

Actuaries and Data Scientists: how our Professionalism and Training keeps us ahead

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The benefit of Actuarial Professionalism on applying Climate Stress Scenarios

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Member of the AAE Professionalism Committee

I was asked to talk about the ESAP3 revision ...

Jules Krijgsman van Spangenberg AAG

- Senior manager Risk Modelling Services at PwC Netherlands
- Chair of the Professionalism Committee of the Royal Dutch Actuarial Society (AG)
- Member of the AAE Professionalism Committee
- Member of the AAE Actuarial Standards Subcommittee (ASSC)
- Chair of the ASSC ESAP2 Review Taskforce (Actuaries & Actuarial Function Report)
- Chair of the ASSC ESAP3 Review Taskforce (Actuaries & ORSA process)
- But first of all
 - I am an actuary ...
 - ... not a climate risk specialist ...
 - ... also not a data science specialist ...
 - ... but eager to bring disciplines together ...
 - ... and always want to know “are we solving the problem or just one of its symptoms?”

Disclaimer: Views expressed in this presentation do not necessarily represent views from AG, AAE or PwC

Climate Change Scenarios – the Solvency II Requirement

- Article 45a of the SII revision prescribes long-term climate change scenarios that should be included in the ORSA.
- **These SII climate scenarios are principle based only.**


Article 45a

Climate change scenario analysis


1. For the purposes of the identification and assessment of risks referred to in Article 45(2), the undertaking concerned shall also assess whether it has any material exposure to climate change risks. The undertaking shall demonstrate the materiality of its exposure to climate change risks in the assessment referred to in Article 45(1).
2. Where the undertaking concerned has material exposure to climate change risks, the undertaking shall specify at least two long-term climate change scenarios, including the following:
 - (a) a long-term climate change scenario where the global temperature increase remains below two degrees Celsius;
 - (b) a long-term climate change scenario where the global temperature increase is *significantly* higher than two degrees Celsius.



at least two climate scenarios



target scenario $\Delta T < 2^{\circ}\text{C}$



(very) bad scenario $\Delta T \gg 2^{\circ}\text{C}$

Actuarial Professionalism & Climate change (ESAP3 = ORSA process)

In determining the appropriateness of the time period considered under the ORSA, the actuary should consider ... changes in sustainability factors, including **climate changes and their physical and transition risks** that may play out over a period beyond the undertaking's projection period used for business planning purposes.

Actuaries will cover in the ORSA the physical and transition risks resulting from climate changes.

In considering whether the **qualitative risk assessments** are appropriate, the actuary should take into account the extent to which the assessments ... analyse the **uncertainty on timing and impact of the identified risks**, particularly in case of sustainability risks.

Actuaries know that even the best analyses do not tell the timing and impact of climate changes.

Where the actuary has reasonable grounds for believing that there is a **material shortcoming in the quantifications or projections** that renders the ORSA unsuitable for its purpose, then the actuary must ensure that such shortcoming is appropriately communicated.

Actuaries will inform their audiences that climate change models are just best effort proxies of the very complex real-world climate changes.

Actuarial Professionalism & Data

(ESAP1 = General Actuarial Practice)

The actuary should have or obtain sufficient knowledge and understanding of the data and other information available, including the relevant history, processes, nature of the business operations, law, and business environment of the subject of the actuarial services, to be appropriately prepared to perform the actuarial services required by the assignment.

Actuaries ensure that they fully understand any available data.

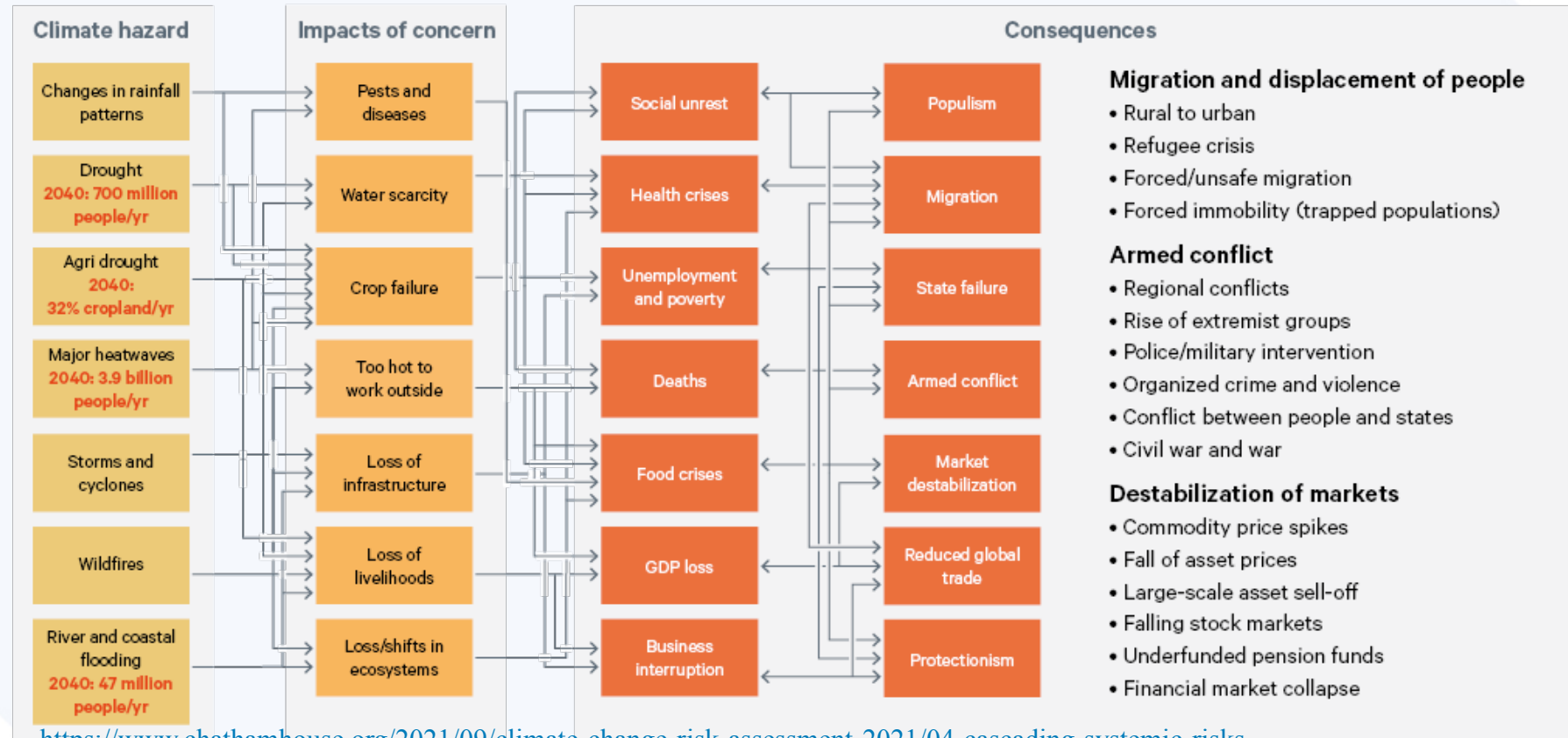
The actuary should consider whether sufficient and reliable data are available to perform the actuarial services. Data are sufficient if they include the appropriate information for the work. Data are reliable if they are substantially accurate.

Actuaries actively challenge available data before using it.

The actuary involved in using models should understand the model, the conditions under which it is appropriate for the model to be used including any limitations of the model for the intended use, the context in which the model will be used, **how model inputs will be provided, and how the actuary expects the results of the model will be used.**

Actuaries understand how models process input data into relevant output.

Major systemic risk dynamics → Climate risk is (very) complex



<https://www.chathamhouse.org/2021/09/climate-change-risk-assessment-2021/04-cascading-systemic-risks>

- ✓ Insurers can help clients to mitigate their climate change risks.
- ✓ Insurers can mitigate their own exposure to climate change risks.
- ✗ Insurers are not the remedy to climate change risks at macro or society level.

SII Climate Change Scenario – Understand the requirement ^{1/2}

Identifying the scenarios behind the “principle based climate change scenarios”

- **ΔT is just one indicator of climate change**, but climate risk is much more diverse than just ΔT .
 - Water shortage / Floods / Storms / Reduced cropland productivity / etc.
 - *“... symbolic violence is at work in climate policies that focus on global mean temperature, compressing the experiences and tragedies of billions into a single net scalar variable ...”*

Erica Thompson – Escape from Model Land
 - Even if ΔT would remain on average below 2°C, that might not be true in all regions and/or seasons.
- **Actuaries are key in understanding the climate component in the ORSA base scenario.**
 - 1) Which climate change scenario is (implicitly) used in Best Estimate values and Asset valuations?
 - 2) Which climate change scenario is (implicitly) used in the SCR (standard formula or PIM)?
 - 3) What actions follow if the answers to 1) and 2) are not the same?
 - 4) What about future management actions, e.g. updating business models to the new reality?

SII Climate Change Scenario – Understand the requirement 2/2

Identifying the scenarios behind the “principle based climate change scenarios”

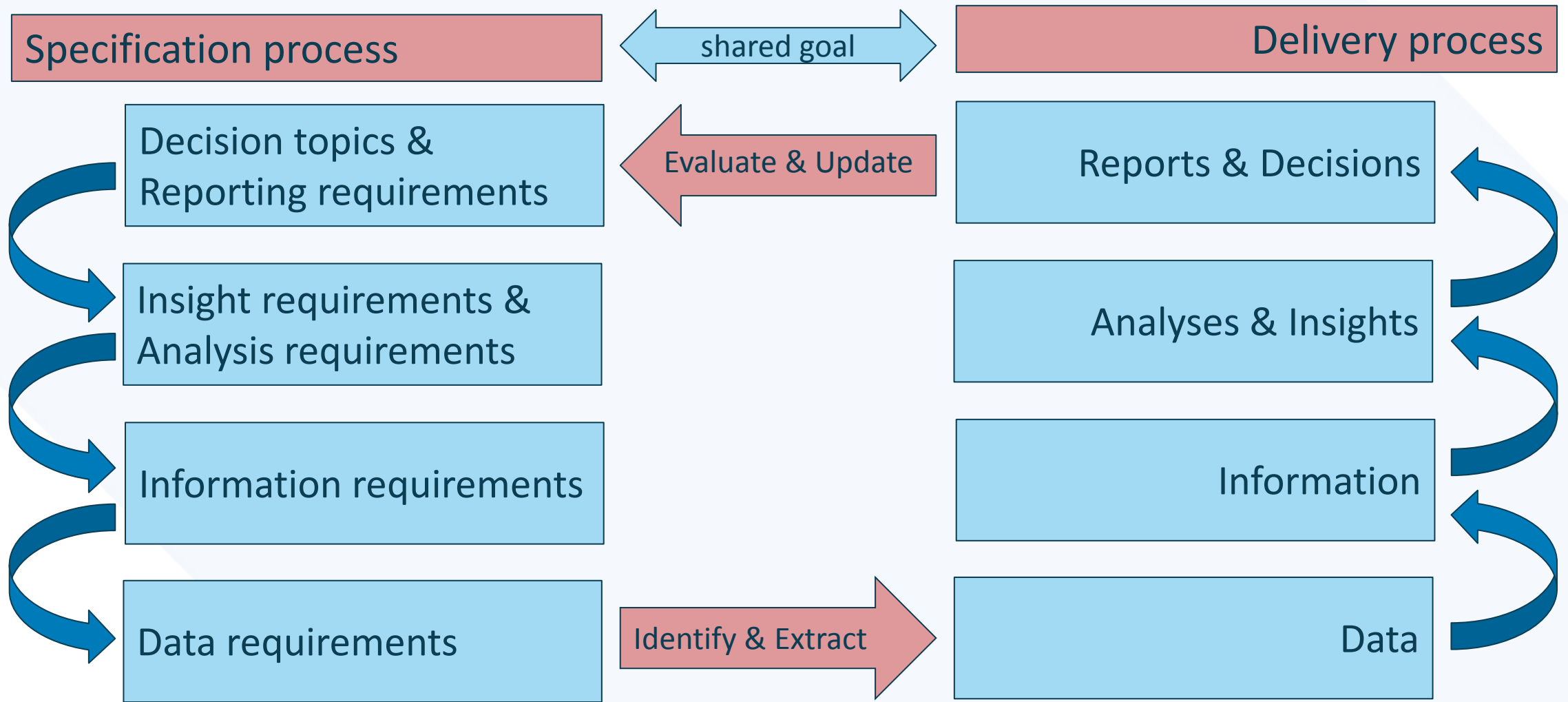
- ΔT below / significantly higher than 2°C
 - **Fill in the details:** how far below / above 2°C, which time horizon, which increase pattern?
- “... specify at least two long-term climate change scenarios ...”
 - Do we need more than two long-term scenarios?
 - Or do we focus on short-term impacts of multiple “what if management now decides to ...” scenarios (short term = traditional ORSA time horizon)
- Which scenarios to use if your **best estimate scenario** already results in $\Delta T > 2^\circ\text{C}$?

1. Global GHG emissions set new record of 57.4 GtCO₂e in 2022

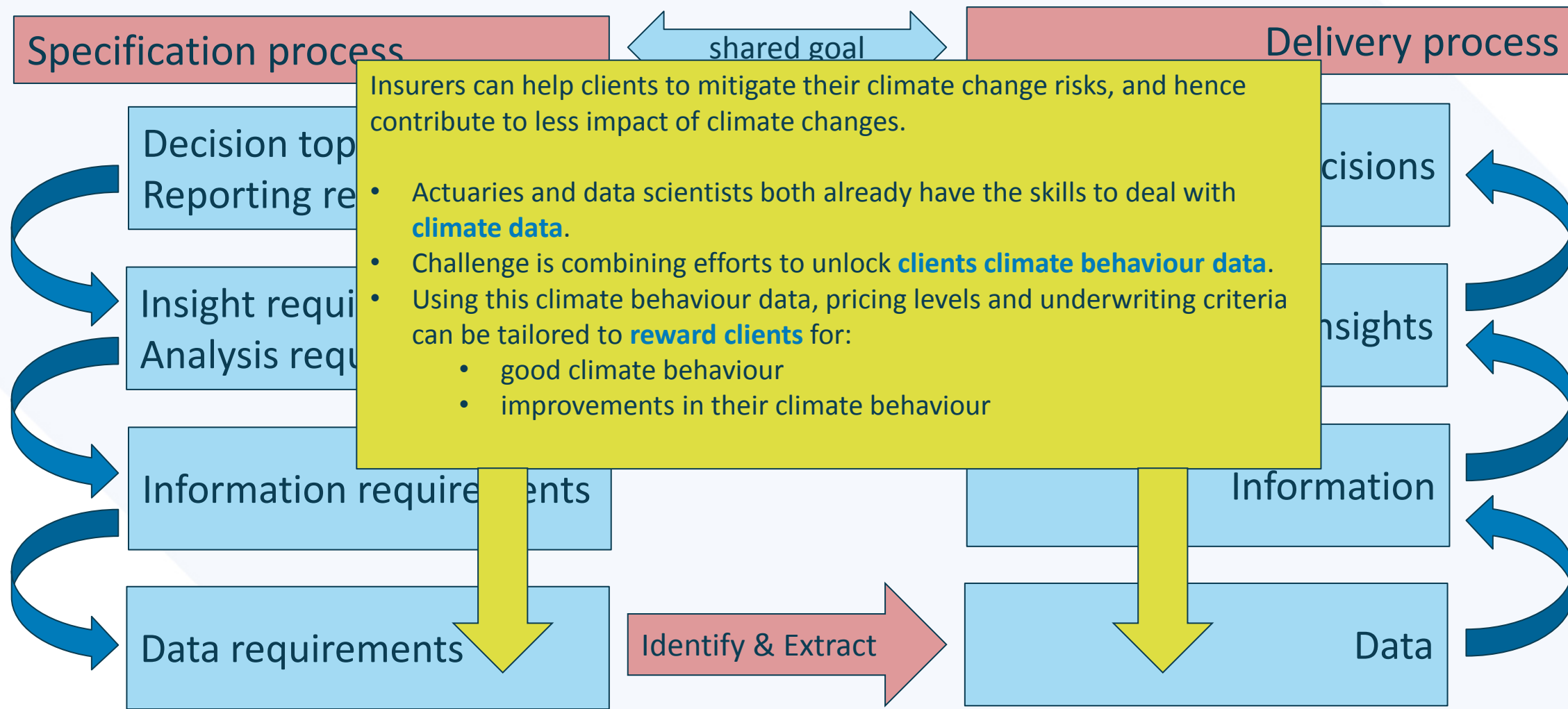
<https://www.unep.org/resources/emissions-gap-report-2023>

7. If current policies are continued, global warming is estimated to be limited to 3°C. Delivering on all unconditional and conditional pledges by 2030 lowers this estimate to 2.5°C, with the additional fulfilment of all net-zero pledges bringing it to 2°C

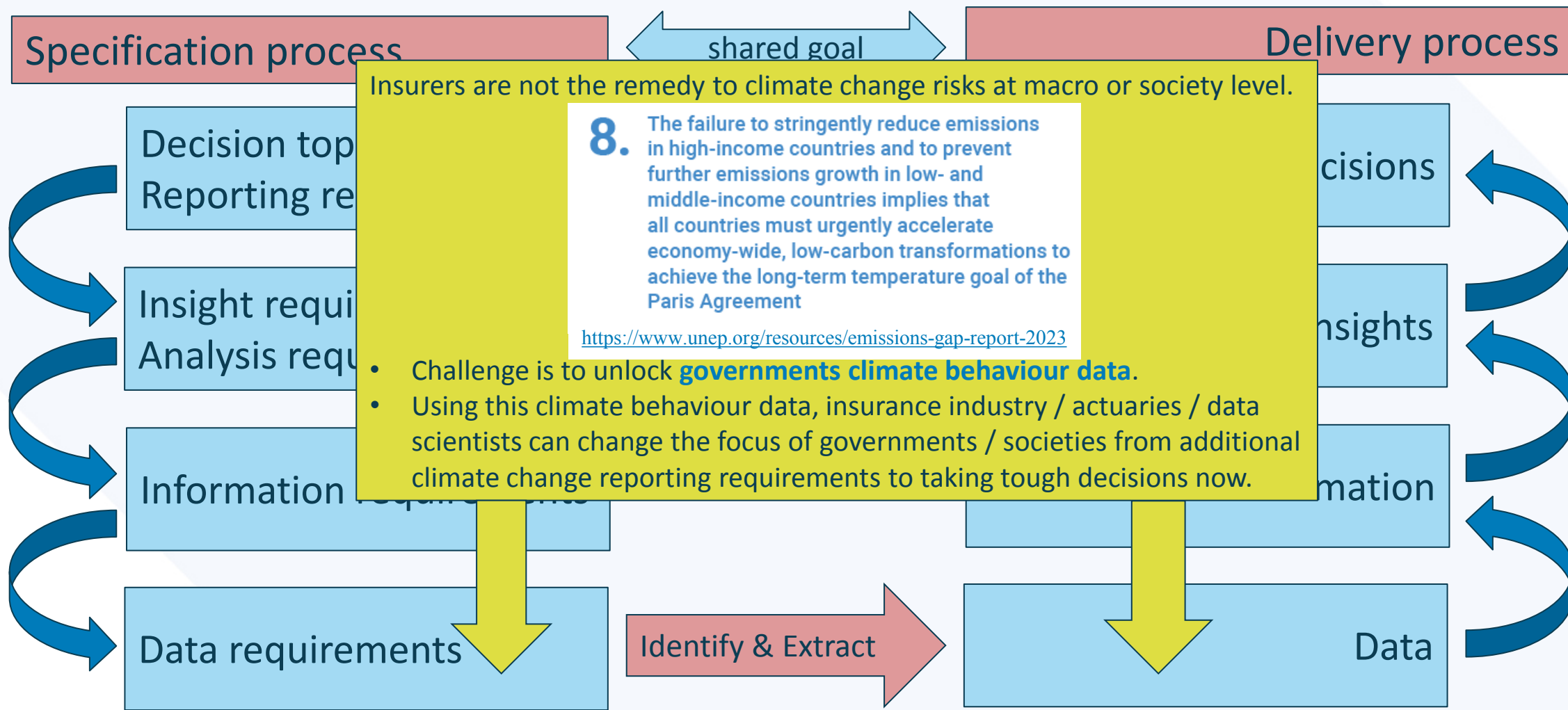
SII Climate change scenarios – the role of Data



SII Climate change scenarios – Climate data at client level



SII Climate change scenarios – Climate data at society level



Actuaries as Data Scientists

The benefit of actuarial professionalism on applying climate stress scenarios

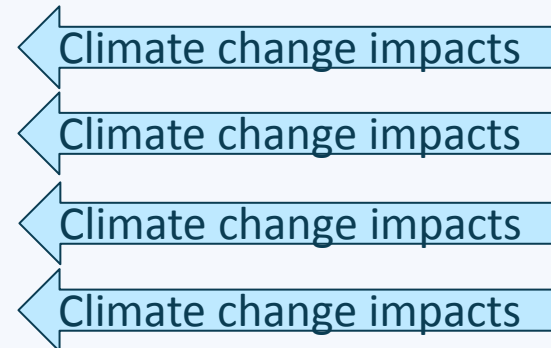
- **Actuaries are trained to match data science techniques to real-world questions.**
 - In general, the purpose of data & models should be to answer real-world questions.
 - The actuarial focus to climate change scenarios is not to measure climate data, but to identify which input data should be influenced – by governments, insurers, individuals – to reduce the real-world consequences of the “burning house” climate change process.
- **Actuaries integrate data science into the actuarial art of developing robust models.**
 - The calibration of complex climate models is certainly an art as well as a science.
 - Actuaries understand that past performance of climate models is no guarantee of future success.
 - Actuaries ensure that output of climate scenario models goes beyond a reporting compliance exercise.
- **Actuaries are specialists in scenarios that inherently need expert panels and expert judgements.**
 - Actuarial Professionalism means that actuaries are intrinsically motivated to work together with data scientists and other professionals with different backgrounds to avoid “single specialism bias” in model selection and data selection.

Thank you & Please refer to our AAE Vision

AAE Vision

The vision of the Actuarial Association of Europe (AAE) is for actuaries throughout Europe to be recognised as the leading quantitative professional advisers in

- financial services,
 - risk management, and
 - social protection,
- contributing to the well-being of society,



and for European institutions to recognise the valuable role that the AAE plays as a leading source of advice on actuarial and related issues.

<https://actuary.eu/about-the-aae/vision/>

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