

# DESTINATION EARTH

Second User eXchange Workshop

## Challenges and opportunities for the Climate Adaptation Digital Twin

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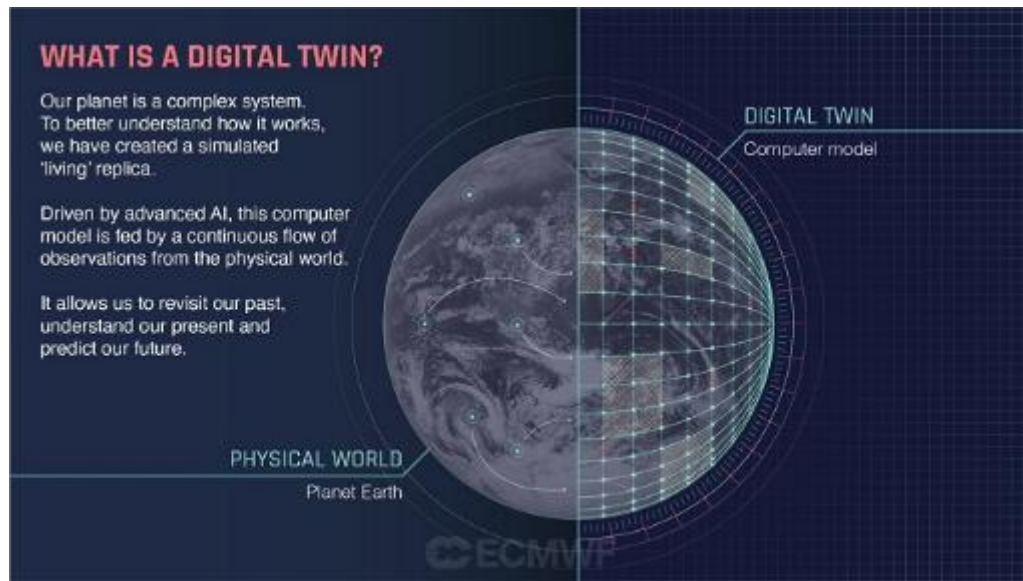
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A **digital twin for climate adaptation** is a system that supports decision-making in adaptation to climate change using the best models available in an environment that allows **an interactive relation with the user**.

The digital twin requires (this is a non-exhaustive list):

- a strategy to **collect user requirements**
- a well-validated set of interoperable **models**
- an environment for **operations** (software and hardware)
- a **work and dataflow** strategy
- a suitable **interface**

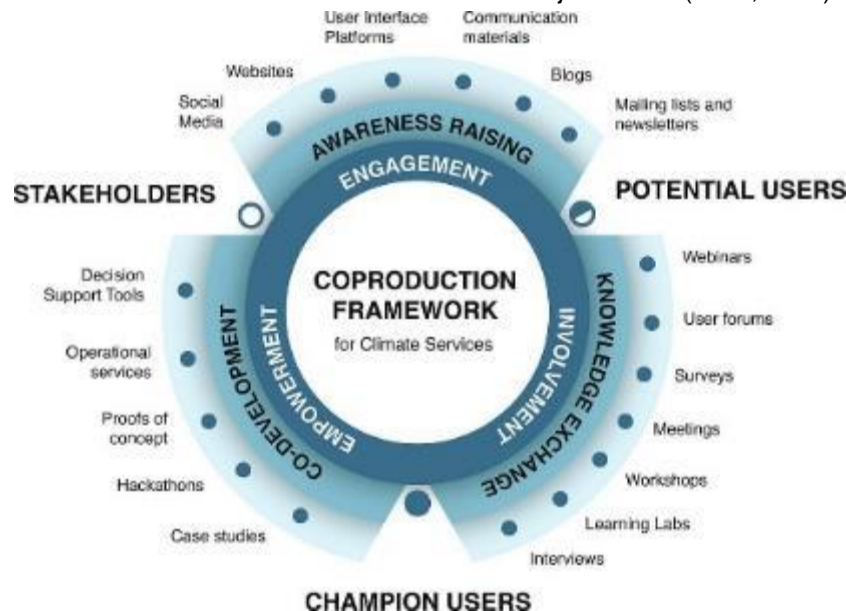


**Challenge:** The digital twin emerges in a **busy context**, with many requirements for climate information, a cacophony of sources, a growing market, increasing needs, no defined standards, and some well-positioned actors. Are the needs taken care of? Are timing, quality, adequacy, and authority addressed?

**Opportunity:** **Social sciences and humanities** play an increasingly important role in the services that provide climate information. New and varied approaches are leading to more efficient and successful links to both public administrations and the private sector.

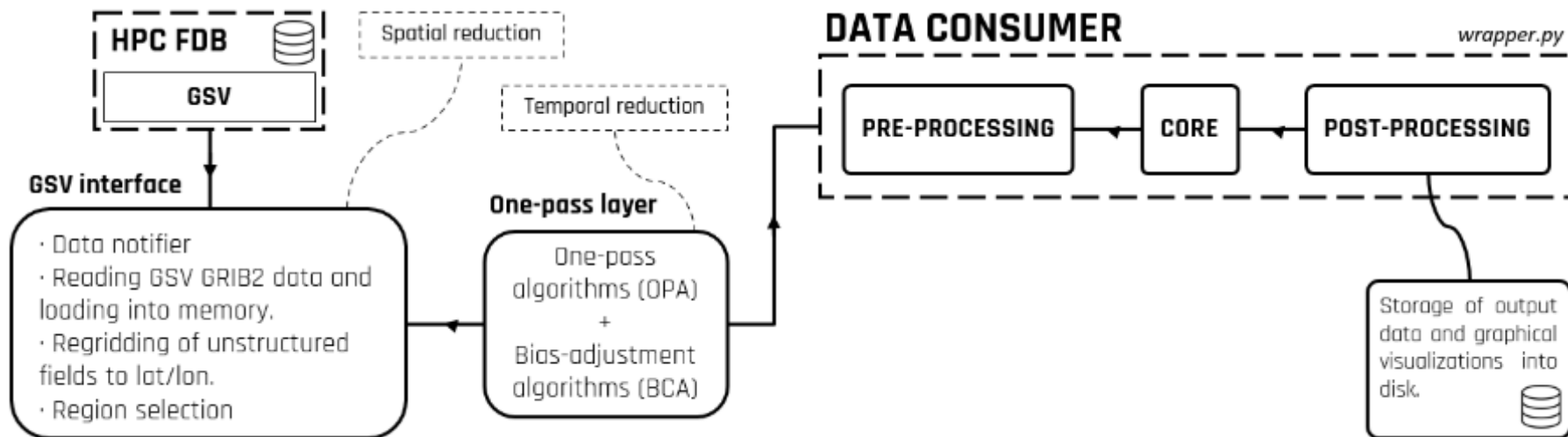
**Collaboration with existing actors** (C3S, private sector, climate services) familiar with user requirements is already taking place and should be enhanced.

Bojovic et al. (2021, GEC)



**Challenge:** As little relevance as climate drivers might have in the complex climate adaptation arena, **climate simulations are still not fit for purpose.**

**Opportunity:** The **streaming and operationalisation** concepts are central in the digital twin because it **gives data consumers access to the full, salient state vector.** **Machine learning-based emulators** of the climate trajectory to allow streaming at will.



**GSV-DATA CONSUMER WORKFLOW**



**Challenge:** Access to climate information for adaptation does not scale. For instance, human expertise is scarce and often oriented to research.

**Opportunity:** Large-language models, fine tuned to the climate adaptation problem using a relevant corpus for training, could offer support to humans to better scale the provision of information.

F what is the probability of coastal flooding in Barcelona in 2

As an AI language model, I do not have access to current or

GPT-4's capabilities and limitations create significant and careful study of these challenges is an important area of research. This report includes an extensive system card (after the Appendix) that foresee around bias, disinformation, over-reliance, privacy, and security. It also describes interventions we made to mitigate potential risks, including adversarial testing with domain experts, and a model of

coming years.

If you're concerned about the risk of coastal flooding in Barcelona, I recommend consulting with local authorities or experts in the field who can provide you with more detailed and accurate information based on the latest research and data available.

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Model

Mode

GPT-3.5 Turbo

Hybrid