



GJU GALILEO JOINT UNDERTAKING



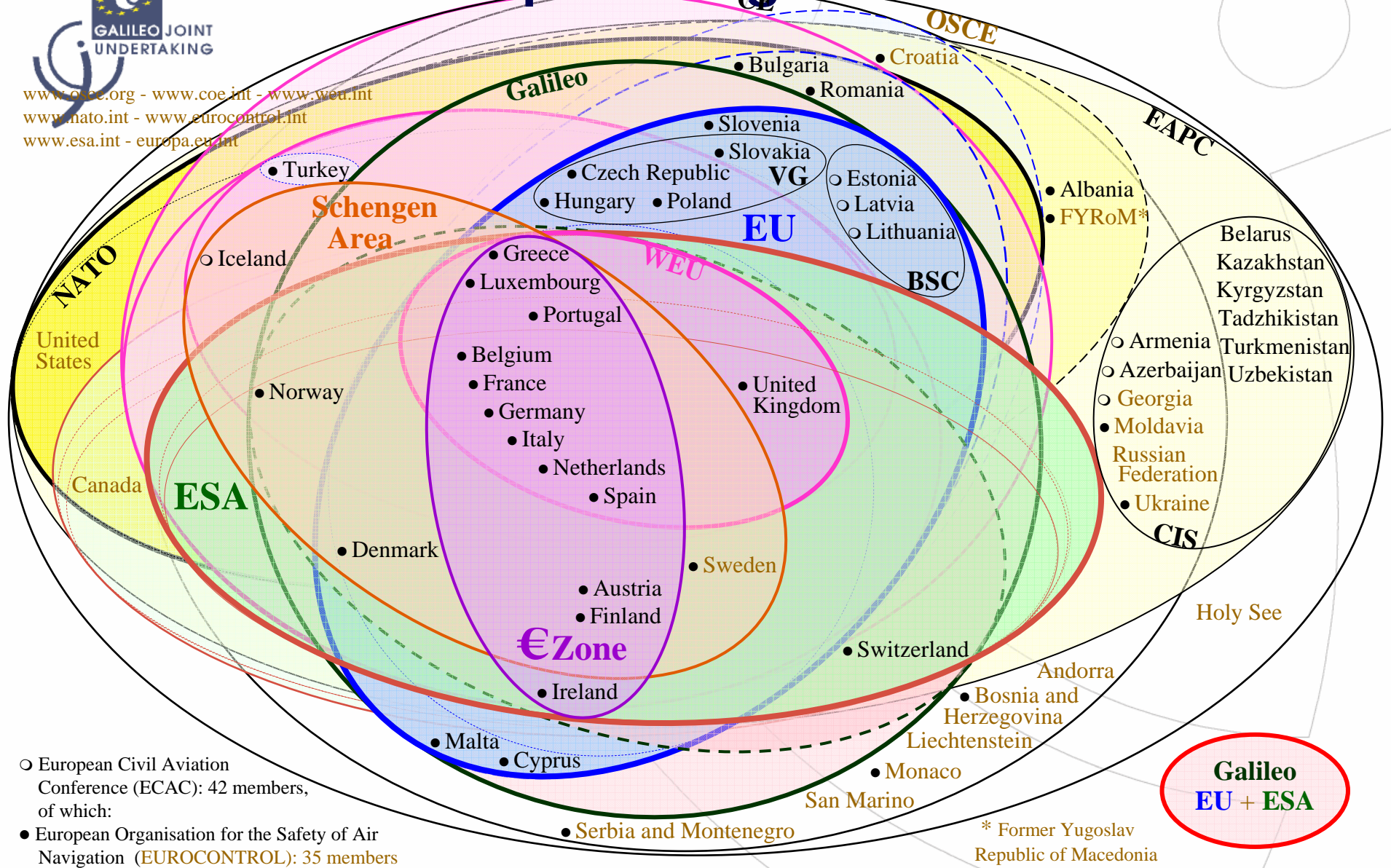
Development of the Galileo Program - The Concession Process

Mr. Peter Marchlewski
General Counsellor
Galileo Joint Undertaking
Beijing, 4th December 2006



China-Europe GNSS Technology
Training & Cooperation Center

European Organisations



- European Civil Aviation Conference (ECAC): 42 members, of which:
- European Organisation for the Safety of Air Navigation (EUROCONTROL): 35 members

OSCE: Organisation for Security and Cooperation in Europe: 55 members	EU: European Union: 25 members + 4 candidates	CE: Council of Europe: 46 members
WEU: Western European Union: 10 members + 6 associates + 5 observers + 7 partners	NATO: North Atlantic Treaty Organisation: 26 members + 3 candidates	€Zone: 12 members
ESA: European Space Agency: 17 members + 1 co-operating State	EAPC: Euro-Atlantic Partnership Council: 46 members	CIS: Commonwealth of Independent States: 12 members
Schengen Area: 15 members	VG: Visegrad Group: 4 members	BSC: Baltic States Council: 3 members



Development of the EU

**1958 – Belgium, Germany, France
The Netherlands, Luxembourg, Italy**

**1973 - +Denmark, Ireland,
United Kingdom**

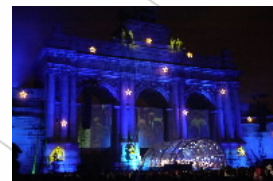
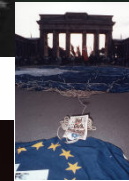
1981- + Greece, Spain & Portugal

1995- +Finland, Austria & Sweden

**2004- + Estonia, Lithuania, Latvia,
Malta, Poland,
Slovakia, Slovenia, Czech Rep.,
Hungary, Cyprus**

25 Member States

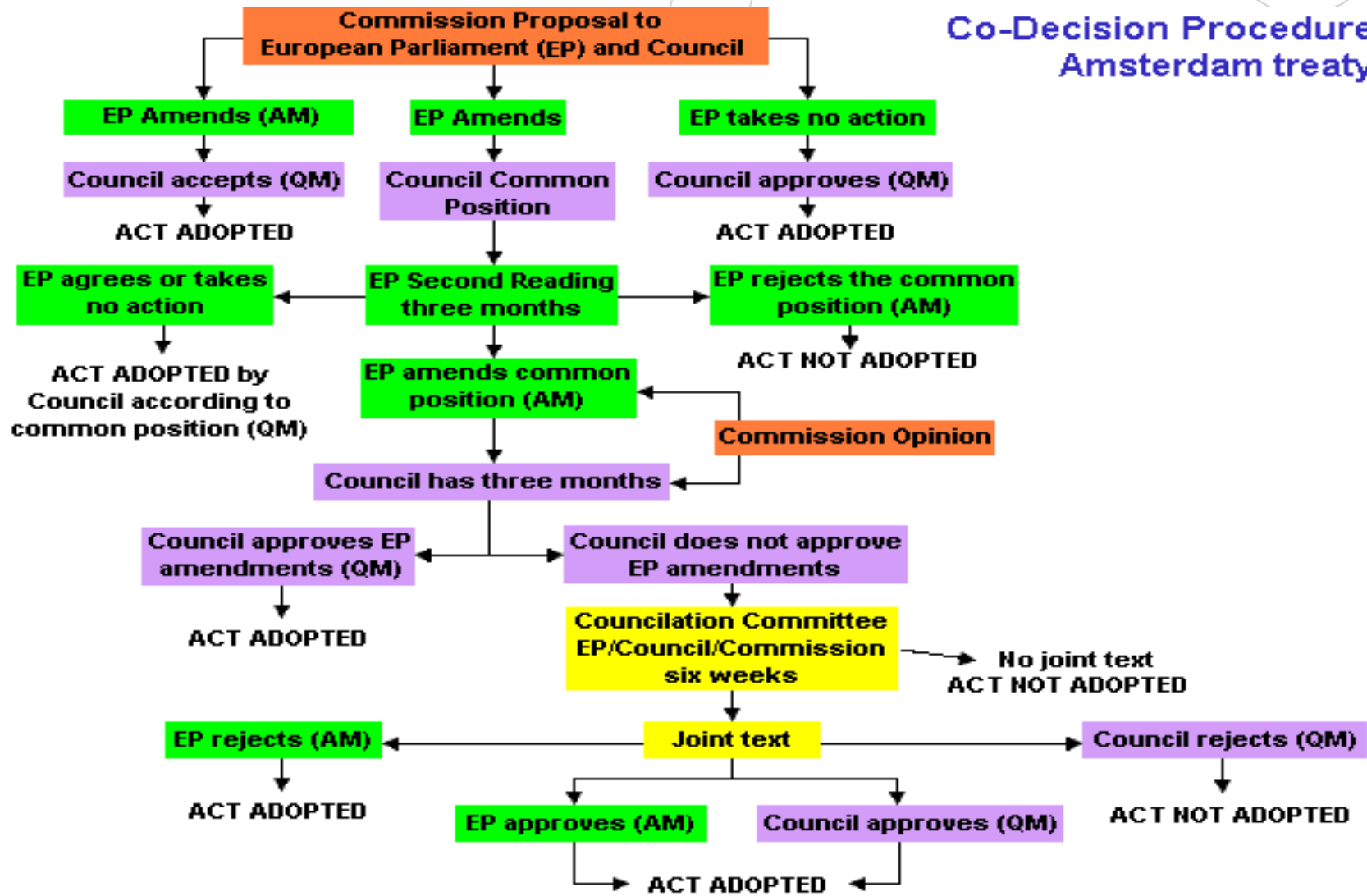
2007 +Bulgaria, Romania





Decision-Making Process of the EU

Co-Decision Procedure
Amsterdam treaty

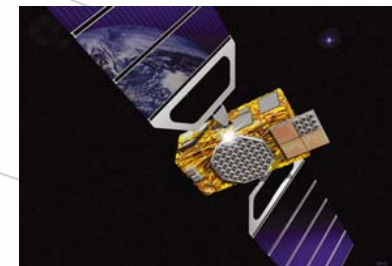


AM = Absolute Majority of Members in European Parliament
QM = Qualified Majority Vote in European Council



The European Union – A Success

- Peace between the Member States
- The Single European Market is a success
- Important Policies – in particular Human Rights, Environmental Protection, Transport Policy etc. have been developed
- Development of important programs – GALILEO





Galileo Joint Undertaking

Created by the European Union & the European Space Agency

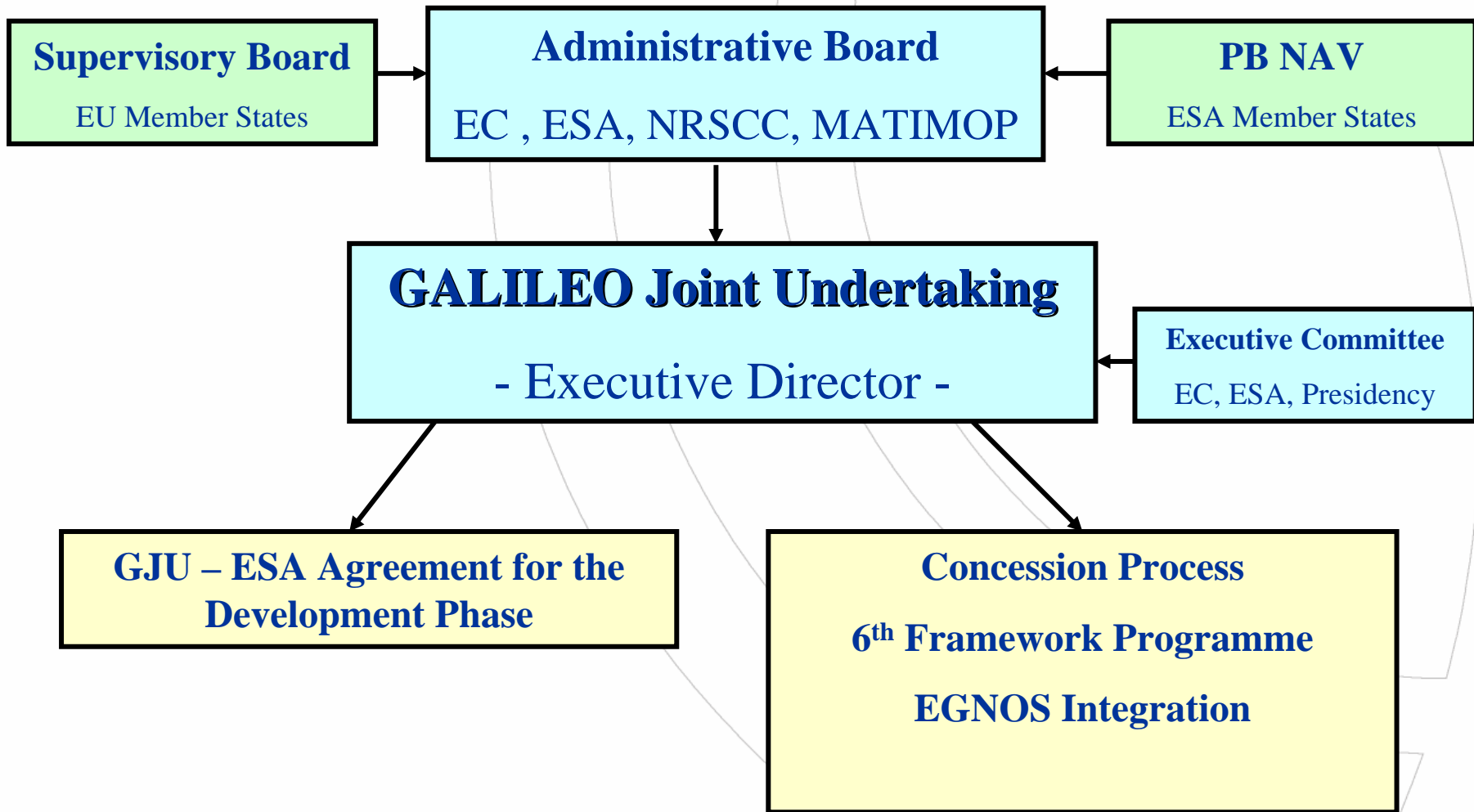
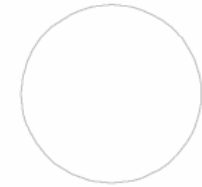


The tasks:

- **Manage the Development Phase**
- **Prepare for the Deployment Phase**
- **Find a concessionaire & secure funding**
- **Develop User Segment Technologies, Services & Applications**
- **Integrate EGNOS into Galileo**

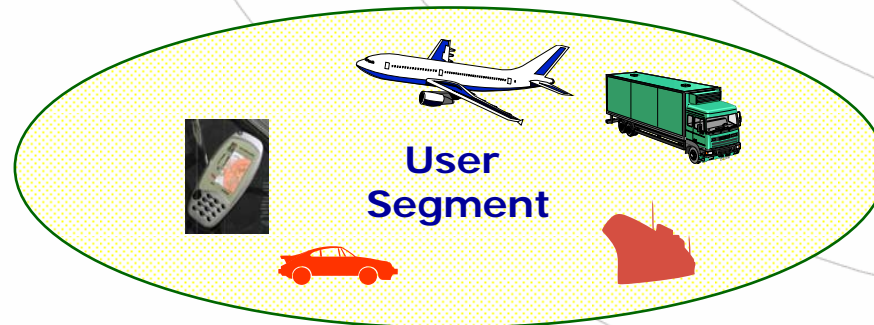
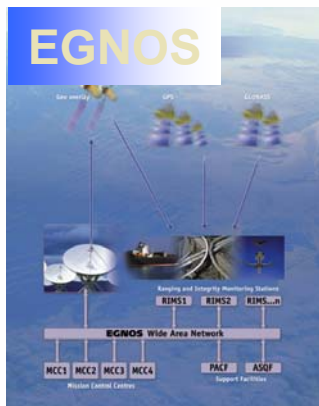
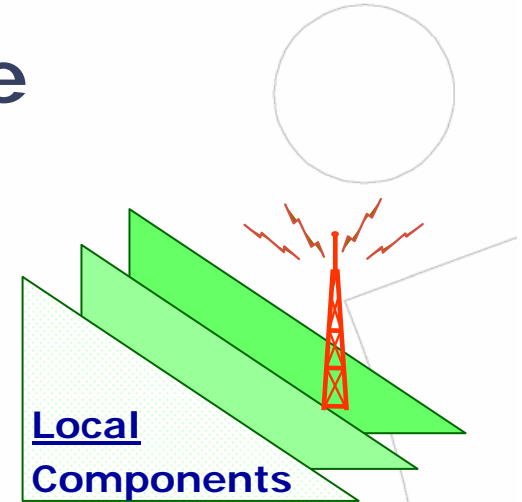
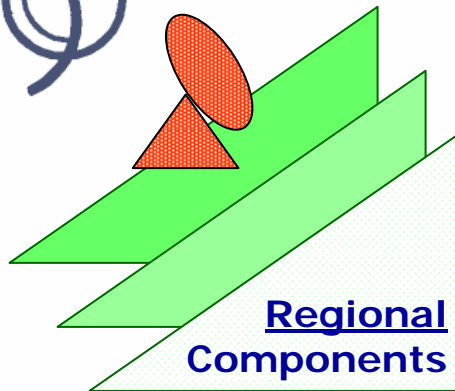


GJU Interfaces



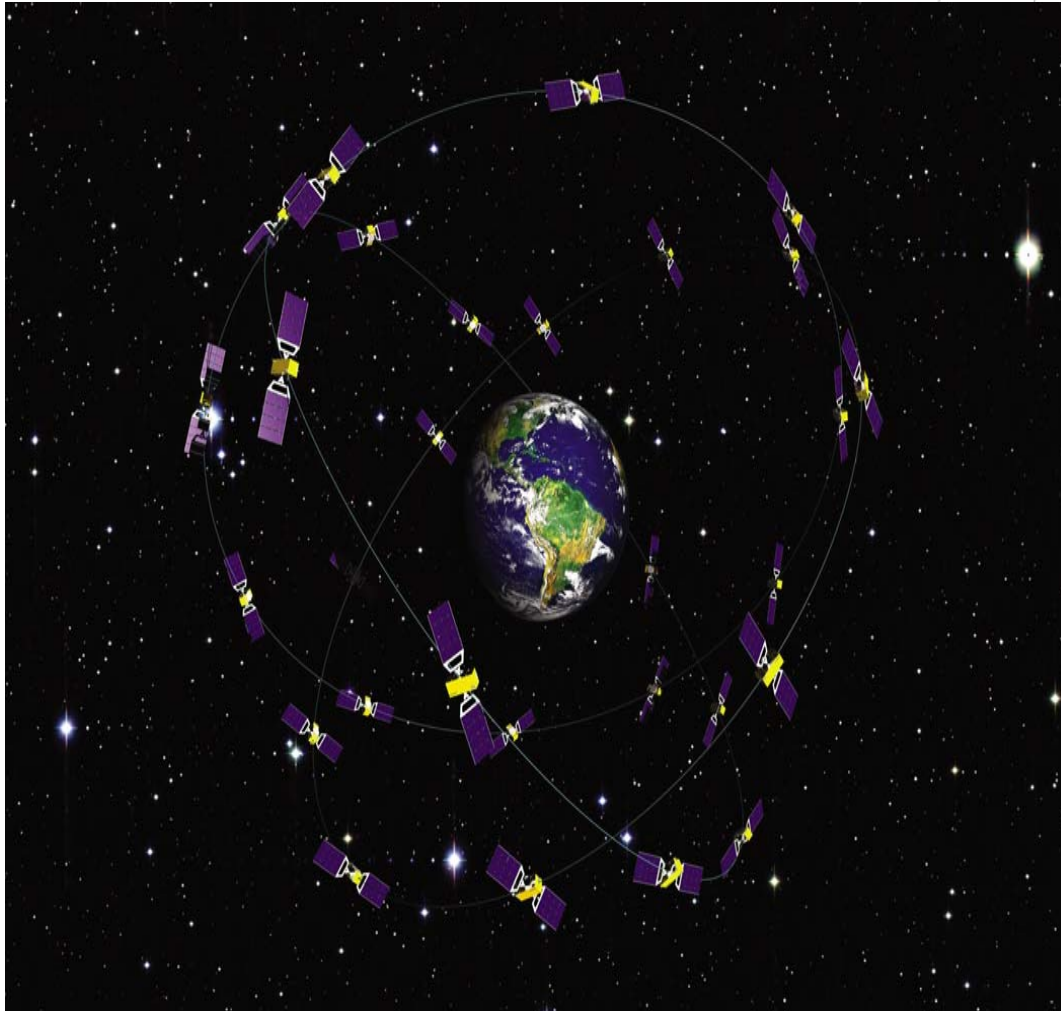


Galileo Architecture



Service Centres

Galileo Constellation

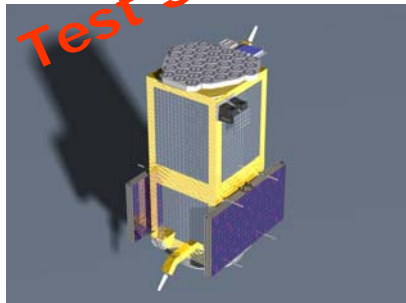


- 30 satellites in three Medium Earth Orbit MEO planes at 23,616 km altitude
- 1 satellite per orbital plane is a spare
- Inclination of orbital planes 56 degrees
- One revolution 14 hours 4 min
- Ground track repeat 10 days

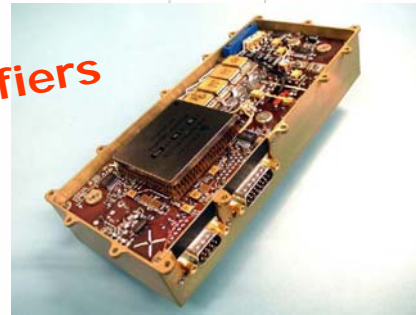


Technology Developments

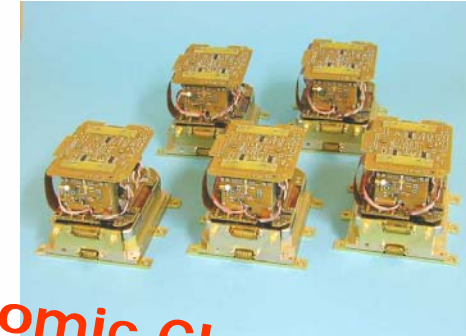
Test Satellites



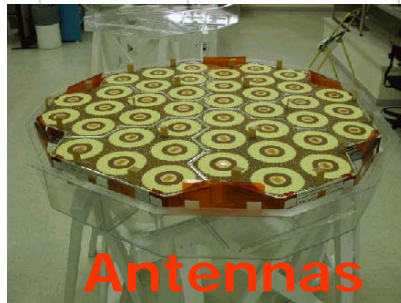
Amplifiers



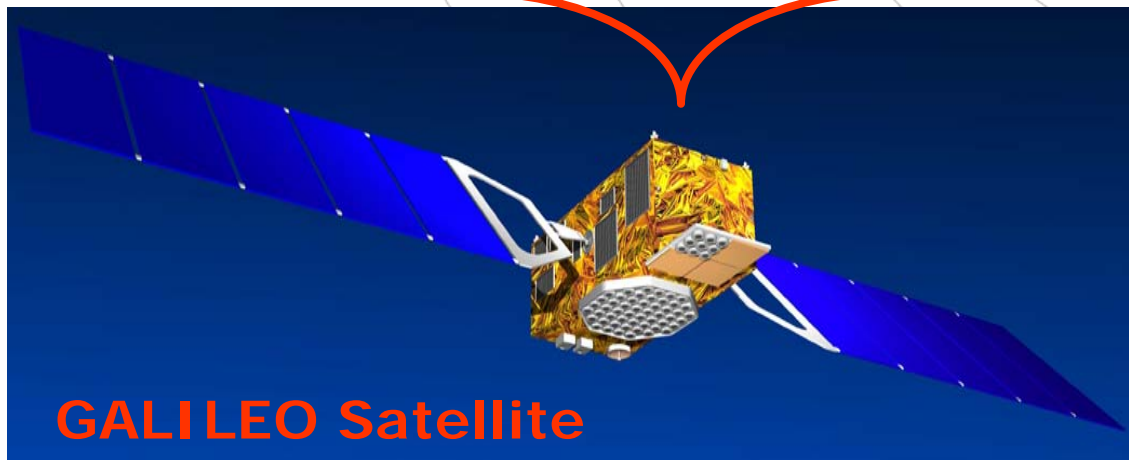
Atomic Clocks



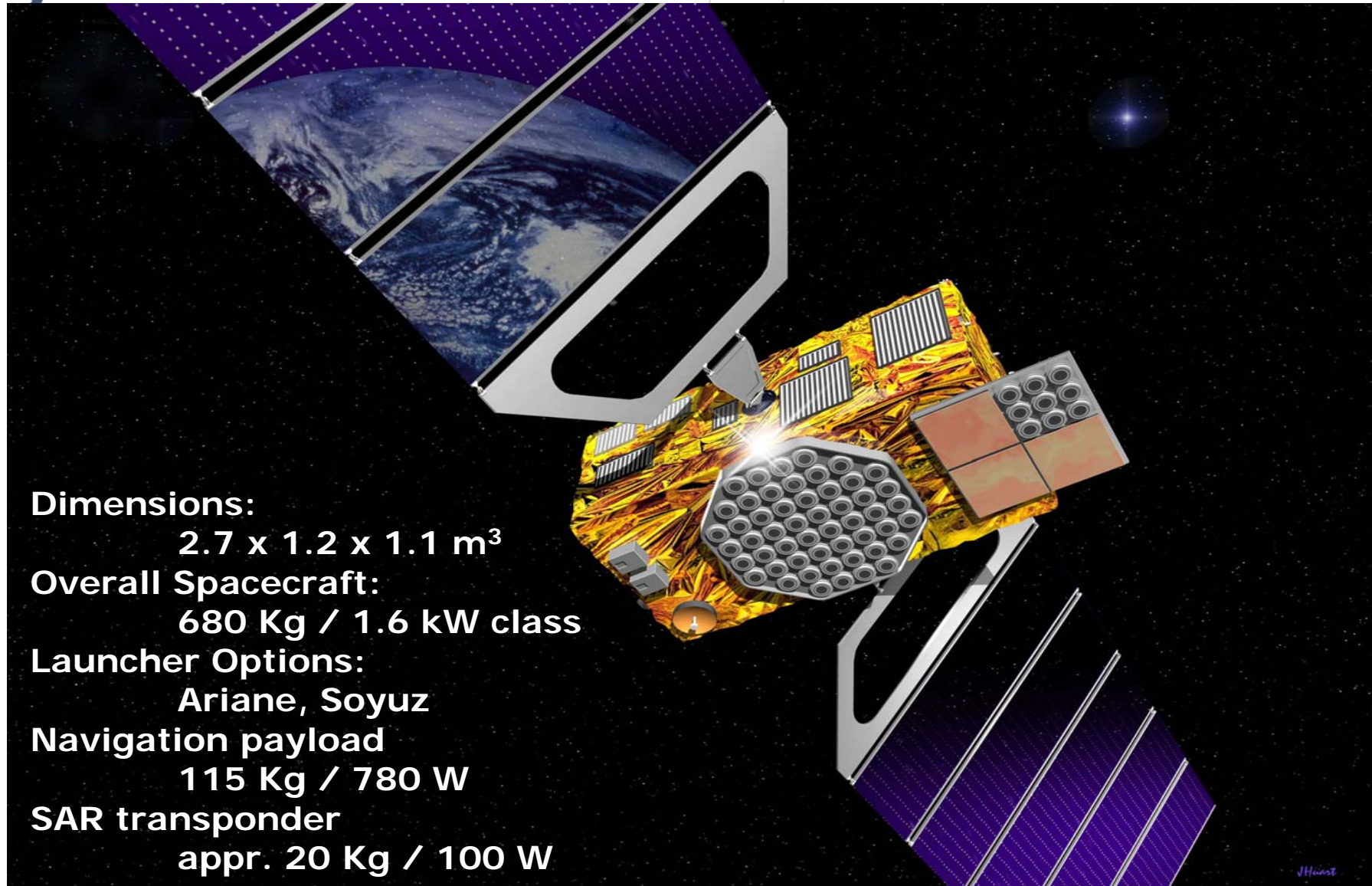
Antennas



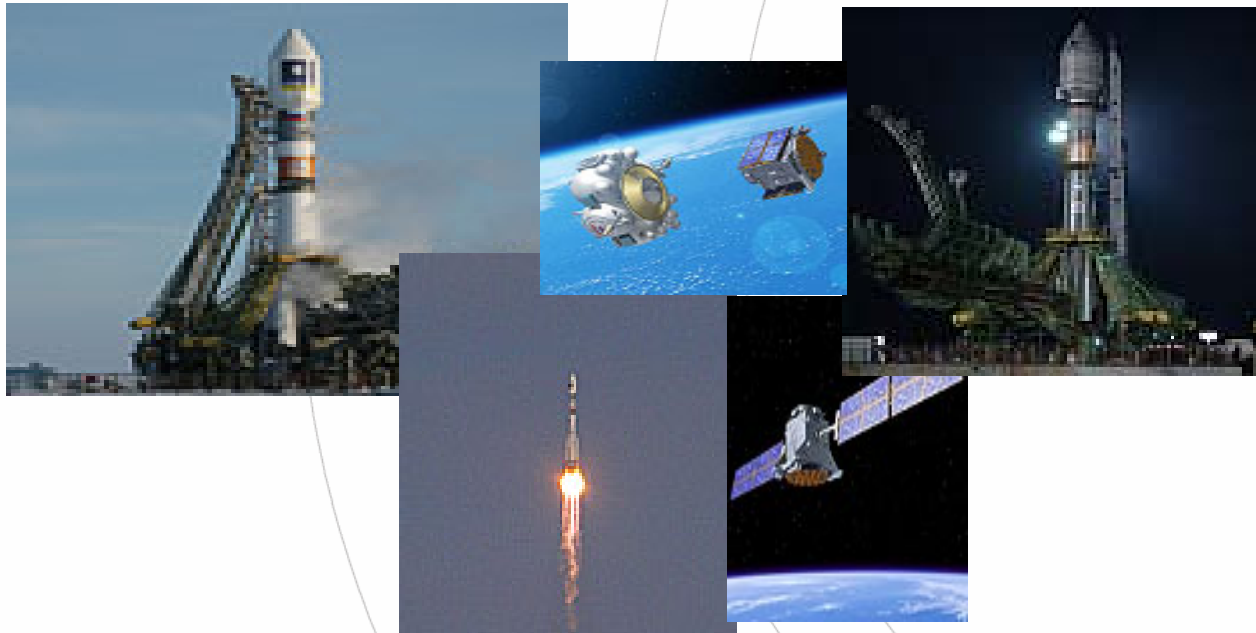
GALILEO Satellite



Galileo Satellite



GIOVE- A Test-Satellite



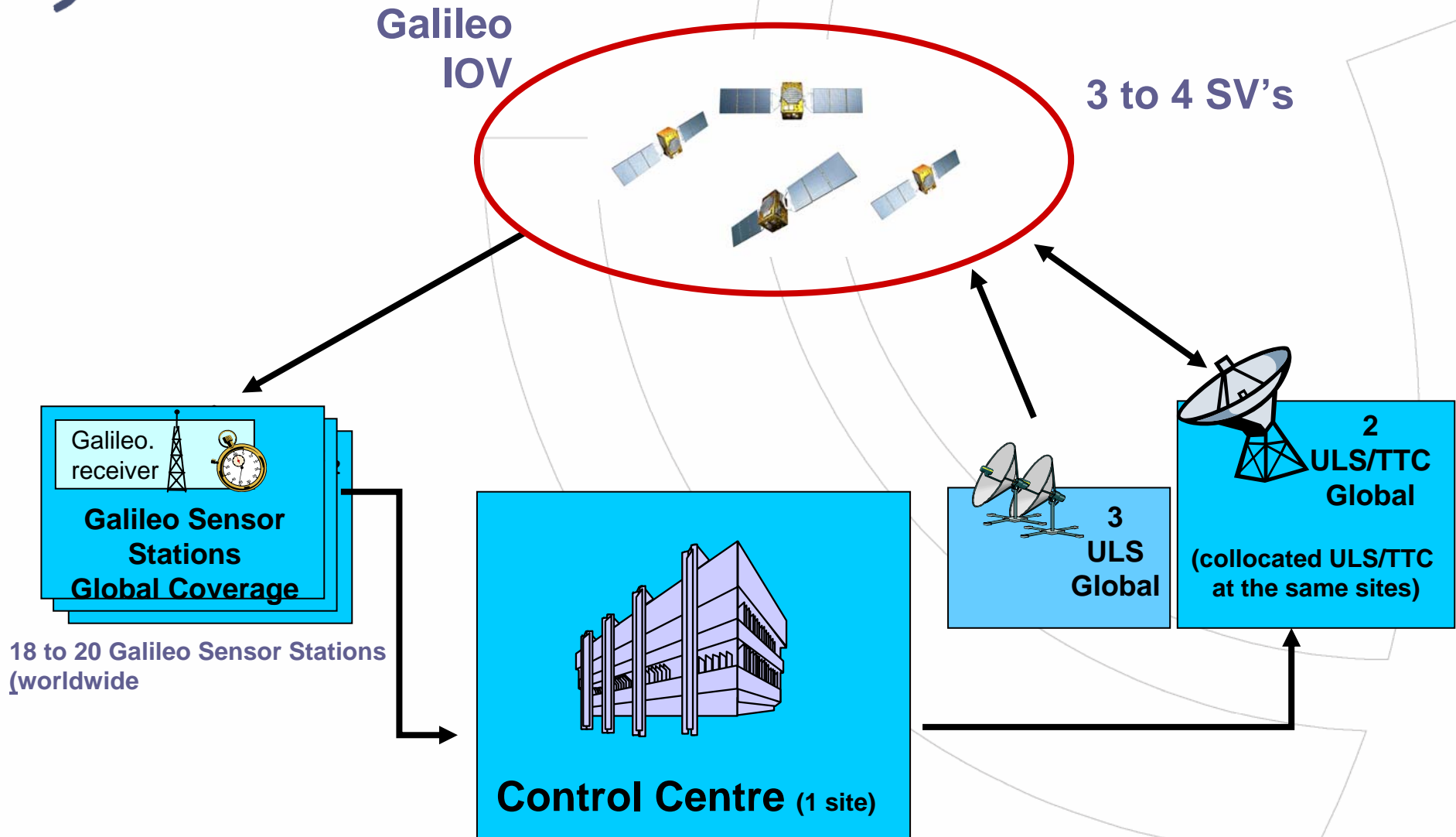
GIOVE-A is Europe's first test satellite placed in a Medium-Earth Orbit.

The purpose of the GIOVE-A test satellite is to:

- **transmit the Galileo signals from one of the orbits to be used by the constellation – received successfully on the 12th January 2006.**
- **test various critical technologies, including the rubidium atomic clock and the signal generator.**
- **measure the physical parameters of the orbit and the particular environment in which the future constellation is to operate.**



IOV System Configuration



Enabled by Galileo

○ Intelligent Transport Systems Driven User Services

○ Open Service

- Galileo adds Additional Signals

○ Safety of Life Service

- Galileo offers Integrity

○ Commercial Service

- Authentication & Guarantees

○ Public Regulated Service

- Signal Robustness

○ Search and Rescue

- Rapid Response & Notification





Galileo Application Overview

Safety of Life

- Aviation
- Rail
- Maritime
- Inland waterways
- Ambulance
- Police / Fire
- Search and Rescue
- Personal Protection
- Traffic surveillance
- Dangerous goods trans.
- ADAS

Mass Market

- Personal communication and navigation
- Cars / motorcycles
- Trucks & buses
- Light Commercial Vehicles
- Personal outdoor recreation
- Others...

Professional

- Oil and Gas
- Mining
- Timing
- Environment
- Fleet Management
- Asset Management
- Geodesy
- Meteorological forecasting
- Land Survey / GIS
- Precision survey
- Precision Agriculture
- Fisheries / EEZ
- Vehicle control and robotics
- Construction / Civil Engineering
- Space

Integrity
(error-free),
Standards,
Regulation,
Continuity,
Availability,
Accuracy

Low costs,
Low power cons.,
Small size,
Friendly use,
Best perf.
accordingly

High precision,
High accuracy,
High reliability



Transport Applications

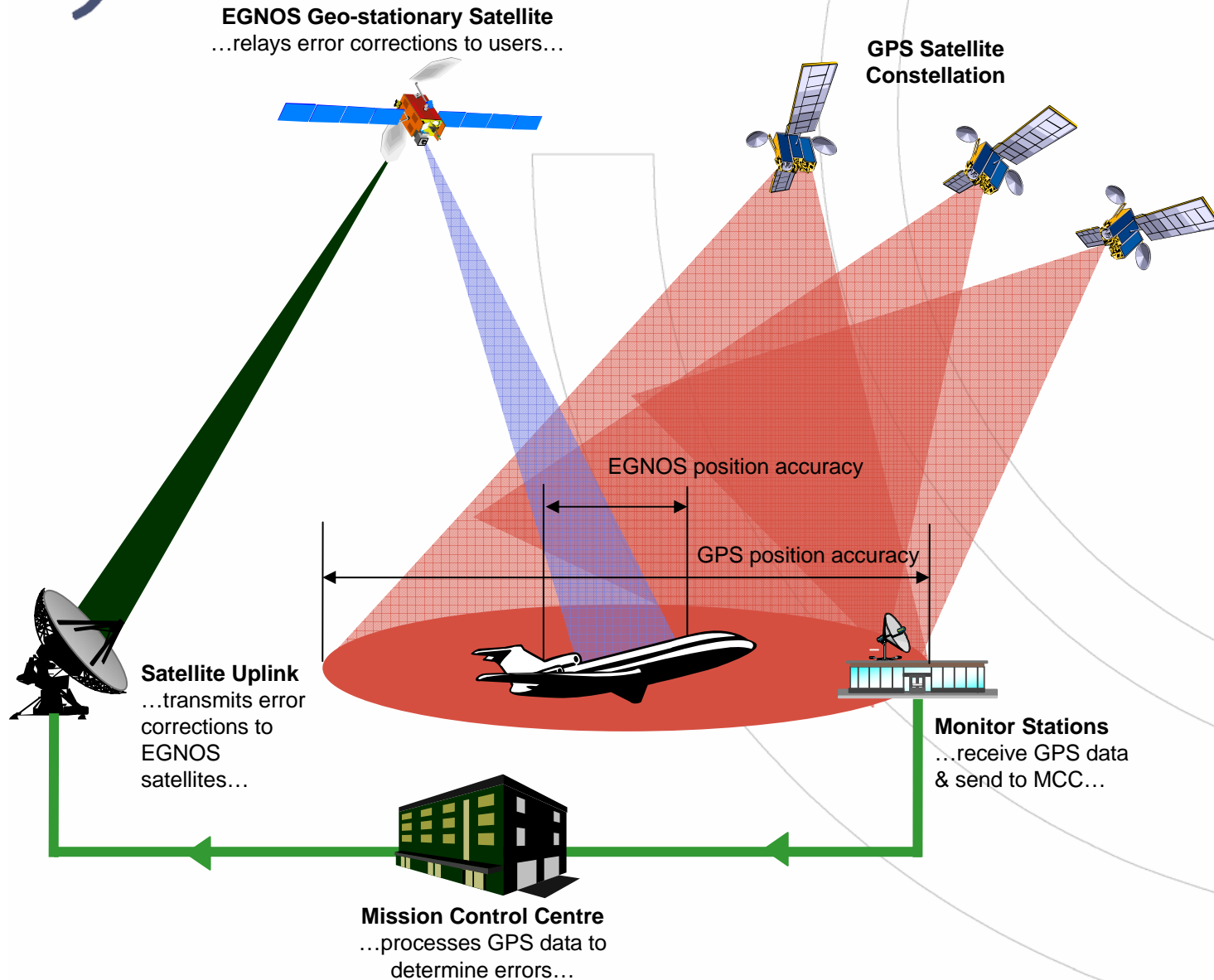
- **Aviation**
 - En-route
 - Approach for landing
 - Landing
- **Maritime**
 - Off-shore, port
 - Inland waterways
- **Railway**
 - Train control
 - Fleet management
- **Vehicle Navigation**
 - Guiding and controlling
 - "Road Tolling"
 - Advance Driver Assistance System (ADAS)
- **Multimodal Transport**



GALILEO added value: Integrity, Precision, Service Guarantee, Authentication



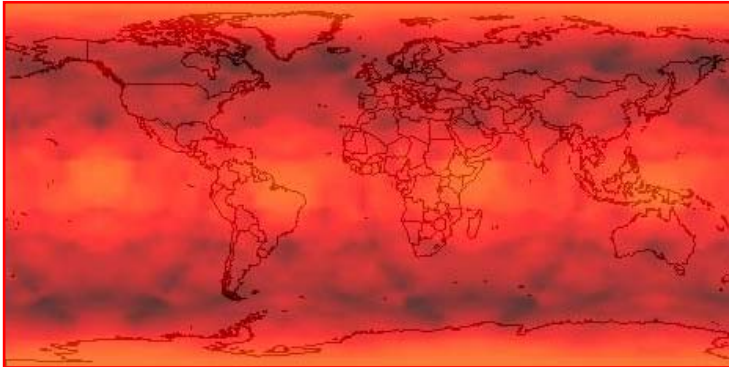
EGNOS offers improved GNSS performance with respect to GPS



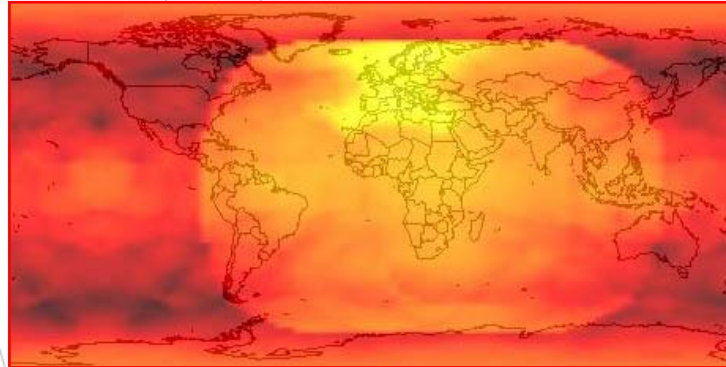


Horizontal Accuracy

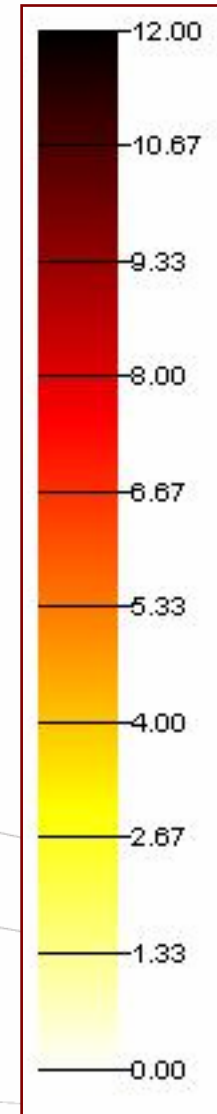
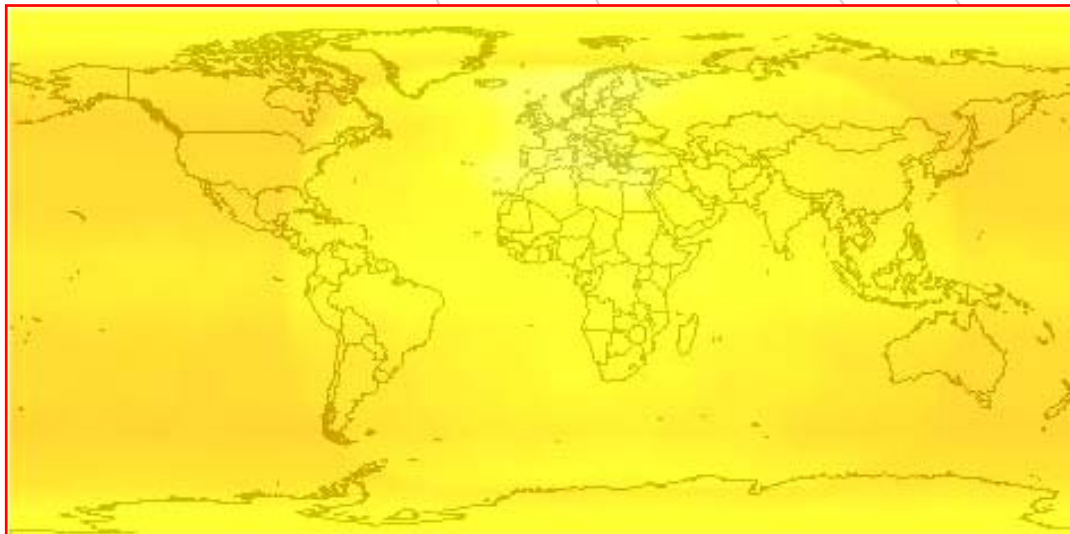
GPS



GPS + EGNOS



GPS + EGNOS + GALILEO



Note: single frequency user, error in meters.



Galileo/EGNOS services for Aviation

Applications:

- ▶ En-route
- ▶ Terminal Area
- ▶ Approach and landing
- ▶ Support to Airports Surface Movement Guidance
- ▶ Helicopter Emergency Services

ICAO Standards:

- ✓ EGNOS compliant with ICAO SARPS
- ✓ Galileo ICAO SARPS under development

Main added-values:

- ✓ Vertical guidance in all European airports.
- ✓ Guaranteed and better performance: integrity, accuracy, continuity and availability.





Galileo/EGNOS services for Airports

Services:

- 1) EGNOS will provide APV service (Approach with Vertical Guidance close to CAT I capabilities).
- 2) EGNOS and Galileo combined will provide CAT I service.
- 3) Local augmentation (GBAS) needed for CAT II and CAT III.

Benefits:

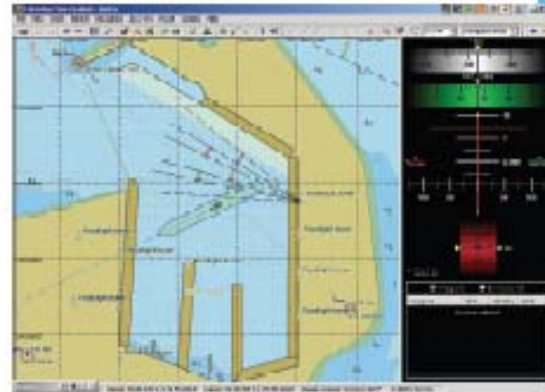
- ✓ Increased safety and capacity.
- ✓ APV service for runways not equipped with ILS
- ✓ Backup to runways equipped with ILS.
- ✓ One single GNSS receiver for all phase of flight.



Galileo/EGNOS services in the Maritime sector

Harbour

- Galileo supports all kinds of approaches and manoeuvre
- Works perfectly in bad weather conditions



Inland waterways

- Safe use of automated vessel navigation and traffic control

Offshore navigation

- Increased navigation safety and collision prevention in combination with Automatic Identification Systems (AIS) and vessel traffic management systems

Galileo in the Rail Domain

3 different types of applications for Galileo in the Rail domain with 3 different impacts

- **Non-safety related applications**

- Freight tracking
- Passenger information
- Fleet management



- **Safety related applications**

- Train control/ train integrity



- **Infrastructure applications**

- Track survey
- Track maintenance





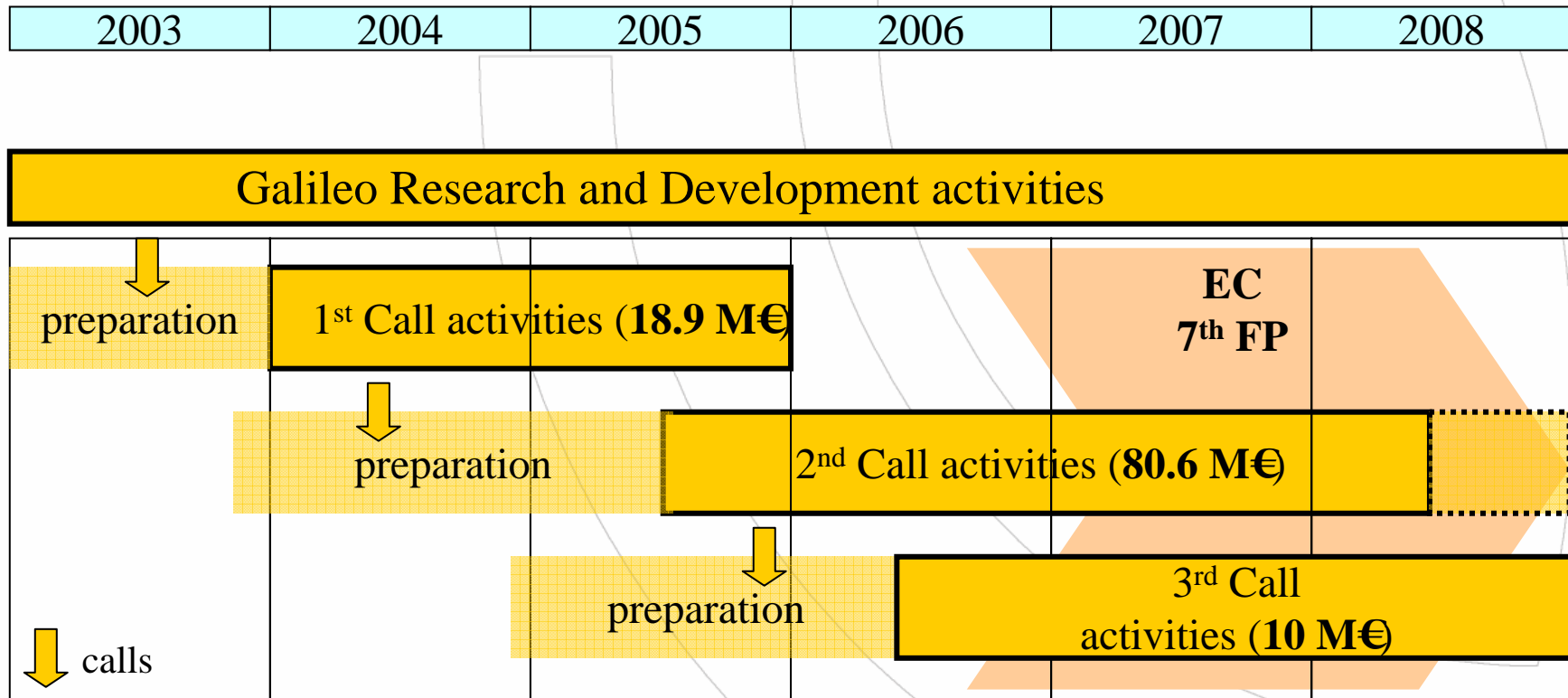
Galileo in the Multi-Modal Domain

Priority applications

- **Node/Terminal yard management, including planning and monitoring of those activities**
- **On-route/Supply chain monitoring and “door-to-door” delivery**



Overall Plan





Conditions

- **Three Undertakings from three different countries**
- **For SME's**
 - **Two Undertakings from two different countries**
 - **(Level – €300,000)**



Results and Outcomes

- GJU has launched **70 projects** (including SMEs) dedicated to the development of the User Segment for an overall budget of **170 M€** (110M€ financed by GJU)
- More than **360 companies** (including a large number of **SME's**) are now involved in the Galileo R&D activities financed by the GJU
- Tendering Rate 33%



Specific support for SME's

- A specific call for SME (and Research Institutes) allowed financing 32 projects: 9M€
- Clear requirement asking for a minimal participation of SME's in each project:
 - No requirement in the first call
 - 7% for the 2nd call (i.e. 5 M€)
 - 10% for the 3rd call (i.e. 1M€ secured for SMEs)
- Out of the 110M€, 15M€ has been 'secured' for SME's.
- The result achieved is much higher *33% of the Galileo R&D budget has been allocated to SME's*



Contribution to the 7th FP

- A **Call for Ideas** has been published on the Galileo Joint Undertaking website
- The GJU in cooperation with the EC, the GSA and the ESA is currently preparing the detailed Work Programme and a strategic Roadmap
- The 7th FP will be carried out by the GNSS Supervisory Authority



Galileo's Economic Impact

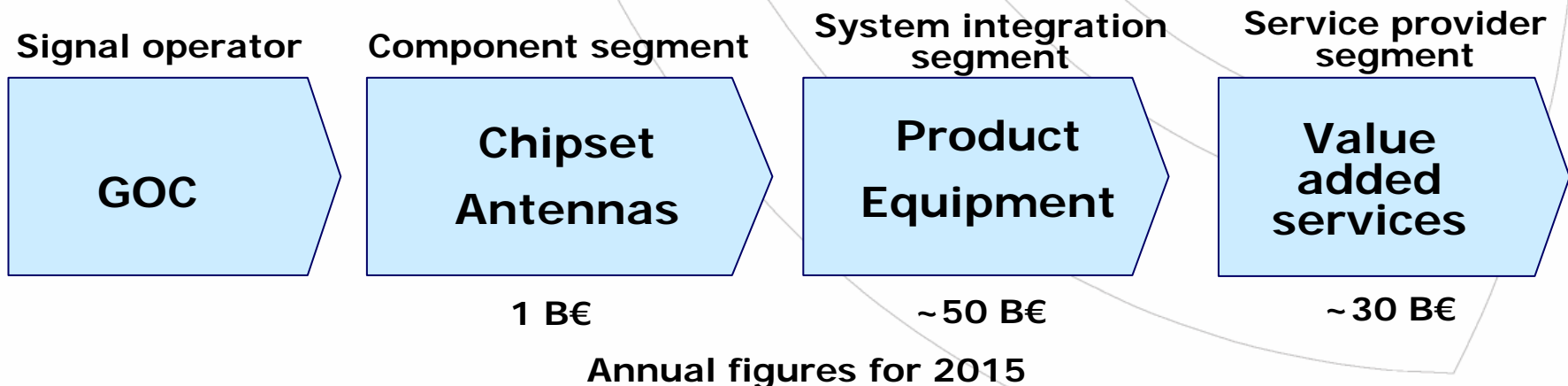
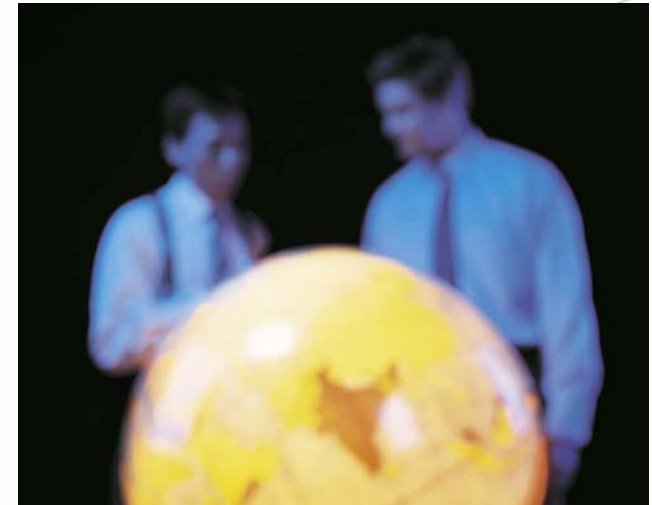
- **Positive Multiplier Effect**
- **Innovation through new applications**
- **Creation of 140,000 new jobs in Europe and much more on a global scale**
- **Research & development for present & future generations**
- **Contribution to the Lisbon Strategy**

Addressing the Market

O Huge world wide market for the Satellite Navigation product and services

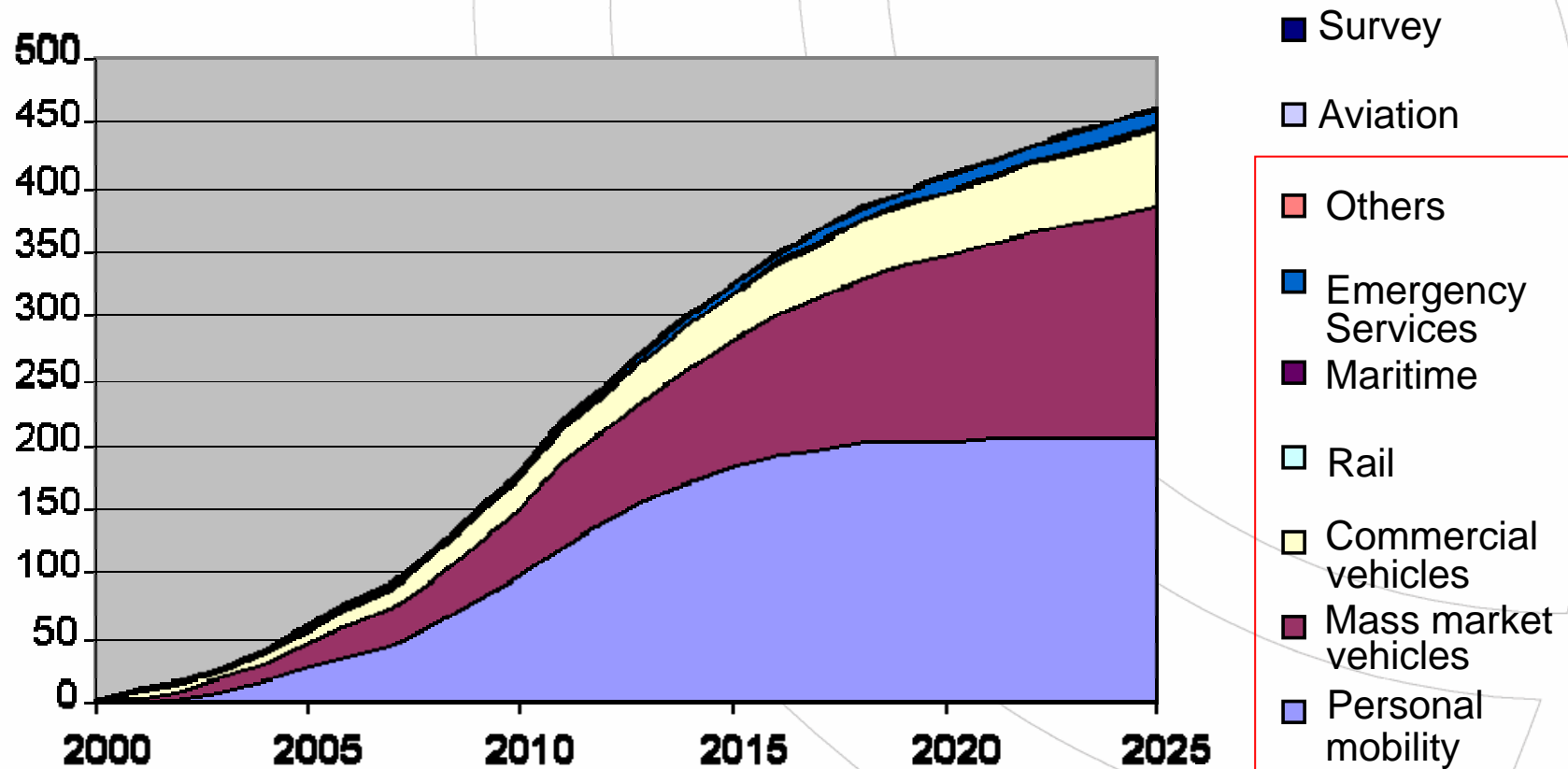
O Joint Public and Private effort: the Galileo PPP

*O The Galileo concessionaire (GOC):
a business partner in the value chain*



GNSS Market forecast

Total GNSS turnover (products + services) by markets (€B)



ITS related



Galileo Concession Time Table

October 2003

April 2004 – March 2005

2005-2007

**Oct. 2003-
Feb. 2004**

**Call for
Interest**

**April 2004-January 2005-
Competitive Negotiation Phase**

**December 2004-
Transport Council Decision**

**1st March 2005- May 2005
Parallel Negotiations**

**Mid-May 2005-
The two consortia expressed their
intention to join forces**

**20th June 2005- Delivery of the joint
proposal to the Galileo Joint
Undertaking**

27th June 2005

**Acceptance of
the joint
proposal from
the two
consortia**

**Contract
Negotiations**

**Head of Terms
Draft Contract
– Dec. 2006**

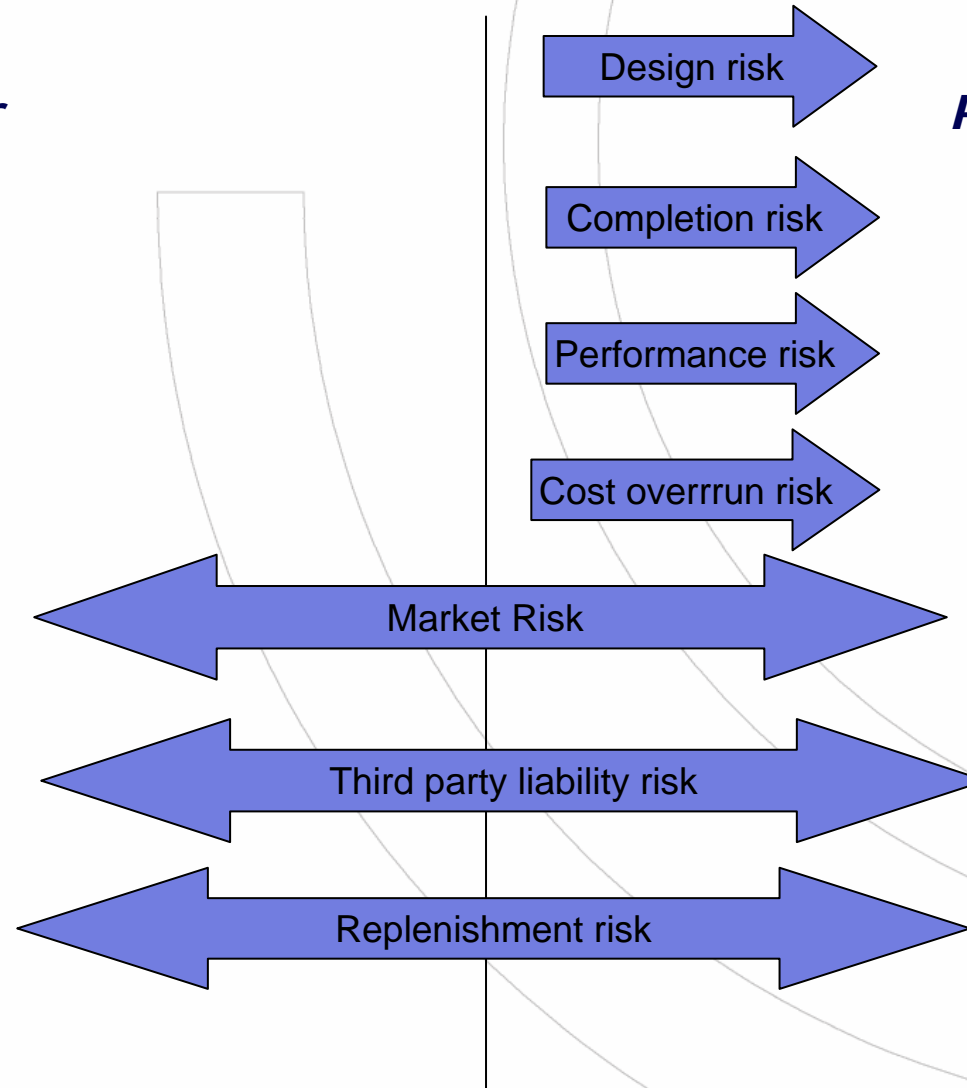
**Financial Close
And signature
of the
Concession
Contract
- 2007**



Main Risk Allocation in the Concession Approach

Public Sector

Private Sector





Galileo International

Perspective:

- World wide markets
- Local-Regional Infrastructure
- Global Standards
- Product Certification
- Financing
- Information Centres

	<i>Signed</i>	<i>Draft</i>	<i>Negot.</i>	<i>Talks</i>
<i>U.S.A</i>	☑			
<i>China</i>	☑			
<i>Israel</i>	☑			
<i>Ukraine</i>	☑			
<i>India</i>		☑		
<i>Morocco</i>		☑		
<i>Norway</i>			☑	
<i>Switzerland</i>			☑	
<i>Argentina</i>			☑	
<i>Russia</i>			☑	
<i>S. Korea</i>	☑			
<i>Australia, Canada, Brazil, Chile, Mexico, Malaysia, Saudi Arabia.</i>				☑



US-EU Cooperation Agreement

○ The signature of the US-EU Cooperation Agreement on GPS & Galileo was held at Dromoland Castle, Ireland, on the occasion of the EU-US Summit on the 26th June 2004

○ GPS & Galileo will adopt a common signal for their respective Open Services

○ The US & EU continue to optimize the Open Signal

○ The use of GPS & Galileo OS will be free of charge for the end-user





Cooperation with China

- **Co-operation Agreement EU/CN - 30th October 2003**
- **The National Remote Sensing Centre of China (NRSCC) became a member of the Galileo Joint Undertaking (GJU) on the 9th October 2004**
- **The Chinese side committed EUR 200 million to the Galileo Programme:**
 - ..EUR 70 million in the development phase
 - .. EUR 130 for the deployment phase



Official Signing Ceremony



The official signing of the Agreement between MATIMOP & the GJU took place in Jerusalem on the 6th September 2005. The signing ceremony was hosted by the current Israeli Prime Minister Mr. Ehud Olmert





GNSS Supervisory Authority (GSA)

The above GNSS Supervisory Authority was established under the Council Regulation (EC) No. 1321/2004 on the 12th July 2004

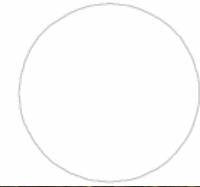
It will:

- **Act as the owner of the European Satellite Navigation Program (Galileo)**
- **Be the legal counterpart of the Concessionaire**

In addition:

The GSA will take over the remaining work from the GJU

Galileo – A Success Story



Worldwide availability

Successful International Cooperation

**Clear contribution to European Transport
Policy**

**The first major European Public Private
Partnership Program**

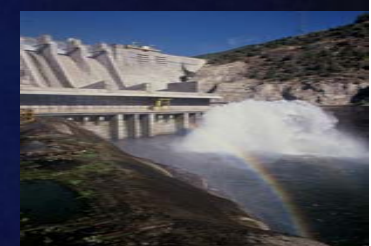
**The first commercial service in Satellite
Navigation**

**Customer orientated to satisfy the needs of
the private user**

Benefits for current and future generations



GJU GALILEO JOINT UNDERTAKING



*Many thanks for
your attention*

Beijing, 4th December 2006

Mr. Peter Marchlewski
Galileo Joint Undertaking

www.galileoju.com

Hans.marchlewski@galileoju.com



China-Europe GNSS Technology
Training & Cooperation Center