

The Case for Prioritizing Model Risk Management (MRM)

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October 2, 2015
2015 CAS ERM Seminar, Minneapolis, MN

Our Goal

- ▶ Make a case for the importance of model risk management (MRM)
- ▶ Introduce some reference MRM frameworks
- ▶ Offer some tips or methods for MRM
- ▶ Facilitate an exchange of ideas on the topic

▶ “More than 300 employees are working in Model Risk and Development. In 2014, this highly specialized team completed over 500 model reviews, implemented a system to assess the ongoing performance of the 1,000+ most complex models in the firm, and continued to enhance capital and loss models for our company.”

▶ –*Letter to Shareholders (2015)*, Jamie Dimon, Chairman and CEO, JPMorgan Chase & Co.

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Polling Question 1 – Current MRM

- ▶ How would you characterize MRM processes within the insurance industry?
 - ▶ Ad-hoc and inconsistent
 - ▶ Somewhat developed and communicated
 - ▶ In-place and consistently applied
 - ▶ None in place

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Polling Question 2 – Current MRM

- ▶ Who develops or manages the MRM framework at your organization?
 - ▶ Actuarial
 - ▶ ERM
 - ▶ Finance
 - ▶ Internal Audit
 - ▶ IT
 - ▶ Segment Leaders/Executive Leadership
 - ▶ Others

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Polling Question 3 – Model Inventory

- ▶ How many models do you think the average insurance company uses today?
 - ▶ Fewer than 50
 - ▶ 50-100
 - ▶ 100-500
 - ▶ >500

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Polling Question 4 – Scope of MRM

- ▶ **What models are typically subject to the MRM process?**
 - ▶ Actuarial pricing/reserving models
 - ▶ Economic capital models
 - ▶ Excel spreadsheet models
 - ▶ Finance/accounting models
 - ▶ Third-party furnished models
 - ▶ Underwriting models
 - ▶ Others

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Polling Question 5 – Model Challenges

- ▶ **What do you think are primary challenges for MRM?**
 - ▶ Clarity of roles and responsibilities
 - ▶ Communicating model assumptions and limitations
 - ▶ Instilling formal procedure and policies
 - ▶ It's labor-intensive & time consuming
 - ▶ Qualified expertise for independent model validation
 - ▶ Sufficient monitoring and documentation

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Agenda

- ▶ MRM frameworks
- ▶ Model-level and entire inventory MRM methods
- ▶ Importance of MRM
- ▶ MRM at CNA



Model management reference frameworks

- ▶ Federal Reserve OCC paper
- ▶ North American CRO Council
- ▶ CAS, CIA, SOA Joint Risk Management
- ▶ Draft ASOP

Note: only selected highlights from each reference will be presented in this session. Links to the references are provided and recommended for a more complete understanding.



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Federal Reserve Office of the Comptroller of the Currency

“Supervisory Guidance on Model Risk Management”

- ▶ SR Letter 11-7 (April 4, 2011)
- ▶ Definition of a model
- ▶ Guidance on effective model risk management
 - ▶ Model validation
 - ▶ Development, implementation, and use
 - ▶ Governance and controls
- ▶ 2 main sources of risk
 - ▶ Model itself
 - ▶ Incorrect or inappropriate use

<http://www.federalreserve.gov/bankinforeg/srletters/sr1107.htm>

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- ▶ Definition of a model

Model refers to a quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates.

3 components:

- ▶ Information input
- ▶ Processing
- ▶ Reporting

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North American Chief Risk Officer Council

- ▶ *“Model Validation Principles Applied to Risk and Capital Models in the Insurance Industry”*
- ▶ 2012
- ▶ **Purpose: promote strong model validation**
 - ▶ Design/build consistent with purpose
 - ▶ Validation performed by independent party
 - ▶ Accountability for validation
 - ▶ Review model governance
 - ▶ Appropriate to materiality/complexity
 - ▶ Validate all components
 - ▶ Address limitations
 - ▶ Document results

http://crocouncil.org/images/CRO_Council_-_Model_Validation_Principles.pdf

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CAS, CIA, and SOA Joint Risk Management Section

- ▶ *“Model Validation for Insurance Enterprise Risk and Capital Models”*
- ▶ April 2014
- ▶ **Model risk**
 - ▶ Conceptual risk
 - ▶ Implementation risk
 - ▶ Input risk
 - ▶ Output risk
 - ▶ Reporting risk
- ▶ **Case study on AIG and JP Morgan London Whale**
- ▶ **Comparison to CRO, Solvency II, OCC**

<https://www.soa.org/Research/Research-Projects/Risk-Management/research-2014-model-valid-ins.aspx>

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Actuarial Standards Board

- ▶ Actuarial Standard of Practice on “Modeling”
- ▶ November 2014 (2nd draft)
- ▶ Issues and recommended practices
 - ▶ Model meets intended purpose
 - ▶ Model risk
 - ▶ Presentation of results

<http://www.actuarialstandardsboard.org/asops/modeling-second-exposure-draft/>

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Agenda

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▶

Individual model management

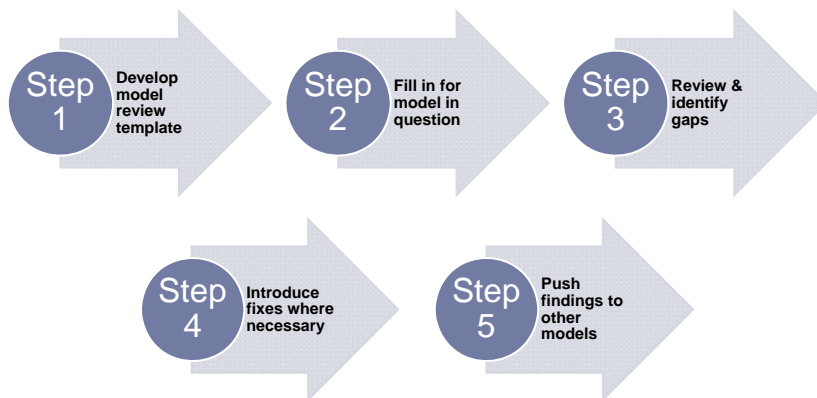
Components of model-level management



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Individual model management

Roadmap to improving model-level management



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Individual model management

Simple reporting & scoring mechanism

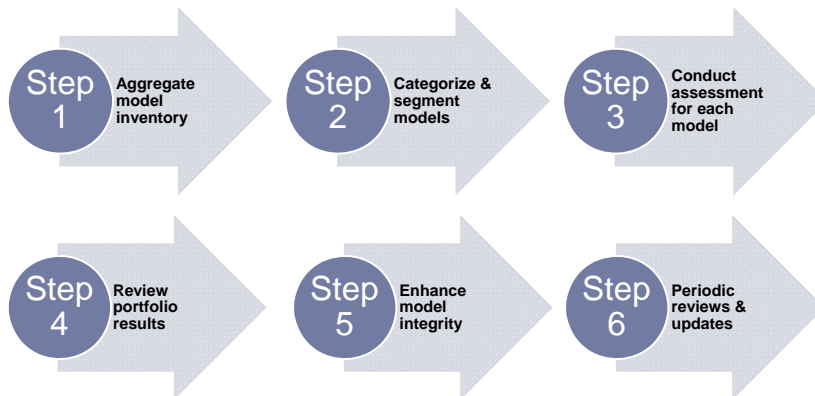
- ▶ Model review template
- ▶ Required items
- ▶ Important items
- ▶ Highlight gaps

SECTION	QUESTION	YES/NO	% of POINTS	CRITICAL GRADE*	SECTION LEVEL
Governance	Does the model	Yes	9.2 OUT OF 10	A	MATURE
	Does the model	Yes			
	Are there requir	Yes			
	Are security pro	Yes			
	Does the model	Yes			
Validation	Is effective mod	No	5.4 OUT OF 10	C	INITIAL
	Is the data used	Yes			
	Are the assumpt	No			
	Are the concept	Yes			
	Are the model c	No			
	Has the model a	Yes			
	Have results be	No			
	Is the model suc	Yes			
	Are all relevant	No			
	Are there requir	Yes			
	Is there a forma	No			
Procedures & Documentation	Are there event	Yes	8.4 OUT OF 10	B	INTERMEDIATE
	Do model modif	No			
	Have model tim	Yes			
	Is there a forma	No			
	Have the model	Yes			
Is there a forma	Yes	7.3 OUT OF 10	C	INITIAL	
Are supporting	Yes				
Are records kep	Yes				
OVERALL MODEL MANAGEMENT ASSE			7.3 OUT OF 10	C	INITIAL

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Inventory model management

An action plan



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Inventory model management

Creating a model inventory

- ▶ Identify models
- ▶ Categorize based on:
 - ▶ Purpose
 - ▶ Primary use
 - ▶ Other permitted uses
 - ▶ Department
 - ▶ Source
 - ▶ Importance
 - ▶ Status
 - ▶ Others

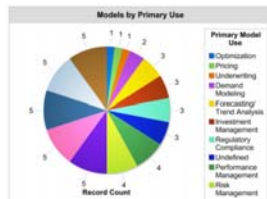
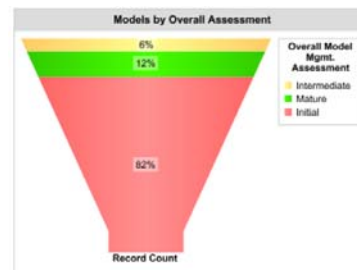
Model *	Primary Model Use	Department	Model Status
10k risk register 2015 v3	Risk Management	Compliance	Production
Accounts payable 2015	Capital Expenditures	Finance	Development
Accounts receivable 2015	Performance Managem...	Finance	Development
Business segment one 2015 P&L	Performance Managem...	Accounting	Production
Business segment three 2015 P&L	Performance Management	Finance	Production
Business segment two 2015 P&L	Financial Planning & An...	Accounting	Production
Capital planning 2015 v2	Capital Adequacy Asse...	Finance	Not Used
Capital planning 2016 v1	Capital Expenditures	Accounting	Production
Capital planning 2016 v2	Capital Adequacy Assess...	Accounting	Production
Cayman captive 2015 financials	Risk Management	Finance	Production
Completed acquisition one vs_a	Valuation	Finance	Production
Completed acquisition three vs_	Valuation	Marketing	Production
Completed acquisition two vs_actual	Performance Managem...	Compliance	Production
Credit rating model	Forecasting/Trend Analysis	Finance	Production
Customer/policyholder behavior	Demand Modeling	Product Developm...	Production
Cyber risk exposure v3	Risk Management	Finance	Not Used
Divestiture five	Valuation	Finance	Not Used
Divestiture four	Valuation	Marketing	Development
Divestiture six	Undefined	Finance	Not Used
Economic Capital Model-enterprise	Regulatory Compliance	FP&A	Production
ERM Key Risks 2015 v2	Risk Management	Finance	Development

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Inventory model management

Reviewing portfolio results

- ▶ Overall MRM assessment
- ▶ Assessment by:
 - ▶ Importance
 - ▶ Primary use
 - ▶ Department
 - ▶ Validation date
 - ▶ Audit assertion
 - ▶ Established procedures
 - ▶ Documentation
 - ▶ Other



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Thank you! & Questions?

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