European GNSS Applications in Horizon 2020

Horizon 2020 Space Information Day, Lisbon
15 September 2016

Vojtech Fort
European GNSS Agency
European GNSS Agency
European GNSS Agency (GSA)

The European GNSS Agency (GSA) today:

• **Staff:** about **145**
• **Nationalities:** **21**
• **Headquarters:** **Prague**  
  (since September 2012)
• **Other Locations:**  
  St Germain en Laye, Swanwick, Torrejon
Integrated approach: understanding the market, stimulating the demand, creating a competitive EU offer

**DOWNSTREAM VALUE CHAIN**

**MARKET SEGMENTS**
- Bodies influencing the market
- Navigation Signal Providers
- Chipset, receiver
- Devices
- Content & Apps
- Service providers

**User Satisfaction**
- Understand **market and user needs and satisfaction**
- **Stimulate**
  - **DEMAND & ADOPTION**
    - EGNSS added Value
    - Cooperate with receivers and apps
    - Roadmaps with stakeholders
    - Support EC policies
- **Support EU**
  - **COMPETITIVE OFFER**
    - of Services, applications
    - and receivers

** Fundamental Elements**

**E-GNSS USER ADOPTION**

**EU PUBLIC BENEFITS**
E-GNSS Market

Source: http://www.reancon.com/
A 4 billion GNSS devices global market, expected to further grow in the future both in volume...

Growth will be observed in all regions
...and revenues, driven by mass market segments

Global GNSS market size (€bln)

Cumulated revenues dominated by LBS

Both core and enabled revenues slowly mature

Cumulative core revenue 2013-2023

- Rail: 0.25%
- Surveying: 4.5%
- Agriculture: 1.9%
- LBS: 53.2%
- Road: 38.0%
- Maritime: 1.1%
- Aviation: 1.0%

* CAGR: Compound Annual Growth Rate
GNSS FP7 results in a nutshell

**GNSS FP7 1st, 2nd and 3rd Calls**

- **13** patents/registered trademarks (also on-going)
- **45** commercialised products/services
- **80** Working prototypes
- **115** Demonstrations
  
  and more is expected...

- **3** calls for proposals on GNSS Applications
  - Portfolio of ~**90** R&D projects with a budget of ~**€70 mil.**
  - **425** beneficiaries

- **40%** of **GNSS funds** to **SMEs** vs. **EU FP7 average <15%**
- **Business coaching for SMEs**: Business expert support
H2020 Galileo 2014-2015 calls

Source: www.visionaryadvertising.co.uk
## H2020-Galileo-2014-2015 Calls

<table>
<thead>
<tr>
<th></th>
<th>1(^{\text{st}}) Call</th>
<th>2(^{\text{nd}}) Call</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Budget available</strong></td>
<td>40.2 mln EUR</td>
<td>25.0 mln EUR</td>
</tr>
<tr>
<td><strong>Budget requested</strong></td>
<td>174.3 mln EUR</td>
<td>192.2 mln EUR</td>
</tr>
<tr>
<td><strong>No of projects funded</strong></td>
<td>27</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>26% success rate</td>
<td>15% success rate</td>
</tr>
<tr>
<td><strong>No of projects submitted</strong></td>
<td>105</td>
<td>89</td>
</tr>
<tr>
<td><strong>No of applicants</strong></td>
<td>775</td>
<td>634</td>
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</table>
Horizon 2020 Application R&D portfolio (1st + 2nd call) fostering application development and adoption in priority markets

Horizon 1\textsuperscript{st} and 2\textsuperscript{nd} call – Application Projects by market segment

Budget split by market segment

- Agriculture: 6%
- Aviation: 22%
- Awareness Rising: 10%
- GNSS Signal Processing: 2%
- LBS: 9%
- Maritime: 6%
- Rail: 14%
- Road: 16%
- Search and Rescue: 5%
- Timing & Synchronization: 5%

# of selected projects by market segment

- Agriculture: 2
- Aviation: 8
- Awareness Rising: 5
- LBS: 5
- Maritime: 2
- Road: 6
- Rail: 3
- Search and Rescue: 3
- Timing & Synchronization: 1
- GNSS Signal Processing: 1
<table>
<thead>
<tr>
<th>Project</th>
<th>Sector</th>
<th>Description</th>
<th>Total Cost</th>
<th>EU Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Lives</td>
<td>AVIATION</td>
<td>EGNSS for helicopters in distress situations</td>
<td>€2.120 mil</td>
<td>€1.573 mil</td>
</tr>
<tr>
<td>spyglass</td>
<td>MARITIME</td>
<td>Galileo for Vessel Traffic Management Systems</td>
<td>€1.313 mil</td>
<td>€1.069 mil</td>
</tr>
<tr>
<td>Foster ITS</td>
<td>ROAD</td>
<td>Galileo for Intelligent Transportation Systems</td>
<td>€2.590 mil</td>
<td>€1.813 mil</td>
</tr>
<tr>
<td>DEMETRA</td>
<td>PROFESSIONAL/TIMING</td>
<td>EGNSS for resilience to Timing &amp; Sync operations</td>
<td>€4.366 mil</td>
<td>€3.506 mil</td>
</tr>
<tr>
<td>ELAASTIC</td>
<td>LBS</td>
<td>Comprehensive EGNSS-enhanced location platform</td>
<td>€2.501 mil</td>
<td>€1.751 mil</td>
</tr>
<tr>
<td>ERSAT EAV</td>
<td>RAIL</td>
<td>European GNSS for safety-critical railway applications</td>
<td>€5.536 mil</td>
<td>€4.252 mil</td>
</tr>
</tbody>
</table>
Examples of H2020 Galileo 1\textsuperscript{st} call projects

**COREGAL - Combined Positioning-Reflectometry Galileo Code Receiver for Forest management**

Innovative platform enabling low-cost, high-accuracy and unprecedented use of airborne GNSS-Reflectometry (GNSS-R) for biomass retrieval and related and relevant applications as carbon mapping and land management.

- New positioning techniques enabled by E5 signals and modulations in an emerging market

Achievements so far:
- Successful trials of GNSS-P+R receiver
- Data Processing Algorithms for biomass data developed
- Data Processing Algorithms for Carbon stock estimation developed

**SAT406M - Application providing an end-to-end solution based on the SAR/Galileo service using the Return-Link-Message (RLM)**

The project develops an EGNSS application to improve the Search and Rescue of people in distress, comprising:

- An improved Personal Locator Beacon (PLB)
- A new communication method enhancing the standard communication between the PLB and the SAR/Galileo system.

Achievements so far:
- PLB beacon prototype successfully tested
- MEOLUT ground infrastructure successfully tested
- PLB and MEOLUT- fully integrated via Galileo satellites

Portuguese coordinator: DEIMOS ENGENHARIA
H2020 Galileo 2017 Call

Source: www.visionaryadvertising.co.uk
### Applications in Satellite Navigation-Galileo-2017

<table>
<thead>
<tr>
<th>Type of Action</th>
<th>Topic</th>
<th>Budget (EUR mln)</th>
<th>Funding rate</th>
<th>Indirect costs</th>
</tr>
</thead>
</table>
| IA             | EGNSS Transport Applications               | 14.50            | 70% (except for non-profit legal entities, where a rate of 100% applies) | 25% of the total eligible costs excluding:  
- Subcontracting  
- Costs of resources made available by 3rd parties  
- Financial support to 3rd parties |
| IA             | EGNSS Mass Market Applications             | 9.00             |              |                |
| IA             | EGNSS Professional Applications            | 8.00             |              |                |
| CSA            | EGNSS Awareness raising and capacity building | 1.50             | 100%         |                |

**Total budget:** 33.00

**Opening:** 08 November 2016  
**Deadline:** 01 March 2017

**IA:** activities aimed at producing plans and arrangements or designs for new, altered or improved products, processes or services.

**CSA:** consisting of accompanying measures such as standardisation, dissemination, awareness-raising and communication, networking, policy dialogues and studies.
What: Demonstrate the commercial potential of the product and/or service and describe how this potential will be realised.

Why: It is an input to evaluate the Impact criteria.

How: Template available in the participant portal.

- Define the proposed offering: the product and/or service and target market sector.
- Review the market sector: structure, size, drivers, market and technology trends.
- Assess the competition: main players, their current offerings and market share.
- Describe the innovation of the proposed offering in the context of the competition and the sector’s needs.
- Summarise potential business model(s) together with possible entry price(s) and costs.
- Assess the key risks to market entry and possible options for risk mitigation.
- Outline, graphically, the roll-out of the offering: timescale, sales growth and market share.
Examples of emerging EGNSS applications in road:

- **autonomous vehicles**, that are safety critical and require a specific accurate and resilient positioning, timing and navigation.

- solutions in policy driven applications, such as new generation of eCall, enhanced **digital tachograph**, **dangerous goods transport**, etc.

*Proposals should in particular build on Galileo specific signal features and differentiators and new services such as authentication and high precision, as well as current and future EGNOS integrity features.*
Examples of emerging EGNSS applications in maritime and inland waterways (including the Arctic):

- vessels navigation,
- traffic management and surveillance,
- search and rescue,
- port operations,
- custom fraud control,
- fisheries monitoring.

Proposals should in particular build on the use of current and future EGNOS dedicated services for maritime, and the Search and Rescue service of Galileo, other Galileo differentiating features and services, such as authentication, and high precision.
Examples of emerging EGNSS applications in rail:

- **train signalling and control**, contributing to the evolution and cost competitiveness of the European Rail Traffic Management System
- **non-safety-critical applications**, such as passenger information system, asset management, etc.

Synergy and complementarity with the **Shift 2 Rail Joint Undertaking and other initiatives shall be clearly identified.**

Proposals should in particular build on the **current and future EGNOS integrity services and multi-constellation, multifrequency**, and specific signal features of **Galileo that improves position performances** in the challenging railway environment (e.g. urban parts).
Examples of emerging EGNSS applications in aviation:

- EGNSS solutions for navigation, surveillance and communication in all phases of flight (also for determination of location of aircraft in distress):
  - GNSS based PBN (Performance Based Operations)
  - advanced operations for approach and landing benefitting from robust vertical guidance and LPV-200/CAT1 services
- Surveillance applications:
  - ADS-B (Automatic Dependent Surveillance Broadcast) and use of reliable PVT for integrity,
  - precise positioning, orientation of remotely piloted aerial systems (RPAS)

Synergy and complementarity with the Sesar Joint Undertaking and other initiatives shall be clearly identified.
Proposals should build on multi-constellation/multi-frequency, current and future EGNOS integrity features and service levels, as well as integration of multi-constellation enabling capabilities.
Examples of emerging EGNSS applications in mass market:

- **Smart Cities** (examples):
  - cross-modal mobility and new emerging “mobility as a service” approach, in which the user does not buy a vehicle or a public transport ticket, but a service to comply with her/his mobility needs
  - innovative **telematics applications** in which the positioning, timing and navigation are used both to deliver the mobility service and to calculate a fair price based on the actual use of it.

- **Internet of things** (examples):
  - exploiting the **interconnectivity of uniquely identifiable devices and the availability of their location**.

- Applications for **commercial LBS**, such as: secure financial transactions; mobile workforce management, tracking solutions; augmented reality; social networking and sport.

- Applications for **social LBS**, such as: **safety and emergency (E112)**, e-health (health services more and more connected), and solutions **supporting visual and mobility of impaired people**.
Examples of emerging EGNSS applications in professional applications:

- **Agriculture:**
  Automated machine guidance, precision farming and machine control and field boundary measurements.

- **Surveying and Mapping:**
  Land survey, marine survey, cadastral and geodesy, and construction.

- **Timing and Synchronisation:**
  Telecommunications, power generation and finance.

- **Other professional applications:**
  Clearly demonstrating amongst others the contribution of EGNSS differentiators, the potential of integration with earth observation data, and the future commercial potential.
Galileo-4-2017 EGNSS Awareness raising and capacity building

Scope:

- support building of **industrial relationships by gathering private and public institutions** around services offered by EGNSS and related applications
- support the **competitiveness of EU industry** by identifying strategic partners and by developing market opportunities
- support to **incentive schemes** should foster the emergence of new downstream applications based on either Galileo and/or EGNOS and therefore to support the EU GNSS industry
To highlight the tangible results coming out of the 7th Framework Programme (FP7) and H2020 1st Call serving as inspiration for those participating in H2020, the GSA launches its new EGNSS R&D application:

http://www.gsa.europa.eu/rd-for-galileo-egnos-app

FP7 brochure offering an overview of results from GNSS research under the FP7 R&D programme:


GNSS Projects’ Portfolio
http://www.gsa.europa.eu/r-d/gnss-project-portfolio
The 4th edition of the GSA’s GNSS Market Report is a comprehensive source of knowledge on the GNSS global market for:

- European GNSS downstream industry and SMEs (e.g. for their business planning and strategic investments decisions)
- Venture capitals and other financial institutions
- European Commission
- Member States governments and policy makers
- … and GSA, as fundamental input to our adoption strategy

EGNSS applications development
Synergies with other H2020 calls

Transport
- **MG-2.3-2016**: New and improved transport concepts in waterborne transport
- **MG-5.2-2017**: Innovative ICT solutions for future logistics operations
- **MG-6.2-2016**: Large-scale demonstration(s) of cooperative ITS
- **ART-01-2017**: ICT infrastructure to enable the transition towards road transport automation
- **ART-02-2016**: Automation pilots for passenger cars

Secure societies – Protecting freedom and security of Europe and its citizens
- **SEC-01-DRS-2016**: Integrated tools for response planning and scenario building
- **SEC-19-BES-2016**: Data fusion for maritime security applications

Information and Communication Technologies
- **ICT-16-2017**: Big data PPP: research addressing main technology challenges of the data economy

Space (other than Applications in Satellite Navigation Call)
- **COMPET-7-2017**: Technology transfer and business generators
- **SME instrument SMEInst-04 -2016-2017**: Engaging SMEs in space research and development
- **Other actions:**
  - Galileo Evolution, Mission and Service related R&D activities
  - EGNOS, Mission and Service related R&D activities
  - GNSS evolution, infrastructure-related R&D activities
Questions time

Thank you!

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