DigWeg

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Holland's public/private partnership for intelligent map database networking

Recognising the key role played by digital maps in transport telematics applications, the Dutch Ministry of Transport has initiated a market-oriented public/private partnership to bring GIS to the benefit of the travelling public. DigWeg – short for DIGitale WEGenkaarten (digital road maps) – sets the agenda for geographic information sharing into the next century

The Dutch Ministry of Transport has examined opportunities for joint public/private production of digital road maps during its DigWeg project. By stimulating such joint efforts the Ministry hopes to achieve expense reductions and efficiency increases by arriving at agreements on standards and update processes. The signatures of the Dutch Ministry of Transport, the Dutch Topographical Agency and European Geographic Technologies (EGT), as well as the recent addition of Tele Atlas, on a letter of intent mark the first step in the process of implementing this key technology in the traffic and transport industry.

In the early 90s, Dutch government and industry analysts foresaw explosive growth in the need for digital road maps. The opportunity to achieve shared expense reductions and efficiency increases resulted in an attempt on the part of the Dutch Normalisation Institute to unite the above parties in a joint effort to produce a public database containing the basis data for digital road maps. The initiative failed due to the fact that the parties involved were unwilling to contribute their most strategic production resource, the data.

"This was the real challenge for Dig-Weg," explains Han Zwijnenberg, project leader and senior policy staff member of the Co-ordination Point for Telematics (CPT) of the Dutch Ministry of Transport. "We had to come up with a partnership concept which emphasised market-orientation and complementary roles: not a standardisation approach, but a concept which offered added value to all of the parties involved. The project was not set up around the assumption of a single option, but based on an inventory of the field of influence. User desires, potential market size, market development and problem points were all examined, as well as the wishes of the public and private suppliers. Potential in the area of market development was an especially important consideration during the project initiation stage."

A KEY TECHNOLOGY

Digital road maps form a key technology within the traffic and transport industry, and are considered an integral part of the telematics infrastructure. As displayed in Table 1, telematics applications based on digital road maps are used in virtually all areas of traffic and transport industry.

The size of the various industry segments varies widely, as do the prices users of digital road information in the various segments are willing to pay for applications: from amounts in the tens of thousands of Guilders for policy and management applications, to little more than twenty Guilders for a car route and navigation system for the individual driver. Although the prices in the latter market segment are the lowest, the size of the market for individual travellers is the largest. The potential offered by this market, in mass terms alone, is large enough to provide attractive opportunities for digital map producers such as EGT and Tele Atlas.

Table 1 : Use of digital road maps for traffic and transport

Industry segment	Application	Users
1. Traffic	Demand management	Central, provincial governments
	Route planning	Travellers
	Route navigation	Motorists
	Transport navigation	Central, provincial governments
	Traffic monitoring	Central, provincial governments, police
2. Goods transport	Fleet management	Transport companies
3. Public transport	Public transport information	Travellers
	Maximisation of routes	Public transport companies
4. Emergency services	incident management	Police, fire departments, ambulance companies, Royal Dutch Touring Club
	Dispatch systems	Police, fire departments, ambulance companies, Royal Dutch Touring Club
5. Policy	Traffic studies	Governments, consulting agencies
	Environmental and public infrastructure studies	Governments, consulting agencies
	Monitoring public safety	Central, provincial governments
6. Management and maintenance	Infrastructure management and maintenance	Central, provincial, local road management agencies

TELEMATICS POLICY

National government also has a vested interest in developing the market for digital road information. Telematics is a relatively new policy instrument within the larger context of Dutch traffic and transport policy. This policy is focused on reducing congestion on the roads in order to increase traffic safety and to maintain the accessibility of cities and economic centres. With this objective in mind, the Ministry of Transport strives to improve alternatives to the automobile (public transportation, bicycle) and road transport of goods (improvement of the market position of railways and inland and coastal waterways), as well as to optimise use of the road network.
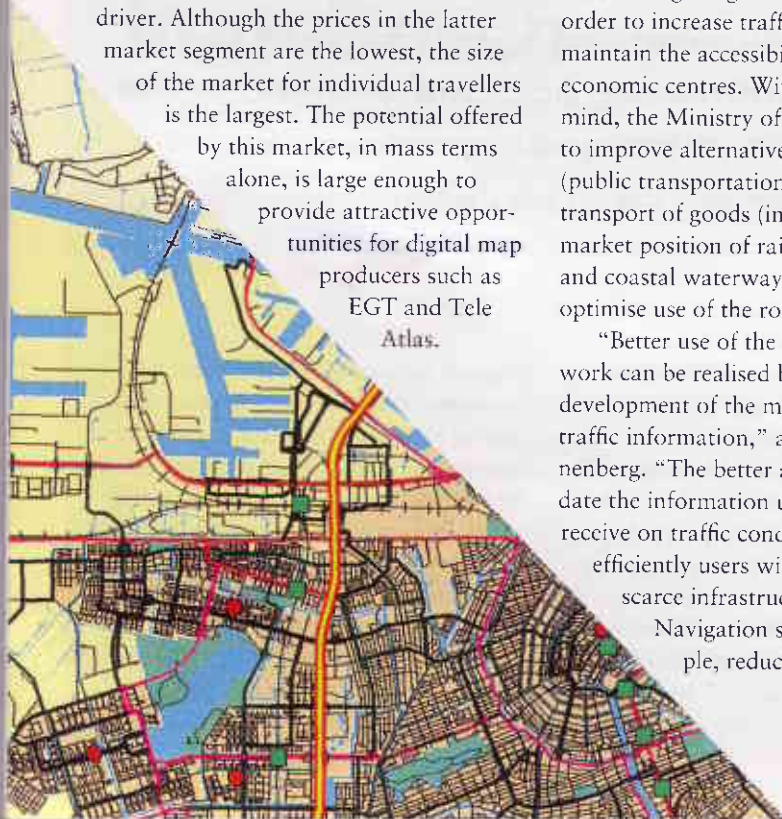
"Better use of the existing road network can be realised by encouraging development of the market for digital traffic information," according to Zwijnenberg. "The better and more up to date the information users of our roads receive on traffic conditions, the more efficiently users will make use of our scarce infrastructure resources. Navigation systems, for example, reduce the number of motorists searching for destinations or parking in city centres, and dynamic in-car systems can help the mobilist to avoid traffic jams, as well as encouraging road users to select other methods of transportation. This kind of system is especially interesting for road transport of goods and for business traffic. In addition to policy considerations, efficiency considerations play a major role. Actually, the Ministry of Transport itself is one of the main users of digital map databases, for accident registration purposes, for example, and for planning and managing infrastructure. These considerations are reason enough for the Ministry of Transport to work toward increased availability of high-quality digital road information."

A SOLUTION FOR UPDATES

An analysis carried out within the context of DigWeg revealed that producers of digital maps are especially concerned about the problems involved in updating the road databases. Each of the producers of digital maps collect identical data, independently of each other, at high costs: approximately 20 per cent of the initial

investment in the production of a digital map database has to be reinvested annually in order to keep each producer's database up to date. Producers such as EGT and Tele Atlas incur annual expenses of tens of millions of Guilders in order to keep their databases at European level up to date. A solution for the problem of database updates would be advantageous not only to these producers, but also to the Dutch Topographical Agency of the Ministry of Defence.

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Amsterdam digital map courtesy of Tele Atlas

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CPT: THE CO-ORDINATION POINT FOR TELEMATICS

The Dutch Ministry of Transport actively stimulates development and implementation projects in the area of traffic and transport. A number of years ago, the Ministry established the Co-ordination Point for Telematics in order to co-ordinate these stimulation efforts. The CPT functions as a point of contact and a centre of knowledge in the area of telematics policy for the traffic and transport industry, enabling it to pay special attention to the introduction and implementation of telematics in this industry. The CPT currently focuses mainly on policy development and co-ordination, spotting new developments and distributing knowledge and policy.

Telematics, Traffic and Transport, a ministerial planning memorandum published in 1993, set the stage for developments in the years 1993 to 1995 by defining five high-priority areas of attention: a chain approach to goods transport, dynamic traffic management, multi-mode travel information, chipcard technology and telematics infrastructure. The telematics infrastructure serves as a foundation for the other areas of attention and includes the following components: electronic networks (including digital map databases), monitoring systems, tracking and tracing systems, mobile communication systems and standards for techniques, messages and organisation.

The Ministry of Transport is now considering follow-up options for this memorandum, the expiration of which is imminent. Current efforts are focused on going into more depth with regard to themes such as international standards and joint efforts, co-makerships and partnerships, traffic safety and the electronic highway. In addition, attention will be focused on a more integrated telematics policy in the area of public transportation.

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mutations which it uses in support of its Traffic Accident Location Registration Network (TALRN)," according to Zwijnenberg. "The Ministry provides the provinces and municipalities with traffic accident statistics, and in return, they provide the Ministry with information on changes to the road network. The Ministry now wishes to provide this advantage to the business world and other parties by offering public access to up to date data in the form of mutation files in GDF format."

GDF (Geographic Data File) is a format for the exchange of geographic data. The format is presently being handled by the CEN as a pre-standard. Interested parties can use the GDF mutation files to efficiently and inexpensively update their own databases, eliminating one of the main barriers to efficient development of the market for digital road information.

"This partnership is not exclusive, however," emphasises Zwijnenberg. "This offer is completely public, enabling the Ministry to play the role of facilitator, which is not competitive, but complementary."

NATIONAL ROAD DATABASE

The DigWeg project was successfully completed with the signatories to the Ministry of Transport's letter of intent. In consultation with these parties, the Ministry of Transport has succeeded in defining clear roles for the various parties involved in the production of a National Road Database (NRD). Each of the parties will perform those tasks which – in conformance with its core business – it can perform most efficiently. The Dutch Topographical Agency, for example, will contribute geometric data (centre lines), while the Ministry of Transport will concentrate on non-metric data and the update process. The commercial parties, EGT and Tele Atlas, will concentrate on attribute data, i.e. which is specific information for the road user, such as one-way roads, exit ramp sign boards, parking garages, tank stations, hotels, etc.

Lex Polderman, manager of the Basis Data Department of the TTCA explains: "The Dutch Topographical Agency and the TTCA will handle the National Road Database. The data for the NRD will be delivered in the form of mutation files, allowing any party who may desire it access to a complete and up to date NRD. EGT and Tele Atlas ▶

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are very interested in receiving these files when they become available. They will then add data, which will result in a digital map which can be processed for user applications."

NRD MUTATION FILES

The basis object of the NRD is the road element, which is identical to the 'Road Element' contained in the Geographic Data File (GDF/CEN, 1975), the European standard for digital road information. A road element can be defined as a piece of road between two intersections. An intersection is defined as a point in the road at which the user must decide to select a direction other than straight ahead or back.

TTCA will assign each road element a unique identification number. The road element number plays a crucial role in the exchange of NRD mutation files. Each new mutation file contains only changes relative to the previous mutation file. Based on the road element number, a determination can be made as to whether the road element is an addition, a change or a deletion.

Phase 1, setting up the NRD, was started at the end of 1995. In order to improve the quality of the road database of the TTCA, the geometric data in the database will be replaced with geometric data provided by the Dutch Topological Agency. This upgrade is expected to be complete for the entire country at the end

IN-CAR SYSTEMS

In the context of European R&D programmes for traffic and transport, the industry has developed a large number of in-car route and navigation systems:
- Static systems (e.g. Carin, Travelpilot);
- Dynamic systems in which up to date information on traffic jams is included in the calculated routes (e.g. RDS-TMC-based Carminat);
- Dynamic, interactive systems which actually function as sensors, independently detecting traffic conditions (e.g. Infrared-based Euroscout and GSM-based Socrates).

The more advanced systems (Euroscout, Socrates) offer almost identical functions, including dynamic route information, up to date traffic conditions, P+R information, public transportation information, emergency alarm systems, tracking and tracing, fleet management and directory information on businesses, hotels, tank stations, etc. In-car systems cannot function without digital maps.

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of 1997. Phase 2, delivery of the mutation files to EGT and Tele Atlas, has not yet started. Discussions on delivery specifications are currently being held with these parties.

"Production of the NRD implies a new way of working for the Traffic and Transportation Consulting Agency, a way of working which is more oriented toward the outside world." says Polderman. "We consult the industry more often and are really working more closely with the industry in the context of a durable society."

EUROPEAN DIMENSION

The GDF standard is being implemented within the Ministry of Transport simultaneously with the realisation of the NRD. "The Ministry was involved in the EU DRIVE program for a number of years, and has actively supported development of the GDF standard," says Polderman. "By participating in the DigWeg project, we are, again actively, supporting implementation of this standard. In the first place, the national government is investing in the migration process needed to create a GDF format database from the existing database (the Traffic Accident Location Registration Network). In the

second place, the selection of the GDF standard provides a stimulus for the development of the market for digital road information. GDF enables efficient data exchange with commercial parties such as EGT and Tele Atlas and guarantees compatibility at European levels."

DigWeg offers a viable solution for the problem of updates, not only at the national level, but also at European level, making it an important stimulus for the introduction of European telematics systems. The approach sketched in this article – open policy forming, market-orientation, added value and complementary roles – could serve as a model for other European countries. In that context, a case study on DigWeg could provide useful insights for international deliberative bodies, such as the EC High Level Group which brings together policy-makers from Europe's national transportation ministries.