves can be used.

Both opportunities and risks should be planned for within contingency plans (Heimann 2000). This includes any event which poses a risk or a threat to the project – defined as a negative risk. Whereas any event which offers an opportunity for the project is defined as a positive risk. Across both these events, the response planning is in place to ensure that the most is made out of any opportunity and to provide a strategy to respond to and overcome risks.

Steps for creating the contingency plan:

1. Identify specific events which could trigger the implementation of the contingency plan.
2. Document the roles and responsibilities, timeframes or processes, where the plan occurs and how it will be implemented.
3. Outline guidelines to report and communicate processes. Document how stakeholders will be engaged, who will send the information, how frequently, and how soon after risks occur the communication needs to be shared.
4. Monitor and report the contingency plan, ensuring it is up-to-date with all potential risks.

There are 6 primary components of a contingency plan:

1. Triggers: the 'things' that happen which require the implementation of the plan.
2. Response plan: outlines what will be done in response to the trigger.
3. Stakeholder engagement: sharing the risk occurrence and the implementation of the plan with key or primary stakeholders.
4. Timeframes: consideration of how soon after the trigger or the risk a response action will be taken.
5. Likelihood: how likely it is it that the risk will occur.
6. Consequence: the level of consequence or effect of the risk occurring.

A primary tool that can be used to develop a contingency plan is the reserve or contingency budget and schedule analysis. This tool assists the project manager and team to determine how much contingency is required for both budget and schedule, based on the risk register. The contingency or reserve is used to respond to risks as they occur. The project manager and team need to ensure that the remaining contingency (both budget and schedule) are sufficient throughout the project life cycle. Where there is less contingency left compared to the number of risks, the project risk manager may need to seek additional funding and/or resources or complete a mitigation plan.

Implementing a contingency plan requires effective project management to ensure that all the strategies, risks and deliverables are managed appropriately. This includes the role of the project team members, who need to be aware of the risks within the register. They need to be entrusted to respond when needed and be empowered to implement strategies. In addition, the project team needs to be comfortable with

the overarching risk management process, ensuring that they are comfortable developing risk mitigation and implementing contingency plans when identified risks occur. The project manager also needs to hold project team meetings frequently and encourage the project team members to be involved.

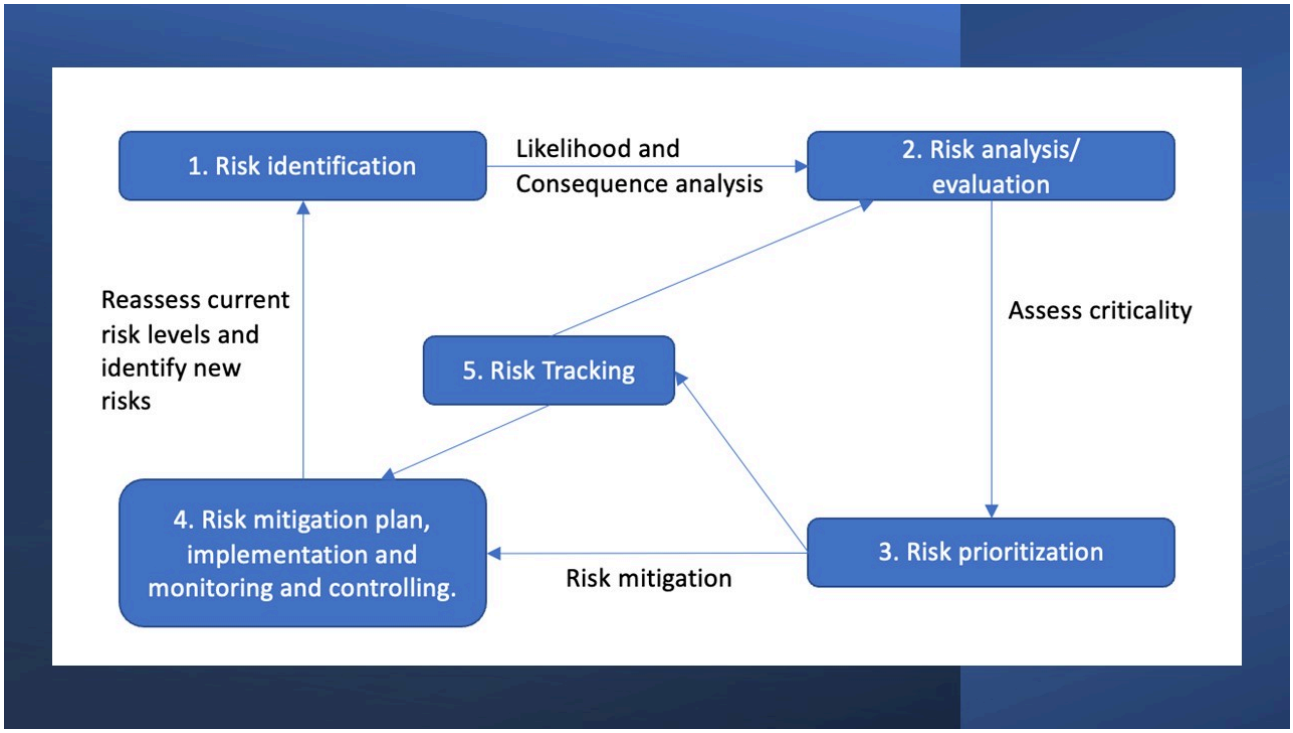
There are 4 common challenges that project managers and project teams face when trying to use contingency planning for risks:

- low priority given to risk contingency planning
- project team and stakeholders may be more confident in their original plan
- there are no clear organisational strategies in place for enterprise risk management
- not enough investment in risk identification.

Risk mitigation plans

The risk mitigation plan outlines actions to be taken in advance of a risk occurring or pre-emptively in response to a risk trigger occurring (Becker 2004). The process for creating the risk mitigation plan includes identifying, analysing, planning, implementing, and monitoring and controlling, as outlined in Figure 5. A primary component of the mitigation process is an iterative risk management process.

Figure 5. Risk mitigation plan process, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



1. **Risk identification:** potential risks are identified and their relationships are defined.
2. **Risk analysis and evaluation:** the likelihoods and consequences of risks are assessed. Consequences

can include budget, schedule, technical, performance impacts and functionality.

3. **Risk prioritisation:** all identified risks are prioritised and ranked by the most critical to the least.
4. **Risk mitigation planning, implementation, and monitoring and controlling:** risks that have been analysed and ranked as high or medium criticality have mitigation planning conducted.
5. **Risk tracking:** throughout the project, the risks are identified and added to the register.

As outlined in the previous chapter, there are many options for responding to the specific risks within the mitigation process, including accepting, avoiding, controlling, transferring, monitoring and watching risks.

Mitigation plan content should include:

- **Roles and responsibilities:** this includes documenting who is responsible for identifying and implementing risks.
- **High-level mitigation strategies:** the aim of creating and developing strategies is to reduce consequence and likelihood.
- **Actions and next steps:** these need to be identified, based on these primary questions:
  - What are the necessary actions?
  - What timeframes need to be followed (e.g., when must actions be finalised or implemented)?
  - Who is responsible for taking actions?
  - What are the necessary resources?
  - How will the actions decrease the levels of likelihood and consequence for the potential risks if they were to occur?

The actions required should be completed through one of the processes below:

- **Backward planning:** this is the process of evaluating the impact of the risk and outlining a schedule for successful intervention (Becker 2004).
- **Forward planning:** this is the process of determining the schedule breakdown required to implement each step within the action plan, including the expected completion date (Becker 2004).

These processes will help to evaluate the primary decision points to determine when the project risk process needs to move from the mitigation plan to the contingency plan.

Similarities and differences: mitigation versus contingency plans

It is recommended to have both risk contingency and mitigation response plans in place for managing risk management processes within a project and organisation. There are numerous differences which are outlined in Table 15.

Table 15. Risk mitigation versus risk contingency plans

Risk Mitigation Plan	Risk Contingency Plan
Actions identified to respond to a potential risk occurring, a risk trigger occurring and/or regardless of risk occurrence.	Actions are planned and conditions are monitored for those that could trigger a risk. Actions are taken when warning signs are identified.
Time and money are spent in advance for a specific risk condition.	Time and money are not spent in advance, but money is set aside to use when or as needed.
Risk mitigation occurs outside risk thresholds. Applying a mitigation plan can reduce the risk likelihood and consequence.	Contingency plan does not change the likelihood or consequence of risk – the aim is to control the consequence for a risk event that could occur.
Used as the initial level of defence for high exposure risks.	Used as a fallback plan for high exposure risks.
In specific situations a proactive action plan is required to reduce the likelihood and consequence of risks. The plan is about supporting the contingency plan.	The contingency reserve is documented in the project management plan to support the budget and/or schedule risk.

There are numerous factors which need to be considered as part of risk mitigation and contingency plans (Becker 2004), including:

- **Understanding clients and stakeholder needs:** who are the risk decision-makers and who has the authority to accept and avoid risks?
- **Liaising with subject matter experts:** seek input from experts inside and outside of the organisation.
- **Recognising the chance of risks reoccurring:** identify and maintain risk awareness, to ensure that all stakeholders understand that there is always a level of risk present.
- **Encouraging risk-taking:** there are consequences to not taking risks – some may be negative, others may be positive. There is a need to take some risks to identify and respond to opportunities.
- **Recognising opportunities:** there are opportunities that can arise from taking risks. Identify whether there is an advantage to taking risks (e.g., performance, capability, flexibility, efficiency).
- **Encouraging deliberate consideration for mitigation or treatment options:** there needs to be careful analysis of the options to mitigate risks and discussion with project teams, stakeholders and subject matter experts on the value of specific options.
- **Not all risks require mitigation:** low ranked risks do not require considerable mitigation planning; however, they need to be tracked, monitored and controlled in case of changes.

The post-project review should include the risk management process, including learnings from the project, an analysis of how the project went, an evaluation of what occurred during the project, whether there needs to be improvements, and what went well.

Monitoring and controlling process

Developing the risk response plans (including contingency and mitigation plans), requires developing and implementing a corresponding monitoring and controlling process. In risk management, a monitoring and controlling process is ongoing throughout the project life cycle. This involves developing processes which document information, which in turn assists with making informed decisions, either before, during or after a risk occurrence. These processes include:

- evaluating the risk response plans implemented
- assessing effectiveness of the actions taken
- ongoing environmental monitoring for potential risk triggers
- reassessing identified risks to examine if there are any changes in their exposure levels
- once a risk has been triggered and a response action taken, determining the residual risks
- creating assurance processes to ensure that policies and procedures associated with risk plans are used
- determining the validity of the contingency plans implemented or not used
- accounting for project scope, schedule, budget and quality changes that may have been approved throughout the project life cycle
- ongoing assessment of whether the project assumptions, constraints, and risks are valid.

There are 2 primary elements within the process for controlling risks within a project:

- **Regular risk reviews.** At least once a week, the project manager and team should allocate time to review the identified risks, identify new risks and monitor progress of all the risks which have been triggered or up/down graded. This process should include a periodic, in-detail review of the entire process and risk register.
- **Project risk reporting.** This involves ensuring that risk exposure levels are documented, with high likelihood and consequence risks documented within ongoing status reporting. At a minimum, the top 10 risks should be outlined within the status and performance reporting. This includes any actions taken to respond to a risk arising or a trigger occurring.

The monitoring and controlling process occurs throughout the project life cycle; however, there are some primary documents which are used to support the process. These include:

- **Risk response plan:** outlines the current state of risks, the potential future impacts if the risk was to occur and the responses required.
- **Risk register:** used for tracking project risks.
- **Change requests:** a log which includes the variations, change orders and changes implemented throughout the project.
- **Project communications:** all the communications that relate to managing the project and the corresponding risks.

- **Post project review:** understanding the effectiveness of the project risk responses and overall management process within the project. This includes identifying opportunities for improvement.

Tools for project risk monitoring and controlling

There are many tools which can be used to support monitoring and controlling in the project risk management space. The tools can be either manual or automated. These tools include project risk audits, status reporting and meetings, project risk assessments, change variance, and risk trend analysis.

These processes can be run manually or streamlined to be automated, depending on the size of the project, the complexity and the industry. Regardless of how the monitoring and controlling is completed, the information needs to be collected and displayed in real-time or as close to real-time. This enables project managers, project team members and stakeholders to track risks, and allows the assessment of risk, based on up-to-date information.

Now let's review our knowledge:

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https://jcu.pressbooks.pub/pmriskquality/?p=127#h5p-8

Key Takeaways

- The monitoring and controlling process occurs throughout the project life cycle.
- Information collected and documented within the risk register is used to **develop a risk response plan.**
- The contingency response plan outlines the responses and actions to be implemented if

or when a risk occurs.

- A primary tool that can be used to support the development of contingency plans is the reserve or contingency budget and schedule analysis.

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MODULE 5. RISK AND AGILE PROJECT MANAGEMENT

In Waterfall project management, the risk management occurs throughout the project, and the project manager plans in advance to anticipate events or risks occurring. Agile project team members and managers are aware of the specifics of what user stories are underway, what the quality requirements are, and who is involved in each activity (Hillson 2009; Moran 2014; Buganova and Simickova 2019; Tarvares et al. 2019). However, there can be a disconnect between knowing the finer details required to achieve the overarching project goals and how they relate to risk.

Therefore, an integrated risk management approach in Agile methods requires understanding the team member differences, the necessary feedback loops and common decision-making processes. By understanding these components, managers are better able to identify and respond to risks and embed the behaviours within their team.

Learning Outcomes

- Infer the complexity associated with the risk management process.
- Critically review the integration of risk management in Agile methods.
- Synthesise the Agile risk management framework.

Agile project management and the corresponding risk management process focuses on what happens now or in the immediate future. Agile project management deals with the delivery of work through iterations, where the highest priority work is completed to provide value to clients. Each iteration is based on developing a usable deliverable, so that the client can inspect or improve the product, project or process progressively.

An important component to consider when completing risk management, is that it is important to understand both the unknown and known events, to best plan for uncertainty (Harris 2008) and ensure that planning and mitigation is completed at the required level.

Agile risk management:

- is an iterative risk management approach, requiring changing the manner in which risk is understood within the organisation
- follows Agile project management principles (e.g., sprints) to break up the risk management response into smaller and more manageable components, while also encouraging collaboration

across stakeholders, project team members and sponsors.

Therefore, a project manager must first consider these elements before deciding whether to use the Agile risk management method:

- Engagement: actively engaged risk managers and stakeholders can understand potential issues or risks as they arise.
- Collaboration: managing risks through team support and discussions.
- Dynamic: recognising that ongoing change needs to be considered and incorporated in risk management.
- Adaptable: rapid changes and adjustments are needed to respond to the new risks as they arise.
- Timely: all reports and documentation around risks need to contain the most up to date information.
- Future focus: focusing on what could occur in the future (e.g., triggers and risks) can help to identify emerging conditions early on.
- On the lookout for manners of working: introducing new ways of managing and responding to risks.

Agile risk management framework

The Agile project management approach helps integrate changes into a project that is underway. Project risks are the highest at the start of a project because of the overall uncertainty about the aims, objectives and deliverables for the project (Harris 2008). However, the risk level declines as more information is gathered or as development is carried out throughout the project planning process.

Agile risk management documentation requires developing 2 forms of risk registers: complex and simple. The complex risk register contains all of the relevant information and considers all of the data that can identify or respond to risk management plans. The simple risk register outlines only the pertinent information. It is easy to read and focuses attention on the key risks (e.g., high or medium exposure risks).

Agile risk management focuses on 3 areas:

- **Strategic.** These are risks which relate directly to organisational plans. This is where the majority of risks will occur.
- **Operational.** These are risks which can occur across specific business units (e.g., accounting).
- **Project and organisational objectives.** These are risks around the organisation, which can be impacted by environmental (or external) influences.

The Agile project management method can help minimise risks, as the risk management approach is built into the iterative process. As part of each sprint or iteration, the risk management processes are conducted

to ensure that risk is given enough attention. Although the risk management plan is created at the start of the project, through each iteration the process is continually reviewed and updated as the project progresses.

Therefore, the Agile approach to risk management requires the iterative delivery of outcomes, incorporating changing requirements, stakeholder engagement and measuring performance of outcomes. An important component for Agile risk management is needing to complete outcomes on a frequent basis; where the project fails to achieve these outcomes (especially based on risks arising), the project may be cancelled early, to decrease the overarching cost of failure.

Agile project risk integration

The Agile project management approach supports the delivery of initiatives and products; however, this still requires the appropriate use of risk management to enable successful outcomes (Moran 2014; Tarvares et al. 2019). This includes using control functions to support alignment between organisational and project risk management, along with consideration of the environment, strategic objectives and stakeholder requirements. These are some of the key activities which need to occur throughout the Agile project life cycle:

- **Challenges affecting objectives and goals:** these include the functions of risk and compliance which can support risk management in setting standards across the organisation.
- **Risk integration:** being aware of risk across the organisation, along with understanding how to identify and respond to risks. Risk and compliance help with monitoring and reporting in real time.
- **Continuous improvement requirements:** using a change control framework for risk oversight. The framework help develop and implement business and technology changes

Risks are often complex and subtle, which makes them difficult to identify, respond to and manage. Some of the primary issues associated with Agile project and risk management require considering the following:

- How are threats and opportunities identified within the project?
- What is the risk appetite of the organisation and what is the level of risk tolerance within the project?
- What is the prioritisation process?
- How are risk mitigation or contingency plans created?
- Who is the owner of the risk and who takes action?
- Who reviews the risk management process?

Risk management within Agile projects needs to be outlined within all governance documents, through whichever form is being used for the project. Through the Agile process, risk visibility is promoted, along with collective ownership and risk response accountability. This process encourages informed and collaborative decision-making.

Agile risk identification and assessment

There are complexities around understanding and identifying risks. Within Agile projects the most common approach is the 'what–why' approach. This requires brainstorming with the project team members, key stakeholders and subject matter experts (Hillson 2009; Moran 2014; Buganova and Simickova 2019; Tarvares et al. 2019) about what may occur at different stages of the project, how it relates to the specific deliverables and why the event may occur.

Following the Waterfall project method, the Agile risk management approach uses a risk register. There is a similar need for the register to be visible to all key stakeholders and maintained through the life cycle of the project, and ownership must be allocated to ease identified risk. By keeping the register in a clear and visible place, the risks can be updated as new risks arise. Also, similar to the Waterfall process, the risk assessment is conducted to understand the risk exposure or ranking, based on the likelihood and consequence of a risk occurring. Depending on the risk level, they are prioritised to determine the risk response process (e.g., contingency and mitigation plans). Risk exposure scores are central to prioritisation as they indicate the urgency of actions that need to be completed. Agile risk treatment

The risk assessment process provides the inputs required to understand and respond to the risks (e.g., the appropriate level of treatment). Within the treatment process, specific activities or actions need to be undertaken to respond to risks (Hillson 2009; Moran 2014; Buganova and Simickova 2019; Tarvares et al. 2019). How risks are addressed should be in line with the Agile approach – as new requirements arise, risks change. Project teams are encouraged to understand the impacts of changes to user stories and the requirements of risk management, whereby the team identifies all activities and tasks which can trigger a risk.

Utilising a Kanban board to support the project management application can also support risk identification and documentation. This is referred to as a risk-modified Kanban board (as outlined in Table 16). It uses colour coding to identify specific components within the project. This approach helps us to visualise the specific risks, requirements, contingency and opportunities.

Table 16. Modified risk Kanban board

Story	Tasks	In Progress	Review	Completed
Story 1	Task 1C, 1D, 1E	Task 1B	Task 1A	
Story 2	Task 2A, 2C, 2D		Task 2B	
Story 3	Task 3C, 3D, 3E	Task 3C	Task 3B	Task 3A
Requirement	Task/activity	Opportunity	Risk	Contingency

In addition to using the modified Kanban board, other Agile documentation processes can be employed. For example, Agile story mapping is a process of documenting relationships between the epics and the user stories. An epic is defined as the body of work within an Agile project. The body of work can be broken into specific tasks (also referred to as user stories), based on needs or requirements stipulated by stakeholders, clients or end users (Buganova and Simickova 2019; Tarvares et al. 2019). An example of Agile story mapping is provided in Table 17. This process provides a visualisation of the different risks, opportunities and contingencies which are active within an Agile project.

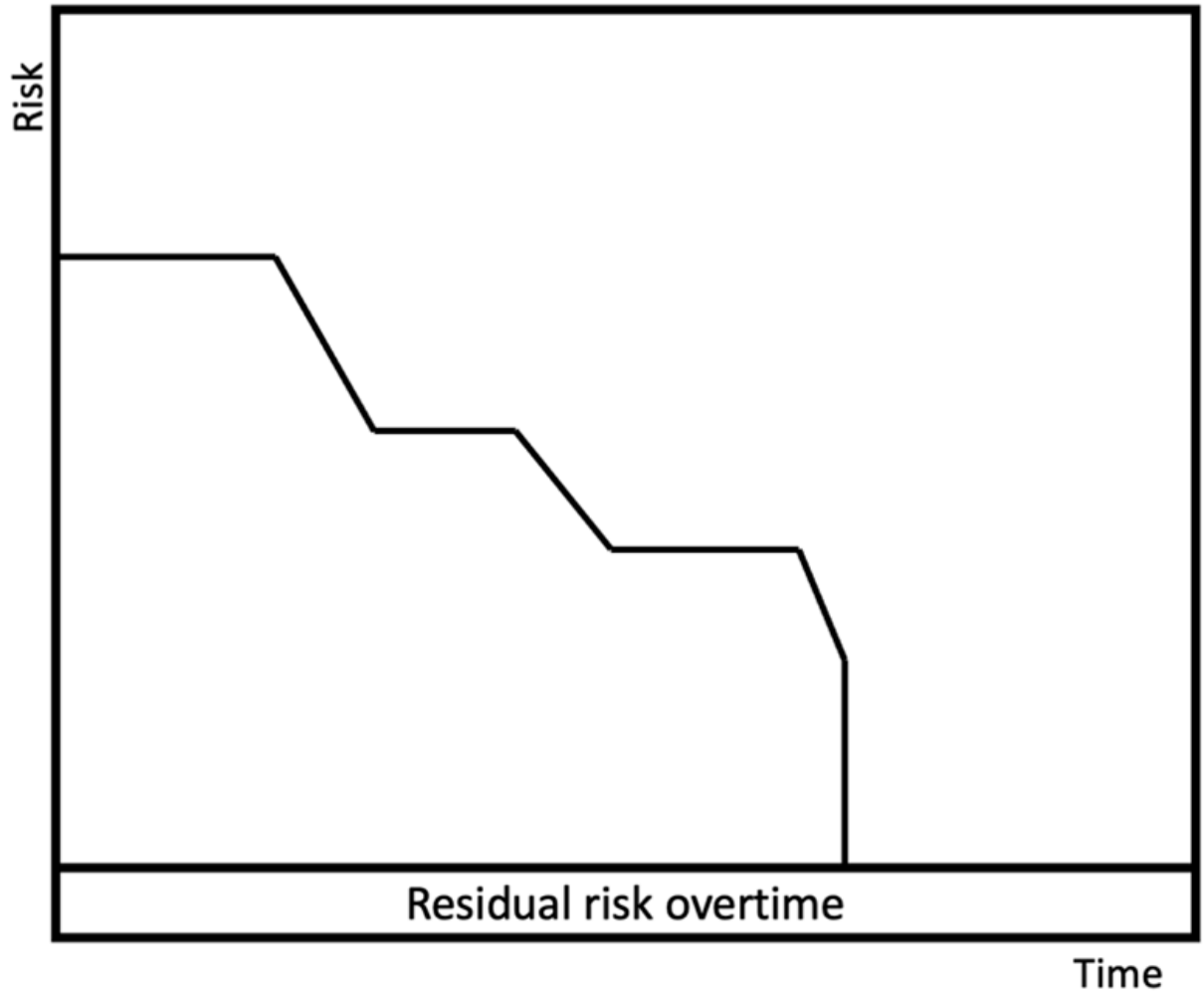
Table 17. Modified risk Agile story mapping

The treatment process involves identifying mitigation and treatment opportunities for risks that could occur throughout the life cycle. The risk treatment process is similar to that of traditional project risk management, which was outlined in earlier modules.

Agile risk monitoring

In Agile projects, risk assessments are conducted and the risk scores are assigned to measure the level of risk. This involves using a risk burndown chart; this is used to track the overall risk management efforts (Hillson 2009; Moran 2014). An example of a burndown chart is provided in Figure 6. The purpose of a burndown chart is to show the project team that there are still residual risks that occur over time. It shows the cumulative level of residual risk for each of the remaining user stories and corresponding risks associated with the remainder of the project.

Figure 6. Risk burndown chart example, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



The risk burndown chart shows the complexities of risk management that highlights secondary or future risks. This is also referred to as 'risk walling' which is used to co-locate the burndown of risks in comparison to other risk-related artefacts (which include the risk register, risk-modified Kanban or user story maps). These can be used to improve overall risk transparency and encourage collaboration across the project team in response to risks.

Common risks in Agile projects

There are many common risks which can occur in Agile projects, including:

- using Agile project management where not appropriate
- not following Agile principles
- reduced level of recommended governance and oversight

- insufficient communication and engagement throughout the project
- ignoring change management processes
- lack of forecasting or considering the future risks.

The following case study showcases the importance of Enterprise Risk management.

Case study

Enterprise risk management and its impact on project management

By Levi Mitchell

Overview

Enterprise Risk Management (ERM) is a tool to improve decision-making. Often it is poorly understood or poorly executed, resulting in the perception that risk management blocks business opportunities or impedes the business from progressing. In reality, effective risk management is a powerful tool.

Risk is commonly represented as the negative consequences of an event but more accurately should be described as the effect of unexpected deviations (good or bad) from objectives. The International Organisation for Standardisation (ISO) define risk as, 'the effect of uncertainty on objectives' (AS/NZS ISO 3100 Risk management). These objectives can have different aspects, including legal, reputational, workplace health and safety, financial, or environmental, and can apply at different levels, such as operational, strategic, project, product and process. Therefore, risk management is a critical area of responsibility for any board.

This case study provides a practical insight into the implementation of risk management from a board/non-executive director, risk oversight perspective. This is a key point of difference, as the board have an oversight responsibility with respect to risk management and alignment with purpose and strategy.

Director's duties and risk management implementation

In Australia, there are 3 sources of law which outline directors' duties:

1. Corporations Act 2001 (Cth) – the primary governing legislation for companies which includes setting out the obligations of companies, boards, executives and members.
2. Fiduciary duties – these work alongside the Act and are developed over time, resulting from case law.
3. Statutory duties – these legislative instruments impose additional duties and liabilities on directors and include laws such as workplace health and safety, consumer and competition, anti-bribery and corruption, and taxation.

The principle duties for directors are:

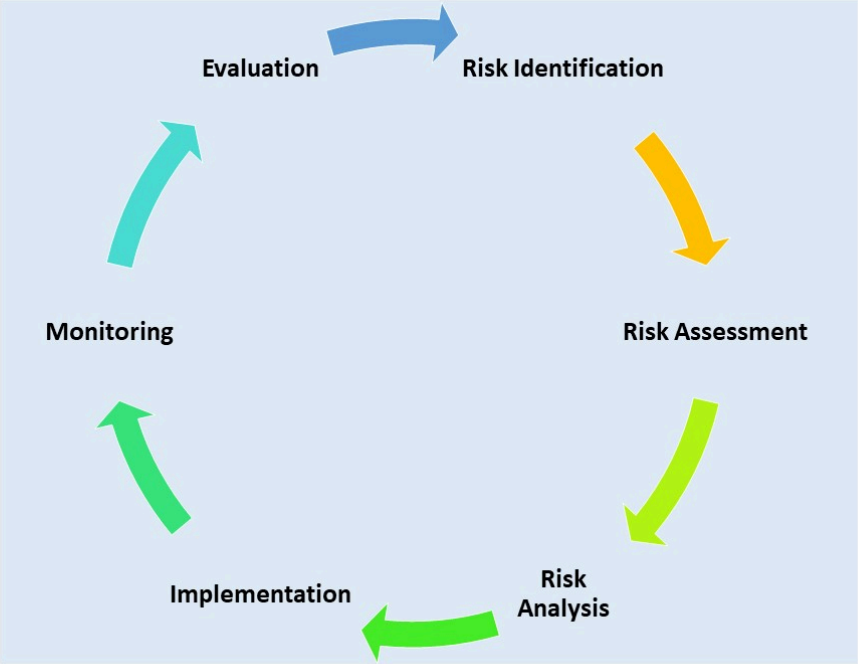
- duty of care, skill and diligence
- duty to act in good faith and in the best interests of the company
- duty to exercise powers and use information for a proper purpose
- duty to prevent insolvent trading
- duty to avoid conflicts of interest
- duties related to company records.

Each of these duties come with inherent risk and it is imperative that any business maintains comprehensive monitoring and effective control over material risks. How the monitoring and control takes place is separated clearly between the board and management. The board have a risk oversight responsibility – they set the risk appetite for the business and oversee and ensure the appropriateness of the business risk management framework. This means that the board ultimately is responsible for deciding the nature and extent of risk it is prepared to take to meet the business' objectives. It is critical that the business' risk appetite is aligned with the business purpose – if a business is not prepared to accept any risks it may become defective in pursuing its purpose, and conversely if the business accepts too much risk it may be exposed to negative consequences.

In contrast to the board, management have a responsibility to design and implement a risk management framework that is consistent with the board's risk appetite. It is important to note that risk management is not a separate activity of the board – it is an integrated activity.

So, with that in mind – what is risk management? Risk management is the way in which the business considers uncertainty when making decisions and includes a series of coordinated activities to manage risk. ERM provides a framework for risk management which is perpetual and management-led (see Figure 7).

Figure 7. Enterprise risk management, by Levi Mitchell under CC BY (Attribution) 4.0



A common mistake is that risk must be eliminated through compliance. Risk management should be embedded into practices, processes and policies. If a business has properly defined their risk appetite and risk tolerance levels in conjunction with proper controls, then the business is able to take risks and capitalise on opportunities by making informed decisions in the pursuit of objectives. Where a business has built maturity around the management of risk, the business has a 'risk-aware' culture.

ERM is a tool for 'risk optimisation'. It is a structured way to consider both the upside and downside of risk-taking activities to improve decision-making and meet existing and emerging challenges. Building a risk-aware culture is not an easy task – it takes a significant investment in time and resources for both the board and management and it starts with the board (Tone from the Top!). The board and relevant board sub-committees need to work with the management team to actively promote and grow a culture and environment that understands, implements and uses ERM to measure and reward success, rather than view it as a specialised corporate function.

In recent times, company shareholders/members have pushed for meaningful transparency and disclosures on boards, in particular with respect to risk oversight, which is one of the top governance priorities for shareholders/members. One of the ways in which management may look to build ERM into the business decision-making is through a risk management strategy that considers:

- the outcomes the business wants to achieve when it comes to management risk (e.g., legal/

compliance programs and special consideration risks such as workplace health and safety, cybersecurity, and environmental/social/governance)
- the frameworks and processes the business will put in place to achieve those outcomes
- the culture the business wants to create
- resources allocated to the work of change
- how the business will monitor the progress of the strategy
- how the business will measure success.

These considerations (as examples) start to build risk management into how the business operates and how it measures success – be that in its day-to-day operations, projects, or strategy development. ERM is a constant and by ensuring a risk-aware culture the business will be able to appropriately identify risk and build contingencies/mitigation to manage and minimise risk and maximise the opportunity for success.

This case study provides a useful overview of the importance of ERM through the lens of a non-executive director by highlighting the focus of the board on risk oversight and the intersectional pieces between the board and management.

ERM has a significant impact on project managers, project team members and stakeholders within a project; therefore, it is vital to understand the end-to-end risk process within an organisation. The role of a company director or board member in the ERM process is different to that of a project manager. Project manager responsibilities are typically to execute strategic objectives; therefore, it is important to understand the board's role in relation to risk oversight. There is a need for due diligence, an understanding of the environment and clear steps for implementing any risk management plans or responses. Although the legal requirements are different for directors, project managers benefit from understanding the legal parameters, end-to-end organisational risk processes and transparency of risks as they arise.

Now let's revise our knowledge :

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https://jcu.pressbooks.pub/pmriskquality/?p=136#h5p-10

Key Takeaways

- Risk management in Agile projects occurs in cycles throughout each sprint.
- Agile projects require unique risk management and mitigation planning.
- Agile project teams take responsibility for risk management. The entire team owns the risks.
- Both active and proactive risk management need to be factored into daily activities.
- Transparency is key.

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MODULE 6. QUALITY MANAGEMENT AND IT'S KEY CONCEPTS

A brief introduction to project quality management

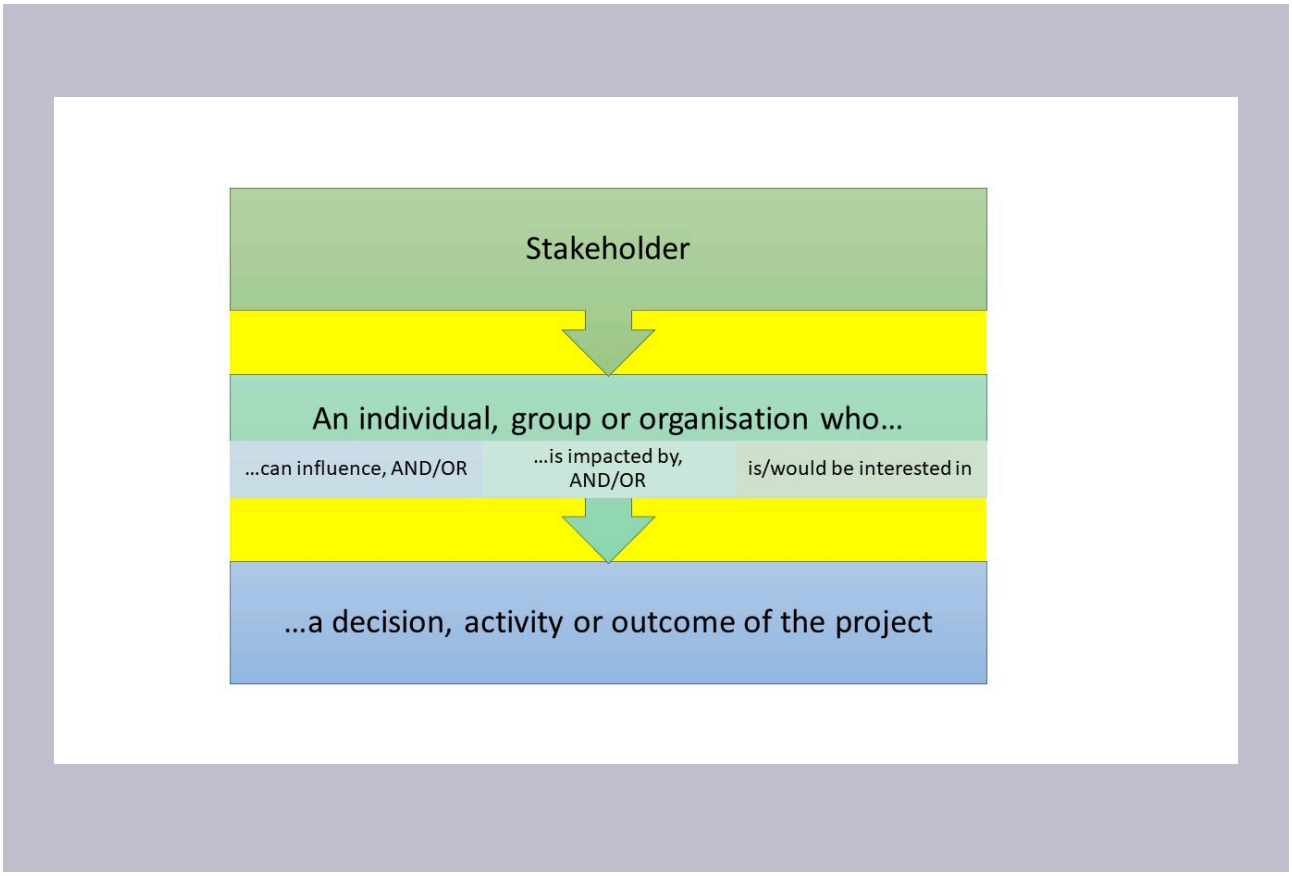
Learning Outcomes

- Assess what constitutes project quality management.
- Analyse the 3 fundamental stages of project quality management.
- Critically review key factors underlining the process of quality project management.

Delivering a project is a unique and often overwhelming experience because planning, managing, and controlling project activities in line with different stakeholders' requirements and needs is not a simple task.

Quality is vital in managing projects and becomes more complex as the project complexity increases. Managing quality in a volatile environment due to political changes that affect national and organisational policies and standards in different industry sectors (i.e., marine, civil, aerospace, manufacturing, etc.) is much more difficult than in a steady environment. Complexity may arise with the presence of a diverse audience of direct and indirect stakeholders that are different in culture, background, religion, and language, and often geographically dispersed (i.e., international projects). These elements can influence or impact project activities and outcomes in different and often opposing ways.

Tips: Stakeholder definition



Project quality management is not a separate, independent procedure that occurs at the conclusion of an activity to evaluate the output quality. It also does not include acquiring costly customised systems or services that are available on the market. The quality management process begins and concludes with the project. Consequently, it is an integral aspect of all project management processes, from the moment a task is initiated in a project through to the last task or activity at the project conclusion.

Managing quality in projects means also looking at integrating organisational quality management systems (QMS), including policy and ISO standards within the 3 fundamental stages as reported below:

Quality planning – defined as the core process for developing the quality management plan which aims to identify project deliverables and documenting stakeholders' minimum requirements and standards compliance for deliverables acceptance.

Quality assurance – assesses how effective quality planning and controls are for products or service delivery, in line with quality and safety standards. This is a continuous improvement process that reviews the original quality plan baseline against the actual quality delivered for products and processes to ensure quality is implemented within a project and to control and avoid or mitigate non-conformances.

Quality control – concerns monitoring and recording the results of project products or services to understand how well stakeholders' requirements are met.

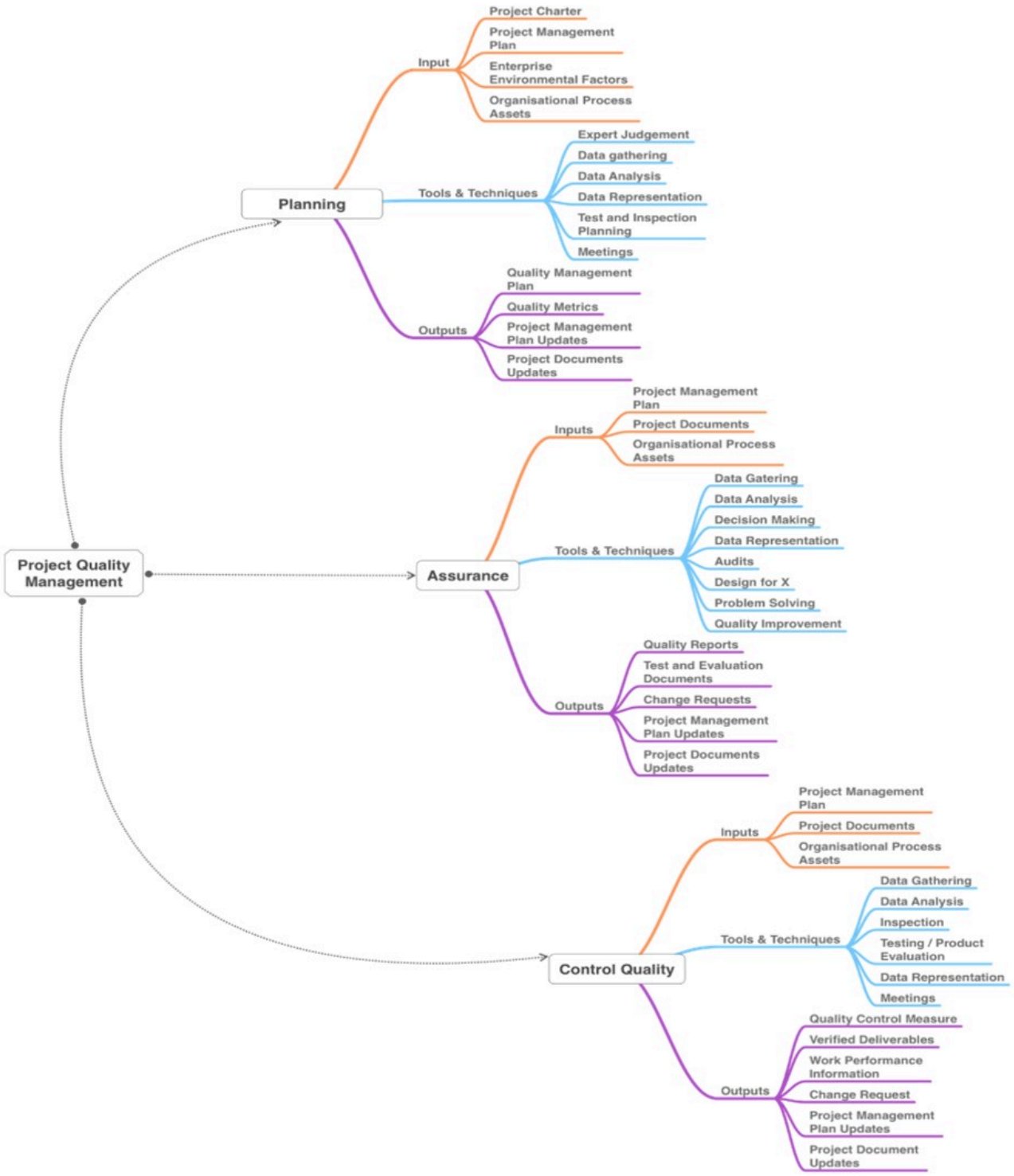
We will be expanding our discussion of these fundamental states in the following modules.

Suggested reading

If you want to learn more about the 3 quality processes at this point, take a look at the article 'Project quality management: all you need to know', by Dr Mike Clayton.

Figure 8 summarises the project management quality overview, with a focus on inputs, tools and techniques, and outputs for each stage of the quality plan.

Figure 8. Project quality overview map, adapted from *PMBOK Guide*, 7th edition, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Organisations can use ISO 9001 (2016) to design their own systems and/or processes based on the QMS specified in this standard. However, the 3 fundamental stages of project quality planning, assurance and

control described above must be met. Underlying these 3 stages, there are 7 ISO 9001 quality management principles (QMP):

QMP 1 Customer focus. A business achieves sustained success when it gains and maintains the confidence of its customers.

QMP 2 Leadership. An organisation's strategies, policies, procedures, and resources will align to meet its objectives if its purpose and direction are unified, and its employees are engaged.

QMP 3 Engagement of people. To strengthen an organisation's capabilities to generate and deliver value, it is necessary to have competent, empowered, and engaged employees at all levels.

QMP 4 Process approach. The QMS must include procedures that are interdependent. Understanding how this system integrates, interrelates and generates value allows an organisation real optimisation of the system's operation and performance.

QMP 5 Improvement. To sustain existing levels of performance, adapt to ongoing internal and external changes, and generate new opportunities, an organisation must continuously improve.

QMP 6 Evidence-based decision-making. It is more likely that decisions based on the study and assessment of facts and information will generate accurate quality-based outcomes.

QMP 7 Relationship management. An organisation must maintain its connections with interested parties, such as suppliers, for long-term success, particularly in the complex and disruptive environments we are exposed to today.

The purpose of quality management

The fundamental idea of project quality management is therefore to exert the above 7 QMPs to guarantee that the project meets and exceeds the expectations of all key stakeholders. To comprehend what quality means to key stakeholders, particularly the project's customers and direct clients, the project manager and the project team must cultivate positive relationships. One of the reasons for bad project evaluations is when the project concentrates solely on satisfying an overall specified criteria for the outputs and disregards the needs and expectations of other stakeholders.

Quality must be considered on par with the project's scope, timeline, and money. If a project client is dissatisfied with the quality of the project's outputs, the project team will need to change or adjust the project's scope, timeline, and budget to meet their requirements and expectations. To achieve this level of stakeholder satisfaction, it is not sufficient to fulfill the project's scope on time and under budget; rather, the project manager must create positive working relationships, transparent communication and a line of trust with all stakeholders, and comprehend their tangible and intangible demands.

There are several advantages to reaching an outstanding project execution. To start with, client satisfaction

and loyalty is commonly the result of achieving a high-quality project outcome. Customers will not only accept the project outcome without question or challenge because the high-quality project outcome is likely to surpass their requirements and expectations, but they may also return if the need arises. A delighted consumer is one who perceives higher value than initially anticipated.

Cost savings are an additional advantage. Quality practices may minimise waste, increase efficiency, and enhance suppliers, all of which contribute to the possibility that the project will cost less than anticipated. As expenses decrease, profits may increase (depending on the price arrangement in the contract upon which the project is based).

Overall, quality planning is a process that ensures all project-related activities are efficient and effective in relation to the project's objectives and performance. Quality management in project management is establishing and adhering to rules and processes to guarantee that a project achieves the customer-defined needs it was designed to meet. As discussed in our first module, and displayed in Figure 9, quality project management must adhere to the following pillars.

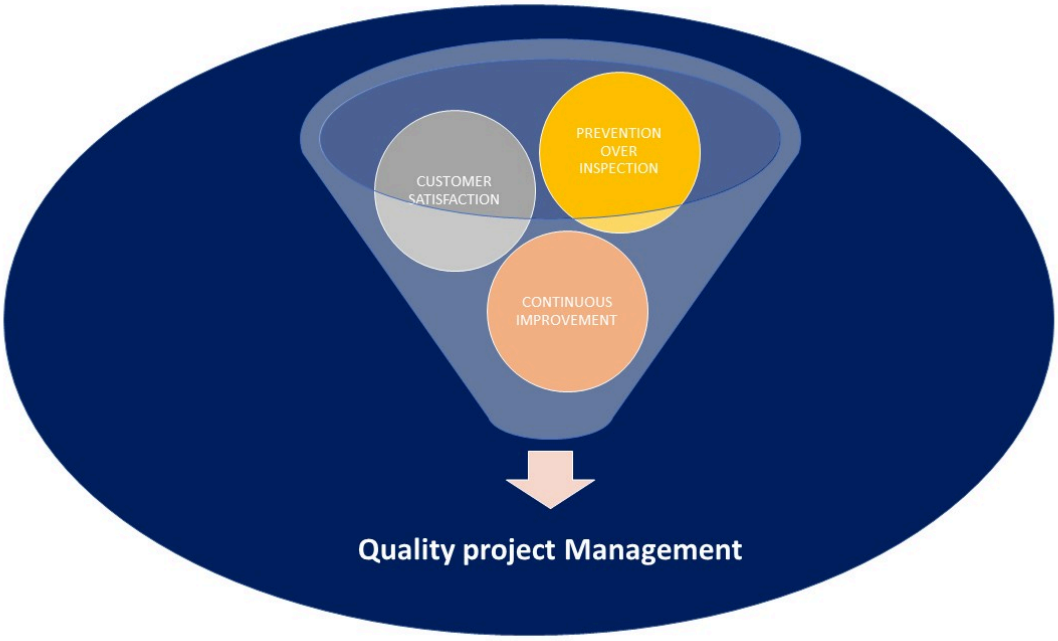
Customer satisfaction. Quality is all about meeting the expectations and requirements of the customer and stakeholders and developing a product that satisfies and is suitable to their needs.

Prevention over inspection. Quality is built via planning, not inspection. Therefore, quality is attained by planning, designing, and incorporating it into a product or process prior to being inspected.

Continuous improvement. The continuous plan-do-check-act cycle is essential for quality management and process improvement. This may be accomplished through quality management improvement of systems (internal and/or external).

These pillars can also be seen to represent a cluster of all 7 QMPs.

Figure 9. Quality project management, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



The following case study showcases the importance of quality management.

Case study

Software quality management for small IT companies that revolves around reliability, performance, security, and maintainability

By Dr Saad Butt

The progress that has been made in information technology has led to the widespread availability of software that is designed to aid in the management of operations and the streamlining of labour. This has been one of the results of the developments that have been achieved. As the pace of adoption quickens,

there is a growing demand for high-quality software that is trustworthy, performance-secure, and easy to administrate. This is done to prevent sensitive data and information, as well as financial resources, from falling into the hands of those who are not authorised to access them. When the systems are upgraded, they perform more effectively, which reduces the likelihood that they will be compromised by hackers or subjected to other kinds of dangers. In order to steal or manipulate data, or tamper with account balances, hackers can attempt to obtain unauthorised access to the system. When the systems are upgraded, their functionality is increased, and as a result, the danger of attacks and threats is decreased. In addition to this, it lessens the dangers that are posed by harmful software and viruses that are found on computers.

The first thing a small business must do is hire staff members that have a high level of both talent and experience, in addition to being conversant with the fluid nature of software. Experienced experts are knowledgeable of the process of software development, aware of the suitable suppliers that provide quality and genuine software and, as a result of their expertise, able to assist the company in meeting its software requirements and demands. When developing high-quality software, it is absolutely necessary to keep the following design principles in mind at all times: eliminate waste, develop first-rate software, encourage the expansion of one's knowledge base, ensure prompt delivery, demonstrate respect for others, put off making a promise, and optimise. It is the duty of the business to guarantee that it has established a software culture in its operation. The business is also obliged to provide its employees with training to assist them in gaining the necessary skills. It is vital to do routine checks on the software development process to prevent the incidence of defects that take place in clusters.

Second, automated regression testing must be performed throughout the whole of the product development process to guarantee that the end result is user-friendly, cost-effective, and efficient for each and every customer. Testing will assist with removing all of the impediments and related problems and will ensure that everything works well (Sahu and Srivastava 2019). The fact that each employee in the organisation works off of their own personal documentation is the major factor that has led to the occurrence of faults. Badly written code is a secondary cause. During the process of developing the organisation's software, during which data is being gathered, difficult solutions, as opposed to simple ones, will need to be employed. It is necessary for the architectural framework to have as much resilience as is humanly feasible for it to be able to contribute to supporting future changes and variations, in addition to other types of software dynamics. Testing must be carried out on a consistent basis, and there needs to be a degree of variety in the approaches that are applied throughout testing. According to the pesticide paradox, using a single testing technique is inefficient since there is a larger potential of missing crucial and relevant parts of the environment in which the topic of the test is being evaluated.

In conclusion, in order to generate high-quality software, the attention must be focused on the requirements that must be met by the end users, and an explanation of the activities that must be carried out must be supplied in order to simplify the process of programming and coding. It is essential that there are no flaws in the user experience, and you should refrain from making any assumptions about it. It is vital to emphasise any conditions or attributes that need to be fulfilled to meet the criteria, as this will enable you to complete all of the requirements. If you do not highlight any circumstances or traits that need to be

met, you will not be able to satisfy all of the criteria. The impact that was intended to be achieved is now realised as a result of the separation of the components and the establishment of a new customised view that adjusts to the needs (Motta et al. 2018). A rise in the total throughput of the developer is associated with an increase in the likelihood of encountering issues. Avoid doing things like having undefined language features or uninitialised variables, having function-level status variables, having complex requirements with more than five sub-conditions, directly accessing hardware addresses and devices, having implicit or duplicate switch cases, and having complex logic that is difficult to understand. These are just some of the things you should try to avoid doing.

Now let's revise our knowledge:

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https://jcu.pressbooks.pub/pmriskquality/?p=151#h5p-12

Key Takeaways

- Project managers can ensure the success of a project and boost customer satisfaction by controlling quality.
- Project managers might raise productivity by having an effective quality plan.
- Quality management has 2 key objectives: ensure a high-quality final result and ensure that all processes involved in the project life cycle are executed effectively.
- Even projects that are completed under budget and on schedule are not successful if the deliverables are of low quality.
- Collectively, the 7 QMPs can form the basis for quality performance improvement and

organisational excellence.

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MODULE 7. QUALITY PLANNING: TOOLS AND TECHNIQUES

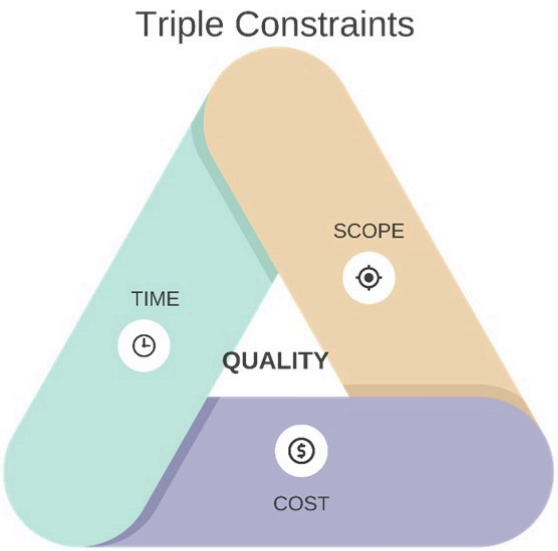
Quality planning: What is quality?

Quality represents a fundamental aspect for end users when buying and interacting with products or services because it is the foundation for branding through customer satisfaction. But quality in project management has a different meaning since it involves the delivery of project activities and outputs as effectively as possible. As a project manager, you are responsible for the overall quality of the work done by setting project quality goals, continuously auditing through project assurance (with regard to the process of checking the performance of the quality management plan) and products or services acceptance metrics through quality controls. Quality planning is fundamental for project success because quality itself is connected to the project triple constraints (time, cost, and scope) and recognise as the 4 element of the Iron Triangle as represented in Figure 10.

Learning Outcomes

- Analyse the quality planning processes, inputs, outputs, tools and techniques.
- Conceptually map the quality planning techniques.
- Assess which quality standards are relevant to the project.

Figure 10. Iron Triangle, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Quality may decrease when a project has a short window of time for output delivery or when the budget is consistently cut. Over-scoping a project with extra activities due to the stakeholder's request for additional products or services features can also compromise the project management quality plan and the project's overall success. In other words, projects cannot be considered successful if stakeholders' quality metrics are not met, even if the project activities are delivered on time and within budget. It is imperative for project managers to make sure that the final project delivery suits stakeholders' expectations so that deliverables and outcomes are beneficial for end users and the community. If you don't know what quality standards your stakeholders consider acceptable, you won't be able to ensure that your project will fulfil their expectations. That is why project managers must manage and control quality, just as they do costs, scope, and time.

Quality planning concerns gathering products or services requirements, usually collected in the initiation stage of the project life cycle (i.e., kick-off meeting or previous meetings with clients). These generally identify how project managers will assess the quality and avoid faults in the planning stage. Usually, organisations have a quality management system in place, consisting of internal policy that aligns with national and international standards (i.e., ISO 9000), that specifies how quality is assessed and measured across the organisation. Project managers must ensure through the quality planning that projects adhere to the corporate policy as well as to the territory legislation, standards, and guidelines where the service or product is made available. High quality is accomplished by preparing for issues rather than reacting to them as they arise. Requirements are established, and then methods are implemented to meet those standards and policies.

The foundation of quality planning is to set a standard for customer satisfaction through conformance

to requirements and fitness of usage. The foremost is based on quantitative inspections of how much the product or service delivered deviates from the targeted minimum quality requirements established with stakeholders (i.e., colour, geometric tolerances, number of features embedded, etc.). The latter refers to how well deliverables do what they were planned to do (practicality or comfort to consume a service or use a product influenced by the design or hardware limitations).

Quality planning using the Agile approach

Unlike in Waterfall or project-controlled environments (Prince2), when teams work with an Agile mindset, individuals and interactions take over process and tools, working software are preferred to comprehensive documentation, collaboration takes over negotiations, and responding to change over following a plan. Therefore, quality planning and control are embedded in the product backlog items, sprint backlogs and sprint reviews as an incremental quality improvement process agreed amongst the scrum team, product owner and clients.

Let's reflect now on the quality planning concepts discussed above with the following exercise.

Reflective exercise: playground renovation project

The council of Brisbane commissioned ABConstruction to undertake the renovation of two playgrounds in the Nundah and Banyo suburbs.

The project is seen as part of the northern suburbs' requalification initiative, where open space can stimulate kids' motor activities and socialisation, and where parents can enjoy moments of relaxation in a safe environment.

Due to the proximity to the local and international airports of Brisbane, Virgin and Qantas airlines have agreed to sponsor the renovation project, providing $1.2 million to requalify and commission the lots of land (2.5 ha each). In addition, they have agreed to purchase equipment, including swinging chairs, sliders, rope ladders, climbing net, and metal stairs, with shock-proof upholstering (1.5 cm) and 500 square meters rubber safety mat (3.5 cm thick) in line with both airlines' themes. The project sponsors will also consider safety features, such as a fenced area equipped with safety cameras placed at the main entrance, the middle and every corner of the playground. ABConstruction will provide guidance on

design aspects of the playground equipment in line with new and refurbished playgrounds to relevant Australian/New Zealand standards, including AS/NZ 4685 series and 4422.

Each playground must include a 500 m track equipped with kiosks and escalators with rolling bars to simulate the check-in process at the airport, where kids can race with airport trolleys.

Please consider:

What is/are the project's deliverable(s)?

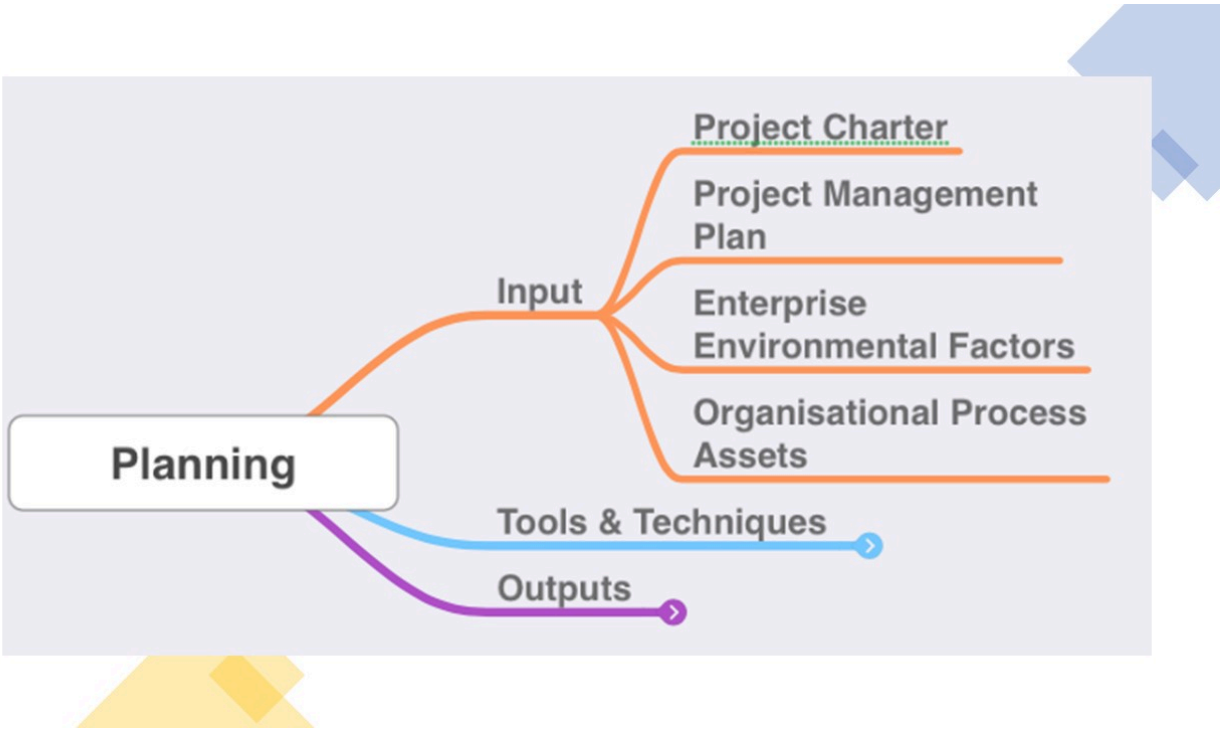
Can you identify any quality requirements?

What is/are project's outcome(s)?

Inputs

As presented in the overview map of the quality management plan, planning quality requires the following documents, as shown in Figure 11.

Figure 11. Planning, adapted from the *PMBOK Guide* (2021), by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Project charter. This is a formal document that provides authority to the project manager to apply organisational resources to the project activities. It is based on the business case, agreements, and enterprise environmental factors and consists of project definition identifying vision, scope, outputs and outcome. It also includes the project governance which identifies roles and responsibilities, and direct and indirect stakeholders. The project plan is also part of the charter and includes resources, quality and financial aspects. The plan includes the schedule of major activities and tasks with dependencies to determine the critical path. Last but not least, the project charter includes project considerations which take into account risks, issues, assumptions and constraints. The charter contains supporting documents (i.e., business case, agreements, and standards).

Project management plan. This is the comprehensive documentation that represents the baseline of a project with regards to the requirements, quality, risks, and stakeholders' management plans. It defines how project activities are performed, monitored and controlled, and closed.

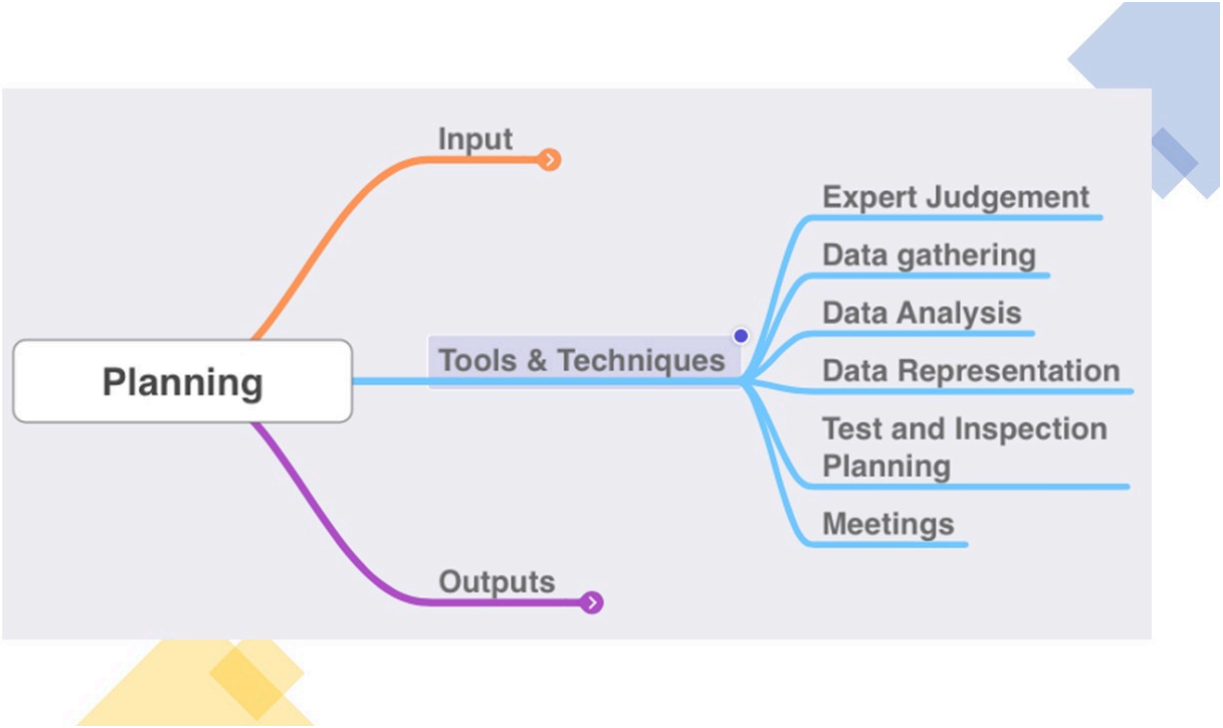
Enterprise environmental factors. These are internal or external constraints to the organisation which can impact the project team and the delivery of activities. Examples of internal factors are organisational culture, infrastructure, geographic location and distribution of facilities, resource availability and so forth. External conditions include, for example, government and industry standards, targeted marketplace conditions, legal restrictions, political or religious aspects, and exchange rates.

Organisational process assets. These consist of the organisational knowledge, practices, policies, procedures, and historical information such as lessons learned, risk data and earned valued data.

Tools and techniques

So far, we have introduced the artefacts of the project planning (inputs) which are essential to generate the main output – the so-called quality management plan. Project managers can develop a quality management plan using tools, abilities, and techniques, as summarised in Figure 12.

Figure 12. Tools and techniques for quality planning, adapted from the *PMBOK Guide* (2021), by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Expert judgement

The expert judgment is based on a project manager's expertise in a specific application, and knowledge, including quality assurance, control, measurements, improvements, and systems.

Data gathering

Data gathering is useful during quality planning. Information can be collected using the following tools.

Benchmarking: allows comparison between projects that show similarities per industry sector or

deliverables. It helps project managers to understand how the project is progressing against its baselines or other similar project baselines vicariously through lessons learned from previous projects.

Brainstorming: can be used to collect data from team members of a group or different groups who possess expertise in specific types of projects or activities.

Interviews: allows project professionals to acquire information about the stakeholders' expectations and deliverable technical requirements. Usually, such interviews are performed in a neutral environment to set the scene for trusted and confidential exchanges, where stakeholders and project participants can feel encouraged to provide an unbiased contribution.

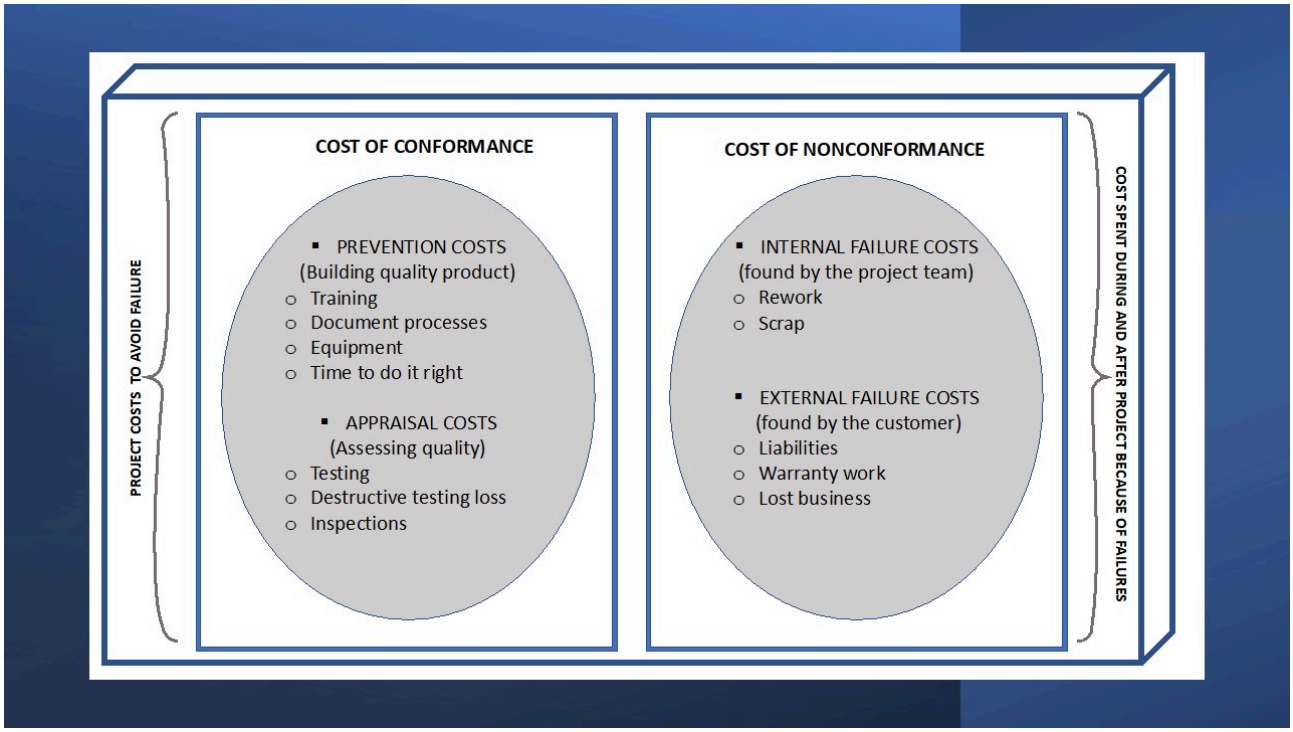
Data analysis

Once quality data are collected with one or more of the methods described above, data analysis is the next step and different techniques can be used for this purpose.

A **cost-benefit analysis** is a financial analysis tool which aims to estimate the pros and cons of alternatives, to assess which one provides more benefits. From a quality perspective, such a tool helps project managers to understand if activities are planned in a cost effective manner. Project managers in fact compare each quality activity against the cost of the quality and the expected benefit. For example, data collected during interviews in meetings or brainstorming are useful for project professionals to validate that stakeholders' quality requirements are feasible within budget and the expected timeline. Moreover, internal meetings for team members have the scope to set from the beginning higher quality standards and productivity rates with less rework to keep costs down and to increase the overall stakeholders' satisfaction.

The **cost of quality** of a project consists of the costs related to preventing poor-quality outputs (prevention costs), the cost related to measuring, auditing and testing deliverables (appraisal costs), and the cost for nonconformances (failure costs). An acceptable cost of quality is one that balances prevention and appraisal costs to avoid failures (see Figure 13).

Figure 13. Cost of Quality, adapted from the *PMBOK Guide* (2021), by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Decision-making techniques using multicriteria decision analysis tools such as the prioritisation matrix allow us to understand which activities to prioritise over others with regard to, for example, costs, quality, time, stakeholder importance and so forth.

Data representation

Once data is analysed, project managers can share the outputs of the analysis through different tools as follows.

Flowcharts aid the project manager to visualise and mind-map the project's processes. displaying all the parallel branching or alternatives available for a process, aiming to transform inputs into outputs. This visual tool is very helpful when controlling the quality through auditing and inspections, where team members, leaders and project managers need to go through a specific set of actions that can lead to multiple scenarios and processes that help to obtain outcomes during each step of the inspection.

The matrix diagram or chart is a tool for planning and managing projects. It helps you to look at the connections between different data points and figure out what they mean. You can use these diagrams to draw comparisons among two or more groups of items within the same group. Matrix charts help project managers to figure out how relevant information is related to each other and how strong those connections are.

A matrix contains the following type of information: data, functions, concepts, people materials, equipment and actions. The connection between items is shown by numbers or symbols within the cell where each element pair intersects.

The matrix's shape is determined by the number of elements being compared. There are 5 common matrix diagrams: L-shaped, Y-shaped, C-shaped, T-shaped, and X-shaped. Figures 14 and 15 provide representative examples of these matrixes.

Figure 14. Y-shaped matrix developed using Lucidchart.com, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0

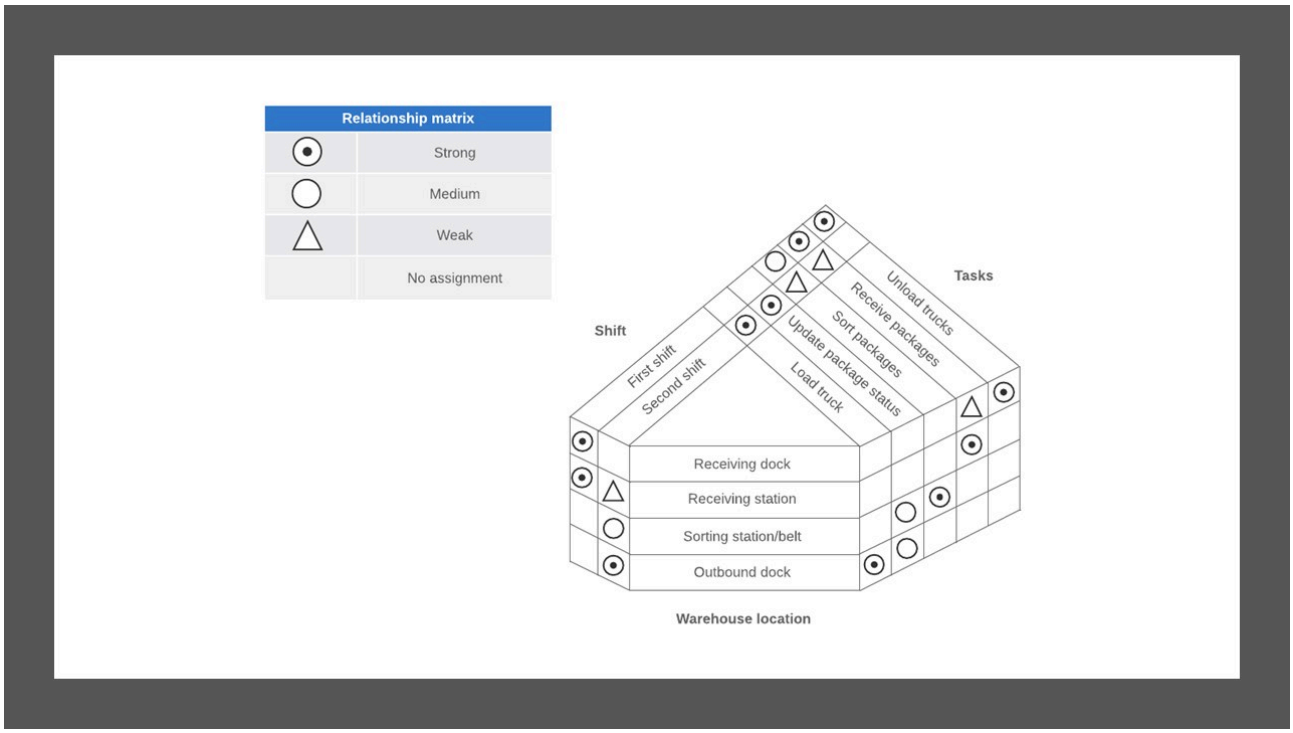
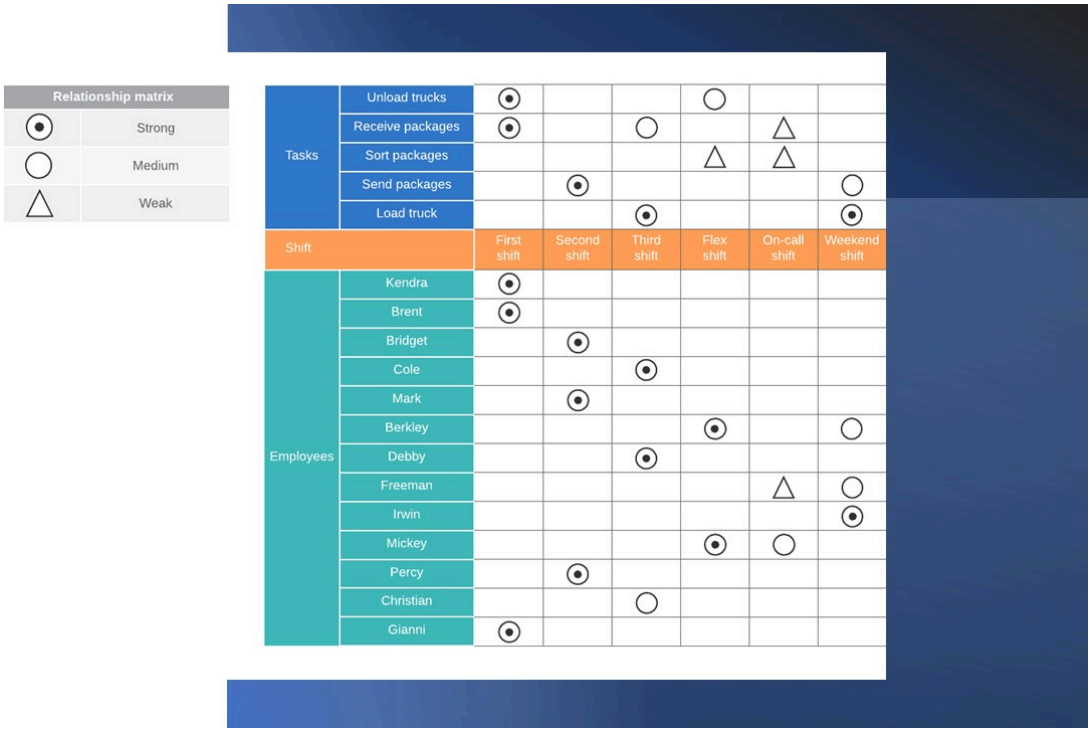


Figure 15. T-shaped matrix developed using Lucidchart.com, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Mind mapping is a visual method which helps project managers organise key concepts around a major topic. For example, quality could be the main topic of interest in quality planning, connected to several other branches which represent the quality requirements, constraints, dependencies, and relationships.

Test and inspection planning

During this stage, project managers and the rest of the team plan how to test and inspect project deliverables against stakeholders' requirements and expectations. Such tests are industry-driven and may in fact incorporate single or two-stage (alpha and beta) testing and inspections to provide robustness to the quality process and also to incorporate any incremental enhancements after consultation with clients and other stakeholders.

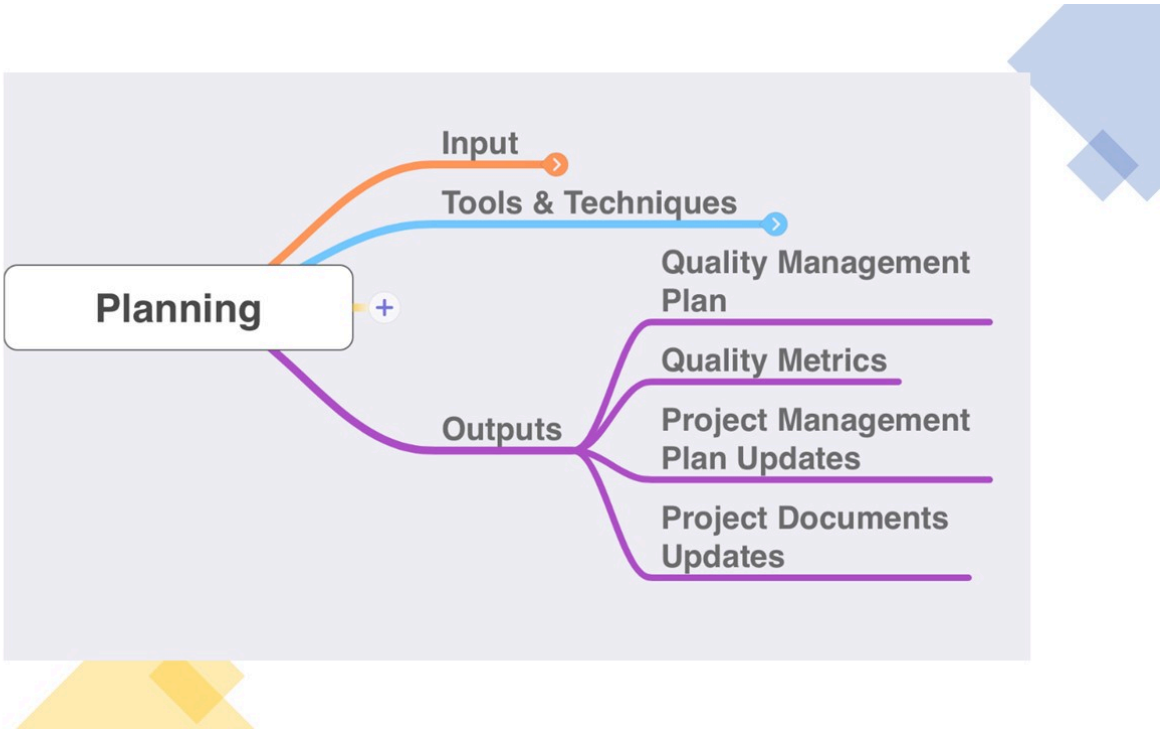
Meetings

When stakeholders meet with the project team and the project manager during official project meetings, it can serve as an effective and efficient way to have a constructive and incremental approach to quality robustness, where quality metrics are discussed and evaluated per activity, product or service that must be delivered.

Outputs

The objectives of the quality planning stage are reported in Figure 16.

Figure 16. Quality planning outputs, adapted from the *PMBOK Guide* (2021), by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Quality management plan

As previously mentioned, the quality management plan is a key part of the project plan, as it describes how standards, guidelines, policies, and organisational procedures and systems are implemented to satisfy the project quality objectives. This plan needs to be reviewed in the planning stage to provide a solid base for project managers to rely upon during the decision-making process. The benefit of reviewing is to ensure that project managers have an up-to-date project value proposition from the beginning which can lead to a cost reduction because of less rework. The way the quality project management plan is structured depends on the type of project and its requirements, but generally it includes relevant quality standards, quality objectives, quality roles and responsibilities, quality control of activities, quality tools implemented in the project and any major procedures which are of key importance for the project to deal with non-conformances.

Quality metrics

Quality metrics are the deliverable attributes requested by clients and any other key stakeholders involved

in the project. Examples of quality metrics include defect rates, failure rates, lead time, deployment frequencies, mean time between failures, number of likes, number of visualisations and so forth.

Overall, quality planning entails establishing which quality criteria are applicable to the project and how to meet them. The project quality management plan details the information essential to properly manage project quality from planning through to delivery. It specifies the project's quality rules, methods, criteria and application areas, as well as roles, duties, and authority.

Now let's revise our knowledge:

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https://jcu.pressbooks.pub/pmriskquality/?p=159#h5p-14

Key Takeaways

- The project quality management plan is created during the planning phase of the project.
- A strong quality management plan begins with a precise explanation of the project's objectives.
- The quality management strategy should detail how the team will apply its quality policy.
- Quality may decrease when a project has a short window of time to deliver outputs or when the budget is consistently cut.

References

Project Management Institute (2021). *A guide to the project management body of knowledge (PMBOK guide)*, 7th edn, Project Management Institute.

MODULE 8. QUALITY ASSURANCE

Learning Outcomes

- Analyse the quality assurance processes, inputs, outputs, tools and techniques.
- Conceptually map the quality assurance techniques.
- Incorporate quality assurance techniques into the project life cycle.

The process of project quality assurance involves taking actions in order to certify the outcomes or objectives of the project compared to the expected or planned requirements. The overarching focus is to apply and maintain the quality standards and produce or create quality outcomes or deliverables (PMI 2021). According to the *PMBOK*, the process of quality assurance involves auditing quality requirements and results from quality control measures ensuring that appropriate quality standards and operational definitions are followed (PMI 2021). Quality assurance is the second component to be outlined within the quality management plan.

The majority of the work around quality assurance occurs in the execution phase; however, the assurance process occurs throughout. Quality assurance is about measuring the process rather than outputs.

Continuous improvement is a key component of the quality assurance process. This includes the implementation of the measurements outlined in the quality planning phase and tested as part of the quality control process. Quality assurance requires analysing the processes to understand if they are within the tolerance of the acceptable range and identifying where adjustments are necessary. Therefore, quality standards and methods are evaluated and updated as required. There are 4 primary components to good measurement systems in quality assurance (George et al. 2005):

1. **Accuracy:** data needs to reflect the true value of what is being measured.
2. **Precision:** data is measured precisely.
3. **Repeatability:** future measurement should yield the same or similar results, by the same data collector.
4. **Reproducibility:** future measurements should yield the same or similar results, by a different data collector.

It is critical that the project manager and project team allocates sufficient time and effort to ensure that the measurement system is accurate and credible. This impacts the credibility of decisions in the future. There are many tools and techniques which can be utilised as part of the quality assurance process. These are outlined below.

Quality assurance steps

Within the quality assurance process there are 3 primary steps that need to be outlined within the project quality management plan:

1. **Plans for quality assurance.** The basic components of a quality assurance plan include:

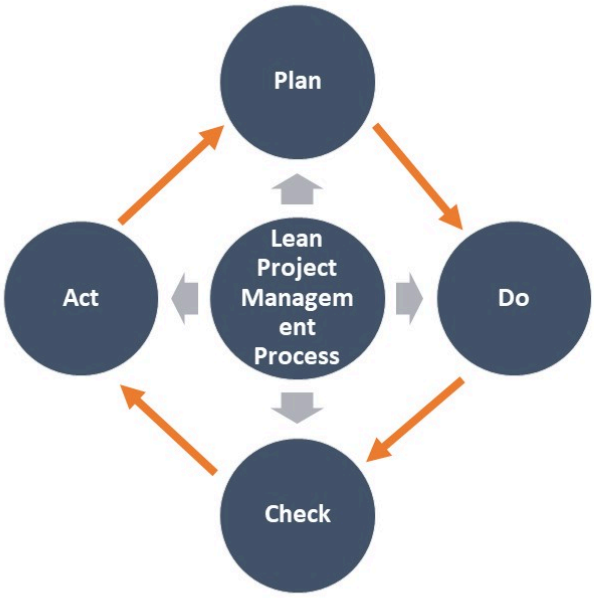
- establish project quality assurance goals
- determine roles and responsibilities within the project team and determine approval processes
- obtain relevant information on quality standards or metrics
- identify quality measurements and metrics to determine quality performance expectations.

2. **Quality assurance audits.** Audits involve systematic reviews of organisational processes and how successfully they are being integrated with the project's quality outcomes. Audits should occur regularly.
3. **Analysis of quality.** This step involves examining the project activities and understanding the value and quality requirements of each output. The purpose of quality analysis is to review quality metrics and identify improvements within the existing quality management plan.

Continuous improvement

Often, improvements are one-time reviews or occurrences through the quality audits; however, the end-to-end aim is continuous improvement. Therefore, quality assurance is about ensuring improvements are a state of mind for everyone involved in the project. This often involves applying the Lean method of project management, which outlines a process based on 4 key stages. These are outlined in Figure 17.

Figure 17. Lean project management process, adapted from Womack and Jones (1996), by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Projects and organisations should operate within a process of continuous improvement. The continuous improvement process empowers all employees, regardless of rank, to seek opportunities to improve both their business-as-usual process and innovate overall. The focus is not specifically on seeking major improvements; instead, this process considers the importance of making many minor improvements over time. The management teams are encouraged to implement changes as they go and measure the success of these changes. This becomes a cultural change in the organisation and project overall and supports quality assurance processes.

Tools and techniques

Process analysis

Process analysis is a key component of conducting quality assurance. The purpose of process analysis is to review the project quality assurance processes and obtain understanding of what is working well and what can be improved. This involves reviewing each component within the project process, including the inputs, outputs, procedures, stakeholders, controls, data, technology, deliverables and governance requirements which all work together to create outcomes.

Quality assurance audits

Quality assurance audits are used to assess consistency and ensure that processes are being used appropriately to achieve quality outcomes. Quality assurance audits often involve:

- analysing quality control data to determine if and where quality issues exist
- revising the quality standards as required
- identifying the potential process improvements which will support quality outcomes
- conducting Ishikawa diagrams and root cause analysis to document improvement opportunities
- determining actions which can be taken as proactive or preventative to support future quality outcomes.

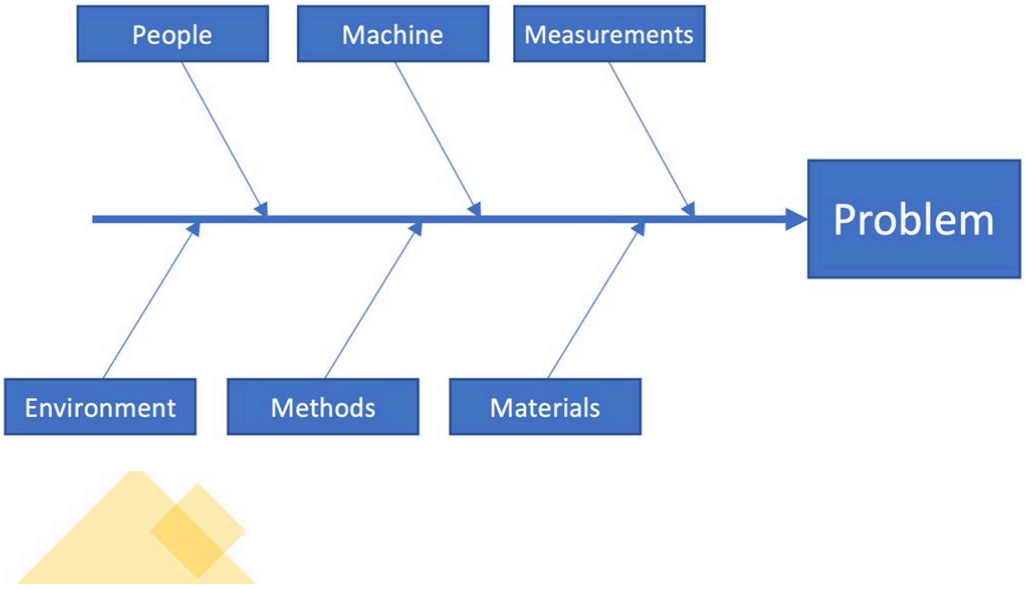
The project team members need to assess the current state and identify improvements within the quality and project processes. As root causes can be difficult to identify, a quality assurance audit will ensure that background information and research is sought.

Audit processes support the development of preventative and proactive actions. The level of confidence in the project outputs will be higher if these actions are documented, the stakeholders are engaged, and any issues are communicated early and often. The role of the quality assurance audit is to compare data from the quality control with other historical projects, or based on expected standards set by stakeholders or subject matter experts. These levels are set and shared with clients, sponsors and stakeholders.

Root-cause analysis

The root-cause analysis is also referred to as a fishbone diagram, cause and effect diagram or Ishikawa diagram. These are causal diagrams which are used to show the potential causes of a specific event or situation (Ishikawa 1968). The diagram is used to assess the potential causes for the problem or issue under review (outlined in Figure 18). The diagram is created by first outlining the major causes on the ribs from the backbone, then listing minor causes or factors below the categories, on the left-hand side of the diagram. The effect (also referred to as the problem or defect) is positioned as the fish-head, on the right-hand side of the diagram.

Figure 18. Example of the Ishikawa diagram categories, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



There are 6 common categories used within Ishikawa diagrams:

1. People: incorporates the attitudes, capabilities and skills required for the completion or execution activities.
2. Machine: problems can occur from equipment issues, failures or maintenance issues.
3. Measurement: relates to the metrics, measures, controls and the monitoring processes.
4. Materials: problem relates to materials used within the processes.
5. Methods: procedures and policies which inform the organisational processes.
6. Environment: considers the problems which relate to the internal and external environment impacting the project.

Identifying the potential causes can be simplified by using the '5 Whys' technique (Tague 2004). This requires asking, 'What are the potential causes of the problem?' and then drilling down to key causes by asking 'why' five times. The responses need to be clear and concise but with sufficient detail. These causes can be identified through brainstorming with project stakeholders, team members and sponsors, and are grouped by the above categories (the bones of the fish backbone). Structure is provided by grouping the causes into primary categories. The process focuses on where improvements or corrective actions can be taken to reduce the impact of the problem or remove it entirely.

Advantages of the Ishikawa diagram:

- easy to use
- visual brainstorming tool
- quickly identify root causes which occur across different categories
- simultaneous view of causes
- visualisation makes it easy to digest.

Disadvantages of the Ishikawa diagram:

- may be difficult to identify root causes for complex problems
- can be visually overwhelming
- interactions between causes can be difficult to identify.

Affinity diagrams

Affinity diagrams are used to organise ideas from brainstorming sessions into their natural relationships or dependencies. Brainstorming is a process that supports idea generation. Affinity diagrams can be used to organise and consolidate information that is collected as part of this process. An example of an affinity diagram is provided in Figure 19. There are 4 common steps which are followed to create an affinity diagram:

1. Brainstorming outcomes are documented onto individual sticky notes.
2. The team is responsible for arranging the ideas into categories. These categories are commonly processes, themes or pathways within the project. Often, between 2 to 6 categories are created.
3. Headings are assigned to categories.
4. All sticky notes are then reviewed and double-ups are removed.

Figure 19. Affinity diagram components example, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0

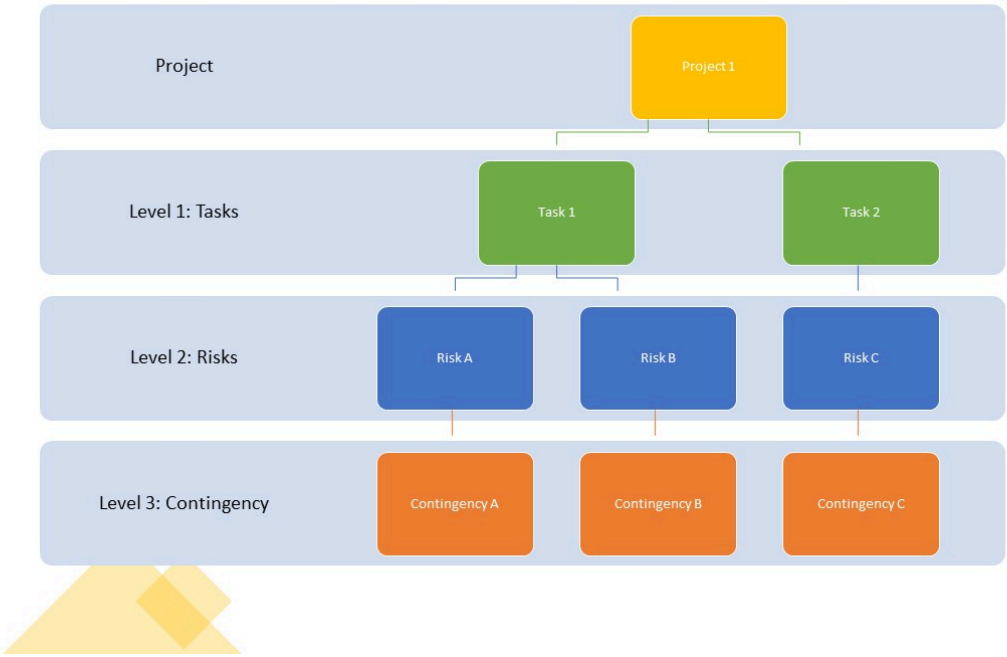
Communication	Environment	Documentation	Procedures and policies	Monitoring
Verbal BAU transition plan	Weather impacts	No formal handover	Procedures are poorly documented	No routine
Lack of clarity of who stakeholders are	COVID-19 lockdowns	Governance process not followed	No clear policy	No check in process

Affinity diagrams often contain similar information as Ishikawa diagrams but in a different format. The process can be used to develop the Ishikawa diagram content or support the cause-and-effect discussion for the process.

Process decision program charts

The process decision program chart is used to systematically identify what may go wrong in future projects or business changes (Tague 2004). These are used to create contingency plans, specifically focused on the impact of failure or risk. These process decision program charts contain 3 levels. The first level outlines the task or process under review, the second level outlines the potential risks or issues associated with the process, and the third level outlines the response plan for each identified risk. An example of a process decision program chart is outlined in Figure 20.

Figure 20. Example of a process decision program chart, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



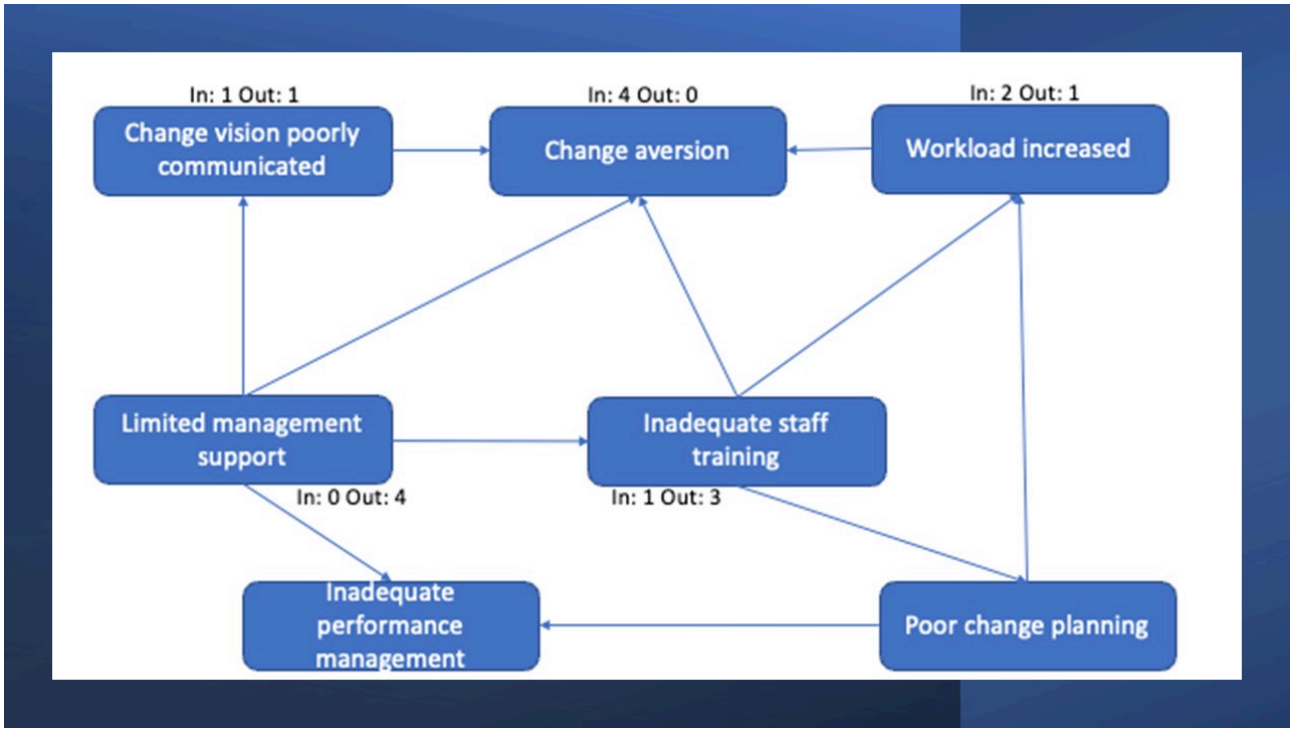
Interrelationship diagrams

Interrelationship diagrams help identify relationships between factors or causes within a complex situation or problem space. By using the diagrams, users are able to determine primary causal factors, and outline their interrelated elements. The process involves a number of steps, including:

1. developing a problem statement
2. documenting factors or causes on a sticky note or card
3. identifying factors with cause-and-effect relationships, shown as arrows
4. identifying primary causes – those factors that have the most arrows.

An example of an interrelationship diagram is provided in Figure 21. It highlights that each cause has many arrows which flow in and out.

Figure 21. Example of an interrelationship diagram, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



The interrelationship diagram can be interpreted through 3 primary steps:

1. Writing the tally of the arrows. The boxes with the most arrows are the key issues or ideas which need to be understood and addressed.
2. Factors which have the most outgoing arrows are the drivers (e.g., primary causes).
3. Factors which have the most incoming arrows are the primary outcomes or effects. These are the most critical to address.

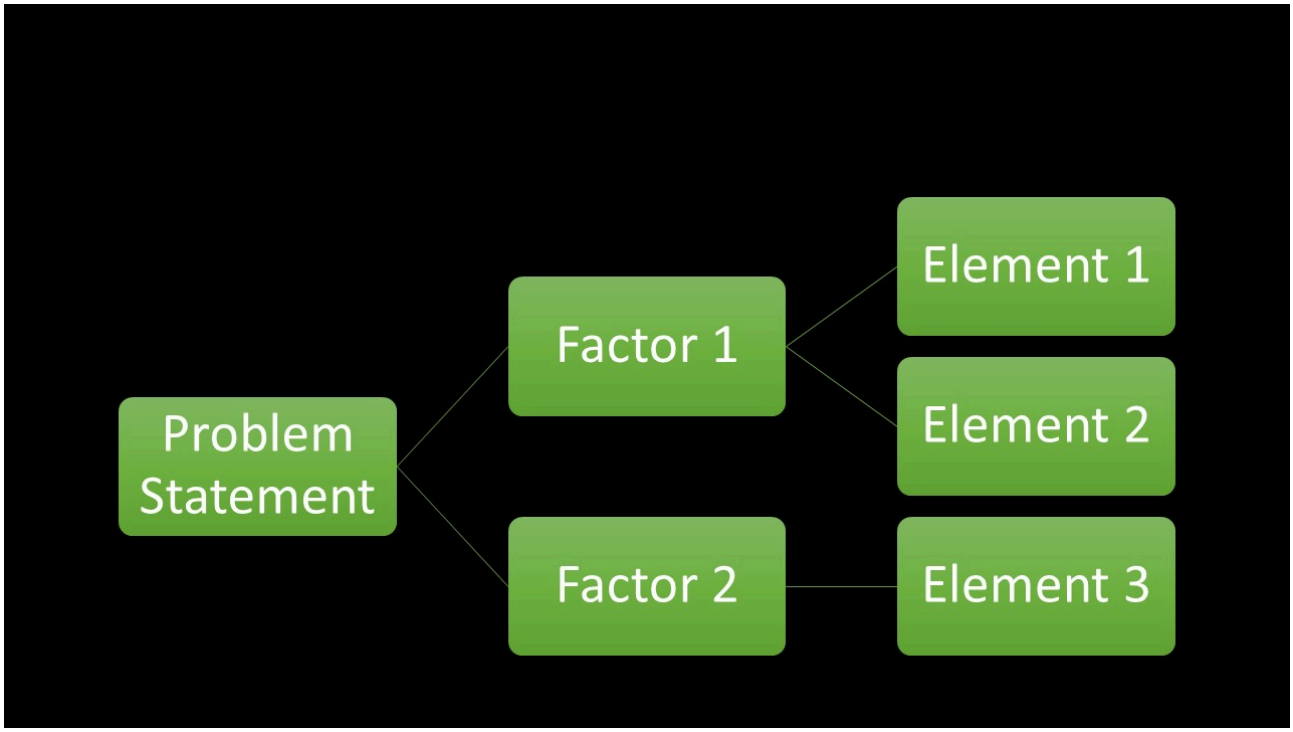
Using Figure 21 as an example of an interrelationship diagram, the project team can see what factors need to be understood and what will impact the project. In this example, limited management support has the most significant impact on the project and causes change aversion. As a result, the project team can target the limited management support and impact outcomes.

Tree diagrams

Tree diagrams can be used to visualise the relationships between the different tasks, activities and processes. Identifying the dependent relationships outlines the primary causes of quality failures. It outlines the hierarchies within the relationships (e.g., tasks and subtasks). To create a tree diagram, the project team starts by identifying one factor which branches into two or more. Each branch will have two or more, and so forth. The completed diagram resembles a tree. A tree diagram will help break down broad factors into finer detail. There are several steps which need to be followed to create a tree diagram:

1. Develop the problem statement. It forms the top of the tree. Trees can be either horizontal or vertical.
2. The project team works together to brainstorm and ask questions about the causes for the problem statement.
3. Each answer is documented. A tree diagram often follows an affinity diagram or an interrelationship diagram.
4. Checks need to occur throughout the process, ensuring that there are necessary and sufficient checks that the level of information provided is accurate.

Figure 22. Example of a tree diagram, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



An example of a tree diagram is demonstrated in Figure 22. It provides a visual representation of the entire problem and allows the project team to see the relationships across and between the different factors and elements.

Cost-Benefit Analysis

A cost-benefit analysis (CBA) is used to estimate both costs and benefits from the implementation of a project or activity. CBA is used to determine the most cost-effective project or process. The purpose is to determine the feasibility of different opportunities and create baselines to measure against. There are numerous steps to undertake in the CBA process:

1. Define the goals and objectives of the project by creating the project business case.

2. Define the alternative projects or actions which can be taken.
3. Determine stakeholders who could be affected by the decision and outline the roles and responsibilities.
4. Consider how the project will measure cost and benefits, including dollar values.
5. Determine the outcome of cost and benefits, assign monetary value and map these over a designated time period.
6. Identify common currency (e.g., US or AUD).
7. Outline the discount rate. This is used to calculate the present value of cash flows in and out of the project.
8. Measure and calculate the net present value. This is calculated by subtracting present values of cash = outflow – inflow.
9. Conduct a sensitivity analysis. This will allow the project team to understand how uncertainty affects costs and profits.
10. Identify which project has the highest cost-benefit ratio.

Cost of Quality (COQ)

This method allows a project team to determine what resources are used to ensure good quality versus poor quality. This calculation encourages the project team to share how much it will cost to repair quality issues (or non-conformance) compared to how much it will cost to ensure quality conformance.

This relates to the 1-10-100 rule, which states that proactive or preventative actions require less resources, time and budget than correcting issues that have happened. Per this rule, it will cost $1 to verify the data as its being collected, it costs $10 to clean data post collection, and it costs $100 to input no quality checks (Omachonu and Ross 2004).

Cost of non-conformance

These are costs or processes associated with fixing issues or correcting actions to fix poor quality outcomes (PMI 2021). The cost of non-conformance is higher than implementing conformance measures to ensure quality. These include 2 key categories:

1. Internal failure costs: associated with quality failures prior to clients receiving poor quality outcomes.
2. External failure costs: associated with quality failures after a client receives a poor quality outcome.

Cost of Conformance

This outlines the amount of resources required to ensure that the quality requirements are met (PMI 2021). These include 2 key categories:

3. Appraisal costs: associated with determining the degree of quality requirement conformance.
4. Prevention costs: used to prevent or avoid quality problems.

How to calculate cost of quality:

COQ = Cost of Conformance + Cost of Non-Conformance (or failure costs)

Cost of conformance includes the sum of all the costs associated with prevention and appraisal. Whereas cost of non-conformance includes the sum of all external and internal failure costs.

Now let's revise our knowledge:

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An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/pmriskquality/?p=163#h5p-16

Key Takeaways

- Quality assurance is about making sure that all the processes are clear, and easy to follow while ensuring that project outcomes meet quality standards.
- The quality assurance process requires the implementation of a system, which ensures that the project deliverables align with the stakeholder requirements (e.g., checklists, process audits).
- Quality assurance differs from quality control.

- There are numerous tools that can be used to ensure project quality and identify potential causes of poor quality or risk occurrence. These need to be understood and considered to support quality outcomes.

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MODULE 9. QUALITY CONTROL

The quality control process involves inspecting, testing and reporting the project outputs. The purpose is to ensure that the project outcomes meet the quality requirements outlined at the start of the project. Quality control is achieved by ensuring conformance, decision-making steps and process improvements (which are outlined in the quality assurance process) (Juran and Godfrey 1998; Grosfeld-Nir et al. 2006; Rever 2007; Kerzner 2009; PMI 2021). Quality control identifies that outputs provided are at the expected level. It is outlined within the quality management plan and documentation which ensures that the project team understands the project control process.

Learning Outcomes

- Analyse the quality control processes, inputs, outputs, tools and techniques.
- Conceptually map the quality control techniques.
- Integrate the quality control processes with previous quality assurance and planning.

In the quality planning phase, metrics are determined and these are used to analyse quality outcomes (PMI 2021). A key component of process quality control involves monitoring quality within the project. Juran's Quality Trilogy and Six Sigma are both methods which can be used to implement quality controls within project management. These are outlined below.

Juran's Quality Trilogy

Juran's Quality Trilogy involves the implementation of 3 processes (Juran and Godfrey 1998):

1. **Quality planning.** Start the process by planning activities which need to be completed to ensure the quality outcomes of a project or process (Juran and Godfrey 1998). Quality planning consists of understanding the client, determining requirements, defining features, designing outcomes or deliverables, and outlining a process which can ensure quality.
2. **Quality control.** This is how the project team will adhere to the processes outlined in planning (Juran and Godfrey 1998). This requires process assurance, measuring metrics and ensuring the process is meeting requirements. Where issues arise and corrective or preventive actions are taken, root cause analysis needs to be conducted. Deviations in metrics should be monitored and updated to meet required targets.
3. **Quality improvement.** Improvements require a process that takes into consideration changes in the environment, the needs of clients and market demands (Juran and Godfrey 1998). Quality

improvement should be used to identify and implement improvement opportunities, based on existing performance.

Juran's Quality Trilogy is commonly associated with quality control processes, as the 3 steps are linked to one another. Therefore, to appropriately implement quality control processes, each component needs to be implemented and streamlined to create an end-to-end quality management plan.

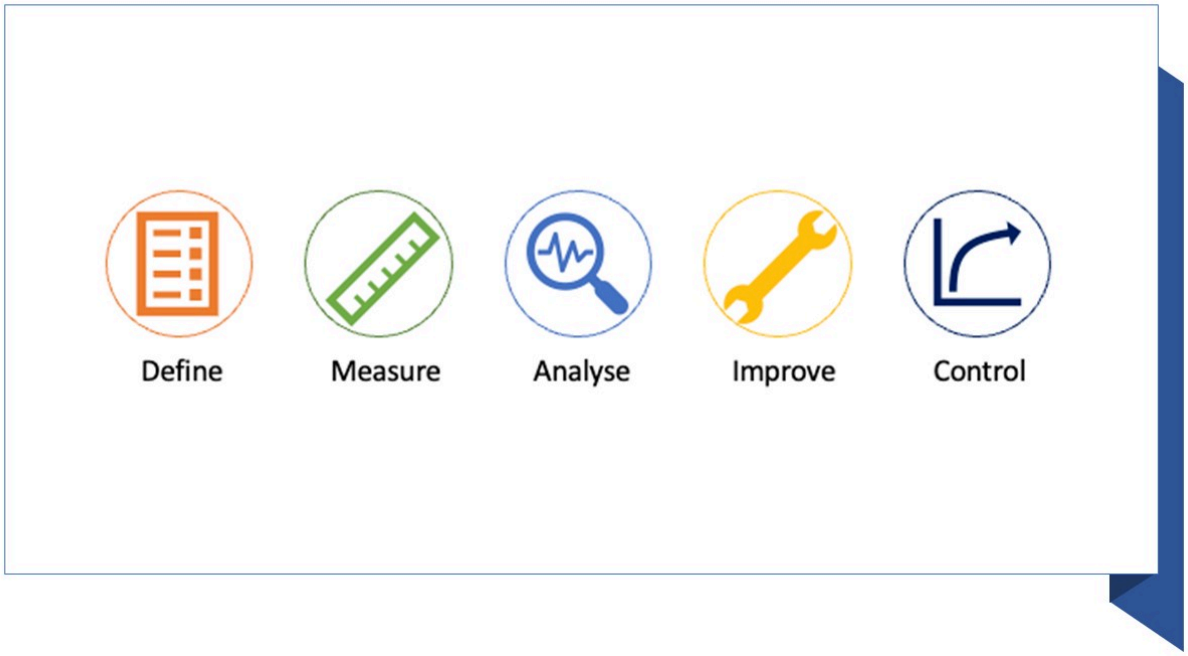
Six Sigma

The Six Sigma process in quality management involves embedding continuous improvement into the organisation and projects. Six Sigma aims for the project to have consistent and predictable outputs (Tennant 2001; De Fao and Barnard 2005). To successfully implement the quality management process, there needs to be top-down endorsement and support. The process focuses on measurable outcomes, leadership, and a commitment to make data-informed decisions throughout the project.

Quality within the Six Sigma method focuses on consistency, reducing issues and the predictability of the outputs. Within statistics, Six Sigma is 6 times the sigma (standard deviation) from the mean (Tennant 2001; De Fao and Barnard 2005). Therefore, the data point needs to be up to 6 standard deviations from the mean. This allows for 99.99966% of deliverables to be free from issues and equates to 3.4 defects per million.

Within Six Sigma, there is a primary methodology used to understand quality control. According to Deming et al. (2012), DMAIC can be used to improve a project's outcomes or create a quality control process. This is outlined in Figure 23.

Figure 23. DMAIC project quality control 5-phase process, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



The 5 phases within DMAIC are:

- **Define:** define the problem space, project, outcomes or system, based on the requirements set by the clients or stakeholders which meet the project goals or outcomes.
- **Measure:** data needs to be collected on the current process, to ensure that there is a baseline, and continue to be collected throughout the project.
- **Analyse:** data needs to be analysed in order to understand causation and relationships between all factors. This helps identify the root causes of a problem or issue.
- **Improve:** the optimisation of the current process is based on data analysis, in order to create new future processes.
- **Control:** future processes ensure deviations are responded to and do not lead to problems. This process should be ongoing to ensure the quality level is maintained.

The DMAIC improvement process is a key part of the Six Sigma process. However, it is not only used within Six Sigma and is often used as a framework to support the improvement of quality within projects, systems and products. Six Sigma can be used to support quality control using many tools and techniques.

Tools and techniques

Within both Juran's Quality Trilogy and Six Sigma methods there are 7 key tools and techniques which are used in quality control processes (Ishikawa 1985). These are outlined below.

Root cause analysis

The root cause analysis process has been outlined in previous modules. Root cause analysis supports both quality assurance and control processes in projects, product development and improvements to business processes. Using the Ishikawa diagram helps us understand the potential causes of a problem statement and the relationships between them.

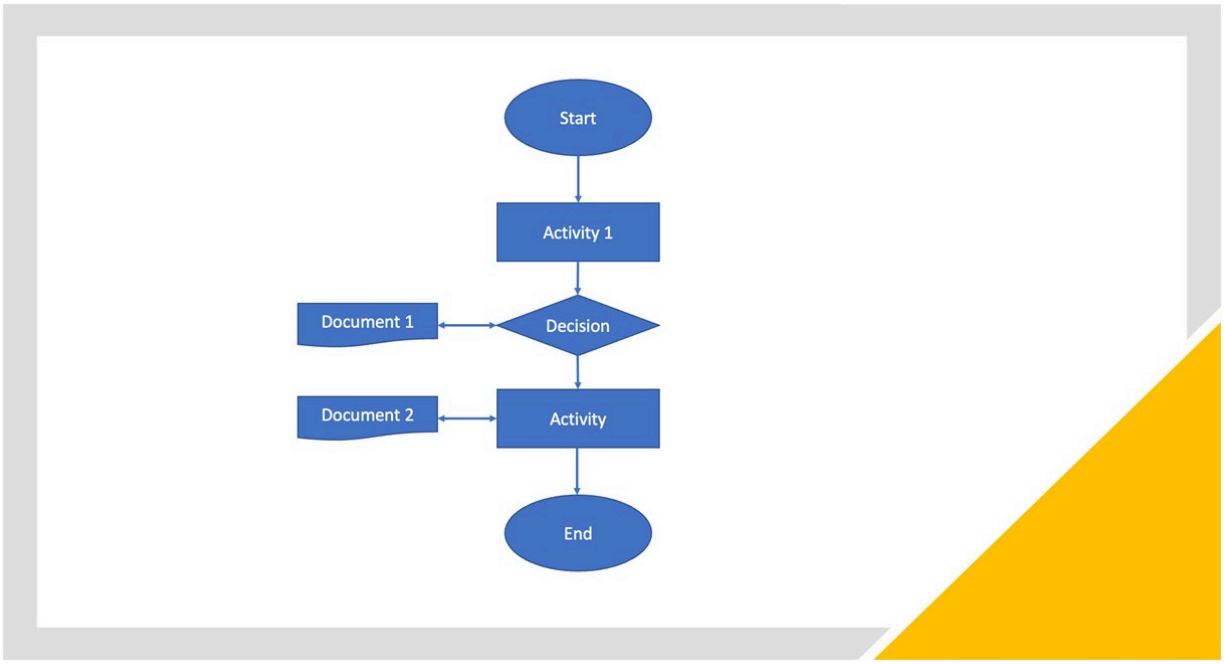
Stratification

The stratification technique is used to separate data from various sources, to identify patterns. This analysis supports quality control tools, which sorts data, objects and resources into separate categories and distinct groups (Juran and Godfrey 1998; Grosfeld-Nir et al. 2006; Rever 2007; Kerzner 2009; PMI 2021). The stratification processes help us to identify meaning, patterns and themes within the data which may not have otherwise been visible. There are 3 primary steps involved in the stratification process:

1. Prior to data collection, there needs to be consideration of how different types of data will be documented and understood. By establishing a process for data collection early on, it will support the analysis process and consistency of data.
2. Different data sources or types need to be plotted within a scatter plot, control chart or histogram, using different colours. This shows that the data has been stratified.
3. Data analysis needs to be completed separately for each set of stratified data.

In some circumstances, project teams will use a flowchart instead of following the stratification process, to break up the project into smaller and more manageable chunks. The flowchart shows a process or a project. It visualises the events or activities completed in their order or parallel to one another (PMI 2021). An example is shown in Figure 24.

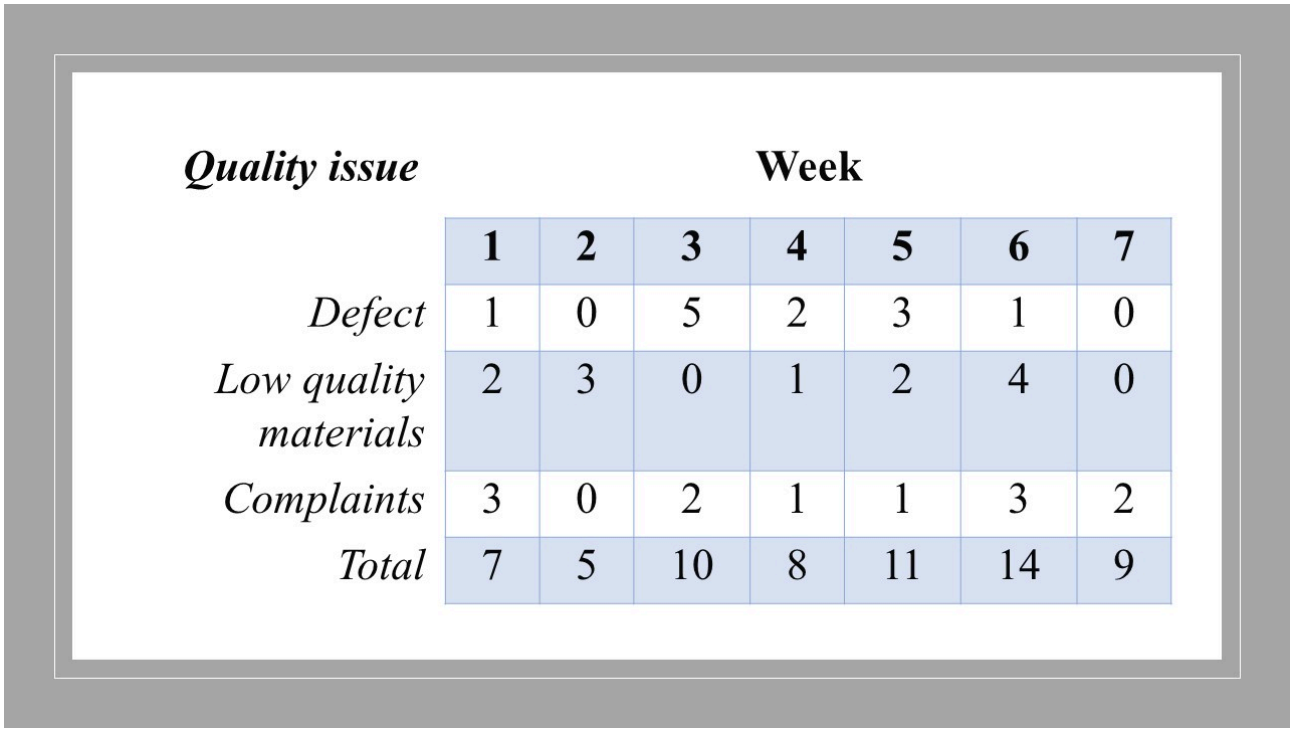
Figure 24. Example of a project flowchart, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Check sheets

A check sheet is a structured document, which is used to collect and analyse quality data (PMI 2021; Rever 2007). Check sheets are generic forms; however, they can be tailored to meet the requirements of the project, the manager and the team. An example is provided in Figure 25.

Figure 25. Example of a check sheet, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Quality issue	Week						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Defect	1	0	5	2	3	1	0
Low quality materials	2	3	0	1	2	4	0
Complaints	3	0	2	1	1	3	2
Total	7	5	10	8	11	14	9

There are 6 key steps involved in creating a check sheet:

1. Document the problem statement.
2. Determine what data collection is required, and the period during which it will be measured.
3. Design the check sheet, and ensure the process is easy to follow.
4. Clearly label the form.
5. Trial the check sheet over a period of time and ensure that the data is appropriately collected and easy to follow.
6. As an event occurs, record it.

A check sheet is used to simply tally the occurrence of events and supports the application of the continuous improvement process (as outlined in our previous modules).

Control charts

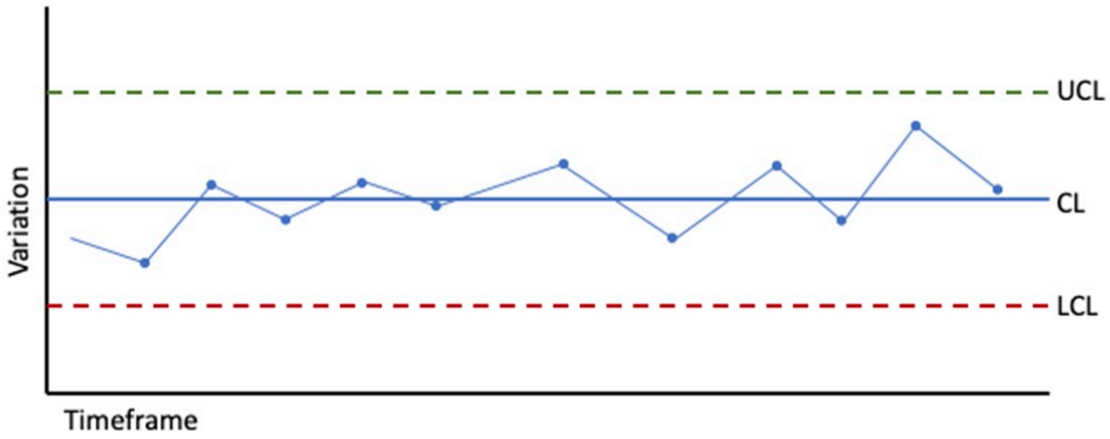
Control charts are used to document if a project's quality performance meets expectations. These charts graphically display how the project quality changes over time by comparing the current data to historical control data limits (Rever 2007; PMI 2021). This allows project managers and team members to understand the variations in the quality. There are 5 steps to creating a control chart:

1. Choose appropriate levels of upper and lower control limits. These are commonly 3 standard deviations from the mean or the control limit (CL).
2. Determine the time period for data collection and analysis.
3. Collect and analyse the data.
4. Determine if there are signals that the quality is deviating out of control (e.g., the data shows deviations above the upper control limit (UCL) or below the lower control limit (LCL)). Project managers and team members should look for patterns across the timeframe of data collected.
5. Data should be plotted as generated and out of control checks should be conducted.

To calculate the CL:

1. CL is the average. This is often calculated by determining the average across 10 to 20 points in the timeframe under review.
2. UCL is the longest or largest deviation that would be accepted within the quality controls. This is often between 1 and 6 standard deviations above the average.
3. LCL is the smallest deviation that would be accepted within the quality controls. This is often between 1 and 6 standard deviations below the average.

Figure 26. Example of a control chart, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0

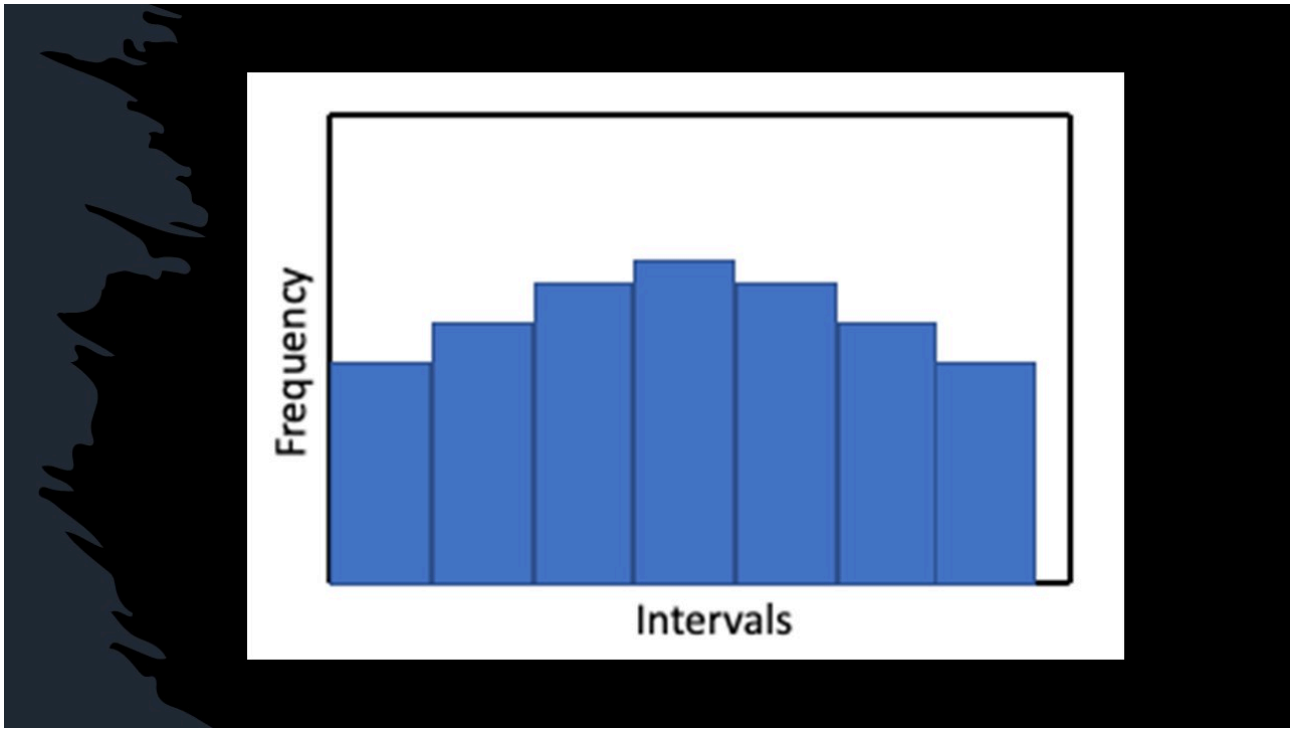


An example of a control chart is outlined in Figure 26. The control chart outlines how the quality within the project changes over time and defines the acceptable variation limits. Control charts can be used to understand the deviations in quality across a project, an organisation or a product life cycle.

Histogram

A histogram shows the frequency distribution. The graph visually displays how often each value occurs within the dataset. A histogram shows the shape of numerical data distributions, which is used to determine if the output is normally distributed (Rever 2007; PMI 2021). An example of a histogram is outlined in Figure 27.

Figure 27. Example of a histogram with a normal distribution, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



There are 7 common steps involved in creating histograms:

1. Collect a minimum of 50 data points. The data needs to be consecutive data points.
2. Divide the numbers over the range of data into intervals of equal length.
3. Count the number of data points within each interval.
4. The vertical axis outlines frequencies.
5. The horizontal axis outlines the lower value of each interval and labels the axis of the type of data displayed.
6. Draw the bars extending from the lower value for each interval to lower values up the next interval.
7. Each bar's height needs to be equal to the frequency of the corresponding interval.

Common types of distributions:

- Normal distribution: also referred to as the bell-curve, which is the typical distribution. This distribution shows that points on either side of the average are likely to be similar.
- Skewed distribution: this distribution is asymmetrical – there is a peak on one side of the average.
- Bimodal distribution: this distribution has 2 peaks and shows 2 distributions across one set of data.

A histogram can be used to outline frequency distribution for continuous variables. The histogram shows

numerical data and outlines how quality is tracking across the project, showing where poor performance is occurring and improvements are required.

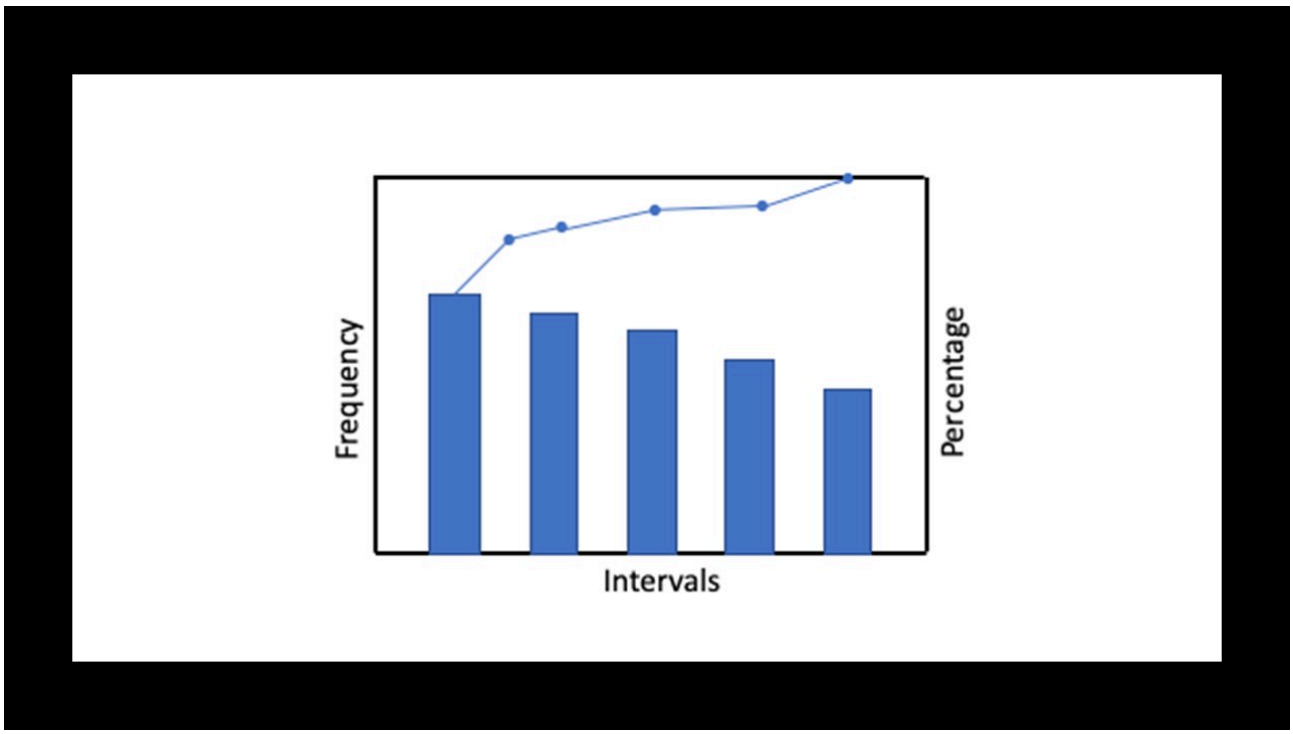
Pareto chart

A Pareto chart is a type of bar graph, where the length of each bar outlines the frequency of cost, time, or resources. The bars within the Pareto chart are arranged left to right, with the longest bars on the left and short to the right. The chart is used to visualise the situations or factors which are significant. This chart can be used to understand causes.

The Pareto chart follows the 80/20 Pareto Principle. This principle states that most issues are derived from a common cause and there are often only a few contributors. Within this principle, 80% of issues come from 20% of causes (Grosfeld-Nir et al. 2006). These causes are often shown in the Pareto chart. An example is presented in Figure 28.

Pareto charts analyse data to understand the problem frequencies within a project. Significant issues can be identified by the frequency of their occurrence on the chart. These are easy to share with stakeholders as they visualise the problems.

Figure 28. Example of a Pareto chart, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



There are 9 steps to creating Pareto charts:

1. Decide on the categories along the intervals.

2. Decide appropriate measures – the most common is frequency.
3. Outline the time period under review.
4. Collect and record data based on categories.
5. Sum the measures for each category.
6. Consider an appropriate measurement scale (e.g., maximum value from step 5).
7. Outline the axes, add the largest bar on the left and continue until the smallest bar is on the right.
8. Calculate percentages for each category. The value of each category should be divided by the total for each category and be documented as percentages along the vertical axis on the right side. The scales across the right and left axes should be the same.
9. This is an optional step, where the project team can add labels above each bar within the chart to show scale.

The Pareto chart can be used to help the project team identify the most frequent causes of quality issues within the project. It helps the project team to communicate their rationale for making decisions.

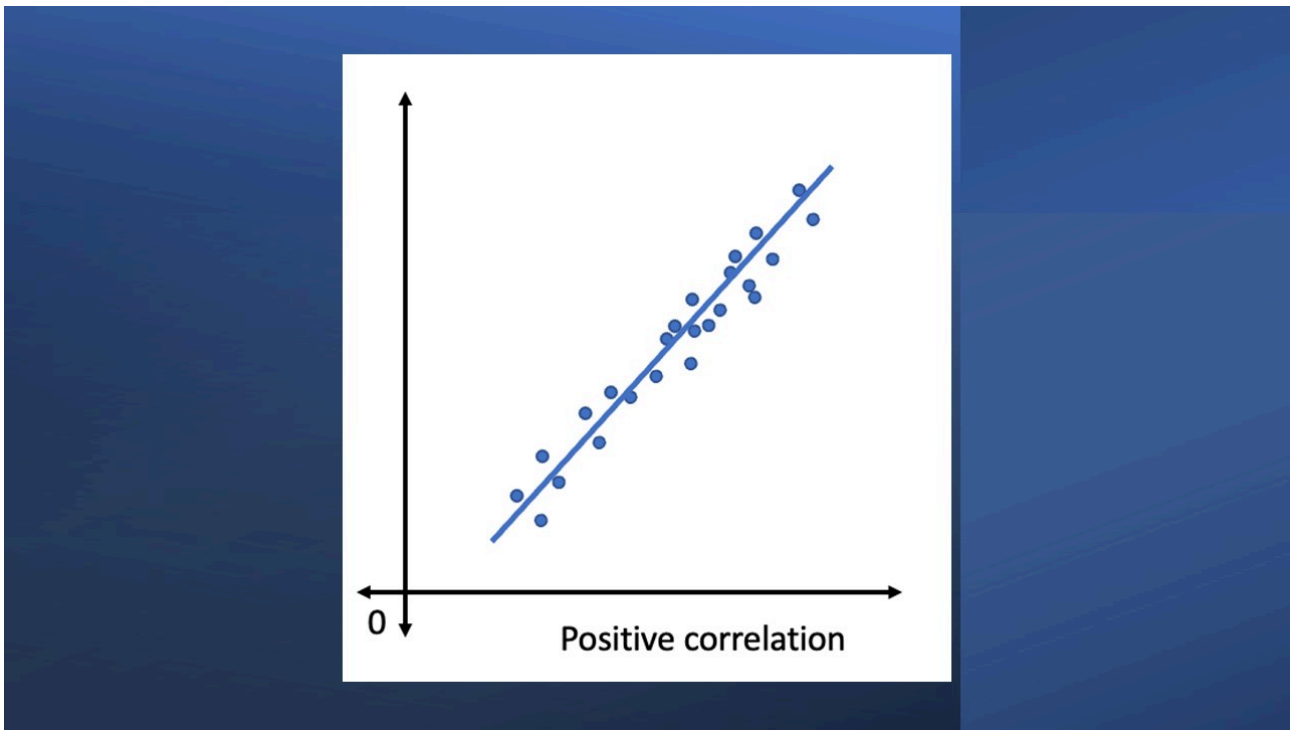
Scatter diagram

Scatter diagrams are the graphical representation of 2 numerical variables. Within quality control processes, it helps identify links between the project elements on one axis and the quality issues on the other (Rever 2007; Kerzner 2009; PMI 2021). A scatter diagram shows the relationships between changing a dependent variable and a corresponding independent variable. The role of the independent variable is to explain the observed outcome. Within the diagram, the points should fall along a 'line' when a correlation between variables is observable. These diagrams are useful when attempting to forecast the behaviours of a dependent variable based on the independent variables, once the relationship has been established.

Types of Scatter diagrams

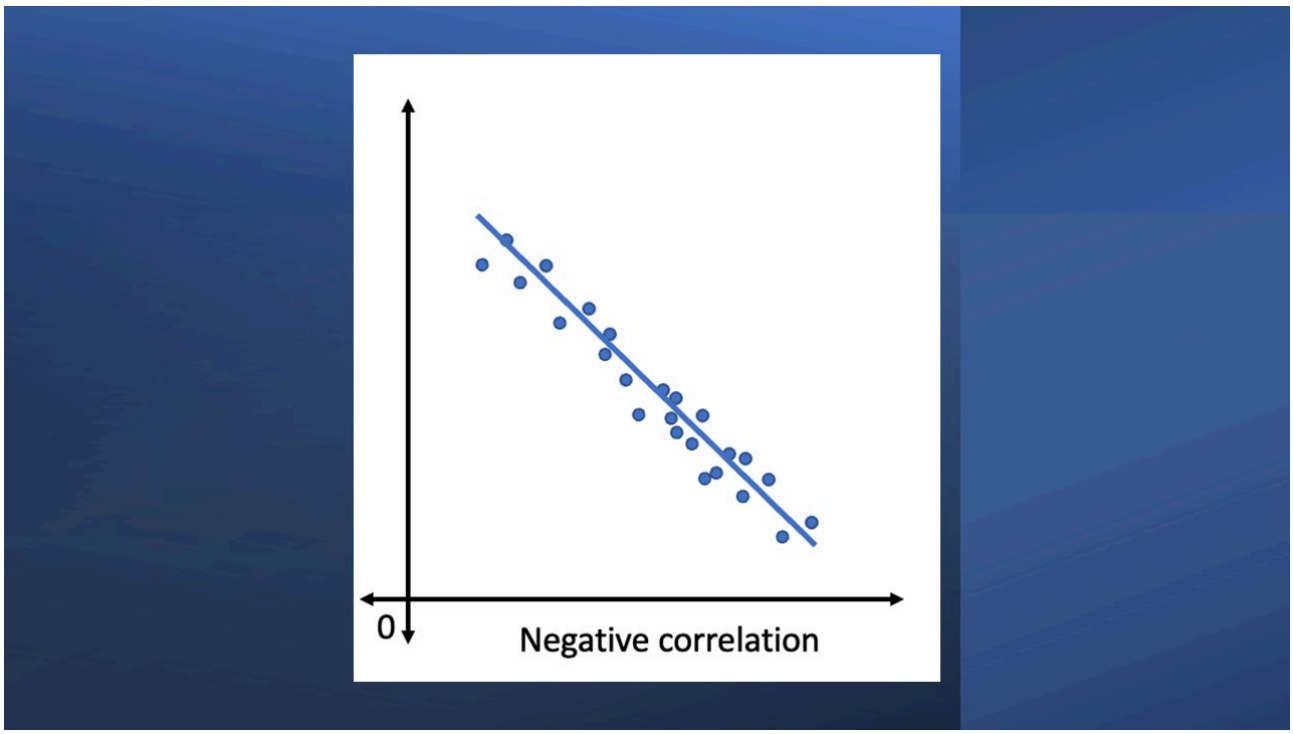
1. **Positive correlation:** where there is a positive correlation between variables, when the independent variable's value increases so does the dependent variable's. An example is provided in Figure 29.

Figure 29. Scatter diagram example with positive correlation, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



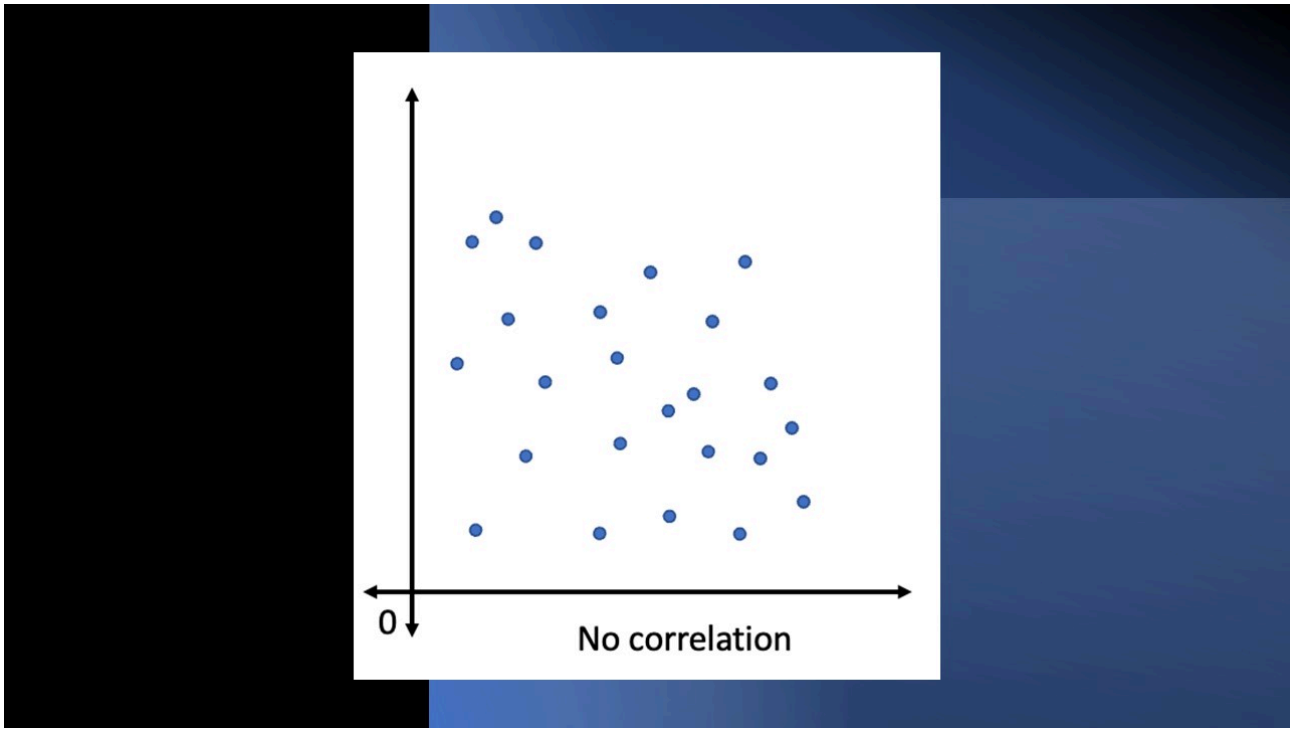
2. Negative correlation: where a negative correlation exists, when the variable's value increases, the other variable's value decreases. As the independent variable shows a value decrease, the dependent variable's value decreases. An example is shown in Figure 30.

Figure 30. Scatter diagram example with negative correlation, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



3. No correlation: there is no link between the dependent and independent variables. An example is shown in Figure 31.

Figure 31. Scatter diagram example with no correlation, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



There are 5 key steps in creating a scatter diagram:

1. **Dependent and independent variable identification:** determine which variable is the independent variable (or the cause). In contrast, determine which is the dependent variable that is affected by the changes of the independent variable.
2. **Collect data on both variables.**
3. **Develop the scatter diagram/plot: use a tool (e.g., Microsoft Excel) to create the scatter plot by connecting dots which represent specific numerical data points.**
4. **Outline the correlation type: plot the dots and determine the correlation between the 2 variables. Within a scatter plot, the line can be upward (showing a positive relationship), downward (showing a negative relationship) or undefined (where no relationship is identified).**
5. **Draw conclusions based on the scatter plot:** determine the key issues and fix the problems identified.

The scatter diagram is used to control and monitor project quality by highlighting issues and problems associated with quality. The scatter diagram should be used to determine the relationships between issues or problems identified within the Ishikawa diagram.

The following case study showcases the importance of quality cost management.

Case study

Quality costs (in many ways!)

By Shaun Kelly

Introduction

Professional services firms operate in a space where their clients engage them to provide an output that is usually only information. Professional services firms include lawyers, accountants, surveyors and similar disciplines. The information that they output may be advice on what the client needs to do or should not do. The information that the client seeks may be to solve a problem because the client has already done something that they perhaps should not have or not done something that they should have done.

Any business, not least a professional services firm, must have governance around the services that they provide. Governance is the 'guard rails' around how a business operates, including their outputs, and responds to laws, regulations and fulfilling the service promised to the client, often written into a legal contract.

Work From Home

Work From Home (WFH) has truly entered the everyday language in most countries, from the changing work arrangements resulting from the COVID-19 pandemic. Before 2020 though, at least since the early years of this century, professional services firms have been subject to ever-increasing client pressure to drive their fees down. Put simply, clients want them to be cheaper but do the same work, or even offer enhanced service. Sometimes the enhanced service or doing more work for the same or lower fees has been created by responding to greater regulation on all business. Quality must include providing a service that does not create a civil or criminal liability for the client or their firm – that requires greater governance.

This has partly led to an appreciation that where the service includes visits to the premises of the client or other designated premises, it may be more efficient in terms of travel distance, time and cost for the firm's employee to work from home rather than travel each day to an office location, often in a Central Business District, and then travel from there to a visit location and back to the office. It will not have escaped the attention of firm management that less people based in an office usually means a smaller office footprint and so less office lease cost and associated expenses, for example, utilities.

WFH = Quality deficit

Professional service firms will employ trainees, often graduates, who are subject to supervision and mentoring by more experienced and usually postgraduate educated, professionally qualified managers or colleagues. The flight-plan for those trainees is that they become ever increasingly competent in what they do and hopefully themselves gain professional qualifications.

Firms should want to 'grow their own and keep them'; that is, recruit staff, make them great at their job and sufficiently reward them that so that they do not leave to work elsewhere. Before WFH, a trainee would have their manager or mentor sitting in close proximity to their own workspace. That would have meant that each new assignment and anything the trainee was unfamiliar with would have involved a face-to-face discussion in the office. Anything new to the trainee that arose as they were working through an assignment, perhaps from an email or telephone call, could be raised with the manager very easily. The trainee would usually be able to look up from their desk and see if their manager was busy or free for the trainee to wander over and ask them for a few minutes to discuss something. With WFH, the trainee may experience the frustration of telephoning the manager and getting no answer or a busy tone. In the advent of MS Teams or Zoom, the trainee will often see that the manager is 'red'/busy when indeed they may just have blocked out time in their calendar to do some work but would otherwise have been available for their trainee if they were both in the office.

Another dynamic of remote working is poor knowledge and use of technology. Examples of managers remotely reviewing a trainee's written output in, say, MS Word over email with neither person knowing of or using the Track Changes and Comments functionality are common. So, the manager may make amendments to the document that are not easily discernible and make margin comments that the trainee does not flag – both missing the function of tutoring the trainee.

Mistakes happen

WFH costs a business less in lease costs, utilities and travel from office to visit locations. However, the compromised face-to-face time, mentoring and supervision will inevitably translate to less than firm guard-rails and will likely negatively impact governance and the quality of the trainee. It can be unavoidable that mistakes happen.

Those mistakes can mean that a client suffers some financial or reputational harm and seeks compensation from the firm (i.e., they make demand for monetary compensation). The firm may be able to defend the claim but some annoyance may remain with the client, or the firm may accept the mistake and so suffers financial harm themselves. The client's confidence in the firm may suffer regardless and that reputational harm could cause the loss of the client's business entirely.

Quality is not just important to a firm and its client. I believe that fundamentally no one engages in work activity to do a bad job. Employees instinctively want to do a great job. They want to create quality. People want to grow in their role(s). They want to receive praise and progress to more interesting, personally

fulfilling and hopefully more financially rewarding tasks, responsibilities and roles. A career, though, is more than just money.

They can best do that with effective supervision and mentoring. Technology is, of course, an enabler when people are trained on its function. Microsoft 365 and similar other office applications and technologies can enable learning and quality growth for a trainee. There must always be physical meetings occasionally, certainly to discuss work product, but also socially to build a comfortable working relationship between the trainee, supervisor and mentor. Empathy is best established in the context of a physical meeting.

Now let's revise our knowledge:

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https://jcu.pressbooks.pub/pmriskquality/?p=169#h5p-17

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/pmriskquality/?p=169#h5p-18

Key Takeaways

- Project quality control processes include 7 common tools and techniques.
- Project quality control is strongly linked to the quality assurance and continuous improvement process within the project.
- They are used to support project managers to understand where issues sit, how they can be communicated, to visually display the current state, and support informed decision-making.
- The implementation of quality control processes support project managers and team members to provide the highest quality outcomes.

- Quality control requires monitoring quality throughout each project phase, to ensure that quality standards are met and adjustments can be made to get them back on track.

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MODULE 10. WHY RISK AND QUALITY MANAGEMENT ARE SO IMPORTANT IN PROJECT MANAGEMENT

Up to now, we have discussed the critical factors, inputs, tools, and outcomes that make processes, risk and quality effective in project management. Let's revise why these processes are important.

While the context may suggest that 'quality' refers to 'perfection' and 'excellence' in project management, it is more important to ensure quality exists across the project life cycle. Many individuals unfamiliar with project management find it peculiar that quality is considered a separate knowledge area. Certainly, quality must be present in every task of the project. However, as it needs to be developed, implemented and monitored, explicit planning is essential and close attention by the project manager and their team is a must. One key aspect to remember is that, as pointed out in Figure 32, quality needs to be customer driven rather than dictated by the project manager or their team.

Learning Outcomes

- Articulate the importance of managing project quality.
- Analyse the processes of risk and quality integration.
- Interpret the challenges of risk and quality implementation processes.

Figure 32. Customer role in quality project management, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0

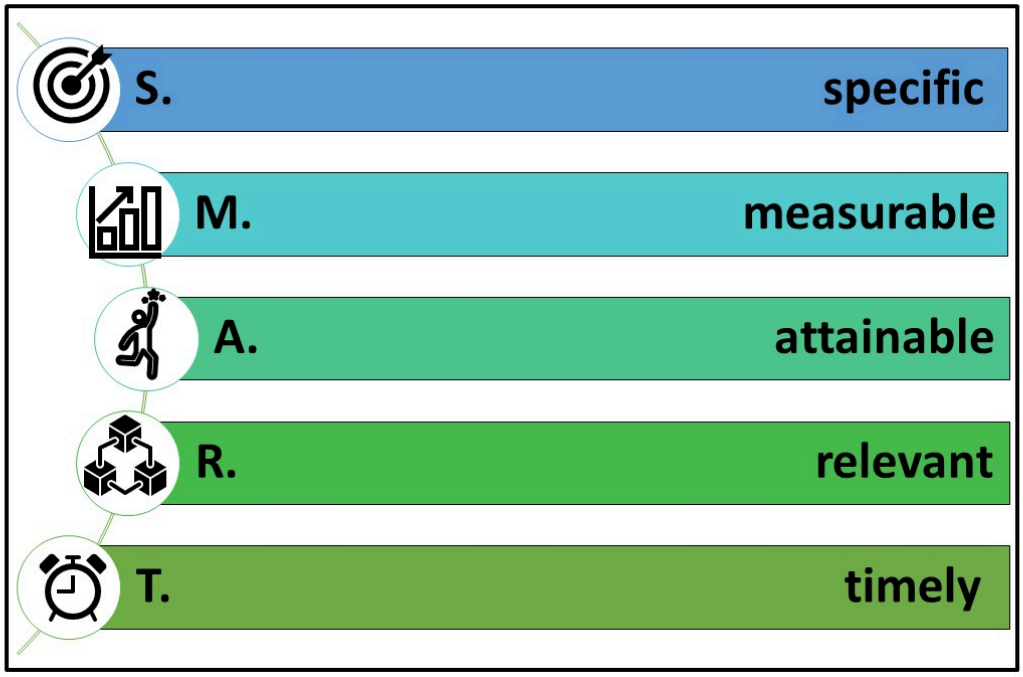
In quality planning, the project manager sets the criteria that the project must satisfy for success, as well as the methods for achieving and confirming those goals. But this is only done once the customer agrees on the project's outcome and its specifications. Therefore, quality planning needs to be considered at the start of the project, within phase 1 and 2 of the project life cycle. Quality planning needs to be consolidated and agreed at minimum, within the project's planning phase since it effects costs, schedule, and other key resources. Without solid quality planning, there is a greater chance that the customer will not be satisfied with the project's results. So, you must have clear documentation of key stakeholders' expectations to avoid unpleasant shocks later in the project. Without this, a project might be derailed if there are differing perceptions of *how* and *what* constitutes acceptable project quality.

Quality planning also establishes the scope of what will be monitored, which metrics will decide the project's success, and how these requirements will be met from start to finish. As suggested by the ISO 9001 quality management's 7 standards, the project manager's scope will often rely on the specific outputs and procedures involved in the project. Therefore, within the scope of the project, we also need to define and execute quality assurance processes. Unless the project is extremely short-term, quality planning should incorporate benchmarks. These points of reference compare the progress of the project to expectations derived from prior projects, industry standards, or other metrics, and monitor the project progress frequently, from its earliest phases through to the final result.

Like other processes, quality planning should include clear, quantifiable, agreed-upon, realistic, and time-constrained objectives. These S.M.A.R.T. objectives may keep the project on track and assist with

uncovering any quality issues early on. As a project manager you should be familiar with the concept of S.M.A.R.T. objectives by now 😊 but just in case, Figure 33 will remind you of these.

Figure 33. S.M.A.R.T objectives, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



There are many factors determining the benefits of project planning. However, keep in mind that cost implications are what make proper quality planning in project management so crucial. A cost-benefit analysis indicates how much each incremental improvement affects the bottom line, allowing for a well-informed decision when determining the project tasks that must-exist from nice-to-exist.

Challenges of implementing quality planning in project management

Quality planning is not always quite so easy as described in earlier modules – there are few challenges.

Difficulties in identifying requirements. Occasionally, project managers may encounter stakeholders' or senior managements' reluctance to identify the project requirements as they are not willing to admit that they are themselves unclear or confused about what they want. The project manager needs to be able to prompt stakeholders to express their needs with sufficient clarity. On some occasions, this challenge is the project manager's liability. This is often the result of not engaging clear communication processes with all stakeholders or not asking all end user groups.

Misunderstanding requirements. In some situations, the requirements are misconstrued and the project

outcomes are misconstrued. Consequently, the design, plan and implementation of the quality management process is invalid. Ongoing meetings, communication and stakeholder engagement are critical to mitigate this challenge.

Inability to meet requirements. For various reasons, external and internal uncertainties will make it difficult or impossible for project managers and teams to meet requirements and achieve project specifications. This may be the result of having unclear and unrealistic objectives at the start or simply due to uncontrollable variables such as market volatility, economic inflation, environment disruption, etc.

Quality requirements creep. Just like scope creep, quality requirements creep is a new term incorporating the unforeseen changes that a project faces and which affect the initial agreed specifications. As we have learnt with our traditional Iron Triangle, any change during the project will have an impact on the quality specifications. The earlier the project manager acknowledges these changes and transparently communicates with key stakeholders, the earlier the quality plan can be adjusted to prevent major costly deviations.

There are always going to be other challenges; however, a good project manager will acknowledge these as soon as they eventuate and respond with a plan that aims to minimise large-scale variations.

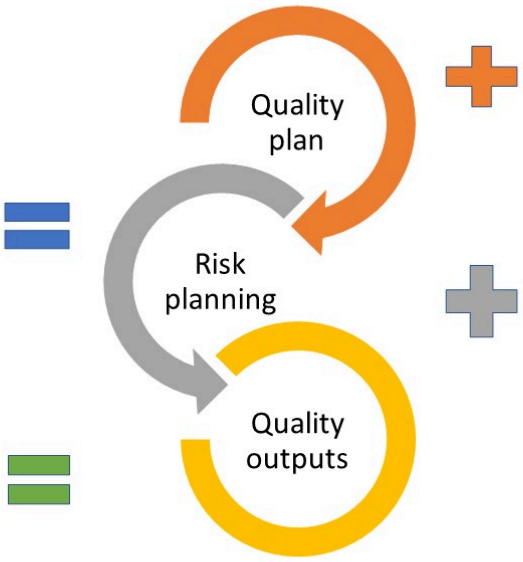
Now let's reflect on the relationship that exists between quality and risk management processes, depicted in Figure 34.

quality plan will minimise risks

while

risk planning will maximise quality

Figure 34. Quality and risk interrelationship, by Carmen Reaiche, Samantha Papavasiliou and Frank Anglani, licensed under CC BY (Attribution) 4.0



Project risk management plays a crucial role in attaining the project's objectives by recognising, analysing, and responding to risks that have an effect on them during the course of the project's duration. It contributes to a successful project outcome by playing a crucial part in selecting excellent projects, identifying project scope, and producing accurate estimates. Through identifying and analysing project risks, information on the project's feasibility and planning is obtained. Project risk management therefore detects potential risk events. Project risk management increases the likelihood that project value realisation is optimal and that the project will be successful.

Unsatisfactory project risk management performance might have significant consequences. It is possible to establish an unrealistic notion that all risks have been accounted for and there are no more issues. It may also lead the project to be terminated unnecessarily, preventing any potential project benefits. To avoid failure, the organisation must be aware that risk management is not free; it frequently adds significant expenses and delays to the project's completion. Therefore, the cost should be accounted for and planned accordingly.

The elements that play a part in risk management are determined by considering the nature of the project and the organisation's strategy. It may affect project risk management tactics in several ways. To be effective, methods to adopt project risk management must be realistic. Obtaining sufficient information and knowledge at the start of the project as well as aligning this information with the organisational strategy are essential steps for successful risk assessment. Since there is an inverse connection between uncertainty and

information, the greater the risk information, the less ambiguity exists. However, it should be recognised that situations of relative uncertainty (partial information) are the norm in project management.

Moreover, the circumstances of a project might influence the risk management approach, such as time constraints and the inability to consult all stakeholders. In addition, identifying an excessive number of risk tasks may limit adequate responses to the most significant ones. While organisations do not dispute the significance of risk management in today's disruptive climate, the culture may not be conducive to conduct a risk assessment. As mentioned earlier, this is because risk assessment and management processes are seen as costly exercises and funding is always limited. Another aversion to these processes, aside from the cost, is the perception of needing extra resources and time.

Challenges of implementing risk management

Similar to any other project management activity, the process of risk management might present obstacles. Let's examine a few of these.

Difficulties in risk identification. Occasionally, project managers may encounter stakeholders' or senior managements' reluctance to identify project risks because they are overly enthusiastic about the project implementation process and/or do not view it as something significant and worth their time. We advocate communicating with stakeholders and explaining the relevance and advantages of risk management, presenting several project result scenarios to highlight the need for a risk management strategy.

Difficulties in formalising risk management processes. Another type of problem emerges when a risk management strategy has been produced, but the risk management process itself has not been given adequate thought and, as a result, has not been executed. It is important that the project manager assigns team members with the responsibility of managing risks, including monitoring, reporting, and responding, but also provides the team with support and encouragement. Enabling the right culture for establishing a risk management system is critical.

Difficulties in identifying leaders in the risk management process. This difficulty is like the preceding one; however, it pertains to responding to risks. For example, a team member may report that an unpredicted risk activity has happened, but finds neither the right leadership nor decision-makers to mitigate or take any sort of action.

Difficulties in managing risk within a large project portfolio. Obviously, working on several projects is considerably more demanding than managing a single project; thus, the risk management process becomes much more complicated and involves prioritising projects and risks. Project managers need to exercise 'risk prioritisation' to respond proactively and at the most critical moment. It is also critical that tasks are automatically prioritised, so that the project manager always knows what to work on first.

Risk and quality management benefits in sum

Overall, project management is the most important aspect of corporate success. Appropriate project management enables an organisation to finish its projects on schedule, within budget, and with the quality desired. A successful project requires exhaustive study and appropriate implementation. A project manager cannot effectively assess the value of a project without identifying and mitigating its related risks or having the right quality processes in place.

Both risk assessment and quality project management are important for any project success. Let's revise and dig into their integrated importance.

Supports the evaluation and assessment of a project. The first and most essential benefit is that both processes facilitate project evaluation and quality project outcomes. Each phase of the project is examined by risk managers, evaluating quality standards, who contribute to the full evaluation and identify problems and risks that are resolved prior to the project's launch meeting the stakeholders' project specifications and needs. After evaluating and mitigating risks, project managers and personnel work freely towards the conclusion of the project with the objective of ensuring its quality outcome and success.

Contributes to the successful completion of a project. With good risk and quality management, all risks associated with a project are reduced, ensuring its successful conclusion and quality outcome standards.

Contributes to budget control. A project's success is not limited to its completion on schedule. One factor that impacts the success of a project is its ability to be completed within the allotted budget and meeting specifications. With good risk and quality management and monitoring processes, a project is finished within the allotted budget, since all risks have been mitigated and there is no longer any chance of a major change in the project's outcome specification(s) that may affect the budget and planning.

Supports a proactive and not a reactive (response) strategy. Effective risk management helps eliminate hazards before they occur, and effective quality management helps eliminate errors and product/service variation, so reducing loss, chaos, and major project deviations. Implementing appropriate control mechanisms assists management to adopt a proactive stance and eliminate a reactive response.

Now let's revise our knowledge:

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https://jcu.pressbooks.pub/pmriskquality/?p=177#h5p-20

Key Takeaways

- Consumer satisfaction entails comprehending, analysing, establishing, and managing expectations to meet customer needs.
- Prevention over inspection implies that quality is planned, created, and built in rather than inspected in, as the cost of preventing errors is typically far lower than the expense of rectifying them.
- To be effective, project risk management should be practical and realistic.
- To increase the likelihood of achieving a successful project outcome, it is essential for the development team to have a thorough understanding of potential risks, to methodically evaluate those risks, to anticipate possible effects and causes, and to identify appropriate means of mitigating those risks.