Budget planning using risk based estimates

Budget wellness for tomorrow

October 14, 2010

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Budget Planning using Risk Based Estimations

Agenda

- Infrastructure for improved budget planning
- Requirements uncertainty and budget calibration
- Intrinsic risk identification
- Sizing and ball park software costs
- Risk based analysis

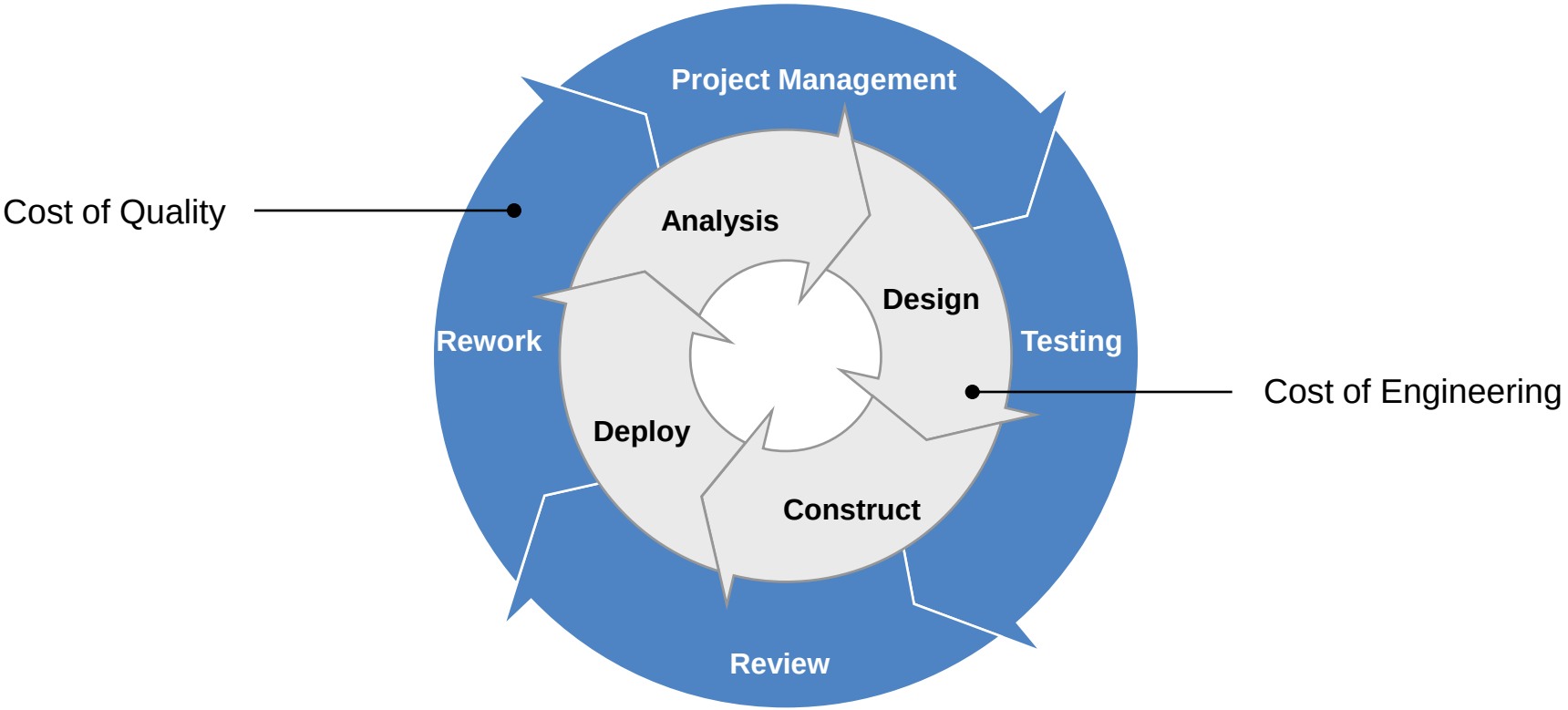
Infrastructure for improved budget planning

Budgeting Challenges at Different Levels deter budget planning

- Decision makers require accurate budget information when there is little information to base the estimate on
- Project managers are reluctant to commit to early phase estimates based on inadequate information
- Ballpark budget estimates created during the annual planning exercise often become the expected project cost
- Uncertainty reduces estimation accuracy
- Estimation is nothing but ‘An approximate judgment of worth’

Infrastructure for improved budget planning

Higher Profitability comes from Optimizing Bid, Minimizing Engineering Costs and Minimizing Cost of Quality



Profitability = Project Bid – (Cost of Engineering + Cost of Quality)

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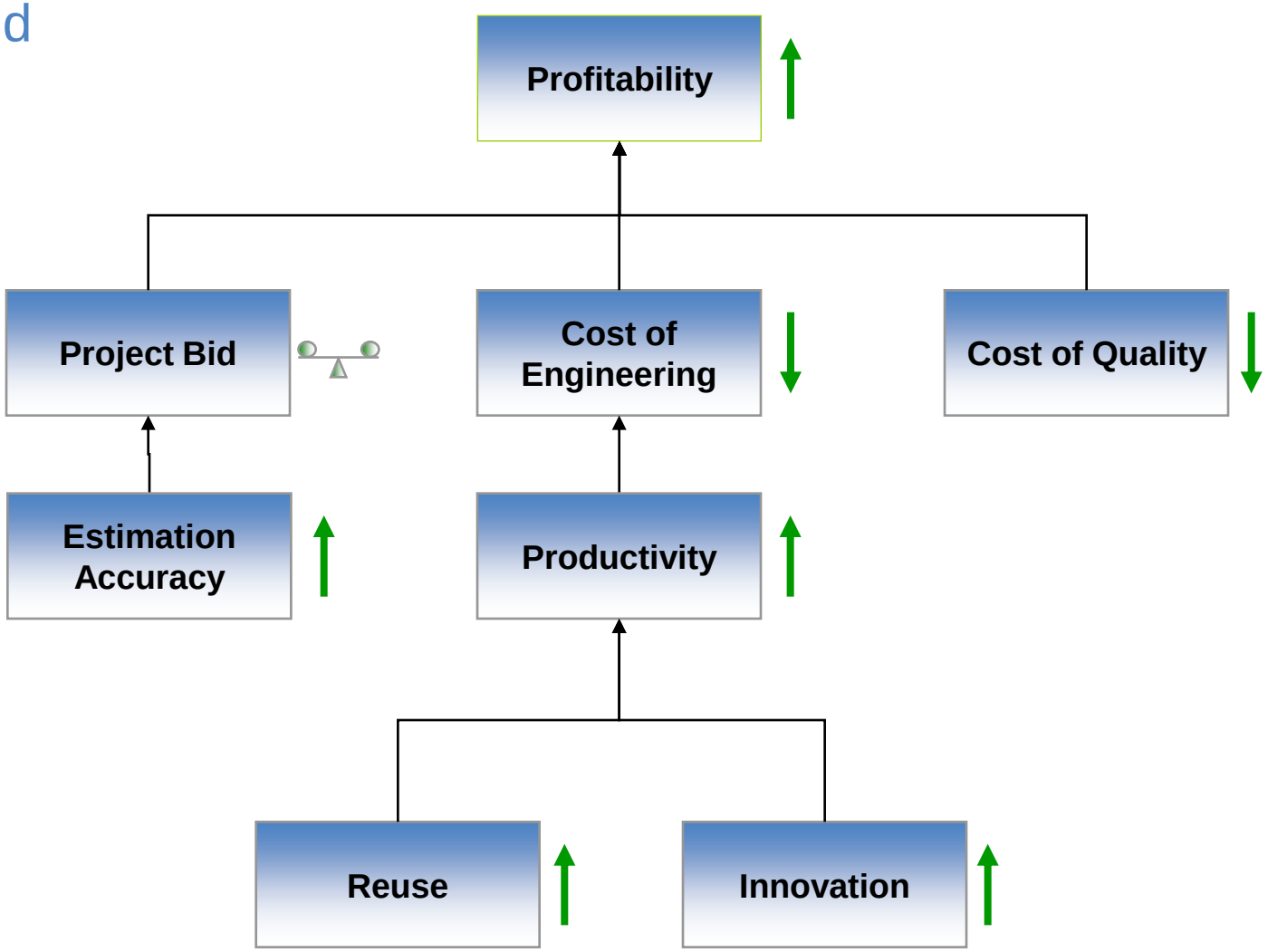
Infrastructure for improved budget planning

Increasing Profitability for Organization is largely dependent on Project Bid



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Requirements uncertainty & budget calibration

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Budget Planning using Risk Based Estimations

What is uncertainty?

How confident is this Project Bid; i.e., what is the probability of not exceeding this value?

How certain am I in this value; i.e., how wide is the probability distribution?

Three-point estimates are better:

LEAST: 1% Probability; “I can’t imagine the result being any smaller than this.”
LIKELY: Best Guess; “If I were forced to pick one value, this would be it.”
MOST: 99% Probability; “I can’t imagine the result being any larger than this.”

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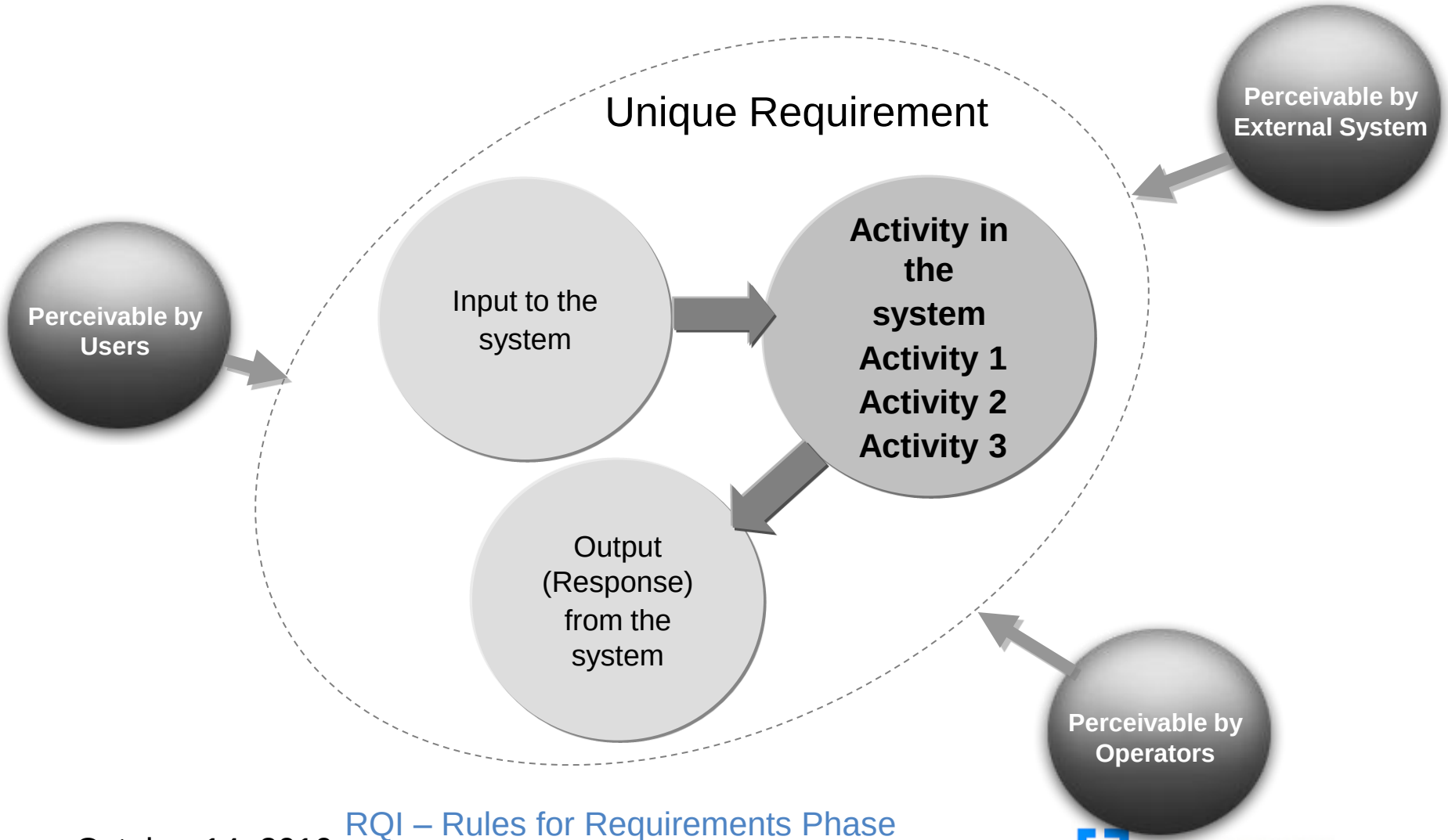
Requirements Uncertainty



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Intrinsic risk identification

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Intrinsic Risk identification

Typical Risks Identified Based on 50 Projects Analyzed

#	Risk Description	Probability of Occurrence (H/M/L) or %	Impact (H/M/L) or %
1	Skilled resource unavailability	High or 90	Medium or 15
2	Number of Cross Commits	High or 70	High or 75
3	New or unproven technology	High or 80	High or 30
4	Undetermined scope creep	Medium or 55	Medium or 10
5	Dependency with other projects	Medium or 22	Low or 5
6	Inadequate availability of business SMEs	Low or 15	Low or 2
7	Unfamiliar / new product being implemented	Medium or 45	Low or 6
8	Significant dependence on external services	Medium or 60	Low or 5

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Intrinsic Risk identification

Risk Profile

Probability:

High	In the life span of the project, if possibility of occurrence is more than 60%
Medium	In the life span of the project, if possibility of occurrence is in the range of 30% to 60%
Low	In the life span of the project, if possibility of occurrence is less than 30%

Impact:

High	If the estimated budget will have more than 20% impact
Medium	If the estimated budget will have 10% to 20% impact
Low	If the estimated budget will have less than 10% impact

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Sizing and ball park software costs

Size based approximations are made based on the details provided in the User needs and development costs are approximated.

Other costs including Project Management costs and project specific costs are computed based on Project Manager's inputs.

Business costs and Hardware costs are provided by the Project Manager

Example

Sl .No.	Cost Heads	% of Total Budget	Cost (in USD)	Remarks
1.	Business Cost	23	230,000	Refer UNS "Releae 4 - UNS EQA Approved v01.00" section 2.8 (Estimated Business Costs)
2.	Development Cost			Estimated from Total Effort assuming rate of $70 per hour.
	Engineering Effort	46	465000	
	Effort Due to Common Factors	14	139000	
	Effort Due to Project Specific Characteristics	17	169000	
	Budget	**100**	**1,003,000**	

* Technology and Contingency Cost specified in the UNS have not been considered as break-up for Technology cost is not given

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Sizing and ball park software costs

Uncertainty plays major role in the quality of the estimates and risk is the vehicle to capture It

Risks defined for an example project

Sl. No.	Risk	Risk Probability (In %)	Risk Impact (In % of Estimated Budget)	Dollar Impact of the Risk on the Project Estimated Budget (In USD)	Remarks
1.	Resource availability	15	5	50,150	Probability and Impact have been derived based on inputs from Project Manager.
2.	Schedule risk because of team inexperience with AQMS	45	25	250,750	
3.	Hardware Procurement may impact project adversely	45	25	250,750	

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Using the Monte Carlo Simulation

The Monte Carlo Simulation is used to generate random sample risk data that may possibly occur in the project The random generation is based on the risks defined and the impact defined specific to a project. The Random number is a representative of the risk that can occur based on the probability of occurrence

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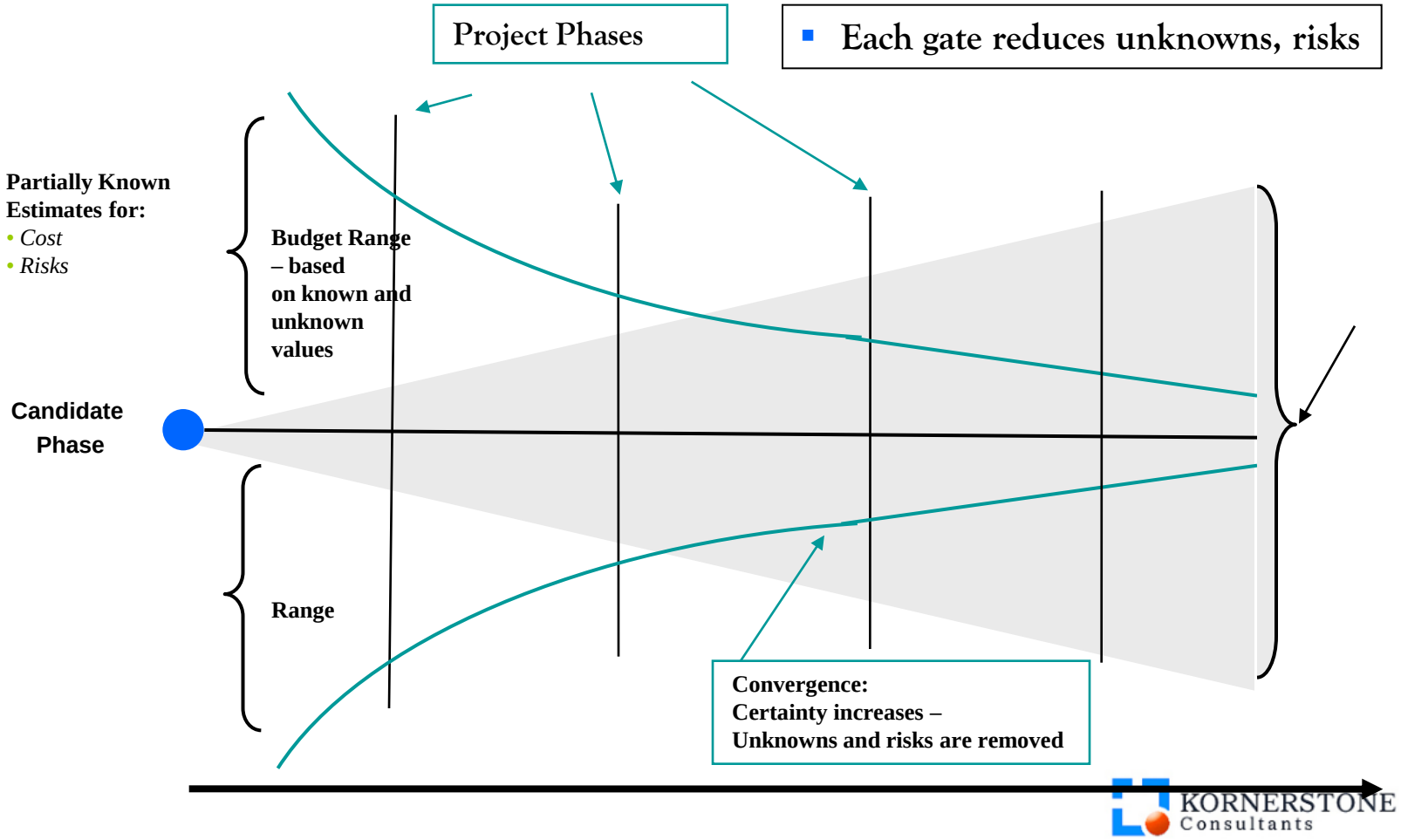
Risk based analysis

Risk Based Estimation is a method by which budget ranges are estimated for a project based on partial known estimates of cost and presence of risks.



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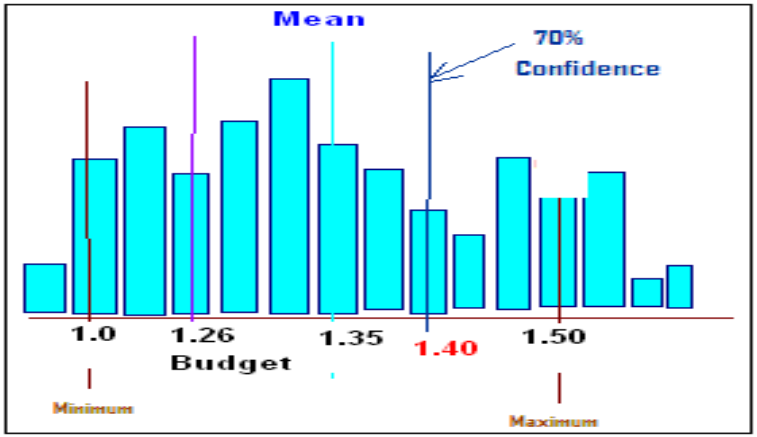
Risk based analysis

Inputs to Early Phase estimation are:

- User Needs Specification Documentation
- Risk Profile (Key Risks and Issues)
- Other Costs, if Known

Outputs of the simulation:

- Total Estimated Cost Range
- Contingency
- Assurance of the budget



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Risk based analysis

Dollar Impact of the Risk occurred

- A triangular distribution is drawn with dollar impact on x-axis and probability on y-axis.
- The three triangular points are Min, Max, and Mode value of the dollar impact of the Risk occurred.
- A random no. is generated and
  - If its 0 than dollar impact is the Min value
  - If its 1 than dollar impact is the Max. value
  - For other values the corresponding dollar value is picked from the S-curve.

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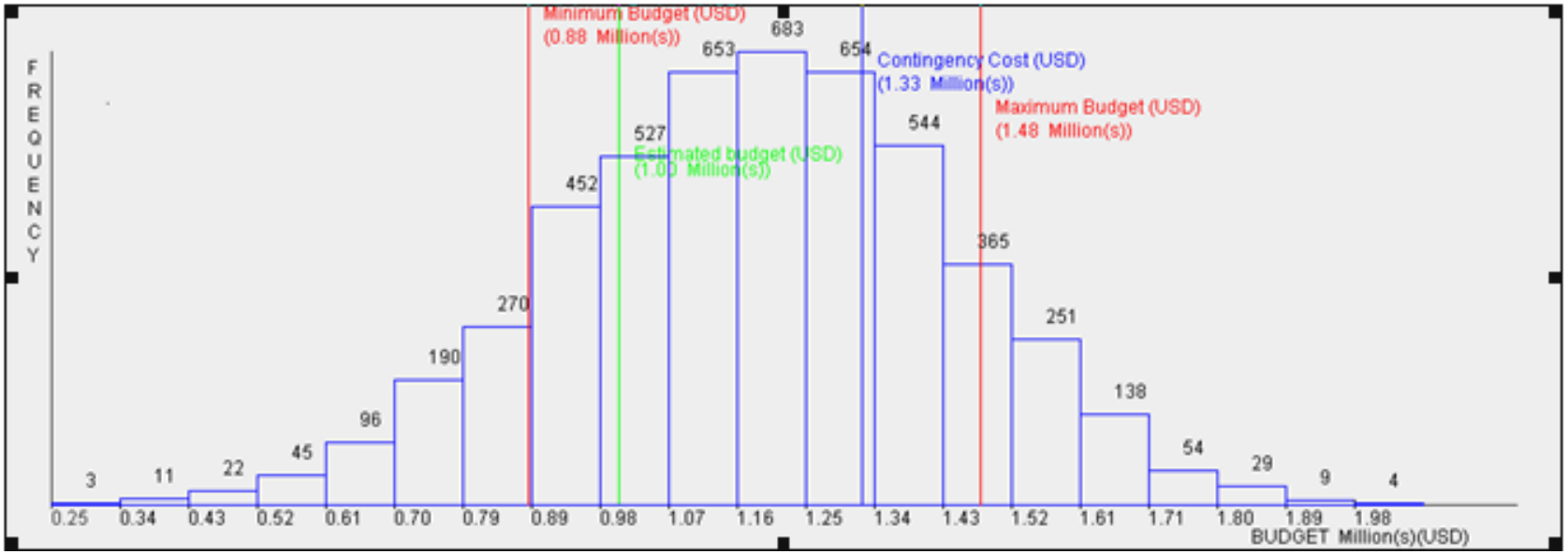
Simulation Output



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Risk based analysis

Interpretation of the Histogram

- The histogram is a representation of the output of all simulations.
- The sorted costs are used for computation of the mean.
- Then the range is divided into 'N' parts, in this case 10 & the frequency is plotted.
- The graph is a histogram of cost range vs. frequency (the output of simulation).

Confidence

- If you want a confidence limit of 90%, we take the area under the curve on both sides of the mean to be 0.45 times the total area. The resulting points give us the maximum and minimum values.

Assured Confidence

- When you integrate from the lowest value till the estimated value is reached and this area is expressed as a fraction of total area, expressed as a % gives the assured confidence limit.

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Questions & Discussion