

European
Global Navigation
Satellite Systems
Agency

EGNSS downstream R&D – consultation results



GALILEO **EGNOS**
NAVIGATION SOLUTIONS
POWERED BY EUROPE

H2020 Space Info Day

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Space strategy for Europe recognizes the importance of investments in downstream

The Space Strategy for Europe recognized that

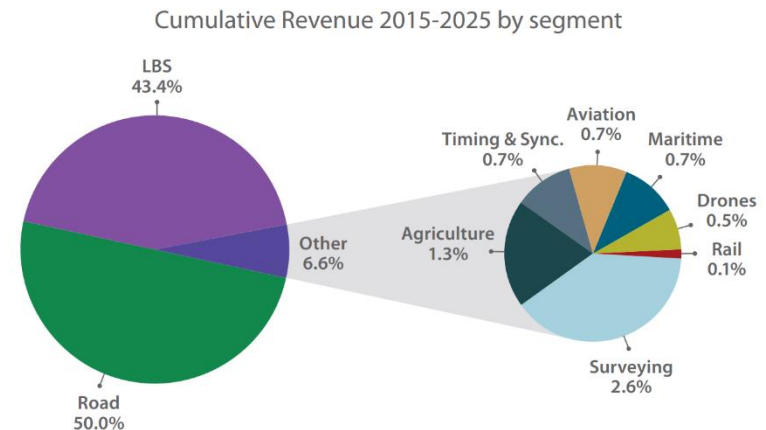
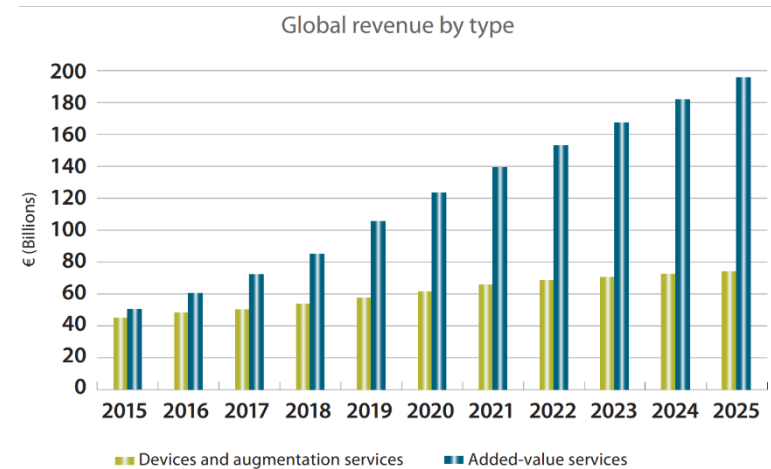
'investments in downstream space developments are necessary to demonstrate the important role of space in achieving the key objectives of the EU policies'

R&D funds shall foster the market uptake of the EU space programmes (e.g. EGNOS and Galileo) through:

- boosting demand among public and private users,
- facilitating access to and use of space services,
- and stimulating the development and use of innovative downstream applications.

The global GNSS downstream market continues to be a promising market in terms of EU growth

- GNSS applications and services market
 - Market size **EUR 140 bn (in 2018)**
 - Annual growth rate by 2025: **7%**
- 2014-2020: EU will invest around
 - **EUR 8 bn** in the European GNSS infrastructure
 - **EUR 300 M** in the development of value-added applications and services (where new jobs creation is)



The R&D investments shall meet the user uptake objectives



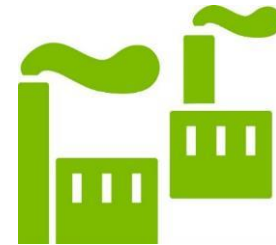
User driven
EGNSS



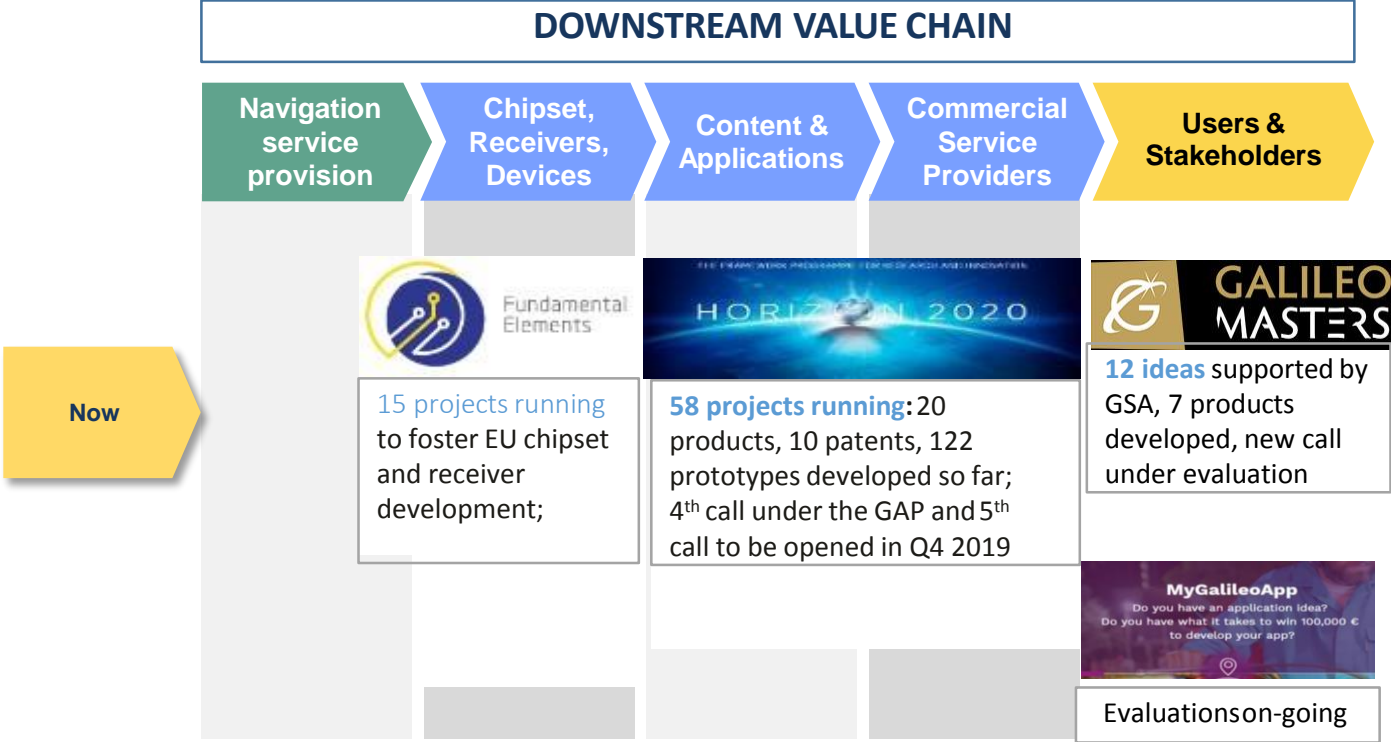
EGNSS Adoption



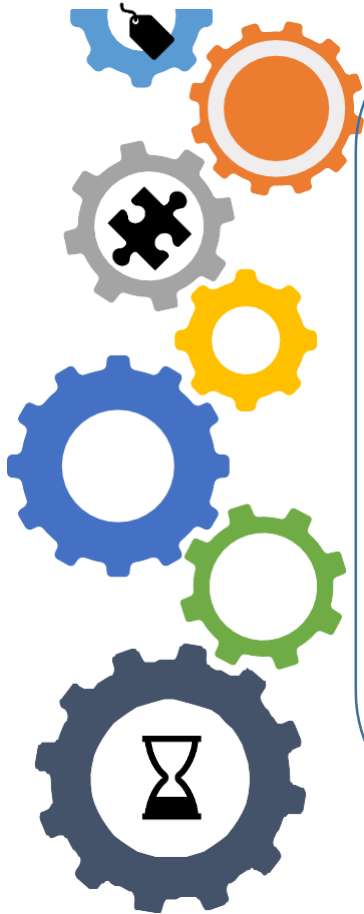
Competitiveness of
EU downstream
industry, SMEs and
start-ups



R&D Programmes address the needs alongside the value chain towards EGNSS adoption



After 2020 EGNSS market will change and R&D funding will need to consider the new opportunities



Situation after 2020

Galileo fully operational

All differentiators will be available
Dual frequency and authentication will be in the market

Galileo enabled receivers in use

Most of the receivers and devices will be having Galileo enabled and activated

Wide portfolio of commercially available applications

New challenging applications will be closer to maturity (e.g. autonomous vehicles)

User needs expansion

e.g. ubiquitous positioning, automation and ambient intelligence, security, ...

User technology advancement

e.g. MEMS integration, Smart Dust, Multi-constellation, multi-frequency GNSS, Pervasive networks SOOP

Other GNSS systems evolution

New EGNSS downstream R&D funding tools needed after 2020, as the market and Galileo will change

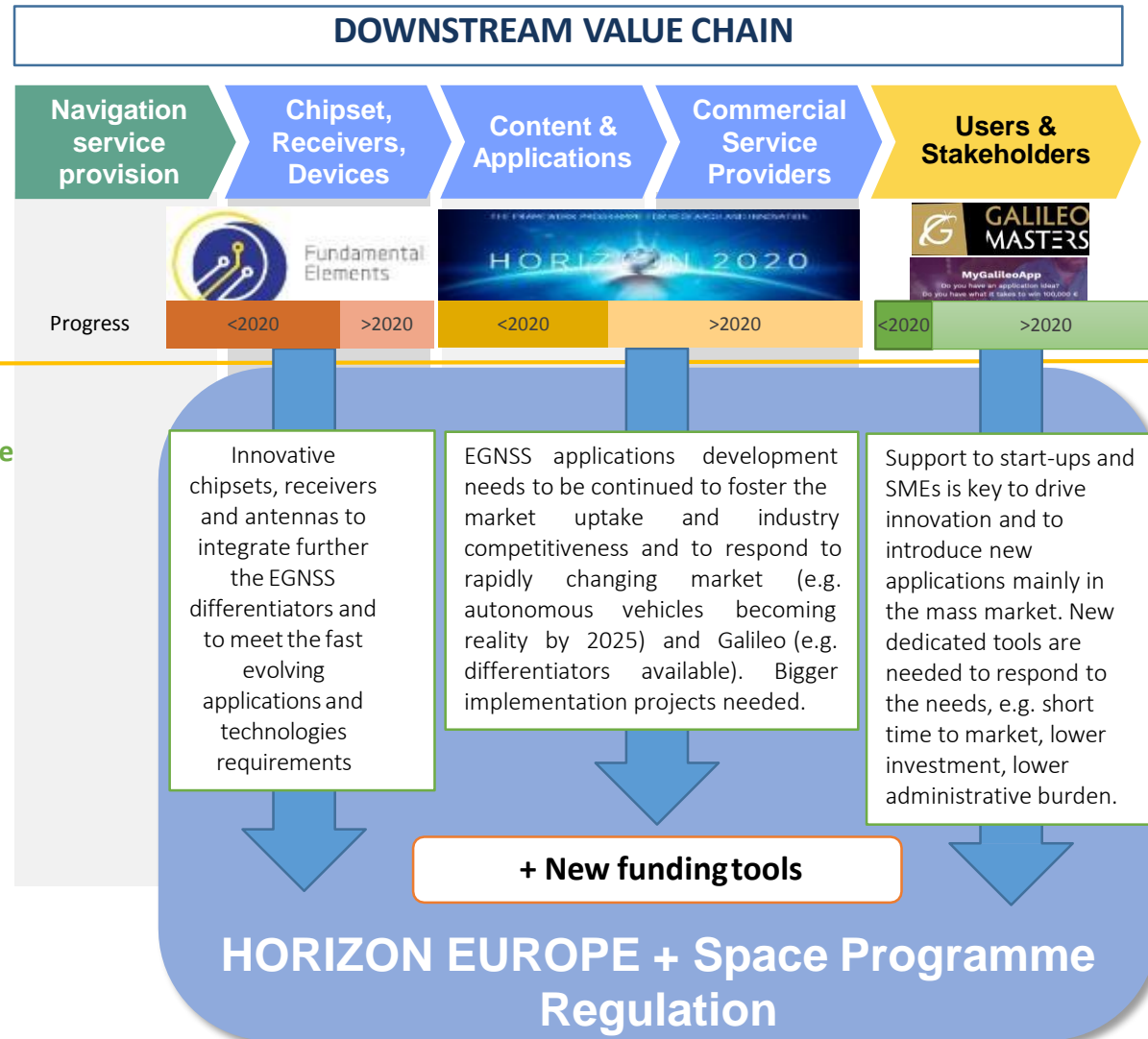
Endorsement of the presented funding mechanisms during several consultation

- Significantly increase the budget of **Horizon Europe** in comparison to H2020 (*continue the H2020 grants and FE*)
 - ✓ complete the uptake in longer term regulated market segments
 - ✓ position Galileo as a leader where differentiators make a difference (via large pilot projects)
 - ✓ support EU industry to export
- Introduce **New Funding Tools*** to cope with the new needs (also via the Space Regulation “innovation actions”)
 - ✓ **Innovation Procurement** for Public Sector as Customer of Galileo
 - ✓ **Centres of Excellence** to leverage regional and national competences as example and supporters for the others
 - ✓ **Space-based entrepreneurship** to provide dedicated funding tool for the area of mass market
 - ✓ **Venture Capital** to scale-up our start-ups



We achieved a lot thanks to R&D initiatives, now it is the time to move forward and prepare background for HE and Space Programme

2020
Galileo fully operational
All differentiators available



The landscape of New EGNSS funding tools defined covers all stages of development

HORIZON EUROPE + Space Programme Regulation



Initial idea



Business plan



Marketable product



Commercialisation



Expansion

EGNSS downstream r&d projects

EU Innovation Procurement

PCP

PPI

SMEs and start-ups

Support to Venture Capital

Excellence Centres

★ **NEW** (Support to SMEs, start-ups and Venture Capital- To complement support to start-ups and SMEs; PCP/PPI- to involve public administration as EGNSS users through; Excellence Centres in order to share the experience, provide advice and mentorship to new comers)

Inputs received during consultations

Existing
funding tools

EGNSS downstream R&D shall:

- devote significant budget to complete the adoption in long lead time market segments e.g. **through realisation of large implementation projects.**
- focus on development of the **close to market applications** in the areas of transport, mass market applications and professional applications
- support the **uptake of new services**, such as the High Accuracy Service, Galileo Authentication features, Public Regulated Service and the Search and Rescue Return Link.
- seek for **synergies** with other technologies, e.g. COPERNICUS, 5G; focus on development of applications involving several components of the space programme to facilitate the synergies
- support developments of **fundamental elements** such as commercial chipsets, receivers and antennas in Europe, in order to open the way for new & innovative missions, concepts, services and applications developments.
- provide support to **awareness raising and capacity** building initiatives in the field of EGNSS
- support the establishment of new EGNSS/Space downstream opportunities for European industries through participation in global value chains and access to new and emerging markets (**international cooperation**)

GSA fully ready to continue H2020 and FE in new financial perspective



Preparatory actions:

- Analysis of synergies between H2020 and FE in order to make the mechanisms more efficient and effective;
- Focus more on EGNSS differentiators
- Analysis of synergies with Copernicus and other systems/technologies
- Continuous monitoring of market and technology trends
- First definition of EGNSS R&D funding priorities in the area of applications and receivers, chipsets, antennas

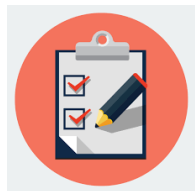


EGNSS downstream R&D shall:

- support public stakeholder needs by specific tools enabling buying the development (PCP) and deployment (PPI) of innovative EGNSS solutions.
- bring national, regional, local public bodies to cooperate with their peer in other EU countries interested in EGNSS based solutions.
- speed up the public sector modernisation in more harmonised way and will improve the quality and efficiency of public services.
- enable to obtain better value for money through cooperation and allows the public sector around Europe to share the cost and the experiences of EGNSS innovative solutions.

GSA is launching the Innovation Procurement pilot in the 5th call of H2020

PCP/PPI



Public Sector as Customer of Galileo

PCP/PPI to foster better meeting of public needs through buying the development (PCP) and deployment (PPI) of innovative solutions

Preparatory actions:

Definition of a topic: EGNSS applications for public authorities within 5th EGNSS applications call:

- The main challenge of this topic is to deepen user integration and thus foster exploitation of EGNSS applications to match the needs of public authorities at national, regional or local levels.
- Proposals should be building on procurement needs of the participating organizations.
- The proposals should support the EGNSS market take-up across Europe and demonstrate a sustainability of solutions beyond the lifespan of the proposed project.
- The choice of EGNSS market segment and application is left to the proposer.

SPACE-EGNSS-5-2020:

EGNSS applications for public authorities' pilot

SPACE-EGNSS-5-2020: EGNSS applications for public authorities' pilot

Specific Challenge:

Innovation procurement can drive the R&D and deployment of innovative solutions from the demand side through respectively pre-commercial procurement (PCP). This can open new market opportunities for companies in Europe, can contribute to speeding up public sector modernisation and can help to tackle societal challenges with innovative/breakthrough solutions for the benefit of the citizen.

Satellite navigation technology is an increasingly common component of innovative applications in different market segments. Involvement of public institutions is key in fostering the EGNSS adoption. Nowadays the maturity of EGNSS based solutions and their increased accessibility provide significant contribution to the achievement of Sustainable Development Goals of the governments.

The main challenge of this topic is to deepen user integration and thus foster exploitation of EGNSS applications to match the needs of public authorities at national, regional or local levels.

The innovative EGNSS solutions developed through this action should have been tested and have demonstrated success in smaller scale settings and have not yet been deployed on a large scale.

Scope:

The objective is to launch demand-driven innovation actions by public authorities aiming at customising EGNSS applications for their needs. Transnational cooperation has a key role to play in this context, as it can facilitate knowledge transfer and optimisation of resources for public authorities. Proposals should be building on procurement needs of the participating organizations. The proposals should support the EGNSS market take-up across Europe and demonstrate a sustainability of solutions beyond the lifespan of the proposed project. The choice of EGNSS market segment and application is left to the proposer. A non-exhaustive list of possible applications is presented below:

- EGNSS for mobility as a service, cooperative ITS, public transport and smart cities,
- Implementation of Performance Based Navigation procedures navigation,
- Integration of EGNSS into U-Space concept for drones,
- Helicopter emergency medical services with EGNOS capabilities (operations and equipment),
- Public rescue services with Galileo SAR capable helicopters, boats and drones
- EGNSS to support port operations,
- Monitoring of infrastructure with EGNSS (rail, road, critical infrastructure)

Inputs received during consultations

EGNSS downstream R&D shall:

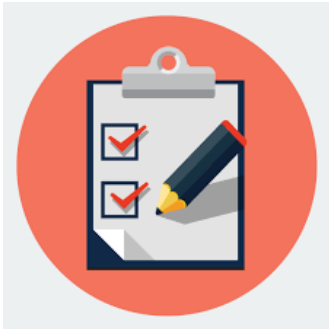
- Support to expand the number of start-ups in the EU building businesses based on innovative EU space technologies (i.e. expand a 'space ecosystem');
- Support the SMEs and start-ups to increase their chances to succeed (with both technical and managerial support);
- Accelerate/secure growth & scale up (attracting more private investors) of EU space innovators;



Space-based entrepreneurship to nurture new business and start-ups, and consolidate existing ones

SMEs and Start-ups

Proposal: agile tool dedicated for the area of mass market (characterized by short time to market and high dynamic of innovation), currently not well covered by H2020, addressing specifically start-ups and SMEs



GSA preparatory actions:

- Analyzing the accelerators/incubators suitable for supporting start-ups and business related to downstream GNSS R&D
- Identifying the best practices for high performing incubation/acceleration structure
- Launching MyGalileoApp to expand the current GSA network of mobile applications' developers that can valorize Galileo use in smartphones
- Discussing with EC the Strategy for the Catalyst programme implementation, avoiding overlaps and creating synergies with existing funding tools and support services for start-ups and SMEs



Inputs received during consultations

EGNSS downstream R&D shall:

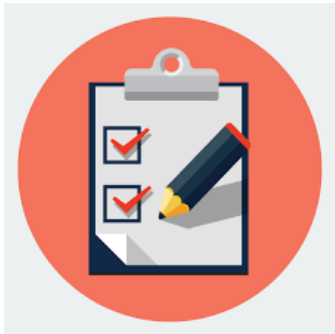
- facilitate the access to finance for EU GNSS downstream companies
- not create a dedicated fund but rather to work with existing Venture Capital funds/initiatives and also EIB/EIF instruments to:
 - Raise the knowledge of EGNSS potential
 - Establish cooperation with existing funds, acting as facilitator for the companies
 - Provide technical support to evaluate the project to be funded
 - support the partner funds with initial financial resources to be used for investments using EGNSS as a core technology.



Support to Venture Capital: to scale-up start-ups and SMEs

Support
to VC

Proposal: Support to Venture Capital through tool that aims to facilitate the access to finance for EU GNSS downstream companies (especially start-ups, for example the ones created in H2020 projects, and SMEs), overcoming the lack of EGNSS potential acknowledgment by currently existing funds.



GSA preparatory actions:

- Analyzing the Venture Capital funds and other financial tools for SME suitable to support R&D and commercialization activities of products based on GNSS
- **Signature of the MoU with EIB (10/09/2019)**
Organization of an event where investors meet SMEs and start-ups



Inputs received during consultations

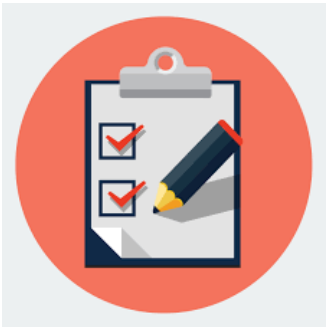
EGNSS downstream R&D shall:

- support the improvement of the expertise in a specific downstream EGNSS/space related area, and utilize its resources to help a business improve towards an identified goal.
- Aim at bringing together a variety of different actors, and build up a community for partnerships downstream space.
- Support creation of a focal point for knowledge management, with the overall goal being to capture new knowledge and practices from inside and outside the organization, and establish best practices to disseminate to the other actors.
- Built the initiative on the excellences existing at regional/national level on a certain EGNSS based application.



Centres of Excellence: to increase applications/service development competencies and knowledge sharing between different regions in Europe

Proposal: Centres of Excellence (Business and Market Champions): build on the excellences existing at regional/national level on a certain EGNSS application, so that it can serve as example, demonstration, learning and testing facilities for other private and public entities in Europe, creating a spill over effect



GSA preparatory actions:

- Gathering inputs from countries related to the EGNSS downstream activities, during the workshops with MS and on one to one basis, addressing specific local competences and needs
- Development of a detailed map of Europe, for region’s competence in specific market segments
- Definition of list of services that could be further customized for specific selected centres.
- Assessment of ways to ensure the sustainability of such centres



Emerging applications by market segment

Inputs received

Aviation

- Widespread LPV implementation to secondary airports
- Advanced navigation operations, e.g. 4D
- Galileo/GPS GBAS Cat II/III (Gast-F)
- EGNSS in U-Space applications
- ADS-B for the future Surveillance infrastructure
- Synchronization of critical airport infrastructure

Urban Air Mobility & Urban Air Delivery

- operations in the very challenging urban environment
- hybridization of EGNSS and intelligent systems for safe navigation
- integrity as key enabler for Drones navigation and UTM services

Rotorcraft

- low level routes
- Point In Space approaches
- Simultaneous non interference operations
- Advanced operations
- GNSS for altimetry

Rail

- enhanced safety (Train Control and Signalling)
- inclusion of EGNSS into the evolution of ERTMS
- infrastructure maintenance (also with usage of UAVs)
- Dangerous goods transport
- Infrastructure maintenance
- Driver advisory systems
- Trackside personnel protection

Maritime

- autonomous vessels
- port Terminal Automation
- surveillance and Accident investigation
- back-up for GNSS spoofing at the vessel side
- Search and Rescue, e.g. remote activation of SAR beacons
- UAVs to support maritime operations

Road

connected, automated driving
smart Tachographs
IoT solutions for efficient mobility

road maintenance
safety-critical transport
automated toll system

Emerging applications by market segment

Inputs received

Consumer applications

Augmented reality
Artificial Intelligence
Robotics
mHealth
Wearables
Geo marketing and advertising
Safety and emergency

Surveying, Agriculture

Surveying and Land Management:

Crowdsourcing and Autonomous Land Surveying
Cadastral Surveying, 3D Mapping and BIM
GNSS/IoT infrastructure Monitoring
Dredging and Marine Surveying (e.g. bathymetries)

Autonomous Mining and Precise Farming:

- Tractor guidance
- Soil-Crop monitoring and Variable rate
- Livestock monitoring

Precise Asset Management

Governmental

Governmental Asset Tracking:

Support to ground operation
Border Control, Automatic Customs Declaration and Excises
Dangerous goods transportation monitoring

Critical infrastructure Monitoring and CyberSecurity:

Critical Assets Monitoring
Data Center resistance against spoofing data

Law enforcement: UAV Monitoring, Offender tracking and
Body camera

Timing & Synchronisation

- Telecom: 5G, Small cell synchronisation
- Energy: Phasor Measurement Units for smart grids
- Mass Market: Digital Video Broadcasting
- Transport: Aviation, Connected Cars, rail
- Data Centres
- Scientific applications

Other professional

- Space applications: radio occultation, spectrum occupancy, navigation for LEO
- Scientific applications: climate change, meteo forecast

Innovative Chipset & Receiver Technologies Development Needs

Inputs received

- Low cost GNSS/LiDaR
- Fully fused GNSS/IoT/Communication transceivers
- Low cost Phased Array antennas
- Advanced Multipath Reduction techniques
- Smartphone Multiple Constellation/Augmentation/Multiple Frequency chipsets
- SLAM and Mobile mapping
- Integrity algorithms specific to the domain of application (RTCM SC134)
- ARAIM integration
- Sensor fusion
- Low cost Phased Array antennas
- Integrity concept beyond aviation
- Multi Sensors platforms certifiable with harmonised procedures and working in any operational scenario
- Power consumption reduction
- Interference/jamming detection and mitigation
- Antispoofing techniques (at antenna, receiver and application levels)
- Machine learning
- TTFF improvements
- Miniaturisation

Call for Actions requiring support from you



Secure budget for EGNSS downstream R&D in HE Decision and Regulation



Secure the scope of EGNSS R&D downstream activities in HE and Regulation



Mobilise the public authorities for the Innovation Procurement pilot in the 5th call of H2020

Linking space to user needs



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