



Model governance
‘What could possibly go wrong’
Part II

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Model governance

What could possibly go wrong – Part II agenda

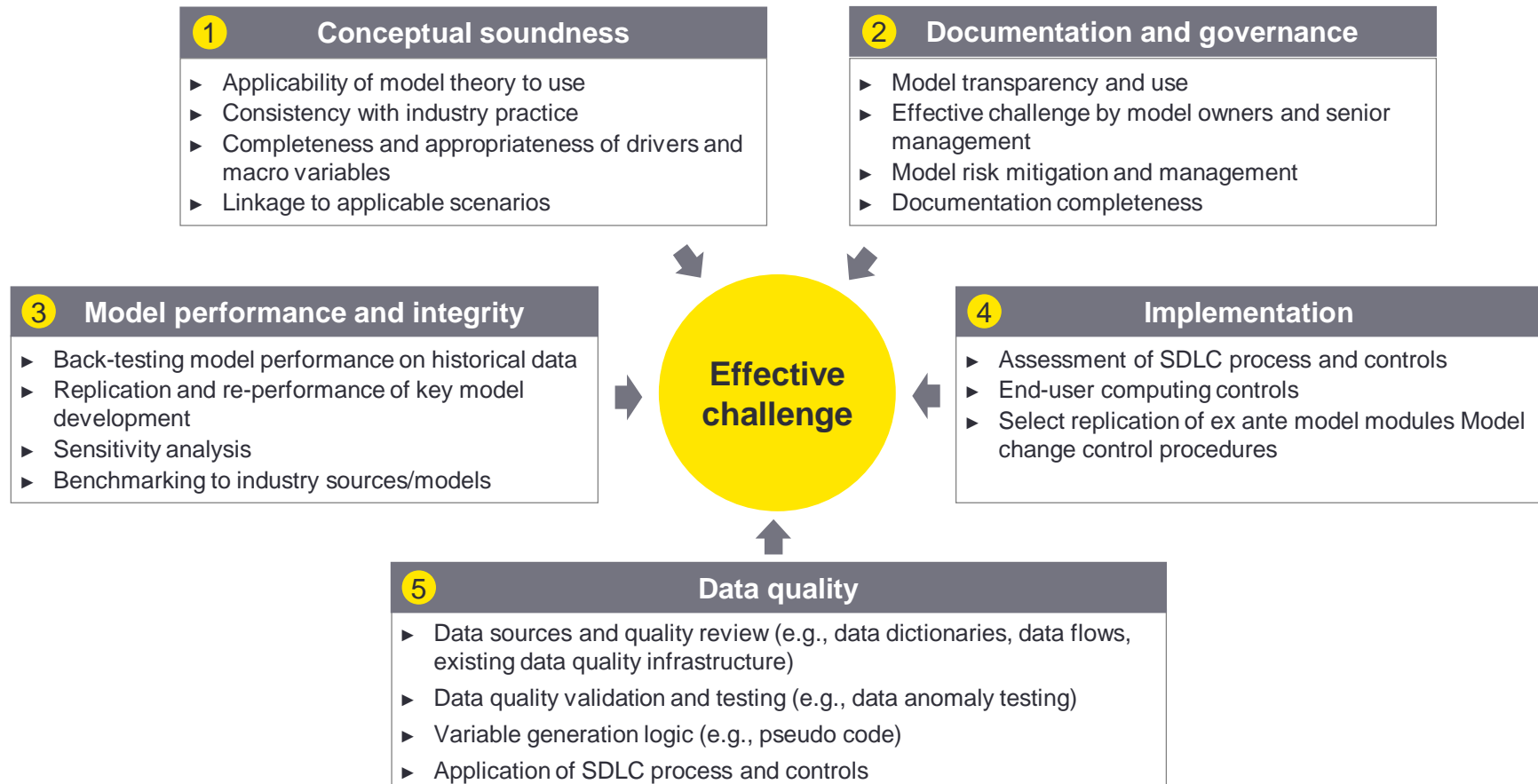


- ▶ Presentation – Model validation
- ▶ Exercise 3 – Fleetville Insurance
 - ▶ Model validation case study
- ▶ Closing remarks

Model validation



Model validation components



Validation goes beyond testing the calculations – and, in fact, may not include independent calculation replication if model owners/developers have performed adequate testing.

'Independent' validation scope options

Adjusting model validation scope

Validation scope can be tailored to each situation. The example below represents an indicative evaluation, which allows management to gain an understanding of the potential uncertainty caused by the use of these models as developed. Scoping may be performed by model class level or model by model.

Review component	Focus and depth options		Overview
Conceptual soundness	Review methodology and compare with statistical and actuarial theory	Quantify impact of alternative methodology choices for all potentially material items	<ul style="list-style-type: none"> ▶ Review the conceptual soundness, including the developmental evidence ▶ Review key assumptions/limitations ▶ Assess applicability of model methodology to models in scope
Documentation and governance	Confirm that documentation meets minimum enterprise standards and governance is followed	Detailed review of documentation, including review of support; include review of model change compliance	<ul style="list-style-type: none"> ▶ Review model documentation ▶ Assess model risk mitigation process and framework
Model performance and integrity	Review model owner analysis for sensitivity of model and impact to key metrics	Independently run the model under stressed and boundary assumptions/ conditions and review results	<ul style="list-style-type: none"> ▶ Review model performance on a select basis ▶ High-level assessment of model uncertainty
Implementation	Review implementation controls and detailed testing performed by model owner	Independent testing of production model to confirm calculation accuracy	<ul style="list-style-type: none"> ▶ Understand operational environment and controls for models in production ▶ Replication of model outputs
Data quality	Review data checks performed by model owner, including evidence of sign-off	Detailed review of data sources, including reconciliation with original sources; confirm proper data usage	<ul style="list-style-type: none"> ▶ Review documentation related to data sourcing and controls

Model validation approaches

Model performance and integrity

- ▶ Effective model validation requires specific approaches that are relevant for the type and complexity of model.
- ▶ Sample validation approaches include, but are not limited to:
 - ▶ Stress and scenario testing
 - ▶ Reverse stress testing
 - ▶ Backtesting
 - ▶ Sensitivity testing
 - ▶ Simulation/convergence test
 - ▶ Profit and loss attribution
 - ▶ Challenger/benchmark models
 - ▶ Replication
 - ▶ Boundary tests

Exercise 3



Exercise 3

Fleetville Insurance model validation case study

Instructions

- ▶ Teams from Part 1 will be paired together and assigned roles; 1) Model Validators and 2) Model Developers
- ▶ Both groups are to review the document “Fleetville Life economic capital financial model overview”
- ▶ Model Validation teams are responsible for generating questions and challenging the Model Development teams after their review of the model overview document
- ▶ Model Development teams are responsible for developing support/ explanations and remediation plans for their model in anticipation of questions from the Model Validation team (20 minutes)
- ▶ Conduct a role-play discussion between the two teams (15 minutes)

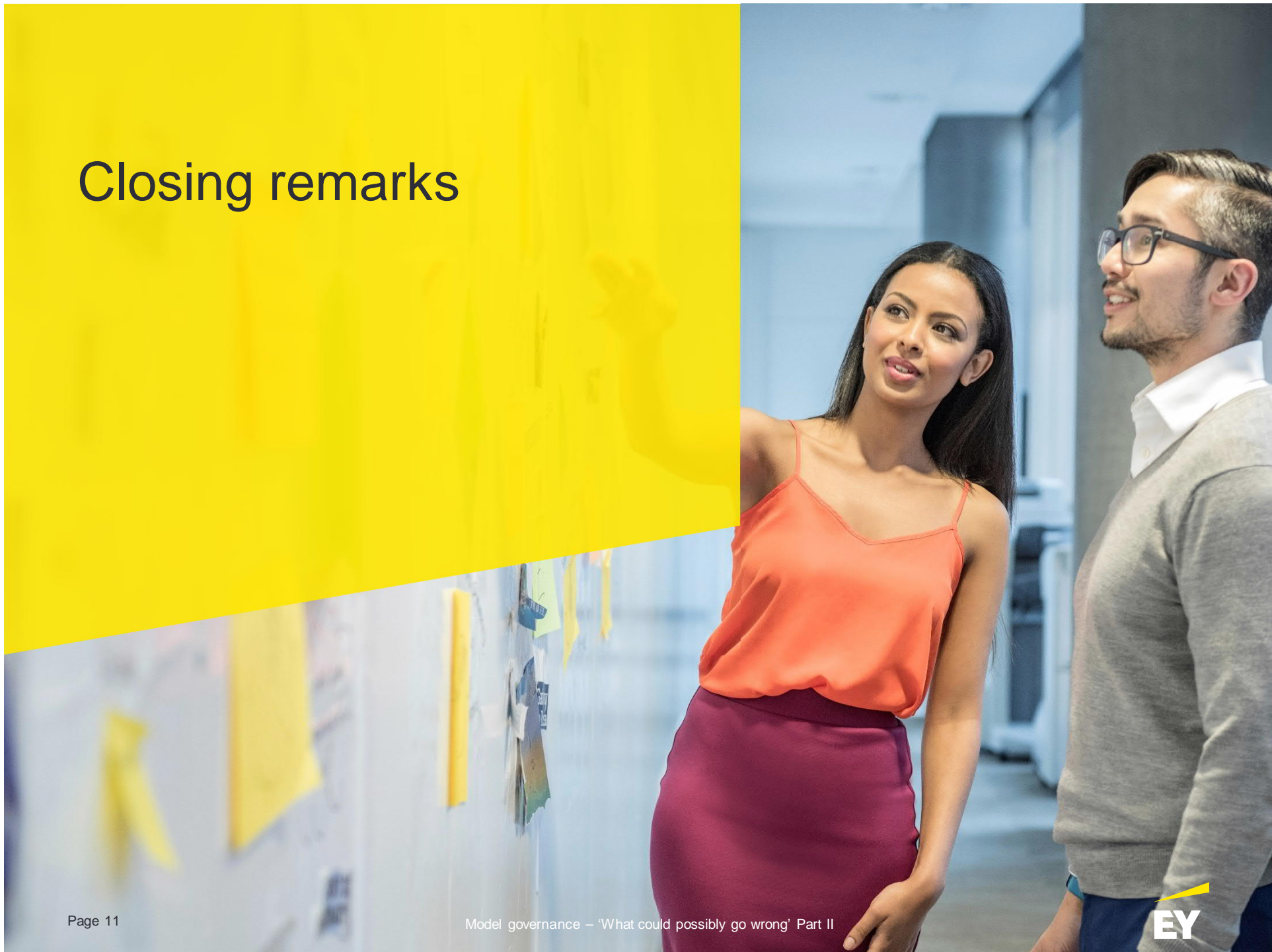
Exercise 3

Fleetville Insurance model validation case study (cont.)

Model validation tips

- ▶ From Fleetville's point of view, think about the different perspectives for:
 - ▶ Chief Executive
 - ▶ Chief Financial Officer
 - ▶ Chief Risk Officer
 - ▶ Chief Actuary (Life)
 - ▶ Life Head of Modeling
 - ▶ Model developer
 - ▶ Model user
 - ▶ Head of Internal Audit
 - ▶ External auditor
 - ▶ External actuarial consultant (performing validation)
- ▶ Pay attention to:
 - ▶ Judgment decisions
 - ▶ Model omissions
 - ▶ Model errors
 - ▶ Methodology considerations, including alternate approaches
 - ▶ Analytics, sensitivities, etc., to support model decisions, methodology, etc.
- ▶ Never assume!
- ▶ Could this have been done differently?
- ▶ What would be the impact if you made this change?

Closing remarks



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