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# Development and Governance of Assumptions

March 20, 2013

# Model and Assumptions

## □ Model

- *A model is broadly defined as a process within a system that transforms data and/or assumptions into values, inferences, or information for the purpose of valuation or business decision making”*
- (Somewhat) Simplified representation of a more complicated reality for the purposes of estimating, evaluating or predicting possible outcomes

## □ Assumptions

- Working hypothesis of model and estimate of model variables to assist in purpose of modeling
- Model specifications

# Types of Assumptions

## ❑ Common Assumptions

- Mortality, mortality improvement
- Morbidity
- Lapse / surrender
- Expenses
- Interest rate
- Inflation

Depending on the model, each model has its specific assumptions.

## ❑ Generally, they fall into two categories

- Financial
- Demographic

# Assumption Setting

- ❑ Assumptions are set generally based on experience and actuarial judgment is often required in interpreting the experience data and setting assumptions

## *Source of data:*

- Industry or market data
  - Company specific experience study
  - Regulator's prescribed information
- ❑ Actuarial Standards of Practice (ASOPs) define an approach be followed in gathering and using data when setting assumptions

# Important Limitations to Consider

- ❑ Assumptions are useful tools but often have limitations
  - Assumptions are estimates – they are not necessarily precise
  - Assumptions can become stale if data underlying them is no longer valid
  - Information supporting assumptions could change – conditions change
  
- ❑ It is fundamentally important to be aware of these limitations and address them to maintain the usefulness of your assumptions
  
- ❑ Calibration in some applications
  - ‘consistency and reasonableness’ check
  - For use in principles-based reserving, regulators provide assumption calibration guidance.
  
- ❑ Stress and Scenario testing

## □ Documentation

The actuary should maintain adequate documentation of the assumptions selected and methods used, such that another actuary qualified in the same practice area could assess the reasonableness of the work.



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# Session A6: Model Review, Validation, Assumption Setting

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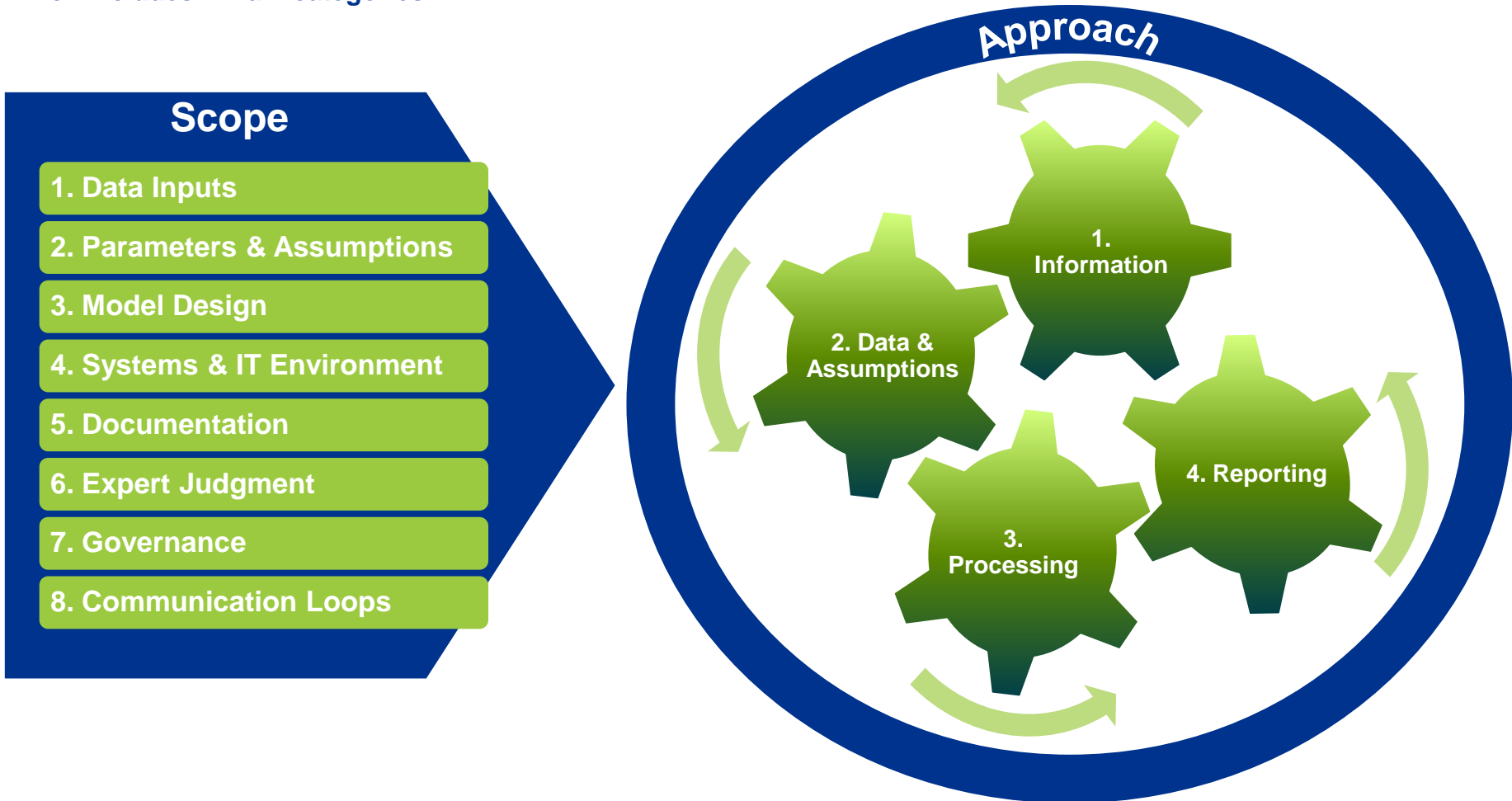


# Agenda

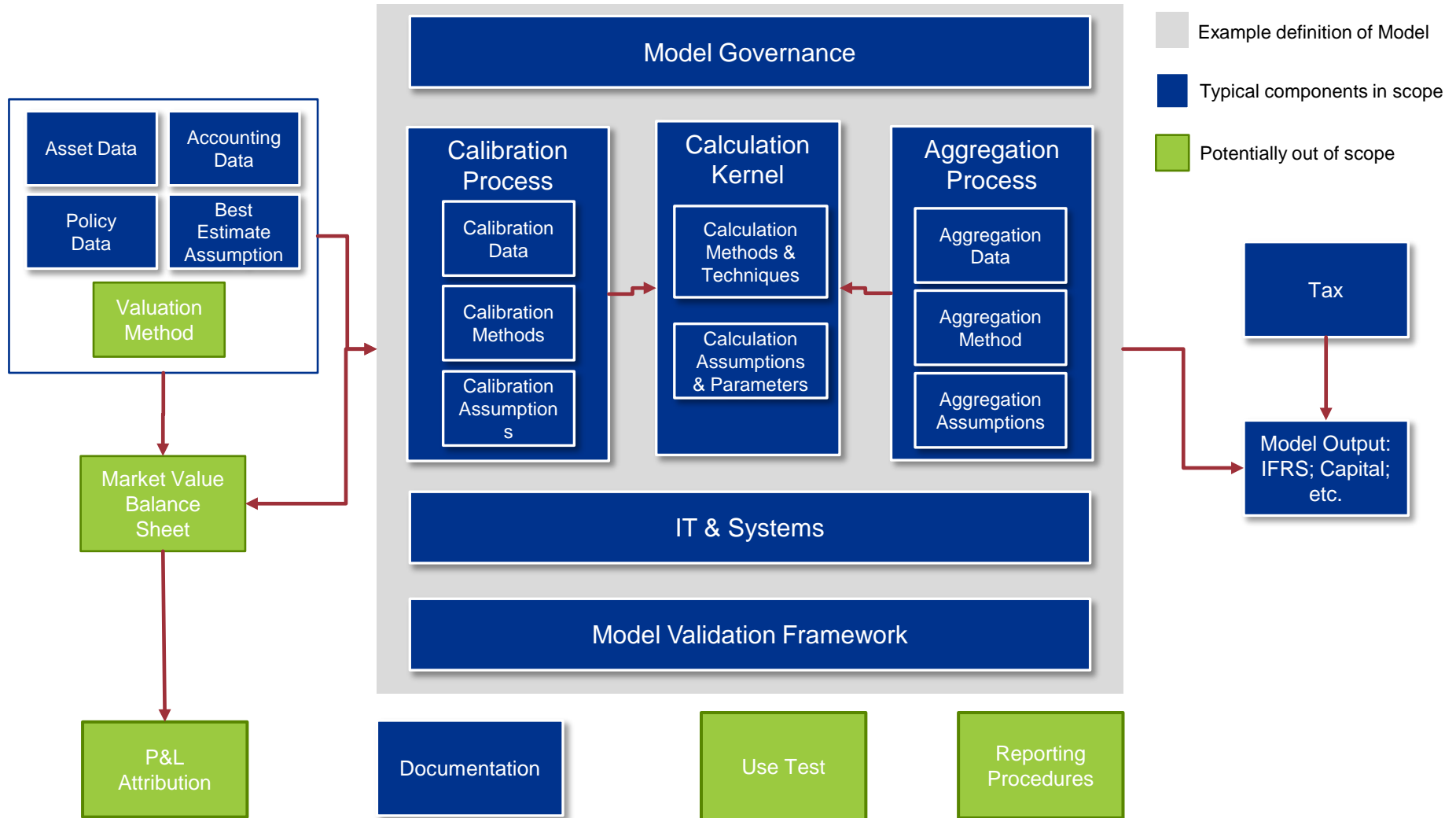
- Scope of Model Validation
- Components of Model Validation
- Sources of Model Risk
- Model Validation Approach

# Scope of Model Validation

Within the scope of model validation there are several fundamentals to consider. These tie to the recommended approach which includes 4 main categories.



# The scope of model validation should be wider than the extent of the model itself

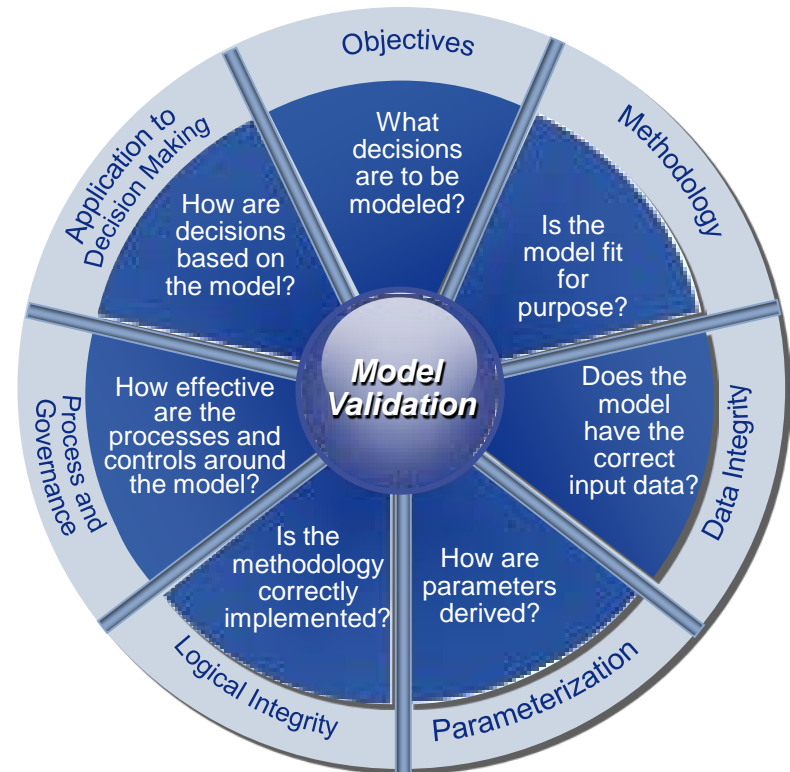


# Components of Model Validation

## Model Validation is intended to help users:

- Assess the appropriateness of their modeling methodology for their objectives
- Identify any errors, risks or limitations in the implementation of their models
- Gain an understanding of the level of comfort they can have in their existing models
- Identify value-adding opportunities to achieve business benefits by enhancing their models

***The diagnostic can be applied at a number of analysis levels based on availability of information and access to personnel***



# Components of Model Validation Continued

## 1 Objectives

- The analysis of *objectives* is a fact-gathering step, identifying goals for the model and its use.
- This step should sketch the basic facts about the business environment the model is to be used in, the types of decisions it will support, and the advantages it is expected to create.
- Creating a model suitable for both current and future use is a considerable challenge and it is important to understand these objectives fully.
- Ultimate findings would compare the “as is” state with these objectives.

## 2 Methodology

- Due to the complexity of economic capital models, structure and methodology are typically described and assessed in several iterations of increasing detail.
- This is usually a substantial part of the assessment exercise.
- Its main purpose is the assessment of the methodology and its appropriateness for achieving the objectives identified above.
- This stage considers whether the model is “fit for purpose” in terms of what it is trying to do and how management wants to use it.

# Components of Model Validation Continued

## 3 Data Integrity

- The output of a model depends as much on the data it uses as on the modeling methodology which is employed.
- The assessment of data addresses the data gathering process for the purpose of the model.
- It also assesses whether the interpretation of data in the model's methodology is consistent with the data collected by the insurer.
- Another objective is to analyze if data used in modeling is consistent with data used for business planning and other financial reporting.

## 4 Parameterization

- Model parameters are derived from collected data.
- If collected data is scarce for the model calculation, parameterization often needs actuarial judgment as a decisive component.
- The objective of this step is to help assess the robustness of choosing parameters.

# Components of Model Validation Continued

## 5 Logical Integrity

- The logical integrity of a model is distinct from its methodology and refers to the physical implementation of the model's logic in a computer program or simulation.
- The objective of this step is to help assess to what extent the approach taken in the physical implementation matches the intended methodology.

## 6 Process and Governance

- Modeling and usage of models are extensive processes which require the support of clear governance.
- Responsibilities are usually distributed over several departments and levels of hierarchy.
- Models generally attempt to model the company as a whole, requiring interaction with many areas and departments.
- Care must be taken so that the incentives to support the modeling effort outweigh possible conflicts of interest.
- The objective of this step is to help assess the processes and governance covering the models, including model build, development, and the use of models in the organization.

# Components of Model Validation Continued

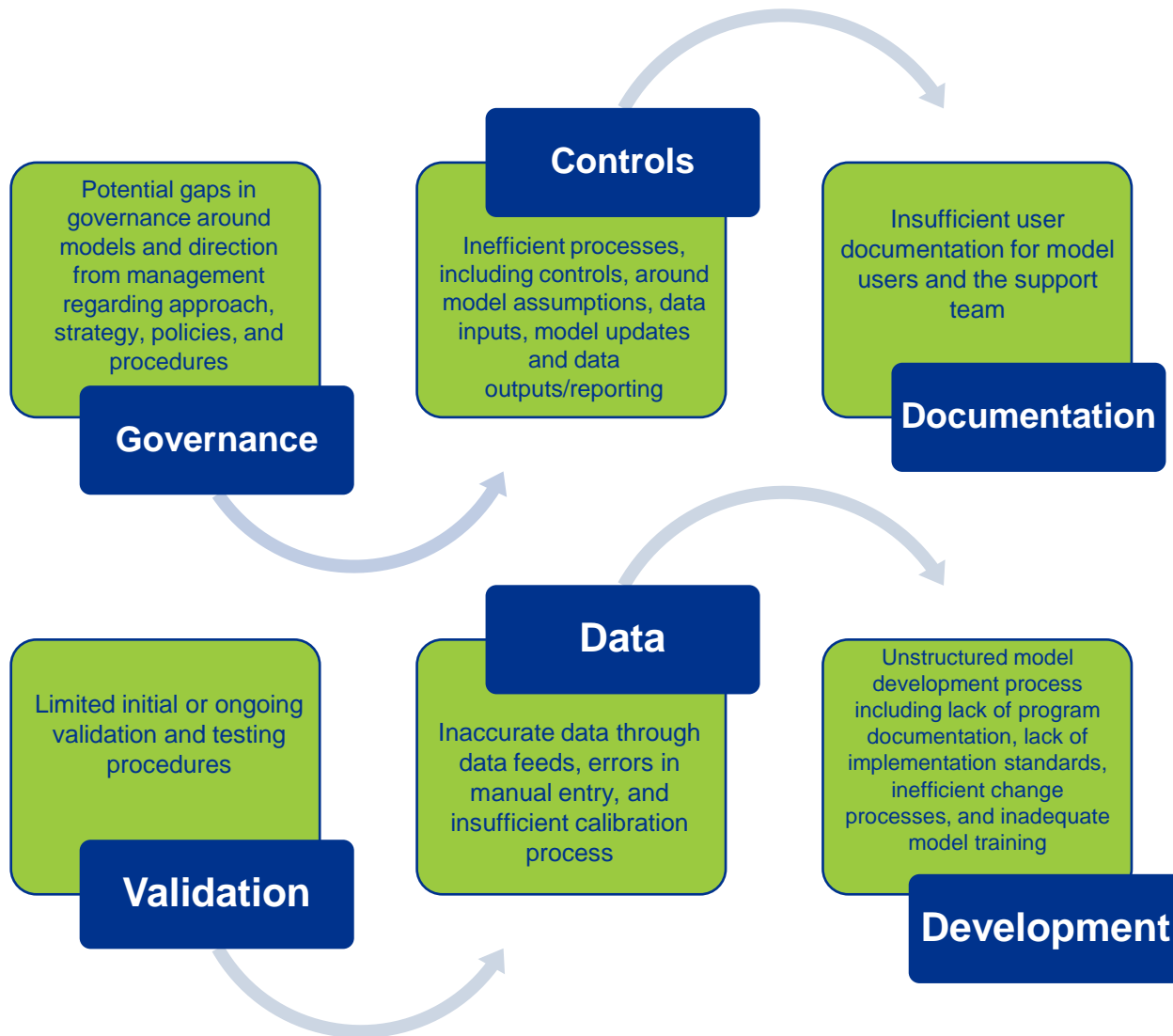
## 7 Application to Decision Making

- In the final step, the application to decision making is analyzed.
- This final step identifies potential gaps between the objectives of modeling, the perceived implementation and its actual use.

***Models are key to enabling management to improve corporate decision making and are fundamental to an insurer's pricing, financing and capital decisions.***



# Things to Consider – Sources of Model Risk



# Model Validation Approach



# Thank you

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