Galileo and the future of SatNav: monitoring the market and technology opportunities

Alberto Fernández Wyttenbach, Market Innovation Officer

ESA Space Moves! 18th September 2017, Berlin
GSA governance summary

- European Commission
- Council and European Parliament
- European Space Agency
- Administrative Board
- Security Accreditation Board
- Working Arrangement
- Delegation
- Program Management
- Political Oversight
GSA in a nutshell

Mission:

*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

Resourcing:

- **150 Staff**
  - 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

- **21 Nationalities**
Galileo officially moved from a testing phase to the provision of live services.

Initial Services are the first step towards full operational capability and reflect Europe’s achievement to satisfy evolving user needs leveraging on more performant GNSS signals.

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

Users can keep track of Galileo-enabled devices in the different market segments, and be informed as soon as new ones become available.

www.useGalileo.eu

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Three main pillars towards Galileo adoption – the bigger picture

DOWNSTREAM VALUE CHAIN

MARKET SEGMENTS
- Road
- LBS
- Aviation
- Rail
- Maritime
- Agriculture
- Surveying & Mapping
- Timing & Synchronization
- Governmental

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 aps
- Roadmaps with stakeholders
- Support EC policies

Support EU
COMPETITIVE OFFER
of Services and applications

E-GNSS USER ADOPTION
EU PUBLIC BENEFITS
Market and Technology monitoring support our integrated approach

The first edition of the GNSS Technology Report was issued on 2016 providing an in-depth analysis of 3 GNSS macrosegments:
• Mass market solutions
• Transport safety and liability-critical solutions
• High precision, timing and asset management solutions

GNSS Market Report 5 was released mid 2017, main enhancements are:
• Expanded session on “macro trends”
• Addition of segment-specific “user perspectives”
• The E-GNSS added value per segment
GSA tangibly supports EU industry in reaping the market opportunities

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.

http://www.gsa.europa.eu/r-d/gnss-r-d-programmes
Smartphones account for almost 80% of the global installed base of GNSS devices, being the most popular platform to support mobile “LBS”.

Thanks to In-Vehicle System and eCall markets the number of devices used for “Road” applications is set to grow substantially, with a CAGR of 11.4%.

Fostered by a maturing regulatory environment, drones market is set to account for over 70% of the installed base of “Professional” segments in 2025.

GNSS is all around: the global installed base expected to reach 8billion devices in 2020...
...especially for innovative added-value services providers, opening the door to SMEs and start-ups

Added-value services are set to witness skyrocketing growth of revenues by 20% annually*

Road and LBS dominate the core revenues representing together more than 93% of the market*

* In the period 2015-2020
Location plays a role in all major technology trends:

- Internet of Things
  - Locating objects
  - Synchronising networks
- Big Data
  - Geo-referencing data
- mHealth
  - Disability assistance
  - Patient monitoring
- Augmented Reality
  - Link between surrounding reality and digital objects
- Smart Cities
  - Supporting infrastructure design and mobility
- Multimodal Logistics
  - Asset monitoring
  - Theft risk reduction
Main emerging applications will address smart and efficient mobility

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<tr>
<th>ICT networks</th>
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<td>• ICT technologies to enhance quality and performance of urban services, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens.</td>
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<th>Connected Cars &amp; Cooperative ITS</th>
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<td>• New vehicle and infrastructure features that enables the exchange of information with the Internet via specific interfaces, bringing the Internet into the automotive world</td>
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<th>Mobility as a Service</th>
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<td>• Shift away from personally owned modes of transportation and towards mobility solutions that are consumed as a service</td>
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<th>Autonomous vehicles</th>
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<td>• An autonomous vehicle is capable of sensing its environment and navigating without human control fulfilling the main transportation capabilities of a traditional car</td>
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Several innovation areas complement the GNSS positioning to achieve ubiquitous location.

A comparison of GNSS and terrestrial radio positioning techniques:

- GNSS
- Augmented GNSS
- eLORAN
- VOR/DME
- Radio & TV
- Cellular
- LPWAN
- Pseudolites
- WLAN
- DSRC
- WPAN
- UWB
- RFID

**GNSS**
- Dedicated Radionavigation System
- Non-Dedicated Systems (incl. SOOP)
- Hybrid* Technology

*Can be used either as a dedicated positioning system, or as a communications one

- Multi-constellation multi-frequency GNSS
- Co-operative positioning (Peer to Peer)
- Cameras
- Visual perception
- 3D Mapping SLAM
- Smart Dust
- Pervasive networks SOOP
- MEMS integration

Positioning User Technology
How can we keep GNSS being the core technology?

Multi-constellation for more availability of the signals

Multi-frequency for better accuracy of the position
Location technologies develop alongside three key dimensions of change:

1) Ubiquitous positioning

The ability to choose the optimal combination of sensors and networks to become environment-independent.

2) Automation & ambient intelligence

Sufficient reliability to enable autonomous operations* by sensing the environment and adapting to it in real time.

* driving, sailing, parking, landing

3) Security

If the positioning system knows where you and your assets are at all times, it better keep this information to itself.

Security is also understood as robustness and resistance to external interferences.
Linking space to user needs

How to get in touch:

www.GSA.europa.eu

EGNOS-portal.eu

GALILEO GSC-europa.eu

GNSS market trends & applications


GNSS receiver trends & technology