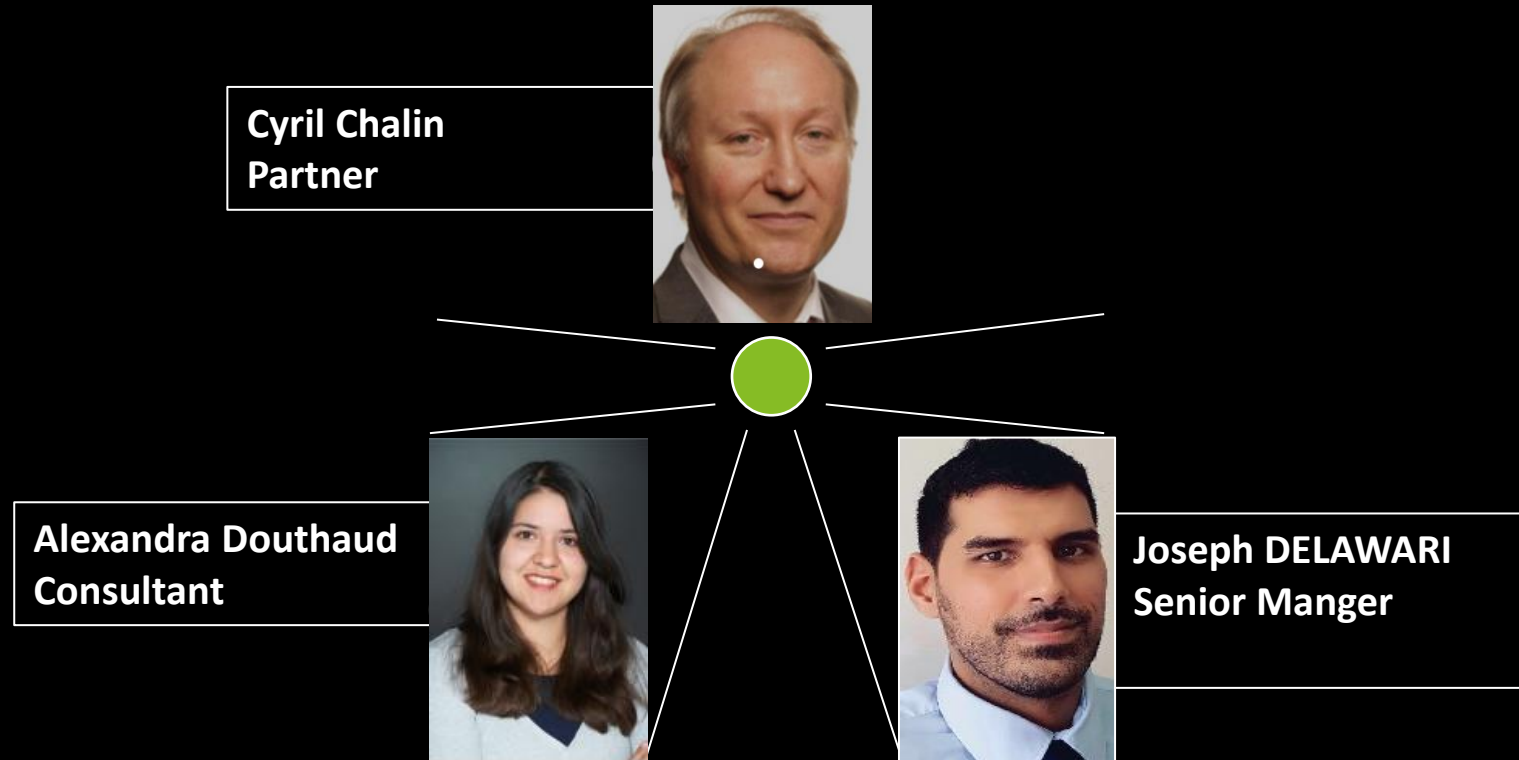


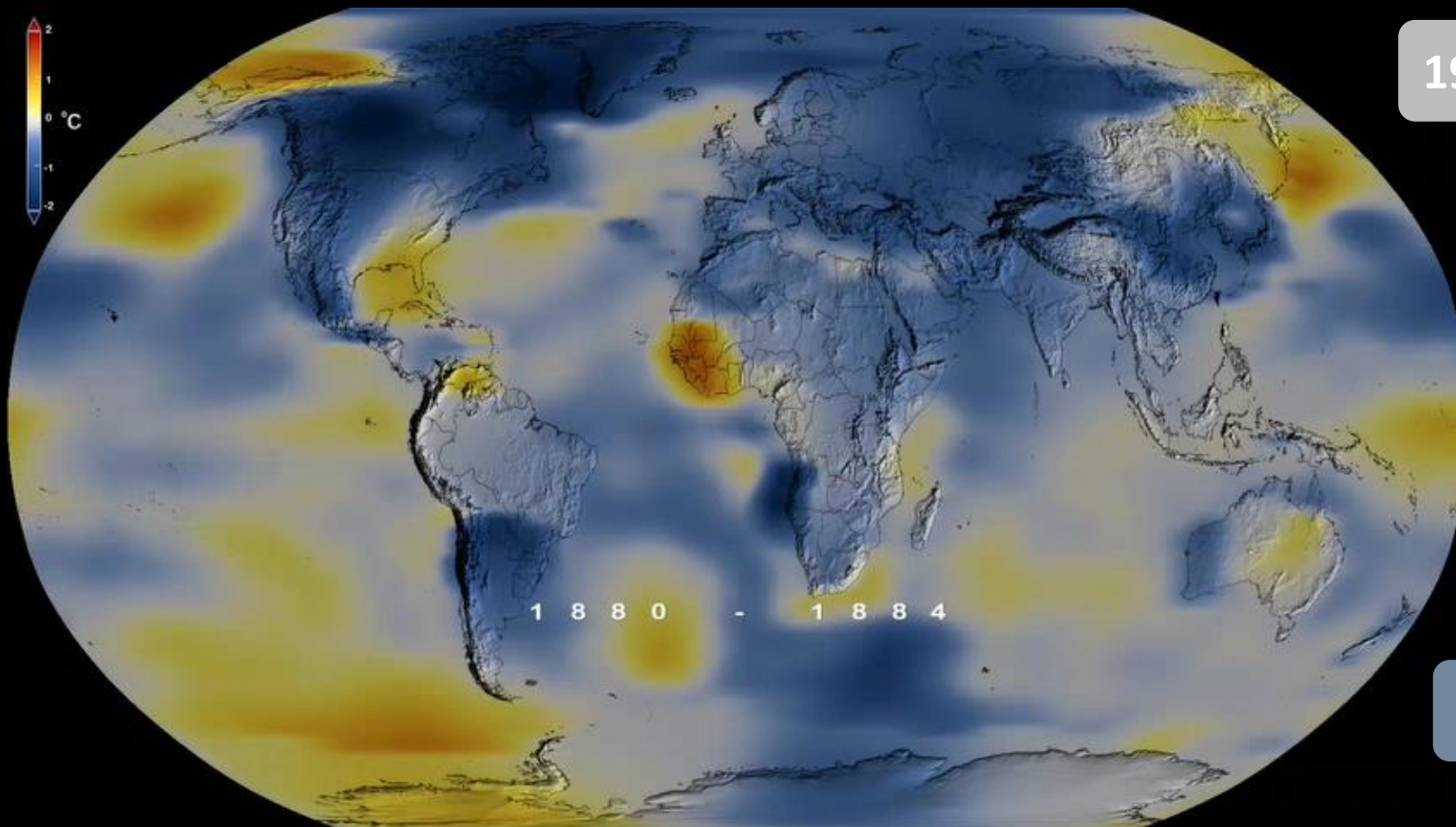
Actuaries facing Climate Change



Building Risk Managements' resilience to Climate Change : recent developments

With you this morning





1980 -2020

€450-520 bn

of economic losses in the European Economic Area

1/4 of these losses were insured

2050

18%



of global GDP

2016

2019

2021

2022

2100

Paris agreement

40% of financial actors wish to account for climate risk vs. 29% in 2016

COP 26

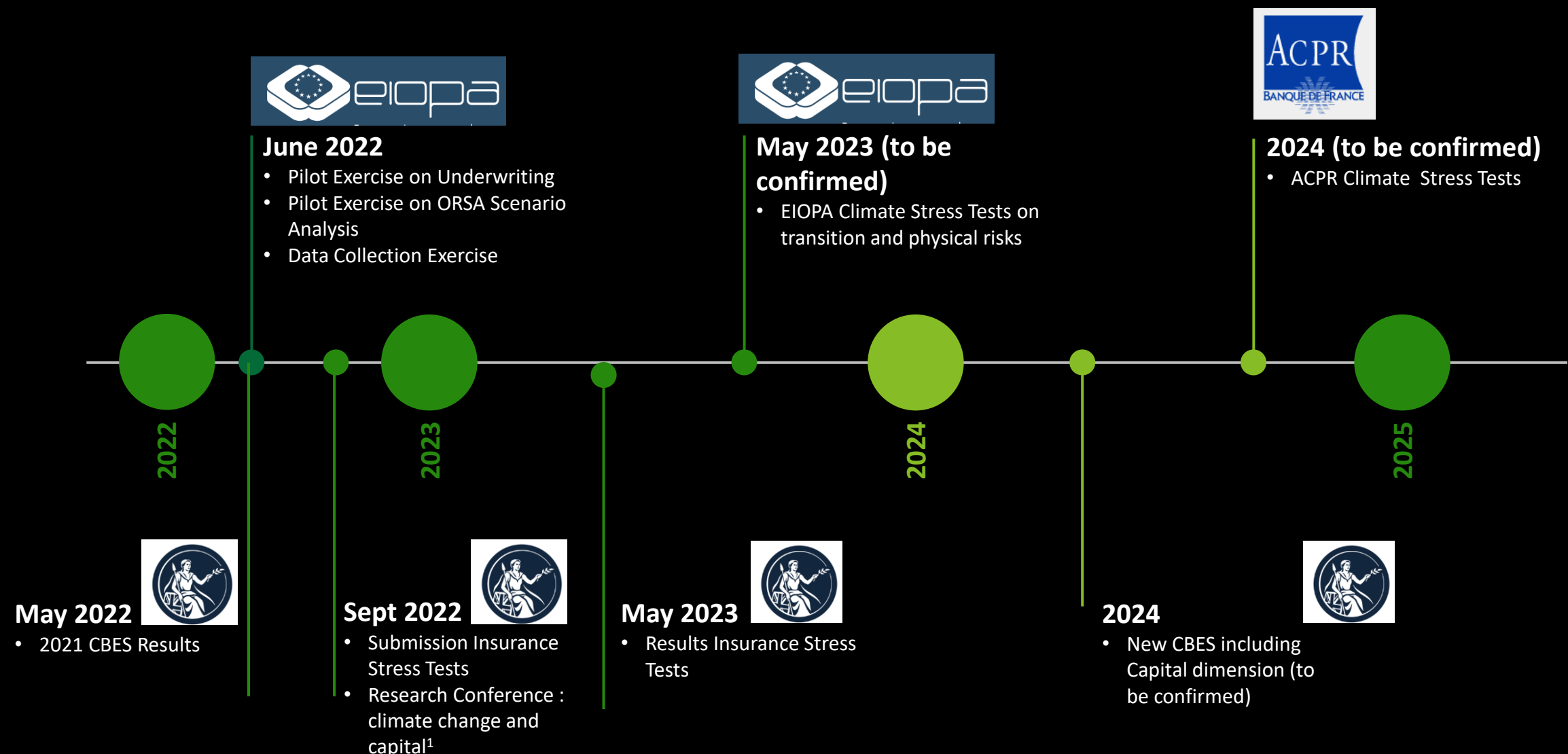
EIOPA's final application guidance on running climate change materiality assessment and using climate change scenarios in the ORSA

Part 1 – Regulatory context in relation with Climate Change

“Supervisors can promote climate risk prevention and help identify risks and protection gaps. In doing so, they increased awareness of the risks and facilitate risk and protection gap management »

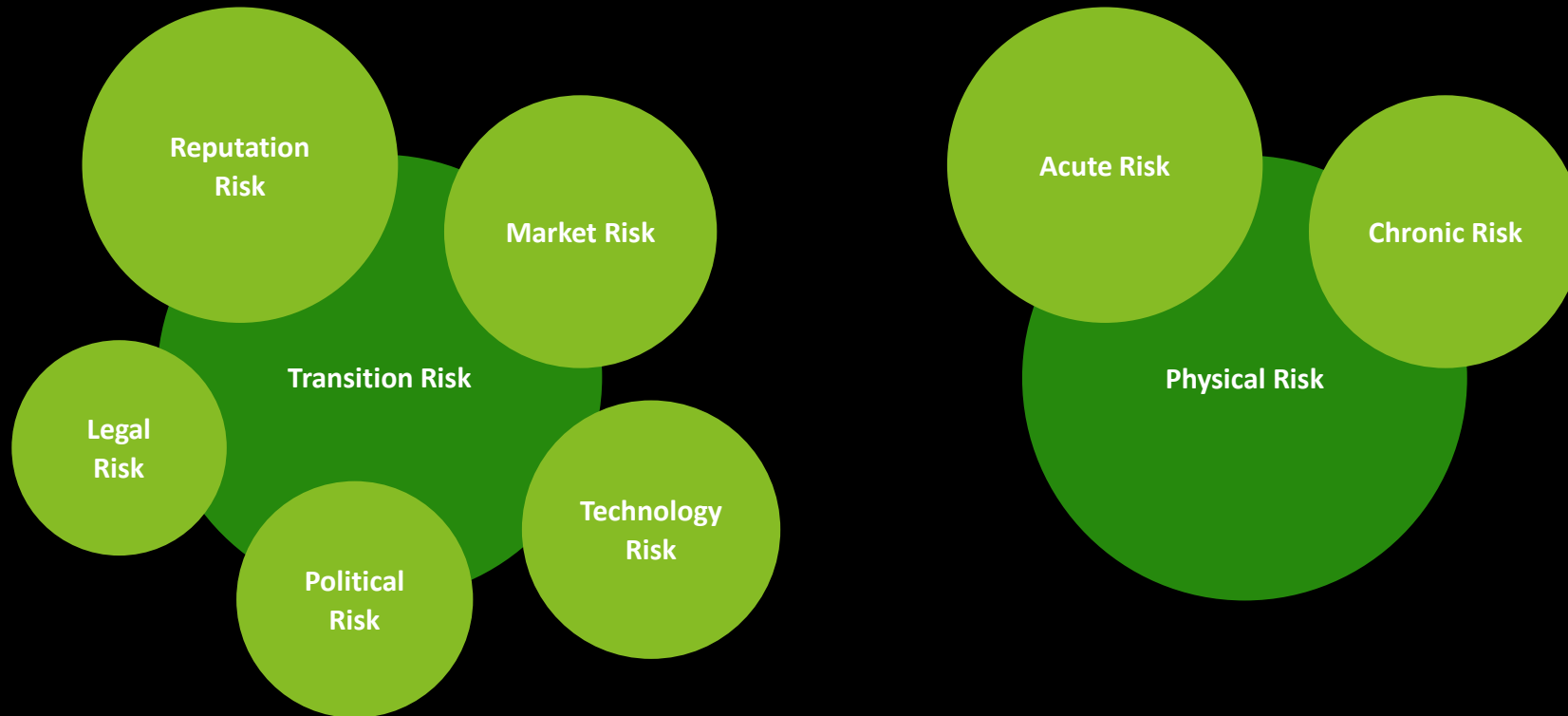
Chair Petra Hielkema, Network for Greening the Financial System's European Plenary Outreach on 12 September 2022

Regulatory Increase in pressure for insurers



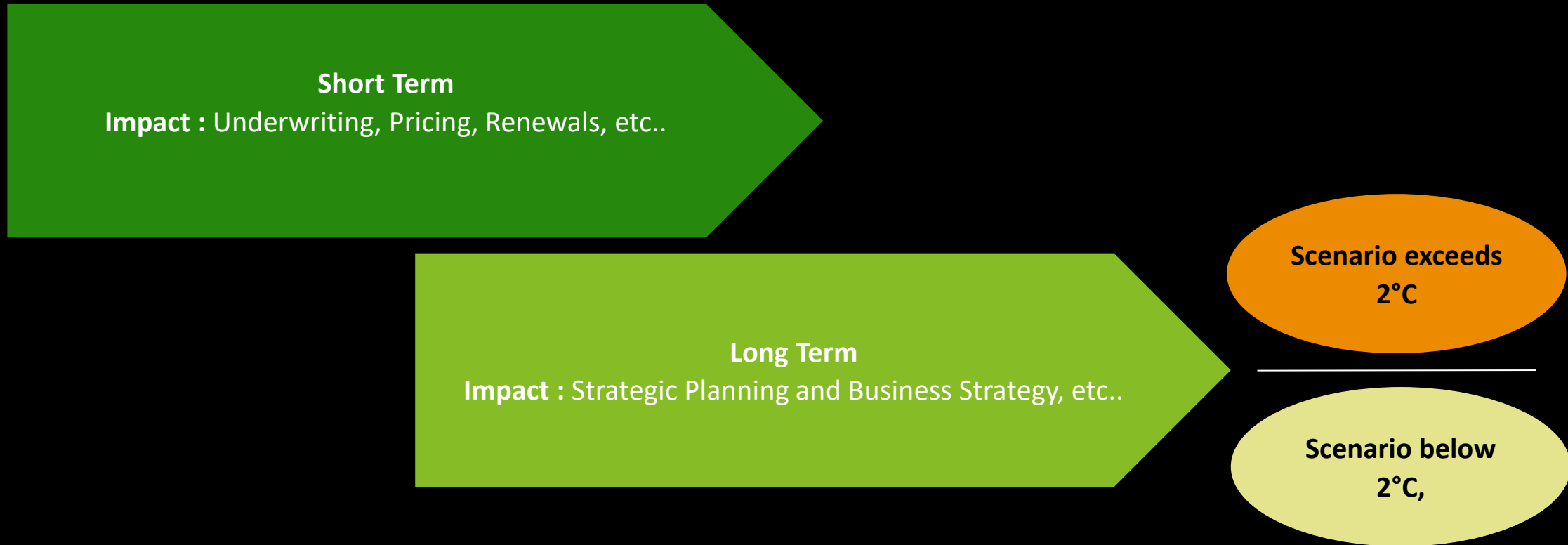
Summary of EIOPA publication on the integration of climate change in the ORSA process

In the latest publication, EIOPA recommends a progressive integration of climate change risk in the ORSA Process and Report. It involves a clear distinction between Physical Risk and Transition Risk....



Summary of EIOPA publication on the integration of climate change in the ORSA process

....As well as the integration of different time horizons (Short & Long term) with at least 2 scenarios of global temperature increase.



Summary of EIOPA publication on the integration of climate change in the ORSA process

ORSA Process and Report integration shall be on a proportional basis and factor based

Materiality evaluation

- Assess climate change materiality **quantitatively** and **qualitatively** on insurance / reinsurance activities through :
 - A clear and deep definition of the context
 - A deep dive analysis of the implications of climate change
 - A selection of the most relevant factors
- Introduce the concept of a **materiality matrix** creating **correlations between exposed risk**, the **occurrence probability** and the **associated insurance losses**
- Remind that climate change impacts the **full scope of the economic balance sheet** :
 - **Assets**
 - **Liabilities**
 - **Capital Requirements**

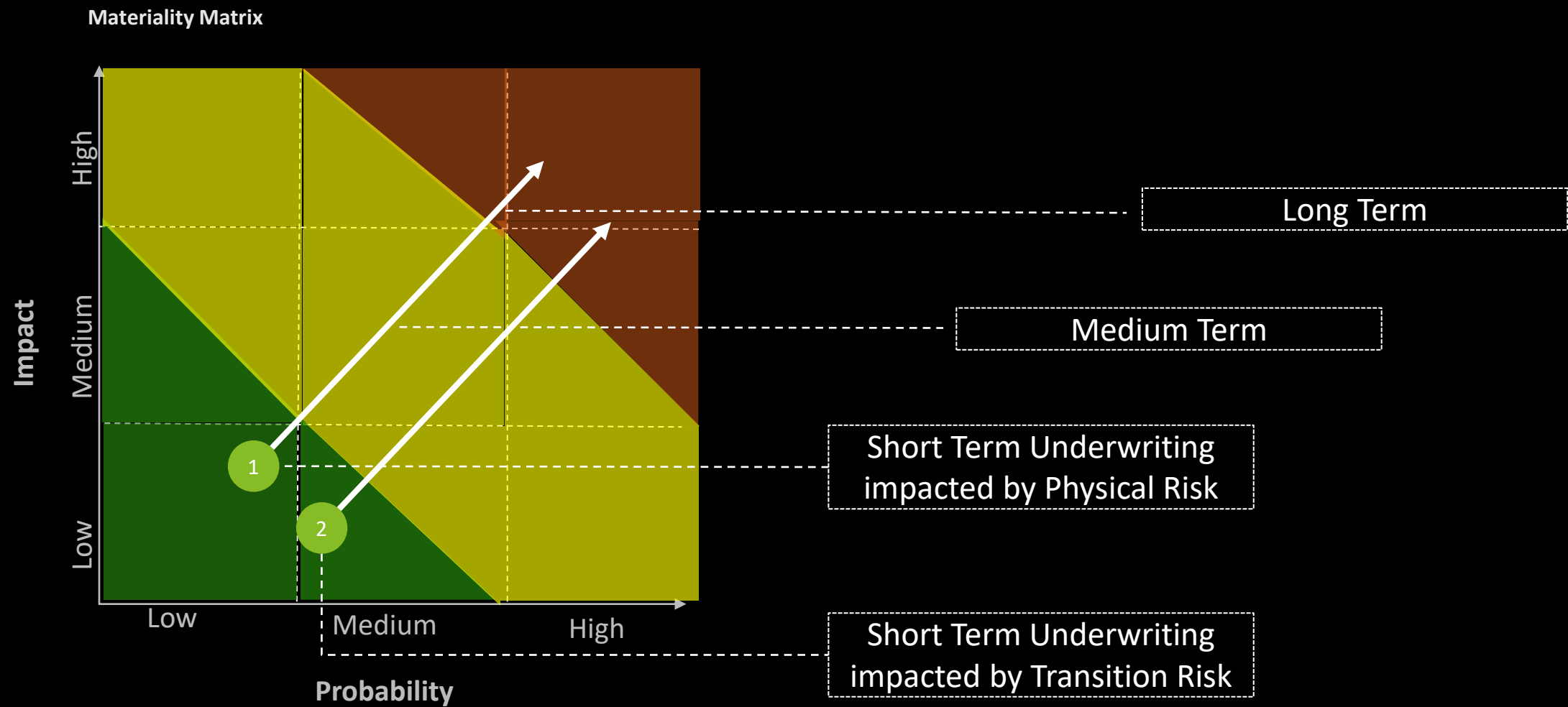
EIOPA Opinion
on the
supervision of
the **use of
climate change
risk scenarios in
ORSA**

Climatic scenarios analysis

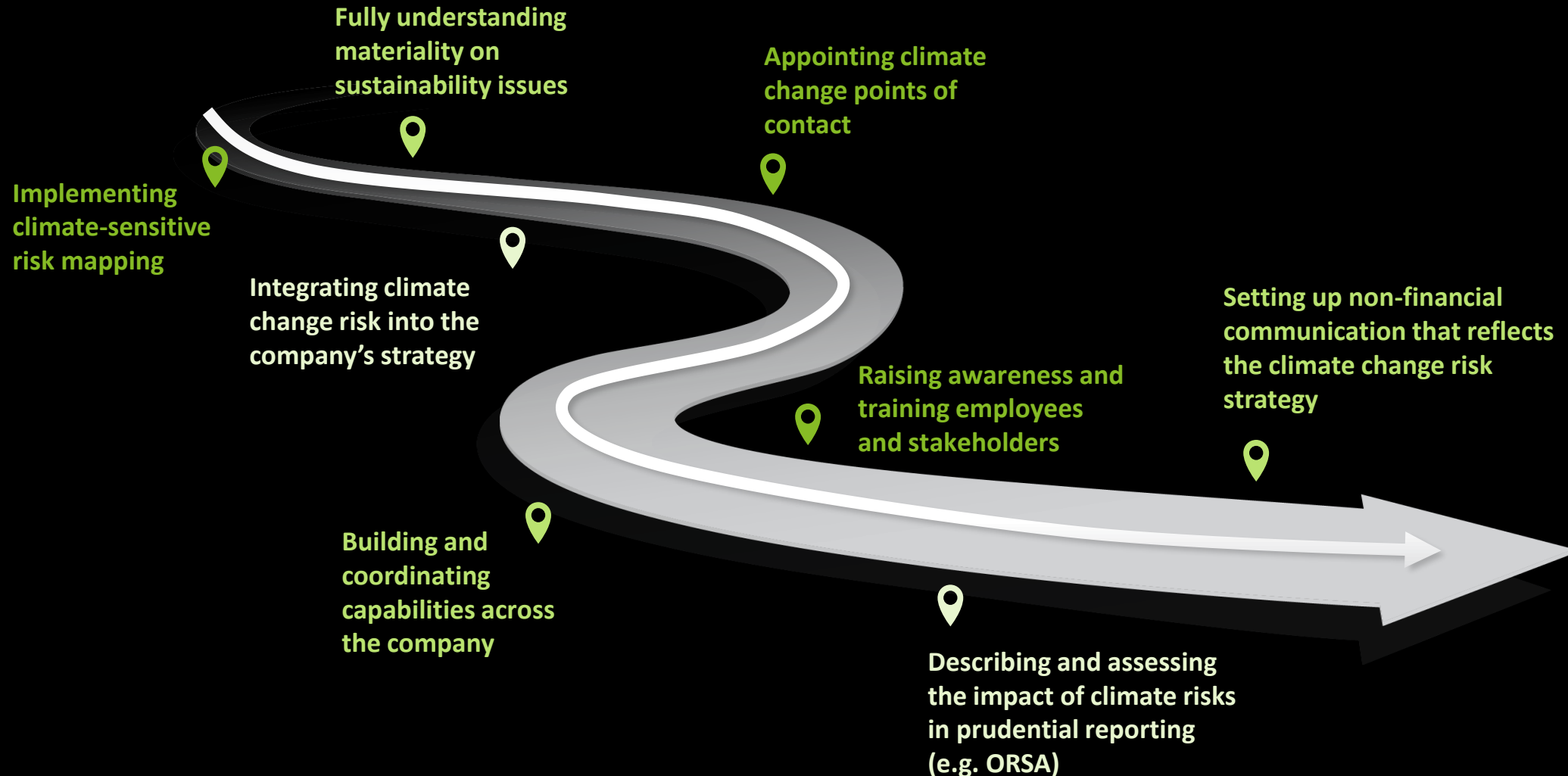
- If and only if Materiality is significant then the insurance company must perform a scenario analysis to assess the impact of the material risks under **at least 2** different climate scenarios (around 2°C)
- Several methodologies are proposed but the steps are similar with the following approach :
 1. Define a **priori** relevant climate scenarios using **expert judgment, strategy adequacy and existing risk profile**
 2. Transform climate information **into hazard information that can be mapped to exposure and vulnerabilities**
 3. Build a model to link hazard to losses and vulnerability selecting at least 2 conservative scenarios (below and above 2°C) **and quantify losses and return period**

Summary of EIOPA publication on the integration of climate change in the ORSA process

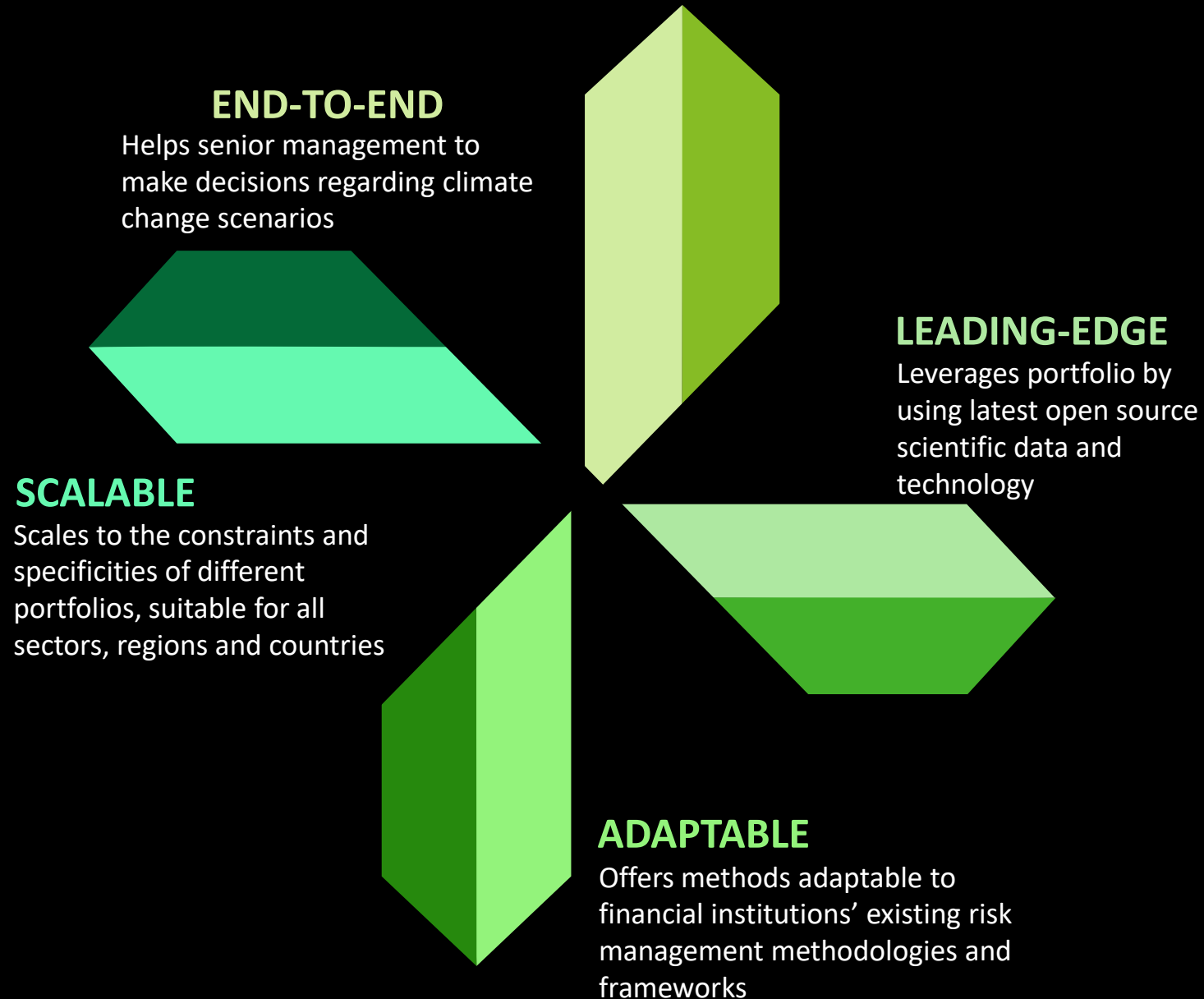
Example : Materiality Matrix to be applied to Underwriting Activities



A journey towards Actuarial Best Practices regarding climate change



A journey towards Actuarial Best Practices regarding climate change



Polling questions

- 1. In your opinion, what would be the most appropriate time horizon to tackle climate change for (re)insurers?**
 - a. Short term (0 to 5 years)**
 - b. Mid term (5 to 15 years)**
 - c. Long term (15 to 30 years)**
 - d. Very long term (over 30 years)**

Polling questions

2. How are you planning to take climate risk into account in ORSA?

- a. Not yet decided**
- b. Provide qualitative analysis**
- c. Adapt ORSA projections with long term projections related to climate risks**

Part 2 – How to use our actuarial expertise to address climate change impacts

2.1 Main dimensions to consider

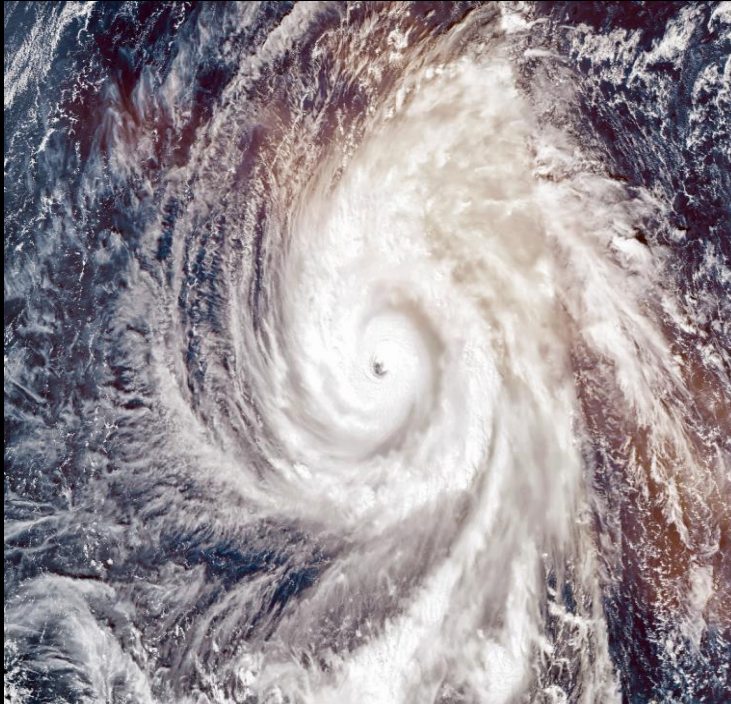
“Weather and climate are sometimes used interchangeably, but scientists, meteorologists and researchers study and model them differently.”

Lauren Harper (« What Are Climate Models and How Accurate Are They? »)

Main dimensions to consider – How does it work ?



Characteristics of Climate Scenarios



Relevant climate scenarios must be aligned with the following principles



Cutting-edge scientific and actuarial knowledge



Political viability, technology et economics



Transparency on data and assumptions



Comparable other existing scenarios

Main dimensions to consider – How does it work ?



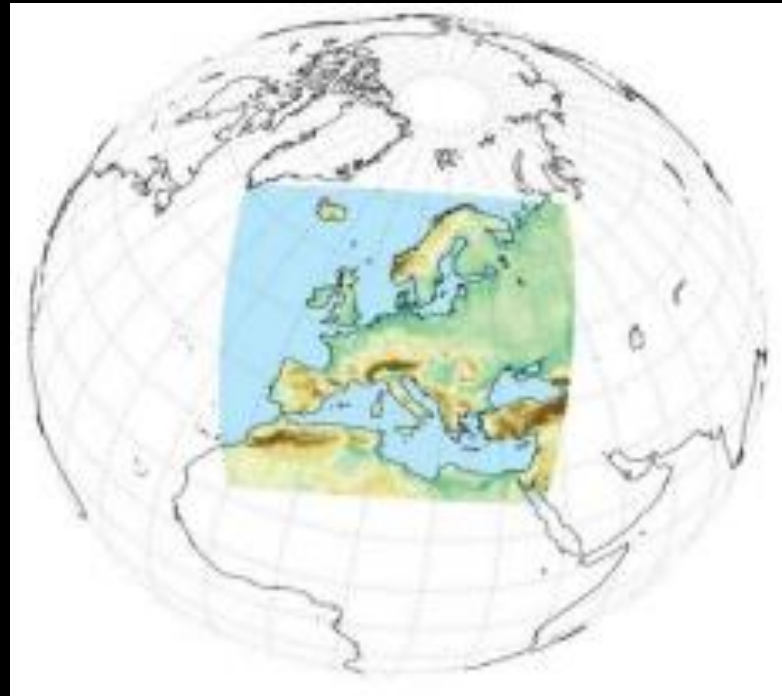
Reference existing climate model

Global Climate Models (GCM)

Open source / academics

Modelling groups : 20 à 30
different models

Resolution: 2.5° Meshs (400-
200km)



Regional Climate Models (RCM)

« Downscaling »
or interpolation of GCMs

Résolution mesh of 0.44° &
0.11° (50 à 15 km)

Main dimensions to consider – How does it work ?



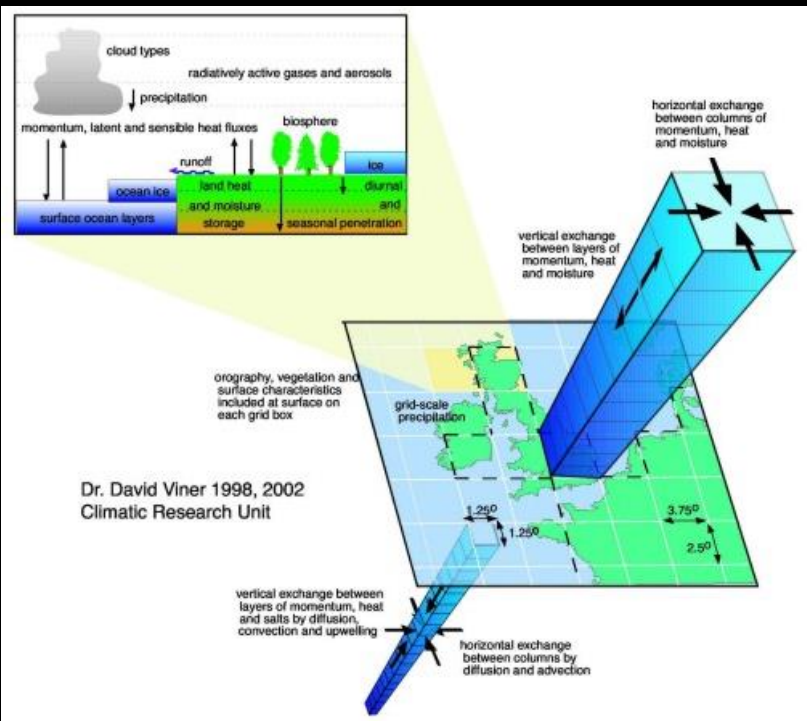
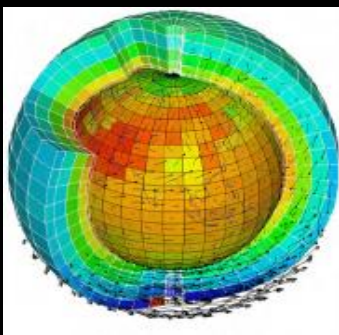
How does climate modelling hazard data can be obtained from available public sources ?

Ground, aerial/
satellite
observations

Physical equation
representation
climate processes

Different IPCC
scenario projections

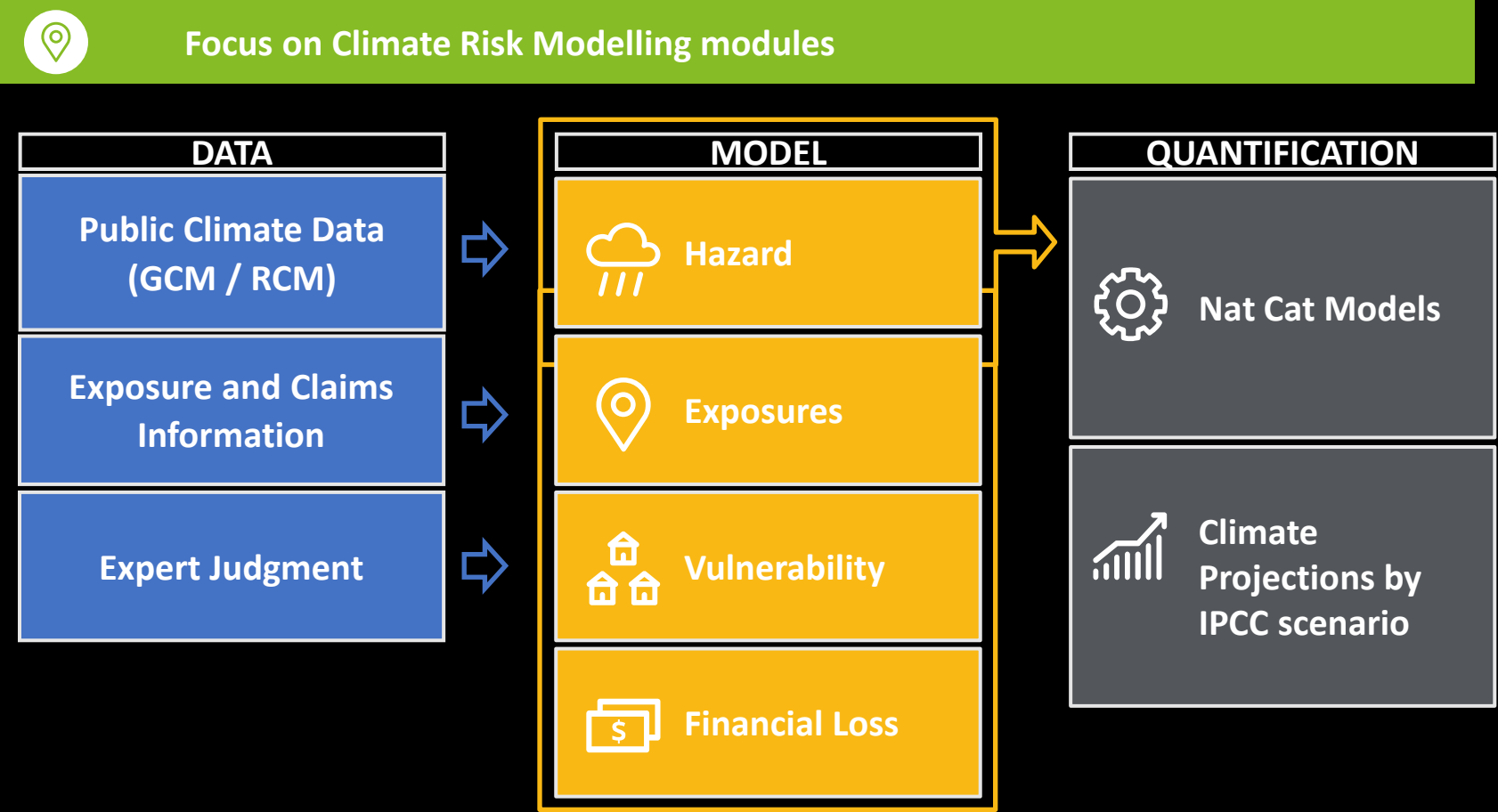
Physical projections :
climate hazard
processes until 2050



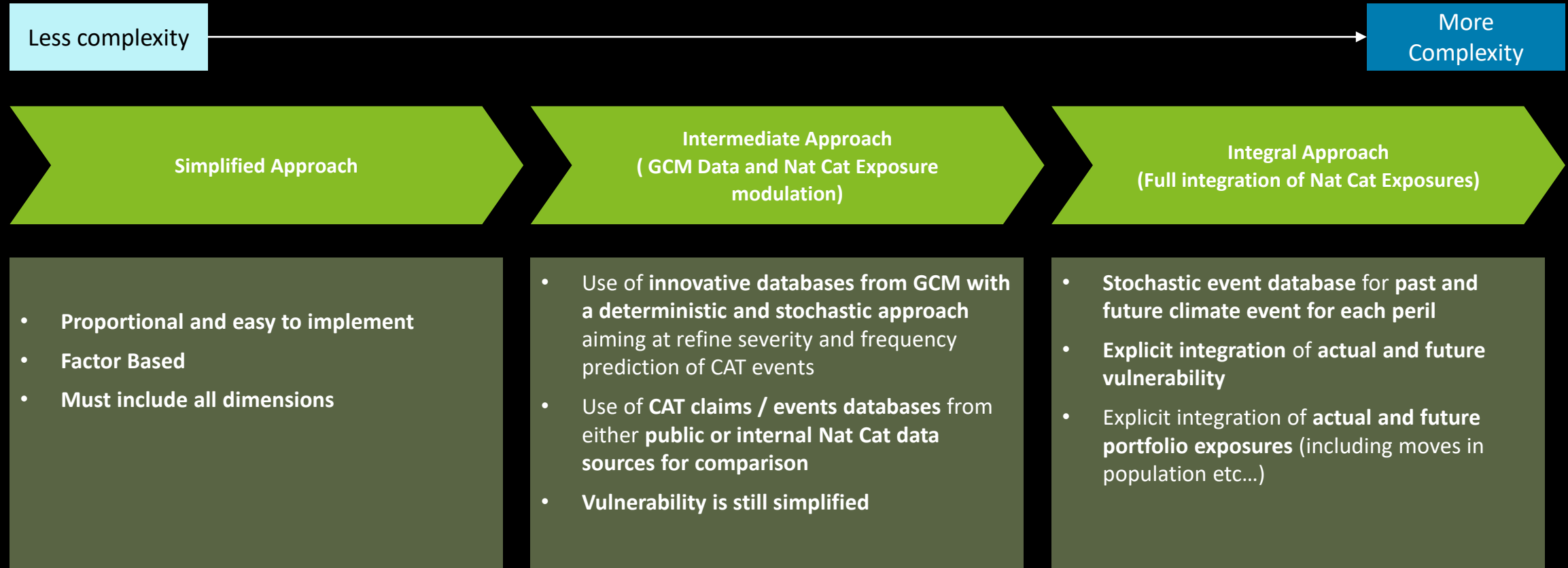
Use of Statistical
Models to
derive Physical
variables



Main dimensions to consider – How does it work ?



Main dimensions to consider – Methodology benchmark



Polling questions

3. Which of the following is the most important short term action for (re)insurers to address climate change?

- a. Transform the risk management process to face climate change**
- b. Adapt natcat models**
- c. Review underwriting / pricing internal guidelines**
- d. Train clients and employees**

Polling questions

4. Which dimension of climate related perils requires the largest investment in resources?

- a. Hazard modeling**
- b. Exposure and claims data management**
- c. Vulnerability management and adaptation measures**
- d. Loss modeling**

2.2 Example of recent developments

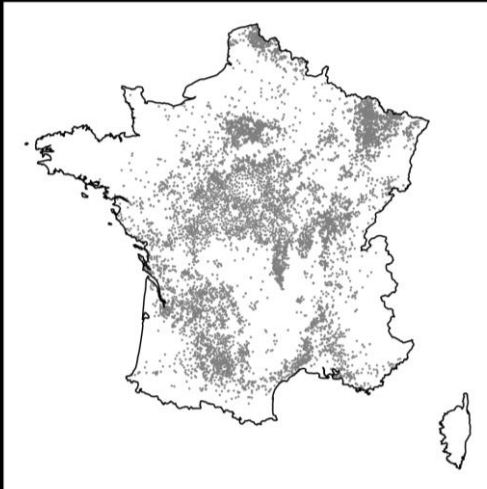
“Advances in technology are enabling actuaries to automate and augment their work, boosting them into higher-value, more strategic roles focused on insight generation and key decision-making”

The Exponential Actuary (Deloitte US publication)

Example of recent developments – Drought Methodology

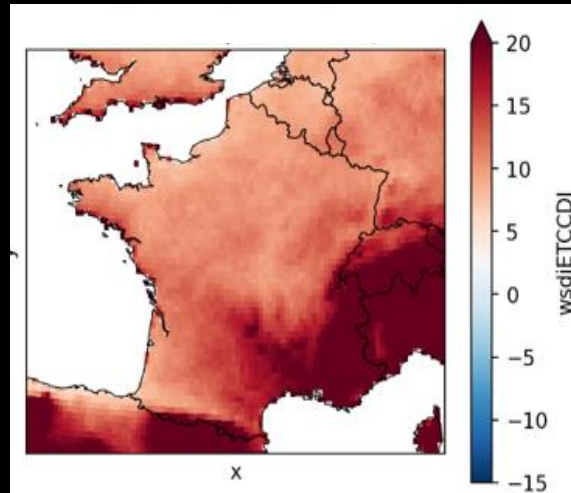
Identify variables to explain

Internal Geocoded Drought
Data



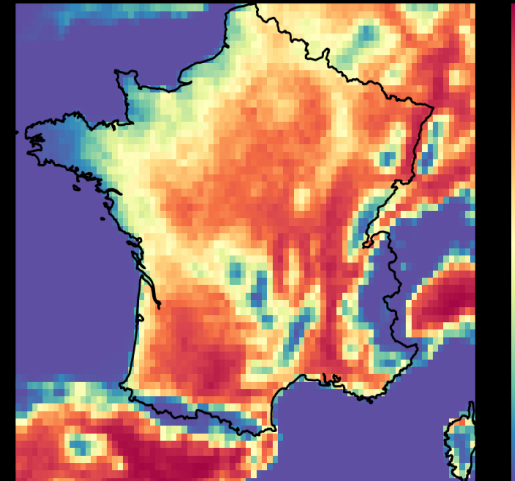
Select explicative variables
and most suited scenario

#extreme heat days 2040



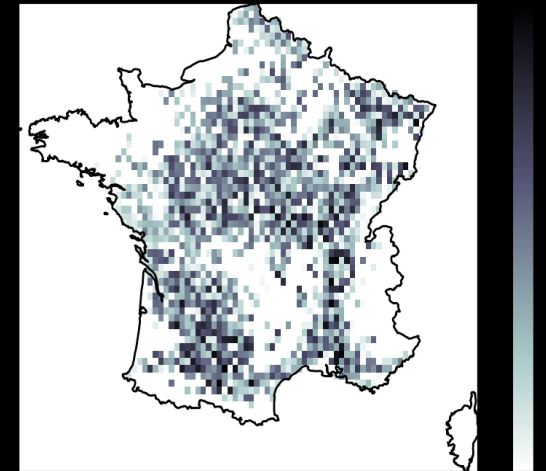
Determine occurrence
probability and frequency

Drought Occurrence
Probability 2040



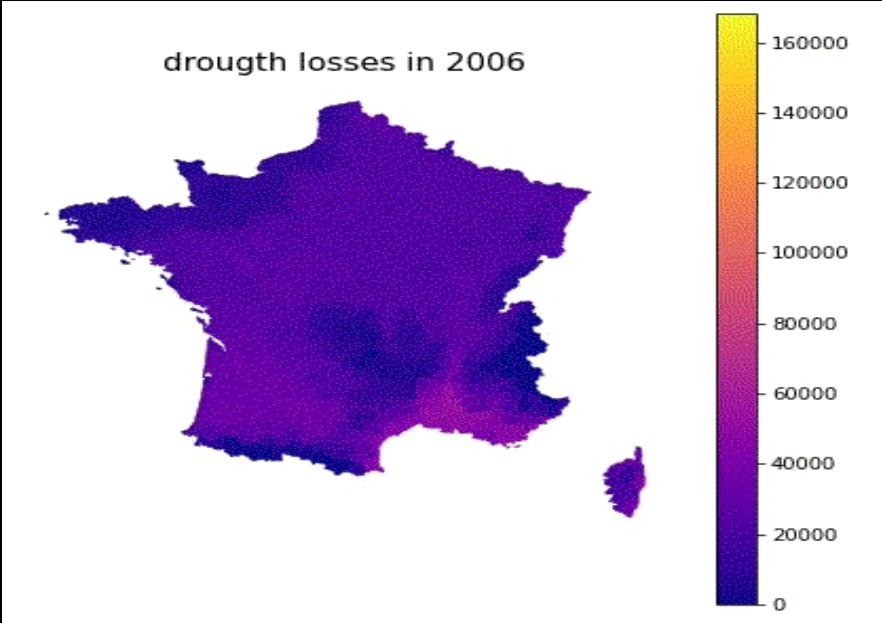
Model average and tail
distribution losses

Estimated 99,5% Quantile
loss (€) 2040



❑ This approach can be used in Scenario Analysis (in ORSA) or to define a transparent approach for climate stress testing

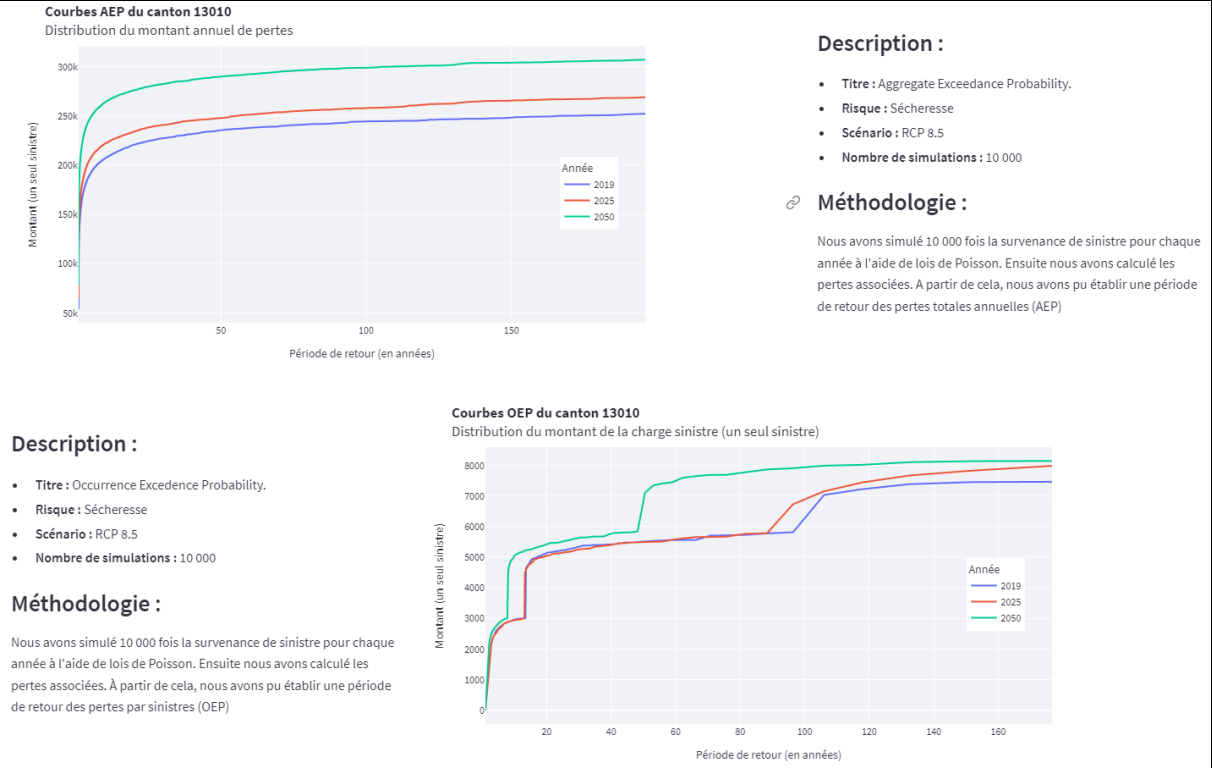
Example of recent developments – Results visualization



Dynamic Drill-Down Engine

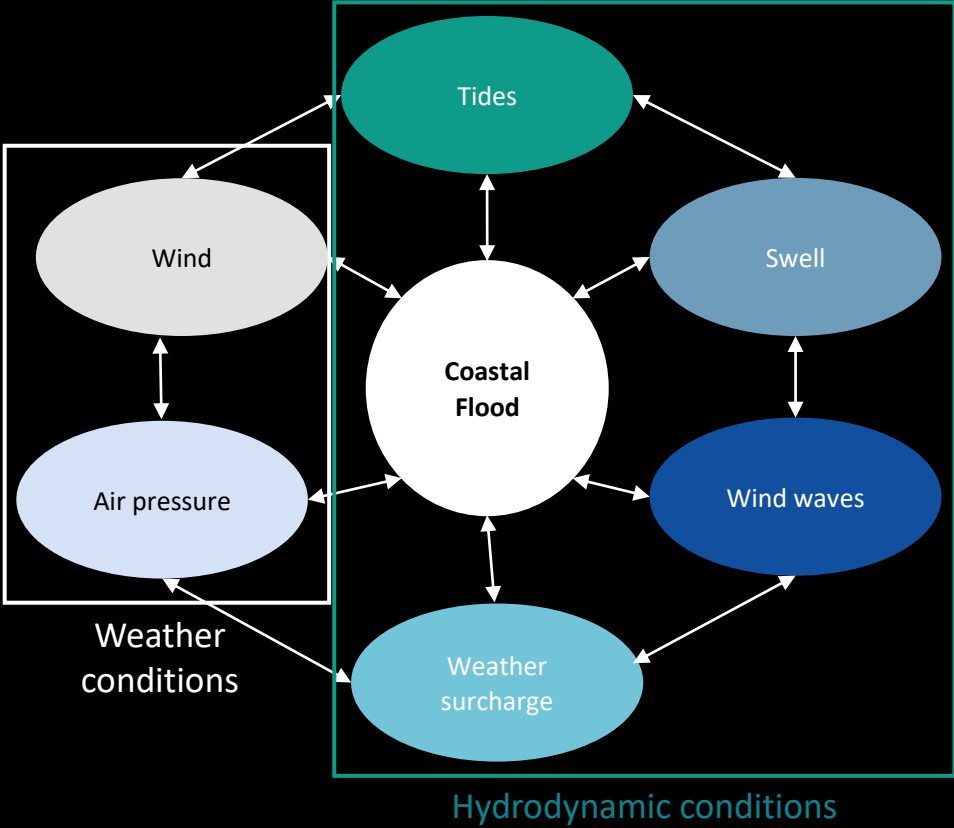
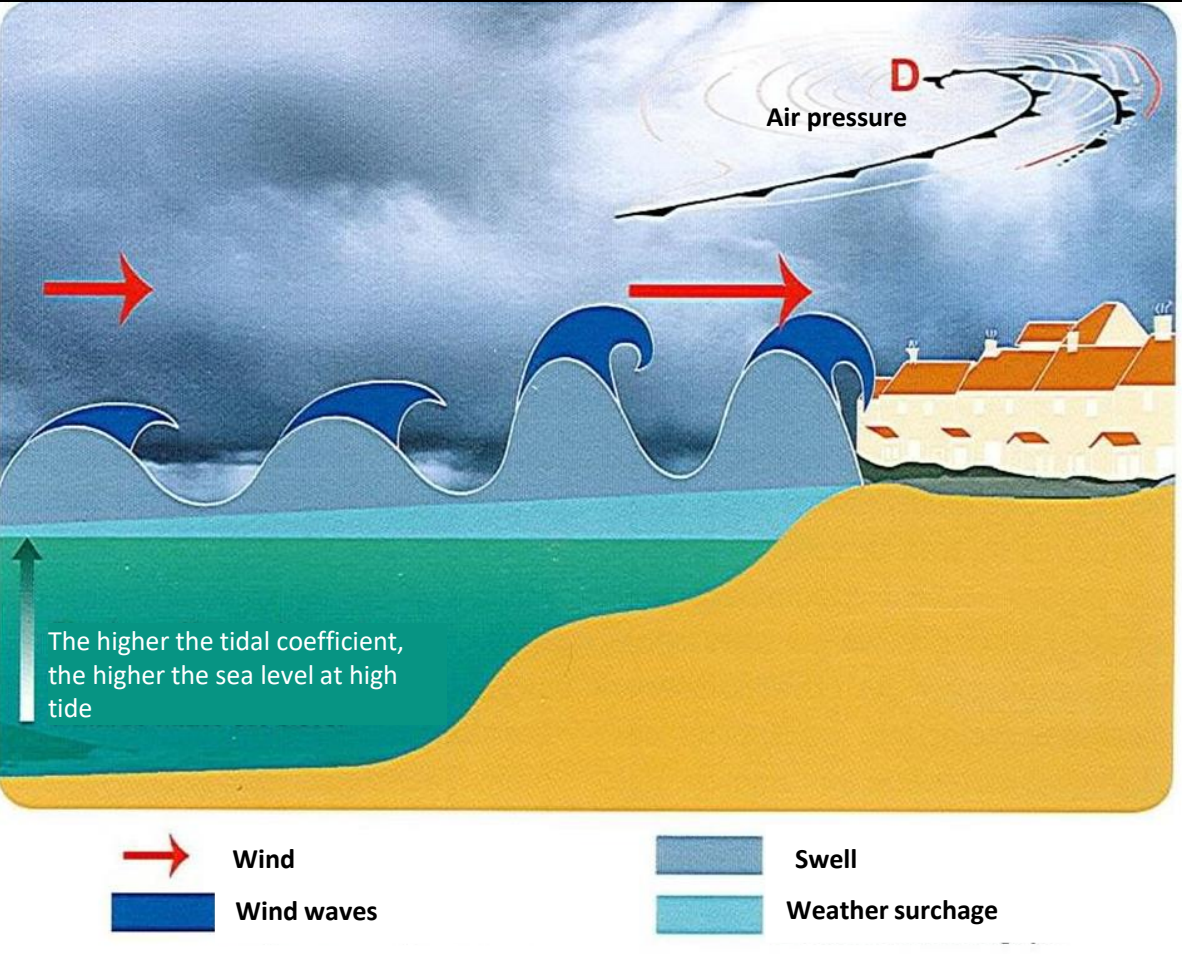


Key Physical and Loss Factors Evolution monitoring

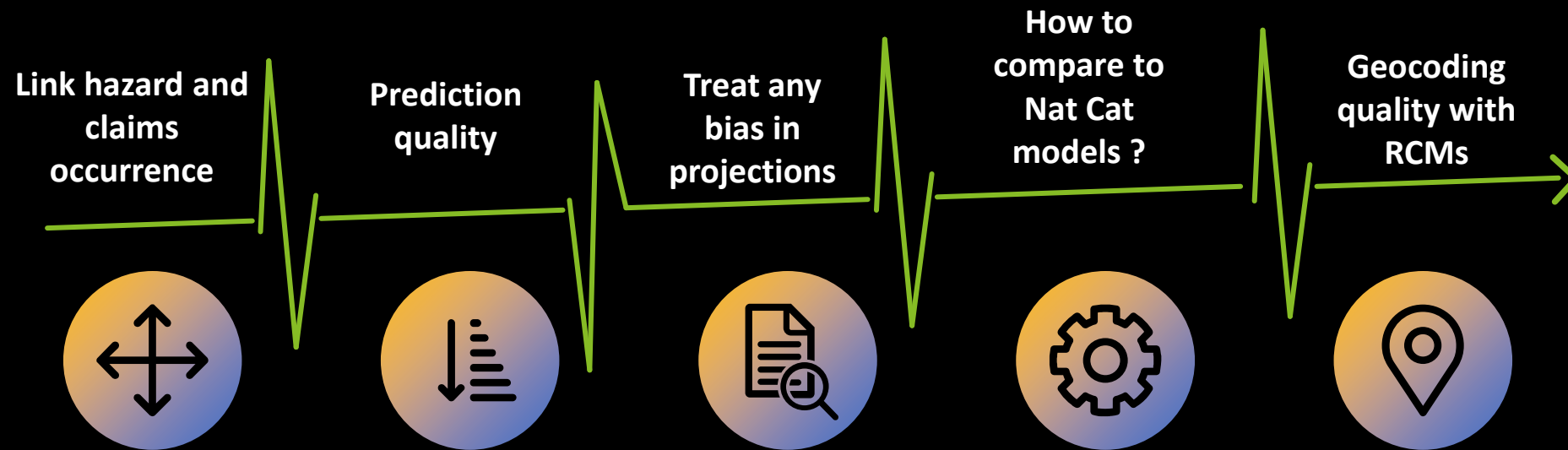


AEP and OEP curves until 2050 with 5 years steps

Example of recent developments – Coastal Flood

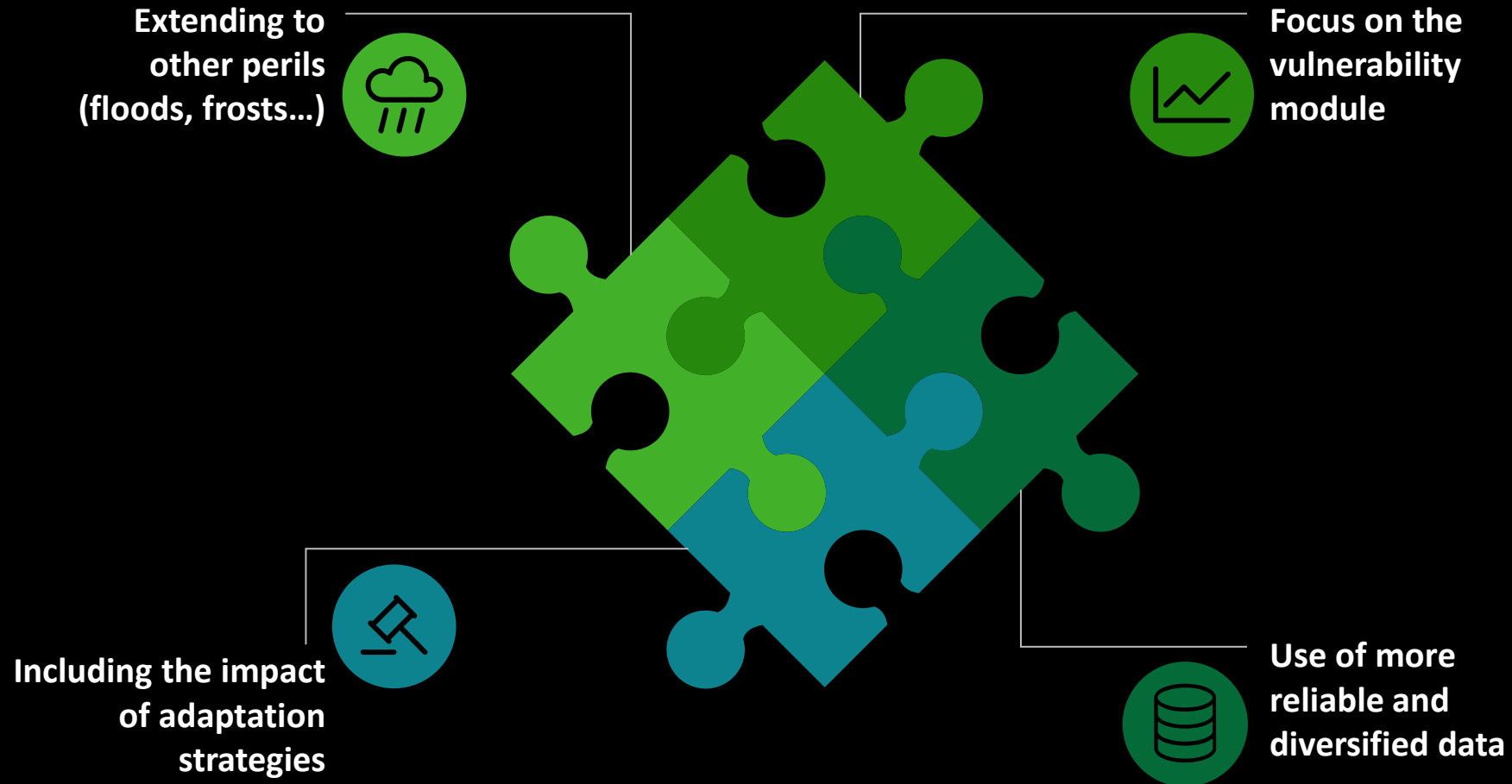


Main dimensions to consider – Limitations

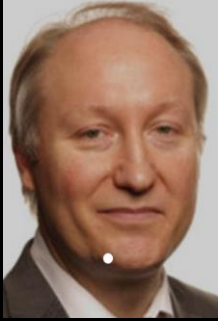


3 What's Next ?

ClimWise Physical Risk – What are the next steps?



ClimWise Physical Risk – Contacts



Cyril Chalin

Partner

cchalin@deloitte.fr



Joseph Delawari

Senior Manager

jdelawari@deloitte.fr



Alexandra Douthaud

Consultant

adouthaud@deloitte.fr



Actuaries facing Climate Change

Thank you for your attention