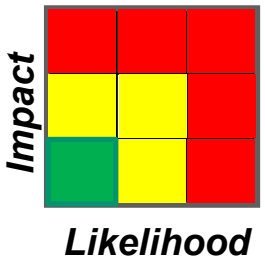
Risks Introduced by Risk Assessments

by Duke Okes



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The Basic Issue

- How accurate are our risk assessments?

  … since they impact our:

- Decisions
- Allocation of resources
  - Controls
  - Finances
- Organizational performance results

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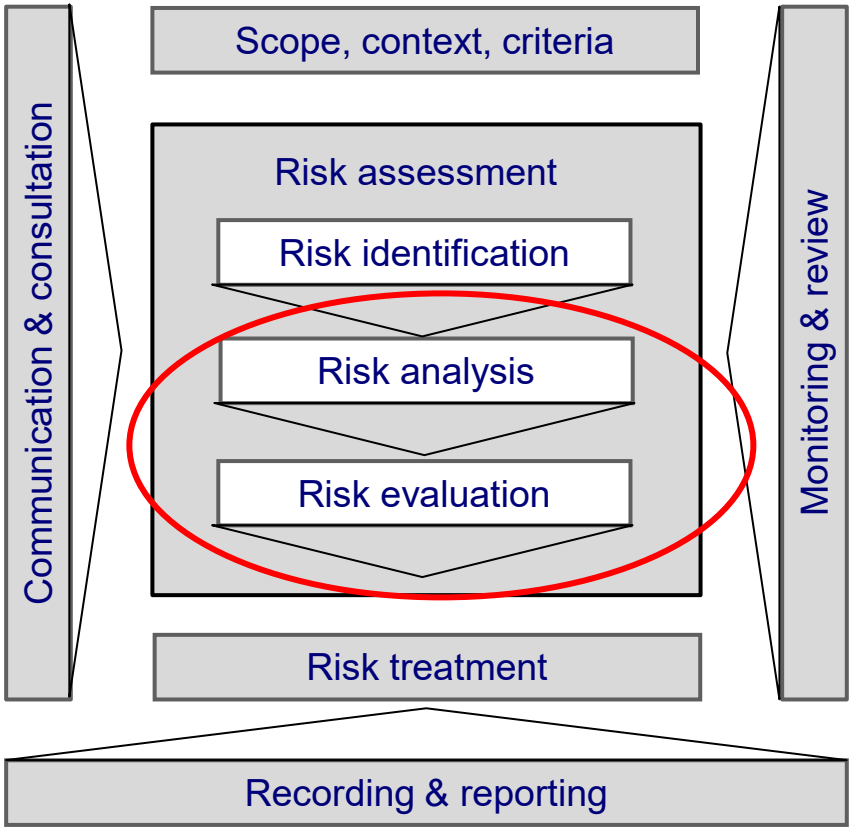
ISO 31000 RM Process Model



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Some Problems with Common Risk Assessments

- Math of Likelihood x Impact
- Actual impact = 100%
- Single point estimates versus range
- Qualitative versus quantitative rankings
- Probability versus frequency
- Scale linearity
- Lack of aggregation

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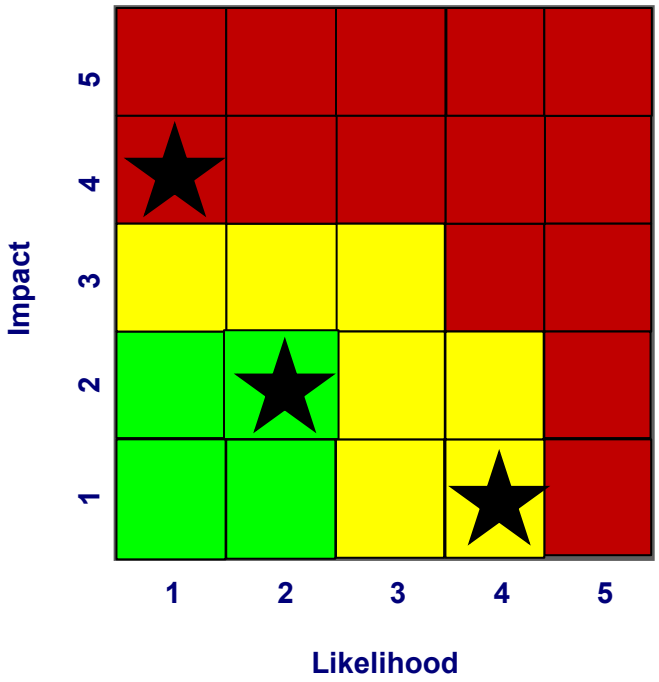
Problems with Math

- Risk = L x I
- L = 1, I = 4, Risk = 4
- L = 4, I = 1, Risk = 4
- L = 2, I = 2, Risk = 4



For an in-depth view of the math problem see: http://www.qualitydigest.com/print/17205

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Actual Impact = 100%

- Likelihood = .01%
- Impact = $10M
- Risk = $1K (Expected Loss/EL)

But if it actually occurs, the impact is $10M!

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Single Point Estimates

- If Likelihood = 3 and Impact = 4 LxI = 12
- But L actually 2.5-3.5 and I is 3.5-4.5
- So LxI could be as low as 9 and as high as 16

- If L = 10% and I = $100k, EL = $10k
- But L actually 1-20%, I is $50-200k
- So LxI could be as low as $1k or as high as $40k

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Qualitative vs. Quantitative

Interpretation of qualitative scales depends on:

- Design of the scale
- Context of the application
- Risk orientation of the organization
- Cognitive biases of individuals

and undermines the purpose of risk rating, which is to accurately understand risks levels and differentiate between risks so as to allocate resources appropriately

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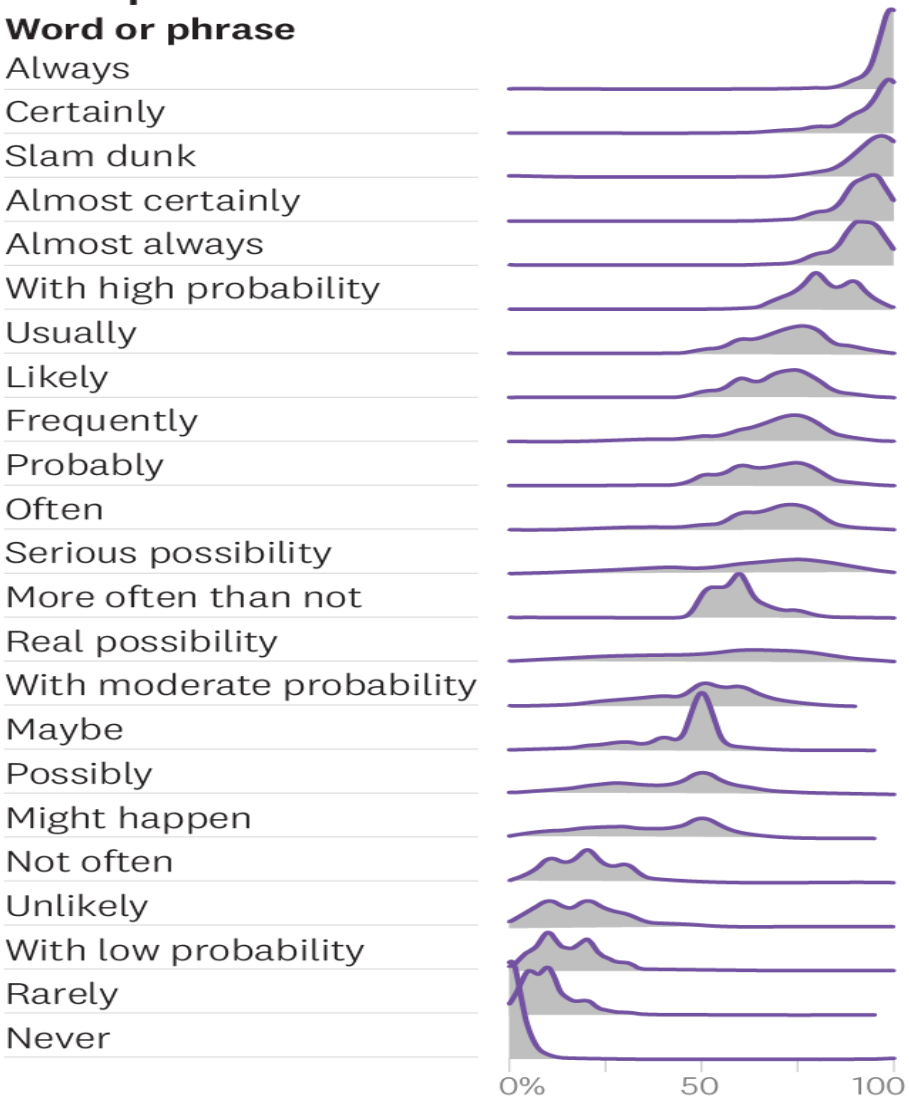
How People Interpret Probabilistic Words

"Always" doesn't always mean always.

Distribution of responses according to respondents' estimate of likelihood



Source: Andrew Mauboussin and Michael J. Mauboussin

HBR

Probability versus Frequency

- Probability isn't time bound, frequency is
- Probability isn't impacted by opportunities, frequency is
- Examples:
  - Probability of failure = .01 (1%); for 1000 opportunities, ~ 10 failures but if opportunities increases to 5000 #failures ~50
  - Impact = $100,000; using probability EL = $1000 (or $100,000), but using frequency with 1000 opportunities EL = $1,000,000

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Scoring Likelihood & Impact

LIKELIHOOD

5	Almost certain	Near 1.0	Monthly
4	Pretty likely	.1	Annually
3	Possibly	.01	Every 5 years
2	Unlikely	.001	Every 20 years
1	Rare	.0001	Every 100 years

IMPACT

5	Catastrophic	Irreparable damage	>$50M
4	Extreme	Extreme damage	>$2M, <$50M
3	Severe	Significant damage	>$200k, <$2M
2	Obvious	Minor damage	>$10k,<$200k
1	Minimal	Little to no damage	< $10k

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Individual Vacation Risk Ranking Scales

Likelihood

5 – 80% or more

4 - 50-79%

3 - 16-49%

2 - 1-15%

1 - <1%

Impact

5 – More than 3 hour delay and/or significant harm to person or vehicle requiring major* care

4 – One to 3 hour delay, or harm to person or vehicle needing minor* care

3 – One to 3 hour delay, no harm to person or vehicle

2 - 30 minute to 1 hour delay

1 - No noticeable impact

Major or minor defined as whether or not overnight stay is required

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Tour Company Vacation Risk Ranking Scales

Likelihood

5 – Monthly

4 - Quarterly

3 - Annually

2 - Every 2 years

1 - Less than every 2 years

Impact

5 – Up to 4 hour delay and/or significant harm to person or vehicle requiring major* care

4 – Up to 4 hour delay, or harm to person or vehicle needing minor* care

3 – Up to 2 hour delay, no harm to person or vehicle

2 - 10 to 30 minute delay

1 - No noticeable impact

Major or minor defined as whether or not overnight stay is required

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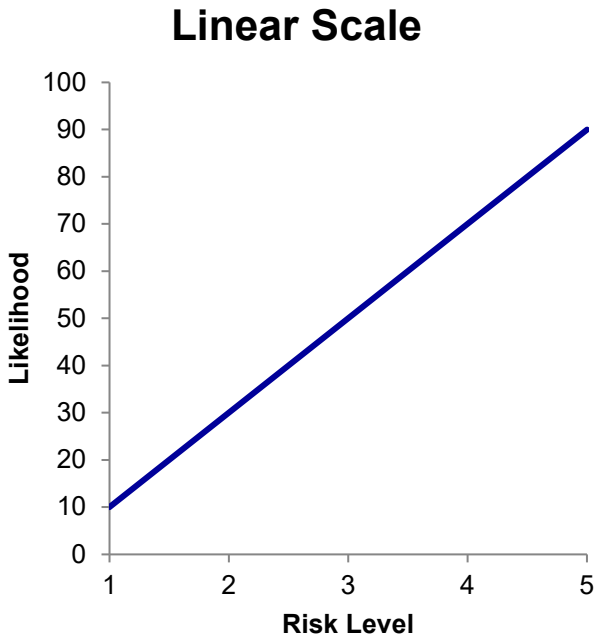
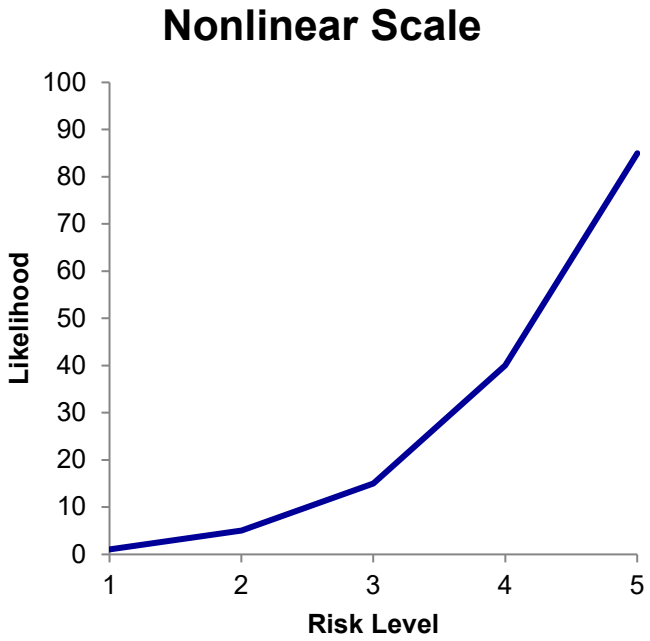
Scale Linearity vs. Not





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Aggregating Risks

- Often not done, but should be
- Aggregate by objectives, by sources, by specific causes, …
- Example of aggregating by objectives:
  - All three risks in the risk register have Schedule as an objective that would be impacted
  - While each specific risk may itself be considered acceptable, how about the combination?

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Project Management Risk Register

ID	Type	Description	P	I	Risk	Objectives Impacted	Mitigation Strategy	Status
1	Contractor	Schedule conflict	M	H	H	Schedule	Contract terms, ID potential backup sources	
2	Resources	Loss of key team member	H	H	H	Schedule, quality	Mentoring requirement, ID potential alternatives	
3	Customer	Failure to approve documentation in a timely manner	M	H	H	Schedule, cost	Onsite rep, joint reviews online	

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Partial pFMEA Example

1. Receive X-ray → 2. Review X-ray → 3. Report results

FAILURE MODE AND EFFECTS ANALYSIS — **X-ray Interpretation & Report**

PROCESS STEP and FUNCTION or REQUIREMENTS	FAILURE MODE(S)	EFFECTS OF FAILURE	SEV S	CAUSE(S) OF FAILURE	PREVENTION CONTROLS	OCC O	DETECTION CONTROLS	DET D	RPN
1. Receive X-ray	Did not receive	Treatment decision delay	3	Computer failure	Redundant systems	1	Receive confirmation	1	3
2. Review X-ray	Did not review	Treatment decision delay	3	Missed it	Resource scheduling	2	Tracking of receipts	2	12
	Incorrect review	Inappropriate treatment decision	5	Diagnosis misunderstood	Certification test	2	Customer issue	5	50
3. Report results	Report false positive	Overtreatment	3	Data entry error	Details required	1	Peer review	4	12
	Report false negative	Patient not treated	5	Data entry error	Details required	1	Peer review	4	20

In this case one RPN number has been deemed by the organization to be too high (that is, the risk for this failure mode it too high).

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Frequency of Risk Assessments

	Episodic	Periodic
Internal Source	Product Design Equipment Safety	Facility Capacity
External Source	Construction Project (weather) Product Supply Chain	Facility Safety (weather) Competitive Position

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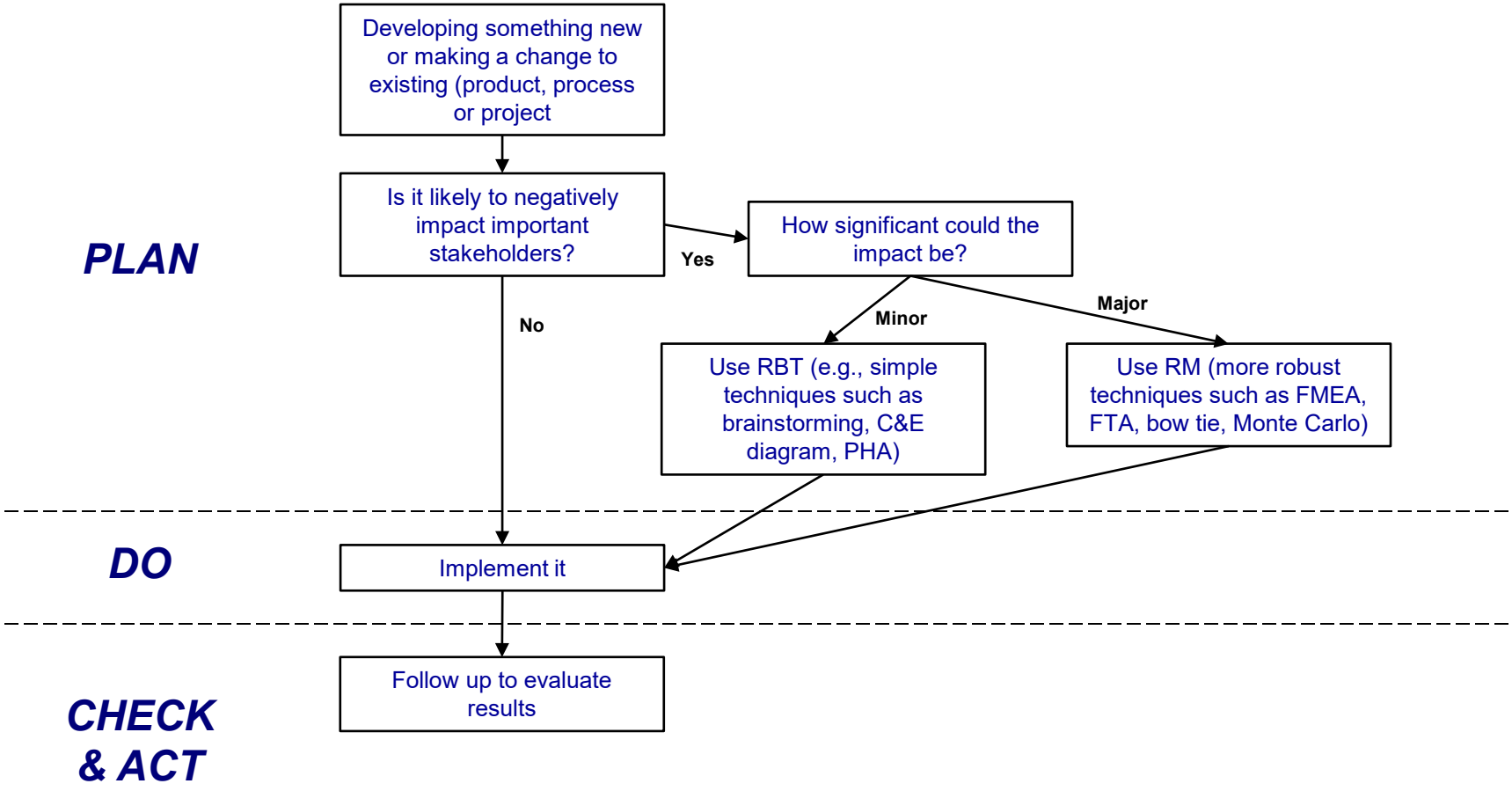
RBT/RM in Decision Making



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Some Considerations

- How important is accuracy?
  - Just trying to understand risk stack
  - Need to know total exposure
- How skewed is the distribution of risks?

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Summary Recommendations

For high potential risk situations, use:

- quantitative vs. qualitative risk level descriptions
- nonlinear scale for risk levels
- frequency vs. probability for Likelihood
- do math on actual frequency and impact, not ordinal ranks
- ranges for estimates, with confidence limits if available
- aggregate by objectives and causes

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