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# Risk Management in Government

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# Objectives

- To show the importance of risk management for governments and introduce some of the relevant risk issues
- To demonstrate the scope for actuaries to contribute in this area and present some UK examples of where actuaries are helping
- To illustrate ideas that may be useful to actuaries in other fields
- *Focus on financial risk, strategic risk, operational & project risk, and model risk*



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# Governments increasingly recognise the importance of understanding and managing risk

“**Risk** management – getting the right balance between innovation and change on the one hand, and avoidance of shocks and crises on the other – is now central to the business of good government.”

[Cabinet Office \(2002\)](#)

“What is new ... is the idea of **risk**-based policy-making as a discipline with its own tools, methods and processes for explicitly assessing and managing the distribution of a wide range of societal and institutional harms. In particular, traditional ‘probability x consequence’ frameworks are being used to hold together a diverse range of **risks** as a way of thinking about the future as indeterminate and potentially controllable.”

[Defra \(2008\)](#)

“A variety of factors ... contributed to the issues...including...the novelty of the **risk** transfer arrangements...[and] the inadequacy of the quality assurance processes.”

[Interim Laidlaw report \(2012\)](#)

“Whether a [disaster **risk** reduction] measure is preferred [to accepting the **risk**] will depend on the value placed on human life, the discount rate and time horizon used, and the range of costs and benefits that are included in the analysis. Decision makers should not accept cost-benefit ratios uncritically, and scientists preparing them should make important assumptions clear.”

[Foresight Report \(2012\)](#)



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**“Courtesy and mutual kindness are ... indispensable to our permanence. But quite consistent with these is the dissemination of truth.” John Finlaison**



John Finlaison 1783 - 1860  
Actuary in government  
1805 - 1851  
President IoA 1848 - 1860

### Who are GAD?

- > Provider of independent analysis within government since 1919
- > 170 employees, 70 qualified actuaries
- > Shared service provider
- > Offer a wide range of actuarial services
  - > pension policy and implications
  - > social security
  - > investment
  - > insurance
  - > modelling & risk

“Our mission is to support effective decision-making and robust reporting within government as the first choice provider of actuarial and specialist analysis, advice and assurance”



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# Our actuaries are risk professionals who help make sense of complexity

## What is an actuary?

a business professional who deals with the financial impact of risk and uncertainty

understands complex modelling - links this to the decision making process - by communicating - with professional standards

within GAD we apply analytical modelling and risk management skills to challenges across government

where there is uncertainty, using mathematical and statistical methods, actuaries perform long-term financial modelling, analysis and certifications under a professional code and standards designed to give assurance on quality and consistency

it's a combination of genuine professionalism (with all that entails on education, annual learning and discipline schemes) directed at the handling of complex financial problems around sustainability and value



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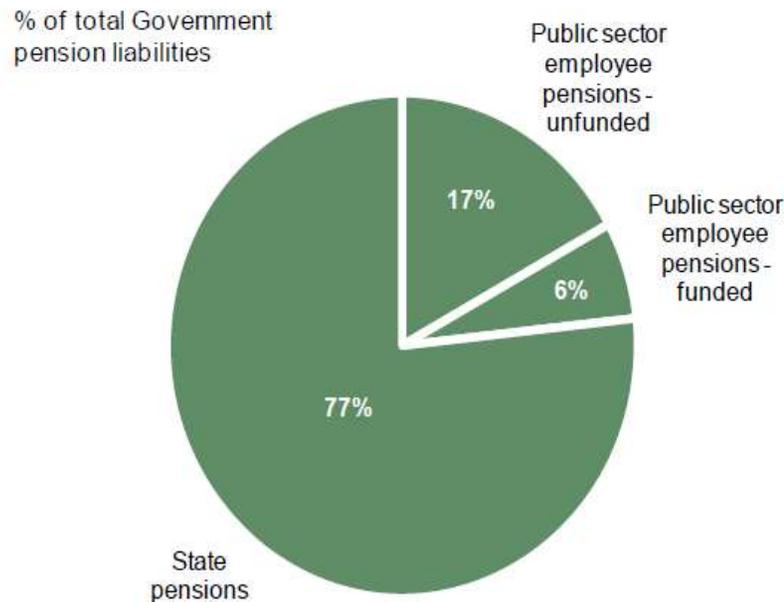
## Most big (risk) issues require long-term thinking

- > The aging population and intergenerational fairness
- > Climate change, sustainability, infrastructure investment
- > Big data, privacy and insurability
- > Poverty, inequality, future of healthcare
- > Government balance sheet:
  - What is the size, profile and nature of liabilities and assets and how is this changing?
  - How confident can we be in the numbers?
  - What are the major long term financial risks?
  - What is the government strategy for management?



# UK public and state pension liabilities are over £6tn

Figure 4: Breakdown of UK Government pension liabilities at end-2010, by type of pension



‘We are seeing a foretaste of a pensioner democracy... It could end up in a situation where older generations plunder the younger ones’.

**Roman Herzog 2008**



President of Germany  
1994 - 1999

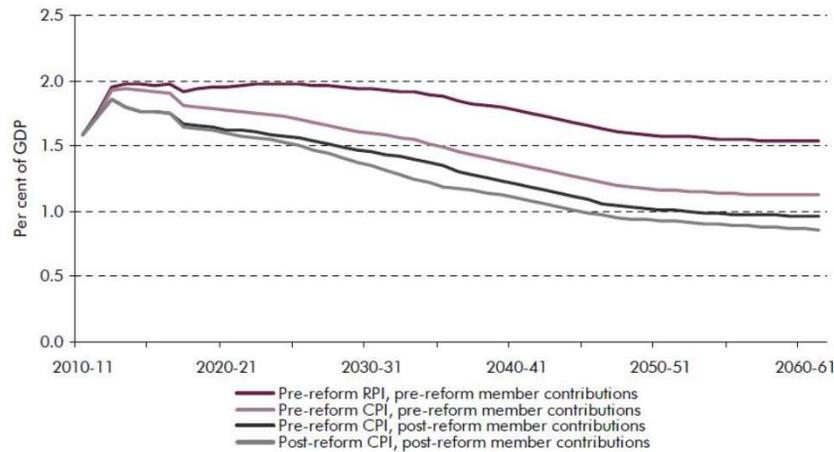
Source: Office for National Statistics, supplementary table on pensions



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# Need to understand impact of policy changes on financial projections

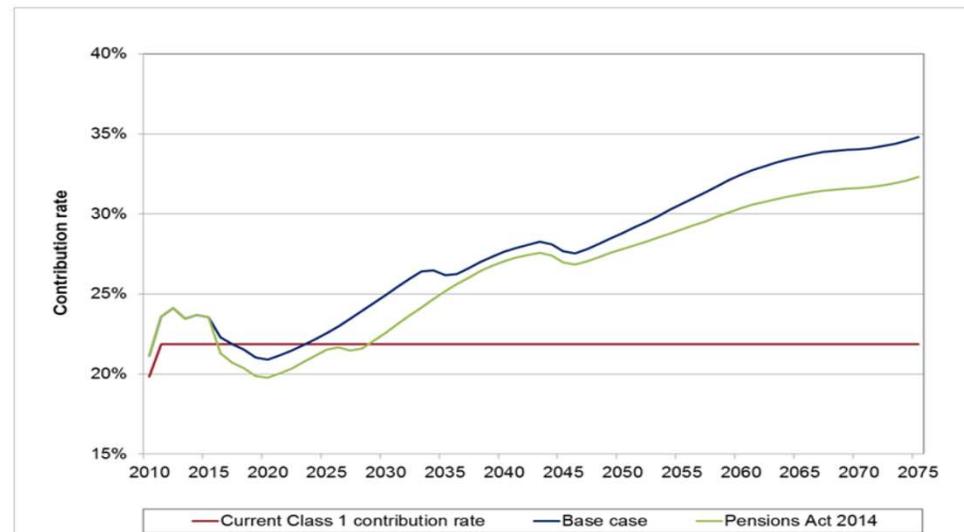
Chart A.5: Effect of reforms on net expenditure



Public service pension reforms in UK to reduce future cost as % of GDP

Source: OBR, GAD

UK social security PAYG costs (contribution rate) and the “demographic bulge”





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# Governments have many contingent liabilities

What are contingent liabilities?

If there is <50% chance that the government will face **some cost** as a result of a **future event**, then it is called a contingent liability.

Quantifiable or unquantifiable?

Liabilities considered quantifiable are included in government accounts, others aren't.



	2011	2012	2013	2014
Restated figures	£bn	£bn	£bn	£bn
Financial stability interventions	10	10	10	-
Export guarantees and insurance	10	10	13	12
Clinical negligence	8	8	10	12
Taxes subject to challenge	10	15	15	29
Supporting international organisations	1	33	32	1
Transport infrastructure projects	3	3	4	5
Military contracts	1	1	1	1
Oil and gas field decommissioning	-	20	-	-
Other	7	1	3	3
<b>Total quantifiable contingent liabilities</b>	<b>50</b>	<b>101</b>	<b>88</b>	<b>63</b>





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Financial risk

## Projections are very sensitive to assumptions

- Need to understand range of possible outcomes
- Consider **climate change** as an example:

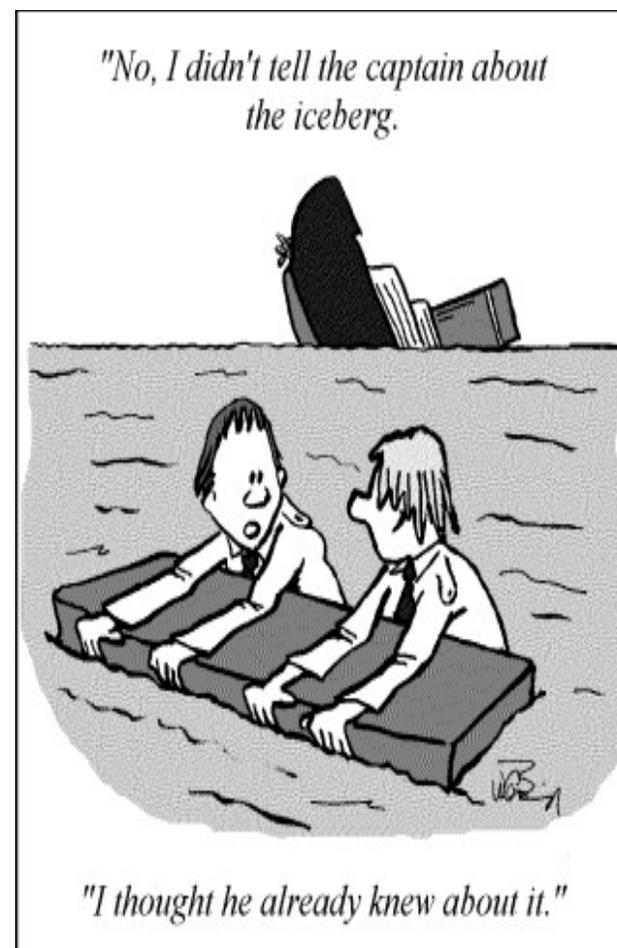
Actuarial area	Potential Impact of Climate Change
<b>Economic assumptions</b>	Will climate change act as a drag on economic growth/asset returns? Will climate change impact on inflation?
<b>Insured Perils</b>	Will climate change alter the frequency and severity of weather events?
<b>Demographic assumptions</b>	Will climate change alter migration or population growth?
<b>Stock selection</b>	How do you allow for member's Environment Social and Corporate Governance (ESG) preferences in stock selection? Are certain assets under/over priced? (eg carbon risk/stranded assets)



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## A number of recent studies and reports aimed at improving risk management

<b>General:</b> <a href="#">FRC Guidance on Risk Management (Sept 2014)</a>	<b>Public Sector:</b> <a href="#">NAO Report (June 2011)</a>	<b>Public Sector:</b> <a href="#">Managing Public Money (July 2013)</a>
<p>A series of questions on risk for the board to consider covering:</p> <ul style="list-style-type: none"> <li>• Risk appetite and culture</li> <li>• Risk management and internal control systems</li> <li>• Monitoring and review</li> <li>• Public reporting</li> </ul>	<p>(The 6 'What')</p> <ul style="list-style-type: none"> <li>• Engaged board to focus on managing the things that matter</li> <li>• Clear risk tolerance → proportionate risk response</li> <li>• Have clear ownership/accountability for risks</li> <li>• Quality information</li> <li>• Evaluation and costing</li> <li>• Implement lessons learned</li> </ul>	<ul style="list-style-type: none"> <li>• Board's strategic guidance should permeate</li> <li>• Need for top-down and bottom-up</li> <li>• Board defines risk tolerance</li> <li>• Board considers likelihood of outcomes beyond tolerance and decides which risks matter</li> <li>• Each organisation should decide what works best for them.</li> <li>• QA of models</li> </ul>





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Strategic risk

# Ideally board strategic risk reports should be limited to a single page

Strategic Risk	Board level risk owner (initials)	Likelihood of risk this month (RAG status)	Likelihood of risk last month (RAG status)	Change over month	Potential Causes	Mitigation plans	Further Comments
<b>Externally considered as failing to act in accordance with its objectives</b>	TBC	<b>RED</b>	<b>RED</b>	↔	Unclear strategy statement Poor communications Inappropriate work focus Insufficient resources	Public consultation Re-launch strategy Thorough skills review	<p><b>GREEN</b> = &lt;3% chance over next 12 months</p> <p><b>AMBER</b> = 3% to 10% chance over next 12 months</p> <p><b>RED</b> = &gt;10% chance over next 12 months</p>
<b>Persistent poor outcomes for users</b>	TBC	<b>AMBER</b>	<b>AMBER</b>	↔	Insufficient or incorrect skill base Inappropriate poor outcome identification criteria Inappropriate review of assessments High profile failure	Workforce training Analyse identification criteria Collaboration with other organisations	
<b>Loss of confidence among stakeholders</b>	TBC	<b>AMBER</b>	<b>RED</b>	↓	Inconsistent statements to media/public Inaccurate reporting of activities Insufficient coverage of all areas of remit	Strategy re-launch Joint working with providers Workforce training Increased transparency with external stakeholders	
<b>Unable to deliver on strategic objectives</b>	TBC	<b>GREEN</b>	<b>AMBER</b>	↓	Inconsistent public reporting Poor understanding of policy/political impacts Lack of understanding of economic conditions Poor management direction	Skills review Improved communication between departments Externally-validated selection process for senior roles	



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Operational and project risk

## 10 questions decision-makers may ask

1. What are our key objectives and how do we identify risks?
2. What are the constraints around our decisions or the project?
3. What can we learn from previous experience of similar exercises?
4. When do decisions need to be made and how do we choose the best option?
5. How can we quantify risks and the likely impact should they occur?
6. What are the main risks that need to be monitored and how?
7. How much should be spent on risk mitigation?
8. Should the project go ahead, or is there a better alternative?
9. How might things change over time and how does this impact the risks and what should be done?
10. Who is responsible for considering the overall position?



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## 10 ways actuaries can help

1. Run risk workshops for boards or executives
2. Benchmark existing or develop new risk governance framework
3. Explain or apply the RAMP\* project framework to identify, quantify and manage risks within projects
4. Produce customised financial models illustrating benefits, financial impacts and risks of options
5. Provide advice on model selection and development
6. Review existing models and provide independent assurance
7. Work with clients to enhance systems to collect relevant and accurate data
8. Review and analyse existing data to understand trends, uncertainties, etc.
9. Evaluate alternative risk mitigation options
10. Develop risk metrics and “dashboards”

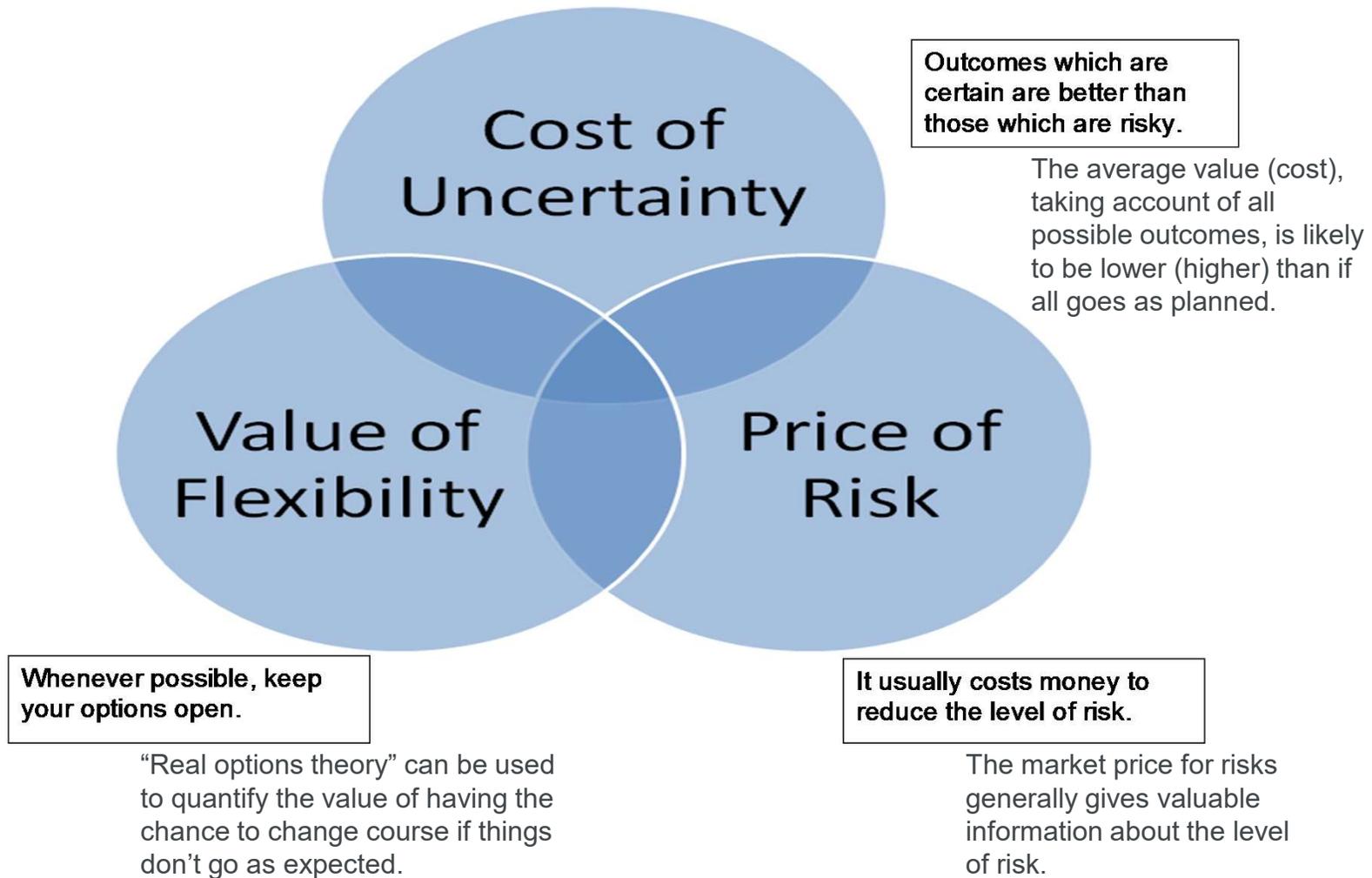
\* *“Risk Analysis and Management for Projects”*, sponsored by actuarial and civil engineering professions since 1998



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Operational and project risk

# Quantitative risk concepts or “How to make decisions”

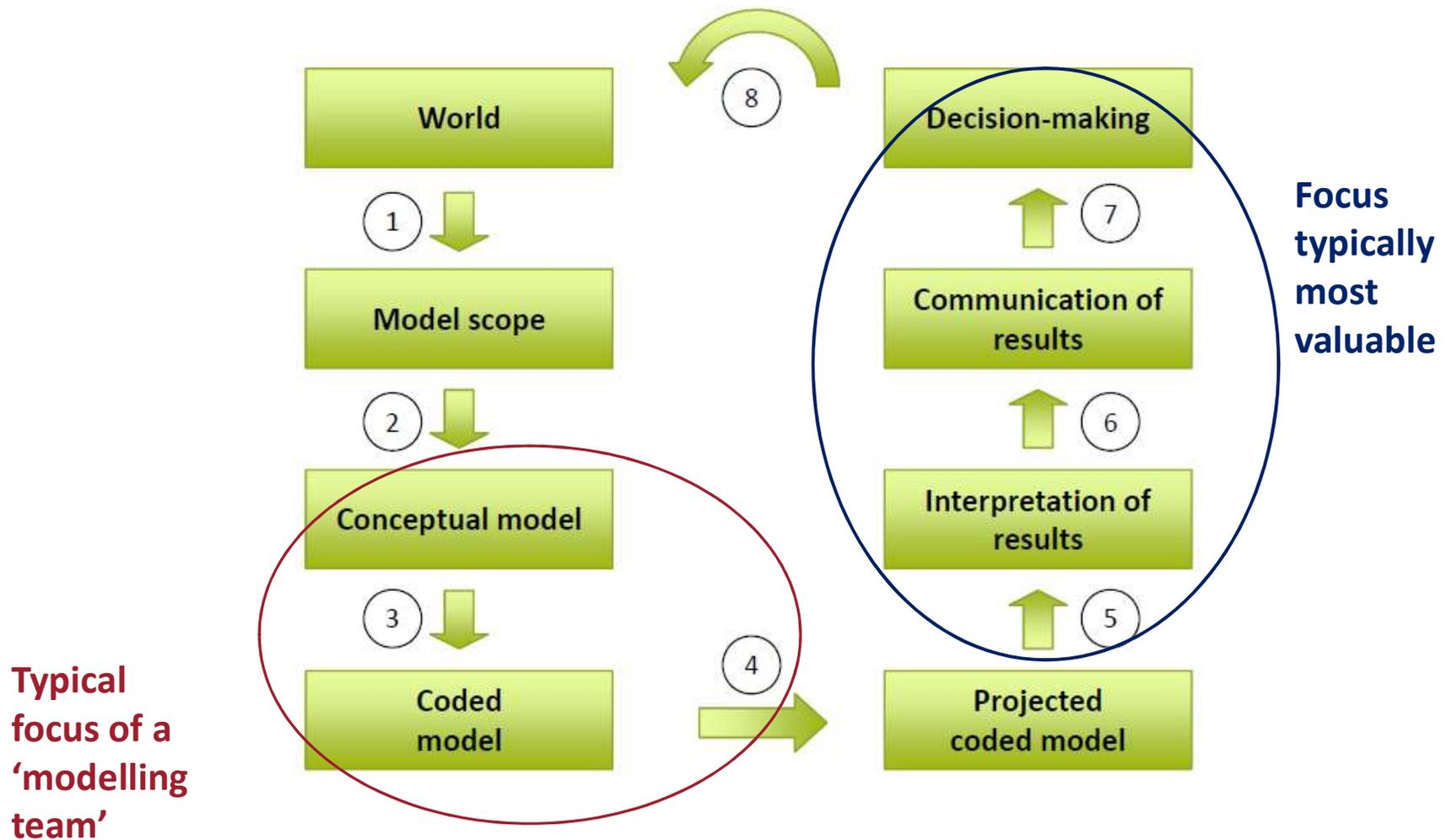




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Model risk

## Modelling process



Process diagram sourced from: "[The Philosophy of Modelling](#)" by Matthew Edwards & Zaid Hoosain, presented to the Staple Inn Actuarial Society on 26 June 2012



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## Managing model risk – some suggestions

Questions to ask	Practical steps
What is current practice within the organisation, where do people use models, who understands them?	Understand what modelling is trying to achieve & how results will be used. Take care when re-using models for different purposes.
What frameworks are in place and what is missing?	Ensure there is appropriate model governance.
How can we have confidence that the models have been correctly built?	Carry out appropriate quality assurance, including possible external audit.
How do we know if assumptions are reasonable or introduced unintended bias?	Be aware of sensitivity to parameters & inputs. Challenge implicit and explicit assumptions.
How do we ensure the answers are appropriate for their use?	Ensure data quality is good. Implement feedback loop between experience and model.
How can we make the most from our modelling?	Obtain external opinion about validity.



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## Examples of model QA in government

- ✓ Changes to state pensions
- ✓ Assessment and valuation of credit risk
- ✓ Long-term care – cost of cap
- ✓ Economic assessment of projects
- ✓ Climate change
- ✓ Transport – demand modelling
- ✓ Education – projection of pupil numbers
- ✓ Flood insurance





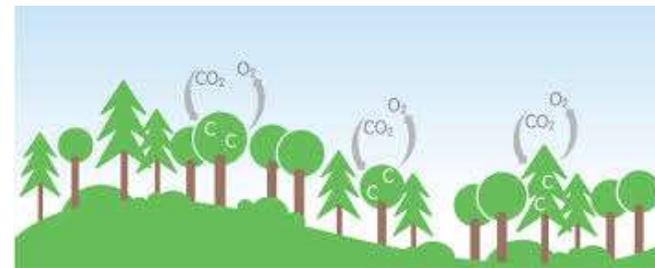
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## Actuaries' skills are very relevant

Actuaries have expertise in a number of relevant areas:

- Supporting decisions involving long-term uncertainty
- Economic and financial modelling, future scenarios
- Data analysis and interpretation
- Projecting demographics & resource demands, model QA
- Managing risk and uncertainty

*"A risk that grows over time will not be managed successfully if our horizons are short-term"*



*'Climate Change: a risk assessment',  
King et al (Centre for Science and Policy 2015)*

*"Of all professionals in financial services, only actuaries advise on events far enough into the future to be seriously concerned by the long-term challenge these risks pose to the sustainability of our clients' objectives"*

*'Sustainability and the financial system: Review of literature' (IFoA, May 2015)*



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# Climate risk example – recent projects and related questions



Disaster risk financing in low & middle income countries



Review of the pooling model and implications on the insurance industry



Department  
of Energy &  
Climate Change

- > Levy control framework
- > Carbon capture & storage



- > Review risk pooling arrangements in Africa to address growing risk of natural disasters
- > Plus similar arrangements in Asia & the Pacific

Area	Example question
Climate index	What measure of current conditions best reflects future risk?
Carbon pricing	What’s the right discount rate to use?
Carbon budgeting	How can underlying models best reflect eg feedback loops and degree of uncertainty?
Climate policy	What are the most useful impact assessments eg estimated returns for upfront subsidies?



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## Conclusions

- **Risk management is important for governments eg long-term government finances, intergenerational fairness, climate change**
- **Relevant risk areas include financial risk, strategic risk, project risk, model risk**
- **There are lots of opportunities for actuaries to help**
- **And lessons that may be useful for actuaries everywhere**

***Public interest: if you can help, you should help!***