

EUROROADS – PAN-EUROPEAN ROAD DATA SOLUTION

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ABSTRACT

There is a clear need for a standardised, seamless, updated and quality assured digital road data infrastructure for Europe as a basis for further development within the areas of intelligent transport systems, mobility management, traffic management, road maintenance, traffic safety, environmental and society planning and many other areas. EuroRoadS is a project intended to lay the ground for the creation of such an infrastructure. EuroRoadS is a project under the eContent programme. It started on 1 March 2004 and will be finished within 30 months.

KEYWORDS: Spatial Data Infrastructure, Road network, ITS, European harmonisation, INSPIRE.

NEED FOR EUROPEAN ROAD DATA

INSPIRE (Infrastructure for Spatial Information in Europe) is a recent initiative launched by the European Commission and developed in collaboration with Member States and accession countries. It aims at making available relevant, harmonised and quality geographic information to support formulation, implementation, monitoring and evaluation of Community policies with a territorial dimension or impact.

INSPIRE is a legal initiative of the EU that will address technical standards and protocols, organisational and co-ordination issues, data policy issues including data access and the creation and maintenance of spatial information. INSPIRE is the first step of a broad multi-sectoral initiative, that will initially focus on spatial information needed for environmental policies and that will be open for needs of other policy areas, such as agriculture and transport. Transport policy is a crucial element of the integration of the European territory and there are several Council decisions, which have a clear spatial impact, e.g. a need for harmonised geographic information.

Related to the INSPIRE initiative EuroGeographics (the association of European National Mapping Agencies) has implemented a long-term strategy on creating large-scale interoperability on the European level between national databases. Important parts in this concept is to focus on user requirements, to use the tools provided from the international standardisation work to set up architectures, standards and specifications, to support national production and maintenance of the databases, and to support clearinghouse functions, if needed. This concept has been used when setting up a project proposal on harmonisation of European road data.

A well-functioning digital road infrastructure on a pan-European level is a fundamental basis for further development within the areas of intelligent transport systems, mobility management, traffic management, road maintenance, traffic safety, environmental and society planning and many other areas. Europe lacks a standardised, seamless, updated and quality assured digital road data infrastructure today. The EuroRoadS project (Pan-European Road Data Solution) is intended to lay the ground for the creation of such an infrastructure.

The main objectives for the project is to build a platform for a European road data solution through a specification framework consisting of a road data structure, description of data content, data exchange mechanisms and interoperability specifications. The framework will be built on identified user requirements and tested through a prototype. A service provider will show that the data set can be used in an application or product. Finally the project will give long-term recommendations for implementation and exploitation aiming to support a rapid establishment of a harmonised road data solution and stimulate a widespread use of road data.

In this way the EuroRoadS project contributes significantly by demonstrating how the important public sector road information can be harmonised and accessed on a pan-European level. This will open up information that to a great extent already exists in digital form and make a corner-stone for the production of both commercial and public value-added services. The result of the project will also contribute to the EC policy issues, such as the development of the single market, i.e. the free movement of goods, persons, services and capital. The project supports the fulfilment of EC policies within transportation, with focus on safer and cheaper transports and with less impact on the environment. It is also, not at least, of vital importance for commercial exploitation, such as the development of location-based services and of new IT based forms for traffic and tourism information.

THE SITUATION TODAY

A well-functioning digital road data infrastructure on a pan-European level is a fundamental basis for further development within the areas of, for example, intelligent transport systems, mobility management, traffic management, road maintenance, traffic safety, environmental issues and society planning. Europe lacks a standardised, seamless, updated and quality assured digital road data infrastructure today. Nowadays the situation can be characterised as follows:

- Road administrations capture and maintain road and traffic information, and have agreed on some information exchange standards, although there is still a lack of a common system to make all this wealth of information available
- National mapping agencies capture and maintain road geographic data (road descriptions, often addresses), but again despite the existence of data exchange standards, there is a lack for a content standard and no global (European) system is there to make all this data available in an interoperable way
- Private sector players, data brokers and service providers have to go around the different European countries agencies and authorities to find the data they need, and must also invest to integrate the information they obtain into their own information system. This effort is duplicated every time a “new player” wants to set up an information based service system that has to rely on road information.

The use of road data (road network and information connected to the road network) is widely spread today in a large number of society sectors, public as well as private. Earlier, road data was commonly used as a part of decision-making data in planning, building and maintenance of roads. Now the use is much wider. Road data is also used for services that aims to enhance the usage of roads considering security and accessibility, as well as to reduce the traffic's negative environmental effects. Future activities on steering traffic streams and optimising transport logistic on the European level as well as developing pan-European road-pricing systems require an integrated road data infrastructure.

As the amount of development of new applications rises, the demands for information increase. The demands are initially about coverage (which geographical areas have complete road data), correctness, data structure and quality. One of the largest problems in using road data is to be able to get access to up-to-date and quality-assured road data.

An increasing number of countries, and commercial actors producing road data, have realised that delivering and updating fundamental road data that are up-to-date and correct must be seen as the responsibility of society. In a situation like this the commercial actors will refine and packet the road data specifically for clients, focusing on applications and services, not on creating and maintaining road data.

The member states of the European Union have reached different stages of development when it comes to the establishment of homogenous national road information infrastructures that cover all roads and all kinds of road information in the whole country. In some countries (very few) there is an integrated approach involving the national road administrations, the national mapping agencies, the municipalities and other interested bodies. In some countries the development is following more separate tracks, while in most other countries there are no homogeneous solutions at all.

The handling of road data in most of the member countries and on a pan-European level is also characterised by a high level of fragmentation due to:

- lack off mutual rules regarding the way road data is specified, quality assured, and exchanged
- lack off mutual rules regarding conditions and pricing
- scarcity in co-operation between the countries
- scarcity in co-operation between different road administrative organisations (e.g. national road administrations, municipalities, etc) in each member country, and
- scarcity in co-operation between mapping organisations and national road administrations within each member country.

This will often lead to completely autonomous and organisationally dependent road databases based on their own definitions and architecture.

The flaws mentioned above have meant that commercial actors in the road information area, who develop and sell applications, have had problems in terms of accessing and making use of public road data when developing road databases for customers. The largest problem is to get access to up-to-date road data. Conversely, redundant efforts are wasted in maintaining parallel partial road information infrastructures.

As an effect of the above mentioned lack of fundamental public road information available in a coherent way from respective countries, the commercial actors have been forced to build large and money consuming organisations for both purchasing, collecting and updating their road databases. This has resulted in making road information very expensive when it reaches the consumer, while commercial actors have a hard time becoming profitable in their activity. Due to this, commercial producers of road data have shown a growing interest in widely extending and deepening their co-operation with the public sector in order to keep their existing road databases up-to-date.

An important prerequisite, in an extended co-operation between European countries, is that the fragmented handling of road information that exists today is attended to. It is completely unreasonable and unprofitable for the commercial actors to adjust to a large number of separate solutions, different in each country.

Even when it comes to standards regarding the road data area the picture is fragmented. There are specialised standards which are orientated towards special areas of applications, e.g. CENs pre-standard GDF 3.0 that focused on in-car navigation. The development of more generic standards for the whole geographical area is being undertaken by the ISO technical committee TC211. Continuing standardisation is being done in the road informatics sector by ISO/TC204, who are also working on a new version of GDF.

Up until today there is no standard that solves the requirement that a road administrator maintains the description of road data. However the organisation for the European road authorities – CEDR – has via their subgroup on "Road Databases" produced a specification for a road data exchange format (RADEF).

ERTICO also works with many important tasks within this field. Members in ERTICO come from both the public and private sector and are constituted of national road administrations, automobile manufacturers, electronics industries etc. A common denominator is their interest in road-informatic applications, which in turn are dependent on accessibility to up-to-date and quality-assured road data.

EuroGeographics is deeply engaged in the development of the European Spatial Data Infrastructure. One important aim is to achieve interoperability between the geographical databases being held by the National Mapping Agencies. This work goes hand in hand with the INSPIRE initiative from the European Commission, which now sets a clear focus on creating an efficient infrastructure for geographic information.

There is no doubt that there are many areas in which a homogenous, up-to-date and quality-assured European road database can be useful. From general community planning, rendering trade and industry more efficient, to the most basic tourist information. The database is a necessary strategic and basic element of a modern society, involving an exchange of information between components in the road transport system. Quality-assured basic data for roads are essential for many commercial services such as location based systems, in car navigation, traffic and tourism information, etc.

The user requirements of up-to-date and quality-assured road data covering the whole of Europe will increase in rate with the marketing and development of new IT-/GPS-/tele-

communication based tools. But the introduction and penetration of many of these products are completely dependent on the accessibility of economically viable, up-to-date, and quality-assured road data.

The need to guarantee to the end-user of the quality of road information being served is emphasised by the instantaneous nature of a network-based service. This can be achieved only if direct access to a maintained database is provided. When road information services are to be introduced to a much broader public than today, open access to primary road databases, continuously updated by governmental organisations, becomes a necessity.

It is very costly to maintain the data. A good and cost effective approach is to register data at the source level, which enables a high level of up-to-date-ness of the information provided. Government authorities and other organisations in society bear the responsibility for the road network and road transport system. Therefore there should also be someone who is responsible for the accessibility of up-to-date and quality-assured road-data for re-use by all of society.

No country in the world has come as long within the use of road data as Japan. Approximately 15% of all private cars in Japan are equipped with in-car navigation systems (in Europe this figure is < 0.1%). The Japanese road database has been built and is maintained by the state and third-parties, with a standardised structure and used by commercial, national and municipality actors. Several in-car navigation systems in Japan rely on much richer data than what is made available now in Europe.

The development of new usage of road information within European countries is relatively slow today, mostly because of a lack of up-to-date road data as well as the problems with the fragmentation that occurs within countries. Up-to-date and quality-assured road data together with other geographical information constitutes an important basis for most new IT, telecommunication and GPS based tools which the automobile and electronics industry develop, such as in-car navigation, vehicle tracking and location based systems. European co-operation considerations in the building up of fundamental, harmonised and up-to-date road-data is therefore of great importance to increase the usage of the European road data. This will also be valuable to the European automobile and electronics industries that develop products and services within this field.

PROJECT SUMMARY

In order to lay the ground for a pan-European road data solution a proposal for a project called EuroRoadS has been worked out. The overall purpose of the project is to set up a specification framework built on identified user requirements. It will also take into account existing standards and solutions within the area. The framework will consist of a:

- common and agreed structure that can be the road data “language” of Europe, a harmonised and unified view of how to describe a digital road network.
- definition of core European road data within the proposed structure. This will point out a basic level of data content proposed to be the road information infrastructure that in the future might be provided to the European market.
- a specification of a data exchange mechanisms and interoperability specification. The specification will be able to be adopted as the basis of an interface solution, supporting an

- easy access to European road data defined as above.

The European road information solution is intended to be built on and maintained by taking full advantage of national road data solutions. The future goal is not to establish a European road database. Instead the goal is to, through national contributions of data available in a harmonised and interoperable way, and technical and organisational provisions for maintaining the infrastructure to make the information available to the market to develop public services and value added services. Many public sector information sources can in the future contribute to such an infrastructure (road administrations, mapping agencies, municipalities, etc.).

The EuroRoadS project is also intended to:

- set up prototype and carry out tests to show that the framework can be used as a platform and assistance for implementing national road databases and then having them supply a European solution with efficient road data that can be merged and provided to the market.
- exemplify the whole information and process flow, and having a service provider show that the data set can be used in an application or product.
- give long-term recommendations of an implementing structure aiming to support a rapid implementation of a harmonised road infrastructure and stimulate a widespread use of road information.

The project consortium includes EuroGeographics (represented by the head office and by some national mapping agencies), CEDR (also represented by the organisation itself and by a few national road administrations), ERTICO (representing the car industry and other actors) as well as the research sector (University of Stuttgart) and private enterprises (Planung Transport Verkher AG). Project co-ordinator is Lantmäteriet – the National Land Survey of Sweden.

Typically the mapping agencies have developed road databases from a cartographic viewpoint (but often made essential improvements in order to also meet other user requirements) and road administrations have developed databases from a road maintenance viewpoint. In some countries national databases are now being established in close co-operation between the mapping agencies, the road administrations and other parties aiming to create a digital infrastructure for road information. Sweden is the first country to create a comprehensive current database managed by the public sector in co-operation with trade and industry.

The private enterprises providing products and services within navigation, fleet management and related areas have been forced to make huge investments not only in developing products and services for end-users, but also in collecting fundamental data on roads, i.e. data that should be part of the infrastructure in society. One reason for this is the lack of efficient national solutions on road reference data. Another reason is the lack of harmonisation between countries within this area. It is now important to provide a sound basis on which interest in intelligent transport systems and other applications can grow.

The project proposal included the following key activities (work packages):

1. Identify the business environment and the most common user groups of European road information and analyse their user requirements, in light of the services they use, as for road data

structure, road data content, update content and frequency, and needs within the area of data access and data exchange.

2. Based on the findings of the first step, and analysis of existing standards and solutions within the area, develop a road data specification framework.
3. Develop a prototype and carry out tests to show that the specification framework can be used as a platform for a European road data solution.
4. Safeguarding processes for evaluation and quality control of the information chain.
5. Propose an implementing solution by addressing the supporting structures and mechanisms needed for the implementation of a harmonised European road data solution.
6. Develop a plan for exploitation in order to support a wide use of the European road data infrastructure and to facilitate services build on it.

In order to carry out these activities, and thereby making it possible to reach the objectives within the allotted budget and on time, the work has been divided into seven work packages. The work of each work package is led by one of the members of the consortium.

STATUS OF THE PROJECT

The actual project work started on 1 March 2004 and the project period is 30 months. This means that the first results can be presented during the EC GI & GIS Workshop in June 2004. The first deliverables are reports on market analyses and user requirements as well as on methodology for evaluation of road data quality. For more information, see www.euroroads.org.