

Managing the model risk of actuarial models 2018 Asian Actuarial Conference

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Presenters

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Agenda

1. Model governance overview
2. Model risk guidance from the Actuarial profession
3. Evolving role of model risk
4. Implications of technology on model risk

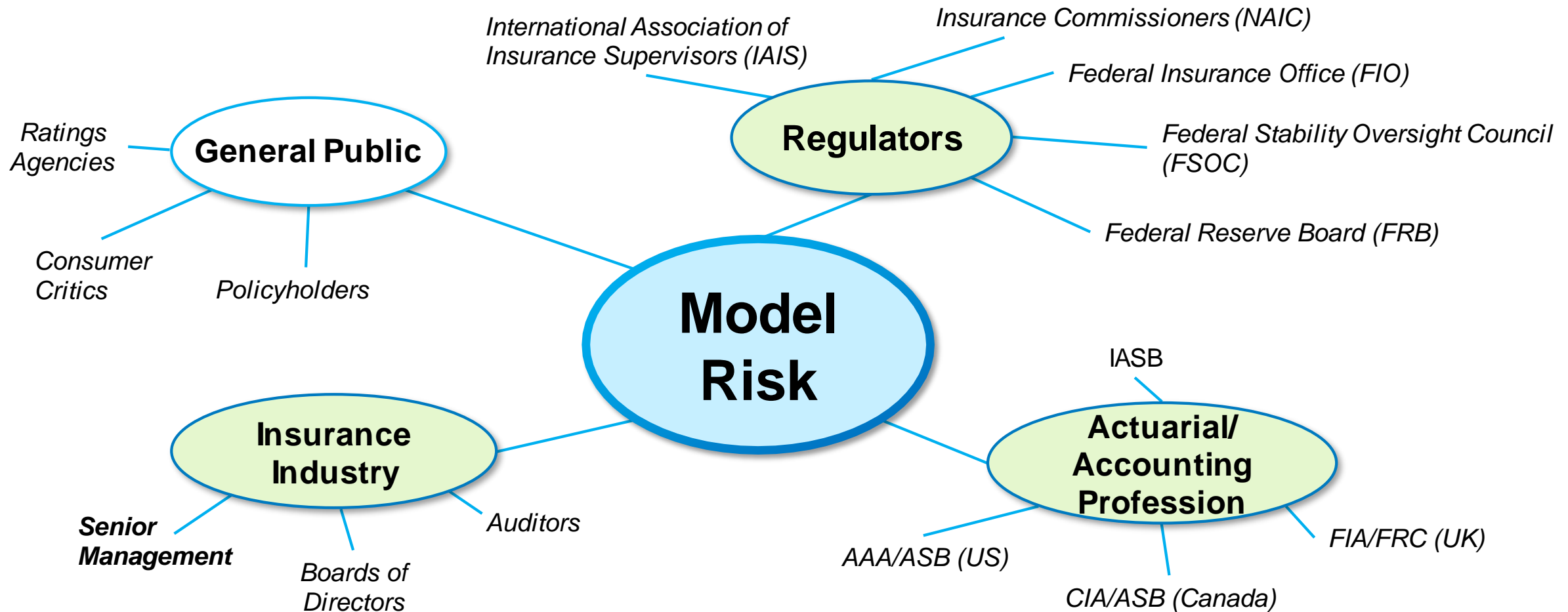
Polling Question #1

Perceived importance of Model Governance/model risk management

Select the option that best describes your view:

- a) Material modelling issues are a major risk which need to be managed proactively.
- b) Actuaries are already managing the models well, and this is not a high priority.
- c) What is model risk management?

Who has led the drive to address Model Risk?



Global Progress on Actuarial Modeling SOPs



- ASOP on “Modeling” 3rd Exposure Draft released July, 2016
- released July, 2016 (comment period ended 10/31/2016)



- “Revisions to General Standards to Reflect the Use of Models”
- Released January 2017 (effective January 2018)



- ISAP 1A: Model Governance
- ISAP 5: Insurer Enterprise Risk Models
- Both adopted November, 2016



- Technical Actuarial Standard M – Modelling
- Effective April, 2010

Model and Model Risk Definitions

Taken from Canadian ASOPs

1110.31.1 *Model* is a practical representation of relationships among entities or events using statistical, financial, economic, or mathematical concepts. A model uses methods, assumptions, and data that simplify a more complex system and produces results that are intended to provide useful information on that system.

1110.31.3 *Model risk* is the risk that, due to flaws or limitations in the model or in its use, the actuary or a user of the results of the model will draw an inappropriate conclusion from those results.

Model Risk Management

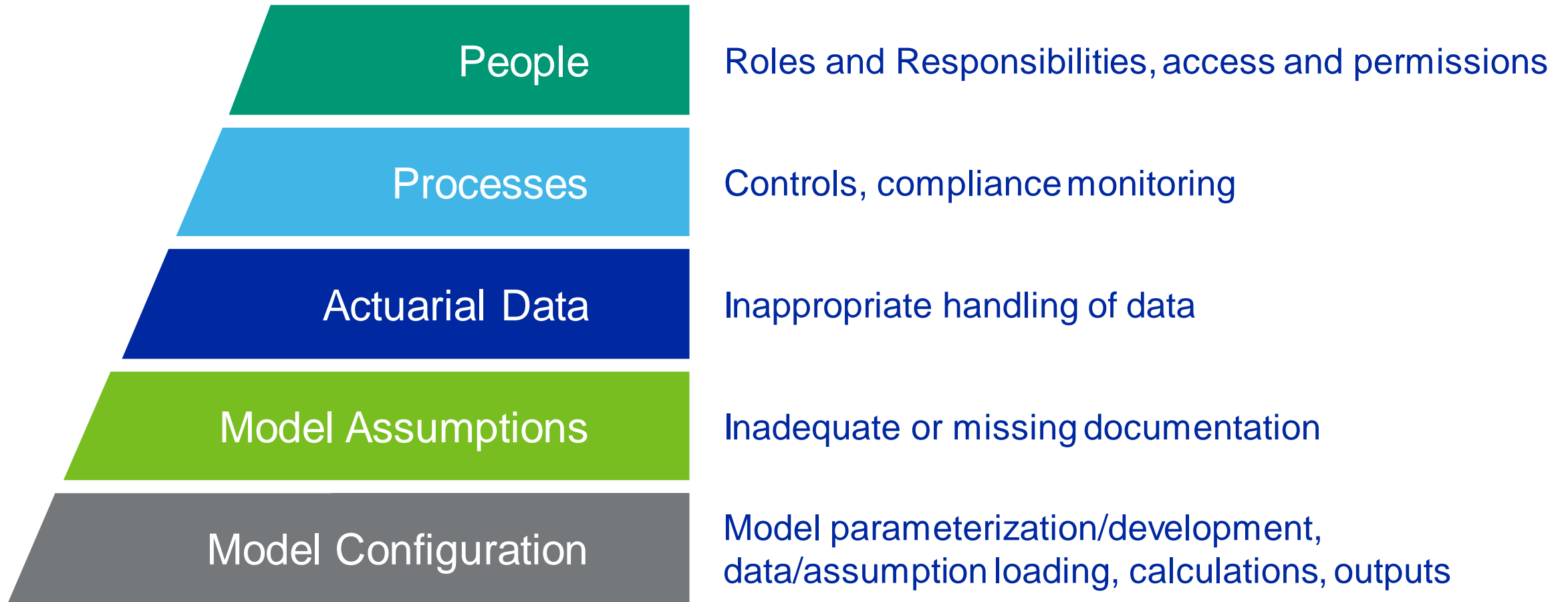
Important components

- » Model Inventory:
 - Record of all models relied on by the company, showing model type and significance, risk rating, the status of validation, and outstanding deficiencies.

- » Model Validation:
 - Process of reviewing and examining all aspects of a model in order to confirm model is fit for its purpose.

- » Model Governance:
 - does not define the approach to model validation. It is vitally concerned with the ongoing assessment of its effectiveness.

Practical Considerations for Model Risk Mgmt



Model Governance Defined:

A comprehensive set of principles, roles, responsibilities and processes that provide comfort to the intended users of the model results that model risk is understood and being effectively managed.

- » Model governance provides a **framework** to:
 - Oversee the use of models
 - Understand model risk throughout the model lifecycle
 - Provide stakeholders with confirmation of model fitness and quality

Model Governance goes beyond Model Risk

- » Model quality and effectiveness
 - Flexibility, usefulness, going beyond compliance
- » Model efficiency and performance
 - Timeliness of full execution
 - IT and Human costs of operation
 - Costs of update and maintenance
- » Model consistency throughout organization

IAA Risk Book



Governance, Management and Regulation of Insurance Operations

- » Collection of papers produced by IAA Insurance Regulation Committee to
“help ensure both the sustainability of insurance programs and the protection of their policyholders”

- » Ch. 15: Governance of Models
 - by Trevor Howes, Godfrey Perrott, Sheldon Selby, David Sherwood, approved Sept. 2016
 - Target Audience: Regulators and other stakeholders
 - Goal: explore Models and Model Risk specifically from an actuarial insurance enterprise perspective, and describe the importance and nature of Model Governance
 - Reviewed and extracted key points from the wealth of materials available
 - Not a comprehensive textbook; not professional guidance

New Definitions in Canadian ASOPs

Models and Controls

1535.03 Amount of effort in validation, documentation and risk mitigation depends primarily on influence model has on the decisions that it supports, and to a lesser extent on the complexity of the calculations and how they are performed.

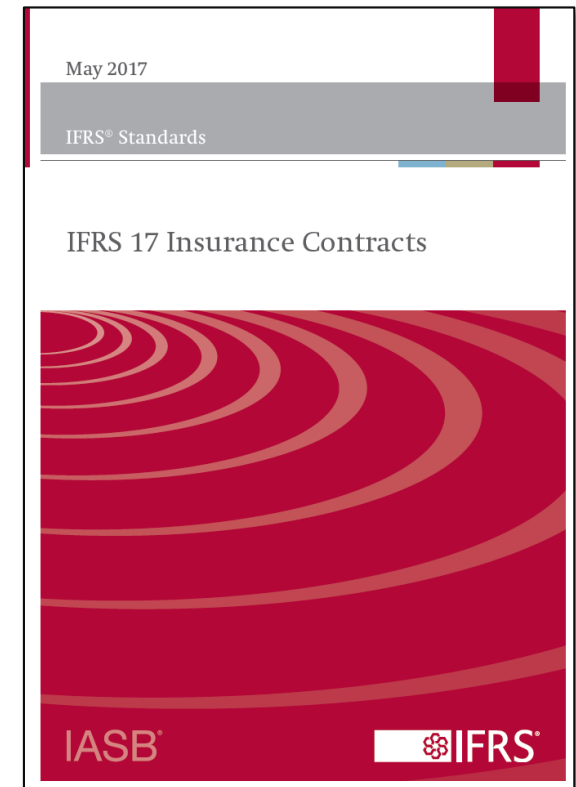
1540.01 Control procedures that **detect errors** and **decrease the effect of errors** should be performed for calculations.

1540.01.1 To mitigate model risk, actuary should perform model validation and employ other strategies appropriate for the **financial significance** of the results and the **complexity** of the model.

Implications of IFRS 17

Revisions to Canadian ASOPs

- » May 16 2018: Release of new Exposure Draft
 - Incorporate changes required by adoption of IFRS 17 Insurance Contracts.
 - Including Principles of International Standard of Actuarial Practice 4 – Actuarial Practice in Relation to IFRS 17 Insurance Contracts
- » Review is needed by all actuaries in valuation/reporting roles
 - Impact on model risk governance and risk mitigation
 - Does ISAP 4 appropriately reflect the Appointed Actuary's role in IFRS 17 reporting?



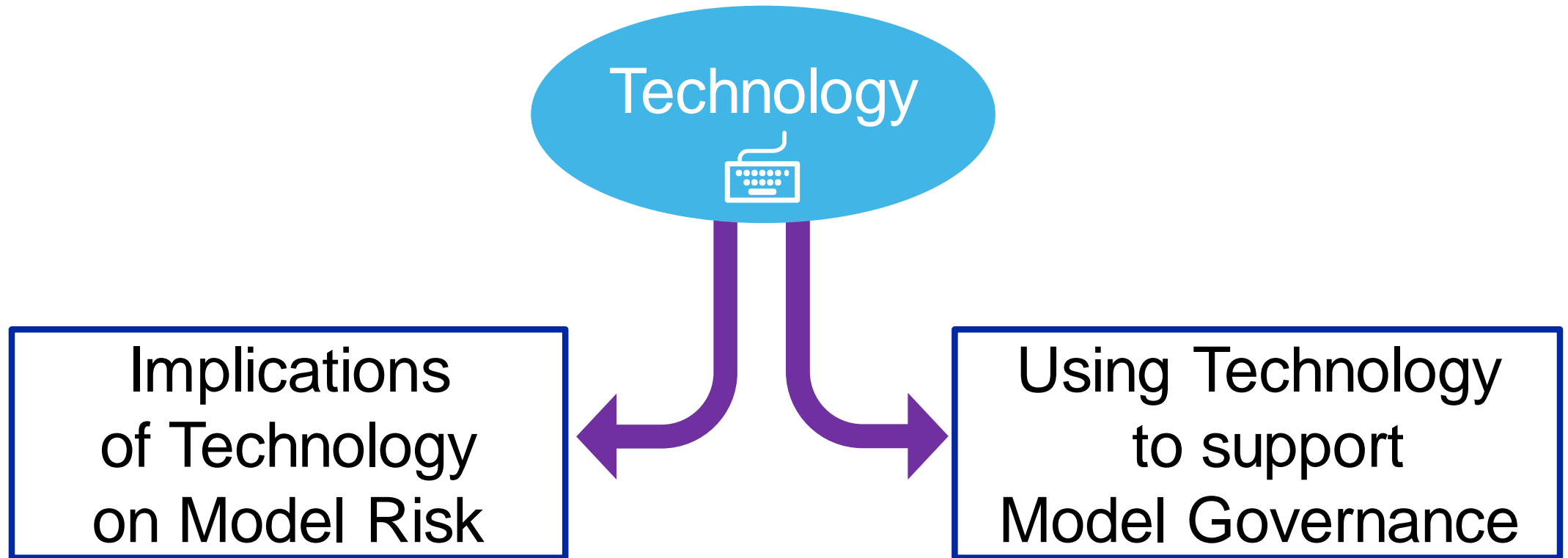
Polling Question #2

Current state of Model Governance/model risk management

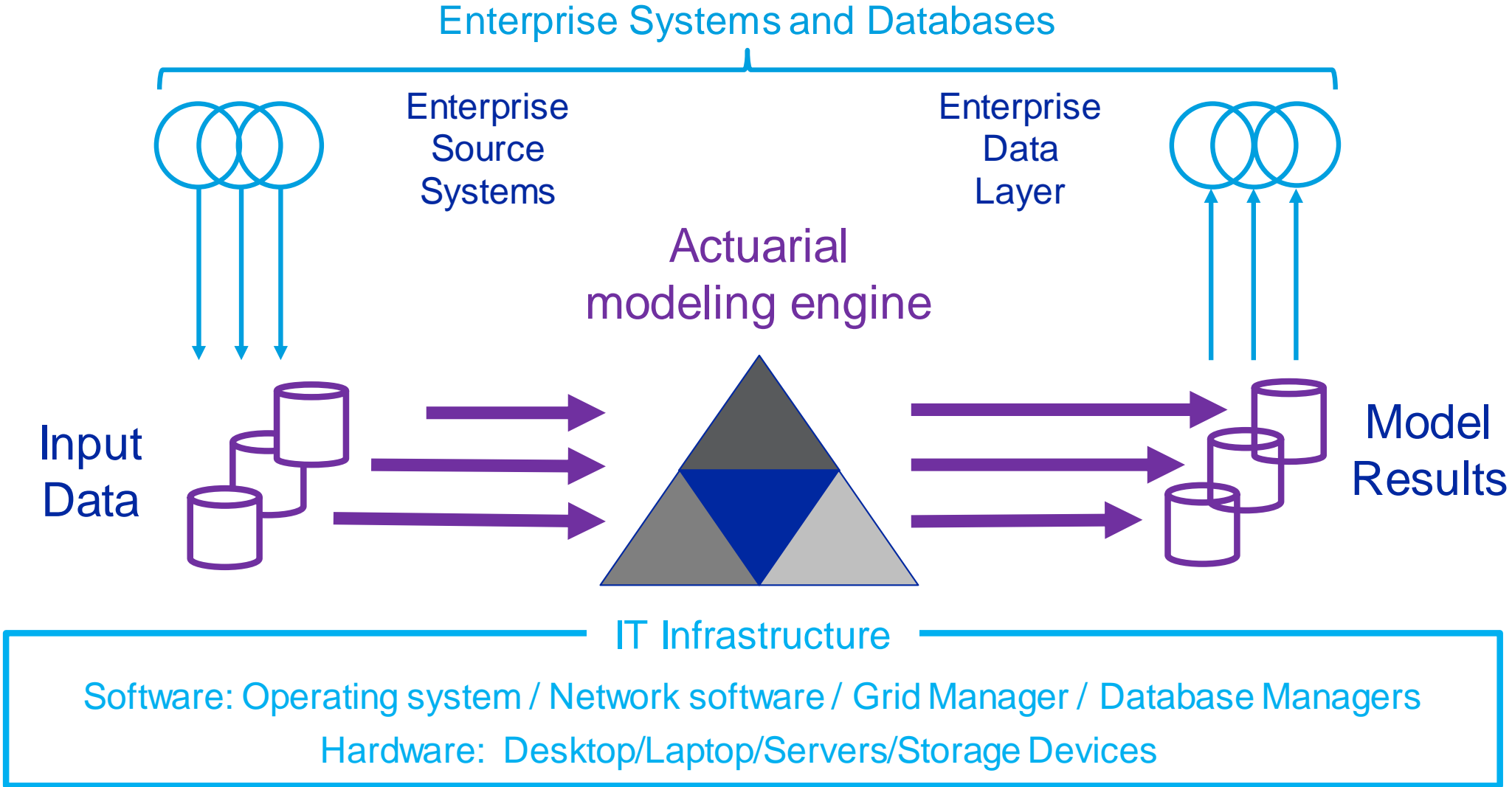
Which option best describes your organization with regards to model risk management and model governance?

- a) A formal framework is already in place with clear policies outlining the processes, roles and responsibilities. There is only minor improvements required for maintenance purposes.
- b) There is a framework in place, but there is definitely room for improvement.
- c) Significant improvements to existing practices are needed to achieve a robust model risk management framework.

Technology Considerations in Model Governance

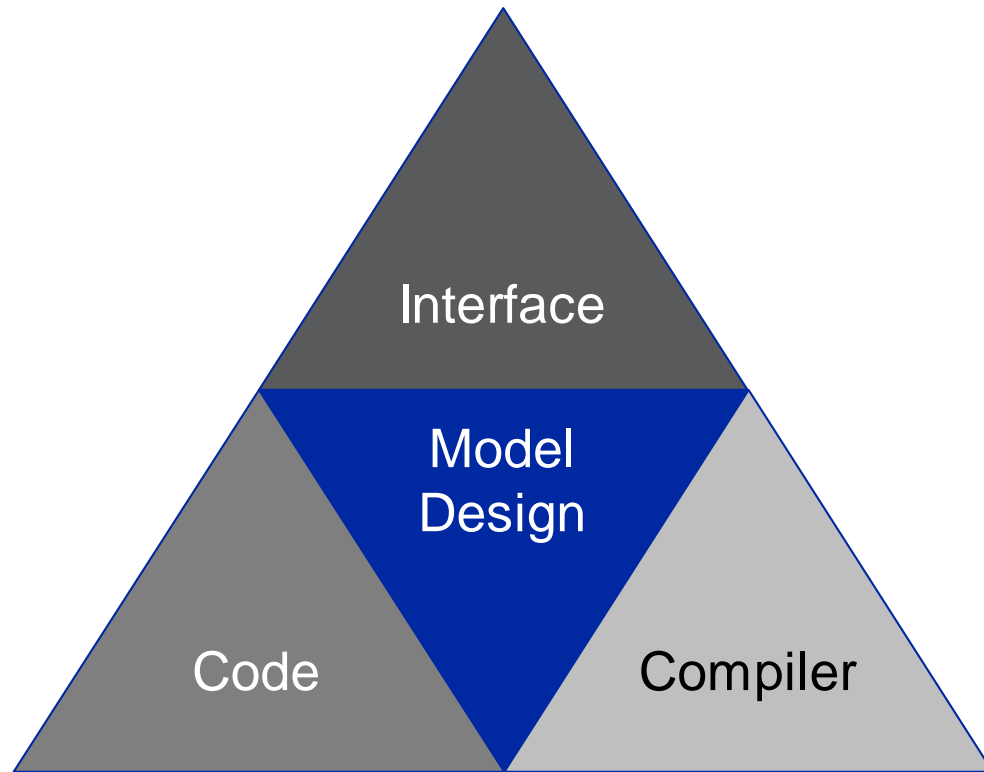


Actuarial Models as Enterprise Applications



Actuarial Models as Enterprise Applications

Actuarial modeling engine



Actuarial model

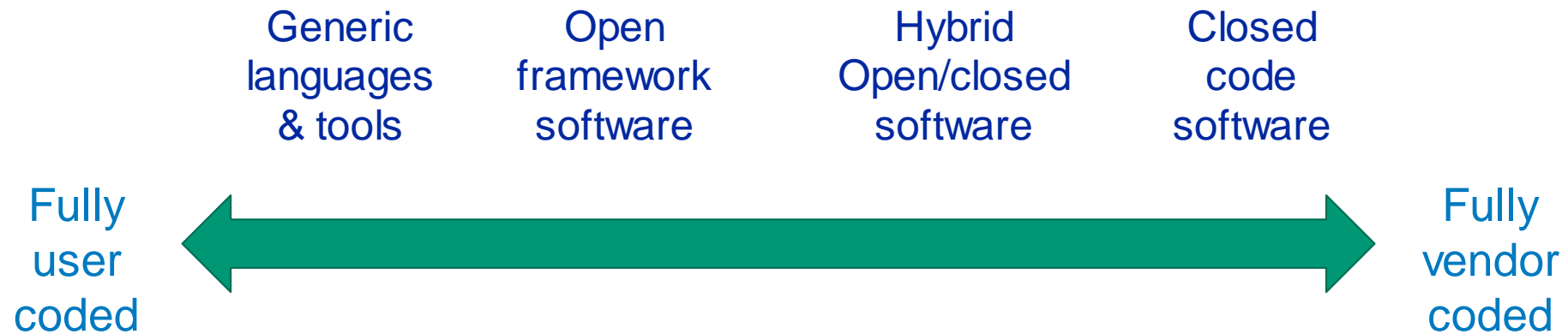
The sum of:

» The engine (platform/system)

Plus:

1. Configuration for purpose and for products/plans
2. Definition of assumptions
3. Linkage of (1) and (2)

Approaches to Actuarial Software



User coded models require:

- » Specification of model logic
- » Coding logic in software
- » Compiling and debugging

Vendor coded models require:

- » Loading of business data
- » Definition & managing assumptions
- » Model configuration

Apply Governance Tools to all Components

| Technique | Preventative | Detective |
|--|--------------|-----------|
| Initial and Ongoing Validation | ✓ | ✓ |
| Independent Review | | ✓ |
| Disciplined Maintenance and Update Processes | ✓ | |
| Permissions and Access Control | ✓ | |
| Training, Education & Experience | ✓ | |
| Change History and Version Control | ✓ | ✓ |
| Analytic Controls and Variance Reports | | ✓ |
| Attribution Analysis, Reconciliation | | ✓ |

Disciplined Maintenance and Update Process

- » Separation of development, test, research and production environments
- » Restrict access and assign independent roles
- » Production versions must be approved
- » Plan regular maintenance and updates, including vendor releases
 - apply incrementally and verify/quantify impact

Note:

- » Apply rules to all IT components of the total model
- » Validate/verify changes in 3rd party software

Model Transparency

- » Transparency is critical for efficient review & audit and for overall confidence
 - What assumptions are applied for what purpose? To which business?
 - Avoid choosing or defining assumptions within code
 - › risky and cumbersome to update
 - › difficult to review, audit, or document
 - Using objects that contain assumptions is preferable to code, provided:
 - › Objects are reviewed, tested and locked against further change
 - › Names of objects are clear and meaningful as to contents and purpose
 - › Assumption updates are not performed by changing object contents
- » Transparency can take more effort and can impact model performance

Technology can enable Model Governance

- » Moving models off desktop PCs to centralized infrastructure enables standard IT controls & safeguards and vendor provided tools
 - Multiple environments and workspaces; simple migration
 - Permissions based on standard Windows logons or selectable roles
 - Version control on all components of a model
 - Identification of approved versions of models and software
 - Automated attribution analysis by model version/change
 - Standard tools for regression testing of results comparing models, software releases, assumptions changes, IT environment changes

Questions & Answers

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