Managing Uncertainty with Professionalism
Members of the Working Party

GIRO Workshop October 2015
Agenda

• Introduction
• Uncertainty Principles
• Uncertainty vignettes
• Conclusions and next steps
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• Uncertainty vignettes
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Colour palette for PowerPoint presentations

Dark blue
R17 G52 B88

Gold
R217 G171 B22

Mid blue
R64 G150 B184

Secondary colour palette

Light grey
R220 G221 B217

Pea green
R121 G163 B42

Forest green
R0 G132 B82

Bottle green
R17 G179 B162

Cyan
R0 G156 B200

Light blue
R124 G179 B225

Violet
R128 G118 B207

Purple
R143 G70 B147

Fuscia
R233 G69 B140

Red
R200 G30 B69

Orange
R238 G116 29

Dark grey
R63 G69 B72
The threats to good decision making

We have an inherent desire for certainty. But there are challenges for both decision-makers and experts:

- Different perspectives
- Understanding
- Bias
- Communication
- Question Clarity
- Recognition of Uncertainty
- Role of analysis and quantification

How might decision-makers and experts manage uncertainty with greater professionalism?
Working Party scope and ambition

• Decision makers and experts
• Technical and social aspects
• Practical and constructive
• Relevant beyond insurance

Aiming to help and influence behaviours
Agenda

• Introduction

• **Uncertainty Principles**

• Uncertainty vignettes

• Conclusions and next steps
Uncertainty Principles

Aim: A set of high level principles for all

Criteria:
- Catchy and memorable
- Meaningful and useful
- A little provocative?

<table>
<thead>
<tr>
<th></th>
<th>Themes</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>Face up to uncertainty</td>
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<td>2</td>
<td>Deconstruct the problem</td>
</tr>
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<td>3</td>
<td>Don’t be fooled (un/intentional biases)</td>
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<td>4</td>
<td>Models can be helpful, but also dangerous</td>
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<td>5</td>
<td>Think about resilience</td>
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<td>6</td>
<td>Bring people with you</td>
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Agenda

• Introduction
• Uncertainty Principles
• Uncertainty vignettes
• Conclusions and next steps
1. Face up to Uncertainty
Start with a decision…

Is the problem well defined?

Clear context, objectives and scope

Inherently vague or poorly explained / understood
1. Face up to Uncertainty
Start with a decision…

How much the problem can be quantified?

A modelling challenge

A resilience challenge

Quantifiable

Unquantifiable

Quantifiable

Unquantifiable
1. Face up to Uncertainty

What decisions fit where?

How should typical insurance decisions be categorised?

Do decision makers and experts agree?
And are they right?

A simplified framework but how do we face up to uncertainty?
2. Deconstruct the problem

Frameworks and Taxonomies

Uncertainty is an inherently complex subject. More constructive guidance and techniques can be achieved from deconstruction into more manageable issues.

The primary taxonomy identified follows the process of decision making:

Framing
- What is the context, the question and are both understood properly?

Analysis and Modelling
- Is the work understood: approach and key uncertainties/limitations? (In light of the question)

Reporting results
- What are the results and how should they be interpreted? (In light of the question and analysis)
2. Deconstruct the problem
Frameworks and Taxonomies

Other taxonomies of potential use include “The Assumption Onion”, seeking to highlight different types of assumptions (and associated sources of uncertainty)

A key point here is the many assumptions which are **implicit** and often overlooked.
2. Deconstruct the problem
Frameworks and Taxonomies

Another deconstruction, “The Ladder”, looks at the difference between risk (traditionally managed through ERM) and uncertainty (requiring a different approach?)

<table>
<thead>
<tr>
<th>Risk</th>
<th>People: Emotive or unpredictable reactions by stakeholders; many unaligned stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biases: Existence of biases that may be known or unknown - might include commercial, political, organisational or other bias</td>
</tr>
<tr>
<td></td>
<td>Obscurity: underlying risk exposures are unknown or obscured, “worst” outcome is unknown</td>
</tr>
<tr>
<td></td>
<td>Complexity: of the system or the model being investigated</td>
</tr>
<tr>
<td></td>
<td>Context: for decision is not well understood</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>[...]</td>
</tr>
<tr>
<td></td>
<td>Understanding: of the underlying risks and their distribution</td>
</tr>
<tr>
<td></td>
<td>Stability: of the regime, no latent risks</td>
</tr>
<tr>
<td></td>
<td>Data: credible data set(s)</td>
</tr>
</tbody>
</table>
3. Don’t be fooled
Two way communication: playing the game

Real life negotiations are often characterised by:

- Different information and perspectives
- Complex payoffs or incentives

It might not be optimal for either party immediately to disclose all facts to the other. How does this fit with professionalism and, in particular, the need for clear communication?
3. Don’t be fooled
Unintentional biases and traps

The overarching technique for responding to biases and traps is to stimulate Slow Thinking (Thinking Fast and Slow, Kahneman 2011)

Useful to consider in three categories:

<table>
<thead>
<tr>
<th>Latent Framing</th>
<th>Traps</th>
<th>Over-interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biases and heuristics that influence the perception of a problem and expectations of the outcome</td>
<td>Biases and heuristics that can deceive the decision maker and advisor</td>
<td>Biases and heuristics (rules of thumb) relating to reading too much or too little into data</td>
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3. Don’t be fooled

Unintentional biases and traps

The overarching technique for responding to biases and traps is to stimulate Slow Thinking (Thinking Fast and Slow, Kahneman 2011)

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<td>• Affect heuristic</td>
<td>• Gambler’s fallacy</td>
<td>• As if bias</td>
</tr>
<tr>
<td>• Anchoring</td>
<td>• Illusion of validity</td>
<td>• Availability heuristic</td>
</tr>
<tr>
<td>• Confirmation bias</td>
<td>• Law of Least Effort</td>
<td>• Causal thinking bias</td>
</tr>
<tr>
<td>• Halo effect</td>
<td>• Mean-reversion bias</td>
<td>• Hindsight bias</td>
</tr>
<tr>
<td>• Myopic loss aversion</td>
<td>• Planning myopia</td>
<td>• Illusion of skill</td>
</tr>
<tr>
<td>• Trusting intuition</td>
<td>• Priming</td>
<td>• Small probabilities</td>
</tr>
<tr>
<td>• Status quo bias</td>
<td>• Temporal discounting</td>
<td>• Winner’s Curse</td>
</tr>
<tr>
<td>• Sunk cost bias</td>
<td>• To overpay where incomplete information.</td>
<td></td>
</tr>
<tr>
<td>• Survivor’s Curse</td>
<td>• To overpay where incomplete information.</td>
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3. Don’t be fooled

Reserving scenario example

Apparent scenario

Q. What should the level of reserves be?

Actuary’s knowledge and perspective:

- Assumptions, stated and unstated, underlying a proposed outcome
- Sensitivity of analysis to different modelling approaches
- Level of diligence in performing the work
- View on how far prepared for answer to move but still sign off
3. Don’t be fooled
Reserving scenario example

Actual scenario?
Q. What should the level of reserves be given currently X and pressure on profits for results announcement?

Questioner’s knowledge and perspective:
• How much information relating to the business has been disclosed to the actuary, and what has been withheld
• How a particular outcome affects the bonus and career prospects of the questioner and other colleagues
• Guesses at the outcome from other colleagues (actuarial or not)
• The acceptable range for the answer, beyond which the actuary will be replaced by someone else more accommodating
3. Don’t be fooled

Reserving scenario example

Actual scenario?

Q. What should the level of reserves be given currently X and pressure on profits for results announcement?

Questioner and Actuary especially vulnerable to these unintentional biases and traps:

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4. Models can be helpful, but also dangerous
Honing your “unknowability radar”

Important to

- Identify limits to knowledge
- Spot bad (actuarial) science
- Spot hard problems
  - Smooth v knotty v unknowable
- Work hard to make this instinctive…

Source: Compound Interest
http://www.compoundchem.com/2014/04/02/a-rough-guide-to-spotting-bad-science

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4. Models can be helpful, but also dangerous
Honoring your “unknowability radar”

Spotting hard problems…

<table>
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<th>Smooth</th>
<th>Knotty</th>
<th>Unknowable</th>
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<tbody>
<tr>
<td>• Reserving a stable book with good data</td>
<td>• Assessing reserve risk</td>
<td>• Predicting “1 in 200” events</td>
</tr>
<tr>
<td>• Assessing scenario severities, based on assumed events</td>
<td>• Assessing relative scenario likelihood</td>
<td>• Assessing scenario return periods</td>
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Prudence and Best Estimates

Ten losses: 10, 20, 21, 34, 48, 82, 84, 167, 241, 293
What is the 1 in 100 loss exceedence estimate?

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Information</th>
<th>1 in 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREEN</td>
<td>Losses from an exponential distribution with mean of 100</td>
<td>461</td>
</tr>
<tr>
<td>AMBER</td>
<td>Losses from an exponential distribution with unknown mean</td>
<td>Higher? True mean may be higher than 100</td>
</tr>
<tr>
<td>RED</td>
<td>No more information</td>
<td>Further concerns that true distribution may be different and also may change over time</td>
</tr>
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</table>

Extra uncertainty in the red and amber scenarios relates to a lack of knowledge, rather than inherent randomness. Can this be quantified?
5. Think about resilience

Resilience thinking in action

• It’s the beginning of the credit crisis you are reviewing your company’s exposure to financial guaranty insurance, providing ‘credit enhancement’ for issuers of CDO’s relating to residential mortgage backed securities

• …. the underlying securities have started to downgrade and default

• …. it’s clear that existing views on the risk and valuation need to radically change. Available pricing and valuation models are no longer credible

You are given one weekend by the Board to value a potential sale of these securities. What do you do?
5. Think about resilience

The Resilience Toolkit

Controlling “exposures to adverse scenarios” - even those that are unknown, and highly unlikely – is known as resilience. Resilience can be overlooked in ERM …

- Governance
- Identify & assess risk
- Risk limits
- Stress & scenario tests
- Risk mitigation
- Resilience

- Facing uncertainty
- Strategies for the unknown
- Building in redundancy
- Communication
- Reducing complexity
- Learn from mistakes

ERM

Resilience
6. Take people with you
Understanding, engagement and trust

What part of

\[ \dot{\nu}_\alpha^{(1)} = -4 \frac{\dot{e}}{\nu_\alpha^{(1)}} - \frac{\hbar}{2m} \pi_\alpha^{(1)}, \quad E = \frac{mc^2}{\sqrt{1 - \frac{\omega^2}{c^2}}}, \]

\[ \pi_f^{(1)} = \dot{V} - (1 - 3e_f^2) \frac{\dot{e}}{\nu_f^{(1)} - V} - \frac{\hbar}{2m} \frac{\omega}{1 + \omega} \pi_f^{(1)}, \]

don’t you understand?
6. Take people with you

Engaging others: framing (1)

Two key elements:

1. The need for engagement of questioner
2. Importance of clarity over scope (context, question and approach)

Engagement top tips:

<table>
<thead>
<tr>
<th>Tip</th>
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<tbody>
<tr>
<td>Ask rather than just tell</td>
</tr>
<tr>
<td>Put in broader context (what are the upside, downside implications?)</td>
</tr>
<tr>
<td>Seek input on key judgements (e.g. advice on use of experts)</td>
</tr>
<tr>
<td>Bring out “carrots” (positive benefits) and “sticks” (negatives to avoid)</td>
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</tbody>
</table>
6. Take people with you

Blip or Trend?

Scenario

Q. You are an actuary addressing the reserving committee at a commercial insurer. You have observed a spike in claims in a particular quarter and make a recommendation on whether this is a “blip” or a “trend”?  

- Current financial pressures may colour management views and perspectives
- Ideally this possibility should have been addressed with the committee prior to this quarter. Important to educate on the range of possible outcomes and possible responses in advance
- If this is the first time the committee is exposed to this issue, its too late …
6. Take people with you

Understanding perceptions

How the Actuary believes the decision maker should perceive the analysis

The way the decision maker currently perceives the analysis

Analysis Essential

Problem Simple

Analysis Not useful

Problem Complex

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6. Take people with you

Engaging others: discussing results (2)

- Engage a range of specialists and non specialists in how to communicate
- Share a basic cognitive map of the problem
- Listen to users, fill in their understanding
- Discuss where experts agree, as well as where they differ
- Avoid vagaries, use scenarios, numbers
- How have results been validated against the real world?
- I think X, but the outcome is very uncertain. It could be Y or Z.
- Don’t provide certainty where there is none
- People tend to do better if things are kept simple.

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Benefits of managing uncertainty

• Better decisions, including:
  – Ensuring relevant information is used
  – Appropriate understanding of risks
  – Saving time

• Reduced risk of misunderstanding

• Increased trust (eg Actuary of CEO; CEO of Actuary)
Uncertainty Principles

Aim: A set of high level principles for all

Criteria:
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2. Deconstruct the problem
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Any questions or comments? Please get in touch

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