



## Session 3: How to Effectively Embed Stress Testing into a Risk Management Framework to Support Management Action

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# How to Effectively Embed Stress Testing into a Risk Management Framework to Support Management Action

# Agenda

1. Market Observations
2. Shortcomings of the Current Approaches
3. Enhanced Solution

1

Market Observations

# Challenging Time for Insurers, Greater Needs for Business Insight

## Regulatory Capital

Measuring and managing the regulatory capital and overall solvency position.

## Financial & Capital Planning

Forecasting the financials and allocation of the capital over the business planning time horizon under different what-if scenarios.

## Performance Management

Measure and manage the risk-based performance metrics within the business. Integrating risk / return perspective



## Risk Appetite & Limits Management

Consistently monitor and manage risk capacity within risk appetite and limits framework

## Stress Testing/ Scenario Analysis

Assess the impact of stresses and macroeconomic scenarios on the current/future solvency and performance of the firm.

## Business Optimisation

Identify actionable growth investment, acquisition or divestiture opportunities

Focus on products that enhance profitability and perform desirably in forecasted scenarios

# 2

## Shortcomings of the Current Approaches

# Current Business Need

Different lenses from multiple stakeholders

## RISK



- Required Capital Measurement
- Stress Testing & ORSA
- Risk Exposure Management

## FINANCE



- Business Planning
- Capital Allocation
- Liquidity Management

## INVESTMENT



- Asset Liability Management
- Strategic Asset Allocation

## BUSINESS

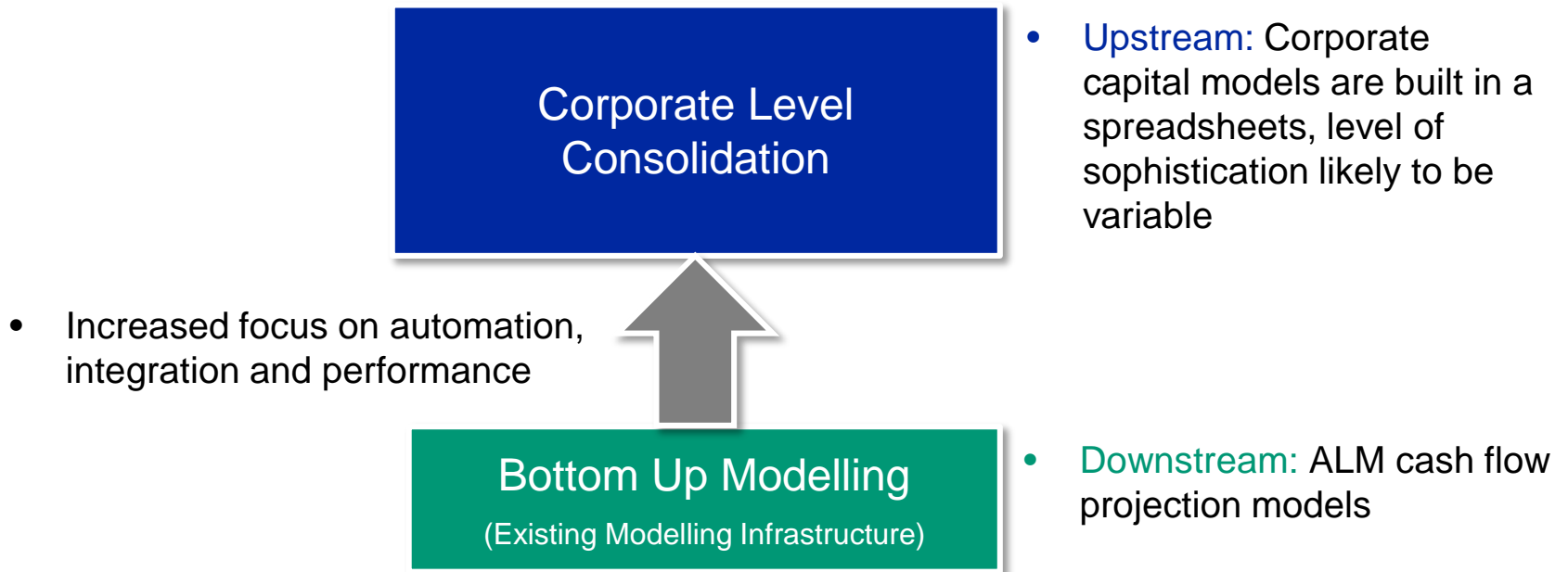


- Performance Metrics
- Risk-based decision making

There are a range of senior stakeholders within the business and each will have a slightly different perspective/need on the type of business insight required.

# Current Modeling Approach

The bottom up approach: re-run the “heavy models” and consolidate the results in a spreadsheet



## Cons:

- Not easy for senior management to use or access;
- Spreadsheets very quickly become complex with significant reliance on the heavy models re-runs



# Summary of Shortcomings

Lack of holistic understanding of business insights



## Multiple Stakeholders

Multiple stakeholders involved with different perspectives/needs for the business modelling capability.



## No Single Solution

No single model that can be used to meet all needs (valuation, solvency, financials, business projections).



## “Heavy” Models

Reliance on heavy models (e.g. actuarial models) that can be slow to run and time-consuming to set up.



## Lack of Integration

Multiple models and data sets managed across different functions that are not well integrated

# Elements of a Ideal Solution

Enabling effective risk-based decision making through:

## Business Insight

Timely forward looking insight is critical to empower senior management to navigate the uncertain waters of the insurance industry

## Modelling Capability

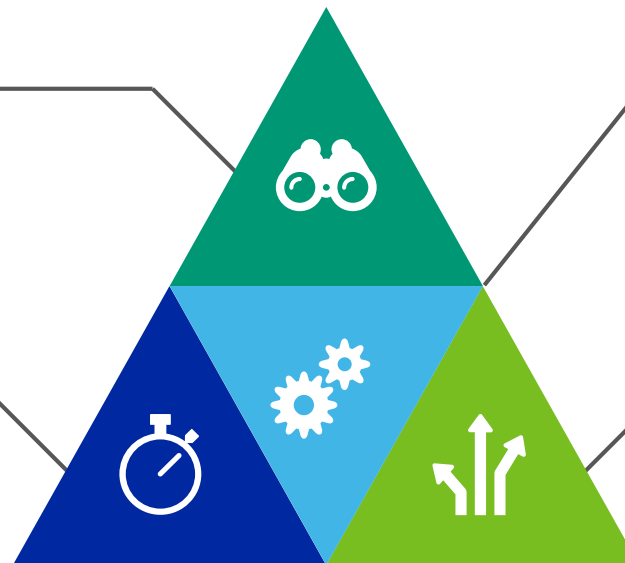
Insurance firms need both top down and bottom up centralized business modelling capability that delivers analysis across a range of business metrics quickly and with sufficient accuracy

## Timely

Senior management require analysis from their business models in hours rather than weeks

## What-If Analysis

Need to be able to assess the impact of different business scenarios and management actions to inform decision-making



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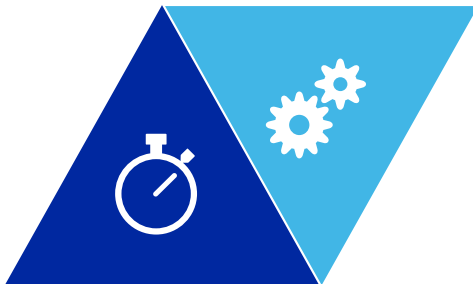
Enhanced Solution

# Enhanced Analytics

A Business Orientated Approach

## Modelling Capability

Optimal balance between bottom-up and top-down modelling approaches.



### Timely

Within hours rather than weeks.

## BUSINESS ORIENTATION

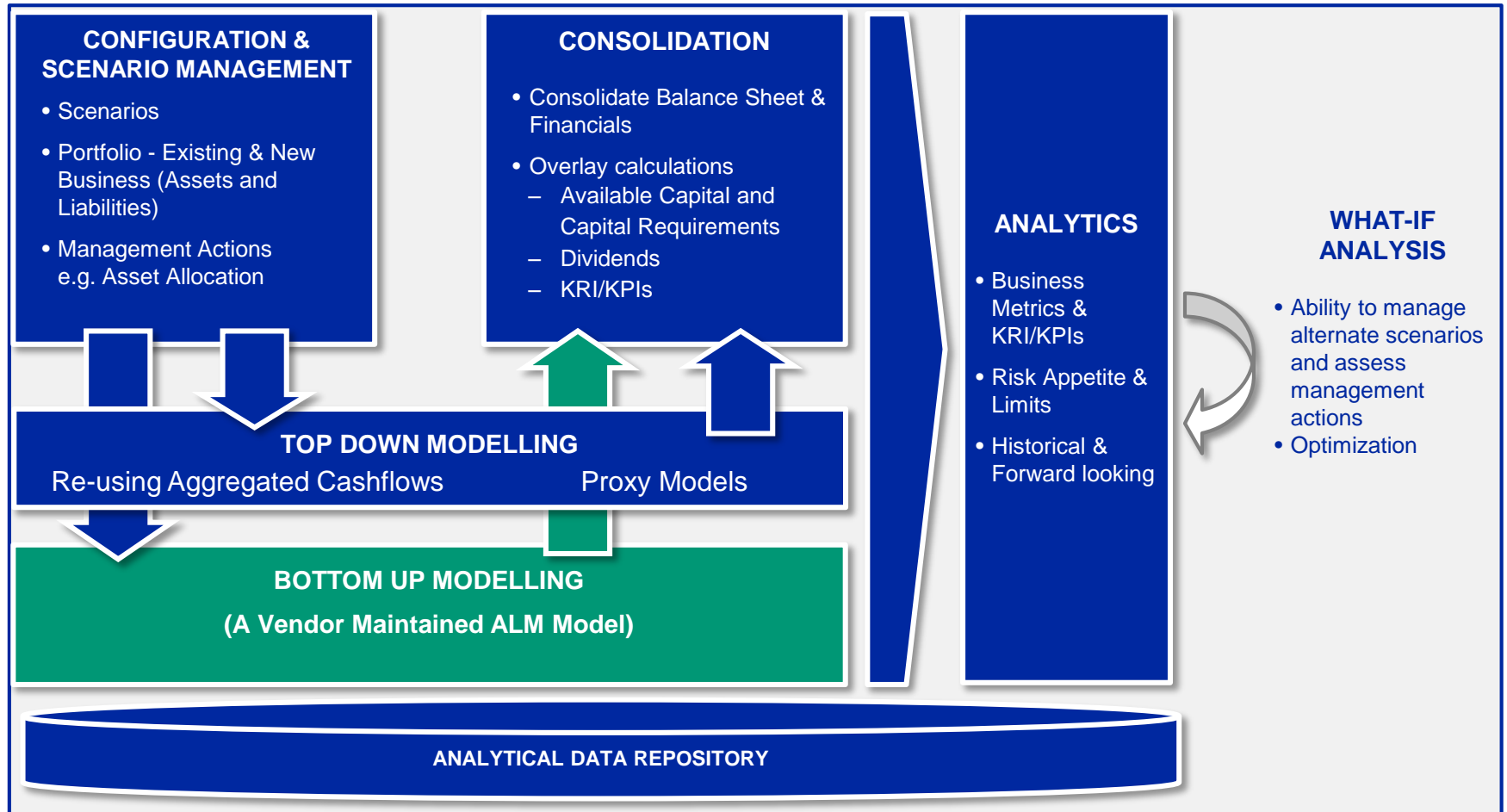
Focus on the senior management's business needs

Requires complementary modelling capabilities

## TRADITIONAL MODELLING PERSPECTIVE

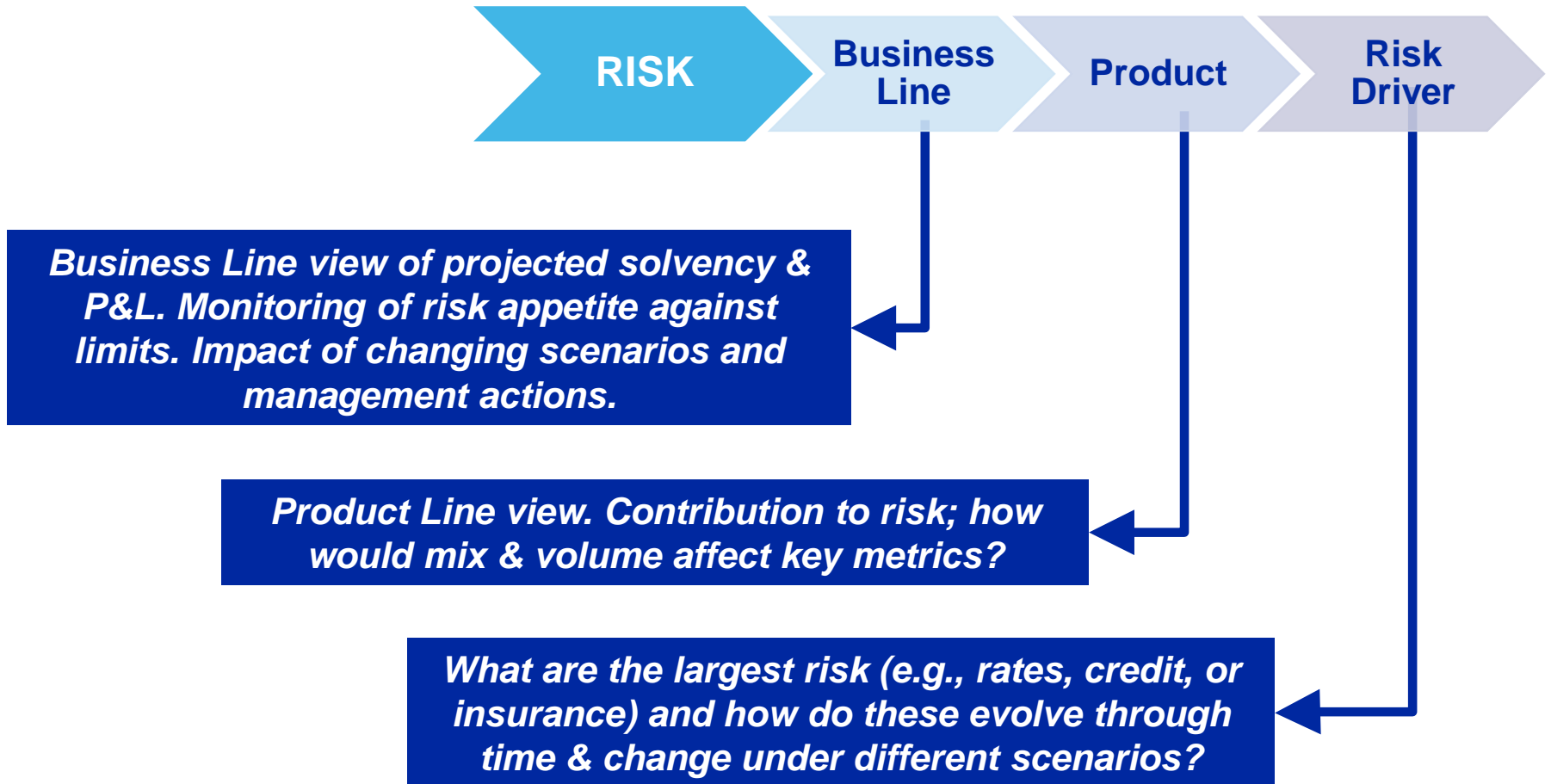
Focus on granularity & accuracy

# Target Modelling Framework



# Actionable Risk and Business Analytics

Layered approach with drill down to the underlying drivers



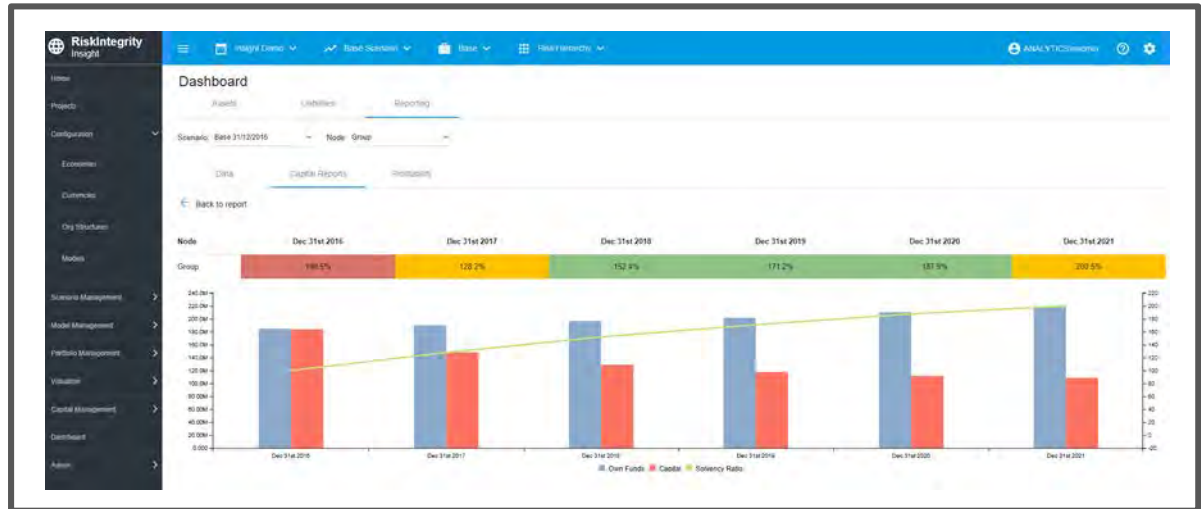
# Empowering the Business

## Business orientated solution

Configurable off-the-shelf modelling solution designed to project the:

- **Income statement**
- **Balance sheet**
- **Solvency**

Under different what-if scenarios to deliver insight to the business.



## Combination of Top-Down and Bottom Up Approach

The combination of Top down and bottom up modelling framework designed to **leverage output from existing modelling** infrastructure.

## Multiple Perspectives

Integrates **risk, solvency and financial** modelling to support analysis from different business perspectives.

## Layered Analytics

Designed to enable **multi-dimensional drill down** analysis to the relevant underlying drivers.

Flexible charting and **comparison analysis** out-of-the box.

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# Embedding stress testing into ERM

19 April 2018



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# Introduction



# Introduction

## Overview of stress testing

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### What is it

- ▶ An analysis technique used to assess the financial impact of specified events and related underlying risks

### Types of stress tests

#### 1. Shock-based stress

- ▶ Stress test based on a one-time “shock” event (e.g., 1 in 100)
- ▶ Analyzes the impact of changes to a single variable
- ▶ Quantified separately across risk types, then aggregated based on correlations

#### 2. Integrated scenario stress

- ▶ Analysis of future outcomes based on a defined deterministic scenario over a multi-period projection
- ▶ Analyzes the impact of changes to multiple variables
- ▶ Risks are quantified in an integrated manner using the same model

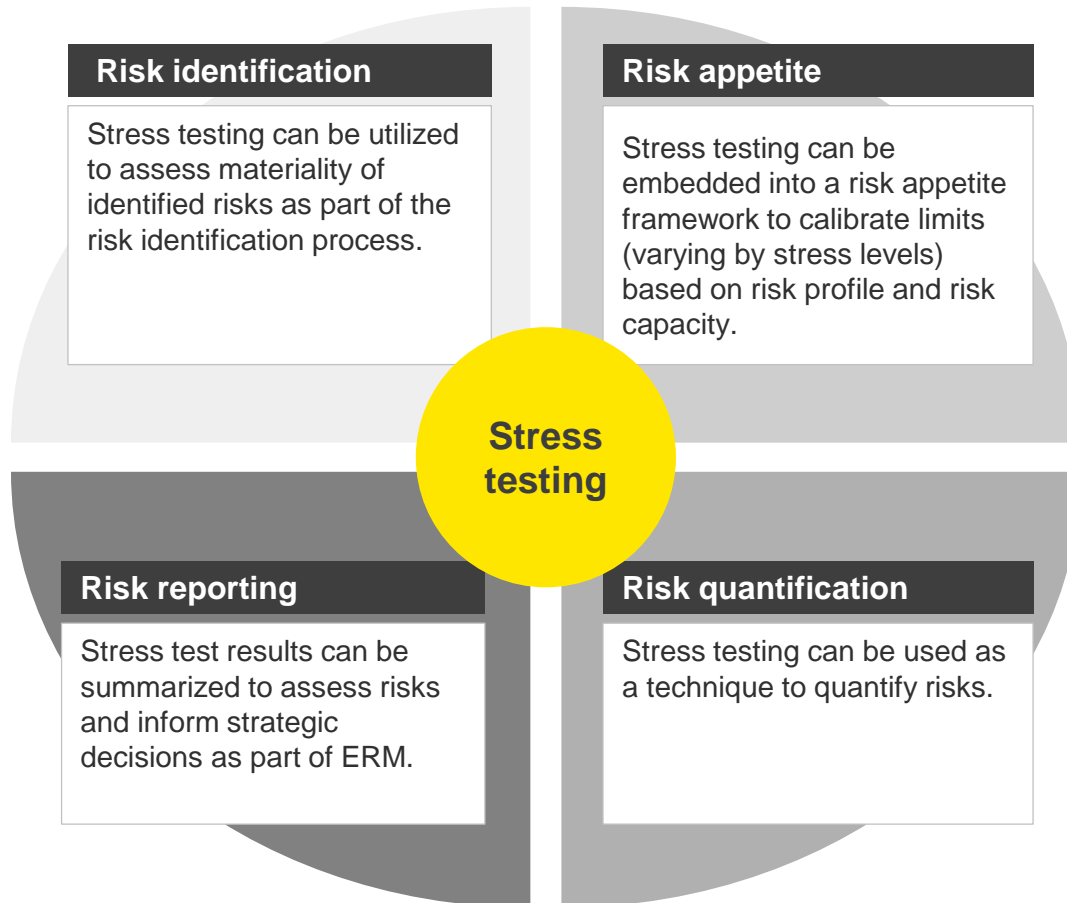
### Why is it important

- ▶ Used as part of risk management to understand and interpret an insurer’s risk profile
  - ▶ Periodically assess financial health and monitor key risks
  - ▶ Ad hoc analysis (e.g., what if) to support business decision-making
  - ▶ Fulfill regulatory requirements

# Introduction

## Applications of stress testing across ERM

Stress testing has various applications that can be incorporated across an ERM cycle.



### The remainder of this session will focus on:

- ▶ How to embed stress testing into a risk appetite framework
- ▶ Key considerations for building a stress testing framework, including:
  - ▶ Challenges
  - ▶ Risk reporting considerations to get the most out of stress testing
  - ▶ Model selection
  - ▶ Leading practices

A group of about eight people are in a red inflatable raft, navigating through white-water rapids. They are wearing blue helmets and red life jackets. The water is splashing around them, and they are using blue and yellow paddles. The background is a dark, forested area.

**Integrating stress  
testing into risk  
appetite**

# Evolution of risk appetite

## Trends in the insurance industry

Insurance risk appetite frameworks have evolved over time.

### Qualitative only statements

- ▶ Largely consisted of broad statements focused on types of risks to take or avoid
- ▶ Difficult to understand how current risk capacity and profile compared to desired risk taking of the organization

### Point in time

- ▶ Started to incorporate quantitative measures
- ▶ Typically consisted of a point in time quantification of a capital metric (e.g., RBC ratio, S&P capital)
- ▶ Economic capital calculations used by many companies as the only “post-shock” analysis

### Forward looking

- ▶ Shifting toward forward looking analysis
- ▶ Incorporating post-stress outcomes as part of risk appetite statements
- ▶ Evaluating multiple levels of stress (including moderate events) evaluated with more strict requirements for post-stress outcomes

Embedding a stress testing framework allows insurers to translate qualitative expressions of risk appetite into meaningful metrics, which vary according to multiple stress levels and can be utilized to assess risk profile over time.



# Integration of stress testing

## Key steps

- ▶ To better understand risks facing insurers, a multidimensional stress testing framework (e.g., metrics and stress levels) can be embedded to analyze risks based on forward-looking projections of the business.
- ▶ The steps below outline how to integrate a stress testing framework into risk appetite.

	Details
<b>1</b> Identify metrics related to risk appetite expressions	<ul style="list-style-type: none"><li>▶ Leading risk appetite statements include measures across accounting, regulatory, economic and cash flow-based metrics.</li><li>▶ Insurers have a diverse set of stakeholders and therefore should include multiple metrics that take into account each group's desired outcomes.</li></ul>
<b>2</b> Determine stress levels and stress types	<ul style="list-style-type: none"><li>▶ Insurers should include stress levels consistent with both external and internal (e.g., based on history) views.</li><li>▶ While it is important to look at extreme events, insurers should also include a moderate event that can be utilized as a binding scenario.</li><li>▶ It is important to look at multiple stresses – both severity and types (e.g., stand-alone shocks, integrated scenarios).</li></ul>
<b>3</b> Calibrate limits based on expressions and stress levels	<ul style="list-style-type: none"><li>▶ Insurers should calibrate and set limits on metrics for stress level based on their desired risk profile.</li><li>▶ Limits should not exceed the risk capacity of the company.</li></ul>

# Integration of stress testing

## Risk appetite expressions – examples

- ▶ The following are examples of expressions of risk appetite that incorporate a stress testing framework.
- ▶ Broad expressions of risk appetite can be translated into detailed expressions.

Broad expressions	Details
<p>Our organization seeks to remain solvent in a severe stress environment.</p>	<ul style="list-style-type: none"> <li>▶ RBC regulatory ratios should exceed X% for all legal entities in all periods over the next five years in a severe stress environment.</li> <li>▶ The decrease in market value of surplus should not exceed more than \$Y in a severe stress environment.</li> </ul>
<p>Our organization wishes to preserve the ability to meet our obligations in a moderate stress environment.</p>	<ul style="list-style-type: none"> <li>▶ The cash ratio should exceed X in all periods over the next five years in a moderate stress environment.</li> <li>▶ The debt ratio should remain below Y in all periods over the next five years in a moderate stress environment.</li> </ul>
<p>Our organization wishes to preserve the ability to distribute shareholder dividends in a prolonged low interest rate stress scenario.</p>	<ul style="list-style-type: none"> <li>▶ The decrease in GAAP equity should not exceed more than \$X in all periods over the next five years in a prolonged low interest rate stress scenario.</li> <li>▶ GAAP earnings should remain positive in all periods over the next five years in a prolonged low interest rate stress scenario.</li> </ul>

A group of about eight people are in a red inflatable raft, navigating through turbulent white-water rapids. They are all wearing blue helmets and red life jackets. The raft is splashing with water, and the background is a dense forest. The scene is dynamic and energetic, representing a challenging activity.

## **Building a stress testing framework**

# Challenges

There are a number of stress testing-related challenges facing insurers.

1

## Sources of complexity for insurance companies

- ▶ Complex product features and business that remain in force for decades
- ▶ Multiple accounting frameworks — with complex and varied valuation rules by product
- ▶ Asset and liability cash flows and balances that are market dependent
- ▶ Interdependence between assets and liabilities

2

## Drivers of current challenges

- ▶ Manual and Excel-driven processes
- ▶ Underutilization of technology
- ▶ Limitations of legacy asset and liability models
- ▶ Lack of coordination and unclear roles and responsibilities
- ▶ Silos and inconsistent processes for various uses
- ▶ Lack of workflow management

3

## Impact on the industry

- ▶ Painful and inefficient processes
- ▶ Limited management information and analysis capabilities
- ▶ Internal inconsistency between projections for different business purposes
- ▶ Inability to provide timely results and analysis

# Risk reporting considerations

To maximize the benefits of stress testing, it's important that reports include the following:

## Clearly defined scenarios

Scenarios should be clearly defined and communicated to the intended audience (e.g., board, senior management, risk committees, etc.) to provide added context for stress test results.

## Relevant metrics

Key stakeholders should be identified and metrics aligned to the business need and purpose of the stress tests.

## Robust analytics

Reports should include robust analytics that improve the transparency results.

This includes trending analysis, attributions and capabilities to drill down into results at a more granular level detail.



## Benefits

- ▶ Greater understanding of stress tests
- ▶ Improved transparency
- ▶ Deeper understanding of how risks impact financial and key performance indicators (KPIs)
- ▶ Better positions ERM to support the decision-making process
- ▶ Increased awareness of sensitivity of results to different management actions and potential levers that may impact key metrics

# Model selection

There are a number of models that insurers can leverage for stress testing. However, each requires careful consideration.

	Model	Key considerations
1	Stand-alone model	<ul style="list-style-type: none"><li>▶ Potential inconsistencies compared to other company models</li><li>▶ Additional costs associated with maintaining a separate model</li></ul>
2	Cash flow testing model	<ul style="list-style-type: none"><li>▶ Typically involves a simplified asset modeling approach</li><li>▶ Does not include new business</li></ul>
3	Forecast models	<ul style="list-style-type: none"><li>▶ Fragmented process that involves various business partners (e.g., Finance, Actuarial, Risk, Tax, etc.)</li><li>▶ Limited projection time-horizon</li><li>▶ Limited multiple scenario capabilities</li></ul>
4	Economic capital	<ul style="list-style-type: none"><li>▶ Provides only a point-in-time quantification of risk profile</li></ul>

# Leading practices

Features	Summary
<b>An integrated and continuous modeling framework</b>	<ul style="list-style-type: none"><li>▶ Supports multiple business processes and purposes, including risk management, strategic, financial and capital planning</li><li>▶ Targets and performance are continuously monitored over a multi-year horizon, and analysis is ongoing</li></ul>
<b>Enhanced projection capabilities</b>	<ul style="list-style-type: none"><li>▶ Integrated models project cash flows and balances to a reasonable degree of accuracy across scenarios</li><li>▶ Modeling capabilities and credible assumptions limit the need for topside and post-model calculations</li></ul>
<b>Next-generation technology ecosystem</b>	<ul style="list-style-type: none"><li>▶ Software that supports automated data movement and consolidation</li><li>▶ Workflow management tools that track activities and sign-offs</li></ul>
<b>Flexible reporting and analytics</b>	<ul style="list-style-type: none"><li>▶ Reporting capabilities support standard reporting and ad hoc analysis to provide stakeholders with timely insights</li><li>▶ This includes what-if scenarios and the ability to query results at a variety of aggregation levels</li></ul>
<b>Effective data management</b>	<ul style="list-style-type: none"><li>▶ Data is maintained at a granular level to support reporting and analytics needs</li></ul>
<b>Engagement and coordination across functions</b>	<ul style="list-style-type: none"><li>▶ Individuals across functions — Finance, Actuarial, Risk, Business and others — coordinate effectively and take ownership of the overall process and results</li></ul>



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1803-2647443  
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