

Earth Sciences  
Department



**Barcelona  
Supercomputing  
Center**  
*Centro Nacional de Supercomputación*

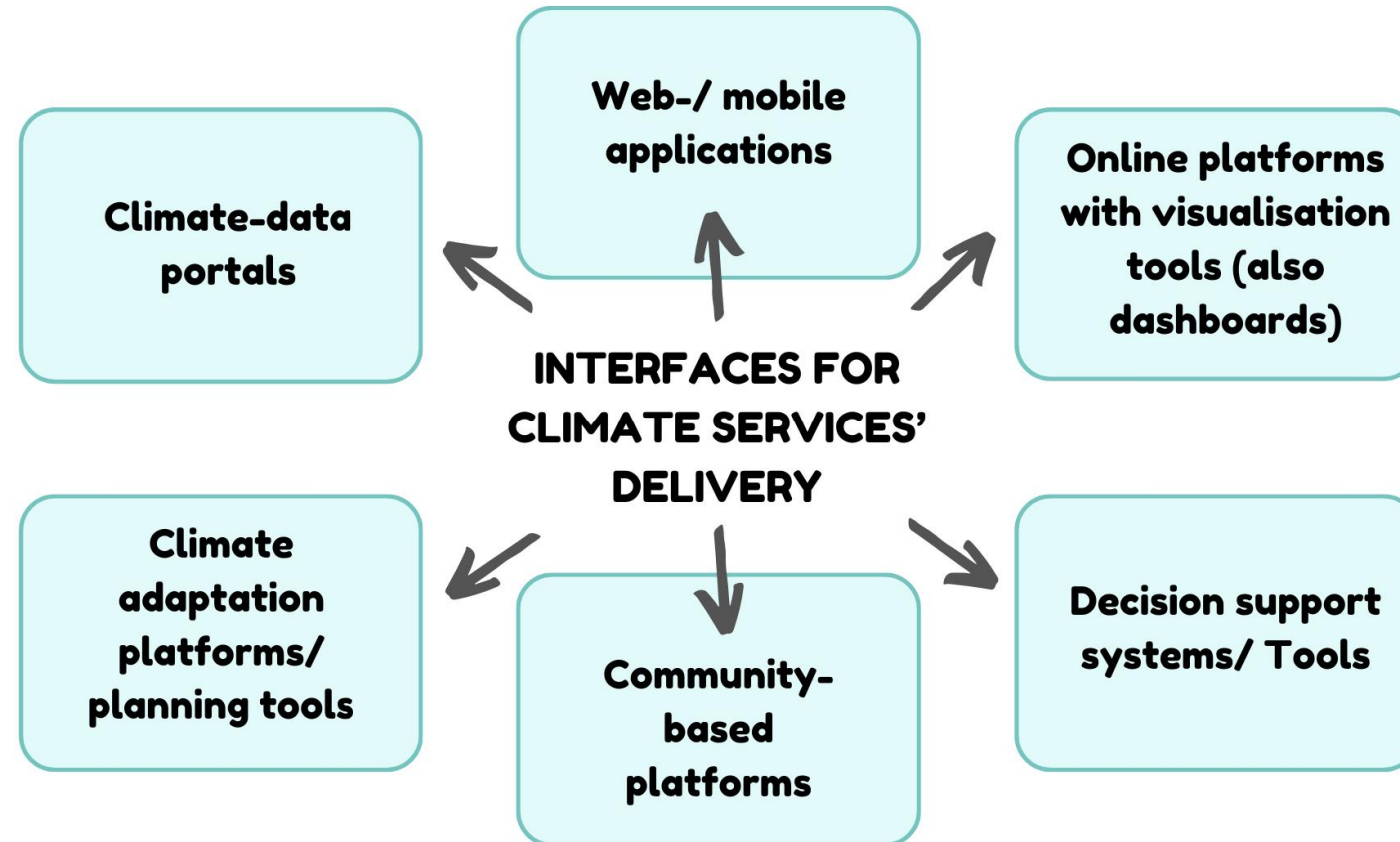
# Co-production of knowledge and tools to mainstream climate adaptation

Marta Terrado & colleagues from the Knowledge  
Integration team, Barcelona Supercomputing Center

9th January, 2024, online

FutureMed WG2 Inaugural Meeting on Climate Adaptation

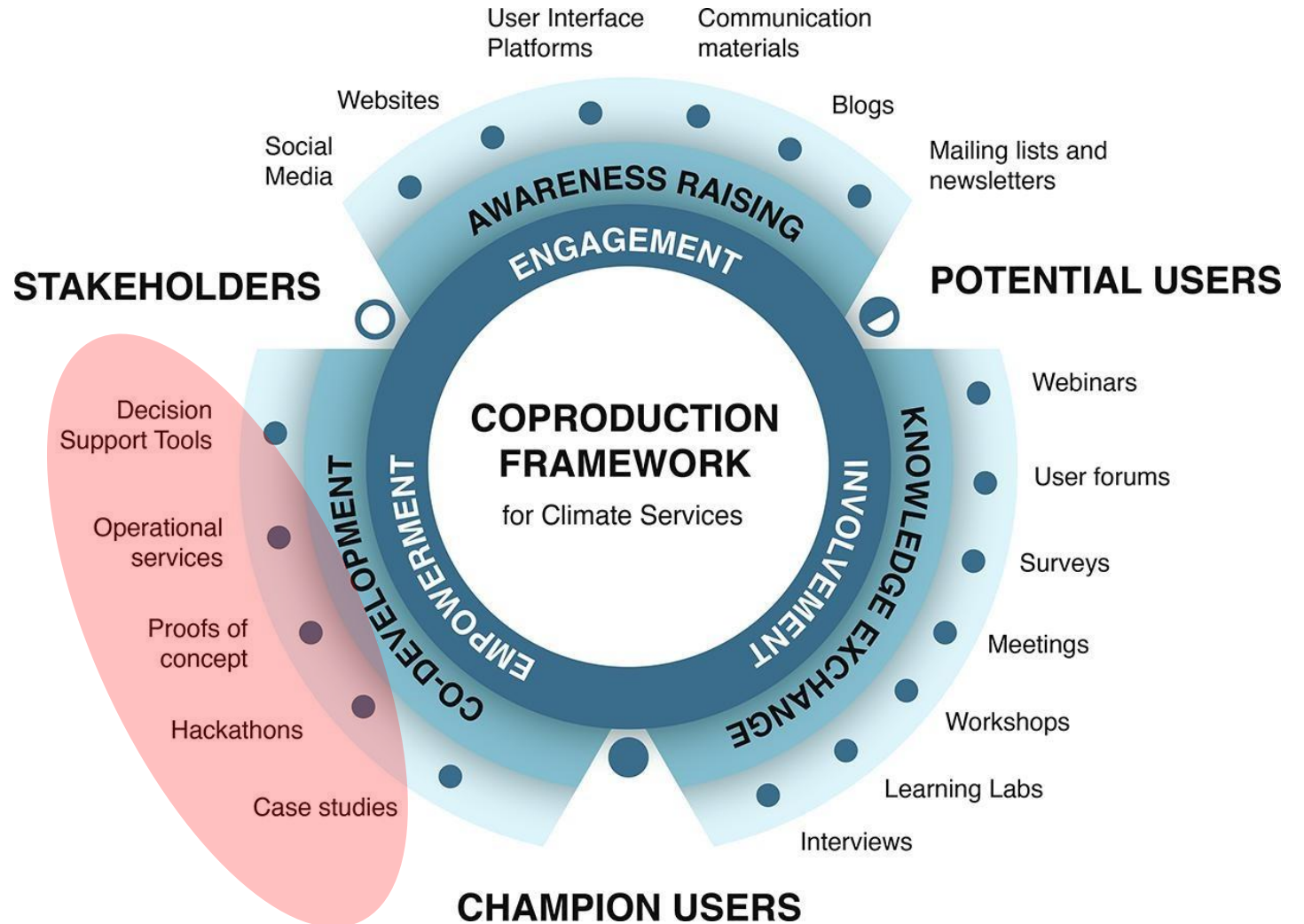
# Types of climate knowledge tools/platforms



# Co-production framework


We apply a transdisciplinary knowledge co-production framework that allows feedback loops between users and providers of climate information.

*Bojovic et al. (2021) Engagement, involvement and empowerment: Three realms of a coproduction framework for climate services. Global Environ. Change*



# Co-developed climate service platforms

**COORDINATION**

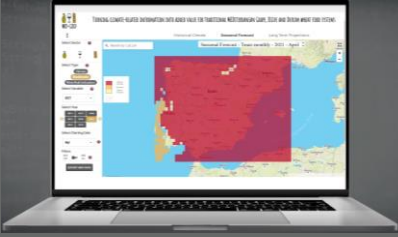


**S2S4E Decision Support Tool**

Sub-seasonal and seasonal forecasting tool

**EXPLORE >**

**COORDINATION**

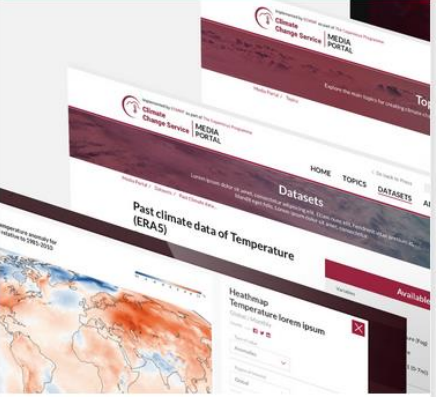


**MED-GOLD**

Climate services for the Mediterranean grape, olive and durum wheat sectors

**EXPLORE >**

**COORDINATION**



*FINISHED*

**C3S Press Data Portal**

Climate data tailored for journalism

**EXPLORE >**

**OPERATIONAL**

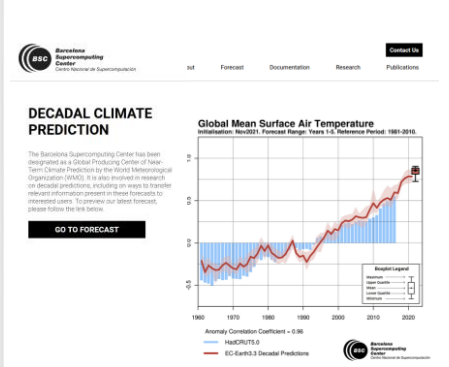


**Seasonal Hurricane Predictions**

Atlantic hurricane season forecasts

**EXPLORE >**

**OPERATIONAL**



**Decadal climate predictions**

Decadal climate prediction system

**EXPLORE >**

**DST**  
**Energy** (wind, solar, hydropower, energy demand)

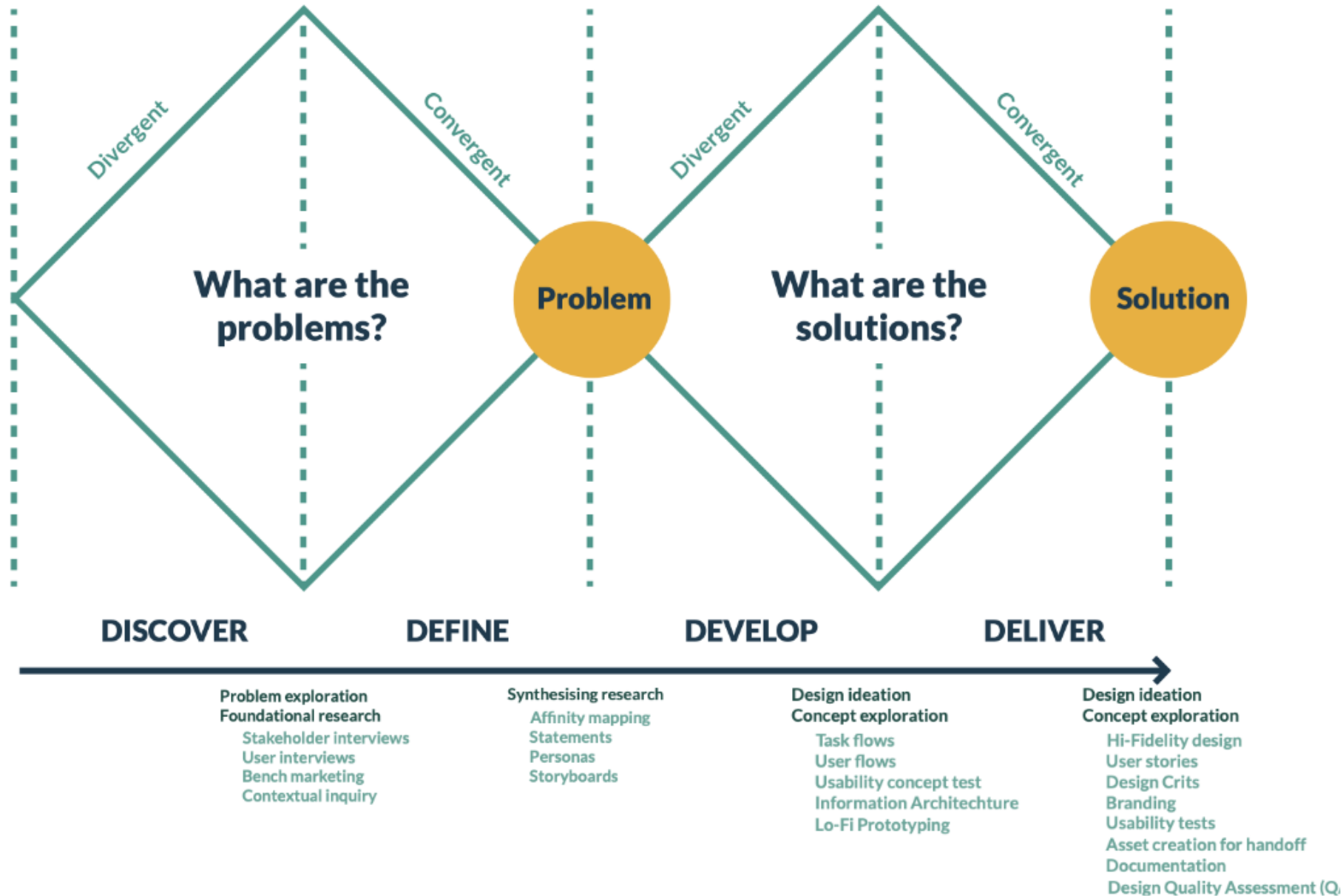
**DST**  
**Agriculture** (grapes/wine, olives/olive oil, durum wheat/pasta)


**Data portal**  
**Journalists, communicators**

**Information platform**  
**Re-insurance, general public**

**Information platform**  
**Academia**

# Human Centered Design

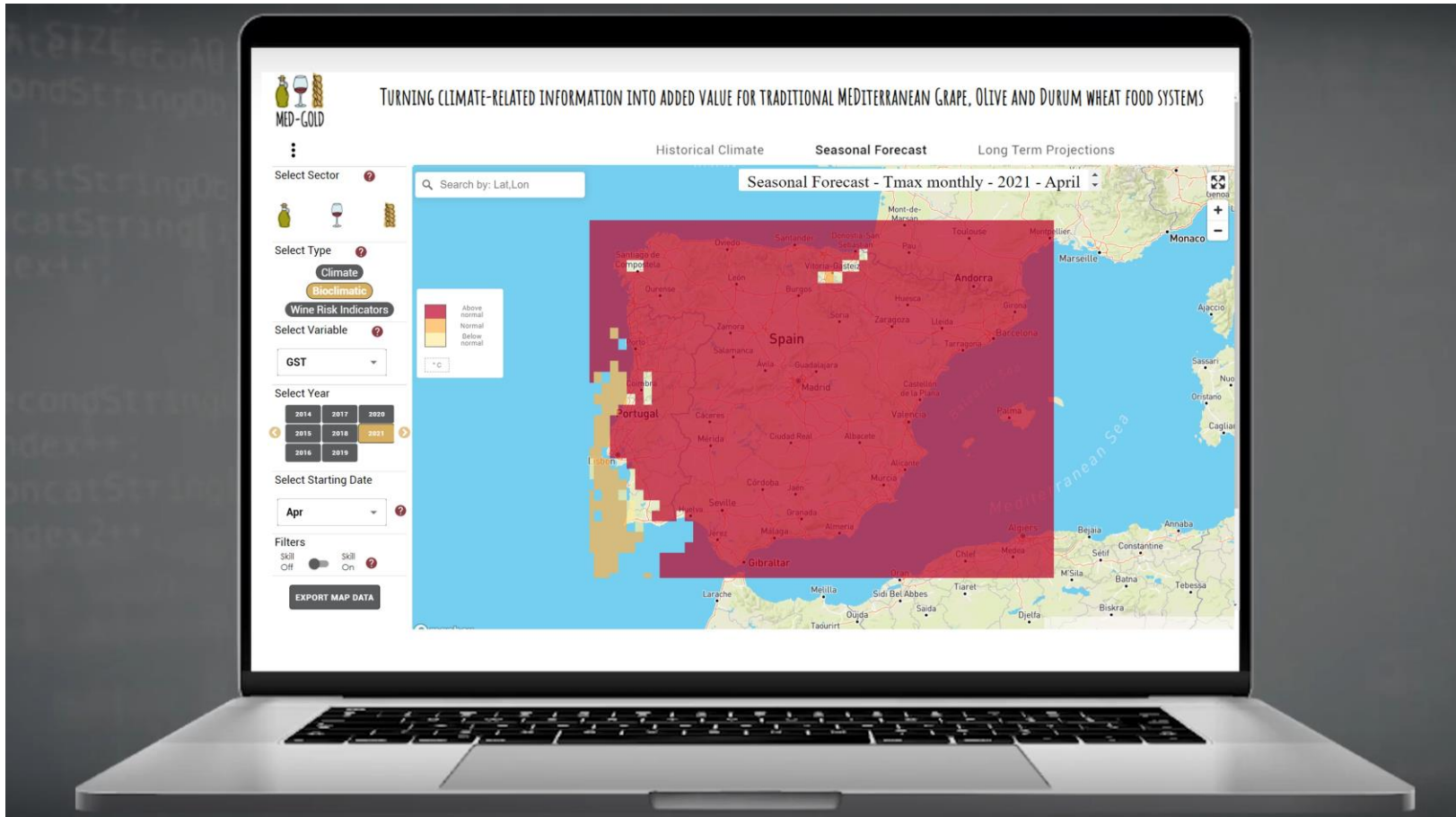




*MED-GOLD Dashboard*: decision support tool for the agri-food sector in the Mediterranean

# MED-GOLD Dashboard

## Decision support tool – agriculture



**MED-GOLD DASHBOARD for wine sector users**

**WINE SECTOR & CLIMATE CHANGE FOR THE WINE SECTOR**  
Grape and wine production is heavily affected by weather and climate change is causing extreme events, heatwaves and droughts have become a big challenge for years for grape growers and producers. As the climate continues to change in the future, anticipatory events is key for the adaptation wine sector.

**MED-GOLD DASHBOARD FOR THE OLIVE SECTOR**  
The MED-GOLD dashboard is an easy-to-use visualization tool for the olive sector, which provides access to information on past climate and predictions of future climate at different time scales. The tool has been co-developed with users to ensure that it addresses their needs and expectations.

**MED-GOLD DASHBOARD for olive sector users**

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**MED-GOLD DASHBOARD for durum wheat sector users**

**WHEAT SECTOR & CLIMATE CHANGE FOR THE DURUM WHEAT SECTOR**  
Durum wheat and pasta production are highly affected by weather and climate conditions. Climate change is increasing the incidence of extreme weather events, such as heatwaves and droughts. As the climate continues to change in the future, anticipatory events is key for the adaptation of the durum wheat sector.

**ABOUT MED-GOLD**  
MED-GOLD is a 4-year European project on "Turning climate-related information into added value for traditional Mediterranean Grape, Olive and Durum wheat food systems". MED-GOLD aims to make European agriculture and food systems more resilient, sustainable and efficient in the face of climate change by using climate services to minimize climate-driven risks and costs.

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Terrado et al. (2023) Co-production pathway of an end-to-end climate service for improved decision-making in the wine sector. *Clim. Serv.*

# MED-GOLD Dashboard

## *Decision support tool – agriculture*

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Spring rain and temperature: increase in the risk of fungal diseases

### Challenge



### Related user decisions



### USE CASE

You are a viticulturist.  
It's March and you need to decide how much stock of plant protection products to buy this season.  
Rainy and warm springs can favor pest outbreaks in vines.

Is this spring going to be particularly dry or wet?



# MED-GOLD Dashboard

## Decision support tool – agriculture

TURNING CLIMATE-RELATED INFORMATION INTO ADDED VALUE FOR TRADITIONAL MEDITERRANEAN GRAPE, OLIVE AND DURUM WHEAT FOOD SYSTEMS

Historical Climate | **Seasonal Forecast** | Long Term Projections

Search by: Lat, Lon | Seasonal Forecast - SprR - 2021

Select Type: Climate, Bioclimatic, Wine Risk Indicators

Select Region: Iberian Peninsula

Select Variable: SprR

Select Year: 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021

Forecast made in: Mar

Filters: Skill On

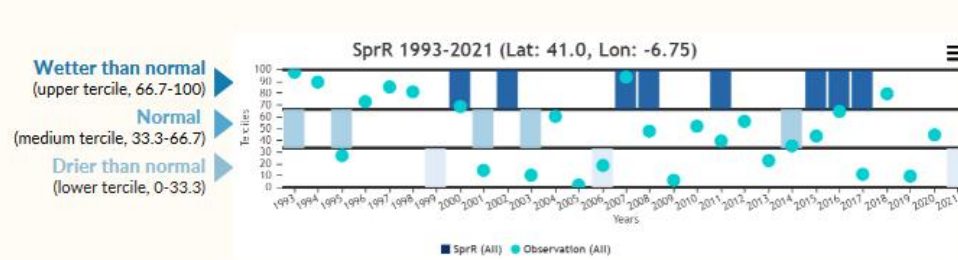
EXPORT MAP DATA

### RISK OF PESTS & DISEASES?

To better assess the risk of pests and diseases, you can also look at the temperature forecast in "Climate" variables alongside the spring rain information.

### HOW ACCURATE IS THE PREDICTION?

Turn on the "Skill" filter option to hide areas where the prediction is not reliable enough for decision-making.



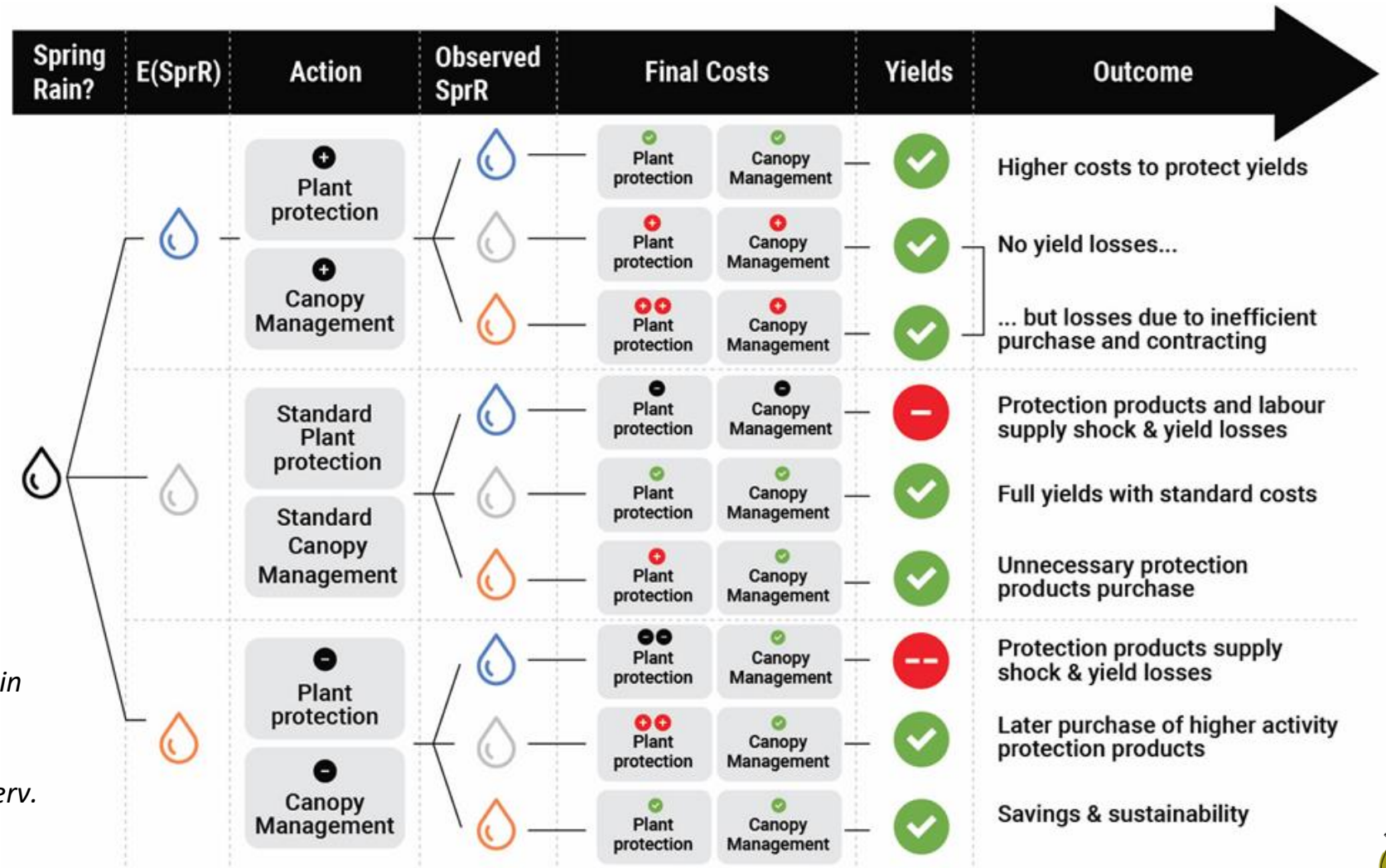
### HOW WELL WAS SPRING RAIN PREDICTED IN THE PAST?

By clicking on the map, a chart will appear where circles correspond to values of spring rain observed in past years, and squares show model predictions (above normal, normal and below normal terciles).

# MED-GOLD Dashboard

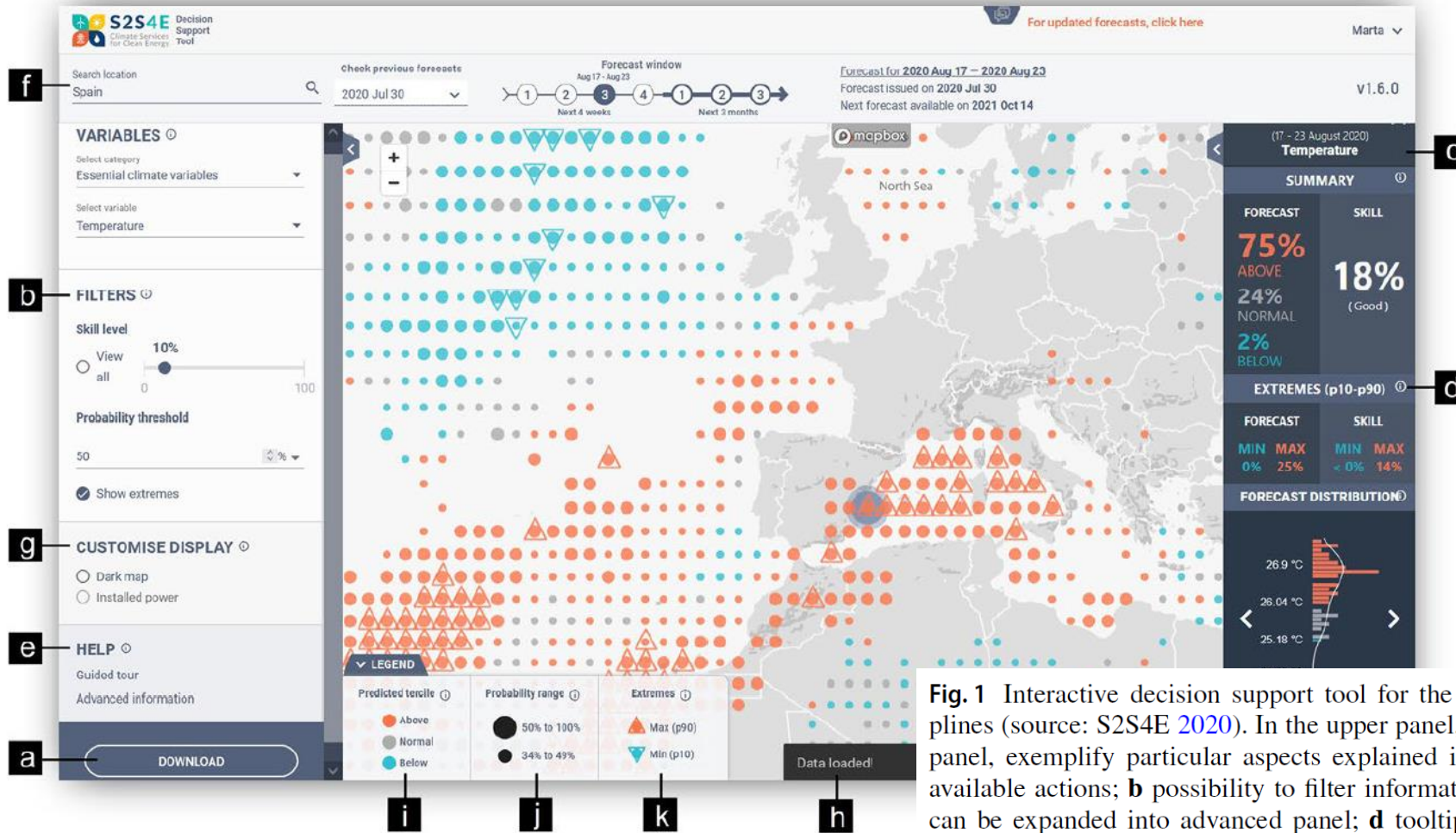
## Decision support tool – agriculture

### Value assessment



Vigo et al. (2023) Managing Spring rain risks in vineyards: A user-centred approach to identify climate decision triggers in seasonal forecasts. *Clim. Serv.*

# Developing effective visualisations: lessons from other fields



*Terrado et al. (2022) Towards more effective visualisations in climate services: good practices and recommendations. Climatic Change.*

**Fig. 1** Interactive decision support tool for the energy sector that considers aspects from different disciplines (source: S2S4E 2020). In the upper panel, highlighted features that are further expanded in the lower panel, exemplify particular aspects explained in the paper. *User experience aspects*: **a** button reflecting available actions; **b** possibility to filter information for skill, probabilities and extremes; **c** basic panel that can be expanded into advanced panel; **d** tooltips and hyperlinks; **e** help documentation section; **f** search location; **g** customisation options; **h** feedback of system status. *Visualisation design aspects*: **g** use of intuitive patterns and conventions, **i** and **j** glyph map variables' representation (e.g. temperature, precipitation) with circles of changing size and colour and use of contrasting colour hues in a dynamic legend. *Graphic design aspects*: **i** typography with good readability and use of colour blind-friendly palettes. *Psychology aspects*: **k** use of triangle symbols for extremes to enhance attention, **i** simple visual encoding

# Towards multi-application tools

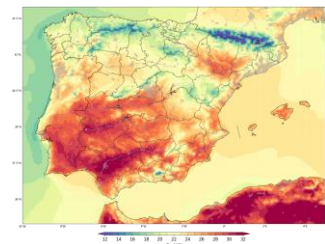
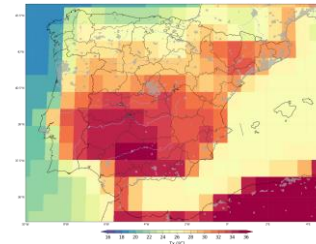
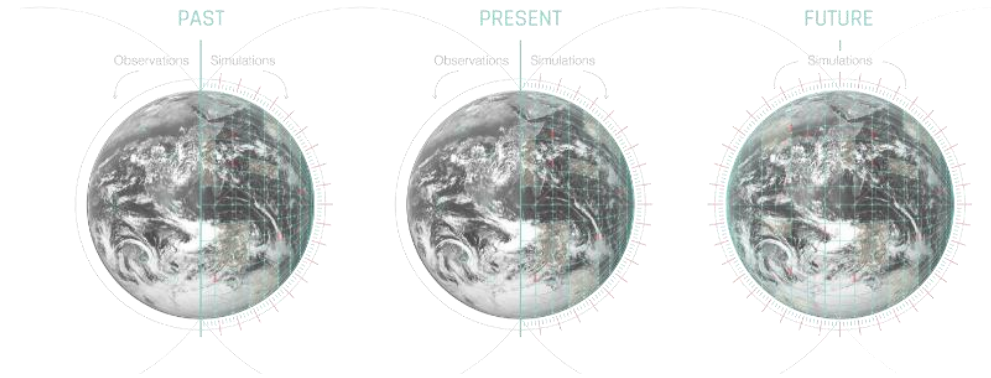


Seamless climate information



Higher resolution for local adaptation

*Guentchev et al. (2023) Clim. Serv.*



Daily Tx averaged over JJA for Spain (2020). Source: EC-Earth3, SSP2-4.5 CMIP6 (left); NextGEMS Cycle 2 ICON 5km (ngc2009 / R02B09) (right)

Horizontal scaling

Geographical expansion; uptake by more users

Vertical scaling

Creation of enabling environment (organisational, political)

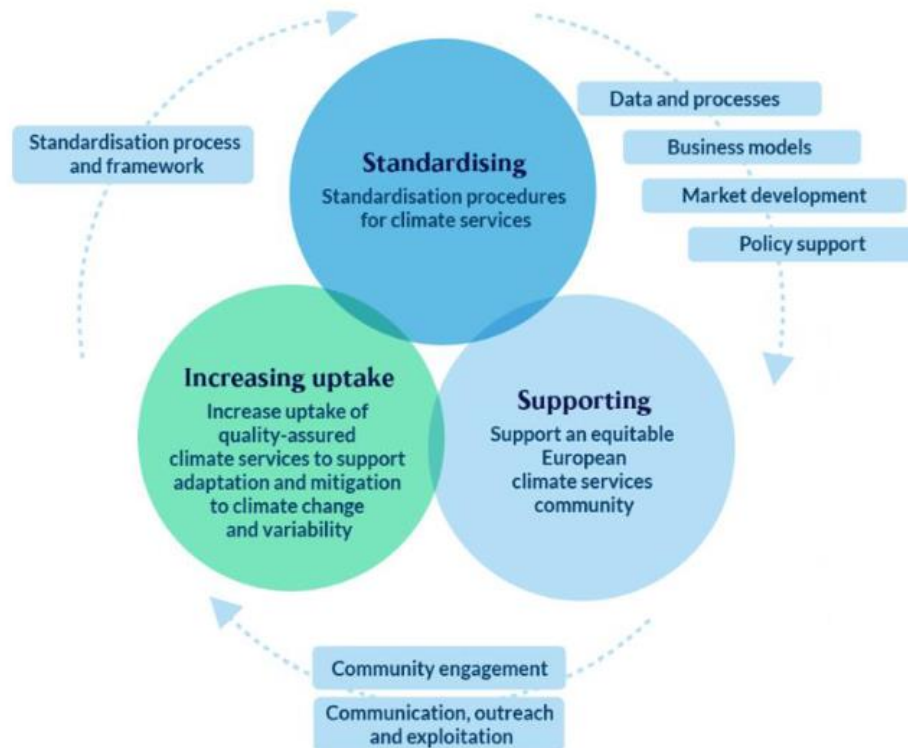
Functional scaling

Addition of new functions and/or elements to the original product

# Towards standardisation of climate services

## Climateurope2

Supporting and standardising climate services in Europe and beyond



Climateurope2 is a Horizon Europe Coordination and Support Action that will run from 2022-2027. The project aims to support and develop the community of climate services in Europe. It also aims to increase the uptake of climate services and their standardisation process. **Climate services** are information and knowledge that can help people and organizations deal with the impacts of climate variability and climate change.

**JOIN OUR NETWORK**

<https://climateurope2.eu>

# Climate services good practices/collaborative platform *community-based platform – climate services community*

**Climateurope2**

Search documents by type, author, name



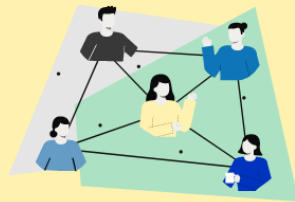
About Actions

## Climateurope2 Platform

We provide an easy access to good practices, recommendations and standardisation processes of climate services, and encourage community engagement and knowledge co-production.

### I want to...

Co-create documents > Explore our library > Check our network >

<p><b>Co-create documents, share knowledge</b></p> 	<p>Our platform offers a unique opportunity for co-creation, allowing you to trigger focused discussions with the wider expert community on climate services and on the standardisation of their components. This will be done through the sharing of early versions of project documents, allowing registered users to collaborate and enable the co-production of knowledge, aligning with open science practices, thus accelerating the consensus process.</p> <p><a href="#">Discover more &gt;</a></p>
<p><b>Explore all documents in our library</b></p> 	<p>Whether users are researchers, policymakers, practitioners, or other stakeholders involved in climate services, the platform serves as a valuable knowledge hub, providing access to a wealth of information to support evidence-based decision making and effective climate services implementation.</p> <p><a href="#">Discover more &gt;</a></p>
<p><b>Connect with our network</b></p> 	<p>Build and develop the climate service network across Europe to improve connection, engagement and promotion of European climate service activities.</p> <p><a href="#">Discover more &gt;</a></p>

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# Thank you!

**Climateurope2**



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