



30 Project Risk Management Tools

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PROJECT MANAGEMENT COLLECTION

BOOK 03

30 Project Risk Management Tools



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1



RISK REGISTER



Maintain a live record of uncertain events that could affect objectives.

1 PURPOSE & VALUE

The risk register records potential events that may affect project objectives, including threats and opportunities.



IMPROVES DECISIONS:

Shows what could happen, its effects and what to do.



INCREASES PREPAREDNESS:

Helps plan responses before events occur.



CAPTURES OPPORTUNITIES:

Highlights positive events that can be leveraged.



PROMOTES OWNERSHIP:

Assigns clear owners and follow-up actions.



KEEPS IT LIVE:

Updated regularly as new information emerges.

2 HOW TO APPLY

Record key details for each risk using a consistent format.

1



Describe the cause and the event.

2



State the effect on objectives.

3



Assign an owner responsible for action.

4



Estimate probability and impact.

5



Define the response strategy.

6



Set a trigger to spot early signs.

7



Record status and next review date.



CONTROL:

Keep the register live and review it regularly throughout the project.

3 INPUTS & EVIDENCE



PROJECT INFORMATION:

Scope, objectives, plan, schedule, budget and key assumptions.



EVIDENCE SOURCES:

Lessons learned, expert input, workshop outputs, stakeholder concerns and external data (such as market or regulatory).



REQUIRED DETAILS:

Cause, event, effect, owner, probability, impact, response, trigger, status and review date.



OWNERS AND CONTRIBUTORS:

Project manager, risk owners, subject matter experts and relevant stakeholders.



DEPENDENCIES:

Related projects, third parties, contracts and external conditions that may influence risk.



QUALITY CHECK:

Information is current, credible and agreed with owners.

4 PRACTICAL EXAMPLE

Illustrative risk entry:



Cause: Supplier faces financial difficulties.



Event: Supplier insolvency.



Effect: Delay to equipment delivery and project schedule.



Owner: Procurement manager.



Probability: Assessed based on current financial signals.



Response: Monitor supplier health, identify alternative suppliers.



Trigger: Negative financial news.



Review: Check monthly and update status.

5 PITFALLS & LIMITS



A REALIZED EVENT:

Once the event happens, it becomes an issue and should be managed through issue management.



COPY AND FORGET:

Using a generic register without active ownership adds little protection.



POOR INFORMATION:

Unreliable estimates or missing details can lead to the wrong priorities.



NO OWNERSHIP:

Risks without a named owner are unlikely to be monitored or acted on.



STATIC REGISTER:

Not updating the register regularly means new risks and changes can be missed.

6 ACTIONS & OUTPUTS



PRIORITIZE RISKS:

Use probability and impact to focus on the most important risks.



LINK TO RESPONSES:

Schedule actions, assign owners and set target dates.



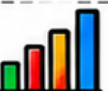
ALLOCATE RESERVES:

Link high-priority risks to contingency or management reserves, as appropriate.



ESCALATE WHEN NEEDED:

Raise significant risks to sponsors or governance boards for decisions.



OUTPUTS:

A live risk register with agreed responses, owners, triggers and review dates, integrated with the project plan and reporting.



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RISK BREAKDOWN STRUCTURE



Organize sources of uncertainty in a hierarchical structure to improve coverage.



1 PURPOSE & VALUE

A Risk Breakdown Structure (RBS) groups sources of uncertainty into a hierarchical structure to improve coverage and support systematic risk identification.



STRUCTURE:

Organizes risks into main categories and sub-categories.



BETTER COVERAGE:

Helps ensure a broad view and reduces the chance of missing key sources.



COMMON LANGUAGE:

Provides consistent categories for the team and stakeholders.



TAILORABLE:

Adapt lower levels to the specific project, industry and context.

2 HOW TO APPLY

Build a hierarchical list of risk sources relevant to your project. Use common high-level categories and tailor the lower levels to the project context.

1



Start with standard categories such as technical, commercial, external and organizational.

2



Define sub-categories based on project scope, life cycle and environment.

3



Review and refine with subject matter experts and stakeholders.

4



Use the RBS in risk identification workshops to prompt discussion.

5



Update the RBS as the project evolves and new risk sources emerge.

3 INPUTS & EVIDENCE



PROJECT INFORMATION:

Scope statement, deliverables, work breakdown structure (WBS) and project plan.



EXTERNAL INFORMATION:

Market, regulatory, legal, political and environmental context.



EXPERTS & STAKEHOLDERS:

Subject matter experts, team members and key stakeholders to validate categories.



HISTORICAL DATA:

Lessons learned, past project risks and organizational risk categories.



OWNER:

Project risk manager (facilitates) with domain owners from technical, commercial, external and organizational areas.

4 PRACTICAL EXAMPLE

Illustrative software project RBS for a new customer platform:



USE: Guides risk identification workshops so the team explores each category and tailors sub-categories to the project.

5 PITFALLS & LIMITS



NOT A GUARANTEE:

Categories are prompts, not proof that every important risk has been identified.



TOO GENERIC:

Using only high-level categories can miss project-specific risks. Tailor lower levels to your context.



OVERLAPPING CATEGORIES:

Risks can fit multiple areas. Keep a clear structure and agree where each risk belongs.



CONFUSION WITH RISK LIST:

The RBS is a structure of sources, not a detailed list of individual risks.



KEEP STATEMENTS DISTINCT:

Avoid duplicate or merged risks when recording them in the risk register.

6 ACTIONS & OUTPUTS



CHECK CONCENTRATION:

Review the number of risks each category generates. Investigate any area with unusually high or low concentration.



ASSIGN DOMAIN REVIEWERS:

Nominate owners for each main category (e.g. technical, commercial, external, organizational) to validate and maintain the RBS.



RUN WORKSHOPS:

Use the RBS to guide discussions and identify specific risks for the risk register.



OUTPUTS:

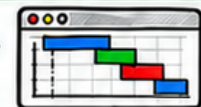
A tailored project RBS, documented categories and sub-categories, assigned domain reviewers, and an updated risk register.



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RISK IDENTIFICATION WORKSHOP



Bring the right people together to find threats, opportunities and dependencies.



1 PURPOSE & VALUE

A risk identification workshop combines cross-functional knowledge to discover threats, opportunities and dependencies that could affect the project.



BROADER VIEW:

Brings different perspectives and uncovers hidden risks.



MORE COMPLETE LIST:

Finds threats, opportunities and interdependencies earlier.



BETTER DECISIONS:

Supports realistic planning and stronger trade-off discussions.



SHARED OWNERSHIP:

Builds awareness and buy-in across the team.

2 HOW TO APPLY

1



FRAME OBJECTIVES

Define scope, time horizon and risk categories (e.g. technical, schedule, cost).

2



INVITE EXPERTISE

Include people from delivery, operations, procurement, finance and other key areas.

3



USE STRUCTURED PROMPTS

Discuss what could go wrong, what could go well, and key dependencies.

4



WRITE CAUSE-EVENT-EFFECT

Describe the cause, the event and the resulting impact for each risk or opportunity.

5



REVIEW AND VALIDATE

Combine duplicates, check clarity and confirm with the group.

3 INPUTS & EVIDENCE



PROJECT INFORMATION:

Scope, schedule, budget, requirements and key assumptions.



EXISTING RISK INFORMATION:

Previous risk registers, lessons learned and relevant incident records.



RELEVANT EVIDENCE:

Contracts, technical studies, site reports, stakeholder feedback and data on interfaces and dependencies.



REQUIRED ATTENDEES:

Cross-functional representatives (e.g. delivery, operations, procurement, finance, legal, HSE) and a facilitator.



OWNERS:

Workshop sponsor, facilitator and note-taker with authority to capture and follow up actions.

4 PRACTICAL EXAMPLE

Illustrative example of a workshop output:



SITUATION:

Delivery, operations and procurement meet to review the project plan.



FINDING:

They identify a site-access dependency missing from the initial plan. Limited road access could delay equipment delivery.



CAUSE - EVENT - EFFECT:

Cause: Road works on access route.
Event: Delayed equipment delivery.
Effect: Later start on installation work package.



RESULT:

Risk added to the register with an owner from the delivery team and a follow-up action to confirm the road works schedule.

5 PITFALLS & LIMITS



GROUPTHINK:

People may agree too quickly and miss weak signals. Encourage different views.



SENIORITY BIAS:

Junior team members may be reluctant to speak up. Use a facilitator and set ground rules for open discussion.



PREMATURE JUDGMENT:

Do not evaluate or debate solutions during idea generation. Capture ideas first, then assess.



NARROW PARTICIPATION:

Inviting only familiar people can miss important perspectives. Use a diverse, cross-functional group.



LIMITATION:

A workshop may not uncover every risk. Follow up with further analysis and expert review.

6 ACTIONS & OUTPUTS



RECORD RISKS:

Create or update the risk register with clear cause-event-effect statements for threats, opportunities and dependencies.



ASSIGN OWNERS:

Agree a responsible owner for each risk or opportunity before the workshop closes.



IDENTIFY EVIDENCE GAPS:

Note what information is missing and who will obtain it.



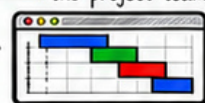
AGREE FOLLOW-UP ACTIONS:

Define actions, due dates and next steps for analysis or mitigation planning.



OUTPUTS:

Updated risk register, action list, evidence gap log and a summary of key findings to share with the project team.



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RISK INTERVIEW GUIDE



Elicit specific concerns and opportunities through structured one-to-one conversations.

1 PURPOSE & VALUE

Ease structured one-to-one interviews to elicit specific concerns, opportunities and insights from people who know the work.



UNCOVER RISKS:

Reveal hidden threats and opportunities before they escalate.



GAIN INSIGHTS:

Draw on real experience and practical knowledge.



IMPROVE PLANS:

Inform schedules, budgets and response strategies.



BUILD ENGAGEMENT:

Show stakeholders their views matter and encourage ownership.



EARLY WARNING:

Identify emerging issues and changes in context.

2 HOW TO APPLY

Use a consistent approach to keep interviews focused and comparable.

1



Prepare a question list based on project objectives and key risk areas.

2



Ask about objectives, assumptions, interfaces, dependencies and constraints.

3



Explore previous failures, warning signs and what could go wrong or go well.

4



Discuss feasible responses and what support is needed.

5



Record key points clearly and confirm understanding with the interviewee.



CONTROL:

Use open, unbiased questions. Avoid leading or suggestive language.

3 INPUTS & EVIDENCE



RELEVANT DOCUMENTS:

Project objectives, scope, schedule, budget, design information and contracts.



PEOPLE TO INTERVIEW:

Project team members, key stakeholders, subject matter experts, contractors and suppliers.



EVIDENCE TO REVIEW:

Previous project lessons, incident reports, performance records and change logs.



OWNER:

Risk manager or facilitator to plan and conduct interviews.



SUPPORT:

Project sponsor and functional managers to provide access to people and information.

4 PRACTICAL EXAMPLE

Illustrative interview at a construction project.



Question:

Are there any key assumptions that might not hold?



Interviewee (installer):

"Site power has not been approved yet, so we may not be able to run test equipment during commissioning."



Identified risk:

Delay to commissioning due to lack of approved site power.



Potential response:

Engage the client to confirm approval dates or consider temporary power solutions.



Insight:

Early discussion uncovered a commissioning uncertainty that was not visible in the current plan.

5 PITFALLS & LIMITS



SUBJECTIVE VIEWS:

Opinions reflect personal experience and may be incomplete or biased.



NEED CONTEXT:

Findings must be validated with additional evidence and other sources.



CONFIDENTIALITY:

Protect sensitive or commercially confidential information when summarizing and sharing input.



LIMITED PERSPECTIVE:

One interview does not represent every view. Speak to a range of roles and disciplines.



NOT A FINAL DECISION:

Interview results inform risk analysis but are not a substitute for formal approval or data.

6 ACTIONS & OUTPUTS



ANALYSE FINDINGS:

Review and group similar concerns, identify common themes and notable differences.



TRIANGULATE:

Compare interview insights with documents, data and other interviews to confirm or challenge.



CREATE RISK STATEMENTS:

Translate key findings into clear risk and opportunity statements with causes and potential impacts.



AGREE ACTIONS:

Assign owners and next steps to investigate, mitigate, exploit or monitor.



OUTPUTS:

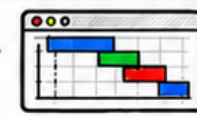
Interview notes, a consolidated risk register and an action log for follow-up.



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RISK CHECKLIST



Use prior experience to test for commonly overlooked sources of uncertainty.



1 PURPOSE & VALUE

A risk checklist is a structured list of questions based on experience, used to identify common and overlooked sources of uncertainty.



SYSTEMATIC CHECK:

Prompts discussion and reveals hidden risks.



CONSISTENT COVERAGE:

Ensures important areas are considered for every project.



SHARED UNDERSTANDING:

Creates a common view of what could go wrong.



EARLY IDENTIFICATION:

Helps find risks before they affect the plan.



LESSONS APPLIED:

Builds on past projects and industry experience.

2 HOW TO APPLY

1



Tailor the checklist to your project scope, context and lifecycle.

2



Work through each prompt with the project team and relevant experts.

3



Ask for evidence to confirm whether the risk applies.

4



If not applicable, mark N/A and record the reason (e.g. out of scope).

5



Add new risks that emerge beyond the checklist.

6



Review and update throughout the project lifecycle.



CONTROL:

A checklist guides discussion; it is not a complete list. Always add new risks.

3 INPUTS & EVIDENCE



BASE CHECKLIST:

Adapted from prior projects, industry practice and lessons learned.



RELEVANT EVIDENCE:

Plans, designs, contracts, technical documents, test results and meeting notes.



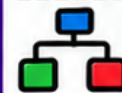
STAKEHOLDERS & OWNERS:

Input from project team, subject matter experts, suppliers and relevant business owners.



CONTEXT INFORMATION:

Project scope, phase, technology environment, locations and dependencies.



RELEVANT POLICIES:

Organizational standards, regulatory requirements and supplier terms.



TIMING:

Use at key points such as initiation, planning and major phase reviews.

4 PRACTICAL EXAMPLE

Illustrative deployment checklist for a new software release:



ROLLBACK:

Is a tested rollback plan available and documented?



ACCESS APPROVALS:

Have all required user and admin access approvals been completed?



SUPPORT COVERAGE:

Is helpdesk support available during and after deployment?



SUPPLIER LEAD TIMES:

Are supplier lead times acceptable for any required hardware or software?



ILLUSTRATIVE:

This example is not a complete checklist. Tailor items to your project and add new risks.

5 PITFALLS & LIMITS



ANCHORING BIAS:

May focus on yesterday's problems and miss novel or emerging risks.



FALSE CONFIDENCE:

A completed checklist is not a guarantee that all risks have been identified.



OUTDATED ITEMS:

May include irrelevant questions if not refreshed for the current context.



INCOMPLETE COVERAGE:

Cannot replace expert judgment, workshops or broader risk analysis techniques.



LIMITATION:

Provides prompts, not answers. It identifies risks to consider; assessment and response are required separately.

6 ACTIONS & OUTPUTS



REFRESH CHECKLIST:

Update using lessons learned from completed projects and remove items that are no longer relevant.



FACILITATE REVIEW:

Use the checklist with the team, ask for evidence and capture new risks.



RECORD RESULTS:

Create a risk register with identified risks and reasons for any N/A items.



ASSIGN OWNERSHIP:

Allocate risk owners and agree next steps for assessment and response.



KEEP UP TO DATE:

Revisit at each major phase or change in circumstances.



OUTPUTS:

Updated checklist, list of new and existing risks with evidence, owners and agreed actions.



ASSUMPTION TESTING



Evaluate whether uncertain planning assumptions remain credible.

1 PURPOSE & VALUE

Assumption testing checks if key planning assumptions are still reasonable based on current evidence, so that decisions and plans remain robust.



CLARITY:

Confirms what we believe to be true.



CONFIDENCE:

Reduces the chance of surprises and rework.



BETTER DECISIONS:

Highlights assumptions that need action or closer monitoring.



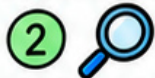
SHARED UNDERSTANDING:

Aligns the team and key stakeholders.

2 HOW TO APPLY



1 Record the assumption clearly and specifically.



2 Identify the evidence needed to validate it.



3 Assign a validation owner and set a deadline.



4 Assess the consequence if the assumption is false.



5 Prioritize high-impact weak assumptions for testing.



6 Review and update regularly as new evidence emerges.



CONTROL:

Do not treat an untested assumption as a fact.

3 INPUTS & EVIDENCE



ASSUMPTION LOG:

Description, source and current status of each assumption.



SUPPORTING EVIDENCE:

Documents, data, expert advice or external confirmations.



VALIDATION OWNER:

Person or team responsible for checking the evidence.



DEADLINE:

Date when the evidence will be obtained and reviewed.



CONSEQUENCE IF FALSE:

Impact on scope, schedule, cost, quality or compliance.



RELATED RECORDS:

Links to risks, issues, dependencies and decisions.

4 PRACTICAL EXAMPLE

Illustrative project assumption:

The plan assumes a permit will be approved in four weeks, allowing site mobilization to start.



ASSUMPTION:

Permit approval in four weeks.



EVIDENCE:

Check the application status with the permitting authority.



OWNER:

Regulatory liaison to confirm.



DEADLINE:

Verify status before committing mobilization.



CONSEQUENCE IF FALSE:

Mobilization delayed and additional costs.

RESULT (ILLUSTRATIVE):

Proceed with mobilization only after the status is confirmed.

5 PITFALLS & LIMITS



UNTESTED ASSUMPTIONS:

Do not treat an untested assumption as a fact or a guarantee.



DUPLICATION:

Do not record the same assumption in multiple logs without links.



OVERCONFIDENCE:

A single source of evidence may be insufficient.



CHANGING CONDITIONS:

An assumption can become invalid as external conditions change.



SCOPE LIMITATION:

Cannot remove all uncertainty; it informs better planning and responses.

6 ACTIONS & OUTPUTS



UPDATE FORECAST:

Revise the schedule, budget or scope when evidence weakens an assumption.



CREATE A RESPONSE:

If the assumption is unlikely, develop a mitigation or contingency action.



RECORD OUTCOME:

Document the test result and any agreed changes.



MONITOR:

Keep tracking key assumptions throughout the project.



UPDATED LOGS:

Assumption log with status (e.g. confirmed, changed or no longer valid) and next review.



COMMUNICATE:

Share material changes with the team and stakeholders.



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PREMORTEM REVIEW



Imagine the project has failed and work backward to identify plausible causes.

1 PURPOSE & VALUE

A premortem review assumes the project has failed at a future date and asks why. It uncovers hidden risks, challenges assumptions and stimulates practical prevention.



REVEAL HIDDEN RISKS:

Brings forward concerns that may not surface in normal planning.



CHALLENGE ASSUMPTIONS:

Encourages critical thinking and a wider perspective.



IMPROVE RESILIENCE:

Helps the team prepare early actions to reduce the chance and impact of failure.



BUILD SHARED OWNERSHIP:

Engages diverse viewpoints across the project.

2 HOW TO APPLY



1

Set the scene: imagine it is a defined future date and the project has failed.



2

Ask participants to individually write down their explanations for why it failed.



3

Group similar causes into themes.



4

Examine the evidence behind each cause and check plausibility.



5

Select and agree preventive actions to reduce or remove the most credible causes.



CONTROL:

Focus on plausible, evidence-based causes. Keep the discussion constructive and solution-oriented.

3 INPUTS & EVIDENCE



PROJECT INFORMATION:

Objectives, scope, plan, key dependencies and assumptions.



RELEVANT EVIDENCE:

Past project lessons, stakeholder feedback, issue logs and early warning signs.



PARTICIPANTS:

Diverse team members, including delivery, business, technical and support functions.



FACILITATOR:

An independent and neutral facilitator to encourage open ideas.



OWNERS & STAKEHOLDERS:

People who can take action on the identified causes and ensure follow-through.

4 PRACTICAL EXAMPLE

Illustrative example (not a real project):

A product launch is imagined to have failed. Team members write down causes independently, then group and discuss themes.



IDENTIFIED CAUSE:

Customer support staff were not adequately trained before launch, leading to poor service and customer dissatisfaction.



PREVENTIVE ACTION:

Develop and deliver support training before launch, with clear materials and a readiness check.



OUTCOME:

The risk is addressed early, reducing the likelihood of launch problems.

5 PITFALLS & LIMITS



NOT A PREDICTION:

Reveals possible causes, not measured probabilities or guaranteed outcomes.



BLAME CULTURE:

Avoid blaming individuals or departments. Focus on system and process causes.



SENSATIONAL SPECULATION:

Do not list unrealistic or extreme scenarios that are unlikely to be plausible.



LIMITED BY INPUTS:

Quality depends on the information and people involved. May miss causes if key voices are absent.



REQUIRES FOLLOW-UP:

Without agreed actions and owners, insights may not lead to real change.

6 ACTIONS & OUTPUTS



CONVERT TO RISKS:

Turn credible causes into clear risk statements and record them in the risk register.



AGREE RESPONSE ACTIONS:

Define preventive or mitigating actions with named owners and time-bound deadlines.



INTEGRATE INTO PLANS:

Include actions in the project plan and track through regular reviews.



OUTPUTS:

List of agreed risks, owners, actions and target dates.



CHECK PROGRESS:

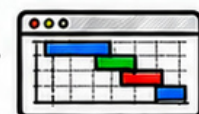
Review and update the risks and actions as new information emerges.



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CAUSE-EVENT-EFFECT STATEMENTS



Describe an uncertainty by linking the present cause, uncertain event and objective affected.

1 PURPOSE & VALUE

Cause-event-effect statements describe an uncertainty clearly enough to analyze and act on it.



CLARITY:

Specifies what might happen, why it could happen, and what it affects.



BETTER ANALYSIS:

Helps assess likelihood and impact and compare options.



DRIVES ACTION:

Links the risk to specific responses and a responsible owner.



COMMON LANGUAGE:

Provides a consistent format for the team and stakeholders.



MORE FOCUSED PLANNING:

Separates one event from others to avoid confusion.

2 HOW TO APPLY

Use a clear three-part statement.

Because <CAUSE>,
<EVENT> may occur,
causing <EFFECT>.

1



Identify the present cause that creates the uncertainty.

2



State one specific, uncertain event.

3



Describe the objective affected and the effect.

4



Keep each statement to one cause, one event and one effect.

5



Check that the statement is clear, concise and actionable.



CONTROL:

Do not combine multiple unrelated events in one statement.

3 INPUTS & EVIDENCE



REQUIRED INPUTS:

Project scope and objectives, current plans, assumptions and constraints.



RELEVANT EVIDENCE:

Supplier contracts and capacity information, technical data, market or regulatory conditions, and historical records.



KEY PEOPLE & OWNERS:

Project manager, subject matter experts, supplier and risk owner responsible for monitoring and response.



TOOLS & SOURCES:

Risk register, project documents, supplier data and team workshops.



QUALITY CHECK:

Evidence supports the cause and the event is uncertain (not already happening).

4 PRACTICAL EXAMPLE

Illustrative cause-event-effect statement for a component supply risk:

Because the supplier uses a single component source, a shortage may occur, causing a delay to assembly by two weeks.



CAUSE:

Supplier uses a single component source.



EVENT:

A shortage may occur.



EFFECT:

Assembly delayed by two weeks (in an illustrative scenario).

5 PITFALLS & LIMITS



VAGUE STATEMENTS:

A phrase such as "supplier risk" cannot support a specific response.



MULTIPLE EVENTS:

Do not combine unrelated events in one statement.



MIXING CAUSE AND EVENT:

Keep the cause as a present condition and the event as an uncertain future occurrence.



ITEMS ALREADY HAPPENED:

This tool is for uncertainties, not issues that are already occurring.



LIMIT:

A clear statement improves analysis, but does not remove the risk.

6 ACTIONS & OUTPUTS



CONFIRM THE CAUSE:

Check with evidence that the cause is real and current.



IDENTIFY A TRIGGER:

Define an early warning sign that the event may be occurring (e.g., falling supplier inventory levels).



ASSIGN A RISK OWNER:

Nominate a person responsible for monitoring, review and response actions.



PLAN RESPONSES:

Use the statement to develop and evaluate response options and update the risk register.



OUTPUTS:

Completed cause-event-effect statement, trigger, risk owner and updates to the risk register and action plan.



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PROBABILITY-IMPACT MATRIX



Screen risks consistently using agreed probability and impact bands.

1 PURPOSE & VALUE

The probability-impact matrix helps the team screen and compare risks consistently, using agreed probability and impact bands.



COMPARABLE VIEW:

Provides a common picture of which risks need attention across the project.



FOCUSED EFFORT:

Highlights the risks with greater potential to affect objectives.



BETTER DECISIONS:

Supports transparent discussions and prioritization using shared criteria.



FLEXIBLE TOOL:

Can be tailored to the project's objectives, scale and risk appetite.

2 HOW TO APPLY



DEFINE SCALES:

Agree probability and impact bands and the time horizon (e.g. project duration).



ASSESS IMPACTS:

Consider effect on each key objective (e.g. cost, time, quality, scope). Use the highest relevant impact.



DISCUSS UNCERTAINTY:

Consider the range of possible outcomes and record the rationale for the chosen ratings.



APPLY THE MATRIX:

Plot each risk using the agreed bands and prioritize according to project rules.



ESCALATION:

Escalate high-rated risks according to the governance process and project rules.

3 INPUTS & EVIDENCE



RISK LIST:

Identified risks with clear descriptions and causes.



EVIDENCE:

Project documents, assumptions, historical data, expert judgment and stakeholder input.



OWNERS:

Risk owner for each risk, with support from subject matter experts.



TIME HORIZON:

Agreed period for the assessment (e.g. project duration or a specific phase).



OBJECTIVES & CRITERIA:

Defined impact criteria for relevant objectives (e.g. cost, time, quality, scope).



CONTEXT:

Project environment, constraints and risk appetite.

4 PRACTICAL EXAMPLE

Illustrative risk at the project level:

Risk: Key supplier may not deliver on time.

Probability rating: High (agreed band).

Impact rating: Major on schedule (agreed band).

	Major			
	Moderate			
	Minor			
		Low	Medium	High
Impact ↑				

RESULT: High-probability, major-impact risk falls in the top-right area and receives priority review under the team's agreed matrix.

5 PITFALLS & LIMITS



NOT A PRECISE MEASURE:

Ratings are ordinal labels. Do not multiply probability and impact labels. The matrix does not produce a precise quantitative measurement.



SUBJECTIVITY:

Ratings can vary between people. Use clear definitions and discuss differences to reach agreement.



FALSE PRECISION:

Larger cells or colors do not represent exact numerical values or expected losses.



CONTEXT DEPENDENT:

Ratings are specific to the project, its objectives and time horizon. They are not universal and should not be compared across different projects without adjustment.

6 ACTIONS & OUTPUTS



USE FOR TRIAGE:

Review and prioritize risks. Focus attention on high-rated risks for further analysis.



ANALYZE FURTHER:

Perform deeper analysis for major risks (e.g. response options, scenario analysis or quantitative methods).



AGREE RESPONSES:

Define and assign risk responses and owners for prioritized risks.



DOCUMENT RESULTS:

Record the ratings, rationale and agreed actions in the risk register.



MONITOR AND UPDATE:

Reassess as the project evolves and new evidence becomes available.



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RISK URGENCY ASSESSMENT



Consider how soon a response decision is needed as well as overall exposure.

1 PURPOSE & VALUE

Assesses how soon a response decision is needed as well as overall risk exposure, so that time-critical risks get attention.



FOCUSES ON TIMING:

Considers urgency, not just overall impact or probability.



SUPPORTS PRIORITISATION:

Highlights risks that need decisions now.



IMPROVES READINESS:

Ensures response options are prepared in time.



ENABLES BETTER USE OF RESOURCES:

Directs effort to the most time-sensitive risks.



WORKS WITH OTHER TOOLS:
Complements qualitative and quantitative risk analysis.

2 HOW TO APPLY

Assess four factors to determine urgency and set the need-by date for a response decision.

1



Assess response lead time.

How long a response option will take to prepare.

2



Check proximity.

How soon the risk event could occur.

3



Review trigger visibility.

Are early warning signs clear and observable?

4



Calculate time remaining to act.

Time until the decision must be made.



CONTROL:

Use these factors together with overall risk exposure to set urgency. Do not rely on a single factor.

3 INPUTS & EVIDENCE



RISK REGISTER:

Risk description, causes, consequences and current scores.



RESPONSE OPTIONS:

Details of possible treatments and their required lead times.



TRIGGER INFORMATION:

Early warning indicators and monitoring data.



SCHEDULE DATA:

Key milestone dates and dependencies that affect timing.



RELEVANT OWNERS:

Risk owner, technical experts, procurement, and operations to confirm lead times and feasibility.



EVIDENCE SOURCES:

Contracts, supplier information, market data, past project records and expert judgement.

4 PRACTICAL EXAMPLE

Illustrative risk at the component procurement stage:

Risk: Preferred supplier may become unavailable.

Current exposure: Moderate.

Response option: Qualify an alternate supplier.

Required lead time: 8 weeks.

Time to potential impact: 10 weeks.

RESULT: ACTION NOW



There are 10 weeks until possible impact and 8 weeks of qualification work. The latest safe start is in 2 weeks, before any extra buffer. Begin preparation now and confirm the decision deadline.



NOTE:

This example is illustrative. Timescales and thresholds are project-specific.

5 PITFALLS & LIMITS



LOW SCORE CAN STILL BE URGENT:

A risk may have low overall exposure but still require immediate action due to short time remaining.



NOT THE SAME AS PROBABILITY:

Urgency is about timing, not how likely the event is.



IGNORE KEY FACTORS:

Looking at only one factor, such as impact, can miss time-critical risks.



OVER-OPTIMISM:

Assuming more time is available than is realistic.



LIMITATION:

Urgency assessment does not replace full risk analysis. Always consider overall exposure and project context.

6 ACTIONS & OUTPUTS



SET LATEST SAFE DECISION DATE:

Use the assessment to agree the latest date a response decision can be made.



ALLOCATE OWNER:

Assign a clear owner to lead immediate preparation of the response option.



PREPARE RESPONSE:

Start required activities, such as supplier qualification, so the option will be ready in time.



UPDATE RISK REGISTER:

Record the urgency assessment, decision date, owner and next steps.



OUTPUTS:

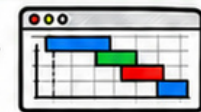
Latest safe decision date, named owner, agreed actions, and an updated risk register with evidence and rationale.



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RISK DATA QUALITY REVIEW



Evaluate whether estimates are reliable enough for the intended decision.

① PURPOSE & VALUE

Assesses the quality of risk data used for estimates and analysis to judge whether it is fit for the intended decision.



BETTER DECISIONS:

Use reliable data for realistic risk estimates.



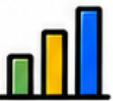
GREATER CONFIDENCE:

Identifies strengths and weaknesses in the evidence.



EARLY RISK MANAGEMENT:

Reveals data gaps and bias before decisions are finalized.



APPROPRIATE USE:

Ensures estimates match the decision's purpose, scope and tolerance for uncertainty.

② HOW TO APPLY

Review each quality aspect and document findings for the estimate.



Check source relevance.

Is the data from a similar project, context and period?



Check completeness.

Are key data points missing or partial?



Check recency.

Is the data still current for today's conditions?



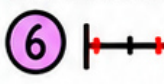
Check consistency.

Does it align with other available evidence?



Check expert bias.

Consider different views and potential conflicts of interest.



Check uncertainty ranges.

Is a range provided and does it reflect the evidence?

③ INPUTS & EVIDENCE



HISTORICAL DATA:

Past project records, lessons learned, and actual outcomes.

Owner: Project controls / PMO.



EXPERT JUDGEMENT:

Subject matter experts, technical assessments and assumptions.

Owner: Relevant technical leads.



CONTEXT INFORMATION:

Current project scope, constraints, market and supplier conditions.

Owner: Project manager.



REFERENCE SOURCES:

External benchmarks, industry data and comparable projects.

Owner: Risk manager.



ASSUMPTIONS & RATIONALE:

Documented assumptions, data sources and any known limitations.

Owner: Estimate owner.

④ PRACTICAL EXAMPLE

Illustrative delay estimate based on five similar deliveries:



Data source: 5 past deliveries from the same supplier.



Findings: Small sample size and new supplier conditions mean the data may not be fully representative.



Adjustment: Consider a wider range to reflect the uncertainty due to different supplier conditions.



Use: Treat the estimate as lower confidence and seek additional evidence before making a consequential decision.

⑤ PITFALLS & LIMITS



FALSE PRECISION:

A single, precise number from weak data can mislead more than an honest range.



IRRELEVANT DATA:

Data from different projects, markets or time periods may not apply.



INCOMPLETE DATA:

Missing key information creates a false sense of certainty.



EXPERT BIAS:

Relying on one expert can skew results. Seek diverse views.



LIMITATION:

This review does not remove all uncertainty. The required quality level depends on the decision and risk tolerance.

⑥ ACTIONS & OUTPUTS



SEEK MORE EVIDENCE:

For consequential decisions, collect additional data or expert views to strengthen the estimate.



DOCUMENT FINDINGS:

Record the data sources, quality assessment and any assumptions in the risk register.



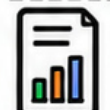
RECORD CONFIDENCE:

State the confidence level and limitations of the estimate, and explain the reasons.



USE THE RESULTS:

Decide whether the data is sufficient for the intended decision or if further analysis is needed.



OUTPUTS:

Quality review summary, updated risk estimate (if needed) and documented actions to close data gaps.



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RISK BOW-TIE ANALYSIS



Link causes and preventive controls to an event, then consequences and recovery controls.

1 PURPOSE & VALUE

Risk bow-tie analysis shows how threats can lead to an unwanted event and how barriers prevent or reduce the impact.



CONNECTS RISK PATH:

Links causes (threats) to an event, and consequences.



FOCUSES ACTION:

Identifies preventive and recovery controls to manage the risk.



COMMON VIEW:

Provides a clear diagram that supports discussion and decision-making.



PRIORITIZES EFFORT:

Highlights critical barriers and gaps for improvement.

2 HOW TO APPLY

1



Define the scope, system boundary and the unwanted event (top event).

2



Identify threats on the left and consequences on the right of the event.

3



List preventive barriers for each threat and recovery barriers for each consequence.

4



Test each barrier for effectiveness and assign an owner.

5



Review the diagram, verify gaps and agree on actions.



CONTROL:

A diagram alone does not reduce risk. Barriers must be real, tested and maintained.

3 INPUTS & EVIDENCE



RISK INFORMATION:

Risk register, hazard list, previous incidents and assumptions.



BARRIER DETAILS:

Design descriptions, procedures, test results and maintenance records.



OWNERS:

Named individuals or teams for each preventive and recovery barrier.



EVIDENCE OF EFFECTIVENESS:

Test reports, inspection records, drill results and monitoring data.



EXPERT INPUT:

Subject matter experts, operations, IT, safety and project team.

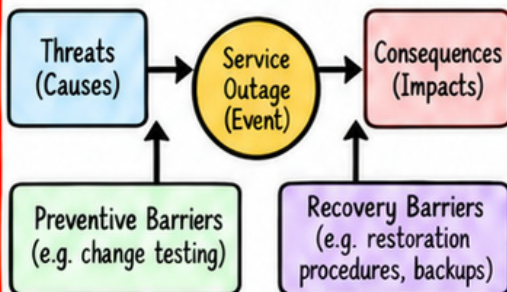


DEPENDENCIES:

Interface risks, external suppliers and shared systems.

4 PRACTICAL EXAMPLE

Illustrative example: service outage for a critical system.



EXAMPLE BARRIERS:

Preventive: change testing, staged rollout, configuration checks.
Recovery: restoration procedures, backups and failover plan.

5 PITFALLS & LIMITS



DIAGRAM IS NOT PROOF:

A bow-tie does not demonstrate that barriers work or are independent.



FALSE CONFIDENCE:

Barriers may be missing, ineffective or not maintained.



DEPENDENCIES IGNORED:

Barriers can rely on other systems, people or external suppliers.



OVERSIMPLIFICATION:

Complex risks may not fit neatly into a single diagram.



STATIC VIEW:

Risks and controls can change over time. Review and update regularly.

6 ACTIONS & OUTPUTS



ASSIGN OWNERS:

Name a responsible person or team for each preventive and recovery barrier.



CHECK EFFECTIVENESS:

Plan tests, drills or inspections and record the results.



AGREE ACTIONS:

Close gaps, strengthen weak barriers and set deadlines.



MAINTAIN & REVIEW:

Update the bow-tie when risks, systems or dependencies change.



OUTPUTS:

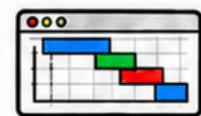
Completed bow-tie diagram, list of barrier owners, test results, action log and review date.



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FAILURE MODE ANALYSIS



Review how a component or process can fail and prioritize prevention or detection.

1 PURPOSE & VALUE

Failure mode analysis (FMA) is a structured method to review how a component, system or process can fail and to prioritize prevention or detection actions.



IDENTIFY:

List possible failure modes and their potential effects.



PRIORITIZE:

Focus on the most serious and likely failures.



IMPROVE:

Strengthen or add controls to prevent or detect failures early.



INCREASE RELIABILITY:

Reduce rework, interruption and negative impact on users and objectives.

2 HOW TO APPLY

Follow a structured assessment:

- 1 List each failure mode, its effects, causes and existing controls.
- 2 Assess severity (S), occurrence (O) and detection (D) using agreed ordinal scales.
- 3 Calculate a risk priority number (RPN):
 $RPN = S \times O \times D$
- 4 Prioritize higher RPNs for action.
- 5 Plan and implement controls that prevent or detect the failure.



CONTROL:

Use consistent rating scales and document the rationale for each score.

3 INPUTS & EVIDENCE



PROCESS INFORMATION:

Process maps, design documents, specifications and workflows.



HISTORICAL DATA:

Past incidents, defects, service records and lessons learned.



EXPERT KNOWLEDGE:

Subject matter experts from engineering, operations, support and quality.



CURRENT CONTROLS:

Preventive and detective controls, including tests, inspections and monitoring.



OWNERS & STAKEHOLDERS:

Process or component owner, risk facilitator and affected business areas.



EVIDENCE OUTPUT:

Completed FMA worksheet with ratings, assumptions and agreed actions.

4 PRACTICAL EXAMPLE

Illustrative example: payment interface might duplicate a transaction.



FAILURE MODE:

Same transaction sent twice.



EFFECT:

Customer charged twice, refund required, loss of trust.



CAUSES:

Network timeout and automatic retry without proper check.



EXISTING CONTROLS:

Request validation and reconciliation report.



ACTIONS:

Add unique transaction ID check and improve reconciliation alerts before release.

5 PITFALLS & LIMITS



RATING SUBJECTIVITY:

Severity, occurrence and detection are ordinal ratings. Use agreed definitions and keep the team consistent.



NOT A PHYSICAL QUANTITY:

$RPN = S \times O \times D$ is a screening aid, not a physical measure of risk. Do not compare RPNs as precise values.



SERIOUS EFFECTS:

High-severity effects may require action regardless of the total score.



SCOPE LIMITATION:

Focuses on known failure modes and may miss unknown or emergent risks.



REGULAR REVIEW:

Reassess after changes, new data or incidents. It is not a one-time exercise.

6 ACTIONS & OUTPUTS



AGREE & ASSIGN:

Create corrective and preventive actions, assign owners and set deadlines.



IMPLEMENT CONTROLS:

Update designs, process steps, checks or monitoring as agreed.



VERIFY EFFECTIVENESS:

Confirm actions are implemented and working as intended.



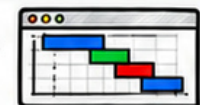
REASSESS EXPOSURE:

Recalculate S, O, D and RPN for remaining risks after verification.



OUTPUTS:

Completed FMA record, action log with status, and updated risk register. Use the results to inform design, testing and operational monitoring.



FAULT TREE ANALYSIS



Analyze combinations of causes that could produce an undesired top event.



1 PURPOSE & VALUE

Fault tree analysis (FTA) identifies combinations of basic causes that could produce an undesired top event, using logical relationships.



FIND ROOT CAUSES:

Shows how basic events combine to cause the top event.



UNDERSTAND RISK:

Reveals critical combinations and single points of failure.



PRIORITIZE ACTIONS:

Highlights where controls most reduce the risk of the top event.



SUPPORT DECISIONS:

Helps justify additional controls and testing based on structured logic.

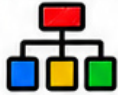
2 HOW TO APPLY

1



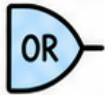
Define the top event clearly and set the scope and system boundaries.

2



Decompose the top event into intermediate and basic events.

3



Use OR gates for alternative causes (any can cause the event).

4



Use AND gates for required combinations (all must occur together).

5



Validate the tree with subject matter experts and confirm dependencies.



CONTROL: Clearly define boundaries and assumptions. Check for common causes and dependencies.

3 INPUTS & EVIDENCE



SYSTEM INFORMATION:

Designs, architecture diagrams, process flows and operating procedures.



HISTORICAL DATA:

Incident records, failure data, maintenance logs and test results.



EXPERT INPUT:

Subject matter experts to validate causes, dependencies and logic.



ASSUMPTIONS & SCOPE:

Defined boundaries, exclusions and operating conditions.

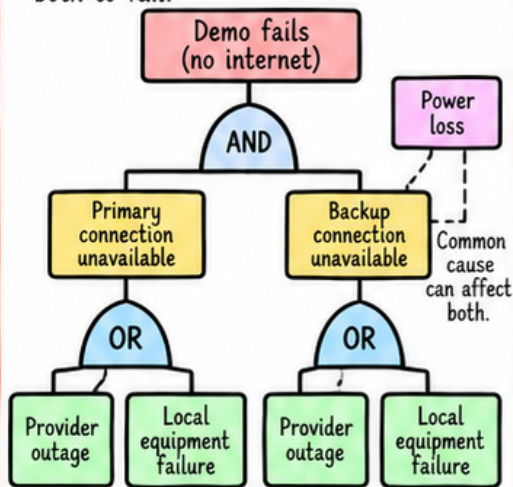


OWNERS:

Risk analyst facilitates; system owner, engineering, operations and maintenance provide inputs and review the analysis.

4 PRACTICAL EXAMPLE

Illustrative example: A live demo fails if both the primary and backup internet connections are unavailable. A common power loss can also cause both to fail.



5 PITFALLS & LIMITS



DO NOT MULTIPLY PROBABILITIES:

Do not multiply probabilities without justified independence assumptions.



INCLUDE COMMON CAUSES:

Do not omit events, such as a power loss, that can affect multiple branches.



CHECK LOGIC:

Avoid incorrect use of AND/OR gates and missing intermediate events.



VALIDATE ASSUMPTIONS:

Uncertain data and expert bias can affect results. Use evidence and review.



SCOPE LIMITS:

FTA focuses on the defined top event and system. It does not estimate cost or schedule impacts.

6 ACTIONS & OUTPUTS



IDENTIFY VULNERABILITIES:

Use the tree to find critical combinations and single points of failure.



STRENGTHEN CONTROLS:

Add redundancy, diversification or preventive measures for key basic events.



PLAN ACTIONS:

Develop and assign actions to address highest risk combinations.



KEY OUTPUTS:

Documented fault tree, list of critical causes and combinations, and recommended control actions.



USE FOR REVIEW:

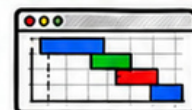
Update the tree when the system changes and use it to support testing, monitoring and project decisions.



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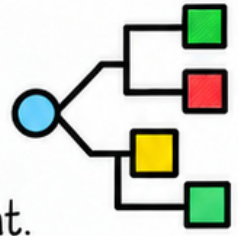
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EVENT TREE ANALYSIS



Explore possible outcome paths after a defined initiating event.

① PURPOSE & VALUE

Event tree analysis explores possible outcome paths after a defined initiating event, based on the success or failure of subsequent barriers.



EXPLORE OUTCOMES:

Map how events can unfold into different results.



SUPPORT DECISIONS:

Identify key risks and opportunities for improved controls.



FOCUS ON CONSEQUENCES:

Show potential impacts of each outcome path.



COMPARE OPTIONS:

Evaluate how changes to barriers affect overall risk.

② HOW TO APPLY

Build the event tree from an initiating event, identify successive barrier successes or failures, estimate conditional probabilities, and evaluate consequences for each end state.

1



Define the initiating event.

2



Identify sequential barriers and create success/failure branches.

3



Estimate conditional probabilities using reliable data.

4



Evaluate consequences for each end state.

5



Summarize results and identify risk reduction opportunities.



CONTROL:

Use conditional probabilities only when supported by credible evidence. Avoid unsupported estimates.

③ INPUTS & EVIDENCE



INITIATING EVENT:

Clear description of the event, scope and system boundaries.



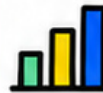
BARRIER INFORMATION:

Design documents, operating procedures and past performance data for each barrier.



PROBABILITY DATA:

Historical records, test results or expert-elicited estimates with documented rationale.



CONSEQUENCE DATA:

Impact assessments for each end state (e.g. safety, cost, schedule, environmental).

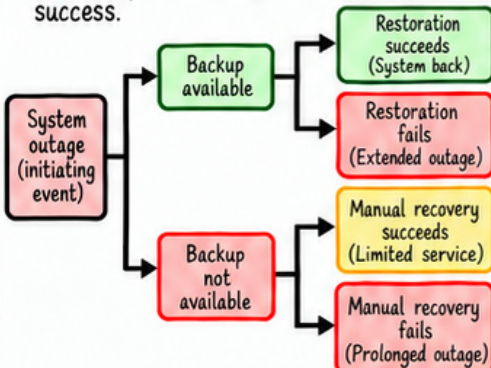


KEY OWNERS:

System or process owner, subject-matter experts and risk management team.

④ PRACTICAL EXAMPLE

Illustrative example: After a system outage, recovery outcomes depend on backup availability and restoration success.



INTERPRETATION:

The tree shows alternative outcome paths and their consequences, helping prioritize improvements to backup and restoration processes.

⑤ PITFALLS & LIMITS



INCOMPLETE BRANCHES:

All realistic outcomes must be included at each split.



MUTUALLY EXCLUSIVE:

Branches at the same split must be mutually exclusive and collectively exhaustive.



UNCONDITIONAL RATES:

Using unconditional failure rates can distort results; use conditional probabilities based on the preceding branch.



DATA UNCERTAINTY:

Gaps or low-quality data increase uncertainty in results.



MODEL BOUNDARIES:

Only events within the defined scope are included; external factors may not be captured.

⑥ ACTIONS & OUTPUTS



COMPARE IMPROVEMENTS:

Assess how changes to barrier designs or procedures reduce likelihood or consequence.



PRIORITIZE ACTIONS:

Focus on barriers that most improve overall risk based on the event tree results.



DOCUMENT ASSUMPTIONS:

Record data sources, conditional probabilities and rationale for each branch.



UPDATE REGULARLY:

Review and revise the analysis when new information becomes available.

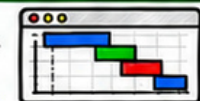


KEY OUTPUTS:

Event tree diagram, probability summary for each end state, consequence assessment and a list of recommended actions.



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EXPECTED MONETARY VALUE



Estimate probability-weighted monetary outcomes for a stated decision context.

1 PURPOSE & VALUE

Expected Monetary Value (EMV) combines the probability of an event with its monetary impact to estimate the average outcome.



SUPPORTS DECISIONS:

Compares options and helps prioritize risk responses.



SHOWS OVERALL IMPACT:

Converts uncertain outcomes into a single monetary value.



WORKS FOR OPPORTUNITIES AND THREATS:

Positive EMV can indicate upside; negative EMV shows potential cost.



USES A STATED CONTEXT:

Applies to a specific decision, timeframe and set of assumptions.

2 HOW TO APPLY

$$EMV = \sum (P \times M)$$

P = probability of outcome

M = monetary impact of outcome

Σ = sum of all relevant outcomes

1



Define the decision context and identify possible outcomes.

2



Estimate a realistic probability and monetary impact for each outcome.

3



Multiply P x M for each outcome and sum the results.

4



Ensure outcomes are mutually exclusive or consistently modeled.



CONTROL:

Use consistent assumptions for probabilities, impacts and currency.

3 INPUTS & EVIDENCE



RISK REGISTER:

Identified risks and opportunities, descriptions and potential outcomes.



PROBABILITY ESTIMATES:

Based on historical data, expert judgment or analogous projects.



MONETARY IMPACTS:

Cost or benefit estimates for each outcome, including direct and indirect effects.



SOURCE EVIDENCE:

Past project records, market data, contracts, technical analysis or expert input.



OWNERS:

Risk owner provides inputs; finance verifies monetary values; project manager consolidates and ensures consistent assumptions.

4 PRACTICAL EXAMPLE

Illustrative example for a single threat:

There is a 25% chance of a \$40,000 loss if a key supplier is delayed.

$$\begin{aligned} EMV &= P \times M \\ &= 0.25 \times (-\$40,000) \end{aligned}$$

RESULT: -\$10,000



INTERPRETATION:

The expected loss is -\$10,000 for this risk. This is an average value across many possible outcomes, not a single predicted loss.



NOTE:

Include all relevant outcomes and model them consistently for the decision context.

5 PITFALLS & LIMITS



NOT A PREDICTION:

Expected loss is not the loss that will occur.



NOT ALWAYS THE RIGHT RESERVE:

EMV alone does not determine the correct contingency or management reserve.



Expected values can be added even when risks are correlated, if impacts are modeled consistently without double counting. Correlation affects the overall distribution and reserve needs.



DISTRIBUTION IGNORED:

EMV hides the range of possible outcomes and does not show the likelihood of extreme losses.



SENSITIVE TO ASSUMPTIONS:

Results can change with different probabilities, impacts or timeframes. Keep assumptions clear and updated.

6 ACTIONS & OUTPUTS



USE IN COMBINATION:

Apply EMV alongside risk tolerance, scenario analysis and the cost of response options.



COMPARE OPTIONS:

Calculate EMV for each option (e.g., mitigate, transfer, accept) to support decision making.



PRIORITIZE RISKS:

Use EMV to highlight the largest expected monetary impacts for targeted action.



REFINE AND UPDATE:

Review and revise probabilities and impacts as new information becomes available.



OUTPUTS:

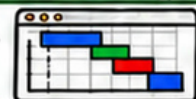
Expected monetary value for each risk or option, documented assumptions, and a prioritized risk list to support decisions.



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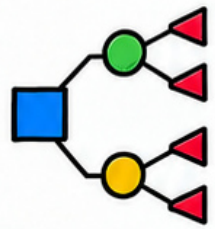
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DECISION TREE



Compare decision alternatives and their conditional uncertain outcomes.

① PURPOSE & VALUE

A decision tree helps you compare alternative options when outcomes are uncertain and depend on future events.



STRUCTURED CHOICE:

Shows decisions and possible outcomes clearly.



HANDLES UNCERTAINTY:

Uses probabilities and costs to estimate expected results.



BETTER DECISIONS:

Reveals trade-offs and highlights higher value options.



APPLIES WIDELY:

Useful for cost, schedule, technical and operational decisions.

② HOW TO APPLY

1. Draw the tree with decision nodes and chance nodes.
2. Assign supported probabilities and comparable costs.
3. Evaluate from right to left (roll back) to find expected values.



Create the decision tree structure.



Assign probabilities to each outcome.



Assign costs or values on the same basis.



Calculate expected values by working backward.



CONTROL:

Keep the same time horizon and cost basis for all options.

③ INPUTS & EVIDENCE



DECISION ALTERNATIVES:

Clear description of each option and decision point.



PROBABILITY EVIDENCE:

Estimates from historical data, expert judgement or analysis.



COST DATA:

All relevant costs and potential benefits, on a comparable basis.



CONTEXT & CONSTRAINTS:

Time horizon, scope, dependencies and any mandatory requirements.



OWNERS & EXPERTS:

Project manager (leads), subject matter experts (provide data), finance (costs), and risk team (reviews assumptions).

④ PRACTICAL EXAMPLE

Illustrative option with a possible further loss:

Upfront cost:	\$3,000
Chance of further loss:	20%
Further loss if it occurs:	\$10,000

Expected cost (EC):

$$EC = \$3,000 + 0.20 \times \$10,000 = \$5,000$$



INTERPRETATION:

The option has an expected cost of \$5,000, combining the certain upfront cost and the probability-weighted additional loss.

⑤ PITFALLS & LIMITS



UNCERTAIN INPUTS:

Probabilities and costs may be inaccurate or biased.



TIME HORIZON:

Compare options over the same time period. Results can change with a different horizon.



MISSING COSTS:

Include all relevant costs, including secondary and downstream effects.



RISK APPETITE:

Expected value alone may not reflect the organization's risk appetite or strategic goals.



MODEL LIMITS:

A tree can become complex and may not capture all real-world uncertainties.

⑥ ACTIONS & OUTPUTS



DOCUMENT ASSUMPTIONS:

Record alternatives, probabilities, costs, sources and time horizon.



CALCULATE & COMPARE:

Evaluate expected values and compare the options.



TEST SENSITIVITY:

Check whether the preferred choice changes under plausible alternative inputs.



OUTPUTS:

Preferred option, decision tree diagram, key assumptions and a summary of the rationale.

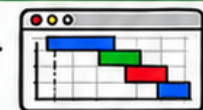


USE IN DECISION MAKING:

Discuss results with stakeholders and consider risk appetite, then confirm the selected option and next steps.



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SENSITIVITY ANALYSIS



Find which uncertain inputs most influence an outcome or decision.

1 PURPOSE & VALUE

Sensitivity analysis tests how changes in uncertain inputs affect a project outcome, such as cost or finish date.



IDENTIFY KEY DRIVERS:

Find inputs that have the greatest influence.



FOCUS EFFORT:

Prioritize data gathering and risk responses.



IMPROVE DECISIONS:

Understand which uncertainties matter most.



SUPPORT COMMUNICATION:

Explain where schedule or cost is most sensitive and why.

2 HOW TO APPLY

Vary one input at a time over a justified range while keeping other assumptions clear, and compare the change in the outcome.

1



Choose the outcome (cost or finish date).

2



Select key uncertain inputs to test.

3



Define a realistic low and high value for each input.

4



Change one input at a time and recalculate the outcome.

5



Compare the change and rank the influence of each input.



CONTROL:

Keep other assumptions constant for each test so results are comparable.

3 INPUTS & EVIDENCE



BASELINE SCHEDULE OR BUDGET:

Approved plan with key dates, durations, costs and logic.



UNCERTAIN INPUTS:

Estimates, productivity rates, supplier delivery dates, resource availability, weather or regulatory approvals.



EVIDENCE FOR RANGES:

Historical data, expert judgement, supplier quotes, technical studies or analogous projects.



OWNER(S):

Planner or scheduler, cost lead, subject-matter experts and relevant stakeholders.



TOOLS:

Schedule or cost model with the ability to vary inputs and observe the resulting change.

4 PRACTICAL EXAMPLE

Illustrative example using a supplier delivery on the driving path:

Planned finish date: 30 Jun
Vary delivery estimate: ± 1 week

If delivery is 1 week later:
New finish date: 7 Jul
Change in finish: +1 week

RESULT: +1 week

If delivery is 1 week earlier:
New finish date: 23 Jun
Change in finish: -1 week

RESULT: -1 week



INTERPRETATION:

The delivery has a high influence because it lies on the driving path.

5 PITFALLS & LIMITS



ONE-AT-A-TIME ONLY:

Testing inputs separately may miss interactions between variables.



CORRELATED INPUTS:

Some inputs move together (e.g., material cost and supplier lead time).



UNREALISTIC RANGES:

Results are misleading if ranges are not justified by evidence.



MODEL LIMITATIONS:

Simplified schedules or cost models may not capture all dependencies.



NOT A PREDICTION:

Shows relative influence within the tested ranges, not a forecast or probability.

6 ACTIONS & OUTPUTS



PRIORITIZE INPUTS:

Focus on the few inputs that cause the largest change in outcomes.



IMPROVE DATA:

Obtain better estimates or confirm ranges for influential inputs.



PLAN RESPONSES:

Develop risk responses for highly influential uncertainties (e.g., expediting, alternatives).



UPDATE AND RECHECK:

Incorporate new information, rerun the analysis and confirm whether influence has changed.



OUTPUTS:

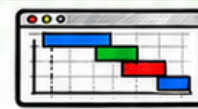
Ranked list of influential inputs, sensitivity results (change in cost or finish date) and recommended actions.



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TORNADO DIAGRAM



Display the relative sensitivity of a project outcome to a set of selected inputs.



1 PURPOSE & VALUE

A tornado diagram shows how sensitive a project outcome is to changes in selected input variables within stated ranges. It helps identify which factors have the biggest influence.



FOCUSES ATTENTION:

Highlights the few inputs that drive the outcome most.



SUPPORTS PRIORITIZATION:

Helps direct risk mitigation and further analysis to key drivers.



IMPROVES DECISIONS:

Provides a clear, visual comparison of relative influence across multiple inputs.



COMPLEMENTS OTHER TOOLS:

Often used before detailed quantitative or simulation analysis.

2 HOW TO APPLY

Follow these steps to build a tornado diagram.



1 Define the base case for the outcome and select key input variables.



2 Set low and high ranges for each input using credible evidence.



3 Calculate the outcome with each input at its low and high value, holding others at the base case.



4 Determine the change in the outcome for each input (low and high) and rank them by absolute influence.



5 Plot horizontal bars from largest to smallest influence.



CONTROL:

Use the same base case, units and ranges for a fair comparison.

3 INPUTS & EVIDENCE



INPUT VARIABLES:

Key drivers such as costs, demand, productivity, durations or exchange rates that affect the outcome.



EVIDENCE FOR RANGES:

Historical data, expert estimates, market forecasts and technical studies to set low-high values.



BASE CASE SOURCE:

Approved project plan or model version with documented assumptions.



OWNERS:

Input owners such as functional leads (e.g., engineering, procurement, construction, finance) to provide and validate the ranges.



DEPENDENCIES:

Note any linked inputs or constraints that could affect the ranges.

4 PRACTICAL EXAMPLE

Illustrative project: total cost sensitivity to selected inputs, using a base case and low-high ranges.



Base case total cost: \$10,000,000



Inputs and ranges:

- Labor productivity: -20% to +20%
- Material price: -10% to +10%
- Exchange rate: -5% to +5%



INTERPRETATION:

Within these ranges, total cost is more sensitive to labor productivity than to exchange rates.

5 PITFALLS & LIMITS



RANGE EFFECT:

Wide bars can reflect wide assumed ranges rather than inherently greater importance.



NO PROBABILITIES:

A tornado diagram shows relative sensitivity only. It does not provide the likelihood of outcome.



IGNORES INTERACTIONS:

Typically varies one input at a time and may not capture combined effects between inputs.



MODEL DEPENDENCE:

Results depend on the accuracy of the model, base case and selected inputs.



NOT A COMPLETE ANALYSIS:

Does not replace quantitative risk analysis or consider all possible risks.

6 ACTIONS & OUTPUTS



VALIDATE RANGES:

Review and challenge the low-high ranges with input owners and supporting evidence.



INVESTIGATE KEY DRIVERS:

Focus deeper analysis or mitigation on the inputs with the largest influence on the outcome.



IDENTIFY ACTIONS:

Develop risk responses such as contingency, design changes or contract strategies for key drivers.



OUTPUTS:

Tornado diagram showing ranked sensitivity bars, a summary of key drivers, assumptions and recommended next steps.



USE NEXT:

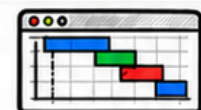
Feed results into detailed risk analysis, scenario planning or management discussion.



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MONTE CARLO SIMULATION



Explore the distribution of possible outcomes by repeatedly sampling modeled uncertainty.



1 PURPOSE & VALUE

Monte Carlo simulation uses random sampling to explore a range of possible outcomes for schedule or cost, based on modeled uncertainty.



QUANTIFIES UNCERTAINTY:
Shows the probability distribution of finishes or costs.



SUPPORTS DECISIONS:
Helps set confidence dates and budgets, prioritize risks and compare options.



SHOWS RISK EXPOSURE:
Reveals the chance of meeting a target and the range of possible outcomes.

2 HOW TO APPLY



BUILD A VALID MODEL:
Create a realistic schedule or cost model with correct logic and scope.



DEFINE UNCERTAINTY:
Assign probability distributions to key inputs (e.g. durations, costs) and define dependencies between items.



RUN SIMULATION:
Use enough iterations for stable results (check convergence).



EXAMINE OUTPUTS:
Review the distribution, confidence levels (e.g. P80, P90) and sensitivity drivers.



CONTROL:
Validate model logic, assumptions and convergence before using results.

3 INPUTS & EVIDENCE



BASELINE MODEL:
Approved schedule or cost model with activities, logic and scope. Owner: Project controls.



UNCERTAINTY INPUTS:
Estimates, ranges and probability distributions for key activities, costs and risks. Owner: Subject matter experts and estimators.



DEPENDENCIES:
Correlations between activities or risks (e.g. common drivers). Owner: Risk analyst.



RISK REGISTER:
Identified risks and assumptions to include in the model. Owner: Risk manager.



VALIDATION EVIDENCE:
Model review records, data sources and assumption rationale. Owner: Project controls/risk team.

4 PRACTICAL EXAMPLE

Illustrative project finish date from simulation results:

P80 finish date: 30 Sep 2026

This means 80 percent of simulated finishes occur on or before 30 Sep 2026 under the model assumptions.



INTERPRETATION:
There is a 20 percent chance the project finishes after 30 Sep 2026, based on the modeled uncertainty.



USE IN CONTEXT:
Compare different scenarios or mitigation options to see how confidence dates change.

5 PITFALLS & LIMITS



NOT A GUARANTEE:
P80 or P90 is not a promise. It shows the probability under the assumptions.



POOR MODEL LOGIC:
Missing activities, incorrect dependencies or unrealistic estimates undermine results.



OMITTED RISKS:
Leaving out significant risks or opportunities gives a false sense of certainty.



FALSE INDEPENDENCE:
Ignoring correlations between items can understate risk.



DATA QUALITY:
Unreliable estimates or vague distributions lead to misleading outputs.

6 ACTIONS & OUTPUTS



REVIEW MODEL QUALITY:
Check scope, logic, distributions and dependencies with subject matter experts.



ANALYZE RESULTS:
Review confidence dates (e.g. P80, P90), sensitivity drivers and the shape of the distribution.



DISCUSS WITH DECISION MAKERS:
Explain key assumptions, results and implications for schedule, budget and risk response.



AGREE ACTIONS:
Decide on contingency, risk mitigation or replanning based on the results.



KEY OUTPUTS:
Probability distribution of finishes or costs, confidence dates, sensitivity analysis and a brief narrative of assumptions and actions.





SCHEDULE RISK ANALYSIS



Assess how duration uncertainty and discrete risks affect completion confidence.

1 PURPOSE & VALUE

Evaluates the impact of uncertain durations and risk events on the project finish date, using the schedule network and a risk model.



COMPLETION CONFIDENCE:

Shows the probability of meeting a target date.



UNDERSTAND DRIVERS:

Reveals activities and risks that most affect the finish date.



BETTER DECISIONS:

Helps set realistic commitments and focus mitigation effort.



INTEGRATES UNCERTAINTY:

Combines duration ranges and discrete risk events.



SUPPORTS PLANNING:

Identifies schedule reserves and the need for risk responses.

2 HOW TO APPLY



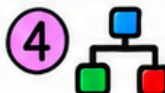
Validate the schedule logic, relationships, calendars and constraints.



Assign duration ranges or distributions for uncertain activities and model discrete risk events (e.g., delay, rework).



Account for correlation between activities and risks (e.g., same supplier or resource).



Run a risk-based schedule model (e.g., Monte Carlo simulation) to calculate finish date scenarios.



Analyze driving paths and key contributors to delays.



CONTROL:

Use consistent data and assumptions. Document and justify key settings.

3 INPUTS & EVIDENCE



BASELINE SCHEDULE:

Network logic, activity durations, relationships, milestones and constraints.



CALENDARS:

Working days, holidays, shifts and resource availability.



RISK REGISTER:

Identified schedule risks with triggers, impacts, probabilities and proposed responses.



EXPERT INPUT:

Estimates from team members, subject matter experts and suppliers.



DATA OWNERS:

Project scheduler (schedule), risk manager (risk data), functional leads (estimates), project manager (overall review).

4 PRACTICAL EXAMPLE

An uncertain supplier delivery can become the driving path, even when it has float in the deterministic plan (illustrative).

Deterministic plan:

- Critical path (design → build): 20 days
- Supplier delivery: 10 days with 5 days float

With risk analysis:

- Supplier delivery has high uncertainty due to shipping and customs delays.
- In simulation, late deliveries frequently delay installation and overall finish.
- Supplier delivery becomes a driving path because the delay consumes its float and pushes the critical path.



RESULT:

Focus mitigation on supplier delivery (e.g., expedite, alternate source) rather than only on critical activities.

5 PITFALLS & LIMITS



DOUBLE-COUNTING RISK:

Adding contingency to every activity and also modelling risks can double-count the same risk and distort results.



FALSE CERTAINTY:

Results depend on data quality, assumptions and modelling choices. They are not predictions.



IGNORING CORRELATION:

Assuming all risks are independent can understate the chance of delay when events are related.



OVERCOMPLICATING:

Too many inputs or unrealistic distributions can reduce transparency and stakeholder confidence.



LIMITATION:

Does not remove risk or guarantee dates. It informs decisions using available information.

6 ACTIONS & OUTPUTS



SET REALISTIC COMMITMENTS:

Use the forecasted confidence levels to agree on achievable target dates with stakeholders.



PRIORITIZE MITIGATION:

Focus on the driving paths and highest-impact risks.



MONITOR ASSUMPTIONS:

Track key risks and assumptions that drive the forecast and update the analysis as conditions change.



UPDATE AND COMPARE:

Re-run the analysis with new data, responses or scope changes to measure the effect.



KEY OUTPUTS:

Probability of meeting target dates, driving paths, sensitivity information and a risk-adjusted finish date range. Use these to guide decisions and communicate the level of confidence.



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RISK RESPONSE PLAN



Turn prioritized risks into specific, authorized work to reduce threats or capture opportunities.

1 PURPOSE & VALUE

Translate risk priority into specific work so the team knows what to do, who will do it and when.



REDUCE THREATS:

Implement actions to lower the likelihood or impact of negative events.



CAPTURE OPPORTUNITIES:

Take actions to increase the likelihood or benefit of positive events.



AUTHORIZE WORK:

Convert strategy into funded, scheduled activities with clear owners.



ALIGN WITH OBJECTIVES:

Supports project goals and efficient use of resources.

2 HOW TO APPLY

Choose a response strategy suited to the risk type, then define the details and authorize the work.



Confirm the risk and assess its priority.



Select a response: avoid, mitigate, transfer or accept (threat) or exploit, enhance, share or accept (opportunity).



Define owner, deadline, cost, trigger and expected effect.



Authorize and integrate the response into the project plan and budget.



CHECK FIT:

Match the response to the risk root cause, risk type and project context.

3 INPUTS & EVIDENCE



RISK REGISTER:

Prioritized risks, causes, current rating and proposed strategy options.



RISK ANALYSIS RESULTS:

Likelihood, impact and risk priority to justify the response.



RESOURCE INFORMATION:

Budget, people, skills, suppliers and schedule constraints.



STAKEHOLDERS & OWNERS:

Assigned risk owner and key stakeholders who approve and support the response.



ORGANIZATIONAL POLICIES:

Risk management procedures, contract rules and escalation paths.

4 PRACTICAL EXAMPLE

Illustrative supplier-delay response for a critical component:



RISK:

Key supplier may be late due to capacity issues.



RESPONSE:

Qualify a second supplier before the decision deadline and verify their capacity.



DETAILS:

Owner: Procurement Lead
Deadline: Before contract decision
Cost: Supplier qualification effort
Trigger: Current supplier shows slippage
Expected effect: Maintain supply continuity and reduce delay risk.



RESULT (ILLUSTRATIVE):

Second supplier qualified and capacity confirmed before the decision deadline.

5 PITFALLS & LIMITS



NO REAL ACTIONS:

Naming a strategy without funded actions does not implement a response.



INSUFFICIENT RESOURCES:

Unfunded or unrealistic actions are unlikely to be delivered.



WRONG STRATEGY:

Choosing a response that does not match the risk type, cause or project context.



MISSING DETAILS:

No owner, deadline, trigger or expected effect leads to unclear execution.



SECONDARY RISKS:

Responses can create new risks; check and manage them as well.

6 ACTIONS & OUTPUTS



PLAN THE RESPONSE:

Document actions with owner, deadline, cost, trigger and expected effect.



IMPLEMENT AND TRACK:

Monitor progress to ensure response actions are completed on time and within budget.



REASSESS RISKS:

Evaluate residual risk and identify any secondary risks.



UPDATE THE RISK REGISTER:

Record status, new ratings and lessons learned.



OUTPUTS:

Approved risk response plan, updated risk register, schedule and budget, and any change requests for remaining risks.



CONTINGENCY RESERVE ANALYSIS



Estimate and monitor provision for identified uncertainty using a documented method.

1 PURPOSE & VALUE

Contingency reserve is a time-phased provision to cover the cost impact of identified risks that may occur.



PROVIDES FINANCIAL BUFFER:

Helps the project absorb expected risk impacts.



SUPPORTS DECISION MAKING:

Increases confidence and enables informed trade-offs.



LINKED TO MODELLED EXPOSURE:

Based on quantified risks and agreed response costs.



PROJECT-SPECIFIC:

Amount and confidence depend on the project, risk profile and risk appetite.



ENHANCES CONTROL:

Used with clear authority, drawdown rules and monitoring.

2 HOW TO APPLY

Select reserve using the cost-risk distribution, response costs and approved risk appetite.



1 Identify and assess risks, including probability, impact and response strategy.



2 Use a cost-risk model to estimate the distribution of total cost.



3 Set an appropriate confidence level and consider risk appetite.



4 Derive the recommended contingency reserve and time-phase it if needed.



5 Agree authority, drawdown rules and monitoring method in the cost baseline.



CONTROL:

Distinguish contingency for identified risks from management reserve under the agreed governance rules.

3 INPUTS & EVIDENCE



RISK REGISTER:

Identified risks, probability, impact, response strategy and risk owners.



COST-RISK MODEL:

Model outputs, assumptions, confidence level and methodology documentation.



RESPONSE COSTS:

Cost estimates for agreed responses (avoid, mitigate, transfer or accept).



SCHEDULE INFORMATION:

Timing of risk impacts and interdependencies.



OWNERS & ROLES:

Project manager prepares analysis; risk owner provides inputs; sponsor authorizes the reserve.



APPROVAL EVIDENCE:

Decision record, authorized amount, confidence level and drawdown rules.

4 PRACTICAL EXAMPLE

Illustrative example using a cost-risk model:



Modelled results (identified risks, incremental above base estimate):

Mean incremental risk cost: \$500,000

80% (P80) incremental risk cost: \$900,000

Illustrative selected contingency reserve:

CR = \$900,000

This is the P80 incremental cost above the base estimate. It provides an 80% confidence level for the range of possible incremental outcomes.



CONFIDENCE LEVEL:

80% is an illustrative, project-specific confidence level, not a guarantee that costs will not exceed the reserve.



NOTE:

Numbers are illustrative. Amounts and confidence levels are project-specific and not benchmarks.

5 PITFALLS & LIMITS



NOT A SIMPLE SUM:

Summed expected losses do not automatically equal an appropriate reserve. Consider distribution, correlations and risk appetite.



DOUBLE COUNTING:

Avoid including the same uncertainty in both contingency reserve and management reserve or in base estimates.



UNIDENTIFIED RISKS:

Contingency reserve covers identified risks only, not unknown risks.



FALSE PRECISION:

Model results are estimates, not guarantees.



SCOPE CHANGES:

Significant scope changes can invalidate the analysis. Reassess when risks or plans change.

6 ACTIONS & OUTPUTS



AUTHORIZE AND RECORD:

Obtain approval for the reserve amount, confidence level and drawdown rules.



MONITOR AND UPDATE:

Reforecast remaining risk exposure as the project progresses and when risks change.



MANAGE DRAWDOWNS:

Release funds only for approved risk responses in line with the rules. Record actual use.



RECONCILE:

Compare authorized reserve, drawdowns and remaining exposure. Explain significant variances.



KEY OUTPUTS:

Authorized contingency reserve, updated risk model, drawdown log, revised forecasts and management reporting.



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TRIGGER DASHBOARD



Monitor observable indicators that signal a risk response may be needed.

1 PURPOSE & VALUE

Tracks key indicators that warn a risk is approaching or may be materializing, so the team can take timely action.



EARLY WARNING:

Detects changes before they cause serious impact.



FOCUSED RESPONSE:

Triggers predefined actions and escalation.



BETTER DECISIONS:

Provides objective, timely information for the team.



CLEAR ACCOUNTABILITY:

Links each trigger to an owner and a decision.



ONGOING MONITORING:

Supports proactive rather than reactive management.

2 HOW TO APPLY

Set up a simple trigger dashboard using these steps:

1



Select measurable indicators linked to key project risks.

2



Assign a data owner for each indicator.

3



Agree the review cadence (e.g. weekly or monthly).

4



Set clear thresholds that will trigger a response.

5



Define escalation routes and actions for each trigger.



CONTROL:

Use specific, measurable and time-bound indicators with agreed thresholds.

3 INPUTS & EVIDENCE



RISK REGISTER:

Key risks, potential triggers and agreed response actions.



PROJECT DATA:

Schedule updates, progress reports, quality records, cost reports and supplier information.



INDICATOR EVIDENCE:

Measured values for each trigger (e.g. milestones, defect rates, delivery dates, test results).



DATA OWNERS:

Named individuals or teams responsible for providing and validating each data source.



ESCALATION INFORMATION:

Contact list, decision rights and communication channels for when a trigger is reached.

4 PRACTICAL EXAMPLE

Illustrative project with a delivery risk:

Risk: Key component may be late.

Trigger: Factory acceptance not achieved by the agreed checkpoint date.

Indicator: Acceptance date compared to the planned date.

Threshold: Missed checkpoint.

RESULT: Trigger activated

Action: Review alternate sourcing options and update the plan.



INTERPRETATION:

Missing the acceptance checkpoint signals an increased likelihood of a delivery delay, so the response is started early.

5 PITFALLS & LIMITS



NOT PROOF:

A trigger is a signal, not proof that the risk event will occur.



LAGGING INDICATORS:

Some indicators may update late, leaving little time to respond.



FALSE ALARMS:

Triggers may activate even when the risk does not materialize.



POOR DATA QUALITY:

Inaccurate or inconsistent data can mislead decisions.



TOO MANY TRIGGERS:

A long list can cause confusion and trigger fatigue. Use only the most meaningful indicators.

6 ACTIONS & OUTPUTS



TEST DATA RELIABILITY:

Check that data sources are accurate, complete and updated at the agreed frequency.



LINK TO DECISION:

Attach each trigger to a specific action and owner, including escalation if needed.



REVIEW REGULARLY:

Confirm triggers, thresholds and owners remain relevant as the project changes.



TAKE ACTION:

When a trigger activates, execute the agreed response and record the outcome.



OUTPUTS:

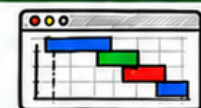
Trigger dashboard with current status, actions taken, escalation log and updates to the risk register.



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RISK REVIEW MEETING



Regularly test whether risk information and responses remain current.

① PURPOSE & VALUE

Hold a regular meeting to test whether risk information and responses are still current and effective. Review what has changed, confirm actions and keep the risk register up to date.



KEEP CURRENT:

Reflect changes in scope, schedule, budget and context.



MAINTAIN EFFECTIVENESS:

Check that responses still reduce exposure.



IMPROVE DECISIONS:

Surface new risks and issues early.



SUPPORT ACCOUNTABILITY:

Confirm owners, deadlines and next steps.

② HOW TO APPLY

Use a consistent agenda and timebox. Focus on changes, new information and required actions.

1



Review changes in exposure since the last meeting.

2



Identify new risks and review existing ones.

3



Check overdue responses and pending actions.

4



Review triggers that may be approaching or have been hit.

5



Confirm realized issues and closed items, and agree next updates.

③ INPUTS & EVIDENCE



RISK REGISTER:

Current list with owners, responses, status and last review date.



CHANGE INFORMATION:

Updates to scope, schedule, budget and external context that affect exposure.



PROGRESS UPDATES:

Status of risk responses and indicators.



ISSUE LOG:

New issues and recently realized risks.



REQUIRED OWNERS:

Project manager (facilitates), risk owners, key stakeholders and subject matter experts.

④ PRACTICAL EXAMPLE

Illustrative example at a milestone review:



A key supplier announces an unexpected ownership change.



The team reviews the supplier risk, reassesses the exposure and reopens it in the register.



A new response is agreed, with an owner and deadline, and linked actions are added to the project plan.



The risk will be reviewed again at the next meeting to confirm progress.

⑤ PITFALLS & LIMITS



READING EVERY ROW:

Going through the entire register can bury significant decisions. Focus discussion on changes and actions.



UNCLEAR OWNERSHIP:

Without clear owners, actions may not be completed.



OUTDATED INFORMATION:

Decisions based on stale data can give a false view of exposure.



LACK OF ATTENDEES:

Missing key stakeholders can result in incomplete discussion.



LIMIT:

A review is a decision forum, not a full risk reassessment. It does not replace deeper analysis when required.

⑥ ACTIONS & OUTPUTS



RECORD DECISIONS:

Capture meeting decisions, rationale and any changes to risk status.



CONFIRM OWNERS:

Agree owners for each action or response.



SET DEADLINES:

Define target dates and track to closure.



UPDATE PLANS:

Reflect approved actions in the project schedule, budget and work plans.



MEETING OUTPUTS:

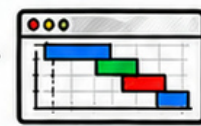
Updated risk register, action log and summary of key discussions and next review date.



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Independently examine whether the risk process and responses are effective.

① PURPOSE & VALUE

A risk audit independently reviews the risk management process and responses to check whether they are working as intended.



CONFIRMS EFFECTIVENESS:

Checks that risks are identified, assessed, owned and managed in practice.



BUILDS CONFIDENCE:

Provides objective assurance for stakeholders.



IDENTIFIES IMPROVEMENTS:

Finds gaps, weaknesses and good practices.



SUPPORTS BETTER DECISIONS:

Helps allocate effort to the areas of highest risk.

② HOW TO APPLY

Use an evidence-based audit to test whether the risk process and responses are effective.



1 Define the scope, objectives and audit criteria.



2 Select evidence-based samples of risks, covering different types and levels.



3 Test ownership, escalation triggers, response execution and record quality.



4 Discuss findings with the team and confirm facts.



5 Report results with clear recommendations and agreed actions.

③ INPUTS & EVIDENCE



RISK DOCUMENTATION:

Risk register, assessments, response plans and status updates.



EVIDENCE OF RESPONSE:

Action records, test results, implementation notes and closure evidence.



KEY OWNERS:

Risk owners, response owners, project manager and governance representatives.



STAKEHOLDER INPUT:

Interviews, meeting minutes and independent observations.



SUPPORTING DATA:

Project reports, issue logs, change records and relevant external information.

④ PRACTICAL EXAMPLE

Illustrative audit finding:

A sampled high-impact risk had a documented fallback plan, but the fallback was never tested and lacked the required system access for the team to run it.



FINDING:

Plan exists, but untested and missing access rights.



IMPACT:

Response may fail when needed, increasing project exposure.



ACTION TAKEN:

Test the fallback in a controlled environment and grant the required access to the response team.

⑤ PITFALLS & LIMITS



PROCESS ≠ LOW RISK:

Meeting process requirements does not guarantee low exposure. Risks may still be underestimated or responses ineffective.



SAMPLE LIMITATION:

An audit reviews selected evidence, not every risk. It may not find all issues.



KEEP IT CONSTRUCTIVE:

Focus on improvement, not blame. The goal is stronger risk management, not fault finding.



CONTEXT MATTERS:

Findings depend on project context. Use professional judgement and avoid one-size-fits-all conclusions.

⑥ ACTIONS & OUTPUTS



AGREE ACTIONS:

Assign clear corrective actions with owners and target dates for each finding.



IMPLEMENT CHANGES:

Update plans, records, access permissions or processes as needed.



VERIFY RESOLUTION:

Check that actions are completed and effective in practice, not just documented.



AUDIT REPORT:

Provide a summary of findings, agreed actions and status.



FOLLOW UP:

Track actions to closure and confirm that risk exposure has been reduced.





RESIDUAL RISK REVIEW



Assess the uncertainty remaining after a response has been implemented.

1 PURPOSE & VALUE

Determine the level of risk that still remains after a response has been implemented, using the same probability and impact definitions.



ASSESS REMAINING UNCERTAINTY:
Estimate how much risk is left after the response.



INFORM NEXT DECISIONS:
Decide whether to accept, monitor or treat the remaining exposure.



FOCUS RESOURCES:
Concentrate effort on the most significant residual risks.



SUPPORT TRANSPARENCY:
Show stakeholders what risks are still open and why.

2 HOW TO APPLY

1



Confirm the response has been implemented as planned.

2



Reassess the probability and impact using the same definitions and scale.

3



Estimate the remaining exposure and describe the key assumptions.

4



Identify further decisions (accept, monitor or treat).

5



Assign an owner and timeframe for each decision.



CONTROL:

Use the same probability and impact definitions as before.
Reassess based on evidence, not hope.

3 INPUTS & EVIDENCE



RESPONSE RECORDS:

Details of actions implemented, completion dates and actual results achieved.



VERIFICATION EVIDENCE:

Test results, inspection reports, contracts, delivery confirmations or other proof the response works.



UPDATED RISK INFORMATION:

Revised probability and impact assessments using the same definitions and scale as before.



RELEVANT OWNERS:

Risk owner, response owner and subject-matter experts to provide input and validation.



DEPENDENCIES & ASSUMPTIONS:

Key assumptions, external factors and any new risks created by the response.

4 PRACTICAL EXAMPLE

Illustrative example: A backup supplier is contracted to reduce the risk of late delivery, but both the primary and backup supplier use the same shipping route.

Before the response:



- Higher chance of delay
- Significant impact on schedule

After the response:



- Lower chance of delay due to backup supplier
- Impact still significant if the shipping route is disrupted



RESULT:

Residual risk remains because a single shipping route still creates exposure.

5 PITFALLS & LIMITS



PLANNED ≠ PROVEN:

A response may be planned or partially complete, but its effect is not guaranteed.



CONFUSING RISKS:

Distinguish residual risk from secondary risks created by the response itself.



OUTDATED ASSESSMENTS:

Using old probability or impact ratings can misrepresent the remaining exposure.



OVERCONFIDENCE:

Assuming the risk is eliminated because a response is in place.



CONTEXT LIMITS:

Thresholds and acceptance criteria are project-specific. Reassess if conditions change.

6 ACTIONS & OUTPUTS



DECIDE THE APPROACH:

Accept, monitor or treat the remaining exposure based on the reassessed level of risk.



ASSIGN OWNERSHIP:

Document a clear owner for each residual risk and the agreed timeframe.



UPDATE RISK RECORDS:

Record the new probability and impact, rationale, assumptions and next actions.



PLAN MONITORING:

Set review dates and triggers to check for changes in the remaining risk.



OUTPUTS:

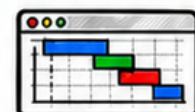
Updated risk register, decision log and, where relevant, follow-up tasks for further treatment.



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OPPORTUNITY RESPONSE MAP



Plan actions that improve the chance or benefit of favorable uncertainty.

1 PURPOSE & VALUE

Helps plan and prioritize actions that increase the probability or benefit of positive uncertainty to support project objectives.



OPPORTUNITY:

A possible future event with a favorable effect.



RESPONSE:

Action to exploit, enhance, share or accept the opportunity.



VALUE:

Greater chance or magnitude of desired outcomes, such as faster delivery, higher quality or lower cost.



ALIGNMENT:

Supports project goals and is consistent with risk appetite and resource constraints.

2 HOW TO APPLY

Select and plan a response based on the opportunity, context and available resources.



1 Identify promising opportunities and describe the potential value.



2 Choose a response: exploit, enhance, share or accept.



3 Estimate required effort, resources and trade-offs.



4 Assign an owner and define next steps.



5 Record in the project opportunity register and review regularly.



CONTROL:

Focus on the most valuable opportunities within available resources.

3 INPUTS & EVIDENCE



OPPORTUNITY SOURCES:

Brainstorming, stakeholder input, market trends, technology developments and lessons learned.



REQUIRED EVIDENCE:

Clear description, potential benefits, likelihood range, assumptions and dependencies.



OWNERS & STAKEHOLDERS:

Opportunity owner, sponsor and relevant team members with decision authority.



INFORMATION NEEDED:

Technical feasibility, resource availability, schedule impact and any constraints.



RECORDS:

Opportunity register, analysis notes and approved response plan.

4 PRACTICAL EXAMPLE

Illustrative project scenario:

A reusable component might shorten development time for a new product.



POTENTIAL OPPORTUNITY:

Reusing an existing component could reduce design and testing effort.



RESPONSE ACTION:

Run a small validation task to test compatibility with the new system before wider adoption.



EXPECTED BENEFIT:

If compatible, the component can be adopted to speed development and free up resources for other work.

5 PITFALLS & LIMITS



NOT A GUARANTEE:

An opportunity is uncertain, not an already approved benefit.



OPTIMISTIC ASSUMPTIONS:

Overly optimistic estimates of likelihood or benefit can lead to wasted effort.



INSUFFICIENT EVIDENCE:

Acting without enough evidence can result in delays or extra cost.



RESOURCE CONSTRAINTS:

Too many opportunities can divert resources from higher value work.



EXTERNAL DEPENDENCIES:

Benefits may not be realized if dependent conditions do not occur.

6 ACTIONS & OUTPUTS



ASSIGN OWNER:

Nominate a responsible owner to drive the response and coordinate actions.



IMPLEMENT RESPONSE:

Carry out the agreed actions and monitor progress and key milestones.



TRACK REALIZED VALUE:

Compare actual benefits with the response cost to confirm outcomes.



REVIEW & UPDATE:

Reassess likelihood, benefits and actions as new information becomes available.



OUTPUTS:

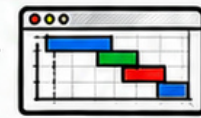
Updated opportunity register, response plan, progress records and realized value summary.



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RISK ESCALATION MATRIX



Route risks to the level with the authority and resources to act.

1 PURPOSE & VALUE

The risk escalation matrix defines when and to whom a risk should be escalated so it can be resolved at the right level.



CLEAR ROUTING:

Sends risks to the level with authority and resources to act.



TIMELY DECISIONS:

Reduces delays and unrealistic local fixes.



BETTER OUTCOMES:

Enables balanced decisions across projects and functions.



SHARED AWARENESS:

Keeps stakeholders informed and aligned.

2 HOW TO APPLY

Set up the escalation matrix and apply it consistently.

1



Define escalation conditions (e.g. impact, cost, time, scope).

2



Specify recipients (e.g. sponsor, steering committee, executive).

3



List required evidence to support the escalation.

4



Set expected response times for each level.

5



Assign an interim owner who continues to monitor until ownership is accepted.



CONTROL:

Escalation does not remove local ownership until formally accepted.

3 INPUTS & EVIDENCE



RISK RECORD:

Current description, cause, impact, probability and ratings.



ESCALATION CRITERIA:

Thresholds or conditions that trigger escalation (e.g. impact level, cross-project effect, regulatory issue).



SUPPORTING EVIDENCE:

Analysis, options considered, expected consequences and relevant data.



ESCALATION RECIPIENTS:

Named roles with authority, e.g. sponsor, programme board or executive committee.



RESPONSE TIME:

Expected timescale for decision or acknowledgement at each level.



CURRENT OWNER:

Person or team keeping the risk under review until it is accepted.

4 PRACTICAL EXAMPLE

Illustrative risk affecting two programs:



The supplier for a critical component may fail, impacting Program A and Program B. The cost and schedule effects exceed the project manager's authority, so it is escalated.



Escalation package includes:

- Impact on both programs.
- Analysis of root cause.
- Options with estimated consequences.
- Recommendation.



Escalated to: Program Steering Committee.



Interim owner: Project manager continues to monitor and provide updates until the committee accepts ownership and confirms the decision.

5 PITFALLS & LIMITS



NOT ABANDONMENT:

Escalation is not a way to drop the risk. The local owner continues monitoring until the new owner accepts it.



INSUFFICIENT EVIDENCE:

Escalating without clear analysis can lead to rejection and delay.



WRONG RECIPIENT:

Sending to a level without the authority or resources slows resolution.



UNCLEAR RESPONSE TIME:

No defined timeframe can lead to prolonged uncertainty.



OVERUSE:

Escalating decisions that can be handled locally reduces credibility and clutters higher-level forums.

6 ACTIONS & OUTPUTS



PREPARE ESCALATION PACKAGE:

Summarize the risk, impact, options, recommendation and evidence.



SUBMIT TO RECIPIENT:

Send the package to the agreed owner and record the date and expected response time.



RECORD THE DECISION:

Note the accepted owner, chosen action and any conditions.



COMMUNICATE OUTCOME:

Provide feedback to affected teams and update the risk register.



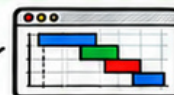
FOLLOW UP:

Ensure actions are implemented and updates are shared.



KEY OUTPUTS:

Updated risk register, decision record, new owner and agreed actions with target dates.





RISK LESSONS REVIEW



Turn experience with uncertainty into improvements for future projects.

1 PURPOSE & VALUE

Risk lessons review captures what happened, why it happened and what worked, so future projects are better prepared for uncertainty.



TURN EXPERIENCE INTO ACTION:

Convert real events and responses into improvements.



STRENGTHEN PLANNING:

Update estimates, checklists and response guidance.



BUILD ORGANISATIONAL LEARNING:

Share lessons across teams and projects.



REDUCE FUTURE UNCERTAINTY:

Identify recurring risks and improve readiness.



ADD VALUE:

Better decisions, faster responses and fewer surprises.

2 HOW TO APPLY

Compare identified risks, actual events, response outcomes and overlooked signals, and separate causes from hindsight.

1



List key risks and what actually happened.

2



Compare planned responses with what was done.

3



Identify what worked, what did not and why.

4



Look for early signals that were missed.

5



Separate actual causes from hindsight opinions, and record clear lessons.



CONTROL:

Base conclusions on evidence. Do not blame individuals.

3 INPUTS & EVIDENCE



RISK REGISTER:

Initial risk descriptions, ratings and planned responses.



PROJECT RECORDS:

Actual events, response actions, decisions, approvals and timelines.



EVIDENCE OF OUTCOMES:

Impacts on scope, schedule, cost and quality.



STAKEHOLDER FEEDBACK:

Views from team, users, suppliers and sponsors.



RELEVANT OWNERS:

Project manager, risk owner, team members and key stakeholders provide input and validate lessons.



REFERENCE MATERIAL:

Policies, standards and previous project lessons.

4 PRACTICAL EXAMPLE

Illustrative example from a completed project:



WHAT HAPPENED:

A supplier delay threatened a critical milestone.



PLANNED RESPONSE:

Use a cost contingency if the delay exceeded the agreed trigger.



ACTUAL OUTCOME:

The contingency worked and the milestone was met, but activation was delayed because authority was unclear.



LESSON:

The next project plan clearly assigns the trigger owner and decision authority for activating the contingency.

5 PITFALLS & LIMITS



COUNTING CLOSURES:

The number of risks closed does not show effective learning or reduced uncertainty.



HINDSIGHT BIAS:

It is easy to find reasons after the event. Focus on facts available at the time.



INCOMPLETE EVIDENCE:

Missing records can lead to wrong conclusions.



SINGLE PERSPECTIVE:

Relying on one person's view may miss important insights.



LIMIT:

Lessons are project-specific and may not apply to all contexts. Validate before reuse.

6 ACTIONS & OUTPUTS



UPDATE CHECKLISTS:

Add new risk signals and control questions based on lessons learned.



REFINE ESTIMATES:

Adjust assumptions and contingency approaches where needed.



IMPROVE RESPONSE GUIDANCE:

Clarify triggers, owners and decision authority.



SHARE AND APPLY:

Communicate lessons to relevant teams and incorporate them into templates and training.



VERIFY USE:

Check in future reviews that changes have been adopted and are making a difference.



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30 Project Risk Management Tools





HOW TO USE THIS GUIDE

Make the most of the 30 Project Risk Management Tools learning cards.



1 START WITH A NEED

Select a card that matches a real project decision. Use the tool where it can add value to your specific context.



CONFIRM SCOPE:

Clarify the decision, objectives and boundaries.



UNDERSTAND CONTEXT:

Consider the project lifecycle, stakeholders and constraints.



USE CONSISTENT TERMS:

Apply the definitions in the cards to avoid confusion.



READ THE EXAMPLE:

Use the worked example as an illustration, not a promise.



GATHER EVIDENCE:

Select the evidence needed before acting on the result.

2 APPLY & REVIEW

Follow a consistent process when using each tool and review the results for your project.



ASSIGN AN OWNER:

Agree who will apply the tool and who will review the result.



AGREE INPUTS AND OUTPUT:

Define the data required and the expected output.



RECORD ASSUMPTIONS:

Document key assumptions and any constraints.



APPLY THE CARD:

Follow the guidance and adapt it to your project context.



REVIEW THE RESULT:

Check if the output is reasonable and still valid.



ADAPT AND MAINTAIN:

Adjust the frequency and thresholds to the project. For a denominator of zero use N/A, not zero percent. Protect sensitive information and maintain version history.

3 ABOUT THIS EDITION

Book 3 of the WikiFree Project Management Collection. Thirty original practical learning cards to help you manage project risk.



WHAT IT IS:

Practical tools, techniques and simple guidance for project teams.



OUR APPROACH:

A practical synthesis of widely used terminology and techniques, not an exhaustive standard or formal certification.



YOUR METRICS:

Custom working metrics must be defined locally for your project.



EXAMPLES:

Worked examples are illustrative to show how a tool can be applied.



FURTHER READING:

Panels 4-6 provide selected sources for additional learning and context.

4 SOURCE 1

APM - Risk Management

The Association for Project Management (APM) provides guidance and learning resources on risk management, including principles, processes and practical advice for project practitioners.



USEFUL FOR:

Foundation reading on risk management concepts and good practice.



HOW THIS HELPS:

Provides additional context and deeper explanation of key ideas used in the cards.



NOTE:

This is a source for further reading and does not constitute an endorsement of this publication.

Click this panel to open the source.

5 SOURCE 2

PMI - Better Data for Risk Assessment

The Project Management Institute (PMI) provides articles and guidance on improving the quality of data used in risk assessment and decision making throughout the project lifecycle.



USEFUL FOR:

Practical advice on identifying, collecting and using better data for risk assessment.



HOW THIS HELPS:

Supports more informed analysis and stronger project decisions.



NOTE:

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6 SOURCE 3

GAO - Schedule Assessment Guide

The U.S. Government Accountability Office (GAO) provides guidance on assessing project schedules, including common risks, best practices and criteria for credible and defensible schedule analysis.



USEFUL FOR:

Detailed guidance on schedule risk assessment and analysis techniques.



HOW THIS HELPS:

Offers practical methods to identify and evaluate schedule related risks.



NOTE:

This is a source for further reading and does not constitute an endorsement of this publication.

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