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## Session B4

# The Effective Communication and Disclosure of Model Risk

The IFoA Model Risk Working Party



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# Agenda

1. Recap on Model Risk
2. Internal Communications
3. External Communications
4. Points for Discussion

ertise  
ponsorship  
Thought leadership  
Progress  
Community  
Sessional Meetings  
Education  
Working parties  
Volunteering  
Research  
Shaping the future  
Networking  
Professional support  
Enterprise and risk  
Learned society  
Opportunity  
International profile  
Journals  
Support



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- 1. Recap on Model Risk**
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# Recap on Model Risk (WP Phase 1)

Model Risk definition (via Federal Reserve, 2011): The use of models invariably presents model risk, which is the **potential for adverse consequences from decisions based on incorrect or misused model outputs and reports**. Model risk can lead to financial loss, poor business and strategic decision making, or damage to a bank's reputation. Model risk occurs primarily for two reasons:

- The model may have fundamental errors and may produce inaccurate outputs when viewed against the design objective and intended business uses
- The model may be used incorrectly or inappropriately

Model Risk is not as well defined and established as other more traditional risks, so the identification, understanding and communication of Model Risk is crucial.

**Daring to Open the Black Box (*Peter Clark Prize, Best Paper 2015*)**

<https://www.actuaries.org.uk/documents/sessional-paper-model-risk-daring-open-black-box>



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# The impact Model Risk can have

Long Term Capital Management (1998)	Famous example of having a sophisticated model but not understanding its mechanisms and the factors that could affect it
JP Morgan “London Whale” (2012)	This was a case of poor model risk management combined with broader risk management issues that led to JP Morgan making losses of £6bn and being fined £1bn
West Coast Rail Franchise (2012)	The £9b West Coast Main Line rail franchise contract is a non-financial services example of a failure of model validation
Cumbria flooding (2015)	Demonstrates the challenge of forecasting based purely on historical data. Record 24-hr rainfall. 1-in-800 event? Just what is an “extreme event”?
George Osborne’s Brexit report (2016)	Report claims that if the UK exits the EU, families will be £4,300 worse off a year. But is the model used appropriate and can it be understood and validated?



# Current Professional Guidance – TAS M

Concise summary of key models. Regularly reviewed. Remember the documentation.

Model coverage	What “aspect of the world” does this model represent?
Model construction	What components does the model contain?
Satisfactory representation / Fitness for purpose	Why is the model a suitable method for calculating cashflows, reserves or technical provisions?
Inputs	What inputs are required to use the model?
Data	Are the data appropriate?
Limitations	What are the key limitations of the model?



# Do you know your model estate?

With many hundred of spreadsheets used across a company, consider

- **Central inventory** of signed-off models including workbooks
- Identifying what is a model and which should be included

Plus, an **established change process** – distinguishing between central and local change

- **Central change** affects models that directly feed into external numbers (e.g. reporting numbers, parts of the Internal Model, technical provisions).
- **Local change** covers models used for internal processes (e.g. validation purposes, reconciliations)

Central change follows an established governance process.

Regression testing is performed between each realisation of the model, as well as testing of the particular development concerned.

Quite a challenge if model changes are made quarterly!



# Current developments

- Exposure draft of TAS 100: Principles for Actuarial Work
  - FRC consultation on changing TAS M (amongst other changes)

***“Communications shall include explanations of any significant limitations of the models used and the implications of those limitations”***

- Consultation on International Standard of Actuarial Practice on the Governance of Models

## ***“Section 3. Communication***

***3.1 The actuary should make any disclosures which the actuary considers to be appropriate so that the intended users are able to understand limitations and uncertainty in the results presented.”***

- Federal Reserve Supervisory Guidance on Model Risk Management (SR Letter 11-7)
  - No specific guidance on communication. Board and senior management are responsible for strong model risk management framework. Need to understand, not just individual models but also in the aggregate. Framework to include model development, implementation, use and validation.

***“Effective validation reports include clear executive summaries with a statement of model purpose and an accessible synopsis of model and validation results, including major limitations and key assumptions”***







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# Internal Communications on Model Risk

## What do we need to communicate internally on model risk?

- Actuarial models generally feed into decision-making and / or financial results. Therefore it is important to communicate key information on model risk to stakeholders to ensure decisions based on model outputs are as well informed as possible, e.g.
  - Scope and purpose of model
  - Fitness for purpose of model
  - Key model limitations
  - Key expert judgements / assumptions underlying the model, and sensitivities to these judgements
  - Extent of review / challenge / validation of the model
  - Quality of data underlying the model
- Important not to overload on information, wood from the trees



# Internal Communications on Model Risk

## Whom internally do we need to communicate model risk to?

- All model users. This could be:
  - The Board
  - Key governance committees / forums
  - Senior management
  - Anyone at any level using the outputs of the model to feed into a process!
- Impact of the Senior Insurance Managers Regime?
  - Places more direct responsibility and liability on individuals in a firm
  - As a consequence, these individuals will require a strong basis for the decisions they make (or don't make!), so will need to ensure they fully understand the risks associated with the model outputs they are using to feed into their decision-making
  - Senior individuals, therefore have limited time!
  - Importantly, this spans wider than the Economic Capital / SCR models (which the regulators have understandably been focused on) – e.g. pricing, conduct



# Internal Communications on Model Risk

## What positive value can good internal communication on model risk add?

- More informed decisions, therefore (we hope!) more likely to be the right decisions; and conversely helping avoid poor decisions being made. Spans a variety of key BAU and strategic aspects of running a business (*e.g. product development, investment strategy, capital planning, transactions, reinsurance placement, risk management, performance measurement, pricing, customer illustrations, etc*)
- Allows senior management to communicate more openly and transparently to regulators, shareholders, analysts around the confidence in the financial results, the business model, and strategic decisions
- Greater visibility to, and value added by, the actuarial teams in organisations.



# Internal Communications on Model Risk

## What are better companies doing?

### Enterprise-wide model risk

- Model inventories, model materiality frameworks
- Model risk appetite statements and regular monitoring of model risk profile / model risk dashboards (*example on the next slide*)
- Model governance committees / integrated into risk management committees
- Enterprise-wide model risk commentary in internal risk MI / ORSA / Actuarial Function Reports



# Enterprise-Wide Model Risk Assessment - Example

As at MAY16

**Overall Risk Assessment:**

Current:

**A**

Projected (3M):

**G**



Risk increased over the period



Risk decreased over the period

  Within RA/Plan – no action other than monitoring required

  Outside RA but within Tolerance/Plan – requires action plan to be put in place or drawn up

  Outside Tolerance – action required or underway

Metric	Definition	RAG Status						
		BU1	BU2	BU3	BU4	BU5	BU6	Group
Sum of Absolute values of Model Errors not approved as remediated at Model Governance Committee	Mis-statements in reported non-linked reserves as a result of model errors or corrections.							
	Mis-statements in reported PBT as a result of model errors or corrections.							
	Mis-statements in reported capital requirement as a result of model errors or corrections.							
First line validation	First line model risk assessments							
Second line validation	Minimal globally material models or model developments should be rated as Not Fit For Purpose.							
	No material independent validation issues outstanding beyond their due dates.							
	No material models should have overdue biennial validations.							
Audit Reviews	Minimal Internal Audit model risk Control Rating assessments of Not Satisfactory.							
	No issues on model risk raised by External Audit.							

## Key model risks:

- Overall Risk Assessment – xxx.
- Global – yyy
- BU1 – aaa.
- BU2 - bbb
- BU3 – ccc
- BU4 – ddd
- BU5 – eee
- BU6 - fff



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# Internal Communications on Model Risk

## What are better companies doing?

### Model risk around specific models

- Clear articulation of the specific purpose of the model, the governance it has been through, and the key limitations and expert judgements underlying the model
- Sensitivities of the key outputs (feeding into decision-making) to the most material expert judgements underlying the model
- Commentary in ORSA / Actuarial Function Reports on model risk for regulatory technical provisions and capital models



# Internal Communications on Model Risk

## *Model risk around specific models - Example*

### 1. Inherent model risk (model risk prioritisation) assessment:

- Is the model materiality assessment High? (YES / NO)
- Is the model considered strategically important by Senior Management? (YES / NO)
- Is there an established model risk governance framework and controls in place? (YES / NO)
- Is the model design / functionality simple or basic? (YES / NO)

Assign a control level (Enhanced / Moderate / Standard / Basic) based on flowchart of assessment outcome

### 2. Residual model risk assessment (after controls, mitigation and validation):

Green	Amber	Red	
		Use model	Demise model
Residual risks within acceptable levels	Significant residual risks, but after mitigation within acceptable levels	Residual risks outside acceptable levels even after controls; but no options other than to use the model	Residual risks outside acceptable levels even after controls; model can be replaced by alternative

### 3. If model to be used, residual model risks (allowing for findings from three lines of validations) formally agreed by both model owner and model user for risk acceptance



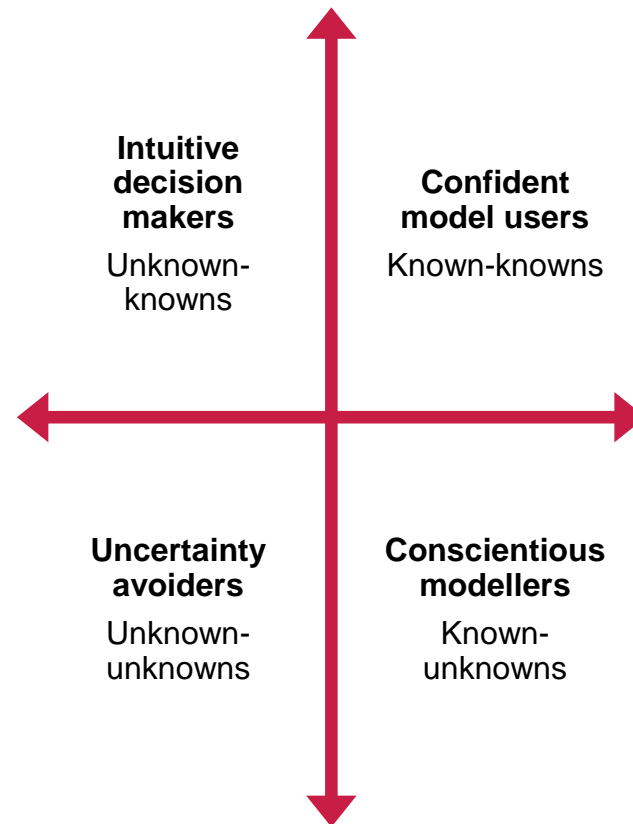
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## *Model risk around specific models – Model Governance Forums*

- Provide the information to answer the ‘right’ questions, addressing the challenges of the different model risk cultural perspectives

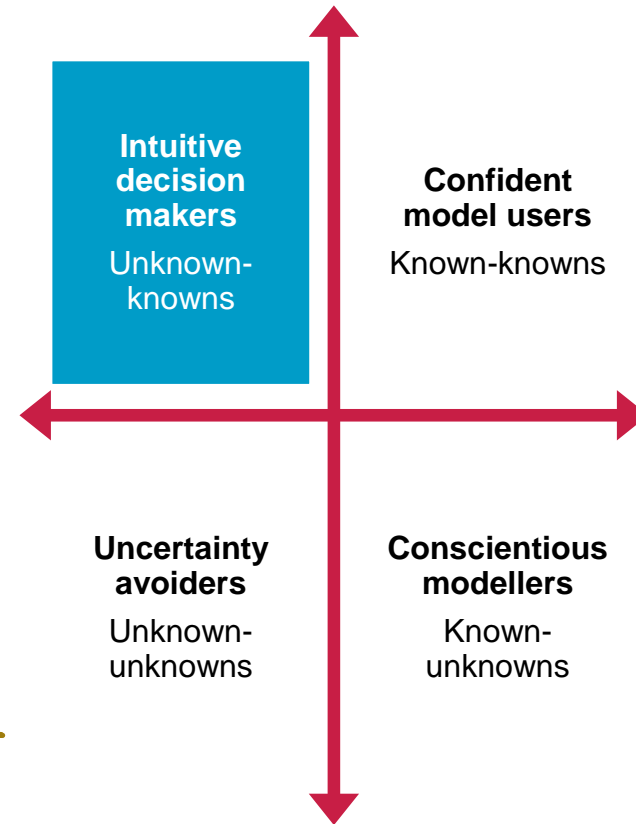


# Internal Communications on Model Risk

## Potential challenges (1)

Model needs to be focused on the issues that are most relevant for the business

What evidence is there for these intuitive views?



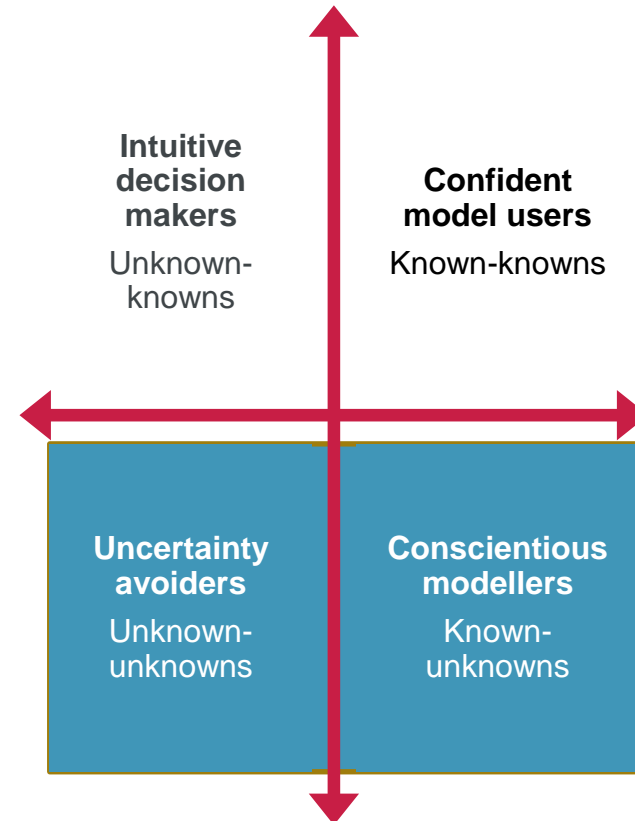
# Internal Communications on Model Risk

## Potential challenges (2)

Coverage of risks and uncertainty needs to be comprehensive

Output may be highly uncertainty – which needs to be explored through stress / scenario testing

We require timely assessment of issues rather than resolution (which may be impossible anyway)

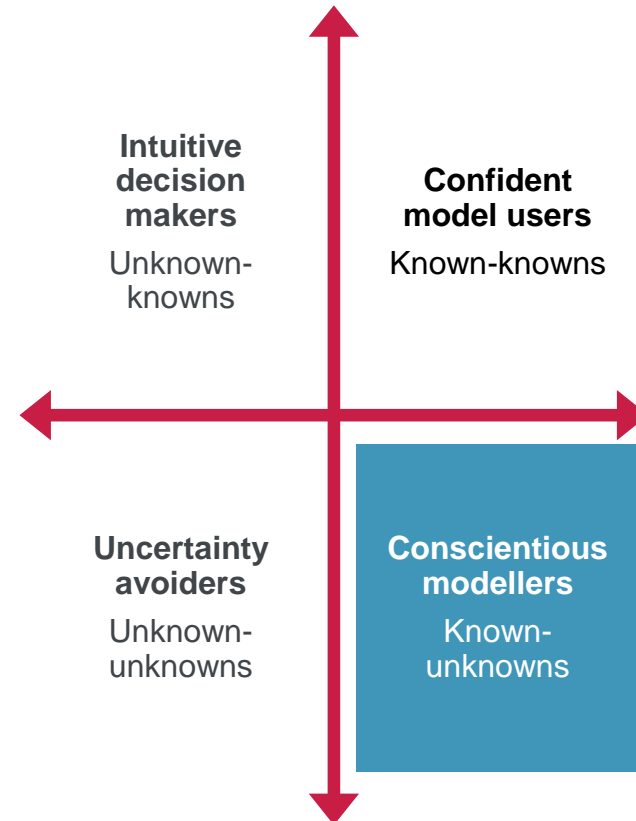


# Internal Communications on Model Risk

## Potential challenges (3)

Must always explain how a decision compares to the model / supporting analysis

Need to place a limit on the time that can be spent by “conscientious modellers” on determining their preferred calibration

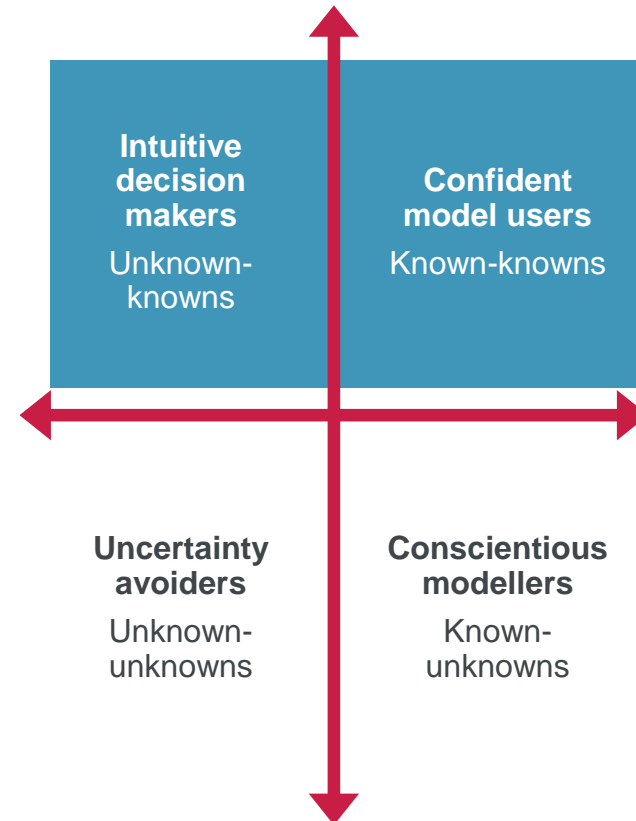


# Internal Communications on Model Risk

## Potential challenges (4)

Models need to provide their output promptly and clearly – so that we can progress with taking the decisions

Need to state “what you believe” in order for the decision to be valid (in respect of both decisions based on the model and those based on intuition)





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# External Communications on Model Risk

What do we need to communicate externally on model risk?

*Should we communicate externally at all?*

If yes, what?



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# External Communications on Model Risk

## Whom externally do we need to communicate model risk to?

- Not necessarily a clear line
  - **Internal** – known audience and [reasonably believed to have] known purpose
  - **External** – unknown audience and unknown purpose(s).
- Consider all external parties for whom model use is relevant. This could be:
  - Regulators
  - Shareholders
  - Clients, customers, suppliers
  - Analysts, Journalists
  - Anyone relying on the model outcomes to make a decision!





# External Communications on Model Risk

## What do we need to communicate externally on model risk?

### *Regulatory Reporting*

- ORSA, ICAAP, Technical Provisions, .....

### *Shareholders require an Annual Report & Accounts*

- Is Model Risk a Principal Risk or a Secondary Risk or an Emerging Risk?
  - Market Risk, Insurance Risk, Governance Risk, Operational Risk, .... Where does model risk fit?
  - Consider the big 4 UK banks as an example

### *Other users may require other published information*

- Investors (e.g. bondholders) who rely on the prospectus
- Potential business partners (clients, customers, suppliers) who consider financial information when entering into an agreement.



# External Communications on Model Risk

## What do we need to communicate externally on model risk?

- Should we apply the **same principles** as for internal? Can we?
  - Scope and purpose of model
  - Fitness for purpose of model
  - Key model limitations
  - Key expert judgements / assumptions underlying the model, and sensitivities to these judgements
  - Extent of review / challenge / validation of the model
  - Quality of data underlying the model
- Convey same high level message in more succinct, less technical way



# External Communications on Model Risk

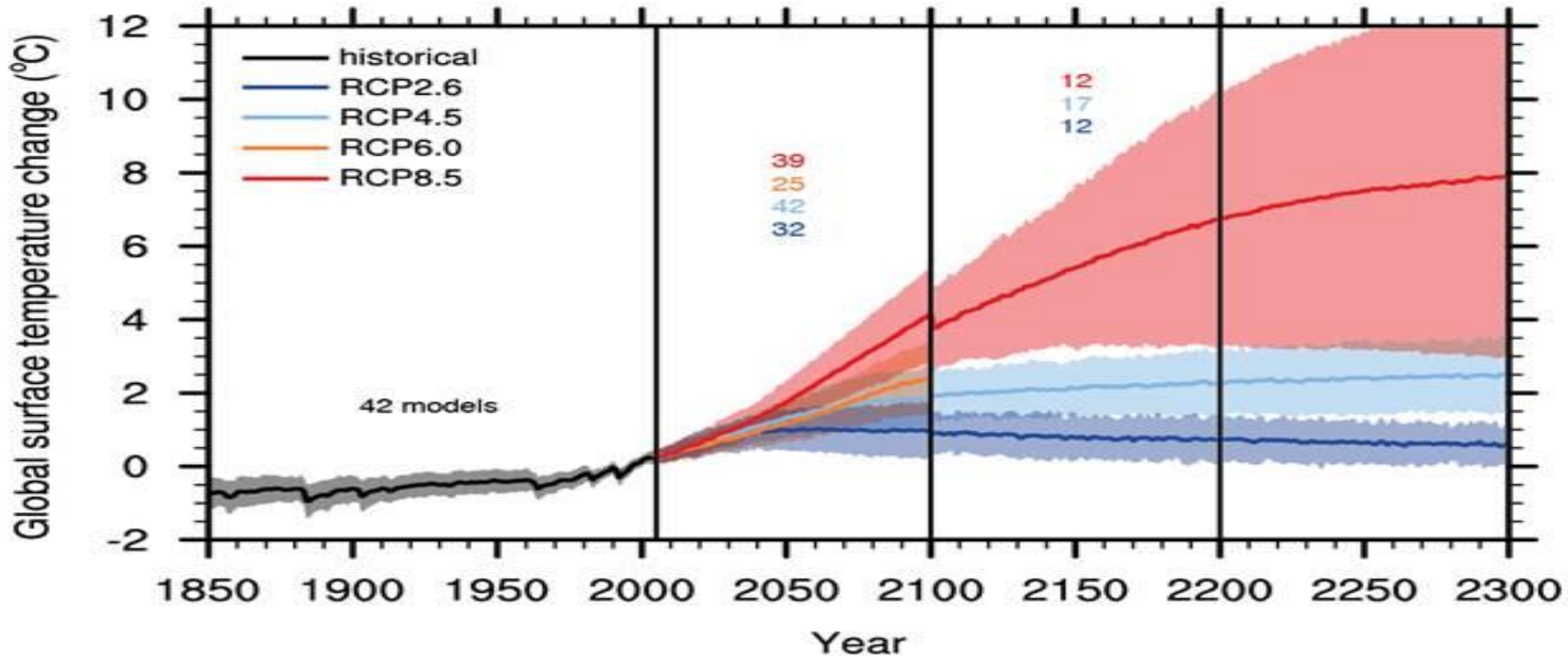
## Communication of model risk around specific models

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# External Communications on Model Risk

## Communication of model risk around specific models



Source: Long-term climate change: Projections, Commitments and Irreversibility  
[www.ipcc.ch](http://www.ipcc.ch)



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# External Communications on Model Risk

## Concerns with external communication on model risk

- It opens up a can of worms
  - Because we can't properly communicate the uncertainty inherent in the model, does it give a false sense of security?
  - Can it leave the modellers unreasonably exposed when things go wrong?

## What positive value can good external communication add?

- It inspires confidence
- Competitive advantage
- Comparable against others
- Information desired by the reader
- [You may have to]



# External Communications on Model Risk

## What are better companies doing?

### Possible path of thought process

Should everything have a model?

- 200 years ago – No models. Now – Go make me a model
- **Perhaps say NO! Sometimes....**

When should you mention the model?

- What would the answer have been if you didn't have a model?
  - Is the model critical to the decision?
- Strategic choices:
  - Lots of data, choice of great models giving similar answers
  - Not much data, not many models, great answers. But...
- “1 in 200 events”: consider what you understand and what your reader may understand e.g. return periods versus probabilities.
- How do you break the model? What needs to happen?



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# External Communications on Model Risk

## What are better companies doing?

### *Consider what we ought to include. Perhaps:*

- Does the firm have a well-understood definition of model risk? Does this have broader reach than just the modelling department?
- Does model risk have prominence with the Board? Is it a principal risk? Is it included in the Board's Risk Appetite?
- Does consideration of model risk feed into decision making in an appropriate way?
- Does the firm apply sufficient resources, tools and independence to the assessment of model risk?





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# Points for Discussion

- When should Model Risk be communicated?
- How to communicate Model Risk effectively?
- What to achieve post communication?



# Questions

# Comments

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