



ESA Visit to Croatia _ 11th March 2019

Galileo and EGNOS activities

Pascale FLAGEL

Head of Coordination Office
Directorate of Navigation

ESA UNCLASSIFIED - For Official Use



European Space Agency

“Never lost in space...”



Positioning, Navigation, Timing

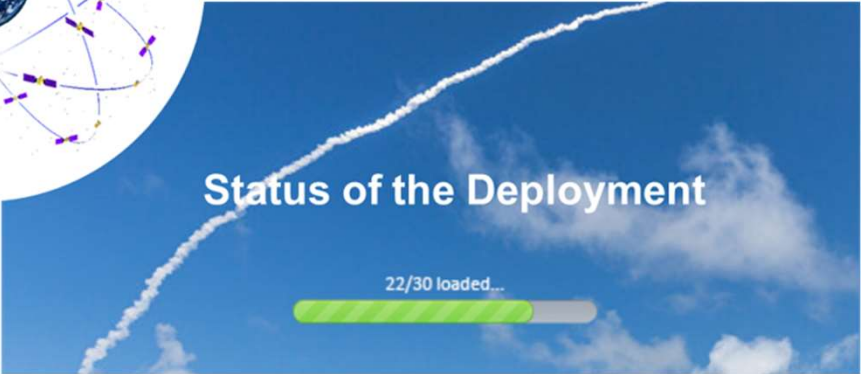
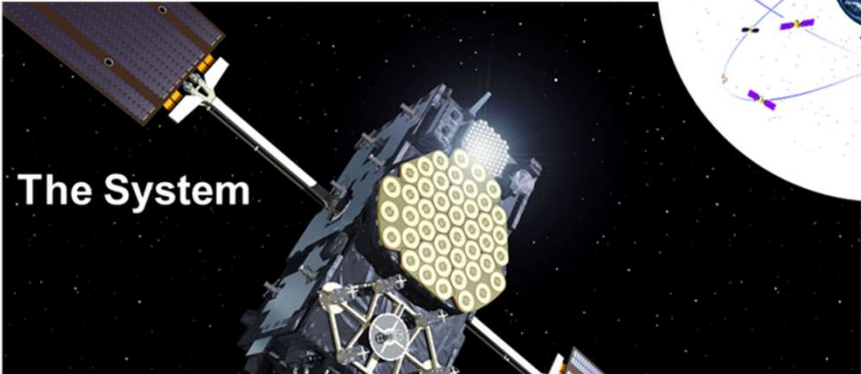
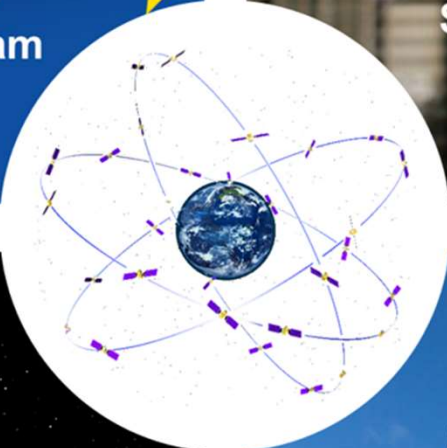
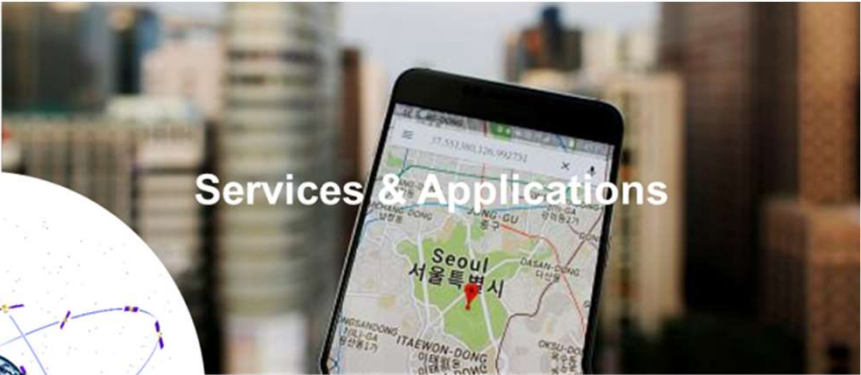
Galileo
EGNOS
Institutional set up
NAVISP

...



European Space Agency

GALILEO



Galileo Services Portfolio



SAR

Search and Rescue Service



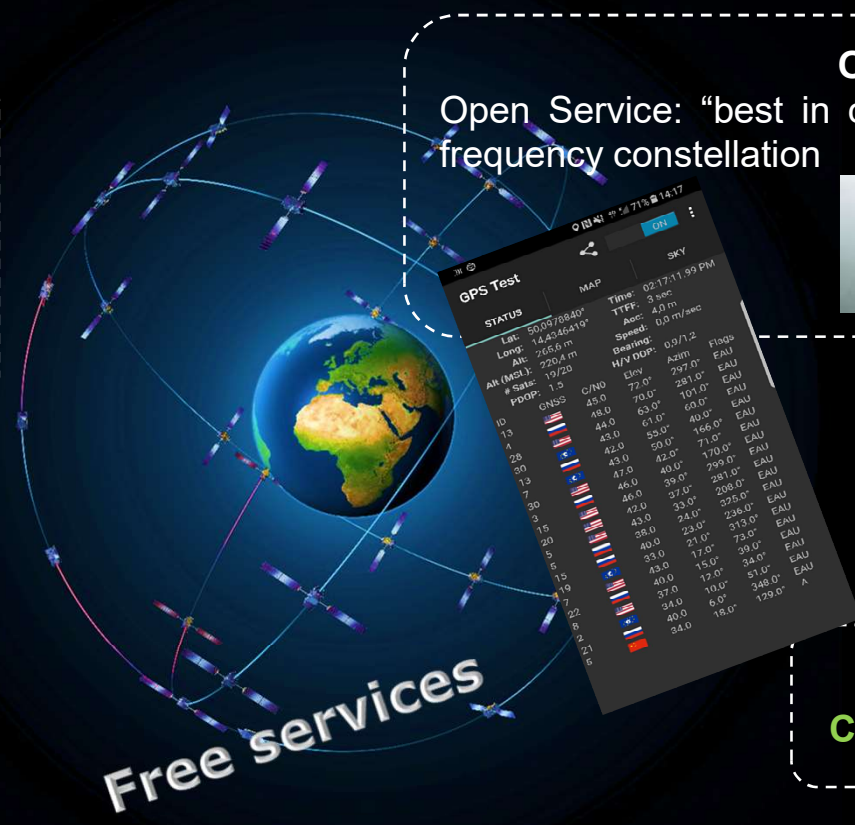
HAS

High Accuracy Service



OS

Open Service: "best in class", first complete dual frequency constellation



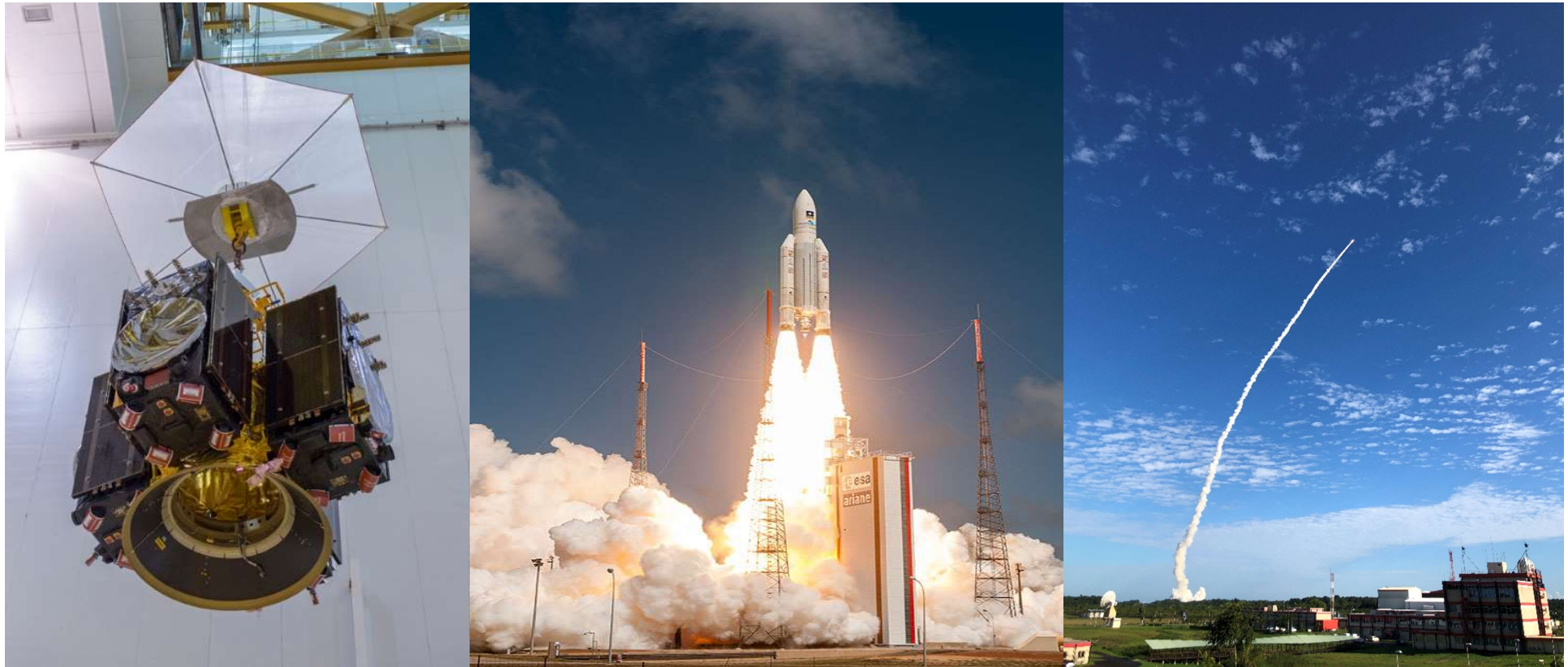
Free services

PRS
Public Regulated Service

Authentication...
Commercial Service.....

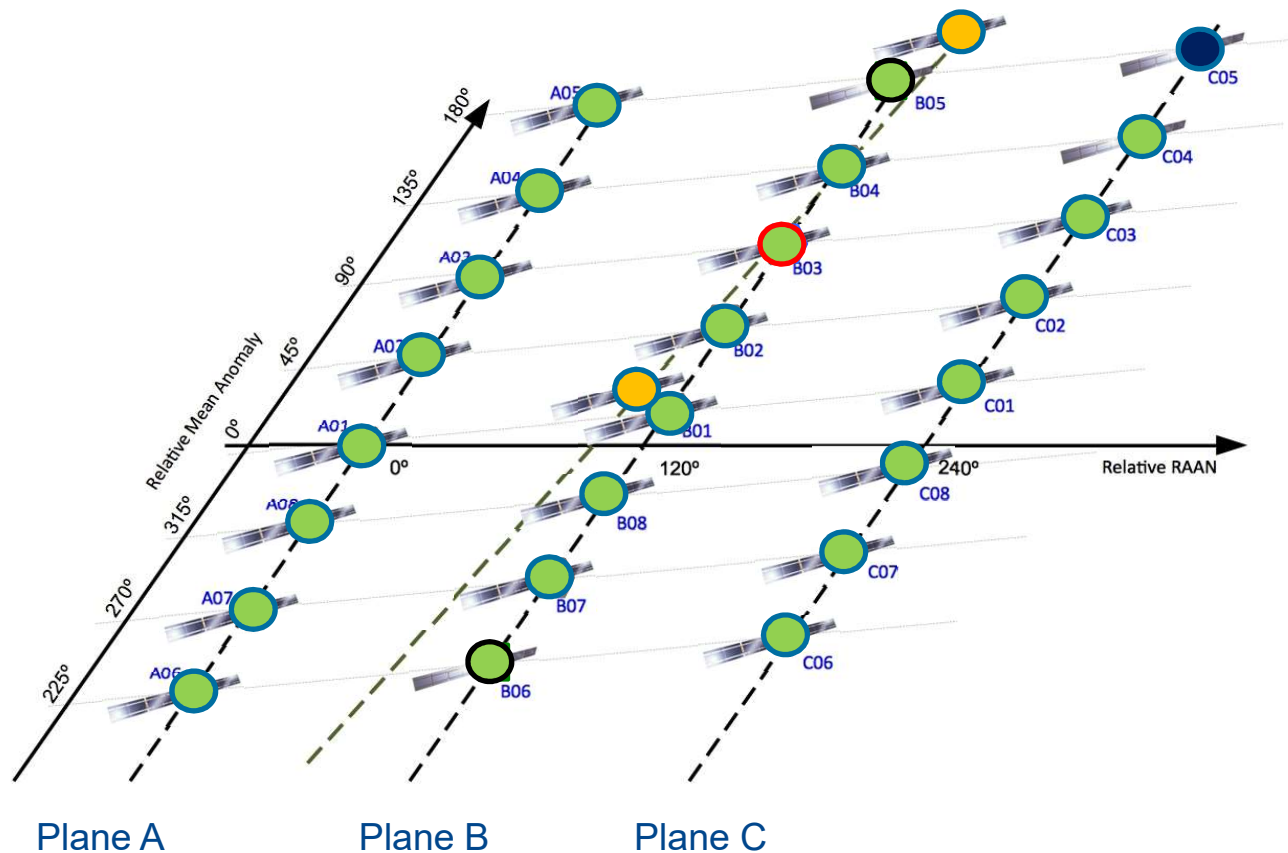


Launch #10 (Ariane 5) - 25 July 2018



European Space Agency

Galileo satellites constellation



Galileo
is providing services with
22 satellites since
11 February 2019

NAV Payload (22 Operational)
SAR Payload (23 Operational)

- 26 satellites in orbit
- 2 in testing (elliptical)
- 1 spare (203)
- 1 NAV unavailable (IOV)
- 2 no SAR (IOV)

→ GALILEO GROUND SEGMENT OVERVIEW



LEGEND

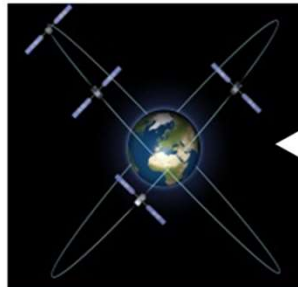
- GCC: Ground Control Centre
- GSS: Ground Sensor Station
- ULS: Uplink Station
- TTCF: Telemetry, tracking and Command
- SAR MEOLUT: Search and Rescue - Medium Altitude Earth Orbit Local User Terminal
- GSMC: Galileo Security Monitoring Centre
- TGVF: Timing and Geodetic Validation Facility
- IOT: In Orbit Test Centre
- LEOPCC: Launch and Early Operations Control Centre

Status: March 2013

Galileo Moving Ahead...



2005
DEVELOPMENT
SYSTEM TESTBED
GIOVE A/B



2013
IN-ORBIT VALIDATION
4 satellites
initial ground
infrastructure

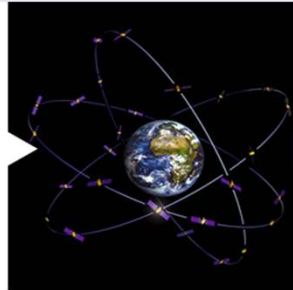


2015/2016
INITIAL GALILEO SERVICES
OS, SAR, PRS, CS demonstrator

2017/2019
EXPLOITATION
PHASE
FOC1 System



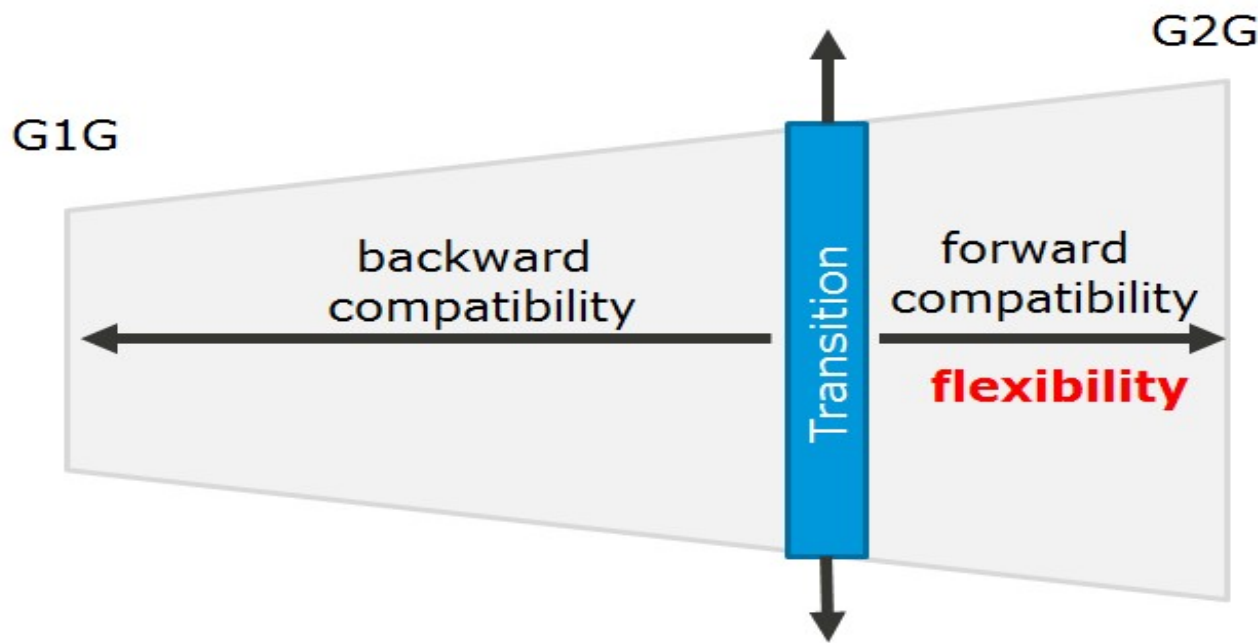
2020
FULL OPERATIONAL
CAPABILITY
24 operational
satellites
and complete ground
infrastructure



After 2020
TOWARD
GALILEO 2nd
GENERATION



Designing the Future (towards 2030) Galileo 2nd Generation Transition



EGNOS

EUROPEAN GEOSTATIONARY NAVIGATION OVERLAY SERVICE

- Satellite-Based Augmentation System.
- Safety Of Life Service operational since 2011
- Currently augments GPS system
- Future EGNOS V3 will augment both GPS and Galileo



Less diversions and delays

Better access to airports

Costs saving
Less ILS installation and maintenance on airports

Source: ESSP

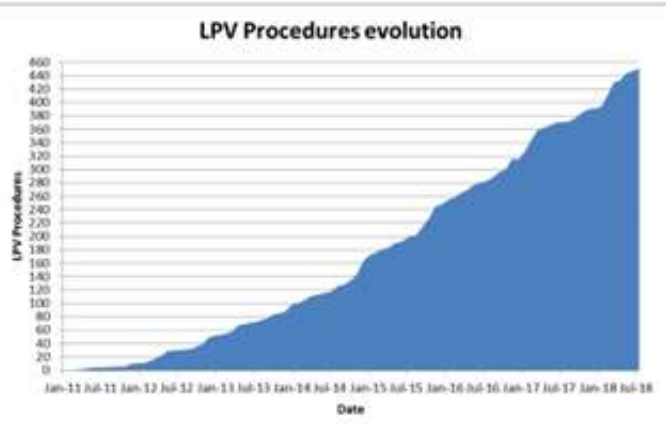
https://egnos-user-support.essp-sas.eu/new_egnos_ops/resources-tools/lpv-procedures-map

EGNOS Procedures Implementation Status



**Instrumental runway ends with LPV procedures:
35% (434)
(31 August 2018)**

**PBN Implementing Regulation
2018/1048 (18 July 2018)
35% (now) → 100 % (2024)**



Source: ESSP

https://egnos-user-support.essp-sas.eu/new_egnos_ops/resources-tools/lpv-procedures-map

Source: GSA



Institutional Setup

Galileo and EGNOS : European Union Programme

- GNSS regulation (N° 1285): 2014 – 2020
 - ✓ 7 G€
 - ✓ Objectives: Galileo FOC in 2020; continuity and improvement of services on EGNOS
 - ✓ Governance set up: GSA progressive empowerment for exploitation and services
- ESA is in charge by delegation of European Commission and through Working Arrangements with GSA
 - ✓ Design development validation of the infrastructure
 - ✓ End to end engineering and design authority
 - ✓ ~ 4 G€ industrial contracts managed by ESA

Institutional Setup



European Union Programme

- EU Space programme regulation for 2021-2027 under discussion
- 9.7 G€ requested for GNSS
- ESA expecting to continue to design develop and deliver those complex space systems compliant with the technical and security requirements given by EU, according to stringent management of costs and planning constraints .



For ESA Member State NAVISP participants

	ELEMENT 1 [Innovation in Satellite Navigation]	ELEMENT 2 [Competitiveness]	ELEMENT 3 [Support to Member States]
Content	Analyses and developments linked to new and emerging design and operational concepts, techniques and technologies related to satellite navigation systems	Ad hoc technological & product developments and pre-operational activities along the whole satellite navigation value chain in support of the competitiveness of the industrial sector in the participating Member States	Support to MS national Programmes & Activities in satellite navigation and along the whole value chain
General principles for implementation of the activities	Competitive tender, 100% ESA funding on the basis of yearly work-plan adopted by PB NAV	Continuous open call, unsolicited proposals, ESA co-funding (level of support to vary according to TRL level), MS support letter	On request by MS, ad-hoc mechanism to be established on a case-by-case basis that ensures ESA's full costs are met
Lead for the definition of the activities	ESA	Industry	Member States

