What is EU SST?

- **Fully-fledged sub-component** of the EU Space Programme 2021-2027
- **Inherently dual governance** structure in place in which civilian, military and security actors collaborate, which enables to operate effectively taking into account the **security** dimension of the SSA domain

**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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Strategy • Five priorities

1. We are fully operational 24/7 and deliver public services to users (collision avoidance, re-entry and fragmentation analysis) to ensure a minimum level of space safety and sustainability.

2. Perform research and development of SST capabilities to improve the level of performance and strategic autonomy.

3. Foster innovation and competitiveness of the European industry and start-ups, we support the consolidation of a commercial ecosystem around SSA, strengthening strategic autonomy in Europe.

4. Exploit synergies between civil and defense, avoid unnecessary duplications, and join forces in order to improve the level of European strategic autonomy.

5. Engage with international partners and contribute to the global burden sharing of the SSA domain through a regional SSA approach.
Governance • Progressive expansion of the Partnership

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<tr>
<th>No.</th>
<th>Country</th>
<th>Name and Title</th>
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<td>1.</td>
<td>France</td>
<td>Dr. Philippe Baptiste, Chief Executive Officer, CNES</td>
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<td>2.</td>
<td>Germany</td>
<td>Dr. Walther Pelzer, Head of the German Space Agency, DLR</td>
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<td>3.</td>
<td>Italy</td>
<td>Ing. Giorgio Saccoccia, President, ASI</td>
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<td>4.</td>
<td>Spain</td>
<td>Mr. Francisco Javier Ponce Martínez, Director General, CDTI</td>
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<td>5.</td>
<td>Poland</td>
<td>Prof. Dr hab. Grzegorz Wrochna, President, POLSA</td>
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<td>6.</td>
<td>Portugal</td>
<td>Mr. Vasco Manuel Dias Costa Hilário, Director General, DGRDN, Ministry of National Defense</td>
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<td>7.</td>
<td>Romania</td>
<td>Dr. Fiz. Marius-Ioan Piso, President and CEO, ROSA</td>
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<td>8.</td>
<td>Austria</td>
<td>Dr. Henrietta Egerth-Stadlhuber and Dr. Klaus Pseiner, Managing Directors, Austrian Research Promotion Agency (FFG)</td>
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<td>9.</td>
<td>Czech Republic</td>
<td>Mr. Martin Kupka, Minister of Transport, Ministry of Transport (MDCR)</td>
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<td>10.</td>
<td>Denmark</td>
<td>Colonel Henrik Hegner Nielsen, Chief of Staff, Air Command Denmark, Royal Danish Air Force</td>
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<td>11.</td>
<td>Finland</td>
<td>Dr. Jussi Kaurola, Director General, Finnish Meteorological Institute (FMI)</td>
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<td>12.</td>
<td>Greece</td>
<td>Prof. Emmanouil Plionis, Director and President of the BoD of NOA, National Observatory of Athens (NOA)</td>
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<td>14.</td>
<td>Netherlands</td>
<td>Mr. Micky Adriaansens, Minister, Ministry of Economic Affairs and Climate Policy</td>
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<td>15.</td>
<td>Sweden</td>
<td>Mrs. Anna Rathsman, Director-General, Swedish National Space Agency (SNSA)</td>
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2015/6/16: founders (Brexit: UK left EU SST in 2020)

2018/12/27: 1st enlargement

2022/11/11: 2nd enlargement

Sensitive unclassified
The **dual governance model** allows for **addressing and preserving sovereign security interests** of the participating Member States within a civilian framework, which is key to the success of any future multilateral SSA or STM initiative.

**How do we take into account duality?**

- EU SST ensures that sovereign security concerns are addressed through the participation of **ministry of defense** representatives and **national security authorities** in all strategic decisions in both the Steering Committee and the Security Committee.

- EU SST integrates and leverages **military and civil operational SST capabilities** from the participating Member States, including sensors, operations centers and personnel.

- EU SST also deals with the security interests of the **respective partners and allies** of the participating Member States regarding the use and exchange of SST data and information by the Partnership through an internal Data Policy and security classification guidelines.
Security - Cybersecurity measures

• The cyber security of the EU Space Programme is critical as it mitigates threats to network and information systems used to provide essential services in key sectors contributing to the Union’s security and to the effective functioning of its economy and society. The recent debates in the Space regulation and EU Space Law are perfect examples of this.

• Strong measures have been put in place to create a cyber-secured architecture to ensure the confidentiality, integrity and availability of EU SST data and services:
  • A rigorous choice of hardware and software solutions, strictly justified in terms of needs;
  • Protection measures for the EU SST system network, databases and other critical physical infrastructures;
  • The check of the innocuousness of data shared via EU SST;
  • User management of EU SST services to control exchanges and access to EUSST public data

• With these measures, overseen by the Security Committee, EU SST is fully committed to follow European Union directives on cybersecurity similarly to the other European flagship components of the EU Space Programme
Operations - Overview

Sensor network

- Member States sensor operation & control + correlation
- Commercial data + correlation
- Coordinated planner (COPLA)

Data processing

- Member States databases & catalogues in LEO, MEO, GEO
- EU SST database & catalogue

Service provision

- CA Service
- RE Service
- FG Service
- Front Desk
- Users

Tasking Requests

High Interest Events
Sensors • 12 military, 19 civil, 9 commercial sensors

Dual approach which enables the use of sensors of different origins: military, civil and commercial

EU SST network is regularly evolving, see https://www.eusst.eu/about-us/

Crucial contribution of military sensors which account for 97% of measurements shared in EU SST

Updated as of 15/10/2023
Sensitive unclassified
Service provision - three public services

Collision Avoidance (CA)
Risk assessment of collision and generation of collision avoidance alerts

Fragmentation Analysis (FG)
Detection and characterisation of in-orbit fragmentations

Re-entry Analysis (RE)
Prediction of space objects re-entry into the Earth's atmosphere

Key features
- Provided by ES (S3TOC) and FR (FR-SSA)
- Hot redundancy scheme with harmonised service level and single service provider per registered user
- Enhanced Analysis & Risk Mitigation support (e.g. covariance estimations, HBR estimations, PoC sensitivity analysis, CAM support)
- Provided by IT (C-SSA)
- Short-term notification to confirm quickly an FG event
- Medium-term FG analysis based on the orbital parameters of the catalogued fragments e.g. Gabbard Diagram
- Long-term FG analysis (with simulations with breakup model)
- Provided by IT (C-SSA)
- Long-term (within 30 days) re-entry predictions
- Short-term (a few days) overflight predictions with ground tracks over customisable areas of interest
Service provision - Users

- **202 ORGS**
  - 23 EU MS

- **64 ORGS**
  - Collision Avoidance

- **155 ORGS**
  - Fragmentation Analysis

- **161 ORGS**
  - Re-entry Analysis

- **419 Satellites**

Updated as of 15/10/2023

Sensitive unclassified
Service provision - Users

419 satellites

Optsat-3000
SAR-LUPE 1, 2, 3, 4, 5
BIROS
Tandem-X, Terrasar-X
PAZ
Brik-II
CHEOPS
METOP B, C
SENTINEL 1A, 1B, 2A, 2B, 3A, 3B, 4A, 6A
DEIMOS 1, 2
FossaSat 2B, 12, 13, 14, 15, 16, 17
ION-SCV 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
NEPT-1
Reaktor HW, Sunstorm, W-CUBE
Spartan, Platform 1, 2
Urdaneta, Geo-sat pre.
Suomi-100
TRISAT
UPMSat-2
NEMO-HD

C50-1, 2
CERES 1, 2
VENuS, SARAL
CALIPSO
JASON 3
PLEIDAS 1A, 1B
SMOS
ANGELS, EYESAT
SWOT
NESS
BRITE PL-1, PL-2
Odin, GMS-T, MATS
GomX-6A, 4B
XR-1, ICEYE-X1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 30
HIVE01
Spacevan-001
Star Vibe
Arthus-1, Gregoire
PLATINO-1
Protomethee

DELFII C3, NIXT, PQ
HUMSAT-2D, LUME-1
Robusta 18
AIISat 1, 2
NorSat 1, 2, 3, TD
ELO3, 4
YAM-2, 3, 5
Globalstar M065, M066, M069, M070, M071, M072, M073, M074, M075, M076, M077, M078, M079, M080, M081, M082, M083, M084, M085, M086, M088, M089, M090, M091, M092, M093, M094, M095, M096, M097, M098

Updated as of 15/10/2023

Commercial 313
Sensitive unclassified

Civil 83

Military 23

29 new SC since 05/07:
Armasat1 Urdaneta, Gei-Sat precursor, Astrocast 01/02/101/102/103/104/105 201/202/203/204/205/301/302/303/304
Arthur-1, Gregoire, Optsat-3000, Droid.001, Iceteye-X23/X25/X26/X30, PLATINO-1. Ion SCV-011, Protomethee
11 removed SC:
Aeolus, EUTE 28B, NSS-6, FossaSat2E1/2/3/4/5/6/7/11

ATHENA-FIDUS
SYRCASE 3A, 3B, 4A, 48
HELLAS-SAT 2, 3, 4
EUTE 10A, 16A, 17A, 28B, 36B, 3B, 65W, 7WA, 70B, 7A, 7B, 8WB, 9A, 9B, HB 13B, 13C, 13D, KASAT 9A, 12WB, 172B, 7C, 5 WEST B, Konnetc, Quantum, KHVTS, HB13F, HB13G, E1B0, INMARSAT 3F1, 3F2, 3F3, 3F5, 4A, 4B, 4F3, 4F1, 5F1, 5F2, 5F3, 5F4, GXS, 6F1, 6F2
VIASAT 1, 2, Wildblue 1
Thur 5, 6, 7

GEO

GSAT / Galileo
0101, 0102, 0103, 0104,
0201, 0202, 0203, 0204,
0205, 0206, 0208, 0209,
0210, 0211, 0207, 0212,
0213, 0214, 0215, 0216,
0217, 0218, 0219, 0220,
0221, 0222, 0223, 0224
03B FM, O3B FM 2, 3, 4,
5, 6, 7, 8, 9, 10, 11, 12, 13,
14, 15, 16, 17, 18, 19, 20,
mPower 1, 2, 3, 4, 5, 6
ALPHA

CELESTA, MT-Cube-2
TRISAT-R

LEO

MEO

GEO

185
Strategic autonomy • Foreseen performance evolution

Higher autonomy in cataloguing

2028 Timeframe

LEO Cataloguing performance
• 50% of the objects above 7 cm
• 65% above 10 cm (catalogue 12 000 objects)

MEO Cataloguing performance
• Not yet evaluated, expectations are all objects above 35 cm

GEO Cataloguing performance
• All objects above 35 cm

LEO Cataloguing performance
• 25% of the objects above 10 cm (around 4600 objects)

MEO Cataloguing performance
• Around 50% of the objects above 35 cm

GEO Cataloguing performance
• All objects above 35 cm

Re-entry analysis (RE)
Fragmentation analysis (FR)
Collision avoidance (CA)
Cataloguing (CAT)

Simulations in 2024 to be revised after inclusion of commercial SST sensors

2023 Timeframe

< 10cm | > 10cm | > 50cm | > 1m
None | ~25% | ~85% | ~100%

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Strategic autonomy • Upgrade of MS sensors

- **Total national investment of ~250 M€**, among which 28 M€ of EU funding
  → High level of Member States (MS) co-funding between 55% and 90%+

- Radar capabilities
- Optical sensor capabilities
Competitiveness • EU Industry and Start-ups Forum

- Jointly with European Commission, EU SST has established the European Union Industry and Start-ups Forum on Space Traffic Management (EISF) in April 2022 to foster a dialogue with European industry and start-ups.
- Already 4 editions of the EISF in one year, with a 5th one planned for November 15th, 2023, with 150 to 200 participants from more than 40 European companies.
- EISF helps promoting opportunities for the industry and start-ups with the participation of representatives from the European Defence Fund, Cassini Fund, IOD/IOV, etc.
- The work has led to concrete recommendations for the total budget of 70 M€ in open European calls - 18 M€ on commercial data provision, 30 M€ for the development of commercial sensors, and 22 M€ on R&D activities.

2nd EISF, November 24 2022

4th EISF, May 23-24 2023
Competitiveness • Commercial SSA capabilities

• EU funding 48 M€

• Provision of commercial SSA data for EU SST operations
  • Budget: 18M€ (100% of EU funding)

• Development of SSA commercial sensors (total investment of upgrade: 67 M€)
  • Budget: 30M€ (45% of EU co-funding)
    • Investment on optical sensors: 4M€
    • Investment on radars, SBSS, passive ranging, others: 26M€
    • Criteria of co-funding: at least 55% from industry

• EU SST acts as a public anchor customer for SST commercial data in order to support the competitiveness of European industry and start-ups while increasing the performance and strategic autonomy in the SST domain

• EU SST acts as a public investor for innovative commercial sensors owned by the industry and start-ups, under specific criteria of co-funding, in order to acquire future data coming from those newly built commercial sensors at best conditions for the first years (virtuous circle)
R&D plan on SST

Contracts Information
- Mostly open tender competition, with few exceptions
- Estimated Calls Opening Date: Between last semester of 2023 and first semester of 2024

Targets
- Improving EU SST capabilities
- Fostering EU industry innovation
- Increase EU industry competitiveness within the global SST ecosystem
- Improving EU autonomy in SSA

How To
- Developing cross transversal technologies
- Enhancing cooperation between EU SST and EU industry
- Maintaining a certain level of capabilities within EU SST to ensure safety and security of operations

R&D activities: 22 M€

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<td>R&amp;D on propagation</td>
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<td>Architecture design (FR)</td>
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<td>Architecture design (ES)</td>
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<td>R&amp;D on CA (FR)</td>
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<td>R&amp;D on CA (ES)</td>
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<td>R&amp;D on lasers</td>
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<td>R&amp;D on maneuver detection</td>
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<td>R&amp;D on RE and FG</td>
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<td>Monitoring rate</td>
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<td>R&amp;D on attitude estimation</td>
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<td>R&amp;D on radio-frequency</td>
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<td>Horizon scanning</td>
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<td>Population hazardous object</td>
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<td>Architecture twin concept (FR)</td>
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<td>R&amp;D on DB &amp; CAT</td>
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<td>R&amp;D commercial use</td>
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<td>DLT added value</td>
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International engagement

- EU SST engages with international partners and contributes to the global burden sharing of the SSA domain through a regional SSA approach.

- Regular exchanges at expert level with the Office of Space Commerce (US DoC):
  - Successful joint EU-US SSA data sharing experiment, aimed at evaluating and quantifying the benefits and challenges of data sharing.
  - Future experiments to be conducted.

- Towards a global federated coordination between regional operational SSA systems.

Source: SpaceNews

Source: Breaking Defense
Summary

• EU SST considered as the **operational capability** for the EU STM approach (cf. *Joint Communication on STM, Council Conclusions on STM*).

• Europe is very far from autonomy in SST capabilities for security and defense. Therefore, priority is to develop a **strategic autonomy** in space surveillance and tracking of space objects in all orbit regimes.

• Priority is also to rely more and more on our **vibrant and energized commercial industry and start-ups ecosystem** in Europe, contributing to strategic autonomy.

• EU SST has an inherently **dual governance structure**, competent on security topics such as sharing of SST data.

• Lack of funding considering the tremendous challenges ahead of us. We need to exploit synergies between **civil and defense**, avoid unnecessary duplications, and join forces in order to improve the level of European strategic autonomy.
Thank you!

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