Climate change impact on safety and performance of existing and future infrastructure

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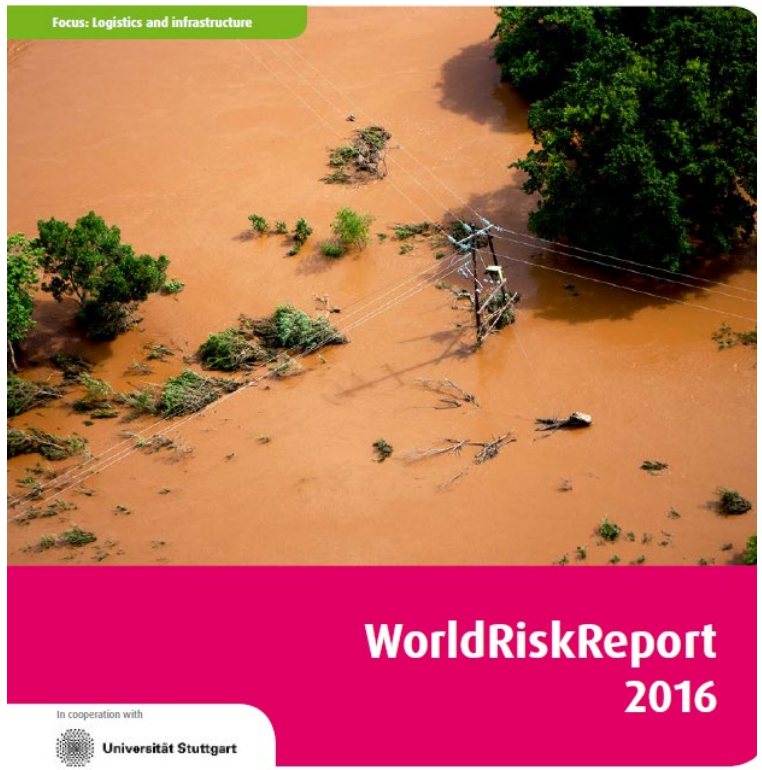
Climate change impacts to infrastructure



- Well-functioning and resilient infrastructure are critical, especially in times of crises and natural disaster
  - Evolving risk of climate change further highlights this need!
- What climate change related risks are relevant and how can our infrastructure be adapted/designed with this in mind?

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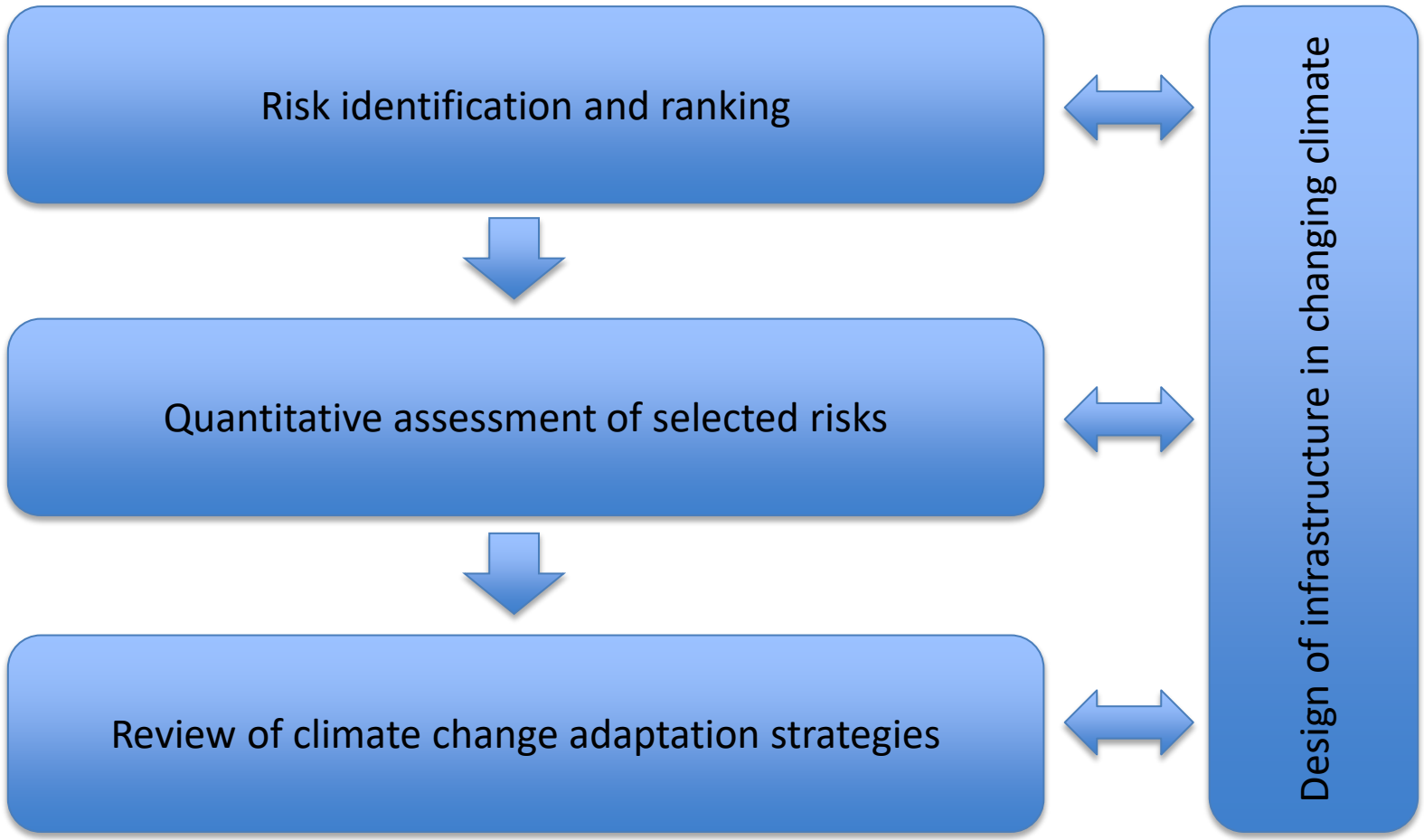
Overview of PhD project



Financing:

TRAFIKVERKET

INFRA SWEDEN 2030

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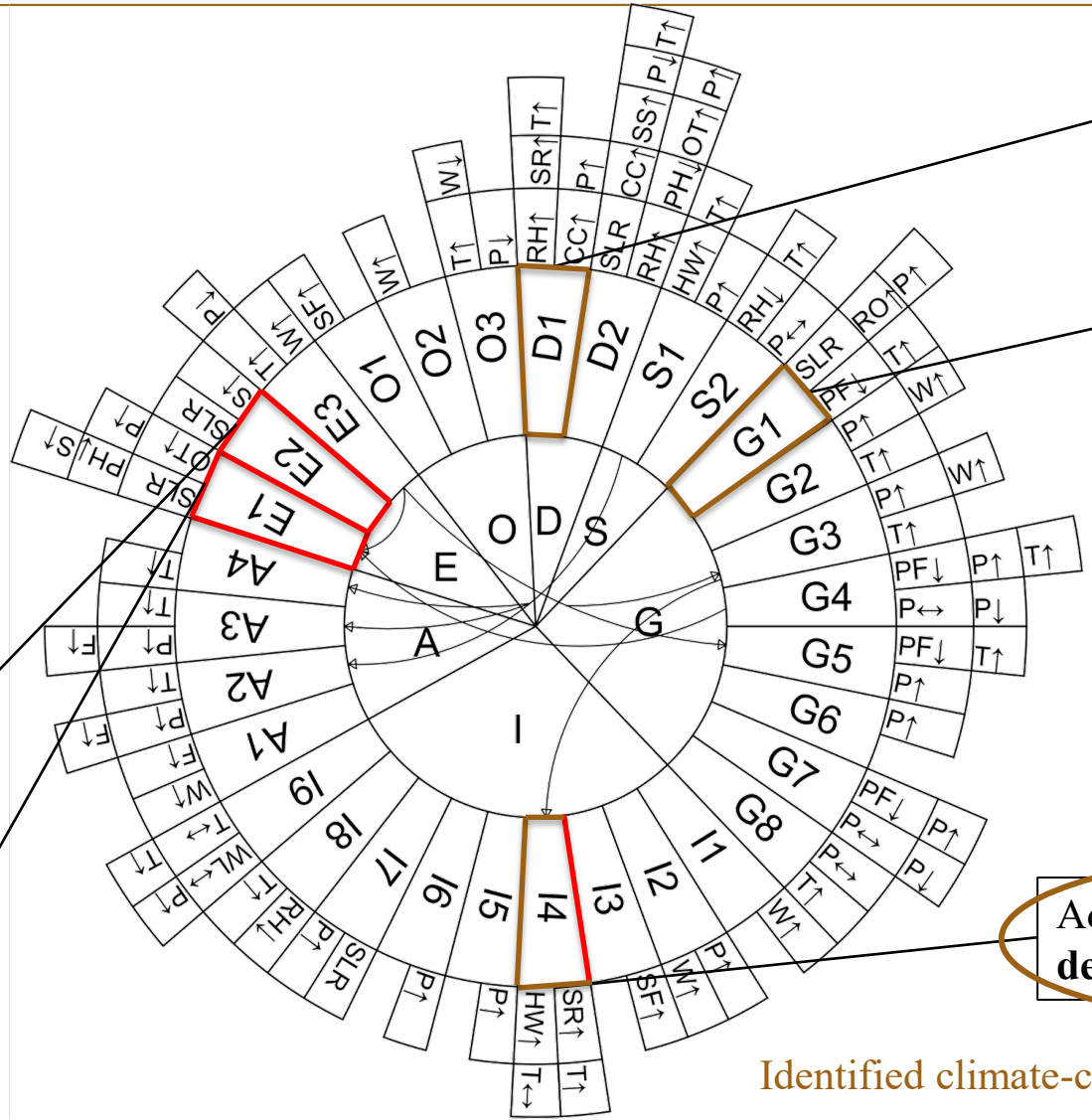
Results – risk identification

D- Durability risks
S- Serviceability risks
G- Geotechnical risks
I- Increased demand risks
A- Accidental loads risks
E- Extreme natural hazards risks
O- Operational risks



Accelerated **deterioration** rates

Higher **scour** rates

Higher frequency/intensity of **storms**

Higher **flooding** risks / Permanent **inundation** due to SLR

Additional demand on **deformation capacity**

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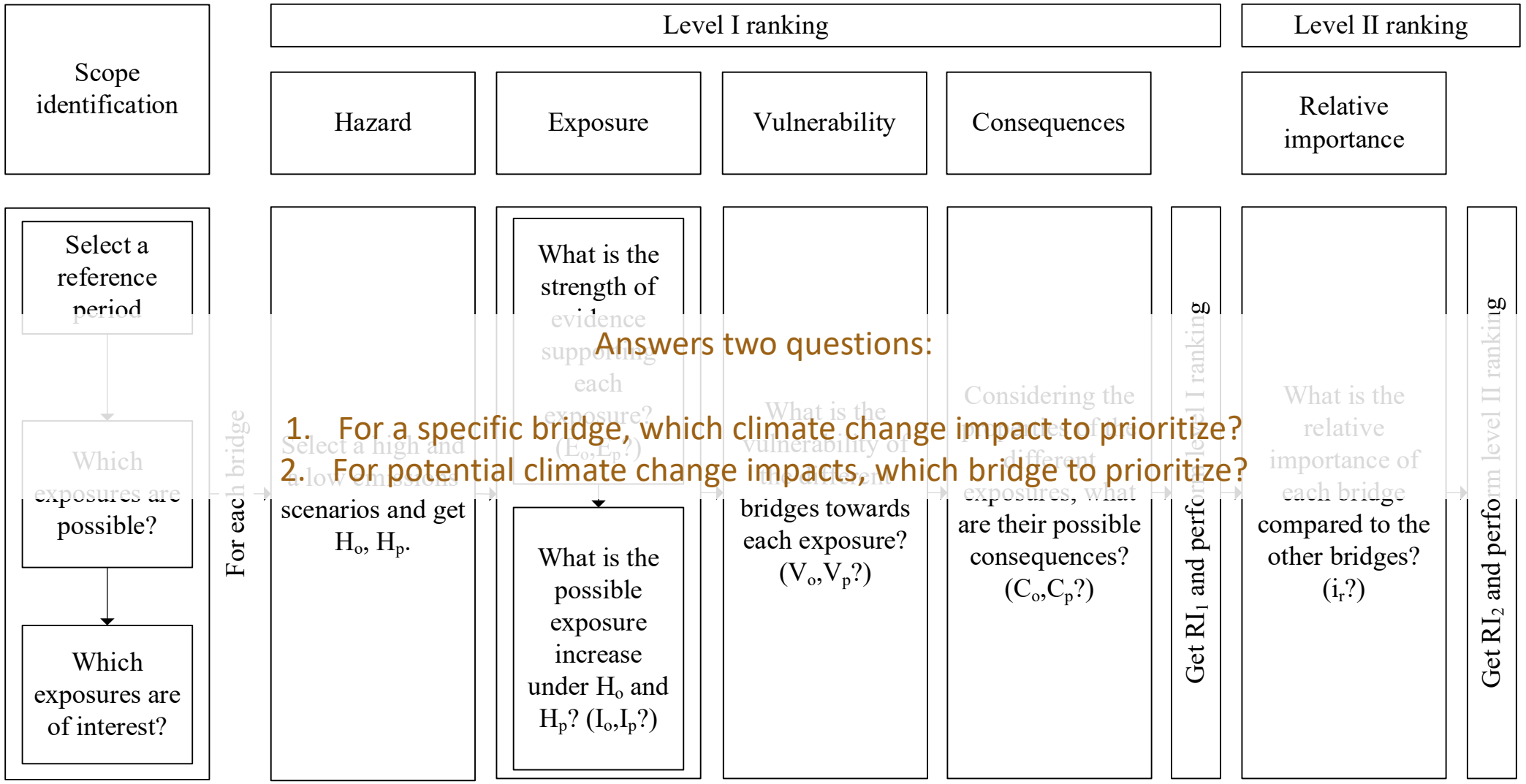
Identified climate-change risks on bridges.

Results – risk ranking



Answers two questions:

1. For a specific bridge, which climate change impact to prioritize?
2. For potential climate change impacts, which bridge to prioritize?

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Results – quantitative assessment of some risks

- Using climate change projections to quantify climate change impacts
  - Concrete creep
  - Decay of timber
  - Thermal loads for bridges (expansion)

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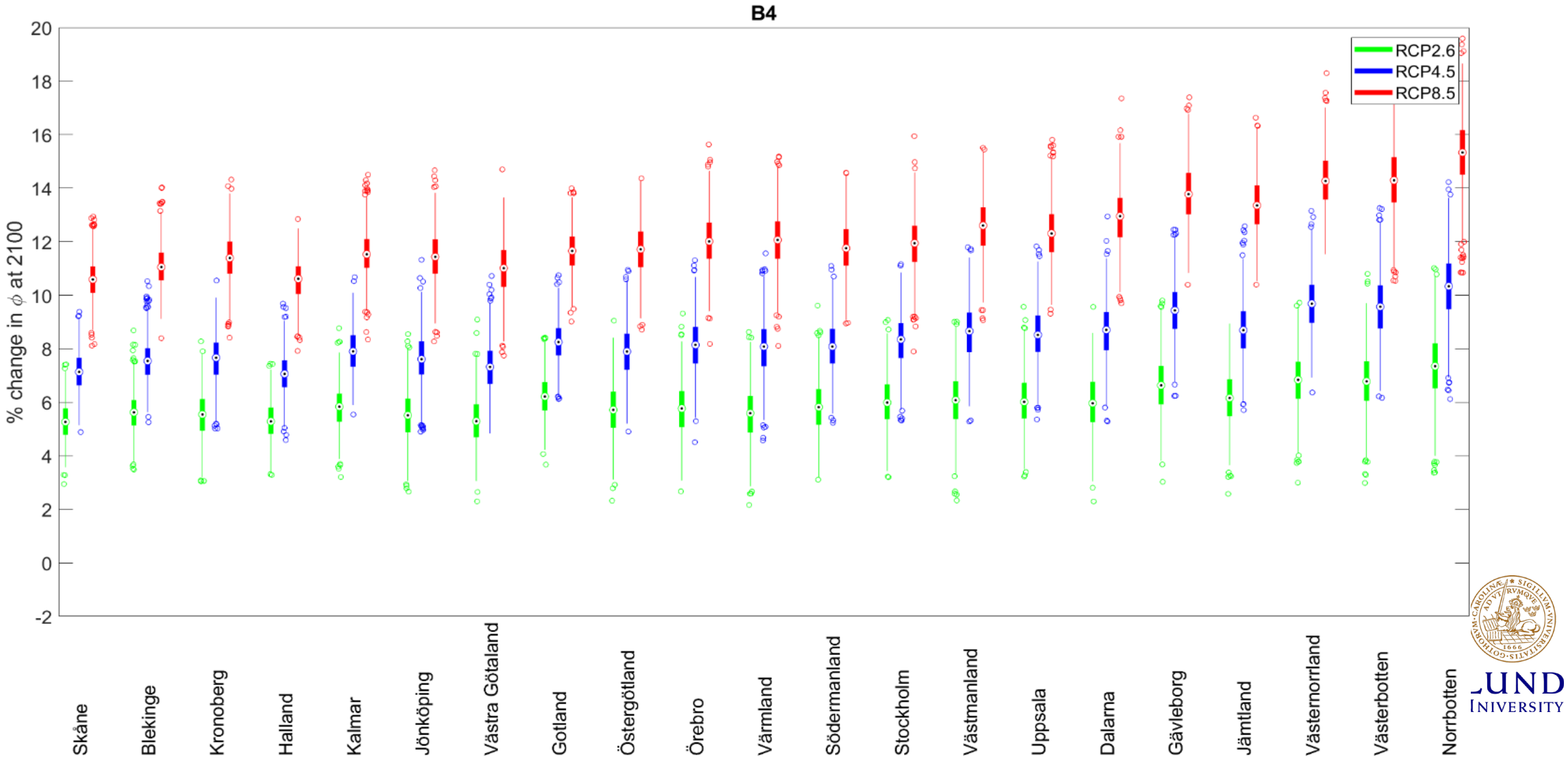
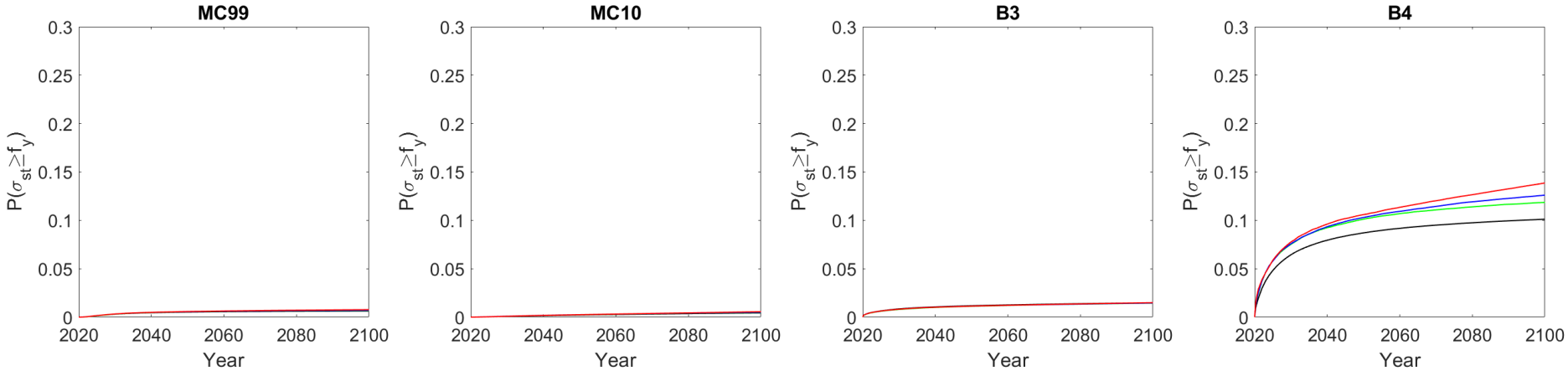
Results – quantitative assessment of some risks (creep)



Results – quantitative assessment of some risks (creep)

- The results depend significantly on the creep model used.



- As a result of creep, stress redistribution between the concrete and steel occurs (from concrete to steel).
- The figure shows the probability of exceeding the yield strength.

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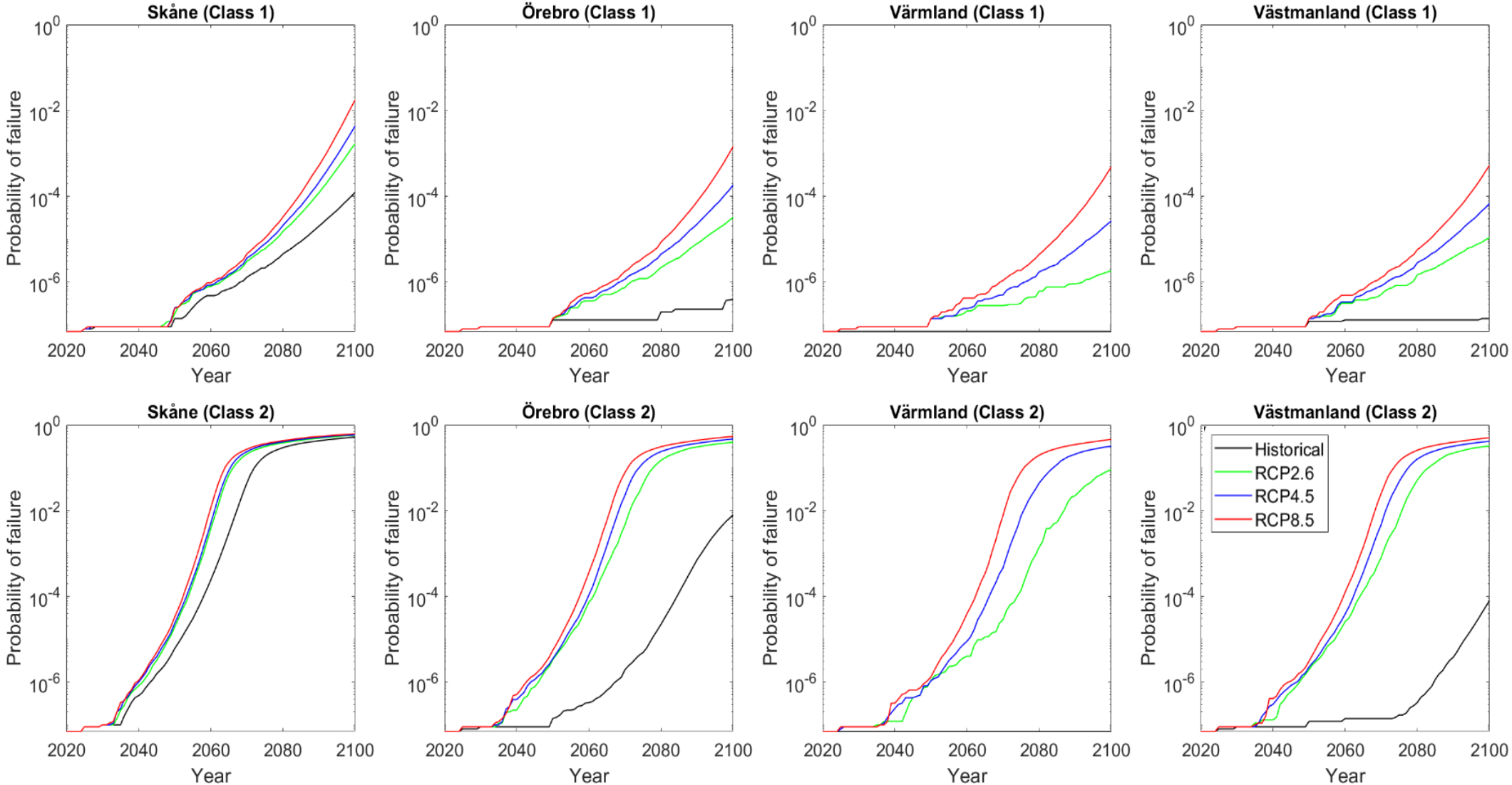
Results – quantitative assessment of some risks (timber decay)



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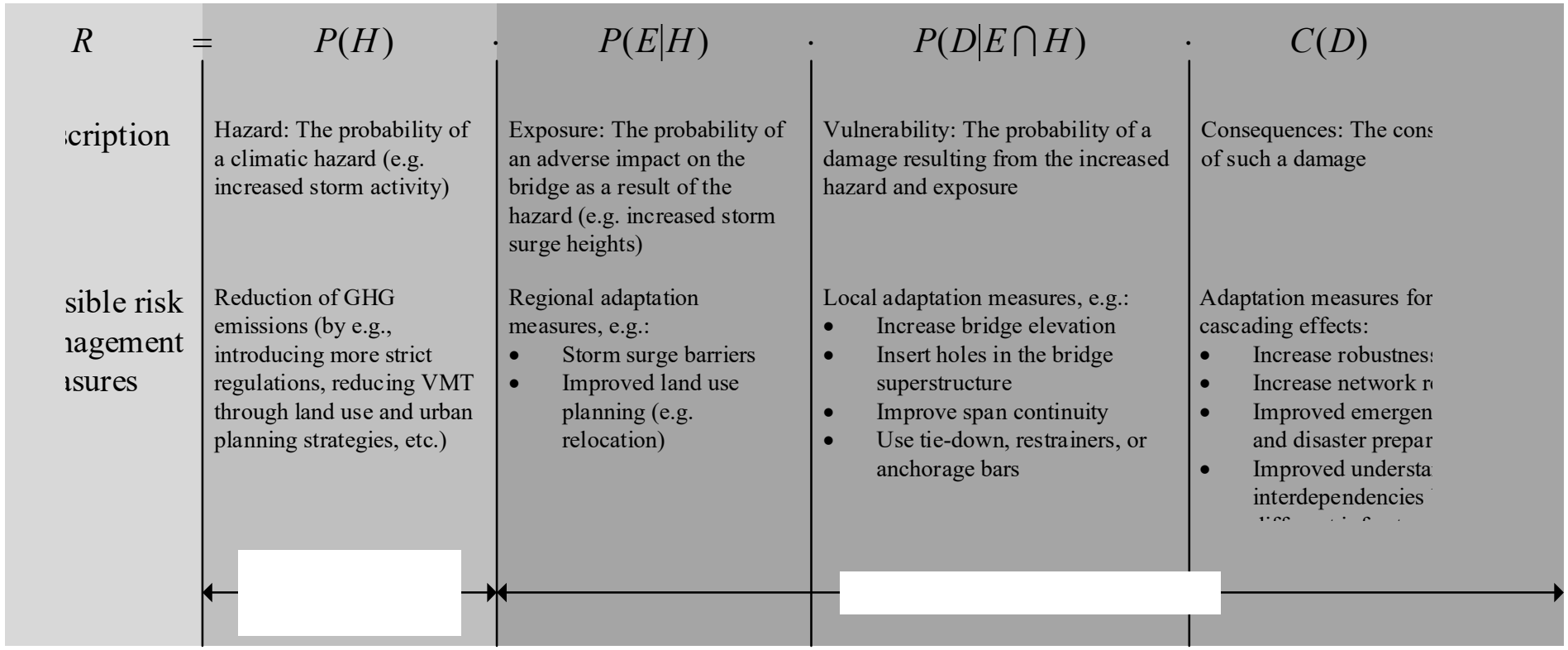
Results – adaptation techniques



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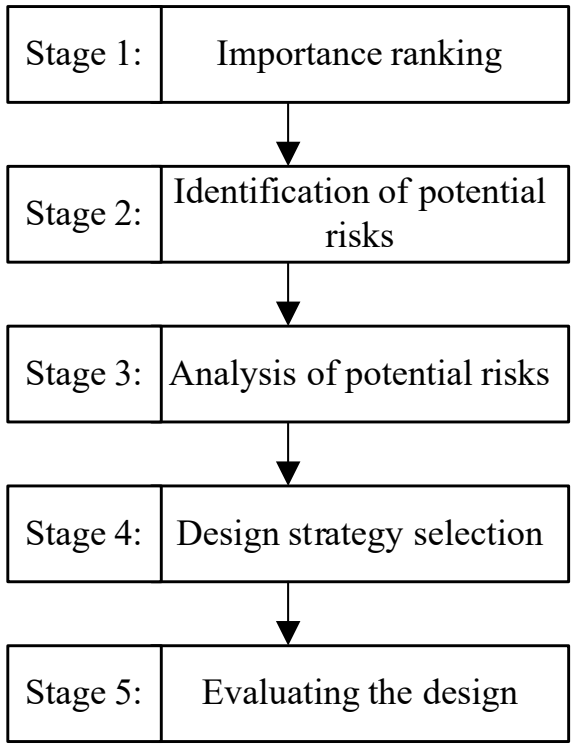
Results – design for climate change



- Design strategies: build to repair, planned adaptation or design based on selected scenario

- Some significant challenges:
  - Deep uncertainties in climate projections
  - Incorporating adaptability in design
  - Establishing acceptance criteria
  - Going from research to practice
  - …

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