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# The WELL-TIMED Study

## WEST EUROPEAN LOCAL LEGAL ARRANGEMENTS FOR TRANSPORT INFORMATION MANAGEMENT AND EXCHANGE OF DATA

A report prepared for the European Commission High Level Group on Road Transport Telematics

# Volume 1 Main Report

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ARTTIC in Brussels

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# The WELL-TIMED Study

## West European Local Legal arrangements for Transport Information Management and Exchange of Data

## Executive summary


1. This report on the WELL-TIMED Study (West European Local Legal Arrangements for Transport Information Management and Exchange of Data) concerns the organisation and operation of advanced travel and traffic information services in the European Union (EU). The study, which is an activity under the Telematics Applications for Transport (T-TAP) ANIMATE Project, was initiated to explore the legal and institutional issues associated with transport data exchange and information management in the EU, and to develop guidelines on best practice. It has been carried out with the support of Members of the EU High Level Group on Road Transport Telematics (RTT-HLG).

2. The European Commission Strategy and Framework for the deployment of RTT in Europe, published in May 1997 * and endorsed by the Council of Ministers, provides the context for the WELL-TIMED study. The study provides an overview of how current and planned information systems and services which use road transport telematics (RTT) are organised in the Member States and reviews in some depth current practice in four Member States - France, Germany, the Netherlands and the UK.

3. Legal and institutional issues pose significant obstacles to the implementation of these services because of their organisational complexity. Issues such as liability, competition, privacy, public procurement, intellectual property, consumer protection, traffic regulation, public/private sector collaboration, and co-operation between EU Member States have surfaced as the technologies evolve from demonstration stage to commercial markets. The study aims to identify good practice and offer recommendations as a basis for European Commission proposals to stimulate the further development of services.

4. The main issues which EU Member States need to resolve in order to stimulate the development of RTT services are (i) principles for access to public traffic data by RTT service providers and for the exchange of publicly and privately owned data; (ii) the enabling framework for public-private partnerships; (iii) a framework for traffic monitoring by independent traffic service providers; (iv) the legal position of RTT service providers wishing to broadcast and disseminate RTT services; and (v) principles for the interconnection of transport-related databases between administrations.

5. The four case studies include a range of real-time RTT services which encompass varied legal and organisational arrangements ranging from public sector data collection systems (e.g. the collection and processing of data within the Dutch Traffic Information Centre), through public/private partnerships (e.g. 'Mediamobile' in France , and the 'Cologne Parkinfo' in Germany), to services which are provided entirely by the private sector (e.g. Traffic*master* in the UK). Reviews of appropriate organisational and legal models from outside Europe have also been included. A questionnaire on advanced travel and traffic information services, sent to RTT-HLG representatives, sought information on the forms


* EUROPEAN COMMISSION. Community Strategy and Framework for the Deployment of Road Transport Telematics in Europe and Proposals for Initial Actions. COM(97) 223 of 20 May 1997, Brussels.

of services already operating, the main agencies involved, the collection and supply of real-time traffic and travel data and the regulation of the services.

6. The study shows that there is considerable diversity in the basic institutional and legal frameworks amongst Member States, particularly in the roles of the road and police authorities and in the involvement of the private sector. Despite differences in the organisational frameworks, the provision of RTT services can be considered as a sequence of events which collectively make up the 'information chain'.

7. The information chain has proved to be a useful concept since it is independent of the technology used and of the types and structures of organisations involved. The delivery of an effective RTT system or service will only be achieved if there is strong continuity throughout the chain and if all of the elements are working to achieve the same objectives. The dependencies between organisations are critically important, since the final service quality will be determined by the weakest link in the chain. The report identifies and discusses the five stages of the information chain namely (i) data supplier, (ii) content organiser, (iii) service provider, (iv) information distributor, and (v) the end-user.

8. With so many potential players there may be conflicting requirements and this raises the question of the role of the public sector. A common aim is the need to find a balance between the economic logic of the private sector and the public service goals of equity and the provision of services available to all. Setting a framework of rules and guidance, and removing institutional barriers to new patterns of service is one of the key roles that the public sector has to assume, given its concern with safety, protecting natural resources and securing efficient mobility.

9. The position, roles and responsibilities of all the organisations involved in the information chain need to be made transparent in order to provide a strategic framework for the development of services. It is inevitable that the role of the State in the transport sector and expectations about public services will vary from country to country. In some countries (e.g. France, Netherlands) the public sector carries out the collection and processing of data, in order to retain responsibility for matters relating to road safety, traffic management and control. In Germany the Federal Economic Forum has been developing the necessary business framework for new RTT services. In the UK, Government policy is that services will have to be developed on a commercial basis unless they are highly cost-effective in support of public policy issues.

10. The growing demand for transport-related information, particularly real-time and customised data, raises many data exchange issues, such as access, payment, quality, intellectual property, confidentiality and privacy. The report discusses these issues and the organisations which are emerging throughout Europe to co-ordinate data collection, processing and dissemination.

11. The development of a market for innovative products and services for traffic and travel information involves a high risk for industry and operators because the market potential for these services is, as yet, unproven. The involvement and role of the private sector varies considerably between Member States. Experience in the UK, France and Germany where private services are already in place. All points to the need for a clear legal framework for the new services to justify the large-scale investments involved. The private sector needs a stable framework to provide planning security and the prospect of a clear return on investment.

12. The opportunities for private sector participation in transport telematics implementation may also be hampered by a number of factors including (i) commercial viability, (ii) difficulties in identifying responsibilities, (iii) lack of cross-sector support,(iv) legal liability, (v) risk sharing; and (vi) intellectual property rules. Business security depends on minimising all of these risks. Important issues are: whether the service provider is permitted to carry out independent traffic monitoring to add value to the basic information product; whether publicly owned real-time traffic data is available and of sufficiently high quality; and whether there is any regulatory constraint on dissemination of traffic information via the new telecommunications media.

13. The multi-agency nature of traffic management in most Member States means that service providers are required to interface with complex organisational arrangements. Difficulties arise when agencies adopt different policies and practices towards the independent service operators. In France the state has acted to simplify these inter-agency demarcations by creating a single, integrated traffic agency for each of the big cities and main motorway corridors - the 'Agence de Presse' acts as a wholesale server of traffic data. In the Netherlands this is being tackled in a slightly different way, by creating a National Traffic Information Centre as the information wholesaler.

14. The proper place for competition in the provision of RTT services is still being evaluated. In Germany, the Economic Forum has concluded that the private sector will primarily implement telematics applications. In practice this implies the encouragement of open competition of technologies and services and standardisation of technologies and interoperability of applications. All four case studies show that the scope for competition in real-time traffic monitoring through fixed equipment is so far very limited. France and the Netherlands have established a predominantly public sector information supply. Germany and the UK have encouraged the private sector to engage in independent traffic data collection. However, to date the operation of fixed, infrastructure-based traffic monitoring by the private sector is not an area where competition is taking place in either country. Floating car methods using taxis and other vehicle fleets offer a more promising avenue for private sector data collection.

15. Public/private partnerships present a positive way of making progress on implementation of RTT services but they do require an appropriate policy and regulatory framework to be put in place before they can take off. The service chain concept defines the information flow and the contractual relationship necessary to provide a transport telematics service, and various types of "contract" are possible. The report discusses various contractual agreements derived from the case studies.

16. Based on the study findings, it is recommended that the European Commission, in conjunction with the High Level group on Road Transport Telematics (RTT-HLG) develop proposals for a number of topics:

    - A code of practice for RTT services on traffic management and control issues should be drawn up (including model agreements with service providers).
    - Guidelines should be drawn up for data and information exchange in emergencies and major incidents.
    - Guidelines for the installation and maintenance of privately-operated roadside equipment should be developed, based on current practice in Germany and the UK.

- The EC should follow and support the work by car manufacturers on the safety of driver information systems and how well they integrate with other in-car systems.
- The options, benefits and disbenefits of further harmonisation of radio frequency allocations for transport telematic applications should be investigated.
- Model contract clauses on data content and accuracy should be drawn up in discussion with the data suppliers and information content providers.
- On privacy, the EC should examine Directive 97/66EC to determine whether additional clauses are required for RTT systems with vehicle location identification systems.
- The RTT-HLG should exchange information on charging schedules for traffic data and information from public sources in order to inform and stimulate a market for added-value services.

17. The report concludes that the future development of RTT services across Europe will depend on the extent to which each Member State can establish an organisational framework which embraces all the stages in the information chain, and on how well these organisational frameworks can be linked both at regional and inter-regional levels. The goal is to offer end-users continuous RTT services from one country to another.

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# West European Local Legal arrangements for Transport Information Management and Exchange of Data

## (The WELL-TIMED Study)

## Volume 1 Main Report

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# The WELL-TIMED Study

## West European Local Legal arrangements for Transport Information Management and Exchange of Data.

## 1. INTRODUCTION

### 1.1. Telematics across Europe

This report is about the organisation and operation of advanced travel information services in Europe. They include trip planning services, dynamic navigation and route finding services as well as real-time information on congestion, accidents, traffic incidents, parking, etc. All of these are examples of Road Transport Telematics (RTT) and are part of a much wider development brought about by the merging of modern digital telecommunications and information technology.

Telematics-based information services require the effective gathering of information in real time and transmission to the end users. In this study (known as the "WELL-TIMED" study) these RTT services have been defined as having the following features:

- they are continuously updated to reflect current traffic conditions; and
- they can be delivered to the users by a variety of different means and at various stages of the journey (pre-trip and on-trip)

Legal and institutional issues potentially pose significant obstacles to the implementation of these services because of their organisational complexity. Issues such as liability, competition, privacy, public procurement, intellectual property, consumer protection, traffic regulation, public/private sector collaboration, and co-operation between Member States have surfaced as the technologies evolve from demonstration stage to commercial markets.

At the European level the main task is the creation of conditions to promote telematics systems and services which are interoperable across national borders. This will add value to the nationally based services and stimulate a market for on-board equipment.

### 1.2. Background to the Study

The European Commission Strategy and Framework for the deployment of RTT in Europe published in May 1997[1] provides the context for the WELL-TIMED study. The strategy, which has been endorsed by the Council of Ministers as a suitable basis for Community action, acknowledges that effective systems for transport data exchange and information management are a fundamental requirement for the operation of advanced traffic information services at European level.

The WELL-TIMED study explores the legal and institutional issues associated with transport data exchange, information management and service delivery in order to develop guidelines on best practice. It has been carried out with the support of Members of the High Level Group on RTT. The aim is to review the situation in the Member States, to investigate current practice in four Member States where services are well-developed, and to identify areas where action is needed to provide a business framework for services at the European level. Where

appropriate, the study makes recommendations as a basis for Commission proposals to stimulate the further development of services.

The study considers several subjects which must be addressed by Member States in order to stimulate the development of RTT services. The main issues identified by the RTT-HLG are:

- The basis for access to public traffic data by RTT service providers and for the exchange of publicly and privately owned data.
- The enabling framework covering public-private partnerships and more generally the participation of the private sector in developing RTT services.
- The framework for traffic monitoring by independent traffic service providers.
- The legal position of RTT service providers wishing to broadcast and disseminate telematics-based travel and traffic information services.
- Principles for the interconnection of transport-related databases between administrations.

The case studies selected from France, Germany, the Netherlands, and the UK - listed in Table 1 below, show examples of current practice with regard to the issues identified above and are designed to identify those administrative, legal and contractual conditions which lead to success. Reference to experience in the USA and Japan has also been included. The review of literature and the four case studies are complemented by a questionnaire on advanced travel and traffic information services which was sent to RTT-HLG representatives in all Member States. The questionnaire sought information on the forms of services already operating, the main agencies involved, the collection and supply of real-time traffic and travel data and the regulation of the services. Results from the questionnaire are tabulated and summarised in Annex A.

As RTT systems evolve from the research and development stage through pilot projects to, in some cases, full commercialisation, the complexity of grafting them onto existing institutions is becoming all too apparent. Public/private partnerships represent a positive way of making progress on implementation of advanced traffic information services but they do require an appropriate policy and regulatory framework to be put in place before they can take off. It is noted elsewhere [2] that public authorities will have to set new ground rules and create the right policy and regulatory environment to enable telematics applications to flourish. However much of the American literature on over-coming non-technical barriers[3] cites the problems generated by the different cultures and perceptions that exist between the public and private sectors.

**TABLE 1: CASE STUDIES**

| COUNTRY | SYSTEMS COVERED | TYPE OF OPERATION |
|---|---|---|
| France | MEDIAMOBILE (Paris) | Real time in-vehicle traffic information by graphical display; data provided by authorities & taxis; |
| | RATP/Infobus | Real- time bus information by pager |
| | SKIPPER | Real- time traffic data for Paris via schematic map; most data collected by taxis. |
| Germany | TEGARON Telematics Joint venture by T-Mobil (Deutsche Telekom) & Daimler-Benz Interservices (debis) | Real time traveller information, navigation, vehicle security, and booking services. |
| | PASSO (Mannesmann Autocom) | Commercial GSM and GPS- based traffic information, navigation and emergency services for private motorists and fleet operators. |
| | Cologne "Parkinfo" | Public-Private structure for advanced traffic information services. |
| Netherlands | RDS-TMC Traffic Information Chain | National real-time and predictive traffic information transmitted via FM Radio. |
| UK | Traffic*master* | Real -time speed and traffic congestion service to subscribers. |
| | ORCHID | Vehicle tracking and in-car navigation (other services planned) |
| | Autoguide | Proposed (1989/90) beacon-based in-vehicle dynamic route guidance system. |

In 1994, ECMT and ERTICO commissioned a joint study (JEEP)[4] of the contractual relationships and information flow involved in delivering telematics based information services which cited institutional and/or legal issues as the main stumbling blocks to the implementation of RTT services. The main legal obstacle concerned the lack of common definitions (for example for road traffic information) and the variability in the meaning of terms from country to country. Institutional obstacles concern administrative dysfunctions, in particular the fragmentation of the responsibility for traffic and information within central government, and the split responsibilities for national, regional and local traffic management between different public authorities.

# 2. CREATING THE BUSINESS FRAMEWORK

## 2.1. The Role of the Public Sector

In transportation, the public sector has a regulatory role to safeguard the general interest of the public. It is concerned, inter alia, with safety, safeguarding natural resources and securing efficient mobility as a key prerequisite for a modern economy. As such the state cannot overlook the implementation of telematics systems with impact on traffic. However telematics are often seen as technical solutions at the service of transport policy, and the need to develop a policy context for telematics applications per se, such as information services, is often overlooked.

A confused picture will result if each public authority at every level has a different vision of the public interest within the framework of its responsibility. Therefore the public sector must encourage the development of an appropriate organisational framework and a clear definition of the roles. Recent experience across Europe shows that the public sector can adopt one or more of the following roles:

- *Monitor* of emerging technologies including safety, environmental and socio-economic analysis;
- *R & D sponsor* for pilot and demonstration projects; wide dissemination of the results; seedcorn funding;
- *Innovation agent* for full-scale implementation of initial pilot or demonstration project;
- *Operator* of transport telematics systems (e.g. for road traffic control); may also require an interface with a private sector operator;
- *User* of primary of telematics services provided by another party (e.g. digital road map database);
- *Regulator* of operations that fall within the scope of the national operating framework (e.g. the operation of driver information services in the UK which are subject to licensing rules);
- *Sponsor* for starting up certain kinds of telematics services which serve the wider public interest (e.g. RDS-TMC).

The relations between public authorities, RTT system operators and users will be determined by the objectives and functions that each party must fulfil. These objectives can be broken down into three categories:

- the *regulatory role* of central government or local and regional authorities when this is required in the public interest;
- the *public service function*, which cannot be left solely to the market, either because it may not be financially profitable to provide such services or because they require a single monopoly provider to be viable;
- *market-driven services* which can safely be left to the private sector to develop because they are demand driven and do not provide an essential public service. In principle these should be supplied by the market with a minimum of regulation (a) at a price the purchaser is willing to pay, and (b) by any entrepreneur who so wishes.

The conventional view is that the public sector will be involved in the provision of RTT information services only for the established tasks of ensuring road safety and traffic management and will leave added value services to private investment. A view therefore has to be taken about the minimum public service obligation for information services which are enabled by transport telematics. For example, the deployment of advanced travel information services brings the prospect of increased provision of information and advice customised to the specific needs of the particular transport operation or individual traveller. This appears to be more the domain of market driven services rather than the public service functions.

## 2.2. The "Information Chain"

The JEEP study recognised the following stages in the supply of road traffic information:

- data collection
- initial processing to meet the specific requirements of each supplier
- forwarding of data to the "public data provider"
- data validation by "public data provider"
- transfer of data to RTT system operator
- formatting of data by RTT system operator
- transfer of data to the radio broadcasting or telecommunications system operator, or transmission by the RTT system operators' own facilities;
- data received by the end user via an appropriate terminal.

Clearly, the provision of dynamic, traffic-responsive real-time services to potential end users requires a suitable telematics infrastructure and service organisation. For example, the provision of dynamic in-car traffic information comprises several interdependent processes, each of which has a specific contribution to the final product - in this case traffic information. These are summarised in Table 2 below. The delivery of an effective traffic/transport information service will only be achieved if there is strong continuity throughout the chain and all of the elements are working to achieve the same objectives. This process involves:

- defining the service's goals and objectives clearly;
- identifying all of the stakeholders
- allocating the roles and responsibilities of partners;
- understanding and respecting the different objectives of each partner (political objectives for the public sector and commercial objectives for the private sector);
- promoting good communications; and
- a flexible approach

Much of the US literature on overcoming non-technical barriers to the implementation of Intelligent Transport Systems (ITS) recognises the important role which the above factors have in promoting strong partnerships.

**TABLE 2: THE INFORMATION CHAIN**

| AGENT | | FUNCTION |
|---|---|---|
| Data supplier | (Sections 2.3.1& 5.4)† | traffic data collection |
| ↓ | | ↓ |
| Content organiser | (Sections 2.3.2 & 5.5) | processing* to produce up-to-date information |
| ↓ | | ↓ |
| Service provider | (Sections 2.3.3 & 5.6) | making this information available for the user |
| ↓ | | ↓ |
| Distributor | (Sections 2.3.4 & 5.7) | transmission via various communications media |
| ↓ | | ↓ |
| End-user | (Sections 2.3.5 & 5.8) | use by drivers, travellers, fleet managers, etc. |

†References in brackets are to sections of this report * including merging data from different sources

The various stages of the service chain are considered in Section 5 of this report; the parties add value to the service when moving through the service chain. In Finland the FIST project (Section 4.4) provides a good example of setting a framework to create coherent services by integrating the distribution chain, although the benefits will not appear until the programme is fully operational. The implementation of RDS-TMC in the Netherlands (Section 4.11) is another good example of the information chain concept.

## 2.3. Agents in the Information Chain

### 2.3.1. Data supplier

The data owner or supplier is responsible for supplying reliable, accurate, up-to-date base data for input to the information service. Advanced travel information services may require input from a number of content owners, for example, to cover traffic and weather conditions and the timetables for collective services. The quality of traveller information ultimately depends on the quality and timeliness of its collection and processing. A problem in this regard is that the infrastructure for automatic data collection (CCTV cameras, loops and other detectors) is costly to install and maintain. Moreover, the geographical coverage of automatic systems across the road network is far from comprehensive. Therefore much road traffic data are still obtained manually on the basis of observation.

Better traffic information implies improving the way in which it is collected on the motorway network and on the subsidiary and urban road network. A great effort is now being made to improve roadside collection through various methods, including above ground detection, induction loops and "floating car" methods. One of the key issues here is how far data supply is a matter for the public sector and whether private operators should be allowed to collect their own data to augment "public" data sources, for example via monitoring equipment along the roads (see Section 5.4.3).

Public transport operators increasingly collect information in real-time on the movements of their vehicles. This produces up-to-date information ensuring punctual services and optimum deployment of resources. The operators are increasingly supplying this information to their

customers, for example, the ROMANSE STOPWATCH project in Southampton, UK, provides real-time bus stop information[5].

### 2.3.2. Content organisers

Once collected, the data need to be interpreted to determine traffic conditions. Low density traffic can, for example, indicate that the roads are quiet, but it can also indicate that an accident has occurred and that the road is blocked. Processing involves interpreting data to give consistent, reliable information. In many countries, Traffic Information Centres (TIC) co-ordinate data processing within regions and data exchange between neighbouring countries. These TICs are likely to be run either by the public sector (Netherlands) or through private franchise or public/private partnerships, as is proposed for the UK Regional Traffic Control Centres (RTCCs) (see national report and Section 4).

In some countries it is felt that the public sector must shoulder responsibility for the collection and processing of data, both of which are at the base of the information chain, in order to keep a better grip on matters relating to road safety, traffic flow and road management.

As far as public (collective) transport is concerned, one condition for the successful introduction of concepts such as "interlinking" of journeys is the provision of integrated traveller information. The collection, processing and distribution will therefore have to be co-ordinated with the public transport information centres. This will create a great challenge for the organisation of advanced traveller information services in the years to come.

### 2.3.3. Service Providers

Normally it will be the job of the service providers to make the traffic information available to the various distribution media. The service may be provided at no charge or for payment, often via subscription. Often the value-added service providers will be the same as the distributors. Value-added service providers will achieve market share by providing services more efficiently than others or by offering completely new products, for example by integrating travel information with on-line booking services or "yellow pages" directories. The service providers could therefore have one or several of the following tasks:

- To add value to information services by collecting, combining and providing information from several sources and by adding new elements to the service;
- To develop and operate services on behalf of the content owner, e.g. by providing marketing and/or public relations support;
- To act as a distributor for the services of other organisations; in which case the service provider must be able to function more effectively or at lower cost than the other organisations can independently;
- To act as a "clearinghouse" or "information warehouse" thereby simplifying the organisation of the information chain.

The advantage of having a service provider independent of existing agencies might be that they are able to provide services for different consumer groups based on a wide range of material collected from multiple sources. Compared to the processing of completely separate services, the integrated services could be packaged for different groups and media with relatively little effort.

End users will expect service providers to safeguard the quality and objectivity of the information they provide, whilst ensuring that it is up-to-date, does not endanger road safety, and is delivered in a timely and accessible fashion. Some of these factors will need to be set down in formal agreements.

### 2.3.4. Information distributors

Distribution to the end users is the vital final link in the information chain. It is the link which, for example, has to guarantee reliable (multimodal) information to the individual traveller and accurate data on current and predicted road network conditions to the fleet manager. With the aid of telematics manufacturers have come up with numerous innovative systems for the distribution of traveller information. Some are already in operation, others are at the prototype stage. Examples include the Internet, RDS-TMC, Digital Audio Broadcasting (DAB) , interactive television and teletext, dynamic information panels, mobile phones, PCs, pagers combined with watches and in-car navigation systems.

The transmission of the information provided to travellers will be under the control of different organisations, depending on the way in which information is received and marketed. Thus, in-home information is currently provided mainly by the established media (radio, television), whereas in-vehicle information additionally is provided by private companies seeking to provide value-added customer services (e.g. Mediamobile in France, TEGARON and PASSO in Germany, Traffic*master* and Orchid in the UK); and roadside information by the transport operator wishing to maximise patronage, or by the local highway authority, with a wider range of objectives to serve. Consistency in information provision is thus an important issue.

### 2.3.5. End users

The users of transport information systems encompass a broad spectrum for example, infrastructure operators, transport operators, police, service providers and travellers in various forms. For travellers, information needs vary widely according to the modal choice available, and the degree of familiarity of the traveller with the intended journey. Broadly speaking information can be provided at three stages in the journey: pre-trip, during the trip, and at or close to the destination. Final acceptance by the user implies a well-organised, high quality, reliable and useful service. Users will therefore expect a service which incorporates accurate statistical data for forecasts, performance analysis, etc.

## 2.4. Need for co-ordination

The introduction of transport telematics systems require public departments to adopt a more coherent policy on the use of data and standard data formats. Greater integration of all traffic data within a given geographical area is an essential condition for operating an RTT system. However the many information sources are not always coherent. Even at national level, different ministerial departments organise data input according to their own requirements and using their own methods.

Increasingly, European countries and regions are looking toward a traffic management organisation to tackle traffic problems and to be able to integrate traffic management and traffic information services into a European context. The co-ordination of the data processing level has proved to be a suitable platform for the collection, processing and dissemination of traffic management data. At an operational level all the main actors will have to talk to each other, for example with regard to the accuracy of data or the consistency of the information.

If co-operation at the data processing level is well organised, it will result in a win-win situation for all partners.

## 2.5. European Data Exchange Network (EDEN)

At a European-wide level, the ERTICO EDEN study[6] has had the ambitious task to accelerate the co-ordinated implementation of interoperable mechanisms for the electronic exchange of traffic and travel information across borders in Europe. Although the project is mostly concerned with the technical issues of data exchange, including the DATEX-Net specifications, some organisational issues are considered. The EDEN study provides a framework of existing organisations involved in traffic management and user services in Europe which will facilitate the organisation of a Europe-wide TIC conference. The study identifies the need for three horizontal organisations for the management of traffic information and user information services:

- *a local traffic centre* would ideally support tactical, link based traffic management and user information services;
- *a national or regional traffic centre* would support strategic traffic management and user services; and
- *a private service provider* with a regional or national scope would support added-value traffic and travel information services.

The EDEN study makes a distinction between traffic monitoring, traffic control and traffic information centres although at implementation level these are sometimes integrated. This provides a functional classification of different types of Traffic Centres and helps to clarify how these could be merged.

The clearest need for data exchange agreements seems to exist at the regional level, leading to the interconnection of regional traffic centres. However, this idealised data exchange network is unlikely to be implemented fully for various practical and political reasons. For example, in France, the existence of a centralised, hierarchical system may require foreign national centres to exchange data with the national traffic information centre.

The EDEN Study has prompted the majority of Member States and others to sign a European Memorandum of Understanding (MoU)[7] on the use of the DATEX-Net specifications for international traffic data exchange. In addition Member States and other parties are being encouraged to endorse the MoU on RDS-TMC[8,]. Table 3 summarises the main components of the DATEX and RDS-TMC MoUs.

**TABLE 3: SUMMARY OF MEMORANDA OF UNDERSTANDING ON RDS-TMC AND DATEX-Net**

| RDS-TMC services with European (ALERT) functionality | DATEX-Net |
|---|---|
| The objective is the provision of products and services on the basis that there will be a network of harmonised and interoperable international, national, regional and local RDS-TMC services across Europe, with subtle differences in content and quality.<br>Anyone can use the same receiver in any country in Europe, in the chosen language and expect to receive an agreed quality of service. | The EU R&D programmes have successfully integrated different approaches for the exchange of traffic and travel data / information into an interoperable solution known as the DATEX-Net specifications. Key elements are a data dictionary, data models, location referencing rules and a message exchange format. |

# 3. LEGAL AND CONTRACTUAL ASPECTS

## 3.1. Types of contract

### 3.1.1. Inter-agency Contracts and Agreements

By defining the information flow and the contractual relationship necessary to provide an RTT service the JEEP study suggests the rights and obligations of public authorities and potential service operators according to the role they intend to take. This production chain offers the advantage of limiting the respective areas of responsibility, in that the prime contractor in each phase is accountable solely for his own activity.

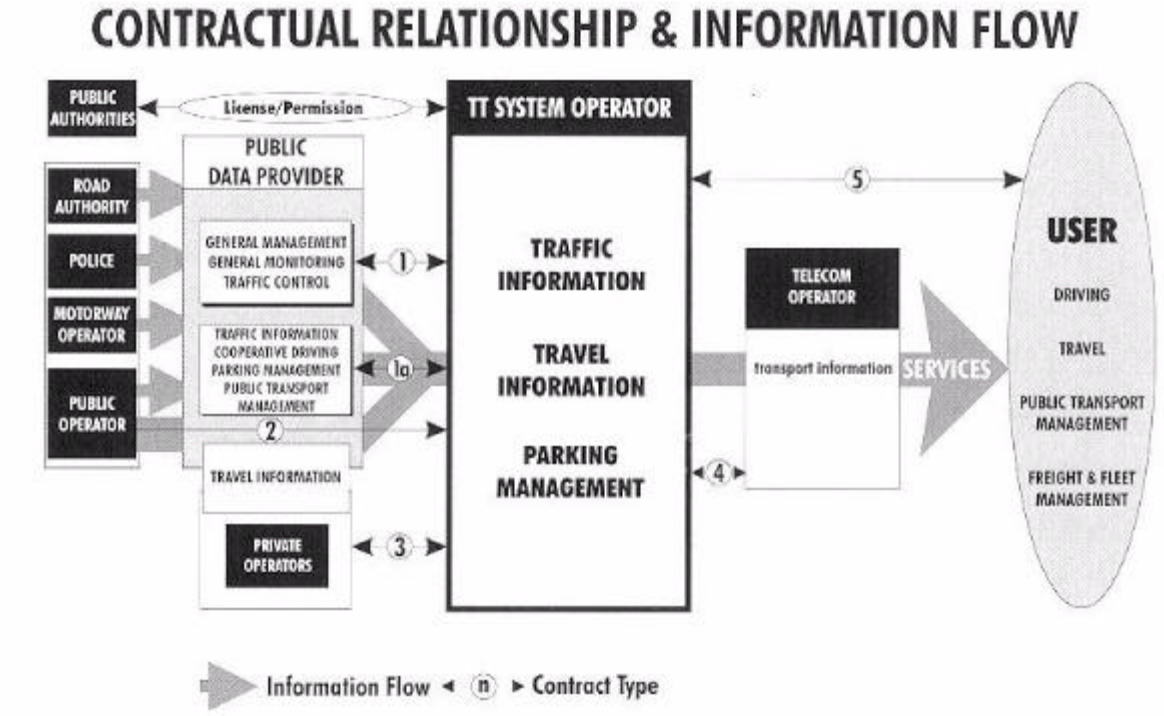


**Figure 1 Information chain with public data provider (JEEP Study)**

Agreements describing the respective legal rights and obligations of the actors involved in supplying data for transport telematics services are referred to generically as "contracts," although depending on their nature, in law they might be termed licences, service contracts, concessions, or leasing agreements. In addition to securing the basic permission or licence to operate, an independent information service provider (or RTT system operator - see Figure 1) may need to secure contracts of five types (numbers refer to contract types in Figure 1):

1. with the public sector data provider;
2. with the road operator where this is different;
3. with a private data supplier if one is present;
4. with the telecommunications operator;
5. with the end user.

Promoters of services will wish to avoid a situation where they must obtain a contract or permission to operate from each regional or city administration in turn. The commercial

pressure is to offer customers every time saving route option and give customers the best local knowledge. However, road safety and environmental factors come into play and local authorities may seek conditions on the operation. The desire to prevent any adverse impact on the local community is understandable.

### 3.1.2. Service licensing

In the UK, licensing of driver information systems was introduced to strike a balance between the need to exercise control over commercial operations of dynamic driver information services without allowing local concerns to dominate completely [9]. The UK legislation is "enabling" because starts from the principle that the service should be authorised (perhaps with strict conditions) rather than restricted or banned (see UK national report). It applies to driver information systems having a geographical content (routes and locations) which give advice in response to real-time traffic conditions. It allows the government to deal with public concern about the potential impact on traffic management and road safety by imposing licence conditions. Systems which do not involve dynamic elements, either in data collection or transmission, do not come within the scope of the legislation. An autonomous map-based navigation unit would therefore not need a licence because it carries no dynamic traffic information.

## 3.2. Other contractual Issues

### 3.2.1. Payment for data

Up to now, transport-related information has usually been provided to the user free-of-charge paid for by the data collection agency. Today, the new technologies make it possible not only to provide such information in real time but also to customise it. Therefore it is necessary to rethink the economic status of traffic information. Such information can be divided into an information "core" - the basic information from which numerous services will be derived - and the value-added "service" - the information content generated by exploiting the core information to meet a specific demand.

In the EDEN study covering cross-border data exchange, one of the Euro-regional projects, CENTRICO, does not currently foresee payments between public traffic centres. As the flow of messages each way between traffic centres is expected to be more or less balanced, it seems reasonable to let suppliers pay for their transmission costs, and not to charge for the information.

The questionnaire on Advanced Travel and Traffic Information Services (see Annex A) collected information about payment for data from Member Countries. Just over one third of countries required payments for "added value" telematics services. However all of these countries provide data which enable their networks to be used safely and efficiently free of charge. Germany has developed several model contracts covering the supply of traffic data to RTT services. A user fee, which is the same all over Germany, is recommended for the supply of data to the content provider, with an exception for basic traffic information services - e.g. via RDS-TMC - which will be supplied free of charge.

In reality, the imputation of the costs of an added value service might be difficult to derive. It is possible in Europe to find along a motorway, a transmission cable belonging to the state, an equipment control device belonging to the region, and the data processing computer residing

with the police. Furthermore, the organisations involved in traffic management and road information may belong to different ministerial departments, authorities, and/or private bodies.

To date, little research has been conducted on consumers' willingness to pay for telematic services, although there is evidence people are very commonly willing to pay for the cost of a telephone call to access information on the Internet. In many cases the costs of the telematics services may be indirect to the consumer bundled in with other services (e.g. an initial subscription to Traffic*master* is now supplied with certain Vauxhall models in the UK). In the longer term, the market penetration of RTT services, may be more influenced by motor manufacturers and equipment suppliers, and by the role of the government (for example - making telematics services obligatory), than by consumers'willingness to pay.

### 3.2.2. Access to Data

A key issue regarding the development of value-added information services will be the ability of the private sector to gain access to data or infrastructure that is owned by the State. In Germany a joint venture of T-Mobil (Deutsche Telekom)and Mannesmann Eurokom has been established to operate fixed detection equipment on the motorways. Similarly Traffic*master* in the UK can operate its own network of speed sensors under the UK's enabling legislation. However this is not necessarily the view of all Member States and there is a view that the public sector's role as traffic controller should not be compromised by private sector initiatives that are geared to the provision of commercial added value services.

### 3.2.3. Data Quality

With a large number of organisations involved in the information chain, quality control of data is likely to become a serious concern. Traditionally traffic data have been supplied by the police or public authorities, however the provision of traffic information per se is not their main objective and as a consequence the information is not always sufficiently comprehensive in its coverage or reliable enough for use in RTT systems. Therefore, additional investment in data gathering systems may be seen as necessary, by commercial service providers. The example from Germany (see Section 3.2.2 above) is a case where the private sector is investing in independent data collection alongside an extensive public traffic detection network.

Data quality can be improved through public investment, e.g. through the establishment of Traffic Information Centres (TICs) on a national or regional basis, as in the Netherlands or France. With a TIC, data gathering and the subsequent processing for information control is undertaken in one organisation. Contracts between the parties supplying the data and the service provider can enable agreement on the exact kind and extent of data to be supplied, and on quality of service criteria.

Competitive pressure is another way to improve the quality of traffic information. This is the path being taken in Germany. People will not pay for poor quality information which is provided late or badly targeted. Too much information is as bad as too little. Technology can certainly help to improve information quality, in response to market forces. Organisations in the information chain should be encouraged to agree minimum quality control procedures.

Responses from the WELL-TIMED questionnaire suggest almost half of Member States have guidelines for data quality, although in many countries these are under development, often in conjunction with the evolution of Traffic Information Centres.

The issue of who is responsible for data errors - the data owner, the content organiser, the service provider or distributor - also needs to be given consideration given the rapidly expanding market for travel information. Litigation against public authorities and large corporations has become more common in recent years. Ideally, information should be labelled so that it can be traced through the chain, to show the information source and the amount of checking carried out (if any). Standard European labelling would be a desirable ideal for international information exchange.

### 3.2.4. Intellectual property

Traffic data represent a basic raw material for travel information services. Data which have been obtained by the public sector may be regarded as a public good, paid for out of the public purse and in principle to be made available freely (though not necessarily free of any charge). However for an Added Value Service Provider the input data - possibly collected at the organisations' own expense - has intrinsic commercial value. Keeping it secret from competitors may become a serious issue.

In a competitive environment, free information sharing between commercial operators may be difficult or impossible. Service providers attract custom by providing the best information service. They may therefore be unwilling to let other services know about the information they have. For reasons of public policy it may be important that a nucleus of safety and management information is in the public domain and is exchanged freely. Other information can be bought and sold - or exchanged - between providers. Consumers can in any case choose the best provider, or subscribe to more than one service.

Some public sector agencies may wish to withhold, or even change information for operational (traffic management) reasons, for example to discourage diversions off a congested motorway. Commercial service providers, on the other hand, are likely to want to give full and accurate information, maximising the benefit to the individual subscriber rather than to the public as a whole. Operational safeguards can be written into the service providers' contractual terms if necessary.

### 3.2.5. Privacy

Individual privacy is at issue when vehicle locations are transmitted automatically to a control centre or when vehicle number plate matching is used to derive point-to-point travel times. Europe leads the world in the protection of the fundamental rights of the individual with regard to personal data processing [10]. The application of new technologies potentially affects highly sensitive areas such as tracking the movement of vehicles and those dealing with the images of individuals (e.g. CCTV), their communication, their movements and their behaviour. With this in mind it is quite possible that some Member States may wish to react to these developments by adopting protection, including trans-frontier control of new technologies and services. National differences in the adoption of such privacy rules will be a source of uncertainty for the operators of advanced travel information services. There is a (small) risk that national authorities might place certain restrictions on the operation of telematics-based services in order to protect personal data.

The demand for the protection of privacy will rightly increase as the potential of the new technologies to secure (even across national frontiers) and to manipulate detailed information on individuals from data, voice and image sources is developed.

# 4. TRAFFIC INFORMATION ORGANISATION - EXAMPLES FROM EUROPE JAPAN AND THE USA

In this Section reference is made to the results of a questionnaire survey of EU Member States which are tabulated in Annex A. The commentary also draws on a review of literature and other information sources. However, information is not available for all Member States.

## 4.1. Austria

The Ministry of the Interior has overall responsibility for urban and interurban traffic management. In each of the nine Austrian provinces ("Länder") mainly the traffic police (towns) and the gendarmerie (country areas) supply traffic data which is stored and handled by their special traffic centres - the "Landes (straßen) verkehrszentralen." The Austrian broadcasting company ORF, and the motorist clubs ÖAMTC and ARBÖ, only collect a relatively small amount of data themselves. The ORF utilises car drivers owning GSM-telephones as traffic probes. Real time data is collected on traffic congestion incidents routinely. Real time data on traffic speeds, journey times, and traffic flows is collected only for some critical points like border crossings and tunnels on a voluntary basis. The railway company Österreichische Bundesbahn provides late-running train information, cancellations etc.

Austria is a partner in the CORVETTE project (Co-ordination and Validation of the Deployment of Advanced Transport Telematic Systems in the Alpine Area), which aims to introduce RDS-TMC. Apart from the Federal Ministries of Science and Transport, and of Economic Affairs, the Austrian partners include the Technical University of Graz and ALCATEL Austria.

## 4.2. Belgium

In Flanders, all sources of information are being brought together in a new Traffic Information Centre. The advantages of pooling different sources of data are better validation, greater data consistency, elimination of conflicts between the traffic management function and the information function, and the creation of a critical mass of data allowing for the development of added-value services. The previous system was far more fragmented with each organisation in the chain seeking information on an *ad hoc* basis from wherever it was available.

In Wallonia, the road authorities have collaborated with both the police and a public radio broadcaster to promote telematics throughout the region. The Road Administration launched the WHIST project (the Walloon Highway Information System for Traffic) which includes information to drivers and the installation of various telematics systems on the road network. The heart of the project is the new traffic centre PEREX (from the French PERmanence dEXploitation des réseaux). PEREX will co-ordinate and manage traffic on the main road network. The Wallonia Ministry of Equipment and Transport (MET) is hoping to form a partnership with the national motorway police, to facilitate the system. Exchange of data and information has also to take place with other Regions in Belgium (Brussels and Flanders) and in neighbouring countries. The Walloon MET had the intention of creating its own service radio for road information, however was not possible to get the necessary FM frequencies and a better solution appeared to be the conclusion of a partnership with the French speaking public broadcaster, the Radio Télévision Belge de la Communauté Française (RTBF). Both partners will co-operate for the constitution of a Digital Audio broadcasting (DAB) network; the MET will install the required network of transmitters and the RTBF will broadcast all of its radio programmes from PEREX. MET and RTBF will also start RDS-TMC as soon as the PEREX centre is fully operational.

## 4.3. Denmark

A number of authorities are responsible for the roads and they tend to take the initiative to control or manage traffic, although formally only the police are responsible for traffic control. The Danish Road Directorate is the statutory authority for inter-urban roads whilst regional road authorities are responsible for local roads. The police have agreements to provide information to the national traffic centre in Copenhagen, run by the Danish Road Directorate. The police provide real time information on incidents and on planned events. The regional roads authorities have agreements to send information on weather related problems to the national traffic centre. In addition the Danish Road Directorate collects real time information on the motorways around Copenhagen. Information on congestion, incidents and travel times is sent to the regional radio station and is the most useful information for the national traffic centre. The national traffic information centre has specified expected data quality with the main data suppliers: police and local authorities. This is defined in agreements with each party.

Traffic information services are currently provided via the Internet and there are plans for GSM based services and RDS-TMC. The Danish Roads Directorate maintains an Internet page showing actual traffic conditions on the motorways around Copenhagen and it is planned to co-ordinate this with similar dynamic information on bus and trains in the near future. The Danish Road Directorate is planning a test together with Tele Danmark A/S to disseminate traffic information to subscribers using GSM. The Danish Road Directorate will be running an RDS-TMC service towards the end of 1998, providing information based on the continuously updated data collection system.

## 4.4. Finland

The Finnish Information Service for Travellers (FIST) programme[11] aims at an integrated service chain of traffic and travel related telematics solutions. FIST provides a common framework within which different players in the value-added chain can develop information services. The interested parties are content and service providers, network operators, user terminal and other equipment manufacturers, software houses and other interest groups in the field. FIST is a programme for inter-agency co-operation. Its function is to promote traffic and travel information services and to provide a forum for co-operation in the field. The purpose is to match the interests and roles of parties in the service chain, so as to benefit the participating organisations.

Two other leading European projects, co-ordinated by the Finnish organisations are SAMPO and PROMISE. The objective of SAMPO is to improve the possibilities for mobility of citizens through the provision of integrated Demand Responsive Transport Services (DRTS). In PROMISE[12], drivers are provided with multimodal traffic and travel information before or during a journey. Trials are being conducted in Helsinki, Gothenburg, Rotterdam, Edinburgh, Paris and Munich.

## 4.5. France (See National Report)

In France, with the exception of the National Centre for Information (CNIR), traffic management information is managed within regions. Generally, the production of traffic information, and subsequent data processing is the responsibility of the public authorities. Making this data available to the public demands the definition of the roles of various players in the road information production and broadcasting chain.

In Paris, a range of on-line data services have been launched during 1997. Services include telephone, radio-telephones, pagers, Minitel, the Internet and RDS-TMC. A commercial travel information service, known as VISIONAUTE has been launched by the private sector company Mediamobile (case study in the France National Report), in the metropolitan Paris region. The major shareholding in Mediamobile is from TéléDiffusion de France, with the car manufacturer Renault, and COFIROUTE (the French private toll road operator) also holding a stake. It will provide travel advisories using the RDS-TMC and the ALERT+ protocol. The launch of Mediamobile followed lengthy discussions between public and private sector participants, followed by the creation and experimentation of the complete technical chain. The role of each participant was defined and an agreement protocol between public communities producing the information, the City of Paris and the State, defined the rules under which this information would be made available to service operators. Bilateral contracts between each information producer and service operator define the specifications to be respected and a moderate tariff. Examples of these contracts are given in the France National Report.

## 4.6. Germany (See National Report)

In Germany, a Federal Economic Forum on Transport Telematics was established in 1995 to act as an enabling institution for the rapid development of telematics. It is a high level group chaired by the Federal Minister of Transport which acts as a strategic public/private partnership. Participation is from the automobile industry, the electronics industry, the German motoring club (ADAC), the working group of transport ministers for the Federal States (*Länder*), the association of German cities, the association of German public transport companies and the German Railways. The objective of the Forum is to jointly promote the implementation of transport telematics within an integrated transport context.

The Federal government has developed a clear policy between public and private activities. Basic information services related to the operation of the road infrastructure are the responsibility of the public sector, whereas new value-added services are to be provided by the private sector. This is shown by the emergence of two groups of services, the first being public services which are freely accessible and available free of charge, the second being the commercial services which use new dissemination media and are tailored to the requirements of individual users.

In the second group, two companies who are in different partnerships to provide commercial products and services, T-Mobile and Mannesmann Autocom, are collaborating in the collection of traffic data. The development and marketing of services will, nevertheless, be based on competition between the two participants. The two have combined forces to form a traffic information collection company DDG (Deutsche Gesellschaft für Verkehrsdaten GmbH, Düsseldorf) which will install and maintain beacons and sensors on bridges over the German Autobahn network. Data processing, service provision and dissemination of the information is being done by the two companies separately.

In a number of urban areas, regions and federal states, traffic information networks are currently being established, which form the framework for numerous different telematics systems and services. They include, for example, The Mobility Information Network (MobIN) in Baden-Würtemberg, the Traffic Information Centre BAYERN INFO in Bavaria and the co-operative traffic management in the greater Frankfurt/Main region. As a basis for these information networks, it is important to link data owners, data administrators, service providers and the final user. For the creation of a joint traffic data management under the

auspices of these networks, rules are being developed which also cover the collection, administration and use of traffic data. All of these regional information networks are being established - to a varying degree - by public-private co-operation.

## 4.7. Greece

Information not available.

## 4.8. Ireland

The main organisations with a leading role in supplying data and information to the service providers include the local authorities, the national police force, the national bus and rail companies and Dublin Bus. The Automobile Association operates an automatic telephone enquiry system, and RTE Radio - the main national radio station - operates an RDS system between its two national channels. The public transport operators provide real-time information on their respective services.

## 4.9. Italy

Information not available.

## 4.10. Luxembourg

Information not available.

## 4.11. Netherlands (See National Report)

The future Dutch organisation of monitoring, processing and dissemination of traffic and travel information provides a potential example of public/private collaboration [13]. Until now the dissemination of traffic information was done mainly by the authorities, but the services have become too complex for one organisation and much of the necessary expertise resides in the private sector. In the planned organisation (see Figure 2), a traffic information centre (TIC) will be used as a common link which integrates the processing of different sources of information. The TIC is being set up in stages. To gain practical experience with this new concept, a test-site, with the name Eurodelta, has been designated, at which a TIC prototype is already operational. The results of the evaluation will be used in deciding the final form of the TIC. The advantage of designating one TIC is that it will be the unique organisation responsible for supplying reliable and consistent traffic information. It is significant that integration takes place only at the information processing level. Strong integration or co-ordination at the data collection and information gathering level or at the dissemination level is not necessary.

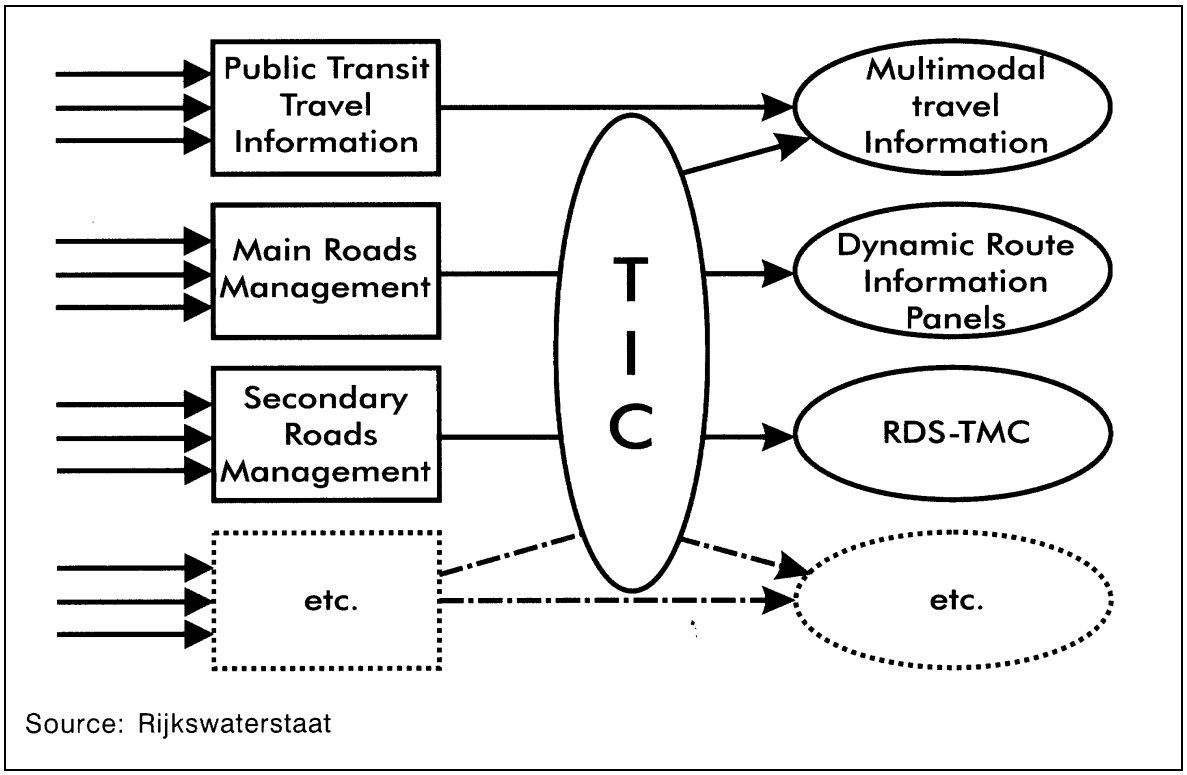


**Figure 2 Traffic Information Centre inputs and outputs (Netherlands)**

In the Netherlands each organisation will have to define its role within the chain, in discussion with the other organisations and also by the role it is able to achieve with other services. In this respect the dependencies between the organisations are very important, since the final service quality will be determined by the weakest link in the chain. This also implies that service level agreements are required. The so-called "TIC-forum"should bring together the different parties that are involved to discuss how strong the integration of data processing by the Traffic Information Centre should be.

## 4.12. Portugal

Information not available.

## 4.13. Spain

The inter-urban road authority - the Traffic General Directorate (DGT) - is responsible for traffic management in Spain, except for the Basque territory, where the regional government has the competence on traffic matters. Unlike most other EU countries, the DGT is controlled entirely by the Ministry of the Interior which has its own traffic police. Strategic traffic management is provided by five regional and a national co-ordinating traffic management centre in Madrid. The traffic centres are operational round the clock and perform both control and information functions. Each Traffic Management Centre has its own helicopter patrol for surveillance, accident assistance and enforcement. Equipped with GPS equipment, the helicopters can broadcast real-time, high quality video images. A sophisticated voice and communications network connects all the local area networks of the Traffic Management Centres, which in turn are linked to the DGT central computer from which they receive incident data from the traffic police. All incidents are immediately forwarded to other centres.

The newest Spanish Traffic Management Centre located in Zaragoza, a city of about 400,000 inhabitants, comprises closed circuit TV, data recording stations (loop sensors and weather stations), variable message signs, and a network of on-road emergency phones.

The traffic information services currently provided by DGT, include telephone services, interactive telematic services and broadcast systems. RDS is seen as an important system for broadcasting traffic information. The objective is to progress towards a high quality RDS-TMC service across the Spanish roads of the TransEuropean Road Network (TERN), with extension to the rest of roads, guaranteeing their consistency with other media, and contributing to the continuity of the service across Europe. The Spanish RDS-TMC implementation project comprises a demonstration project in Madrid, and a study on the Spanish part of the TERN.

## 4.14. Sweden

Information not available.

## 4.15. United Kingdom (See National Report)

The UK introduced legislation for the licensing of driver information systems in 1989. The Act gives the Secretary of State powers to include a wide range of conditions in licences. Examples are the roads on which a route guidance system could direct traffic and the size and shape of system apparatus. The legislation was introduced to regulate the proposed Autoguide route guidance system, although a commercial service was not introduced (see UK National Report case study).

The first commercial RTT service in the UK was Traffi*cmaster,* offering real-time traffic information on motorway traffic conditions to its subscribers. It is entirely privately financed and has gradually increased its span of operation over the years to include all the motorways. In 1998 coverage will extend to non-motorway inter-urban trunk roads. The Traffic*master* operation covers the entire information chain, from data collection, through to information dissemination to the end-users. The company has entitlements to install its own traffic monitoring equipment on motorway overbridges under the licenses granted by the UK government under the 1989 Act discussed above.

Other commercial service are now developing in the UK. One of them, developed by Global Telematics (a joint venture between European Telecom and Racal) is called the Orchid services. It uses GSM digital cellphone network plus GPS for vehicle positioning and makes use both of the GSM Short Message Service and voice combinations for more complex information, like navigational directions.

A unique example of public/private partnership has been tested in Scotland by the SCOTIA (SCOttish Traffic Information Association) initiative[14], launched in 1995. SCOTIA, led by the Automobile Association (AA), brought together private motoring and transport companies and associations with local, regional and national governments. The SCOTIA consortium operated a Traffic Information Centre for its members in parallel with national and regional traffic management operations provided by the public sector. Currently the consortium is reviewing the business case for a more permanent operation.

In England the proposals for Regional Traffic Control Centres (RTCCs ) [15] illustrate how far the authorities might go in their efforts to harness private capital and resources through a package to privatise the assets and business opportunities. The following are being suggested

as examples of new business opportunities for the private sector under private finance arrangements:

- Marketing commercial added-value services like driver information;
- Exploiting under-used assets, such as communications cables alongside motorways and some trunk roads;
- Rental of motorway margins for siting installations for mobile communications;
- Charging for breakdown and recovery services;
- Renting out spare capacity in RTCC buildings and computer systems.

## 4.16. Experience in the USA

In the USA, private consortia are acquiring the franchise to operate new traveller information services in a number of cities. For example, in Washington D.C., 27 public sector agencies are between them investing $8 million to establish a traveller information centre for the region which will be operated privately by the private company SmartRoute Systems. After 3 years the service is expected to become a self-financing, profit-making enterprise, providing both free and commercial information services.

The "ITS Showcase" or test bed has been a strong USA development. Here, the public sector highway operator makes available access to facilities such as CCTV cameras and public traffic data sources to a number of private sector companies for them to develop their products and services. The companies offer their products to test at their own expense and develop their own marketing agreements within limits defined in the terms of the contract. Examples include the California Bay Area Intelligent Transport Systems (ITS) test bed[16] and the Atlanta 1996 Advanced Traveller Information (ATIS) Showcase[17].

The Seattle Wide-area Information for Travellers (SWIFT) project[18] involves the collaboration of public-sector agencies and private-sector companies to test the viability of delivering traveller and traffic information over a wide area using wireless technology. The SWIFT project is a unique public and private sector partnership in which data obtained by several public-sector entities for surveillance and control tasks are combined to provide an information stream to which the private sector can add value. The differing goals and objectives of the public and private sectors are met by defining the content and structure of messages to be passed between the participants and defining the interfaces through which the messages are passed. The success of projects like SWIFT requires the development of rigorous methodologies to facilitate public and private sector partnerships.

## 4.17. Experience in Japan

In Japan, the "third sector" public limited companies which operate the expressways are strong customers for transport telematics systems and are collaborating closely with the development of the Vehicle Information and Communication System (VICS) offering dynamic travel and traffic information services across the whole of Japan [19]. The VICS consortium itself is entirely private sector - approaching 100 companies- who agree to develop products to conform to the VICS system architecture. Nevertheless VICS relies heavily on the traffic data made available by the Expressway Corporations and from the surface street traffic sensors installed and maintained by the Police Traffic Bureaux. To finance the building of regional VICS information centres the manufacturers have agreed that the sale price of all VICS receivers includes a surcharge which goes to the operating company and supports the basic

driver information services. The more sophisticated dynamic information services are made available only on subscription.

# 5. ESTABLISHING THE INFORMATION CHAIN

## 5.1. National context

Section 4 shows that there is considerable diversity in the basic institutional and legal frameworks amongst Member States. At national level in particular, the respective roles of the road and police authorities and the involvement of the private sector vary enormously.

In order to investigate the issues surrounding legal, contractual and institutional arrangements for RTT services, a study was made of the organisational framework for driver information services in four EU Member States. Although concentrating on driver information, many of the remarks concerning the organisation of the information chain apply equally to multi-modal telematics-based travel information services.

Detailed results are contained in the four national reports for France, Germany, Netherlands and UK. Each country has a unique starting point of organisations involved and has evolved its own legal and institutional framework. There are also some similarities: France and Netherlands place the responsibility for data collection and processing with the public authorities (or those who manage the roads on behalf of the authorities), whereas in Germany and the UK the independent service providers play a greater role.

In outline, arrangements in the four countries are as follows:

**France:** The national and local public authorities retain full responsibility for collecting and processing raw traffic data. Broadcasters and others involved in providing travel information services may secure public data for a fee. Those who receive public data are bound by contract to observe various operating conditions.

**Germany:** New driver information services are given entirely to the private independent service providers to develop in response to market requirements. A partnership of two competing service providers is authorised to collect raw traffic data for the national network of Autobahns. The authorities retain responsibility for basic information on traffic conditions as a part of their traffic control function and are actively enhancing the quality of public services within public-private cooperation agreements.

**Netherlands:** The national government plays a major role in the collection and processing of comprehensive traffic information through the national Traffic Information Centre which is operated by the public sector. Information is made available to the private sector for provision of added value services.

**United Kingdom:** A large amount of traffic data is collected and processed by government agencies and local authorities but driver information services have been left mainly for the private sector to develop. The UK regulates by law certain types of driver information service. Traffic*master* is one such licensed service which has established its own independent Traffic Information Centre, alongside public traffic management organisations.

## 5.2. Strategic frameworks

Different countries have their own organisational frameworks for telematics-based services. But for all of them a basic requirement is that the information chain must be complete in order to be able to deliver the service. This requirement is independent of the technology used for transmission and broadcasting to the end-user.

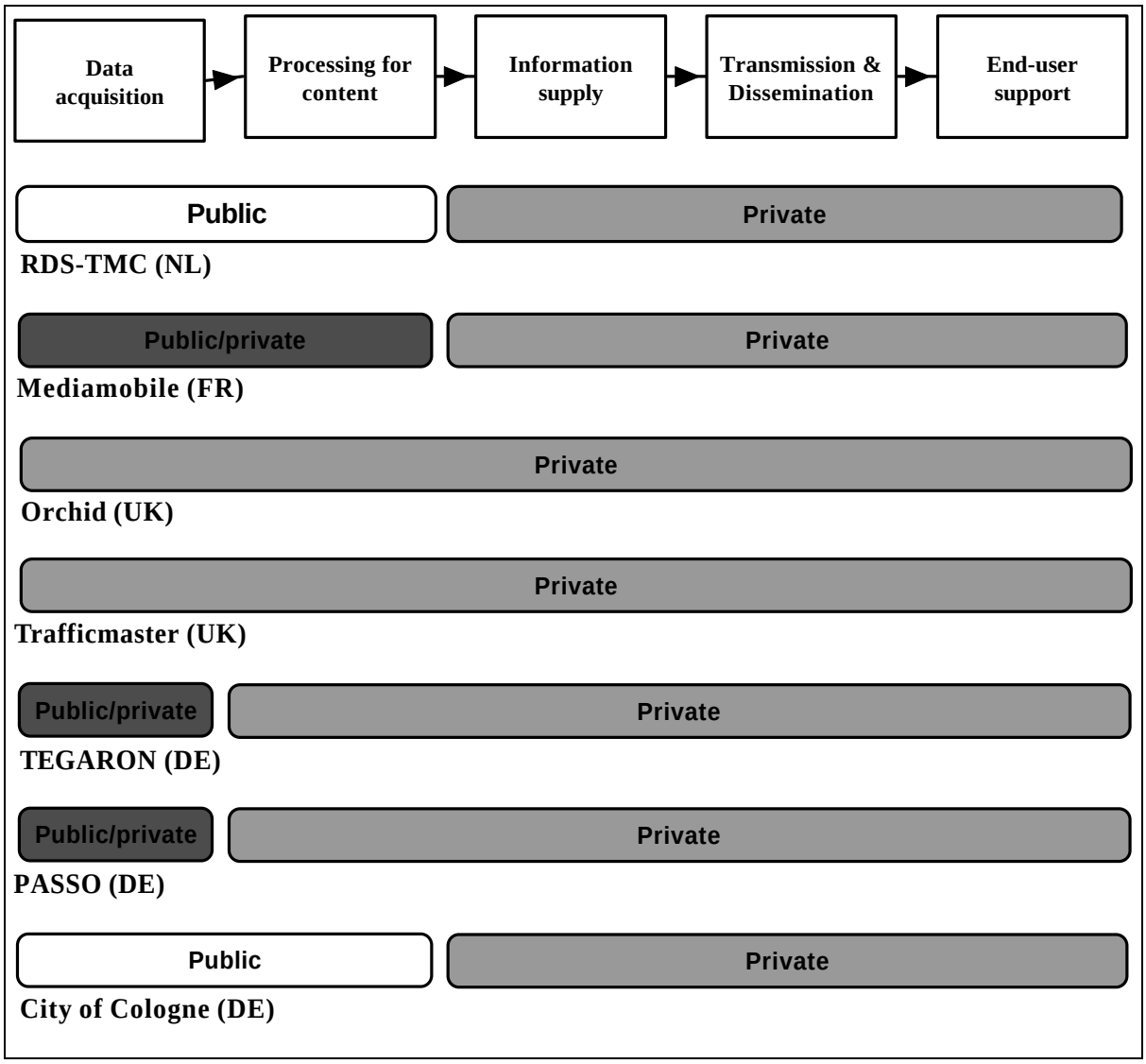


**Figure 3 Examples of the Information Chain (From the national case studies)**

Five main processes in the chain were identified in section 2. They are (1) traffic data acquisition, (2) processing, (3) information supply, (4) transmission and dissemination and (5) end user support. The make up of the information chain for the examples reported in the national case studies varies considerably (see Figure 3). Each link can comprise one or more organisations and some can involve both public and private sector operators. An exact definition of the roles and responsibilities of the different partners is therefore negotiable, and the appropriate mix of roles and responsibilities is an interactive process in response to local, sometimes changing, operating environments.

The examples tabulated in the national reports show a variety of agencies involved in the information chain, drawn from the public and private sectors: police, local authorities, regional and national government, private sector motorway concession-holders, private service providers, broadcasters, telecommunications operators, motoring organisations, vehicle manufacturers, etc.

## 5.3. Harmonising agency objectives

With so many potential players there can be conflicting requirements. Commercial interests are geared to profit and will be orientated to market-driven (consumer) needs. Public authorities and the police will have a very different emphasis, concerned with public safety, and orderly traffic management, the avoidance of traffic congestion and nuisance. Therefore in some countries (e.g. France, Netherlands) the public sector shoulders responsibility for the collection and processing of data, at the start of the information chain, in order to retain responsibility for matters relating to road safety, traffic flow and road management.

The different political and commercial objectives need to be harmonised. This can be done in various ways, as the national case studies show.

France: Under the contract for the supply of road traffic information in the Paris region the service operator guarantees the public authority against any condemnation of the authority for matters arising out of their commercial activities.

Germany: The Federal Economic Forum on Transport Telematics has been instrumental in developing the legal framework and model contracts for private traffic telematics services through discussion and consensus.

Netherlands: Distributors of information will be bound by an agreement with the National Traffic Information Centre to safeguard the quality, consistency and objectivity of the information they provide, while ensuring that it is up-to-date, does not endanger road safety and is accessible to the public.

United Kingdom: The national government licences certain kinds of driver information system to allow private sector operation. The enabling legislation makes provision for service licensing terms and conditions designed to ensure that safety (for operator, driver, equipment installer) is respected and government can utilise data from the service operator for traffic management and control purposes.

## 5.4. Stage 1: Data collection and supply

### 5.4.1. Public data acquisition

Most road authorities and their agents collect traffic data as an essential part of traffic management and control. Some have invested heavily in traffic monitoring equipment, installing loop detectors and other sensors. For example, in the Netherlands the Ministry of Transport sees the collection of basic traffic data as its task and has spent large sums (MECU 140) on extensive automation. Distribution of road traffic information is seen as one of the most effective ways of improving the utilisation and efficient operation of the existing infrastructure.

In Paris traffic detection for the urban motorways is used to calculate travel time forecasts between known points which are displayed on Variable Message Signs.

Sophisticated public traffic monitoring is usually put in place on heavily trafficked motorways or where the city authorities have invested in advanced traffic control or parking management systems. These systems can be a source of high quality data for telematics-based traveller information services. Major investment of this kind may not be justified on strictly commercial criteria. In these cases the public sector is in a strong position to offer quality data to private sector service providers. In practice, arrangements vary considerably from country to country.

### 5.4.2. Access to public data

France: Authorities in the Paris region have started to collaborate in an "Agence de presse" which acts as the wholesaler of traffic information to private sector service providers. The contracts for data supply have a 3 year term and a scale of fees is in place, being partly a lump sum plus a variable amount according to usage. Rebates can be negotiated if the public authority fails to supply in accordance with the contract.

Germany: Public data, where it provides automatic detection of incidents, heavy traffic etc. is available free of charge. Fees apply to data collected automatically on other traffic conditions with 1 minute updates available. Private service providers pay for the cost of installation of interfaces.

Netherlands: The objective is to have only one main source of traffic information which will be the National Traffic Information Centre (TIC). This information is defined as:

> "Information concerning the actual situation on the (Dutch) roads, as well as short-term forecasts for those situations which are of major concern to the (prospective) road users. This information consists of the following elements: information on traffic flows, actual and planned roadworks, expected congestion, traffic-related weather forecasts, traffic-relevant information concerning public transport and parking problems, advice and announcements regarding traffic management."

United Kingdom: Large amounts of raw data on traffic conditions are collected by national and local government agencies. However, private firms operating in the information field already or intend to collect their own data and thus control all stages in the information chain. Public sector revenue streams are not yet developed because the market value of the basic information has not been determined.

### 5.4.3. Infrastructure-based traffic monitoring

There are marked differences between countries in the policies adopted for the installation of fixed traffic monitoring equipment by private sector service operators. In France and the Netherlands traffic monitoring on public highways (not toll-roads) is solely the responsibility of the owners and operators of the road infrastructure and they are the monopoly suppliers of data. This is not so in Germany or the UK where agreements are in place for the private sector to install independently operated detection and monitoring sites.

In Germany the Federal Ministry of Transport and the road administrations of the Federal states, have elaborated a model contract as the basis for local permissions. On the basis of these contracts, private sector providers in Germany are aiming at equipping a larger part of the federal motorway network with their own data collection systems; their objective being to equip the entire network by the end of 1998. The company DDG has been established to operate the monitoring network as a joint venture involving the mobile telephone subsidiary of Deutsche Telekom (T-Mobil) and the equipment manufacturer Mannesmann Autocom.

In France the toll-road operators do their own traffic monitoring and data collection as private companies and for their own commercial purposes.

In the UK the private sector company Traffic*master* has established its own independent monitoring of speeds through fixed detectors and cameras covering the motorway network.

In this way the company can secure vertical integration of the complete information chain for its real-time driver information services.

In summary, for fixed infrastructure-based data collection there are four alternative organisational models:

- an exclusively publicly funded and managed operation which is available to any service provider on equal terms (the French "Agence de Presse," or Dutch National TIC); or
- an arrangement with a private sector to operate infrastructure-based data collection but with an obligation to make it available to any service provider on equal terms (DDG Germany); or
- a completely private and commercial operation where data collection is done by the private sector exclusively for its own operations (Toll-road operators in France or Traffic*master* in the UK); or
- a partnership between the public and private sectors bring together data sources from both sides (SCOTIA).

Each of these organisational models has advantages and disadvantages. The examples point to there being an emerging network of data suppliers, some public sector, some private sector and some hybrids, each one operating fixed monitoring equipment on an exclusive or near-exclusive basis within the area of their coverage.

### 5.4.4. Other data sources

Fixed detection is not the only way to secure real-time traffic data. With the rapid spread of mobile telephones the motoring organisations and some radio stations are recruiting members of the public to act as traffic reporters using mobile phones during the course of their regular journeys. ADAC, the motoring club in Germany, currently has some 10,000 of these *Staumelder*. Some radio stations also use helicopters and light planes to report on traffic conditions at peak times on the busiest days.

Another recent development is the use of floating cars (also known as traffic probes) to send automatic reports on traffic conditions. Mediamobile in Paris uses a fleet of 2000 taxis to report their position every 3 minutes or 400 metres when on duty. Between 100 and 800 taxis are active at any one time generating over 200,000 position reports in a day. Software is used to determine point to point travel times in real time.

Independent service providers in Germany will be basing their services increasingly on floating car data following the successful VERDI trial with 1000 vehicles in North-Rhine Westphalia. This was conducted jointly by the private company Mannesmann Autocom, the regional ministry of transport and the motoring club, ADAC. Information from floating cars requires no permission from the authorities to collect and will therefore be an attractive source of traffic information for the private sector.

There is also the possibility of tracking individual vehicles passing known points in the network to obtain point-to-point journey times. This can be done by digital camera, using image processing to read the vehicle number plates (optical character readers - OCR - the method used by Traffic*master*) or by using the tags issued for electronic tolling and installing additional readers to provide extra timing points. Both methods require safeguards to preserve the anonymity of vehicle owners and drivers.

The cost of securing real-time traffic data is a major commercial factor for private service operators. Independent traffic monitoring by use of floating cars or by installing roadside equipment will increasingly enable a private service provider to obtain control over the geographical coverage and supply of data. Not only will the emergence of alternative data sources be a factor in cost control but they may also give service providers the opportunity to develop an advantage in data collection over their competitors.

### 5.4.5. Data exchange

The combination of public and private sector data seems to be a crucial point for the achievement of win-win situations. But although both parties might be willing to exchange data, the costs involved in data exchange can become prohibitively expensive, for example if the data communication costs are high or the data need extensive re-formatting and location codes adding.

In France, Germany and the Netherlands there is already open access to public traffic data subject to complying with the contract conditions imposed by the public sector. This is not yet accepted as the norm in the UK, although SCOTIA in Scotland shows the way and the situation in England may change if the proposed Regional Traffic Control Centres are established.

The EDEN study suggests some quality attributes for the exchange of data between neighbouring traffic centres:

- what is the accepted time between the occurrence of an event and its detection, and within what time scale should the information be forwarded to a neighbouring TIC?
- how can different certainty levels be dealt with for individual messages; should different certainty levels be attached to different sources of information (e.g. police versus GSM-based); how should conflicting data be treated?
- will important but unverified information be forwarded immediately or will a centre wait until it has been verified by the police?
- how to be sure that messages have arrived? What happens with computer failure?

Traffic information in the Netherlands is supplied by the TIC using agreed common European standards: the RDS-TMC location database, the DATEX data dictionary and the DATEX and DATEX-Net data exchange specifications. The situation in the UK is somewhat different. With Traffic*master* and Orchid the information chain from data collection to publishing is controlled by a single operator.

At present there is no mechanism to require private operators to conform to European standards or protocols such as DATEX. However, the adoption of standard formats and protocols for data exchange between the organisations in the information chain will encourage service development and market competition. If public authorities are involved, as in France and the Netherlands, they can insist on the use of accepted standards. For this reason it may be important to retain a minimum level of public sector participation even if the services themselves are delivered to the end users on a free market basis.

## 5.5. Stage 2: Processing for information content

### 5.5.1. Adding value to raw data

Processing raw traffic data to produce useful and marketable information is a key step in the information chain. It involves sorting and merging traffic reports, traffic data, and other information (such as weather forecasts) from different sources. Some of this can be done automatically, as when floating car data are processed to compute point-to-point journey times, or when spot speeds are averaged to show the current level of congestion. Value is added by interpreting all the data inputs to yield information which is relevant to users'needs. Later stages of the information chain involve delivering this information in a format which is convenient to the user.

In France and the Netherlands the business of processing high-quality up-to-date information content from public data sources is retained under public sector control as an adjunct to data collection. Service providers receive the information output from this process, but not the raw data. In Germany raw traffic data is supplied direct but only in aggregated format. Either way, the providers may take these official data feeds along with their own independent data sources to develop the information content for their products. In the UK and Germany service providers rely heavily on these other sources. However, police control room reports are one official data source which is very hard to replace, and most information providers will try to secure access to these.

Strict conditions are placed on service providers receiving public data in the Netherlands. They are not allowed to alter the contents of the traffic information supplied by the TIC. They may, however, aggregate the data, on condition that the criteria of selection are explained to their clients.

In Germany, the joint venture company DDG supplies raw data both to T-Mobil's joint operation with Mercedes-Benz (TEGARON) and to Mannesmann Autocom which operates the "PASSO"service. The two partners in the joint venture therefore collaborate on data collection but compete in the market on their information service supply and product ranges.

### 5.5.2. Location referencing

Most traffic data are location-specific, in that they relate to a stretch of road, an intersection of two or more roads, a defined geographical area like the town centre, or a well-known landmark.

Location referencing can be costly and time-consuming, unless it can be done automatically. It has to be done accurately, and to a format which can be easily interpreted at later stages of the information chain. For example place names, road numbers and landmarks would need to be included if it is to be read as the script for a radio broadcast or transmitted to a pager as a text message, but the same data would be geo-coded for display on an electronic roadmap. Traffic information broadcast by the Radio Data System Traffic Message Channel (RDS-TMC) for digital transmission on FM radio requires its own unique referencing system.

Errors in location referencing are potentially serious from the point of view of the end user. At the European level, locational referencing systems need to be compatible from one country to another. This problem is being addressed by an ERTICO task force on location referencing.

### 5.5.3. Data ownership, quality and reliability

With multiple stages involved in the information chain (often involving different organisations) quality control of data is likely to become a serious concern. In the Ile-de-France Region (Paris) each public authority retains control and liability for the data provided to its wholesale server. It also retains liability and ownership for the processes used to reconstruct the traffic situation and travel time in the area under its management.

In Germany it is standard practice to disclaim liability between data suppliers and intermediaries and towards end users. The model contract accepted by the national and federal transport ministries allows private companies to match, combine and transmit the received data freely but does not guarantee the continuity of data provision and data quality.

The same issues do not arise when the whole information chain is managed by the service provider and is under the providers' direct control. However, the service provider needs to guarantee a minimum standard of quality and reliability of information to the end user and may face financial penalties if it does not.

## 5.6. Stage 3: Information service supply

Just as the organisations involved in gathering raw traffic data may not be the same as those processing data for information content, a further separation can take place between processing and service supply. This is most clearly seen when the authorities operate a Traffic Information Centre or warehouse, as with the Netherlands national TIC or in Ile de France. The public sector organisation has only narrow responsibility for providing an information service to end users, for example operating roadside variable message signs or RDS-TMC but no other in-vehicle services.

The separation between information processing and supply is not clear cut because of the option for independent traffic monitoring to augment official sources. Thus Mediamobile in Paris collects and processes floating car data for its Visionaute product, in addition to receiving public authority data. Public-private partnerships are also possible, as with the city of Cologne which has entered into an agreement with the local city carrier, NetCologne, to act as the exclusive provider of dynamic traffic-related data to third parties and to jointly market traffic data with the urban authority.

Where the information chain is vertically integrated, for example Traffic*master* and Orchid in UK, the same organisations are responsible for data collection, information processing and supply, and the separation between the three does not arise. However these examples show how traffic information services can be supplied by one party and marketed by another quite different company. For example Traffic*master* provides the in-vehicle information service for Vauxhall/GM cars.

## 5.7. Stage 4: Transmission and dissemination

### 5.7.1. Diversity in service carriers

The marketing and distribution of traffic information is rapidly expanding both in terms of the type of service offered and the user groups. For example, the local radio station in Cologne, WDR, offers videotext, fax on demand, Internet, automatic telephone enquiry lines, and RDS-TMC. It has recently added a digital audio broadcast service (DAB) in addition to its normal traffic broadcasts. Another example is Traffic*master* which offers group access via a PC link

or TV monitor to offices, hotels, distribution centres and to Heathrow airport, in addition to Traffic*master* in-vehicle and mobile phone products and services targeted at individuals.

Traffic*master* uses paging networks and low-power radio transmitters to disseminate the data and information for its products. As the company expands from its UK base it is experiencing problems with the different radio frequency allocations from country to country. Although in principle the low-power transmission frequencies and paging networks are available across national borders, in practice the frequency allocations differ which means that its in-vehicle receivers have to be fine tuned for each country. This of course has implications for the supply of cross-border transport telematics services.

The value of information services can be greatly affected by delays in transmission. A common criticism of broadcast information is that it often arrives too late to be useful to the end user. Performance of the transmission stage of the information chain is therefore critical to the delivery of high-quality services. Traffic*master* monitors continuously the time delay between posting a message for transmission and the time it is received over the radio paging network.

### 5.7.2. Radio Data System - Traffic Message Channel (RDS-TMC)

The available communications media are also expanding. In the Netherlands achieving nationwide coverage of the RDS-TMC has the full backing of the Ministry of Transport. The Ministry sees no role for itself in the operation of services but they are working with others (the National Police Agency, service industry, electronics industry) with the aim of achieving that goal during 1998. Achieving Europe-wide coverage of RDS-TMC services is the purpose of the Memorandum of Understanding launched at the Berlin World Congress on Intelligent Transport Systems in October 1997.

RDS-TMC provides the means of one-way transmission of short messages to a pre-specified format and provides the basis for electronic map-based products like Visionaute (Mediamobile, France) as well as radio receivers equipped with RDS-TMC decoders.

### 5.7.3. GSM - based services

One consequence of the rapid development of mobile phone networks, especially GSM, is the growing involvement of telecommunications companies in disseminating travel information. Examples are Orchid in the UK and TEGARON in Germany. GSM provides a digital transmission medium both for voice and short text messages. Moreover a packet data service on GSM is planned and this may provide the carrier for travel and traffic information.

German industry is promoting the use of an industry protocol called GATS (Global Automotive Telematics Standard) as the standard for emerging travel and traffic information services using mobile data transmissions. The advantage of making this interface an open standard is the diversity it will allow in the market for in-vehicle equipment. A number of early systems based on GATS are detailed in the German National report (Mobile Hound, Bosch, Skeye Guide). In principle, GATS is intended as a global standard and its future status as such will have to be secured by industry agreements and through the formal standardisation process.

### 5.7.4. Other transmission options

Broadcast digital data transmission is also starting to take off, not only with RDS-TMC but also Digital Audio Broadcasting (DAB) and the planned launch of satellite-based digital networks in the near future. The national report for Germany cites trials with DAB in Frankfurt, providing parking occupancy data and information on traffic conditions.

Dedicated Short-Range Communication (DSRC) using a microwave link to the emerging European standard offers the possibility of an alternative transmission system, although the availability of DSRC for information services is going to depend on decisions about the investment in electronic tolling infrastructure as well as the availability of suitable in-vehicle receivers. The prime movers for this development will be the toll road authorities and operators.

Use of the Internet for traffic and travel information has grown rapidly in the last two years. Germany provides examples: road works information by the national transport ministry, parking information in Cologne, Frankfurt, etc. A Wireless Applications Protocol (WAP) is being promoted by Ericsson, Motorola, Nokia and others to bring Internet content and advanced services such as RTT to digital cellular telephones.

Travel and information services can make use of all these transmission systems as carriers. There will be synergy between the information service provider and carrier, because the carriers themselves have an interest in developing services which increase business on their networks. Carriers are also competing on the basis of the services they can deliver. Travel and traffic information is one of these, as part of the wider movement taking place to develop services for information and entertainment.

In all of these cases there is a need for basic travel information content to a standard of quality and reliability that is consistent with the service to be offered. In terms of organising the information chain the implication is that the carriers themselves can diversify and become the information service providers, or they can remain in their primary role as broadcasting or telecommunications network operators.

## 5.8. Stage 5: Interface with the end user

Distribution to the end user is the vital final link in the information chain. This is often the vehicle driver, but a great diversity of other parties are end users such as bus and taxi operators, distribution managers, public transport users and transport operations support staff. Moreover all travellers by road are potential consumers of pre-trip and on-trip travel and traffic information.

Increasingly the information is being bundled with other interactive services appropriate to the user, such as hotel and ticket reservations, emergency call-out and remote vehicle diagnosis in the case of breakdowns, vehicle tracking in the case of theft, and support at a distance for commercial drivers. Many of the German car manufacturers are planning or are already operating these integrated services: Ford "Rescu," Opel "OnStar," Mercedes-Benz "TeleAid" and Volkswagen "GEDAS" are just some examples.

All this is made possible by the enabling role of low-cost and reliable mobile data communications. Given the recent rapid growth and expansion of these services the German national report concludes that the major issues are no longer the products:

"The key issue is content, especially information on inner-urban traffic situations, the availability of parking, and the availability of intermodal travel options: Park & Ride, public transport and logistical solutions for car pooling, etc."

## 5.9. Continuity of services

As these services expand, effective systems for all stages of the information chain need to be established from the local level up. End users will expect continuity of service between adjacent countries, regions and local authorities, with no "black holes". An example is emergency calls by mobile phone, where there is as yet no European equivalent to the "911" service in the USA.

The need for service continuity will be most visible for the middle and later stages of the information chain: information supply, transmission and end user support. This will be a primary focus for European inter-operability initiatives. Some European mobile data networks and digital broadcasting systems are already emerging: GSM, RDS-TMC and DAB. This is not yet the case for DSRC and other short-range radio communications links, or for paging networks where there are still some discrepancies between countries in the radio frequency and bandwidth allocations. European standards bodies are playing a major part in resolving these problems and their efforts need to be further supported.

The weakest link in the information chain is likely to be with data collection and processing for information content. This will have a direct affect on service quality, and raises two key issues:

- How can continuity in the supply and coverage of public sector data and publicly provided information be secured? This needs to deliver the necessary content and quality for a telematics based information service, including continuous road network coverage, information timeliness, comprehensive road network coverage and a high degree of reliability.
- What are the options available to the private sector to make good shortcomings in these public sources in order to secure added value for their products and guarantee quality?

If these issues can be resolved it is clear that there can be strong competition in the information products and services offered to end-users through the powerful alliances now being formed between the telecommunications companies and the motor industry.

# 6. DEVELOPMENT OF SERVICES

## 6.1. Public and private sector roles

### 6.1.1. The public sector role

Sections 4 and 5 of this report demonstrate the range and complexity of organisation required for the provision of advanced traveller information services. All of the examples have involved establishing new business structures, both in the public sector (the Netherlands National TIC and the French "Agence de Presse") and in the private sector (DDG in Germany, Traffic*master* in the UK) or by means of a public/private partnership such as SCOTIA.

Setting a framework of rules and guidance, and removing institutional barriers to new patterns of RTT service is one of the key roles the public sector has to assume. The position, role and responsibilities of all the organisations involved in the information chain need to be made transparent in order to provide a strategic framework for the development of services. Final service quality as delivered to the end user will be determined by the weakest link in the chain.

In the Netherlands, the Ministry of Transport puts the emphasis on the creation of the necessary conditions for information systems, such as the availability of the traffic monitoring systems and the relevant standards.

In Germany, the Federal Economic Forum has been supportive in developing the necessary business framework for new telematics services. It operates as an enabling institution chaired by the German Federal Minister of Transport to develop the legal framework. In particular it has worked on:

- model contracts and financial provisions for data exchange from the public to the private sector;
- contracts for deployment of privately-operated traffic monitoring equipment on the highway;
- guidelines on design and installation of private traffic monitoring units on the highway.

### 6.1.2. Public services

Germany is also in the process of establishing clear policy guidelines towards the provision of the services themselves, distinguishing between:

- basic collective information services which should be freely accessible to the public and supplied free of charge;
- new services tailored to the requirements of the individual user and developed on a commercial basis by the private sector.

France and the Netherlands also see the delivery of basic traffic information as a public service closely linked to traffic management. However, in the UK there is still uncertainty about the role of information with respect to the control and management of road traffic. Government policy is that services will have to be developed on a commercial basis unless they are highly cost-effective in support of public policy issues. Currently the official view is that the public sector role should not extend beyond roadside information services.

It is inevitable that the role of the State in the transport sector and expectations about public and private services will vary from country to country. This in turn will influence the nature of any private sector enterprises that emerge from transport telematics. However a common factor is the need to find a balance between the economic logic of the private sector - primarily that of gaining a return on any investment - with the public service goals of equity and the provision of services available to all. There is also an expectation that the public sector will ensure personal mobility while trying to limit its costs to society as a whole.

### 6.1.3. Commercial services

The development of a market for innovative products and services for traffic and travel information involves a high risk for industry and operators because the market potential for these services is, as yet, unproven. Private sector experience in the UK, France and Germany all points to the need for a clear legal framework for the new services to justify the large-scale investments involved. The private sector needs a stable framework to provide planning security and the prospect of a clear return on investment.

Business security depends on minimising the risks in participating in each step of the value chain. This includes whether the service provider can carry out independent traffic monitoring to add value to the basic information product, whether there are procedures in place for securing publicly owned traffic data of sufficiently high quality and whether there is any regulatory constraint on dissemination of traffic information via the new telecommunications media.

The opportunities for private sector participation in transport telematics implementation may also be hampered by a number of factors.

- *Commercial viability.* New and complex services often require high initial investment and can involve potential risks. Private participation will only occur if a satisfactory revenue stream can be established. Some services may only provide returns after a long period of negative cash flow.
- *Identifying responsibilities.* The horizontal and vertical split of competencies for road traffic management in most Member States can be a major complication and burden for the private sector operators who need to establish interfaces with all the key players. The emergence of a lead agency which can be the wholesaler of traffic information, like the Netherlands National TIC, also simplifies arrangements for the private sector.
- *Cross-sector support.* Inevitably there are different priorities between transport policy objectives on the one hand, where the focus is traffic control, safety and management, and on the other hand trade and industry objectives, where need is to stimulate employment and new products and services. A high-level planning group, like the German National Economic Forum, allows the actions which flow from these different priorities to be debated and prioritised.
- *Legal liability.* At present the liability risks of providing information services are unknown. Some opportunities, like dynamic route guidance, could generate new liability risks for the private firms and public agencies involved, unless the legal liability issues are circumscribed.
- *Risk sharing*. Public/private partnerships are becoming more common in Europe, combining the strengths of the public sector and the opportunities provided by the

private sector. However the terms of the partnership, the allocation of risks and the scope for generating revenue streams will all need to be closely evaluated.

- *Intellectual property.* If private sector companies are to invest money in the collection of traffic data, that information has commercial value. The rules for sharing proprietary information with others must be placed on a proper commercial basis. A similar issue is whether traffic data and information secured at public expense should be available to service providers at marginal or zero cost? Policies on this point differ between Member States.
- *Marketing packages:* Commercial operators will be seeking opportunities to package traffic information with non-transport content such as integrated booking, tourism information, yellow pages and entertainment services.

## 6.2. Multiple authorities and agencies

There is great complexity in the organisations with which a service provider must interface. Results from the questionnaire survey (see Annex A) illustrate the multi-agency nature of traffic management in most Member States. The traffic police or gendarmerie, town and city authorities, regional transport authorities, motorway and toll-road operators and the statutory authorities for inter-urban roads can all play a significant role.

Authorities naturally will wish to exercise some control over services and their content. To achieve influence the public agencies must co-operate proactively with the private sector in developing the legal and business framework. Difficulties arise when agencies adopt different policies and practices towards the independent service operators. The interactions between the agencies can be as significant as the interactions with the service provider itself (see Figure 4)

In France the state has acted to simplify these inter-agency demarcations by creating a single, integrated traffic agency for each of the big cities and main motorway corridors. The local authorities and the state together will form an "Agence de Presse" to act as the wholesale server of traffic data. The Agency will furnish traffic data in a format that can be used by service providers. The first is close to operation in the Greater Paris Region and another is in progress in Lyon.

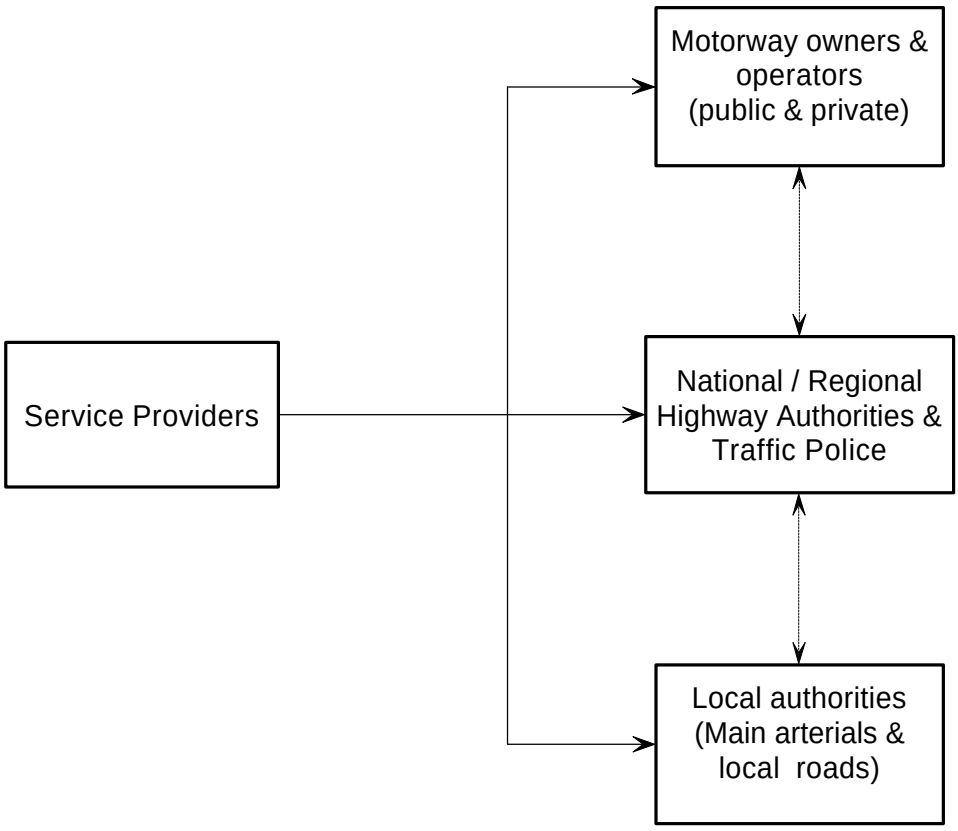


**Figure 4. Links between the service providers and the main agencies**

In parallel, two committees are created for Greater Paris: the Public Authorities Co-ordination Committee (CCCP) and the Consultative Committee on Road Information Broadcasting (CCDIR) for the service providers. The CCCP co-ordinates the work of the public authorities managing a wholesale server. Its role is to harmonise the work of all the parties, to ensure the users services get established and to supervise their impact on road safety and traffic. It can also issue an opinion on the conformity of the road information services to the published strategy on road network management and safety. The CCCP includes representatives of all the various authorities concerned with the issue and is open to any public information producer in the region who becomes associated with the agreement.

For Greater Paris (Ile de France) formal contracts have been drawn up to define the terms on which road traffic information is supplied. It is significant that these include annexes dealing with the terms on which information is supplied by the wholesale server (modes of data handling, file formats etc.) and also the strategy on road network management and traffic safety. Further details are given in the annexes to the national report for France.

The creation of co-ordinating bodies to bring all the authorities and agencies together with the private sector to build consensus and administer agreements made voluntarily is a promising way forward. The Paris region Public Authorities Co-ordination Committee and the Federal Economic Forum on Telematics in Germany provide two alternative models.

## 6.3. Market competition

The proper place for competition in the provision of transport telematics services is still being considered. In Germany, the Economic Forum has concluded[20] that:

> The planning, organisation and operation of telematics applications are tasks primarily to be fulfilled by private industry. Competition is to decide on which telematics applications and services survive in the market."

In reality this implies the encouragement of open competition of technologies and services; standardisation of technologies and interoperability of applications; and the lowest possible number of services operated by the government, but priority for private services in a more or less deregulated market.

### 6.3.1. Competition in data collection

Underpinning the information chain there is a heavy investment needed for basic traffic monitoring infrastructure and in collecting and processing raw data to achieve information content. Competition at this stage of the information chain will happen as and when the cost of data collection drops (for example if floating car methods prove cost-effective) or if the revenues to be gained from operating services are expected to grow considerably.

All four national case studies show that to date competition over infrastructure-based traffic monitoring is very limited. France and the Netherlands have established a predominantly public sector information supply. Germany and the UK have encouraged the private sector to engage in independent traffic data collection but in each case a single dominant operation has emerged. In Germany the two major service providers have formed a joint venture to operate traffic monitoring equipment on the motorways. The equivalent in the UK is Traffic*master* which operates its own exclusive network of motorway speed sensors.

Public policy usually demands safeguards against a monopoly supplier. If another major player is to emerge in the German or UK markets, it will need to follow one of three options, or a mix of all three:

1. collect its own data, to its own requirements, with its own independent traffic monitoring, possibly by installing its own fixed traffic monitoring equipment;
2. negotiate to receive data from the existing supplier(s), who may be market competitors;
3. negotiate access to unexploited public sources of real-time traffic data where they exist: e.g. traffic detector loops on motorways and on local arterial roads.

Early indications from Germany are that the decision by the private sector (Mannesmann and T-Mobil) to pool resources for the earlier data-gathering stages of the information chain will not prevent the development of a variety of products and services which will compete with one another later in the chain.

### 6.3.2. Public / Private partnerships

The Dutch national report concludes that a European strategy on ITS implementation and a breakthrough in public-private collaboration is needed. In the Federal Economic Forum on Transport Telematics, Germany has developed the kind of strategic public-private partnership that is required. It has been successful as an enabling institution even though the German federal structure means it is not capable of making binding commitments. At the operational level the UK has looked at a public-private partnership (SCOTIA) for managing the information chain. After three years of trials SCOTIA must now agree long-term operating arrangements which have still to be put in place.

The key issues for SCOTIA, as in any partnership, seems to be to define the nature and terms of the partnership. This involves an agreement on the rights and obligations of the various partners, particularly in the key areas of information sharing (intellectual property), the sharing of costs and the admission of members who may be competing on service delivery. The experience of SCOTIA is that public authorities need to be very pro-active in developing a public/private partnership agreement for this approach to succeed.

Achieving unity of purpose for a public-private partnership involves a meeting between two quite different cultures. Public authorities will place a heavy emphasis on traffic safety issues and will be biased in favour of regulation. The commercial bias is self-regulation, profit maximisation and customer service. Different divisions between public and private, open and closed operations (exclusivity arrangements) will have a marked effect on business risk.

### 6.3.3. Franchising and subsidies

Franchising the service provider provides one possible way forward. Here the authorities can secure a private sector consortium by competition and so assign the entitlement to gather and process information on an exclusive basis. The franchise-holders can be made to observe rules about intellectual property, and for allowing open access to non-proprietary data sources at publicly agreed rates. There could be financial penalties or the franchise can be withdrawn if the rules are breached.

Financial support from the public sector is one last form of partnership. This may be desirable for policy reasons, to give an initial stimulus to the market. A greater degree of financial underpinning by the public sector can only be justified where the socio-economic benefits will greatly outweigh the direct costs. This is happening in the Netherlands where the Dutch government is making a one-off financial contribution to the launch of RDS-TMC-based travel information services.

# 7. CONCLUSIONS AND RECOMMENDATIONS

## 7.1. The legal and business framework

### 7.1.1. Regulation of services and service providers

The regulatory framework for RTT services has to achieve a balance between giving commercial freedom to the service providers to develop services as they wish and the need in some cases for controls, especially over road safety and orderly traffic management. The principal reasons for regulation are four: safety, traffic management, consumer protection and fair competition. The case studies show that the service provider may or may not coincide with the service carrier. There are three distinct levels of controls possible and not all will be required in practice:

1. Regulations and contracts relating to the carrier of the RTT service: the broadcaster, telecommunications provider, Internet or DSRC operator (e.g. in relation to the use of radio spectrum or continuity of service coverage)
2. Regulations and contracts concerning the travel and traffic information service provider *per se* (e.g. in relation to the safety of the providers' traffic monitoring operations and the way they are conducted).
3. Rules on the content of the information service (e.g. for traffic management reasons.)

Normally it should be the service provider that will be the subject of a regulation, Memorandum of Understanding (MoU), contract or other legal instrument, with a view to influencing some aspect of the service itself. Commercial interests will tend to favour self-regulation and voluntary arrangements whereas the authorities may have a bias towards formal regulation and visible sanctions. The national case studies provide examples of self-regulation by the private sector based on consensus-forming (Germany), of regulation by legal and contractual conditions (France, Netherlands and UK), and by MoU (Germany for the rapid introduction of telematics services, and at EU-level for RDS-TMC and Data Exchange).

Recommendations:

- Regulation should wherever possible be "enabling" rather than restrictive.
- Opportunities for self-regulation and the use of voluntary codes of practice should be adopted whenever possible. The aim should be to avoid over-regulation which would act as a brake on the start-up of new commercial services.
- Regulations should separate what is necessary to influence the service and service content from the rules that may apply to the service carrier.

### 7.1.2. Co-ordination between authorities and agencies

Bringing all the relevant actors together into some kind of formal relationship with the service providers will help to establish business security and encourage private sector investment. The approach being taken in France and Germany is to develop model contracts and legal frameworks which can be used for reference and adapted to local conditions by all the parties. In both countries there is a complex sharing of responsibilities between the different levels of government for the control of traffic and for information on traffic conditions.

In Germany model contract documents on data exchange have been developed for use by the federal state authorities; a similar contract is in preparation by the association of German cities for use by its members. There is also an optional licence for the installation of privately operated road-side equipment on national highways. France has developed a legal framework around the duties and responsibilities of service providers who are supplied with traffic information from the public sector wholesale server or "Agence de Presse."

Recommendations:

- Inter-agency co-ordination is needed at a strategic level and at the operational level.
- At the strategic level a regional or national policy forum, such as the Public Authorities Co-ordination Committee for the Greater Paris Region or the Federal Economic Forum on Telematics in Germany can provide a platform for developing model agreements on the organisation of information services and the resolution of inter-agency demarcations.
- A "TIC-forum," as in the Netherlands, is recommended at the operational level to bring together all the different parties that are involved to agree local arrangements for the integration of data by the Traffic Information Centre.
- To be successful, the regional or national forum must be given the authority and responsibility for developing and maintaining an enabling framework of rules, contracts, and voluntary agreements for advanced traffic and traveller information services in its area of responsibility.

### 7.1.3. Competition between service providers

The private sector is unlikely to invest until the public sector sets out the ground rules about how the information chain should be organised, in particular the regulatory framework and the basis for competition.

A key question is the balance between competition and controls in the early stages of the information chain. Independent data collection is an important means of developing service quality and content relevant to the needs of the end users. At the same time there is a core requirement for continuous, infrastructure-based traffic monitoring which is expensive to provide and maintain. Member States face choices in how to manage the data collection and information processing stages. Either there can be a public information wholesaler, as in France and Netherlands, or this becomes a private operation, as in Germany and the UK.

Recommendations:

- Full competition should be encouraged in the delivery of information products and services at the middle and later stages of the information chain.
- Commercial operators should be permitted to engage in their own independent traffic monitoring, either through the use of floating cars or through deploying their own traffic monitoring equipment, since this is a way of developing different products to serve the market.
- Sources of traffic data and information which are paid for from public funds should be made available to all service providers on equal terms.

### 7.1.4. Minimum public service obligation

In most countries there is growing recognition that reliable information about major traffic hold-ups, major road accidents, adverse weather conditions and other major incidents can contribute to the effective management of traffic on the road network. It is the policy in some Member States that this essential information should be made available to all road users as a minimum service, universally available and free of charge.

For example in the case of an emergency or major traffic incident it is highly desirable that all service providers give out information promptly and consistently with one another. Germany has recommended a policy of making this information available free to service providers. In France and the Netherlands service providers are required to pass on this type of information with speed and accuracy as a condition of their contract with the public information wholesaler.

As services develop, operators will increasingly secure their own means of traffic monitoring independently of the public authorities. Some services, like Skipper in Paris, operate completely independently without any kind of licence or contract with the authorities. From time to time they will be the first to obtain information on a major traffic incident or accident and it essential for public safety that this information is shared with the agencies without delay and passed on to other service providers so that all can benefit.

Recommendations:

- An agreement between service providers and the major actors on handling essential information about emergencies and major traffic incidents is necessary to put in place good information handling procedures, consistency of information and universal coverage.
- Any licence, contract or code of practice made with service providers should oblige them to make prompt transmission to the authorities (and/or the public information wholesaler) of any notification they obtain concerning a potential emergency or major traffic incident.

### 7.1.5. Traffic management and control

Legislation was introduced in the UK because of public concern about the potential for dynamic driver information systems leading to greater use of alternative traffic routes that are unsuitable for certain types of traffic (such as minor residential roads being used for through traffic). This is a key issue for most local authorities in urban areas. For example the city of Cologne requires private service providers to restrict their guidance services to a pre-defined major road network and to get agreement for a traffic management concept by the city authorities before they commence operation.

For a service like Traffic*master* which is strictly information-only and does not offer any advice or guidance on routes and diversions the concern does not arise. But in Greater Paris the distributors of traffic information with routing features, like the Mediamobile Visionaute product, are required to observe the strategy on road network management and safety. This may provide a model for other regions.

Recommendations:

- Local authorities and other agencies should agree on a regional basis the rules that should apply to road network management and safety, and publish a recommended

road hierarchy for through traffic and for different classes of traffic. These rules and recommendations should be made available to RTT service operators, with prompt notification of any updates.

- Suppliers of navigation databases should ensure that their products correctly reflect the local roads hierarchy, where one is published.
- A code of practice is needed which requires service providers to consult the relevant local or regional authority and agree local guidelines and procedures. This has to be done at local or regional level because the traffic mix, the circumstances for redirecting traffic and the availability of alternative routes are all highly variable and very localised.

### 7.1.6. Data content and accuracy

Final responsibility for data content and accuracy rests with the organisation publishing the information or supplying it to the end user. Contracts between intermediates in the information chain may need to include provisions regarding liability for data inaccuracies, loss of coverage and delay or failure in transmission. The model contract recommended to the *Länder* in Germany makes the following provisions:

- it excludes any form of liability of the data providers,
- it does not guarantee the continuity of data provision and data quality (depends on availability),
- it allows private companies to match, combine and transmit the received data freely.

In France the public authorities agree to make information available on condition that the service provider agrees to provide a fast information service of good quality.

Service providers have a duty to their end users to achieve minimum standards of data content and accuracy and may wish to carry insurance against liability claims by users for wrong or misleading information. Operators in the UK believe the exposure to risk from publishing traffic data which may be misleading is relatively small.

Recommendations:

- Data content and accuracy should be dealt with through the relevant contracts and agreements between the parties in the information chain.

### 7.1.7. Intellectual property

Commercial development of added value services involving data and information exchange between different parties raises issues about intellectual property. Travel and traffic information which is proprietary to the service operator has commercial value. If it is made available to another party (including the authorities) the commercial value of the data should be respected.

Recommendations:

- Agreements on data exchange should include clauses to protect the commercial value of traffic monitoring done independently of the public authorities, e.g. a requirement that the authorities do not transmit proprietary information to a third

party unless the circumstances are exceptional (e.g. an emergency or major traffic incident or other threat to life).

- The requirements of public authorities in relation to the use and commercial exploitation of publicly-owned data should be dealt with through contracts with commercial service providers for data and information supply.

### 7.1.8. Charging for data

National policies on charging for traffic data and information exchange vary between the four case studies. The process of collecting and processing reliable traffic data, even with maximum use of automatic monitoring, will incur both capital and on-going operating costs. A charge for information is a means of recovering added value. The agencies involved also need to recover their costs in order to maintain service. In Greater Paris (Ile de France) this is done on the basis of a fixed sum plus variable charges according to usage. In Germany fees for commercial purposes are specified under the model contract for public data provision.

Recommendation:

- The parties in the information chain must negotiate an appropriate basis for charging for data and information exchange, and agree what rebates should be offered as performance incentives (reliability of data supply; speed and accuracy of information transmission, support for public policy goals on safety and traffic management etc.)

### 7.1.9. Protection of privacy

The privacy of vehicle owners and drivers when they are members of the public is a highly sensitive issue in most European countries. Automatic location, identification and tracking systems now allow vehicles to be followed with great precision. The public authorities may need to introduce procedures to safeguard privacy in the interests of maintaining public confidence in telematics. For example Traffic*master* has developed a method for using numberplate data captured by optical character reader to calculate point-to-point journey times while still giving anonymity to the vehicle and driver. Similarly Tegaron has developed an encryption technique for floating car data.

Recommendation:

- The technical methods for ensuring anonymity to the vehicle and driver should be published or made available under licence.

### 7.1.10. Independent traffic monitoring

Pressure for independent traffic monitoring is likely to grow as new information systems take off. Germany has developed a model licence for the installation of private roadside equipment. In the UK this is dealt with through the service licensing system, supported by a detailed method statement for installing and maintaining equipment on motorway overbridges. France and the Netherlands do not foresee a role for the service providers regarding the installation of equipment.

There are a number of reasons why service operators may wish to secure their own independent data sources:

1. To secure better geographical coverage of the network;

2. To have direct control over data collection costs, quality and reliability;
3. To secure a competitive advantage by obtaining information that is highly tuned to the RTT product and to end-users'needs.

It is expected that floating car data and data from taxis and other vehicle fleets will increasingly serve these requirements. Nevertheless fixed detection equipment is likely to be of continuing importance, to provide continuous monitoring in real time of the core network and at key locations.

Recommendations:

- Those authorities and infrastructure owners who are prepared to allow private operation of fixed traffic detection equipment on the road network should exchange guidelines on recommended safe procedures for installing and maintaining this equipment e.g. at the roadside and on motorway overbridges.
- Those authorities who do not operate a comprehensive network of fixed traffic detection equipment at present should review their policies with respect to private sector installations.
- Authorities and agencies who do operate fixed on-line traffic detection equipment should be asked to adopt procedures for making the data available in real time to service providers.

### 7.1.11. Use of radio spectrum

Where radio paging networks and low-power radio transmitters are needed for service delivery, the allocation of radio frequencies is usually dealt with by the national competent authority. There are inconsistencies between countries in the frequencies available for transport telematic applications. Further harmonisation at the European level would assist the development of cross-border services.

Recommendation:

- This matter has to be dealt with at the European level ( see Section 7.2 below).

### 7.1.12. Regulation of service content

In Germany there is an Information and Communication Services Act which provides the general legal framework for the provision of any teleservices, their related data privacy issues and for digital signatures. The key provision is that teleservices, including traffic-related information and services, can be provided without special licensing or registration. There is no specific liability for the contents of teleservices other than for any other commercial product or service provided (i.e. providers can exclude liability in service agreements with their customers). [The position in other countries was not available to the study team.]

Recommendation:

- Regulation of service content for travel and traffic information services should be limited specifically to matters covered in paragraphs 7.1.4 and 7.1.5. Other controls on service content, if justified, would be best dealt with through general regulations for the Information Society and teleservices.

### 7.1.13. Safety and product liability

Concerns regarding the safety of equipment in use have centred on the design of the human-machine interface for in-vehicle equipment. This is one of five priority domains in the Community Action Plan on Road Transport Telematics. Germany has agreed guidelines on the design and installation of information and communication systems in vehicles (for details see German national report). The UK similarly has a draft "Guide to in-vehicle information systems" published by the British Standards Institute.

The issues of safety in use and the human-machine interface are being addressed by the Task Force on HMI issues, who will, *inter alia*, take into consideration the documents prepared in Germany and the UK.

Safety in use is also addressed in the UK by the Highway Code published by the government as an authoritative source of advice to road users, including drivers. A new version is in preparation and will include guidance on the use of in-vehicle information systems and other equipment.

Recommendations:

- From a legal standpoint, safety in use should be covered by general legislation for consumer protection based around a test of fitness for purpose.

## 7.2. Actions at European level

The High Level group on Road Transport Telematics (RTT-HLG) facilitates at European level the identification of requirements for developing RTT, including the framework for advanced traffic and traveller information services. Like the German Economic Forum on Transport Telematics it serves as a policy forum for representatives of the EU Member States. There are also precedents for involving the private sector, for example the industry forum on RTT deployment arranged by the European Commission (EC) in January 1997. The RTT-HLG is therefore well placed to help the EC identify subjects for common action between the Member States.

Based on the findings of the WELL-TIMED activity, it is recommended that the EC, in consultation with the RTT-HLG, should develop a Memorandum of Understanding between service providers and the major actors covering the following important areas:

- *Minimum public service obligation*: Guidelines are needed on data and information exchange in emergencies and major traffic incidents, with provisions to protect the commercial value of independent traffic monitoring and on the requirements for service providers to convey safety-related information promptly and accurately.
- *Traffic management and control* There should be a generally applicable code of practice for service providers (including model agreements). Its provisions should include a requirement on service providers to observe the local roads hierarchy and any local and regional road network management strategies. Service providers should liaise with the local traffic management authorities to avoid actions which would encourage traffic to use unsuitable roads.

On *privacy*, the EC should examine Directive 97/66/EC (Concerning the processing of personal data and the protection of privacy in the telecommunications sector) to determine whether additional clauses are needed on the use of vehicle location identification and tracking systems in anticipation of public concern about the privacy of these systems.

The EC should also bring forward *model contracts for the installation and maintenance of privately-operated roadside equipment* based on current practice in Germany and the UK in order to assist authorities and agencies who are considering these developments.

The *safety of driver information systems* and well how they integrate with other in-car systems is a subject receiving much attention amongst car manufacturers. The EC should follow and support this work on in-vehicle system safety, which is also a priority area for the Intelligent Vehicle Initiative in the USA.

Other recommendations:

- The EC with European Radiocommunications Office (ERO) should investigate the options, benefits and disbenefits of further harmonisation of radio frequency allocations for transport telematic applications, particularly low-power short-range radio and radio paging networks.
- The EC should sponsor the drawing up of model contract clauses on data content and accuracy in conference with the data suppliers (public sector and private sector) and information content providers.
- The RTT-HLG should exchange information on charging schedules for traffic data and information exchange from public authorities and publicly funded franchised operators sources, in order to inform and stimulate a European market for added-value services.

There is a growing emphasis on multi-modal transport with better integration of journeys by public transport and between different modes, for example through the proposals in the 1996 EC White Paper on the Citizens' Network [21]. Many of the findings in this report apply. However there are special factors such as bringing together real-time information and data for different modes, and co-ordinating the databases of different operators, particularly across borders. A follow-on study of advanced multi-modal travel information services is therefore recommended and could have high relevance to the development of transport policy in the EU Member States.

Finally, the underlying need is to establish an organisational framework in each of the Member States which will embrace all the stages in the information chain. The future development of RTT services across Europe will depend on the extent to which this can be done regionally and then further developed through inter-regional connections. In this way end users can be offered a continuous service from one country to another.

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# 8. ANNEX A QUESTIONNAIRE AND TABLES OF RESULTS

As part of the WELL-TIMED activity a questionnaire on advanced travel and traffic information services was sent to Members of the High Level Group on Road Transport Telematics (RTT-HLG). The overall objective of the questionnaire was to identify current best practice in transport data exchange and information management in the EU Member States in relation to advanced travel and traffic information services. The questionnaire sought information on the forms of services already operating, the main agencies involved, the collection and supply of real-time traffic and travel data and the regulation of the services.

In total, responses were received from fourteen Member States. The main results are tabulated in Table A1.

## Advanced travel and traffic information services

This part of the questionnaire sought information on the range of advanced travel and traffic information services which were operating in EU Member Countries in mid 1997, or which were planned to start operating in the next 12 months. Figure A1 shows the number of EU Member Countries having each type of service.

Almost three quarters of EU Member States have some form of dynamic travel and traffic information services. Services based on RDS-TMC, Minitel and the Internet were the most common. Over half of the countries had automatic phone enquiry systems, and/or GSM and cellular phone systems.

## Traffic Management Agencies

Figure A2 shows the main agencies with legal and contractual control and management of urban and inter-urban traffic and thus responsible for exchanging data for advanced travel and traffic information services. The results demonstrate the important role of the town or city authorities along with the traffic police or gendarmerie. Regional transport authorities, the statutory authority for inter-urban roads, and the motorway and toll road operators also had some responsibilities in two-thirds of Member States. The data also illustrate the multi-agency nature of traffic management in Member States, with half of the countries having five or six agencies involved in the process.

## Service Providers

Figure A3 shows the range of service providers which have a leading role in providing advanced travel and traffic information services to the public or commercially. Not surprisingly, radio and TV stations provided services in all of the EU Member Countries. Other frequently cited service providers were city transport operators (67%), collective transport operators (64%), motoring organisations (57%), and motorway operators (57%). Four countries had five or more types of service provider. The cable TV operators do not yet appear to have entered this market.

## Real Time Data Exchange

The questionnaire sought information on the types of data which were being exchanged between the traffic management agencies and the travel and traffic information service providers and the results are shown in Figure A4. In all of the countries real time data exchange was evident for traffic congestion, incidents and for advance warning information, for example, on roadworks. About three quarters of countries reported agencies who exchange real-time data on congestion levels, two-thirds exchange statistics on traffic flows and traffic speeds, and about a third exchange data on journey times. Only two countries reported data exchange in real-time on all of these parameters.

Half of the EU Member States have guidelines or other conditions concerning data quality and other information supplied by the traffic management agencies to the service providers, although in many countries these are under development, often in conjunction with the evolution of Traffic Information Centres. Only three countries had examples of the traffic management agencies charging for supplying data and information to the service providers. Public/private partnerships were in place or planned in eight countries for the collection of data and information for dynamic real-time information services.

Up-to-date dynamic information (e.g. late running services, cancellations, timetable changes) was provided by public transport operators in almost two-thirds of EU Member States.

## Real Time Traffic Data Collection

Dynamic travel and traffic information services rely on the systematic collection of real-time traffic data, with good coverage of major routes. This section investigated whether any of the service providers routinely and systematically collect real-time data independently from the traffic management agencies (see Figure A5). In up to 50% of EU Member States, service providers are independently collecting real-time traffic data, most frequently on incidents and roadworks (50%), and on traffic speeds, traffic flows and congestion monitoring (33%). In one third of countries surveyed, service providers operate their own equipment at the roadside or on the highway for continuous monitoring and supply of information.

## Regulation

This section sought information about any laws, regulations, restrictions, licences or other pre-conditions placed on advanced travel and traffic information, including dynamic trip planning or route-finding services, or on the type of organisation which can operate these services. Evidence from the questionnaire responses (see Figure A6) suggests that this is a developing area in the provision of advanced travel and traffic information services, with many countries stating that these issues were "under discussion." Protection of privacy for the individual was seen as the most important aspect for regulation, with almost two-thirds of countries having laws, regulations or codes of practice about this. Only four countries have controls to protect the public interest, for example to regulate the information on diversionary routes, or the selection of routes for navigation purposes. Seven countries have laws, codes of practice, informal policies or guidelines on charges and pricing applied specifically to advanced travel and traffic information services.