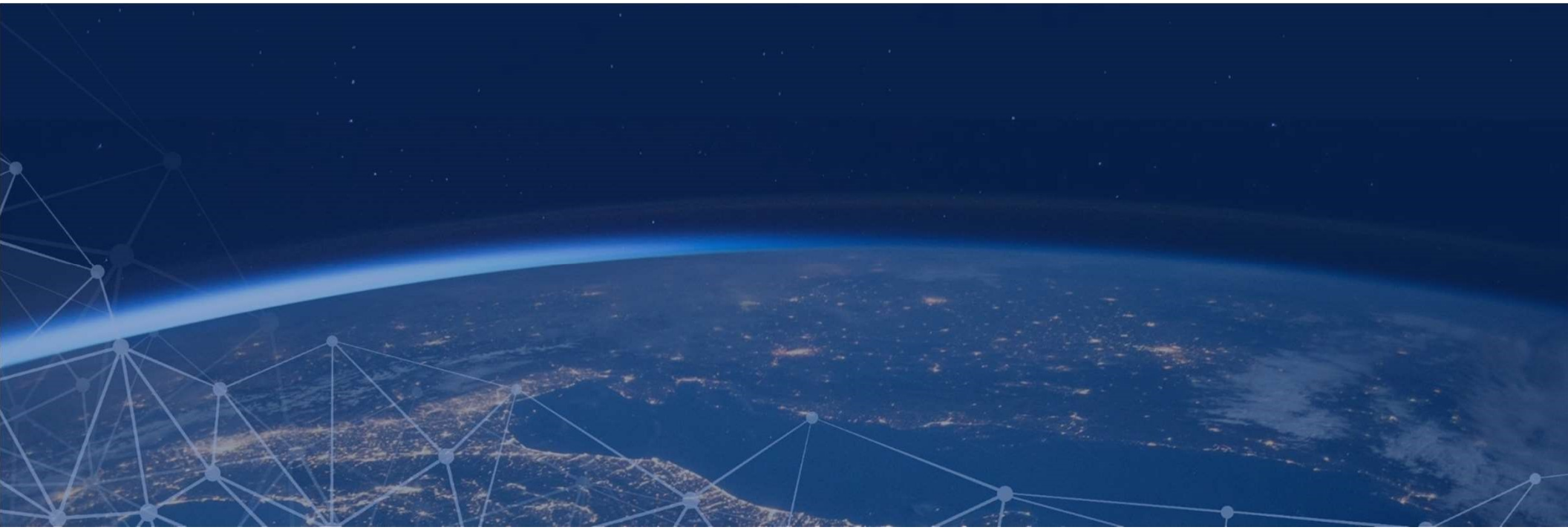
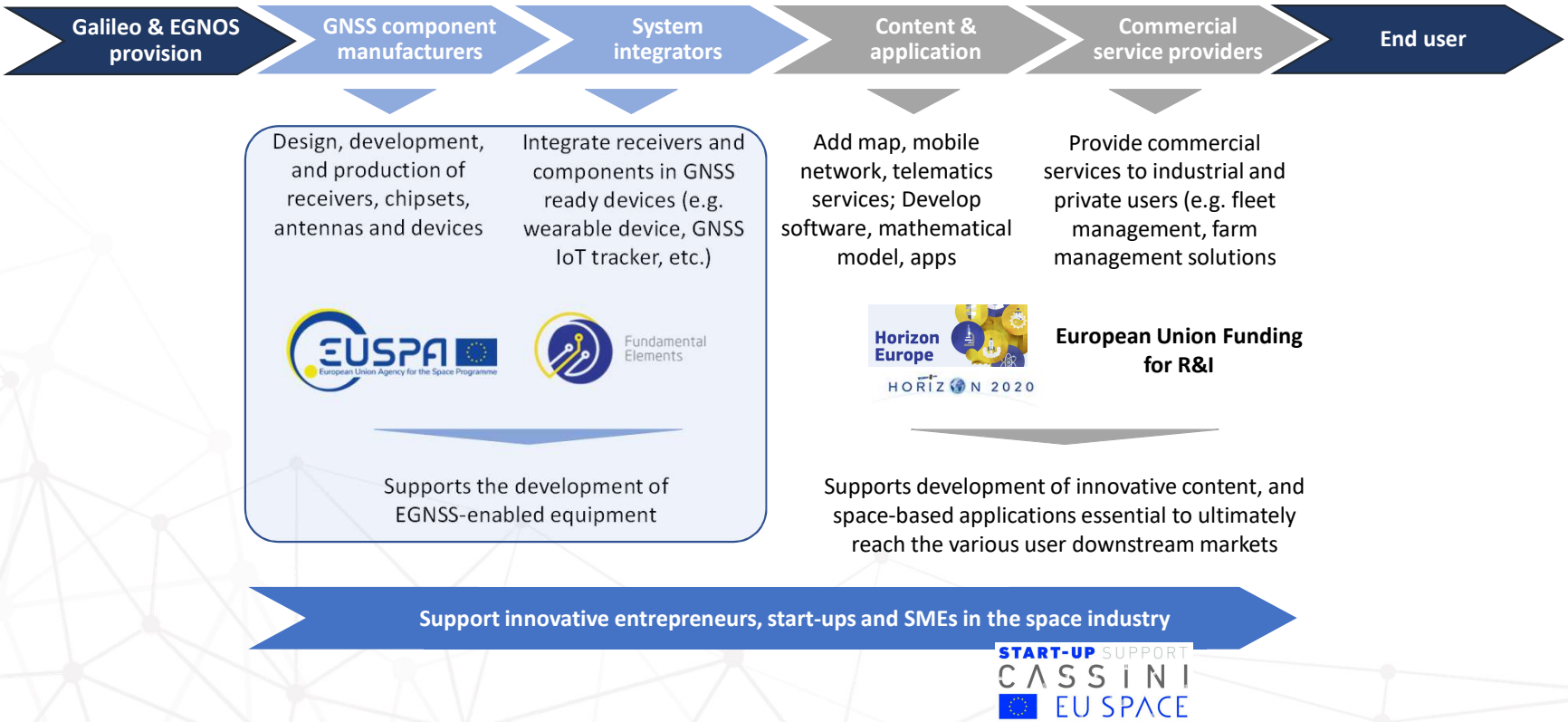


Updates on the overall status of Fundamental Elements programme

Valeria Catalano, Market Downstream and Innovation Department, EUSPA

30th June 2022

The FE programmes support the development of EGNSS-enabled devices



Fundamental Elements 1: A success story

All grants and procurements launched,
with **30** still **on-going projects** covering all the market segments

13 projects successfully completed

FANTASTIC
Receiver with **first implementation of OSNMA** successfully tested under simulated spoofing attack at JRC

ESCAPE
First Galileo-based highly automated vehicle with multi-frequency & multi-constellation GNSS receiver

GLAD
Significant contributions to improvements in position integrity via **ARAIM**

Galileo of Things
Development of a **semiconductor-IP core** mating with NB-IoT IP for **low-power consumption solutions**

GIANO & GEARS
Galileo-based timing platform implementing **OSNMA**

H-GEAR
OSNMA-based, motorbike anti-theft system with eCall technology

MAREC
Implementation guidelines of **SBAS for SOLAS and non-SOLAS** applications for both navigation equipment and AIS

OSCAR
Development of a **modular, open source / open hardware Galileo receiver**

APOLLO
Galileo-based geolocation solution for the **IoT market** leveraging **Cloud computing**

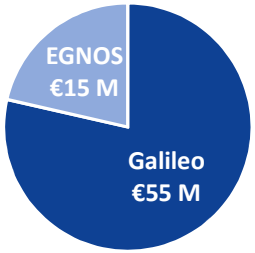
TAUCETI & PHOENIX
Development of **MEOSAR Beacons**

PATROL
Development, supply and testing of a **Galileo open service authentication user terminal**

43 FE projects have been funded from 2014 to 2020 covering 9 topics

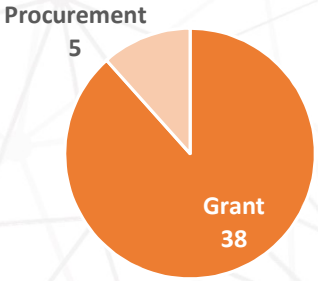
€70 M in funding for grant & procurement projects

2014-2020, 43 projects



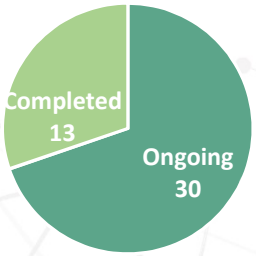
Grant vs procurement

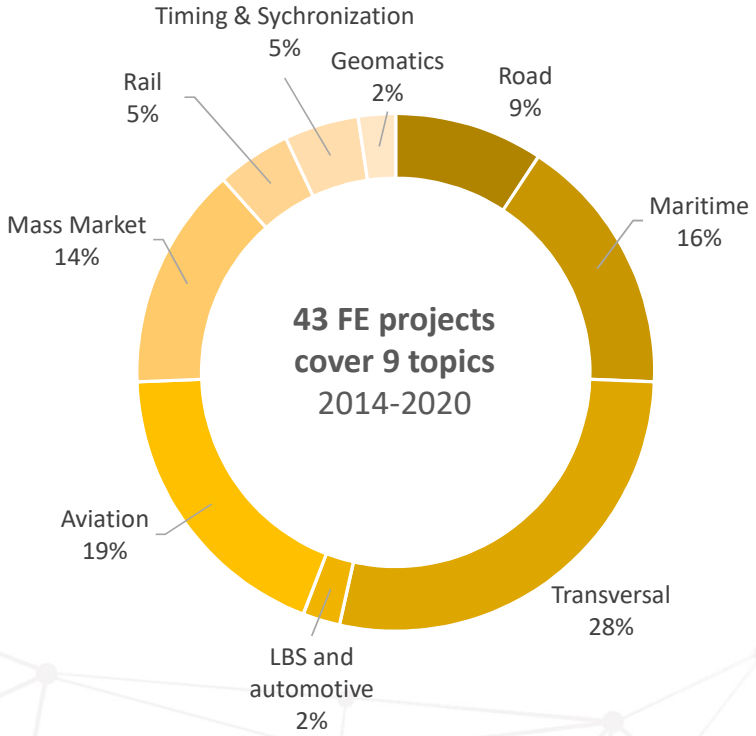
2014-2020, 43 projects



FE project status*

2014-2020, 43 projects

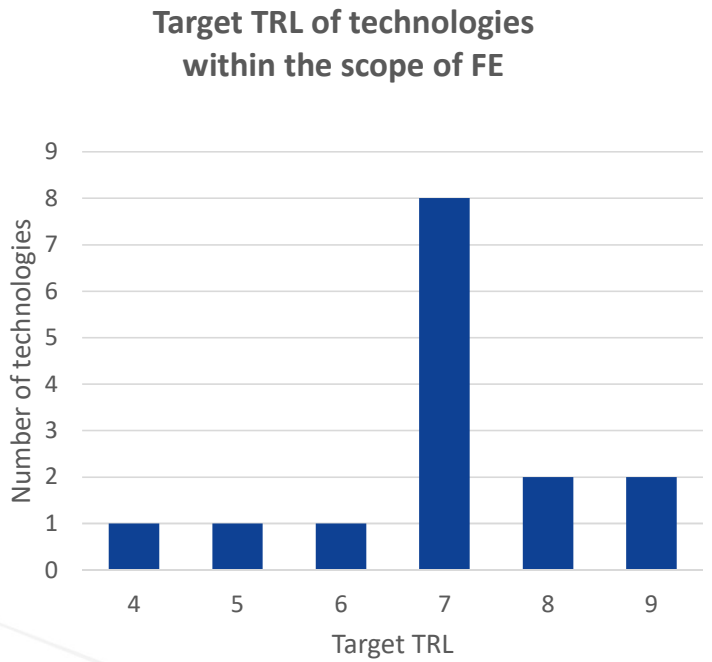




* status as of 06/2022. Source: EUSPA.

FE projects aim to develop & commercialise innovative technologies

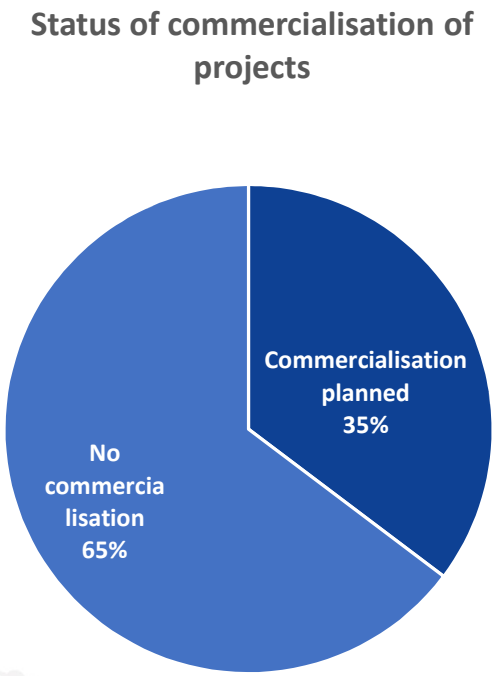
- FE projects address **new innovative technologies**
- FE projects are expected to play an important factor in **advancing the TRL levels of the concerned technologies** and encouraging their pursuit or adoption
- On average, FE projects target a **TRL increase of 3**, usually **aiming for TRL 7**



Sample size: 15 technologies

Commercialisation is a key target and will be an even larger focus in upcoming calls

- The FE programme aims to eventually **encourage companies and institutions to commercialise the solutions** being developed
- Commercialisation is **expected to be an outcome after the end of the project**
- **18 products already developed**



Sample size: 17 projects

The expected results from on-going FE projects involve several topics

Road & Urban mobility

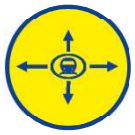
- ✓ Smart cities
- ✓ Urban mapping
- ✓ Autonomous driving

Aviation & Maritime

- ✓ MEOSAR Beacons
- ✓ EGNOS
- ✓ Ship-borne receivers
- ✓ Drone-borne receivers

Transversal technologies

- ✓ HAS
- ✓ OSNMA
- ✓ Multi frequency & multi constellation
- ✓ IoT
- ✓ Wearable devices
- ✓ Indoor-outdoor positioning



Rail

- ✓ Dedicated receivers
- ✓ Railways antennas

Further developments are needed to fill the identified gaps

Strengthen the implementation of the EGNSS differentiators

- ✓ Further implementation of **OSNMA in specific use cases**: Drones and consumer solutions
- ✓ Achievement of **PVT authentication** via implementation of CAS in addition to OSNMA for Road/Autonomous Vehicles and Critical Infrastructures
- ✓ Implementation of **HAS** in Agriculture, Geomatics and Maritime
- ✓ **ARAIM** receivers in Aviation, Maritime & Rail in the long term
- ✓ New SAR Beacons for Maritime
- ✓ Early Warning Services

Transversal technologies

- ✓ Miniaturisation
- ✓ Antennas
- ✓ Integration of 5G in GNSS devices
- ✓ Artificial intelligence
- ✓ Machine learning

Focus on exploiting **EGNOS SoL** as well as other Satellite-Based Augmentation Systems (**SBAS**)

Fusion with **Copernicus** and **Secure Communication** for a complete integration and exploitation of the EU Space Programme as a whole

Fundamental Elements 2 continues the successful work of FE1

New development of receivers, antennas and enabling users technology:

Continue to be **driven by user needs** and **oriented for a commercial use**:
- Priorities on specific segments driven by market needs, consultation with Users, with MS, with Industry/Academia
- Clear-cut from prototype receiver developments needed to leverage new services

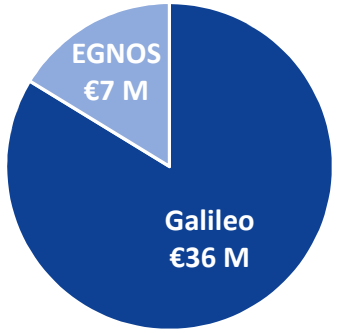
Operational **implementation of current differentiators**:
- E.g. OSNMA and HAS, multi frequency

Prepare for commercial implementation of **new differentiators**:
- Early Warning Service, CAS, ARAIM, …

Develop **emerging, disruptive technologies**:
- E.g. leveraging Machine Learning and Artificial Intelligence

Explore **synergies with other space systems** on user technology:
- E.g. Copernicus, SatCom

Allocated EC budget for FE2
€43* million
2021-2027



* Indicative budget

Linking space to user needs

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