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- A new outlook on Modern Business Risk Management Practices in Engineering and Technology Development Environments -

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Table of Contents

Abstract

Over the past several years, conventional, strategic risk management practices have come under fire. Since this initial scrutiny, traditional methods have become outdated for implementation and use in modern, successful business management structures. This paper discusses why this has become the case, and proposes a new strategic risk management methodology for modern business.

Introduction

Historically, risk management at any strategic level, has been heavily based upon and reliant on "stringent-no-marginal error" rules. As systems progressed in practice, and additional risks became identified, rules became more stringent over time.

While this may not be seen as an issue from a logical point of view, increasingly competitive environments have morphed over time – particularly in the fields of science, engineering and technology.

In 2007, BP was responsible for the worst manmade disaster of the 21st century; the explosion of the Deep-Water Horizon Oil Rig. Post federal investigation, the enquiry commission attributed the disaster to management failures that crippled "the ability of individuals involved to identify the risks they faced and to properly evaluate, communicate and address them".

After this hardscrabble realization, there have been several attempts to find and/or develop new schools of thought surrounding effective, strategic risk management methodologies. The aim being, to evaluate risks outside of a governed, firm set of "ideal world" rules.

This paper defines the development of a new proposed method for strategic risk mitigation, in an engineering environment. The case that has been put forward, focuses on evaluating new business prospects – but is adaptable to multiple scenarios. This methodology comprises new Risk Management Practices (some of which have been extracted from highlights by JP Morgan, on their current practices) while not straying from traditional project prioritization practices; an adequate blend of new and old methods to suit ever changing "modern practice".

Revised Philosophy on Categorizing Risk

Habitually, all prospective risks are weighted and listed on a single master list. Once listed, differing styles of scoring were used to obtain an overall project score. Conventional models changed between compilers, and a set evaluation standard between multiple parties may not have been established. The key issue, is that all the prospective risks were adjudicated and weighted according the same, philosophically established matrix – "the set rules".

Fixed rules-based risk management, can sensibly mitigate many risks, but rules-based risk management alone, will not diminish either the likelihood and/or impact of a risk stemming from a poor decision.

To manage risk effectively, one needs to establish and understand the qualitative distinctions amongst the types of risks faced by the organization, when vetting new work. To accurately adapt to this line of thinking, recent studies suggest three effective, broad-business-spectrum categories, into which to classify various risks:

- **CATEGORY I RISKS**
  - Preventable Risks
    - Internal risks, arising from within the organization, that are controllable and ought to be eliminated or avoided;
- **CATEGORY II RISKS**
  - Strategical Risks
    - Voluntary risks that a company is willing to accept, in order to generate superior returns through its strategy;
- **CATEGORY III RISKS**
  - External Risks
    - Risks that will potentially arise from outside of the company, and are beyond its influence and/or control.

Facilitating the Classification of Risks per Category

To establish a uniform method of capturing risks, the following structure proves effective. It is based on traditional project prioritization tables:

Weight	Criterion	Score
5 = Very Important Risk	Factors to be considered, relevant to the business using this methodology. Each respective point should have its own section (i.e. a line entry).	9 = Ideal Risk ("Good")
4		6
3		3
2		0 = Non-Ideal Risk ("Bad")
= Near Negligible Risk		

In any organization, consistency is key. To ensure consistency when utilizing this methodology, the following generic application rules need to be followed by all persons compiling a risk assessments, based on this methodology:

1. Each category is to have its own classification table (i.e. a table for category I, a table for category II, a table for category III);
2. Each table is to be evaluated using the evaluation algorithm discussed further into this paper, this in turn will provide an independent "risk score" for each category;
3. Within each table, entries (i.e. risks) should be ranked in descending order (i.e. by weight). This means that the most important risks will be published at the top of each classification table;
4. The criterion column, is adaptable by the risk assessment compiler. Each risk entry can thus have its own unique risk criteria – relevant to the organization;
5. The scoring matrix is a fixed pattern which cannot be changed. This methodology is based on the elementary set 0, 3, 6 and 9.

6. Each risk needs to be fully evaluated using <u>the entire scoring matrix</u>. This means that you cannot have one risk entry that is evaluated using the full 0, 3, 6 and 9, and then only use 0 and 3 when evaluating another risk. This is crucial to facilitate the evaluation algorithms defined in this paper.

Assessing Individual Risks relative to the Scoring Matrix

This new methodology, uses to fixed styles of evaluating methods. The compiler of a strategic risk assessment can choose which style to utilize, relative to the risk being considered.

It is important to realize that it is easy to simply develop a weight and criteria for a risk. The challenge lies in effectively evaluating a risk – to achieve this, the scoring matrix needs to be setup accurately, based on an understanding of the organization's management strategy. This in conjunction with a compiler's commercial experience will allow for a relevant and true analysis to be ascertained.

Method 1	Method 2
Each score ranking, carries a definitive answer, based on a question posed in the risk's criteria. This method ensures that all assessments carry true relevance, and prevents bias by the person executing the risk.	Each score represents a number of successful answers, relative to the strategic thinking points posed in the risk's criteria.
High-level Example: 0 = Not Relevant ("Bad"); 3 = No; 6 = Maybe; 9 = Yes ("Good").	**High-level Example:** 0 = One is True ("Bad"); 3 = Two are True; 6 = Three are True; 9 = All are True ("Good").

Mathematical Evaluation Algorithms to Quantify the Risks Score per Category

Risk Ideal Score [A]

To assess the ideal score for a risk entry:

$$Single\ Risk\ Target\ Score = xy$$

Where:
X = risk weight;
Y = best score (9).

Category Ideal Score [B]

For a risk category of n risks, repeat [A] n times, cumulatively evaluating each respective Single Risk Target Score. This will give you the ideal target score for that risk category:

$$Category\ Risk\ Target\ Score = \sum_{i=1}^{n} SingleRiskTargetScore_i$$

Where:
i = index of summation (i.e. category first risk element);
n = upper summation limit (i.e. category last risk element).

Actual Risk Score [C]

To establish the actual score for each risk evaluation, based on the input of the assessor:

$$Single\ Risk\ Actual\ Score = xz$$

Where:
x = risk weight;
z = user score.

Calculating the overall score for a Risk Category [D]

To calculate the actual score for the entire category:

$$Category\ Risk\ (\%) = \left(\left(\frac{\sum_{j=1}^{n} SingleRiskActualScore_j}{CategoryRiskTargetScore}\right)(100)\right)$$

Where:
j = index of summation (i.e. category first risk element);
n= upper summation limit (i.e. category last risk element).

And:

$$0 \leq Category\ Risk\ (\%) \leq 100$$

Evaluating the overall Score for all three Categories

It is important to remember that without any risk, comes no reward. However, blind risks hold no relevance in such an evaluation – strategic thinking and due commercial diligence must be afforded to the work being evaluated.

To evaluate the overall prospect risk score, the categories are weighted as follows:

Category	Weight (%)
Strategic Risk	50
Preventable Risk	35
External Risk	15
Total	**100**

To determine the overall risk score:

$$Total\ Risk\ Score\ (\%) = [\ ((\%risk\ strategic)(0.50)) + ((\%risk\ preventable)(0.35)) + ((\%risk\ external)(0.15))\ ]$$
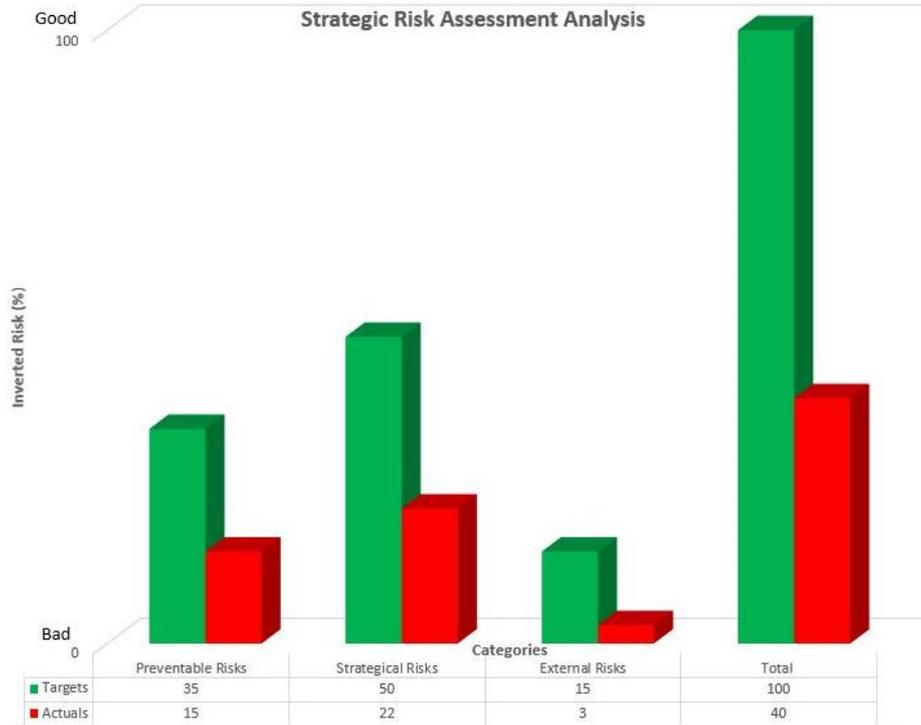
0% = company is exposed to extreme risk levels should this prospect proceed. The prospect should be abandoned.
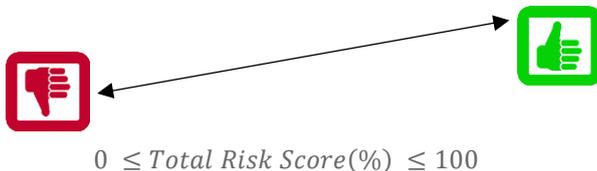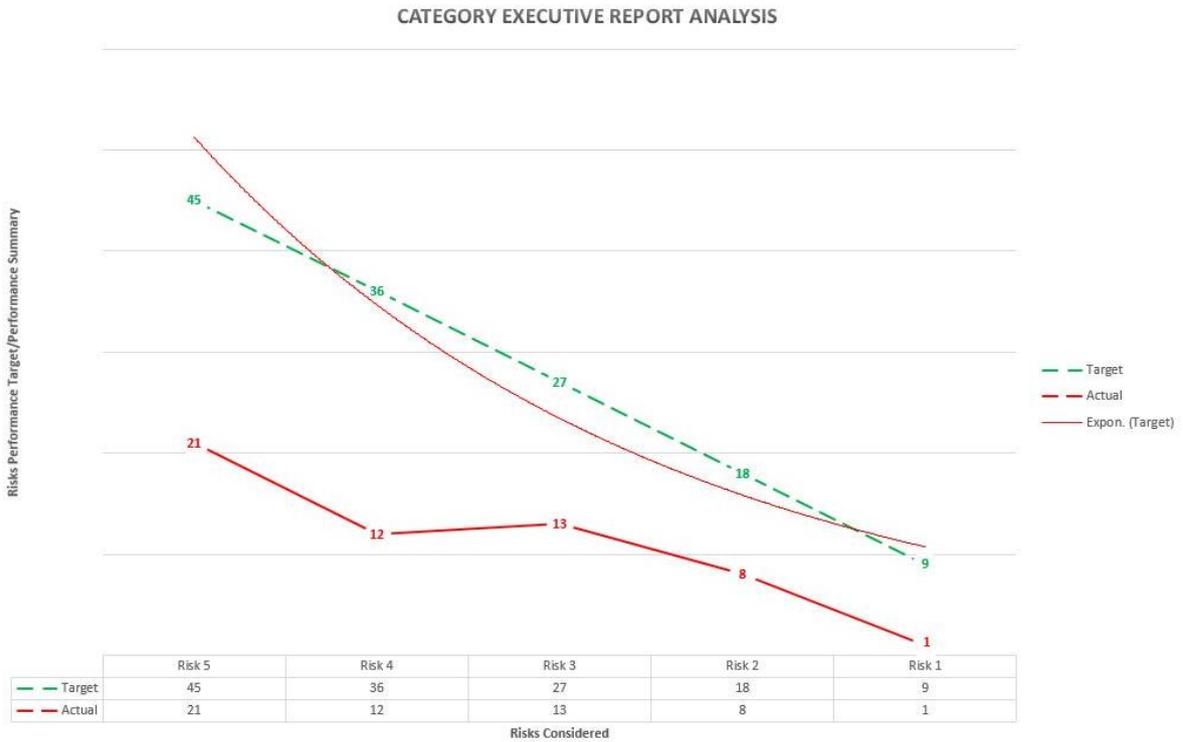

100% = the company is exposed to negligible risk. The prospect poses strong, strategic revenue potential, and should be pursued.

$$0 \leq Total\ Risk\ Score(\%) \leq 100$$

Methodology Executive Reporting Capabilities

Total Risk Score Breakdown Analysis

Strategic Risk Assessment Analysis

	Preventable Risks	Strategical Risks	External Risks	Total
■ Targets	35	50	15	100
■ Actuals	15	22	3	40

Per Category Executive Report

CATEGORY EXECUTIVE REPORT ANALYSIS

	Risk 5	Risk 4	Risk 3	Risk 2	Risk 1
--- Target	45	36	27	18	9
--- Actual	21	12	13	8	1

Risks Considered

Final Strategical Evaluation ("Yes" / "No")

To establish the final decision on the evaluated prospect, the following hierarchy is to be established:

CEO
Strategical Input 1
Strategical Input 2
Strategical Input 3
Strategical Input 4

FINAL OUTCOME

The CEO has the final say on the outcome of the project, at his or her sole discretion. The CEO is required to establish a strategy evaluation committee, consisting of four members. Each member is expected to hold relevant expertise in areas comprising the Risk Assessment. Typically differing Risk Assessment will have separate evaluation committees.

Each Strategical Input member is to rate their opinion relative to their area of expertise, out of a score of 25:

$$0 \leq Professional\ Opinion \leq 25$$

Establishing the Opinion Risk Score

$$Opinion\ Risk\ Score\ (\%) = Strategical\ Input\ 1 + Strategical\ Input\ 2 + Strategical\ Input\ 3 + Strategical\ Input\ 4$$

Establishing the final Risk Analysis Score for Executive Consideration

$$Final\ Risk\ Evaluation\ Score\ (\%) = \left(\left(TotalRiskScore(0.75)\right) + \left(OpinionRiskScore(0.25)\right)\right)$$

Determining the Final Decision

$$Final\ Outcome\ (\%) = (FinalRiskEvaluationScore)(a)$$

Where:

a = CEO Decision

And:

1 = Yes

0 = No

Conclusion

The final outcome of the prospect that has been evaluated, is as follows:

Final Score Outcome (%)	Outcome
0	Prospect is a no-go
>0	Prospect is to be developed. The organization should establish ranges above 0%, which indicate how a prospect is to be expedited.

This methodology is aimed to provide a consistent, effective and meaningful methodology for evaluating strategic risk. Further, the methodology is aimed to be adaptable to various organizational structures.

To execute this methodology, it is advised to establish an Excel spreadsheet to facilitate the organizations implementation of this methodology. The spreadsheet should be locked down to maintain a consistent standard per risk assessment matrix.

Some points which should be recorded when implementing these user-interfaces, to allow for easy archiving and effective customer relationship management, include, but are not limited to:

1. Date Lead Received;
2. Person Responsible for Lead;
3. Prospective Client Name;
4. Brief Description of Lead;
5. Region of Lead;
6. Estimate overall Prospect Value;
7. Prospect Response Deadline;
8. CRM Reference Number;
9. CRM Feedback;
10. CRM Status.

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