

PROJECT MANAGEMENT COLLECTION

07

30 Project Quality Management Tools



30 Project Quality Management Tools

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1

QUALITY MANAGEMENT PLAN



Define how the project will meet applicable quality requirements and demonstrate acceptance.

① PURPOSE & VALUE

The quality management plan sets out how the project will deliver products, services and results that meet requirements and are accepted by stakeholders.



CLARITY:

Defines quality criteria, methods, roles and evidence.



ALIGNMENT:

Links quality activities with project objectives and stakeholder expectations.



CONFIDENCE:

Provides a basis to demonstrate acceptance.



CONTINUOUS IMPROVEMENT:

Enables learning and better results on current and future work.

② HOW TO APPLY

Develop and document the plan with these key steps:



Define quality requirements and measurable acceptance criteria.



Assign roles and responsibilities for quality activities.



Plan assurance activities, inspections and reviews with timing and resources.



Set defect handling and correction process.



Plan improvement reviews to capture lessons and update the plan.



CONTROL:

A plan without scheduled work and resources does not create quality. Keep it realistic and resourced.

③ INPUTS & EVIDENCE



REQUIREMENTS:

Approved scope, product and service requirements, standards and compliance needs.



REFERENCE INFORMATION:

Organizational quality policies, procedures, templates and lessons from past projects.



KEY EVIDENCE:

Inspection and test records, review checklists, defect logs, acceptance records and approval signatures.



OWNERS:

Project manager, quality lead, technical experts and product owner as appropriate.



STAKEHOLDER INPUT:

Customer and user expectations, regulatory requirements and supplier information.

④ PRACTICAL EXAMPLE

Illustrative data migration project:



1. MAPPING REVIEW:

Review data fields and transformation rules against requirements.



2. TRIAL RECONCILIATION:

Run a trial migration and reconcile source and target data.



3. CORRECTION:

Investigate and correct identified discrepancies.



4. SIGNED ACCEPTANCE:

Customer reviews results and signs acceptance record once criteria are met.



RESULT:

Data is migrated, reconciled and accepted in line with the plan (illustrative example).

⑤ PITFALLS & LIMITS



NO SCHEDULED WORK:

A plan without defined activities, timing and resources does not deliver quality.



UNCLEAR RESPONSIBILITIES:

Leads to missed activities and gaps in evidence.



VAGUE CRITERIA:

Unclear or unmeasurable acceptance criteria cause disputes and rework.



EVIDENCE NOT COLLECTED:

Without records, acceptance cannot be demonstrated.



TOO MUCH BUREAUCRACY:

Excessive documentation can slow delivery. Keep it practical and fit for purpose.

⑥ ACTIONS & OUTPUTS



INTEGRATE PLANNING:

Include quality activities in the scope, schedule, cost estimates and resource plan.



ASSIGN & COMMUNICATE:

Confirm responsibilities and share the plan with the team and key stakeholders.



EXECUTE & MONITOR:

Carry out reviews, inspections and tests. Track defects and agreed corrective actions.



REVIEW & IMPROVE:

Hold regular improvement reviews and update the plan as needed.



KEY OUTPUTS:

Approved quality management plan, records of quality activities, defect log, acceptance records and improvement actions.



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ACCEPTANCE CRITERIA MATRIX



Define clear, objective conditions to accept each deliverable and the evidence required.



1 PURPOSE & VALUE

The acceptance criteria matrix connects each deliverable with objective conditions for acceptance and the evidence required.



CLARITY:

Sets out what must be achieved for acceptance.



OBJECTIVITY:

Uses measurable or verifiable criteria.



ALIGNMENT:

Ensures agreement among the project team and stakeholders.



QUALITY ASSURANCE:

Reduces rework and supports consistent decisions.



SCOPE CONTROL:

Helps prevent unplanned requirements and disputes.

2 HOW TO APPLY

List each deliverable and define the acceptance details in a table with these elements:

1



Deliverable:

Name or description of the work product.

2



Acceptance criterion:

Objective condition that must be met.

3



Verification method:

How the criterion will be checked.

4



Reviewer:

Person or role who confirms acceptance.

5



Approval authority:

Role authorized to accept the deliverable.

6



Required evidence:

Records or artifacts to be retained.

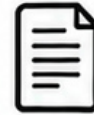
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Review timing:

When the check is performed.

3 INPUTS & EVIDENCE



PROJECT DOCUMENTS:

Scope statement, requirements, work packages and project plan to identify deliverables and intent.



REQUIREMENTS & STANDARDS:

Approved specifications, templates and quality standards to set criteria.



EVIDENCE SOURCES:

Test results, inspection records, data files, meeting sign-offs and user confirmations.



OWNERS & ROLES:

Project manager, product owner, quality reviewer and approval authority for each deliverable.



TOOLS:

Checklists, test scripts, validation tools and document repositories to collect and store evidence.

4 PRACTICAL EXAMPLE

Illustrative acceptance criteria for a project report deliverable:



Deliverable: Monthly project report.



Criterion: Totals reconcile to the approved source and all required fields pass validation.



Method: Compare report totals with the approved source data and run field validation checks.



Reviewer: Project manager.



Authority: Sponsor.



Evidence: Reconciled report file and system validation log.



Timing: At the scheduled monthly review.

5 PITFALLS & LIMITS



SUBJECTIVE CRITERIA:

Vague or opinion-based criteria invite disputes.



MOVING TARGET:

Adding requirements after work has started, without change control, can cause delays and rework.



INCONSISTENT APPLICATION:

Different reviewers using different interpretations lead to inconsistent decisions.



MISSING EVIDENCE:

Acceptance cannot be defended if supporting evidence is not retained.



LIMITATION:

The matrix cannot cover every situation. Criteria and thresholds are project-specific and may vary by deliverable.

6 ACTIONS & OUTPUTS



AGREE EARLY:

Develop and agree the acceptance criteria matrix with key stakeholders before work starts.



COMMUNICATE:

Share criteria with the delivery team and ensure common understanding.



COLLECT EVIDENCE:

Gather and retain the evidence that demonstrates each criterion has been met.



FORMAL ACCEPTANCE:

Confirm and document the decision, including the approver and date.



OUTPUTS:

Completed acceptance criteria matrix and a set of signed evidence records for each accepted deliverable.



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CHECK SHEET

Collect observations consistently at the point where work occurs.



1 PURPOSE & VALUE

A check sheet is a simple, structured form used to collect and tally observations in a consistent way at the point where work occurs.



PURPOSE:

Capture the frequency of defined events, errors or defects as they happen.



VALUE:

Turns observations into reliable data for analysis and decision making.



HELPS WITH:

Identifying patterns, prioritizing problems and tracking improvements over time.



BEST USED FOR:

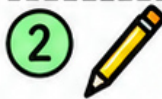
Repetitive work, quality issues and process observations where consistent data is needed.

2 HOW TO APPLY

Design a simple form and clear rules so everyone records observations the same way.



1 Define the purpose and list the categories to be recorded.



2 Write operational definitions for each category.



3 Set the time window, location and who will collect the data.



4 Specify recording rules (for example, one tally per occurrence).



5 Pilot the form, check clarity and make adjustments before full use.

3 INPUTS & EVIDENCE



PROCESS INFORMATION:

List of categories, operational definitions and recording rules agreed with the team.



EVIDENCE COLLECTED:

Completed check sheets with tallies, notes and the defined time window.



REQUIRED INPUTS:

Process documents, current procedures and a clear purpose for data collection.



OWNERS:

Process owner to approve categories, team members to collect data, and quality lead to review and consolidate.



SUPPORTING EVIDENCE:

Instructions, training materials and any observations about unusual events.

4 PRACTICAL EXAMPLE

Illustrative example from a document review. A reviewer uses a check sheet to record the types of data issues found in a defined sample.



Missing fields: 10 tallies



Incorrect codes: 6 tallies



Duplicate entries: 4 tallies

TOTAL OBSERVATIONS: 20



INTERPRETATION:

Most issues were missing fields. Use this information to investigate and plan corrective actions.

5 PITFALLS & LIMITS



NOT A CHECKLIST:

A check sheet collects data. It does not automatically list the actions that must be taken.



UNCLEAR DEFINITIONS:

Vague categories lead to inconsistent data. Use clear, operational definitions.



INCONSISTENT RECORDING:

Different people may interpret categories differently. Provide instructions and, if needed, training.



LIMITED CONTEXT:

A check sheet shows what happened, not why. Further analysis is needed to find root causes.

6 ACTIONS & OUTPUTS



REVIEW DATA QUALITY:

Check for missing observations, ambiguous categories or inconsistent recording.



VALIDATE COMPARABILITY:

Confirm the same definitions and rules were used across people, locations and time periods.



AGREE NEXT STEPS:

Discuss results with the process owner and decide on actions to investigate and address the main issues.



OUTPUTS:

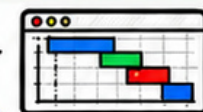
Completed check sheets, consolidated summary of observations and agreed actions for further analysis and improvement.



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The All-in-One PM Templates Bundle

940+ Premium Templates • One Payment • Lifetime Access

\$49

SAVE 94%

Worth \$3,300+



EXCEL & GOOGLE
SHEETS



PROFESSIONAL
& RELIABLE



AUTOMATED
DASHBOARDS



SAVE TIME &
STAY ON TRACK



INSTANT ACCESS
DOWNLOAD

GET LIFETIME ACCESS

PARETO ANALYSIS



Prioritize categories that contribute the largest observed share of a problem.



1 PURPOSE & VALUE

Pareto analysis identifies the vital few categories that contribute the most to a problem, so effort is focused where it matters most.



PRIORITIZE EFFORT:

Focus improvement work on the largest contributors.



USE RESOURCES WISELY:

Direct time, budget and people to high-impact areas.



MAKES PATTERNS VISIBLE:

Shows which categories contribute the most.



SUPPORTS BETTER DECISIONS:

Provides a simple, data-based way to set improvement priorities.

2 HOW TO APPLY

Use consistent counts, cost or impact across categories, then sort and show the cumulative contribution.

1



Define the problem and the measurement basis (e.g., count, cost or time).

2



Collect data for each category using the same basis and time period.

3



Sort categories from highest to lowest contribution.

4



Calculate the cumulative contribution for each category.

5



Identify the vital few categories to investigate further.



CONTROL:

Use consistent data and a clear measurement basis for all categories.

3 INPUTS & EVIDENCE



PROBLEM STATEMENT:

Clear description of the issue and scope of analysis.



DATA & EVIDENCE:

Counts, cost, time or other consistent impact measure for each category, from a defined and reliable period.



DATA SOURCES:

Defect logs, service tickets, inspection records, customer feedback or other project records.



OWNERS & ROLES:

Data owner to provide verified data and a facilitator to prepare and review the analysis.



TIME PERIOD:

Specify the period covered and any filters, such as project phase, product or location.

4 PRACTICAL EXAMPLE

Illustrative analysis of defect categories in a software release:

Coding defects:	40
Missing fields:	30
Other defects:	30

Total defects = 100

Coding defects have the largest contribution (40%), so they are the first area to investigate. Missing fields and other defects are also significant.



RESULT:

Coding defects are the largest category, but this is not an automatic 80/20 pattern. All categories are reviewed based on data, severity and risk.

5 PITFALLS & LIMITS



80/20 IS A HEURISTIC:

A Pareto pattern is common but not a law. Do not assume exact percentages.



SMALL CATEGORIES MATTER:

Rare but severe failures may still require priority, even if they are not among the largest categories.



DATA QUALITY:

Incomplete or inconsistent data can lead to wrong conclusions.



CHANGING CONDITIONS:

Contributions may change over time, so review and update the analysis.



SINGLE-METRIC FOCUS:

Do not rely only on counts. Also consider severity, risk, customer impact and cost.

6 ACTIONS & OUTPUTS



INVESTIGATE MAJOR CONTRIBUTORS:

Analyse the top categories to find root causes and improvement opportunities.



CONSIDER SEVERITY & RISK:

Prioritize actions using impact, severity and risk, not just volume.



ASSIGN ACTIONS:

Give each action an owner, deadline and expected effect.



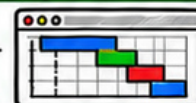
IMPLEMENT & MONITOR:

Apply changes and track results to see if the contribution reduces.



OUTPUTS:

Pareto analysis table and chart, list of prioritized categories, recommended actions and an agreed follow-up plan.



CAUSE-AND-EFFECT DIAGRAM



Organize possible causes of a defined problem for investigation.



① PURPOSE & VALUE

A cause-and-effect diagram helps a team organize and explore possible causes of a defined problem (effect).



CLARIFIES THE PROBLEM:

Keeps the team focused on one clear effect.



STRUCTURES THINKING:

Groups causes into logical categories.



BUILDS AGREEMENT:

Captures team knowledge and different perspectives.



GUIDES INVESTIGATION:

Highlights likely areas for data collection and testing.

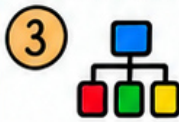
② HOW TO APPLY



1 State the specific effect (problem) to be analyzed.



2 Brainstorm plausible causes with the team.



3 Group causes into relevant categories (e.g. people, process, tools, materials, information, environment).



4 Ask for evidence and discuss how each cause could lead to the effect (causal mechanism).



5 Review, refine and prioritize the most likely causes for further investigation.

③ INPUTS & EVIDENCE



PROBLEM STATEMENT:

Clear description of the effect, scope and boundaries.



TEAM KNOWLEDGE:

Input from people who do the work and understand the process.



RELEVANT EVIDENCE:

Process data, records, observations, complaints and other factual information.



REQUIRED OWNERS:

Process owner, subject-matter experts and data owner to provide information and validate causes.



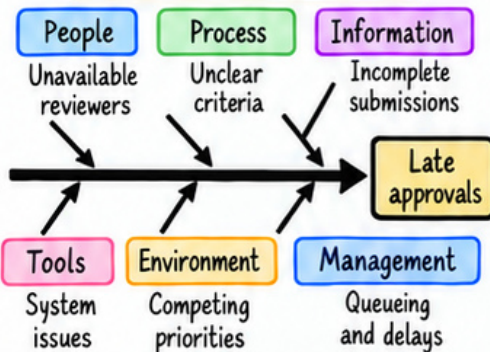
SUPPORTING INFORMATION:

Procedures, work instructions, system logs and recent changes that may explain causes.

④ PRACTICAL EXAMPLE

Illustrative project: deliverables are not approved on time.

Effect: Late approvals



INTERPRETATION:

These are possible causes to investigate, not confirmed root causes. Each cause needs evidence.

⑤ PITFALLS & LIMITS



NOT PROOF:

A fishbone diagram lists hypotheses, not proven root causes.



INCOMPLETE LIST:

Important causes may be missed if the right people are not involved.



TOO VAGUE:

Broad or unclear causes are hard to test and do not lead to useful actions.



NO EVIDENCE:

Relying only on opinions can lead to the wrong conclusions.



CONTEXT SPECIFIC:

Causes and significance vary by project and should fit the selected scope.

⑥ ACTIONS & OUTPUTS



SELECT CAUSES:

Choose the most likely and testable causes from the diagram for further analysis.



GATHER EVIDENCE:

Verify selected causes using observations, data, interviews or document review.



CONFIRM OR DISPROVE:

Assess whether each cause contributes to the effect and understand the causal mechanism.



DEFINE ACTIONS:

Plan and implement actions to address confirmed causes.



OUTPUTS:

Documented fishbone diagram, list of tested causes, evidence summary and agreed actions with owners and due dates.



FIVE WHYS



Find the underlying cause by repeatedly asking why a problem occurred.

① PURPOSE & VALUE

Five Whys explores a causal chain by repeatedly asking why a specific problem occurred, until an actionable, supported cause is identified.



FIND ROOT CAUSES:

Looks beyond symptoms to the underlying cause.



SIMPLE METHOD:

Uses plain questions and evidence, not complex tools.



IMPROVE SYSTEMS:

Highlights process, data or resource issues behind the event.



PREVENT RECURRENCE:

Helps define changes that reduce the chance of the problem happening again.

② HOW TO APPLY

1



Start with a clear, factual statement of the specific problem.

2



Ask "Why did this happen?" and write the answer.

3



Test each answer with evidence. If unclear, ask why again.

4



Branch when different plausible causes emerge. Explore each path.

5



Stop when you reach a cause that is actionable and supported by evidence.



CONTROL:

Do not stop at a symptom. Confirm the cause with reliable evidence.

③ INPUTS & EVIDENCE



PROBLEM EVENT:

Clear description of what happened, when, where and its impact.



RELEVANT EVIDENCE:

Project records, timelines, data logs, emails, meeting notes and system reports.



PROCESS INFORMATION:

Procedures, work instructions, dependencies and resource availability.



KEY STAKEHOLDERS:

Team members, process owners and subject matter experts.



OWNERS:

Facilitator to lead the analysis and relevant owners to provide data and validate findings.

④ PRACTICAL EXAMPLE

Illustrative example of a late report:

Why 1:

The report was late.
Because review began late.

↓

Why 2:

Why did review begin late?
Because the required dataset was unavailable.

↓

Why 3:

Why was the dataset unavailable? Investigate this dependency (e.g. data owner not provided it, system delay, or unclear request).



NEXT STEP:

Gather evidence, identify the actual cause and define a change to prevent recurrence.

⑤ PITFALLS & LIMITS



NOT ALWAYS FIVE:

It may take more or fewer than five questions to reach a supported cause.



SINGLE STORY RISK:

Avoid one convenient explanation. Explore multiple plausible causes when needed.



DO NOT BLAME PEOPLE:

Focus on process, data, tools or system issues, not individuals.



UNVERIFIED ANSWERS:

Do not accept answers without evidence.



SYMPTOM NOT CAUSE:

Stopping at a symptom can lead to ineffective solutions and repeat problems.

⑥ ACTIONS & OUTPUTS



VALIDATE CAUSES:

Confirm the root cause(s) with evidence and stakeholder input.



ASSIGN CHANGES:

Define and assign actions that address the system behind the event (e.g. update process, improve data flow, clarify roles).



IMPLEMENT & TRACK:

Apply changes, set owners and monitor completion.



PREVENT RECURRENCE:

Update procedures, checklists or training as needed.



OUTPUTS:

Documented root cause(s), agreed actions, owners and updates to relevant project documents.



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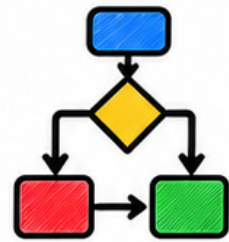
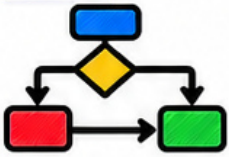
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PROCESS FLOWCHART

Show the actual sequence of work, decisions and handoffs.



1 PURPOSE & VALUE

A process flowchart maps how work is done from start to end, making activities, decisions and handoffs visible.



VISUALIZE WORK:

Show the real sequence of steps and handoffs.



IMPROVE UNDERSTANDING:

Create a shared view across the team and stakeholders.



FIND IMPROVEMENTS:

Reveal delays, rework and unnecessary steps.



SUPPORT CONSISTENCY:

Clarify who does what and when, reducing confusion.



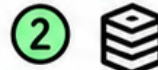
USE:

Project delivery, operations, onboarding and change initiatives.

2 HOW TO APPLY



1 Define the scope, start and end of the process.



2 List the activities in the actual order they occur.



3 Add decision points with clear yes/no branches.



4 Include rework loops and handoffs between roles or teams.



5 Identify owners for each step.



6 Validate the flow with people who do the work and update as needed.



CONTROL:

Use observed practice, not an idealized process.

3 INPUTS & EVIDENCE



EXISTING INFORMATION:

Current procedures, work instructions, system screens and policy documents.



REAL WORK EVIDENCE:

Actual cases, emails, tickets, approval records and handoff logs.



PEOPLE & OWNERS:

Process participants, step owners and decision makers.



SYSTEMS & TOOLS:

Applications, forms and communication channels used in the process.



DEPENDENCIES:

Upstream and downstream processes, external parties and required inputs.

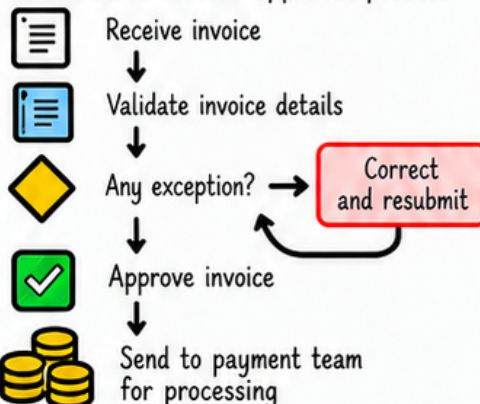


VALIDATION:

Confirm the flow and evidence with people who perform the work in practice.

4 PRACTICAL EXAMPLE

Illustrative invoice approval process:



INTERPRETATION:

The flow shows the normal path, a decision branch for exceptions, and a rework loop back to validation. This makes handoffs and ownership clear.

5 PITFALLS & LIMITS



IDEALIZED PROCESS:

A neat diagram can hide real delays, workarounds and informal steps.



MISSING PERSPECTIVES:

Relying on documents only may miss what actually happens in practice.



UNCLEAR DECISIONS:

Vague decision criteria lead to inconsistent outcomes.



IGNORING REWORK:

Leaving out loops understates the true effort and cycle time.



CONSTANTLY CHANGING:

Frequent changes can make the flow outdated. Review and update regularly.

6 ACTIONS & OUTPUTS



WALK THROUGH ACTUAL CASES:

Discuss real examples with users to confirm each step, decision and handoff.



TARGET IMPROVEMENTS:

Look for unnecessary loops, unclear decisions, duplicate approvals or handoffs that can be simplified.



ASSIGN OWNERS:

Agree responsible roles for each activity and decision.



UPDATE & SHARE:

Refine the flow and publish it for the team to use.



OUTPUTS:

A clear, validated process flowchart with activities, decisions, handoffs and owners, plus a list of improvement actions.



SIPOC MAPPING



Define a process at a high level through Suppliers, Inputs, Process, Outputs and Customers.



① PURPOSE & VALUE

SIPOC provides a high-level view of a process, showing Suppliers, Inputs, Process, Outputs and Customers, to align understanding before detailed analysis.



CLARITY: Creates a shared view of scope and key elements.



ALIGNMENT: Helps stakeholders agree on boundaries and interfaces.



FOCUS: Highlights what enters and leaves the process.



BETTER ANALYSIS: Identifies key areas for deeper investigation.



COMMUNICATION: Simple format easy for diverse stakeholders to understand.

② HOW TO APPLY



1 Agree the process boundaries. Define the start and end points and what is in scope.



2 Identify the key suppliers and their main inputs.



3 Describe the high-level process with a few major steps.



4 Identify the main outputs and their characteristics.



5 Identify the customers who receive and use the outputs.



CONTROL:

Keep the map high-level. Confirm scope with key stakeholders before moving to detailed analysis.

③ INPUTS & EVIDENCE



PROCESS INFORMATION:

Existing process descriptions, SOPs and relevant documentation to understand how work currently operates.



INPUT EVIDENCE:

List of key inputs from suppliers, including requirements and acceptance criteria.



OUTPUT EVIDENCE:

Description of main outputs, formats and quality requirements.



STAKEHOLDERS & OWNERS:

Process owner, key suppliers and key customers to review and validate the map.



ADDITIONAL SOURCES:

Procedures, interface agreements, meeting notes and any relevant process metrics or records.

④ PRACTICAL EXAMPLE

Illustrative SIPOC for the test execution process at a high level:

SUPPLIERS

Development team,
Test management.
Provide builds and test cases.

INPUTS

Approved builds,
Approved test cases,
Test environment access.

PROCESS

Prepare environment,
Execute test cases,
Record and analyze results.

OUTPUTS

Verified test results,
Defects (issues),
Test summary report.

CUSTOMERS

Delivery team,
Product owner.
Use results to make
release decisions.



ILLUSTRATIVE ONLY:

Example kept high-level; actual items will vary by project and context.

⑤ PITFALLS & LIMITS



NOT A DETAILED WORKFLOW:

SIPOC is a scoping view and does not show every activity, decision or handoff.



NOT PROOF OF CAPABILITY:

It does not confirm that the process is effective, efficient or meeting quality requirements.



RISK OF OVER-SIMPLIFICATION:

Too much detail can make the map complex; too little detail can miss important interfaces.



BOUNDARY UNCERTAINTY:

Unclear start or end points to scope confusion and missing elements.



CONTEXT DEPENDENT:

Thresholds, terminology and level of detail will vary by project, industry and method.

⑥ ACTIONS & OUTPUTS



CONFIRM INTERFACES:

Review and validate suppliers, inputs, outputs and customers with key stakeholders.



USE THE MAP:

Identify gaps, unclear areas or missing inputs and outputs to focus further analysis.



AGREE NEXT STEPS:

Decide which parts of the process need more detailed mapping or improvement work.



COMMUNICATE & ALIGN:

Share the SIPOC map with stakeholders to build a common understanding and confirm scope.



KEY OUTPUTS:

A completed SIPOC map showing Suppliers, Inputs, Process, Outputs and Customers, used to prioritise further investigation and analysis.

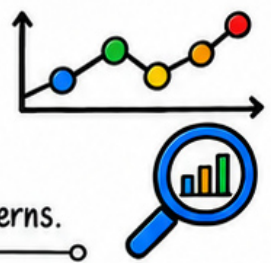
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RUN CHART



Display observations in time order to identify possible changes or patterns.

1 PURPOSE & VALUE

A run chart displays observations in time order to help you see changes, trends, or patterns in a process.



VISUALISE OVER TIME:
Shows how a measure behaves across time.



SPOT CHANGES:
Helps identify shifts, trends or unusual patterns.



SUPPORT DECISIONS:
Highlights when to investigate and when to take action.



SIMPLE AND FLEXIBLE:
Useful for many types of data and project settings.

2 HOW TO APPLY



1 Define the measure clearly and collect data at consistent time intervals.



2 Use the same measurement method, units and time intervals throughout.



3 Plot the data in time order and connect the points with a line.



4 Label important events such as process changes, releases or external factors.



5 Look for patterns such as shifts, trends, cycles or unusual points.



6 If used, apply a documented pattern rule and state the rule used.

3 INPUTS & EVIDENCE



DATA:
Sequential observations of the chosen measure with dates or time periods.



DEFINITIONS:
Clear measure definition, units and data collection method.



CONTEXT INFORMATION:
Records of process changes, releases, external events or seasonal factors.



OWNERS:
Process owner provides the data. Project team reviews and interprets the chart.



EVIDENCE RECORDS:
Data source files, change logs and notes on data quality and assumptions.

4 PRACTICAL EXAMPLE

Illustrative project using weekly defect counts to review a process change:



1. **Collect data:**
Record the number of defects each week using the same definition and counting method.



2. **Plot the run chart:**
Display the weekly counts in time order and connect the points.



3. **Add a change label:**
Mark the week a process change was introduced.



4. **Review the pattern:**
Look for a sustained shift after the change to see if the process behaviour appears different.



INTERPRETATION:
A visible downward or upward shift after the change may indicate a possible impact. This example is illustrative only.

5 PITFALLS & LIMITS



NO CONTROL LIMITS:
A run chart does not have statistical control limits by default. It only shows the data over time.



NOT CAUSATION:
A visual association between a change and a pattern does not prove causation.



INCONSISTENT DATA:
Changing the measure, units or time intervals can create misleading patterns.



MISSING CONTEXT:
Failing to label changes or consider external factors can lead to incorrect conclusions.



PATTERN RULES:
Different pattern rules exist. Use a documented rule and be consistent in its application.

6 ACTIONS & OUTPUTS



INVESTIGATE PATTERNS:
Follow up on meaningful shifts, trends or unusual points to understand the causes.



CONSIDER CONTEXT:
Review process changes, volume, seasonality and other factors that may explain the pattern.



TAKE ACTION:
Decide on corrective or decision actions where appropriate and monitor the effect.



OUTPUTS:
Run chart with labels, documented observations, interpretation and follow-up actions.



RETAIN RECORDS:
Keep the chart, data, change log and conclusions for future reference and ongoing monitoring.



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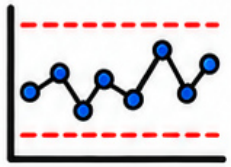
30 Project Quality Management Tools



CONTROL CHART



Distinguish common-cause process variation from signals requiring investigation.



1 PURPOSE & VALUE

A control chart shows how a process measure changes over time and helps distinguish normal (common-cause) variation from unusual signals that need investigation.



MONITOR STABILITY:

Check if the process is in statistical control.



DETECT SIGNALS:

Identify non-random patterns that suggest an assignable cause.



SUPPORT BETTER DECISIONS:

Avoid reacting to ordinary fluctuations.



IMPROVE PROCESS:

Focus effort on real issues to reduce variation and increase consistency.

2 HOW TO APPLY

Choose the right chart for your data type and sampling, establish limits from a stable baseline, and use documented signal rules.



1 Select a suitable chart (e.g., $\bar{X}$ -R, p, np, c or u) based on data type and sampling method.



2 Collect data from a stable process to calculate center line and control limits.



3 Apply standard signal rules (e.g., a point outside limits or a non-random pattern).



4 Investigate signals to find assignable causes and confirm the cause.



5 Take corrective action and continue monitoring to confirm improvement.



CONTROL:

Use valid limits from a stable baseline. Do not change limits without a reason.

3 INPUTS & EVIDENCE



PROCESS DATA:

Time-ordered measurements or counts, collected with a consistent method and sampling plan.



CHART SELECTION INFO:

Data type (variable or attribute), subgroup size, and rational subgroup method.



BASELINE EVIDENCE:

A period of stable process data (without special causes) to establish center line and control limits.



DOCUMENTED RULES:

Agreed signal rules and investigation procedure.



OWNERS & ROLES:

Process owner provides data, quality or PMO supports analysis, team investigates signals and implements actions.

4 PRACTICAL EXAMPLE

Illustrative example for a filling process:



A measured fill weight falls outside the upper control limit on today's sample, indicating a potential assignable cause.

SITUATION:

A routine sample is plotted and one point is above the upper control limit.



ACTION:

Investigate the cause, such as equipment adjustment, material change or operator error.



FOLLOW UP:

Confirm the cause, apply a fix and monitor subsequent points to ensure the process returns to control.

5 PITFALLS & LIMITS



NOT SPEC LIMITS:

Control limits show process variation, not customer requirements. An in-control process can still fail specifications.



WRONG DATA:

Using non-representative or mixed data can give misleading limits and signals.



IGNORING PATTERNS:

Trends, runs or cycles may indicate a problem even if all points are within limits.



OVERREACTION:

Investigating every ordinary fluctuation wastes time and creates unnecessary changes.



LIMITATION:

A control chart shows statistical signals. It does not identify the root cause; investigation is required.

6 ACTIONS & OUTPUTS



VERIFY ASSUMPTIONS:

Check data type, measurement system, subgrouping and that the baseline was stable.



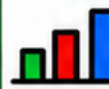
INVESTIGATE SIGNALS:

Use a structured root cause analysis to find and confirm assignable causes.



IMPROVE THE SYSTEM:

Implement actions that remove the cause and reduce process variation.



CONTINUE MONITORING:

Keep collecting and plotting data to confirm the process remains in control after changes.



KEY OUTPUTS:

Updated control chart, investigation record, actions taken and evidence of sustained improvement.



HISTOGRAM



Show the distribution of measured values over a defined sample.

1 PURPOSE & VALUE

A histogram shows how often measured values fall into ranges (bins) for a defined sample.



VISUALISE DISTRIBUTION:

Reveals the spread, shape and common values.



IDENTIFY PATTERNS:

Shows typical range and unusual clusters or gaps.



HIGHLIGHT VARIATION:

Makes skewness, outliers and multi-modal patterns easy to see.



SUPPORT DECISIONS:

Helps select actions and explain variation to stakeholders.

2 HOW TO APPLY

1



Define the data element to analyse and the objective (e.g., duration, size, defects).

2



Choose sensible bins (equal width or based on your context) and keep units consistent.

3



Collect a representative sample of completed items from the same process.

4



Plot the histogram with clear bin labels and axis units.

5



Examine the spread, shape and any unusual clusters, gaps or outliers.



CONTROL:

Use consistent units, reasonable bin widths and a representative sample for valid interpretation.

3 INPUTS & EVIDENCE



MEASURED DATA:

Numerical values for a defined sample (e.g., durations, sizes, defects).



SOURCE & OWNERS:

Project records, tools or databases. Owned by the data owner or process owner.



CONTEXT INFORMATION:

Definition of the measure, units, time period, filters and inclusion criteria. Provided by the analyst or process owner.



SAMPLE QUALITY:

Representative and complete data, not selectively chosen. Validated by the data steward.

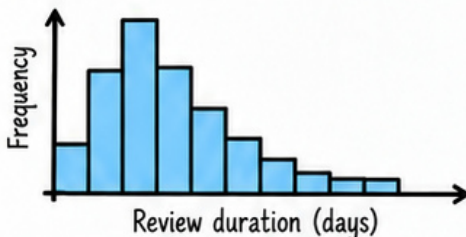


SUPPORTING EVIDENCE:

Any relevant notes on data collection method and known changes in the process.

4 PRACTICAL EXAMPLE

Illustrative example: histogram of review duration for completed work items. The distribution may show many short reviews and a long right tail that an average hides.



INTERPRETATION:

Most items are completed quickly, with a few taking much longer. This suggests an average alone would not show the longer durations.

5 PITFALLS & LIMITS



REMOVES TIME ORDER:

A histogram does not show when values occurred, so trends and shifts in time are hidden.



NOT A STABILITY PROOF:

It cannot by itself prove the process is stable or in control.



NORMALITY ASSUMPTION:

Do not assume a normal (bell) shape. Many project measures are skewed or multi-modal.



DATA LIMITATIONS:

Misleading results can occur with small, biased or inconsistent data, or poorly chosen bin widths.



USE WITH CAUTION:

It summarises the distribution only and does not show causes.

6 ACTIONS & OUTPUTS



PAIR WITH TIME ANALYSIS:

Use run charts or control charts to check for trends, shifts or instability over time.



INVESTIGATE FINDINGS:

Explore unusual clusters, long tails or gaps to find root causes or mixed populations.



TAKE ACTION:

Address identified causes (e.g., different work types, missing steps or blockers) and implement improvements.



OUTPUTS:

Histogram with clear labels, a short interpretation, key insights and agreed actions.



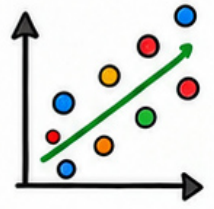
FOLLOW UP:

Recheck with new data after changes to confirm the distribution has improved.





SCATTER DIAGRAM



Explore the relationship between two measured variables.

1 PURPOSE & VALUE

A scatter diagram shows how two measured variables are related using pairs of data points. It helps you see patterns, strength and direction of the relationship.



EXPLORE:

Identify whether a relationship exists.



UNDERSTAND:

See if the relationship is positive, negative or no clear pattern.



INVESTIGATE:

Spot unusual points and potential causes.



VALUE:

Supports data-driven decisions and prioritizes further analysis.

2 HOW TO APPLY



1

Define the two variables and ensure each pair of observations matches (e.g., same item or period).



2

Plot the pairs on a scatter diagram. Label both axes with variable names and units.



3

Inspect the pattern (direction, strength, form) and look for outliers.



4

Consider confounding factors that might influence the relationship.



5

Use the observed pattern to guide further analysis and actions.



CONTROL:

Pair data correctly and use consistent units on both axes.

3 INPUTS & EVIDENCE



DATA PAIRS:

Measured values for both variables with clear units and the same observation basis (e.g., same items or time periods).



DATA SOURCES:

Project records, system reports, databases or measurements.



RELEVANT EVIDENCE:

Complete and accurate paired data, notes on data definitions and any data quality checks.



OWNERS:

Data analyst or project team member responsible for collecting, verifying and providing the data.



CONTEXT INFORMATION:

Known factors that could influence the relationship (e.g., different teams, complexity, or time periods).

4 PRACTICAL EXAMPLE

Illustrative example: plot review duration against submission size to explore whether larger packages tend to take longer.



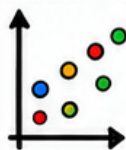
VARIABLES:

X: Submission size (pages)
Y: Review duration (days)



PLOT:

Create a scatter diagram with submission size on the horizontal axis and review duration on the vertical axis. Label both axes with units.



OBSERVE:

Look for a general pattern (e.g., upward trend), and check for outliers that may need investigation.

5 PITFALLS & LIMITS



CORRELATION $\neq$ CAUSATION:

A relationship does not prove one variable causes the other. Other factors may be involved.



NONLINEAR PATTERNS:

A simple correlation coefficient may miss curved or complex relationships.



OUTLIERS:

Unusual points can distort the apparent relationship. Check for data errors and real causes.



CONFOUNDING FACTORS:

A third variable may influence both variables, creating a misleading pattern.



LIMITATION:

Results depend on data quality, range and context. Use additional analysis before drawing conclusions.

6 ACTIONS & OUTPUTS



INTERPRET RESULTS:

Summarize the observed pattern (strength and direction) and note any outliers.



CHECK FURTHER:

Use domain knowledge and additional analysis to understand possible causes.



IDENTIFY ACTIONS:

Decide whether to investigate further, collect more data, or test potential drivers.



OUTPUTS:

Scatter diagram with labeled axes, brief interpretation, list of potential factors and recommended next steps.



FOLLOW UP:

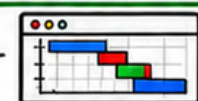
If a meaningful relationship is supported, consider targeted actions and monitor results.



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STRATIFICATION

Separate data into relevant groups to reveal hidden patterns.



1 PURPOSE & VALUE

Stratification separates data into relevant groups to reveal hidden patterns, differences and root causes that are not visible in overall averages.



SHOWS PATTERNS:

Highlights where issues are concentrated.



FOCUSES ANALYSIS:

Helps identify likely causes and priorities for action.



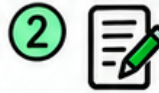
SUPPORTS BETTER DECISIONS:

Enables targeted solutions instead of one-size-fits-all actions.

2 HOW TO APPLY



Choose meaningful categories such as team, supplier, product or work type.



Define each category clearly and keep the definitions consistent.



Collect and sort data into the chosen groups.



Compare results across groups to look for differences and patterns.



Investigate the reasons for significant variations and confirm root causes.



CONTROL:

Use consistent category definitions and time periods for valid comparison.

3 INPUTS & EVIDENCE



DATA REQUIREMENTS:

Defect records, inspection results, customer feedback or other relevant quality data with clear dates and category information.



USEFUL EVIDENCE:

Data already grouped by team, supplier, product, work type or location. Ensure data is accurate, complete and traceable.



OWNERS:

Quality team to provide data, process owners to explain context, and project manager to coordinate the analysis.



DEPENDENCIES:

Reliable data collection process and consistent category definitions across the project.



QUALITY CHECK:

Verify data completeness and that each record is assigned to the correct group.

4 PRACTICAL EXAMPLE

Illustrative example from product defects:

Overall defect rate: 5%

After stratification by product type:

Product A: 2%

Product B: 12%

This shows that the overall rate may hide a serious problem in Product B, while Product A is performing well.



INTERPRETATION:

Stratification reveals where to focus investigation and corrective action, rather than treating all products the same.



NOTE:

Numbers are illustrative only. Actual results and thresholds are project-specific and may differ.

5 PITFALLS & LIMITS



SMALL GROUPS:

Very small sample sizes can lead to misleading comparisons.



UNEQUAL COMPLEXITY:

Groups with different levels of complexity may not be directly comparable.



INCONSISTENT DEFINITIONS:

Changing category definitions over time can hide true patterns.



SENSITIVE DATA:

Protect confidential or sensitive data and follow organizational rules.



AVOID MISUSE:

Do not use stratification to make unsupported performance rankings or unfair comparisons.

6 ACTIONS & OUTPUTS



INVESTIGATE DIFFERENCES:

Explore the contextual factors behind significant variations, such as process changes, supplier issues or different work conditions.



TAKE TARGETED ACTION:

Develop specific actions for the groups with higher problem rates based on the identified causes.



COLLABORATE:

Work with relevant owners to agree and implement improvements in the affected groups.



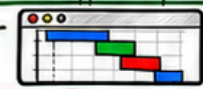
MONITOR RESULTS:

Track the impact of actions on each group and check if differences are reduced.



OUTPUTS:

Stratified analysis showing key patterns, findings, agreed actions and a record of follow-up, without unsupported performance rankings.





INSPECTION CHECKLIST



Guide a repeatable examination against defined requirements.

1 PURPOSE & VALUE

An inspection checklist guides a repeatable examination to confirm that work meets defined requirements before acceptance or release.



VERIFIES COMPLIANCE:

Confirms required standards, specifications and policies are met.



IMPROVES QUALITY:

Finds defects early, before they reach customers.



ENSURES CONSISTENCY:

Uses the same checks for repeatable and fair reviews.



REDUCES REWORK:

Catches issues early, saving time and effort.



BUILDS CONFIDENCE:

Provides documented evidence of a thorough review.

2 HOW TO APPLY

1



Turn each requirement into a clear, verifiable check (Yes/No or criteria).

2



Specify required evidence for each check.

3



Assign a responsible reviewer or owner.

4



Define how to record results and handle exceptions.

5



Review and update the checklist from defects and lessons learned.



CONTROL:

Do not close the review while unresolved exceptions remain open.

3 INPUTS & EVIDENCE



REQUIREMENTS:

Approved scope, specifications, standards, and acceptance criteria to be checked.



EVIDENCE:

Test results, configuration records, approvals, documents, or other verifiable proof.



OWNERS:

Named reviewer for each check (e.g., developer, tester, security, operations).



CHECKLIST:

A list of verifiable checks with evidence type and responsible person defined.



EXCEPTIONS LOG:

Record of items that do not meet criteria, with planned actions and target dates.

4 PRACTICAL EXAMPLE

Illustrative project: software release checklist before production deployment.



Version:

Confirm the approved version is deployed.



Access configuration:

Verify roles and permissions match security requirements.



Test evidence:

Confirm required tests ran and all critical defects are resolved.



Rollback readiness:

Check that a rollback plan and required resources are available.



RESULT:

All checks completed with required evidence, or recorded as exceptions with agreed actions.

5 PITFALLS & LIMITS



CHECKING A BOX IS NOT INSPECTION:

A check without supporting evidence does not prove compliance.



LIMITED SCOPE:

A checklist can miss novel failure modes or issues not anticipated.



OUTDATED CHECKLIST:

Using an old checklist can miss new requirements or risks.



FALSE CONFIDENCE:

Passing all checks does not guarantee the absence of defects.



CONTEXT DEPENDENT:

Effectiveness depends on having the right checks, evidence and competent reviewers.

6 ACTIONS & OUTPUTS



CONDUCT THE REVIEW:

Complete each check, collect evidence and record the result (yes, no, or not applicable).



HANDLE EXCEPTIONS:

Log unmet criteria, agree actions, assign owners and target dates, and track to closure.



IMPROVE THE CHECKLIST:

Update checks based on defects, near-misses and lessons learned.



OUTPUTS:

Completed checklist, evidence records, and an exceptions log with current status.



USE THE RESULTS:

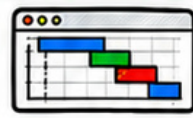
Confirm whether the work meets release or acceptance criteria and can proceed.



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PEER REVIEW



Use qualified colleagues to identify defects and improve a work product.



1 PURPOSE & VALUE

A peer review uses qualified colleagues to examine a work product and identify defects, improvements and risks before formal acceptance.



IMPROVE QUALITY:
Find errors, gaps and inconsistencies early.



BETTER DECISIONS:
Gain unbiased perspectives from experienced peers.



REDUCE REWORK:
Fix issues before submission or handover.



BUILD SHARED UNDERSTANDING:
Strengthen team knowledge and consistency.

2 HOW TO APPLY

1



Define scope:
Specify which sections, documents or deliverables will be reviewed.

2



Set review criteria:
Agree on quality, accuracy, completeness and compliance requirements.

3



Independent preparation:
Reviewers examine the work individually before discussion.

4



Record issues:
Log defects, risks and improvement suggestions clearly and objectively.

5



Resolve and verify:
Take agreed actions and confirm that issues are closed with evidence.

3 INPUTS & EVIDENCE



WORK PRODUCT:
Draft documents, designs, calculations, plans, code or other deliverables to be reviewed.



REVIEW CRITERIA:
Applicable standards, requirements, checklists and acceptance criteria.



REVIEWERS:
Qualified colleagues with relevant skills and independence.



BACKGROUND INFORMATION:
Scope, assumptions, previous versions and related reference materials.



RECORDING TOOL:
Issue log, comments template or review platform.



OWNERS:
Work product owner organizes the review; reviewers provide independent feedback.

4 PRACTICAL EXAMPLE

Illustrative example: A financial report is reviewed by a second analyst before submission to the sponsor.



1. **DEFINE SCOPE:**
Review the calculation logic, key assumptions and summary tables in the report.



2. **INDEPENDENT REVIEW:**
A second analyst checks formulas, data sources and assumptions using the agreed criteria.



3. **RECORD FINDINGS:**
Log questions about an assumption and a calculation discrepancy.



4. **RECORD & VERIFY:**
The first analyst updates the report and the reviewer confirms the changes before submission.

5 PITFALLS & LIMITS



NOT JUST PROOFREADING:
A peer review is not limited to checking spelling or grammar. It assesses technical content, logic and completeness.



NOT A SUBSTITUTE:
It does not replace required independent approval, formal testing or regulatory review when these are needed.



DEPENDENCE RISK:
Reviewers may miss issues if they lack the right expertise, are rushed, or are too close to the work.



TIME & SCOPE:
Reviews take time and may not catch every issue. Scope and criteria must be realistic and focused.

6 ACTIONS & OUTPUTS



PLAN THE REVIEW:
Agree scope, criteria, reviewers and timing.



CONDUCT REVIEW:
Review independently and hold a discussion to compare findings.



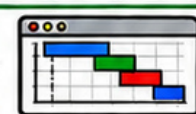
CLOSE FINDINGS:
Take agreed actions and verify that each issue is resolved.



OUTPUTS:
Updated work product and a concise review record showing comments, actions and evidence of closure.



RETAIN RECORD:
Keep the review log and final version with the project files for audit and future reference.



QUALITY AUDIT



Assess whether processes and controls meet agreed requirements and operate effectively.



1 PURPOSE & VALUE

A quality audit is an independent examination of project processes, controls and records to assess conformance with agreed requirements and to identify improvements.



CONFIRM COMPLIANCE:

Check that required processes are defined and followed.



ASSESS EFFECTIVENESS:

Determine if controls operate as intended in practice.



FIND IMPROVEMENTS:

Identify gaps and opportunities to strengthen quality.



ADD VALUE:

Build confidence in deliverables and support continual improvement.

2 HOW TO APPLY

Follow a structured approach to plan, execute and report the audit.

1



SET AUDIT CRITERIA AND SCOPE:

Use requirements, policies and standards. Define what is in and out of scope.

2



SELECT SAMPLES:

Choose representative records, deliverables or activities to review.

3



INTERVIEW OWNERS:

Talk with team members to understand how work is performed.

4



DOCUMENT FINDINGS:

Record evidence, classify observations and agree corrective actions.

3 INPUTS & EVIDENCE



RELEVANT DOCUMENTS:

Plans, procedures, standards, work instructions and requirements.



RECORDS & DELIVERABLES:

Completed work products, review records, test results and change logs.



PEOPLE & OWNERS:

Process owners, team members and subject matter experts for interview.



AUDIT EVIDENCE:

Objective evidence such as signed reviews, reports, meeting minutes and system records.



DATA SOURCES:

Project repositories, tools and configuration management systems.

4 PRACTICAL EXAMPLE

Illustrative project audit of design reviews:



1. CHECK RECORDS:

Review design review schedules, meeting minutes and action logs to confirm required reviews occurred.



2. VERIFY FINDINGS:

Check that review findings were recorded and assigned for resolution.



3. CONFIRM RESOLUTION:

Review evidence that all findings were addressed before release of the deliverable.



RESULT:

Provides assurance that the design review process was followed and findings were resolved.

5 PITFALLS & LIMITS



CONFORMANCE ≠ QUALITY:

Following the process does not guarantee a good product, service or outcome.



MAINTAIN OBJECTIVITY:

Use independent auditors and avoid conflicts of interest.



LIMITED SCOPE:

Audits cover selected areas at a point in time and may not find every issue.



SUBJECTIVE EVIDENCE:

Relying only on interviews can be biased; always corroborate with objective records.



NOT A GUARANTEE:

A clean audit does not remove all risk or assure future performance.

6 ACTIONS & OUTPUTS



AUDIT REPORT:

Document findings, evidence and agreed corrective actions.



AGREE CORRECTIVE ACTIONS:

Work with owners to define actions, responsible persons and due dates.



VERIFY IMPLEMENTATION:

Follow up to confirm corrective actions were completed and effective.



IDENTIFY SYSTEMIC IMPROVEMENTS:

Look for recurring issues and opportunities to improve processes and controls.



OUTPUTS:

Audit report, action log and recommended process improvements for management review.



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ROOT CAUSE ANALYSIS



Identify supported underlying causes of a problem so recurrence can be reduced.

1 PURPOSE & VALUE

Root cause analysis (RCA) finds the underlying cause or combination of causes that led to a problem, so recurrence can be reduced.



FOCUS:

Looks beyond symptoms to identify real causes.



VALUE:

Enables effective, lasting solutions.



USE WHEN:

Problems repeat, impacts are significant, or the cause is unclear.



OUTCOME:

Agreed, evidence-based cause(s) and targeted preventive actions.

2 HOW TO APPLY

Follow a structured approach to find and confirm the causal mechanism and select interventions.

1



Define the problem event clearly (what happened, where, when).

2



Gather and review evidence from multiple sources.

3



Build possible causal explanations (e.g. 5 Whys or cause-and-effect).

4



Test each explanation against the evidence to confirm or refute.

5



Select and plan interventions to address the confirmed root cause(s).



CONTROL:

Base conclusions on facts and verifiable evidence, not opinion.

3 INPUTS & EVIDENCE



PROBLEM DESCRIPTION:

Clear statement of the event, including scope, impact and when it started.



EVIDENCE NEEDED:

Process data, records, logs, screenshots, physical checks and witness comments.



OWNERS / CONTRIBUTORS:

Process owner, subject-matter experts, team members and any affected stakeholders.



CONTEXT INFORMATION:

Process maps, procedures, recent changes and relevant constraints.



SUCCESS CRITERIA:

Agreed criteria for confirming the cause and for verifying that actions prevent recurrence.

4 PRACTICAL EXAMPLE

Illustrative example: Repeated data errors in a project report.



OBSERVED PROBLEM:

The same data items are consistently incorrect in the monthly report.



ANALYSIS:

Review shows the source-field mapping in the import file is ambiguous, causing values to be placed in the wrong column.



ROOT CAUSE:

Ambiguous source-field mapping, not operator carelessness.



ACTION:

Update the mapping rules and add a validation check to prevent recurrence.

5 PITFALLS & LIMITS



CORRELATION IS NOT CAUSE:

Events may occur together without a causal link. Check evidence and test explanations.



OPINION-BASED CONCLUSIONS:

Personal views or blame are not sufficient. Use facts and verifiable evidence.



SINGLE CONVENIENT CAUSE:

Avoid stopping at the first plausible cause. Multiple causes may contribute.



SCOPE LIMITATION:

RCA may not find every possible cause, especially for very complex or unknown systems.



TIME AND RESOURCES:

Thorough analysis can take time and may need specialist input. Use a level of effort to match the problem's impact.

6 ACTIONS & OUTPUTS



CONFIRM CAUSAL MECHANISM:

Validate the identified cause(s) with evidence and stakeholder agreement.



IMPLEMENT CORRECTIVE ACTIONS:

Address the root cause(s) with clear responsibilities and due dates.



VERIFY RESULTS:

Monitor to confirm the problem does not recur and intended benefits are achieved.



OUTPUTS:

Documented root cause(s), corrective actions and verification results. Update relevant processes, procedures and risk registers.



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CORRECTIVE ACTION LOG



Track and manage actions to remove the causes of actual nonconformities.

1 PURPOSE & VALUE

The Corrective Action Log tracks actions intended to remove the causes of actual nonconformities so they do not happen again.



NONCONFORMITY:

A confirmed deviation from requirements, standards or agreed processes.



CORRECTIVE ACTION:

Action to remove the root cause and prevent recurrence.



VALUE:

Improves quality, reduces repeat issues and strengthens processes and controls.



SCOPE:

Use for actual problems. For potential risks, use a separate risk or preventive tool.

2 HOW TO APPLY

Record each nonconformity with complete details and manage to closure.

1



Describe the issue and its impact.

2



Identify and record the root cause.

3



Record the immediate correction to fix the current instance.

4



Define the corrective action to remove the cause and prevent recurrence.

5



Assign an owner and due date.

6



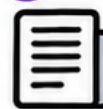
Track implementation and review effectiveness with evidence.



CONTROL:

Do not close until the corrective action is implemented and effective.

3 INPUTS & EVIDENCE



INPUTS:

Nonconformity reports, test results, audit findings, customer complaints and process records.



REQUIRED EVIDENCE:

Description of issue, root cause analysis, correction performed, corrective action plan, owner, due date and follow-up results.



EVIDENCE OF EFFECTIVENESS:

Updated records, test results, reworked samples, audit verification or monitoring data showing the cause has been removed.



OWNERS:

Process owner for implementing actions, with support from the quality team. Approver confirms closure based on evidence.



DEPENDENCIES:

May require support from other teams, tools or process changes.

4 PRACTICAL EXAMPLE

Illustrative project situation:

A monthly report contains incorrect totals due to a data mapping error.



NONCONFORMITY:

Report totals are wrong.



CORRECTION (immediate):

Recalculate and publish the correct report to fix this instance.



ROOT CAUSE:

A field in the data mapping rule was incorrectly defined.



CORRECTIVE ACTION:

Update the mapping rule and add a validated rule to prevent recurrence.



FOLLOW-UP & EVIDENCE:

Run test data, verify correct totals and keep validation results as evidence.

5 PITFALLS & LIMITS



CONFUSING CORRECTION WITH CORRECTIVE ACTION:

Correction fixes the instance; corrective action addresses the cause.



CLOSING TOO EARLY:

Do not close without implementation and an appropriate follow-up check.



WEAK ROOT CAUSE ANALYSIS:

Symptoms lead to repeat issues. Find and address the real cause.



INSUFFICIENT EVIDENCE:

Actions must be effective. Provide objective evidence that the cause has been removed.



SCOPE LIMITATION:

Use for actual nonconformities only. Prevention for potential issues is a separate process.

6 ACTIONS & OUTPUTS



CREATE AND MAINTAIN LOG:

Record all required fields for each nonconformity and keep it up to date.



ASSIGN OWNERSHIP:

Confirm owner and due date for each action. Provide support and remove blockers.



IMPLEMENT ACTIONS:

Carry out the correction and corrective action. Update status and attach evidence.



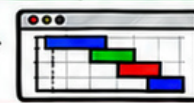
VERIFY EFFECTIVENESS:

Review results after an appropriate period to confirm the cause has been removed.



OUTPUTS:

Closed corrective actions with evidence, updated process records and lessons learned for future improvement.



FAILURE MODE AND EFFECTS ANALYSIS



Examine potential failures and their consequences before release or process change.

① PURPOSE & VALUE

FMEA systematically examines what could go wrong, why it could happen and what the impact would be before a product, service or process is released or changed.



PREVENT PROBLEMS:

Identify and address potential failures early.



REDUCE RISK:

Minimise the impact on customers, operations and project goals.



IMPROVE DECISIONS:

Focus effort on the most significant risks.



BUILD QUALITY IN:

Strengthen design, process and controls before deployment.

② HOW TO APPLY

Follow a structured method:

1



Define the process or product and set the scope and team.

2



Identify potential failure modes, their effects and possible causes.

3



Evaluate existing controls for prevention and detection.

4



Assess severity (S), occurrence (O) and detection (D) using an agreed rating method.

5



Prioritise risks and agree actions to reduce the risk.



RISK PRIORITY NUMBER (RPN):

$$RPN = S \times O \times D$$

Use a consistent rating method.

③ INPUTS & EVIDENCE



PROCESS INFORMATION:

Process maps, design documents, requirements and change details.



HISTORICAL DATA:

Previous failures, defects, customer complaints and support records.



CONTROL INFORMATION:

Current prevention and detection controls and their performance evidence.



PEOPLE & EXPERTISE:

Cross-functional team including design, operations, quality, maintenance and customer representatives.



OWNERSHIP:

FMEA facilitator and process owner provide evidence and maintain the analysis.

④ PRACTICAL EXAMPLE

Illustrative example: automated file import for customer records.



POTENTIAL FAILURE MODE:

Customer identifier is truncated during import.



POTENTIAL EFFECT:

Record linked to the wrong customer, causing data errors and rework.



POSSIBLE CAUSE:

Field length not correctly validated.



CURRENT CONTROLS:

Input validation and rejection of records with incorrect length before loading.



PLANNED ACTION:

Strengthen validation and add an automated rejection report before deployment.

⑤ PITFALLS & LIMITS



ORDINAL RATINGS:

S, O and D are relative values. The RPN is a screening aid, not a precise measure.



FALSE SENSE OF SECURITY:

A low score does not mean no risk. Consider wider impacts and judgment.



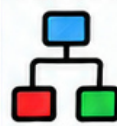
SERIOUS CONSEQUENCES:

High-severity risks may need action regardless of the score.



INCOMPLETE ANALYSIS:

Missing team members, causes or controls can overlook key risks.



CHANGING CONDITIONS:

The analysis must be reviewed when the process, design or environment changes.

⑥ ACTIONS & OUTPUTS



IMPLEMENT ACTIONS:

Assign owners and deadlines for agreed risk reduction actions.



UPDATE CONTROLS:

Design or strengthen prevention and detection controls.



REASSESS RISK:

Review S, O and D after implementing actions using evidence of their effectiveness.



OUTPUTS:

Updated FMEA record with actions, owners, target dates and revised ratings.



KEEP IT CURRENT:

Integrate with change and release processes and review regularly throughout the project lifecycle.





DESIGN OF EXPERIMENTS



Plan controlled tests to learn how selected factors affect a response efficiently.

1 PURPOSE & VALUE

Design of Experiments (DOE) plans controlled tests to learn how selected factors affect a response efficiently, using multiple tests in a structured way.



PURPOSE:

Find which factors and combinations influence the response.



VALUE:

Provides reliable evidence with fewer tests than changing one factor at a time.



USE WHEN:

You need to optimize a process, product or service by testing several factors together.



RESULT:

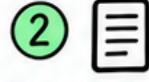
Clearer understanding of main effects and possible interactions between factors.

2 HOW TO APPLY

Plan, run and analyze a structured set of tests with suitable expertise.



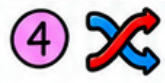
1 Define the objective and success criteria for the experiment.



2 Select the key factors to study and set their realistic levels.



3 Choose the response variable and how it will be measured.



4 Plan randomization, replication and the test matrix with expert support.



5 Run the tests under controlled conditions, respecting constraints and using suitable expertise.



CONTROL:

Keep other conditions constant and follow the agreed test plan.

3 INPUTS & EVIDENCE



BUSINESS NEED:

Problem statement, objective, scope, constraints and success criteria.



FACTOR INFORMATION:

List of potential factors, possible levels and practical limits.



BASELINE DATA:

Current performance of the response variable and existing process knowledge.



RESOURCES & OWNERS:

Process owner, subject matter experts (e.g., engineering, operations, data analysis) and test facilities or tools.



EVIDENCE NEEDED:

Test plan, raw test results, analysis outputs and recommended settings with rationale.

4 PRACTICAL EXAMPLE

Illustrative example: A team tests two configuration settings to compare response time under controlled conditions.



Factor A: Cache size
Levels: Small, Large



Factor B: Thread count
Levels: Low, High



Response: Average response time
(lower is better)

Planned tests: Run all combinations with replication in a randomized order, keeping other conditions constant.



Outcome (illustrative):
Identify the settings that give a lower response time and confirm by repeating the tests.

5 PITFALLS & LIMITS



ONE FACTOR AT A TIME:

Changing one factor informally can miss interactions between factors.



DESIGN DEPENDENCE:

Conclusions depend on the experimental design, data quality and assumptions used.



UNREALISTIC TESTS:

Running tests in non-representative conditions can lead to misleading results.



LIMITED SCOPE:

Results apply to the tested factors, levels and operating conditions only.



REQUIRES EXPERTISE:

Proper design, analysis and interpretation usually need suitable statistical and technical expertise.

6 ACTIONS & OUTPUTS



ANALYZE RESULTS:

Use appropriate analysis methods to assess main effects and possible interactions. Focus on the response and practical significance.



SELECT SETTINGS:

Choose the best factor levels based on the analysis and project objectives.



VALIDATE IN REAL USE:

Confirm the selected settings in realistic operating conditions before full implementation.



DOCUMENT OUTPUTS:

Experimental plan, test results, analysis summary, recommended settings and implementation notes.



USE THE INSIGHTS:

Apply the results to improve the product, process or service and share lessons learnt with



STATISTICAL SAMPLING PLAN



Use a defined sample to draw bounded conclusions about a larger population.

1 PURPOSE & VALUE

A statistical sampling plan uses a selected sample to estimate the quality of a larger population and supports consistent, objective decisions.



DEFINED SAMPLE:

A subset taken using an agreed method.



LARGER POPULATION:

All items or records of interest (e.g. a batch or deliverable).



BOUNDED CONCLUSIONS:

Provides an estimate with known risk, not a guarantee.



VALUE:

Reduces inspection effort, avoids biased selection and supports fair acceptance or rejection.

2 HOW TO APPLY

Follow a clear plan agreed in advance.

1



DEFINE THE POPULATION

Specify what is being assessed (e.g. batch, period or dataset).

2



IDENTIFY SAMPLING FRAME

List all eligible items and check it is complete and accurate.

3



CHOOSE SELECTION METHOD

Use a random or systematic method; avoid convenience selection.

4



DETERMINE SAMPLE SIZE

Based on risk, variability and the desired confidence in the decision.

5



SET ACCEPTANCE RULE

Define the criteria for accept or reject and the acceptable risk levels (producer's and consumer's risk).

3 INPUTS & EVIDENCE



QUALITY SPECIFICATION:

Acceptance criteria and defect definition for the items being checked.



POPULATION & SAMPLING FRAME:

Complete list of eligible items with unique identifiers.



SAMPLING PLAN:

Selection method, sample size rationale, acceptance rule and risk levels.



RECORDS FOR REVIEW:

Access to the items or data and the inspection checklist.



EVIDENCE OF SELECTION AND RESULTS:

Sample list, inspection results and calculation against the rule.



OWNERS:

Quality manager, process owner and data owner to provide inputs, approve the plan and review results.

4 PRACTICAL EXAMPLE

Illustrative example using a random sample from a defined batch:



POPULATION:

All records in a batch scheduled for release.



SAMPLING FRAME:

List of all batch record IDs.



SELECTION METHOD:

Randomly select items using a number generator, not convenient examples.



INSPECTION:

Review the selected records against the agreed criteria.



DECISION:

Compare results with the acceptance rule and either accept or reject the batch.



NOTE:

This example is illustrative only. Sample size, criteria and risk levels are project-specific.

5 PITFALLS & LIMITS



CANNOT PROVE ZERO DEFECTS:

A sample cannot guarantee the population is free from defects.



RISK REMAINS:

Acceptance and rejection risks exist. There is a chance of accepting a bad batch or rejecting a good batch.



BIAS IN SELECTION:

Convenience or non-random selection can give misleading results.



INCOMPLETE SAMPLING FRAME:

Missing or inaccurate lists can exclude items and invalidate conclusions.



WRONG SAMPLE SIZE OR RULE:

An unsuitable plan can make the decision unreliable.



CONTEXT LIMITATION:

Results apply only to the defined population, time period and acceptance criteria.

6 ACTIONS & OUTPUTS



AGREE AND DOCUMENT PLAN:

Record population, sampling frame, method, sample size, acceptance rule and risk levels before sampling.



SELECT SAMPLE:

Use the approved random or systematic method and keep a record of the selected items.



INSPECT AND RECORD:

Review sampled items, record results and compare with the acceptance criteria.



MAKE A DECISION:

Accept or reject based on the predefined rule. Escalate if the criteria are not met.



OUTPUTS:

Sampling plan, sample list, inspection results, decision record and any required corrective actions.



FOLLOW UP:

Communicate the outcome and implement next steps with the process and quality owners.





MEASUREMENT SYSTEM REVIEW



Check whether the way data is measured is sufficiently reliable for decisions.

1 PURPOSE & VALUE

Checks whether the measurement system used to collect project data is reliable and fit for purpose so that decisions are based on trustworthy information.



SUPPORTS DECISIONS:

Confirms data can be trusted for analysis and control.



IMPROVES QUALITY:

Reduces measurement error and unclear definitions.



BUILDS CONFIDENCE:

Increases consistency across people, tools and locations.



FITS THE CONTEXT:

Reviews the measurement method against project needs and data use.

2 HOW TO APPLY

Review key aspects of the measurement system as relevant to the project and data type.

1



Confirm calibration:

Check instruments are in date and traceable.

2



Check resolution:

Ensure the smallest detectable change is adequate.

3



Assess repeatability:

Same person, same method, consistent results.

4



Assess reproducibility:

Different people or locations give consistent results.

5



Evaluate bias:

Check for systematic difference from the true value.

6



Review operational definitions:

Ensure terms and criteria are clear and applied the same way.

3 INPUTS & EVIDENCE



REQUIRED INPUTS:

Measurement procedures, calibration records, data sheets and operational definitions.



EVIDENCE TO REVIEW:

Calibration certificates, equipment maintenance logs, measurement system studies, sample records and training materials.



RELEVANT DATA:

Repeated measurements, results from different people or locations, and known reference samples where available.



KEY OWNERS:

Process owner, quality team, equipment owner and data users.



DEPENDENCIES:

Access to tools and records, skilled reviewers, and cooperation from teams who collect the data.

4 PRACTICAL EXAMPLE

Illustrative example of unclear defect criteria leading to different measurements:



Reviewer 1:

Classifies a surface mark as a defect.



Reviewer 2:

Classifies the same mark as acceptable.

RESULT:

Different measurements for the same case.



INTERPRETATION:

The defect criteria are unclear and need to be refined and explained to all reviewers to ensure consistent decisions.

5 PITFALLS & LIMITS



CONFUSE VARIATION:

Process variation can be mistaken for measurement error. Investigate both before taking action.



BIAS RISK:

A precise instrument may still be biased, giving consistent but incorrect results.



UNCLEAR DEFINITIONS:

Terms and defect criteria not clearly defined lead to inconsistent measurements.



LIMITED SCOPE:

Suitability depends on the data type and intended use. Not all formal statistical studies are needed for every project.



RECHECK AFTER CHANGES:

Changes to people, tools or methods can affect measurement reliability, so review again.

6 ACTIONS & OUTPUTS



IMPROVE DEFINITIONS:

Clarify measurement criteria and update procedures so everyone applies them in the same way.



PROVIDE TRAINING:

Ensure people understand the definitions, methods and equipment use.



MAINTAIN OR UPGRADE:

Calibrate, repair or replace equipment where necessary to meet measurement needs.



REASSESS SUITABILITY:

Repeat the review after changes to definitions, training or equipment to confirm reliability.



OUTPUTS:

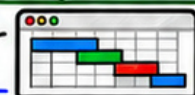
Updated measurement procedures, calibration records, training records and a confirmed measurement system suitable for decision making.



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Assess how a stable process distribution relates to specification limits.

1 PURPOSE & VALUE

Process capability analysis assesses how well a stable process meets specification limits, using statistical measures under stated assumptions.



QUANTIFY PERFORMANCE:

Shows the potential to meet requirements, not past yield.



SUPPORT DECISIONS:

Helps prioritise process improvements and risk actions.



FOCUS ON VARIATION:

Considers both spread and centering relative to limits.



COMMON USE:

Widely used in manufacturing and repeatable service processes with measurable output.

2 HOW TO APPLY

For suitable, approximately normal data from a stable process, calculate capability indices.

$$C_p = \frac{USL - LSL}{6\sigma}$$

$$C_{pk} = \min \left(\frac{USL - \text{mean}}{3\sigma}, \frac{\text{mean} - LSL}{3\sigma} \right)$$



1 Confirm process stability using control charts.



2 Check data is approximately normal and free from special causes.



3 Calculate C_p and C_{pk} using specification limits and process mean and σ .



4 Interpret results in the context of project requirements.



CONTROL:

Validate stability and distribution assumptions before calculating.

3 INPUTS & EVIDENCE



PROCESS DATA:

Representative measurements of key output from a stable period, with sampling method documented.



SPECIFICATION LIMITS:

Upper specification limit (USL) and lower specification limit (LSL) from customer or design requirements.



PROCESS INFORMATION:

Process description, measurement system details and evidence of stability (e.g., control charts).



OWNERS:

Process owner provides data, quality team validates analysis, and project team uses results for decisions.



EVIDENCE RECORDS:

Data set, analysis method, assumptions and conclusions.

4 PRACTICAL EXAMPLE

Illustrative example for a stable, approximately normal process:

Upper specification limit (USL): 16

Lower specification limit (LSL): 4

Process mean: 10

Process standard deviation (σ): 2

$$C_p = (16 - 4) / (6 \times 2) = 12 / 12 = 1$$

$$C_{pk} = \min \left(\frac{(16 - 10)}{(3 \times 2)}, \frac{(10 - 4)}{(3 \times 2)} \right) = \min \left(\frac{6}{6}, \frac{6}{6} \right) = 1$$

RESULT: $C_p = 1$, $C_{pk} = 1$



INTERPRETATION:

Under the stated assumptions, the process is centered and the natural variation fits within the specification limits.

5 PITFALLS & LIMITS



UNSTABLE PROCESS:

Indices can be misleading if the process is not in statistical control. Remove special causes first.



NONNORMAL DATA:

Formulas assume an approximately normal distribution. Skewed or multimodal data may give unreliable results.



POOR MEASUREMENT:

Inaccurate or inconsistent measurement systems distort capability indices.



MISUSE OF INDICES:

Capability does not guarantee future performance and is not a substitute for ongoing control.



DIFFERENT LIMITS:

Control chart limits show process variation; specification limits define customer requirements. They are not the same.

6 ACTIONS & OUTPUTS



INVOLVE EXPERTISE:

Use quality and statistical expertise to validate data, check assumptions and interpret results.



ADDRESS GAPS:

If C_{pk} is low, reduce variation (σ) or improve centering of the process mean, based on evidence.



IMPLEMENT IMPROVEMENTS:

Apply and verify changes to process parameters, equipment or procedures.



OUTPUTS:

Calculated C_p and C_{pk} , analysis summary, key assumptions and recommended actions.



USE RESULTS:

Feed into quality plans, risk assessments and project decisions. Continue monitoring with control charts after improvements.





COST OF QUALITY ANALYSIS



Understand resources spent preventing, assessing and responding to quality failures.

1 PURPOSE & VALUE

Cost of quality analysis identifies resources spent to achieve and verify quality and the costs caused by quality failures, within the same scope and period.



PREVENTION COSTS:

Activities to avoid defects and build quality into work.



APPRAISAL COSTS:

Activities to assess and verify conformance to requirements.



INTERNAL FAILURE COSTS:

Failures found before delivery (e.g., rework, scrap).



EXTERNAL FAILURE COSTS:

Failures found after delivery (e.g., warranty, support).



VALUE:

Helps prioritize improvements and focus on the true causes of quality problems.

2 HOW TO APPLY

Classify quality costs consistently and avoid double-counting.



1 Define the scope, time period and cost categories (prevention, appraisal, internal failure, external failure).



2 Collect relevant cost data and assign each cost to one category only.



3 Use consistent definitions across the project and discuss borderline items with the team.



4 Total each category and review the distribution to understand patterns.



5 Identify key drivers and the biggest opportunities for improvement.

3 INPUTS & EVIDENCE



COST RECORDS:

Actual costs for training, inspection, testing, rework, scrap, warranty and customer support.



PROJECT DOCUMENTS:

Quality plan, requirements, acceptance criteria and scope definition.



SOURCES:

Accounts, purchase orders, job records, nonconformance reports and change orders.



OWNERS:

Project manager, quality manager, finance/accounting and functional leads.



EVIDENCE FORMAT:

Invoices, timesheets, inspection reports, rework logs and customer claims.



DEPENDENCIES:

Use the same scope and time period for all cost categories and ensure data is complete.

4 PRACTICAL EXAMPLE

Illustrative project within the same scope and period:



Prevention: Training costs: \$4,000



Appraisal: Inspection costs: \$3,000



Internal failure: Rework costs: \$8,000

Total cost of quality:

$\$4,000 + \$3,000 + \$8,000$

= \$15,000



INTERPRETATION:

In this example, rework is the largest share, indicating a need to investigate root causes and strengthen prevention and appraisal.

5 PITFALLS & LIMITS



HIGHER PREVENTION IS NOT WASTE:

Spending more on prevention can reduce total costs by avoiding failures.



INCOMPLETE PICTURE:

Not all quality effects are captured in accounting data, such as reputational damage or lost future opportunities.



DOUBLE-COUNTING RISK:

The same cost must not be included in more than one category.



SCOPE MATTERS:

Compare costs for the same scope and time period only.



LIMITATION:

Analysis depends on the availability and accuracy of cost data and defined categories.

6 ACTIONS & OUTPUTS



TARGET CAUSES:

Use the cost breakdown to identify the main sources of quality failures (e.g., recurring rework or customer claims).



PRIORITIZE IMPROVEMENTS:

Select actions that address the largest cost drivers and are feasible within project constraints.



EVALUATE ECONOMICS:

Estimate the expected reduction in failure costs and compare with the cost of proposed actions.



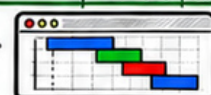
TRACK OVER TIME:

Repeat the analysis periodically to see if the mix of costs improves after actions are implemented.



OUTPUTS:

Cost of quality breakdown, key drivers, recommended actions and input to the project quality improvement plan.





QUALITY GATE REVIEW



Decide whether work is ready to progress based on defined quality evidence.

1 PURPOSE & VALUE

Quality gate review is a formal check to decide if work is ready to move to the next phase, based on agreed quality evidence.



CONFIRM READINESS:

Ensure deliverables meet defined entry and exit criteria.



REDUCE RISK:

Prevent defects and rework in later phases.



PROTECT QUALITY:

Maintain agreed standards and compliance.



ALIGN STAKEHOLDERS:

Give visibility and a shared decision on next steps.



ENABLE PROGRESS:

Release work only when evidence shows it is ready.

2 HOW TO APPLY

Define and use a consistent gate process for each project phase.



Set entry and exit criteria for the gate (what must be in place).



Assign reviewers with the right expertise.



Specify required evidence and how it will be checked.



Confirm decision authority (who can approve, defer or reject).



Define exception rules and how waivers are approved.



CONTROL:

Do not proceed unless all required evidence is complete or a waiver is approved.

3 INPUTS & EVIDENCE

Collect the evidence needed to assess readiness, with clear owners.



QUALITY DELIVERABLES:

Requirements, design, build outputs and test results.
Owner: Project team.



TEST EVIDENCE:

Test plans, execution results, open defect list and test closure.
Owner: QA team.



OPERATIONAL READINESS:

Deployment plan, environment prepared, support and runbook.
Owner: Operations team.



EXCEPTIONS & WAIVERS:

List of open issues, waivers with justification and expiry.
Owner: Project manager.



REVIEW PACK:

Gate checklist, summary of evidence and recommendation.
Owner: Gate reviewers.

4 PRACTICAL EXAMPLE

Illustrative release gate for a new software feature:



CRITICAL DEFECTS:

No open critical defects.
Major defects have agreed resolution plan.



TEST COVERAGE:

Functional and non-functional tests executed with required coverage and passed.



OPERATIONAL READINESS:

Deployment steps completed, monitoring and support in place.



APPROVED WAIVERS:

Any remaining non-critical issues have an approved waiver with owner and target date.



RESULT: If all criteria are met or waivers approved, the feature is authorized to proceed.

5 PITFALLS & LIMITS



MEETING IS NOT READINESS:

A scheduled review meeting does not mean the work is ready to proceed.



INCOMPLETE EVIDENCE:

Missing or outdated evidence can lead to the wrong decision.



UNRESOLVED EXCEPTIONS:

Open issues need explicit ownership, approval and clear target dates.



LACK OF AUTHORITY:

Reviewers without decision authority can delay or confuse the outcome.



CONTEXT SPECIFIC:

Criteria, evidence and roles vary by project type and phase. This tool does not replace formal governance or audits.

6 ACTIONS & OUTPUTS

Complete the review, record the decision and verify any conditions before proceeding.



RECORD DECISION:

Approve, defer or reject, with rationale and date.



CAPTURE CONDITIONS:

List any required actions, waivers and target dates.



ASSIGN OWNERSHIP:

Give clear owners and deadlines for each open action or waiver.



VERIFY BEFORE PROCEEDING:

Check that all conditions are completed or waivers are valid.



OUTPUTS:

Gate decision record, updated risk and issue logs, actions list and approval to proceed (where applicable).





REQUIREMENTS-TO-TEST TRACEABILITY



Link each approved requirement to verification tests and recorded results.

1 PURPOSE & VALUE

Connect required behavior and quality criteria to verification evidence so every requirement can be shown as tested.



CONFIRM COVERAGE:

Demonstrates that each approved requirement has a corresponding test.



SUPPORT QUALITY:

Provides objective evidence of what was verified and its outcome.



ENABLE CHANGE IMPACT:

Shows which tests are affected when requirements change.



IMPROVE COMMUNICATION:

Gives a clear, shared view across development, testing and stakeholders.

2 HOW TO APPLY

1



Assign stable, unique IDs to each approved requirement.

2



Assign unique IDs to test cases that verify the requirement.

3



Map each requirement to one or more test cases and record the linkage.

4



Execute tests and record the actual results and outcome (pass or fail).

5



Maintain traceability when requirements or tests change.



CONTROL:

All approved requirements must have at least one mapped test.

3 INPUTS & EVIDENCE



REQUIREMENTS BASELINE:

Approved requirements with IDs, detailed descriptions and acceptance criteria.



TEST CASES:

Test cases with IDs, expected results and the requirement(s) verified.



TEST EXECUTION RECORDS:

Actual test results, execution date and tester/owner.



CHANGE RECORDS:

Links showing how requirement changes affect test cases.



OWNERS:

Business analyst (requirements), test lead (test cases and execution) and configuration/change manager (traceability records).



QUALITY EVIDENCE:

Traceability matrix or traceability tool output with current links and status.

4 PRACTICAL EXAMPLE

Illustrative requirement and test mapping:

Requirement ID: R-07
Description: System shall encrypt user data at rest.

Acceptance criterion: Data is stored encrypted using approved algorithm.

Mapped test cases:

T-11: Verify encryption enabled on file.

✓ Result: PASS (expected behavior observed).

T-12: Verify decryption with valid key.

✓ Result: PASS (expected behavior observed).



DECISION: ACCEPTED

Requirement R-07 is verified by T-11 and T-12 with passing results.

5 PITFALLS & LIMITS



INCOMPLETE COVERAGE:

A requirement without a test is a gap and leaves risk unverified.



WEAK TESTS:

A mapped test may be too narrow and not fully verify the requirement.



UNEXECUTED TESTS:

Mapped tests that are not executed provide no evidence of actual behavior.



OUTDATED LINKS:

Changes to requirements or tests may break traceability if links are not updated.



LIMITATION:

Traceability shows coverage and test results, but it is not proof that the product is correct or defect free.

6 ACTIONS & OUTPUTS



FIND GAPS:

Review the traceability matrix to identify requirements without tests or unexecuted tests.



UPDATE TESTS:

When approved requirements change, update or create tests and maintain the links.



RECORD RESULTS:

Execute tests, capture actual results and update the traceability records.



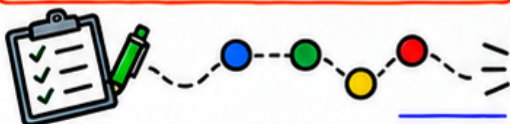
REVIEW & VALIDATE:

Check traceability in reviews and ensure all changes are reflected and approved.



OUTPUTS:

Updated traceability matrix, execution records, change links and evidence for quality reviews and audits.



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DEFECT LOG AND TRIAGE



Create a reliable record for evaluating and resolving observed nonconformities.

① PURPOSE & VALUE

The defect log records, tracks and manages observed nonconformities through to resolution. It provides transparency, supports triage and helps maintain product and project quality.



SINGLE SOURCE:

All defects captured and visible to the team.



INFORMED DECISIONS:

Clear information for prioritization and release readiness.



IMPROVES QUALITY:

Drives timely resolution and prevents recurrence.



STAKEHOLDER TRUST:

Shows progress and manages expectations.

② HOW TO APPLY

Follow a consistent process from reporting to closure.



1 Capture a new defect with clear description and steps to reproduce.



2 Record expected result and actual result.



3 Assess severity and set priority.



4 Assign an owner and determine the status (e.g., Open, In Progress, Resolved, Closed).



5 Update with evidence and retest the fix.



CONTROL:

Keep entries accurate, current and traceable to test results.

③ INPUTS & EVIDENCE



DEFECT DETAILS:

Clear title, description and reproducible steps.



ENVIRONMENT DATA:

Version, build, configuration, platform and any special conditions.



EXPECTED VS ACTUAL:

Expected result and actual result, with links to test cases if available.



EVIDENCE:

Screenshots, logs, error messages, recordings or other artifacts.



OWNERS AND STAKEHOLDERS:

Assigned owner, reporter and relevant reviewers.



RELATED INFORMATION:

Impact on features, dependencies and release or milestone context.

④ PRACTICAL EXAMPLE

Illustrative defect at a login screen:



DESCRIPTION:

User cannot log in with valid credentials.



STEPS TO REPRODUCE:

1. Open login page
2. Enter valid username and password
3. Click Sign In



EXPECTED RESULT:

User is logged in and taken to the dashboard.



ACTUAL RESULT:

Error message is displayed and login fails.



ENVIRONMENT:

v2.1.0, Windows 11, Chrome.



ASSESSMENT:

Severity: High (blocks core function).
Priority: High (impacts release).

⑤ PITFALLS & LIMITS



SEVERITY VS PRIORITY:

Severity is the technical impact (e.g., crash or data loss). Priority reflects business urgency and release impact. They can differ.



DUPLICATE REPORTS:

Multiple reports for the same issue can inflate counts and distort triage. Check for existing defects before logging.



NOISY OR VAGUE LABELS:

Unclear titles or missing steps can misdirect effort and delay resolution. Be specific and provide evidence.



LIMITATIONS:

A defect log tracks issues; it does not guarantee a fix or define release approval. Thresholds for severity and priority are project-specific.

⑥ ACTIONS & OUTPUTS



TRIAGE AND AGREE:

Review each defect, confirm details, agree severity, priority and disposition (e.g., fix, defer, accept with rationale, or reject).



ASSIGN AND RESOLVE:

Assign to an owner, track progress and update the status regularly.



VERIFY THE FIX:

Retest using the original steps and perform appropriate regression checks.



UPDATE AND CLOSE:

Attach evidence of the fix, confirm expected result and close the defect.



USEFUL OUTPUTS:

Up-to-date defect log, resolution records, evidence of fixes and inputs for release readiness decisions.



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CARD 27 OF 30

30 Project Quality Management Tools





PLAN-DO-CHECK-ACT



Use an iterative cycle to test and improve a process.

1 PURPOSE & VALUE

Plan-Do-Check-Act (PDCA) is an iterative cycle used to test and improve a process in a structured, low-risk way.



PURPOSE:

Identify a change, test it, learn from the results and improve the process.



VALUE:

Reduces risk, builds evidence for change and supports continuous improvement.



WHEN TO USE:

When a process can be improved, and a small test is possible.

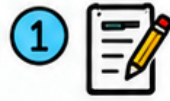


SCOPE:

Applies to project processes, work methods and team practices.

2 HOW TO APPLY

Follow a four-step cycle. Keep each cycle small, focused and time-boxed. Repeat the cycle to build improvement.



PLAN:

Identify the problem, propose a change and define success measures.



DO:

Implement the change on a small scale in a controlled trial.



CHECK:

Compare the results with expectations using the agreed measures.



ACT:

Adopt the change, adapt it or abandon it based on what you learned.



CONTROL:

Define clear measures before the test. Do not roll out until results are reviewed.

3 INPUTS & EVIDENCE

Gather the right information, people and data before starting the cycle.



PROCESS INFORMATION:

Current process description, issue or opportunity to improve.



BASELINE DATA:

Measures of current performance (such as rework, cycle time, or quality defects).



PEOPLE & ROLES:

Process owner, team members and affected stakeholders.



SUCCESS CRITERIA:

Agreed measures of improvement and how results will be judged.



EVIDENCE RECORDS:

Notes from trials, data collected, feedback from users and decisions taken.



OWNER:

Process owner leads the cycle and ensures evidence is captured.

4 PRACTICAL EXAMPLE

Illustrative example: A team receives frequent rework on document submissions. They test a clearer template.



PLAN:

Design a simpler template and define measures: rework instances and review time.



DO:

Use the template with a small group for a limited time.



CHECK:

Compare rework and review time with the baseline. Collect feedback from reviewers and users.



ACT:

Refine the template based on findings. If results are positive, standardize it and roll out to the whole team.

5 PITFALLS & LIMITS



SKIPPING CHECK:

Turning improvement into an untested preference without evidence.



UNCLEAR MEASURES:

Makes results hard to judge and decisions subjective.



TOO LARGE A TRIAL:

A wide rollout increases risk before the change is proven.



IGNORING STAKEHOLDERS:

Can lead to resistance and low adoption.



ONE-OFF USE:

PDCA is iterative. Stopping after one cycle misses further improvements.



LIMIT:

Results are specific to the context. What works in one situation may not work elsewhere.

6 ACTIONS & OUTPUTS



RECORD LEARNINGS:

Document what worked, what did not, and why.



STANDARDIZE SUCCESS:

Update process documents, templates or guidelines when a change proves effective.



COMMUNICATE:

Share results with stakeholders to support adoption.



BEGIN NEXT CYCLE:

Identify the next improvement opportunity and repeat the PDCA cycle.



KEY OUTPUTS:

Updated process, evidence of results, decision to adopt/adapt/abandon, and a plan for the next cycle.





QUALITY RETROSPECTIVE



Review quality outcomes and practices to identify specific improvements.

1 PURPOSE & VALUE

A quality retrospective reviews quality outcomes and practices after a phase, release or project to identify specific improvements.



FIND WHAT WORKED:

Highlight practices that delivered good quality.



IDENTIFY GAPS:

Uncover problems, defects and rework causes.



DRIVE IMPROVEMENT:

Convert lessons into practical actions for future work.



STRONGER CULTURE:

Encourages open, constructive discussion about quality.



BETTER OUTCOMES:

Helps teams deliver higher quality work over time.

2 HOW TO APPLY



1 Gather and review quality evidence (defects, rework, reviews, acceptance).



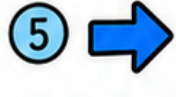
2 Discuss what went well and what did not, focusing on causes.



3 Identify specific quality improvements.



4 Agree and assign owners for actions.



5 Add actions to the next delivery plan and follow up.



CONTROL:

Keep the discussion constructive and focused on process and practices, not on blaming people.

3 INPUTS & EVIDENCE



QUALITY DATA:

Defect and issue logs, rework records, review findings and acceptance evidence.



PROCESS EVIDENCE:

Quality plans, checklists, standards, audit or inspection results and test summaries.



STAKEHOLDER FEEDBACK:

Customer or user feedback, change requests and support tickets related to quality.



PEOPLE INVOLVED:

Project team members, product owner or customer representatives and quality roles (assurance, testing or review leads).



OWNERS NEEDED:

A facilitator to run the session and action owners to deliver agreed improvements.

4 PRACTICAL EXAMPLE

Illustrative example from a software release:



REVIEW FINDING:

The team noticed that early peer review prevented repeated defects in a module.



DISCUSSION:

The retrospective confirmed that peer review caught issues early, reducing rework later.



AGREED ACTION:

Add a mandatory early peer review to the next delivery plan for similar work packages.



RESULT:

The team expects fewer repeat defects and smoother delivery in future releases.

5 PITFALLS & LIMITS



ONLY COMPLAINTS:

A session that produces only complaints or blame rarely leads to improvement.



UNOWNED LESSONS:

If no one is assigned to actions, lessons are quickly forgotten.



VAGUE ACTIONS:

General statements like "be more careful" do not change outcomes.



IGNORE ROOT CAUSES:

Focusing only on symptoms can lead to the same problems reappearing.



CONTEXT MATTERS:

Findings and actions depend on the project context; there are no universal solutions.

6 ACTIONS & OUTPUTS



ACTION PLAN:

A prioritized list of quality improvements with clear owners and target dates.



INTEGRATE INTO PLAN:

Include actions in the next iteration, release or project plan.



FOLLOW UP:

Check action completion regularly and keep the team informed.



VERIFY IMPACT:

Review later evidence to see whether quality has actually improved.



OUTPUTS:

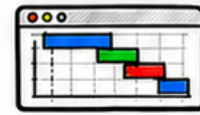
Retrospective summary, action log and updates on progress and achieved improvements.



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CARD 29 OF 30

30 Project Quality Management Tools





CONTROL PLAN



Specify how an improved process will be monitored and maintained.

1 PURPOSE & VALUE

Defines how key process characteristics will be monitored after improvements, to sustain the benefits.



MAINTAIN RESULTS:

Keeps the improved process stable and repeatable.



DETECT VARIATION:

Shows when performance deviates from agreed limits.



CLEAR OWNERSHIP:

Assigns responsibility for monitoring and response.



GUIDE DAY-TO-DAY WORK:

Gives simple checks and actions for operators.



CONTINUOUS IMPROVEMENT:

Feeds learning back into future changes.

2 HOW TO APPLY

Define and document control items for each key characteristic.

1



Identify the key characteristic to control (e.g. accuracy, completeness).

2



Set the measurement method and data source (e.g. system report, checklist).

3



Define the monitoring frequency (e.g. each batch, daily, weekly).

4



Assign a named owner who reviews results and takes action.

5



Set limits or acceptance criteria and define what is out of tolerance.

6



Specify the reaction plan when a limit is exceeded (e.g. stop, investigate, fix).

3 INPUTS & EVIDENCE



PROCESS DOCUMENTATION:

Updated process map, standard work instructions and the list of key characteristics from the project.



MEASUREMENT DATA:

Reliable data source, method and tools to capture results (e.g. system reports, checklists, inspection logs).



LIMITS & CRITERIA:

Agreed acceptance limits or tolerances for each characteristic.



OWNERS & ROLES:

Named process owner and operators responsible for monitoring and taking action.



EVIDENCE RECORDS:

Ongoing control logs, checksheets, exception records and action taken.



SUPPORTING RESOURCES:

Training materials, reference guides and access to the reaction process (e.g. escalation path).

4 PRACTICAL EXAMPLE

Illustrative example: Data import control plan after system improvement.



KEY CHARACTERISTIC:

Reconciliation total between import file and system records.



MEASUREMENT METHOD:

Automatic comparison report after each import batch.



FREQUENCY:

Every batch.



OWNER:

Data processing supervisor.



LIMIT / CRITERIA:

Totals must match.



REACTION PLAN:

If a mismatch is found, stop further processing, investigate the cause and correct the data before re-running the import.

5 PITFALLS & LIMITS



UNREALISTIC LIMITS:

Limits that do not match real operating capability cause constant false alarms.



STALE CONTROLS:

Outdated thresholds and methods may miss real problems after process or system changes.



UNTESTED REACTIONS:

Response actions that are not practised can be slow or ineffective when needed.



UNCLEAR OWNERSHIP:

If no one owns the check and action, problems may be ignored.



TOO MANY CONTROLS:

Excessive checks can create workload and reduce focus on the important few.

6 ACTIONS & OUTPUTS



FINALISE PLAN:

Agree control items, methods, frequency, limits and reaction plans with process owners.



TRANSFER OWNERSHIP:

Confirm named owners and ensure roles are understood.



TRAIN OPERATORS:

Provide training and quick reference guides on how to perform checks and take action.



IMPLEMENT & MONITOR:

Start using the control plan and review evidence regularly.



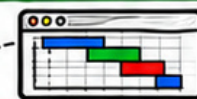
REVIEW EFFECTIVENESS:

Periodically assess whether controls are working and update as needed.



OUTPUTS:

Control plan document, trained team, ongoing monitoring records and improvement actions from review.





HOW TO USE THIS GUIDE & SOURCES



Get the most from the 30 Project Quality Management Tools cards and explore further reading.

1 START WITH A NEED

Select a card that matches a real project decision. Make sure it fits your context and purpose before using it.



CONFIRM CONTEXT:

Check scope, project lifecycle, stakeholders and key constraints.



USE COMMON DEFINITIONS:

Apply the terms in this guide consistently across your team.



READ THE WORKED EXAMPLE:

Use it as an illustration of how to apply the tool, not a promise or guarantee.



SELECT EVIDENCE:

Decide what data or information you need before taking action.

2 APPLY & REVIEW

Follow a clear process to apply the tool, record what you did, and review the result.



ASSIGN AN OWNER:

Name who will apply the tool and who will review the output.



AGREE INPUT AND OUTPUT:

Define the input data, expected output and how it will be used.



RECORD ASSUMPTIONS:

Capture key assumptions, choices and any limitations.



APPLY AND REVIEW:

Use the card, check the result and discuss actions with the team.



ADAPT TO YOUR PROJECT:

Set your own frequency, thresholds and review points.



SPECIAL CASES AND CONTROL:

For a denominator of zero use N/A, not zero percent. Protect sensitive information and keep a version history.

3 ABOUT THIS EDITION

Understand the scope of this guide and how to use it effectively.



BOOK INFORMATION:

Book 7 of the WikiFree Project Management Collection. Thirty original practical learning cards.



SCOPE AND APPROACH:

Terminology and techniques are a practical synthesis, not an exhaustive standard or formal certification.



LOCAL METRICS:

Custom working metrics must be defined locally to suit your project context and objectives.



EXAMPLES:

Examples are illustrative, showing how to apply the tools. They are not formal benchmarks or guarantees.



FURTHER READING:

Additional sources and references are listed in panels 4-6 to help you explore topics in more depth.

4 SOURCE 1

ASQ - QUALITY GLOSSARY

The ASQ Quality Glossary provides clear definitions of quality terms used in practice. It can help you understand common language and concepts that appear in this guide.



HOW IT HELPS:

Useful for checking meanings, clarifying terminology and building a shared understanding across the team.



IMPORTANT NOTE:

This is a foundation for further reading, not an endorsement of this publication.

Click this panel to open the source.

5 SOURCE 2

PMI - WORK BREAKDOWN STRUCTURE

The PMI resource on the Work Breakdown Structure (WBS) explains how to organise and define project work. It supports planning, scope clarity and quality management activities.



HOW IT HELPS:

Provides guidance on structuring project work and defining deliverables in a clear and consistent way.



IMPORTANT NOTE:

This is a foundation for further reading, not an endorsement of this publication.

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6 SOURCE 3

APM - LESSONS LEARNED

The APM resource on lessons learned explains how to capture, analyse and apply project experience. It supports continuous improvement and helps teams avoid repeating the same mistakes.



HOW IT HELPS:

Provides practical guidance on identifying, recording and using lessons to improve future project performance.



IMPORTANT NOTE:

This is a foundation for further reading, not an endorsement of this publication.

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