Adopting the Quadratic Mean Process to Quantify the Qualitative Risk Analysis

Session NA13RSK01

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Qualitative and Quantitative Methods

Qualitative and Quantitative Methods

	Quantitative Methods	Qualitative methods
Advantages	• Facilitates the cost benefit analysis • Gives a more accurate value of the risk • More valuable	• Relatively simple to be implemented • Easily determine risk categories with greater impact in the project • Visually impactful
Disadvantages	• Results of the method may not be precise • Numbers can give a false perception of precision • More expensive and time consuming	• A lack of understanding of the parameters used in the scale can lead to different interpretations • Results can be biased • Less valuable

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The Essence of the Qualitative Analysis

Qualitative Risk Matrix
### Risk Levels are Relative to Regions Connected by Arrows

Probability

and Impact

Probability Scale
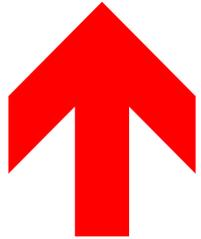
Level	Score	Description
Very High	5	It is expected that the event will occur. If it does not occurs it will be a surprise.
High	4	The event has a great chance of occurring.
Medium	3	The event can occur.
Low	2	It will be a surprise if the event occurs.
Very Low	1	Very remote chance of the event to happen. Practically impossible.

5 Dimensions of Impact
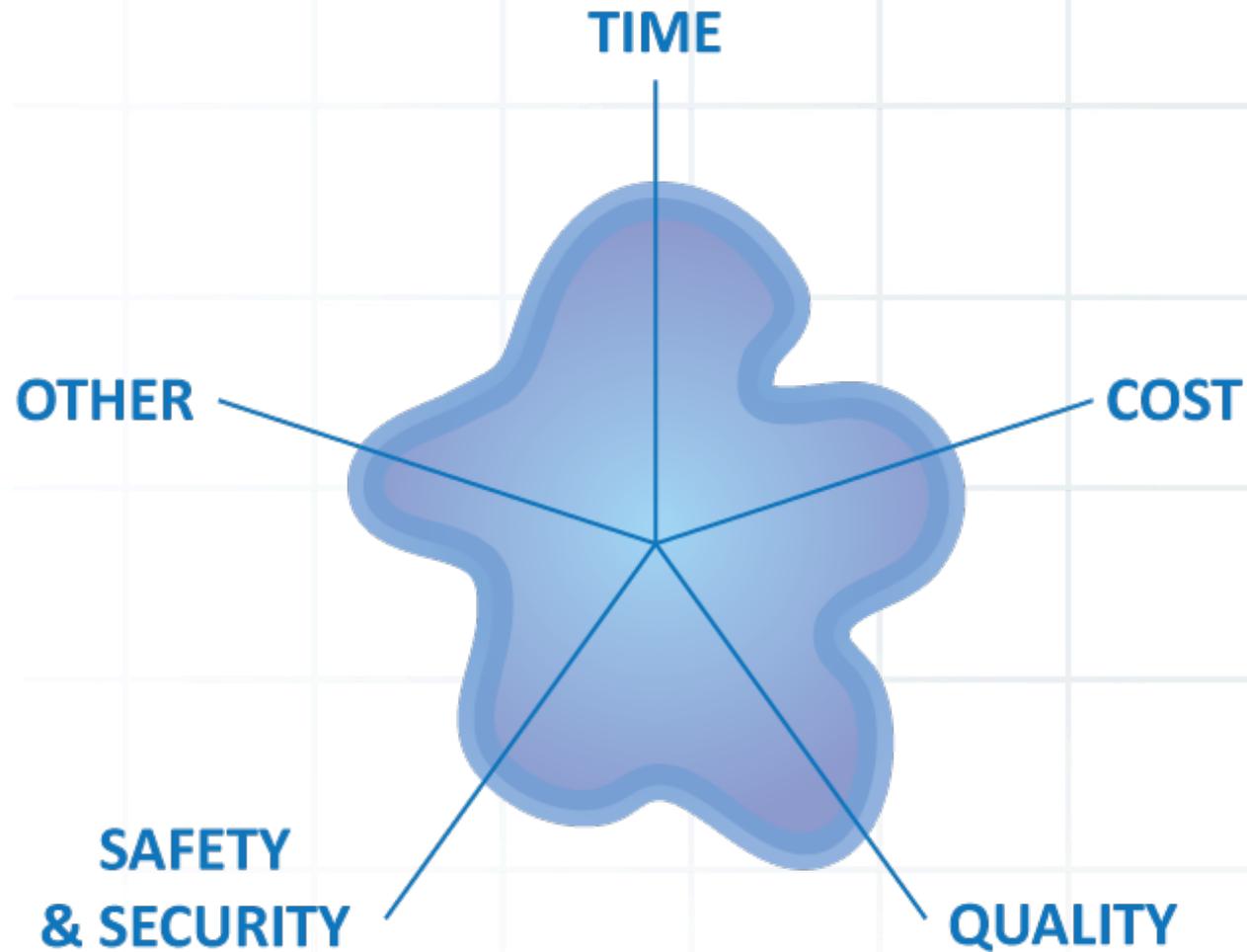
Impact on Time and Deadlines

- Assessment of the level of impact on the conclusion of the project

Level	Score	Description
Very High	5	Delays/Anticipation above 180 days or 6 months.
High	4	Delays/Anticipation between 120 and 180 calendar days.
Medium	3	Delays/Anticipation between 60 and 120 calendar days.
Low	2	Delays/Anticipation between 15 and 60 calendar days.
Very Low	1	Less than 15 calendar days of delays/anticipation.

Example

Impact on Costs

- Assessment of the level of impact on the final cost of the project

Level	Score	Description
Very High	5	Variation (positive or negative) above $1,000,000.
High	4	Variation (positive or negative) between $500,000 and $1,000,000.
Medium	3	Variation (positive or negative) between $250,000 and $500,000.
Low	2	Variation (positive or negative) between $100,000 and $250,000.
Very Low	1	Variation (positive or negative) lower than $100,000.

Example

Impact on Quality

- Assessment of the level of impact on the quality required for the project

Level	Score	Description
Very High	5	Client rejects the delivery or product.
High	4	Client asks for immediate corrective actions.
Medium	3	Client perceives and asks for action/information.
Low	2	Client perceives but forgives and no action is needed.
Very Low	1	Imperceptible impact (most of the time not even perceived by the stakeholders).

Example

Impact on Safety and Security

- This impact group could include or not aspects related to environment, physical security of the work in the project, data security (IT), and reputation, among others
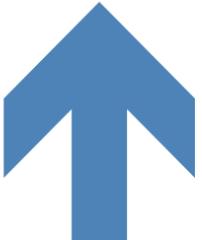
Level	Score	Description
Very High	5	Crisis. Impact is so evident and public that the project could not proceed as planned.
High	4	Evident impact on environment/reputation.
Medium	3	Impact is perceived and raises concerns.
Low	2	Perceived impact on environment/reputation but without relevance.
Very Low	1	No impact on environment and reputation.

Example

Other Impacts

- Optional group that aims to include any other specific impact of a risk that was not covered in the previous groups

Proximity: The 6th Impact Dimension
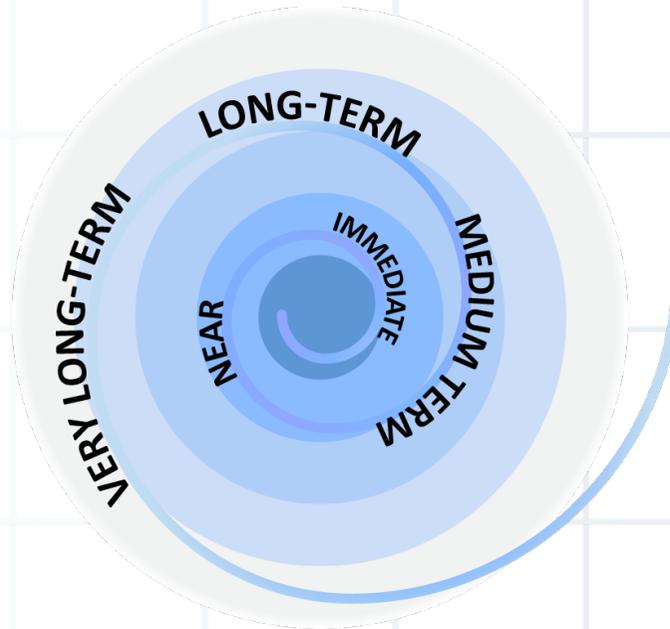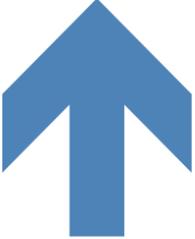
Level	Score	Description
Immediate	5	Event can happen anytime in the next 15 days.
Short-term	4	Event can happen between 15 days and 3 months.
Medium-Term	3	Event can happen between 3 and 6 months.
Long-Term	2	Event can happen between 6 months and 1 year.
Very Long-Term	1	Event can happen more than 1 year ahead.

Example

Calculating the Expected Value

- Risk measurement used to assess and prioritize risk events

$$Expected\ Value = Probability \times Impact$$

- Probability: 1 to 5

- Impact: 1 to 5 based on the formula

$$Impact = \sqrt{\frac{Impact\ on^2_{Time} + Impact\ on^2_{Cost} + Impact\ on^2_{Quality} + Impact\ on^2_{S\&Secutity} + Impact\ on^2_{Other} + Proximity^2}{6}}$$

Why Quadratic Mean (Root Mean Square) and not Arithmetic Mean

- Based on the assumption that different levels of impact add additional exposure to the project and this variance should be considered as a risk factor to the project.

$$Quadratic\ Mean^2 = Arithmetic\ Mean^2 + Variance$$

  – where the variance is a measure of how far a set of numbers is spread out

Example of Impact Calculation

	Impact Time	Impact Cost	Impact Quality	Impact S&S	Other Impact	Proximity
Risk A	3	2	1	1	1	4

$$Impact = \sqrt{\frac{3^2 + 2^2 + 1^2 + 1^2 + 1^2 + 4^2}{6}} = \sqrt{\frac{32}{6}} = 2{,}31$$

Example of Project Expected Value Calculation

Type	Probability	Proximity	Impact Time	Impact Cost	Impact Quality	Impact Safety and Security	Other Impacts	Total Impact	Expected Value
Threat	1	3	2	1	1	1	4	2,31	(2,31)
Threat	2	4	4	3	3	4	3	3,54	(7,07)
Threat	2	3	5	4	4	5	1	3,92	(7,83)
Opportunity	3	2	4	3	5	4	2	3,51	10,54
Opportunity	4	1	3	2	4	3	2	2,68	10,71
Threat	5	2	2	1	3	1	1	1,83	(9,13)
							Total Risk Expected Value		(5,10)

Conclusions

- The qualitative risk method is always a simplified model if compared with the quantitative methods.

- The process should be tailored to include different kinds of impacts and scales in order to produce a reliable quantitative result.

- This result allows opportunities and threats to be compared in order to determine the total risk exposure.

  - The concept that an opportunity can cancel a threat of the same level is not possible with the traditional qualitative risk management approach.

Do not miss

- Determining the Mathematical ROI of a Project Management Implementation
  - *Monday, October 28 at 10:45:00 AM*
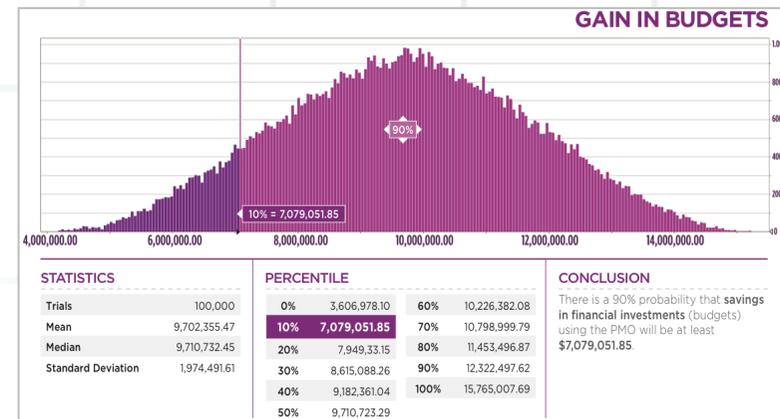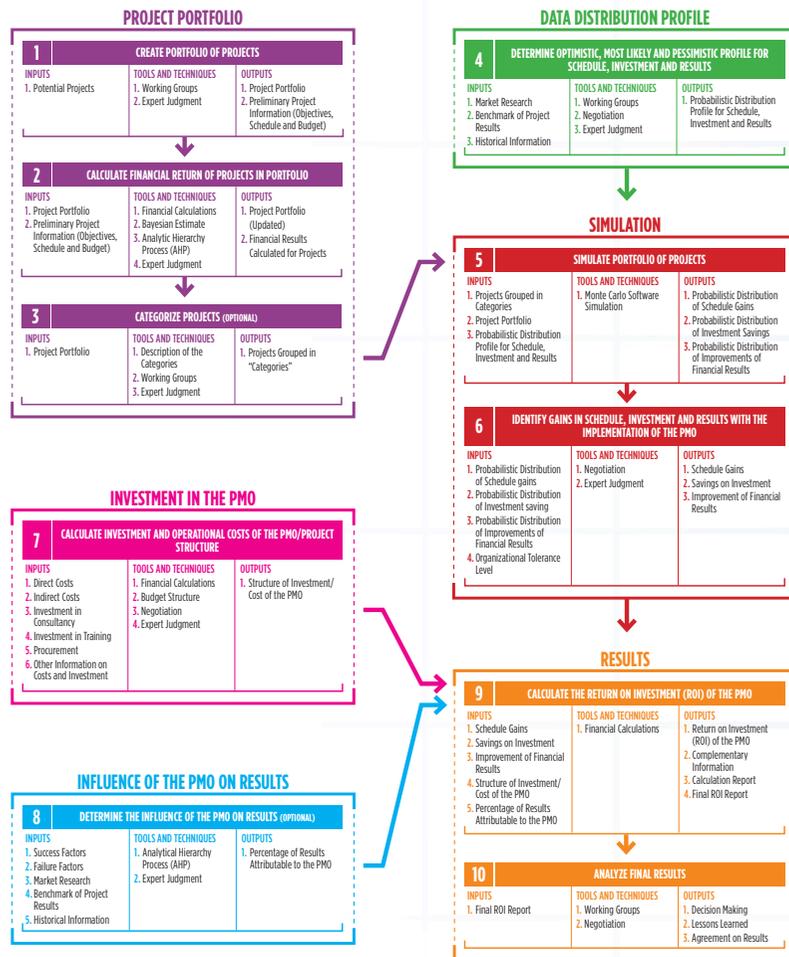
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