The EU Navigation Satellite Programmes in the new financial perspective 2014 -2020
EGNSS Applications – Opportunities in H2020

Alberto Fernández Wyttenbach
Market development- European GNSS Agency
GSA role within EU GNSS programmes

Political oversight
Council and European Parliament
European GNSS Programme Committee
European Commission
Independent advisors

Programme management

Execution
Delegation
European Space Agency
IOV Contracts
Upstream (space) industry
Downstream (applications) industry

Assistance and delegation
European GNSS Agency
EOC Contracts
Future responsibility
Security centre (GSMC)
Security accreditation
Market Development
Applications R&D programme
System management and service provision
The European GNSS Agency (GSA)

- Staff: 88
- Nationalities: 18
- Headquarters: Prague

The European GNSS Agency mission is to exploit the EGNOS and Galileo system

- to the full benefit of users in the European Union,
- to maintain the system and services in the most cost-efficient manner,
- to promote the development of applications and value added-services towards defined user segments.
GSA Market Development

User segment development
- Road
- LBS
- Aviation
- Agriculture
- Surveying/Mapping

Segments:
- Maritime
- Rail

Services:
- Galileo OS
- Galileo CS
- Galileo PRS
- EGNOS OS
- EGNOS SOL

Application development
- R&D project management
- Leveraging R&D results

Market monitoring
- Market analysis & forecast (incl. public benefits, APPAP KPIs)
- Technology monitoring launch
- Monitoring EU share in global GNSS

European GNSS Agency
AGENDA

1. EU-GNSS potential
2. FP7 - experience and results
3. H2020 opportunities
EU-GNSS potential
increases the **accuracy** of GPS positioning and provides information on its **reliability**

- **3 services** (OS, SoL, EDAS)
  - open service is operational since **October 2009**
  - Safety of Life service declared operational in **March 2011**

- Designed primarily for **Aviation**, widely adopted in other segments:
  - **159** EGNOS approach procedures in **87** airports
  - **2/3 of farmers** using GNSS adopted EGNOS
  - EGNOS inside the **EU largest road user charging scheme** deployed after 2009 service declaration

- Available in over **70% of commercial receivers models**

- An **enhanced version of EGNOS** is currently under development. It will offer Galileo corrections and a wider coverage area expanding into Africa and the Middle East
Autonomous infrastructure

Highly accurate global positioning services worldwide

Under civilian control and wholly interoperable with GPS, GLONASS, and BeiDou

4 services (OS, CS, PRS, SAR)

Galileo is currently finalising its In-Orbit Validation (IOV) phase using an initial group of 4 satellites launched during 2011-2012.

Already 30% of receiver models are Galileo ready
12th March 2013: Galileo starts transmitting the navigation signal...

The first 4 satellites start transmitting the navigation message: it is then possible to compute the position.
...the same day, all over the world the first “position fix” with Galileo is computed.

✓ The first positions computed confirms the excellent expected performances, at the state-of-the-art in satellite navigation.
✓ The satellites also transmit a time reference of atomic standard.
Website

Provide information to users and capture user’s feedback
- Static content: general system and services information
- Dynamic content: including scheduled maintenance activities

Customer interaction functionality

- Helpdesk ticket management
- Skilled people
- User’s database population
- Procedures involving all actors

GSA is setting a preliminary Customer assistance

Helpdesk

Our experts will provide answers to your questions about Galileo
Galileo services
Implementation Plan

- **Open Service**
  - 2012: Initial Services
  - 2014: Early Service
  - 2015: Demonstration
  - 2016: Early Service

- **Public Regulated Service**
  - 2012: Initial Services
  - 2014: Early Service

- **Commercial Service**
  - 2012: Initial Services
  - 2013: Pilot Projects
  - 2014: Early Service
  - 2015: Demonstration
  - 2016: Early Service

- **Search and Rescue**
  - 2012: Initial Services
  - 2014: Early Service
Many EGNSS opportunities in different market segments

<table>
<thead>
<tr>
<th>Segment Service</th>
<th>Mass Market</th>
<th>Intelligent Transport Systems</th>
<th>Aviation</th>
<th>Maritime</th>
<th>Rail</th>
<th>Professional</th>
<th>Governmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGNOS Open Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety of Life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GALILEO Open Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authentication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Precision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Regulated Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Search and Rescue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EGNOS and Galileo Relevance
GNSS FP7 - experience and results
GNSS FP7 results in a nutshell

- **GNSS FP7 1st, 2nd and 3rd Calls**
  - 6 Patents
  - 31 Products
  - 39 Working prototypes
  - 27 Proofs of concepts

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

- 40% of GNSS funds to SMEs vs. EU FP7 average <15%
  - **Business coaching for SMEs**: Business expert support
GNSS FP7 in numbers: Budget

Budget and projects funded per Call

- **Funding (in EUR millions)**
  - 1st Call: 19
  - 2nd Call: 25
  - 3rd Call: 30
  - TOTAL: 74

- **No of projects**
  - 1st Call: 24
  - 2nd Call: 29
  - 3rd Call: 39
  - TOTAL: 92
GNSS FP7 in numbers: Awarded projects

Number and percentage of proposed projects awarded funding

- **1st Call**: 65 proposals, 24% awarded, 24 projects
- **2nd Call**: 104 proposals, 29% awarded, 29 projects
- **3rd Call**: 148 proposals, 26% awarded, 39 projects
- **Total**: 317 proposals, 29% awarded, 92 projects

- **% of proposals awarded funding**:
  - 37%
  - 28%
  - 26%
  - 29%

European GNSS Agency
GNSS FP7 in numbers: Average projects’ costs

Average project cost and EC funding

<table>
<thead>
<tr>
<th></th>
<th>1st Call</th>
<th>2nd Call</th>
<th>3rd Call</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average total cost (EUR)</td>
<td>979,271</td>
<td>1,331,973</td>
<td>1,205,349</td>
<td>1,200,729</td>
</tr>
<tr>
<td>Average EC funding (EUR)</td>
<td>678,588</td>
<td>869,155</td>
<td>735,462</td>
<td>768,640</td>
</tr>
</tbody>
</table>
GNSS FP7 in numbers: Countries participation
Based on sample of 26 GNSS FP7 projects that realised/expected commercial outputs:

• Almost **15,000 units have already been sold**, to over **13,000 clients**, yielding **revenues of € 4.0 million**;

• Overall, by end-2015 they are expected to have generated **200,000 unit sales**, to over **23,000 clients**, yielding revenues of **€ 27.1 million**.
GNSS is a large and growing market

Global GNSS market size

- Core revenue (Global)
- Enabled revenue (Global)

CAGR: 9%
CAGR: 5%

- The projected long-term growth gives significant business opportunities for GNSS market.
- Along with the rapid development of new services and applications, the business environment of GNSS market is demanding and requires constant innovation on the supply side.

7 bln GNSS devices by 2022 – almost one for every person on the planet
GNSS FP7 is supporting GNSS industry progress
Most segments covered in the proposals

Although LBS and road dominate, there were many hi-tech proposals in the area of science, high precision, indoor and robust positioning.
Position accuracy & confidence guarantee for tracking services

- ENI is tracking +300 operating vehicles in Italy, France, Germany, Switzerland and Austria
- SCUTUM specifies the standard for the implementation of EGNOS commercial services in ITS and mobility applications (CEN Workshop Agreement SCUTUM).
- **Italy’s and France’s Ministries of Transport** validated the technical standard for the implementation of EGNOS commercial services, as part of a shared vision for EGNOS adoption.

[www.scutumgnss.eu](http://www.scutumgnss.eu)
SAFEPORT: Safe Port Operations using EGNOS

- EGNOS improves **Vessel traffic management**
- Development of EGNOS enabled **Portable Pilot Unit (PPU)**
- Successful **prototype demonstration** in Dublin port
- Implementation of the EGNOS based PPU in: **Riga, Harwell, London** ports and Medway River

**SafePilot - A new Commercial Release in May 2013:**
- Docking with automatic distances with depth contours
- Predictions, history & replay functionalities
- Route, passage planning and meeting points
- Full vessel tracking services integration with real time data
- Online chart purchase and update
Inclusion is a location-based service (LBS) solution offering motor-impaired persons improved mobility in safe conditions, helping them navigate traffic safety problems and limited accessibility of public transport.

During the European Space Solution 2012 in London, the INCLUSION solution was tested by Peter Norfolk, British wheelchair tennis player.

www.inclusion-fp7.org
CIGALA: Challenging the Solar Maximum in Brazil with PolaRxS

Understand the cause and implication of IS disturbances at low latitudes:
- develop **models** for signal propagation prediction and perturbation tracking
- deploy multi-frequency multi-constellation Ionospheric Scintillation Monitoring (ISM) network
- design and implement novel **IS mitigation** techniques in GNSS receivers

Project outcomes:
- Establishment of **8 ISM stations**
  - Latitudinal and longitudinal distribution over Brazil
- Upgrade of **4 SSN AsteRx2e/2eL/3** and **PolaRx4** products
The FP7 projects not only produce results but also build new knowledge...

**GNSS Education Network for Industry and UniversitieS**

“The GNSS Education Network for Industry and UniversitieS (GENIUS) project is concentrating on forging strong links between the GNSS applications industry and universities and research institutes”

### The results of the network

- 10 sessions of the GNSS Professional Training
- 4 PhDs with Industry
- 2 PhD training events
- 1 PhD Workshop
- 16 internships with
- 4 MSc scholarships.
- Continuous management of the MSc in GNSS

1 [http://www.gnss-education.eu](http://www.gnss-education.eu)
Launch of EU-Japan industrial cooperation in GNSS 13-15 May in Tokyo

**GNSS.Asia Japan workshop** (13-15 May 2013, Tokyo) triggered strong interest from Japanese market players and stakeholders. 400 participants in SPAC workshops and 4 meetings with industry:

- willingness to promote Galileo via joint ventures with EU companies
- availability to foster Galileo and QZSS adoption

Conference on GNSS applications in Sub-Saharan Africa 30-31 May in Dakar

- Strong promotion of technological and scientific competences that have a clear potential for Galileo and EGNOS in Sub-Saharan Africa
- Launch of the competition for the Best African Student Paper Award by Awareness in Africa consortium
H2020 opportunities
Space in H2020

Galileo Call

Excellent Science
- Frontier research
- European Research Council (ERC)
- Future and Emerging Technologies (FET)
- Marie Curie actions on skills, training and career development
- Research Infrastructures

Industrial Leadership
- Innov. SMEs
- Access Risk Finance
- Info. Commun. Technologies
- Key Enabling Technologies

Societal Challenges
- Bioeconomy
- Food security
- Sustainable agriculture & Forestry
- Marine & maritime research
- Secure societies
- Energy
- Secure, clean and efficient
- Transport
- Smart, green and integrated
- Resource Efficiency & Raw Materials
- Climate Action

Beneficiary
Enabler

SPACE in H2020
Across the **societal challenges** of H2020 the possible additional relevant research topics for funding development of E-GNSS applications could be found:

- smart, green and integrated transport
- marine and maritime research
- inclusive, innovative and secure societies
- food security, sustainable agriculture
- health, demographics changes and well being
- bio-economy
- secure, clean and efficient energy
- climate action and resource efficiency including raw materials
Galileo Call in H2020

Horizon 2020 Framework Regulation:

Union level action and investment in space research are required in accordance with Article 189 (TFEU), in order to maintain the competitive edge, to safeguard Union space infrastructures and programmes such as Copernicus and Galileo and to sustain a future role for Europe in space.

Horizon 2020 will accompany the infrastructure deployment by

1) fostering the further uptake of EGNSS in applications
2) preparing the secure utilisation through the development of PRS
3) foreseeing the future evolution of the EGNSS infrastructure

This call should result in the development of applications with a potential to contribute to the growth and strengthening of the European GNSS market and to have an impact on sectors where the EU’s added value and cost effectiveness are the greatest

* infrastructure and the operations of the EGNSS, will be funded through the budget of the Regulation of the European Parliament and of the Council on the implementation and exploitation of European satellite navigation systems.
Projects should be focused on:

- Development of innovative applications, products, feasibility studies, market tests
- Fostering development of innovative applications within international context and related standards with high international impact
- Exploitation of synergies with other space-based services and systems
- Validation of Early Services
- Implementation of pilot projects
- Supporting standardisation, certification, legal and societal acceptance
- Organization of awareness campaigns
Horizon 2020 GNSS topics and funding

1 - EGNSS applications (15-20 M€)

2 - SME based EGNSS applications (5-10 M€)

3 - Releasing the potential of EGNSS applications through international cooperation (5-8 M€)

4 - EGNSS awareness raising, capacity building and/or promotion activities in and outside of EU (5-10 M€)

Flat rate: 25% with some exceptions e.g. subcontracting

E-GNSS Apps development

Innovation: 70% funding

Promotion of E-GNSS use by using various means

Coordination and Support Actions (CSA): 100% funding
• 11 December 2013 publication foreseen
  ec.europa.eu/embrace-space
  http://ec.europa.eu/ (new participants portal for H2020)

• Early April 2014 deadline
• Selection in 6 months
• Signature of Grant Agreements in December 2014
✓ **Connected vehicles**: robust and accurate lane level positioning for navigation, in-vehicle infotainment, safety and eco-driving

✓ **Dangerous goods tracking**: robust positioning requirements uptake in EU Member States

✓ **PNDs**, replaced by multi-function devices

✓ **Automatic emergency assistance**: eCall regulation will accelerate the business case

✓ **Pay as you drive, Distance based road pricing**: more accurate and trustable positioning enhance the performances

✓ **Traffic information services** enabled by GNSS

---

**Shipments of GNSS devices by application**

**Units (millions)**

- **2012**
- **2013**
- **2014**
- **2015**
- **2016**
- **2017**
- **2018**
- **2019**
- **2020**
- **2021**
- **2022**

**Categories**:
- **Personal Navigation Device (PND)**
- **RUC**
- **PPUI**
- **In-Vehicle System (IVS)**
- **eCall**
- **ADAS**

**Description**:

- **2012**: Approximately 50 million units
- **2013**: Approximately 60 million units
- **2014**: Approximately 70 million units
- **2015**: Approximately 80 million units
- **2016**: Approximately 90 million units
- **2017**: Approximately 100 million units
- **2018**: Approximately 110 million units
- **2019**: Approximately 120 million units
- **2020**: Approximately 130 million units
- **2021**: Approximately 140 million units
- **2022**: Approximately 150 million units
Recent developments:
- Augmented reality – an information overlay on top of the physical world in mobile devices.
- Indoor positioning – location of people and objects inside large buildings, such as airports and shopping centres.

Upsurge in number of applications:
- 775,000 in Apple App Store.
- 700,000 in Android Apps compared to 88,000 in 2011.
- An estimated 40% of applications use location information.

- Integration of positioning into devices such as cameras, watches, and binoculars
- Location information sent from devices to application layers to enable sharing and tracking (e.g. for recording the distance run, social networking).
- Various positioning technologies integrated into one device.
- GNSS as the primary positioning solution outdoors, offering better accuracy than Cell-ID and Wi-Fi.
- Technological developments concentrate on seamless integration and switch from outdoor to indoor positioning.
E-GNSS concrete opportunities for industry – Aviation

- **Better Performance** for increasing number of more demanding applications (e.g. from 5 to 1 NM, LPV 200, ADS-B,..)
- **Multiconstellation/multifrequency** enables more robustness against vulnerabilities (iono, interferences)
- GNSS for the introduction of **Performance-Based Navigation (PBN)** in line with ICAO standards
- **Interoperability**, doing things better working together for a global aviation
- GNSS to increase safety, reduce congestion, save fuel, protect the environment, reduce infrastructure operating costs, and maintain reliable all weather operations, even at the most challenging airports.

A gradual proliferation of EGNOS enabled aerodromes

Increase in published procedures, which can be used by aircraft approved for LPV operations.
EGNOS and Galileo can contribute to a more efficient train command and control as well as better asset management supporting multimodal logistics.

- **Train signalling**: GNSS as an enabler of economically more viable signaling solutions providing more precision and saving valuable resources.
- **Asset Management**, including functions such as fleet management, need-based maintenance, infrastructure charges, and inter-modal transfers. GNSS is increasingly seen as a standard source of positioning and timing information in these systems.
- **Passenger Information** systems on-board trains showing the real-time location of the train along its route.
EGNOS and Galileo, can contribute to a safer and more efficient navigation

Examples of applications:
- Track control
- Portable Pilot Units
- Ship-to-ship coordination
- Port approach and navigation
- Ship-to-shore coordination
- Port automation, such as the tracking of shipping containers and other goods

Galileo will efficiently contribute to international SAR operations
- Europe’s contribution to the MEOSAR system of COSPAS-SARSAT
- “Return link” feature to send detection acknowledgement message from the SAR operator to the distress emitting beacon
- Detection of SAR alert in near real-time
With the emergence of Galileo, multi-constellations and dual-frequency use will sustain current high growth rates

Examples of business opportunities:

✓ Farm management solutions involving the use of real-time information for monitoring the location and status of farm equipment.
✓ Tractor guidance
✓ Variable Rate Applications leveraging local conditions on the field for precise control over farming inputs (e.g. fertilisers, nutrients).
✓ Automatic steering solutions

Supporting trends creating a strong business case:

✓ Increasing average farm size (EU)
✓ Decreasing farming population vs. increasing world population
✓ Better access to agriculture machinery
✓ Central and Eastern Europe catching up quickly
Through H2020 you can turn it into practice

We are waiting for your proposals!!!