From the Telematics Applications Programme (TAP)
To the Information Society Technologies Programme (IST):
Results and Outlook
The world economy is in transition. It is moving from the industrial age to a new set of rules, that of the ‘Information Society’. These changes are underpinned by technological progress and economic globalisation. The combination of global competition and digital technologies is having a sweeping effect on all segments of the economy - traditional and high-tech alike. Economic growth leads to higher demands for transport of goods and people; at the same time this threatens the environment and general quality of life. New systems available to people on the move are needed to improve travel and traffic information and drastically reinforce safety.

Erkki LIIKANEN
Member of the European Commission

Contents

Mobile Information Society 02
Satellite Navigation Systems for the Citizen 03
The Fourth Framework Programme:
TAP actions to support GNSS 04
The Fifth Framework Programme:
IST actions to support GNSS 06
Future Activities 08
Creating the User-Friendly Information Society is a key policy aim for the European Union. Industrial competitiveness, employment, quality of life and sustainable growth all depend on Europe being at the cutting edge in exploiting Information Society Technologies (IST).

The IST Programme of the EU builds on a decade of Research and Technological Development (RTD) work and on European policy in liberalising the telecommunications equipment, services and infrastructure markets. It is highly relevant to transport, travel and tourism, because it develops intelligent infrastructure and vehicle systems for efficient mobility management, for increased safety and for the delivery of information based value-added services.

The vision guiding the Transport and Tourism actions of the IST Programme is one of 'Building the Mobile Society within the Information Society'. Its strategic objective is to realise the full benefits for Europe both by accelerating emergence of the Information Society and by ensuring that it meets the needs of individuals and businesses. To prepare for this Mobile Information Society, the Commission has taken very active initiatives.

First, the Commission and the Member States have adopted the e-Europe Action Plan to accelerate the 'new economy' in Europe. This Action Plan covers a number of domains and includes some priority actions on Intelligent Transport Systems. Second, the Commission has proposed directives on a common regulatory framework for electronic communication networks and services. These directives include some key aspects of universal services and user rights, authorisation, access, personal data and privacy protection to reinforce the competition in the European markets.

The Transport actions of the IST Programme are based on the results of previous RTD on Telematics for Transport - also known as Intelligent Transport Systems or ITS, in which the EU has played a leading role since 1988. Under the EU’s Fourth Framework Programme for RTD&D (1994-1998), the Telematics Applications Programme (TAP), administered by Directorate-General Information Society of the European Commission, has realised leading-edge systems and applications, promoting competitiveness in the European industry and improving the quality and efficiency of essential public services such as transport.

Information Society Technologies are contributing to safer, cleaner and more efficient transport:

- providing travellers and operators with convenient access to real time information
- helping passengers, drivers, freight distributors and transport operators to avoid delays, congestion and unnecessary trips
- diverting traffic from overcrowded roads to alternative routes
- transferring road freight transport to other modes when possible including rail, coast-line and inland waterways
- encouraging integrated multimodal passenger transport
- reducing accidents, fatalities and injuries
- increasing productivity
- gaining extra capacity from existing infrastructures
- reducing energy use and
- reducing environmental pollution.

Intelligent Transport Systems are already in operation on land, water and air routes, and at passenger and freight terminals and depots. They have laid solid foundations for new advances under the EU’s Fifth Framework Programme for RTD&D, which began in 1999 with a number of projects under the IST Programme.
Due to the advent of a broad new range of applications and services enabled by satellite navigation technology (primarily GPS from the United States of America and, to a lesser extent, GLONASS from the Russian Federation), and building on experience gained within EGNOS for the development of an augmentation system for GPS and GLONASS, Europe has recognised the importance of having a global navigation satellite system conceived as a civil system, and has launched the definition phase of GALILEO.

GALILEO plays a crucial role in the creation of an integrated European system, securing adequate performance and economic value in various areas, including transport, timing, energy and telecommunications. It will be used in all modes of transportation for navigation, traffic- and fleet-management, tracking, surveillance, emergency and infomobility applications. The enhanced performance of GALILEO compared with current systems, in terms of its superior technical and operational parameters, is a major asset. It will provide Europe with sovereignty in safety-critical applications and telematic infrastructure.

The European Union’s Galileo project, undertaken together with the European Space Agency (ESA), aims to launch a constellation of at least 21 satellites, which will be placed in a medium earth orbit at around 20,000 km and monitored by a network of ground control stations in order to provide world coverage. Galileo will allow the development of value-added services, based on the provision of position, time and velocity information to user terminals from a satellite-based infrastructure. The Galileo system will enable each individual to know his or her position to within a few meters with a guarantee of continuity of signal transmission not offered by GPS.
The Fourth Framework Programme:
TAP actions to support GNSS

From 1994 to 1998, the European Commission has undertaken in the framework of the Telematics Applications Programme (TAP), a number of project studies relevant to Galileo. These projects addressed many issues: GNSS2 architecture options, receiver terminals, applications and value added services. The TAP projects have made a significant contribution to the European GNSS Programme, both in terms of the development, validation and testing of equipment and applications and research leading to European Policy definition.

The research activities were mainly focused on the four following themes:

• **General aspects of satellite navigation:** In a first stage, a clear need emerged for clarification of what satellite navigation represents and what can be achieved with it, the importance it might have with the related geopolitical strategy considerations. The potential role that Europe could play in this field was investigated. The "GNSS", "GNSS SAGE" and "SATEMA" studies covered this purpose.

• **Standards:** since the GPS/GLONASS augmentation activities occur at international level (WAAS* in U.S., MSAS** in Japan) standards are extremely important, justifying European industry input to defining these standards with these international organisations. The "ELSA" project contributed through the definition of standards for Local Area Differential systems. This project has been instrumental in giving a voice to European bodies in international standard definition institutions.

• **Architecture of the system:** Two architecture studies were initiated which can be seen as precursors of the actual Galileo architecture studies. The INES project investigated the possibility of setting up a Low Earth Orbit (LEO) constellation. INES demonstrated the feasibility of a LEO approach at "low cost", but clearly indicated the limitations in terms of positioning requirements. The EURONAV project explored the possibility of designing a satellite navigation system based on Inclined Geostationary Satellites (IGSO). This led to the development of regional systems with rather good performances, but which did not correspond to the "strategic" approach that was later defined at political level.

• **End-user applications:** several studies covered this essential element for the development of the European GNSS. The feasibility of EGNOS receivers was considered by the MAGNET project, which has resulted in the availability of receivers from European manufacturers on the European market. As soon as the EGNOS signal becomes fully operational, users will be able to buy equipment on the market. Other studies checked various applications like the "marking" of containers by satellite navigation receivers. The freight industry (air, rail, road, maritime) is faced with logistic problems linked with the knowledge of the position of the various goods and containers under their control. To improve efficiently and control movements of these goods,
dedicated tools are needed to trace them. An obvious solution is offered by "satellite navigation". The MULTITRACK project addressed this important application, and demonstrated its feasibility.

In terms of fleet management, communication channels coupled with navigation tools are crucial: a pilot project called SANSICOM was therefore developed: the simple concept is to couple GPS positioning information with satellite communications (INMARSAT, GLOBALSTAR, etc.) for trucking companies working in eastern European countries. This very promising project will provide by the end of year 2000 a fully tested prototype which could later be extended into a commercial product.

Finally, the rail sector also needs location tools for trains, containers, travellers, etc. The idea of the APOLO project is to define clearly the needs of this user community and to develop pilot applications based on the hybridisation of satellite navigation receivers with other sensors (odometers, accelerometers, etc.). A prototype will have been developed and tested by the end of year 2000.

The major result of these studies has been the enormous level of interest in satellite navigation in Europe. This interest did not originate only from space system manufacturers for which the development of a satellite constellation represents a very lucrative market, but also from service providers, equipment manufacturers and end-users. The projects also demonstrated that Europe has all the necessary capabilities required to develop such a complex infrastructure.

During the last three months of 1998, the "GNSS-2 Forum", organised by the European Commission, stimulated a Europe-wide brainstorming on satellite navigation in which all potential actors were encouraged to express their interests, their concerns and their ideas or opinions. The outcome is presented in the "Galileo Commission Communication" of February 1999. This Communication has been endorsed by political instances (i.e. ESA, EU Transport Council). It resulted in a Galileo Definition Phase, which is being executed by the European Commission and the European Space Agency.
The Fifth Framework Programme: IST activities to support GNSS

Information Society Technologies Programme (IST), within the Fifth Framework Programme (FP5) offers the opportunity to further contribute to the strategic European Galileo project, at the end-users applications and services level. Market studies indicate that after automobile-based applications, that “the citizen”, walking in the streets, for business or pleasure, throughout Europe, may prove to be the largest market for location based services and navigation. There is a clear push today from mobile phone manufacturers to provide positioning services too. As such, the support for development of application projects that are building on European strengths and are exploiting the GNSS advantages is an essential element for the Galileo Programme.

Four projects have already been initiated in the frame of the IST Programme and further calls should offer continuity in the research and development of location based services and navigation. The four projects started during year 2000, are described briefly below:

• **GUST**: the project will provide support in the field of satellite navigation terminals. In particular it is focussing on the standardisation process with a particular emphasis on receivers related to safety critical applications, and the certification of GALILEO receivers. Another aspect of the project will be to support the EC with expertise during its discussions with USA and Russia related to signal and receiver design.

• **HELINET**: the project objective is to create an integrated infrastructure based on HALE (High Altitude Long Endurance) unmanned solar platforms, allowing the development of several interoperable applications: localisation, environmental data processing and transmission and broadband services. HeliNet will ensure Europe plays a full role in the economic exploitation of the stratospheric segment and in the development of standards for the related applications.
• **GLORIA**: aims at improving the market penetration of GNSS by combining it with the existing terrestrial Loran-C position determination system. This combination will improve the reliability and availability of the position determination and open the door to new applications and to major improvements in application designs for rail and road transport. The project will develop and optimise combined GNSS/Loran-C receiver systems and test them in a series of road and rail applications and simulations. GLORIA investigates solutions for the mobile European citizen and unveils a valid migration path for the future GALILEO and a prerequisite for competitive future European value added services for mobility.

• **GAUSS**: aims at designing and demonstrating a realistic and attractive integration concept between navigation and communications (in which the communications component is fitted within the general S-UMTS framework), with specific reference to the planned Galileo program. GAUSS also aims at developing innovative applications in the field of infomobility and intermodality, and experimenting with them in a real scenario by means of a technologically-advanced demonstrator representative of the target system. GAUSS will also provide contributions for standardisation and regulatory aspects. In the frame of the IST a further Call on Ubiquitous and Intelligent Info-mobility and Geo-Information Systems has been opened in October 2000 and will be closed in January 2001.
Future Activities

It must be stressed that Europe is poised to play a major role in the fast emerging markets for location-based and navigation services for travel, transport, tourism, work and leisure. This opportunity demands full attention. In parallel to the setting up of the infrastructure, Europe needs to develop a complete range of services and applications, and the industrial capabilities required to offer end-users a new dimension of products and services, to exploit the opportunities provided by the advent of Galileo.

The European Commission is in continuous contact with organisations, companies, and service providers active in this field: it is widely recognised that one primary key for the future success of the Galileo-enabled market is the need for early investment in positioning technologies, systems and services. Therefore, even while the Galileo infrastructure is being built, research and development in the domains of all downstream activities is essential if Europe is to keep a significant share of the emerging market.
Further information can be obtained from:
European Commission
DG Information Society
Rue de la Loi 200
B-1049 Brussels
Belgium

Fax: +32 2 2962391
Email: info@cec.eu.int

Internet Home page of the IST - Transport and Tourism Sector:
http://www.cordis.lu/ist/4k2/trans_tourism/home.html

Home page of the TAP - Transport Sector:
http://158.369.50.95:10080/telematics/transp/transport.html

© European Communities, 2000
Reproduction is authorised provided the source is acknowledged,
except where otherwise stated.