Using the EUSST portal - An Operator's Perspective

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Goal

To present an overview of the EUSST service and compare it to the Space Data Center

Overview
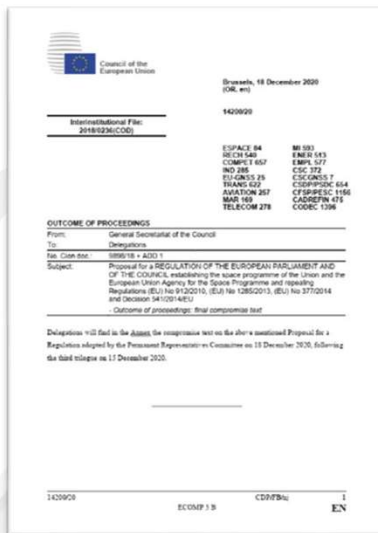
- **What is the EU Space Surveillance and Tracking (EUSST)?**

- **What services does EUSST offer?**
  - **Conjunction Assessment**
  - **Reentry Service**
  - **Fragmentation Service**

- **Who can subscribe to the EUSST?**

- **Comparison to Space Data Center**

- **View of the portal**

What is EU SST?

SST becomes a component of the new European Union space programme, adopted in April 2021

Our goals:

▌ Ensure **resilience of European space infrastructures**

▌ Higher level of **strategic autonomy**

▌ Global **SSA** burden-sharing

We:

▌ are **operational**: sensor network, database, services, users

▌ perform **research and innovation** activities to improve the level of performance: upgrades of sensors, architecture studies, etc.

▌ are **security** relevant: security and data sharing

▌ mature and expand: **EU Space Programme**

PROGRAMME OF THE
EUROPEAN UNION

Sensitive unclassified

Governance

EU SST Partnership:

15 EU Member States

- Austria, Czech Republic, Denmark, Finland, France, Germany, Greece, Italy, Latvia, the Netherlands, Poland, Portugal, Romania, Spain, Sweden
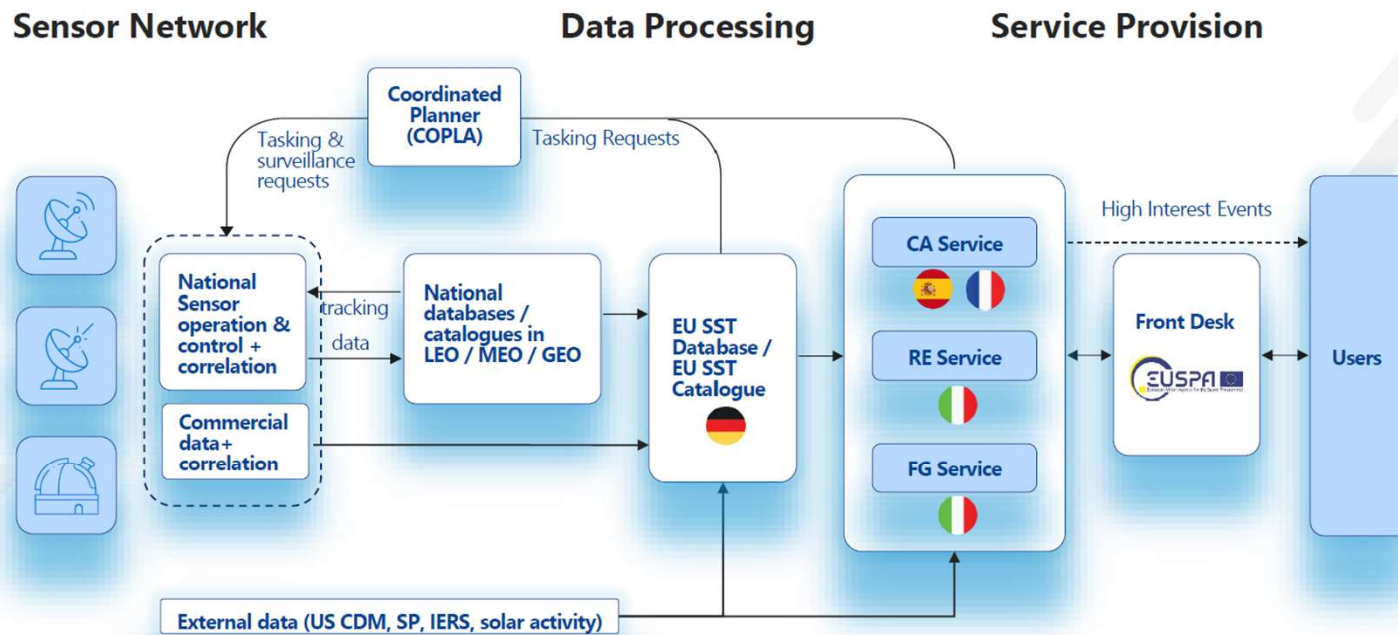
EUSPA as Front Desk

Overseen by European Commission
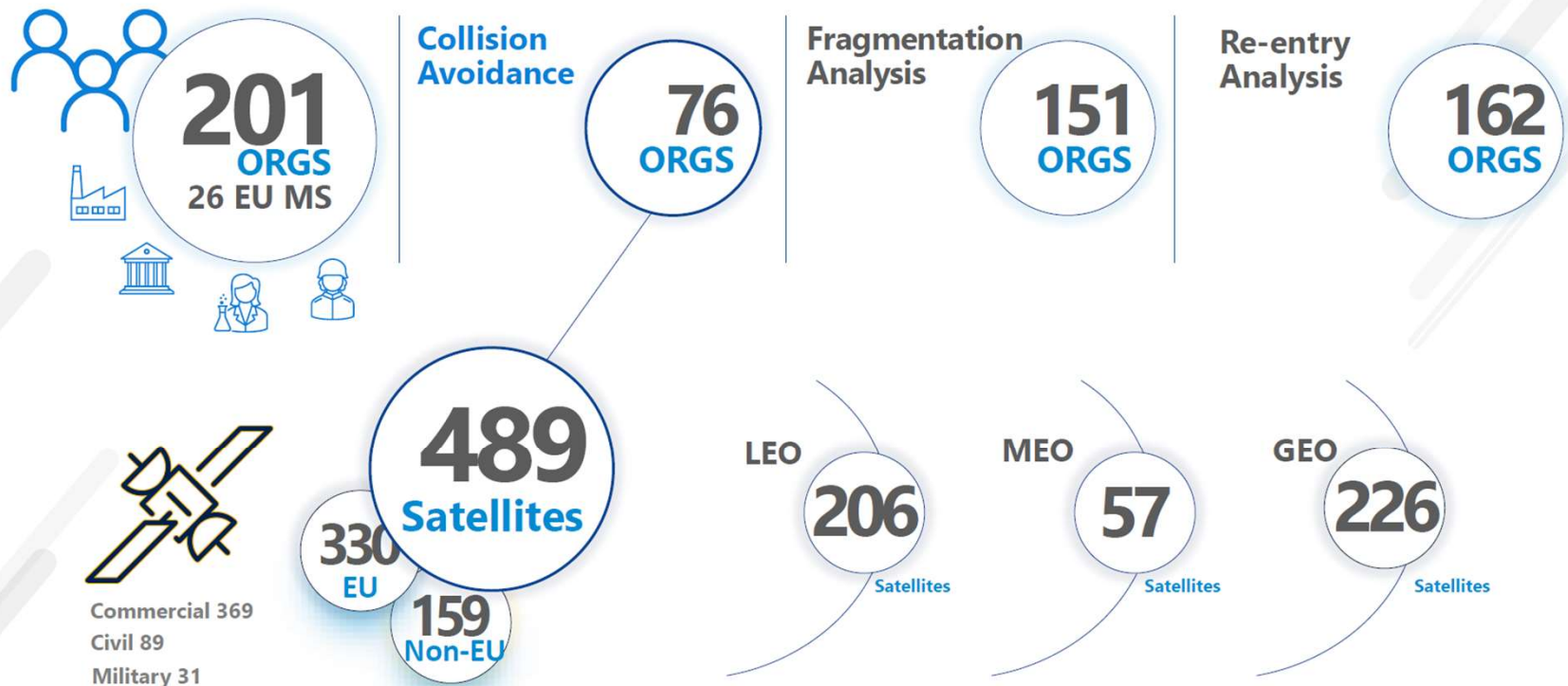
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Operations · Overview

EU SST ▪ Users & Satellites registered to CA

Conjunction Assessment Data Input types

- **Primary: OPS (uploaded ephemeris)**
  - Covariance uploaded in OEM
  - Synthetic Covariance using abacus model, from uploaded ephemeris history

- **Secondary: SPCAT**
  - TCA < 14 days. Usually, first warning received
  - No Covariance, No PoC

- **Secondary: CDM (from Space-track.org)**
  - Covariance from CDM

- **Secondary: CAT (EUSST measurements)**
  - Covariance from Observations and Orbit determination

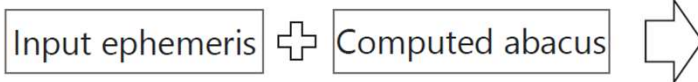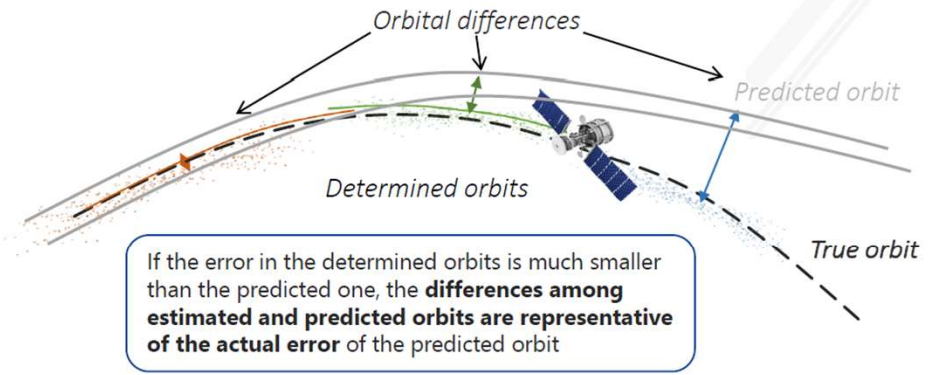CDM Management

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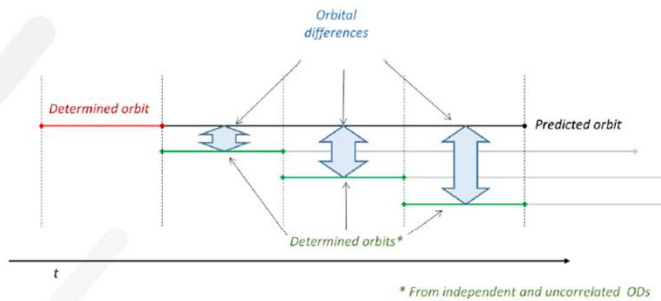 - Covariance uploaded in OEM
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Key concepts to understand EU SST CA service (3/3)

EU SST
Space Surveillance and Tracking

- O/O **ephemeris analysis** to enhance quality of CA service
  1. Computation of a covariance abacus: Covariance is **not usually provided** by most ephemerides sources or it might not be realistic, thus requiring methods to estimate it with no more information than sets of ephemerides

Orbital differences

Determined orbit

Predicted orbit

Determined orbits*

t

* From independent and uncorrelated ODs

Orbital differences

Predicted orbit

Determined orbits

True orbit

If the error in the determined orbits is much smaller than the predicted one, the **differences among estimated and predicted orbits are representative of the actual error** of the predicted orbit

Input ephemeris ➕ Computed abacus ➡ **OEM with covariance used for the CA analysis**

Conjunction Assessment Reports and Analysis

- **Warning and Alert levels set by operator**
  - Time to TCA,
  - Scaled Probability of Collision (Ks and Kp, 0.5 to 2.0)
  - Minimum Distance
  - Minimum Radial Distance

- **Warning or Alert Email**
  - Summary of all results for that event
  - Scaled Poc Analysis

- **Daily Summary Report**

- **EUSST Portal**
  - Geometry and Risk charts
  - Viewer
  - Communication Channel

Portal Demo

EUSST Portal – EUSST Portal

Case Astra 1M – Raduga
SummaryTable Raduga
SPOC_SES_GEO_Raduga

Case O3b M017 – SKIF-D
SummaryTable SKIFD
SPOC_SES_MEO SKIFD

Collision avoidance maneuver planning

- EUSST can suggest avoidance maneuver

- Planning assessment to consider operation and satellite constraints

- Conjunction assessment of post avoidance maneuver orbit needed

Developments

Current Developments

- **Open to international partners (non-EU satellite operators)**

- **User feedback and enhancements of the portal**

Planned Developments

- **Investigating offering Advanced Services**

- **Investigating SSA marketplace**

How does EUSST compare?

- **EUSST benefits**
  - Independent Sensors for OPS vs. CAT screening
  - Additional Analyses: Scaled PoC, Hard Body Radius and Covariance analysis
  - Summary Events page, Risk and Distance Evolution plots, Customizable User Interface
  - Continuous Improvement of the Service and Portal from User Feedback

- **Drawbacks vs. Space Data Center**
  - No access to OPS/OPS screening of other operator uploaded ephemeris.
  - Same False Alarms for Active Station-kept satellites

- **Drawback vs. Space-track/CSpOC**
  - Initial warning using SP screening and CDM

Rather than the operator decide between different results from different systems and inputs

Share and merge observations and include predicted maneuvers to build the best ephemeris and the most realistic covariance