

# Paving the way to Galileo : Telespazio's R&D approach on applications

Athens LIAISON WORKSHOP

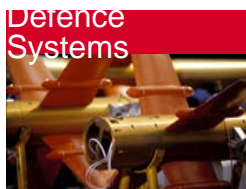
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- ▶ Telespazio R&D Themes
- ▶ Telespazio Service Center for provisioning of infomobility services
- ▶ EGNOS based solution for infomobility services
- ▶ Telespazio R&D activities and projects
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# Introduction to Telespazio

- ▶ **Telespazio** is the Finmeccanica Group company leader in **satellite based applications and services**: *Communication, Satellite Navigation & Infomobility, Television, Satellite Monitoring & Control, Earth Observation*

- ▶ **The Finmeccanica Group\*** : the most important hi-tech Italian group, focused in Aerospace and Defence

• <b>Revenues:</b>	<b>11.5</b> B Euro	(2005 data)
• <b>Backlog:</b>	<b>32.1</b> B Euro	
• <b>New Orders:</b>	<b>15.4</b> B Euro	
• <b>R&amp;D:</b>	1.75 B Euro	(15.2% of production value)
• <b>People:</b>	56,600 employees	all over the world



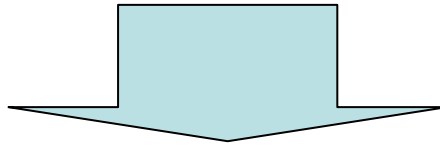
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- ▶ All the activities in the satellite navigation and infomobility field are summarized in different R&D themes that are exploited in the framework of different projects.
  
- ▶ R&D themes:
  - Mobility Management & logistics
  - Positioning Support for other services (e.g.: Fleet and Freight management, Infomobility)
  - Advanced Navigation Systems and Solutions for Positioning
  - GMES/Security

# Mobility Management & logistics and Positioning

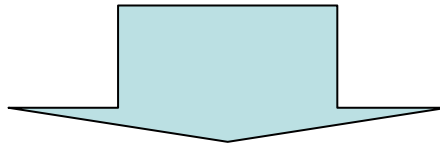
## Support for other services

- ▶ The first two R&D themes are developed together and include:
  - Service Centre Platform
  - Infomobility Services
  - Logistics and Multimodality Management
- ▶ This themes are mainly focused on:
  - Convergence among telematics, navigation services and mobile communications;
  - Development of satellite navigation integrated services, e.g. fleet management, transport of dangerous goods, emergency services, intermodality



- ▶ These themes are the input for the development of a platform that can efficiently support the infomobility sector evolution trend and customized to the specific needs of the various customers professional and institutional (B2B).

- ▶ This theme includes the ability to design and implement:
  - geodetic reference networks
  - complex algorithms both as system level (orbitography and integrity) and at user terminal level
  - the ability of predicting navigation performances with the evaluation of navigation system parameters in the "actual" environment



- ▶ Output of these expertise are
  - The experimental provision of compensation data to correct raw navigation measurements:
  - D-GPS like "local" compensation,
  - WAD EGNOS SBAS message data
  - "Assisted GPS" positioning (EGNOS-TRAN project, ESA, SWATHE, MIUR).

- ▶ The implementation of a complex software simulators of satellite navigation systems, reproducing aspects of ground, space, user and service segments)
- ▶ Telespazio developed the first Italian simulator of Galileo system (STENAV project, ENAV), implementing within the same “product” several algorithms both at system and user level.
- ▶ The simulator operates in “real time”, being able to supply the navigation message and navigation observables at a rate up to some Hz, simultaneously computed for several “End Terminals” in the simulative scenario.



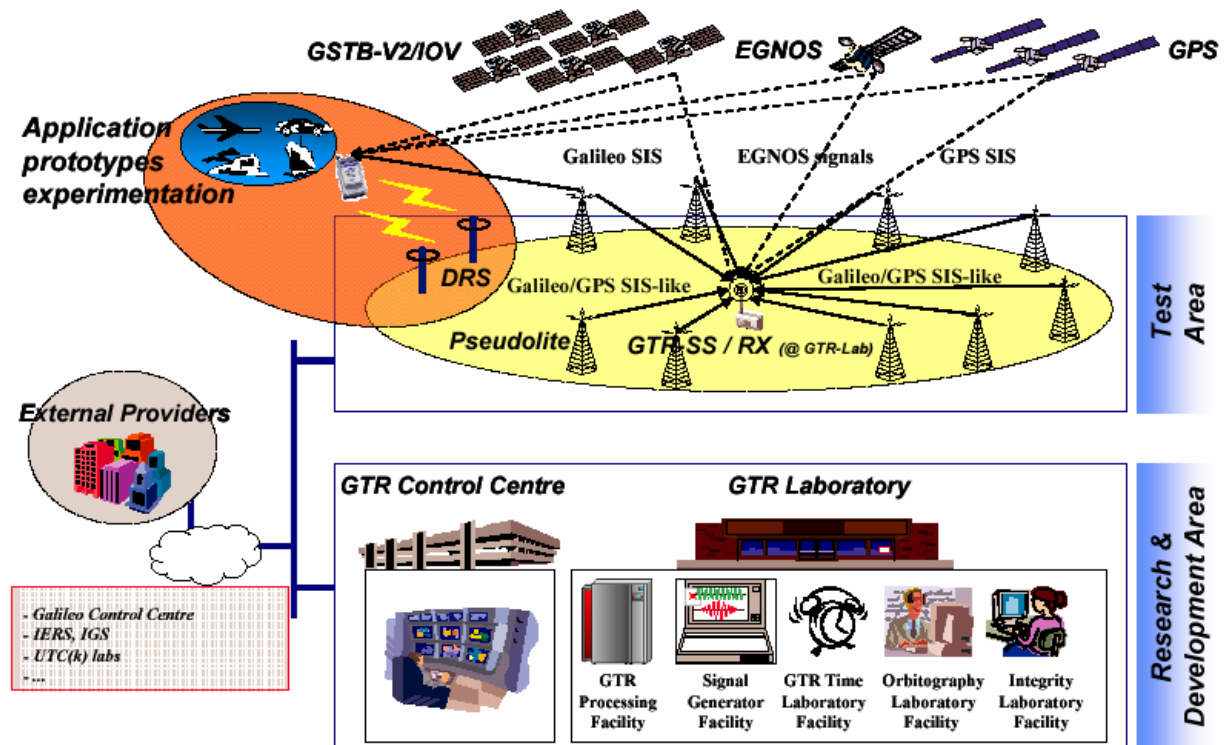
- ▶ Telespazio R&D manages an infrastructure that is capable of uplinking the ESTB or a self generated SBAS message to Inmarsat (MTB, Mediterranean Test Bed).
- ▶ These activities are based also on the ability of organizing and support to the execution of in field "demo" trials (mainly aeronautical), to appreciate SBAS benefits (MIDAN project, ESA/ENAV; METIS project, GJU).
- ▶ In some cases, the extension of SBAS coverage area was required and implemented by Telespazio, installing and interconnecting with ESTB Central Processing Facility some "portable" RIMS (Ranging/Integrity Monitoring Stations)



# Advanced Navigation Systems and Solutions for Positioning

- ▶ The focus of R&D is also on the design and testing of innovative facilities for navigation, using ground generated signals through the so called "pseudolite" equipment (Galileo Test Range (GTR) project, regione Lazio)
- ▶ GTR project implies the development of a complete, "end to-end" infrastructure that, among several other testing functionalities, allows positioning with pseudolites,

computing and providing to the user the information needed in order to achieve a precise navigation solution with the inter-operated "real" and "ground" constellations of payloads.

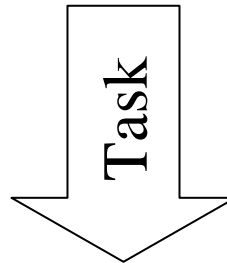


- ▶ “The objective of GMES (Global Monitoring for Environment and Security) is to provide on a sustained basis reliable and timely services related to environment and security issues in support to public policy makers’ needs”.
- ▶ The R&D activities in the GMES framework, should stimulate the industrial sector to expand the service offer and to develop the innovative observing, communications and information technologies that will be required.

- ▶ The R&D activities includes also the following cross topics:
  - Data validation and fusion from multiple sources.
  - Data assimilation and data integrity.
  - Data delivery processes of observation systems (satellite, in-situ).
  - Interoperability and interconnection of the data processing and delivery systems.
  - Use of integrated Space technologies

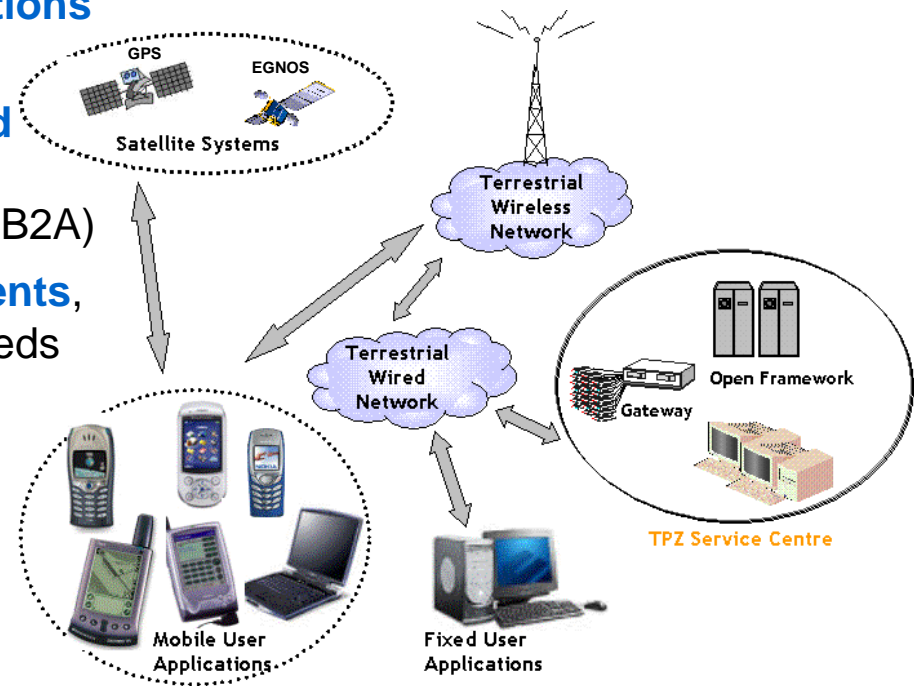
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- ▶ **Telespazio R&D** department is currently involved in different European research project such as ASK-IT, M-TRADE, ASTRO+, LIAISON and SWATHE that deal with **EGNOS** and how it is used to **provide navigation services and infomobility services for mobile user and transport sector**.

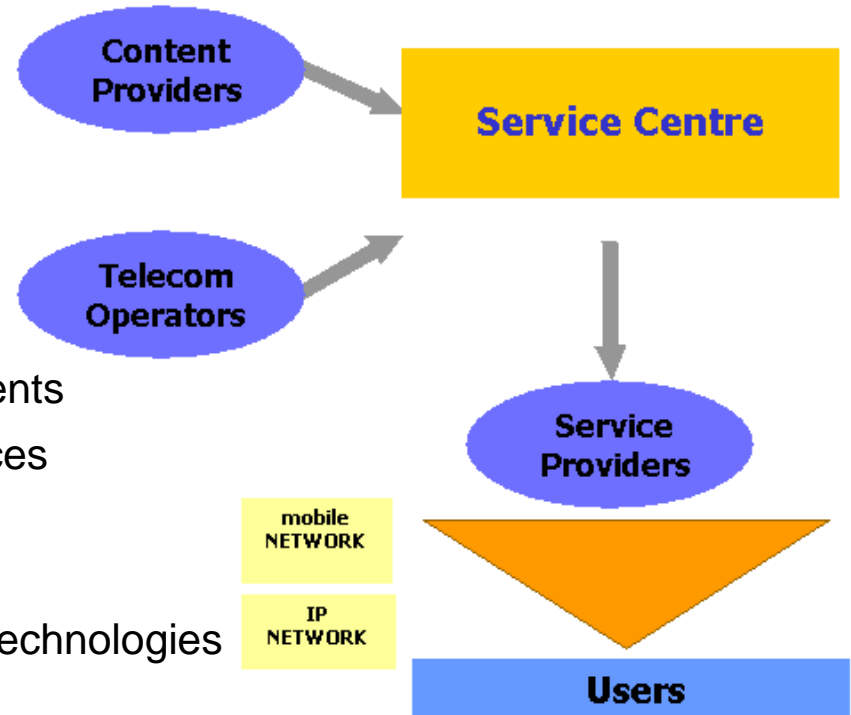


- ▶ Telespazio R&D department is working on the realization of a modular and interoperability IT platform – the **Telespazio Service Center** - which integrates and provides navigation and infomobility services for mobile user and transport sector making use of EGNOS accurate positioning and integrity information.

- ▶ Telespazio Service Center technological platform, developed in the frame of European (ESA, EC) and National (such as ASI, MIUR):
  - **Point of access** for users and services
  - Oriented to **transport applications** for mobile users
  - Provisioning of **location-based services for institutional and professional users** (B2B and B2A)
  - Delivery of **value-added contents**, customised to specific user needs (such as traffic, meteo information, etc.)

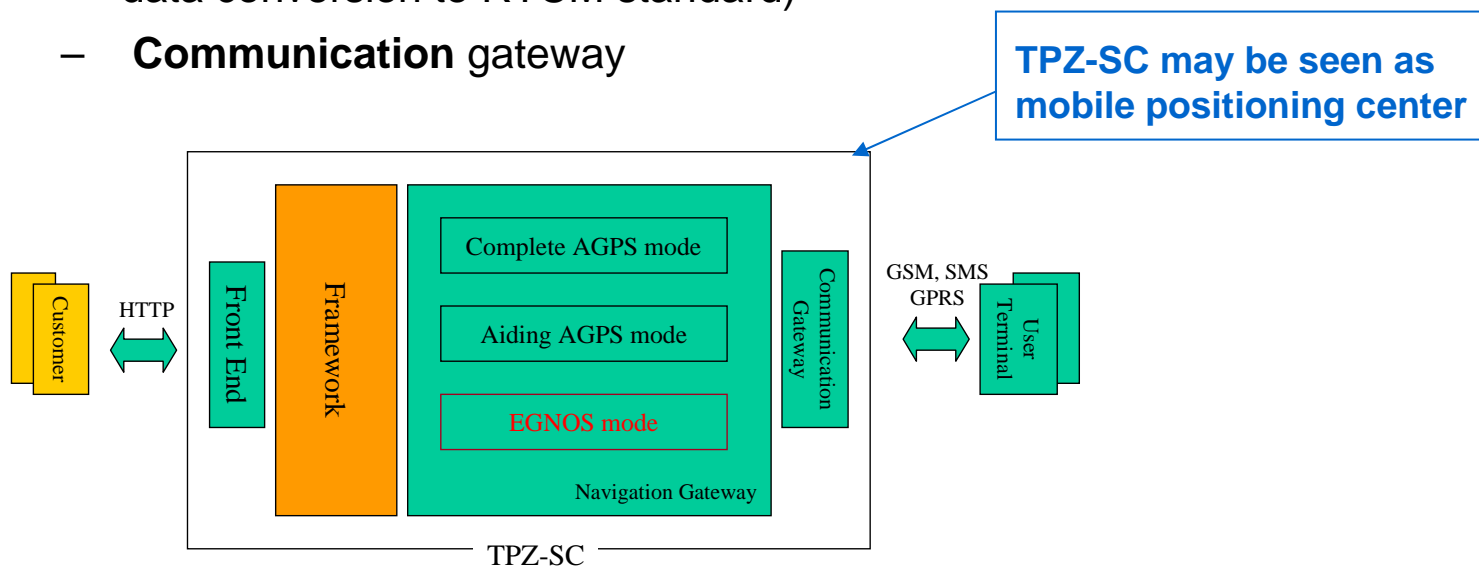


- ▶ Technological standard-based **middleware open platform** for
  - **Data sharing** and access
  - Service integration
  - Content **integration** for VAS
  - **Collaborative** framework
  - **Modularity** and flexibility
- ▶ Exploitable towards:
  - **Distributed** infrastructure elements
- ▶ GNSS-based applications and services (EGNOS towards GALILEO)
  - **New contents** and services
  - **Different** user access/terminal technologies
- ▶ User access to services, through:
  - End-user application
  - Web Interface.



# EGNOS based solution for infomobility services

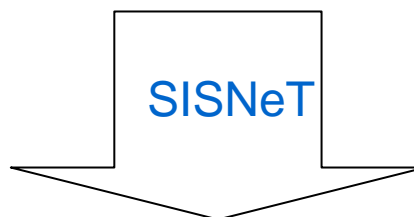
- ▶ All the applications are based on a common IT infrastructure that is composed by different modules linked together using a distributed middleware (CORBA):
  - **Front-End**
  - **Framework** → it is the kernel of the system including the rules to manage and access the applications
  - **Navigation Gateway** → it is used to support A-GPS techniques and EGNOS data conversion to RTCM standard)
  - **Communication gateway**



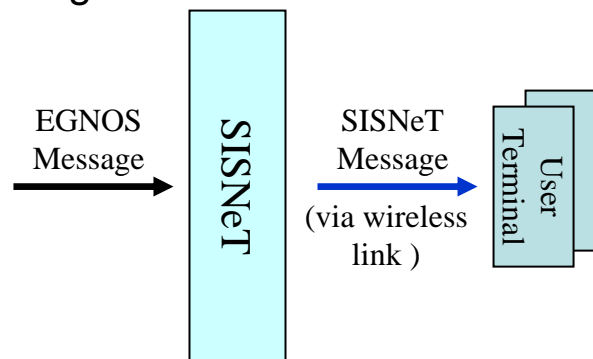
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## EGNOS based solution for infomobility services

- ▶ **EGNOS** provides its augmentation navigation signals through **Geostationary satellites** enabling receivers on the ground to correct errors in GPS signals.
- ▶ Transmission through GEO means is quite adequate for some user communities (e.g. maritime and civil aviation). Yet, EGNOS signals are less available for land-mobile users in urban areas, because buildings or other objects may easily block the GEO signals.



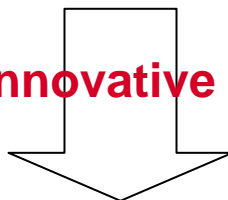
- ▶ **SISNeT (Signal-In-Space through the internet)** relays the EGNOS signal in real time over the internet using wireless networks



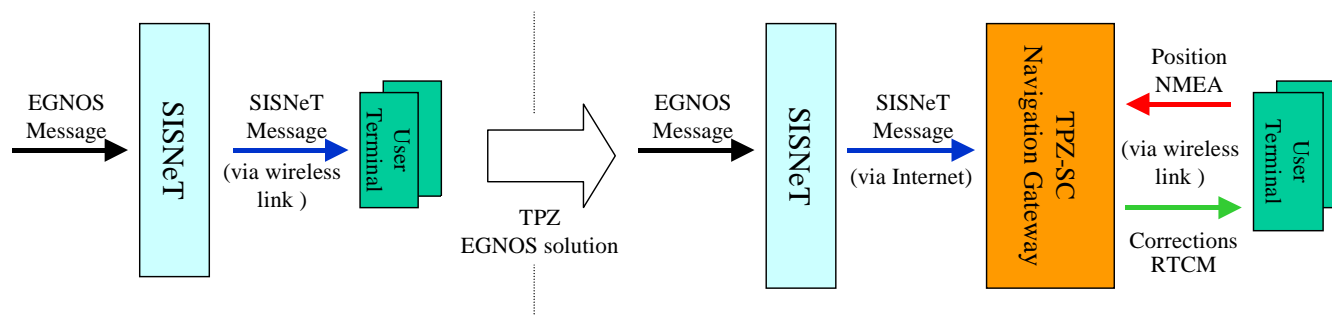
## EGNOS based solution for infomobility services

- ▶ The land-mobile user terminal converts the received EGNOS message into RTCM format and, transmit it to its GPS device that determines the position. The drawback of this approach is that the aforementioned conversion **increases the complexity and cost of land-mobile user terminal.**

### TPZ innovative solution



- ▶ to move the conversion of the EGNOS message into RTCM format from the land-mobile user terminal to the TPZ Service Center



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[www.ask-it.org](http://www.ask-it.org)

**Ambient Intelligent System of Agent for Knowledge-based and IntegraTted Services for Mobility Impaired users**

Study and development of integrated services (i.e. localisation, accessible intermodal route guidance, domotic, e-commerce, in-vehicle services...) which allow Mobility Impaired users, to move and travel independently, lead a quality life, achieve economical and social integration:

- Innovative location for outdoor environment based on EGNOS and A-GPS
- Innovative location techniques for indoor environment based on WIFI, RFID
- Interoperability of localisation services



**System for Wide Area Travellers and Haulers to provide infomobility sErVICES**

Study and development of infomobility services:

- Improved IT platform
- Intermodality (maritime-road-rail)
- Logistics
- Innovative location techniques for Assisted Navigation (e.g. assisted GPS and more in general network assisted systems, differential correction networks)



<http://swathe.newapplication.it/>



[www.astro-pars.com](http://www.astro-pars.com)

Advanced Space  
Technologies to  
Support Security  
Operations

Security Research

ASTRO+ aim is to show to EU stakeholders the potential of using Space to support Security operations, objectives being to :

- Improved IT platform
- Integration of the different space technologies Earth Observation, Telecommunication and Navigation;
- Innovative localization techniques based on A-GPS and EGNOS



GNSS  
Introduction  
ROADS sector

Study and development of infomobility services:

- Improved IT platform
- Intermodality (maritime-road-rail)
- Logistics
- EGNOS based localisation technology



**M**ultimodal  
**TR**ansportation  
supported  
by **EGNOS**

**L**and/Sea  
**I**ntegrated  
**M**onitoring for  
**E**uropean  
**S**ecurity

It is addressing the introduction and deployment of EGNOS / Galileo technology and applications in the freight multimodality transport User Community.

M-TRADE designs and develops an end-to end “solution”, for providing copying services with user needs and operative requirements

- In-Node
  - Terminal yard management
- On-Route:
  - Remote asset and resource localisation
  - Freight tracking & tracing (including perishable and dangerous materials).

LIMES focus on the use of Earth Observation technology, the integration of the latter with satellite TLC and Satellite navigation capacity.

- 1) Definition, development and validation of pre-operational versions of :
  - Services to support Security management in EU
  - Enabling Decision Support Tools and Platforms for the provision of the services
- 2) Set up of a framework through which MSs and EU Bodies can improve:
  - access, archiving, exchange, integration and processing of data and products following secure access policies and rules
  - organisational common operational procedural modes

Telespazio is involved in the implementation of several tasks within the Maritime Service Cluster , the Common Information products/tool and Security Policy and Scenarios.

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- ▶ The development of the research themes has the primary aim to provide prototypes of new applications and services that may become part of the Telespazio offer.
- ▶ The participation to R&D projects is also an important occasion for:
  - refining service requirements
  - directing more precisely the research themes
  - pursuing the standardization process
- ▶ The aim is providing final users with multi-application, reliable and low cost services.
- ▶ Moreover Telespazio willing is to continue in the development of new solutions, also participating to the VII Frame Program, also as an occasion to give rise to new research and development areas

[www.telespazio.com](http://www.telespazio.com)

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