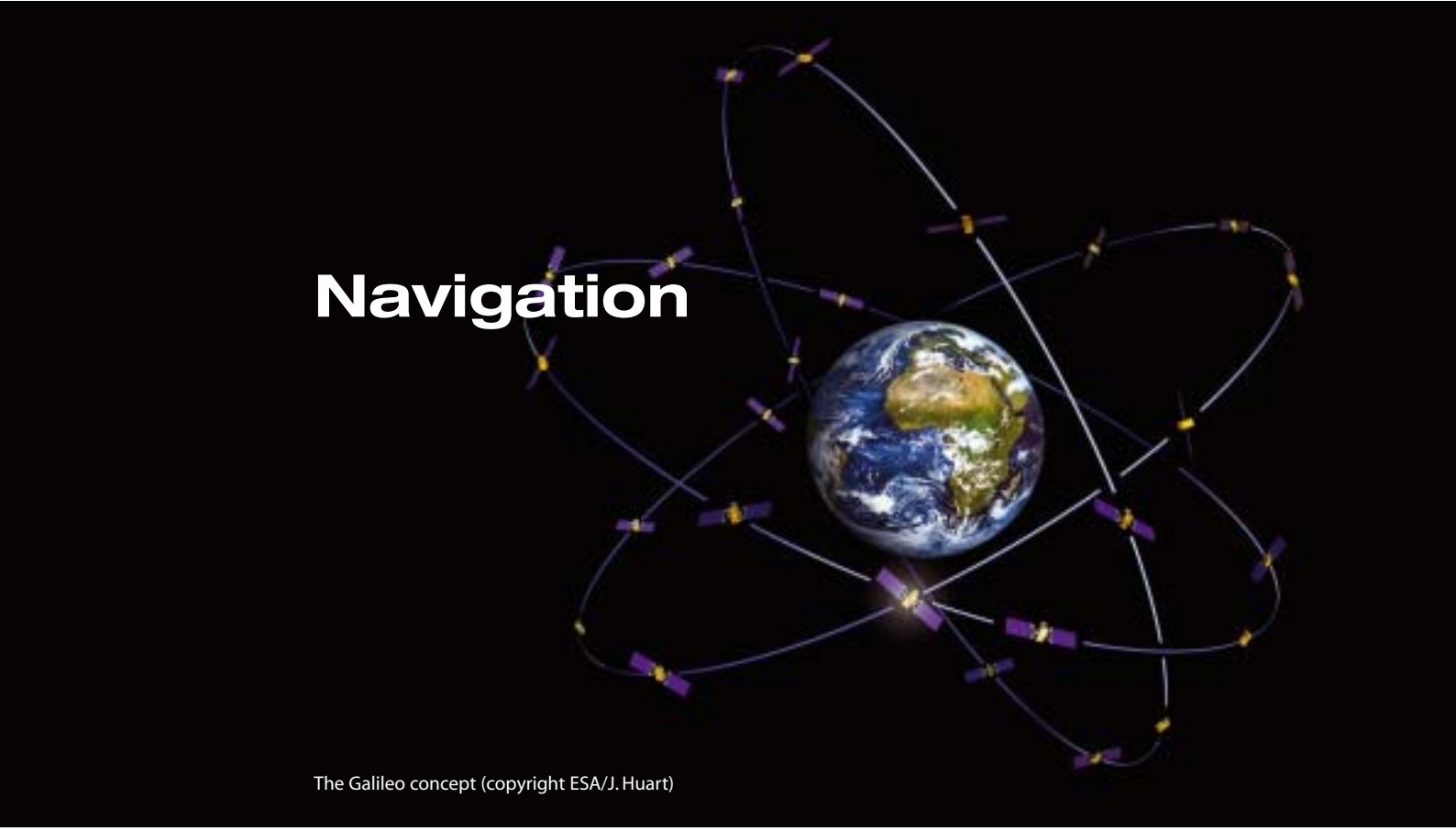
Navigation



The Galileo concept (copyright ESA/J. Huart)

Galileo

System Test Bed Version-1

Following twelve months of successful ground-segment development operations for the Galileo programme, the Galileo System Test Bed Version-1 (GSTB-V1) routine operations were concluded on 22 December. The GSTB-V1 project supported investigation of the critical performances behind the services to be delivered to users by the final Galileo system. The results of the experiments conducted will be fed into the development-phase activities necessary for in-orbit validation of the system.

GSTB-V1 consisted of a worldwide network of sensor stations collecting high-quality GPS observables at 1 Hz, an Experimental Precision Timing Station, located at the Istituto Elettronico Nazionale (IEN) Time Laboratory, providing the reference time scale steered to universal time and international atomic time (UTC/TAI), and a Processing Centre located at the ESA/ESTEC in The Netherlands, which was used for the generation of navigation and integrity core products based on Galileo-like algorithms.

The experimentation results have made it possible to assess, in a realistic environment, the feasibility of some of the most important assumptions and performance objectives for the final Galileo system, including:

- experimental Galileo system time and steering to UTC/TAI
- orbit determination and time synch-ronisation, and signal-in-space accuracy
- integrity computation.

The GSTB-V1 has also mitigated the risks inherent in the development of the operational processing facilities for the Galileo ground segment, bringing added value in terms of confidence, design consolidation and accelerated schedule, by ensuring:

- actual measurements and comparison of alternative algorithms in a realistic environment
- an appropriate Galileo timing-infrastructure setup
- calibration over an extended period of time
- early verification and tuning of simulators, and the build-up of adequate analysis tools
- consolidation of the operational concept.

The next step will be a second Test Bed, GSTB-V2, geared to the launch of the first experimental satellite by end-2005, which will allow experimentation on the signal-in-space and the navigation payload, including onboard-clock characterisation.

In-Orbit Validation Contract

Following the signing of the first contract in July 2003 for two test satellites, known as GSTB-V2, the Galileo programme took a further step

forward on 21 December 2004 with the signature of a second contract concerning the In-Orbit Validation (IOV) phase. ESA and Galileo Industries signed a 150 MEuro contract, as a first step towards signing an approximately 950 MEuro contract covering the overall IOV phase.

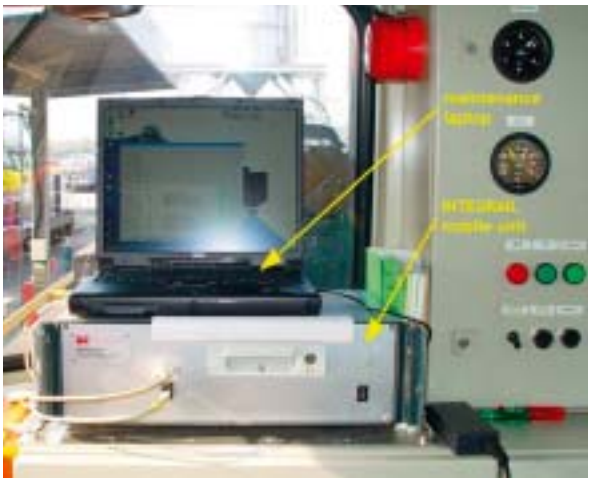
The contract provides the basis and the technical activities necessary for in-orbit validation of the Galileo system. It gives preliminary authorisation to proceed with the whole of this work, over a six-month period. It concerns the management of the programme and the choice of engineering systems and technical support required to maintain the overall credibility of the scheduling and to ensure system coherence.

IOV involves the delivery of the first four satellites in the Galileo constellation of 30, along with a number of ground stations. Subsequently, the programme will enter its deployment phase, which will cover the entire ground infrastructure network and the launch of the remaining 26 satellites, which will complete the constellation.

EGNOS

Several demonstrations were carried out in 2004, based on the European Geostationary Navigation Overlay Service (EGNOS), Europe's first step into satellite navigation, a service that provides superior positioning information by correcting the signals delivered by the American Global Positioning System (GPS) and the Russian GLONASS system. By offering better accuracy with integrity information and greater continuity of service, EGNOS can enhance the safety, reliability and efficiency of transport operations everywhere, from inland waterways to urban environments or railway networks.

Demonstration projects on the River Danube in Austria, and on the Yangtze River in China, showed the practical value of adapting satellite-navigation technology to the needs of inland-waterway transportation, improving safety and offering value-added services. Another demonstration project, still on the water but this time off the Greek coast near Athens, showed how EGNOS can enhance the management of a fleet of sailing boats, including a more efficient response to calls for assistance. Further demonstrations in the Athens Olympic environment proved how useful EGNOS can be in the management of a security company by offering appropriate tools to the patrol cars and guards on duty.



A prototype EGNOS-based train-locating unit, which forms part of a system known as INTEGRAIL, installed in a locomotive for test purposes (Courtesy of Bombardier GmbH)

Although first designed for aeronautical applications, EGNOS can also be used for railways, as was shown by trials in Belgium with train positioning via satellite, providing both safe and cost-effective solutions.

Lance Armstrong crossing the finishing line of the Alpe d'Huez stage of the 2004 Tour de France, tracked from the local EGNOS Control Centre (left)

Another remarkable EGNOS demonstration in 2004 was the real-time tracking of cyclists during the Tour de France. It was possible to pinpoint certain riders, calculate their positions and speeds, and measure the gaps between them. This represents a potential revolution not only for cycling events, but also for other large sporting events where one wants to follow the competitors' progress.

These EGNOS demonstration projects in 2004 clearly proved that, whatever the application, be it on land, on water or in the air, satellite navigation can surely make a difference!