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**Underwriting Decisions: Evaluating Model Risk  
Model Risk Management**

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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

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## Data! Big Data!

- 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

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### 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

Source: North American CRO Council

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### Model Risk Management in Practice

Model Risk is one of the risks included in our Risk Register

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graph TD; KR[Key Risks] --- SR[Strategic Risk]; KR --- UR[Underwriting Risk]; KR --- RR[Reserve Risk]; KR --- CR[Credit Risk]; KR --- MR[Market Risk]; KR --- LR[Liquidity Risk]; KR --- OR[Operational Risk];
```

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### 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

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### 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**

						As of 9/29/15
Severity	>\$200m					
	\$100m-\$200m					
	\$50-\$100m					
	<\$50m					
		Medium	Medium-Low	Medium	Medium-High	High
Size		Complexity				
Small Emerging Established Enterprise						

SAMPLE

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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: <http://www.occ.gov/news-issuances/bulletins/2011/bulletin-2011-12a.pdf>

Model Validation Principles Applied to Risk and Capital Models in the Insurance Industry, North American CRO Council, 2012: [http://crocouncil.org/images/CRO\\_Council\\_-\\_Model\\_Validation\\_Principles.pdf](http://crocouncil.org/images/CRO_Council_-_Model_Validation_Principles.pdf)

Model Validation for Insurance Enterprise Risk and Capital Models, Prepared by: Markus Stricker, Shaun Wang, and Stephen J. Strommen, 2014: <https://www.casact.org/community/sections/rms/IRMS-Model-Validation.pdf>

Model Risk – Daring to open up the black box, Model Risk Working Party of the Institute and Faculty of Actuaries, 2015: <http://www.actuaries.org.uk/sites/all/files/documents/pdf/model-risk-working-party-paper.pdf>

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### THANK YOU!

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