

Presentation: **Quantitative risk analysis and project governance**

Risk Engineering Society Conference, RISK 2023, Brisbane, 7-8 September 2023

Dr Dale F Cooper, Broadleaf Capital International

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Agenda

Project phases and decisions

Quantitative analysis of uncertainty in projects

Quantitative analysis and the Decision Support Package

Lessons

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decisions

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Project phases and decisions

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Project phases

	Phase 1	Phase 2	Phase 3	Phase 4	Additional activities	
Phase label	Identify Concept	Pre-feasibility Select	Feasibility Design and develop	Deliver Implement Install and commission	Operate and maintain	Abandon Dispose
Purpose	Appraising opportunities: determine whether the project could be worthwhile and its alignment with business strategy	Selecting options: identify and appraise project development options and select the preferred one	Defining the project: finalize the scope and detail of the preferred option	Delivering the project: produce an operating asset, product or service, consistent with the agreed scope	Realising the benefits: evaluate the project outcome to ensure performance	Closure: ensure safe and acceptable closure or disposal
Focus of risk management activities	Strategic threats and opportunities	Risk-based options selection	Design and delivery strategy	Project delivery, test and handover	Operation and maintenance	Disposal and rehabilitation

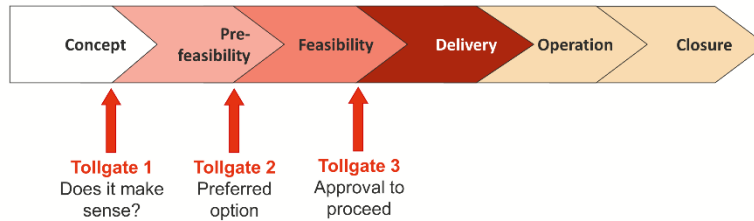
Note to Table 1: The additional activities in the two right-hand columns might correspond to phases in the life cycle of an asset, product or service that is created by a project. They are not project phases, but they are included here because they must be considered by project managers as they proceed through phases 1 to 4.

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Source: IEC 62198, *Managing risk in projects – Application guidelines*, draft 3Ed CDV, 2023

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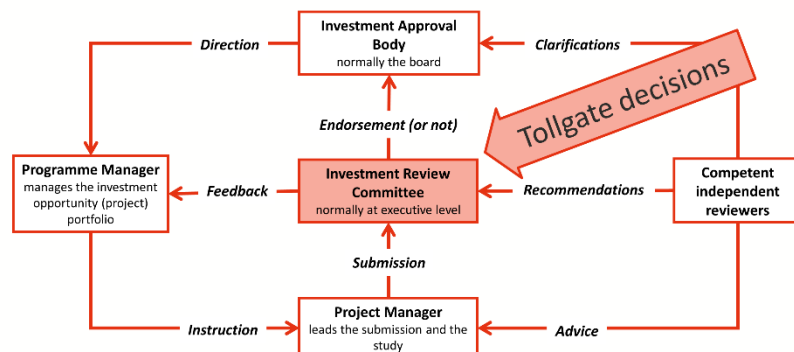
Project phases and decision tollgates



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Project investment governance framework



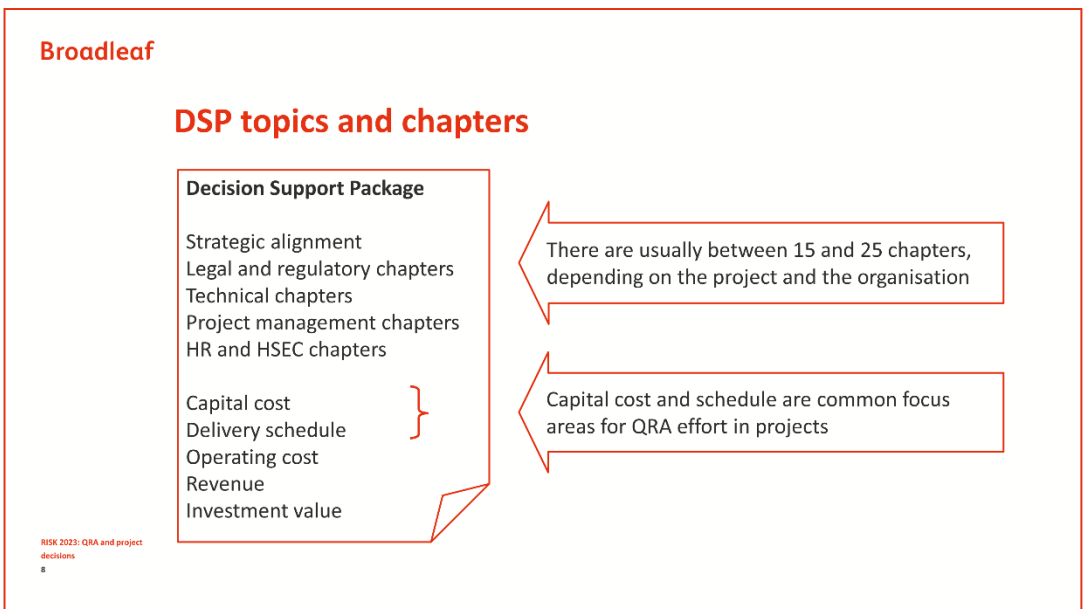
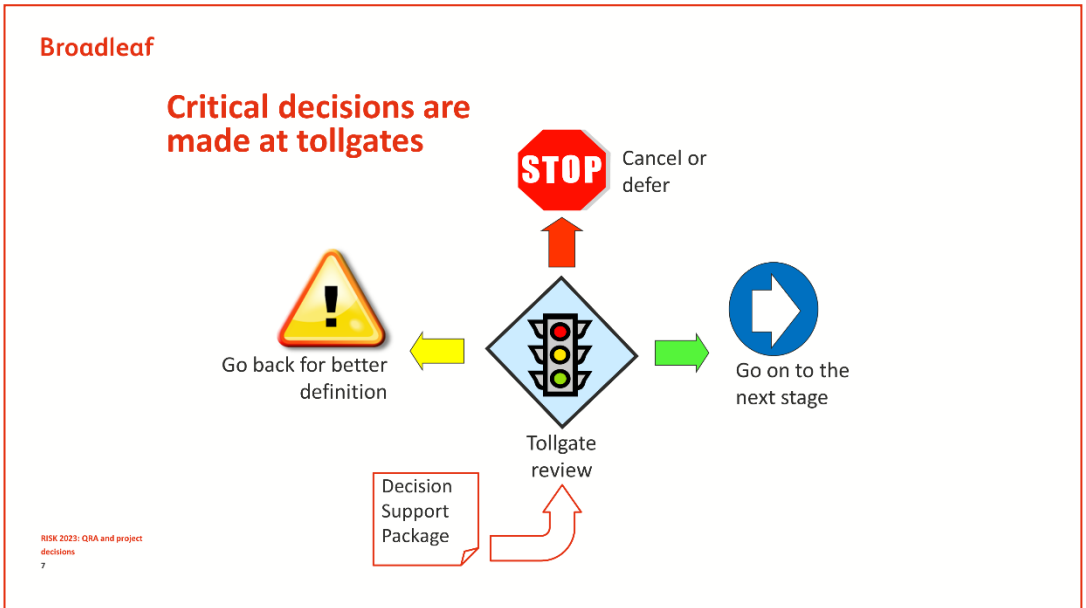
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QRA and project governance

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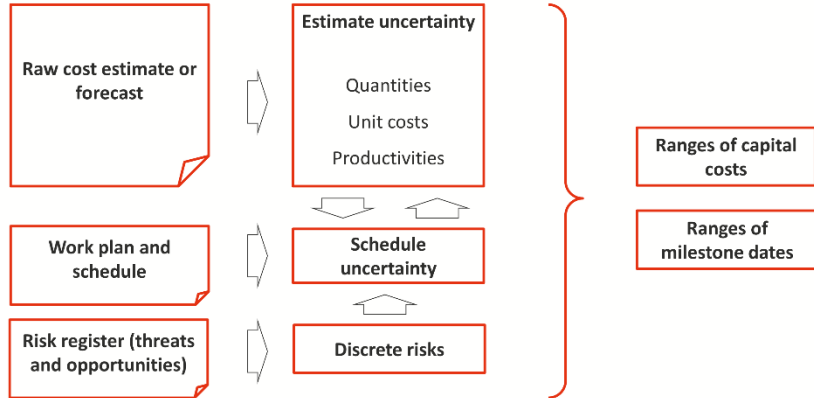
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Quantitative analysis of uncertainty in projects

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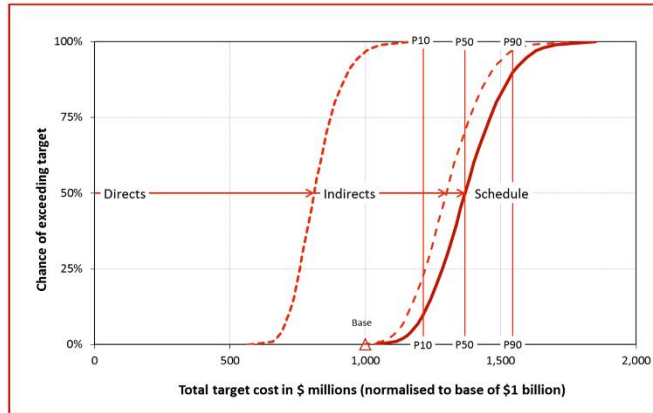
We are good at cost and schedule QRA



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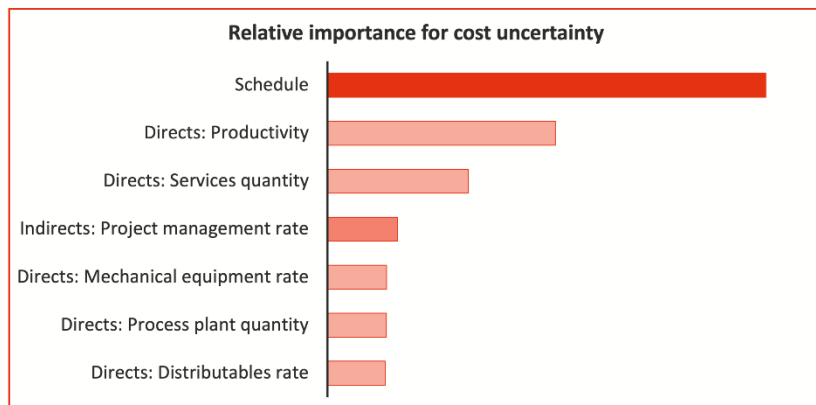
We use QRA to generate distributions of capital cost



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... and identify the main drivers of uncertainty



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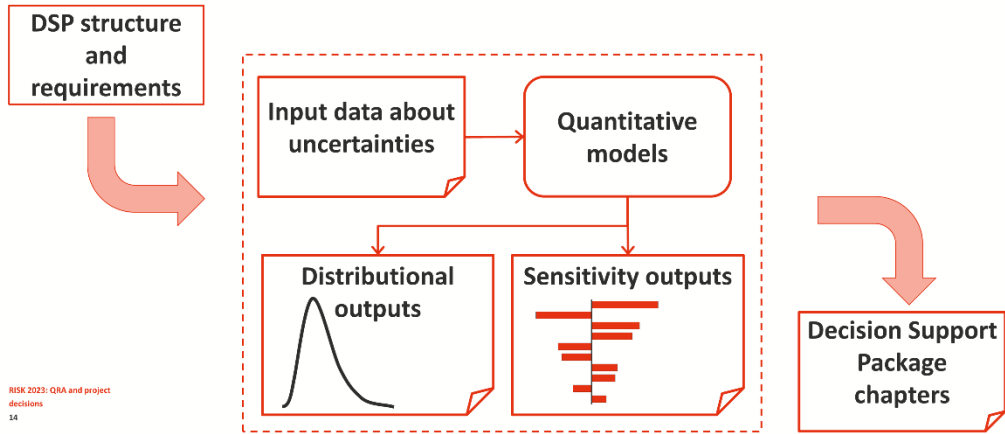
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Quantitative analysis and the Decision Support Package

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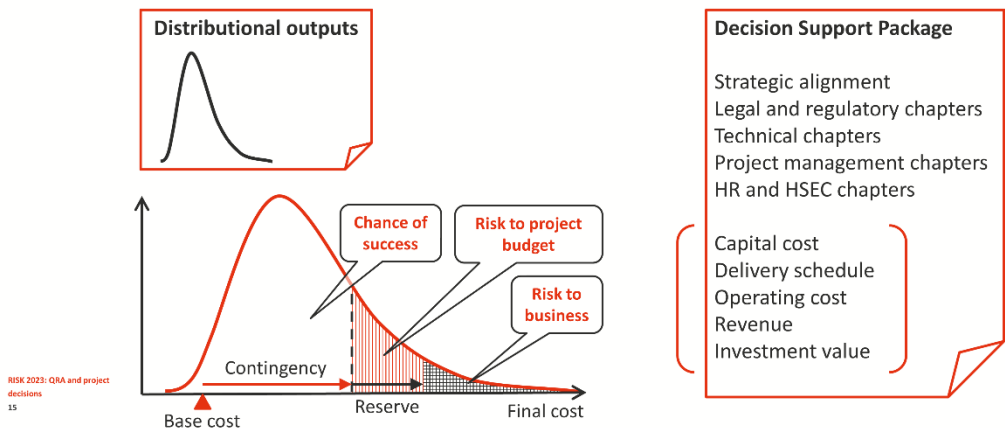
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Quantitative analysis and the DSP



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Distributional outputs



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Sensitivity outputs

Sensitivity outputs

Relative importance for cost uncertainty

Category	Relative Importance
Schedule	High
Directs: Productivity	Medium-High
Directs: Services quantity	Medium
Indirects: Project management rate	Low
Directs: Mechanical equipment rate	Low
Directs: Process plant quantity	Low
Directs: Distributables rate	Low

Decision Support Package

- Strategic alignment
- Legal and regulatory chapters
- Technical chapters
- Project management chapters
- HR and HSEC chapters

- Capital cost
- Delivery schedule
- Operating cost
- Revenue
- Investment value

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Input data

Input data about uncertainties

	Model component
Risk register (threats and opportunities)	Context Scope and assumptions Status Sources of uncertainty
	Scenarios Pessimistic Optimistic Likely
	Range estimate scenarios Estimate
Action plans (to reduce uncertainty)	Worst
	Best
	Pessimistic P90
	Optimistic P10
	Likely

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Take care though: Capital cost and schedule may not be the main drivers of uncertainty in project value

Relative importance for value uncertainty

Category	Relative Importance
Sales price USD/tonne FOB	High
Operations: Production efficiency	Medium-High
Operations: Conversion yield	Medium
Operations: Cycle time	Low-Medium
Operations: Productivity	Low-Medium
Operations: Energy price	Low
Capital cost	Low
Operations: Unscheduled shutdowns	Low

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Lessons

Summary of the main lessons

Distributions: Output distributions from QRA provide guidance for critical project decisions

Sensitivity: Quantitative sensitivity analyses provide guidance for work plans for the next project phases, by focussing effort on the uncertainties that matter most

Data: Data inputs to quantitative analyses, and the discussions involved in generating them, provide guidance for detailed chapters in the Decision Support Package

Value: While we're generally good at analysing uncertainty in the capital cost and schedule, they may not be the most important factors if our main focus is on long term project value

Contact

Dr Dale F Cooper

Director

Cooper@Broadleaf.com.au

+61 419 433 184

If you would like further information about this topic please contact us. We will endeavour to reply promptly.

For further information visit www.Broadleaf.com.au