

Building a co-design methodology supporting the resilient growth of the Earth observation ecosystem

Results and perspectives from the e-shape project

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EuroGEO Showcases: Applications Powered by Europe

69 partners

7 showcases
37 pilots

4 years grant



More than a project: establishing the European contribution to GEO

Leveraging state-of-the-art EO resources and expertise to enable the uptake and long-term sustainability of EO-based services



Goal: building a co-design approach adapted to the EO context

- Workpackage led by the *Center for Management Science* at MINES ParisTech - PSL University: leveraging our expertise in **design theory** and methods for innovation
- Approach progressively built through **interactions and experimentations with e-shape pilots**



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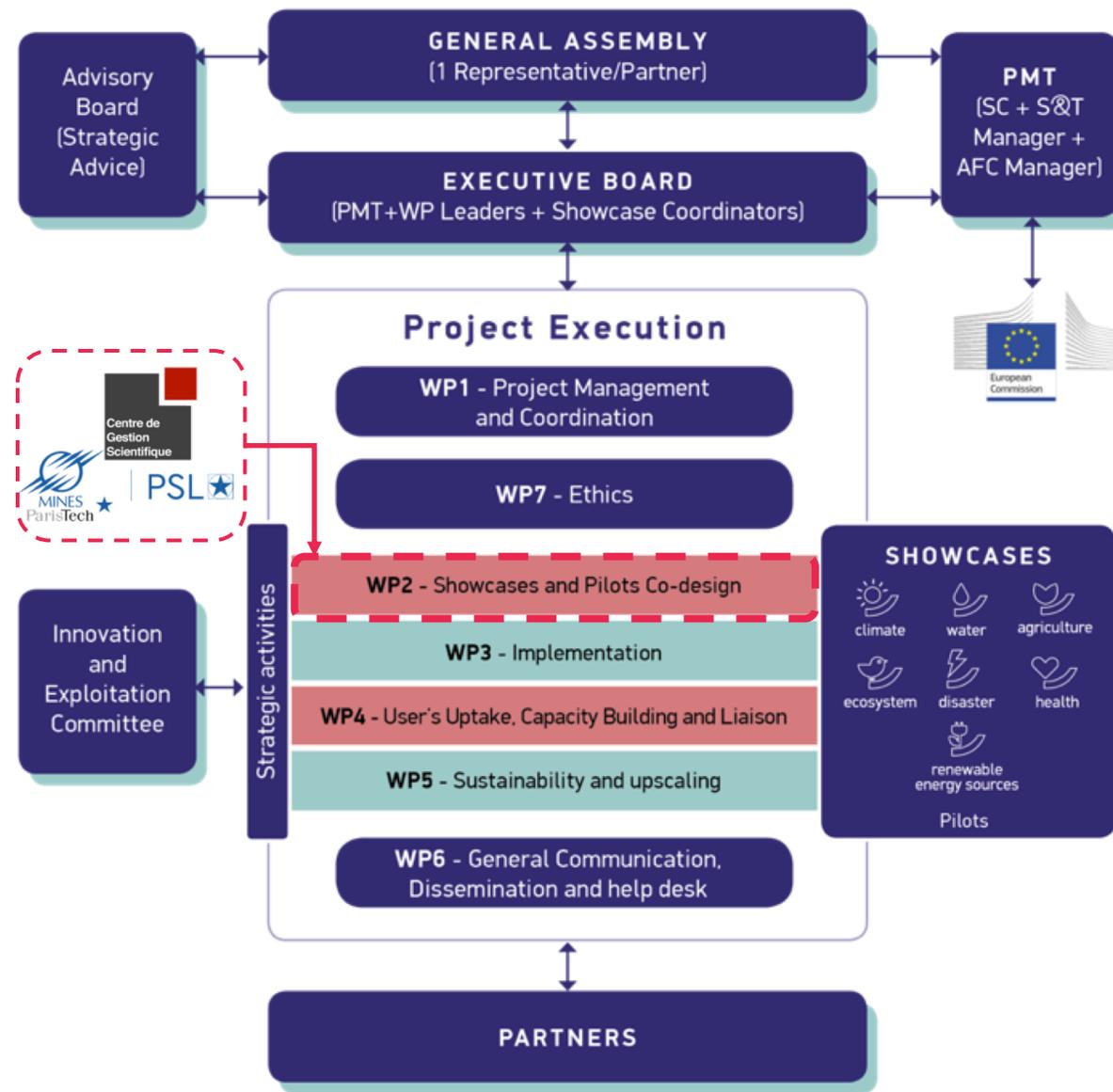
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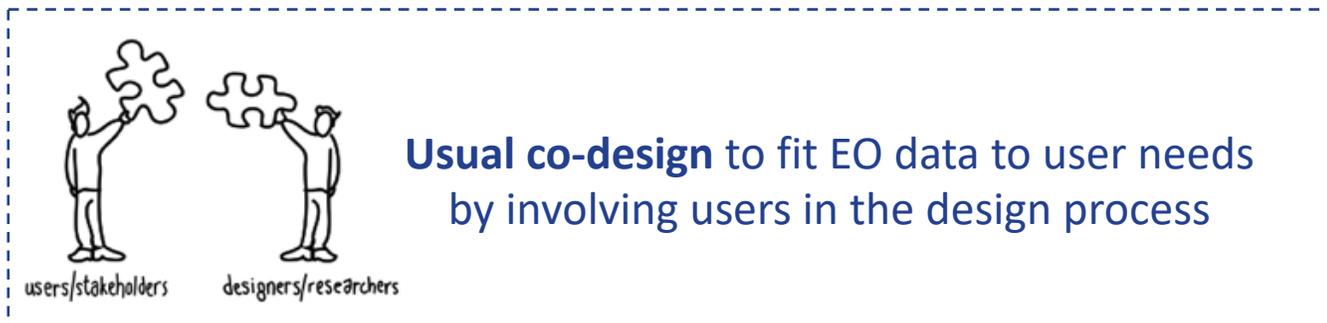
An enriched understanding of co-design driven by e-shape objectives - in line with GEO vision

1. Enhancing cooperation among heterogeneous actors:

- GEO core function - Fostering partnerships and mobilizing resources: *“Connect users, resource providers, and experts from different sectors in the domain of Earth observations and environmental information to form partnerships”*

2. Targeting resiliency

- GEO core function - Identifying user needs and addressing gaps in the information chain: *“Obtain commitments from providers and users to ensure these observations, products and tools are delivered and used in a comprehensive, coordinated and sustained way”*



- (1) Cooperation limited to the **end user - data provider relationship**
- (2) Mainly considering co-design as a **one-shot action**



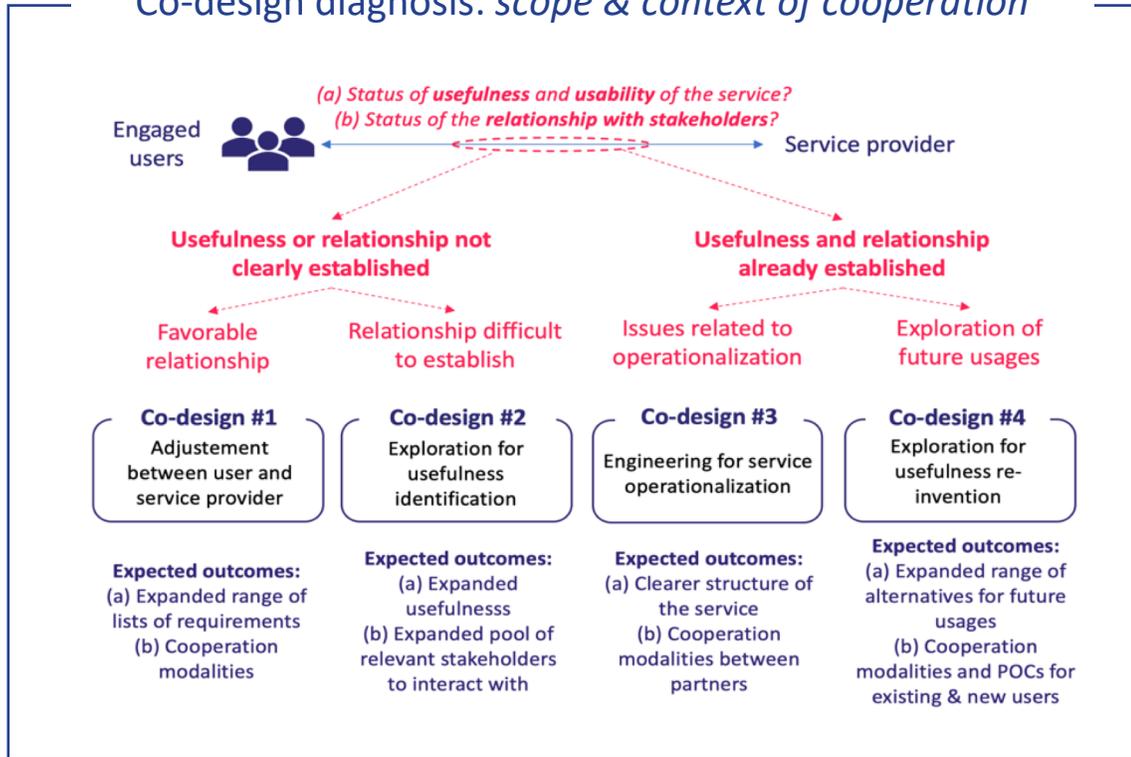
- (1) **Designing relationships** between a large range of actors (beyond end-users)
- (2) Taking a **dynamic and long-term perspective**

Resilient-fit co-design: diagnosis & action

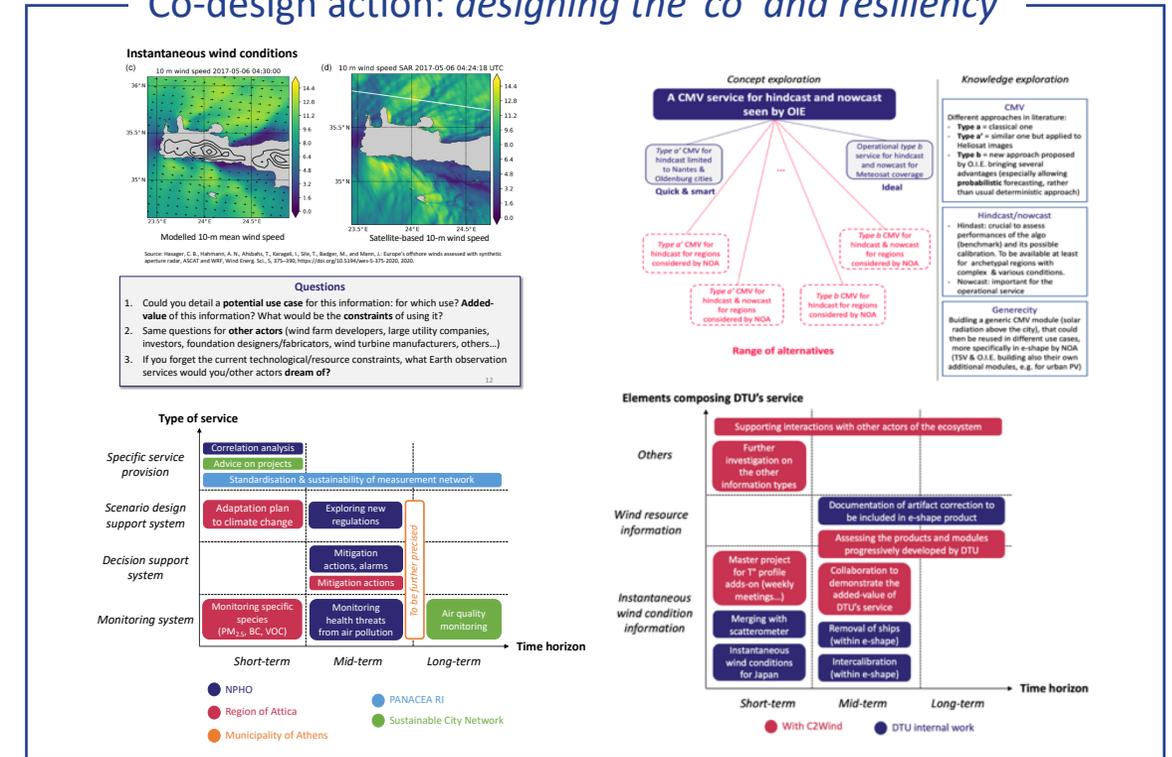
EO resource provider's timeline



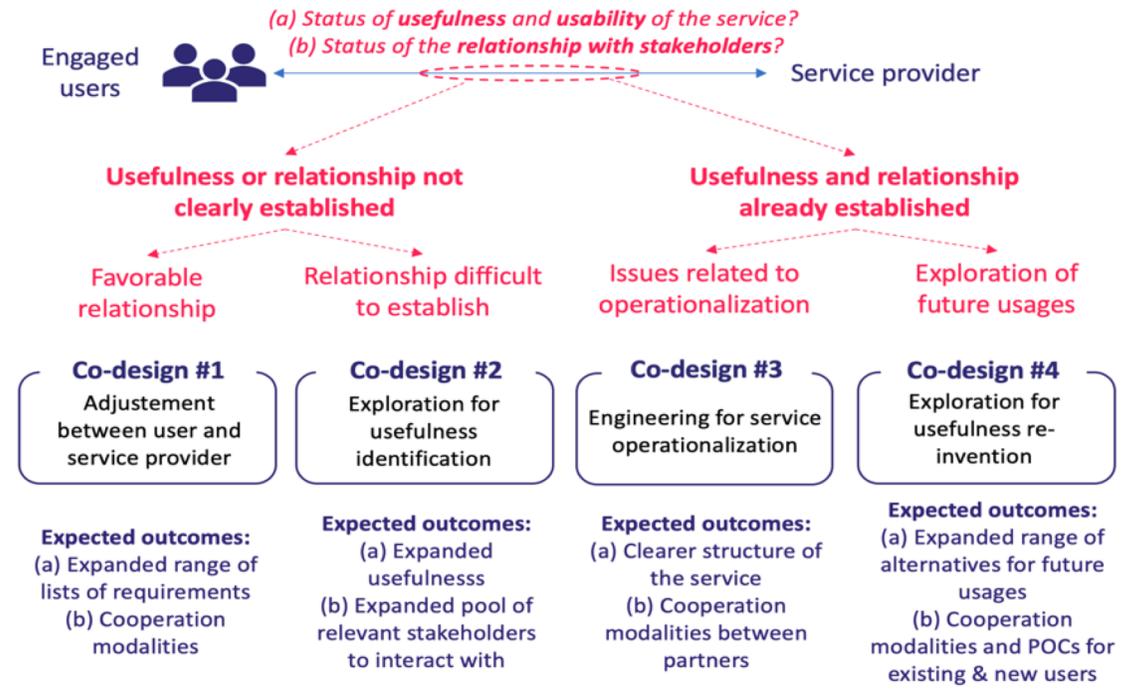
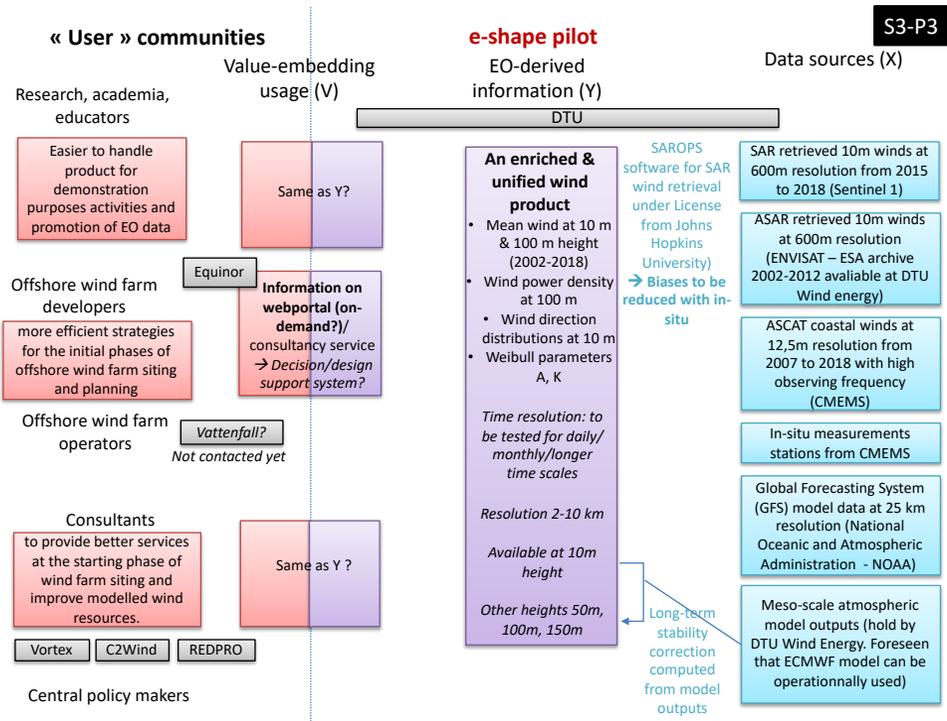
Co-design diagnosis: scope & context of cooperation



Co-design action: designing the 'co' and resiliency



Co-design diagnosis: who? why? when?



- Helping the pilot to formalize its **objectives** and **understanding** about the users' communities
- Identifying the relevant types of co-design actions at **different time horizons**

“The co-design diagnosis was very well structured [...] It was very good to have short-term and long-term, this helped us to come back couple of months after and see what we had said for the long-term and what is now time to implement.” (Alexia Tsouni, NOA)

Co-design action: guidelines for resiliency

Possible agenda for a 3h workshop agenda (timing to be adapted)

9h - 9h15 – Introduction

9h15 – 9h30 - Phase 1: Demonstration by the pilot (prototype of the service + expertise, competencies...)

Pilot	Participants
Speaking	Active listening: to what extent might the service be useful for me? Any issue raised?

9h30 – 10h45 – Phase 2: Knowledge shared by each user

Pilot	Participants
Active listening: New features to be added? Adapted relationships with the users? New relevant actors to be involved?	Speaking, reacting on pilot demo

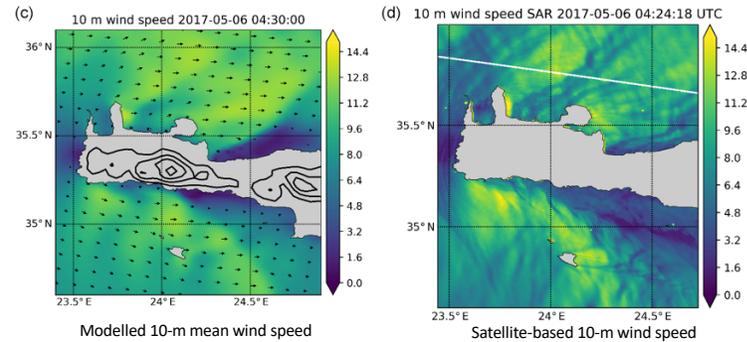
10h45 – 10h55 - Break

10h55 – 11h45 - Phase 3: Enrichment of list of requirements and agreement on future relationships

Pilot	Participants
Suggesting	Reacting

11h45 – 12h - Wrap up and next steps

Instantaneous wind conditions

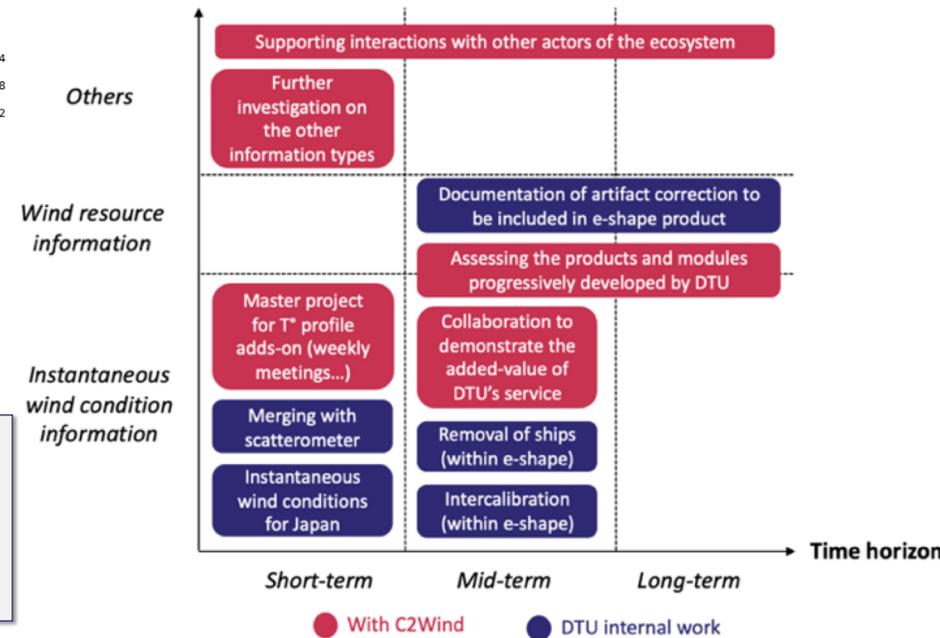


Source: Hasager, C. B., Hahmann, A. N., Ahsbahs, T., Karagali, I., Sile, T., Badger, M., and Mann, J.: Europe's offshore winds assessed with synthetic aperture radar, ASCAT and WRF, Wind Energ. Sci., 5, 375–390, <https://doi.org/10.5194/wes-5-375-2020>, 2020.

Questions

1. Could you detail a **potential use case** for this information: for which use? **Added-value** of this information? What would be the **constraints** of using it?
2. Same questions for **other actors** (wind farm developers, large utility companies, investors, foundation designers/fabricators, wind turbine manufacturers, others...)
3. If you forget the current technological/resource constraints, what Earth observation services would you/other actors **dream of**?

Elements composing DTU's service



Guidelines to steer the strengthening of cooperations targeting resiliency

- **Rigorous process** for each co-design type: sequence of preparatory phase and workshop(s)
- Outcomes: formalizing a **range of cooperation forms at different time horizons**
 - **Designing the 'co'**: explicitly agreeing on the relationship to be built between actors
 - **Designing resiliency**: not converging on one list of requirements but eliciting a range of alternative development paths at different time horizons

Perspectives

Research perspectives : a **trans-ecosystems co-design** to transform EO data into a resource to accelerate the sustainable transitions of multiple socio-economic ecosystems (*growing streams of works in innovation management and information systems research*)

Operational perspectives: from promising experimentations in e-shape towards exploring ways of **enhancing co-design expertise in the EO community**

- *Autonomous co-design* → guidebooks + trainings
- *Co-design helpdesk* for more complicated cases → Europe / GEO supporting the establishment of a community of experts (teams, networks, labels, experience sharing, devices & interactive platforms)?

"The initial co-design workshop proved to be an immense success [...]. The workshop served as a means to formalize relationships and find synergies between workflows and users, propelling us to officially pursue partnering with National Public Health Organization and the Ministry of Energy and the Environment." (Evangelos Gerasopoulos, NOA, pilot leader)

"For me it was really eye opening that we could use it in such a broad way to look at all sort of possibilities rather than trying narrow down what we wanted to do. It was more about broadening out and gathering lots of ideas and inputs." (Merete Badger, DTU, pilot leader)

Thanks for your attention!
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Diagnosis: handling different forms of cooperations

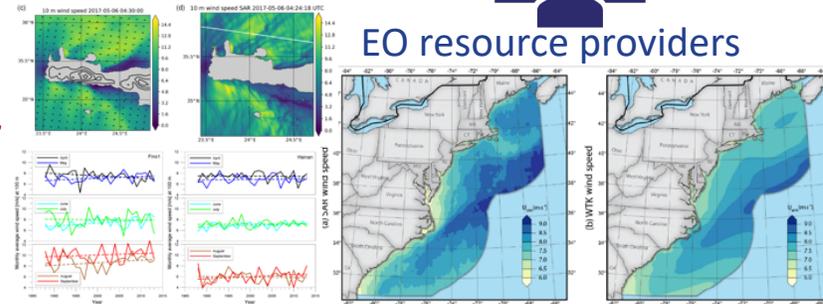


Type of partnership? Feedback loop?



EO resource providers

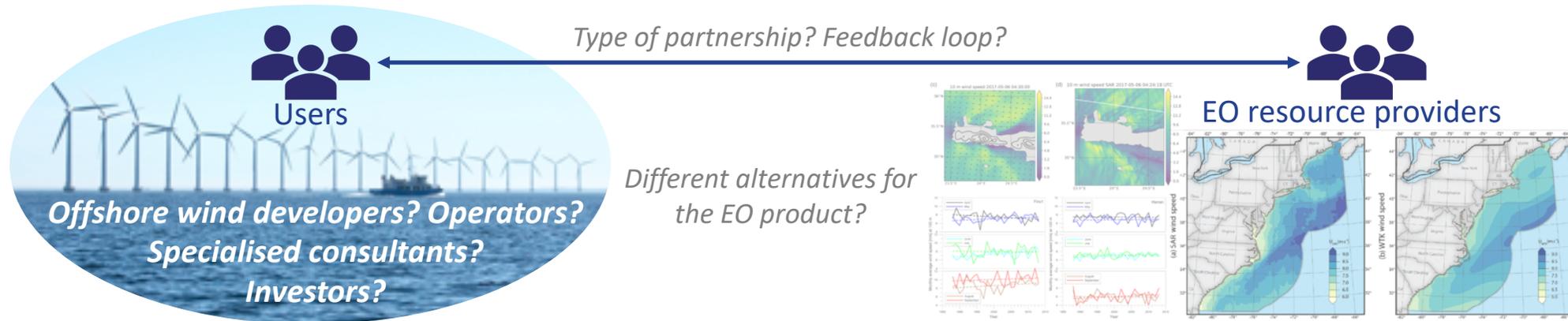
Different alternatives for the EO product?



Four types of co-design: *identifying the scope & context of cooperations to be strengthened*

Type #1: identified user *but how to build a robust relationship with this user for further developments?*

Diagnosis: handling different forms of cooperations

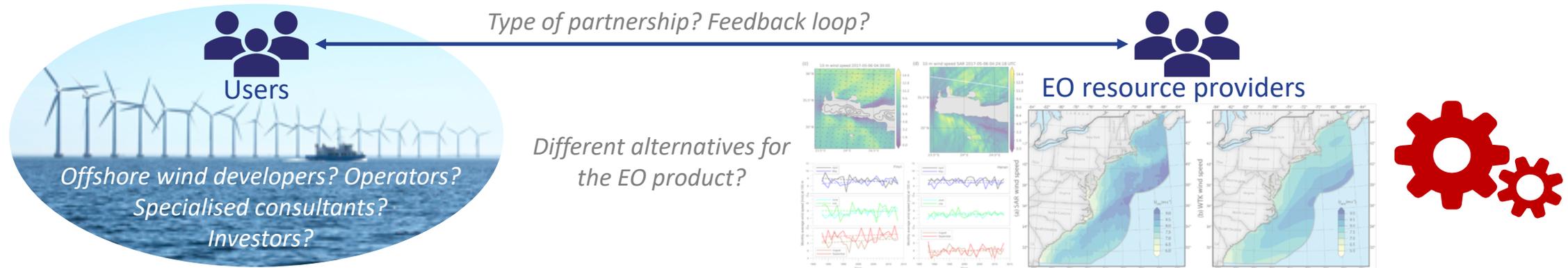


Four types of co-design: *identifying the scope & context of cooperations to be strengthened*

Type #1: identified user *but how to build a robust relationship with this user for further developments?*

Type #2: user not clearly identified, so *how to explore the usage ecosystem to identify the relevant actors to interact with?*

Diagnosis: handling different forms of cooperations



Four types of co-design: *identifying the scope & context of cooperations to be strengthened*

- Type #1:** identified user *but how to build a robust relationship with this user for further developments?*
- Type #2:** user not clearly identified, so *how to explore the usage ecosystem to identify the relevant actors to interact with?*
- Type #3:** existing user *but how to build a robust relationship with partners to operationalise the EO-based solution?*

Diagnosis: handling different forms of cooperations



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Type #4: existing user *but how to sustain and expand the existing EO-based solution towards new ones?*

Diagnosis: handling different forms of cooperations



Four types of co-design: *identifying the scope & context of cooperations to be strengthened*

Type #1: identified user *but how to build a robust relationship with this user for further developments?*

- Issue: considering demands specified by users, taken separately → helping users to explore all the potential of EO data + possibly coordinating users

Type #2: user not clearly identified, so *how to explore the usage ecosystem to identify the relevant actors to interact with?*

- Issue: considering user as a potential client (commercial prospection) → user as a partner for learning and exploration

Type #3: existing user *but how to build a robust relationship with partners to operationalise the EO-based solution?*

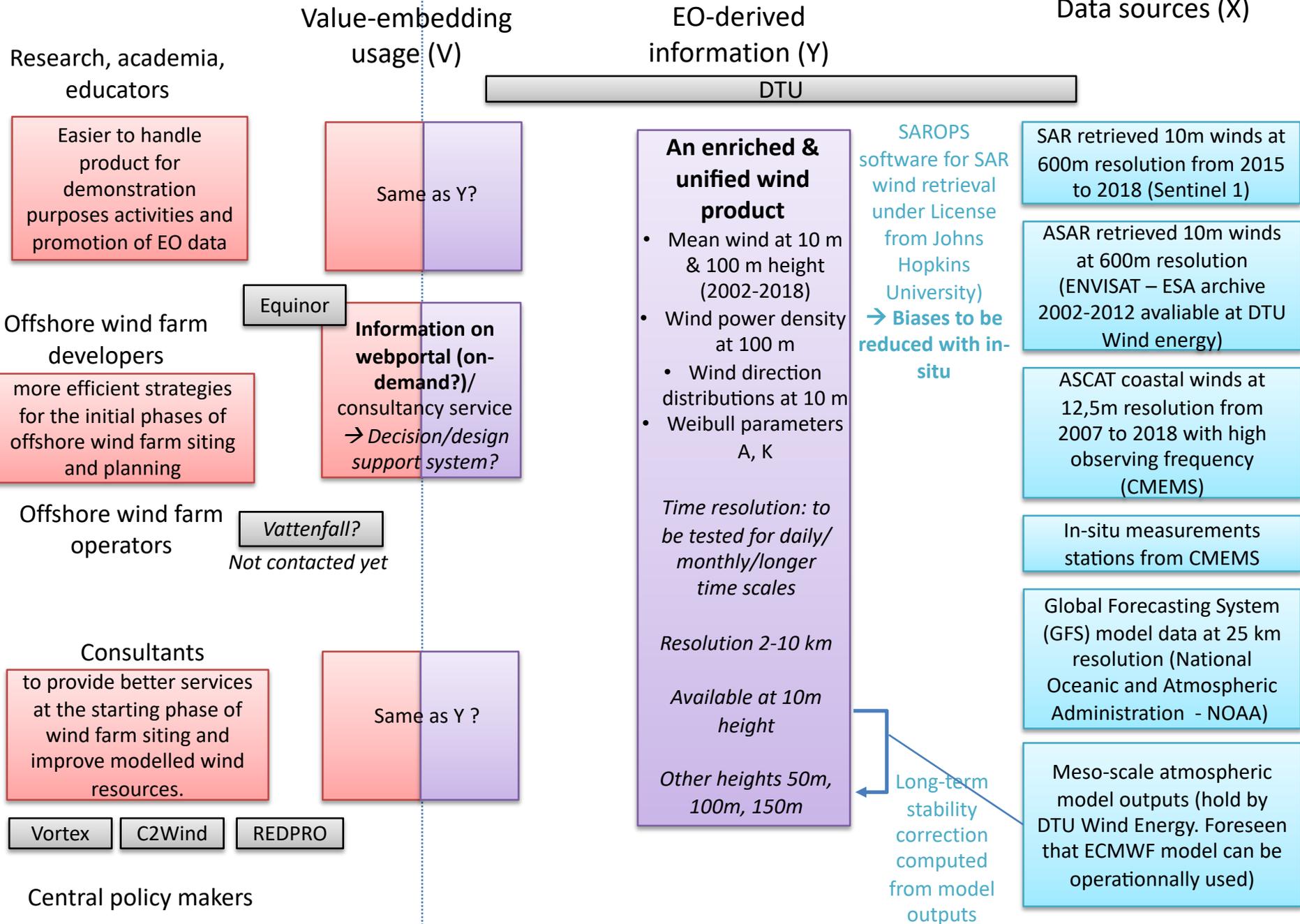
- Issue: considering the operationalisation as a transfer from R&D to engineering entity → both involved in exploration and operationalisation

Type #4: existing user *but how to sustain and expand the existing EO-based solution towards new ones?*

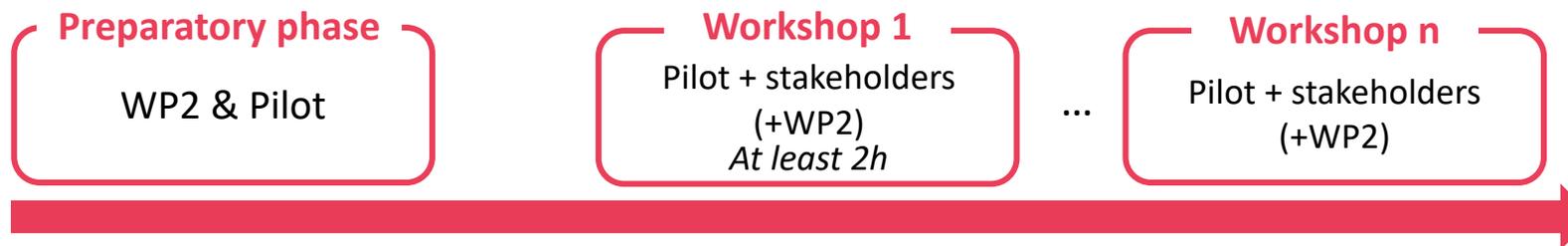
- Issue: considering the expansion as scaling-up by replication → leveraging existing users to address issues hindering the future growth of ecosystems

« User » communities

e-shape pilot



Workshops



Workshop protocol (ex for co-design type 1)

Possible agenda for a 3h workshop agenda (timing to be adapted)

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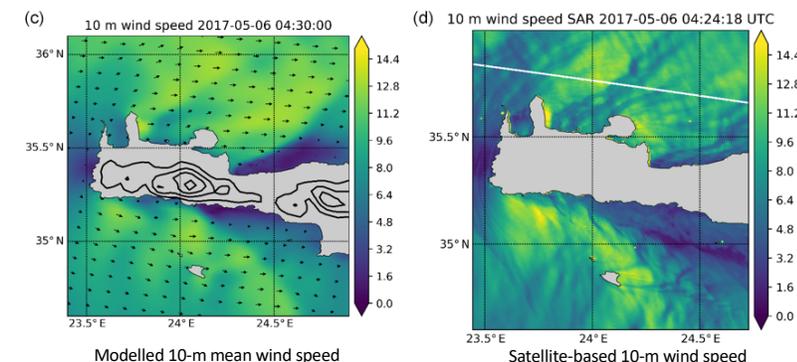
11h45 – 12h - Wrap up and next steps

Guiding questions addressed to users for phase 2 (to be further adapted)

- Overall usefulness of the service: What are your current operations that would potentially benefit from the proposed service?
- Detailed use case of the service (1/2): According to what was presented by the e-shape pilot, what would you do with this service? Which division would be concerned? To what extent would you be able to use the provided service on your own?
 - If you use the service for monitoring purposes, what information would you like to monitor?
 - If you use the service as a decision support system, what types of actions in your operations would it potentially support?
 - Beyond using the service for your current workflows, how could the service help you to develop new operations or services on a longer-term perspective?
- Detailed use case of the service (2/2): What would be the constraints, drawbacks and risks of using the proposed service?
- Dream of future EO services: If you forget the current technological/resource constraints, what Earth Observation applications would you dream of?

Ex of questions asked for type 2

Instantaneous wind conditions

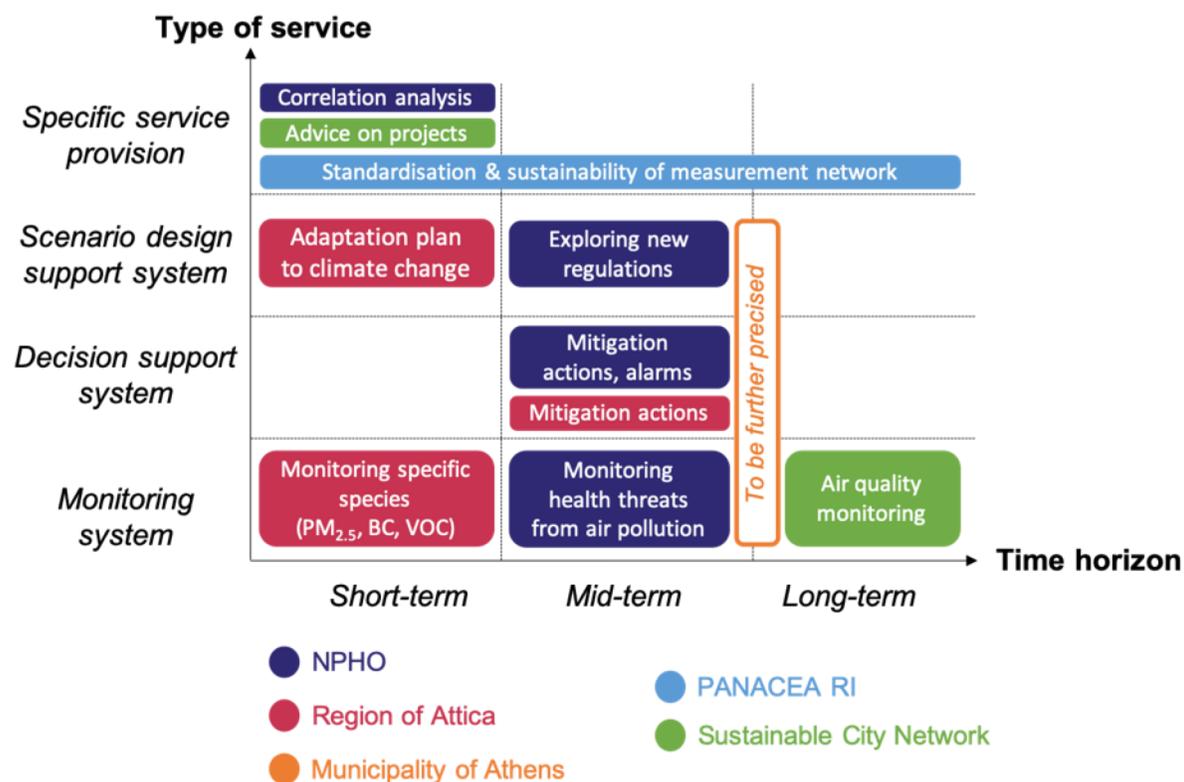


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Outcomes



Ex of type 1

	Short-term	Mid-term	Long-term	Cooperation modalities
Modules to be operationalized	Product based on method a, limited to a certain geographical area	Product based on method a, with additional functionality		March 2021: kick-off and working sessions to define inputs & outputs and development planning.
Modules to be explored	Product based on method b, limited to a certain geographical area	Processing transferred to operationalization entity	Product based on method b, with additional functionality	March 2021: technical working session with on python code developed by research entity
Undetermined	Collaboration for exploration of new deep learning methods		Commercial service for forecasting at different time horizons	R&D collaboration (joint PhD & internships, specific interest group)

Ex of type 3