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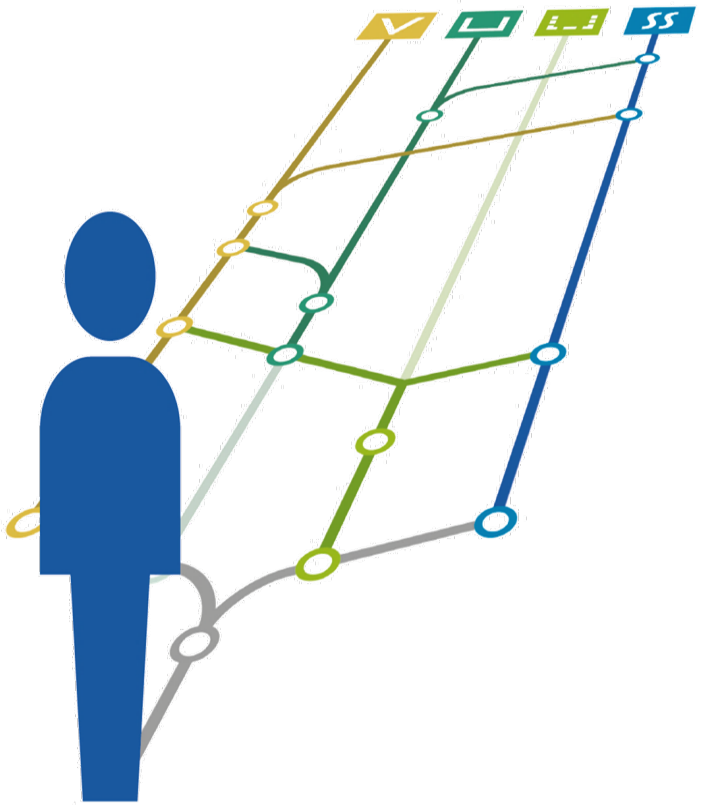


Putting Dynamic Adaptive Policy Pathways into Practice

An introduction to the DAPP approach and its application in the Netherlands

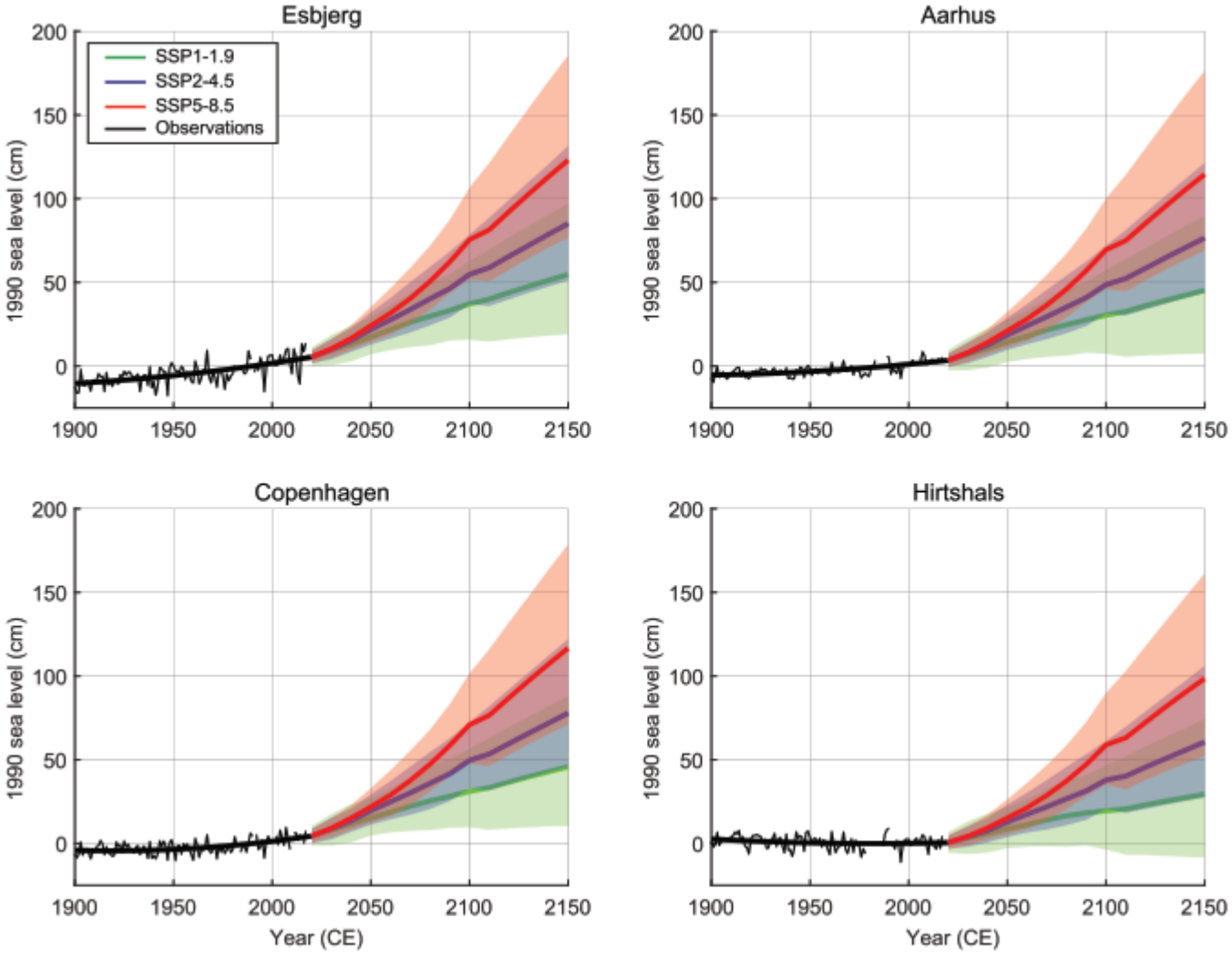
Gundula Winter

Marjolijn Haasnoot

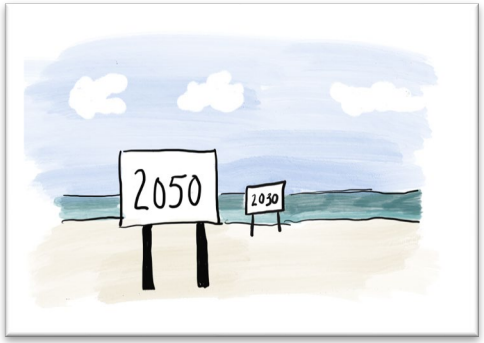
26 October 2022

enabling delta life

Drivers of future flood risk

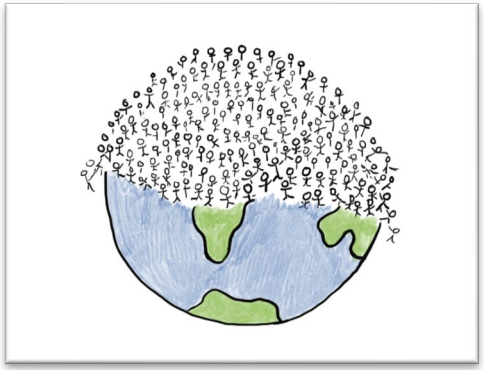


Sea Level Rise



Climate Change

Demographic change



Economic change

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Colgan et al. *GEUS Bulletin* 49, https://doi.org/10.34194/geusb.v49.8315

Under **deep uncertainty** decision makers should aim for **robust** plans that can be **adapted** over time

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Outline

1. Introduction to the Dynamic Adaptive Policy Pathways (DAPP) approach
   - When to use DAPP
   - Why to use DAPP

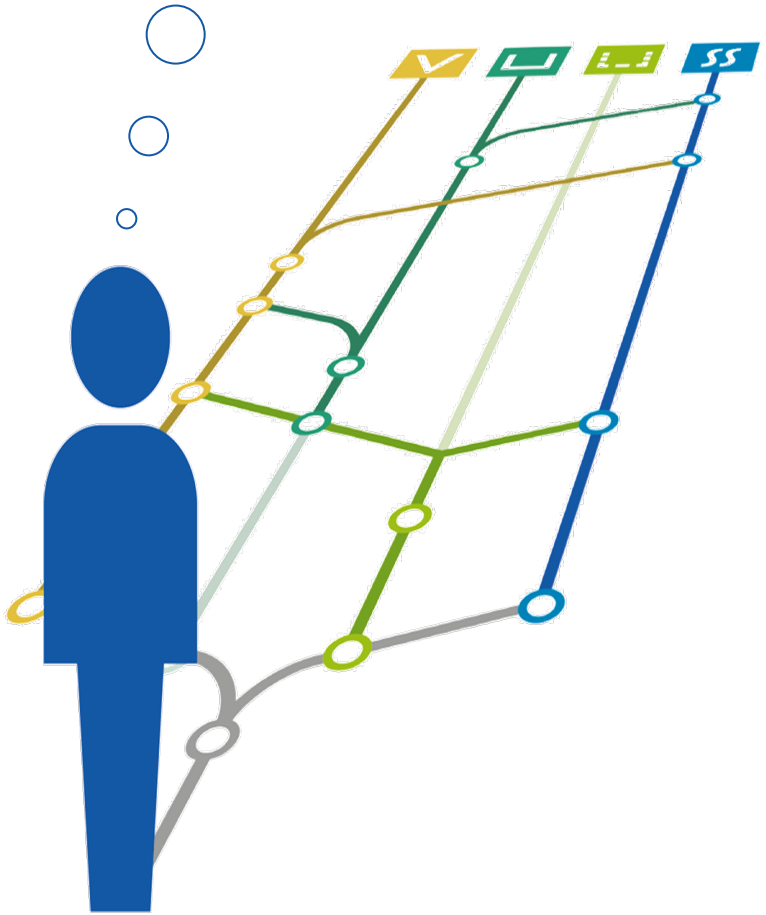
2. How to use DAPP
   - a 7-step approach
   - with examples from the Dutch Delta Program

Why use DAPP?

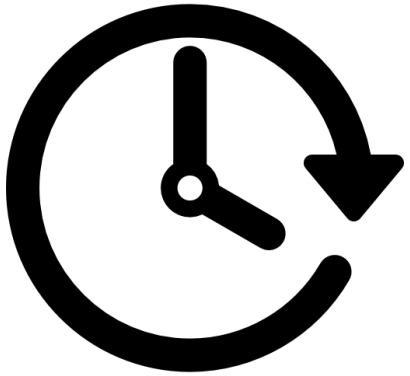
"What to do and when?"
"Not too much, not too little"
"Not too early, not too late"

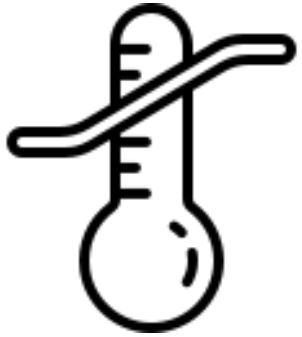
The advantages of DAPP are that it

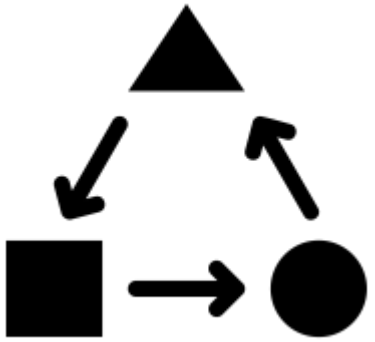
- helps to think about **long-term** actions and connects them with **short-term** actions to take now
  - Which actions to prioritise, which to postpone?
  - How to keep more options open in the future?
- widens the **solution** space (portfolio of actions) and considers transformative actions



When to use DAPP?







Long infrastructure/ societal lifetime

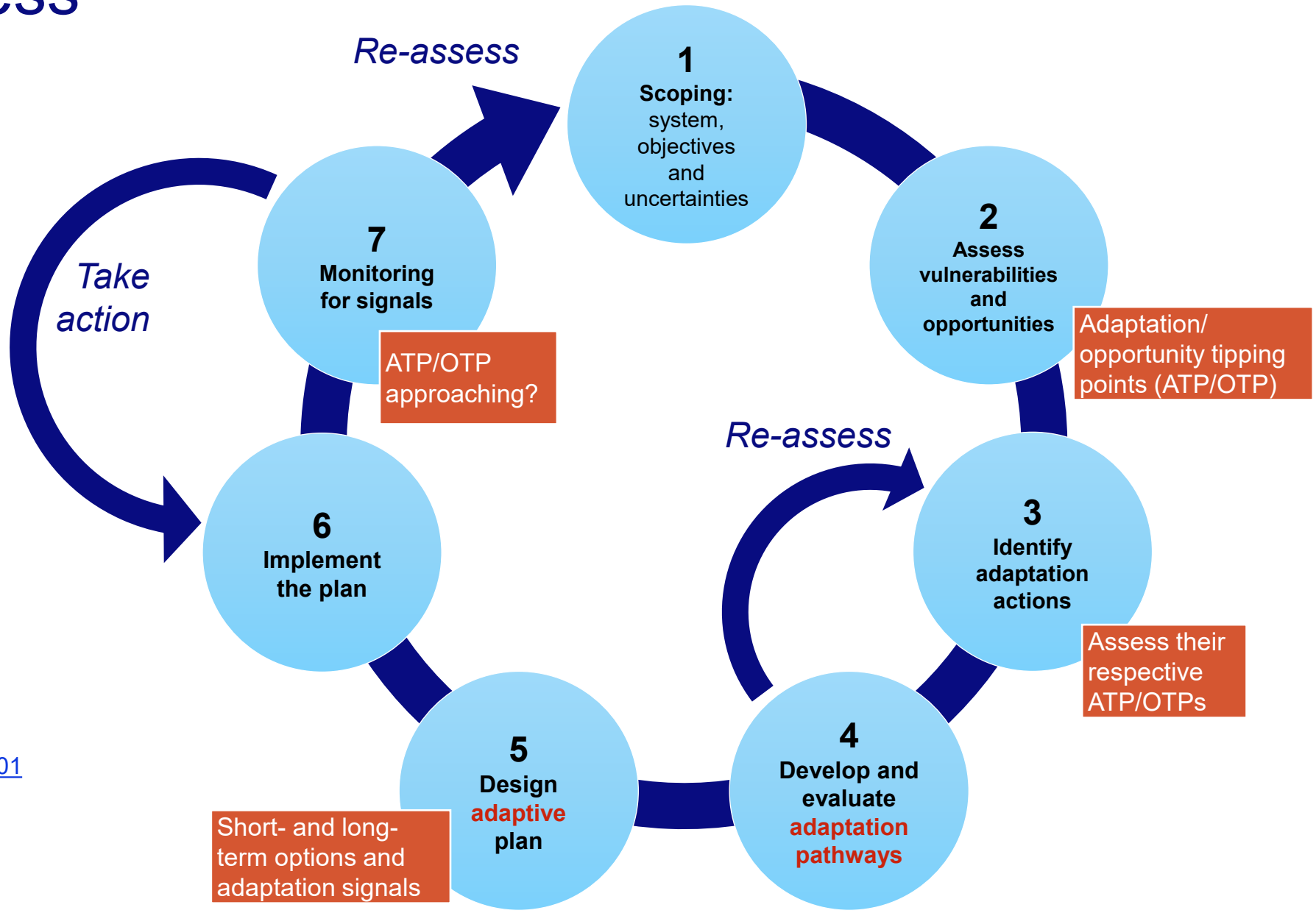
System sensitivity to (uncertain) future changes

High path-dependency risks

High investment costs

i.e. When potential for regret is high

DAPP process



Adapted from:

Haasnoot et al. (2013) *GEC,* https://doi.org/https://doi.org/10.1016/j.gloenvcha.2012.12.006

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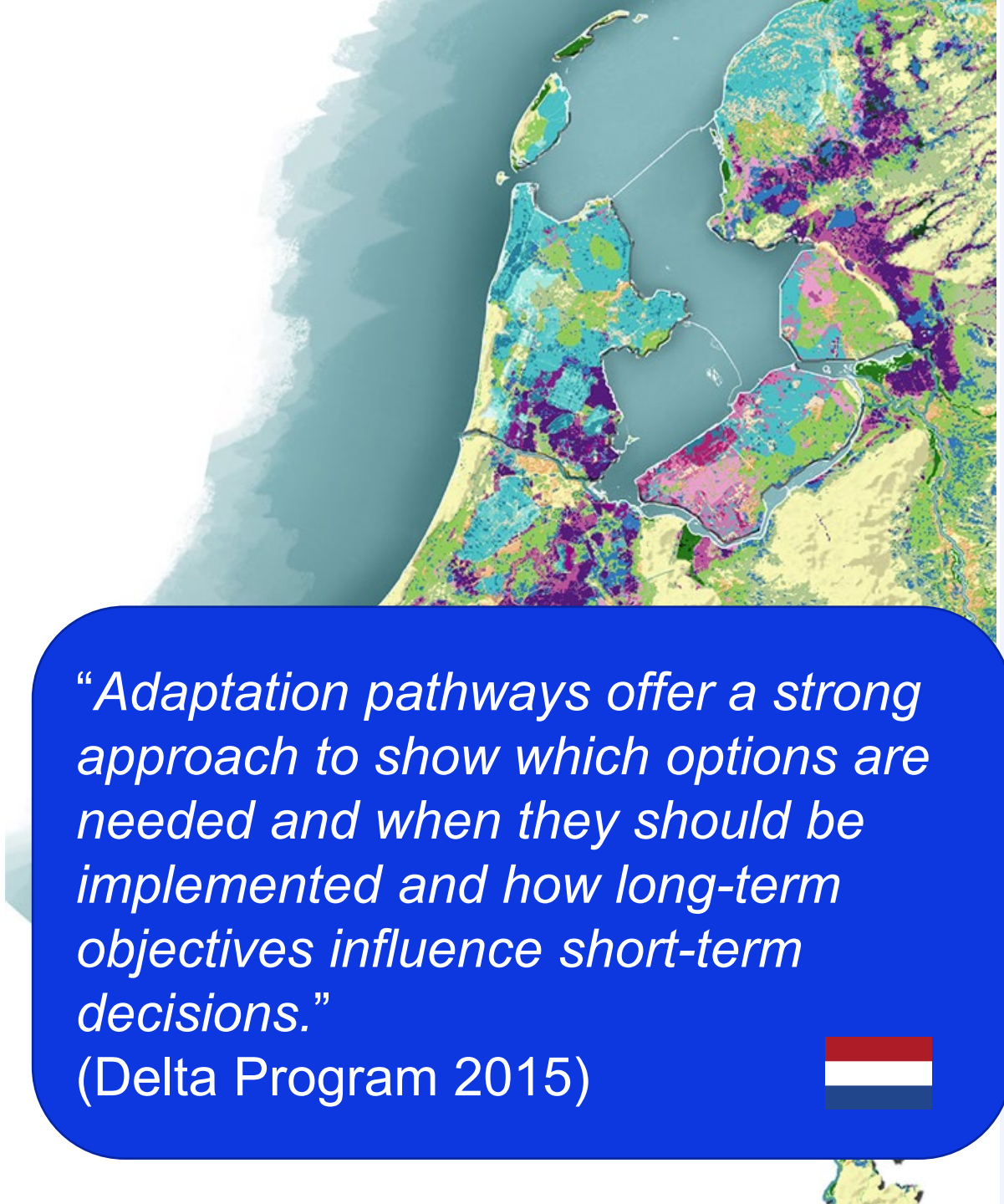
The Dutch Delta program



The goal is to “maintain the Dutch delta as an attractive place to live, work, and recreate for present and future generations”

Periodic review every 6 years

Home | Delta Programme (deltaprogramma.nl)

“Adaptation pathways offer a strong approach to show which options are needed and when they should be implemented and how long-term objectives influence short-term decisions.”
(Delta Program 2015)

Underpinned by Science

The Knowledge Program Sea Level Rise informs the Delta Program on:

1. Impacts
2. Feasibility of preferred strategies
3. How to know when to act
4. Long-term options
5. Behavioural change to enact timely action

[Sea Level Rise Knowledge Programme | Delta Programme | Delta Programme (deltaprogramma.nl)]

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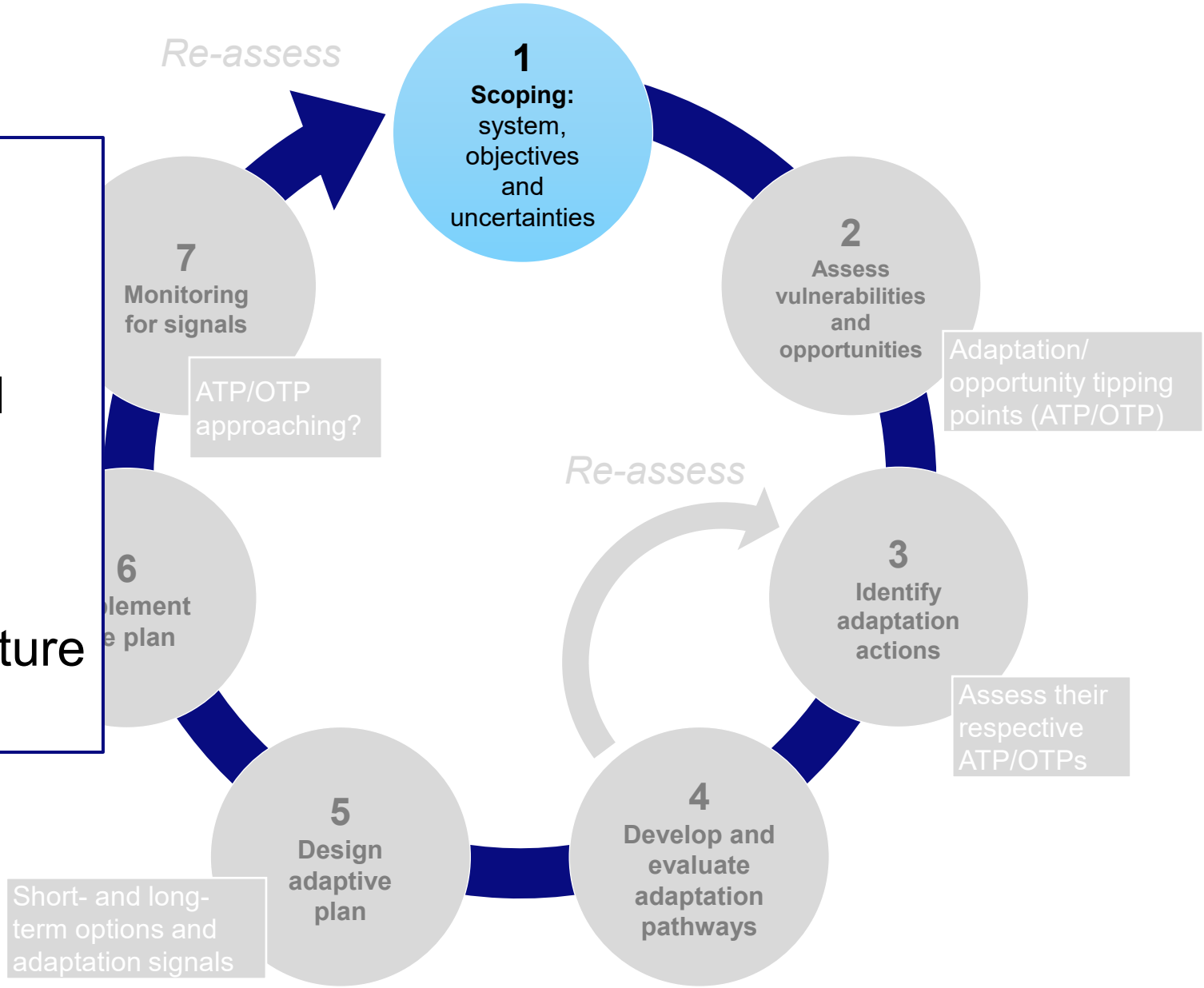
DAPP Step 1

- System objectives and constraints relevant for decision-making
- Performance targets and indicators
- Planning time horizon
- Plausible scenarios of future risk drivers



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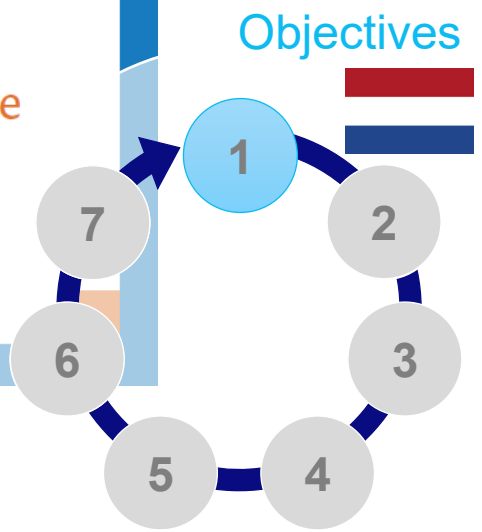
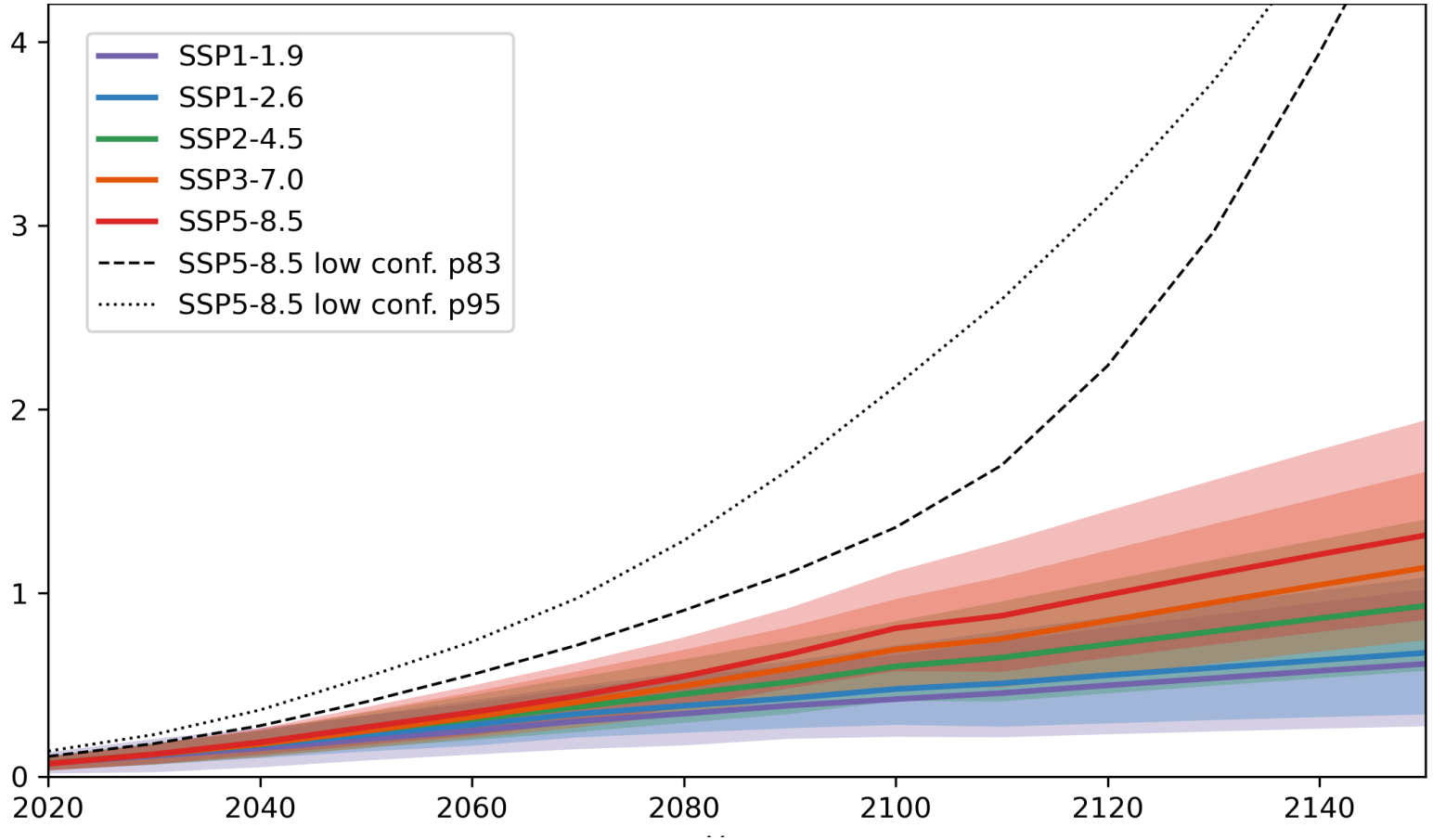
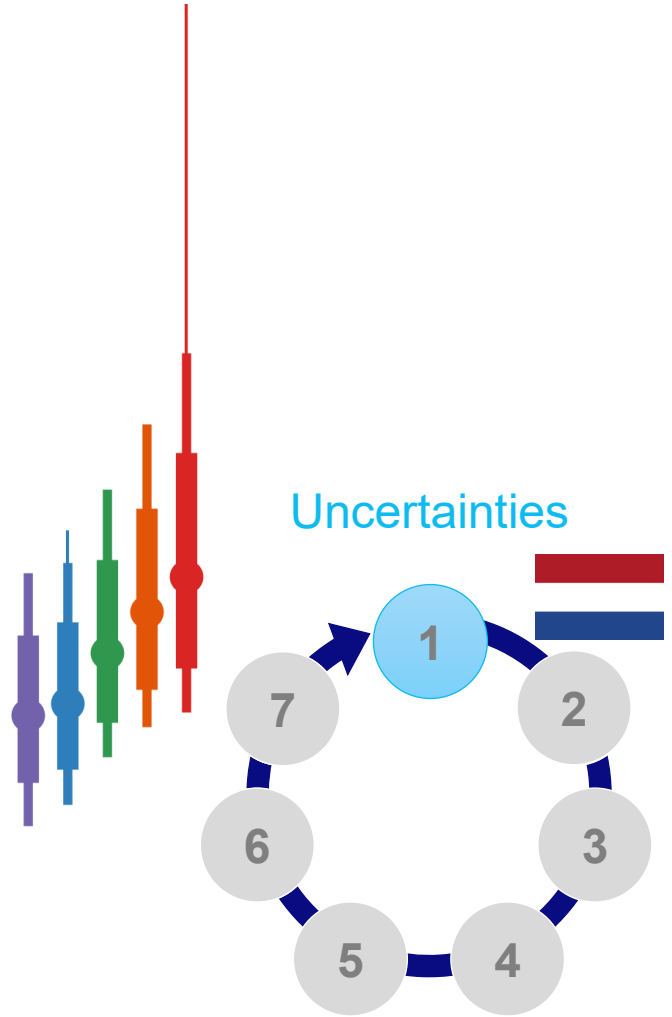
Dutch Delta Program: Objectives



Dutch Delta Program: Sea level rise scenarios





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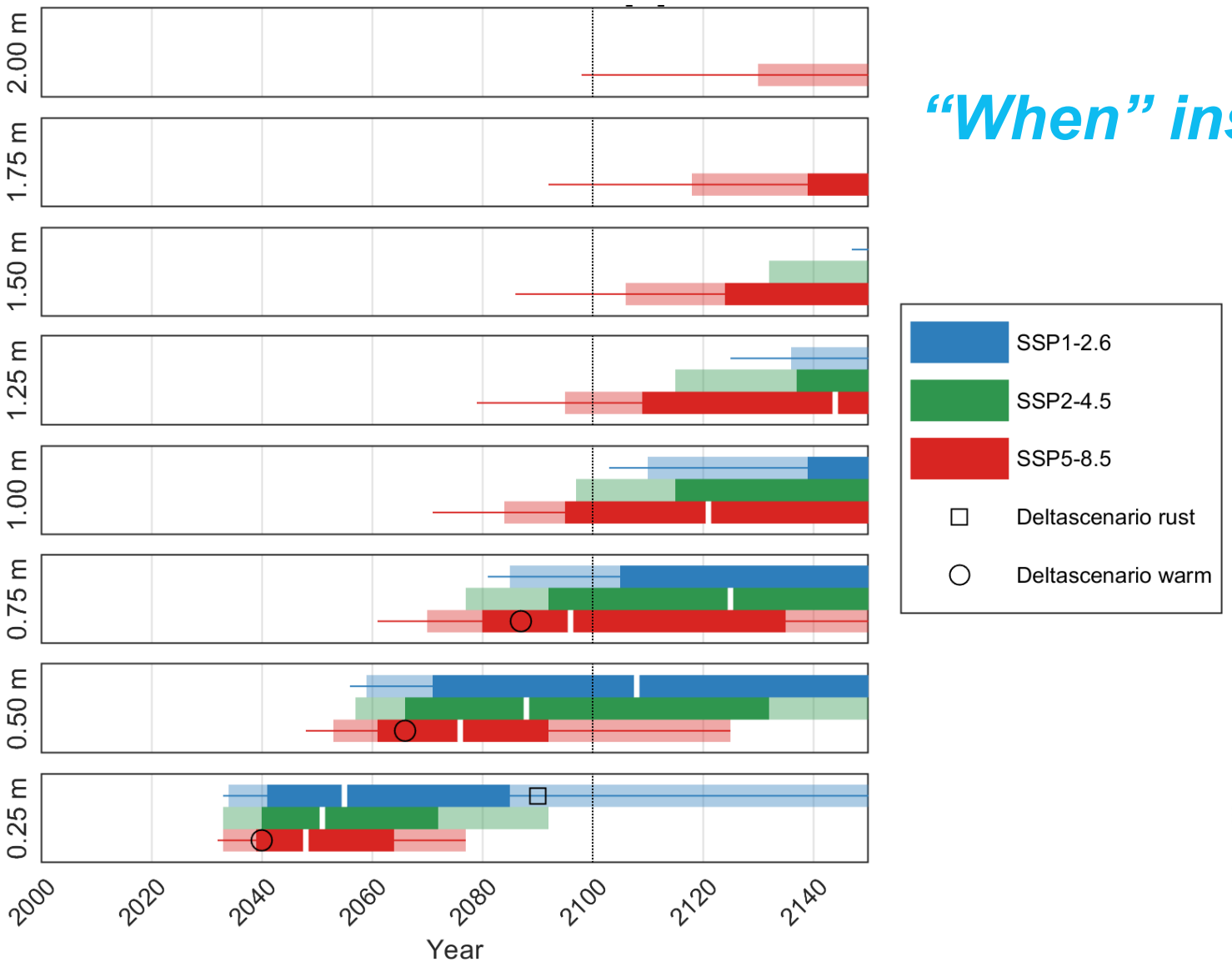
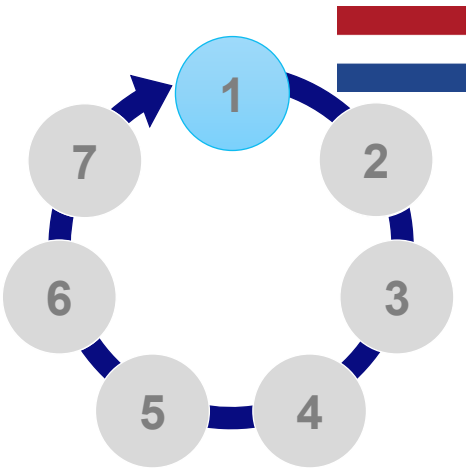
Dutch Delta Program: Sea level rise scenarios



"When" instead of "if"

Uncertainties



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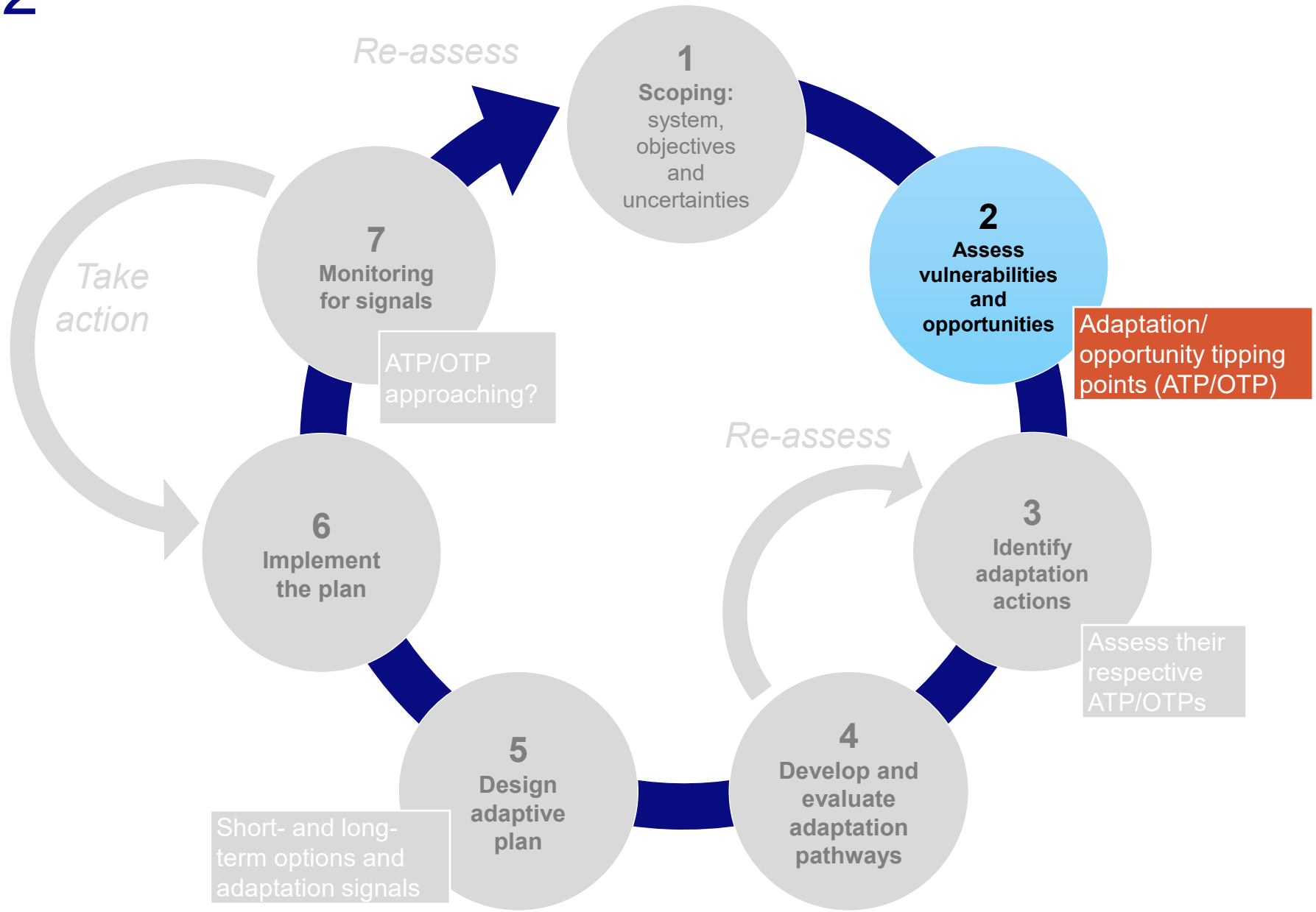
DAPP Step 2



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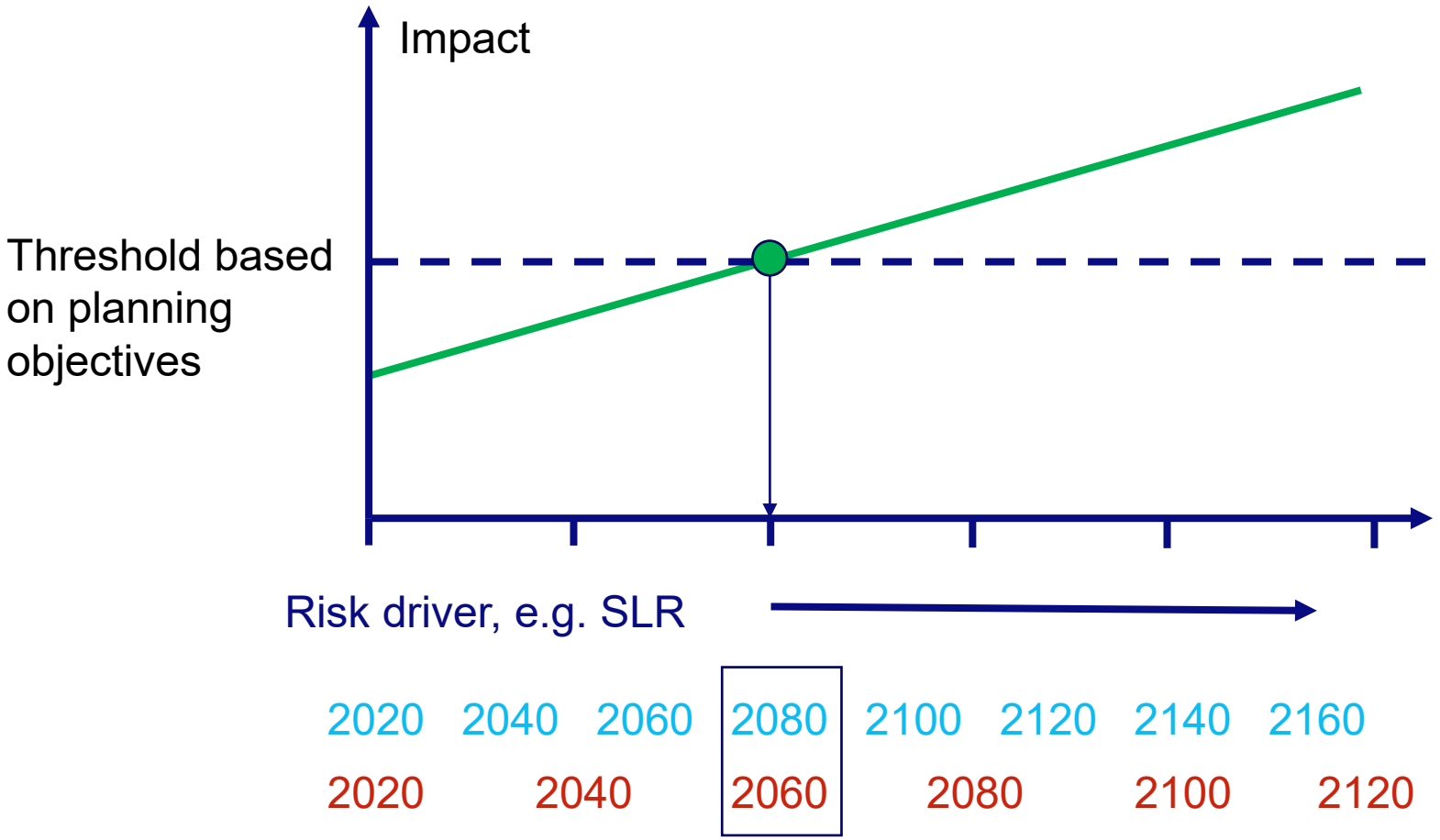
Adaptation Tipping Points

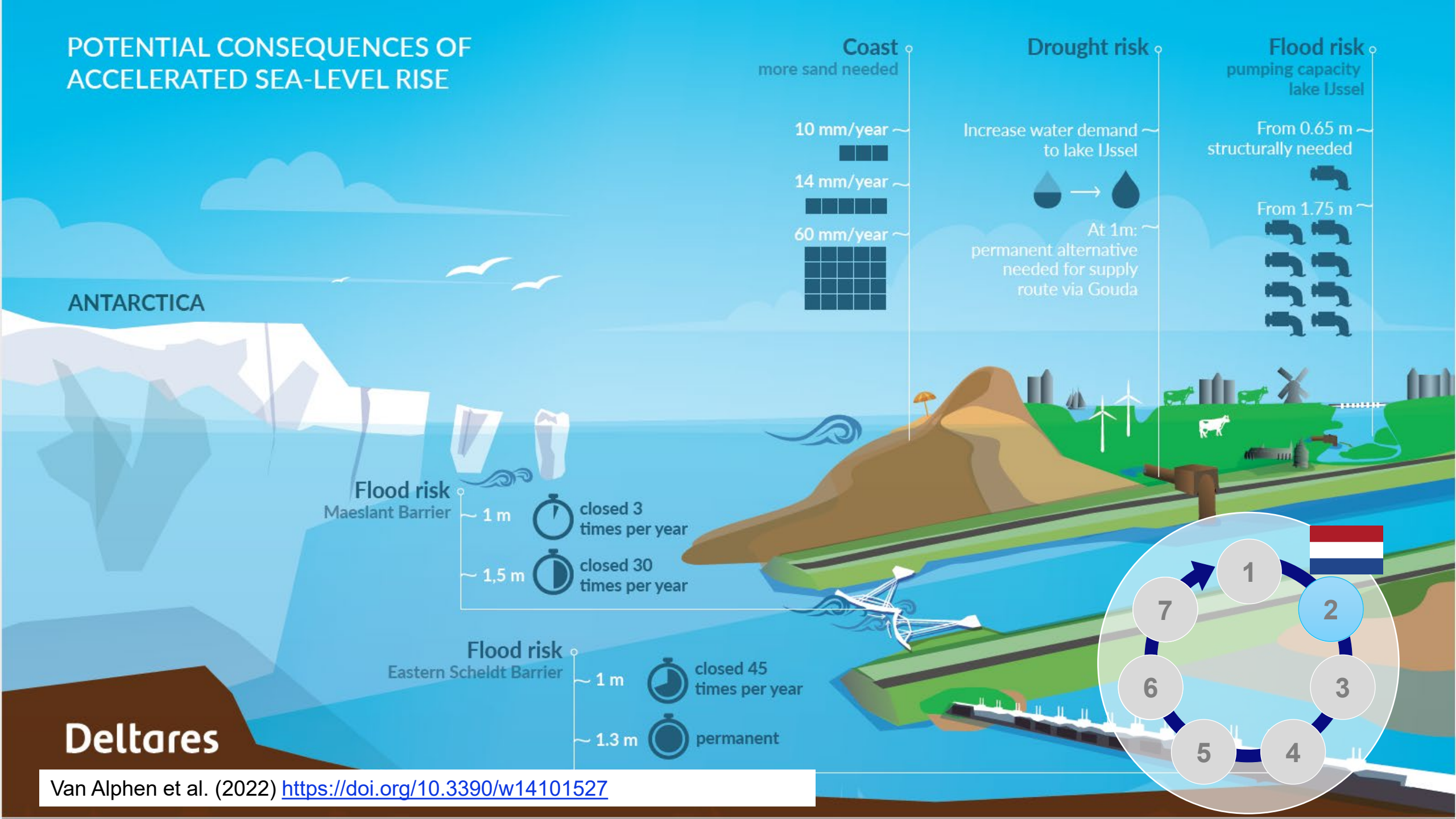


Status quo

Low Scenario
High

Deltares

Kwadijk et al (2010), https://doi.org/10.1002/wcc.64



Van Alphen et al. (2022) https://doi.org/10.3390/w14101527

DAPP Step 3

Re-assess

1 **Scoping:** system, objectives and uncertainties

2 **Assess vulnerabilities and opportunities**

Adaptation/ opportunity tipping points (ATP/OTP)

Re-assess

3 **Identify adaptation actions**

Assess their respective ATP/OTPs

4 **Develop and evaluate adaptation pathways**

5 **Design adaptive plan**

Short- and long-term options and adaptation signals

6 ement plan

7 **Monitoring for signals**

ATP/OTP approaching?

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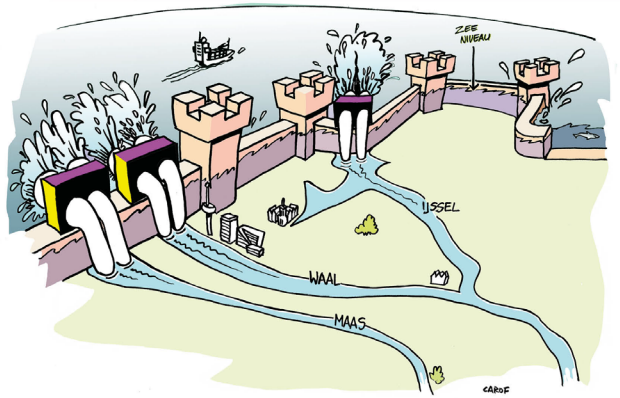
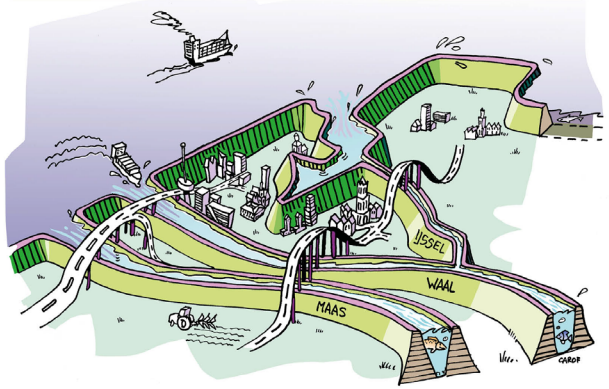
Solution spaces for long-term SLR in the Netherlands

Protect-closed



Protect-open

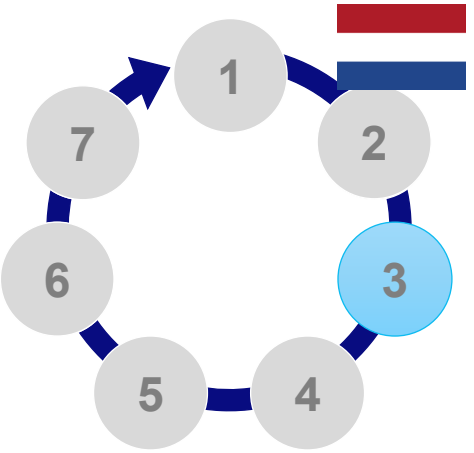


Advance

Accommodate

Cartoons developed by Carof for Deltares

Pathways



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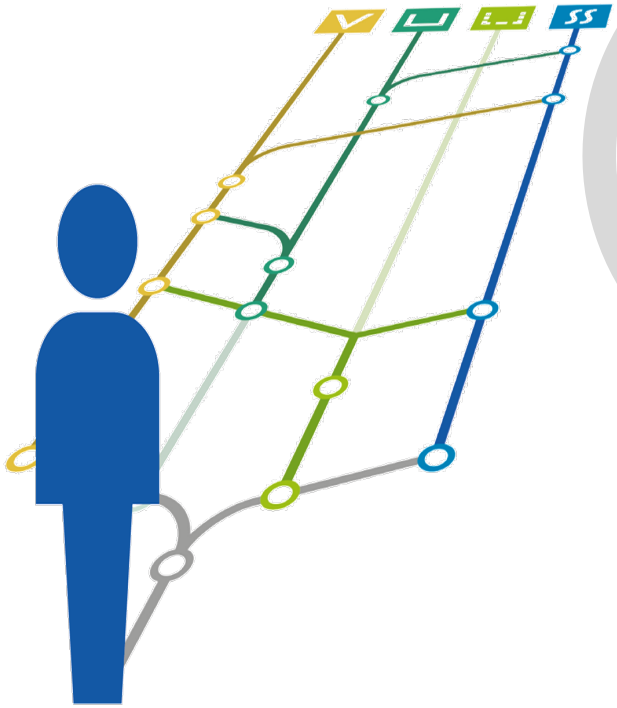
DAPP Step 4



Re-assess

Take action

1 **Scoping:** system, objectives and uncertainties

2 **Assess vulnerabilities and opportunities**

Adaptation/ opportunity tipping points (ATP/OTP)

3 **Identify adaptation actions**

Assess their respective ATP/OTPs

Re-assess

4 **Develop and evaluate adaptation pathways**

5 **Design adaptive plan**

Short- and long-term options and adaptation signals

6 **Implement the plan**

7 **Monitoring for signals**

ATP/OTP approaching?

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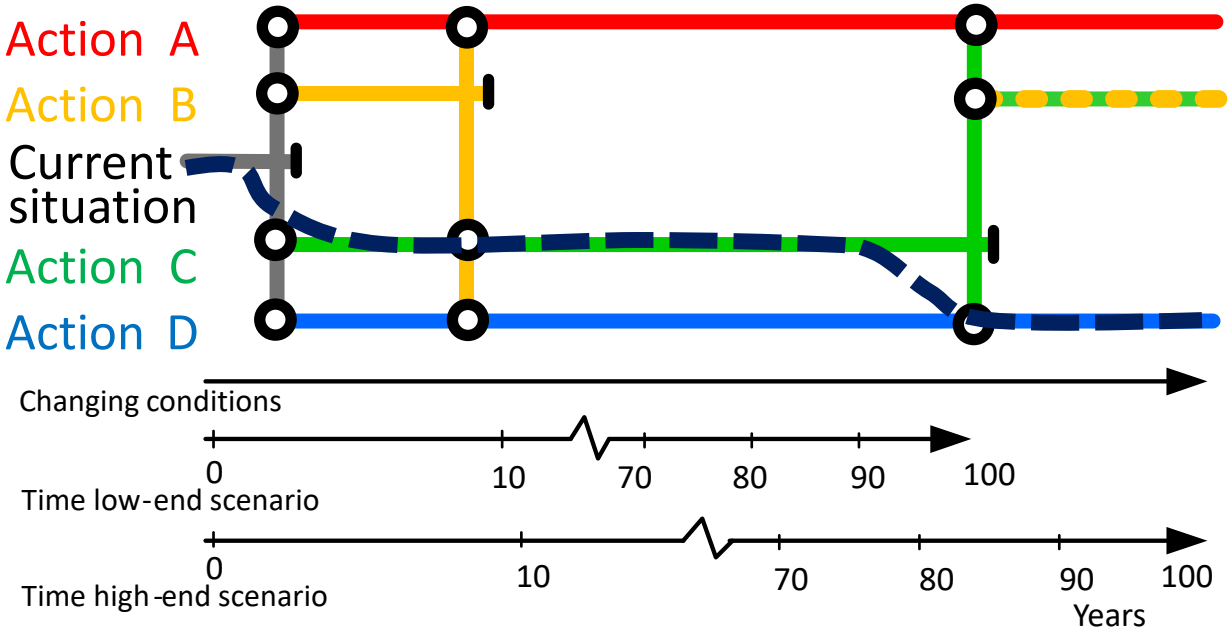
Adaptation pathways map (“Metro map”)



Transfer station to new policy action

Adaptation Tipping Point of a policy action (Terminal)

Policy action effective

Time horizon 50 years, high-end scenario

Time horizon 100 years

Pathway	Costs	Benefits	Co-benefits
1	+++	+	0
2	+++++	0	0
3	+++	0	0
4	+++	0	0
5	0	0	-
6	++++	0	-
7	+++	0	-
8	+	+	- -
9	++	+	- -

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Haasnoot et al. (2013) https://doi.org/10.1016/j.gloenvcha.2012.12.006

Staged approach to pathway development

Increasing level of detail and data requirements

Qualitative - based on narratives

Semi-quantitative

Quantitative – based on modelling

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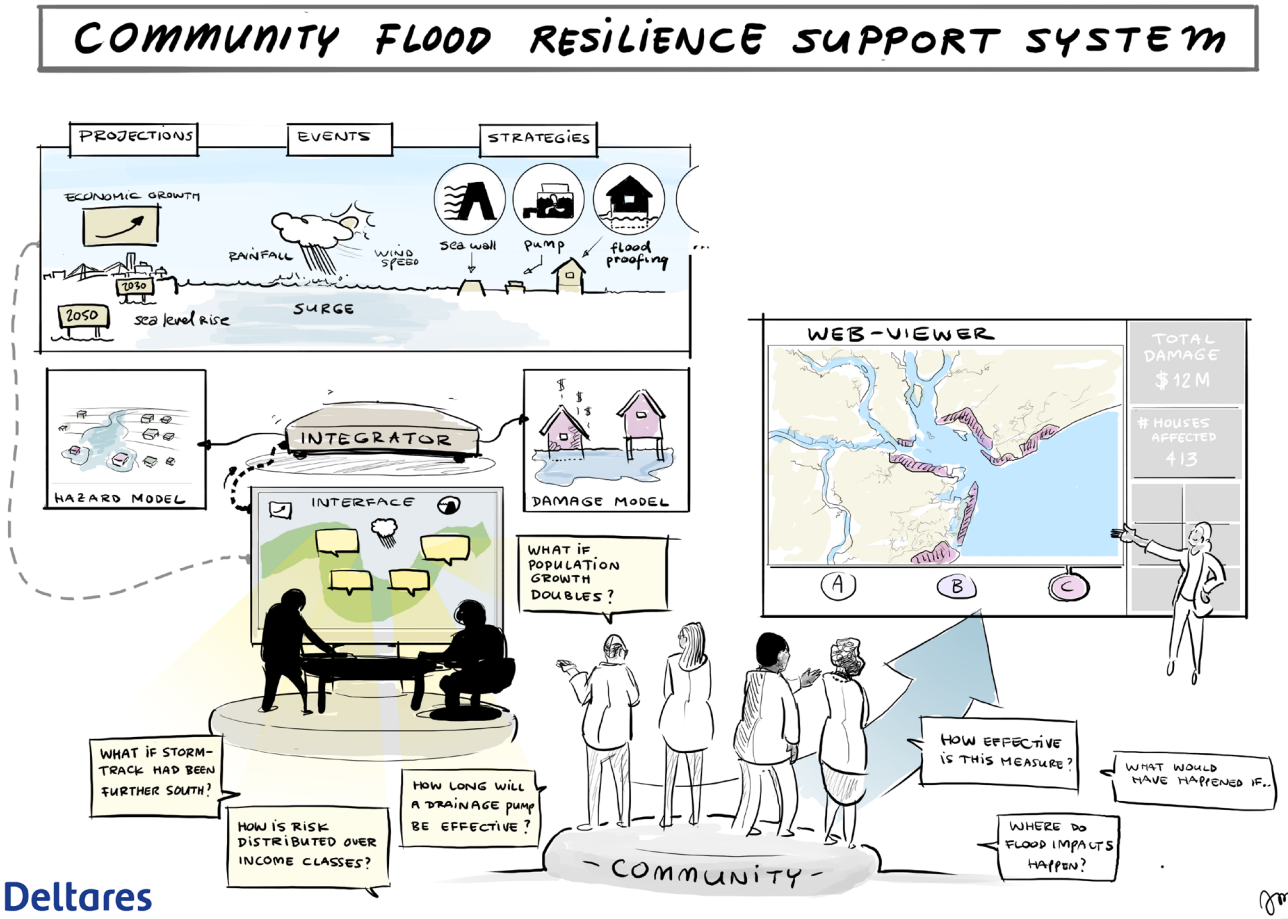
Tools supporting pathways planning at community level



Based on the ***Community Flood Resilience Support System***

- puts compound flood hazard and impact models in the hands of municipalities
- helps to explore different adaptation strategies.

[Feature Article: Building Community Climate Resilience with Compound-Flood Modeling Tools | Homeland Security (dhs.gov)]

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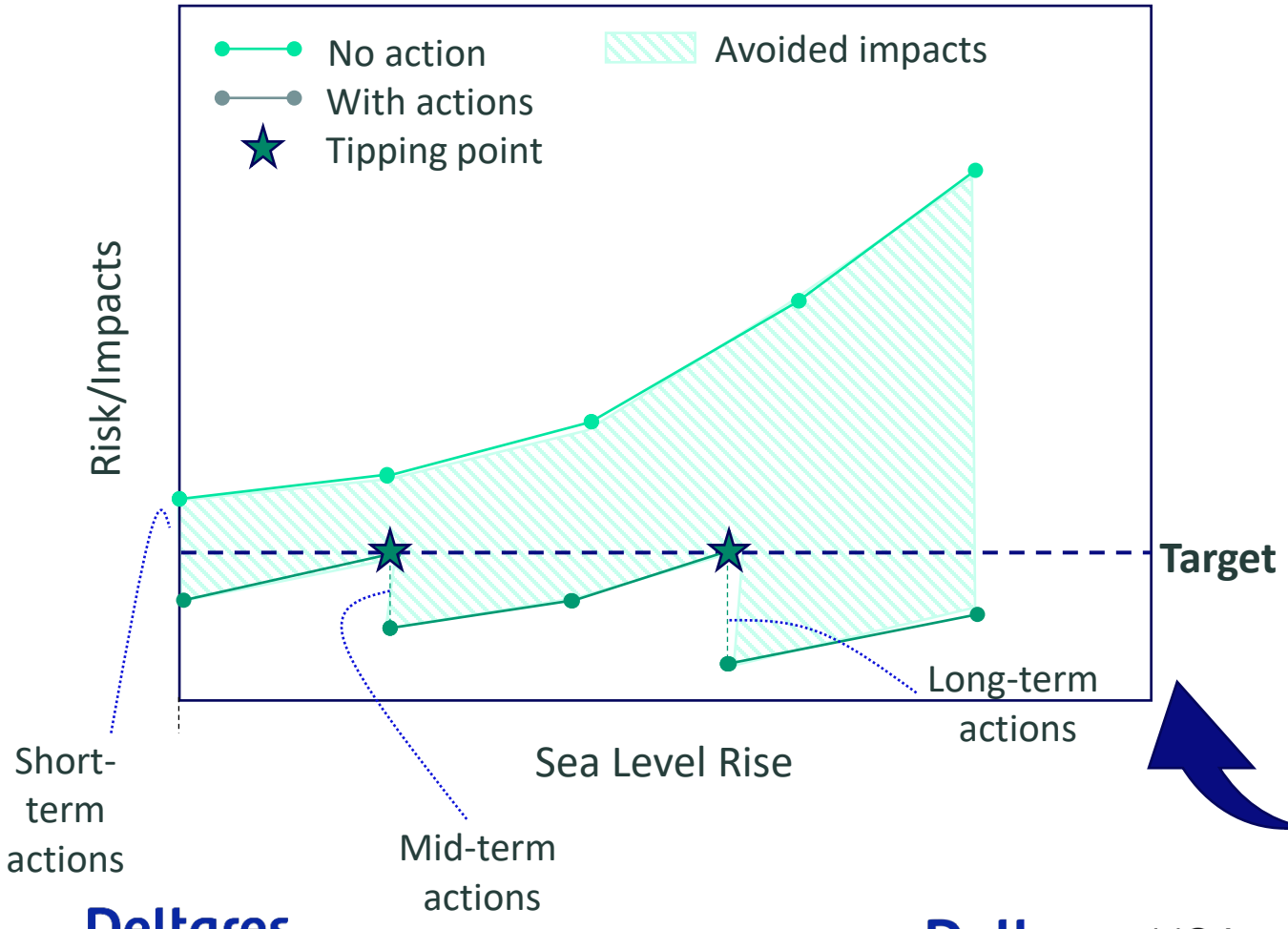
Homeland Security
Science and Technology

City of Charleston

Tools supporting pathways planning at community level



Using the CFRSS to evaluate different future (physical and socio-economic) scenarios and adaptation actions

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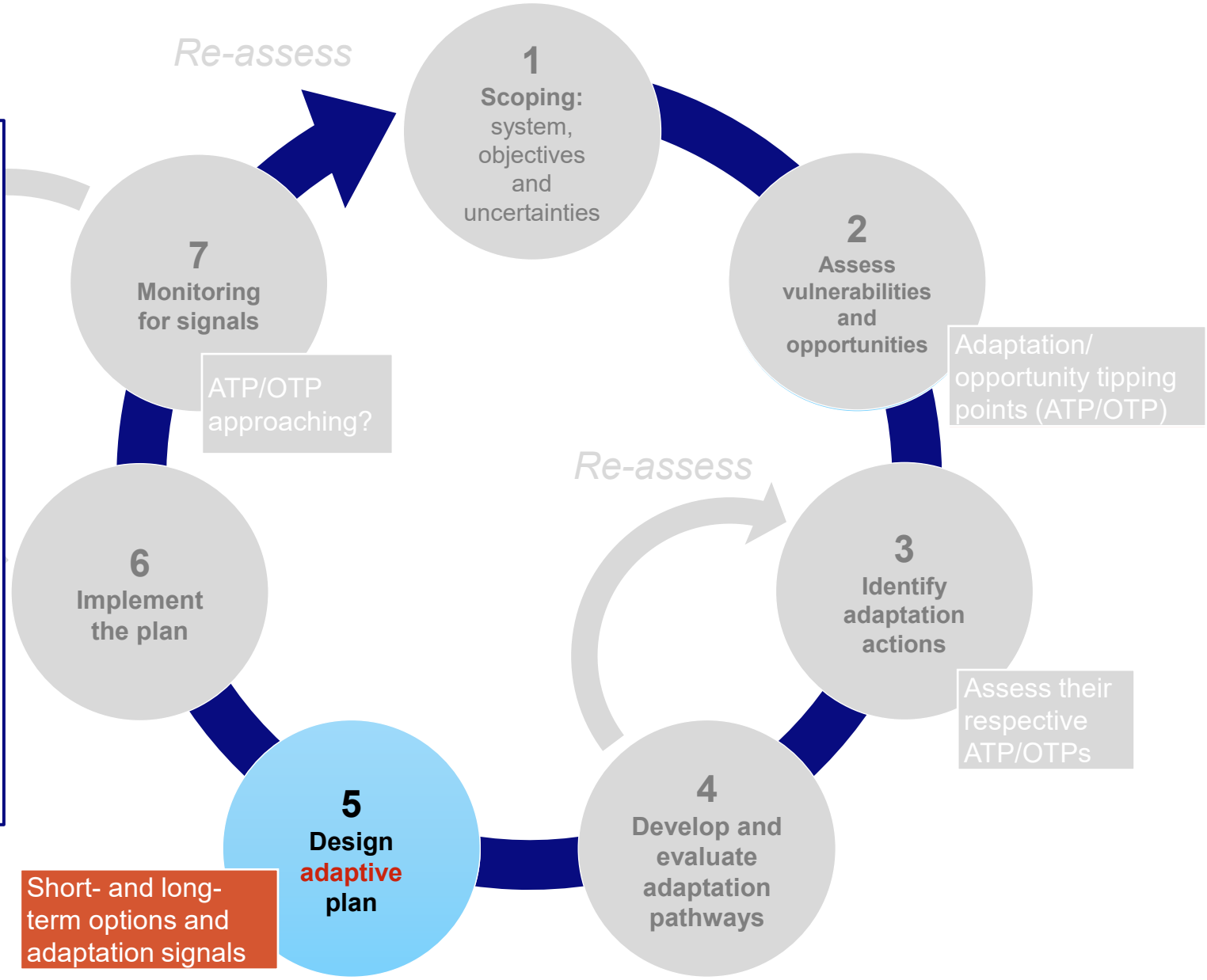
Homeland Security
Science and Technology

City of Charleston

DAPP Step 5

- Based on preferred pathway(s)
- Supporting and contingency actions
- Monitoring plan with Early Warning Signals
- Implementation constraints
- Financing



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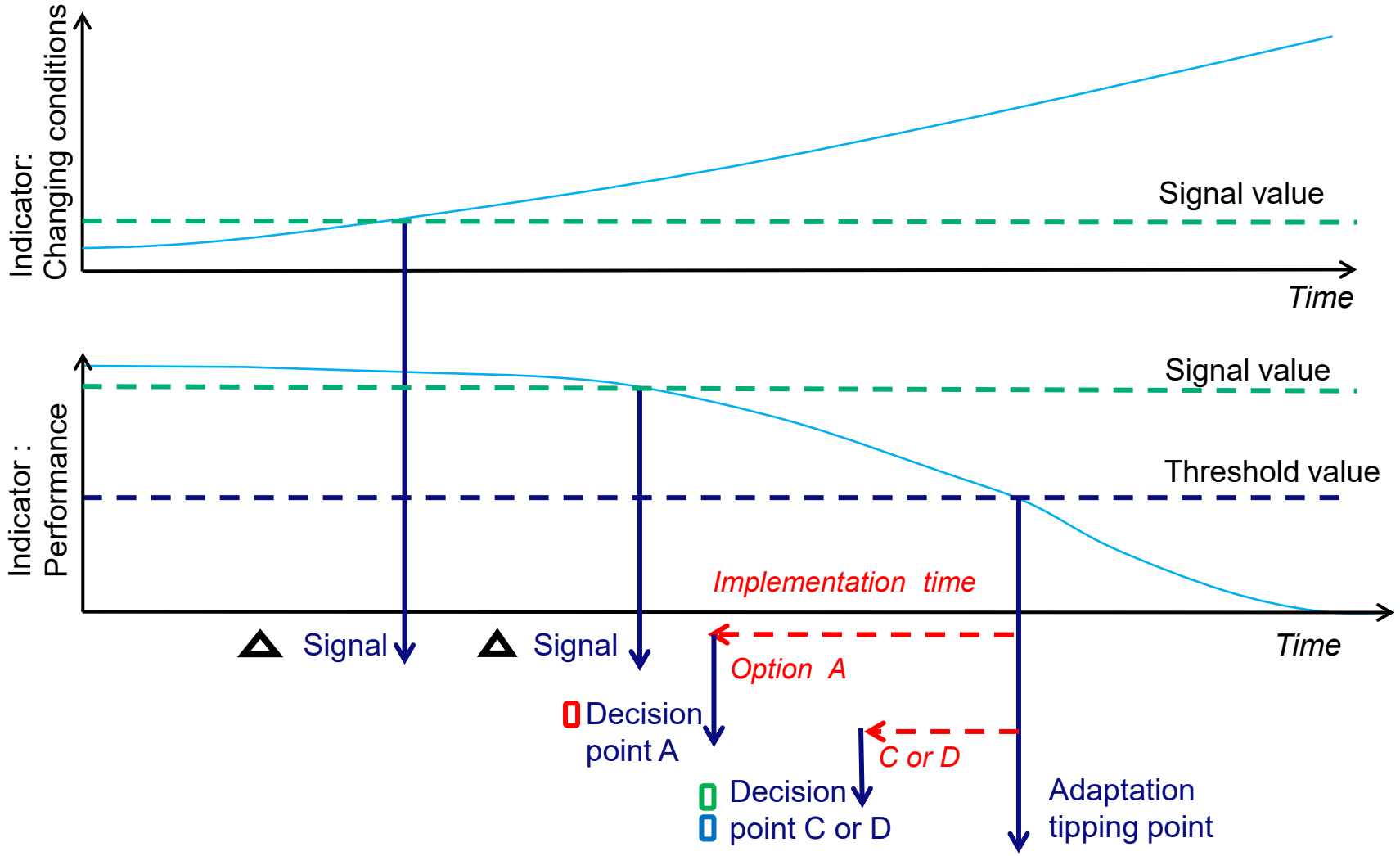
“Early Warning Signal” in the context of DAPP



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Haasnoot, M. et al. (2018). Designing a monitoring system.. GEC
10.1016/j.gloenvcha.2018.08.003

Criteria for a Signal

Salience

Measurability

Timeliness

Reliability

Credibility

Convincibility

Institutional connectivity

Legitimacy

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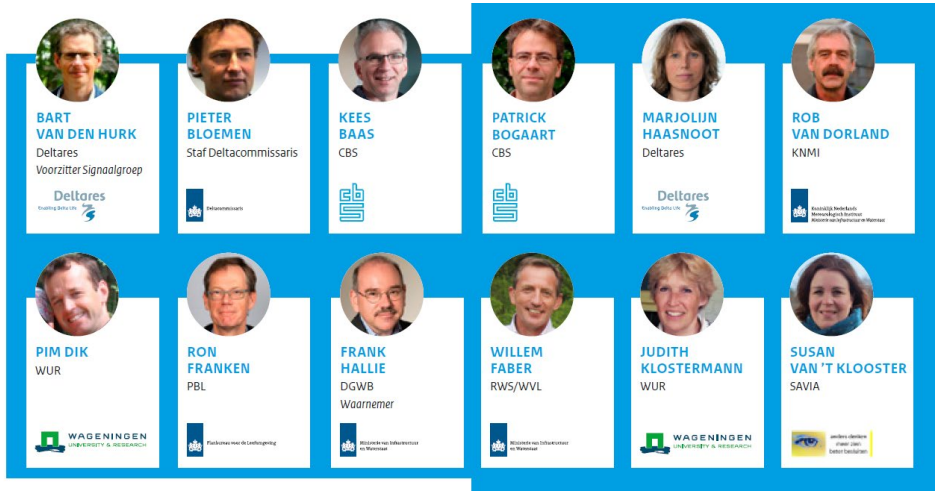
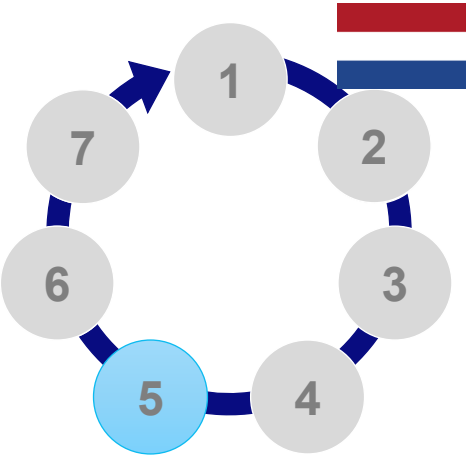
Haasnoot, M. et al. (2018). Designing a monitoring system.. GEC
10.1016/j.gloenvcha.2018.08.003

Design a monitoring plan

With annual advice of the “Signal group” - experts from 7 Dutch science institutions:



→ Monitoring physical, societal and knowledge developments



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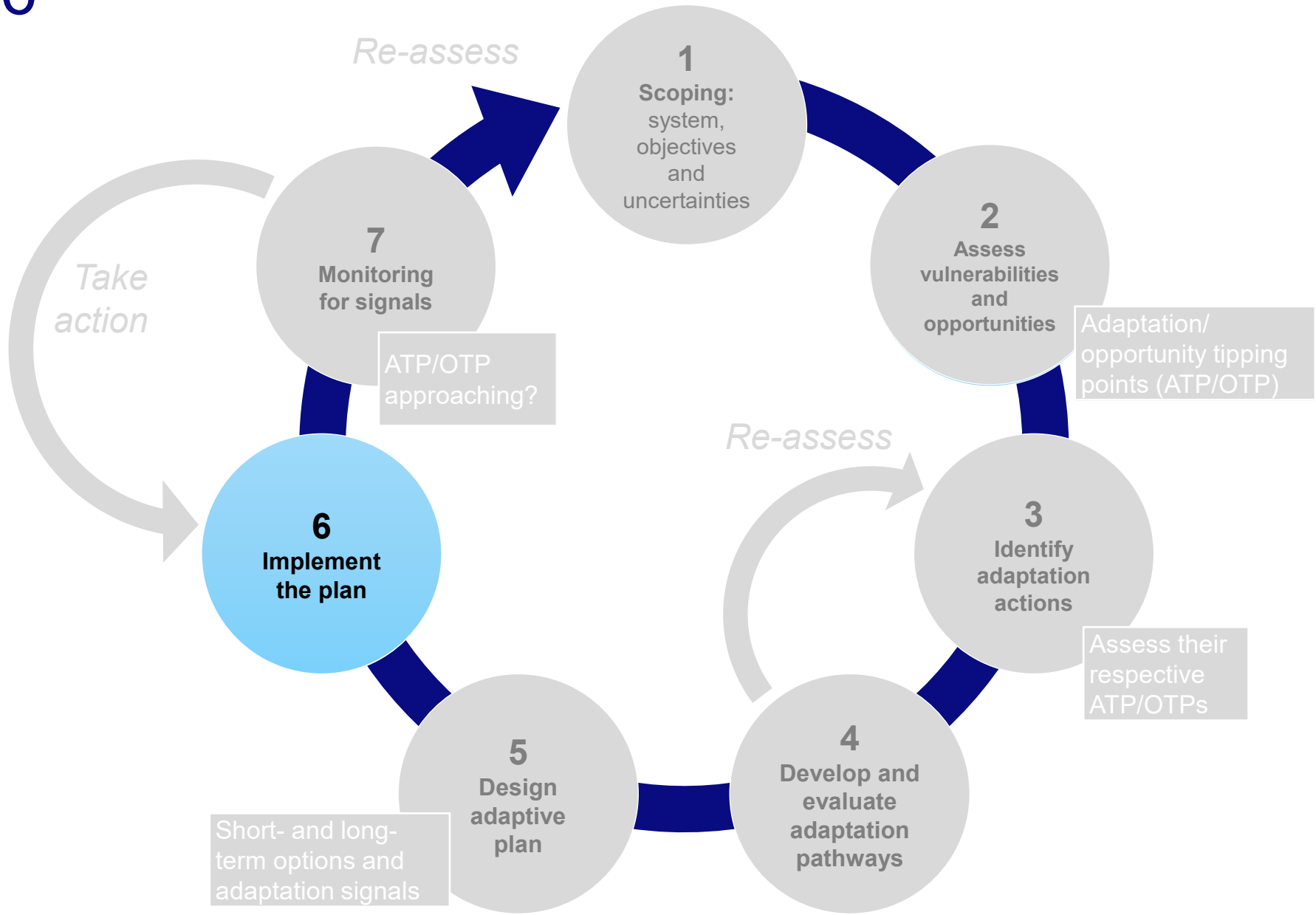
DAPP Step 6



Implement all immediate short-term actions

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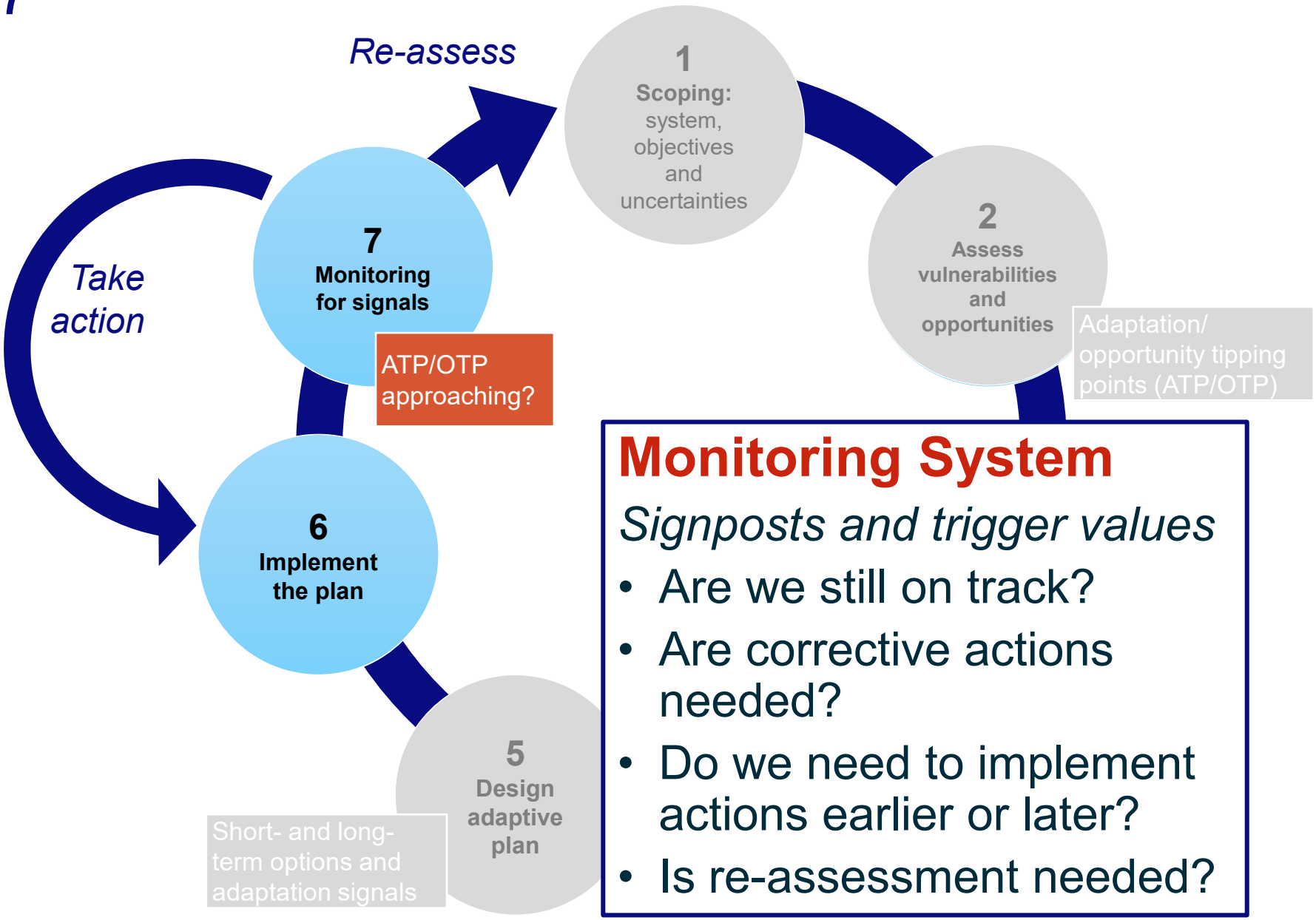
DAPP Step 7



Monitoring System

Signposts and trigger values

- Are we still on track?
- Are corrective actions needed?
- Do we need to implement actions earlier or later?
- Is re-assessment needed?

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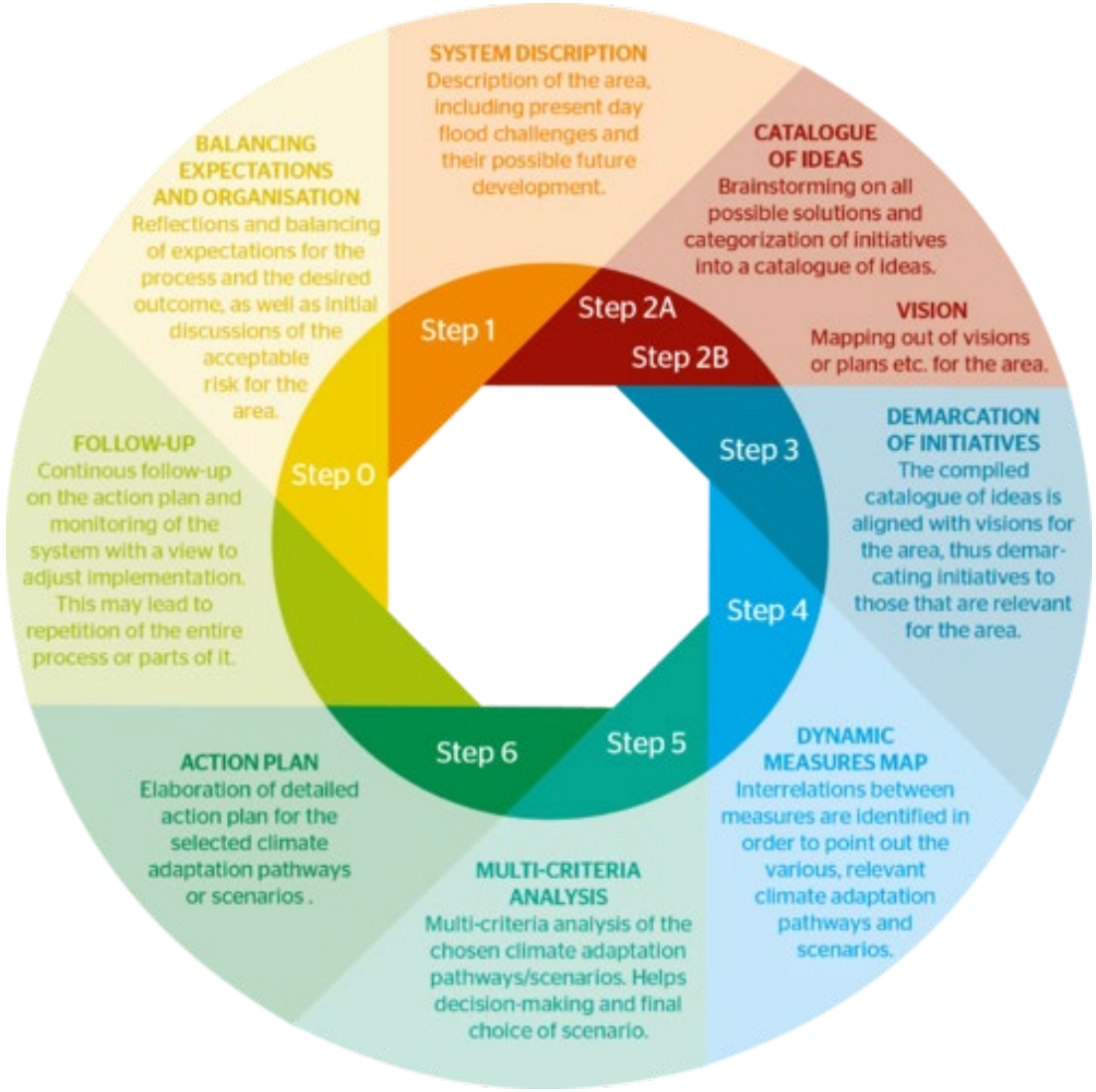
Application in Denmark

Contact: Danish Coastal Authority

Pilots: Vejle and Assens

https://kyst.dk/media/84875/guide-til-dynamisk_planlaegning-af-klima-tilpasning-og-styring-af-risikoen-for-oversvoemmelse-i-kommuner.pdf



Ministry of Environment of Denmark
Coastal Authority

Contact: Kaija Jumppanen Andersen kja@kyst.dk

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Interreg North Sea Region FRAMES
European Regional Development Fund

EUROPEAN UNION

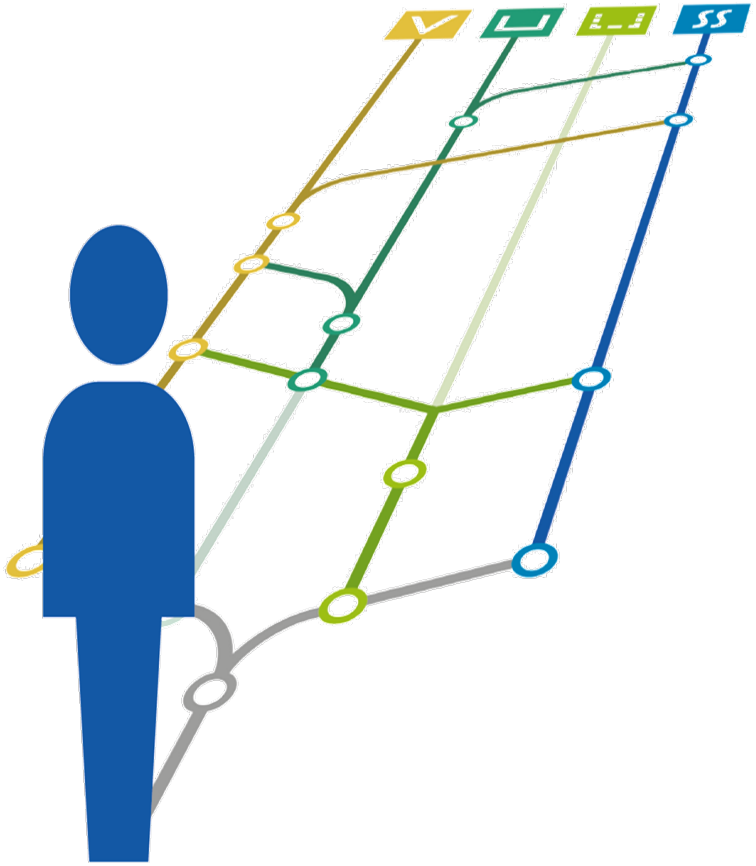
Take-home messages

Adaptive planning supports decision making under uncertain change. **“Invest not too little nor too much, and not too early nor too late”**.

Adaptation PATHWAYS provide insights into options, lock-in possibilities, and path dependencies to identify **short term actions** to mitigate adverse impacts and seize opportunities, and **keep options open** to adapt.

Adaptation TIPPING POINTS help in identifying if and **when** to take actions at earliest or at latest.

MONITORING plan and **CONTINGENCY** actions help **to stay on track**. Autonomous adaptation of stakeholders can be important.



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[Dynamic Adaptive Policy Pathways: supporting decision making under uncertainty using Adaptation Tipping Points and Adaptation Pathways in policy analysis - Deltares]

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