GALILEO & EGNOS Evolution Programme: The Road to 2030

ENC • Helsinki, May-June 2016

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PRESENTATION CONTENT

- Context
- Methodology
- R&D instruments

GALILEO TODAY

- **Space segment**
  - 3 successful launches in 2015
  - 12 satellites in the constellation
  - 14 additional satellites ordered
  - Procurement for additional batch to complete the constellation

- **Ground segment**
  - Consolidation of the system configuration for FOC (2020)
  - Additional facilities on-going: Service center, performance center, logistic center

- **Service provision**
  - Initial service declaration to take place in 2016

- **Operations**
  - New contract for the exploitation phase under negotiation

GNSS TOMORROW

- **At least 4 global constellations in Medium Earth Orbit**
  - > 120 satellites broadcasting signals
- **Use of positioning and timing information (PNT) generalized**
  - The 5th facility (after *water, electricity, gas, phone*)
- **Emerging new requirement from user communities**
  - e.g. *authentication* , for applications requiring trusted position and timing information
  - Key feature to enable new types of commercial applications such as "*Pay As You Drive*" (PAYD), "*Road User Charging"* (RUC), access to mobile content, etc.
- **New technologies could compete with GNSS**
  - Terrestrial technologies (e.g. *miniaturized sensors, mobile networks used for positioning*)
  - New concepts for satellite-based positioning (e.g. *mega constellations of small-size satellites)*

Prepare TODAY to face TOMORROW's challenges

- **Competitive environment: distinguish Galileo as an attractive option** to ensure that it is widely used and to maximise business opportunities
  - Continuous and independent provision of relevant, robust and accurate services
  - Timeliness of delivery when introducing new features
  - Cost effectiveness of the infrastructure development, deployment and exploitation

- **Competitive sector: reinforce the EU industrial and commercial competitiveness in GNSS**
  - Independent access to all elements of the supply chain
  - Cost effectiveness

DEVELOPMENT PROCESS

- EC's approach towards evolution of Galileo is to:
  - Capture the strategic objectives and priorities of Member States (*top-down analysis*)
  - Understand the changing GNSS environment (*bottom-up entries*)
    - markets
    - lessons learnt
    - international scene
    - user changing habits
    - technological capabilities
    - signals and frequencies trends

- Approach largely supported by consultations:
  - Member States, in multi- and bi-lateral format
  - EC's internal services for sectorial inputs
  - ESA, GSA and JRC
  - Industry

TYPICAL QUESTIONS

- Should Galileo be made even more accurate?
  - From a few meters accuracy today to sub-meter tomorrow ?

- Should Galileo expand the current service portfolio with new services, and if so which ones?

- How much would those evolutions cost?

- Should Galileo allow the hosting of potential new mission(s), beyond the navigation and SAR missions?

GUIDING PRINCIPLES

- Users are at the center of the evolutions:
  - User-driven evolutions
  - Quality of the service
  - Backward compatibility
  - Timeliness of introduction

- Costs of development, deployment and operation shall be minimized:
  - Gradual introduction
  - Cost-effectiveness
  - Low complexity

R&D INSTRUMENTS

- The study of the evolution of Galileo at mission and system levels is supported by a strong R&D programme under the Horizon 2020 envelope.
  - Technological studies to augment the technology readiness level (TRL) for some components and assess their maturity for a possible use in Galileo;
    - Budget is delegated to ESA
  - In parallel, EC is also conducting R&D on mission and service evolution, with the aim to assess the viability of new mission concepts or of new services.
- GSA is also conducting specific R&D on applications and receiver technology:
  - Receivers ("*fundamental elements*")
  - Applications

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R&D OPPORTUNITIES

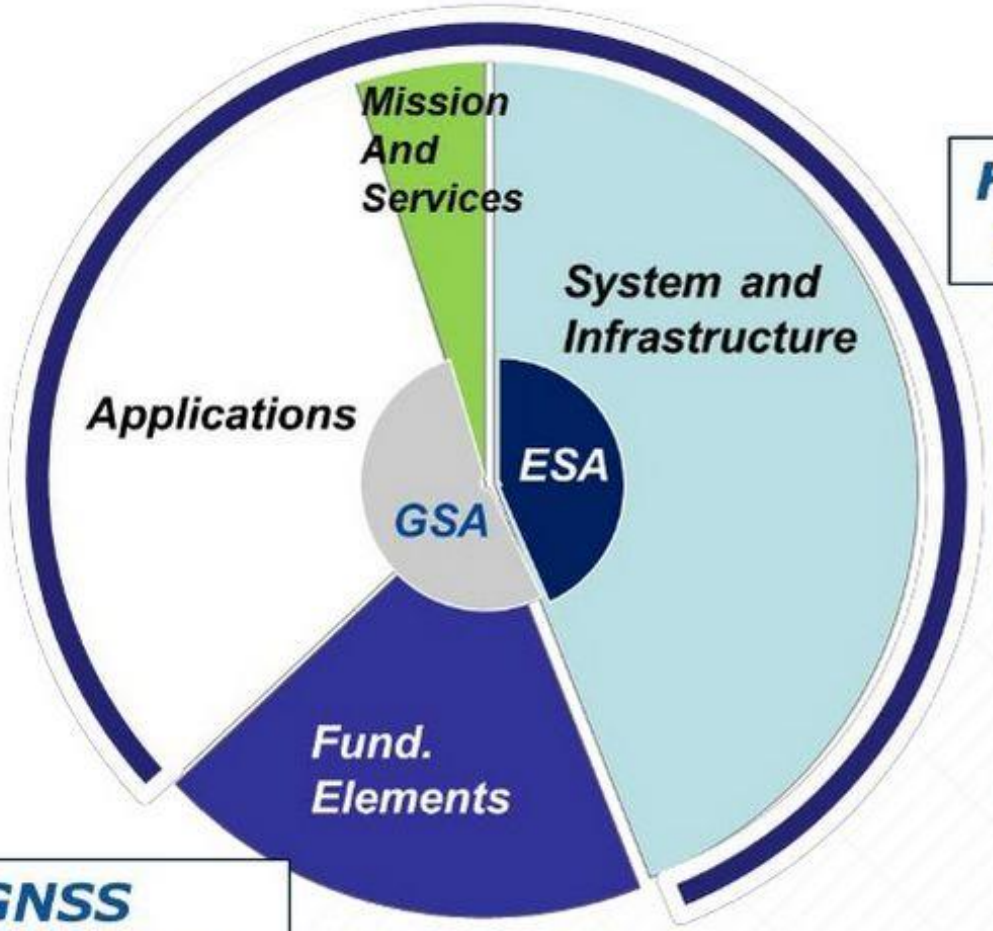
- MISSION: concept studies for new types of mission and services
  - ⇨ H2020 budget, managed by EC
  - ⇨ Envelope for [2015-2017] period: ~14 M€

- INFRASTRUCTURE: technological studies for infrastructure evolution
  - ⇨ H2020 budget, delegated to ESA
  - ⇨ Envelope for [2015-2017] period: ~ 150 M€.

- RECEIVERS: user receiver technology ("*fundamental elements*")
  - ⇨ GNSS Programme budget, managed by GSA
  - ⇨ 100 M€ until 2020

- APPLICATIONS
  - ⇨ H2020 budget, managed by GSA
  - ⇨ Envelope for [2015-2017] period : ~ 60 M€.

Wrap-up – R&D



Horizon 2020 Programme

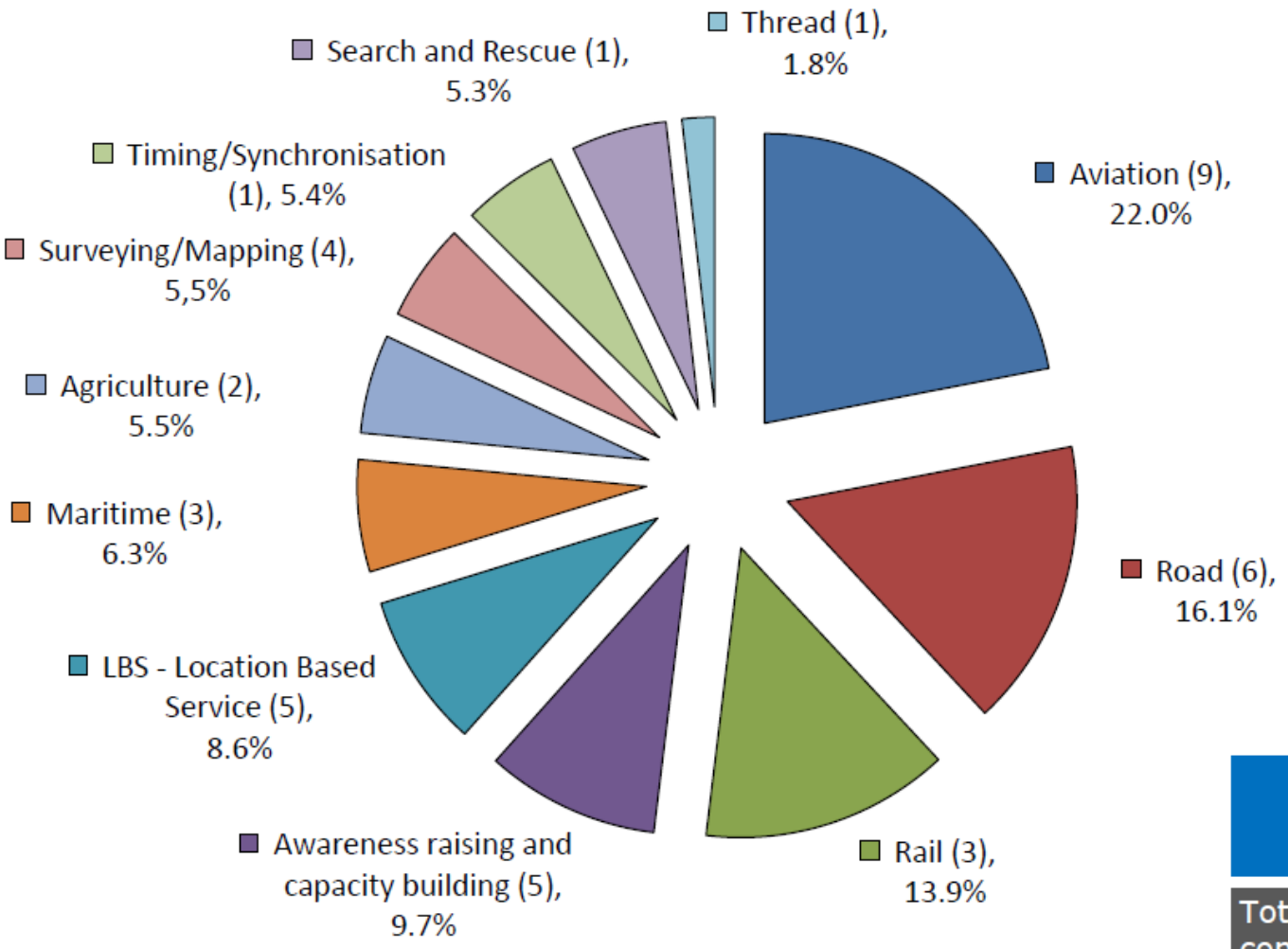
- Mission And Services
  ⇨ [2015-2017] ~ 14 M€
- System And Infrastructure:
  ⇨ [2015-2017] ~ 150 M€
- Fundamental Elements
  ⇨ 100 M€ until 2020
- Applications
  ⇨ [2015-2017] ~ 60 M€.

GNSS Programme

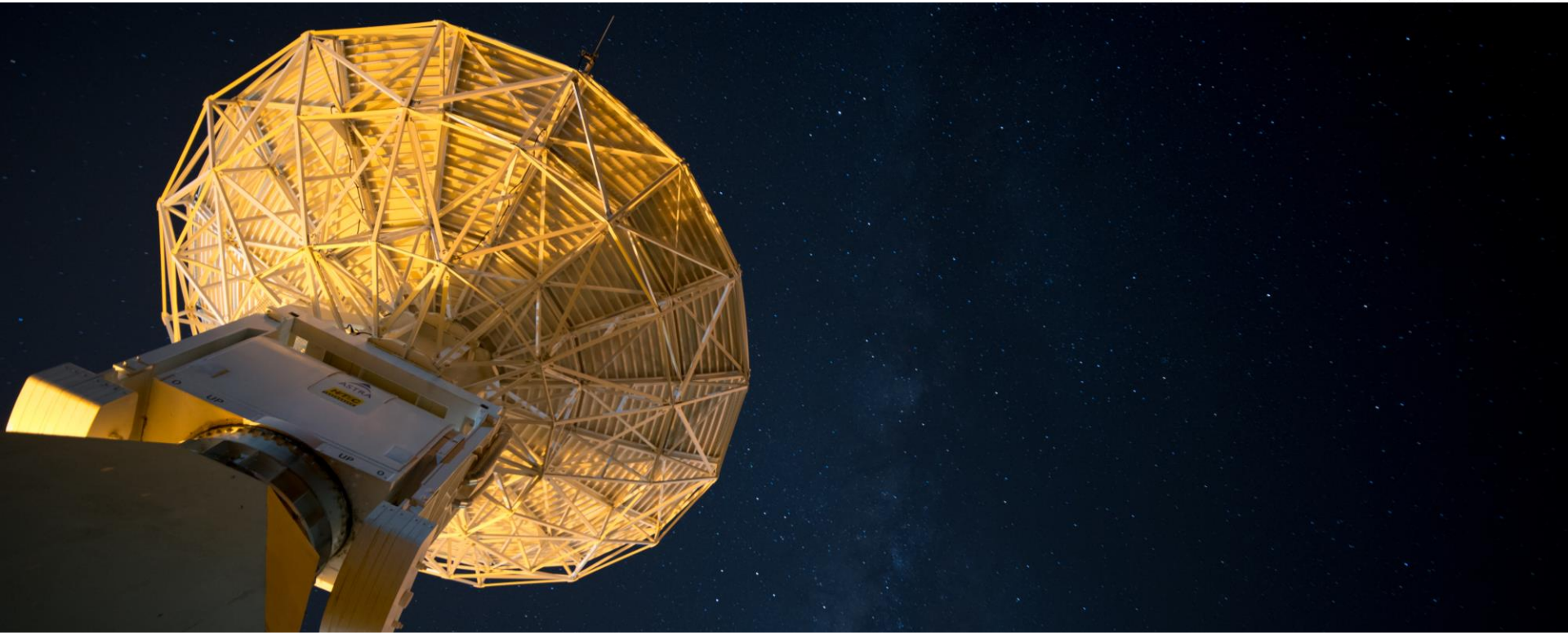
HORIZON 2020 – APPLICATIONS

Funded projects distributed by market segment

(number of projects), %EU contribution



EGNSS applications Calls for proposals Galileo 2014-2015	
Total EU contribution (M€):	65.1



THANK YOU

www.gsc-europa.eu

http://ec.europa.eu/growth/sectors/space/galileo/

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