Institute and Faculty of Actuaries

Managing Uncertainty with Professionalism

Members of the Working Party

GIRO Workshop October 2015

Pre-reading for 2017 workshop F2

21 October 2015

Agenda

- Introduction
- Uncertainty Principles
- Uncertainty vignettes
- Conclusions and next steps

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- **Introduction**
- Uncertainty Principles
- Uncertainty vignettes
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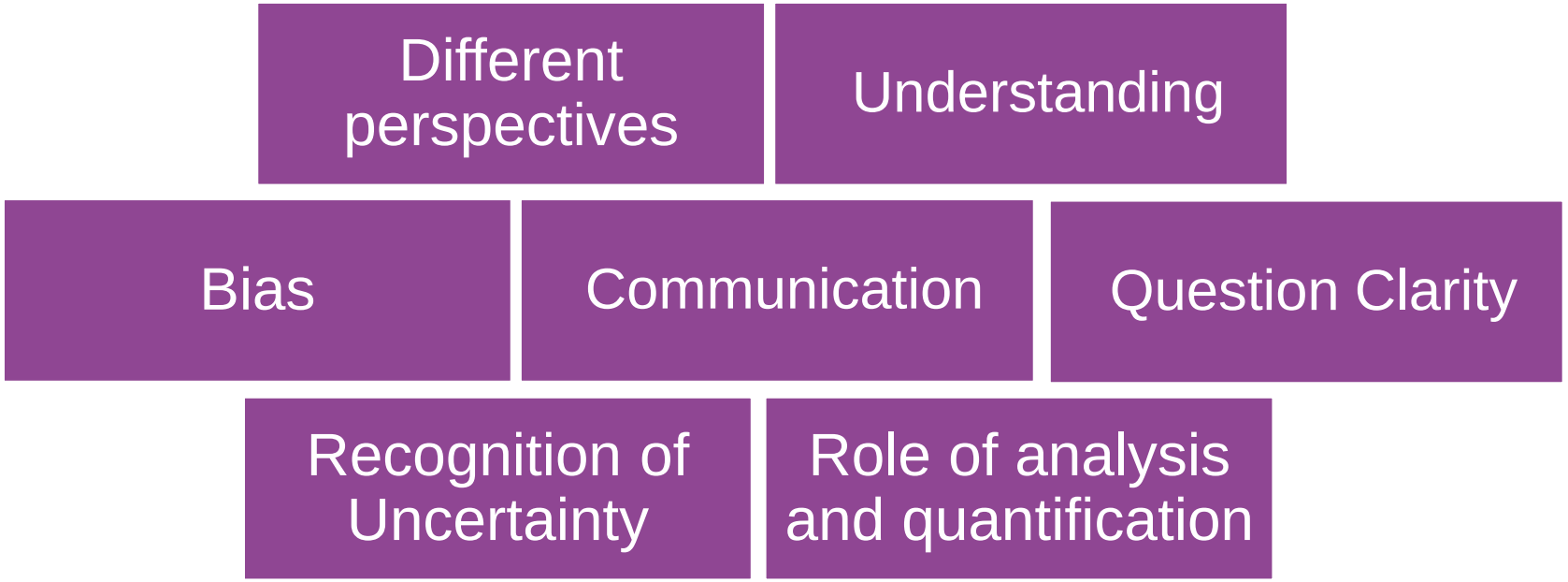
The threats to good decision making

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



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

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- 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?

Themes
1. Face up to uncertainty
2. Deconstruct the problem
3. Don’t be fooled (un/intentional biases)
4. Models can be helpful, but also dangerous
5. Think about resilience
6. Bring people with you

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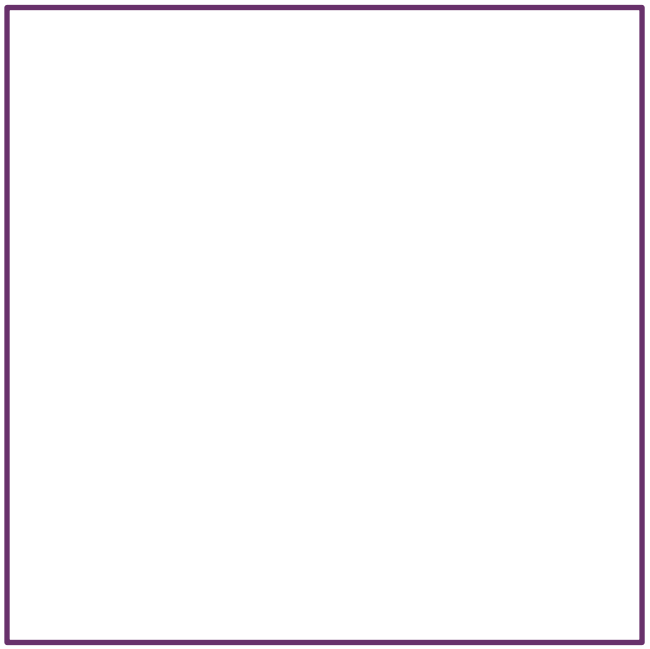
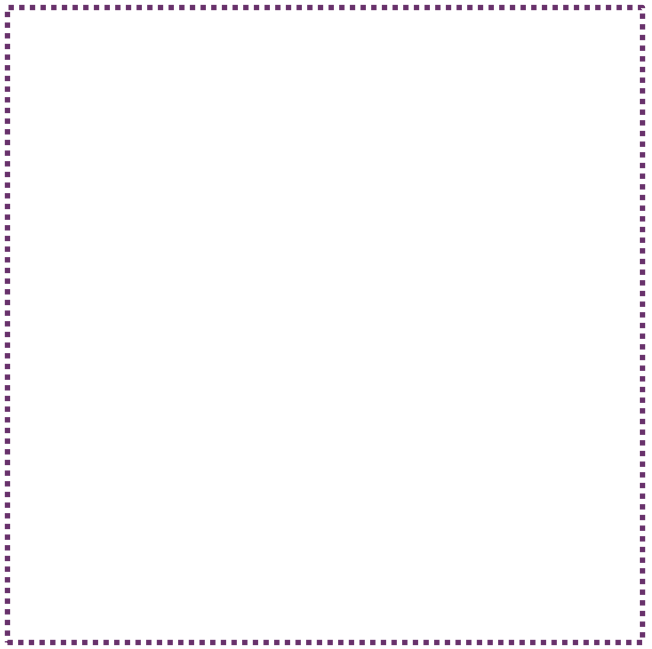
1. Face up to Uncertainty

Start with a decision…

Is the problem well defined?



Clear context, objectives and scope

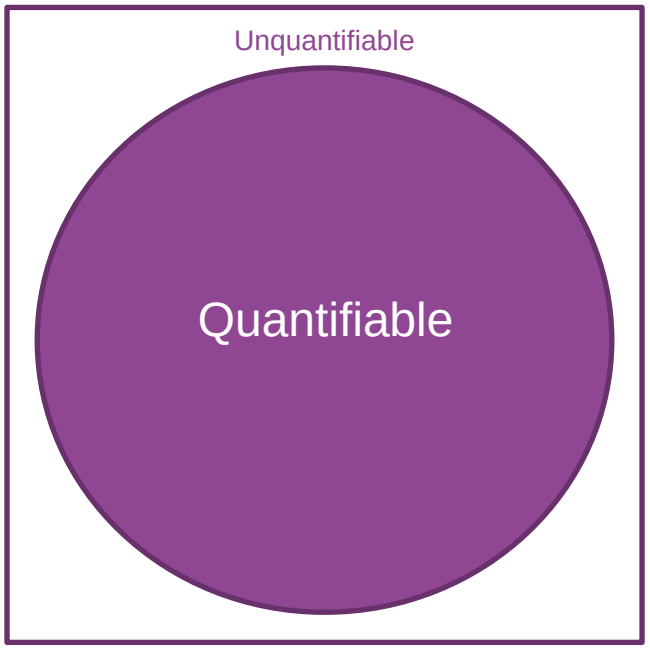


Inherently vague or poorly explained / understood

1. Face up to Uncertainty

Start with a decision…

How much the problem can be quantified?

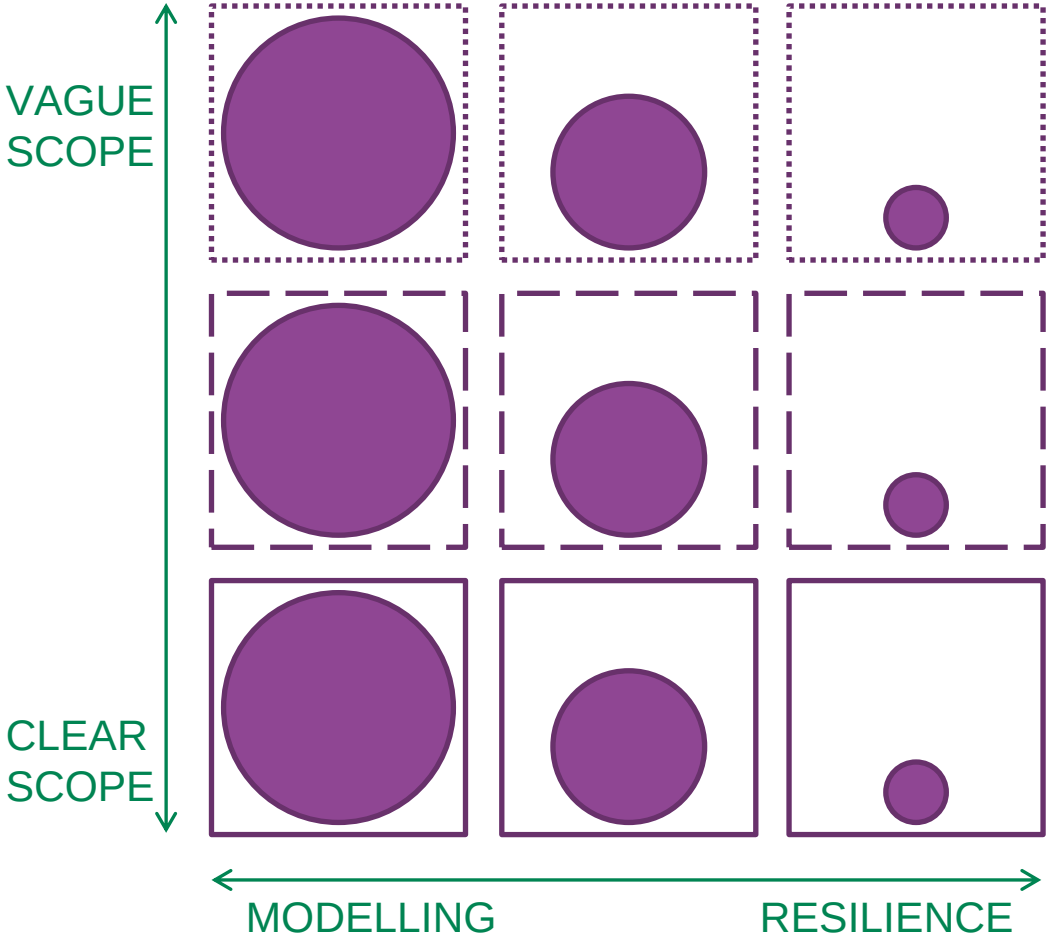


A modelling challenge

A resilience challenge

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

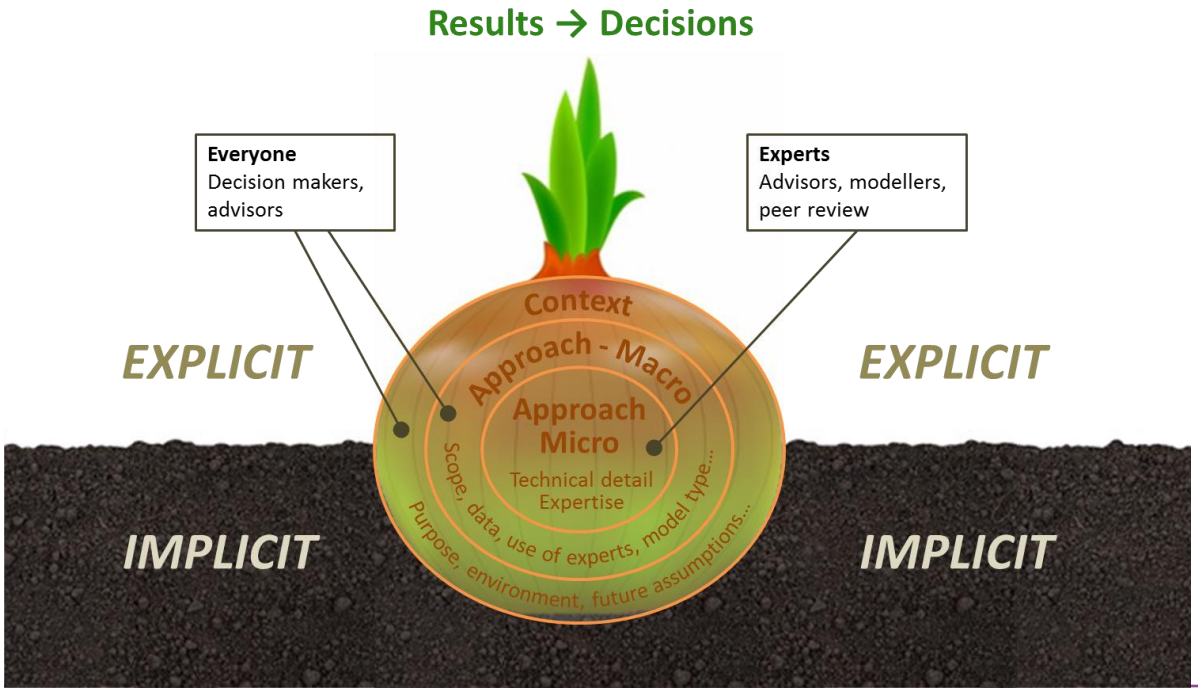
- Is the work understood: approach and key uncertainties/ limitations? (In light of the question)

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?)

Uncertainty

People: Emotive or unpredictable reactions by stakeholders; many unaligned stakeholders
Biases: Existence of biases that may be known or unknown - might include commercial, political, organisational or other bias
Obscurity: underlying risk exposures are unknown or obscured, “worst” outcome is unknown
Complexity: of the system or the model being investigated
Context: for decision is not well understood
[…]
Understanding: of the underlying risks and their distribution
Stability: of the regime, no latent risks
Data: credible data set(s)

Risk

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:

Latent Framing	Traps	Over-interpretation
Biases and heuristics that influence the perception of a problem and expectations of the outcome	Biases and heuristics that can deceive the decision maker and advisor	Biases and heuristics (rules of thumb) relating to reading too much or too little into data

3. Don't be fooled

Unintentional biases and traps

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Latent Framing

- **Affect heuristic** the tendency for people to use their personal likes and dislikes to form beliefs about the world.
- **Anchoring** the process of using a starting point for evaluating or estimating unknown values.
- **Confirmation bias** tendency to seek evidence that is compatible with a given view.
- **Halo effect** the tendency to like (or dislike) everything about a person, including their opinions.
- **Myopic loss aversion** a phenomenon whereby investors are particularly concerned with the potential for a short term loss, even in the context of long-term investments.
- **Trusting intuition** the tendency for people to have a lot of confidence in their intuition.
- **Status quo bias** the preference for things to stay the same.
- **Sunk cost bias** costs incurred in the past are used as a justification to continue investing in suboptimal projects or strategies in the future.
- **Survivor's Curse** tendency for the lucky to survive and have misplaced optimism.

Traps

- **Gambler's fallacy** the tendency of decision makers to underestimate the probability of a repetition of an event that has just happened.
- **Illusion of validity** the use of evidence to make confident predictions even after the predictive value of the evidence has been disproved.
- **Law of Least Effort** the tendency for people to seek the easiest way possible to complete a task.
- **Mean-reversion bias** when decision makers assume that over time, a trend has to return to the mean.
- **Planning myopia** the tendency to consider consequences over a too restricted time horizon.
- **Priming** purposefully triggering thoughts or ideas.
- **Temporal discounting** the greater the delay to a future reward, the lower its present, subjective value.
- **Winner's Curse** tendency for winning bidders to overpay where incomplete information.

Over-interpretation

- **As if bias** the potential to be optimistic when restating historic behaviour due to exposure revisions or past misfortune.
- **Availability heuristic** the tendency for people to respond more strongly to risks when instances of those risks are more available to them (from memory, imagination, media, general social discourse, beliefs about the world).
- **Causal thinking bias** tendency for people to seek patterns and explanations rather than believe in chance.
- **Hindsight bias** the false belief that events are more predictable than they actually are.
- **Illusion of skill** the tendency for people to mistake good luck for skill.
- **Small probabilities** a group of biases that can arise when people reason about rare events. Small probabilities tend to receive too much, or too little weight depending on the decision context.

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**:

Latent Framing	Traps	Over-interpretation
• Anchoring • Confirmation bias • Status quo bias • Trusting intuition	• Gambler’s fallacy • Illusion of validity • Law of Least Effort • Mean-reversion bias	• Availability heuristic • Hindsight bias

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…

A Rough Guide to

SPOTTING BAD SCIENCE

Being able to evaluate the evidence behind a scientific claim is important. Being able to recognise bad science reporting, or faults in scientific studies, is equally important. These 12 points will help you separate the science from the pseudoscience.

1. SENSATIONALISED HEADLINES

Aa

Article headlines are commonly designed to entice viewers into clicking on and reading the article. At times, they can over-simplify the findings of scientific research. At worst, they sensationalise and misrepresent them.

2. MISINTERPRETED RESULTS

News articles can distort or misinterpret the findings of research for the sake of a good story, whether intentionally or otherwise. If possible, try to read the original research, rather than relying on the article based on it for information.

3. CONFLICTS OF INTEREST

Many companies will employ scientists to carry out and publish research - whilst this doesn't necessarily invalidate the research, it should be analysed with this in mind. Research can also be misrepresented for personal or financial gain.

4. CORRELATION & CAUSATION

Be wary of any confusion of correlation and causation. A correlation between variables doesn't always mean one causes the other. Global warming increased since the 1800s, and pirate numbers decreased, but lack of pirates doesn't cause global warming.

5. UNSUPPORTED CONCLUSIONS

???

Speculation can often help to drive science forward. However, studies should be clear on the facts their study proves, and which conclusions are as yet unsupported ones. A statement framed by speculative language may require further evidence to confirm.

6. PROBLEMS WITH SAMPLE SIZE

In trials, the smaller a sample size, the lower the confidence in the results from that sample. Conclusions drawn can still be valid, and in some cases small samples are unavoidable, but larger samples often give more representative results.

7. UNREPRESENTATIVE SAMPLES USED

In human trials, subjects are selected that are representative of a larger population. If the sample is different from the population as a whole, then the conclusions from the trial may be biased towards a particular outcome.

8. NO CONTROL GROUP USED

In clinical trials, results from test subjects should be compared to a 'control group' not given the substance being tested. Groups should also be allocated randomly. In general experiments, a control test should be used where all variables are controlled.

9. NO BLIND TESTING USED

To try and prevent bias, subjects should not know if they are in the test or the control group. In 'double blind' testing, even researchers don't know which group subjects are in until after testing. Note, blind testing isn't always feasible, or ethical.

10. SELECTIVE REPORTING OF DATA

Also known as 'cherry picking', this involves selecting data from results which supports the conclusion of the research, whilst ignoring those that do not. If a research paper draws conclusions from a selection of its results, not all, it may be guilty of this.

11. UNREPLICABLE RESULTS

Results should be replicable by independent research, and tested over a wide range of conditions (where possible) to ensure they are consistent. Extraordinary claims require extraordinary evidence - that is, much more than one independent study!

12. NON-PEER REVIEWED MATERIAL

Peer review is an important part of the scientific process. Other scientists appraise and critique studies, before publication in a journal. Research that has not gone through this process is not as reputable, and may be flawed.

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

4. Models can be helpful, but also dangerous

Honing your "unknowability radar"

Spotting hard problems…

Smooth	Knotty	Unknowable
• Reserving a stable book with good data	• Assessing reserve risk	• Predicting "1 in 200" events
• Assessing scenario severities, based on assumed events	• Assessing relative scenario likelihood	• Assessing scenario return periods

4. Models can be helpful, but also dangerous

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?

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

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

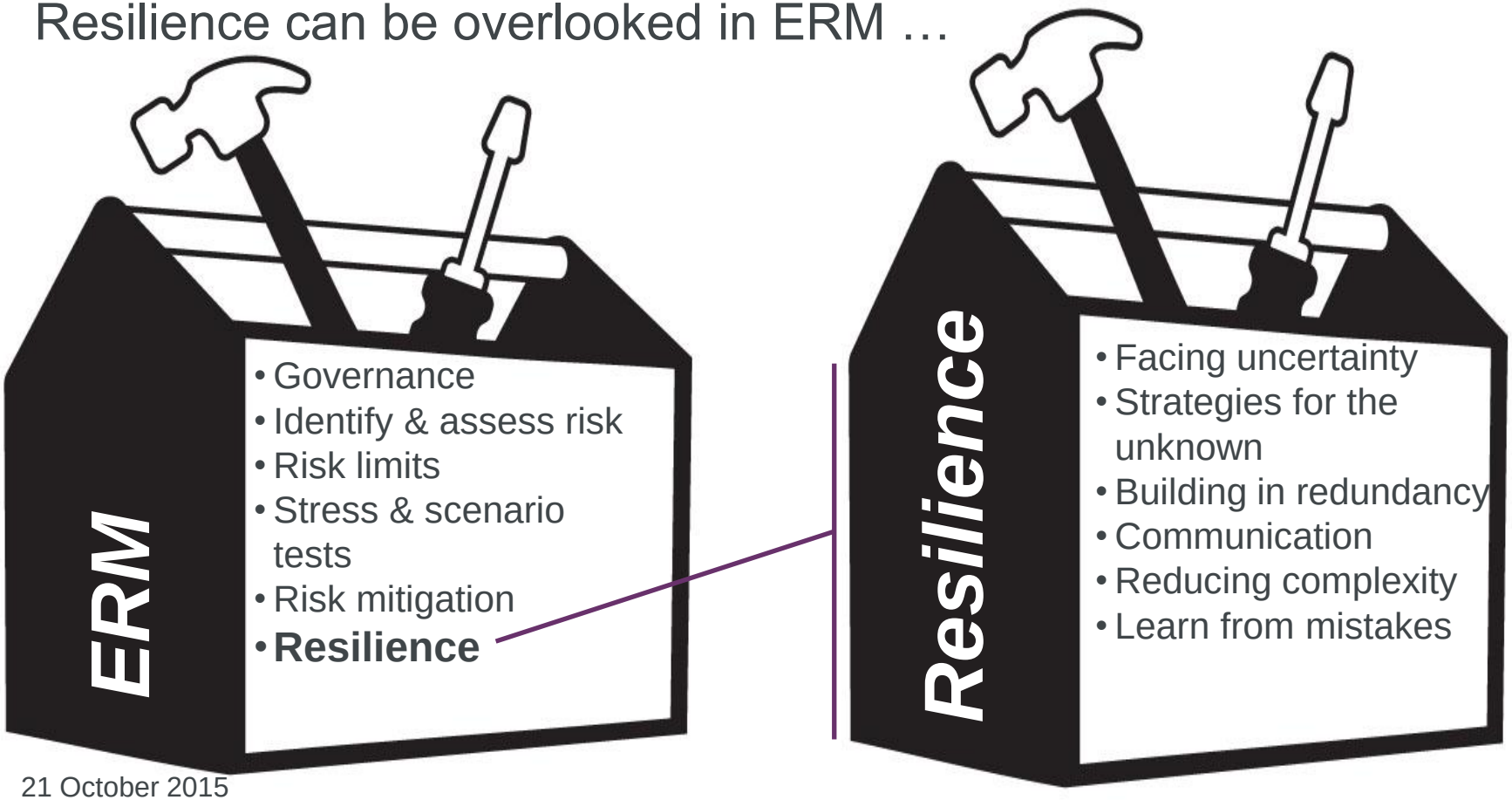
- It's the beginning of the credit crisis you are reviewing your company's exposure to financial guaranty insurance, providing 'credit enhancement' for issuers of CDO's relating to residential mortgage backed securities
- …. the underlying securities have started to downgrade and default
- …. it's clear 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

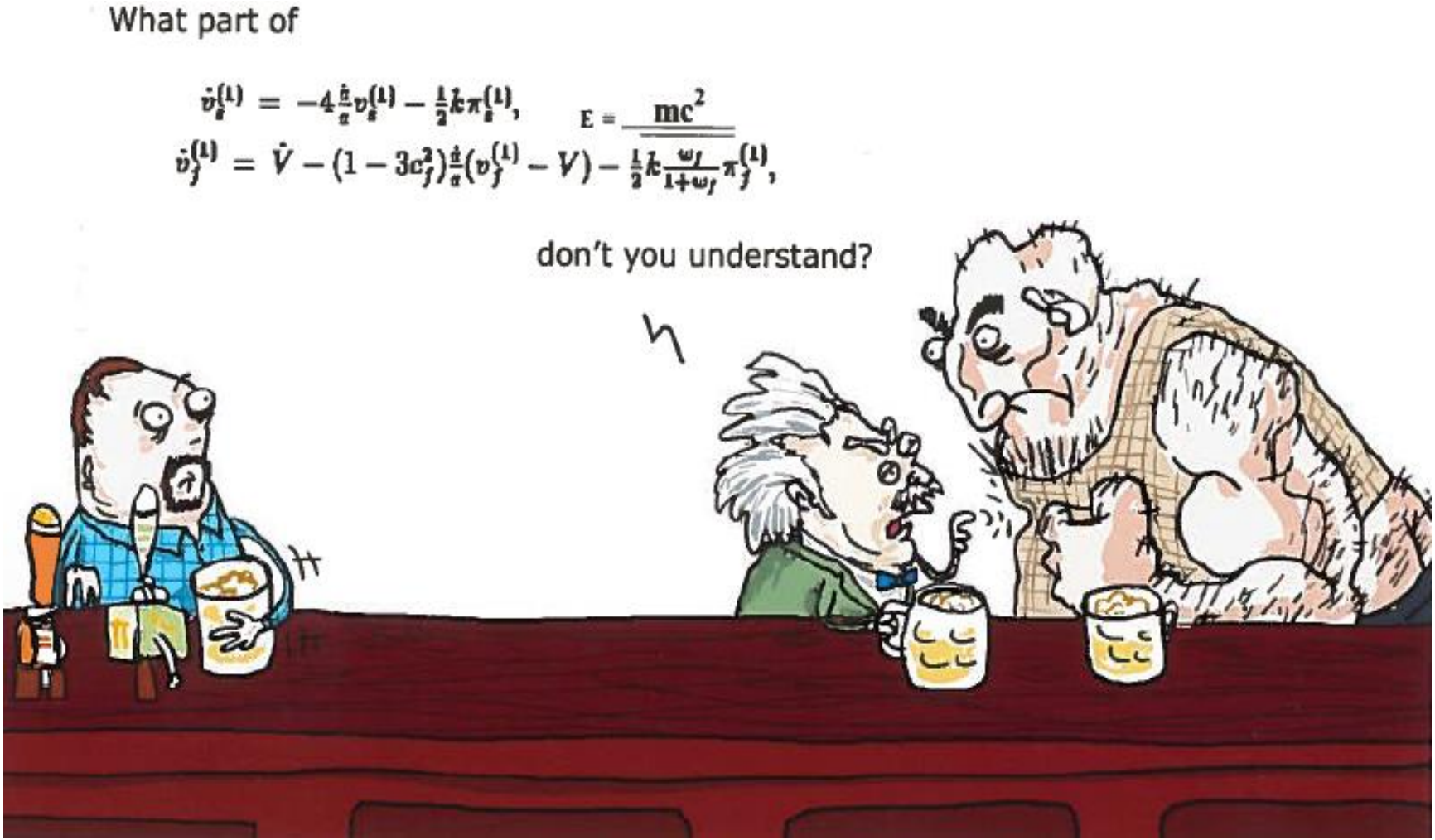
The Resilience Toolkit

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



6. Take people with you

Understanding, engagement and trust



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:

- Ask rather than just tell
- Put in broader context (what are the upside, downside implications?)
- Seek input on key judgements (e.g. advice on use of experts)
- Bring out “carrots” (positive benefits) and “sticks” (negatives to avoid)

6. Take people with you

Blip or Trend?

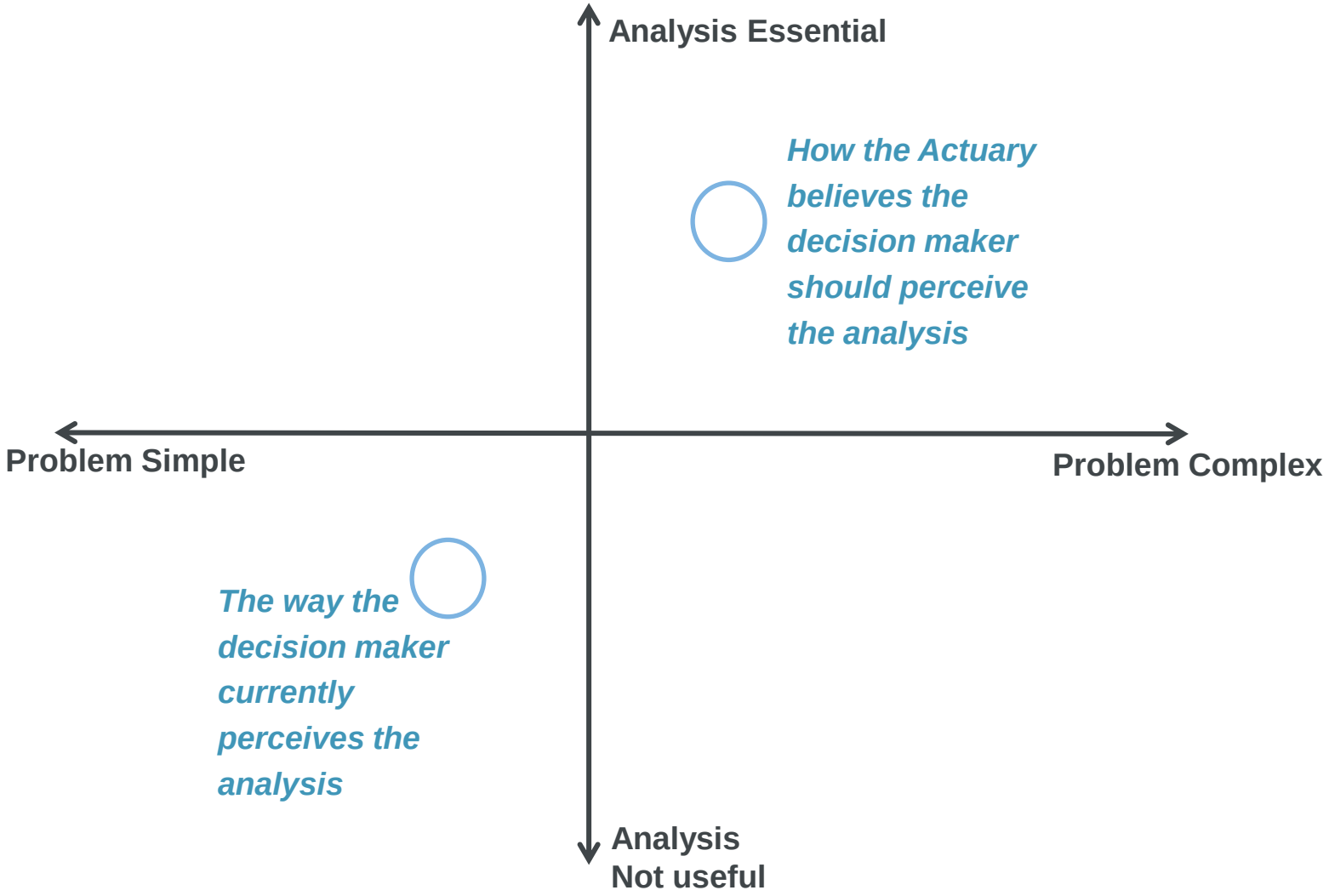
Scenario

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



6. Take people with you

Engaging others: discussing results (2)

Revisit scope, objectives (upside?)

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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- Introduction
- Uncertainty Principles
- Uncertainty vignettes
- **Conclusions and next steps**

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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Any questions or comments?
Please get in touch

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