



Copernicus

Overview and evolution

Andreas Veispak
Head of Unit

European Commission – Space Data for Societal Challenges & Growth
Copernicus Training and Information Session in Sevilla, 4 October 2018



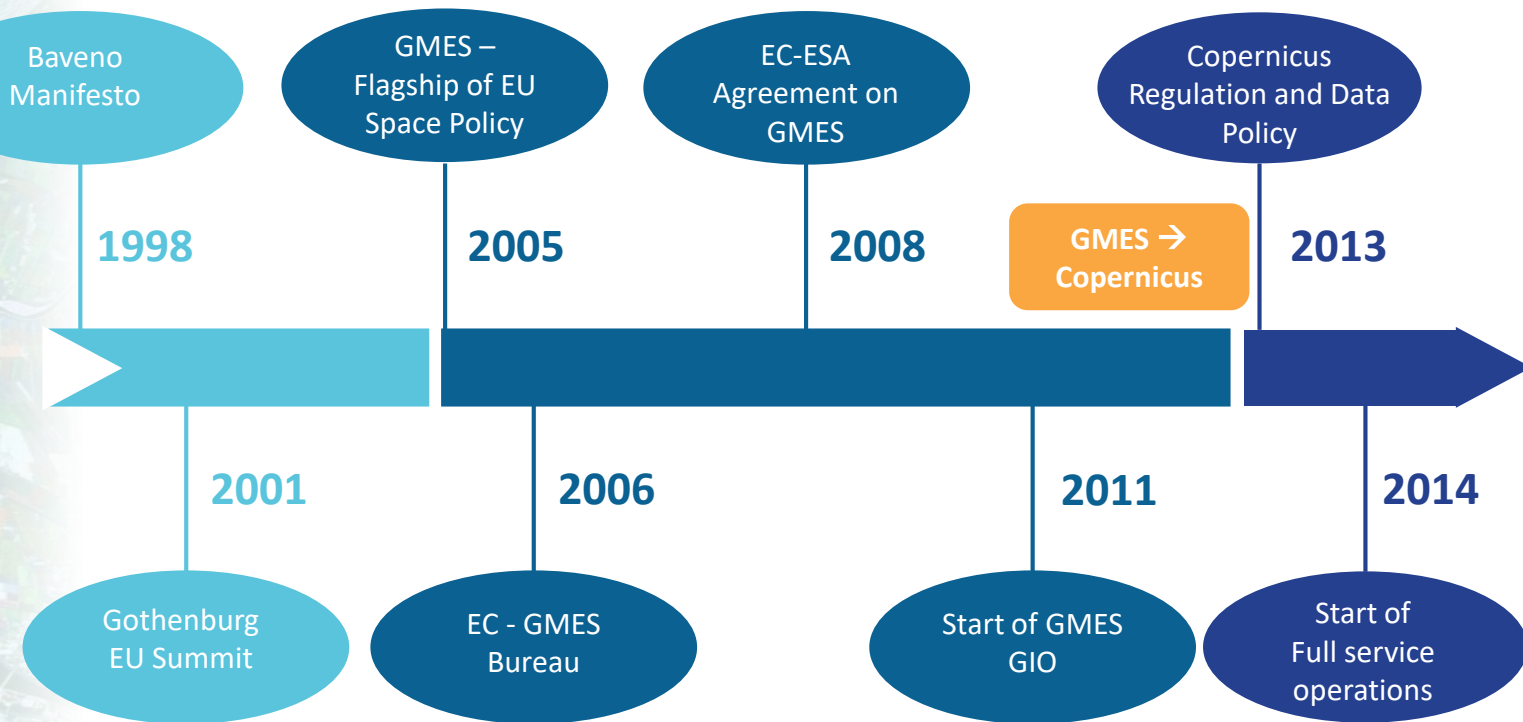
C O P E R N I C U S I N B R I E F

- **Copernicus is a flagship programme** of the European Union:
 - Monitors **the Earth**, its environment and ecosystems
 - Prepares for **crises, security risks** and **natural or man-made disasters**
 - Contributes to the **EU's role as a global soft power**
- a **full, free and open data policy**
- Is a tool for **economic development** and a driver for the **digital economy**



Copernicus

COPERNICUS HISTORY

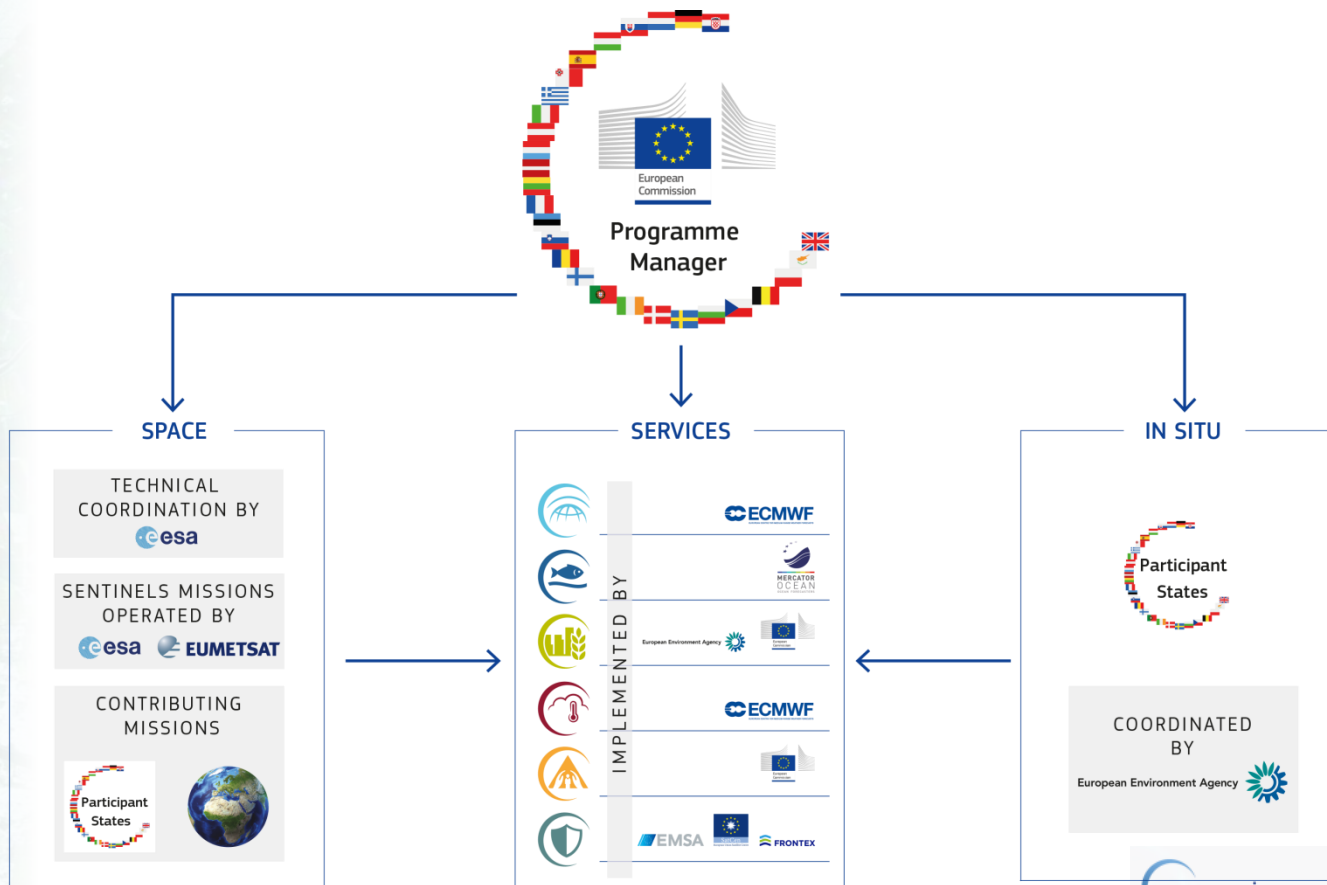


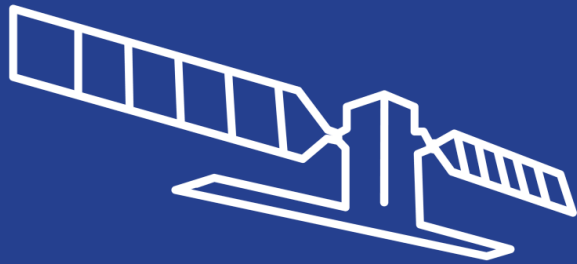
GIO = GMES Initial Operation



Copernicus

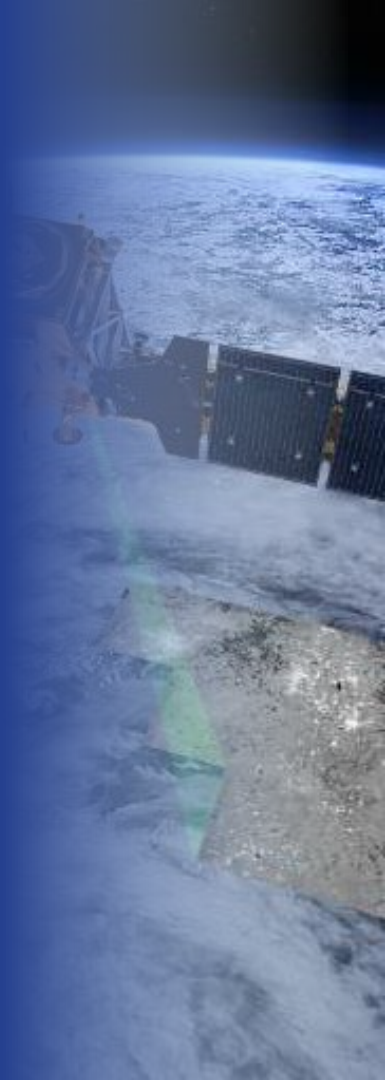
COPERNICUS GOVERNANCE





Space Component

Copernicus Space Component





Space
Component

THE SENTINELS



SENTINEL-1:
4-40m resolution, 3 day revisit at equator

***S1A and 1B
in orbit***



SENTINEL-2:
10-60m resolution, 5 days revisit time

***S2A and 2B
in orbit***



SENTINEL-3:
300-1200m resolution, <2 days revisit

***S3A and S3B
in orbit***



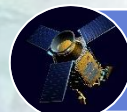
SENTINEL-4:
8km resolution, 60 min revisit time

***1st Launch
2020***



SENTINEL-5p:
7-68km resolution, 1 day revisit

S5P in orbit



SENTINEL-5:
7.5-50km resolution, 1 day revisit

***1st Launch
2021***



SENTINEL-6:
10 day revisit time

***1st Launch
2020***

Key Features

Polar-orbiting, all-weather,
day-and-night radar imaging

Polar-orbiting, multispectral
optical, high-resolution imaging

Optical and altimeter mission
monitoring sea and land parameters

Payload for atmosphere
chemistry monitoring on MTG-S

Mission to reduce data gaps
between Envisat, and Sentinel 5

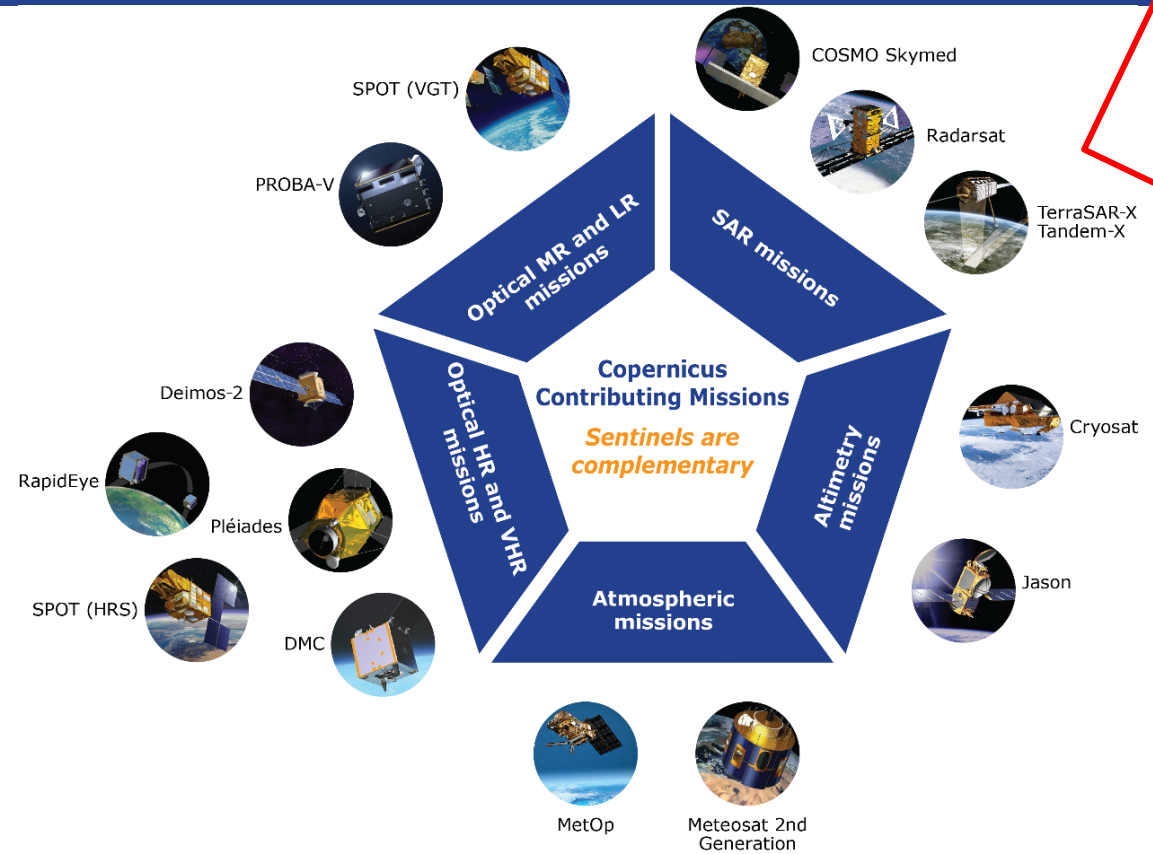
Payload for atmosphere chemistry
monitoring on MetOp 2ndGen

Radar altimeter to measure sea-
surface height globally



Space
Component

THE CONTRIBUTING MISSIONS



Subject to Data
Owner's Data
Policy



In situ

Copernicus In situ Component





In situ

IN - SITU : OVERVIEW

- *In situ* data = observation data from ground-, sea-, or air-borne sensors, reference and ancillary data licensed for use in Copernicus
- Use of *In situ* data:
 - Validate & calibrate Copernicus products
 - Reliable information services
- Implementation in two tiers:
 - Tailored *in situ* data for each Copernicus service level
 - Cross-cutting coordination across services by the EEA





Copernicus

COPERNICUS SERVICES

*Monitoring the State of the
Earth System Environment ...*



*... Six cross-cutting
Thematic Services*



Land
Monitoring

Benefit areas and products examples

Ecosystems

Biodiversity

Agriculture

Forestry

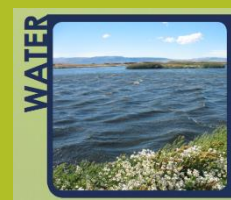
Energy

Natural Resources

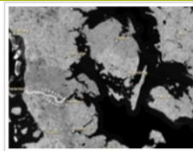
Water

Urban planning

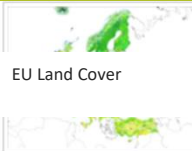
Global



Pan-European



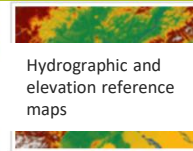
[Image Mosaics](#)



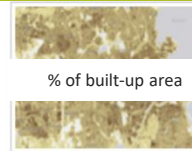
[CORINE Land Cover](#)



[High Resolution Layers](#)



[Reference Data](#)

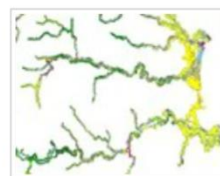


[Related Pan-European products](#)

Local



[Urban Atlas](#)



[Riparian Zones](#)



[Natura 2000 \(N2K\)](#)



Marine
Monitoring

Benefit areas and products examples

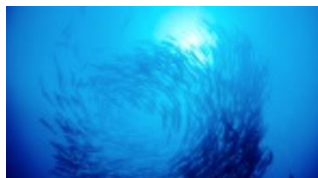
Marine safety

Marine resources

**Coastal and marine
environment**

**Climate and
meteorological
forecasting**

**Other: Transport,
Tourism,
Environment,
Pollution, Energy, etc.**



Sea Level

Ocean Salinity

Ocean Temperature

Sea Ice

Wind

Ocean Currents

Ocean Colour / Biogeochemistry
(e.g. optics, chlorophyll, biology, chemistry)



Atmosphere
Monitoring

Benefit areas and products examples

Health

Air Quality and Atmospheric Composition



Environment

Climate forcing



Pollution

Ozone layer & UV



Climate

Solar radiation



Renewable Energy

Emissions and surface fluxes





Climate
Change

Benefit areas and products examples

Climate change

**Mitigation and
adaptation**

Weather forecast

Pollution

Environment

Health

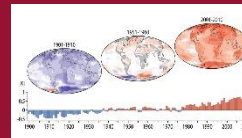
**Consistent Estimates of the
Essential Climate Variables (ECVs)**



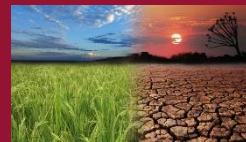
**Adaptation and Support to Mitigation
Strategies**



**Global and Regional
Reanalyses**



**Seasonal Forecasts
And Climate Projections**





Benefit areas and products examples

**Disaster
Emergency
Situations**

**Humanitarian
Crises**



Risk & Recovery Mapping:

- Reference Maps
- Pre-disaster Situation Maps
- Post-disaster Situation Maps

Rapid Mapping:

- Reference Maps
- Delineation Maps
- Grading Maps

Early Warning:

- Floods: EFAS
- Forest Fires: EFFIS

*EFAS = European Flood Awareness System;
EFFIS=European Forest Fire Information System*



Security

Benefit areas and products examples

Border Surveillance

- Coastal monitoring
- Pre-frontier monitoring
- Reference mapping



Maritime Surveillance

- Maritime surveillance of an area of interest
- Vessel detection
- Vessel tracking and reporting
- Vessel anomaly detection



Support to EU External Action

- Road network status assessment
- Conflict damage assessment
- Critical infrastructure analysis
- Reference map
- Support to evacuation plans
- Crisis situation map
- Border map
- Camp analysis





User Uptake

...▶ **Socio-economic benefits of Copernicus**





Copernicus

COPERNICUS ECONOMIC BENEFITS

- Poised to generate significant **socio-economic benefits**
- Driver for **research, innovation** and the creation of **highly skilled jobs**

Key Figures



Cost per
EU citizen =
~€1.07/year



Every **€1** spent
generates
a return of
~€3.2



Min. financial
benefits on
EU GDP =
~€30bn by 2030

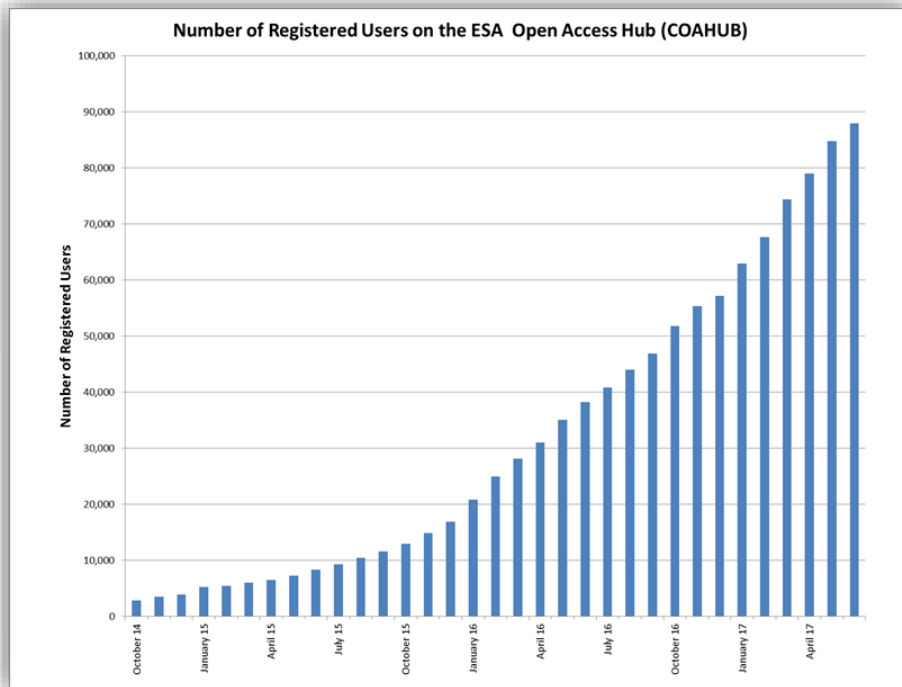


~50.000 jobs
maintained/
created in the
next 15 years



User Uptake

The uptake of Copernicus is very strong



➔ Unprecedented growth in number of Sentinel users

➔ Similar trend in the Copernicus services

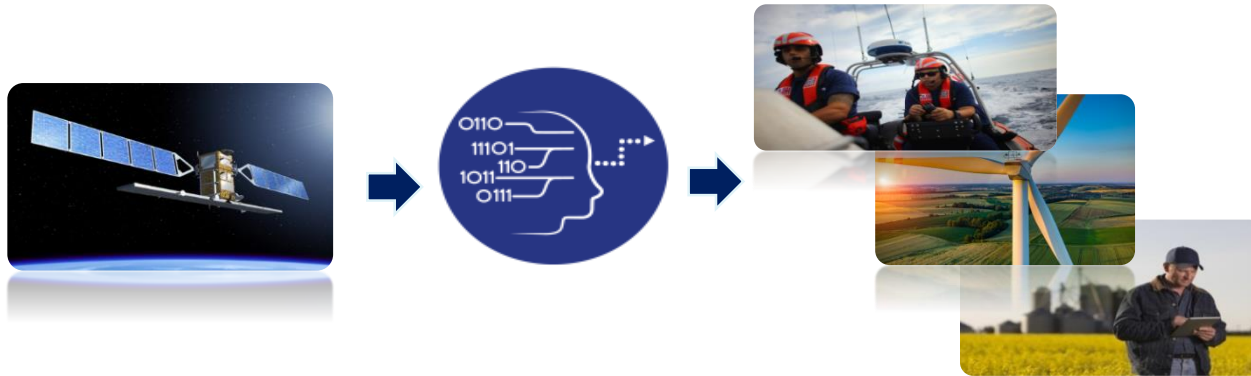


Uptake of Copernicus by Users

Objective: maximizing the socio-economic benefits of Copernicus;

Challenge: geospatial data (including Copernicus) are difficult to use by non-experts;

Strategy: supporting the emerging downstream eco-system, which use Copernicus data and services to create products for non-experts.





User
Uptake

The Commission Strategy

I) Increase **awareness** about Copernicus

II) Facilitate **access** to Copernicus

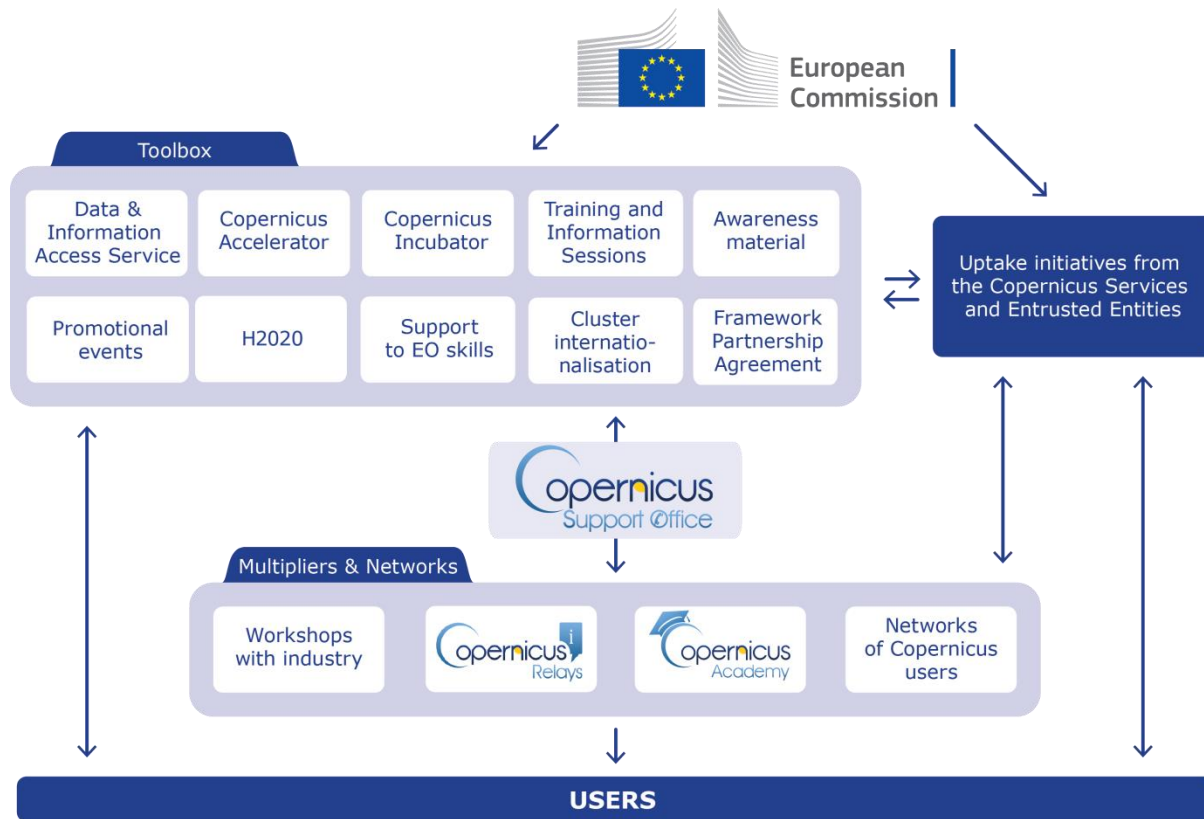
III) Support **downstream** actors (public authorities, businesses and researchers)

Leverage with
actions from
Member States and
Entrusted Entities



User Uptake

Copernicus User Uptake Initiatives



Copernicus Networks

Copernicus Relays

- 80 Relays
- 33 countries
- 4 continents

Copernicus Academy

- 130+ Academy members
 - 34 countries
 - 3 continents



Copernicus Relays

- Reaching end-users in different countries and regions worldwide
- Content localization
- Local and global cooperation
- Support to local users
- Organising promotional events and training

JOIN THE COPERNICUS RELAYS NETWORK !



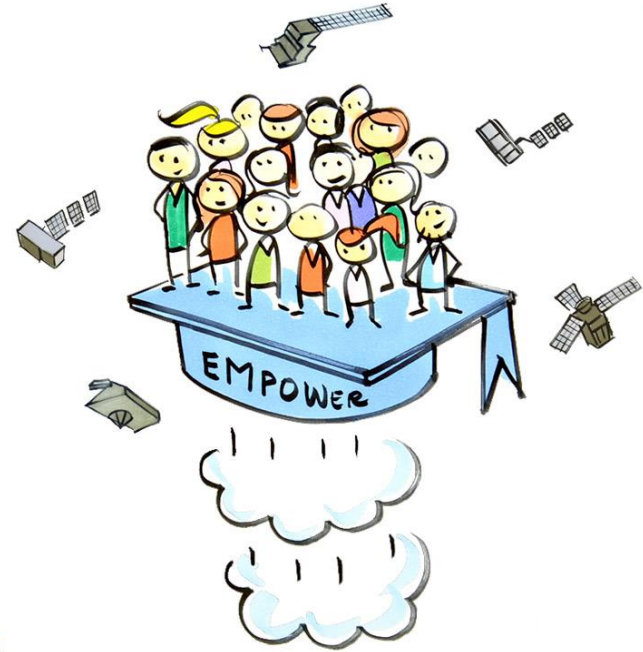
THE MEMBERS OF THIS NETWORK ARE BRIDGES BETWEEN COPERNICUS AND THE END-USERS OF THE PROGRAMME INCLUDING BUSINESSES, START-UPS AND THE EU CITIZENS

α υ ι δ ο ς

Copernicus Academy

- Reaching academic institutions worldwide
- Enabling global Earth Observation research network
- Promoting space in education
- Accelerate research to market link
- Building skills

JOIN THE COPERNICUS ACADEMY



THE MEMBERS OF THIS NETWORK ENSURE THAT SKILLS ARE DEVELOPED TO ENABLE COPERNICUS TO UNLEASH ITS FULL POTENTIAL

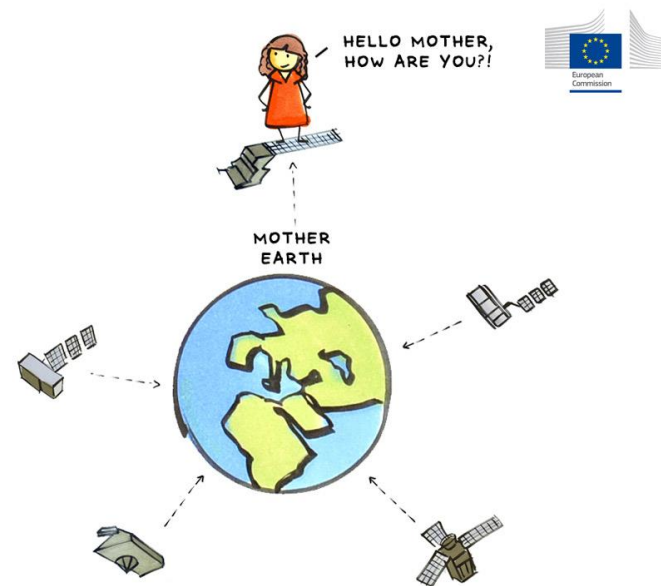
Copernicus Support Office



support@copernicus.eu



Ask on Twitter
@CopernicusEU



Questions about Copernicus?
Ask the Copernicus Support Office team!



SUPPORTS AND MONITORS THE DEVELOPMENT
OF KEY COPERNICUS MARKET DEVELOPMENT
INITIATIVES LAUNCHED BY THE EUROPEAN COMMISSION



Copernicus

Copernicus International Strategy

Objectives:

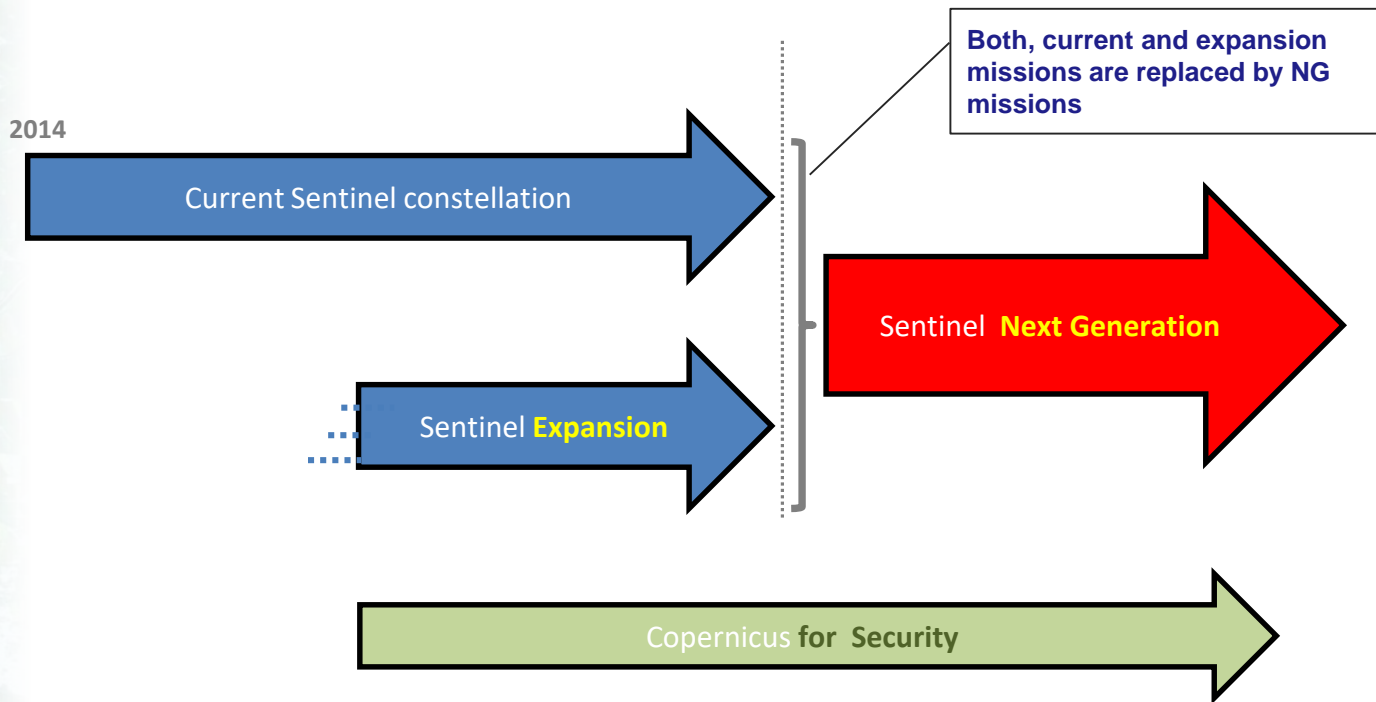
- Maximise the **efficiency of EU investments through cooperation with international partners**
- Promote the **uptake of Copernicus data globally integrating data from international partners** into Copernicus
- Promote **access to international markets for European EO companies**
- Agreements signed with USA, Australia, India, Brazil, Chile, Colombia
- Discussions ongoing with **ASEAN Countries** and **Singapore**





Copernicus

COPERNICUS SPACE COMPONENT EVOLUTION





Copernicus

POLICY NEEDS AND PRIORITIES

- Top priority: Stability of the programme and long term commitment
 - **(Enhanced) continuity** of current data and services;
 - Continuity of **full, open and free data policy** for the environmental domain;
- Additional services will be considered to meet emerging needs
 - Climate change and sustainable development;
 - Monitoring CO₂ and other greenhouse gas emissions;
 - Changes in the Arctic;
 - Land use and forestry;
 - Security: improving the EU's capacity (border controls and maritime surveillance);



Copernicus

ESTABLISH USER NEEDS / REQUIREMENTS

- Copernicus will **continue to be a public service, driven by the needs of policy and public administrations and to foster economic development in Europe**
 - Key Users at European, national, and sub-national level;
 - Intermediate Users, downstream companies, value added services;
 - Help Europe to maintain a prominent role in the international context;
- User needs and priorities have been and are being established through:
 - Link to EU policies and priorities;
 - User Requirements Study;
 - Thematic Workshops dedicated to specific topics;
 - Contacts with Member States;
 - Expert Groups and Task Forces
- User Requirements collected and evaluated by EC and assisted by entrusted entities led to the release of initial Observation Requirements to ESA and EUM in mid-2017
- Refined User Requirements to be finalised by end-2018/ early-2019



Copernicus

RESULTING OBSERVATION PRIORITIES

The (enhanced) continuity of existing observation capacity is the overarching priority;

Conclusions on major gaps :

- CO2 measurements to estimate anthropogenic emissions (**top priority**)
- High-Resolution Thermal observations
- SAR L-band observations
- Monitoring of sea ice and ice sheets in the polar region (PMR Imaging, Altimeter)
- Hyper-spectral measurements

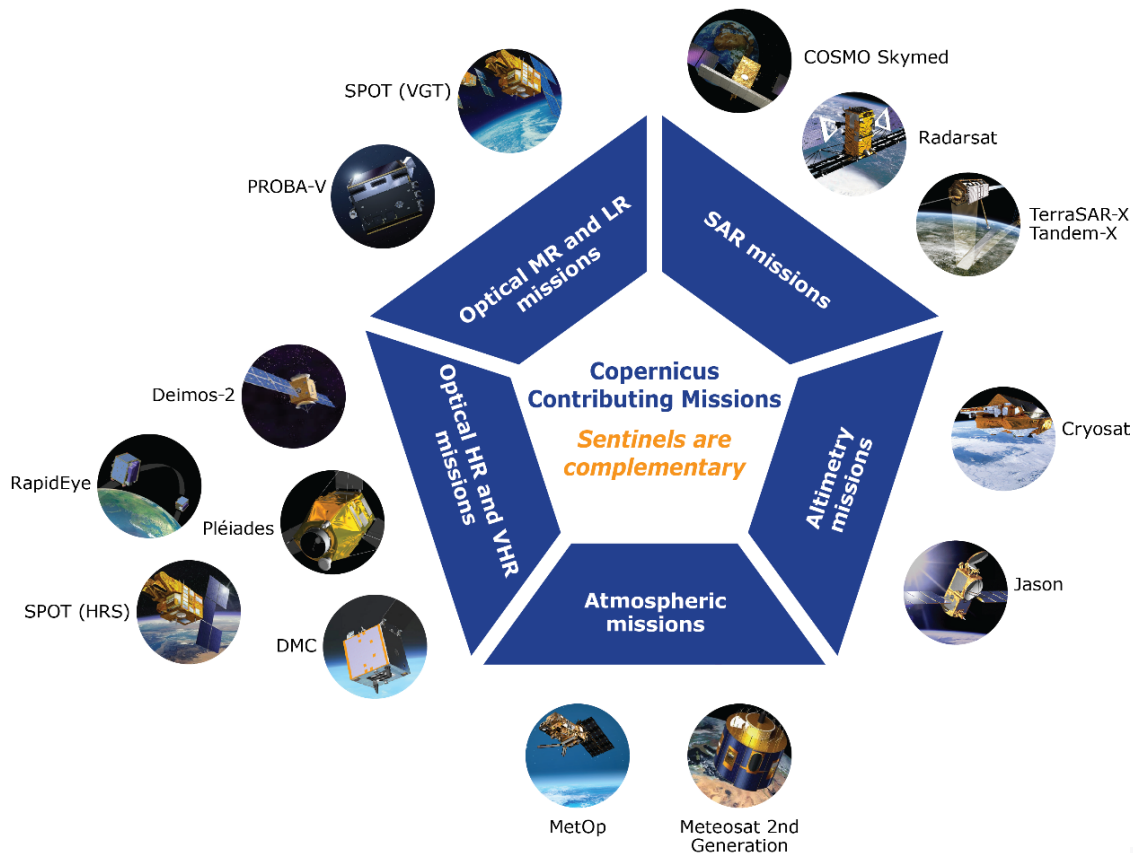
The results of these studies will serve as input to iterate further the LTS but do not present any commitment of the Commission at this stage.

The new EU Space Programme Regulation will frame the implementation of the Copernicus Space Component in the next programme period and spell out the missions to be part of the future programme.



Copernicus

THE CONTRIBUTING MISSIONS



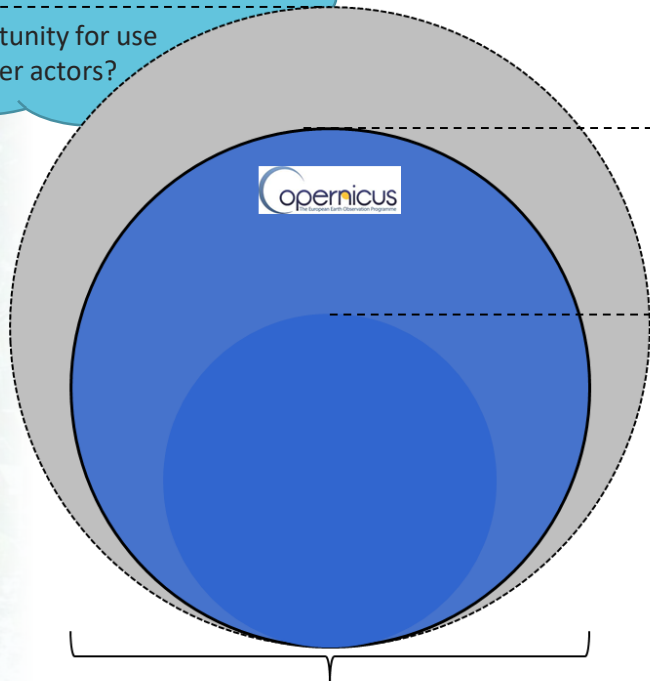


Copernicus

EVOLUTION OF CONTRIBUTING MISSIONS

Commercial services

Opportunity for use by other actors?



EU-led industrial consortia (& Member States)

- Services, Operations, Technology & Innovation
- E2E Service responsibility including supply chain
- Market and technical risk



On-Demand services

- On-Demand Products & Services, fast delivery
- Negotiated prices (minimum-buy option)
- Priority customer (incl. tasking)
- Security and shutter control
- Full, free and open where possible (ΔT)

Baseline services

- Routine Products & Services, timely availability
- Agreed annual fee
- Priority customer
- Security & shutter control
- Full, free and open in principle

Partnership Agreement

- Service Level Agreement
- Annual fee & at-use
- Price catalogue
- Priority customer
- Security (shutter control)
- Licenses/IPR

Value for money



Thank you