EDAS-N Service Analysis

Workshop on Horizon 2020 EGNSS Mission And Services

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deimos elecnor group

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AGENDA

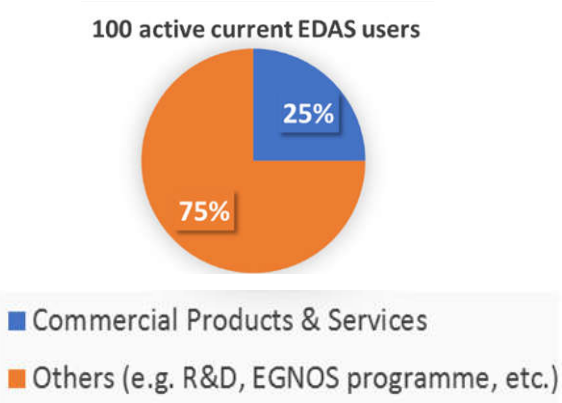
- Context to the topic and goals
- Overview of the project
- User domain analysis
- New proposed EDAS-N services
- Challenges
- Conclusions and recommendations

Context to the topic and goals

Image: ESA

CONTEXT OF THE PROJECT AND GOALS

The **EGNOS Data Access Service (EDAS)** provides EGNOS data to users who have a communication channel available but do not continuously receive the signal in space from the EGNOS geostationary satellites. EDAS users can obtain **improved performance** and **data with greater added value** (e.g. RIMS data, DGNSS and RTK data, etc.) with respect to EGNOS Open Service.



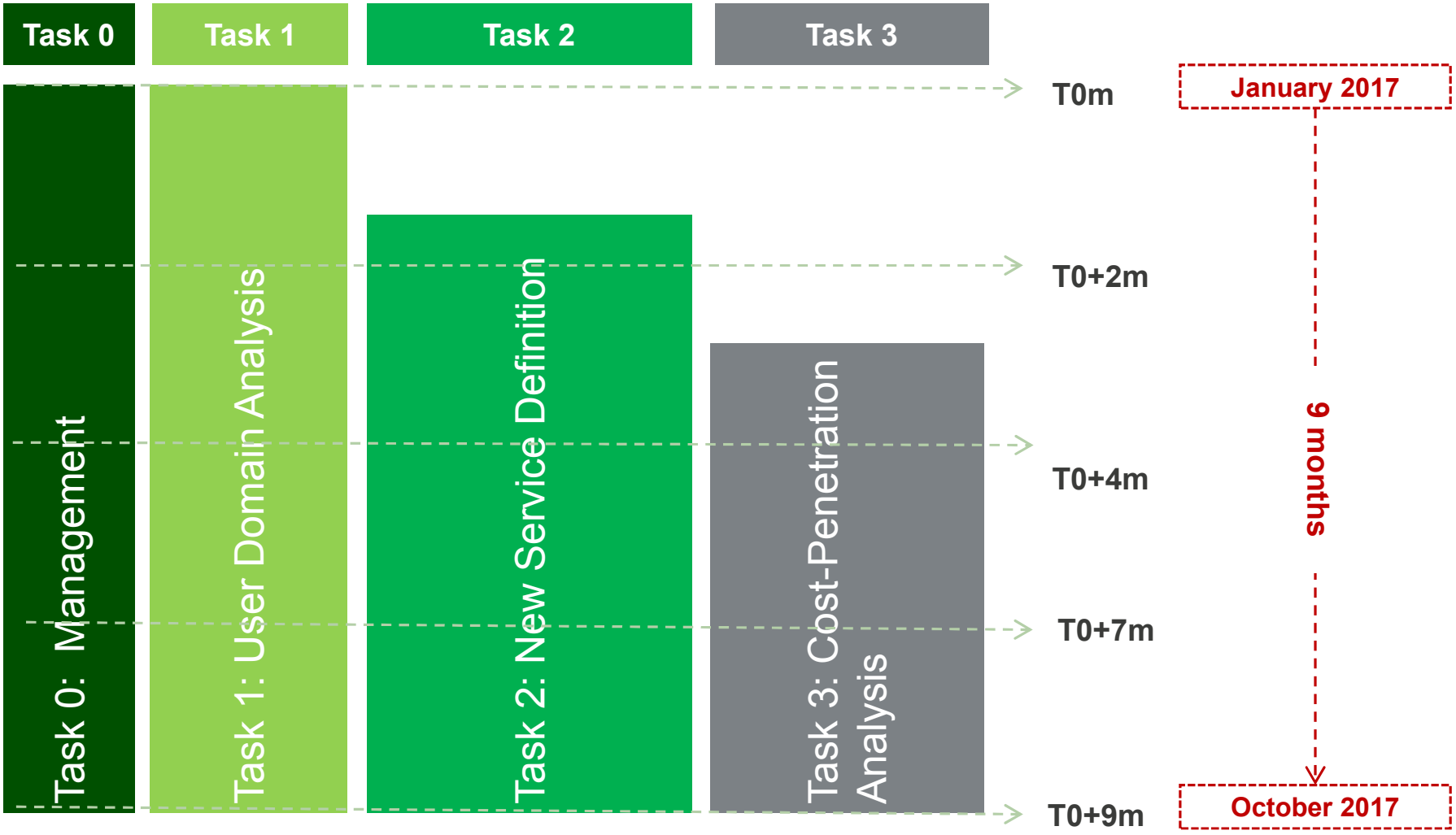
The EGNOS EDAS Service Analysis (**EDAS-N**) studied the potential **evolution** of EDAS in the timeframe **2020+**. EDAS will be modified to add new EGNOS V3 data due to the **augmentation of Galileo**: what other additional features could be included to generate **attractive new EDAS services** for **users** or for **added-value service providers***?

*added-value service providers use EDAS data as part of their services or commercial products for specific applications (e.g. precise agriculture, tracking of dangerous goods)

Image: ESA/P. Carril

Overview of the project

OVERVIEW OF THE PROJECT



User Domain Analysis

Image: ESA

6 FOCUS MARKET SEGMENTS FOR EDAS-N

Agriculture

- Tractor Guidance
- VRT/Automatic Steering
- Asset Management
- Forestry Solutions

Aviation

- GNSS performance monitoring
- Airport management

Maritime

- RIS backup system
- Innovative RIS applications
- SOLAS Navigation Open Water/Coastal
- SOLAS Navigation Open Harbour/Docking

Road

- Autonomous Driving
- Transport of Dangerous Goods

Surveying

- Cadastral in urban environments
- Cadastral in rural environments
- Machine control

Others

- R&D activities
- EGNOS / GNSS performance monitoring
- GNSS algorithms and new development

FOCUS MARKETS OF EDAS-N SERVICES

LBS

- Urban-environment LBS applications
- LBS-based payment applications

Rail

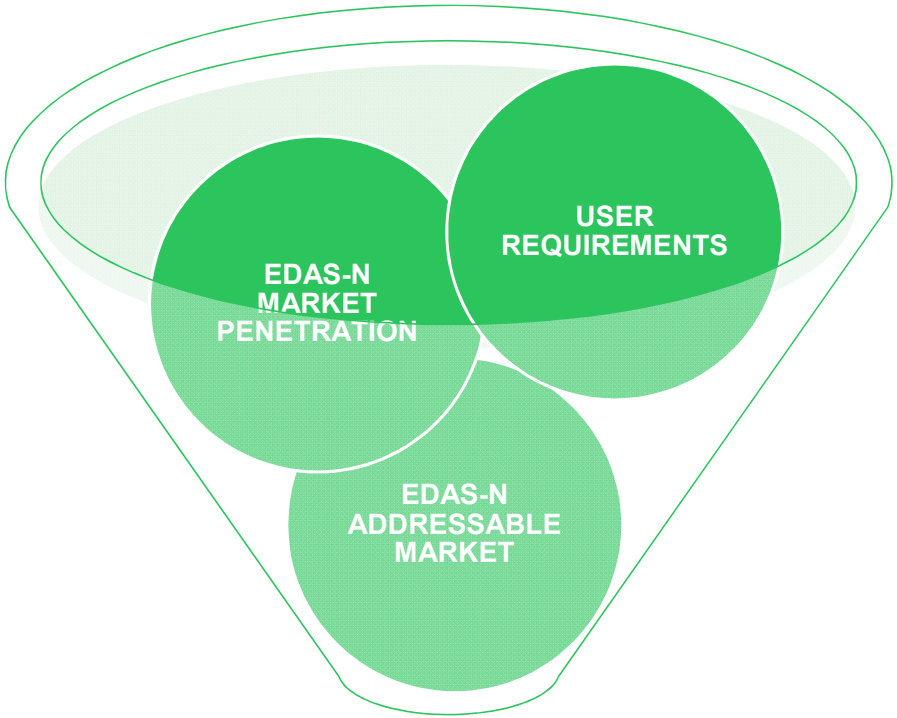
- Virtual balises
- Monitoring of train length

T&S

- 5G phase/time synchronisation for backhaul
- Financial Operators – Time Stamping

NO FEEDBACK AVAILABLE

ENGAGEMENT OF STAKEHOLDERS IN THE SERVICE DEFINITION



EDAS-N Direct and Indirect Users per sector

CONSULTATION PHASE 1 (DELPHI 1):
A.1 USER REQUIREMENTS PER APPLICATION
B.1 EDAS-N SERVICES' DEFINITION

CONSULTATION PHASE 2 (DELPHI 2):
A.2 USER REQUIREMENTS PER APPLICATION
B.2 EDAS-N SERVICES' DEFINITIONS
C.1 EDAS-N MARKET PENETRATION

FINAL GROUP DISCUSSION (DELPHI 3):
C.2 EDAS-N MARKET PENETRATION
D.1 VALIDATION OF RESULTS

24 **Applications** considered in 9 markets

11 **New EDAS-N** Services

34 **Stakeholders'** involved in the Delphi process

EDAS-N ADDRESSABLE MARKET

Agriculture

46 Potential EDAS users

Potential pool of **+292,000 users/applications** by 2030

Aviation

28 Potential EDAS users

Maritime

58 Potential EDAS users

Potential pool of **+35,000 vessels** by 2030

Road

11 Potential EDAS users

Potential pool of **+320,000 vehicles** by 2030

Others

363 Potential EDAS users

Surveying

46 Potential EDAS users

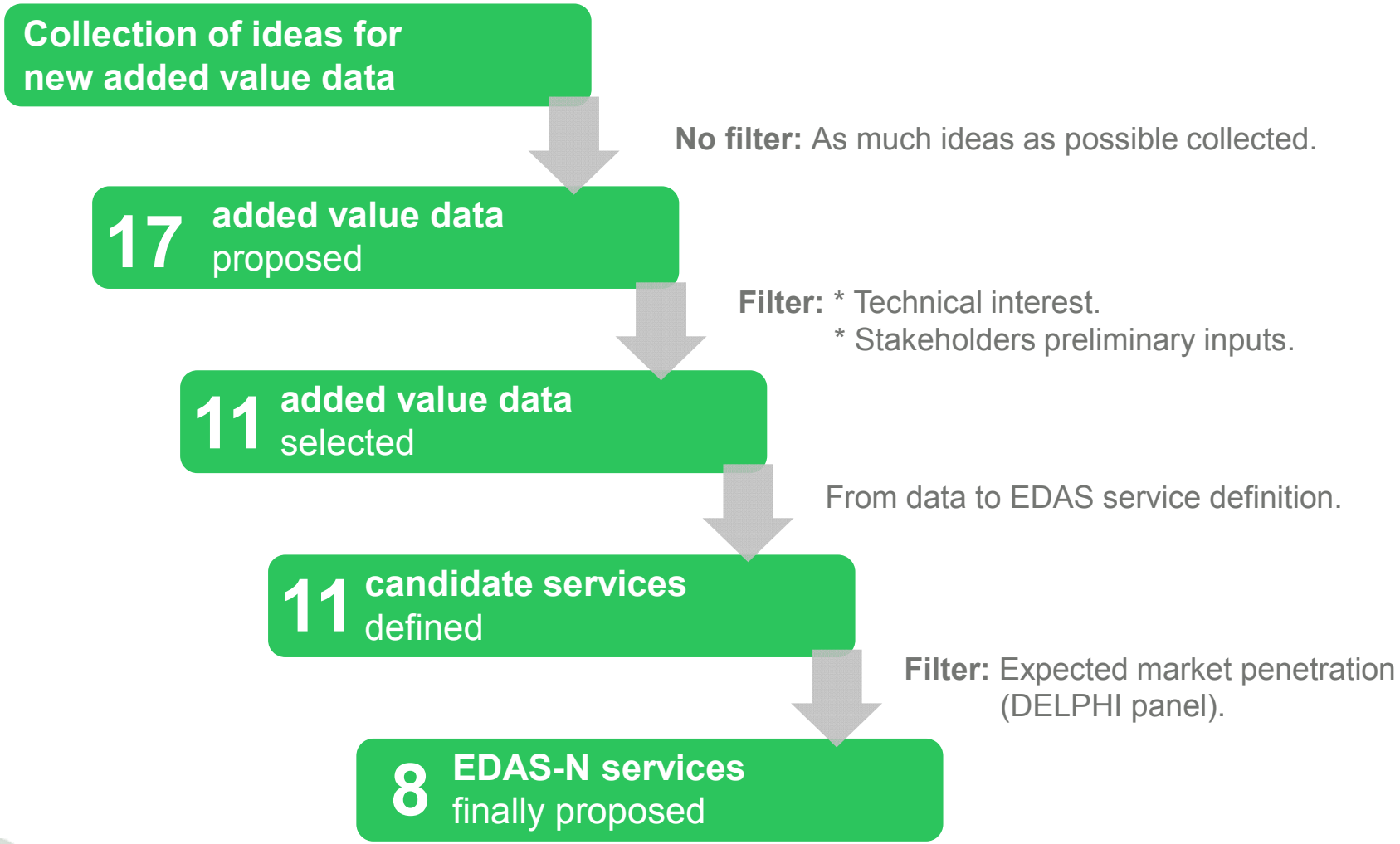
Potential pool of **+200,000 users/applications** by2030

EDAS users are ANSPs, Maritime authorities, developers of GNSS algorithms, providers of precise positioning services, etc.

Image: ESA/P. Carril

New proposed EDAS-N services

SERVICES DEFINITION PROCESS



EDAS-N MARKET OVERVIEW IN 2030

01 ARAIM ISMs

02 SPACE WEATHER NOTICES

03 VRS DGNSS CORRECTIONS

04 SATELLITE ALERTS

05 DEMONSTRATION CHANNEL

06 AUTHENTICATED EGNOS MESSAGE

07 GALILEO SENSOR STATIONS RAW DATA

08 STATIONS STATUS

09 EGNOS AUGMENTATION MESSAGES THROUGH NTRIP

10 PRECISE POINT POSITIONING

11 NETWORK TIME PROTOCOL TIMING

Prioritised services

Non-prioritised services

WHAT SERVICES AND WHY ARE THEY PROPOSED?

02 SPACE WEATHER NOTICES

Provision of space weather notices and the monitoring of the real-time ionosphere.

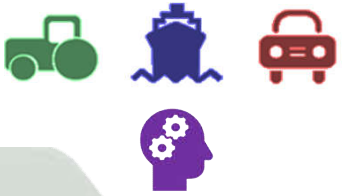
- Support service providers (such as ANSPs) to monitor GNSS environmental conditions.
- Allow the integration of space weather information on the receivers.

03 VRS DGNSS CORRECTIONS

Dissemination of DGNSS corrections for virtual locations requested by the users.

- Make DGNSS corrections available anywhere in EGNOS service area, allowing, in particular, to get rid of dedicated infrastructure in DGNSS base stations.

04 SATELLITE ALERTS



Provision of satellite alerts based on EGNOS internal barriers flags.

- Allow the integration of EGNOS satellite status flags (alerts) on the receivers.

WHAT SERVICES AND WHY ARE THEY PROPOSED?

06 AUTHENTICATED EGNOS MESSAGES

Dissemination of an authenticable sequence of SBAS messages introducing the authentication credits on the SBAS messages themselves or through the emulation of another signal that would be used for authentication purposes.

- Support EGNOS applications requiring SBAS message originator verification.
- A test-bed to decide/design a potential implementation in EGNOS SIS.

07 GALILEO SENSOR STATIONS RAW DATA

Provision of Galileo Sensor Station raw data

- Make available the raw measurements from a reliable and resilient worldwide network of stations.
- Cover the gap between private networks and public networks provided in a best effort basis.

WHAT SERVICES AND WHY ARE THEY PROPOSED?

08 STATIONS STATUS

Provision of EGNOS stations status based on EGNOS internal barriers flags.

- Allow the integration of EGNOS stations status flags on the receivers.

09 EGNOS AUGMENTATION MESSAGES THROUGH NTRIP

Provision of the EGNOS augmentation messages through the widely used RTCM/NTRIP protocol/format.

- Foster EGNOS usage facilitating the access to the EGNOS messages.

10 PRECISE POINT POSITIONING

Provision of PPP corrections for GPS and Galileo and for both L1/L5 and E1/E5A signals. Ionospheric corrections would be provided to allow single frequency PPP and to reduce the dual-frequency PPP convergence time.

- Support the demand for high accuracy applications.

EDAS-N EVOLUTION SCENARIO

8 **new** added-value services

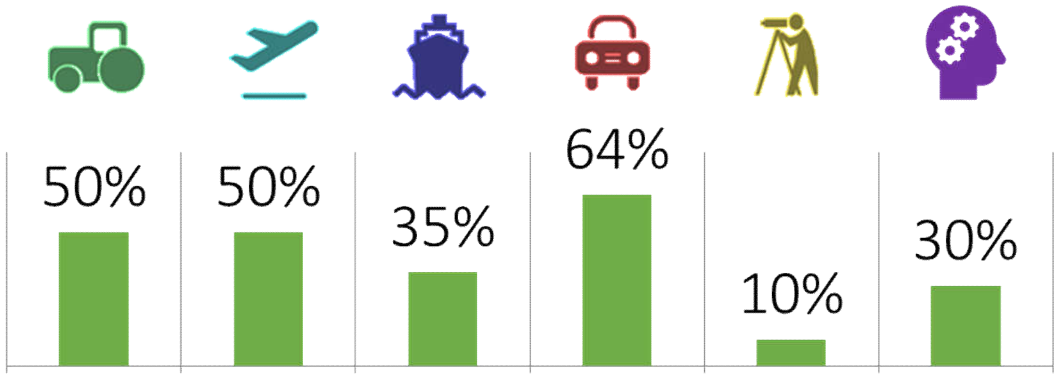
45 **direct users** that sell **commercial products and services**

178 potential **direct users** including

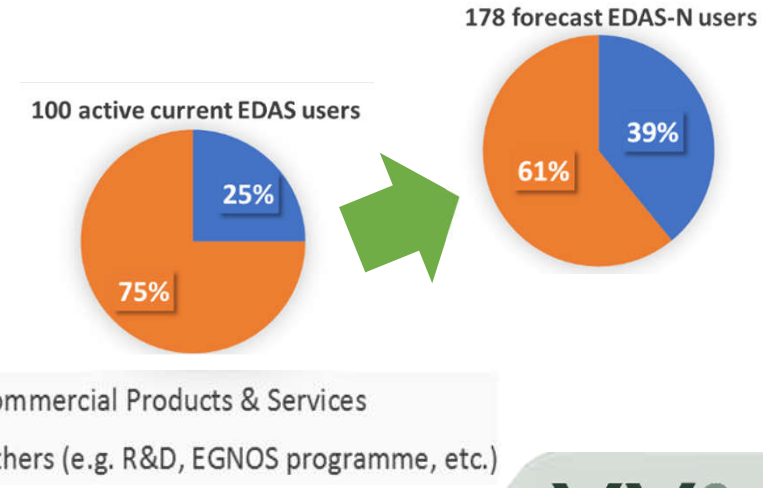
350,000 potential pool of **indirect users**

EDAS-N SERVICES
EGNOS-based VRS DGNSS
Authenticated EGNOS Messages
Galileo Sensor Stations Data
Precise Point Positioning
Satellite Alerts
Reference Station Status
Space Weather Notices
EGNOS Messages through NTRIP

2030+ Market penetration forecast of EDAS-N Service Evolution



	Agriculture	Aviation	Maritime	Road	Surveying	Others
Direct users	23	14	20	7	5	109
Indirect users	146,000	N/A	11,000	173,000	20,000	N/A



Challenges and recommendations

Image: ESA

CHALLENGES OF THE PROJECT and RECOMMENDATIONS

- The TRANSVERSAL NATURE OF EDAS-N SERVICES (space weather alerts, authentication service, etc.) required repeated interactions with the stakeholders to explain the scope of EDAS, the new EDAS-N services and their potential added-value.

- The DIFFICULTY TO ENGAGE SOME STAKEHOLDERS who considered EDAS-N SERVICES (VRS DGNSS and PPP) as a competitor to their business (applications that require precise positioning).

- The DIFFICULTY TO QUANTIFY EDAS-N ADDED VALUE TO END USERS and its MARKET PENETRATION FORECAST IN 2030+.

→ AWARENESS ACTIVITIES OF EXISTING AND FUTURE EDAS SERVICES should be carried out regularly

CHALLENGES OF EDAS-N FUTURE IMPLEMENTATION

- **ENSURE AVAILABILITY OF EXTERNAL DATA** (e.g. Galileo data, Space Weather data, PPP data, etc.)

- **ANALYSE SECURITY ASPECTS** linked with the dissemination of EGNOS and Galileo data via EDAS

Image: ESA/P. Carril

Conclusions

CONCLUSIONS

EDAS-N project showed the importance and challenges of **BUILDING CONSENSUS and SHARING IDEAS** among **KEY GNSS STAKEHOLDERS.**

The outcome of the EDAS-N project will contribute to the definition of the evolution of the EGNOS mission:

EDAS-N → proposals for EDAS evolution →EGNOS Mission Requirement Document

Further information on EDAS-N project can be found here:

https://ec.europa.eu/growth/sectors/space/research/horizon-2020/edas-n_en

THANK YOU FOR YOUR ATTENTION

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