RAMP
Risk Analysis and Management for Projects
By Chris Lewin

Agenda

- How RAMP came about
- Purpose and scope of RAMP
- The RAMP process
- RAMP and financial services
- RAMP within ERM
- How actuaries can help RAMP users

How RAMP came about

- Collaboration between actuaries and civil engineers since 1995
- RAMP first published 1998
- Growth of interest in RAMP
- Second edition, 2005
Purpose and scope of RAMP

- A framework for managing project risk
- Applicable to any complex project
- Analyses risk in a financial context
- Facilitates an optimum response to risk
- Leads to better design and control of projects
- Improved decision-making

A Country Walk

- Define objectives
- Identify risks
- Find the risk response options
- Decide which options to adopt
- Control residual risks

RAMP Process

- The risks – identify, analyse, find response options
- Feed into a financial model, e.g. NPV
- Use scenario analysis or stochastic modelling
- Determine responses leading to risk efficiency
- Identify residual risks and make decision
- Implement responses and control residual risks
Aspects of RAMP

- A logical iterative process
- Ensures steps not omitted (e.g. assumptions list)
- Facilitates a watch on the risk tails
- Not in itself mathematical
- Not a substitute for judgement

Example (1)

<table>
<thead>
<tr>
<th>Year</th>
<th>Expected cashflow £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>- 1,000</td>
</tr>
<tr>
<td>2</td>
<td>+ 300</td>
</tr>
<tr>
<td>3</td>
<td>+ 400</td>
</tr>
<tr>
<td>4</td>
<td>+ 400</td>
</tr>
<tr>
<td>5</td>
<td>+ 400</td>
</tr>
<tr>
<td>Total</td>
<td>+ 500</td>
</tr>
<tr>
<td>NPV (6%)</td>
<td>+ 292</td>
</tr>
</tbody>
</table>

Example (2)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Risk event</th>
<th>Probability</th>
<th>NPV £000</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Expected</td>
<td>55</td>
<td>+ 292</td>
</tr>
<tr>
<td>B</td>
<td>Sell know-how</td>
<td>10</td>
<td>+481</td>
</tr>
<tr>
<td>C</td>
<td>Technical delay</td>
<td>15</td>
<td>- 64</td>
</tr>
<tr>
<td>D</td>
<td>Does not work well</td>
<td>10</td>
<td>- 54</td>
</tr>
<tr>
<td>E</td>
<td>C and D together</td>
<td>10</td>
<td>-391</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>+155 *</td>
</tr>
</tbody>
</table>

* weighted average
Example (3)

Risk Response option: contractor offers to bear extra development costs (if there is technical delay as in scenarios C and E) for an extra £80,000. Should the sponsor accept?

Example (4)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Probability</th>
<th>Original NPV £000</th>
<th>New NPV £000</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>55</td>
<td>+292</td>
<td>+212</td>
</tr>
<tr>
<td>B</td>
<td>10</td>
<td>+481</td>
<td>+401</td>
</tr>
<tr>
<td>C</td>
<td>15</td>
<td>- 64</td>
<td>+139</td>
</tr>
<tr>
<td>D</td>
<td>10</td>
<td>- 54</td>
<td>-134</td>
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<tr>
<td>E</td>
<td>10</td>
<td>-391</td>
<td>-188</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>+155 *</td>
<td>+145*</td>
</tr>
</tbody>
</table>

* weighted average

The nature of risk

- Uncertainty
- Fuzziness
- Dependence
- Upside/downside
Identification of risks

- Brainstorming
- Ascertain underlying causes
- Risk register records detail of each risk and possible impact
- Checklists, site visits, review of plans
- Upside risks, too

Analysis of risks

- Likelihood/frequency
- Impact(s)
- Risk assessment tables
- Catastrophic risks
- Use of an investment model to assess NPV distribution

Risk responses – downside risks

- Reduce/eliminate
- Transfer
- Avoid
- Absorb or pool
- Research to reduce uncertainty
Risk responses – upside risks

- Increase scope
- Improve design
- Maximise revenues
- Reduce costs
- Extend life
- Transfer

Risk efficiency

- A state achieved when the downside risks have been sufficiently mitigated and the upside risks optimised (depending on sponsor's utility)
- Trial and error needed
- Search for "cheap" response options
- Deal with some risks simultaneously?
- Secondary risks

Bias

- Accidental bias
- Deliberate bias
- Adjustment for optimism bias – government increases estimated cost but would full risk analysis be better?
Decision

- Identify residual risks and NPV distribution
- Watch the tails
- Intangible factors
- Decision criteria

Planning for risk control

- Risk response plan
- Risk custodians
- Contingency plans and budgets
- Crisis management
- Communicate

Controlling risks

- Study trends (potential, expected, committed)
- Meet interested parties regularly
- Formal risk reviews
- Reassessments
- RAMP close down
Financial Services Organisations

Applications of RAMP:
- Project finance
- New products
- Computer systems
- Takeovers
- Property developments
- Major change initiatives

RAMP within an ERM approach

- Enterprise risk = Strategic risk +
  - Project risk +
  - Operational risk
- Knitting it all together
- Forecasting operational risks on projects
- Strategic risk of wrong projects
- When do project risks become strategic?

How Actuaries can help RAMP users

- Building investment models and choosing discount rates
- Scenario analysis and stochastic modelling
- Achieving risk efficiency
- Insurance-based risk-mitigation
- Decision criteria (including real options and shareholder value)
- Project financing
Some broader issues

- Experience of infrastructure projects
- Use of social benefit analysis
- Engineers against poverty
- Cost of using RAMP

Conclusion

- RAMP is now well established
- Capable of wider application, e.g. in financial services
- Potential for actuarial involvement
- Future development of RAMP
- Website: www.RAMPrisk.com