USE OF EGNOS AND GALILEO FOR SOL APPLICATIONS FOR ALL TRANSPORT MODES

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Growing GALILEO 2010
Information Day
Wednesday, 22 September 2010, Brussels
NEW APPLICATIONS, NEW BENEFITS, NEW OPPORTUNITIES
Use of EGNOS and GALILEO for Safety-of-Life applications for all transport modes

- Introduction of EGNOS in aviation, extending its use to both commercial and general aviation, and prepare the adoption of GALILEO.
- Other domains of applications where the integrity concept might be of interest: road, railways, maritime and inland waterway transports
- Area of R&D listed in the topic description is NOT EXHAUSTIVE

EGNOS and Galileo differentiators as key factor of success.
### Budget for “SOL” topic in past Galileo calls

<table>
<thead>
<tr>
<th></th>
<th>EUR mln</th>
<th># of projects</th>
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<tbody>
<tr>
<td><strong>FP6</strong></td>
<td></td>
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<tr>
<td>Aviation</td>
<td>2,5</td>
<td>4</td>
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<tr>
<td>Maritime</td>
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<td>3</td>
</tr>
<tr>
<td>Rail</td>
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<td>2</td>
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<tr>
<td><strong>FP7</strong></td>
<td></td>
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<tr>
<td>Aviation</td>
<td>4,4</td>
<td>4</td>
</tr>
<tr>
<td>Maritime</td>
<td>1,3</td>
<td>3</td>
</tr>
<tr>
<td>Rail</td>
<td>1,3</td>
<td>2</td>
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Note: 6,9 is the total budget for FP6, 6,4 is the total budget for FP7.
Oct 1, 2009: EC declares ‘open service’ operational including some very relevant statements concerning aviation

“Both the Open Service and the Safety-of-Life Service are provided free of charge, and the European Union is committed to supporting EGNOS for the long term, even after Galileo has become operational. This includes extending its geographical scope within the coverage of the three satellites involved.”

End 2010: EC declares ‘SoL service’ operational Procedures being published all over Europe
THE MAJORITY OF EGNOS RETURNS ARE IN LPV LANDINGS

EGNOS PROVIDES ILS CAT1 performance … without the infrastructure cost

- Phasing out Navaids
- CFIT (Controlled flight into terrain)
- DDC (Delays, Diversions and Cancelations)

Millions of Euro

<table>
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<th>Benefits</th>
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<tr>
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<tr>
<td>Navaids</td>
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<tr>
<td>CFIT</td>
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<tr>
<td>DDC</td>
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Millions of Euro

<table>
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<tr>
<th>Public</th>
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<tr>
<td>CA</td>
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<td>GA</td>
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<td>Airports</td>
<td>153</td>
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<td>ANSP</td>
<td>195</td>
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</table>
Advanced RNP operations (in final approach and terminal manoeuvring area) with EGNOS

- Lower decision height:
  - Current decision height: 250 ft in EU, 200 ft WAAS
  - Challenge: lower decision height < 200 ft in EU

- Curved approaches
- Steep descend approach
- Continuous descent approach
  - protection of light aircraft against wake turbulence from heavier aircraft
  - higher traffic flow in approach thanks to a separation
  - noise nuisance reduction
Emerging GNSS applications in aviation

- Time-based operations using GNSS timing
- Reduction of onboard equipment and ground based navaids, while maintaining safety.
  - Multi-constellation synchronisation: GPS, Galileo, EGNOS SOL.
  - VOR and NDB replacement by GNSS equipment
- Airport ground operations
AVIATION. EXAMPLES OF APPLICATIONS (III)

EGNOS in General Aviation

- Enhanced & safe VFR (Visual Flight Rules)
  - EGNOS assistance to leisure/private pilots to improve safety
  - Functions and electronics
  - Tests and implementation in system-level demonstrators.
  - Regulatory needs

- SAR: helicopters, rotorcraft, UAV
  - EGNOS based UAV autonomous navigation and landing
  - EGNOS-based approach procedures for helicopter emergency medical services
EGNOS AND GALILEO FOR MARITIME SOL APPLICATIONS

• Trials/proof of concept to assess the EGNOS technological features for:
  • Aids to Navigation in recreational ports
  • Aids to Navigation in commercial ports
  • Inland waterways navigation

• Demonstrate safer inland waterways with EGNOS SOL
  • Integration of EGNOS in existing RIS infrastructure, offering an improved solution over GPS-only solutions
  • Integration of EDAS to overcome EGNOS outages

• EGNOS/Galileo-enabled receivers supporting safety critical operations:
  • Tracing and tracking dangerous goods
  • Integration in the Vessel Data Recorders of ships servicing in intra-EU routes to simplify customs procedures for intra-EU transports
  • Accidents reconstruction and accidental/intentional pollution.
Main objectives are:
- To advance on past work and tackle roadblocks, propose solutions
- Certification aspects
- Operational use of EGNOS SOL in railways
- Analyse cost and benefits of EGNOS/Galileo

Innovative use cases of GNSS in Rail transportation are:
- Signalling
- Train control
- Train supervisor
- Freight management
**ACCEP TA**

- **Call**: FP7 2nd
- **Topic**: Aviation
- **Grant**: 2.50 mln
- **Budget**: 4.53 mln
- **Galileo**: ×
- **EGNOS**: ✓
- **EDAS**: ×

**Achieved results:**
- Customised cost benefit analysis for 3 airlines
- 40 procedures to be written in 2010-2011
- €1m available to equip aircraft with EGNOS receivers and FMS

**HEDGE**

- **Call**: FP7 1st
- **Topic**: Aviation
- **Grant**: 0.85 €m
- **Budget**: 1.21 €m
- **Galileo**: ×
- **EGNOS**: ✓
- **EDAS**: ×

**Develop the helicopter approach procedure assisted by EGNOS, including necessary avionics**

**Develop helicopter procedures for mountain rescue and Helicopter Emergency Medical Services**

**Perform demonstrations on four helicopters and one fixed-wing case (small aircraft/general aviation)**

**SafePort**

- **Call**: FP7 2nd
- **Topic**: Maritime
- **Grant**: 1.93 mln
- **Budget**: 2.75 mln
- **Galileo**: ×
- **EGNOS**: ✓
- **EDAS**: ✓

**Development of an Active Vessel Traffic Management and Information System (A-VTMIS) to manage vessel movements within their jurisdiction.**

**Development of a pilot aid (SafePilot)**

**Accuracy, reliability and safety of life aspects of EGNOS are critical.**

**GRAIL-2**

- **Call**: FP7 2nd
- **Topic**: Rail
- **Grant**: 1.28 mln
- **Budget**: 2.05 mln
- **Galileo**: ×
- **EGNOS**: ✓
- **EDAS**: ×

**Define, develop and validate a GNSS based ETCS application in High Speed Railway Lines.**

**Development of a GNSS-based EO system prototype.**

**Validation of the prototype by means of an extensive test campaign.**
EGNOS AND GALILEO FOR ROAD SOL APPLICATIONS

• **Objective:** Secure and guaranteed positioning for road transport application where safety of life is a key issue.

• **Example:** **Advanced Driving Assistance Systems (ADAS):** Vehicles Safety Systems are used to help the driving process.
  - With Human-Machine Interface (HMI) they can increase car and people safety.
  - Different systems interact with the driving experience: in-vehicle navigation systems, intelligent speed adaptation (ISA), blind spot detection.
  - A reliable and accurate positioning engine is a key factor enabling ADAS deployment.

**EGNOS and Galileo differentiators,** as increased accuracy, integrity and authentication can contribute to a guaranteed and secure positioning.
**EXAMPLES OF ONGOING PROJECTS**

**COVEL: Cooperative Vehicle Localization for Safe and Sustainable Mobility**

Development of the Lane Navigation Assistant (LNA) – an in-vehicle system which will enable lane-level positioning, lane-level navigation and lane-level traffic management especially in urban areas.

- **Call**: FP7 2nd
- **Topic**: Road
- **Grant**: 2.12 mln
- **Budget**: 3.35 mln
- **Galileo**: ×
- **EGNOS**: ✓
- **EDAS**: ×

**GENEVA: Galileo / EGNOS Enhanced Driver Assistance**

Development of an innovative application within the context of advanced driver assistance for high precision, reliable and certifiable use, contributing to the adoption of EGNOS/EDAS in the European automotive industry.

- **Call**: FP7 1st
- **Topic**: Road
- **Grant**: 1.61 mln
- **Budget**: 2.48 mln
- **Galileo**: ×
- **EGNOS**: ✓
- **EDAS**: ×
• Coordination with other projects:
  • GSA/EC encourage collaboration among FP7 projects
  • Be ready to participate in meetings and organise workshops
  • Avoid overlapping with previous/ongoing projects
  • Use all the new media available to maximize dissemination

• Further information and questions:
  • www.gsa.europa.eu
  • http://www.egnos-portal.eu/
  • cordis.europa.eu
  • research@gsa.europa.eu
THANK YOU

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