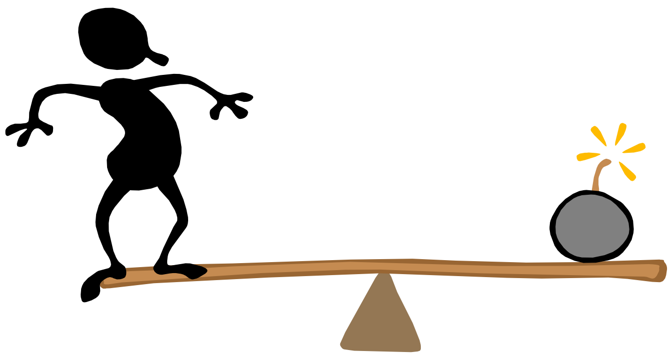
Managing the Right Risks



Tom Kendrick, PMP

Project Management Consultant

Defining Risk

Insurance industry:
Loss times Likelihood

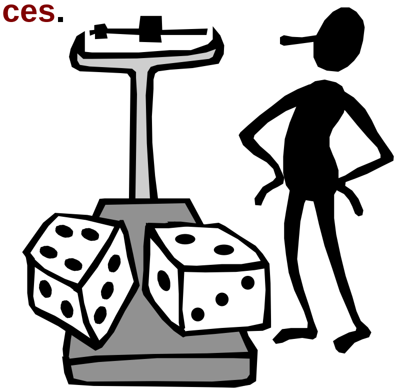
PMI PMBOK®:
Uncertainty that matters

ISO 31000 Standard (Risk management - Principles and guidelines):
Effect of uncertainty on objectives

Wikipedia
Risk is a concept that denotes a potential negative impact to an asset or some characteristic of value that may arise from some present process or future event.

Keys: Probability and Impact

All definitions include some variation on the themes of **chance** and **material consequences**.



Estimating **Probability**:

- Risk likelihood
- Assessed as percentages (or percentage ranges)

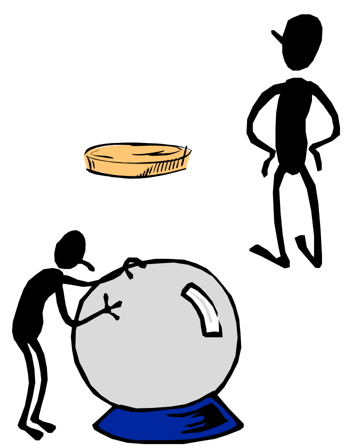
Estimating **Impact**:

- Risk damages
- Assessed as estimates of time lost, money spent, extra effort, or other impact (or of ranges/categories for these factors)

Risk Probability Is Uncertain

Three methods:

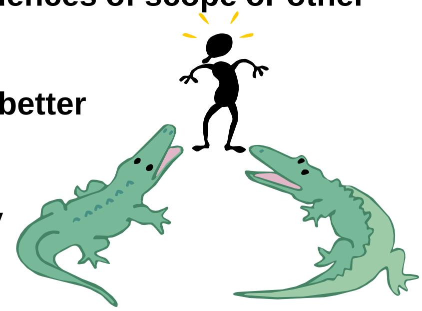
- Mathematical model
- Empirical analysis
- Guesses



Project risk probabilities are usually guesses, and are **often biased**.

Risk Impact May Also Be Uncertain

Impact assessment relies on incremental estimates of time, cost, effort, or potential consequences of scope or other changes.



Accuracy of the estimates is no better than other project estimates

The main focus always on easily measurable, significant consequences, discounting impact that cannot be precisely measured (or may not even be measurable).

"Not everything that can be counted counts, and not everything that counts can be counted." -- Albert Einstein

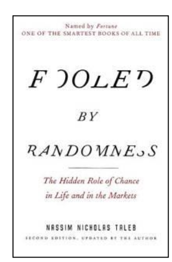
"Black Swans"

Assumed to be true: "All swans are white."
In 17th century logic, A "black swan" was something that could not occur.

Then, people journeyed to Australia.

Today: A Black Swan may be any large-impact, hard-to-predict, rare event.

Related ideas are explored in:
Fooled by Randomness: The Hidden Role of Chance in Life and in the Markets
©2005 by Nassim Nicholas Taleb

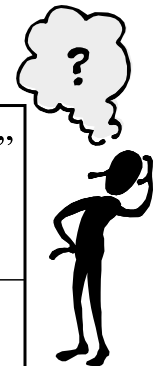


Risk Response Dispositions

Four Options for Risks Identified:

Choose to Manage:

Risk Occurs:		Yes	No
	Yes	Hooray for Us	"Black Swans" (Type 2 Errors)
	No	Oh, Well (Type 1 Errors)	Lucky



"Type 1" Errors: Waste

Managing a risk that fails to materialize
- **Risks have probability between 0 and 1, so <u>this happens.</u>**
- **Justifying action for "remote" risks may be hard.**

After-the-fact criticism is common: "You squandered resources doing unnecessary work."
- **You can never "prove" a risk-preventative action was justified if the risk never happens.**
- **You cannot even prove that your estimates of potential harm were "appropriate."**
- **There can be positive effects that may partially justify any actions taken, though.**

"Type 1" Error: Y2K?

"Doomsday 2000" Peter de Jager. ComputerWorld, 1993:

"One IS person I know of performed an internal survey and came up with the following results: of 104 systems, 18 would fail in the year 2000. These 18 mission-critical systems were made up of 8,174 programs and data-entry screens as well as some 3,313 databases. With less than seven years to go, someone is going to be working overtime. By the way, this initial survey required 10 weeks of effort. Ten weeks just to identify the problem areas."

Risk Probability: Estimated Very High (essentially 100%)
Risk Impact: Estimated by many organizations Very High

Cost of Mitigation: Hundreds of Billions of Dollars, worldwide
Actual result: The world did not end.

Worthwhile?

"Type 2" Errors: Damage

Failing to managing a risk that occurs
- Risks with apparent low probability do happen (Black swans).
- Justifying action for "remote" risks or things that have never (yet) happened may be hard.

Again, after-the-fact criticism is common:
"You failed to see and manage this
(in retrospect) obvious problem."

“Type 2” Errors: Damage

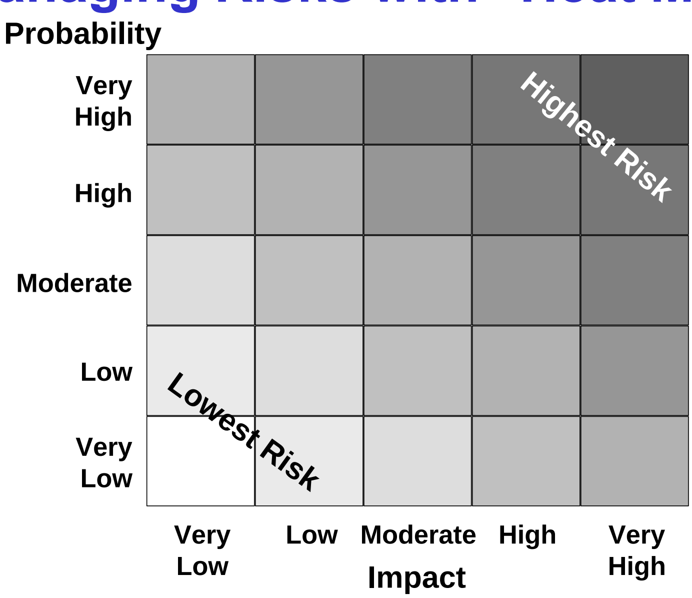
BP digs Deep Sea Oil Wells – lots of them

- BP and partners have complex, distributed decision-making in key areas.
- BP (and competitors) successfully lobby for minimal and fragmented government oversight.
- Shortcuts and exemptions were implemented contrary to established BP policies.
- People on site were not empowered to act or override decisions.

Risk Probability: Assumed to be very low “Safe so Far…”
Risk Impact: Poorly estimated, apparently (if at all)

Result: $20 Billion fund set up, likely will cost more. (And: Corporate reputation? Wildlife? Gulf region economies? …)

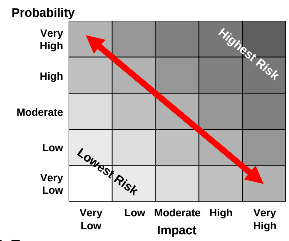
Managing Risks with “Heat Maps”



Some Issues with Heat Maps

They appear to be symmetric:

- High probability, Low impact.
- Low probability, High impact.
- … Same?



Heat maps tend to be **subjective**, based on qualitative info and guesses.
It can be very difficult to decide which risks to manage.

Sorted lists (or tables) based on **expected impact** assessment weighted with quantitative probabilities are much more useful.

But… What if quantitative estimates uncover significant uncertainty?

Expected Impact of a Risk

Quantitative assessment of each significant risk:

- Loss times likelihood (or, probability times impact)

Probability:

- Estimate a percentage, or at least a percentage range. Base it on history, a model, simulation, or whatever your best analysis method may be.

Impact:

- Determine the units of measure that are appropriate (incremental funds, effort, duration, and whatever else matters to your project and organization).
- Estimate the potential impact (or a range) for each type of consequences.

Example: Expected Risk Impact

Risk:

- Loss of a key contributor with unique skills

Probability:

- Looking at past projects, this is currently fairly low, about 20-30%

Impact:

- Cost: Hiring and training a new person $1000-$2000.
- Duration: Two to six weeks of delay and learning curve.

Expected (based on worst cases):

- Cost: $600; Duration: About two weeks.

Setting Materiality Thresholds

For every project, determine the "risk appetite" of the sponsor and key stakeholders.

Determine a High/Low discrimination points based on organization risk tolerance (not on yours).

Probability:

- High: Sufficiently likely to cause concern (e.g.: >30%).
- Low: Low enough to be considered unlikely.
- Not known: No reliable basis for assessment.

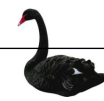
Impact:

- High: Visible impact to the project or organization (e.g.: Project objective changes, or other impact exceeding project cost).
- Low: Impact not visible outside the project.
- Not known: No reliable basis for assessment, at least within the project.

Risk Map (Reflecting Uncertainty)

Probability:

Probability \ Impact	Low	Not Known	High
High	Accept Most	Manage Most	Manage
Not Known	Accept Most	Consider Worst-case Impact	Manage Most
Low	Accept Most	Consider Worst-case Impact	Manage Most



Impact: Low Not Known High

Justifying Risk Responses

The easy cases:

- **Manage risks with high probability and impact**
- **Accept most risks with low probability and impact**

But what about these other cases:

- **Low probability risks with high impact estimates?**
- **Risks with "non-quantitative" significant impact?**
- **Risks where the prevention (avoid/mitigate/transfer) costs are well below the "loss times likelihood."**
- **Risks with moderate (or low) probability/impact assessments?**
- **Risks where your best probability estimates are WAGs?**
- **Risks where your best impact estimates are WAGs?**

High Impact, High Probability

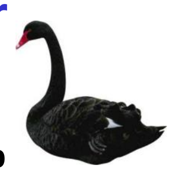
Manage:

- **Treat these risks as issues or problems. Develop a sufficient response in advance.**
- **Accept only where there is no credible or effective response available. Even here, seriously investigate contingency and recovery options.**

For this and all other cases:

- **Use risk analysis to establish risk reserves for budget, schedule, or both.**

High Impact, Unknown or Low Probability



Manage most:

- **Because impact would be material, develop responses for all risks with unknown probability.**
- **Be skeptical of low probability risk estimates. Consider responses for all high impact risks unless you can afford the impact. For risks accepted, do develop contingency plans.**

Accept some:

- **If the cost of the only response exceeds the expected risk (and the project is justified even if the risk occurs).**
- **If there is no known response (but the overall project benefits justify the risk).**

Unknown Impact, Low or Unknown Probability

Consider **worst-case impact**:

- Determine ranges for impact, and consider the consequences of the worst cases. Manage most risks where the impact could be unacceptably high.
- Consider managing where an effective response would require trivial project changes.

Accept where:

- The cost of a response would exceed the worst-case cost of the risk.
- The expected cost of the risk fails to justify the best identified response. (But do consider contingency actions, especially if the impact could be significant.

Low Impact, Any Probability

Accept most:

- For low impact risks, ad-hoc responses may be generally sufficient.
- Consider managing where an effective response would require only trivial project changes.
- Monitor all risks, and plan to reassess impact periodically, especially for longer projects.

Justifying “Type 1 Errors ”

Clearly document significant investments made to manage risks:

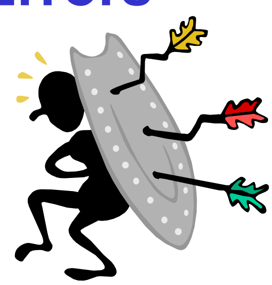
- Use data to show the damage the risk would cause.
- Use historical project information to show past impact and occurrence of similar risks.
- Do simulations to test project impact assumptions.
- Identify all beneficial side effects of risk management tactics. (For example: Additional focus on better communication, or process improvements to avoid past problems that also increase efficiency.)

Solicit early sponsor and stakeholder support (in writing) for actions adopted.

Minimizing “Type 2 Errors”

Manage estimating bias:

- Probability: People significantly overestimate the likelihood of beneficial outcomes (such as risk mitigations adopted) and underestimate the chances of adverse results (like risks happening). Probe for reasons and ranges, and assess using high values.
- Impact: Work to uncover worst cases and root causes. Investigate potential unintended consequences and correlations with other risks and events.



Respond to all risks that are under your control.

Develop a strong case for risk responses requiring changes needing sponsor and stakeholder approval.

Document all risks not managed, and strive to establish project-level risk reserves.

Overall Risk Example

	Assumed Values	Assumed Probabilities	Expected Values
Project Cost:	$750,000	100%	$750,000
Project Benefits:	$1,000,000	100%	$1,000,000
Risk 1:	-$500,000	10%	-$50,000
Risk 2:	-$200,000	15%	-$30,000
Risk 3:	-$250,000	10%	-$25,000
Opportunity 1:	$50,000	5%	$2,500
Opportunity 2:	$125,000	25%	$31,250
Total Expected Value			$178,750

About a 24% return—not bad. But is this the full story?

Project Outcome Ranges

Nominal Value (Certainties Only)	**$250,000**
Expected Value	**$178,750**
Maximum Value	**$425,000**
Minimum Value	**-$700,000**
Average Simulated Value	**$170,400**

Simulation results (1000 samples):

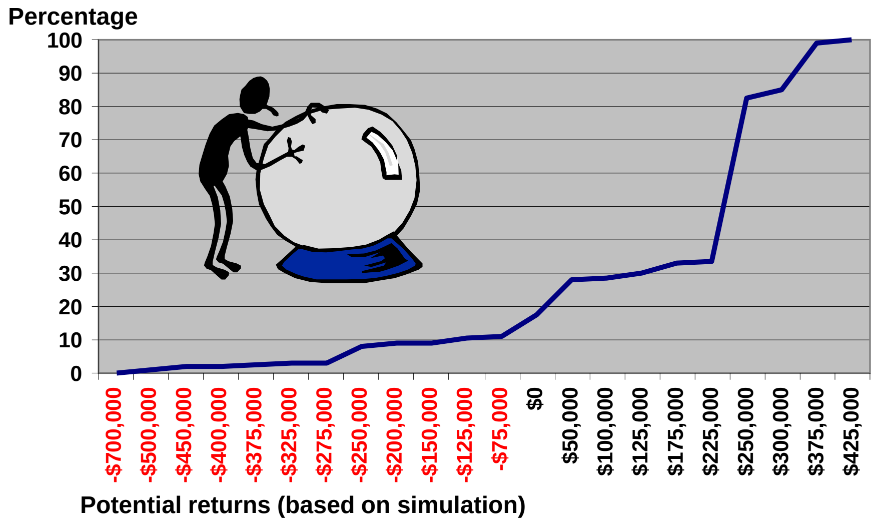
-$700,000	0.1%
-$500,000	1.1%
-$450,000	0.7%
-$400,000	0.3%
-$375,000	0.3%
-$325,000	0.5%

-$275,000	0.1%
-$250,000	5.0%
-$200,000	0.9%
-$150,000	0.2%
-$125,000	1.2%
-$75,000	0.4%

$0	6.9%
$50,000	10.5%
$100,000	0.3%
$125,000	1.7%
$175,000	3.0%
$225,000	0.2%

$250,000	**49.3%**
$300,000	2.3%
$375,000	13.8%
$425,000	1.2%

Cumulative Project Probabilities



Is this still a "good" project?

Assessing Overall Project Risk

Options for overall project risk:

- **Aggregate "expected impact" data, considering correlation effects.**
- **Accumulate all costs of contingency plans, weighted using realistic risk probability estimates.**
- **Use worst-case and nominal estimates to analyze project budgets and duration using Monte Carlo computer simulation.**
- **Clearly outline all significant other risks that are not easily measured (reputation, relationships, productivity, conflicts…) or fall outside your project (future projects, business losses, customer dissatisfaction…).**

Summary

Know your project risks, and manage all significant risks—there usually are more than you think.

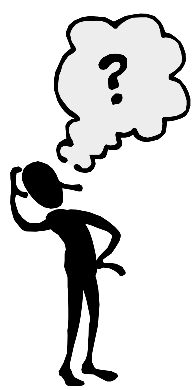
Be skeptical of estimating bias around impact and especially probability; assess all risks realistically.

Accept some "waste."

Develop a sense of overall project risk and clearly communicate the downside (worst case) exposure.

Scrupulously manage all project changes, and periodically review project plans to reassess risks.

Questions?

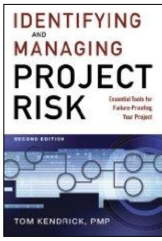


Tom Kendrick, PMP

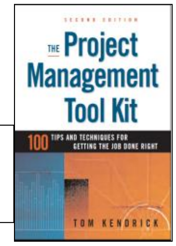
Director, RiskSIG—Western Americas

Past President, PMI Silicon Valley, CA Chapter

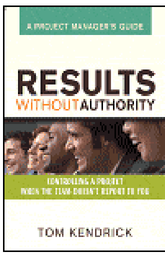
References



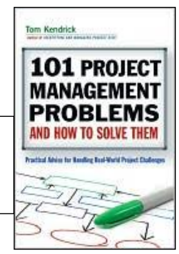
***Identifying and Managing Project Risk: Essential Tools for Failure-Proofing Your Project*, Second Edition** by Tom Kendrick AMACOM, Feb 2009. ISBN 0814413404



***The Project Management Tool Kit* , Second Edition** by Tom Kendrick AMACOM, February 2010. ISBN 0814414761



Results Without Authority by Tom Kendrick. AMACOM, July 2006. ISBN 0814473431



101 Project Management Problems by Tom Kendrick. AMACOM, December 2010. ISBN 0814415571