

GALILEO overview



Eero Ailio

European Commission

COPUOS S&T Committee 19 February 2008



Presentation Structure

- Galileo key features
- Program overview
- International cooperation
- Future perspectives





Galileo

Key features

1. **Higher quality services globally available**
2. **Market oriented, designed for civil users**
3. **Autonomy → security**
4. **Accountability**

full service and performance monitoring and real-time “integrity”





Galileo Constellation








- **30 satellites in orbit (only 27 active)**
- **3 planes**
- **Orbit altitude: 23222 km (above GPS and GLONASS).**
- **Each satellites makes 17 orbits in 10 days.**
- **12 satellites visible from any ground location, in average.**



Galileo

Services

Navigation	Open Access	Free to air; Mass market; Simple positioning and timing	
	Commercial	Encrypted; High accuracy; Guaranteed service	
	Safety of Life	Open Service + Integrity and Authentication of signal	
	Public Regulated	Encrypted; Integrity; Continuous availability	
SAR	Search and Rescue	Near real-time; Precise; Return link feasible	



Galileo Project Status



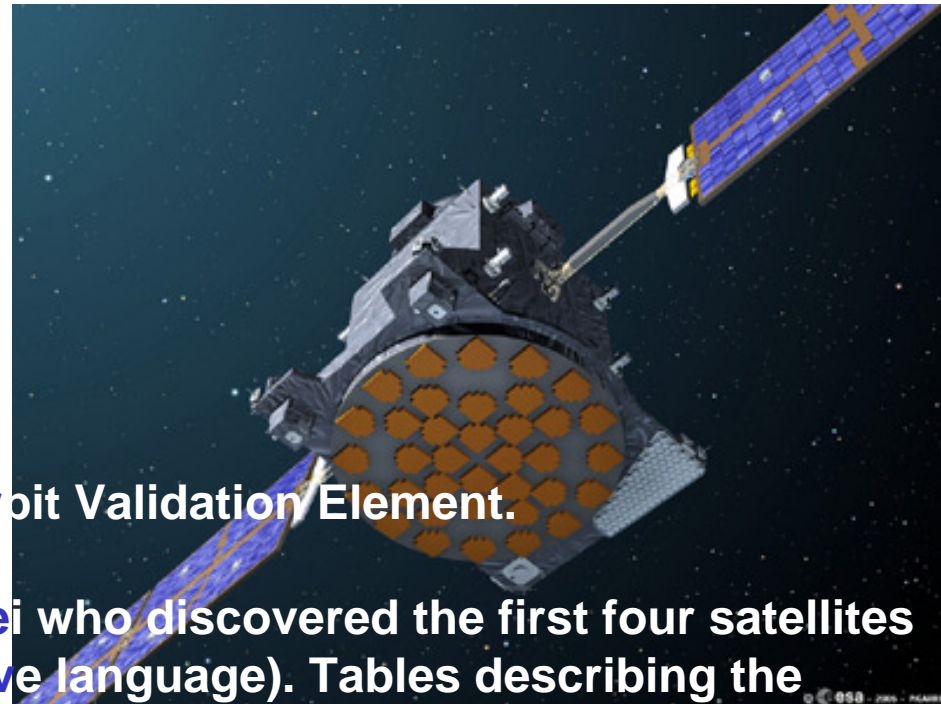
*The GIOVE-A satellite under test at the ESA
Technical Facilities in the Netherlands*

- **Definition Phase started in 2000 and was completed in 2003.**
- **Currently the Development and Validation phase.**
- **Critical technology developments completed (i.e. atomic clocks).**
- **First Experimental satellite GIOVE-A launched 28 December 2005.**
- **Second experimental satellite GIOVE-B completed, launch in 2008**



Galileo

GIOVE A



- GIOVE-A is the first Galileo In-Orbit Validation Element.
- Named in tribute to Galileo Galilei who discovered the first four satellites of Jupiter (*Giove* in Galilei's native language). Tables describing the motion of these four Jovian satellites were used to determine longitude at sea and on land.
- built by Surrey Satellite Technology Limited, Lift-off mass: 600 Kg, Power demand: 700 Watts, Stowed Dimensions: 1.3 m, 1.8 m x 1.6 m
- “bringing into use” of Galileo frequency filing assignments March 2006



Interoperability Galileo - GPS

- *Agreement signed on June 26th 2004 on the provision and promotion of Galileo and GPS services*
- **Full interoperability and compatibility Galileo and GPS**
- ***Common baseline signals + optimisation under study***
- **-> Optimisation work concluded in July 2007**
- **Result: “MBOC” new common modulation for Galileo and GPS III and thus global standard for civil global satellite navigation applications**



Interoperability/compatibility Other GNSS providers



- **GLONASS-Galileo contacts underway**
- **COMPASS –Galileo contacts to start**
- **QZSS-Galileo talks close to final results**
- **IRNSS-Galileo talks started**



Galileo

GIOVE B

- GIOVE-B is built by Galileo Industries.
- Back-Up of GIOVE-A.
- Launch planned for 2ndQ 2008.
- Incorporates additional key technologies such as the H-maser atomic clock (the most precise clock ever flown yet in space).





EGNOS

Update



- **EGNOS operations started in July 2005.**
- **Declaration of Open Service availability planned by end 2008.**
- **Coverage extensions taking place:**
 - **South Mediterranean and North Africa: 4 additional stations.**
 - **Sub Saharan Africa: Potential investors have set up a Steering Committee for project definition.**
 - **Several demonstrations in Africa during 2005 using test-bed signals.**



Objectives

international co-operation

- **Seek interoperability with existing systems**
- **Reduce risks (technical, market, regulatory..)**
- **Raise awareness**
- **Promote access to GNSS/Galileo**
 - ➔ **Make Galileo inclusive from outset**



Activities

international co-operation

- **Bilateral agreements (PRC,ISR, MOR, UA, KOR)**
- **Research and technological development**
- **Training, information days, Galileo centres**
- **Industrial co-operation, EGNOS extensions**
- **Certification, standardisation**
- **Co-operation in international forums** → **IGC**



Galileo Cooperation Centres

- **Asia Region: Beijing, 2003**
- **Africa Region: Cairo, 2004**
- **Latin American Region: Sao Jose dos Campos, 2005**
- **Galileo Centers: cooperation with UN / ICG**
(e.g. training course in Galileo training center in Beijing Dec. 2006)



Galileo 2007

Reprofiling

1. *Public Private Partnership stopped June due to i.a.:*
 - *Unsatisfactory risk sharing*
 - *Drawn-out negotiations*
 - *Market uncertainties*
2. *Commission to seek alternative solutions on*
 - *Financing needs*
 - *Governance needs*
 - *Exploitation plan*
 - *Implementation calendar*
3. *Proposals in September, decisions in October and November 2007*



Financing

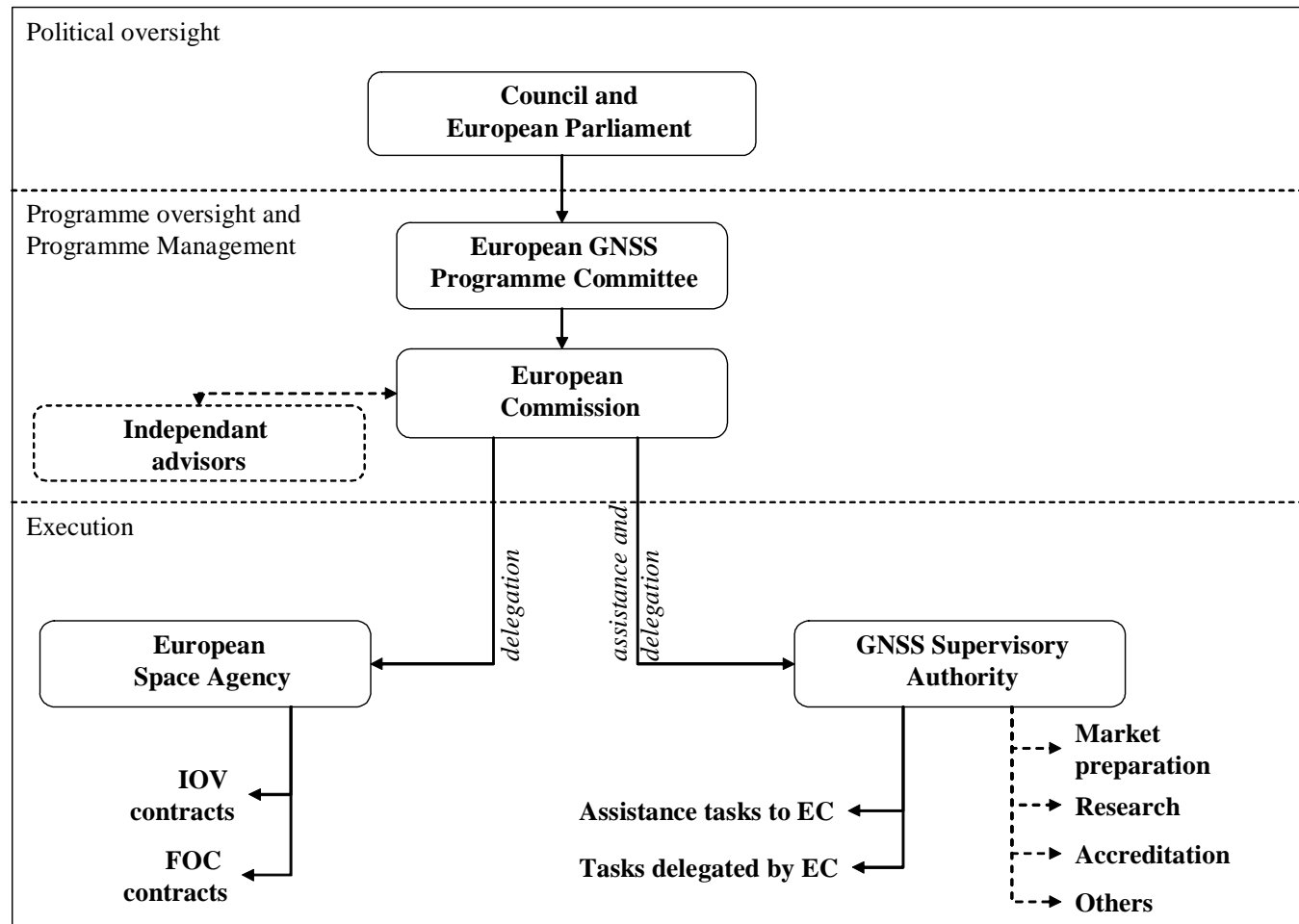
decisions

- ***Community funding required 3.4 B€***
 - ***1 B€ already allocated in the current financial framework 2007-2013 for in orbit validation***
 - ***2.4 B€ more reserved for deployment of Galileo and EGNOS through a revision of general EC budget for 2007-2013***



Governance

Decisions





Galileo

Operation

- *PPP*
- *Service contracts*
- *Publicly owned corporate entities*

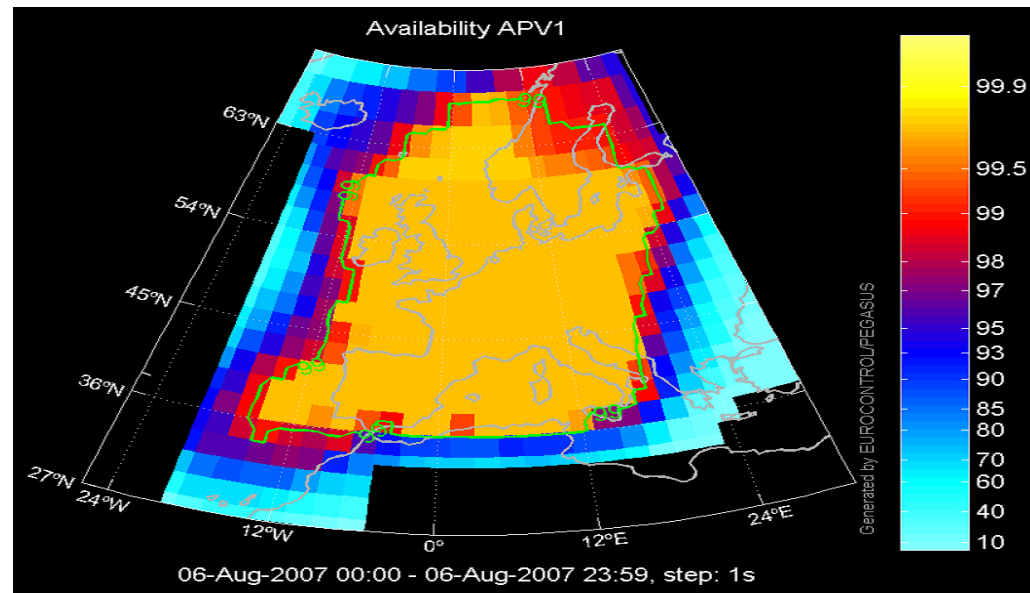
Fully operational: 2013

***Different options possible,
decisions on precise structure
at appropriate time in the future***



EGNOS implementation

Need to implement Egnos without delay





Galileo

2008 priorities

- Creation of legal base to codify political conclusions of 2007
- Set up new governance structure
- Launch procurement
- Continue development activities (IOV, launch of Giove-B)
- Promote GNSS Applications and European Radionavigation Plan
- Develop international cooperation (bilateral, IGC/Providers Forum)



Future perspectives

- GNSS equipment costs down, capacity up
- Broader access to GNSS
- Higher compatibility, interoperability and communication needs as systems proliferate
- Potential international law issues (liability etc)
- Increased importance of IGC Providers Forum