Copernicus
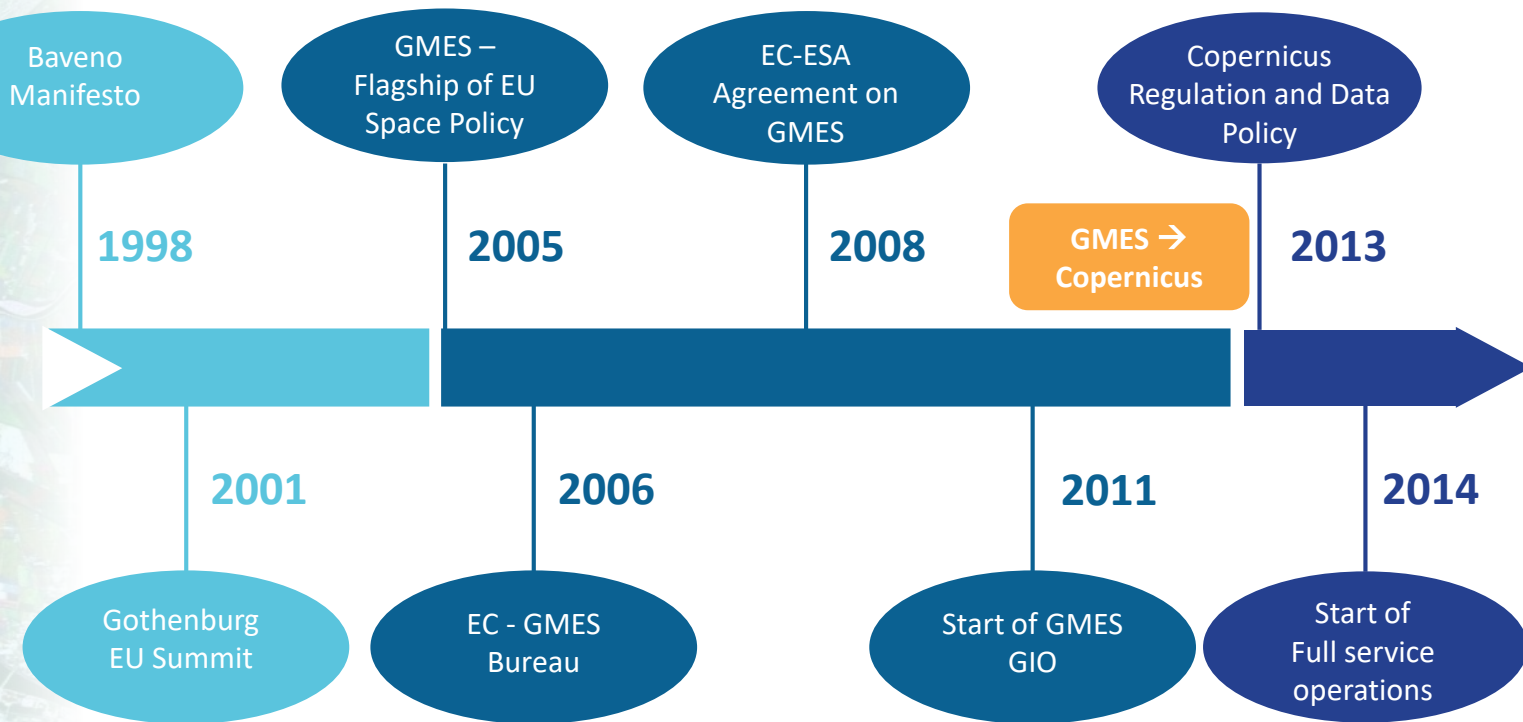
- **Copernicus is a flagship programme** of the European Union:

  - 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**
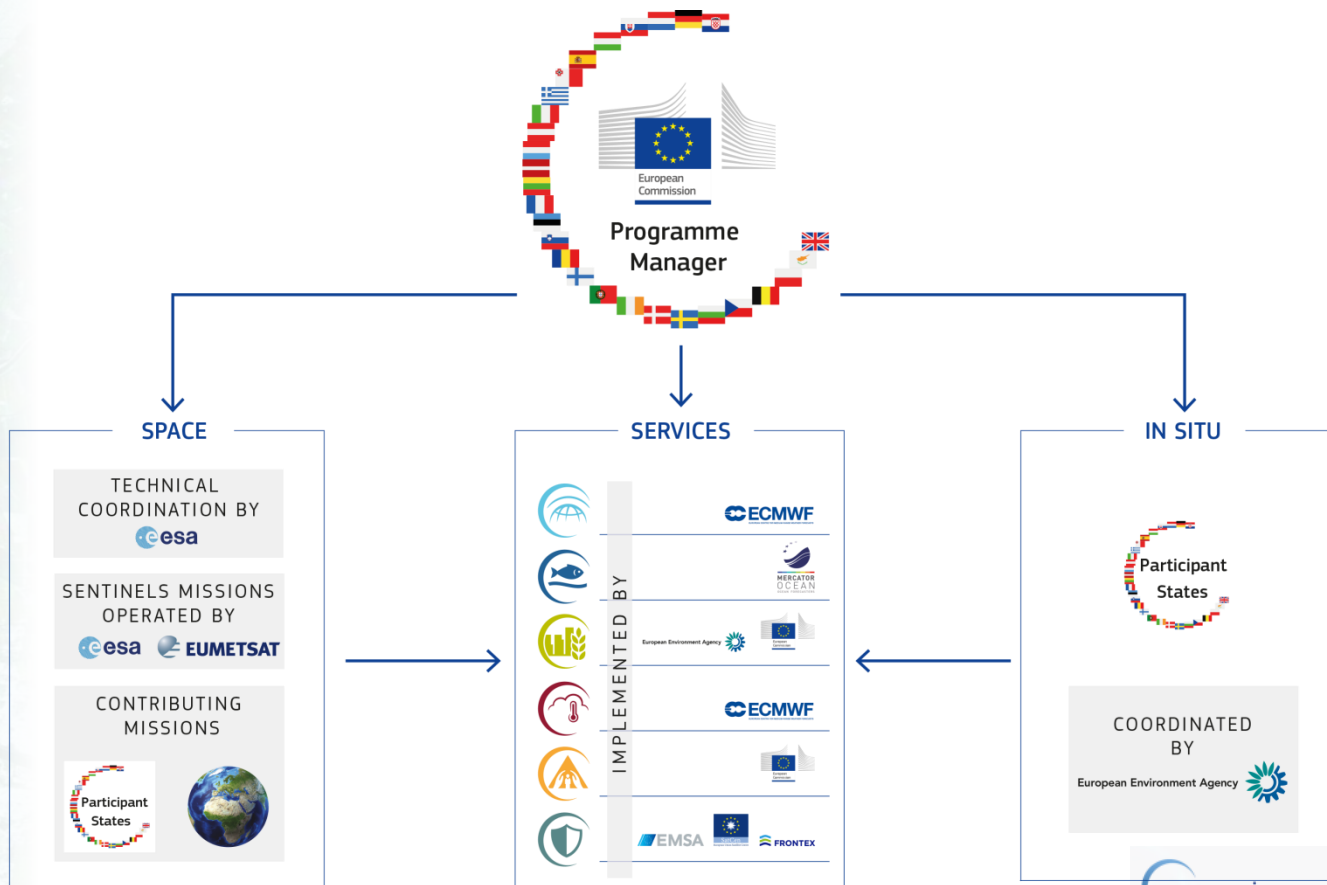
COPERNICUS HISTORY

Baveno Manifesto

GMES – Flagship of EU Space Policy

EC-ESA Agreement on GMES

Copernicus Regulation and Data Policy

1998

2005

2008

GMES → Copernicus

2013

2001

2006

2011

2014

Gothenburg EU Summit

EC - GMES Bureau

Start of GMES GIO

Start of Full service operations

GIO = GMES Initial Operation

Space Component

Copernicus Space Component

Space Component

SENTINEL-1: 4-40m resolution, 3 day revisit at equator	*S1A and 1B in orbit*		Polar-orbiting, all-weather, day-and-night radar imaging
SENTINEL-2: 10-60m resolution, 5 days revisit time	*S2A and 2B in orbit*		Polar-orbiting, multispectral optical, high-resolution imaging
SENTINEL-3: 300-1200m resolution, <2 days revisit	*S3A and S3B in orbit*		Optical and altimeter mission monitoring sea and land parameters
SENTINEL-4: 8km resolution, 60 min revisit time	*1st Launch 2020*		Payload for atmosphere chemistry monitoring on MTG-S
SENTINEL-5p: 7-68km resolution, 1 day revisit	*S5P in orbit*		Mission to reduce data gaps between Envisat, and Sentinel 5
SENTINEL-5: 7.5-50km resolution, 1 day revisit	*1st Launch 2021*		Payload for atmosphere chemistry monitoring on MetOp 2ndGen
SENTINEL-6: 10 day revisit time	*1st Launch 2020*		Radar altimeter to measure sea-surface height globally

Key Features

Copernicus — Europe's eyes on Earth

European Commission

Space Component

Subject to Data Owner's Data Policy

SPOT (VGT)

COSMO Skymed

Radarsat

PROBA-V

TerraSAR-X Tandem-X

Optical MR and LR missions

SAR missions

Deimos-2

Cryosat

Copernicus Contributing Missions

Sentinels are complementary

Optical HR and VHR missions

Altimetry missions

RapidEye

Pléiades

SPOT (HRS)

DMC

Atmospheric missions

Jason

MetOp

Meteosat 2nd Generation

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European Commission

Copernicus In situ Component

In situ

In situ

- *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

Monitoring the State of the Earth System Environment ...

... Six cross-cutting Thematic Services

Land Monitoring

Ecosystems

Biodiversity

Agriculture

Forestry

Energy

Natural Resources

Water

Urban planning

Global

VEGETATION

ENERGY

WATER

Pan-European

Image Mosaics

EU Land Cover

CORINE Land Cover

Specific land cover info

High Resolution Layers

Hydrographic and elevation reference maps

Reference Data

% of built-up area

Related Pan-European products

Local

Urban Atlas

Riparian Zones

Natura 2000 (N2K)

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Marine Monitoring

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, chlorophyil, biology, chemistry)

Atmosphere
Monitoring

Health

Environment

Pollution

Climate

Renewable Energy

Air Quality and Atmospheric Composition

Climate forcing

Ozone layer & UV

Solar radiation

Emissions and surface fluxes

Climate Change

Climate change	**Consistent Estimates of the Essential Climate Variables (ECVs)**
Mitigation and adaptation	
Weather forecast	**Support to Mitigation and Adaptation Strategies**
Pollution	**Global and Regional Reanalyses**
Environment	
Health	**Seasonal Forecasts And Climate Projections**

Emergency Management

Disaster Emergency Situations

Humanitarian Crises

RESILIENCE

RECOVERY

EMERGENCY RESPONSE

PREPAREDNESS

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

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Europe's eyes on Earth

European Commission

Security

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

Copernicus
Europe's eyes on Earth

European
Commission

User Uptake

Socio-economic benefits of Copernicus

Copernicus

- 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/
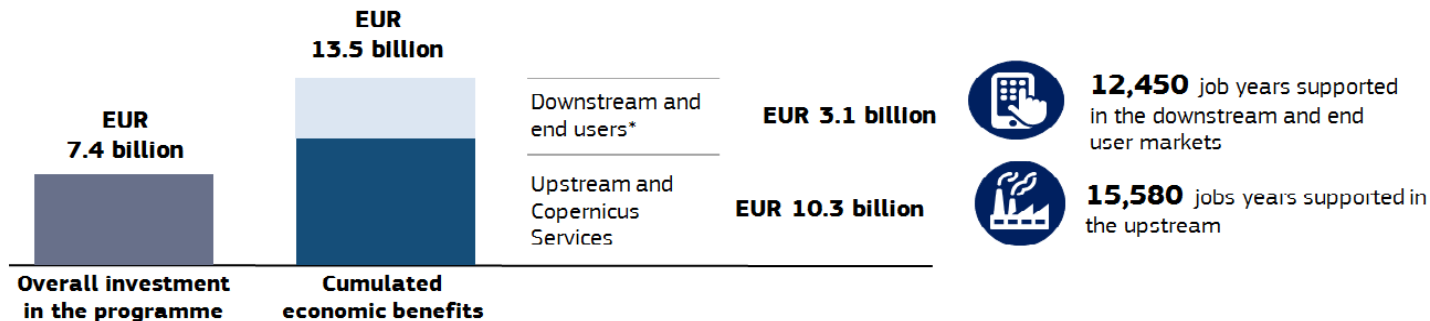created in the
next 15 years

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COPERNICUS ECONOMIC BENEFITS

Estimated direct monetary benefits between 2008 and 2020

EUR 7.4 billion
Overall investment in the programme

EUR 13.5 billion
Cumulated economic benefits

Downstream and end users* **EUR 3.1 billion**

Upstream and Copernicus Services **EUR 10.3 billion**

12,450 job years supported in the downstream and end user markets

15,580 jobs years supported in the upstream

Examples of existing Copernicus benefits

70% Cost reduction of a precision farming service in Austria, thanks to Copernicus

€ 60k Yearly savings for each construction company using a work progress monitoring app
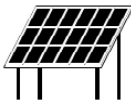
60% Higher accuracy for analysis of the impact of trans-boundaries pollutants on air quality

5% Productivity gain for fish farmers, by monitoring toxic algal blooms

50% Copernicus-based forecasts generate 50% more benefits to solar energy producers than traditional forecasts

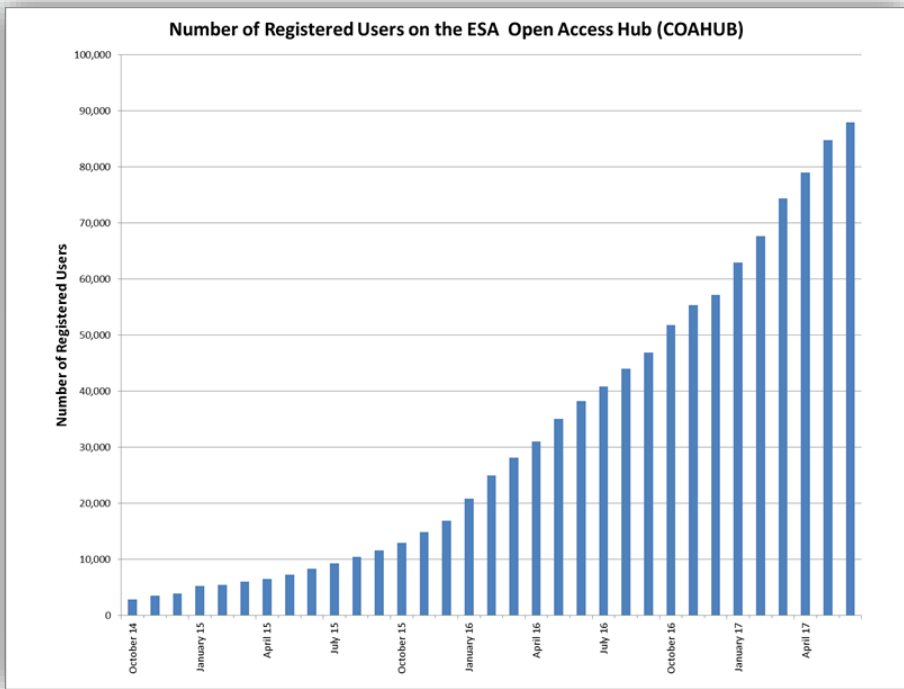**€ 186M** Benefits of Copernicus on the insurance market in 2015

* The Downstream and end user analysis includes only 8 value chains: Agriculture, Forestry, Urban Monitoring, Insurance, Ocean Monitoring, Oil & Gas, Renewable Energies and Air Quality. Estimates for end users were only calculated for Insurance, Oil&Gas and Urban Monitoring. The estimates of downstream and end user benefits should be seen as extremely conservative because they were calculated a year after the launch of the first Sentinel satellite. Benefits are likely to increase significantly as more Sentinels become operational.

The uptake of Copernicus is very strong

User Uptake

Number of Registered Users on the ESA Open Access Hub (COAHUB)

➔ **Unprecedented growth in number of Sentinel users**
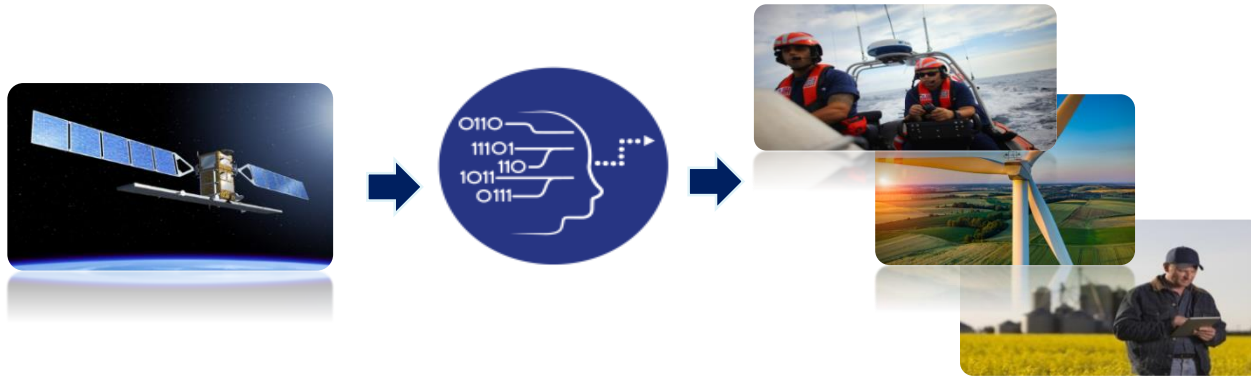
➔ **Similar trend in the Copernicus services**

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User Uptake

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.

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User Uptake

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

I) Increase **awareness** about Copernicus

II) Facilitate **access** to Copernicus

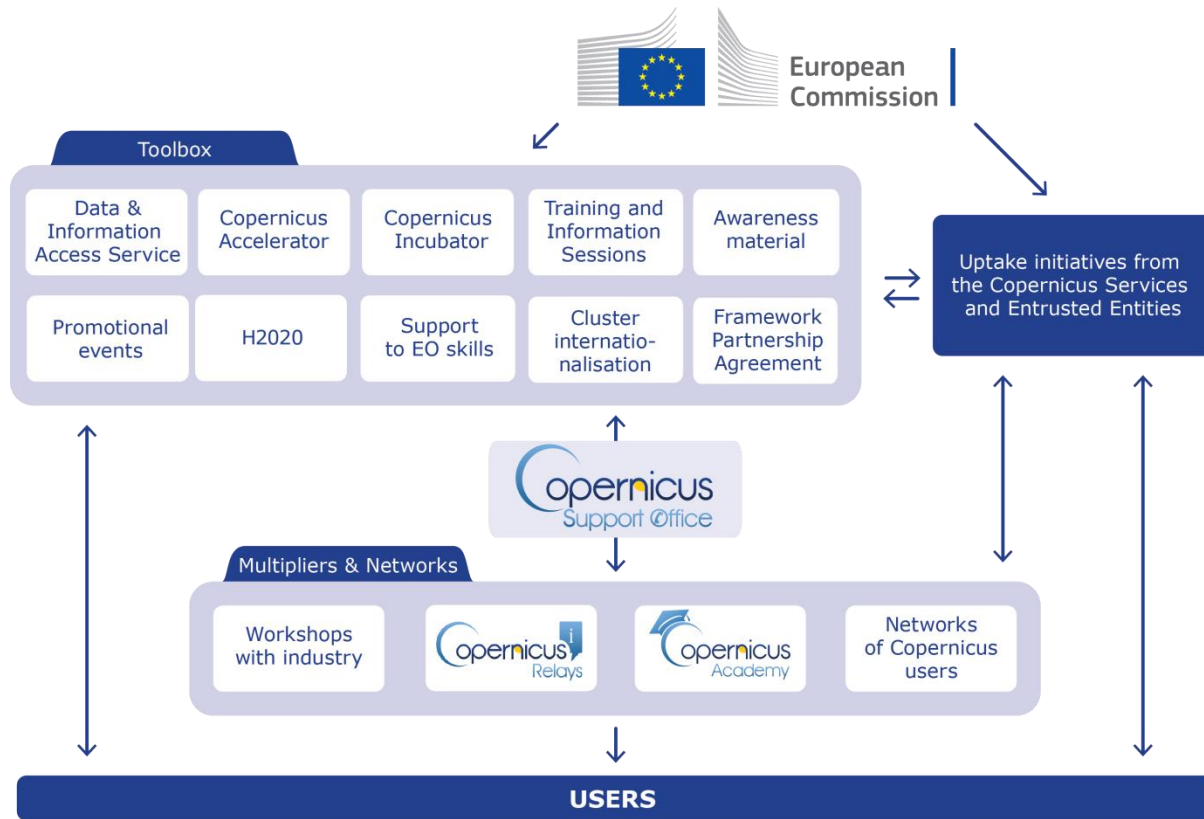III) Support **downstream** actors (public authorities, businesses and researchers)

Leverage with actions from Member States and Entrusted Entities

Copernicus User Uptake Initiatives

User Uptake

European Commission

Toolbox

Data & Information Access Service	Copernicus Accelerator	Copernicus Incubator	Training and Information Sessions	Awareness material
Promotional events	H2020	Support to EO skills	Cluster internatio-nalisation	Framework Partnership Agreement

Uptake initiatives from the Copernicus Services and Entrusted Entities

Copernicus Support Office

Multipliers & Networks

Workshops with industry	Copernicus Relays	Copernicus Academy	Networks of Copernicus users

USERS

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European Commission

Copernicus Networks

Copernicus Relays

- 80 Relays
- 33 countries
- 4 continents
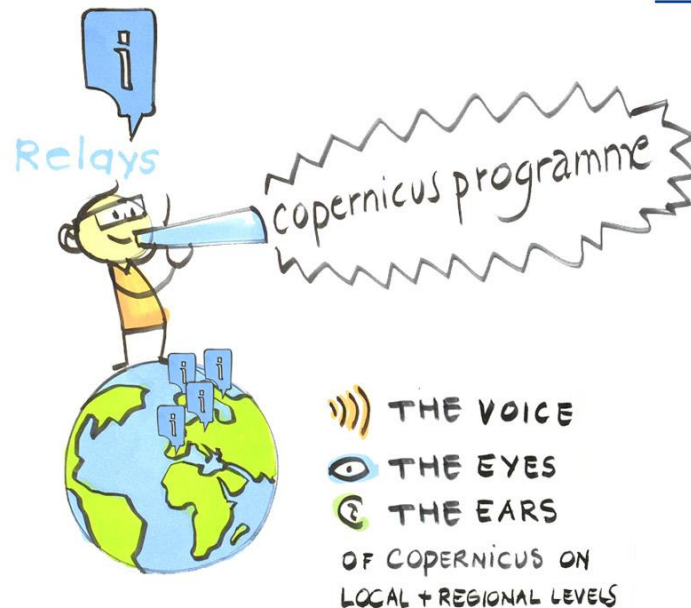
Copernicus Academy

- 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
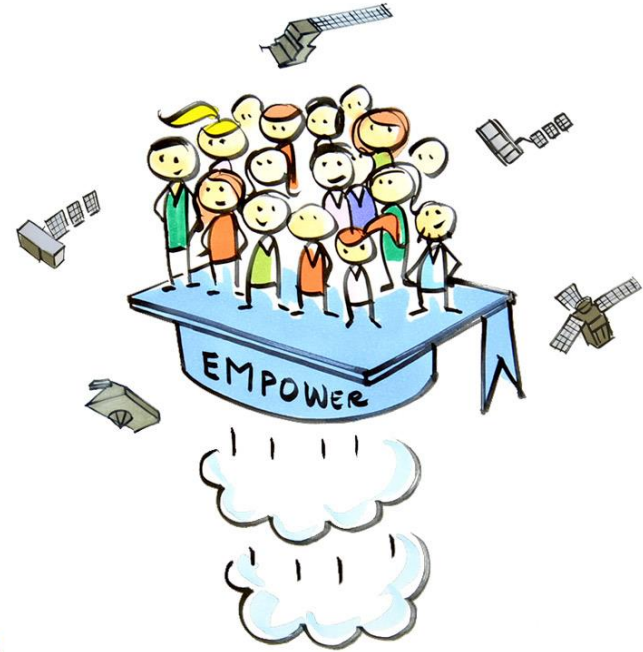- Organising promotional events and training

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

EMPOWER

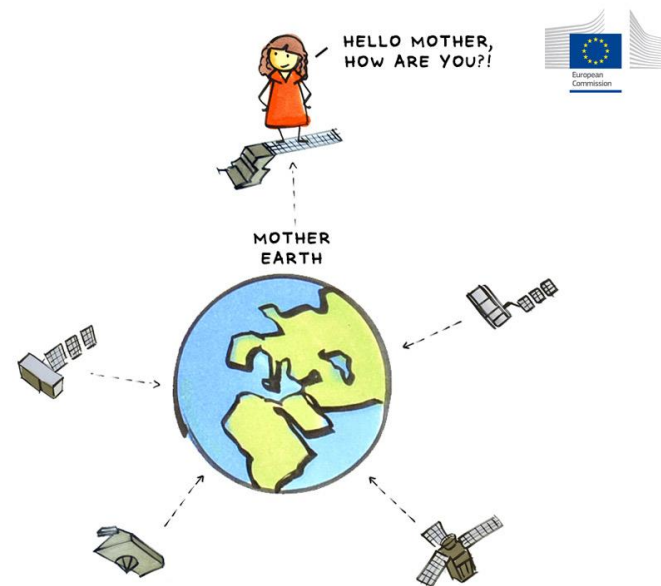THE MEMBERS OF THIS NETWORK ENSURE THAT SKILLS ARE DEVELOPED TO ENABLE COPERNICUS TO UNLEASH ITS FULL POTENTIAL

Copernicus Support Office

✉ support@copernicus.eu

🐦 Ask on Twitter
@CopernicusEU

HELLO MOTHER, HOW ARE YOU?!

MOTHER EARTH

Questions about Copernicus?
Ask the Copernicus Support Office team!

quidos

Copernicus Support Office

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

User Uptake

I) Increase **awareness** about Copernicus

II) Facilitate **access** to Copernicus

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

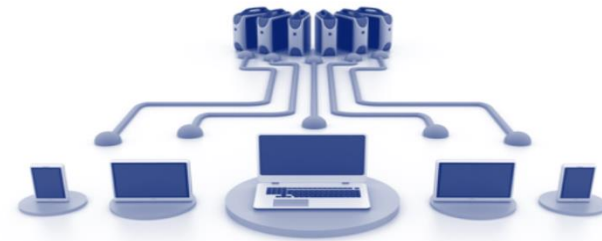**Leverage with actions from Member States and Entrusted Entities**

User Uptake

- **Enhanced distribution (Open hub)**

- **Data and Information Access Services (DIAS)**
  operational from 21 June 2018

- **Copernicus Support Office**

  - 2000+ ticket handled

  - replies within few hours

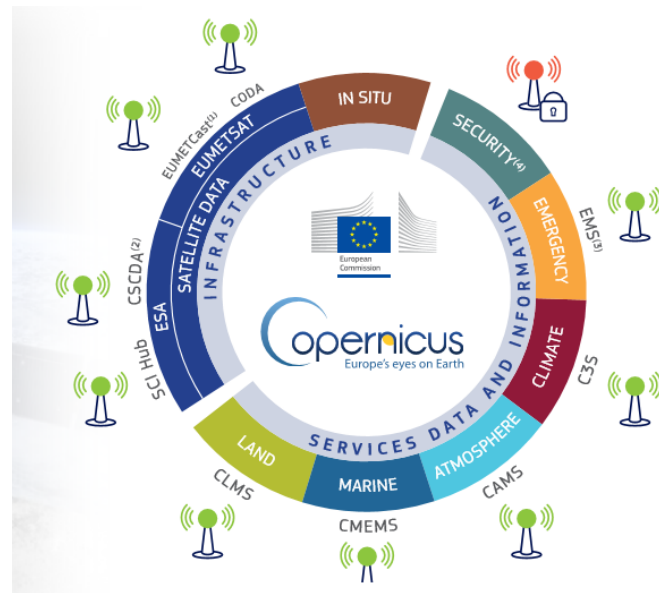 - animates Relays and Academy networks

Data Access

- **Satellite Data distribution Hubs**
  - Sentinels
  - Contributing missions
  - Access to images in NRT
  - Access to archives

- **Services Information portals for**
  - Added value products, indicators
  - Models
  - Archives, Near Real Time and Forecasts products

Note: *Copernicus in situ component provides in situ data access, serving the Copernicus services. It is not delivering in-situ data to the end-users.*

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Data Access

Dual approach:

- Strong Copernicus Distribution Services for download

- **Data and Information Access Services (DIAS)**

  - **Access to all Copernicus data and information collocated with cloud computing resources**

  - **Big Data analytics without the need to download the data and information**

  - **Data fusion with non-EO data and information**

Overall ensuring that Copernicus data is easily accessible and used!

Data Access

THE DIAS & WHERE TO REACH THEM

CREODIAS
WWW.CREODIAS.EU

sobloo
WWW.SOBLOO.EU

mundi WEB SERVICES
WWW.MUNDIWEBSERVICES.COM

ONDA
WWW.ONDA-DIAS.EU

WEkEO
WWW.WEKEO.EU

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European Commission

User Uptake

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

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Copernicus user uptake strategy

As explained in the Space Strategy, *"The potential of space solutions has not yet been fully exploited (…) The space sector needs to be better connected to other policies and economic areas."*

Strategy: supporting the eco-system of service suppliers that transform Copernicus data and services into the products required by end users

User Uptake

Data flow guaranteed at least up to 2030, with full, free and open data policy

Copernicus start-up programme

Copernicus
Masters
Operational

Copernicus
hackathons
Operational

50 start-ups
per year

Copernicus
Accelerator
Operational

Other
accelerators and
incubators

20 start-ups
per year

Copernicus
Incubation
Programme
Operational

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User Uptake

Copernicus Masters

- A competition for **entrepreneurs, start-ups & students**, who develop applications based on Copernicus;

- **13 prizes**, worth €1.5 million (cash, business incubation, technical assistance…);

- **Evaluations of the winners 2018 are now ongoing**

User Uptake

Copernicus Hackathon Programme

- A hackathon is a **sprint-like event** in which programmers and subject-experts collaborate to develop software (based on Copernicus data and services);

- Every year, the European Commission distributes 20 vouchers (20k) to organisations wishing to organise a Copernicus hackathon;

- 10 organisers have been selected in the first round. The first hackathons will be organised **at the end of September**.

- 2nd application phase is **open until 31 December 2018**

Copernicus hackathons

Copernicus
Europe's eyes on Earth

European Commission

User Uptake

Copernicus Accelerator

- The Copernicus accelerator has **supported 100 start-ups so far**

- Each start-up receives a mentor for the duration of the programme, as well as regular business online courses

- The accelerator starts and closes with two BootCamps, where all participants meet their mentor and can network

- Application to the third Accelerator closed on 15 September 2018

User Uptake

Copernicus Incubation Programme

- The European Commission finances the **incubation of 20 start-ups per year**;

- Each start-up receives 50K voucher to spend on **business development**;

- 1st applicaiton phase: 50 applications received, 7 start-ups selected

- 2nd phase being evaluated

- 3rd phase **open until 16 November 2018**

User Uptake

- **H2020**: forthcoming space calls in support of Copernicus user uptake

- **Cooperation with KICs:**
  - Post-doc scholarships awarded in partnership with KIC raw material
  - "Journey": summer course organised in June-July with Climate KIC

- **Ongoing ERASMUS+ sectoral skill alliance for Earth Observation** (with several Copernicus Relays)

- **Forthcoming Copernicus awareness campaign in universities** (in partnership with COSME)
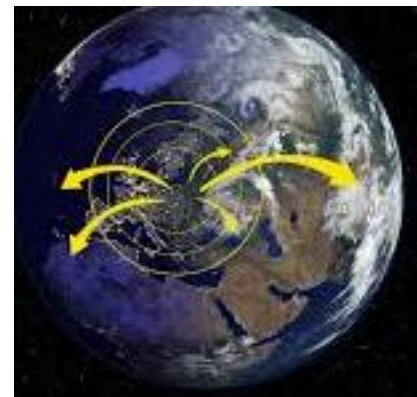
Copernicus International Strategy

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, Peru, Colombia

- Discussions ongoing with **ASEAN Countries** and **Singapore**

- **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 to **meet emerging needs:**

  - Monitoring CO2 and other greenhouse gas emissions
  - Climate change and sustainable development
  - Changes in the Arctic

- **Next generation of satellites:** evaluation on-going to define observation needs in cooperation with users - e.g. GHG monitoring, thermal infrared, hyperspectral

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