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Underwriting Decision Model Risk Manageme	ns: Evaluating Model Risk ent	
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CAS 2015 In-Focus Seminar Boston, MA October 22, 2015		

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## Agenda

- John Major: Introduction to Model Risk
- Alietia Caughron: Model Risk Management
  - Importance of Model Risk Management
  - Model Risk Management in Practice
- Erin Kang: Implementing and Using Models

# Data! Big Data! | Same | Same

- · Amount of data continues to grow exponentially
- Its quality is also getting exponentially worse
- Data => Information!
- The value proposition comes from extracting information out of the data and telling the story consistently and concisely

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## From Data to Models

The need to extract information out of data and tell the story consistently and concisely across the organization:

• Models are one of the tools we have to do this.



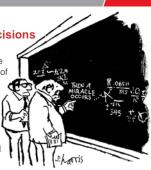


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# From Models to Decisions

We use the models to drive business decisions. Some of the challenges:

- Sufficiently credible data
- Selection of model type
- Alignment of results with the question being asked
- Portfolio versus individual risk views
- Implementation
- Transparency



"I THINK YOU SHOULD BE MODE EXPLICIT HERE IN STEP TWO."

### What is a model?

- A quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates. – Federal Reserve Board
- A representation of some aspect of the world which is based on simplifying assumptions. Institute of Actuaries
- A presentation of relationships among variables, entities, or events using statistical, financial, economic, mathematical, or scientific concepts. – Casualty Actuarial Society (draft)

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## What is model risk?

- Risk that a model is incorrectly specified or incorrectly implemented in the IT environment or inappropriately used by users, such that a user of the results of the model makes an incorrect decision. – Delta Lloyd
- The risk of adverse consequences from decisions made as a results of a model that does not adequately represent that which is being modeled – Casualty Actuarial Society (draft)

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## **Model Risk and ERM**

With the growth in data and model use, model risk is part of an Enterprise Risk Management Framework





# **Model Risk Management in Practice**

We identified key parties that needed to be involved

- 1. Corporate Stakeholders / Champions
- 2. Model Risk Management Committee
  - ERM / Capital Modeling
  - ERM / Catastrophe Modeling
  - Analytics / Predictive Modeling
  - Actuarial / Pricing
  - Actuarial / Reserving
  - Internal Audit
  - Others!!

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# **Model Risk Management in Practice**

Established 'Terms of Reference'

- 1. Made the definition of Model and Model Risk our own
- 2. Defined the mandate / scope of the Model Risk Management Committee

## **Model Risk Management in Practice**

Established a Management Information Framework

- 1. Overview of a model
- 2. The history of its updates
- 3. Status of peer reviews
- 4. Key model dependencies

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# **Model Risk Management in Practice**

Identified ways to mitigate risk and which models have them in place

- 1. Documentation
- 2. Peer Reviews
- 3. Performance Monitoring
  - Does the model work?
  - Do we follow the model?
  - How does the model affect competitiveness?

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Model Risk Management in Practice

Created a Model Risk Dashboard

1. Severity

2. Complexity

Model Risk Heat Map

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To Learn More	
Supervisory Guidance on Model Risk Management, Board of Governors of the Federal Reserve System, Office of the Comptroller of the Currency, OCC 2011-12 Attachment, April 2011: <a href="http://www.occ.gov/news-issuances/builetins/2011/builetin-2011-12a.pdf">http://www.occ.gov/news-issuances/builetins/2011/builetin-2011-12a.pdf</a>	
Model Validation Principles Applied to Risk and Capital Models in the Insurance Industry, North American CRO Council, 2012: <a all="" documents="" files="" href="http://crocouncil.org/images/CRO Council&lt;/th&gt;&lt;th&gt;&lt;/th&gt;&lt;/tr&gt;&lt;tr&gt;&lt;th&gt;Model Validation for Insurance Enterprise Risk and Capital Models, Prepared by: Markus Stricker, Shaun Wang, and Stephen J. Strommen, 2014:&lt;br&gt;https://www.casact.org/community/sections/rms/JRMS-Model-Validation.pdf&lt;/th&gt;&lt;th&gt;&lt;/th&gt;&lt;/tr&gt;&lt;tr&gt;&lt;th&gt;Model Risk – Daring to open up the black box, Model Risk Working Party of the Institute and&lt;br&gt;Faculty of Actuaries, 2015: &lt;a href=" http:="" model-risk-working-party-paper.pdf"="" pdf="" sites="" www.actuaries.org.uk="">http://www.actuaries.org.uk/sites/all/files/documents/pdf/model-risk-working-party-paper.pdf</a>	
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