



Stress Testing in an Uncertain World

Anthony Bice & Garreth Sweeney

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The rising importance of stress testing

"[The stress test] provides unprecedented levels of transparency...and provided banks with a strong incentive to act... ."

– **Andrea Erina, Chair of EBA, 2011**

"[the Supervisory Capital Assessment Programme] gave more disclosure than ever before."

– **Til Schuermann, SVP, the Fed, 2009**

"Stress tests are a regular supervisory tool and the execution of periodic exercises is set down in EIOPA's regulation."

– **EIOPA press release, 2011**

"APRA expects stress and scenario testing to be used both in setting the insurer's risk appetite and in developing target capital levels... It should also play a key role in determining an insurer's reinsurance strategy."

– **Helen Rowell, Executive GM, Supervisory Support Division, APRA**

"A key component of our stress testing infrastructure is supervisory stress testing."

– **FSA referring to its own tests**



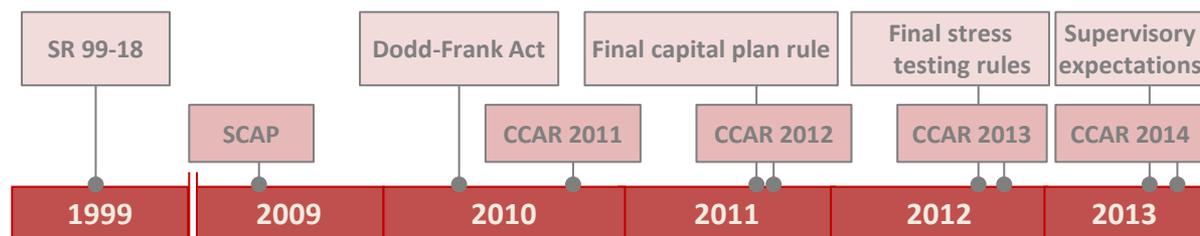
Benefits of stress testing

Pre-crisis views of required capital vs. Stress testing approach

	Basel-based standards/ Economic capital	Stress testing
1	Focused on losses	Holistic - includes business risks through stresses applied to income statements
2	Estimates "through the cycle" capital losses	"Point-in-time" approach
3	Calibrated to a very high degree of confidence	Model estimates are keyed to plausible, real world outcomes
4	Dependent on correlation assumptions among losses from different assets, business lines, and types of risk	Risk correlations inherent to each scenario
5	Often readily calculable	Relatively time consuming to produce
6	Can be allocated at a granular level (e.g., individual positions)	Only able to produce capital figures at firm and business unit level



Regulatory trends in the US



➤ CCAR 2014 results

Pre SCAP

- Capital planning based on regulatory capital and economic capital

Version 1.0 stress testing

- Institutions begin developing firm-wide stress testing
- Initial models rely on coarse portfolio segmentation and heavy top-down business judgment

Version 2.0: machinery and governance

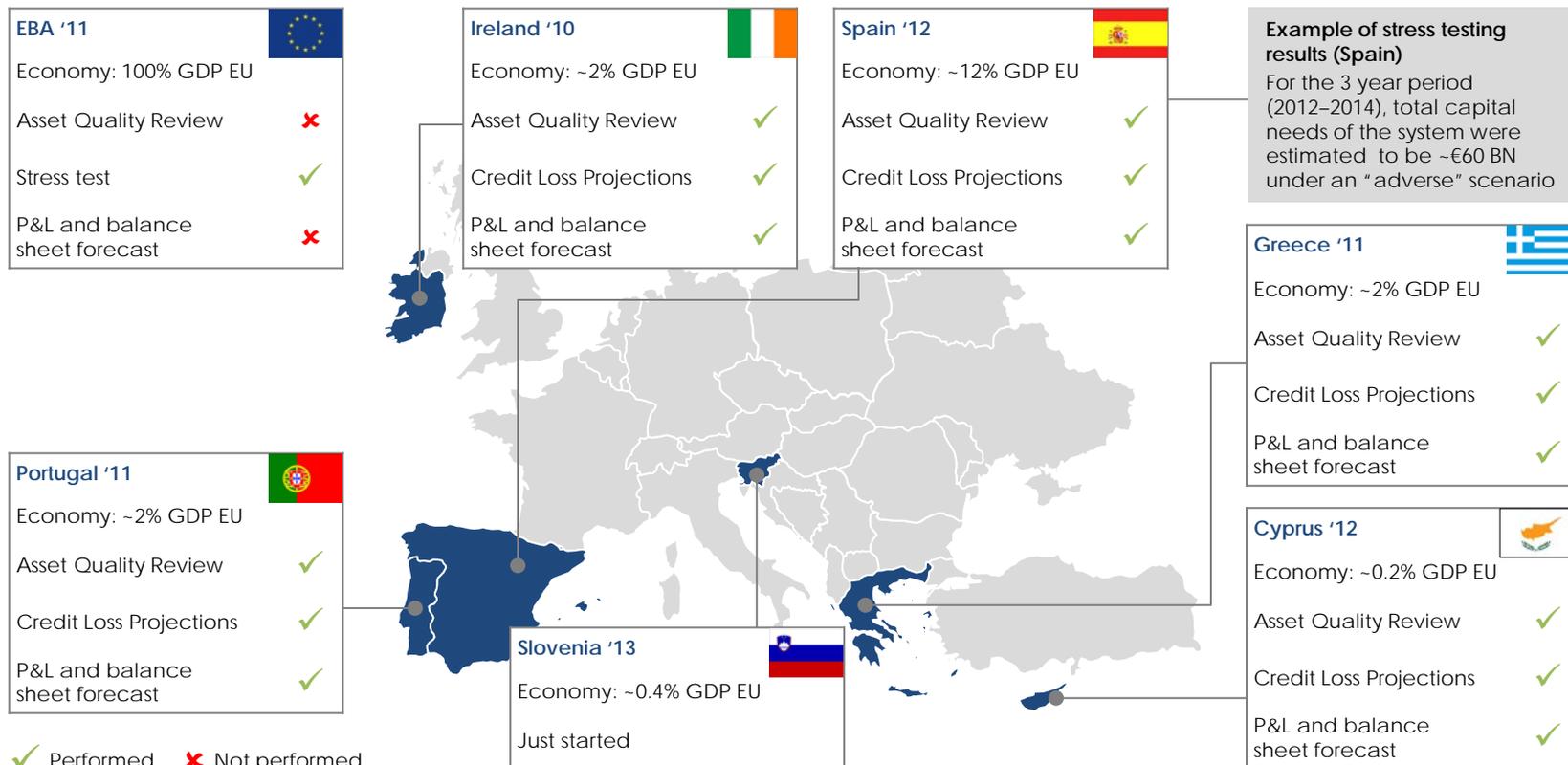
- Institutions create dedicated stress testing functions/groups
- Regulators push heavily on qualitative assessment through 2011 and 2012 CCAR processes
- Stress testing data becomes increasingly granular and reliable, enabling more suitable segmentation
- Models begin to undergo validation and auditing

- Three banks projected to have at least one capital ratio fall below regulatory minimum levels in the 'severely adverse' scenario ¹
- Four banks found to have deficiencies in their capital planning processes

1. Based on their original planned capital actions



Recent stress testing activity in the EU

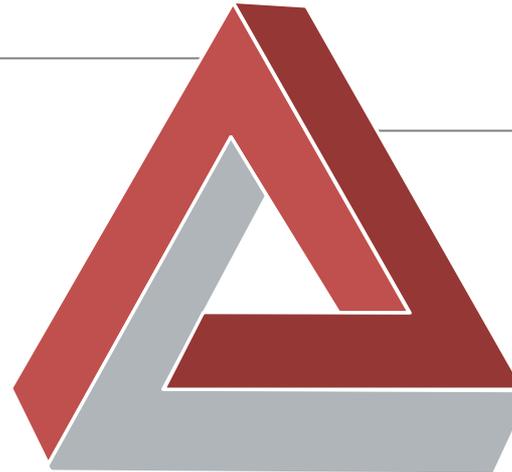




Uses of stress testing

Strategy / product

- **Strategic planning**
 - Test the resilience of the strategy, highlight areas of risk and opportunity, and identify triggers for review
 - Test strategic investment decisions against a range of scenarios
 - Assist in portfolio steering
- **Product design**
 - Test the impact of adverse developments on projected product/ deal profitability and returns e.g. what level of interest rates would make the current pricing unprofitable?



Capital management

- Capital adequacy and **risk appetite** buffer assessment

Risk management

- Set **risk appetite** and triggers/limits
- **Understanding risks**
 - Identify risks and linkages
 - Understand risk profile
 - Understanding unknown, complex risks
- **Managing risks**
 - Develop and test contingency plans/risk mitigation and management
 - Hedging and reinsurance strategy



Types of stress and scenario testing

Increasing complexity/insight

1 Sensitivity testing

- Assessment of impact of changing one parameter/risk factor (e.g. interest rates) while leaving the rest constant
- Example: what if our lapse rate assumption is underestimated?

2 Factor-based stress testing

- Analysis of a single risk factor or simultaneously impacting multiple risk factors
- Example: what is the effect of a 1 in 10 year equity market drop?

3 (Narrative) scenarios

- Typically a qualitatively defined scenario impacting all risk types
- Example: what is the effect of a pandemic?

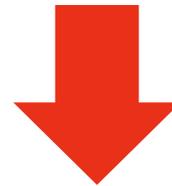
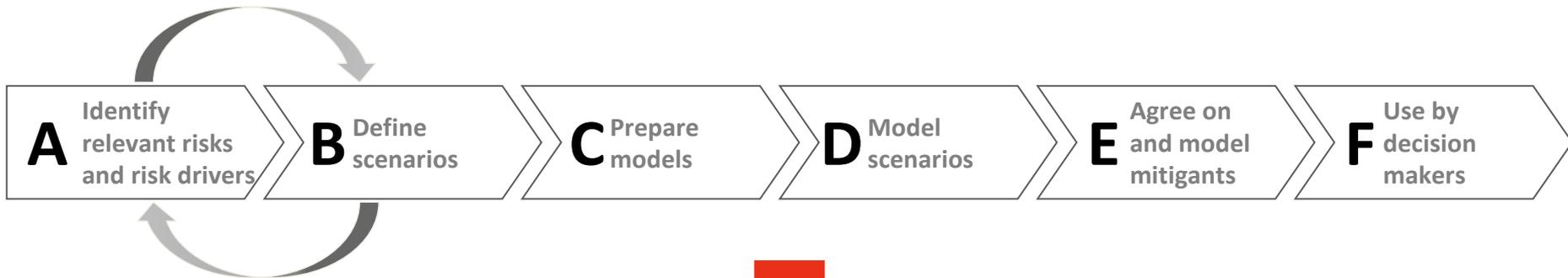
4 Reverse

- Analysis of stresses on one or a number of factors resulting in a specified loss amount



What it looks like in practice

Scenario testing process

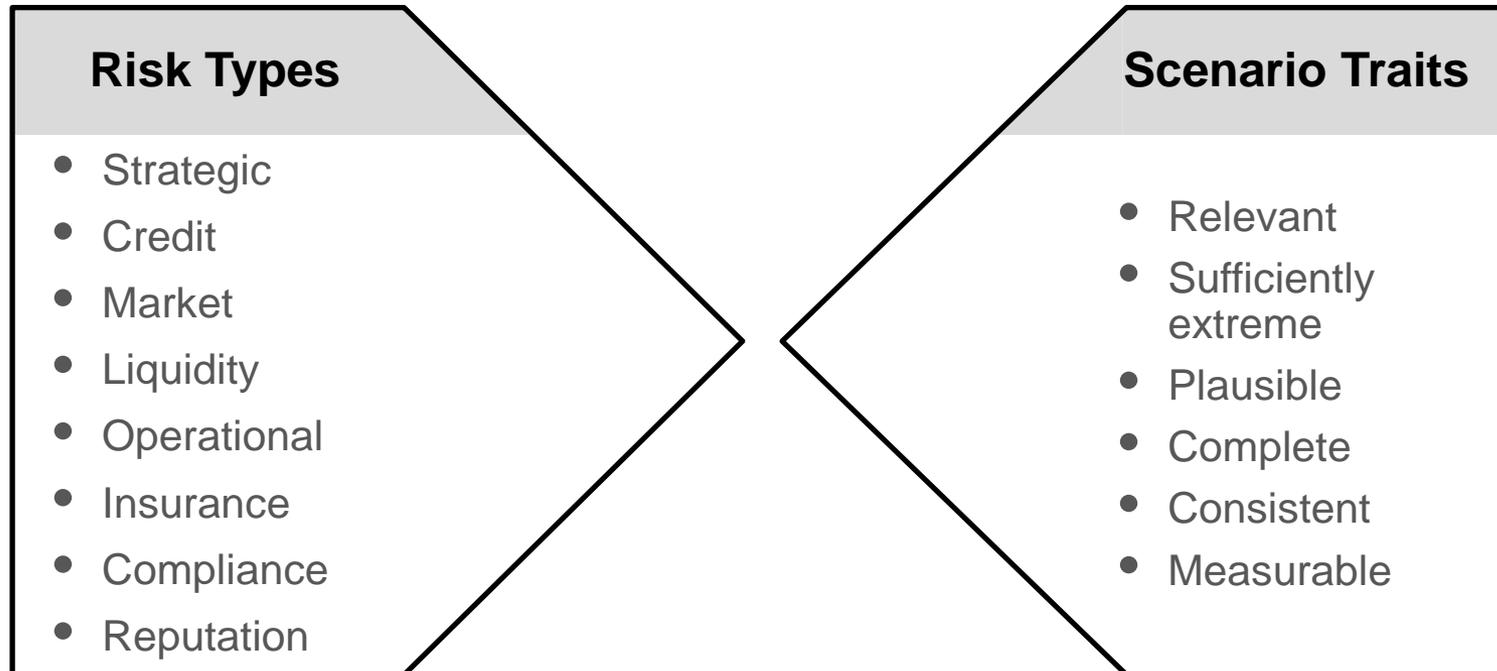


Scenario Example

Severe earthquake in CBD

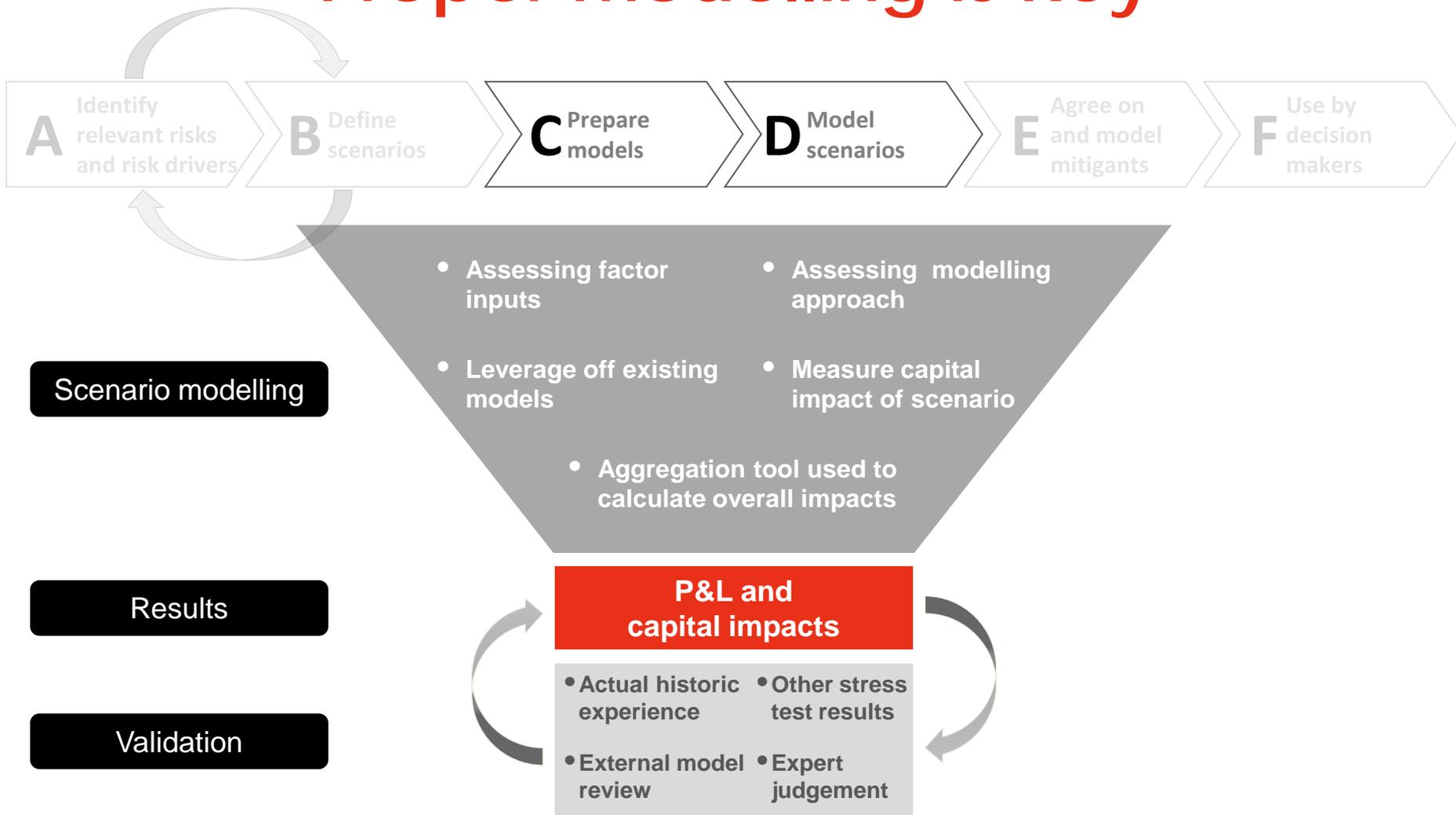


Preparing Relevant Scenarios



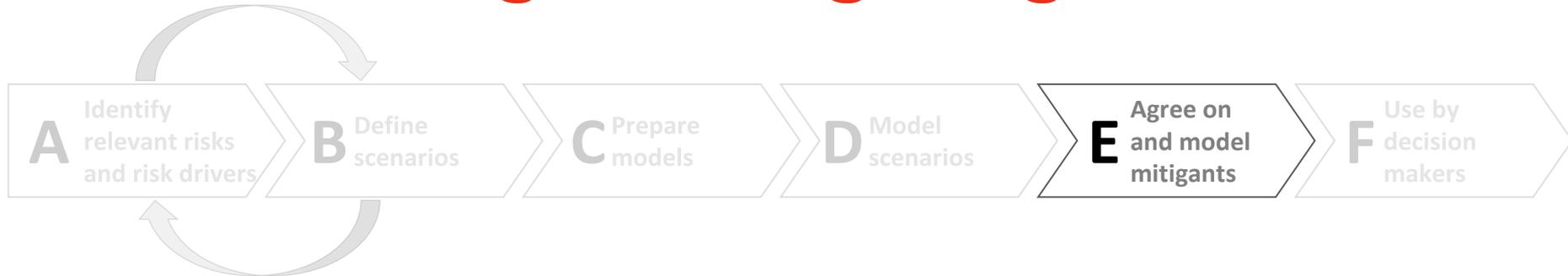


Proper modelling is key

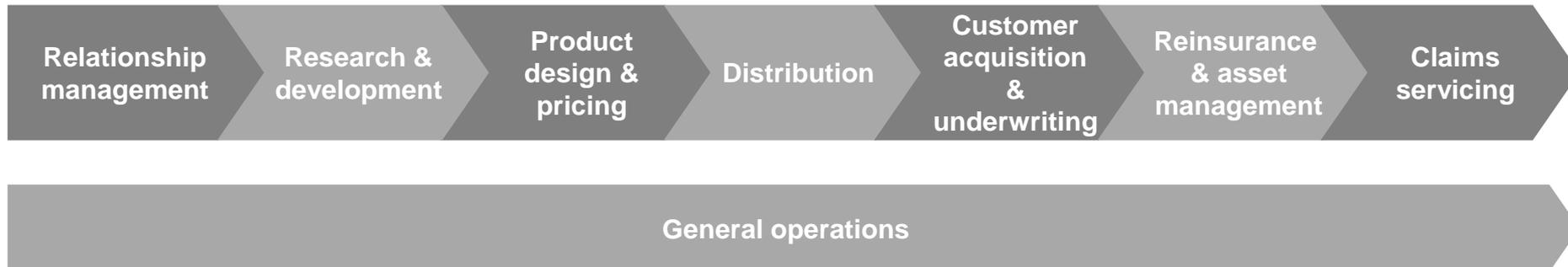




Allowing for mitigating actions



Management responses across the value chain

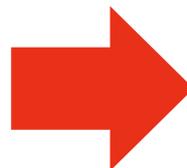
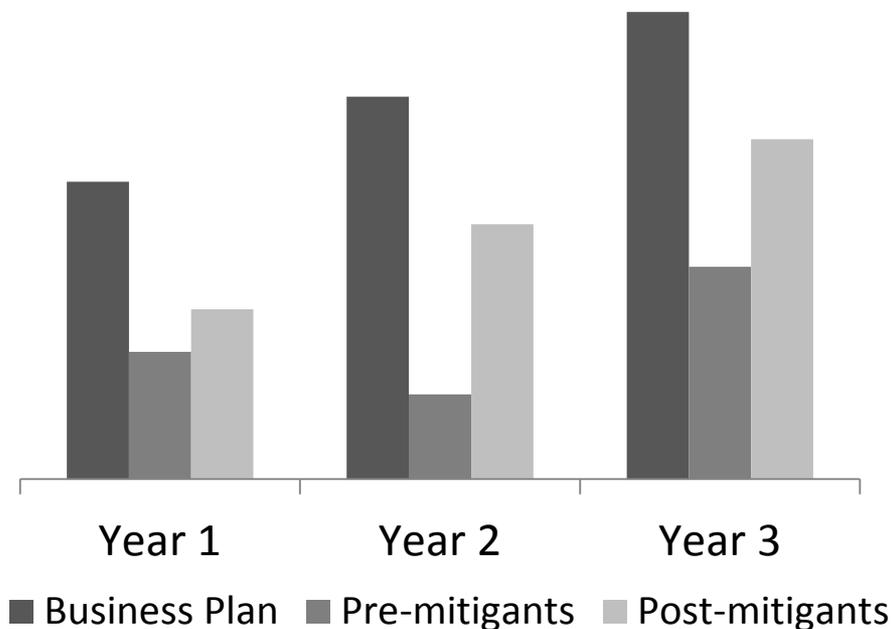




Using the results



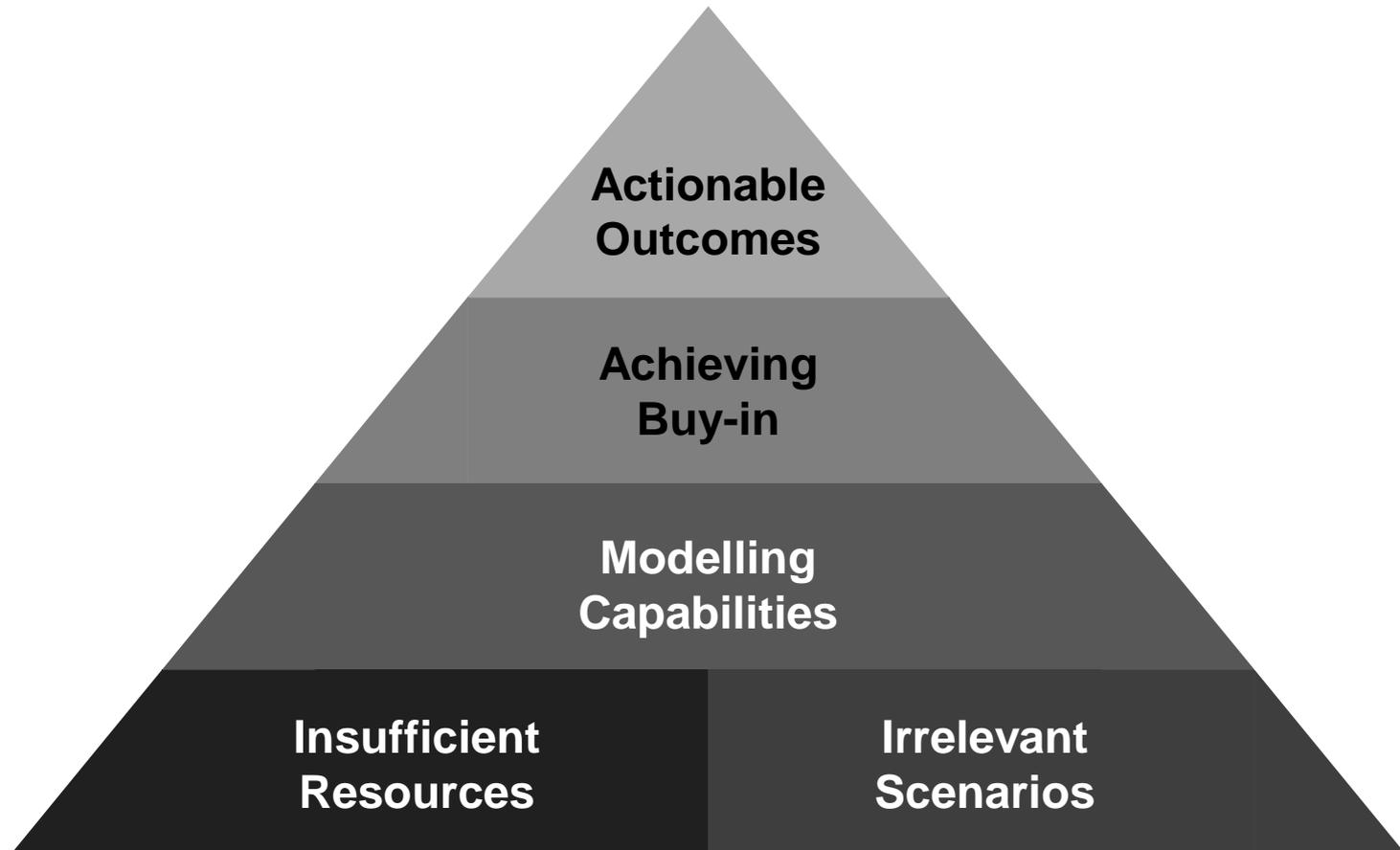
Forecast Profit



- Adoption in RAS
- Incorporating into business planning cycle
- Changing business processes
- Strengthening capital levels
- Improve understanding of company's vulnerabilities



Challenges to overcome

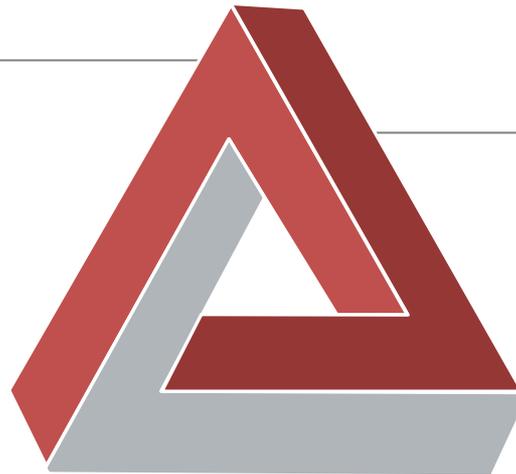




Broader benefits of narrative scenarios

Strategy / product

Risk management



Capital management