

# The Meaning of Risk in an Uncertain World

Patrick Weaver PMP, FCIQB.  
Mosaic Project Services Pty Ltd

Session # GBS03



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## Introduction

- Structure of Presentation
  - Understanding Risk
  - Variability & Risk Events
  - Case Studies
    - Wembley Stadium
    - Terminal 5 – Heathrow
  - Risk Attitudes (People and Organisations)
  - Conclusions



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## Understanding Risk

- PMBOK Definition:  
*An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives*
- Key elements
  - Uncertainty + Effect
  - Risks = Uncertainties that matter!



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## Understanding Risk

- Dimensions of uncertainty
  - Positive -v- Negative (manage both)
  - Variability -v- Events (or 'knowns')
- Understanding & managing 'knowns'
  - Known knowns (treat or accept risk / contingencies)
  - Unknown knowns (make into 'known knowns')
  - Known unknowns (contingencies or mitigate)
  - Unknown unknowns (organisational reserves)



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## Understanding Risk

- Understanding and managing variability
  - **Every** process has inherent variability
    - Variability in cost estimating
    - Variability in scheduling (time estimating)
  - **Variability is not a ‘risk’!**
  - The uncertainty is how much variability?
  - And the ‘risk’ is the level at which the variability starts to matter



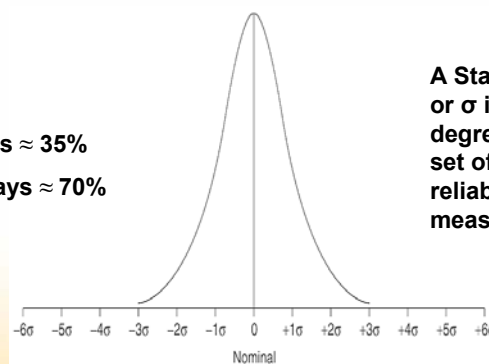
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## Understanding Risk

- **Normally** this falls into a normal distribution

1 SD Always  $\approx$  35%  
 $\pm$  1 SD Always  $\approx$  70%



**A Standard Deviation, or  $\sigma$  identifies the degree of error in a set of data, not the reliability of one measurement!**



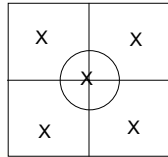
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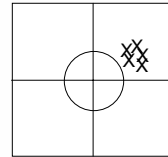
## Understanding Risk

- Precision -v- Accuracy

The 'target' is the circle in the middle



Group 1: This grouping is 'on average' accurate but is not consistent



Group 2: This grouping is consistent but not accurate



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## Case Study #1 Wembley Stadium



**The owner WNSL entered into a 'Guaranteed Maximum Price' contract with 'Multiplex' to design and build the stadium for £326 million.**



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## Case Study #1 Wembley Stadium

- The consequences of Multiplex's 'low bid'
  - £150 million loss
  - Multiple disputes with subcontractors
- The failure of 'contracting out' of all risk
  - WNSL lost £430 million
  - Stadium completed 18 month late
  - Everyone 'walked away' from the fight!



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## Case Study #1 Wembley Stadium

- The detrimental impact of 'feedback loops' making a bad situation worse:
  - Multiplex's management became focused on 'the fight' to save/recover time and cost
  - The GMP contract "left no flexibility for problem-solving" (WNSL)
- **But the opening was a great success!!**



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## Case Study #2 BAA 'Terminal 5' (Heathrow)



£4.3 billion. Built on time and on budget.  
Highly innovative contracting system



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## Case Study #2 BAA 'Terminal 5' (Heathrow)

- BAA accepted **ALL** construction risks
  - Innovative project wide insurance
  - Paid for builders errors and mistakes
- The BAA 'risk attitude' (alliance contracts)
  - Confront and manage risks early
  - Invest in communication and team building
  - Reward success (but don't punish mistakes)



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## Case Study #2 BAA 'Terminal 5' (Heathrow)

- Focus on the terminal roof



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## Case Study #2 BAA 'Terminal 5' (Heathrow)

- Terminal roof identified as a **Major Risk**
  - BAA paid for a prototype built early off site to understand 'the risks' (cost £2.4 million)
  - Improved erection processes were identified (**serendipity**)
  - Major cost and time savings achieved in the erection of main roof (3 months and £millions)




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## Case Study #2

### BAA 'Terminal 5' (Heathrow)

- During construction BAA worked to mitigate Negative issues and exploit opportunities
- Construction risks were managed proactively
  - But these are tangible
  - The industry understands its risk profile
- **Then there was the opening!!!!**




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## Case Study #2

### BAA 'Terminal 5' (Heathrow)

- **What went wrong?**
  - BAA (builder) has problems with the baggage handling software (control systems)
    - Inadequate testing under full load ? New owners saving costs???
  - BA (operator)
    - Did not train staff properly
    - Did not test peripheral systems (staff car parking)
    - Did not have fallback plans and spare staff



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## Case Study #2 BAA 'Terminal 5' (Heathrow)

- **What went wrong and why?**
  - The 'Halo Effect' – great project, nothing can go wrong (but it did)
  - BA management appear risk averse / ignorant
    - Did not plan properly (where were the contingencies?)
    - Ignored warning from staff (not adequately trained)
    - Appeared to focus on 'saving money'
  - The cost to date – over £20 million + Reputation



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## The Case Studies

- During construction:
  - BAA actively managed its risks
  - WNSL tried to avoid 'all risk'
- At the opening:
  - WNSL celebrated a great stadium (but stadiums are relatively simple)
  - BA and BAA created a disaster through
    - inadequate planning and testing, and
    - inadequate risk management



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## The Case Studies

- Both are great buildings: but the **Risk Attitudes** of the three organisations heavily influenced outcomes
- One of the key problems with most management cultures is their inability to live with uncertainty (risk agnostics?).
- They expect people working for them to guarantee the future.....



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## Managing Variability In Estimates

- Every estimate is wrong!
- But how many managers expect accuracy?
- Identifying the likely range of outcomes
  - Based on the PMBOK
    - ROM = -50% to +100%
    - Detailed cost estimate -10% to + 15%
  - Schedule estimates are significantly less accurate



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See: *Float - Is It Real?* [www.mosaicprojects.com.au/Resources\\_Papers\\_043.html](http://www.mosaicprojects.com.au/Resources_Papers_043.html)

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## Managing Variability In Estimates

- Factors to reduce variability
  - Knowledge of the work being estimated (data)
  - Well defined processes (precision)
  - Time to check evaluate and review (QA)
- Realistic acceptable risk limits
  - +/- 5% is not realistic
  - Proper contingencies are needed



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## Managing Variability In Estimates

- The cost of a ‘Standard Deviation’
- 1 SD is a fixed measure in any ‘population’
- To reduce the ‘size’ of 1 SD the process creating the ‘population’ needs to be improved (greater precision)
- This **ALWAYS** costs money!
- It should generate greater savings



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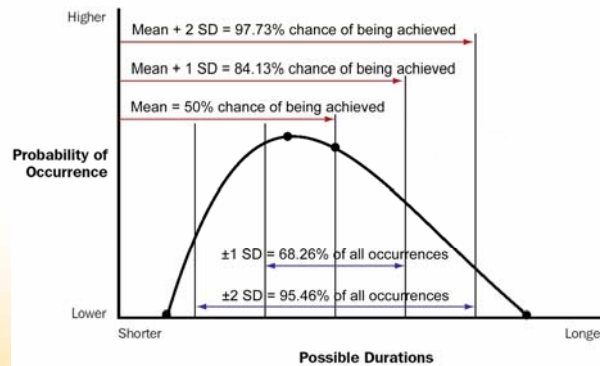
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## Managing Variability In Estimates

- The cost of greater security is directly related to the 'size' of a 'Standard Deviation'

If 1 SD = 5 days, a one week contingency = 85% probability of completing 'on or before time'

If 1 SD is reduced to 2 days, the same contingency improves the chance to over 98%

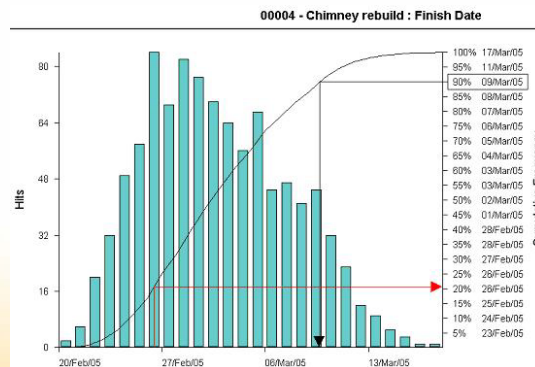


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## Managing Variability In Estimates

- How 'safe' is acceptable?
  - Too safe and you don't get the job
  - Too optimistic and you lose \$\$\$\$\$\$\$\$\$



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## Managing Variability In Estimates

- The cost of reducing variability -v- the value of contingencies
- Consider the value of converting a 'budget estimate' to a 'detailed estimate' for a \$500,000 project:
  - Budget +25% / -10%
  - Detailed +10% / -5%
  - 80% certainty required by management



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## Managing Variability In Estimates

### The 'Budget Estimate':

Optimistic cost = \$500,000 - 10% = \$450,000

Most Likely cost = \$500,000

Pessimistic cost = \$500,000 + 25% = \$625,000

Therefore the expected Mean (50% probability of being achieved) =  $(a + 4b + c)/6 = (\$450,000 + 4 * \$500,000 + \$625,000)/6 = \$512,500$

The Standard Deviation for the set =  $(c - a)/6 = (\$625,000 - \$450,000)/6 = \$29,167$

And an 84.13% probability of the project completing at or below a planned cost is achieved by adding one standard deviation to the Mean =

$$\$512,500 + \$29,167 = \$541,667$$



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## Managing Variability In Estimates

### The 'Detailed Estimate':

Optimistic cost =  $\$500,000 - 5\% = \$475,000$

Most Likely cost =  $\$500,000$

Pessimistic cost =  $\$500,000 + 10\% = \$550,000$

Therefore the expected Mean (50% probability of being achieved) =  $(a + 4b + c)/6 = (\$475,000 + 4 * \$500,000 + \$550,000)/6 = \$504,167$

The Standard Deviation for the set =  $(c - a)/6 = (\$550,000 - \$475,000)/6 = \$12,500$

And an 84.13% probability of the project completing at or below a planned cost is achieved by adding one standard deviation to the Mean =

$$\$504,167 + \$12,500 = \$516,667$$



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## Managing Variability In Estimates

- Required Contingency =
  - Budget Est.  $\$541,667 - \$500,000 = \$41,667$
  - Detailed Est.  $\$516,667 - \$500,000 = \$16,667$
- Reduction in Contingency =  $\$25,000$
- **But what if doing the detailed estimate was going to cost \$30,000?**



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## Managing Uncertain Events (The Risk Register)

- Risk Registers are totally useless... Unless
  - All of the risks are listed and prioritised
  - And Action is taken to treat the key risks
    - Avoid / Exploit
    - Mitigate / Transfer
    - Share / Enhance
    - Accept (Reserves / Contingencies)
- And there's a regular review of the current risk profile



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## Managing Uncertain Events (The Risk Register)

- The PMBOK risk processes
  - Plan / Identify / Analyse / Plan Response / Control
- Potential enhancements
  - Add an overt step to 'treat' risks (implied in RP)
    - Focus on the 'action' of treatment and the risks associated with implementing this 'action'
  - Integrate the requirements to update cost plans and schedules, etc



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## Managing Uncertain Events (The Risk Register)

- Managing contingencies and reserves
  - Policies required to allow
    - Project Manager to manage known risks
    - The organisation to support unknown risks
  - This is better than blaming people
- Linking Risk to Earned Value Management for complete visibility

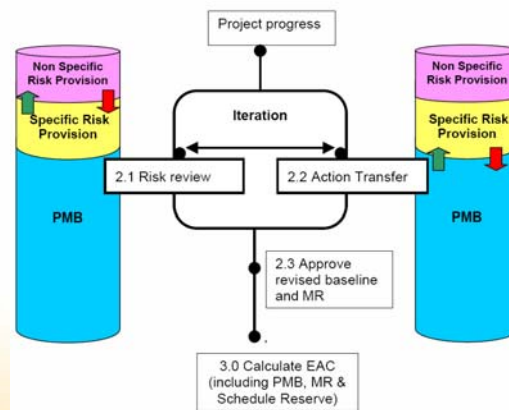


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## Managing Uncertain Events (The Risk Register)

**Interfacing Risk & Earned Value Management,**  
draft guide by the  
UK EV-Risk working Group  
(UK, 2007).



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## Different Focuses

- Risk Attitudes need to be adjusted for different levels of an organisation
- Internally:
  - At the portfolio level, total risk avoidance = no business
  - The project level needs to focus on minimising uncertainty



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## Different Focuses

- In a Contract situation (eg T5):
  - The project team should focus on achieving an ‘optimistic’ outcome (stretch target)
  - The contracting organisation on achieving the ‘Mean’ or most likely outcome
  - The client on a ‘safe outcome’ including appropriate contingencies
- But in an open and trusting relationship



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## The Human Dimensions of Risk

- Understanding your stakeholders
  - People are the source of many risks
    - In business projects, over 90%
    - Engineering projects ?????
  - Stakeholder identification and mapping
    - Standardised process (eg *Stakeholder Circle*<sup>®</sup>)
    - Requires organisational maturity (eg SRMM<sup>®</sup>)
  - Risk tolerance and ‘risk -v- reward’ tradeoffs

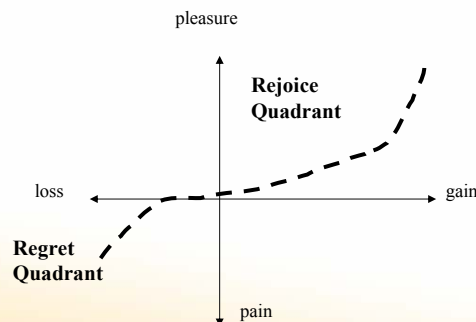


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## The Human Dimensions of Risk

- Utility theory



People tend to be:

- Loss averse (always)
- Risk accepting in ‘familiar’ situations
- Risk averse in unfamiliar situations
- Emotional (asbestos)
- ‘Blind’ (car accidents)

Groups act differently to their individuals!



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## The Human Dimensions of Risk

- Managing stakeholder expectations
  - Identifying and managing expectations
  - Effective communications are the key
  - The importance of trust in developing confidence
- The benefits of ‘open engagement’
  - Unrealistic expectations are unlikely to be fulfilled



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## The Human Dimensions of Risk

- Effective communications influence expectations and change actions / outcomes
  - Schedule changes work performance
  - Cost plan changes procurement options
- ‘Complexity Theory’ offers new insights
- But in the end, its still all about people

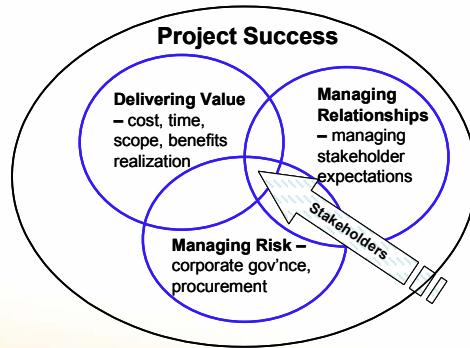


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See: **A Simple View of ‘Complexity’ in Project Management**,  
[www.mosaicprojects.com.au/Resources\\_Papers\\_070.html](http://www.mosaicprojects.com.au/Resources_Papers_070.html)

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## The Human Dimensions of Risk



Your project's stakeholders



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## Conclusions

- All projects are 'risky' ie, the outcome is uncertain
- Attempts to avoid 'all risk' are impossible and doomed to fail
- Managing risk is safer than ignoring risk
- Balancing risks and rewards is the key to success



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## Conclusions

- Organisations need to aim to win overall, attempting to win every time is impossible
- The primary commercial advantage of any organisation is its ability to manage the risks inherent in its environment better than its competitors



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## Conclusions

- The key is a mature risk attitude
  - At all levels of management
  - But appropriate to the organisation

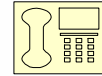


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## Contact Information

- Mosaic Project Services Pty Ltd  
Australia
- +613 9696 8684
- [patw@mosaicprojects.com.au](mailto:patw@mosaicprojects.com.au)



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