Model Governance

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risk&regulatory CONSULTING

OBJECTIVES

- Provide background on model governance requirements and guiding principles
- Explore real life examples of model governance challenges and solutions
- Identify helpful resources to use in your day to day work

Current Landscape

Increasing Product Complexity

Capital markets guarantees
Policyholder optionality

Regulatory Requirements

Principles Based Reserves
IFRS 17/GAAP Long Duration
Modeling guidance

Risk Management

Enhanced CAT modeling
ALM and hedging
Internal models

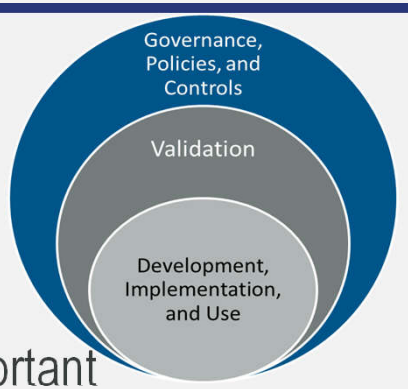
Competition/Analytics

New market entrants
Newer/greater data sources

Increased Industry Focus on Models:

- Independent, Specialized, Modeling Function
- Model Governance Policies
- Model Inventory
- Model Validation
- Model Documentation
- Model Controls
- Production Environments
- Increased involvement of 2nd/3rd lines of defense

SR 11-7
*SUPERVISORY GUIDANCE ON MRM**



- Purpose
  - Comprehensive guidance for banks on effective MRM
  - Rigorous model validation plays a critical role in MRM
  - Strong governance and control mechanisms are fundamentally important
  - Sound development, implementation, and use of models also vital elements
- Guiding principles for managing model risk
  - Disciplined and knowledgeable development and implementation processes consistent with the situation and goals of the model user and with company policy
  - Effective challenge of models can identify model limitations and assumptions and produce appropriate changes
  - Model validation is the set of processes and activities intended to verify that models are performing as expected, in line with their design objectives and business uses

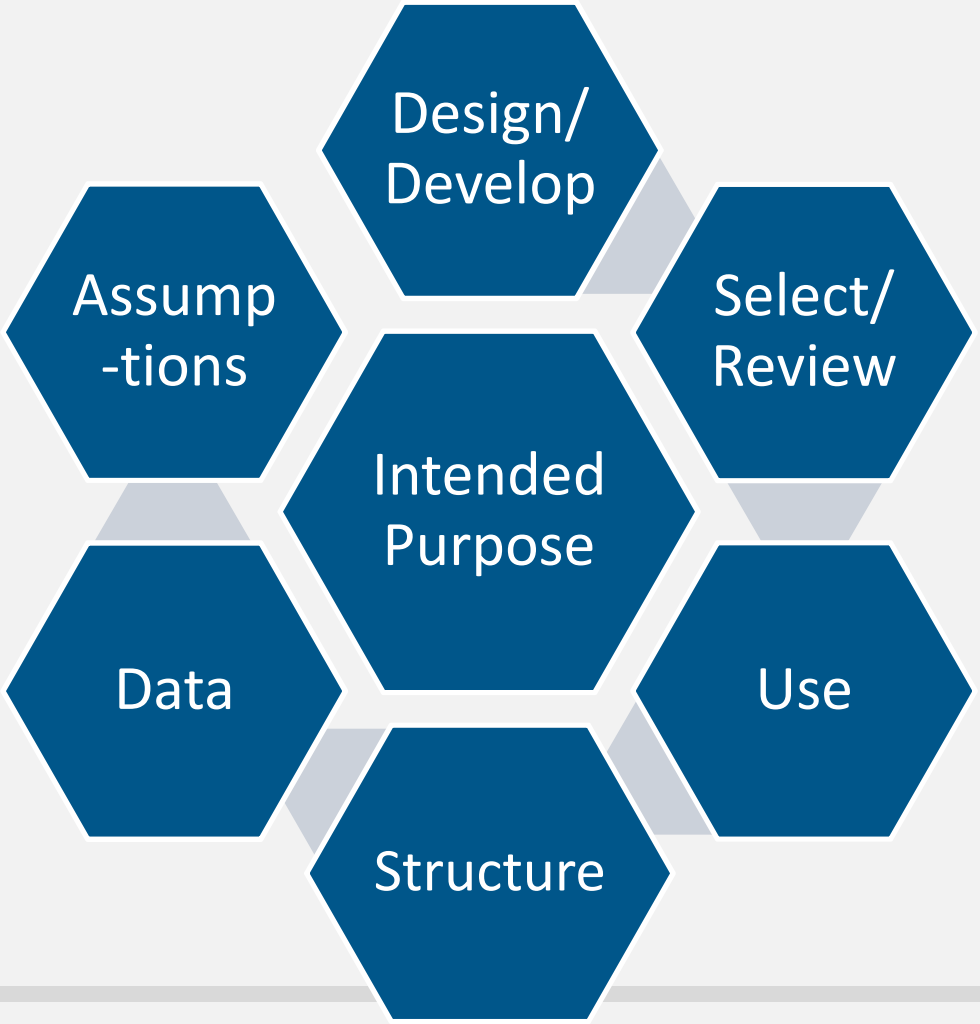
* Model Risk Management

ASOP* No. 56, *Modeling*

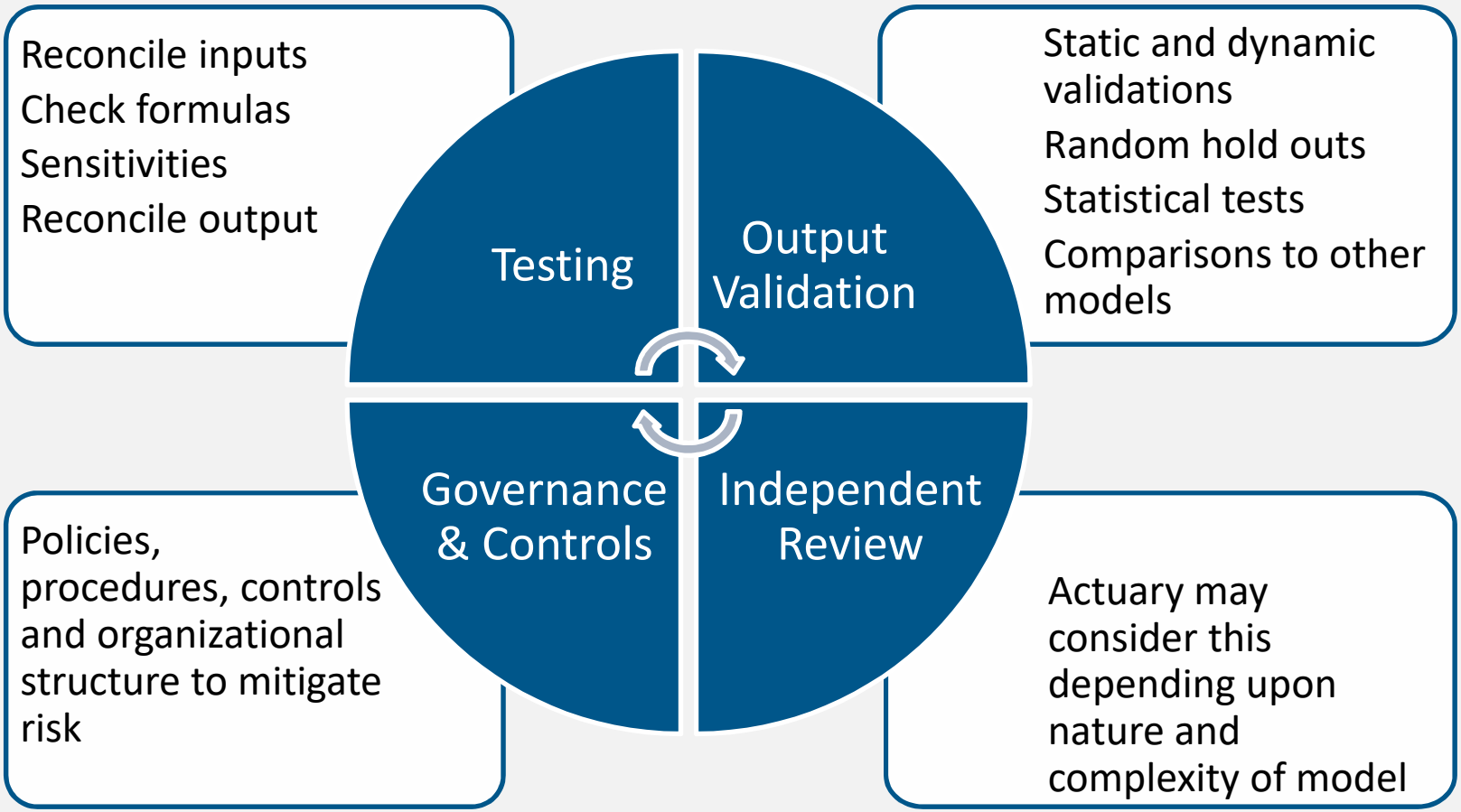
- Significant work over last 3 years on modeling standard for actuaries; final standard effective October 1, 2020
- Provides guidance with respect to designing, developing, selecting, modifying, using, reviewing or evaluating all types of models with a material effect
- Defines a model as "*a simplified representation of relationships among real world variables, entities, or events using statistical, financial, economic, mathematical, non-quantitative, or scientific concepts and equations*"
- Covers reliance on others, intended purpose, understanding the model, evaluating and mitigating model risk, documentation, and disclosures

** Actuarial Standard of Practice*

MODELING ASOP – INTENDED PURPOSE



Modeling ASOP – Evaluating & Mitigating Risk



OTHER GUIDANCE

- International Professional Practices Network (IPPF) *Auditing Model Risk Management* Practice Guide
- Solvency and Actuarial Issues Subcommittee, Standard No. 2.2.7: *IAIS Standard on the Use of Internal Models for Regulatory Purposes*
- ASOP No. 38, *Using Models Outside the Actuary's Area of Expertise (Property & Casualty)*

INDUSTRY ACTIVITIES

Modeling Function	• Increasing complexity driving movement to centralized function • More common use of single model steward accountable for meeting management and external requirements • May include a dedicated actuarial IT resource
Model Architecture	• Increased interest in more controlled platforms vs open architecture • Use of test and production environments; production "owned" by IT • Move toward single source of data, often sourced from warehouse • "Back end" output database(s) used for reporting and analytics
Model Governance Approach	• Increased involvement by senior management and Board, including new "Model" or "Model Risk" Committees • Formal model governance policies • Creation of independent model review function (in 1st or 2nd line)
Validation and Controls	• Expansion beyond SOX and MAR • Requirements tied to model risk ranking results • Trend toward more preventive and automated controls

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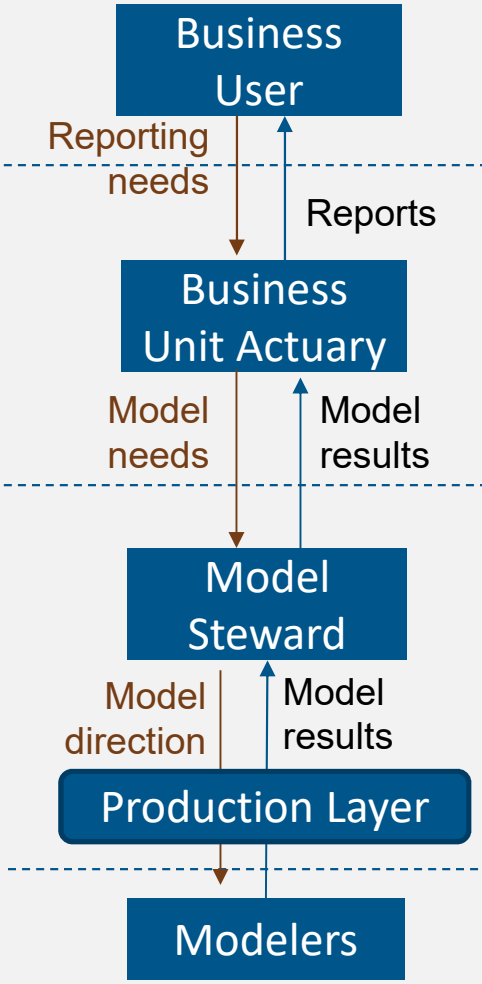
Case Study – Roles & Responsibilities



- Defines business needs
- Challenges results provided
- Explains key drivers of results

- Directs process & delivers results
- Explains key drivers to stakeholders
- Oversees assumption and scenario development
- Designs reports for management
- Investigates issues

- Owns quality, accuracy, timeliness
- Leads assumption/scenario development
- Works with business on fit for purpose
- Gathers/reviews/challenges inputs/assumptions
- Works with IT on test and production version
- Owns revisions to process and technology
- Implements model governance and controls

- Updates and runs models; explains results
- Owns quality of model outputs

Model Risk Committee(s)

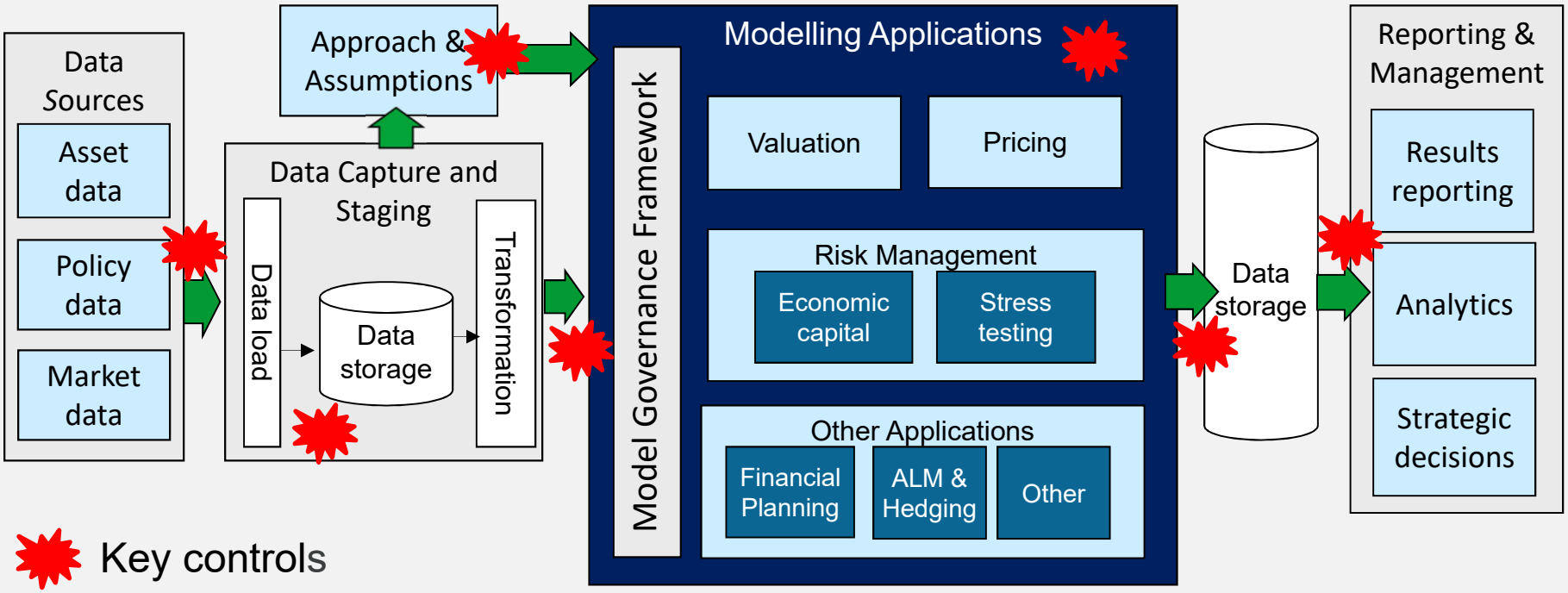
ERM Design & Review

Internal Audit Review

Board Oversight

CASE STUDY - CONTROLS

In general, the industry is moving toward a more controlled environment for all modeling applications, with a centralized location for inputs and outputs and formal approvals and signoffs at each stage in the process



Model Validation – CRO Council

Core Principle*	Considerations
Build for intended purpose	While the idea of a "single model" is nice in theory, it often fails in practice There is a tradeoff between a single platform and platforms that are fit for each product and application
Model validation is independent	A separate functional area charged with validation
Establish model validation owner	Creates accountability Should have authority to communicate and remediate
Appropriate model governance	Defined policies that cover roles, responsibilities, and minimum requirements
Consider proportionality	Critical for validation to provide sufficient benefits for the cost
Validate model components	Data, methods, assumptions, calculations, and outputs
Address validation limitations	Including plans to address in the future
Document the validation	Can be used to improve and focus future validations

*8 core principles identified in the North American CRO Council's paper "Model Validation Principles Applied to Risk and Capital Models in the Insurance Industry"

Model Risk Management Practices*

- Documented model risk policy approved by the Board (or appropriate delegate), reviewed and updated regularly
- Defined roles & responsibilities
- Model inventory containing details of all company models (complexity, materiality, risk ranking)
- Model documentation
- Model risk quantification
- Model development & implementation
- Model review & validation
- Ongoing monitoring

*source: AAA Model Risk Management Practice Note

Model Validation Plan

This figure depicts a typical model validation plan

Additional details can be found in the appendix to the AAA Model Risk Management Practice Note

Model Documentation Content

- Model owner as of a date
- Intended purpose and uses
- Version/last change date
- Summary of last validation and result
- Assumptions made in model construction
- Developer notes associated with any codes or calculation engine underlying the model
- Data sources and formats
- Parameter assumptions
- Dependencies on other models and processes
- Key outputs
- Applicable regulations and guidelines
- Limitations and future research areas
- Detailed step-by-step user instructions

**source: AAA Model Risk Management Practice Note*

Case Study - Model Risk Scorecard

Model	Source	Materiality	Complexity	Years in Use	Past Findings	Risk Score
VA Hedging – Liability Calc	H	H	H	1	2	10
Life Forecast	M	H	M	12	0	6
Credit VaR	V	H	M	6	0	4

Source: Homegrown (H), Vendor (V), or Mixed (M)

Materiality: Significance to financial reports and/or management decisions

Complexity: Considerations include type of system, volume of inputs, volume of data, nature of calculations

Years in Use: # of years used since original implementation or last major update

Past Findings: # of significant findings from validation or audit

Risk Score: Scale of 1 (low risk) to 10 (high risk)