



# The EU Earth Observation Programme Copernicus: Status and prospects

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Copernicus

# COPERNICUS IN BRIEF

## A flagship space programme of the European Union



- Monitors the Earth, its environment and ecosystems
- Prepares for crises, security risks and natural or man-made disasters
- Supports the EU's role as a global actor, contributing solutions to common global challenges



**Full, free and open access** to Copernicus data and information



**A tool for economic growth**  
and a driver for the **digital economy**



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# COPERNICUS SOCIO-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

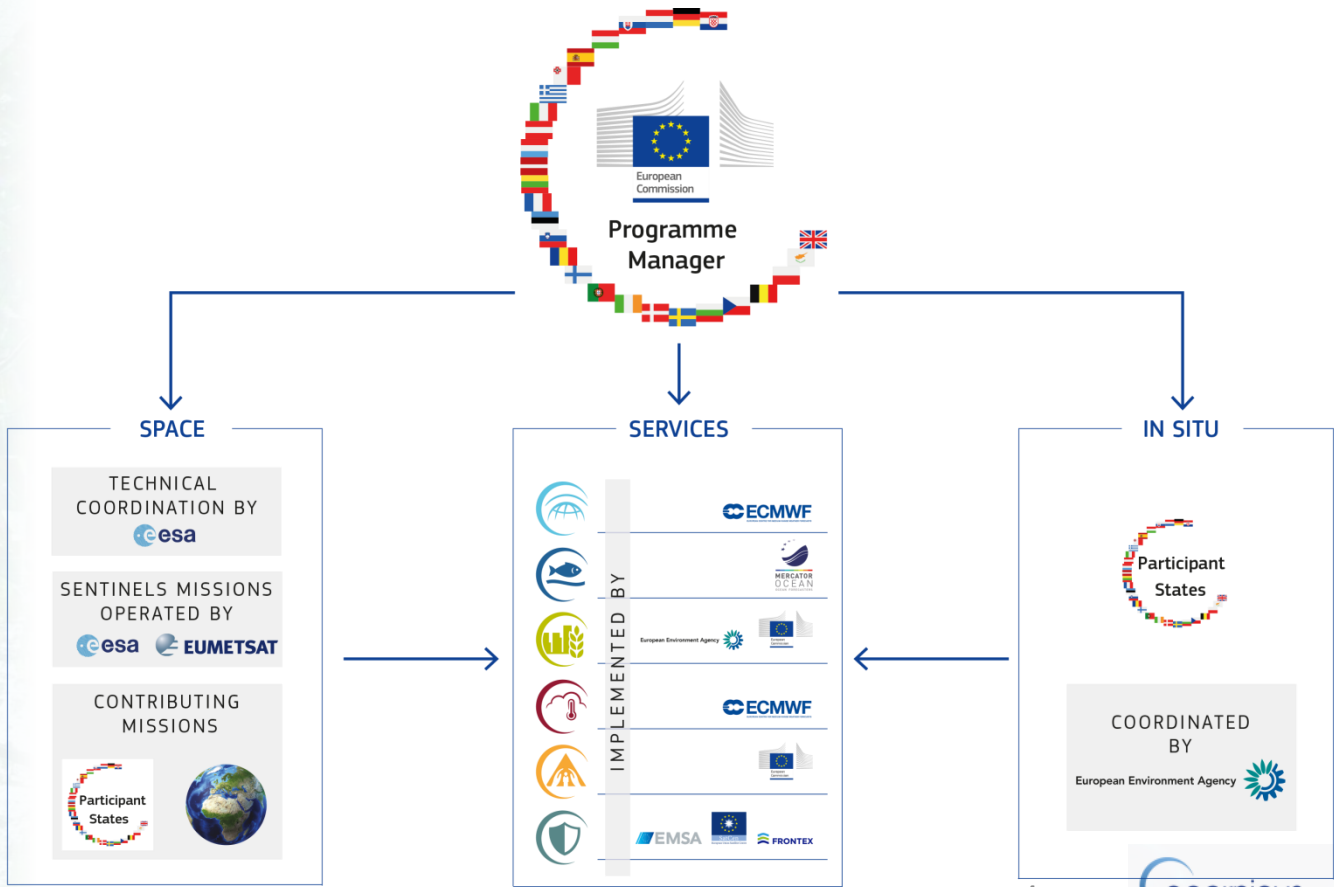


**~50.000 jobs**  
maintained/  
created in the  
next 15 years



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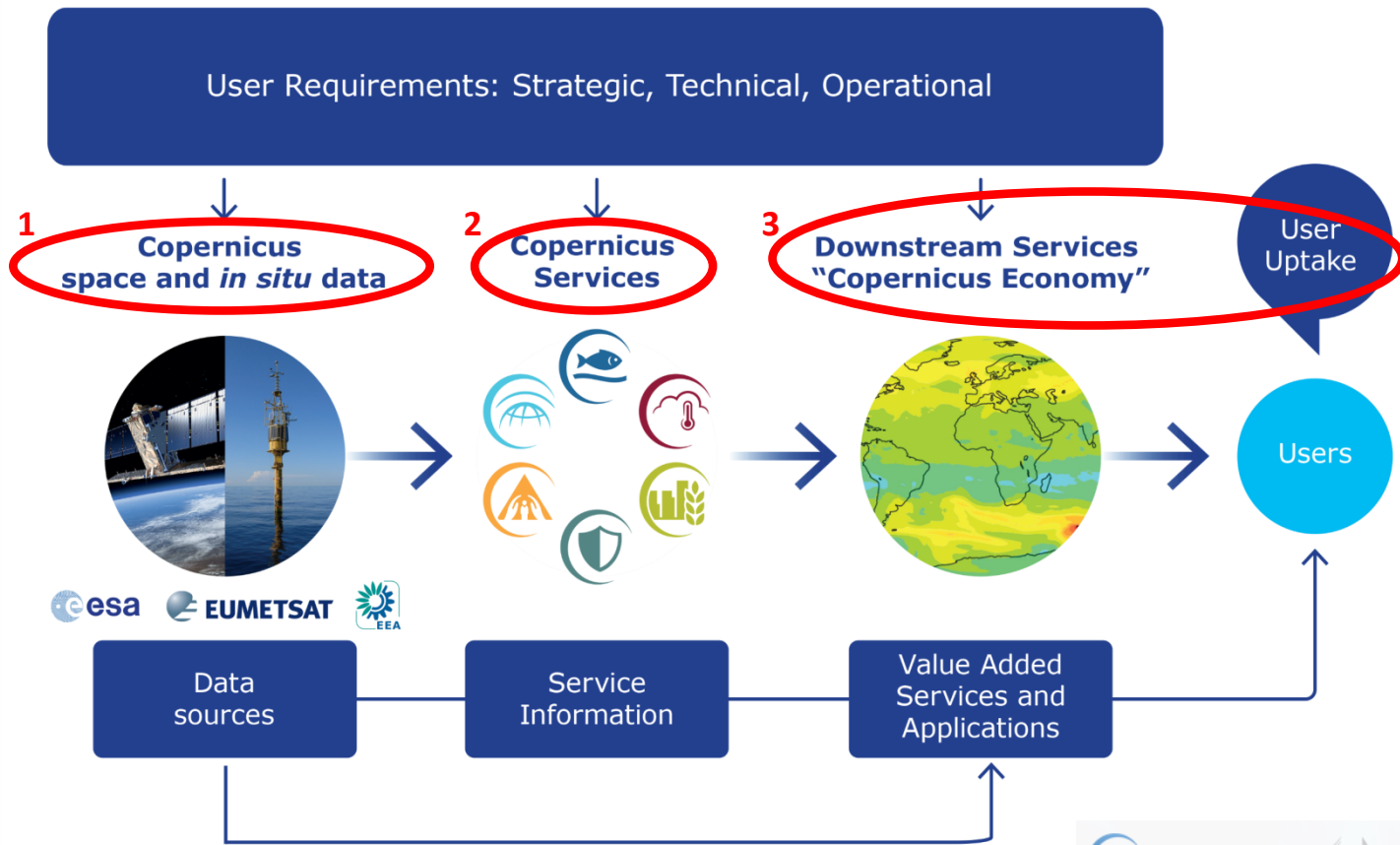
# COPERNICUS GOVERNANCE





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# COPERNICUS IS DRIVEN BY THE USERS





Space  
Component

# THE SENTINELS

## Sentinel Mission and Status

## Key Features



**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 in orbit,  
S2B 3/2017*

Polar-orbiting, multispectral  
optical, high-resolution imaging



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

*S3A in orbit,  
S3B end 2017*

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

*Launch mid-  
2017*

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 2<sup>nd</sup>Gen



**SENTINEL-6:**  
10 day revisit time

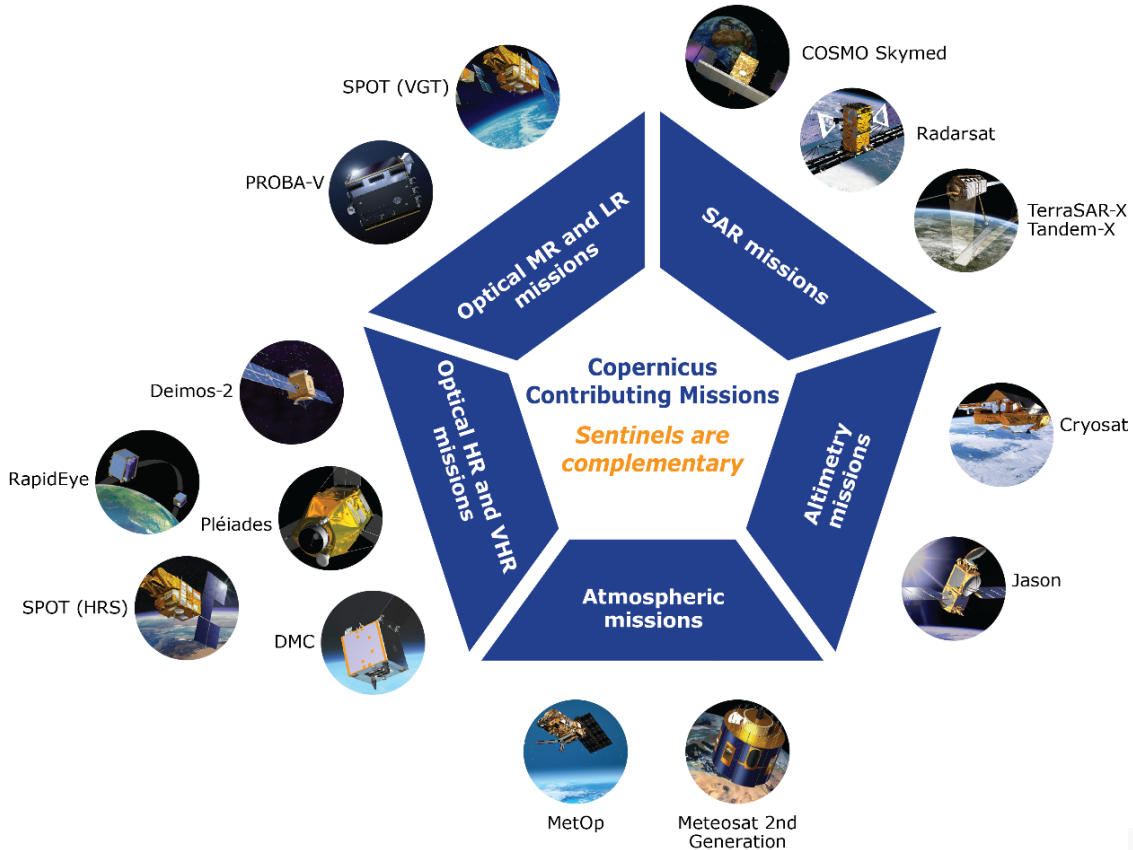
*1st Launch  
2020*

Radar altimeter to measure sea-  
surface height globally



Space Component

# CONTRIBUTING MISSIONS





Space  
Component

# 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 European Environment Agency







Space  
Component

# SENTINEL EVOLUTION

- Copernicus needs to **respond to the evolution of EU policy priorities**

e.g. impact of climate change, pressure on natural resources, migration

- Address gaps in the current Copernicus range of observations: **existing Sentinel families to be complemented after 2020**, while current families continue to be deployed

- Next generation of satellites: **inclusive evaluation process** with users to define observation needs

e.g. Greenhouse gases monitoring (CO2 mission task force with JAXA support)





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# COPERNICUS SERVICES

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

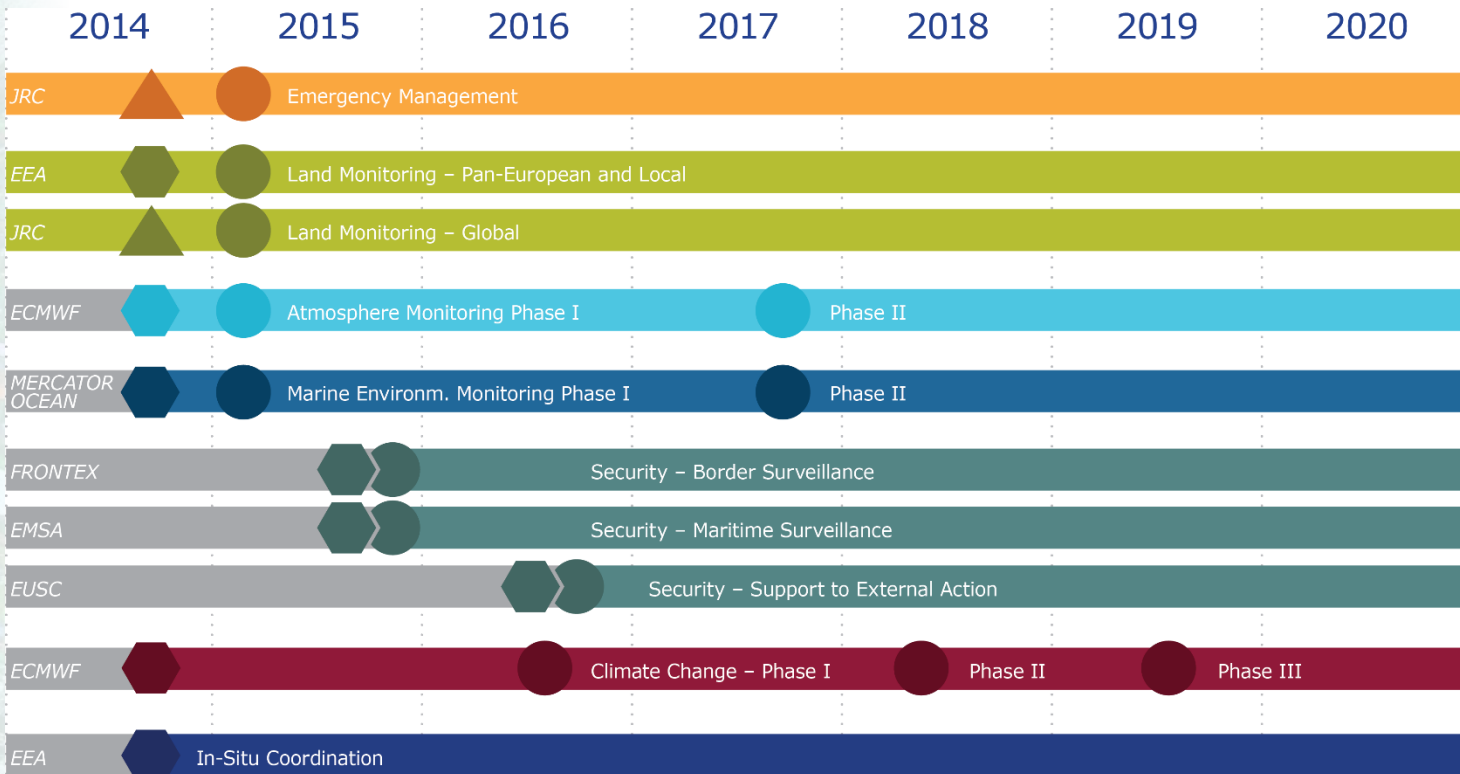


*... Six cross-cutting Thematic Services*



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# SERVICES IMPLEMENTATION SCHEDULE



Legend: Delegation agreement Direct Management Operational phase



User  
Uptake

## 4 priorities

- Maximise the benefits of space for society and the EU economy
- Foster a globally competitive and innovative European space sector
- Reinforce Europe's autonomy in accessing and using space in a secure and safe environment
- Strengthen Europe's role as a global actor and promote international cooperation

- ✓ Copernicus data access
- ✓ Copernicus user and market uptake
- ✓ Copernicus international relations

# COPERNICUS DATA ACCESS

Data  
Access

Access to Satellite data: <https://sentinel.esa.int/web/sentinel/sentinel-data-access>



**FULL, FREE  
AND OPEN**

Scientific and  
Other Access

<https://scihub.copernicus.eu/>



Access for  
Copernicus Services

*Restricted to the  
Copernicus Service  
Projects*



Access for Collaborative  
Ground Segment

*Copernicus Space  
Component Data  
Access Portal\**



Access for International  
Agreements

*Restricted to  
international partners  
(bilateral cooperation)*

Access to Copernicus Services Data

- Land-related data: <http://land.copernicus.eu>
- Atmosphere-related data: <http://atmosphere.copernicus.eu>
- Marine-related data: <http://marine.copernicus.eu>
- Emergency-related data: <http://emergency.copernicus.eu>
- Climate change-related data: <http://climate.copernicus.eu> (Beta version)

**FULL, FREE  
AND OPEN**

(\*) Includes instructions on how to access Contributing Missions data

# THE BIG DATA CHALLENGE



Data  
Access



- **Massive amounts of data**
- **Full, open and free-of-charge**

ca. 8 Terabyte/day or ca.  
3 Petabyte/year  
with just Sentinels-1, -2  
and -3 fully operational

## Ensure that Copernicus data is easily accessible and used!

- Different types of dissemination infrastructures
- New technology developments
- ICT and EO cross-fertilisation
- Interoperability with non-EO datasets
- Global EO competition
- Growth and jobs in downstream sector

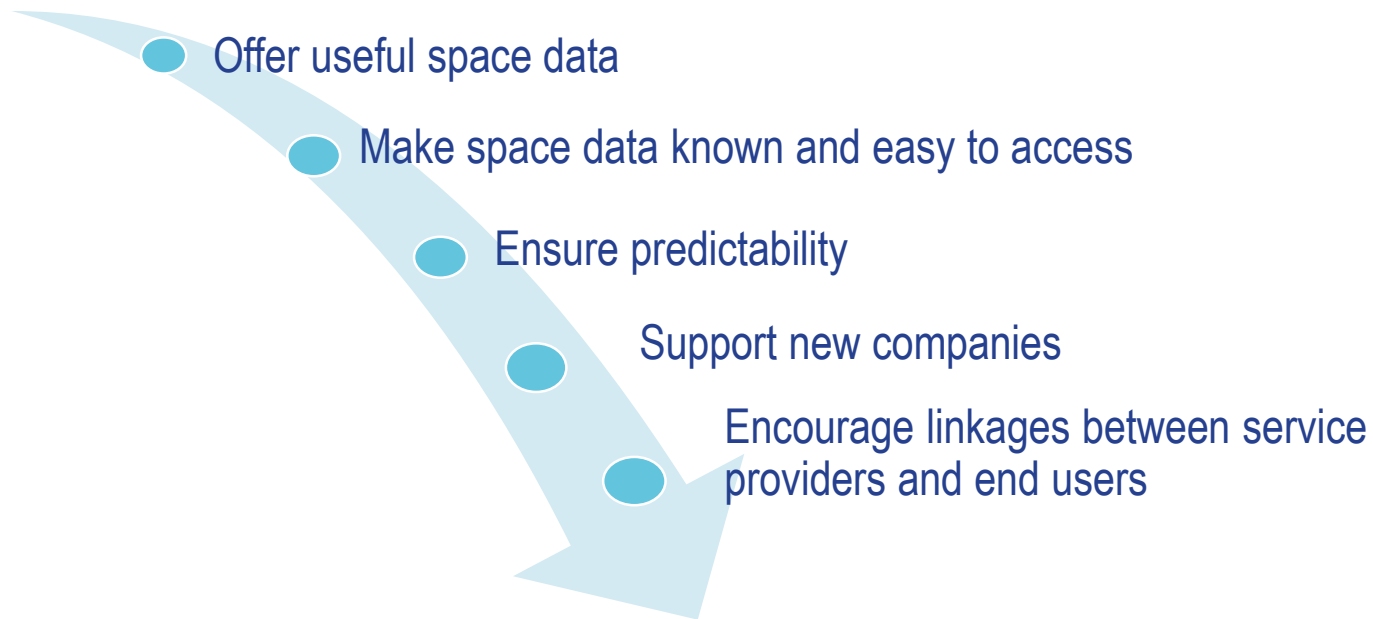
## Imminent launch of a Data Access and Information Service (DIAS)





# C O P E R N I C U S   U S E R   U P T A K E   S T R A T E G Y

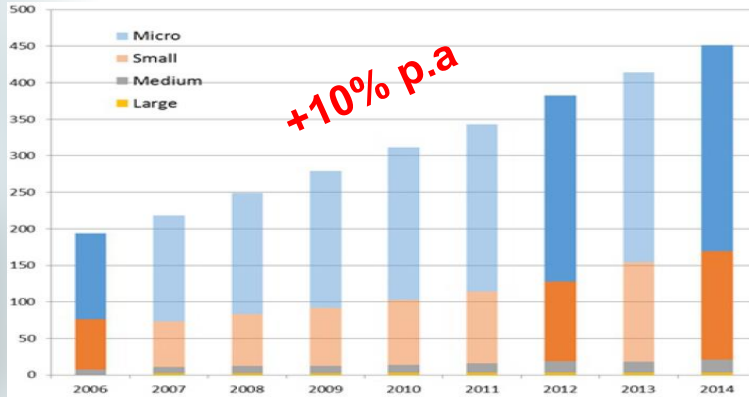
User  
Uptake



# A NEW DOWNSTREAM ECOSYSTEM

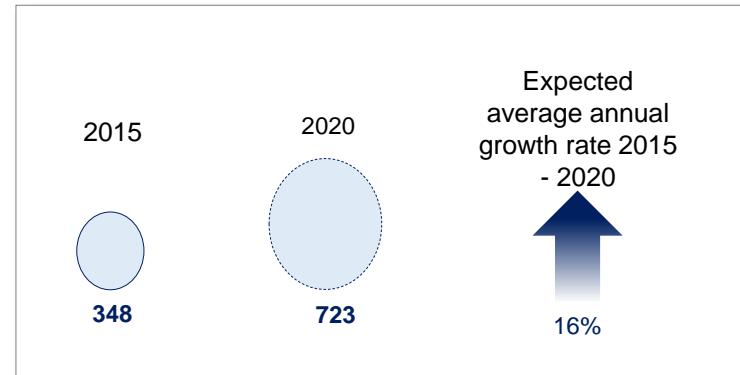


User Uptake



Number of EO companies in Europe

Commercial annual benefits of Copernicus (in EUR million)







## User Uptake

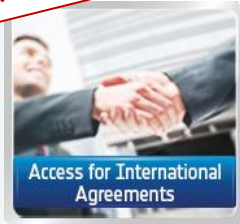
- Maximise the **efficiency of EU investments through cooperation with international partners**
- Promote the **uptake of Copernicus data globally** and create the conditions for integrating **data from international partners** into the EO data management system in Europe
- Promote **access to international markets for European EO companies**





User  
Uptake

**Preferential access for international partners**



- **Cooperation on data exchange**

- Cooperation arrangements signed with US and Australia, under way with several other countries and regions
- **Easier and faster access to Sentinel data** through dedicated international hub
- **EU willing to explore EO data exchange with Japan** on a reciprocal basis

- **CEOS chairmanship by European Union in 2018**

- **EO industry cooperation:**

Memorandum of Understanding JSS-EARSC, November 2016