

# ESA Framework –



## The Copernicus Ground Segment transformation in synergy with the DestinE Core Platform

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→ THE EUROPEAN SPACE AGENCY

# ESA Copernicus Sentinels Operations



- > 200,000 satellite orbits
- > 15 Million min of satellite observations
- > 50 Million products published
- > 400 PB of data downloaded by users
- > 550,000 registered users
- > ....



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Plan the satellite observations



Acquire the satellite data on ground

Process all satellite data into user products



Maintain access to all relevant information for user data exploitation



Preserve acquired mission data for future access



Ensure access to new and past Sentinel data

Ensure and monitor the data quality



Operate, monitor and control the satellites

The Copernicus Ground Segment has been initially designed and deployed following state of the art decentralized approach before the launch of the Sentinels to maximise readiness, robustness and reliability while minimizing the risks within existing implementation constraints



Copernicus Wide Area Network



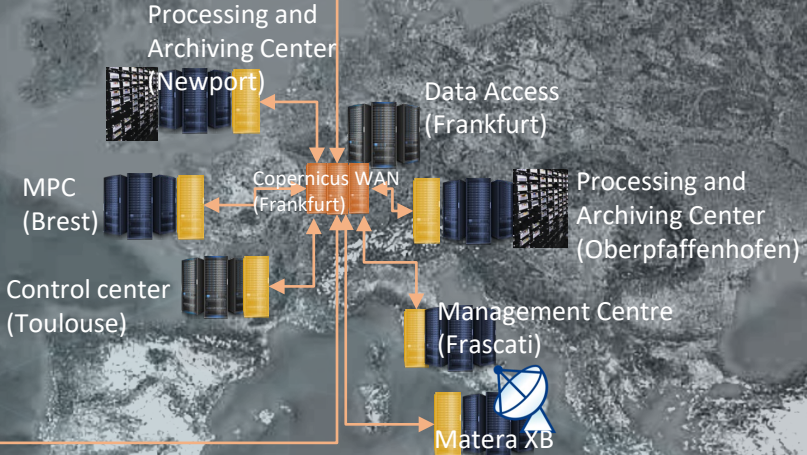
Svalbard XB



Maspalomas XB



# Sentinel-1 Initial Ground Segment layout (2014...2019)





Copernicus Wide Area Network

Svalbard XB

Processing and Archiving Center (Newport)

Data Access (Frankfurt)

Control center (Toulouse)

MPC (Nice)

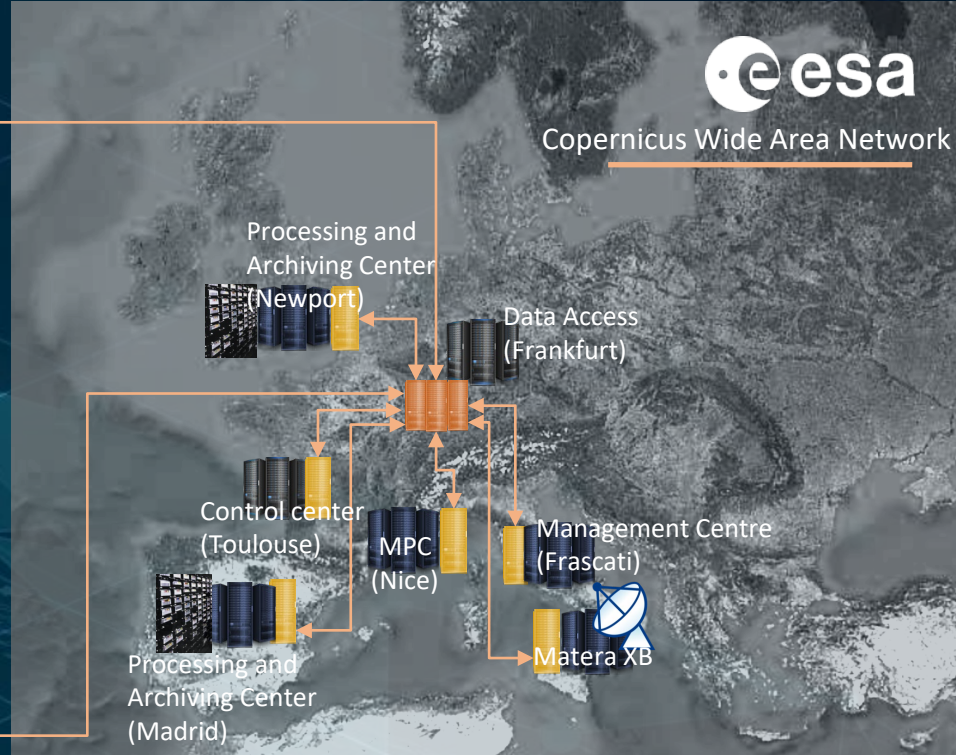
Management Centre (Frascati)

Maspalomas XB

Processing and Archiving Center (Madrid)

Matera XB

# Sentinel-2 Initial Ground Segment layout (2015...2020)



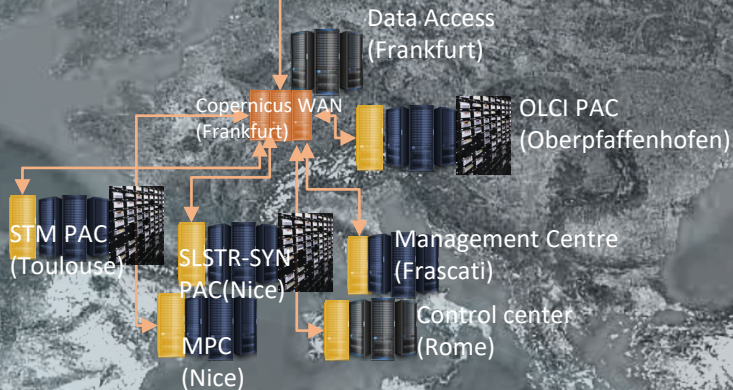


Svalbard XB

# Sentinel-3 Initial Ground Segment layout (2015..2020)



Copernicus Wide Area Network



# Building on experience and innovation to prepare the future



7 satellites successfully in operations in 4 years

- Increasing trend in data volume
- User uptake is pushing the system far beyond original expectations
- Increasing risk of industrial lock-in
- Industrial interdependencies reducing SLA efficiency
- Four DIAS in operations in 6 months

The right time to prepare the system for the future


LPS

New architecture in place

- C-D units
- Copernicus Expansion preparation
- Operational budget constraints
- Future user scenario evolution remains a major unknown
- ....

#LPS22



The background of the slide features a large iceberg floating in a dark blue sea. The tip of the iceberg is visible above the waterline, while the much larger, submerged part of the iceberg is visible below. The sky is a lighter blue with some clouds. The overall theme is the 'iceberg metaphor' for hidden or underlying issues.

...ESA is pursuing strategic management of  
Ground Segment performances and user  
experience  
to...

Support the long-term  
sustainability of the  
present and future  
Copernicus operations

Maximize the operations  
performance within the available  
resources

The background of the slide is a blue-tinted image of an iceberg. The top part of the iceberg is above the water, while the much larger, jagged part is submerged underwater, illustrating the concept of hidden or underlying changes.

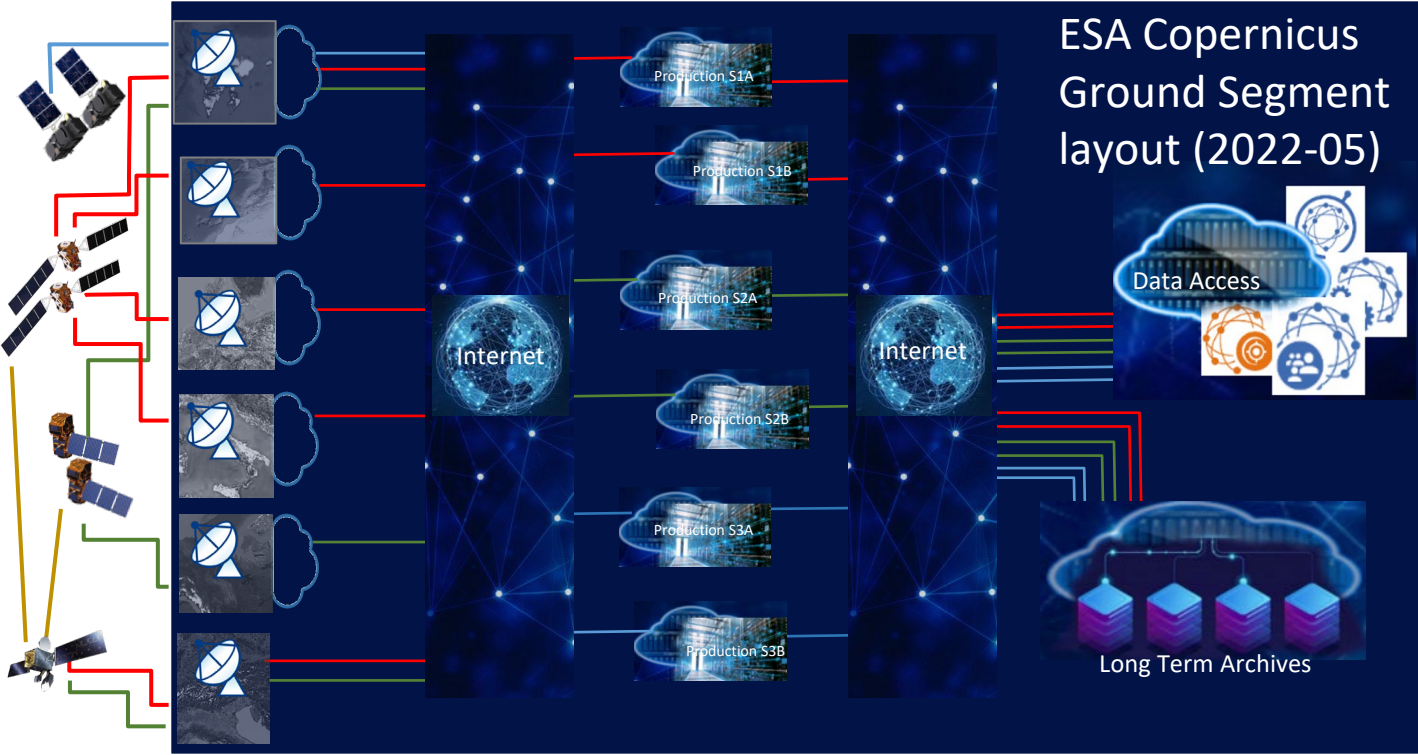
The ESA Copernicus Ground Segment has been drastically transformed with a gradual and user-transparent evolution over the last 2 years....

Migrating the operations to **public clouds**

Strengthening the **industrial service** approach

Increasing **competitiveness** of operational services provision

Increasing operational **flexibility**



# ESA Copernicus Ground Segment layout (2022-05)

Production S1A

Production S1B

Production S2A

Production S2B

Production S3A

Production S3B

Internet

Internet

Data Access

Long Term Archives

## 2 years after.....



- ✓ Increased cost effectiveness, sustainability, robustness and flexibility of the CSC operations, particularly for evolving user scenarios and large data volumes
  - ✓ Decreased the time to integrate new services, increase the flexibility to face future user needs
  - ✓ Favored the service approach and the industrial competition, incentive service quality
  - ✓ Rationalized the archive volume growth, in parallel to the preparation for integrating on-demand production in operations
  - ✓ Started the development of flexible processors and products tailored to user needs
  - ✓ Preventing industrial and technical lock-in
- ...and...

Enabled the creation of the Copernicus Data Space hosting the future Data Access Service with all Sentinel data at your fingertips

# Copernicus Data Access Service & DestinE



LPS

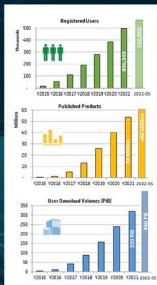


Data and Information Access Services (DIAS)

## Copernicus Data Access Service – In few numbers



7.5 years  
of Data Access Service  
operations



560,000  
Total Registered Users

>50,000,000  
Published products

440 PiB  
Total Volume Downloaded

A new Copernicus Data Access Service is under procurement, with long time perspective

Competition!

Copernicus Data Space- Copernicus Data Access

6 years + Optional 4

Under preparation

DestinE Data Space

#LPS22

# Copernicus & DestinE

Unified user management

Other ecosystems



## Copernicus Data Space ecosystem

Cloud infrastructure services



Streamlined Data Access



Data Discovery and Retrieval



Data Access Service



On-Demand Production



Traceability Service

Marketplace and support to Third-Party services



Applications, documentation and software repository



Other ecosystems

## DestinE ecosystem

ECMWF

Digital Twin Engine (DTE & DTs)



EUMETSAT

Data Lake (DEDL)

esa

Core Service Platform (DESP)

No data duplication and services mutual enrichment

Gradual implementation in progress thanks to the joint effort from European Commission, ESA, ECMWF, EUMETSAT and European Industry

with the objective to

create and offer industry and users

**a real attractive data space to share data and services within an European interoperable ecosystem with a long-term perspective**