Fundamentals of Project Planning and Management

Week 3: It's a Risky World

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DARDEN SCHOOL OF BUSINESS

Fundamentals of Project Planning and Management

Week 1	Week 2	Week 3	
Define and Organize	*Plan*	*Improve Plan*	
Project Goal The Three Objectives and their Priorities Organization	Project Scoping Dependencies Schedule Trade-Offs	Assessing Risks and Planning for Ambiguity	

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Sources of Uncertainty

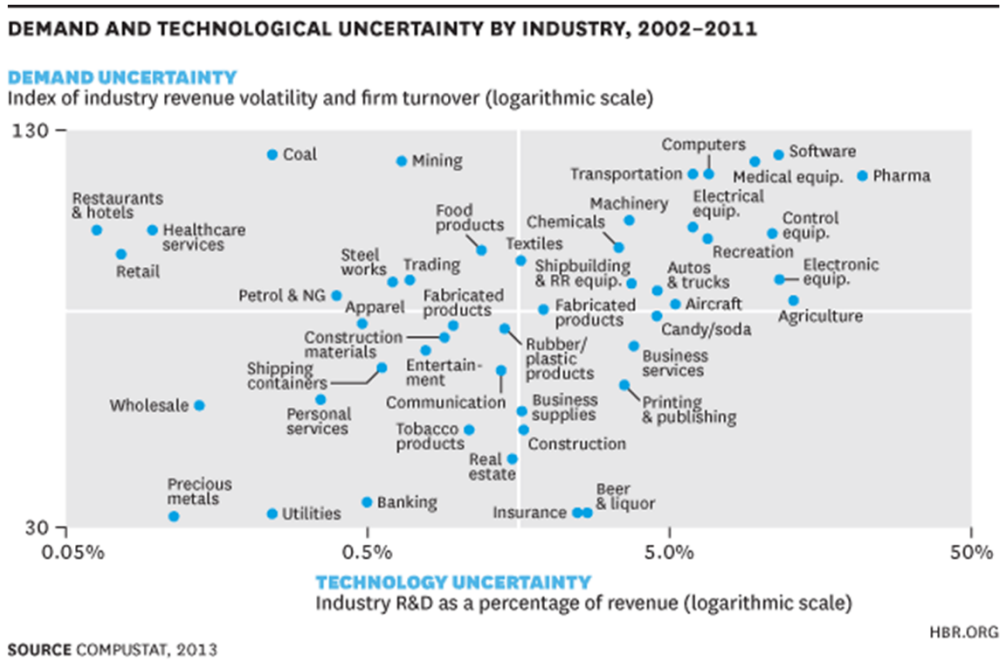
(Loch, DeMeyer, Pich 2006)

Foreseeable Uncertainties	Complexity	Unforeseen Uncertainties
Variability	Project Tasks	Novel Technology
Alternative Paths	Stakeholders	Novel Markets

Sources of Uncertainty

Uncertainty	Risks	Ambiguity
Variability	Project Tasks	Novel Technology
Alternative Paths	Stakeholders	Novel Markets

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Plan to Match Risk

(Loch, DeMeyer, Pich 2006)

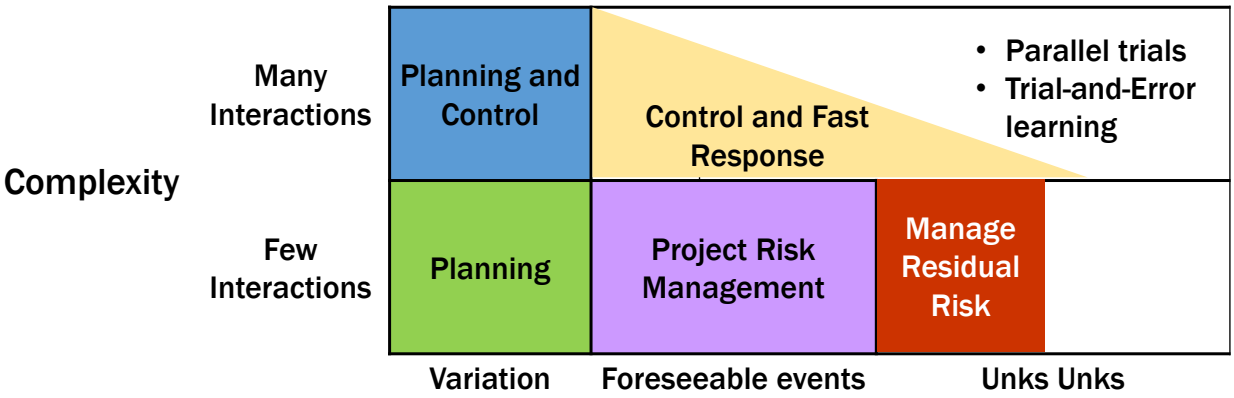
Complexity	Variation	Foreseeable events	Unks Unks
Many Interactions			
Few Interactions			

Ambiguity

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Plan to Match Risk

(Loch, DeMeyer, Pich 2006)

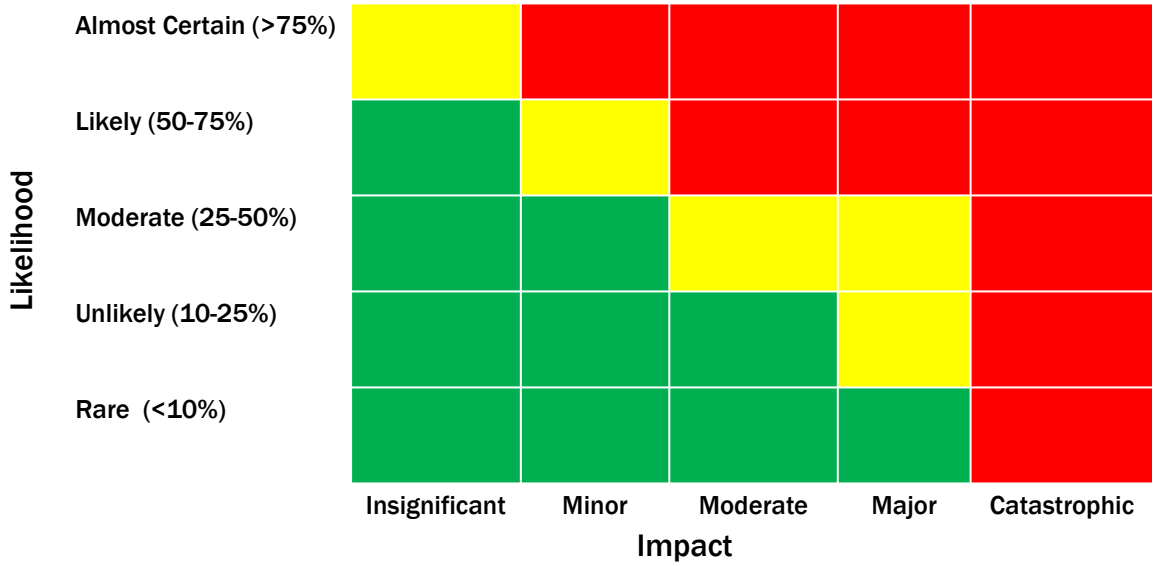


Project Risk Management

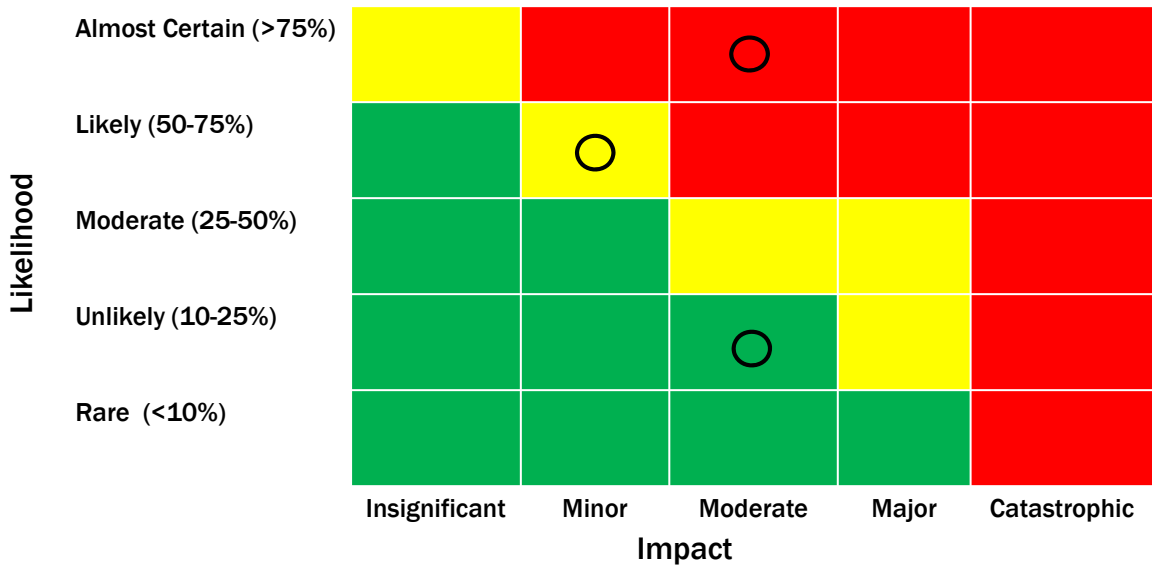
Identification	Assessment	Response Planning	Monitoring and Control
• Brainstorming, checklists, previous projects, experts • Risk Register	• Impact • Likelihood • Prioritized Risk Register	• Identify response strategy to each risk • Assign responsibilities	• Update risk probabilities • Execute planned strategy if events occur

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Risk Assessment

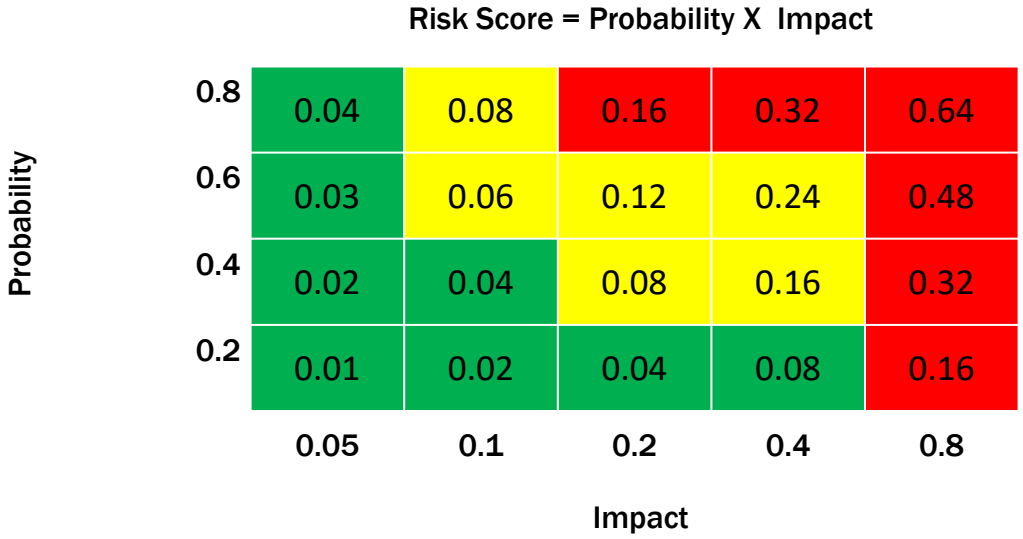


Risk Assessment



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Probability Impact Matrix



Risk Register

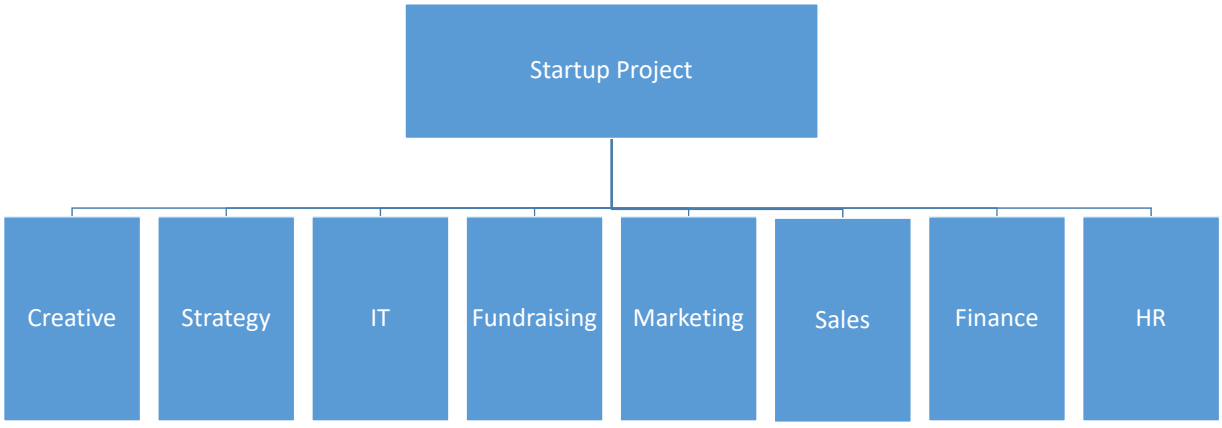
	ID	Risk Area	Risk Type	Probability Level	Impact Level	Timeline	Risk Score	Risk Mitigation Plan/Owner
1	OP01	Operations	Schedule	4	4	1	16	
2	W01	Team	Scope	3	3	3	9	
3	E09	Engineering	Cost	3	3	2	9	

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Risk Assessment

Top 10	ID	Risk Area	Risk Type	Probability Level	Impact level	Timeline	RPN	Risk Mitigation Plan	Rationale for Classification
1	OP01	Lead time on major plant and equipment items	Schedule	4	4	1	16	Close dedicated management of suppliers using US Division previous suppliers or dual sourcing where possible. Installation and commissioning will be a dedicated sub-project with full-time resources and detailed project plans.	Procurement specifications to be revised for US operation and sources to be identified. Long manufacturing, installation and commissioning period
2	E01	Brake performance shortfall with DMS 669 carbon	Technical	3	3	3	9	Brake systems design	
3	E02	Loose flange wheel - potential problems with increased weight and forging/quenching	Technical	3	3	2	9	Early manufacture of wheels. Develop A-frame alternative	
4	E03	Thick/thin rotor/stator configuration - uneven wear	Cost	2	4	3	8	Build in adequate clean up allowance. Develop spreader plate design	
5	E04	Excessive wear rate	Cost	2	4	3	8	Implement Taxi Select managed wear	
6	OP05	Process Qualification on new site	Technical	2	4	1	8	Pre-bonded sample discs will be provisioned from the Coventry facility to allow additional optimization/validation	Processing parameters need to be adjusted to suit local natural gas chromatography
7	OP09	Skilled personnel availability and training	Schedule	2	4	1	8	Large local aerospace talent pool both in San Antonio area and within SASAI. Strategic relocation of key company personnel. Well-defined training methodology. DA experience with large training requirements	Specific process knowledge and experience required for implementing and operating Carbon Production equipment.
8	PS03	Computing infrastructure will not be able to handle real-world transaction loads	Technical	2	4	3	8	Use automated load/testing tools to simulate real-world usage. Architect computing infrastructure to enable resources to be scaled quickly to match demand.	
9	OP04	Identification and control of subcontractors & suppliers	Schedule	2	3	3	6	Control. Robust system in place. Identification. Supplier base for production is already identified and in place. If the supplier goes out of business there are contractual terms ensuring that we will have their IP to source elsewhere.	Ensuring that suppliers deliver on time and with high quality will be done through the Supplier Management procedures set out in the DA quality procedures manual.
10	PS05	Interfaces with partner information systems are incompatible or cannot be automated	Schedule	2	3	2	6	Get data definitions, protocols, and platform information from targeted partners early in program. Develop simple protocols for the generation of text-based messages and transmission using IP-based networks	
	E08	Estimated hours for SOW activities underestimated	Schedule	2	3	2	6	Recruit to cover resource shortfall	
	E05	One piece titanium torque tube – excessive operating temperature	Technical	2	3	2	6	Plasma spray development tests. Investigate alternative material design	
	E07	Electronics COTS Components may not meet required temperature range	Cost	2	3	3	6	Repackage for thermal isolation; move to Mil Spec components if necessary	
	OP02	Production volume requirements different from initial plan	Schedule	3	2	3	6	This could result in building size changes. Need to have options on adjacent land for expansion. Facility is designed to allow capacity increases to be readily accommodated	This could result in building size and equipment capacity shortages leading to production schedule slippages.
	OP10	Quality of locally supplied Natural Gas	Technical	2	3	1	6	Doping/supplementing gas supply to required methane levels if and when required	Natural gas is critical to the carbon manufacturing process. In the San Antonio area, it is of high quality and composition variability is low.
	OP11	Significant (Major) design changes	Schedule	2	3	2	6	This could result in building size changes. Need to have options on adjacent land for expansion. Facility is designed to allow capacity increases to be readily accommodated	This could result in building size and production equipment specification changes leading to initial production schedule slippages
	PS01	Skilled application development personnel availability	Cost	2	3	1	6	Begin recruitment of teams as early as possible; identify skills gaps and consider the use of contractors to fill them	
	PS02	Representatives of partner organisations will not be available when required.	Schedule	2	3	2	6	Communicate goals and timing of program to all identified partners early in program. Request individuals to be nominated to program team, apply contractual obligations where possible.	
	PS04	Planned task durations are calculated with insufficient analysis, deadlines for deliverables are unrealistic	Schedule	3	2	2	6	Ensure that worst-case estimates are included in overall risk profile to warn business sponsors in advance. Assess whether deadlines can be met with addition of more resource. Re-plan on a regular basis as more information becomes available.	
	PS06	Significant expansion of business process applications development	Schedule	3	2	1	6	Manage program to ensure that critical features are completed. Involve users early in the requirements definition process, ensure they are allocated to requirements definition for its duration.	
	E09	Electronics – Part obsolescence	Technical	1	5	3	5	Careful obsolescence management. Life time buys of obsolete components. Include contingency for re-design of EMAC in financial model	
	OP03	Electrical power variability/outage	Schedule	1	5	3	5	Implement alternate local/decentralized power supply in the form of standby generators.	Power outages would have catastrophic consequences for the furnaces due to cooling stoppage.
	OP07	Environmental regulations	Schedule	1	4	1	4	ISO 14001 registration. On-site Environmental Coordinator. Facility design from the ground up to include all necessary environmental control methods and machinery.	Environmental Permitting could be an issue but local San Antonio DSAG personnel have a good relationship with city and state authorities and extensive experience regarding the local regulatory framework.
	OP08	Environmental regulations	Cost	1	4	1	4	ISO 14001 registration. On-site Environmental Coordinator. Facility design from the ground up to include all necessary	Environmental Permitting could be an issue but local San Antonio DSAG personnel have a good

Work Breakdown Structure



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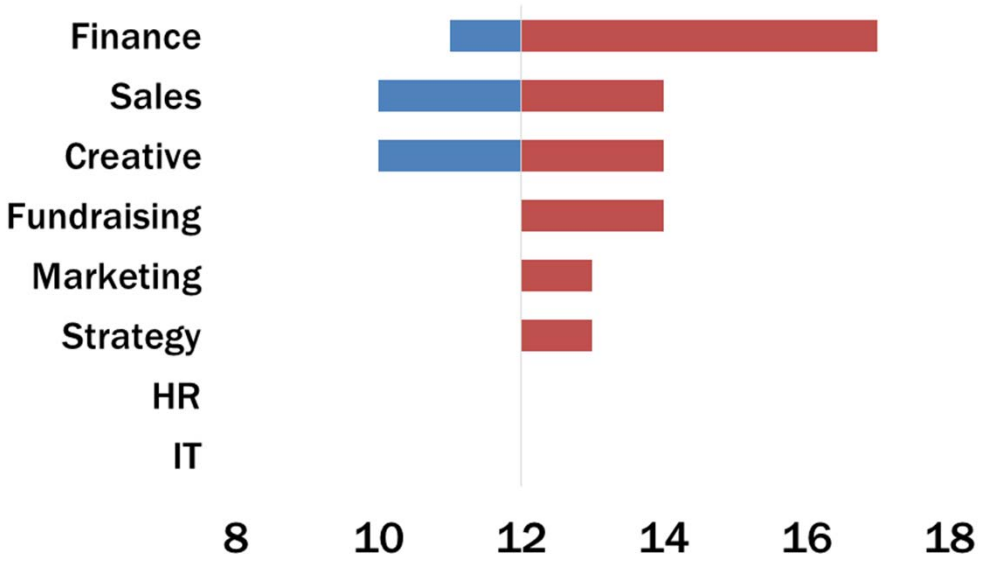
Project Duration: 12 Weeks

Activity #	Description	Predecessors	Duration (Weeks)
1	Creative	-	5
2	Strategy	-	2
3	IT	-	4
4	Fundraising	1	4
5	Marketing	1,2	2
6	Sales	1,2	5
7	Finance	5,6	2
8	HR	4,6	1

Schedule Risk Analysis

Activity #	Description	Predecessors	Min Duration	Likely Duration	Max Duration
1	Creative	-	3	5	7
2	Strategy	-	1	2	6
3	IT	-	3	4	5
4	Fundraising	1	2	4	8
5	Marketing	1,2	1	2	6
6	Sales	1,2	1	5	7
7	Finance	5,6	1	2	7
8	HR	4,6	1	1	1

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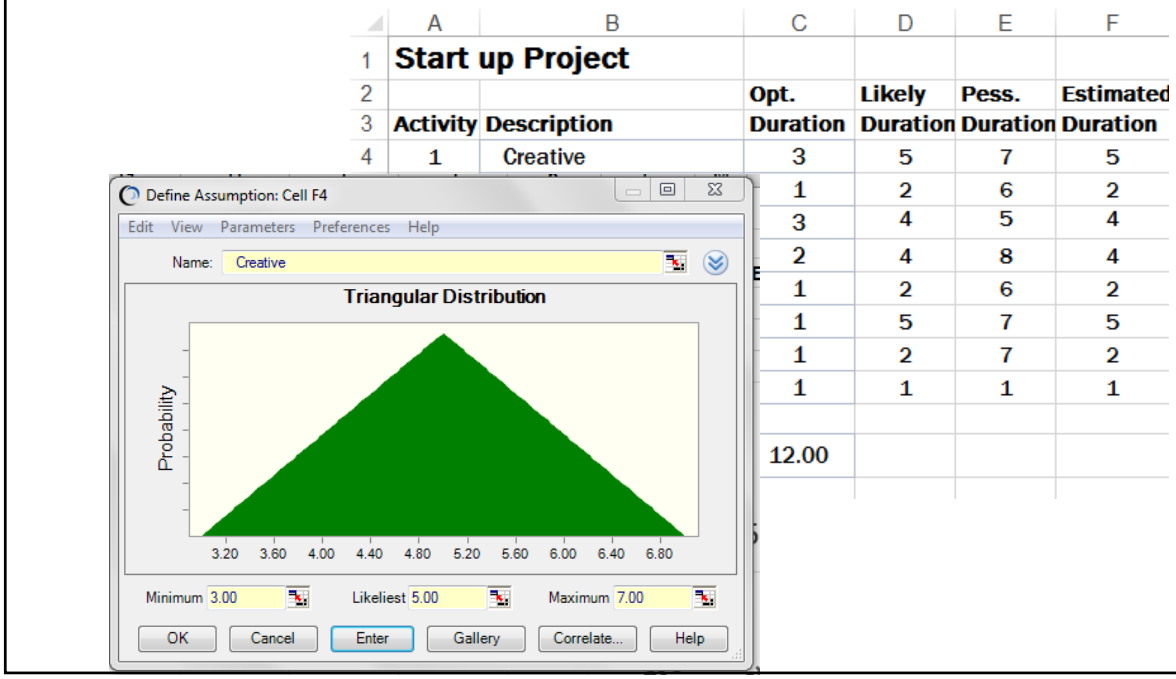
Schedule Scenarios

- Elicit ranges or three point duration estimates.
- Consider historical data.
- Ask multiple opinions.
- Start thinking of the overall project duration as a range not a single number.

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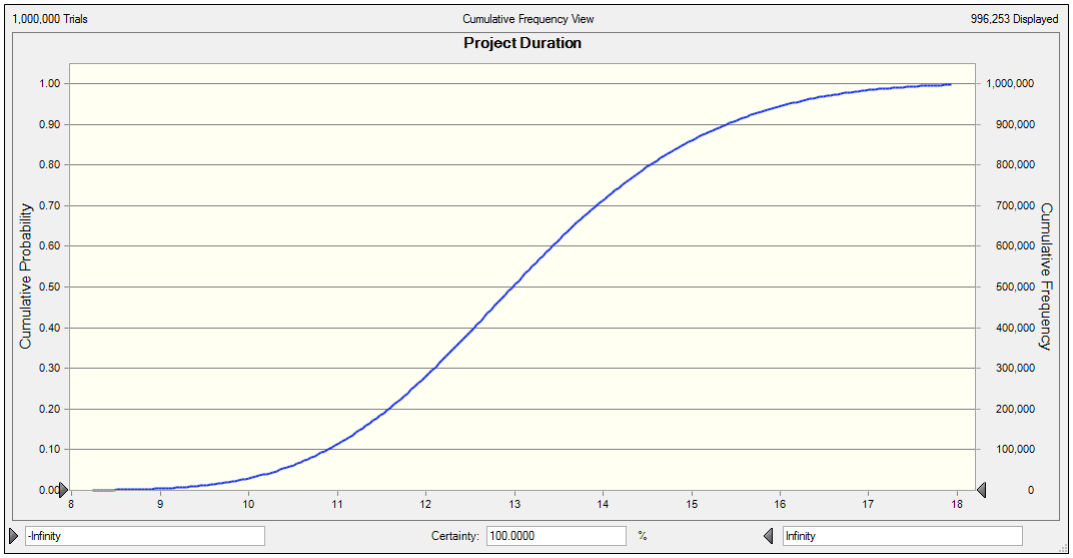
Schedule Risk Analysis

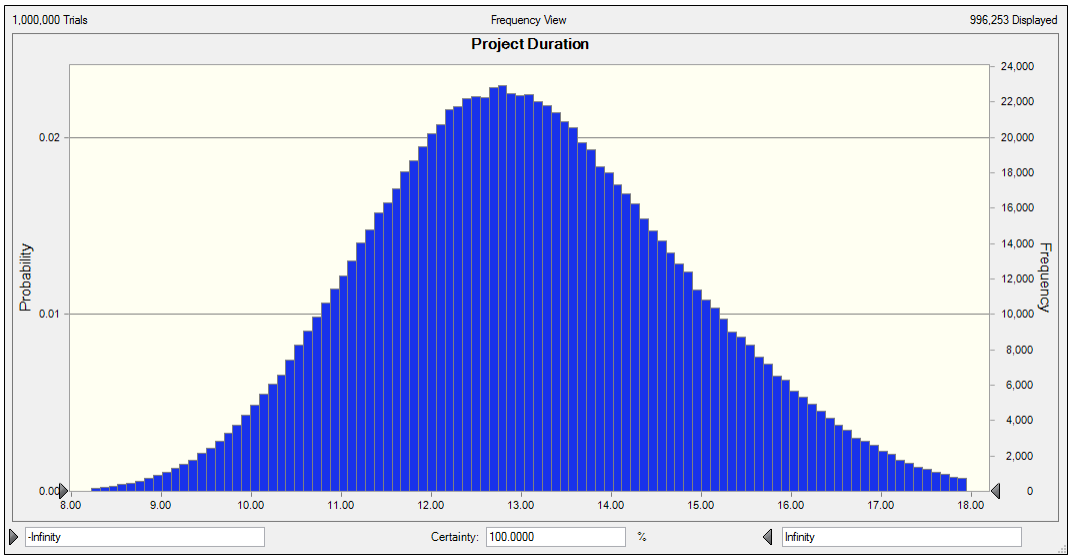
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8	HR	4,6	1	1	1



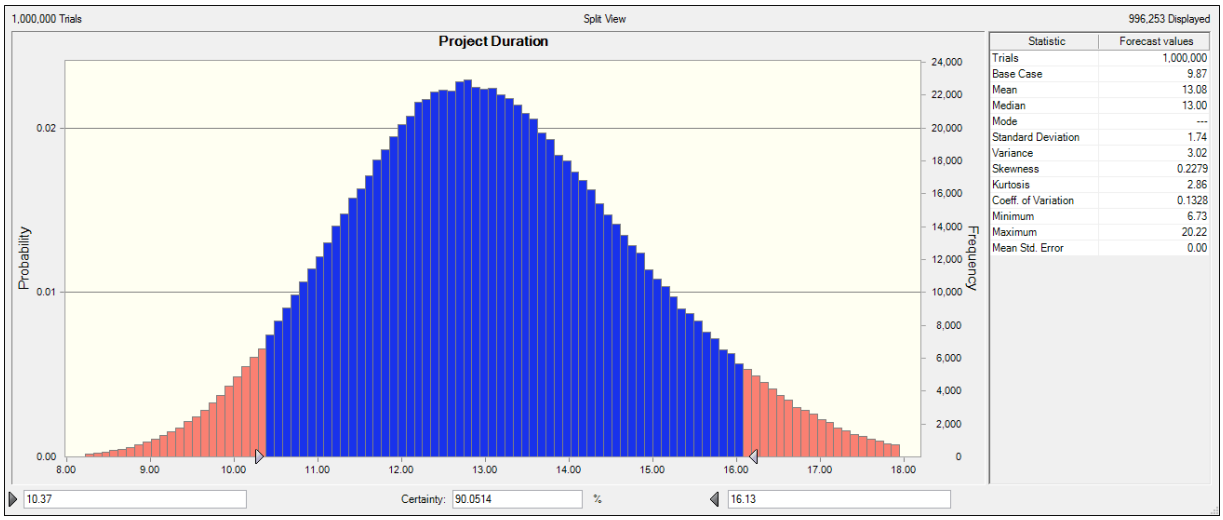
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Risk Analysis





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Changing Critical Path

- As task durations changes, critical path might change.
- We will no longer ask – which tasks are on the critical path?

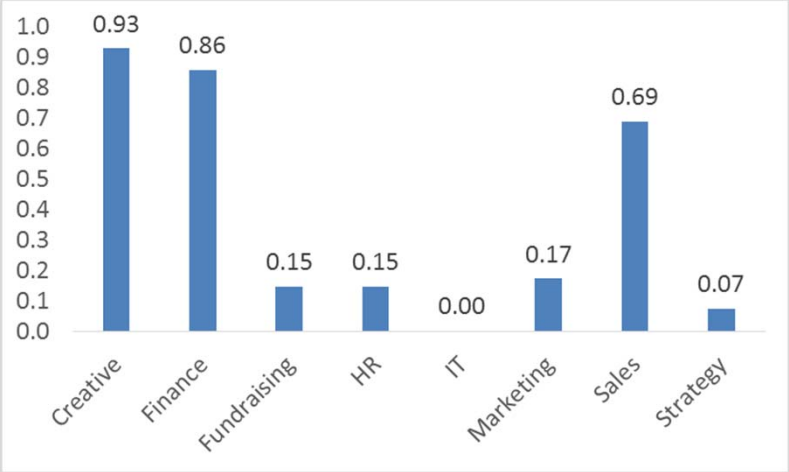
But:

- How likely are tasks to be critical?

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Criticality Index

- Probability that an activity is critical

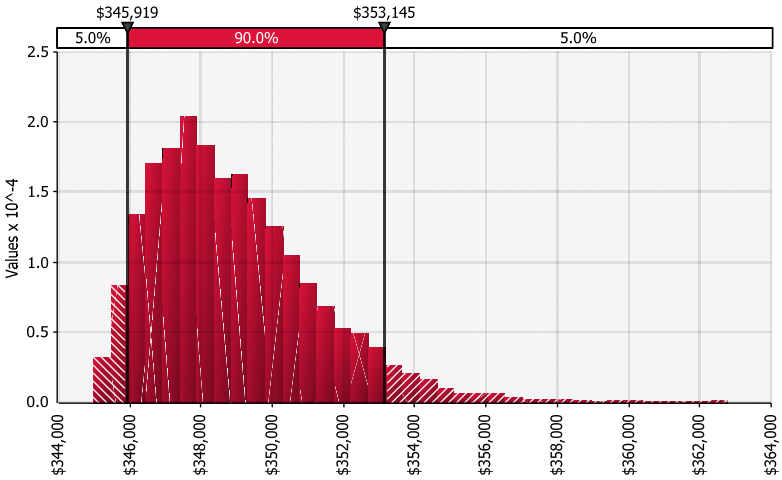


Budget Risks

- Cost estimates are subject to variations.
- Foreseeable risks can cause the actual project cost to differ from planned.
- Establish some contingency budget.
- Budget contingency should be allocated at a project not task level (provides more flexibility for the project manager).

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Simulation Results



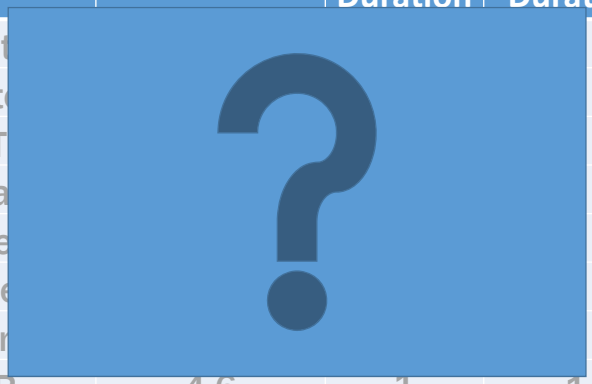
Project Planning: Risk Analysis

Activity #	Description	Predecessors	Min Duration	Likely Duration	Max Duration
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Project Planning: Risk Analysis

Activity #	Description	Predecessors	Min Duration	Likely Duration	Max Duration
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2	Strat				6
3	IT				5
4	Fundra				8
5	Marke				6
6	Sale				7
7	Finar				7
8	HR	4,6	1	1	1



Roadmap Instead of Plan

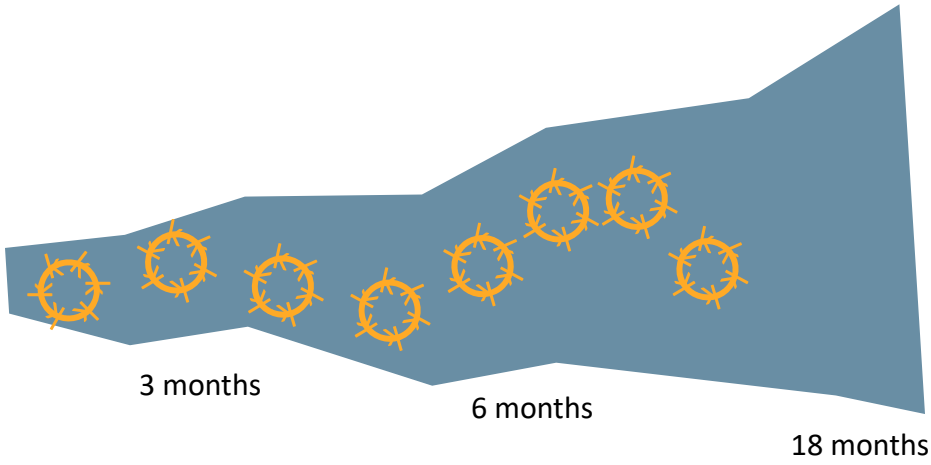


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Trial and Error learning

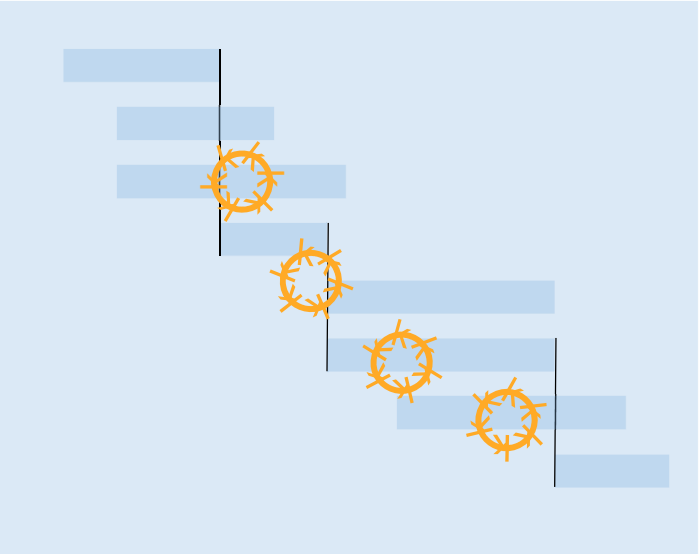


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