



# The European GNSS Programmes EGNOS and Galileo

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18 October 2010

Directorate-General  
for Enterprise  
and Industry



**EGNOS**

Navigation solutions powered by Europe

- ★ **1. State of Play of EGNOS**
  
- ★ **2. State of Play of Galileo**



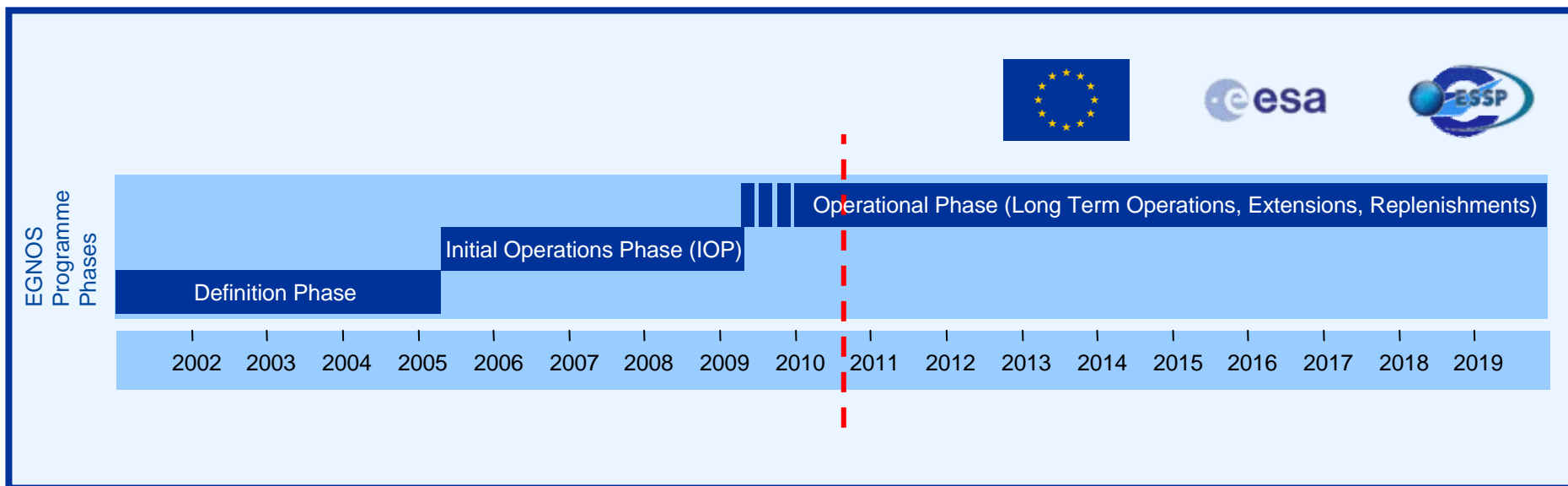
**EGNOS**

Navigation solutions powered by Europe

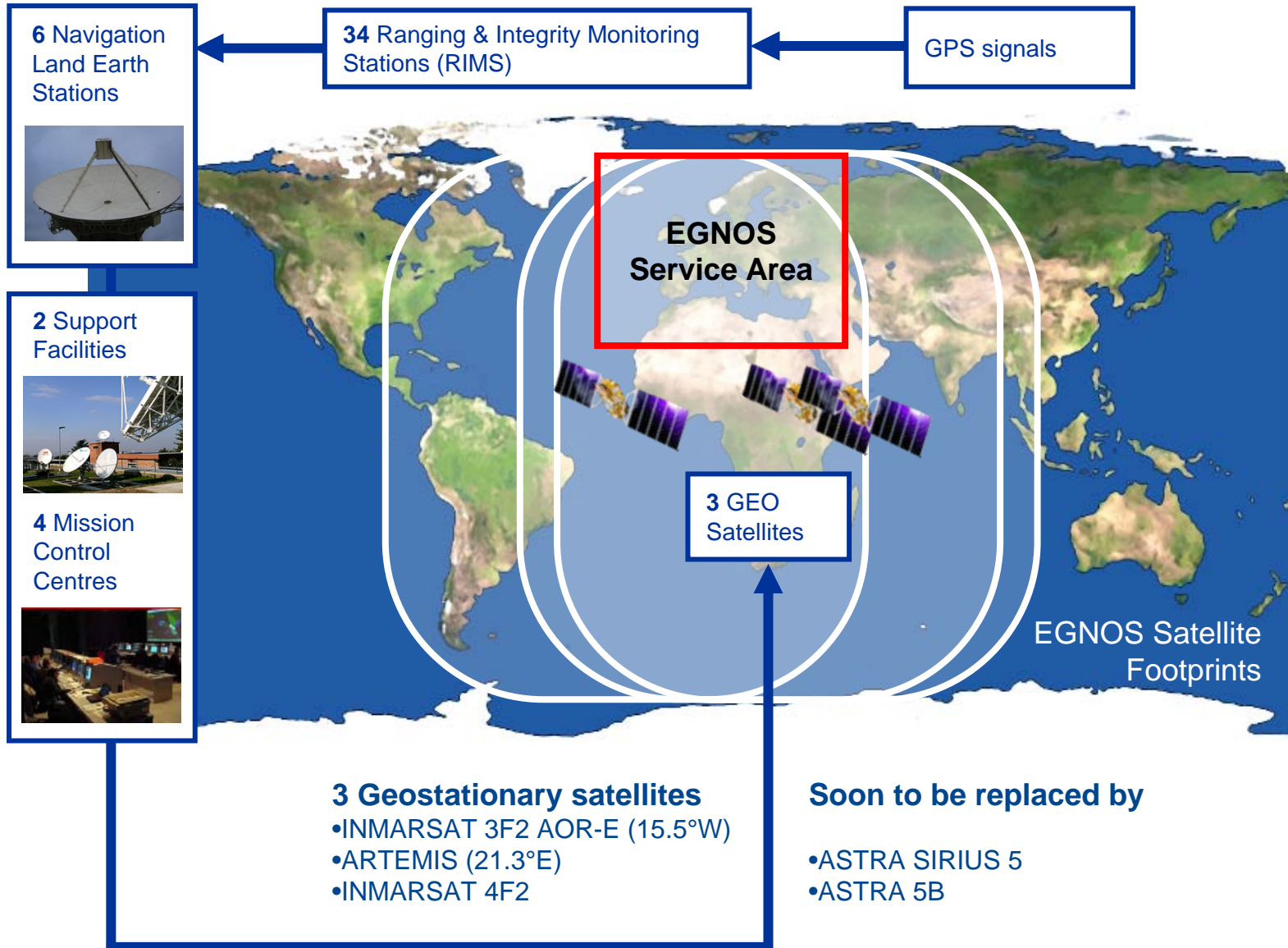


**'It's there, use it'**




## EGNOS has been delivering a free Open Service over Europe since October 2009



# EGNOS System Architecture and Service Area

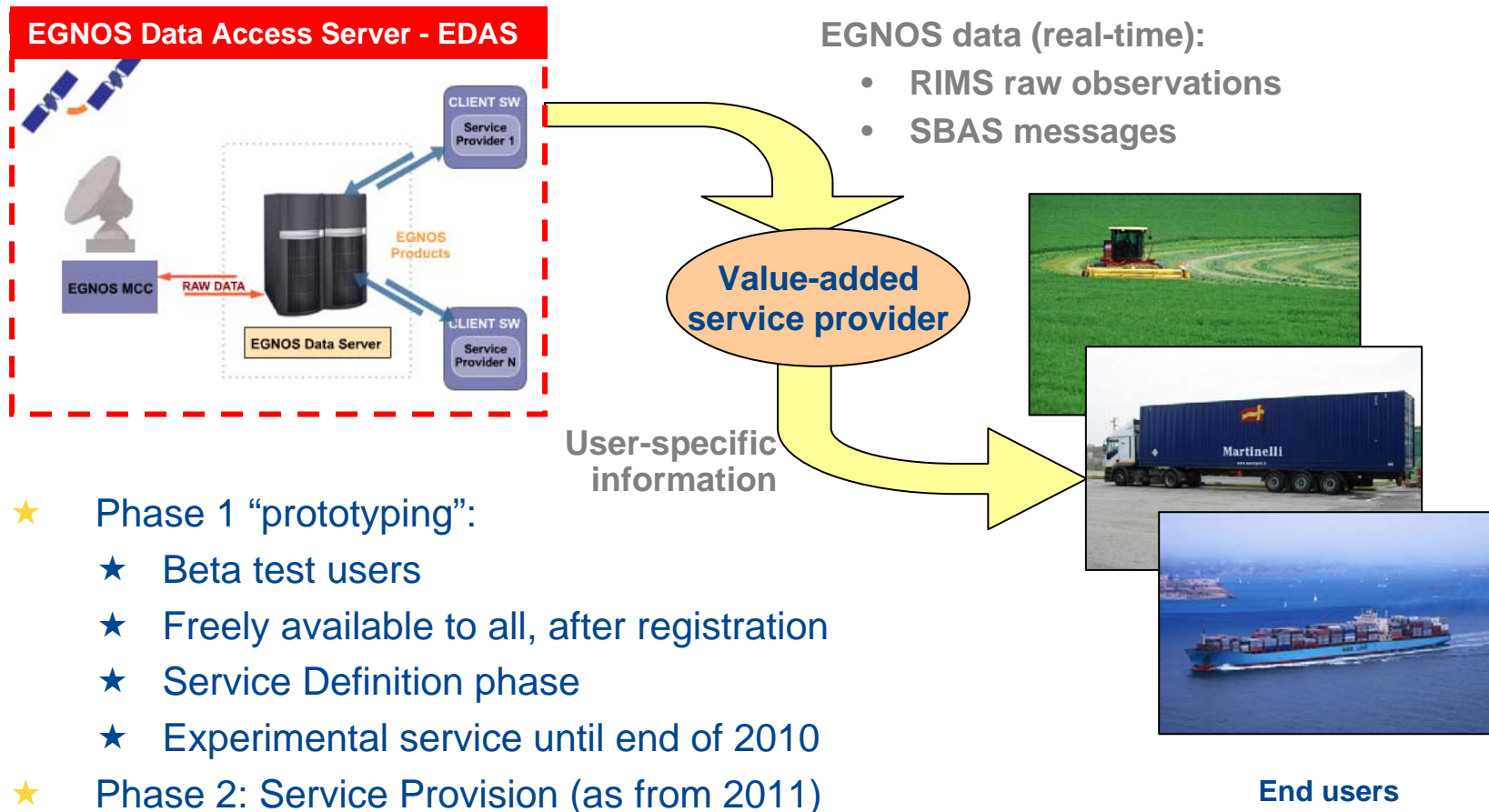


## EGNOS will deliver its services on a long-term basis (>20 years)

Service	Characteristics	Service Status	
Open Service	accuracy ~1m, free	available since October 2009	
Safety of Life Service	accuracy ~1m, compliant to aviation standards	to be made available beginning of 2011	
Commercial Service (EDAS)	accuracy <1m, corrections are provided by terrestrial networks	experimental service since 2008; official service to be made available in 2011	

EDAS ... EGNOS Data Access Server

## The EGNOS commercial service (EDAS) will be made available in 2011



## EGNOS achieves almost 100% availability

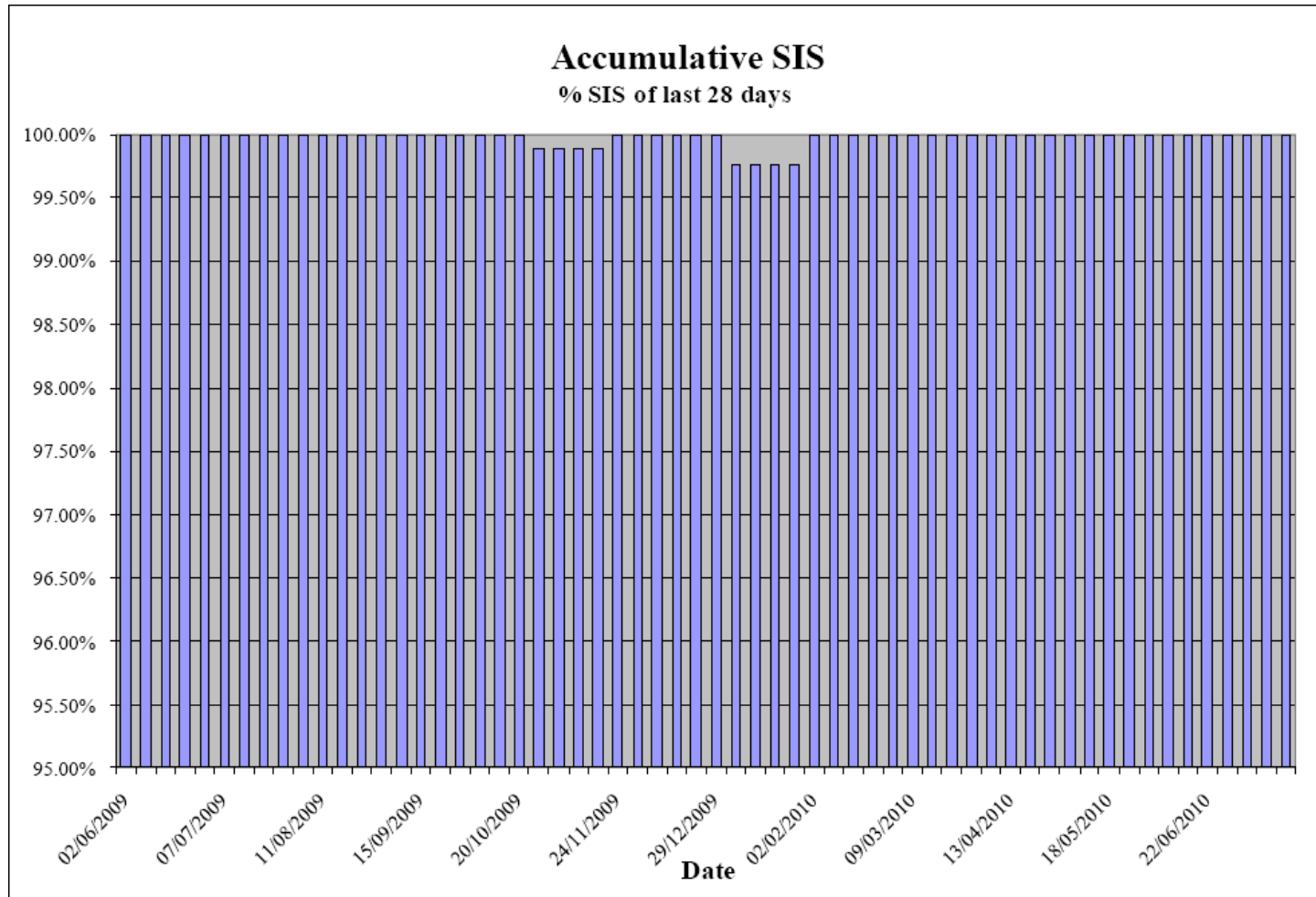
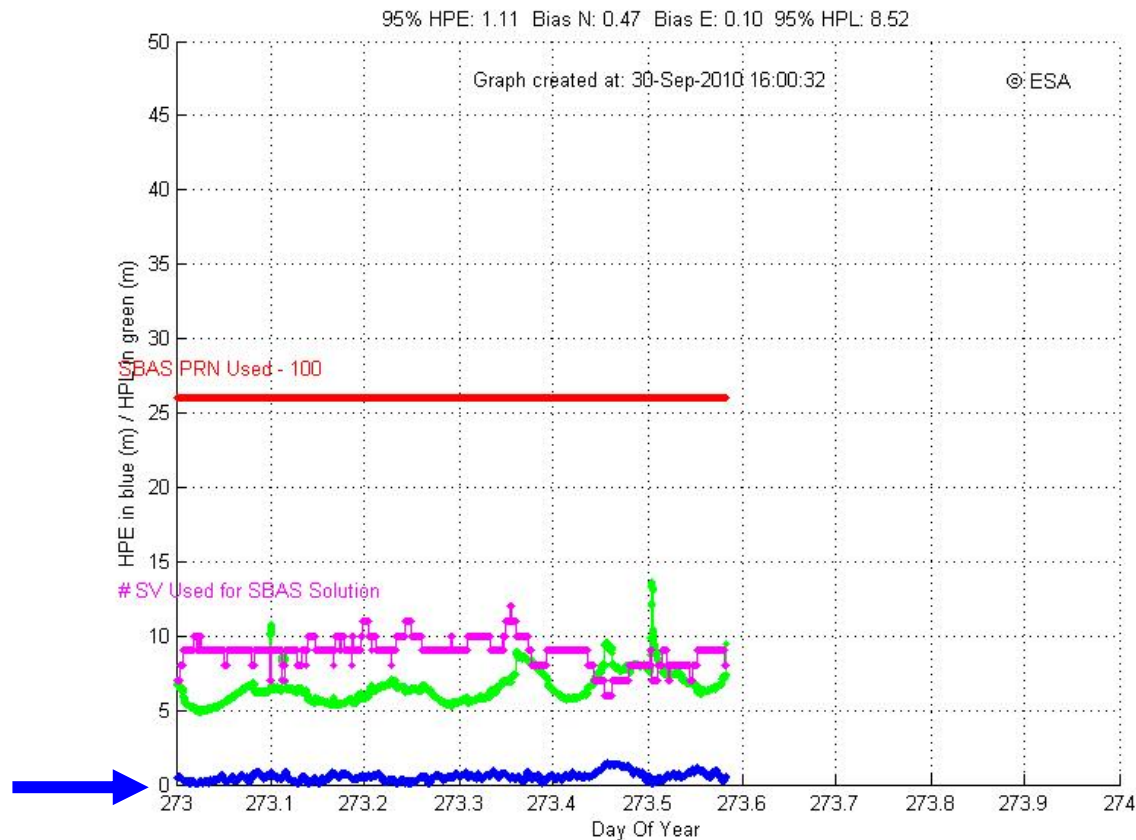


Figure 3 - Operational SIS Broadcast since June 2<sup>nd</sup> 2009



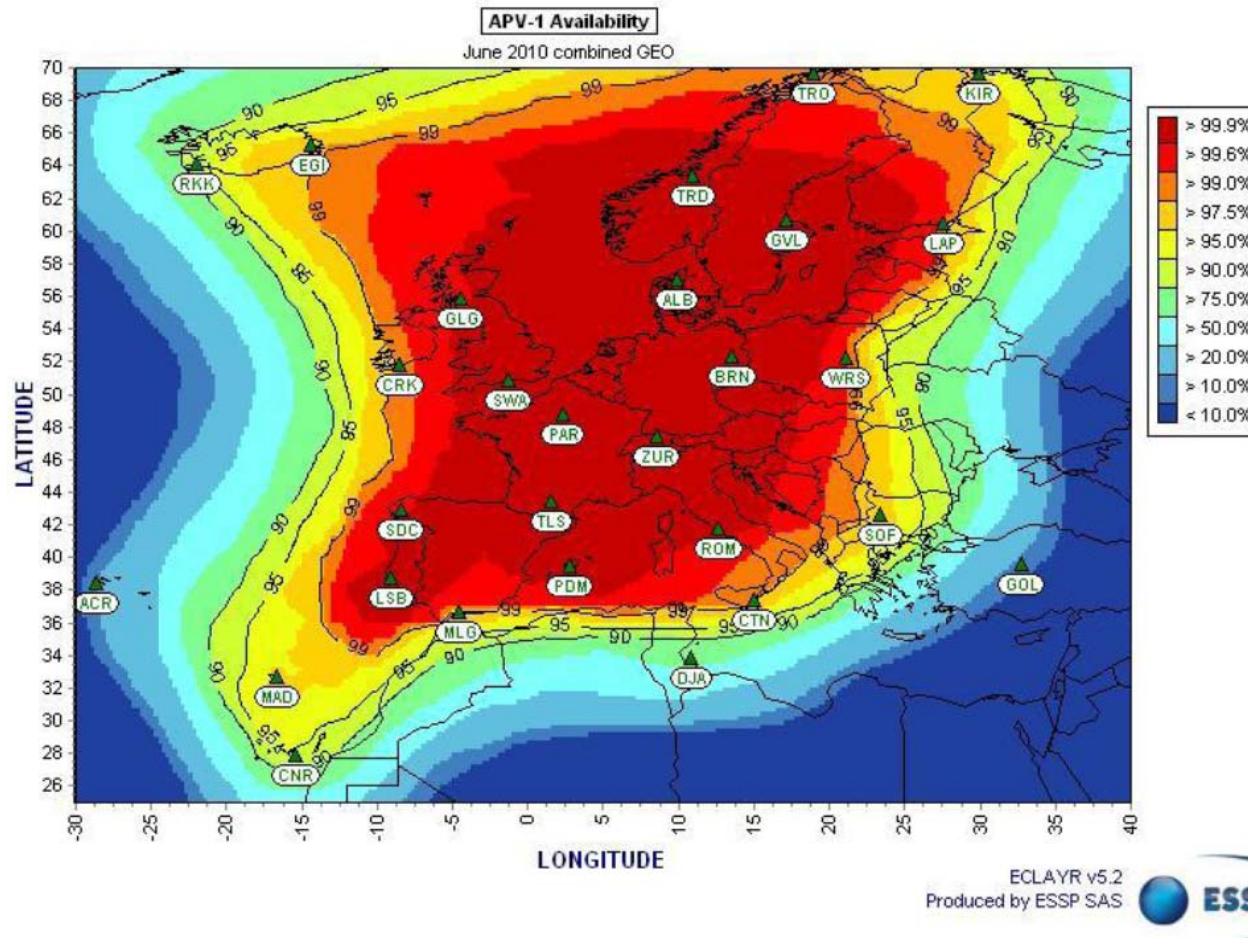
**With around 1 m (blue line), the measured Horizontal Precision Error for the centre of Europe is consistently better than the requirements**



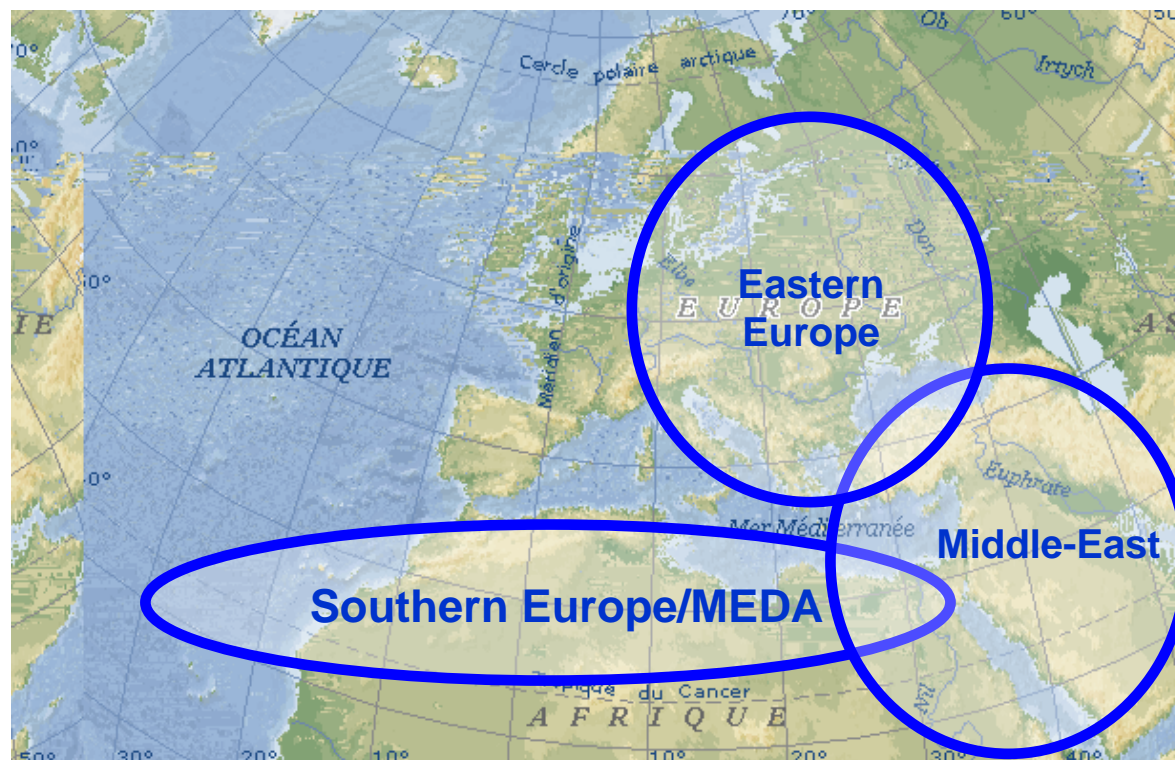
HPE ... Horizontal Precision Error, HPL ... Horizontal Protection Level

Source: [http://www.egnos-pro.esa.int/IMAGEtech/perfect/real\\_time/view\\_all/toulouse.html](http://www.egnos-pro.esa.int/IMAGEtech/perfect/real_time/view_all/toulouse.html)

The deployment of additional RIMS in Eastern Europe, Southern Europe, Northern Africa and the Middle East will increase the availability area of APV-1



APV ... Approach with vertical guidance



Depending on the extension area, technical implementation may vary from:

- ★ Homogeneous extension with deployment of additional RIMS
- ★ Regional infrastructure including additional processing capabilities

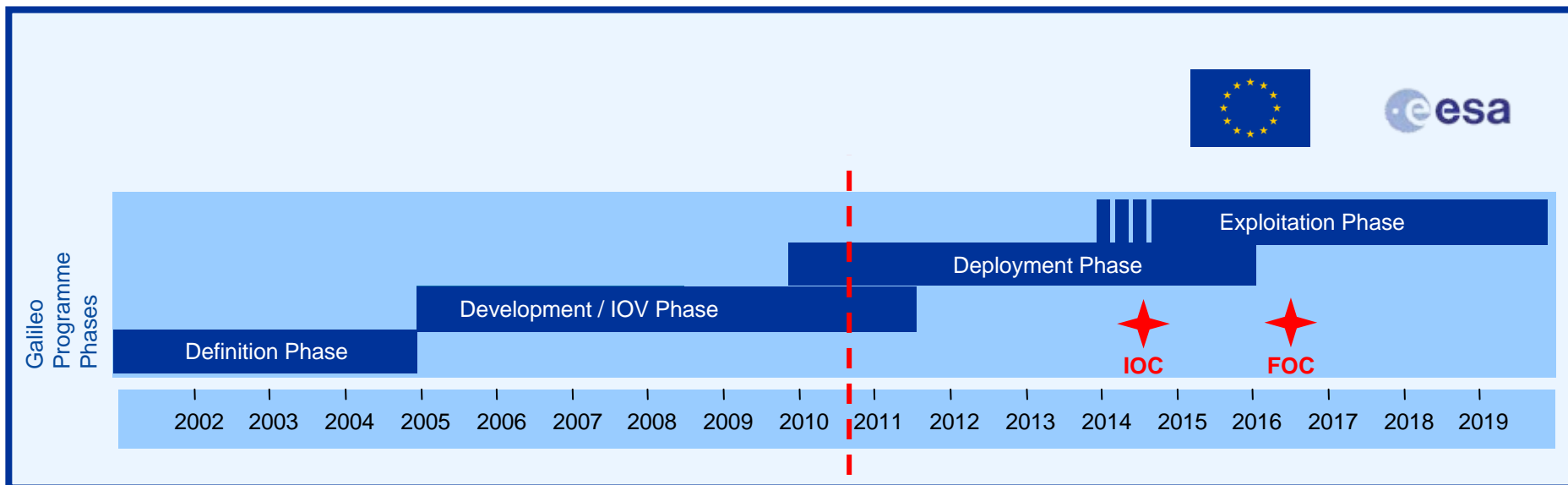
## EGNOS has entered into its operational phase

- ★ 2009
  - ★ Assets were transferred to the European Union on 1 April
  - ★ Long-term service provision contract was signed on 30 September
  - ★ **Open Service declaration** took place on 1 October
  - ★ Procurement to replace the transponder on Artemis is finalized (Astra Sirius 5 to be launched in November 2011)
  - ★ Procurement to replace the transponder on Inmarsat 4F2 is finalized (Astra 5B to be launched in June 2013)
  - ★ Geographical extension is under study
- ★ 2010
  - ★ Certification of ESSP as air navigation services provider on 12 July
- ★ 2011
  - ★ **Safety-of-Life Service declaration planned for Jan 2011**
  - ★ **Commercial Service declaration (EDAS) planned for 2011**



Navigation solutions  
powered by Europe

## Galileo is moving from the development phase (IOV) to the deployment phase



IOC.....Initial Operational Capability (Early Services)

FOC....Full Operational Capability (Full Services)

# Galileo Implementation Plan

In order for Galileo to be recognized by the downstream market as the second satellite navigation system of choice it is key to deliver early services as soon as 2014/2015

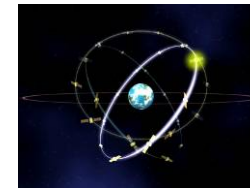
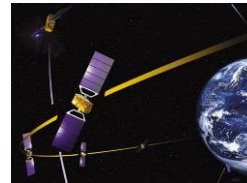
**Galileo System Testbed v1**  
Validation of critical algorithms  
**2003**



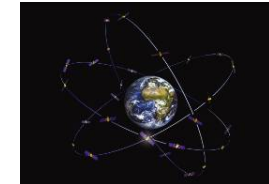
**Galileo System Testbed v2**  
2 initial test satellites  
**2005**



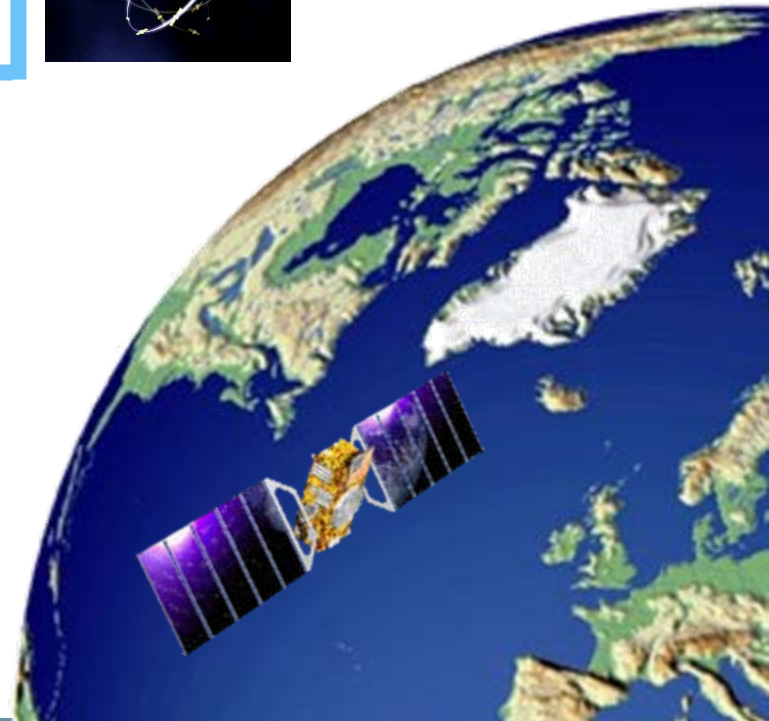
**In-Orbit Validation**  
4 IOV satellites plus ground segment  
**2011**



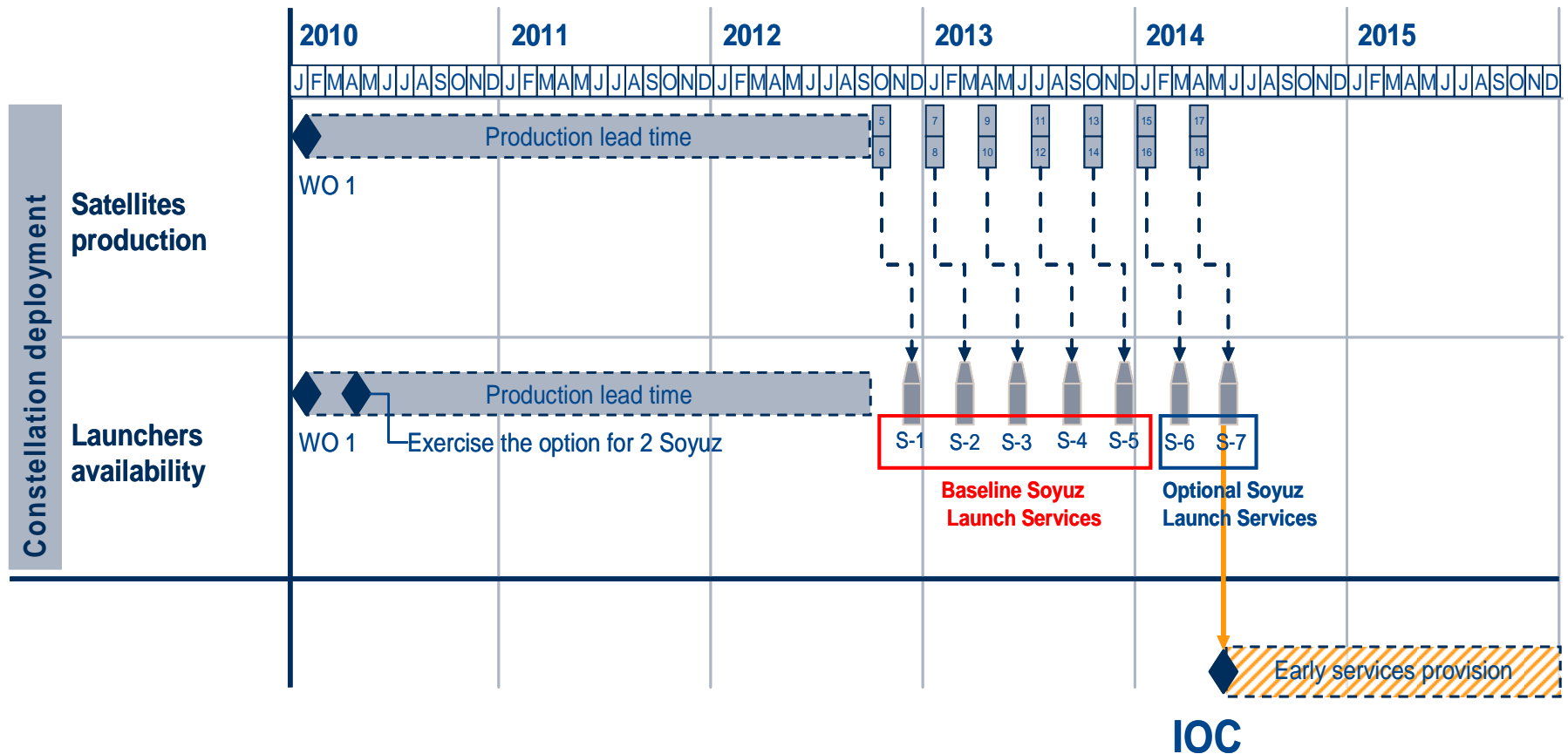
**Initial Operational Capability**  
Early Services for OS, SAR, PRS  
18 satellites  
**2014/2015**



**Full Operational Capability**  
All services, 30 satellites  
**2016/2017**

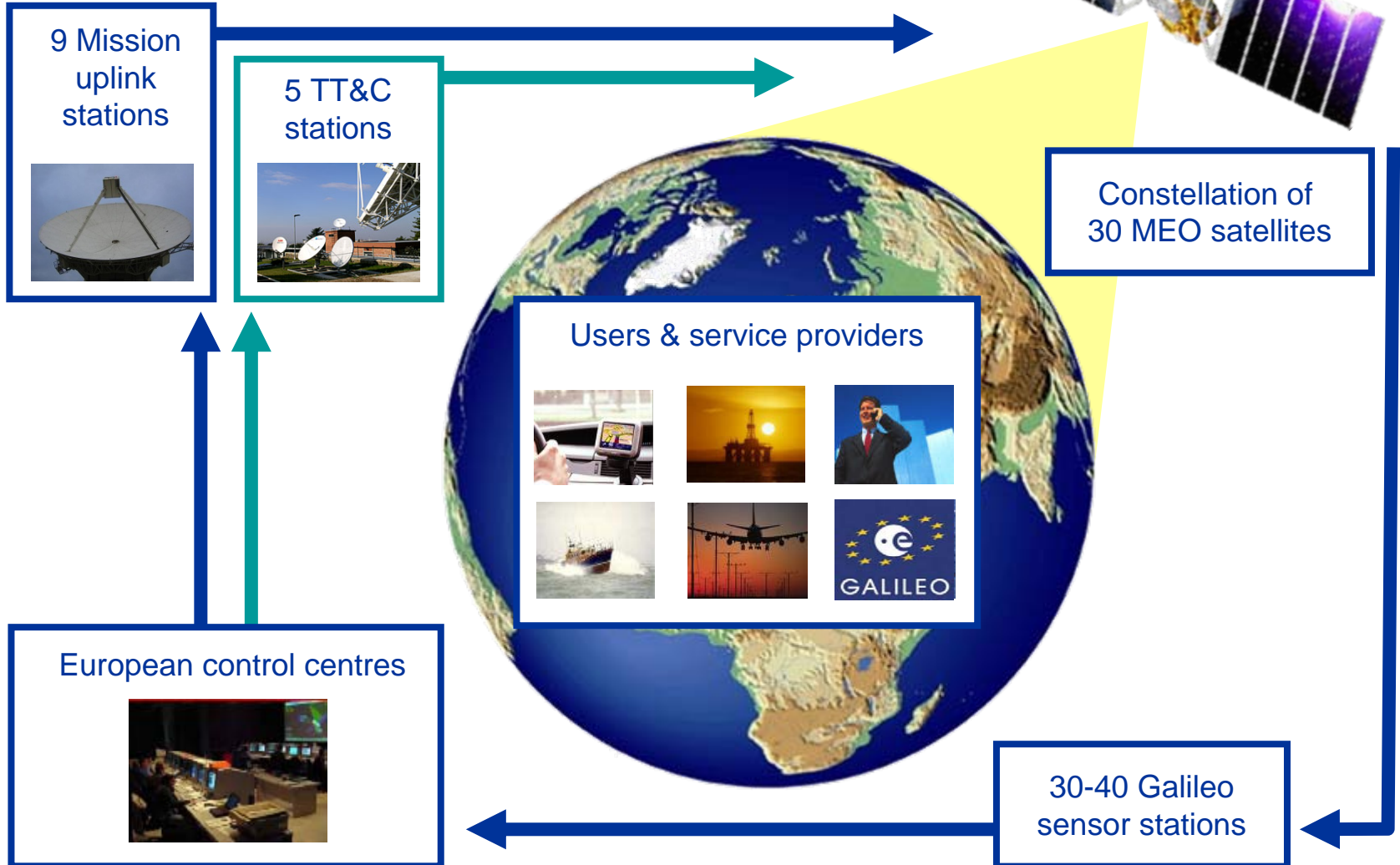
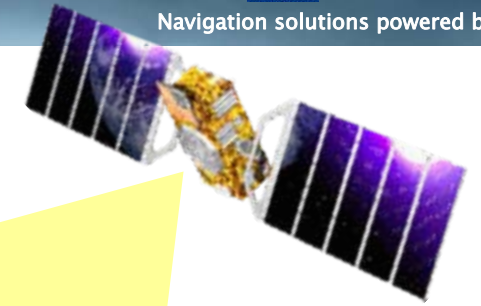


## Initial Operational Capability (18 satellites) will be reached around 2014










# Galileo System Architecture



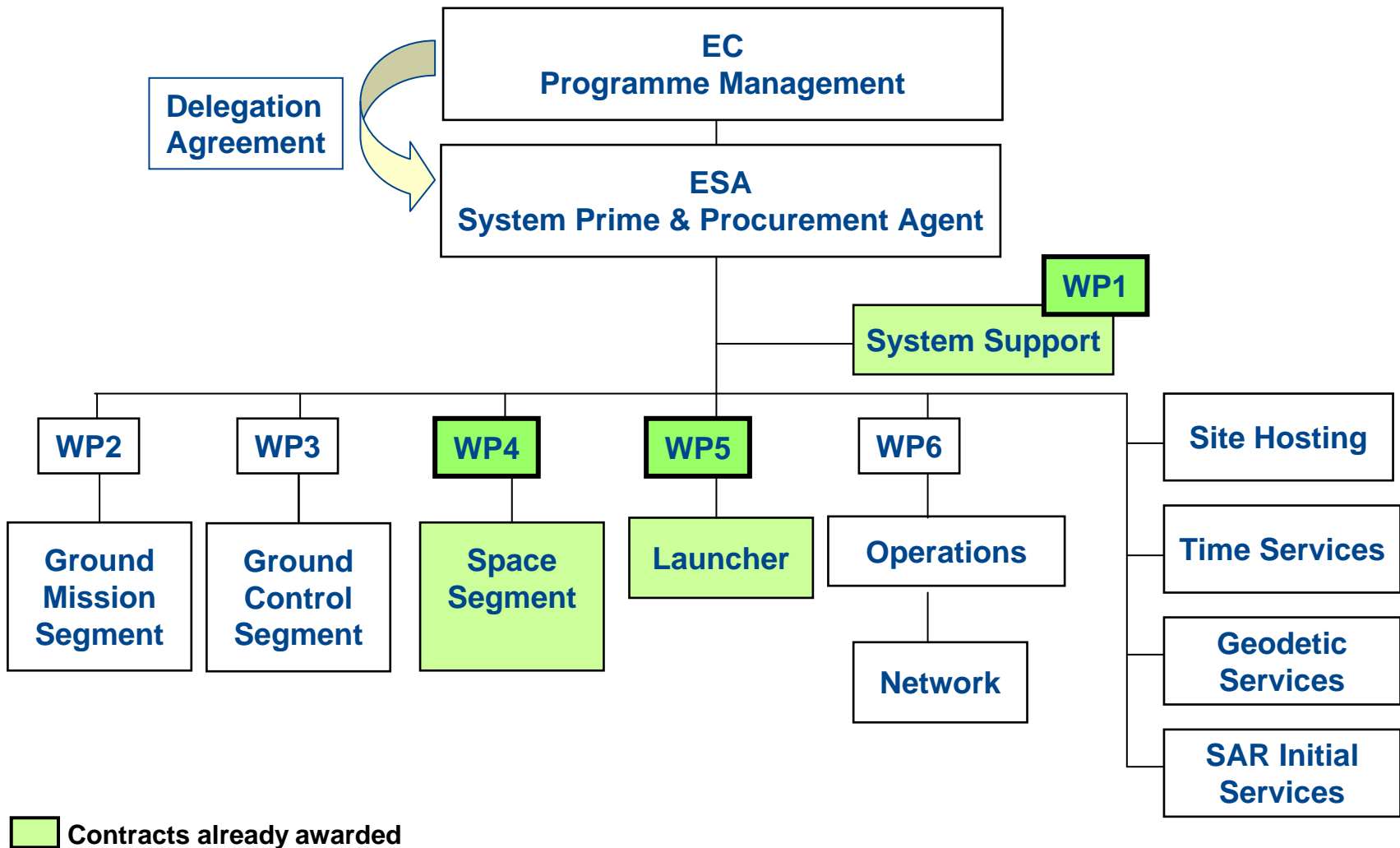
## Galileo will be offering five services

<b>Open Service</b>	Free to air, mass market, simple positioning	
<b>Commercial Service</b>	Encrypted, high accuracy, added-value service	
<b>Safety of Life Service</b>	Adds integrity to Open Service	
<b>Public Regulated Service</b>	Encrypted, robust, continuous availability	
<b>Search and Rescue Service</b>	Near real-time, precise, return link	

## The Galileo Open Service will offer an accuracy better than 4 metres (horizontal)

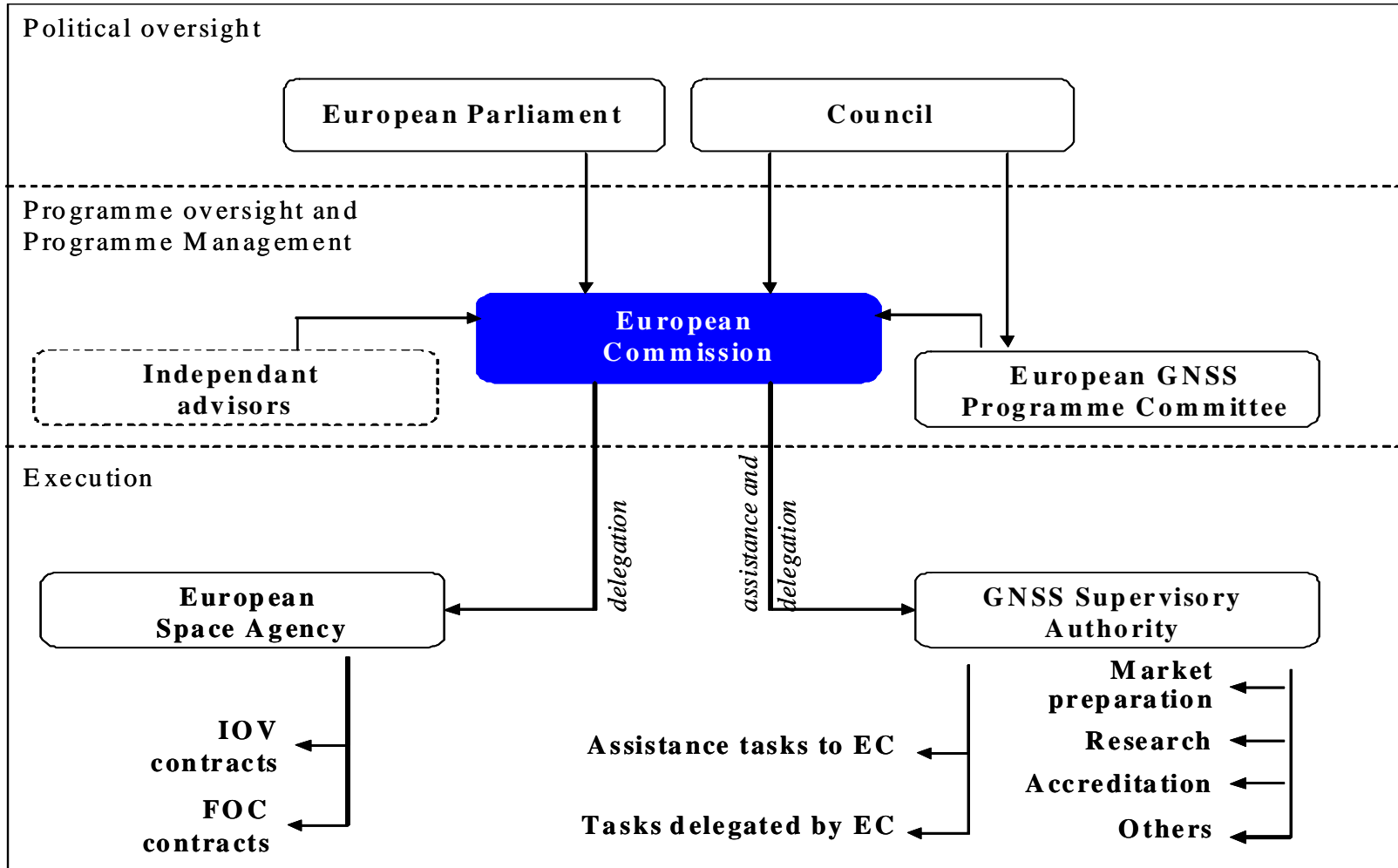
Service	Horizontal Accuracy (95%) (incl. system margins)	Vertical Accuracy (95%) (incl. system margins)	Availability for global coverage	Integrity
Open Service	4 m	8 m	> 99.5%	NO
Commercial Service	Detailed performance requirements under elaboration			
Safety of Life Service	4 m	8 m	> 99.5%	YES (LPV200)
Public Regulated Service	4 m	8 m	> 99.5%	NO

Note: Guaranteed performance in the worst case situation. Actual measured performance is expected to be higher than these requirements



Work Package	Shortlisted Candidates/Winners
1. System Support	Winner: <b>ThalesAleniaSpace</b> (IT)
2. Ground Mission Segment	ThalesAleniaSpace (FR)
3. Ground Control Segment	Astrium (UK)
4. Space Segment	Winner work order 1: <b>OHB System</b> (DE) Candidates for the following work order: OHB System (DE ) EADS-Astrium (DE)
5. Launch Services	Winner: <b>Arianespace</b> (FR)
6. Operations	OPAL (DE+IT)

## The GNSS Regulation entrusts the European Commission with the role of *Programme Manager*



## ★ Agreements with:

P.R. of China  
USA  
Israel  
South Korea  
Ukraine  
Morocco  
Norway

## ★ Multilateral:

Founding member of UN  
International Committee on  
GNSS & Providers Forum,  
host of ICG in Turin in 2010

## ★ Cooperation *inter alia* on:

- ★ Compatibility
- ★ Interoperability
- ★ Standardisation
- ★ Development activities
- ★ Galileo applications
- ★ Research
- ★ SBAS and EGNOS extensions
- ★ Trade matters

## ★ Regional training centers:

- ★ Asia
- ★ Africa
- ★ Latin America



## **EGNOS has entered its operational phase**

- ★ EGNOS Open Service since Oct 2009
- ★ EGNOS Safety-of-Life Service early 2011

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## **Galileo is progressing, at the crossing between the development (IOV) and deployment phases**

- ★ GIOVE-A, GIOVE-B missions on-going
- ★ FOC procurement on-going
- ★ First operational IOV satellites in 2011
- ★ Early Galileo services from 2014/2015



## **International coordination is key**

- ★ Ensure compatibility with other GNSS
- ★ Achieve interoperability



**Thank you for your attention**

