Update on European GNSS

4th EUPOS® Council and Technical Meeting

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Market Development
European GNSS Agency (GSA)

Bratislava, 20 November 2017
Agenda

- GSA: Who We Are and What We Do
- E-GNSS: State of the Play
- Engagement with Surveying Market Stakeholders
- Market and Technology Trends
- Funding Opportunities
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1. GSA: Who We Are and What We Do
2. E-GNSS: State of the Play
3. Engagement with Surveying Market Stakeholders
4. Market and Technology Trends
5. Funding Opportunities
GSA in a nutshell

What?

*Gateway to Services*
- Galileo & EGNOS Operations and Service Provision
- Market Development of the applications and the receivers

*Gatekeeper of security*
- Security Accreditation
- Operation of Galileo Security Monitoring Centre, governmental service (PRS) activities

Who and where?

150 Staff
21 Nationalities

Prague, CZ Rep – HQ
St. Germain en Laye, FR – GSMC
Swanwick, UK – GSMC
Torrejon, ES – GSC
Noordwijk, NL – GRC
Toulouse, FR – EGNOS
Brussels, BE – COMM
How GSA fits in the EU structure

- Political oversight
  - Council and European Parliament

- Programme management
  - European GNSS Programme Committee

- Execution
  - European Space Agency
    - Development contracts
    - Deployment contracts

- Delegation
  - Assistance and delegation

- Upstream (space) industry

- Downstream (applications) industry

- Market Development
- Security
- GSMS operation
- GNSS exploitation
Agenda

GSA: Who We Are and What We Do

E-GNSS: State of the Play

Engagement with Surveying Market Stakeholders

Market and Technology Trends

Funding Opportunities
EGNOS already available serving EU citizens and industry

- Satellite Based Augmentation System (SBAS)
- Improves GNSS performance
- European coverage (under extension in other regions, e.g. North Africa)
- Available free of charge and widely adopted in off-the-shelf receivers

<table>
<thead>
<tr>
<th>Service</th>
<th>Accuracy/Features</th>
<th>Availability</th>
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<tbody>
<tr>
<td>Open Service (OS)</td>
<td>Accuracy ~1m, free</td>
<td>Available since October 2009</td>
</tr>
<tr>
<td>Safety of Life Service (SoL)</td>
<td>Accuracy ~1m, compliant to aviation standards</td>
<td>Available since March 2011</td>
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<tr>
<td>EGNOS Data Access Service (EDAS)</td>
<td>Accuracy &lt;1m, corrections provided by terrestrial networks</td>
<td>Available since July 2012</td>
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Galileo is the European GNSS offering four services

- Worldwide navigation system “made in EU”
- Fully compatible with GPS
- Open service free of charge, delivering dual frequencies
- Signal authentication will provide trustability

<table>
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<tr>
<th>Service</th>
<th>Description</th>
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<tr>
<td><strong>Open Service (OS)</strong></td>
<td>Freely accessible service for positioning and timing</td>
</tr>
<tr>
<td><strong>Public Regulated Service (PRS)</strong></td>
<td>Encrypted service designed for greater robustness and higher availability</td>
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<tr>
<td><strong>Search and Rescue Service (SAR)</strong></td>
<td>Assists locating people in distress and confirms that help is on the way</td>
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<tr>
<td><strong>Commercial Service (CS)</strong></td>
<td>Delivers authentication and high accuracy services for commercial applications</td>
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Galileo’s implementation is progressing with Full Operation Capability in 2020.

- 4 more satellites scheduled to launch on 12/12/2017 using Ariane 5.
- 18 satellites already launched.
- 14 satellites will follow by 2020.
Galileo officially moved from a testing phase to the provision of live services

**Galileo goes live**
Initial Services are the first step towards full operational capability and reflects Europe’s achievement to satisfy evolving user needs leveraging on more performant GNSS signals

**Upgrading devices**
Already today, leading GNSS companies representing more than 95% of the GNSS chipset market produce Galileo-ready chips

**www.useGalileo.eu**
Users can keep track of Galileo-enabled devices in the different market segments, and be informed as soon as new ones become available
Galileo is used today on majority of professional devices and several consumer platforms.
The European GNSS Service Centre provides a single and unique interface with the users

GSC Nucleus
- Web portal
- Information on:
  - System status
  - Almanacs
  - User notifications
- Electronic Library
  - Iono Doc, OS SIS OSD, OS SIS ICD, future SDD
- Helpdesk:
  - User queries
  - Galileo incident reporting
- EGNSS Dissemination Platform
- User surveys
- Galileo performance reports

Galileo Initial Open Service (IS OS) Public Quarterly Performance Report confirms good performance of Galileo
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Surveying User Requirements Document
The GSA receiver manufacturers workshop after Initial Services declaration saw high industry participation.

4th workshop for Receiver manufacturers, 21st March - Prague

Information shared on:
- Market update
- Galileo system status
- User consultation platform
- Space strategy
- Funding opportunities
- Concluded and upcoming testing campaigns
- Update on Galileo OS NMA, CS and INAV improvements

Example of Industry participants:
Augmentation service providers are accelerating the adoption of Galileo

**RTK**

- Majority of RTK providers upgraded or have started to upgrade
  - SWEPOS (SE), GeoSoft (ET), SAPOS (DE), SOGEI (IT), GEONET (JP), TERIA (FR), etc.

"Based on our test results, we clearly recommend Galileo corrections to our customers needing reliable high precision"

**PPP**

President and CEO of NovAtel, Michael Ritter stated

“Our OEM customers are already benefiting from the enhanced reliability, availability and accuracy the Galileo constellation adds to the GNSS.”

Anders Haneborg, Fugro commercial manager said

“Galileo’s Initial Services operations [...] a key consideration for our customers during critical positioning operations”

Graham Purves, President and CEO of Veripos stated

“As an European company, we are particularly proud and excited about the opportunities the Galileo services create for our customers. The reliability and safety enhancements made possible to continue to expand the capabilities of our cutting edge safety critical positioning solutions.”
GSA workshops “Integrating Galileo in RTK networks: success stories and open challenges” during CLGE GA

Invited speakers
- Roberto Capua from Sogei (Italian public augmentation service provider)
- Paul Chambon from Terria (French private RTK service provider)

- Usability of the Galileo constellation in high-precision RTK applications
- Show improved availability, reliability, and accuracy and time-to-fix in difficult measuring environments (urban canyons and under tree canopy).

- End-users’ understand Galileo added value: 69% of the respondents are convinced that Galileo will improve their work.

Ongoing issue with the inter-operability between the different brands of RX manufacturers within RTK-network
Inclusion of Galileo into RTK network is cost demanding.
Ongoing discussions between stakeholders of the Galileo Programme have outlined the opportunity to consider offering the High Accuracy Commercial Service (HA CS) to all interested users on a free of charge basis, with content and format of data publicly and openly available on a global scale.

Stakeholder Consultation GSA/SC/30/17 on Galileo Commercial Service High Accuracy Provision
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Construction, mapping and cadastral industries stimulated growth in shipments of GNSS surveying equipment.

Surveying, Mapping and Construction (both person-based and machine control), together, accounted for 95% of the shipments of GNSS devices in high precision market in 2016.

In the coming decade, the total amount of shipments is expected to reach 815,000 units worldwide, representing almost a 4-fold increase over 2015.
European GNSS industry accounts for a quarter of global GNSS revenues

Added-value services will increasingly be the largest source of revenues
Innovation areas and emerging concepts likely to influence future positioning and navigation

GNSS is the **most cost-effective** outdoor positioning technology currently available – and will remain so for the foreseeable future.
First dual frequency chipset for mass market – GIS democratisation

GNSS raw measurements on Android (Nougat version and higher):
- GSA has launched the GNSS Raw Measurements Task Force to engage with leading experts in navigation and positioning, and boost innovation around this new feature.

First dual frequency GNSS chipset for mass market devices (smartphones, tablets) in the market which will offer dm-level accuracy:
- Better accuracy
- Ionosphere error cancellation
- Improved code tracking pseudorange estimates and faster transition from code tracking to phase tracking
- ……

Mass market device allowing cm or dm level accuracy?
A full analysis of GNSS receiver capabilities is available in the GSA’s Technology Report.

An in-depth analysis of 3 GNSS Macrosegments:

- MASS MARKET SOLUTIONS
- TRANSPORT SAFETY AND LIABILITY-CRITICAL SOLUTIONS
- HIGH PRECISION, TIMING AND ASSET MANAGEMENT SOLUTIONS
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The GSA’s funding mechanisms promote the development of Galileo compatible solutions

Aims to foster adoption of Galileo and EGNOS mostly via content and application development and supports the integration of services provided by these programmes into devices and their commercialisation

Fundamental Elements projects focus on fostering the development of innovative Galileo- and EGNOS-enabled receivers, antennas and chipsets technologies. The objective is to achieve products that address user needs in priority market segments

*8 €mln budget dedicated to high precision market in the 3rd H2020 call – under evaluation*

*€75.5 M for non-PRS projects*

http://www.gsa.europa.eu/r-d/gnss-r-d-programmes
Linking space to user needs

How to get in touch:

GSA Newsletter
GSA Twitter - @EU_GNSS
EGNOS Twitter - @EGNOSP
GNSS Facebook page
GNSS YouTube Channel
European GNSS Agency LinkedIn Page
GNSS Market, Research & Development
GNSS Slideshare Page (presentations)

www.GSA.europa.eu
Thank you!

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