



EGNOS, it's there. Use it.

# EGNOS Multimodal Adoption Plan 2016

**EGNOS Adoption activities in aviation, maritime,  
rail, agriculture and surveying market segments**

EGNOS Service Provision Workshop  
Warsaw 27<sup>th</sup>-28<sup>th</sup> September 2016



European  
Global Navigation  
Satellite Systems  
Agency



Precise navigation,  
powered by Europe



# Table of Contents

- GSA Adoption Strategy overview
- EGNOS in Aviation
- EGNOS in Maritime
- EGNOS in Rail
- EGNOS in Agriculture
- EGNOS in Surveying

# EGNOS benefits European citizens and businesses

**EGNOS brings a huge range of public and commercial opportunities. Below are just a few examples of how EGNOS responds needs of the users in relevant segments**



Enables more access to small airports, increases safety and facilitates business across Europe.



Contributes to a more accurate, reliable and safer navigation



Increases the safety of signalling solutions and reduce costs of investments

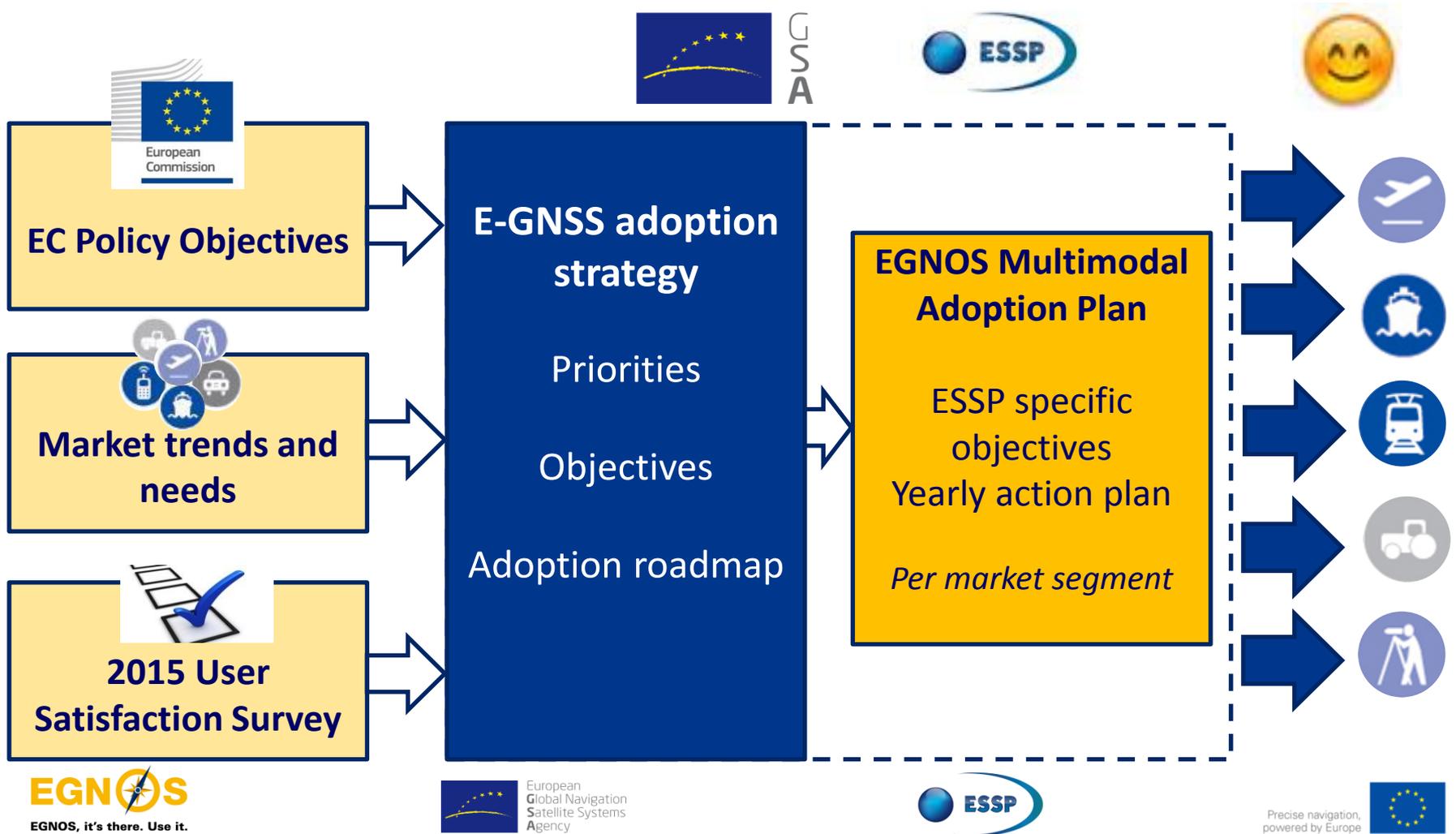


Enables precise spraying of fertilisers and pesticides, reducing the amount of chemicals



Improves accuracy to sub-meter level without investing in ground infrastructure

# Yearly EGNOS Multimodal Adoption Plan integrated in the GSA Adoption Strategy for E-GNSS



# Table of Contents

- GSA Adoption Strategy overview
- EGNOS in Aviation
- EGNOS in Maritime
- EGNOS in Rail
- EGNOS in Agriculture
- EGNOS in Surveying

# Table of Contents

## EGNOS in aviation

- EGNOS Multimodal Adoption Plan Priorities for 2016
- Objectives reached in 2015 & Objectives for 2016
- Tools & Actions placed to foster EGNOS adoption

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# EGNOS IN AVIATION

**GSA Priority**



## Navigation

Performance based navigation  
Navigation support in all phases of flight  
Fleet management



- Precise vertical guidance
- Safer landings at airports without ground infrastructure
- Increased airports capacity

## Surveillance

Reliable PVT for cooperative ADS-B  
Location Protocol Emergency locator  
& Personal Locator Beacon



- E-GNSS improves localization information on-board

## Communication

System and ATM synchronisation



- GNSS timing

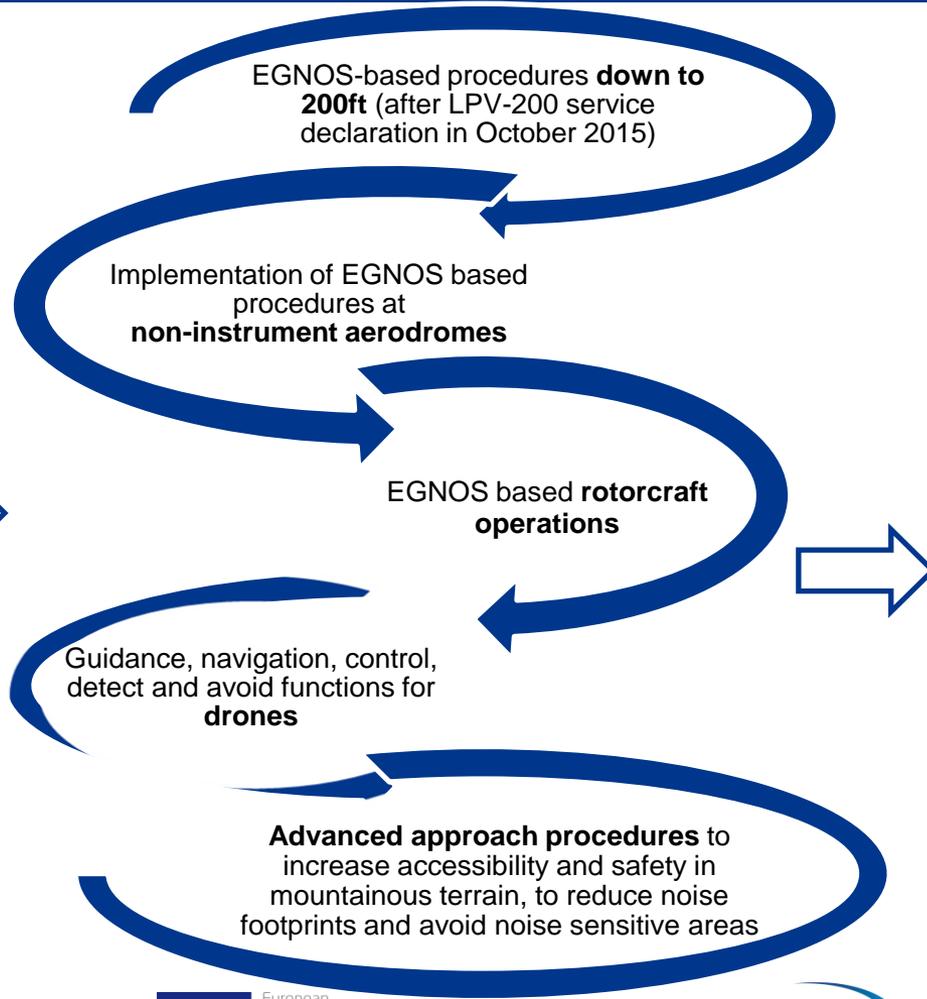




# EGNOS IN AVIATION

## Current market trends

EGNOS



**Performance Based Navigation** driving transition from traditional routing to GNSS navigation

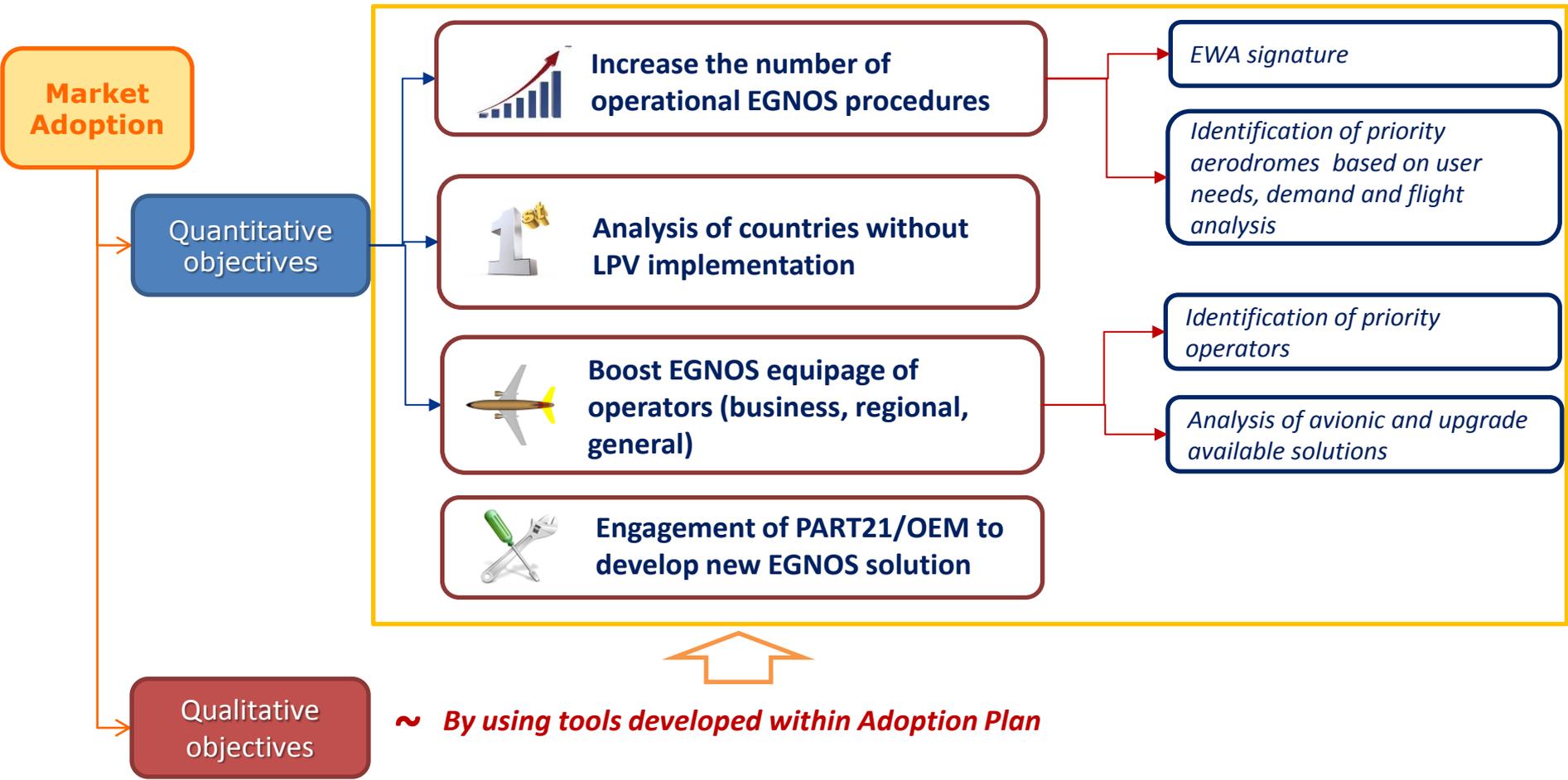
Solution for:

- Commercial, regional, business and general aviation
- Rotorcrafts, HEMS
- Drones



# AVIATION

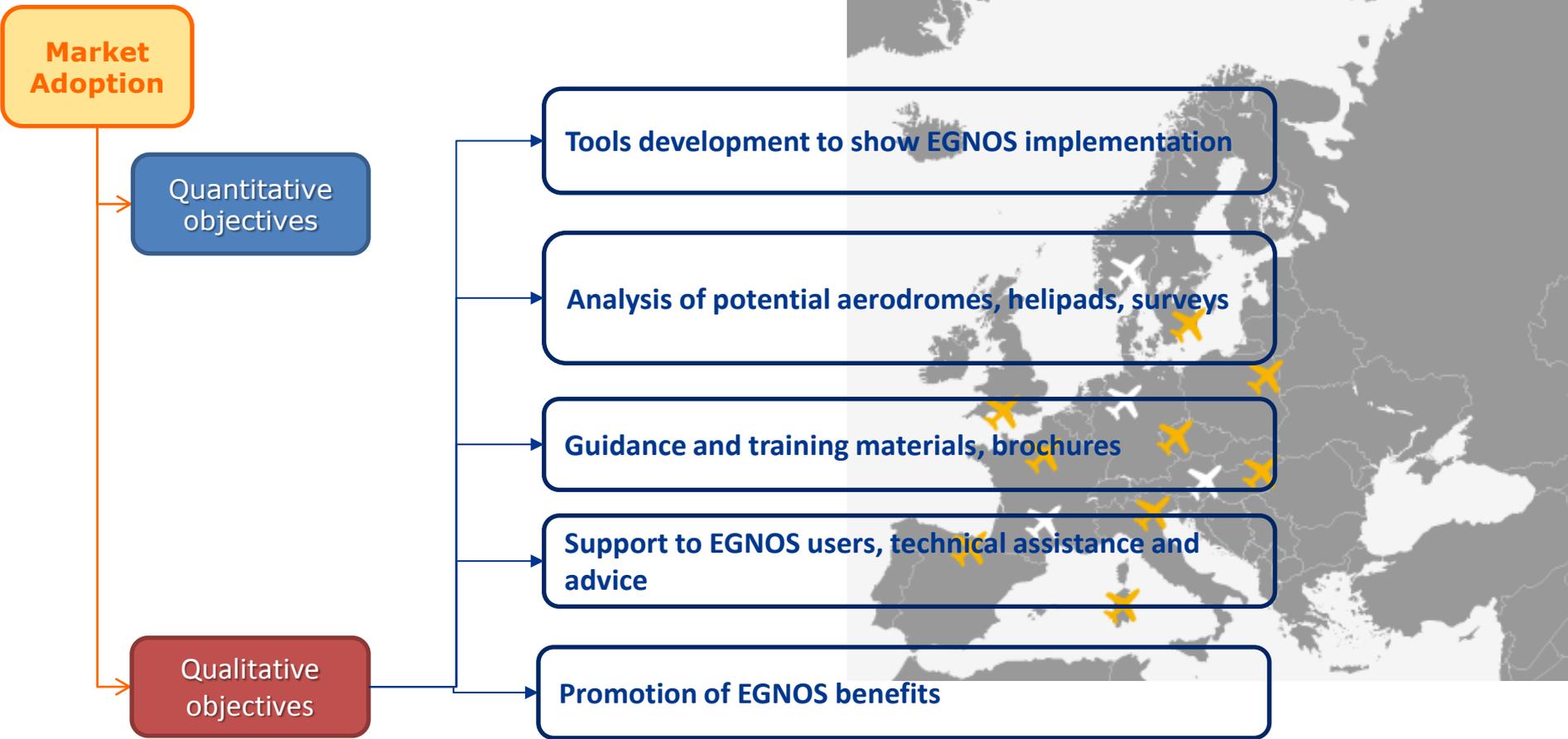
## EGNOS Multimodal Adoption plan 2016 Priorities (1/2)





# AVIATION

## EGNOS Multimodal Adoption plan 2016 Priorities (2/2)



# Table of Contents

## EGNOS in aviation

- EGNOS Multimodal Adoption Plan Priorities for 2016
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# AVIATION

## Objectives reached in 2015

**EWAs signed:**

12/12



**Operational LPVs:**

85/114



*(As per AIRAC Cycle #13 2015)*

**New planned LPVs :**

204/122



**Operational aircraft:**

11/20



**New planned aircraft:**

205/158





# AVIATION

## Objectives for 2016

### More EWAs signed

Target: **50** (cumulated)

Today: **47**



Yellow	Discussions paused
Green	Discussions on going
Blue	EWA signed
2	Number of published LPV procedures
White	No feedback

### More published LPVs

Target: **375** (cumulated)

Today: **296**

### More planned RWYs

Target: **233**

Today: **103**



### More approved A/C

Target: **62**

Today: **33**

### More planned A/C

Target: **100**

Today: **32**



# Table of Contents

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# AVIATION

## Actions placed to foster EGNOS adoption

### TECHNICAL WORK

- Active monitoring of LPV plans
- Operational Approval Guidelines
- LPV200 guidance material
- Identifying the STC retrofits available
- SBAS ops. for new manufactured a/c
- Business Cases and Cost-Benefit Analyses
- Technical support to GSA funded projects

Identification  
of relevant  
PoC

### PROMOTION

- Workshops
- Dedicated meetings and awareness actions
- Articles in magazines
- Emails/calls
- Events participation

more EWAs, more LPVs published, more aircrafts certified .....



# AVIATION

## Connecting SBAS capabilities on air & in land

### ANALYSIS OF HISTORICAL FLIGHT PLANS



### RESEARCH ON A/C SBAS CAPABILITIES



### AIRLINES DESTINATIONS SERVED BY LPVs



Capabilities offered to the contacts established  
Specifically done to engage Estonia, Luxembourg and Latvia



# AVIATION

## Pilot training: simulators on the pitfall

### Flight Simulation Training Devices

- **These play a key role in FCL**
  - *New Air Crew regulation: RNP APCH added in FSTD qualification*
- **Identification of principal manufacturers and operators in EU: identification of industry's readiness**
- **Develop material** to facilitate that adequate references on EGNOS are available to ATOs and air operators, covering all aspects of pilot training.



*LPV demonstrator at WAC 2016*



# AVIATION

## Helicopters: paving the way for PinS

### CAT H and Point in Space LPV approaches

- 1. Identification and characterisation of landing sites:** airspace classification, ATS availability, infrastructure, location
- 2. Identification of operators:** SAR, HEMS, offshore (REGA, AirGreen, Norsk Ambulance, CHC, DRF, Bristow, NHV...)
- 3. Identification of challenges for implementation**



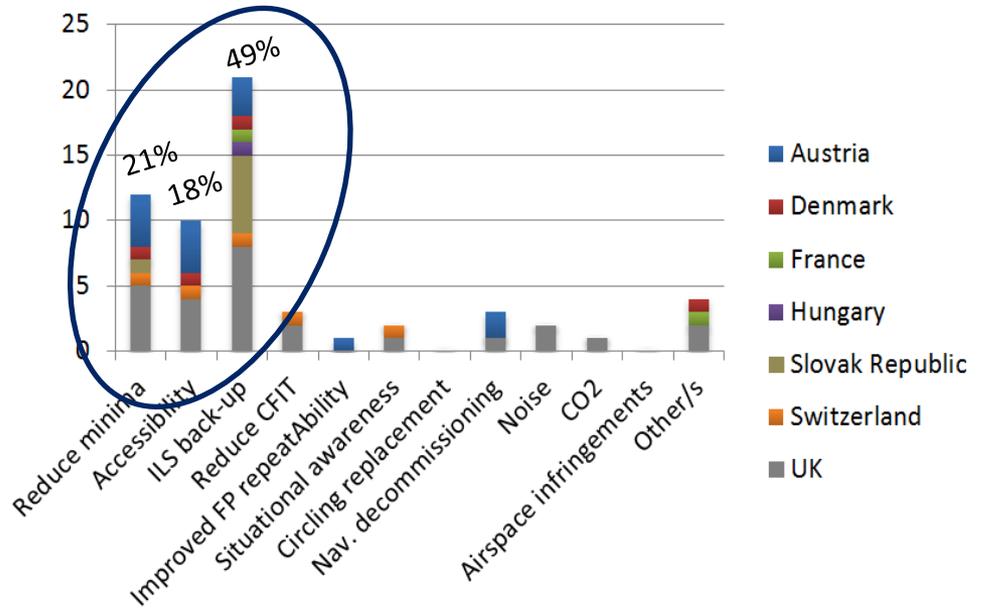
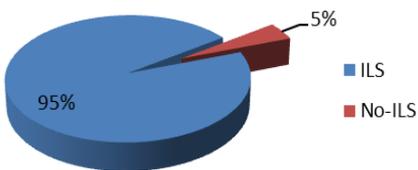
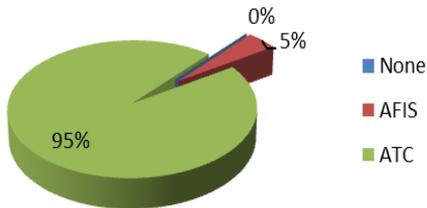
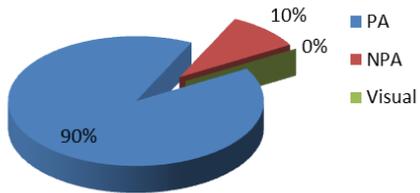
*NHV H175 during offshore operations from Aberdeen*



# AVIATION

## LPV-200: understanding the need

### Analysis of the first 42 IAPs known plans





# AVIATION

## Maintaining the appetite for EGNOS in all aviation segments...

- **Large transport**
  - **Airbus Commercial Aircraft:** tailored assessments for A320 customers
- **Regional Aviation**
  - Participation in **ERA Operations Advisory group**
  - Customised **Business Cases and analyses of destinations** for several operators
- **Business Aviation**
  - Contacts established at EBACE: EBAA, Textron, Bombardier, Dassault, operators...
  - Dissemination of LPV Training and updated LPV Ops Approval guidelines
- **Rotorcraft**
  - **Airbus Helicopters:** EGNOS seminar at Donawörth premises



# AVIATION

## On-line tools to foster EGNOS adoption

### EGNOS Business Case Tool

Just in 4 steps



#### Operators business case (Results)

##### Savings, year #1 (constant euros)

Average fuel flow	291 gph	Total annual saved	4.26 h
Average speed	402.00 kts	Annual fuel saved	4887.98 €
Engine reserve	295 \$/hr	Annual engine reserve saved	904.23 €
Home base time saved	0.00 hrs	Other savings	4550.32 €
Additional time saved	4.26 hrs	Total annual savings	10342.53 €

Results are exportable!

#### Airports business case (Results)

##### Savings of disruption costs (constant euro)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
RW end #1. Avoided disruptions	2.9	3.5	4.3	6.8	15.8	36.8	48.7	59.4	66.1	73.6	8
RW end #1. Savings due to avoided DDC	1891 €	2306 €	2810 €	4489 €	10421 €	24304 €	32202 €	39253 €	43689 €	48624 €	54

Free on-line access at the [NEW EGNOS USER SUPPORT WEBSITE.](#)



# AVIATION

## On-line tools to foster EGNOS adoption

### LPV procedures



### EGNOS Business Case Tool



### Guidelines & Training



*More on the pipeline! (Computer Based Training, on-line simulator...)*

Free on-line access to all tools and docs at the [NEW EGNOS USER SUPPORT WEBSITE](#)



# AVIATION



# Table of Contents

- GSA Adoption Strategy overview
- EGNOS in Aviation
- EGNOS in Maritime
- EGNOS in Rail
- EGNOS in Agriculture
- EGNOS in Surveying

# Table of Contents

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- EGNOS Multimodal Adoption Plan Priorities for 2016
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# EGNOS in Maritime

## How EGNOS helps

- ▶ Contributes to the reduction of the number of accidents thanks to enhanced precise positioning, especially in tight waters
- ▶ Makes navigation safer for a broader user base
- ▶ Help improve traffic management without costly ground infrastructure investment
- ▶ Help with casualty analysis





# MARITIME

## EGNOS Multimodal Adoption plan 2016 Priorities



Regulated

**EGNOS**



Unregulated  
Leisure

**EGNOS**

### GENERAL NAVIGATION

- 1 Perform cost-benefit analysis of optimisation of DGNSS network using EGNOS
- 2 Analysis of EGNOS v2 performances for its use in maritime using SBAS integrity
- 3 Guidelines for the implementation of SBAS in shipborne receivers
- 4 Guidelines on EGNOS transmission via AIS for Inland waterways, coastal waters and ports
- 5 Guidelines on EGNOS transmission via IALA beacons for coastal waters

**EDAS**

### LEISURE

- 6 Provide support in communicating EGNOS benefits to users and receiver manufacturers/dealers

Market  
Uptake



# Table of Contents

## EGNOS in maritime

- EGNOS Multimodal Adoption Plan Priorities for 2016
- Actions & Tools placed to foster EGNOS adoption



# Maritime

## Guidelines to transmit EGNOS corrections via IALA beacons & AIS stations

- ❖ Proposal of high level architectures of an EGNOS based DGNSS service over IALA beacons and AIS using EGNOS SIS or EDAS
- ❖ EGNOS based VRS DGNSS service over IALA beacons and AIS.



[Finisterre DGPS station](#)

DGNSS station:  
GNSS receiver +  
MF transmitter.  
Courtesy:  
MxMarine





# Maritime

## Ready to develop CBAs for IALA beacons & AIS stations recapitalisations

### Objective:

- To provide a quantitative analysis of the incurred costs and benefits due to the modifications to introduce EGNOS, in comparison with current deployments.
- To determine options that provide the best approach in terms of costs.
- Two different types of analysis are proposed:
  - Generic CBA
  - Specific CBA



### Key point:

- Close contact with Maritime Authorities and other AtoN providers. Their feedback is essential to fine tune the assumptions and estimations made in the generic CBA.



# Maritime

## Preparing the needed background for an EGNOS maritime service

- ❖ Sub-group in EMRF to ensure an European common and harmonized approach for the Services provision aspects in the EGNOS introduction in the Maritime domain





# Maritime

## Preparing the guidelines for Rx manufacturers

- ❖ Working on the “Draft Guidelines for Manufacturers for the Implementation of SBAS in Shipborne Receivers”:
  - ✓ To establish the minimum set of SBAS messages to be processed by an SBAS receiver for the maritime sector to be compliant with the IMO Resolution A.1046.
  - ✓ Presentation in RTCM SC-104 and SC-131.
  - ✓ Creation of a SBAS subgroup in RCTM SC-104.

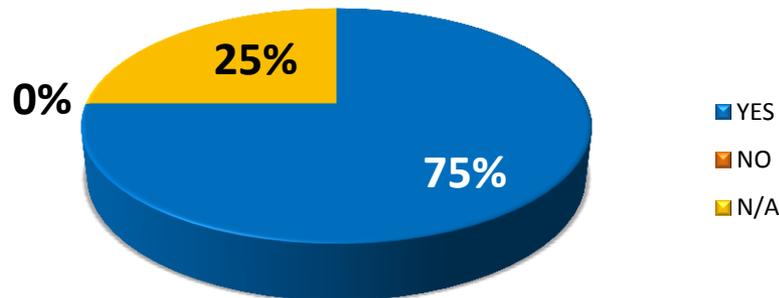




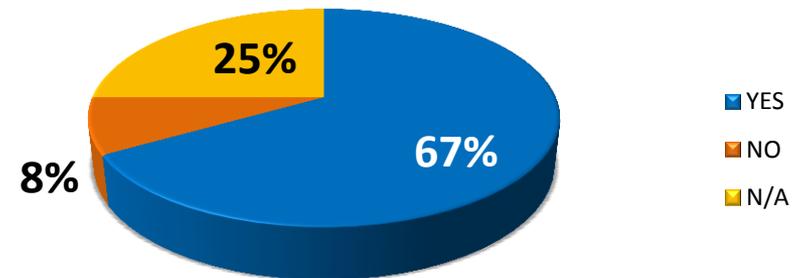
# Maritime: identify EGNOS compatible equipment SOLAS

- ❖ Identification of GNSS-based equipment used in SOLAS
- ❖ **More than 90%** of the authorised manufacturers to provide SOLAS GNSS-based equipment have at least 1 receiver SBAS-enabled and 71% mention EGNOS.

SBAS compatible



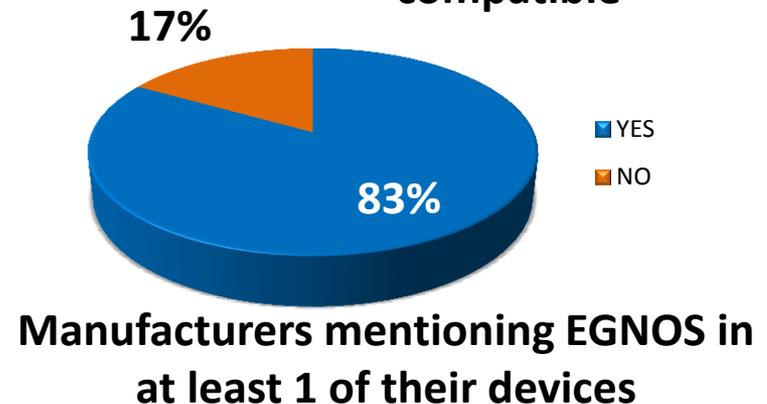
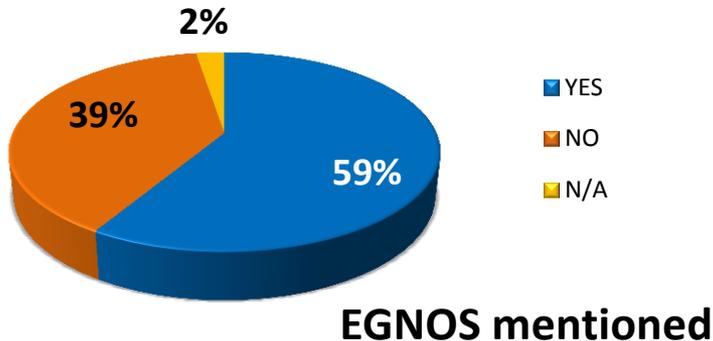
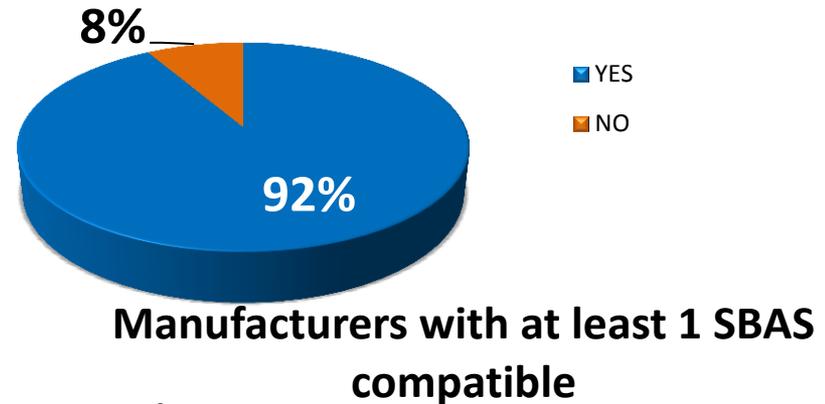
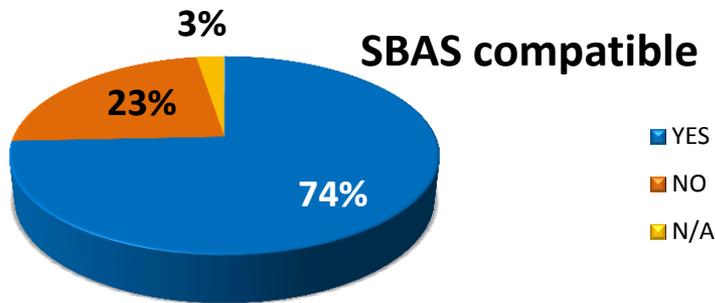
EGNOS mentioned





# Maritime: identify EGNOS compatible equipment non-SOLAS

## ❖ Identification of GNSS-based equipment used in non-SOLAS vessels



# Maritime: promoting success stories

- ❖ EGNOS is well-known and used by regatta crew
- ❖ Regatta ships (as the ones in 52 Super Series -technologically avant-garde-) are equipped with EGNOS compatible equipment.



The banner features the EGNOS logo in the top left corner. The main image shows several sailboats with black sails racing on the water. The sails have various logos and text, including '52', 'FRA 5217', 'PREC CLAGE', 'GER52', and 'GBR'. The text 'EGNOS 52 SUPER SERIES CASCAIS CUP' is prominently displayed in the center. Below the image, there is a list of participating teams with their respective national flags: ALEGRE (UK), AZZURRA (Italy), BRONNOSEC GAZPROM (Russia), GLADIATOR (UK), PHOENIX (Germany), PLATOON (Germany), PROVEZZA (Czech Republic), QUANTUM RACING (Czech Republic), RÅN RACING (Sweden), and SLED (Sweden). At the bottom left, there is a call to action: 'Download the Official App Search "52 SUPER SERIES" in the App Store' with icons for the App Store and Google Play. At the bottom center, the website 'www.52superseries.com' is listed. Social media icons for Facebook, Twitter, and YouTube are also present.

EGNOS sponsorship and promotion:

The EGNOS 52 Super Series Cascais Cup (**October 11<sup>th</sup> - 15<sup>th</sup>, 2016**).

# Table of Contents

- GSA Adoption Strategy overview
- EGNOS in Aviation
- EGNOS in Maritime
- EGNOS in Rail
- EGNOS in Agriculture
- EGNOS in Surveying



# Table of Contents

## EGNOS in rail

- EGNOS Multimodal Adoption Plan Priorities for 2016
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# EGNOS in Rail



## EGNOS is key for safety relevant railway applications!

- ❑ **integrity** delivered by EGNOS can be the enabler of GNSS based positioning in **railway signalling** in Europe
- ❑ **accuracy** improved by EGNOS is offering improved precision of positioning for free, which can further contribute to efficiency of train localisation in ERTMS
- ❑ Due to difficult rail environment any safety relevant GNSS based solution must be complemented by additional sensors to cover availability gaps

## The future:

EGNOS V3 under development, offering multifrequency/multiconstellation augmentation will further improve accuracy and reliability of the positioning information



# RAIL

## EGNOS Multimodal Adoption plan 2016 Priorities

**Market Adoption**

**Support the definition of E-GNSS role within European Railway Traffic Management System (ERTMS)**

**Analysis of innovative EGNOS applications**

**Analysis of possible pilot projects of rail logistics managements mobile apps**

**Support EGNOS promotion**

**Provision of technical support with certification aspects**



# Table of Contents

## EGNOS in rail

- EGNOS Multimodal Adoption Plan Priorities for 2016
- Actions placed to foster EGNOS adoption



# Rail: promote EGNOS so it is used means

... support GSA in  
fora/groups with  
technical info on  
EGNOS  
✓ UNISIG - NGTC  
WP7



... Explore  
possibilities for

- ✓ *Inter Freight Transport*
- ✓ *Non-safety of life applications in rail:*
  - Location of GSM-R reports
  - Track Worker Protection
  - Driver advisory systems

...keep contact with  
stakeholders, gather  
feedback, attend key  
events



# Table of Contents

- GSA Adoption Strategy overview
- EGNOS in Aviation
- EGNOS in Maritime
- EGNOS in Rail
- EGNOS in Agriculture
- EGNOS in Surveying

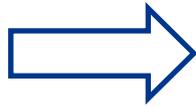


# Table of Contents

## EGNOS in agriculture

- EGNOS Multimodal Adoption Plan Priorities for 2016
- Tools & Actions placed to foster EGNOS adoption

# EGNOS in Agriculture



## Applications

- Variable rate applications
- Tractor guidance for operations such as spraying
- Virtual fencing
- Post-harvest pick-up
- Field boundary mapping (CAP)
- Individual livestock positioning and supervised tracking



## How EGNOS helps

- Enhance precision without costly investments
- Eliminate waste and over-application of fertilisers and herbicides
- Save time and reduce fatigue
- Extend equipment lifetime by optimising usage,
- optimise crop yields and increase profit margins



**GSA priorities**  
Utilization of EGNOS  
in Common  
Agricultural  
Policy (CAP)

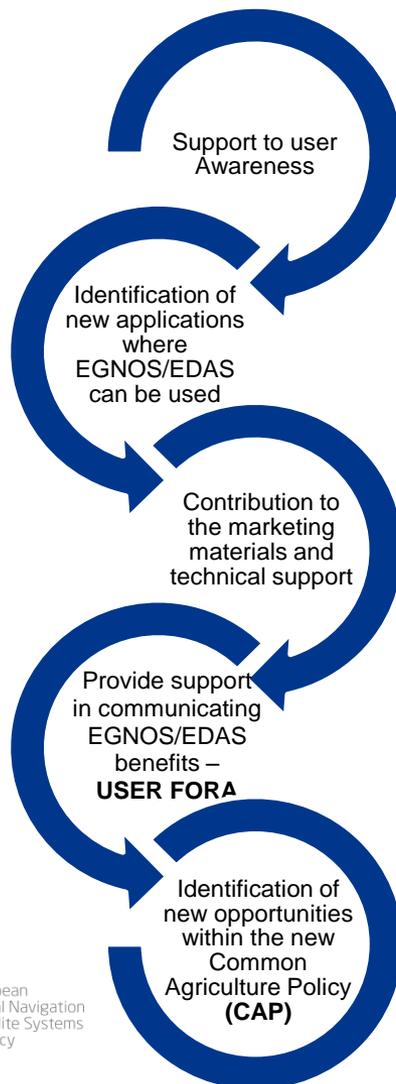
# AGRICULTURE

## EGNOS Multimodal Adoption plan 2016 Priorities



AGRICULTURE

EGNOS  
EDAS



Maximise  
Adoption





# Table of Contents

## EGNOS in agriculture

- EGNOS Multimodal Adoption Plan Priorities for 2016
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# Agriculture User Awareness Campaigns

## How to configure EGNOS & EDAS receivers

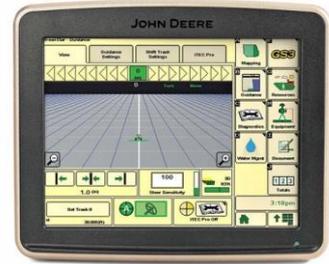


TopCon AGI-4

Ag Leader GPS6500

Trimble CFX-750

SF 3000



Presented in Geospatial World Forum 2016, Rotterdam





# Agriculture Marketing material

## PASS TO PASS Accuracy Available on EGNOS User Support WEBSITE



NEWS | DOCS & TOOLS | HELPDESK | EGNOS SYSTEM | SAFETY OF LIFE SERVICE | OPEN SERVICE | EDAS SERVICE

### PASS TO PASS

HOME / OPEN SERVICE / HISTORICAL PERFORMANCE / AREA

#### User login

Scilla

.....

Forgot?

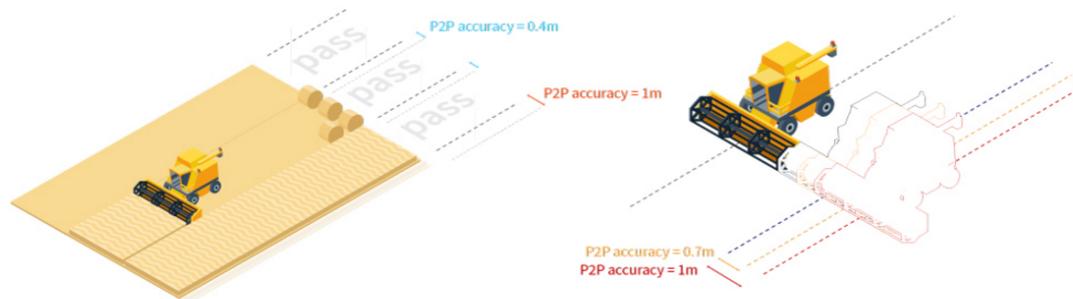
Register | Log in



Pass to Pass accuracy is the term used by farmers to describe their user needs in relation with accuracy; and the term used by GNSS manufacturers to describe the accuracy the equipment can provide. Pass-to-pass accuracy is defined as the accuracy which can be achieved over a 15 minute window, being 15min the approximate time to make a pass in a typical field. Standard ISO 12188 describes in detail how to compute this quantity.

Figure below, explains graphically the concept. Once you have done a pass in the field with the tractor, and you return and place it in the same position according to your GNSS equipment, you are not exactly in the same place, there is a bias. This bias is the so called "pass-to-pass" accuracy. To see Pass-to-Pass accuracy provided by EGNOS, select a date and a RIMS station. Note this pass-to-pass accuracy is available in all EGNOS Service Area (not just only in the RIMS station).

#### LPV Procedures Map





# Agriculture

## New applications: farming insurance

### Measuring areas on the field: expert opinion for farming assurance



- GNSS, EGNOS in particular, known and used for expert assurance: **key tool for their work**
- Key actors: agriculture engineers
  - Non regulated activity
  - Liberal profession
- New actors to influence: Training program in relation with GNSS (EGNOS in particular) provided in Agricultural Schools



# Agriculture

## In touch with agriculture community

### Many farming fora in EU: farmers share opinions and EGNOS is there!

Currently identifying main fora, user association and relevant user groups in EU. They represent a valuable source for user feedback, and a direct way to communicate EGNOS/EDAS benefits

#### The farming forum:

*"I've accidentally drilled with Egnos before. Lines are still perfectly straight and it appears reasonable, but when the crop comes up you'll find your tramlines marginally further apart than you intended if you aren't careful....and that error increases across the field."*

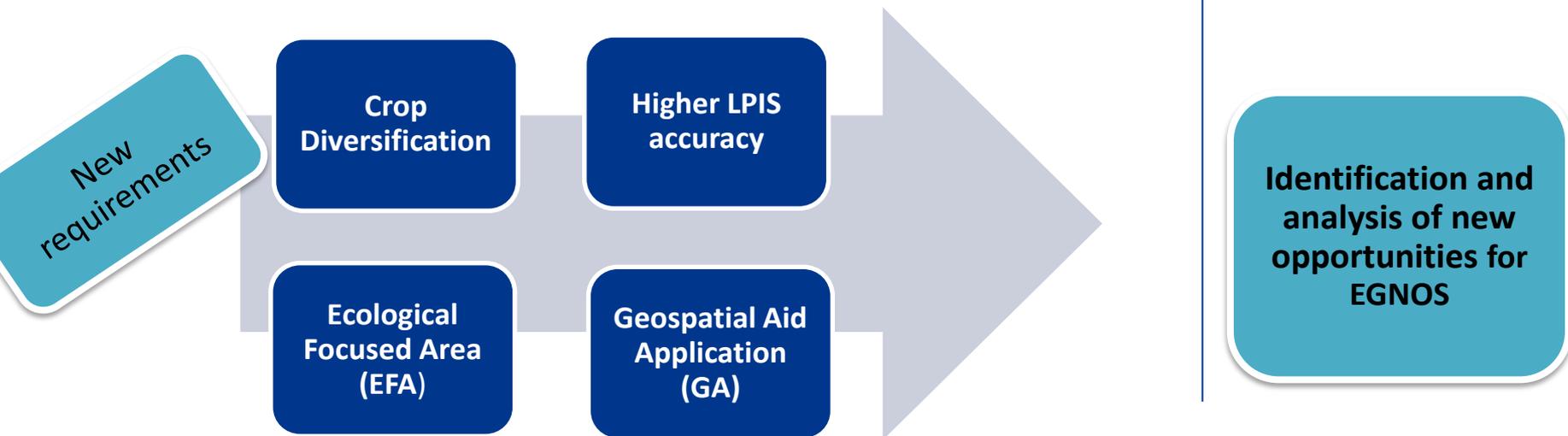




# Agriculture

## CAP reform, new opportunities

The current reform of **Common Agriculture Policy (CAP)** brings new requirements which directly affect the way how farmers in Europe will claim aid for agricultural parcels and other elements in their aid applications as well as subsequent process of administration and control of area-related payments.



# Table of Contents

- GSA Adoption Strategy overview
- EGNOS in Aviation
- EGNOS in Maritime
- EGNOS in Rail
- EGNOS in Agriculture
- EGNOS in Surveying



# Table of Contents

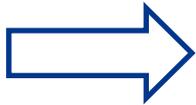
## EGNOS in Surveying

- EGNOS Multimodal Adoption Plan Priorities for 2016
- Tools & Actions placed to foster EGNOS adoption

# EGNOS in Surveying/Mapping



MAPPING &  
SURVEYING



EGNOS  
EDAS



**EGNOS**  
EGNOS, it's there. Use it.

## How EGNOS helps

- An effective option for a wide range of mapping applications where both metre accuracy and real-time positioning is adequate
- It's free and does not require any installation of hardware nor investment in ground infrastructure nor ongoing subscriptions
- Most new GNSS devices are EGNOS-enabled
- Covers the majority of Europe, with no white spots



## GSA priorities

Increase the usage of EGNOS free corrections

Turn mapping into a more accessible activity

Identify further user needs in cooperation with surveying associations

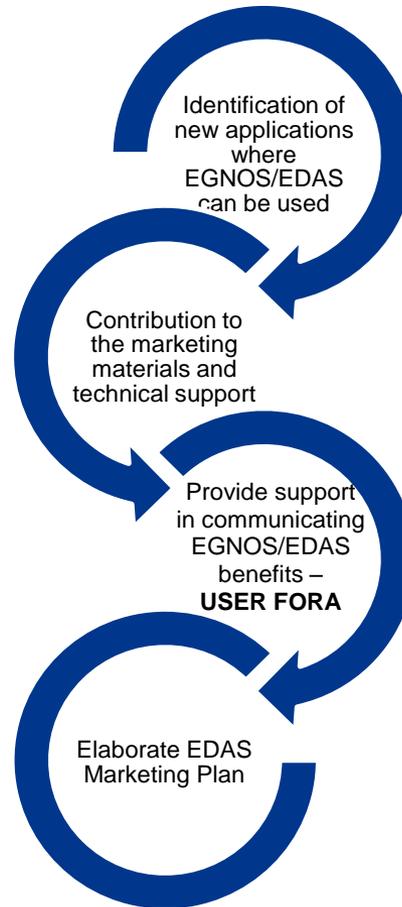
Prepare EDAS Marketing Plan with the list of actions to increase EDAS awareness

# Surveying/mapping

## EGNOS Multimodal Adoption plan 2016 Priorities



EGNOS  
EDAS



Maximise  
Adoption





# Table of Contents

## EGNOS in Surveying

- EGNOS Multimodal Adoption Plan Priorities for 2016
- Tools & Actions placed to foster EGNOS adoption



# Surveying/mapping

## New applications

### Analyzing existing regulation

ICAO Doc 9674-AN/946 –  
Aeronautical data quality  
requirements



Obstacles in the approach and  
take-off areas

1 m or 1 ft surveyed

Obstacles in the circling areas and  
at the aerodrome/heliport

1 m or 1 ft surveyed

Obstacles en-route, elevations

3 m (10 ft) surveyed



IHO S44 – Standards  
for Hydrographic Surveys

Order	Special	1a	1b	2
Description of areas	Areas where under-keel clearance is critical	Areas shallower than 100 metres where under-keel clearance is less critical but features of concern to surface shipping may exist.	Areas shallower than 100 metres where under-keel clearance is not considered to be an issue for the type of surface shipping expected to transit the area.	Areas generally deeper than 100 metres where a general description of the sea floor is considered adequate.
Maximum allowable THU 95% confidence level	2 meters	5 metres + 5% of depth	5 metres + 5% of depth	20 metres + 10% of depth

Natural habitats  
Natura 2000



*“The spatial cartographical accuracy may not be less than 1.0 mm at 1:50000 which is equivalent to 50 m on the ground when compared to the original”*





# Surveying/mapping Marketing material

TUESDAY, SEPTEMBER 20, 2016    SIGN IN / JOIN    HOME    SUBMIT PRESS RELEASE    ABOUT US    CONTACT

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**GNSS**

## Improving GPS in Europe

By Reinhard Blasi - July 14, 2016    116    0



**Geo: Geo International September 2016**

 **Subscribe**    Volume 15 • Issue 8



**A better location in Europe**  
The European Geostationary Navigation Overlay Service (EGNOS) can help surveyors to get even better positioning...

**Read More...**    1 2 3 4 5

**HAMBURG 2016**    **INTERGEO®**  
**11 – 13 OCTOBER**    GLOBAL HUB OF THE  
GEOSPATIAL COMMUNITY





# Surveying/mapping

## Communicating benefits to GIS users

### GIS & GNSS: gathering contacts, user groups, fora



@Kate: SBAS is Satellite Based Augmentation System. WAAS/EGNOS is a form of SBAS. It is actually a differential correction service. Without SBAS, your GPS

### Using GIS (ArcGIS tool) applications to promote EGNOS





EGNOS, it's there. Use it.

**QUESTIONS?**



**EGNOS, it's there. Use it.**

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**THANK YOU!**