



The Copernicus Climate Change service –C3S–

**DG GROW and
ECMWF teams**

Brussels, September 29, 2016

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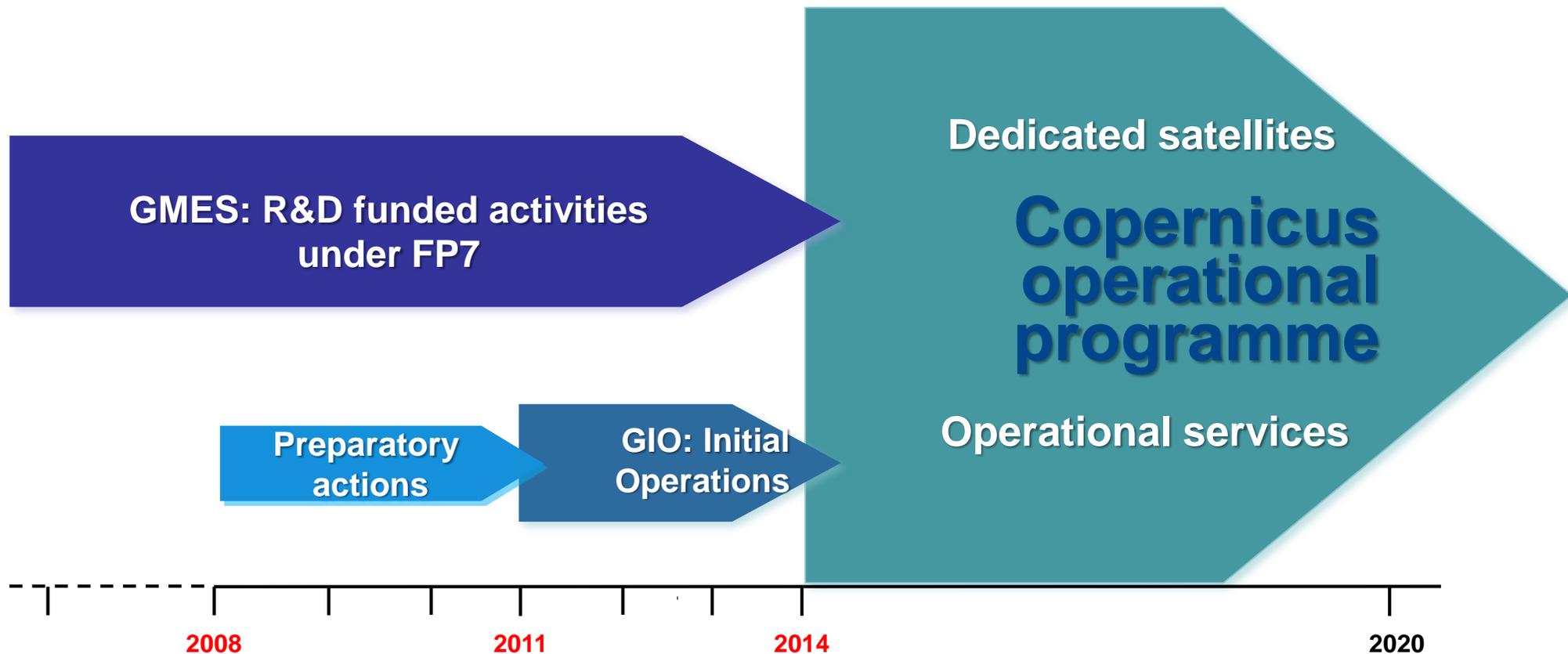
Space



 **Copernicus**
Europe's eyes on Earth



- ❑ **The Copernicus programme** is a cornerstone of the European Union's efforts **to monitor the Earth** and its many ecosystems, whilst ensuring that its citizens are prepared and protected in the face of **crises** and **natural or man-made disasters**.
- ❑ The Copernicus programme places a world of insight about our planet at the disposal of citizens, public authorities and policy makers, scientists, entrepreneurs and businesses on **a full, free and open basis**.
- ❑ The Copernicus Programme is a tool for **economic development** and a driver for **digital economy**.



€ 1.3 Bn



€ 4.3 Bn

Copernicus Space Component



S1: Radar Mission



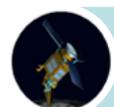
S2: High Resolution Optical Mission



S3: Medium Resolution Imaging and Altimetry Mission



S4: Geostationary Atmospheric Chemistry Mission



S5P: Low Earth Orbit Atmospheric Chemistry Precursor Mission



S5: Low Earth Orbit Atmospheric Chemistry Mission



S6 (Jason-CS): Altimetry Mission

FIRST LAUNCHES
-1A: 3.04.2014
-1B: 22.04.2016

FIRST LAUNCH
-2A: 23.06.2015

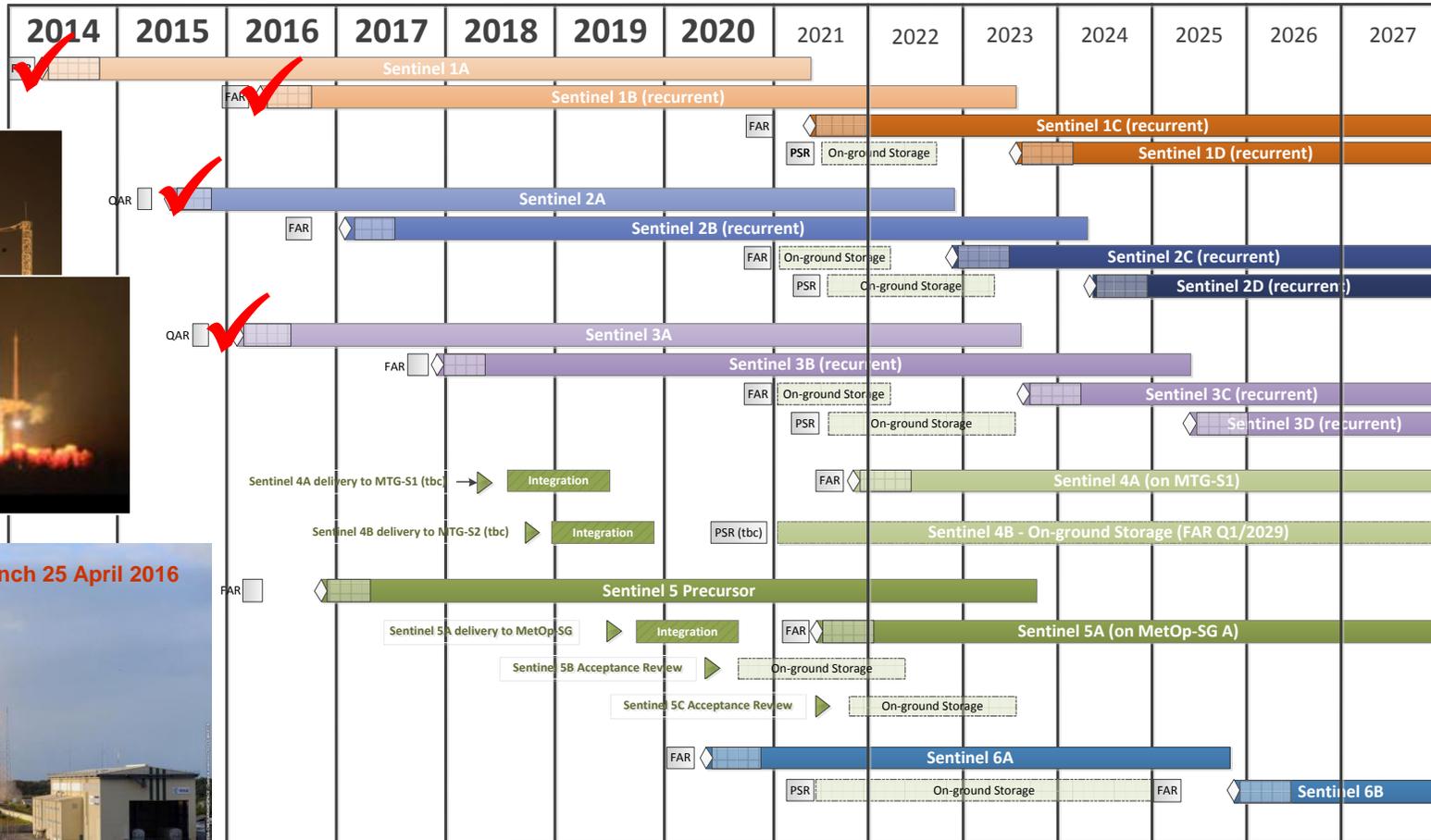
FIRST LAUNCH
-3A: 16.02.2016

2016

Continuity until 2030



Copernicus Constellation Deployment Schedule



Legend:

□ Validation Acceptance Review (QAR)
 □ Flight Acceptance Review (FAR) or
 PreStorage Review (PSR)

▭ On-ground Storage

◇ Tentative launch date

▭ In-orbit Commissioning

Status: 22 March 2016

6 operational Services



Monitoring the State of the Earth System Environment

...

Copernicus Land Monitoring Service

✓ ✓

Copernicus Europe's eyes on Earth

This cover features a green background with two red checkmarks and an aerial photograph of a patchwork agricultural landscape.

Copernicus Marine Environment Monitoring Service

✓

Copernicus Europe's eyes on Earth

This cover has a blue background with a red checkmark and an underwater scene showing a school of fish.

ECMWF Copernicus Climate Change Service

Copernicus Europe's eyes on Earth

This cover is dark red with a photograph of icebergs in the ocean.

ECMWF Copernicus Atmosphere Monitoring Service

✓

Copernicus Europe's eyes on Earth

This cover is light blue with a red checkmark and a photograph of white clouds against a blue sky.

Copernicus Emergency Management Service

Mapping Component
Early Warning Component

✓

Copernicus Europe's eyes on Earth

This cover is orange with a red checkmark and a photograph of a volcanic eruption.

Copernicus Security Service

✓ ✓

Copernicus Europe's eyes on Earth

This cover is teal with two red checkmarks and a photograph of a helicopter and a ship on the water.

... cross-cutting Thematic Services

✓ = operational



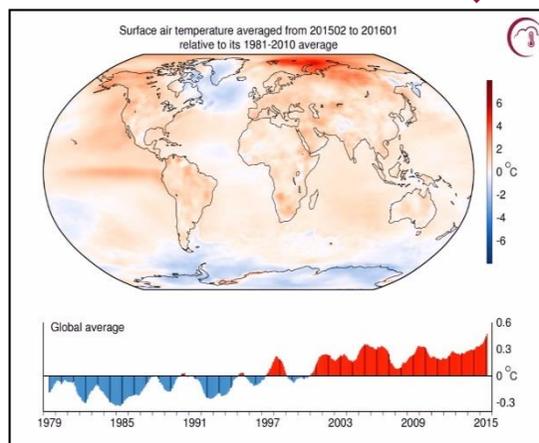
Copernicus regulation (EU) 377/2014:

"the Climate Change service shall provide information to increase the knowledge base to support **adaptation and mitigation policies**. It shall in particular contribute to the **provision of Essential Climate Variables (ECVs), climate analyses, projections and indicators** at temporal and spatial scales relevant to adaptation and mitigation strategies for various Union's sectoral and societal benefit areas."

To monitor and to analyse the Earth System to build a global picture and provide the data, tools and products needed by policy makers, societal and economic sectors to mitigate and adapt to a changing climate.



C3S data provide the evidence and provide key indicators of climate change.



The data captured, analysed and tailored by C3S helps sectors affected to identify the risks, to adapt and identify business opportunities.



to be an authoritative source of climate information for Europe

**How is the
climate
changing?**

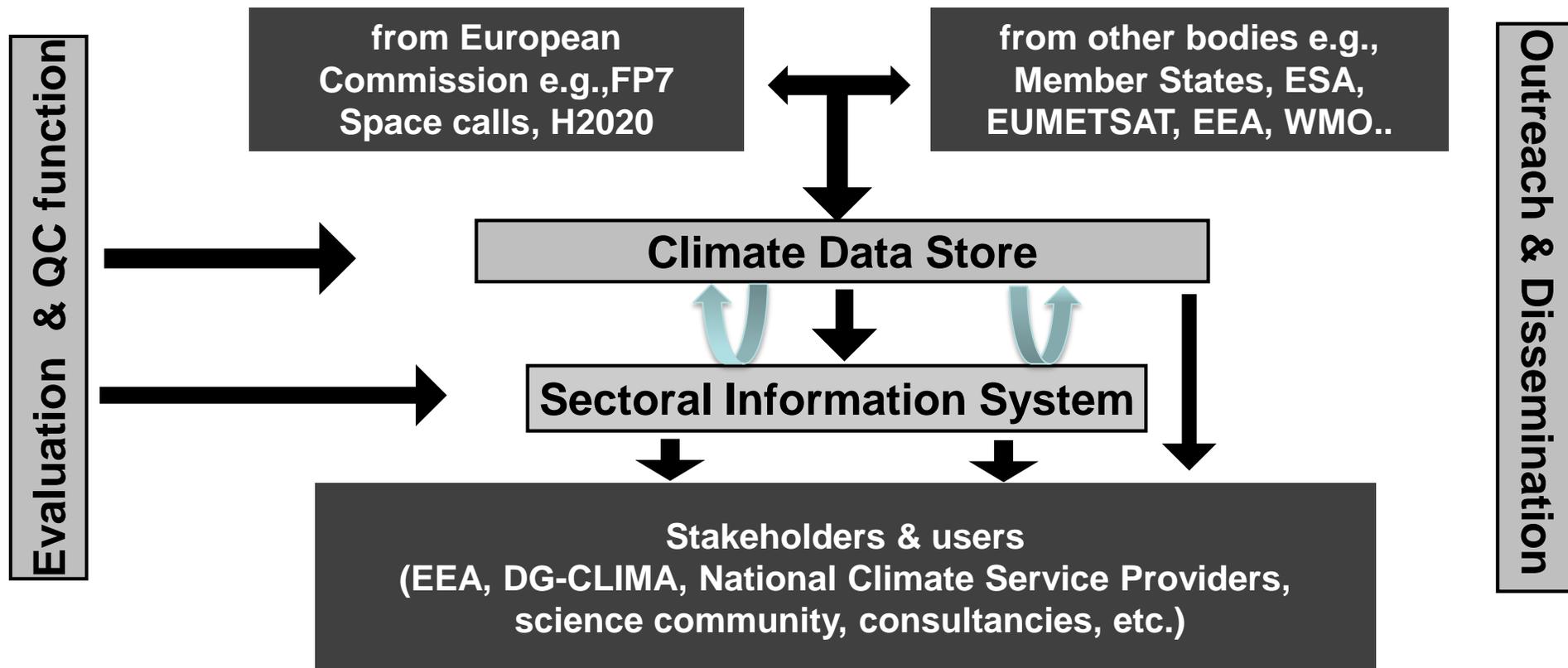
*Observations &
Re-analysis*

**What is the
rate of change?**

*Forecasts &
Projections*

**What are the
societal impacts?**

*Climate indicators &
Sectoral information*



Climate Data Store

Sectoral Information System

Evaluation and Quality Control

Outreach and Dissemination

- ECVs past, present and future
- Observed, reanalysed and simulated
- Derived climate indicators
- Tools to support adaptation and mitigation at global and European level

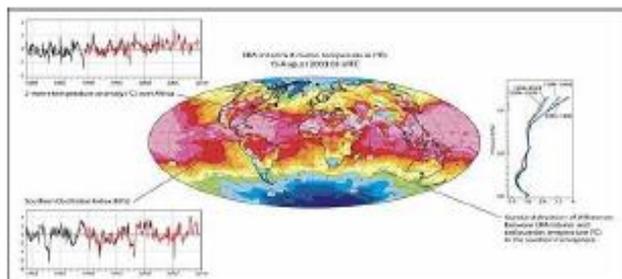


- Monitors quality of C3S products and services
- Ensures C3S delivers state-of-the-art climate information to end-users
- Identifies gaps in service provision
- Bridges Copernicus with the research agenda in Europe (e.g. H2020, national research projects)

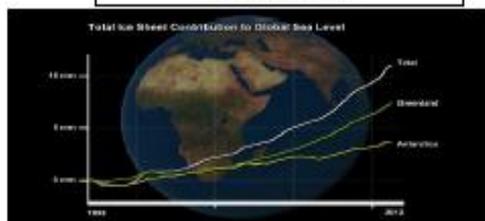
- Web content
- Public outreach
- Coordination with national outreach
- Liaison with public authorities
- Conferences, seminars
- Training and education

Series of ECV datasets and climate indicators

- Observed, reanalysed and simulated
- Relevant to support adaptation/mitigation policies at European level and wider



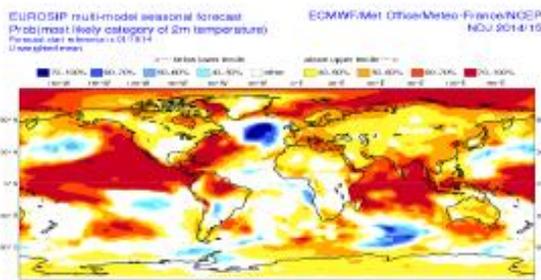
Reanalyses



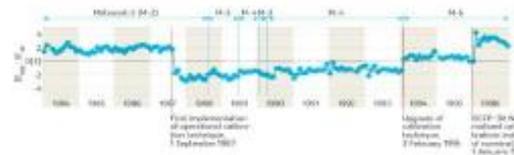
Other ECV datasets



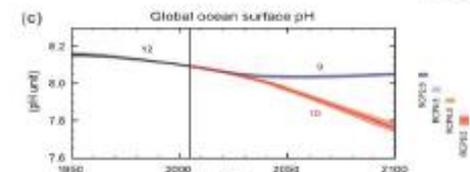
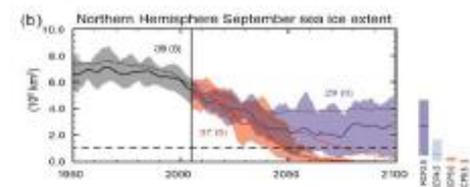
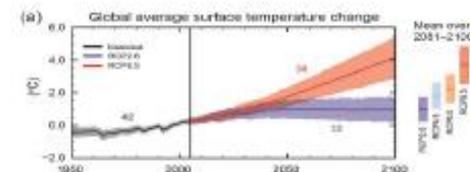
Data collection and data rescue



Multi model seasonal forecast products



Data reprocessing



Climate projections



Consistent Climate Data Store - ~ 20 ECVs & indicators - Observed, re-analyzed and model projected products

ATMOSPHERE

- Surface Air Temperature
- Surface Precipitation
- Water Vapor
- Surface Radiation Budget
- Earth Radiation Budget
- Carbon Dioxide & Methane
- Ozone & Aerosols
- Cloud properties
- Wind Speed & Direction

OCEAN

- Ocean Color
- Sea Ice
- Sea Level
- Sea Surface Temperature
- Global Ocean Heat Content

LAND

- Snow Cover
- Glaciers & Ice Caps
- Albedo
- FAPAR
- Fire Disturbances
- Ice Sheets

Sectoral Information System – 6-8 sectors

Agriculture and forestry

Health

Energy

Infrastructure

Insurance

Coastal areas

Water management

Tourism



Consistent Climate Data Store - ~ 33 ECVs & indicators - Observed, re-analyzed and model projected products

ATMOSPHERE

Surface Air Temperature
Surface Precipitation
Water Vapor
Surface Radiation Budget
Earth Radiation Budget
Carbon Dioxide & Methane
Ozone & Aerosols
Cloud properties
Wind Speed & Direction
Upper Air Temperature
Other Long-Lived GHGs

OCEAN

Ocean Color
Sea Ice
Sea Level
Sea Surface Temperature
Global Ocean Heat Content
CO₂ partial pressure
Ocean Current
Sea Surface Salinity
Current Salinity

LAND

Snow Cover
Glaciers & Ice Caps
Albedo
FAPAR
Fire Disturbances
Ice Sheets
Lakes
Permafrost
Land Cover
Leaf Area Index
Soil Moisture

Sectoral Information System – ~ 8-10 sectors

Agriculture and forestry

Health

Energy

Infrastructure

Insurance

Coastal areas

Water management

Tourism

Biodiversity

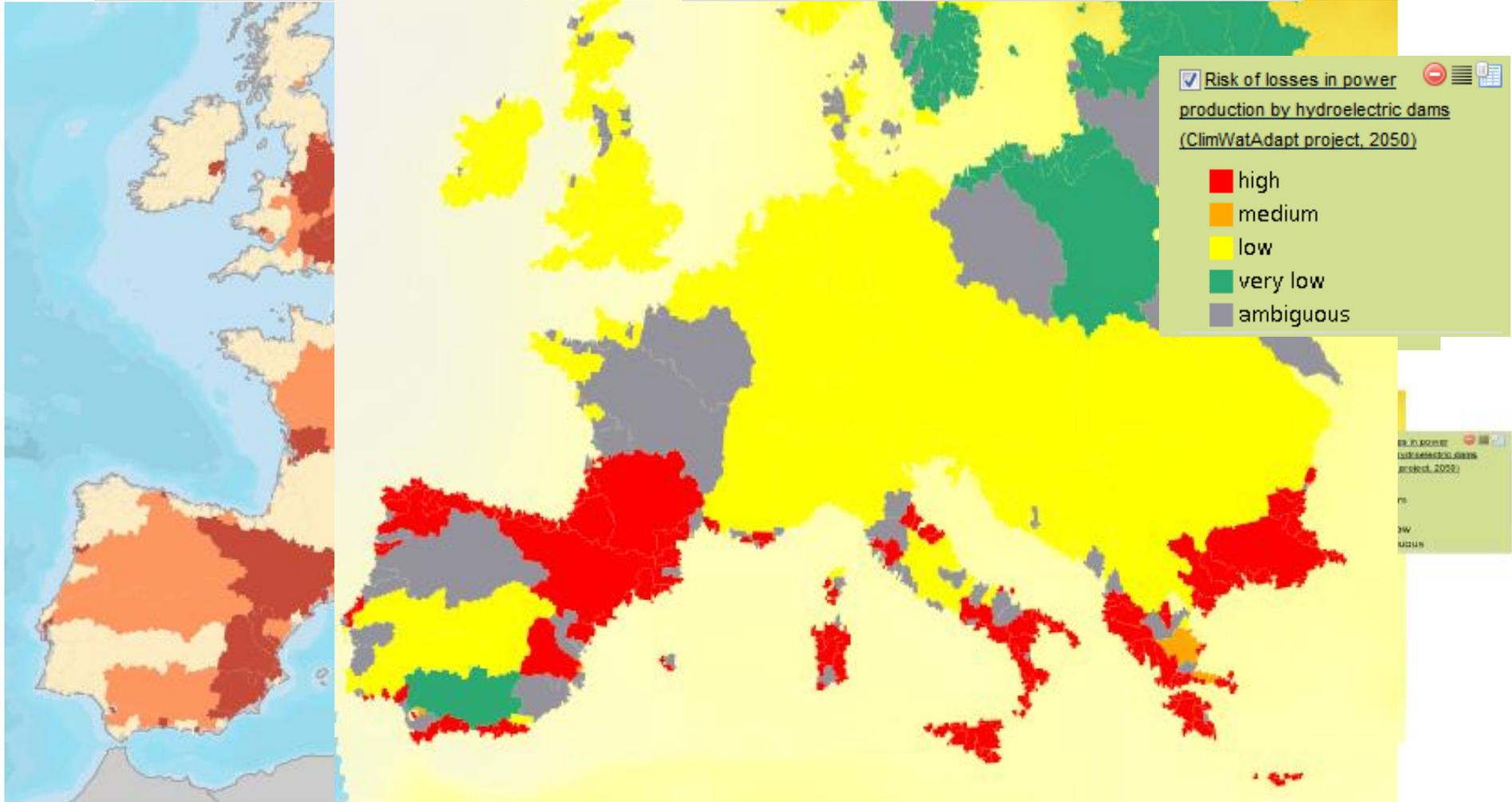
Disaster risk reduction

Marine and fisheries

Transportation

Water management

Energy

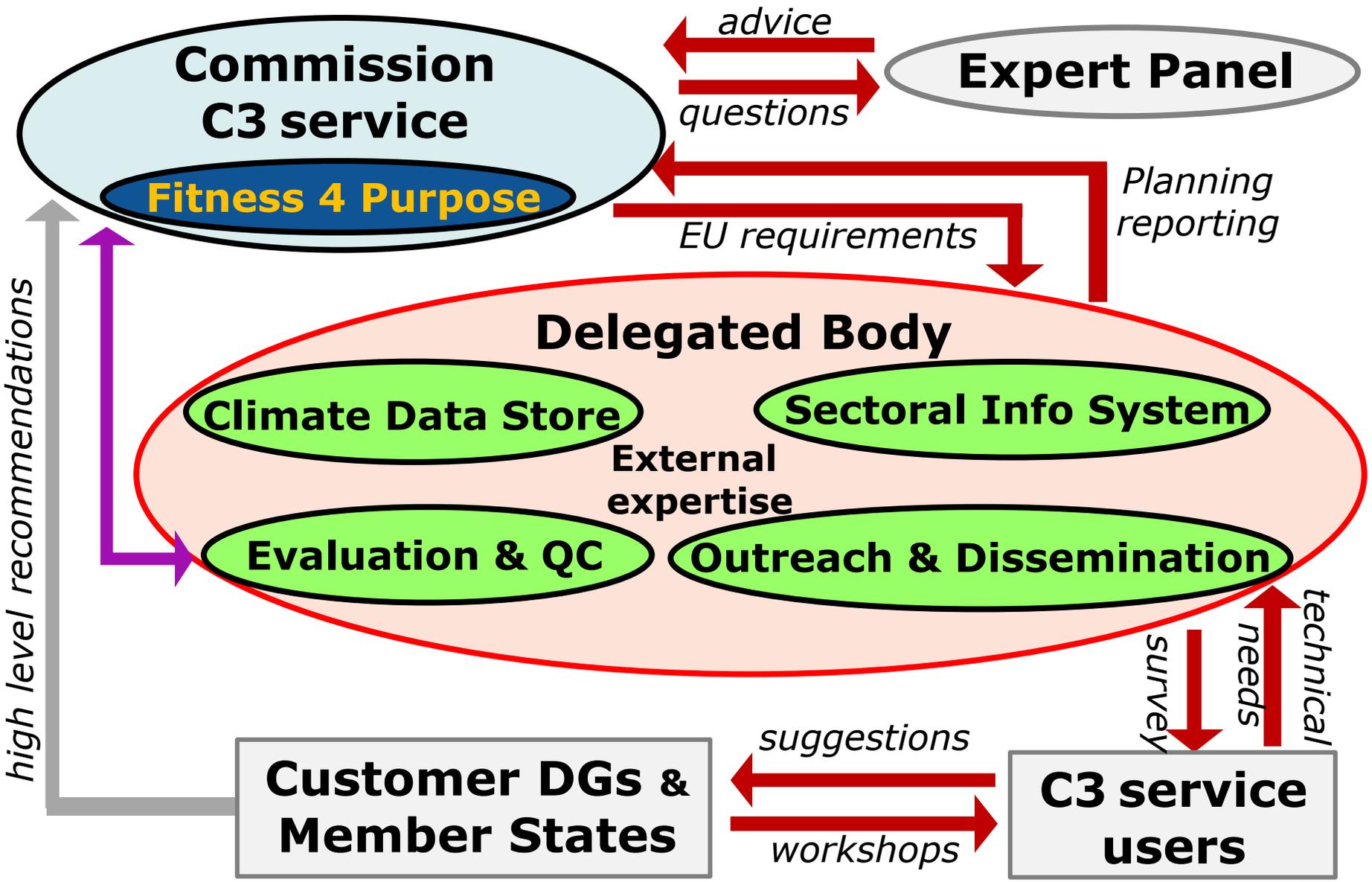




Stage 0/1 - Proof of Concept/Pre-operational
Stage II - Operational ~20 ECVs, ~5-6 Sectors
Stage III - Operational ~30 ECVs, ~10 Sectors



Copernicus Climate Change Service – C3S



- ❑ 2016/17: **Mid-term evaluation** of the Copernicus programme
 - to demonstrate value for money of the C3S service and the entire programme.

- ❑ 2018-20: **New MFF** for 2021-2027(?)
 - to establish Copernicus budget for next MFF (competing programmes, political uncertainties)

- ❑ 2018-20: **New Copernicus Regulation** for 2021-2027
 - to decide on programme evolution (governance, services, space component, ...)



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