



Galileo and EGNOS Programmes Status Update

Philippe Jean, European Commission

Tenth ICG Conference, Boulder, 2 November 2015



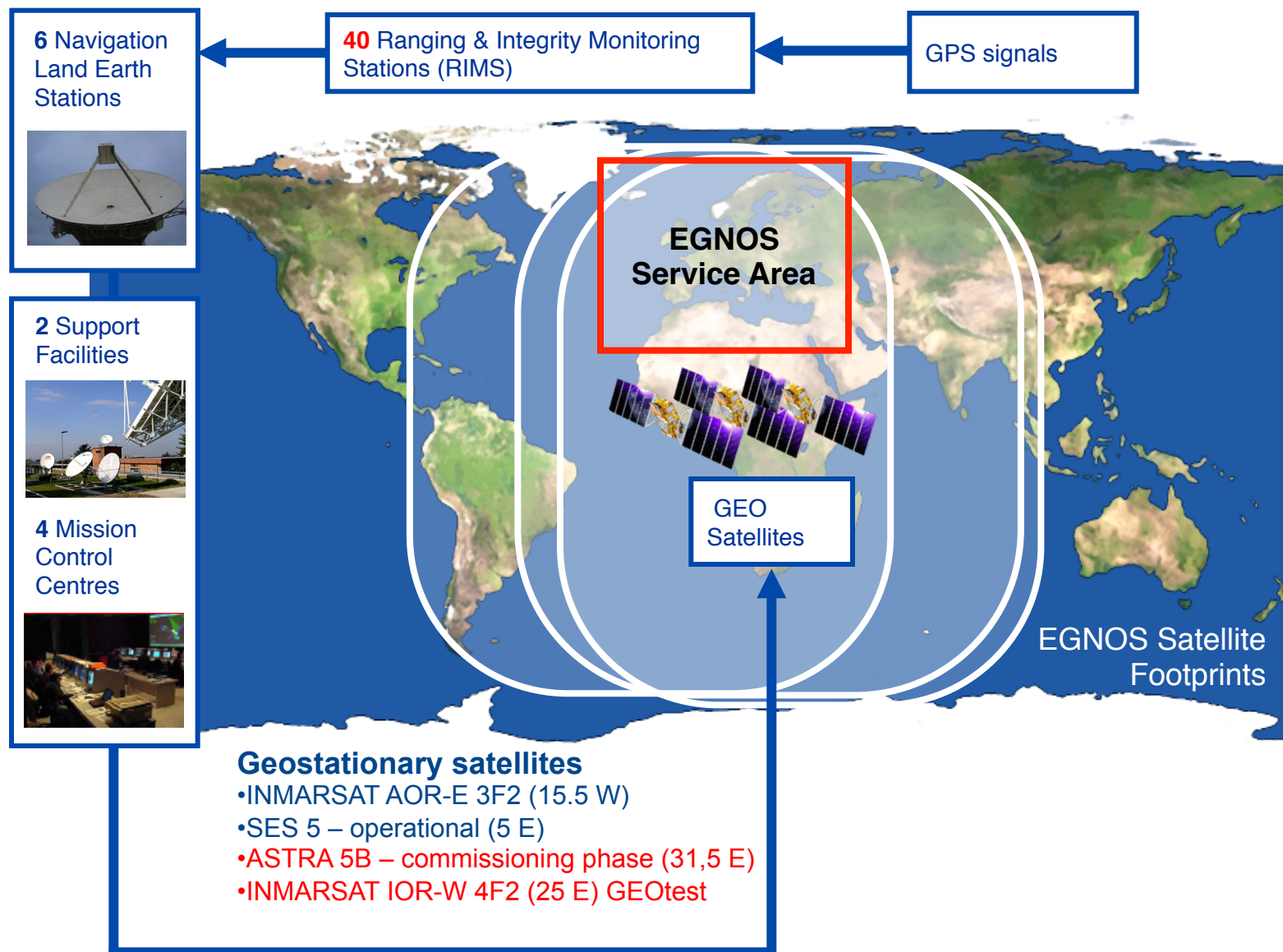
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- ★ **1. State of Play: EGNOS**




- ★ **2. State of Play: Galileo**



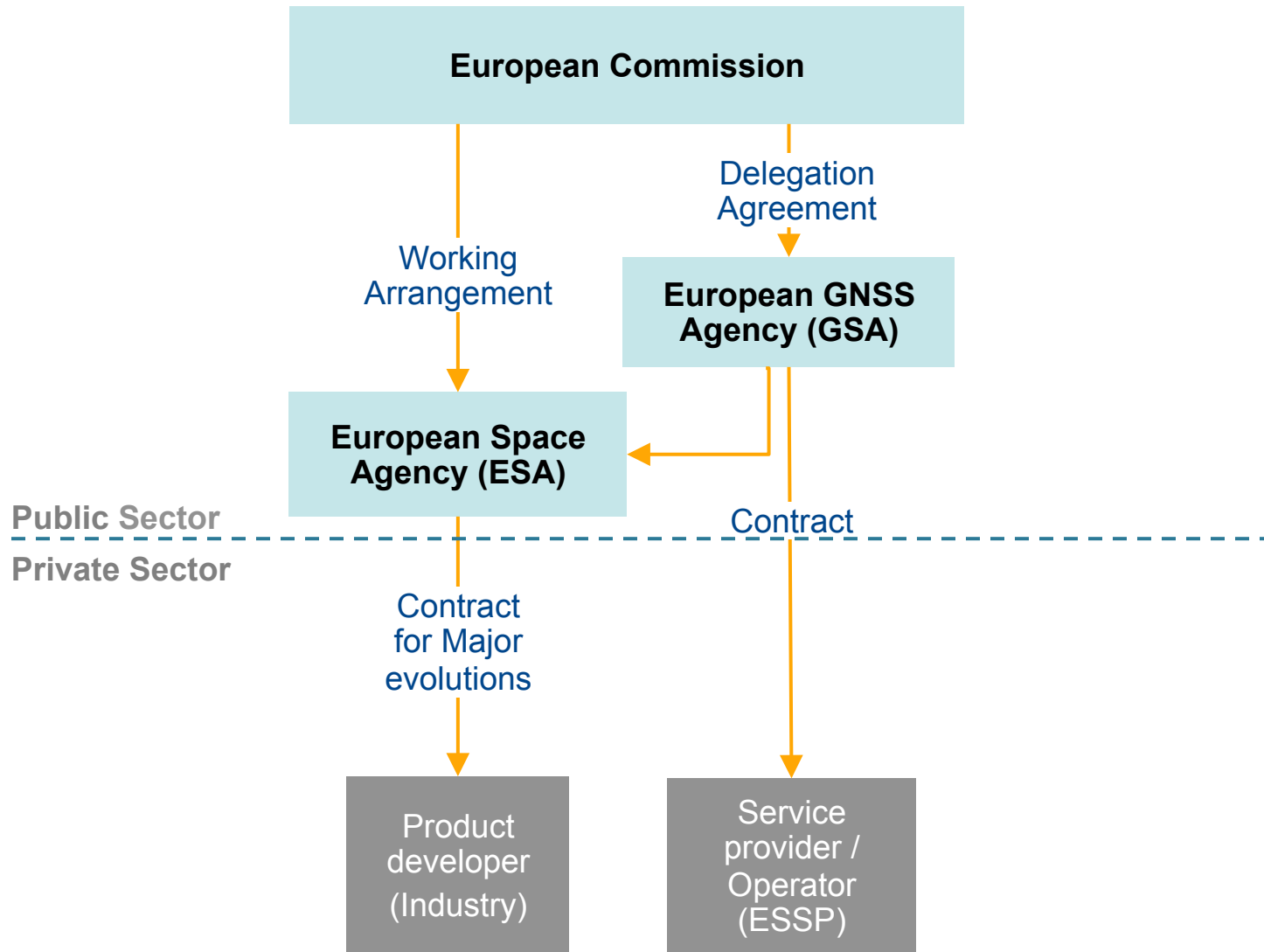
Recap: EGNOS System Architecture and Service Area



EGNOS will deliver its services on a long-term basis (>20 years)

Service	Characteristics	Service Status	
Open Service	accuracy ~1m, free	available since October 2009	
Safety of Life Service	accuracy ~1m, compliant to aviation standards	Available since March 2011	
EDAS	accuracy <1m, corrections are provided by terrestrial networks	Available since 2012	

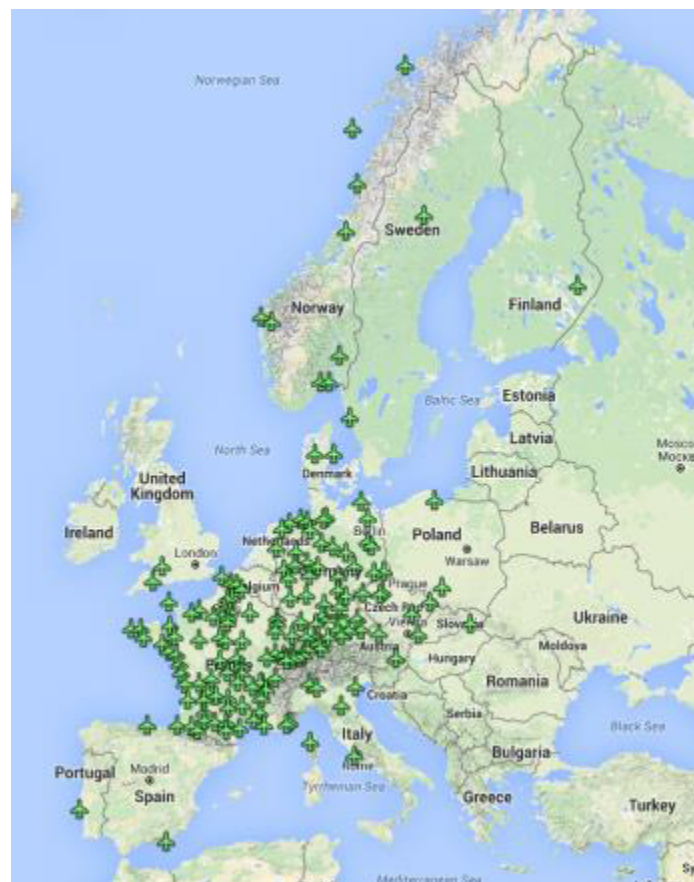
(EDAS: EGNOS Data Access Service)



(ESSP: European Satellite Service Provider)

Implementation Status for EGNOS in aviation

As of Sept 2015: 202 operational LPV in 130 airports in 18 countries



http://egnos-user-support.essp-sas.eu/egnos_ops/lpv_map/map.php

EGNOS services will further improve over time

2015

- ★ Publication of the Service Definition Document for SoL LPV200 service level, September 2015

Medium term

- ★ Full coverage of 28 EU Member States' territory (geographically located in Europe)
- ★ EGNOS version 3 with dual (L1/L5) frequencies, also to enable augmentation of Galileo and potentially other GNSS, procurement in 2016, kick-off in 2017

Long term

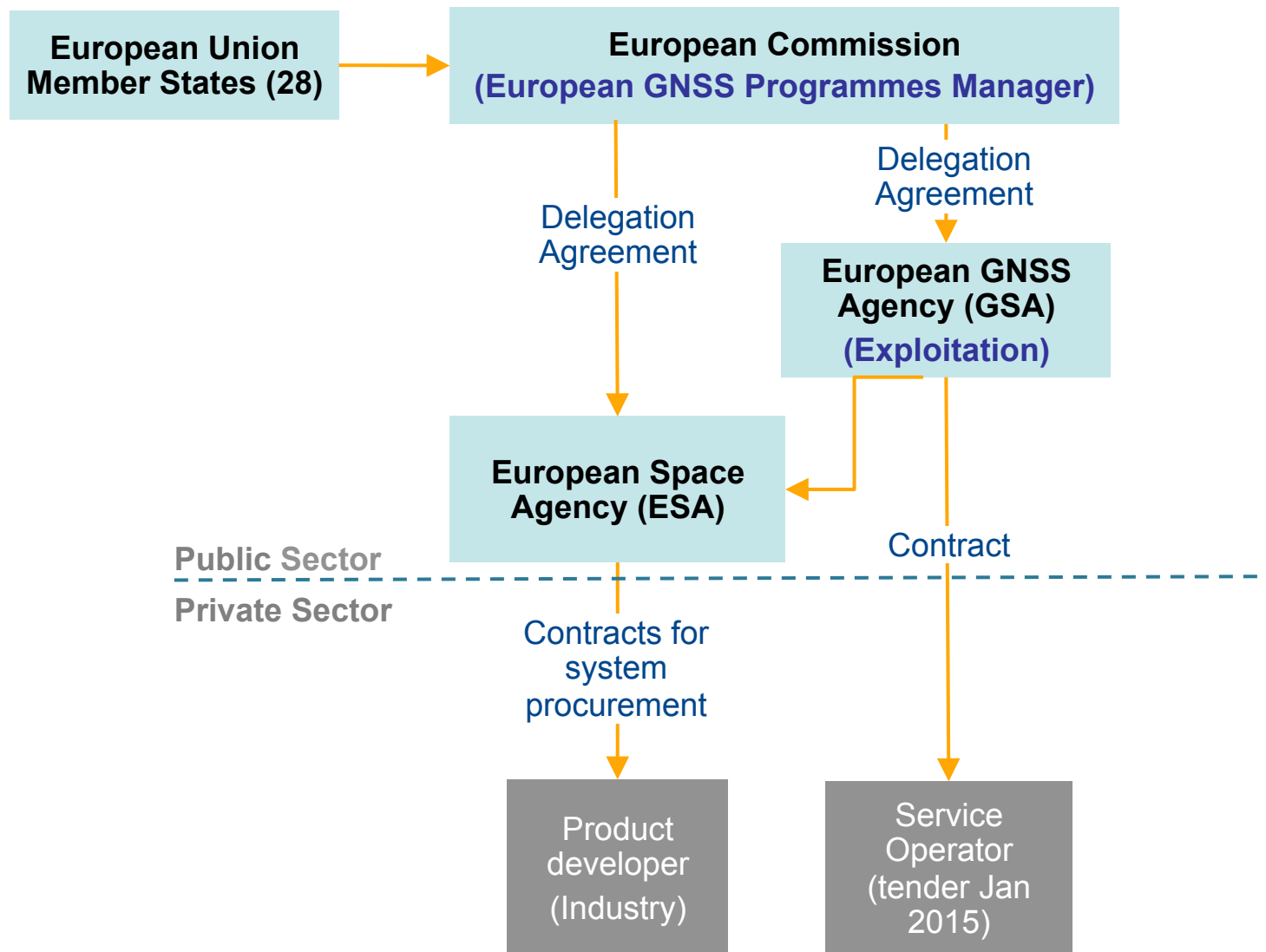
- ★ Subject to conclusion of necessary contracts and agreements, extension of the EGNOS coverage to EU neighbouring countries and regions, including Africa.

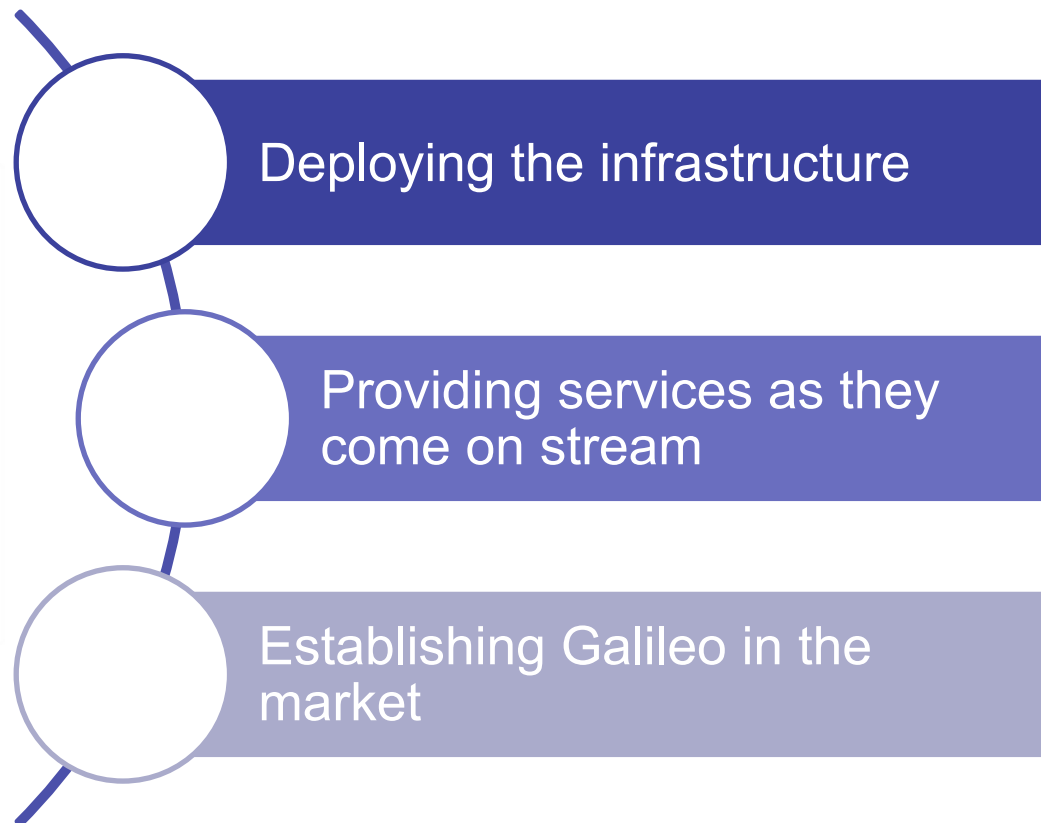
(SoL: Safety of life, LPV: Localizer Performance with Vertical guidance)



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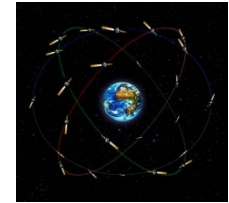
Galileo is implemented in a step-wise approach

By 2020 Galileo will be:

- ★ fully deployed and recognised
- ★ adopted by the widest user communities
- ★ a civilian infrastructure delivering robust positioning and timing services with high degree of performances

Full Operational Capability
Full services, 30 satellites

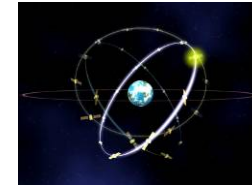
2020



Initial Services Provision

Initial services for OS, SAR, PRS, and demonstrator for CS

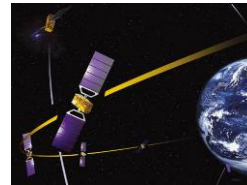
2016



In-Orbit Validation

4 operational satellites and ground segment

2013



GIOVE A/B
2 test satellites
2005/2008



Galileo System Testbed v1
Validation of critical algorithms

2003



<p>Open Service (OS)</p>	<p>Freely accessible service for positioning, navigation and timing for mass market</p>	
<p>Public Regulated Service (PRS)</p>	<p>Encrypted service designed for greater robustness in challenging environments</p>	
<p>Search and Rescue Service (SAR)</p>	<p>Locates distress beacons and confirms that message is received</p>	
<p>Commercial Service (CS)</p>	<p>Delivers authentication, high accuracy and guaranteed services for commercial applications</p>	
<p>Integrity Monitoring Service</p>	<p>Provides vital integrity information for life-critical applications</p>	

The former "Safety-of-Life" service is being re-profiled

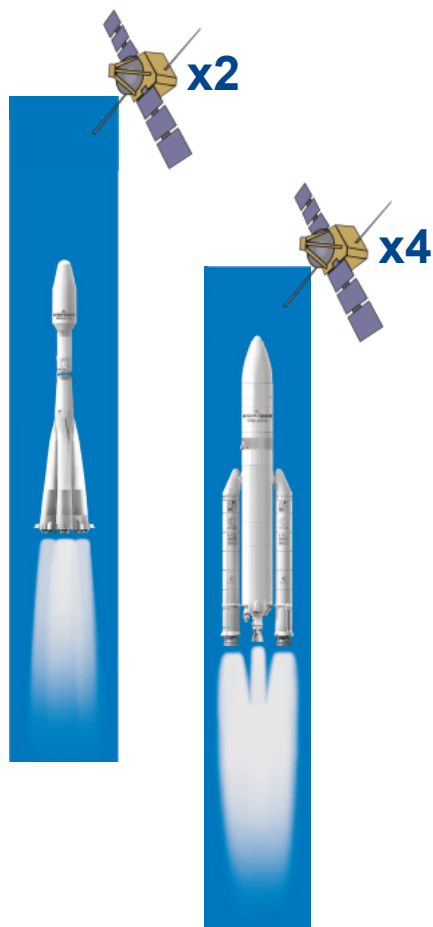


First four satellites (IOV) launched in 2011 and 2012

Satellite 5 & 6 are recovered and safe on improved orbits

Satellites 7 & 8, launched 27 March
Satellites 9 & 10 on 17 September
Satellites 11 & 12 on 17 December

26 satellites to be launched by 2018
30 satellites by 2020



Ariane 5 will enable the launch of 4 satellites per launch

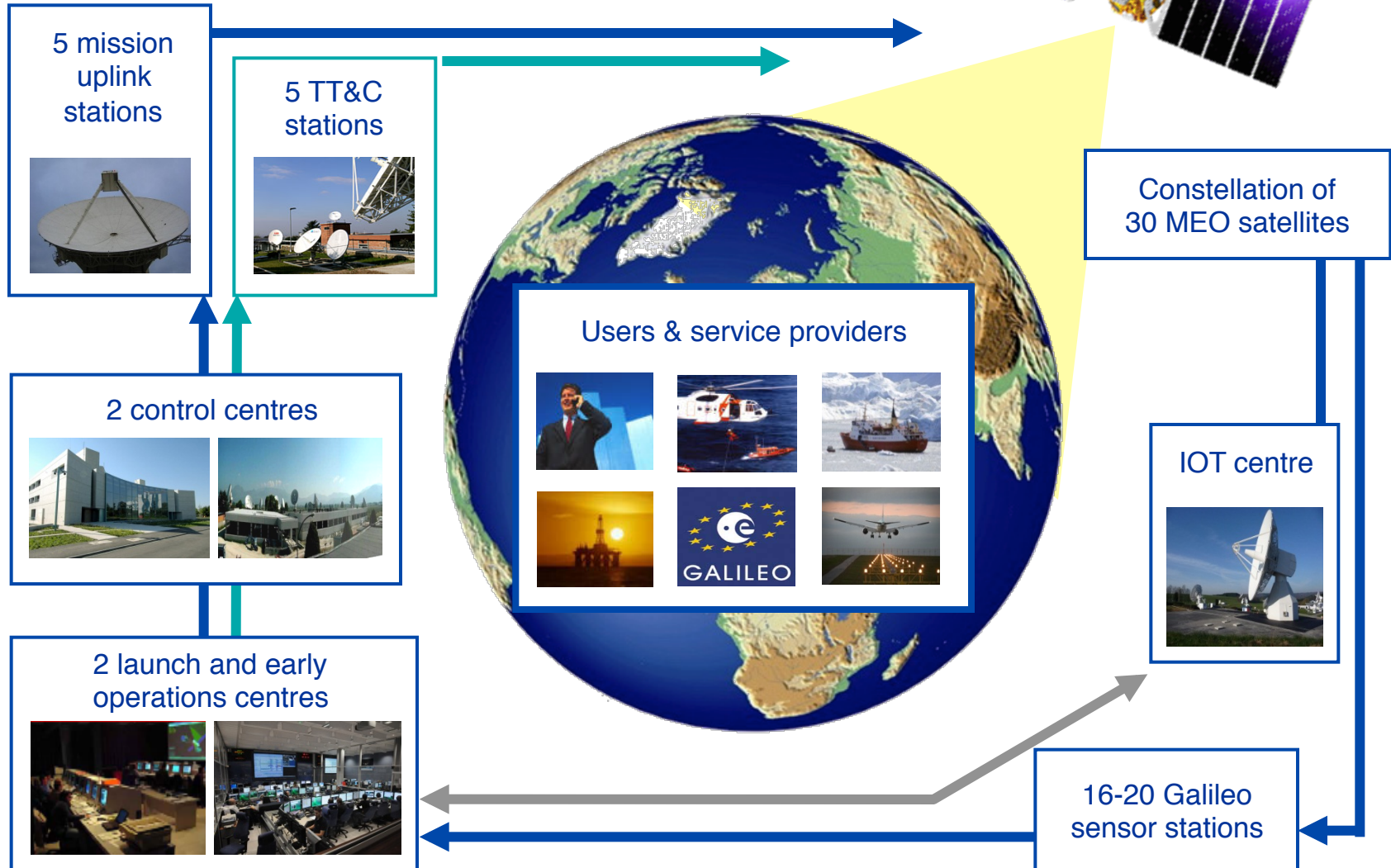
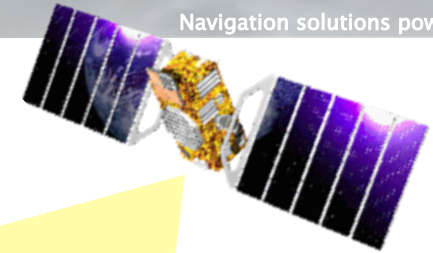
Contract signed with Arianespace for three Ariane 5 launches

The first will be next year

Galileo system architecture



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MEO: Medium Earth Orbit

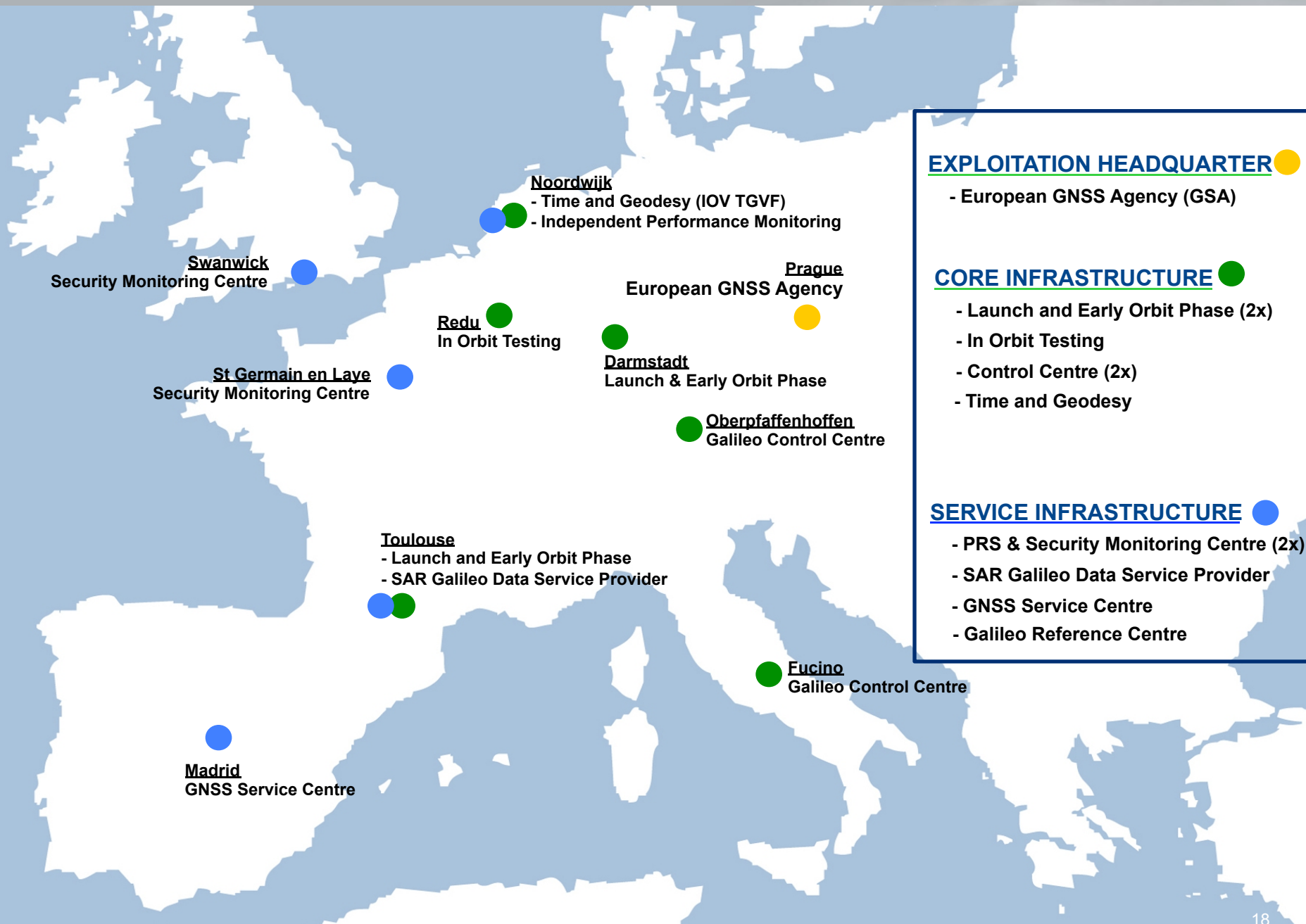
TT&C: Telemetry, Tracking and Command

IOT: In-Orbit Testing

Galileo Ground Segment



- Galileo Sensor Station (GSS)
- Up-Link Station (ULS)
- Telemetry, Tracking and Command Station (TTC)
- SAR MEOLUT Station



EXPLOITATION HEADQUARTER

- European GNSS Agency (GSA)

CORE INFRASTRUCTURE

- Launch and Early Orbit Phase (2x)
- In Orbit Testing
- Control Centre (2x)
- Time and Geodesy

SERVICE INFRASTRUCTURE

- PRS & Security Monitoring Centre (2x)
- SAR Galileo Data Service Provider
- GNSS Service Centre
- Galileo Reference Centre



Galileo Service Operator procurement ongoing

Call for tender published January 2015

Indicative value: 1 billion EUR



Ensure the provision of initial services in 2016

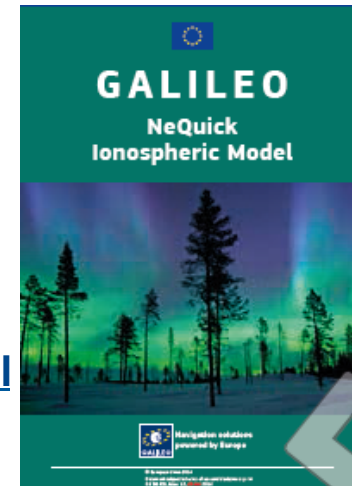
Involve user communities

Stimulate market development

Full services by 2020

- ★ **Galileo Nequick Ionospheric Model**

- ★ Version 1.1 published in April 2015



- ★ **Galileo Open Service Signal In Space Interface Control Document (OS SIS ICD)**

- ★ Version 1.2 published in September 2015

- ★ **Galileo SiS Operational Status Definition**

- ★ Version 1.0 published in September 2015



- ★ **Galileo Service Definition Document**

- ★ Currently under preparation

- ★ Public version to be released at initial service declaration



- ★ **Galileo will deliver reliable, high quality services to the world and continue to evolve and introduce innovative features**
- ★ **In the near future, the trend for most user communities is towards service levels based on a multi-constellation approach, it is therefore crucial to:**

- ★ Continue improving signal compatibility and service interoperability with other providers
- ★ Cooperate on multi-constellation service provision



In 2016,

- ★ Procurement of additional satellites
- ★ Kick Off Authentication Service Implementation
- ★ Galileo Service Validation Campaign
- ★ SAR Service Declaration
- ★ Selection of new operator
- ★ Set-up of User Consultation Forum
- ★ Define strategic goals for 2nd Generation



Thank You



EGNOS

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<http://ec.europa.eu/galileo>