

## CO-PRODUCING DEMAND-DRIVEN EO-BASED CLIMATE SERVICES FOR WATER RESILIENCE: INSIGHTS FROM THE PCP WISE INITIATIVE

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### BACKGROUND & MOTIVATION

Climate change is increasing the frequency and severity of Droughts, Floods, (Urban) Heat stress, and Wildfires. Effective adaptation requires timely, location-specific information and cross-sector collaboration. Water managers need actionable climate intelligence for adaptation planning and operational decision-making, yet uptake of Earth Observation (EO)-based climate services remains limited.

PCP WISE leverages pre-commercial procurement (PCP) to co-develop pre-operational EO-based Water Intelligence Services that monitor and forecast Soil-Water-Vegetation (SWV) dynamics and support climate adaptation across Europe. Funded by the European Commission's Horizon Europe Programme under HORIZON-CL6-2024-GOVERNANCE-01-5, it advances the European Green Deal by enhancing the use of EO data and products. The project procures interoperable information products and a shared water intelligence system to support local and regional water- and climate-related decisions, helping decision-makers anticipate extreme events and plan for water availability and infrastructure resilience.

PCP WISE involves water authorities, municipalities, emergency services, and environmental agencies, directly engaged in climate adaptation. Centering stakeholders from outset and grounding PCP in their expressed needs ensures solutions are relevant, scalable and demand-driven. This co-production approach strengthens adaptation capacity by equipping decision-makers with data and tools to act early, coordinate effectively, and build resilience across borders.

### RESEARCH QUESTIONS

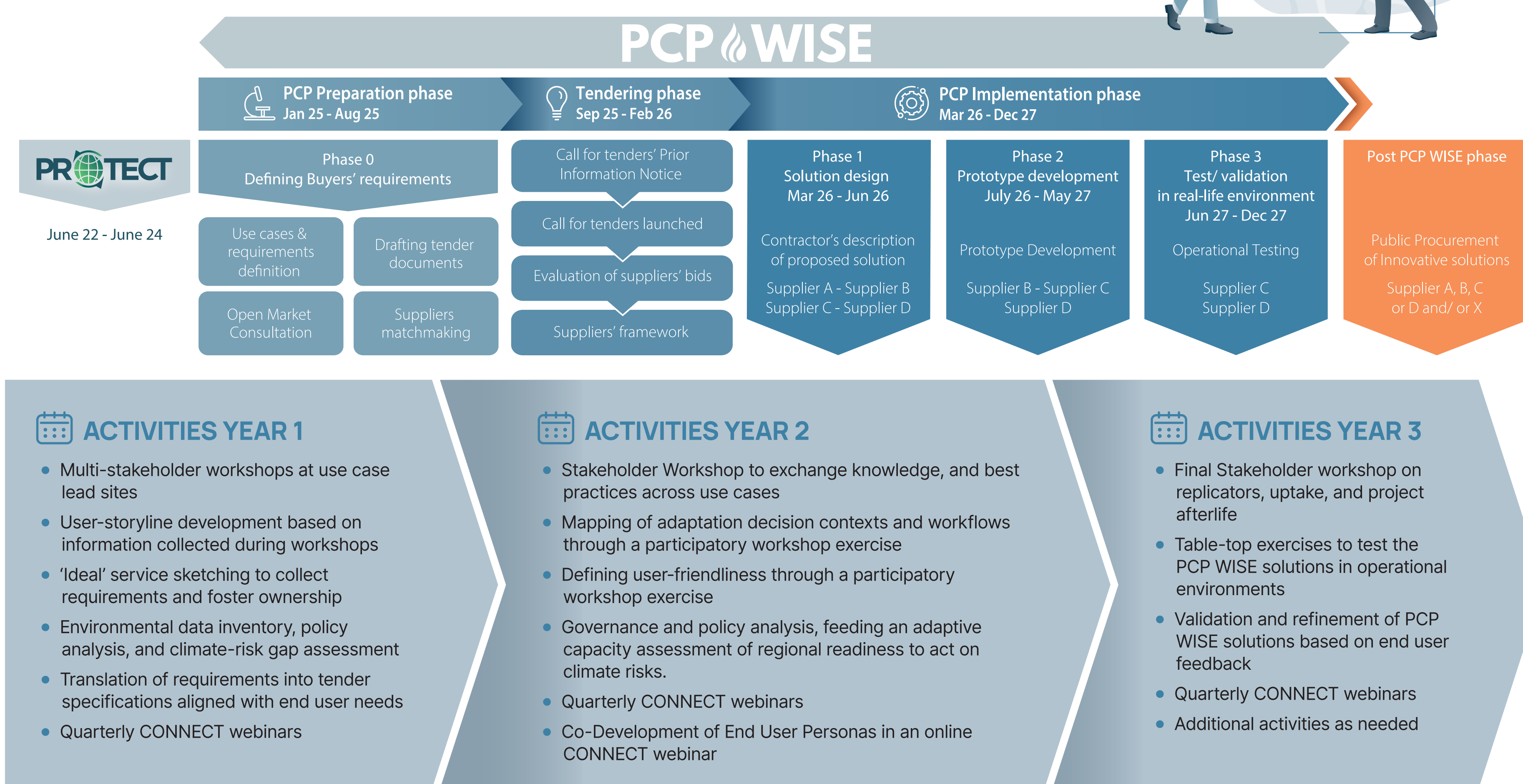
1. How can participatory co-production methodologies be integrated into pre-commercial climate-service procurement?
2. What common climate-information gaps and needs exist in the PCP WISE use case sites?

### METHODOLOGY:

#### Co-Production Methodology

PCP WISE implemented a Climate KIC-led structured co-production process across five European use-case regions, using Climate KIC's CS ADOPT Climate Service uptake framework rooted in co-development and sensemaking. The framework structures participatory user engagement to build co-ownership and support uptake and was adapted to integrate co-production into the PCP instrument.

Methods include quarterly PCP CONNECT webinars, workshops at the 5 use case lead sites, and three cross-cutting stakeholder workshops including the Stakeholder Observatory Group (SOG). Inputs were translated into actionable insights including user story lines for tender specifications, and representative end user personas to facilitate the user-provider interactions in PCP phases 2 and 3.



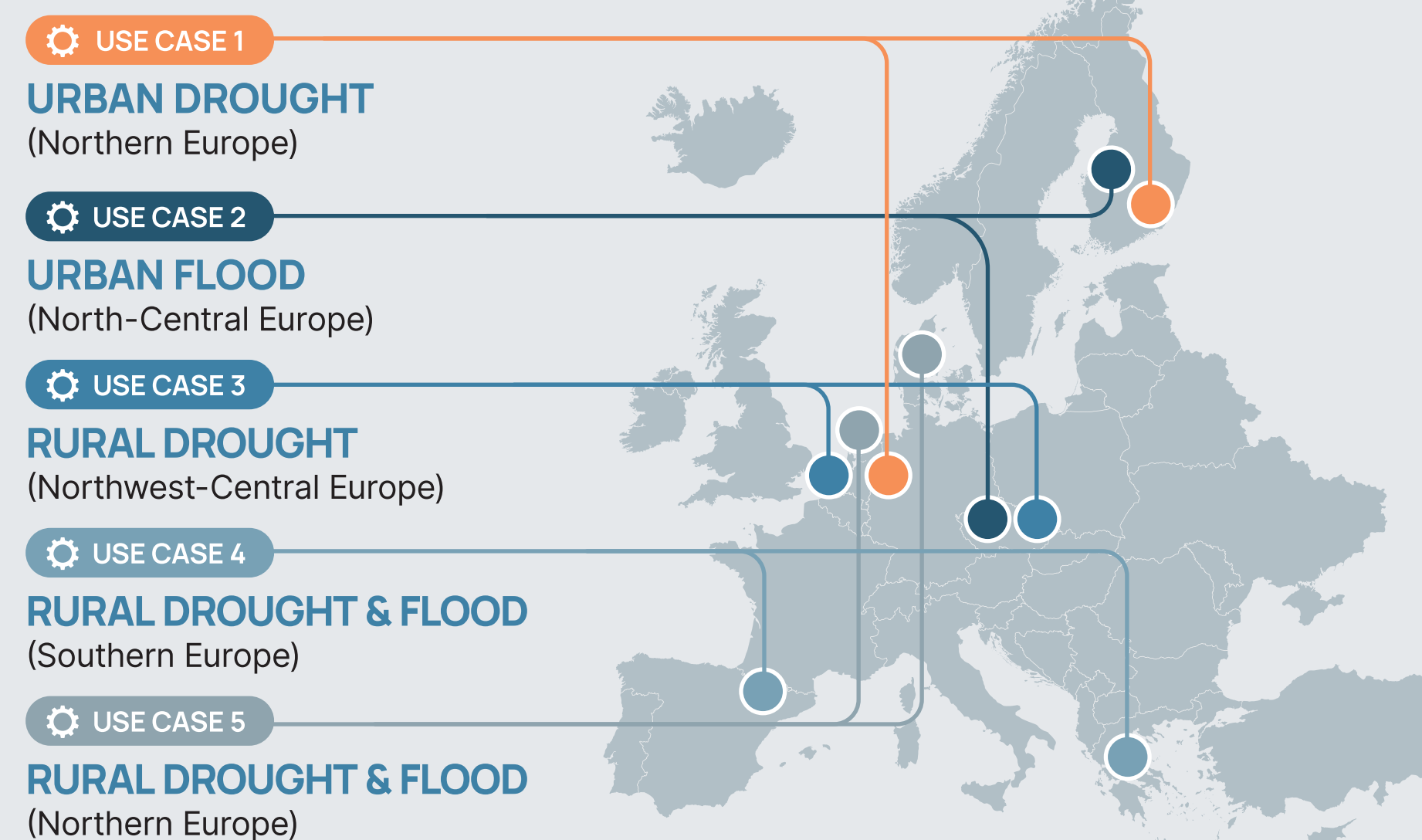
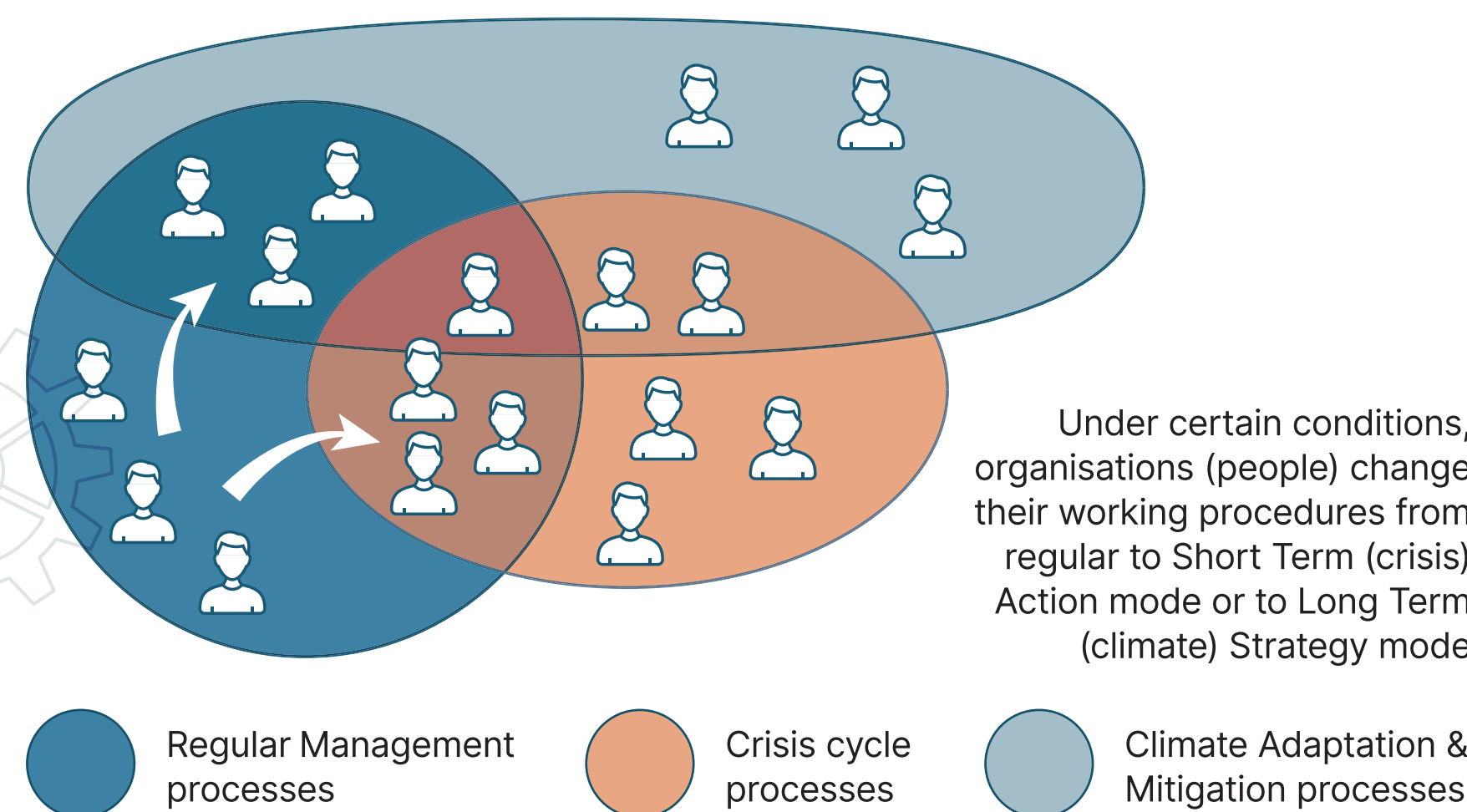
### STAKEHOLDERS INVOLVED IN THE CO-PRODUCTION

PCP WISE stakeholders are categorized across three non-exclusive dimensions: Regular, crisis, and climate. Stakeholders may shift dimensions during events such as rapid-onset floods. Categories include:

- Water managers (regular)
- Nature managers (regular)
- Regional and city authorities (regular)
- Civil protection agencies (crisis)
- Fire brigades (crisis)
- Meteorological services (all dimensions?)
- Climate Adaptation Policy Makers (climate)

PCP WISE engages both technical and non-technical end users to broad usability.

### UNDERSTANDING CHANGING STAKEHOLDER NEEDS



### RESULTS

#### FINDINGS: USER NEEDS & CLIMATE DATA GAPS

The workshops and other co-development activities revealed several key user requirements, such as the need for continuous monitoring of soil-water-vegetation (SWV) system dynamics, enhanced early-warning capabilities, the integration of relevant risk indicators, operational decision support, and user-friendly access to climate information. Common data gaps identified across use cases include fragmented environmental data ecosystems, limited interoperability between existing systems and datasets, a lack of integrated datasets, and a lack of updated and specific strategies. Furthermore, issues

with insufficient resolution for several key SWV elements (soil moisture, evapotranspiration, and groundwater dynamics) were reported. Additionally, the workshop attendees and PCP WISE stakeholders reported several governance-related challenges, including the barriers around cross-sector coordination of datasets and climate information, issues with a lack of cross-border datasets (mainly in the KHH case), and difficulty integrating datasets and services into existing workflows.

#### HIGHLIGHT: COMMON BARRIERS ACROSS USE CASES

Even in diverse governance contexts, similar challenges emerged, which include data fragmentation, poor interoperability, limited workflow integration, gaps in available SWV indicators, and coordination challenges among actors.

#### ADAPTATION READINESS: THE ADAPTIVE CAPACITY ASSESSMENT

Alongside the data-gap analysis, we assess how ready each region is to act on its climate risks, by scoring the fit between its adaptation strategies, its existing tools, and the risks it faces. Each risk is scored on policy strength and tool coverage, giving one comparable adaptive capacity figure per climate risk per region.

#### HIGHLIGHT: ADAPTATION POLICY VS COMMON BARRIERS

Strong adaptation policy is repeatedly held back by weak or fragmented tooling, the same barrier the co-production surfaced. This confirms that the co-produced service requirements respond to a real readiness gap, shows where PCP WISE adds most value in each region, and links validated user demand to regional adaptation planning and to the climate relevance of the procured solutions.

### TRANSLATION OF EXPRESSED NEEDS INTO TENDER SPECIFICATIONS

Stakeholder needs were translated into tender specifications published with the PCP WISE call for tenders in September 2025. These include continuous SWV monitoring; sector-specific risk indicators; multi-hazard assessment; early warning integrated with civil-protection workflows; user-friendliness, including language support; interoperability and workflow integration; and adaptation planning & decision support.

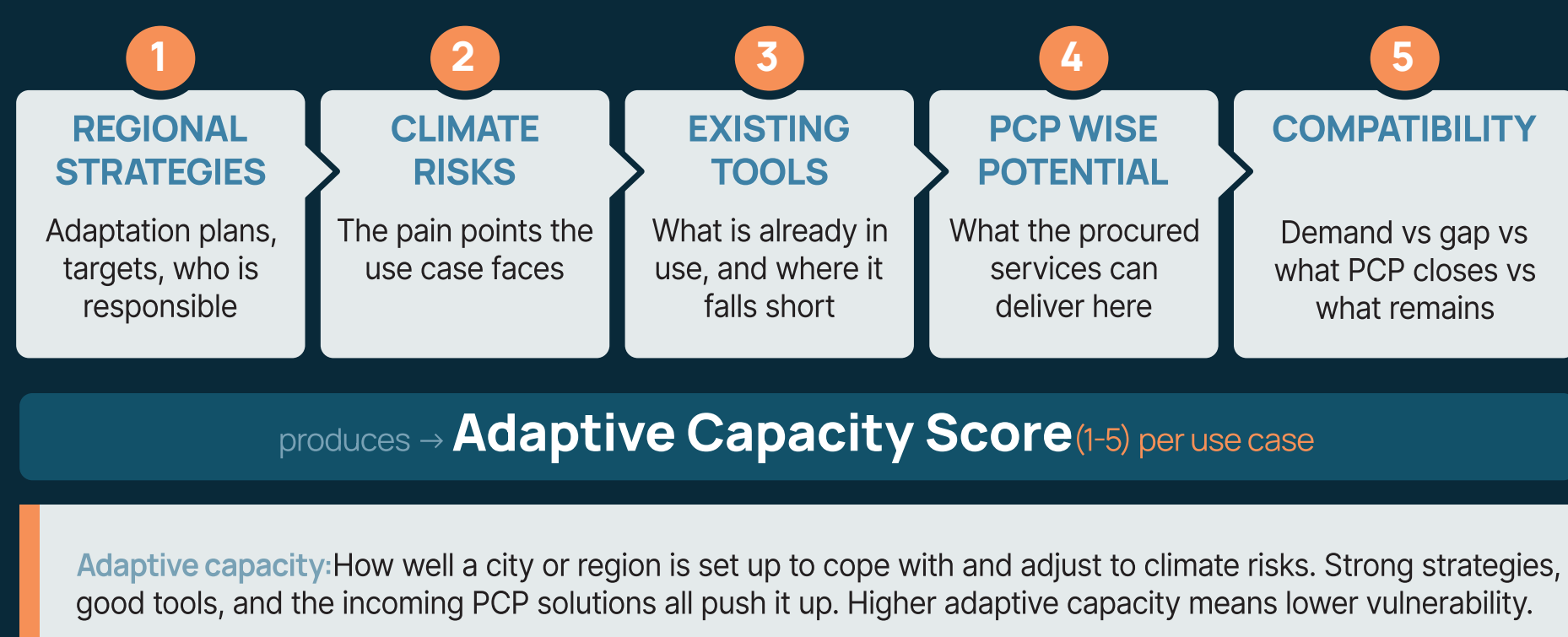
For instance, in the Netherlands and Belgium, close cooperation between water and nature managers and meteorologists at the PCP WISE Kalmthoutse Heide test site has led to the co-creation of a daily 'Hydromet' alerting system. This system supports short-term wildfire risk assessment while feeding into long-term climate-resilience measures, reducing the impacts of prolonged drought on the SWV system.



### CONCLUSION

This approach demonstrated the value of integrating Co-Production into a PCP process. It aligns procurement with expressed and validated user demand, rather than broad market assumptions, increasing the relevance of the procured Climate Service to public buyers and its potential impact on adaptation decisions. Embedding user feedback also supports usability for non-technical users, while stakeholder involvement fosters ownership and uptake.

The approach provides a framework for aligning technological innovation with societal needs, and reducing the gap between Climate Service development and operational uptake, improving long-term sustainability. Aligning services with climate and adaptation decision contexts also supports adaptation planning; the adaptive-capacity assessment makes this concrete by showing that co-produced services target real regional readiness gaps.



| Adaptive capacity: score explanation |                                                                                       |                                                                                                          |
|--------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Score                                | A-Policy strength                                                                     | B-Tool coverage                                                                                          |
| 5                                    | Specific, owned, funded and monitored, at national and city level, and current.       | Detailed and current, right resolution, and built into day-to-day decisions.                             |
| 4                                    | Sets concrete requirements with a named owner and is current.                         | Meets most of the demand, with minor gaps in integration or resolution.                                  |
| 3                                    | Addresses the risk with general goals, but missing a clear owner, funding or recency. | Tools inform the risk, but a clear limit (coarse, static, siloed or restricted) leaves the demand unmet. |
| 2                                    | The risk is mentioned only, in general terms, with no measures or owner.              | Some data exists, but too sparse, static or indirect to use for this risk.                               |
| 1                                    | No strategy addresses this risk.                                                      | No tool or dataset addresses the demand.                                                                 |