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Community transport statistics at the dawn of the third millennium
Madrid, Spain, 30 and 31 October 2000
A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (http://europa.eu.int).

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\textbf{OPENING SESSION}
KEYNOTE SPEECH

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Introduction

At the dawn of the 3rd millennium, telecommunications envelop the planet in an extremely close net, but it is up to the transport systems to move people and goods and to regulate (or limit) the flow of exchanges between countries and between geographical and economic areas. The importance of transport has become crucial due to the increasing economic integration, to globalisation, and to the increasing impact of trade in the world economy.

As for the European Union, the Common Transport Policy has been one of the first "common policies", and the related competencies placed at Community level have been regularly increasing through the different Treaties which have shaped the Union during the last half of the 20th century.

Transport statistics are the basis to understand the role of transport in a world dominated by the revolution in information technologies, the liberalisation of trade and the world integration of markets.

For users the issue of statistics involves many dimensions:
- what questions statistics can or should answer ?
- which theories and models these statistics are built on ?
- which level of reliability can be reasonably expected, in particular taking into account the costs of statistics ?
- which level of timeliness is necessary for statistics to be really useful ?
- and finally, what kind of training is necessary to understand and properly use statistics ?

For official statisticians the role is changing:
- the public policy use of official statistics is growing exponentially;
- the need for international comparability in statistics is also growing very fast;
- the role of official statisticians is gradually shifting from that of creator of information through surveys to that of selecting relevant information from abundant existing computerised databases.

Official statistical systems have to respond to these changes under severe resource constraints. This requires strong improvements in terms of effectiveness and efficiency, needing the use of Total Quality Management methods as well as an optimal policy for externalisation of work.

A systematic cooperation between official statisticians, academic statisticians and the private sector is essential, due in particular to the shift from survey lunching to data mining, which will more and more be the case.
**Scope and mission of Community transport statistics**

Community transport statistics refer to transport as a function as well as to transport as an economic activity.

Statistics on **transport as a function** describe the quantities of passengers and goods transported, the types of goods, the journeys, the vehicles and the infrastructure, at international, national and regional level, as well as the impact of transport on environment, safety, and energy consumption.

Statistics on **transport as an economic activity** concern the economic aspects of those enterprises for which transport is the principal activity.

These statistics are produced and disseminated under the **responsibility of Eurostat**, the Statistical Office of the European Communities. More precisely, the **mission of Eurostat** in transport statistics consists of:

- providing the statistical information necessary to support the elaboration, monitoring and evaluation of **Community transport policies**;
- being the **statistical office of the Union**, which means meeting the information needs of national and regional administrations, the private sector, research, and citizens;
- promoting and coordinating the improvement and development of the **European transport statistical system**, which includes Eurostat and the national statistical systems of the countries of the European Economic Area and the candidate countries;
- cooperating with other countries, in particular the Mediterranean countries, with a view to **convergence of transport statistical systems**.

**Community transport statistical programme**

The **needs for statistics on transport** are quite complex and difficult to satisfy because transport has many dimensions and because general and specific data are requested at the same time. The liberalisation and fragmentation of the transport market and the decentralisation of statistical institutions increase the complexity of the system. Changes in user needs leave some existing data sets less exploited while demanding new data sets. On the other hand, technological development is providing new opportunities for cost-efficient collection and dissemination of statistical data on transport.

The **priorities** of the programme are based on many **criteria**:

- information needs of Community policies;
- information needs of national and regional administrations;
- information needs of the private sector, research, and citizens;
- rapidity of return of investment (how quickly development can produce results);
- inter-domain production links (contribution to production of statistics in other domains);
- robustness of the data collection framework (legal bases and voluntary agreements).

The Community transport statistical programme 1998-2002 results from the necessary compromises between these criteria.
The **traditional data sets** rely on quite robust legal bases and voluntary agreements, and are rooted in the partner countries. In addition, **new data sets** are becoming increasingly important for Community and national policies:

- not only inland transport, i.e. road, rail, and inland waterway transport, **but also** maritime and air transport;
- not only transport of goods, **but also** transport of passengers;
- not only the quantities transported, **but also** transport traffic, i.e. vehicle movements;
- not only the demand of transport, **but also** the impact of transport on the economy, safety, environment, and energy consumption;
- not only modal data, **but also** intermodal data;
- not only national data, **but also** international and regional data;
- and finally, a geographical scope covering not only the European Union, **but also** an enlarged Europe and the partners that are relevant to the external policies of the Union.

For the assessment of the Trans-European Network data on **infrastructure parameters** (nodes and links) and **traffic flows on the network** are needed, and this information is normally not available from national statistical institutions.

There are not sufficient resources at Community and national level to extend the European transport statistical system to regular **intermodal statistics**. As today, these statistics are dealt with mainly through Community research programmes in transport.

Due to the increasing importance of environmental issues, it is necessary to collect additional basic information from countries, which is necessary to improve **transport and environment** indicators. Due to the liberalisation of the transport market and the development of a Community framework for fair and efficient pricing of transport, it would be necessary to extend the Community statistical programme to **transport prices**.

**Working partnership in Community transport statistics**

Like in most statistical domains, Eurostat coordinates a **joint venture between the Commission and the partner countries**, based on common interests and investments, so as to build up a consistent European transport statistical system. All partner countries are called upon to share the challenges of this joint venture in return for Community investment.

The European statistical system is moving **towards a system with more than thirty countries**, and this is a major step to be faced through progressive and concrete incorporation of candidate countries into the system.

Eurostat promotes a **working partnership** in the production and dissemination of Community transport statistics, which is based on:

- **reciprocity** in access to statistical information;
- **joint investment** to improve and develop the European transport statistical system;
- **distribution of production** to partner countries.

Partner countries need Community transport statistics because of the network nature of transport: the national transport policy of each country strongly depends on the transport policy of the Community and of other countries, in particular for all decisions concerning transport infrastructure. This **reciprocity** is systematically taken into account when improving and developing the European
transport statistical system. Basically, each legal base or voluntary agreement is the framework to satisfy the priorities of both the Community policies and the partner countries.

Reciprocity in access to statistical information is a counterpart of partner countries’ increased investment in improving coverage, statistical quality, and timeliness in data collection. However, changing processes at work or developing new ones has to take into account severe resource constraints in most partner countries. The Community has thus to cofinance this effort through a joint investment that is already at work in some transport areas.

Eurostat has to deal with the increased workload involved in extending the coverage of Community transport statistics. Since it is likely that Eurostat human resources remain almost constant over the next years, some distribution of production has to be organised in a way that complies with the Community statistical law, in particular with the principle of confidentiality. Eurostat is thus organising this distribution within the European statistical system, by externalising some production processes to partner countries.

Basically, the production of Community transport statistics is (or will more and more be) carried out by a network of partners coordinated by Eurostat. The functioning of the European transport statistical system will thus less and less look like a “star”, and more and more look like a “web” of partners. The respective institutional roles of Eurostat and the partner countries will be almost the same as today, but the European transport statistical system will become more participatory and more flexible, with better distribution of information flows and resources.

**Future prospects**

For the future, it is crucial for data users and data producers of Community transport statistics to understand how transport statistics will be influenced in particular by the main determining factors which are on the agenda of this seminar:

- EU transport policies;
- changes in transport geography;
- transport in the net economy; and
- intelligent transport systems.

It is important in particular to answer the following main questions:

a) **What statistics will be necessary for whom?**
We have to identify the future statistical information needs of the different categories of data users as well as the degree of overlap between these needs.

b) **Who should be responsible for what statistics?**
We have to identify suitable scenarios for division of responsibility between the different categories of data producers. In particular we have to assess to what extent and in which transport areas data collection undertaken directly at Community level might become more appropriate than today's data collection based on the subsidiarity approach.

c) **By what financial and technological resources?**
We have to identify what financial and technological resources can be made available to produce transport statistics, in particular as regards cofinancing schemes and the exploitation of data from the more and more computerised transport systems.
d) **How to organise production?**
We have to identify suitable organisational approaches to optimise information flows and the use of available resources, in particular as regards externalisation.

**Conclusions**

I am confident that this seminar organised jointly by the CEIES and Eurostat will be able to provide substantial and concrete answers to these crucial questions. Last but not least, answering these questions is necessary for preparing the next **Community transport statistical programme 2003-2007**.
1st plenary session:

EU TRANSPORT POLICIES, DATA NEEDS
THE CHANGING NEEDS FOR STATISTICS FOR THE FUTURE DEVELOPMENT
THE COMMON TRANSPORT POLICY

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Introduction

This Conference presents a valuable opportunity to reflect on the changing needs for statistical information in the Community and in particular for Community policies. I am responsible for the co-ordination between DG TREN and EUROSTAT of both transport and energy statistics. I can sincerely say, in the numerous years that I have been at the Commission, that there has been a considerable improvement in both the quantity and the quality of statistics that the ‘office ‘has made available. However, this conference is not to allow Commission officials to praise each other and I would like to raise a number of issues that I believe need to be thought through at the beginning of the new millennium.

Economists like to start any analysis by devising a scenario and I propose to follow best practice. My starting point is that the rate at which Europe and the world are changing has accelerated considerably in the last twenty years and seems likely to continue to do so. One consequence is that I believe policy makers need much shorter response times in terms of statistical early warning than has been the case in the past. This, in turn, implies obvious questions about the nature of the statistics that can be supplied. For the transport sector, which is one of the key areas of the economy, there is a well-known ‘coupling’ between transport activity and the rate of growth. What happens in the economy as a whole certainly is reflected, even magnified in some cases, in the transport sector. Decision-makers in transport need appropriate data rapidly hence it seems to me that there has to be a conscious trade-off between the quantity, perhaps indeed the quality, of statistics and speed of delivery. The essential test for policy making is whether the statistics will offer a sufficient degree of reliability to allow decisions makers to make rational and objective judgements of the situation they are confronted with. This is something that I want to come back to.

Let me just mention a number of other issues that could be tackled. I just said that I will start like an economist but I will rapidly descend from that particular pedestal and be a civil servant in order to address the important issue of the management of statistical work. Traditionally, statistics has been seen as an activity that can be undertaken outside the main stream of policy making - in fact it must, so as to avoid political fiddling with data. Is this the same today or should there be a distinction made between what might be termed traditional statistical gathering and a new function of identifying trends and key movements that relate directly and in the short term to policy making? Collection of data and its interpretation are by and large interdependent activities.

The present political orientation of the Commission with emphasis on benchmarking of best practice and its dissemination so as to improve competitiveness is also particularly demanding as to statistics.

The Commission also preaches good governance from the public sector which requires the availability of a weaponry of indicators and models that integrate social behaviour responses (ie elasticities). One particular aspect of this good governance refers to the need to contain externalities
whose measurement requires quite a sophisticated approach. The TERM exercise (Transport and Environment Reporting Mechanism) illustrates well the efforts of the Commission in this field.  

From a parochial viewpoint, for the Union another important question concerns the expansion of the Member States. Does this have any impact? Should the statistics for Europe of say 28 be the same as Europe 15? Gathering statistics has to compete with other budgetary outlays: as we know well at the EU, this often loses ground in front of more pressing needs. The situation is much worse in the accession countries, where the provision of statistics may often not be considered a priority. Statistics are never urgent, and when they become so it is already too late. 

Yet another issue is that some of the traditional sources of transport statistics - customs, public enterprises – have disappeared or are disappearing. What can replace them? Can some new form of statistics be possible, do we need to take a new look at the sort of information that decision makers would find useful? As we are now in the age of the Information Society, there should be a new approach to providing guidance for decision making. In many cases statistics may have to be considered a public good (needed for social efficiency but a nuisance for the firms filling the questionnaires) whose provision may have to be enforced. The need for an efficient performance of the transport system may well outweigh arguments of commercial confidentiality and privacy or collection cost considerations. 

These are only some of the issues that one can identify as potentially important. What I propose to do is to attempt to assess these issues against what I see as the main themes of the Common Transport policy (CTP) - Common in this sense means Community - and how this could call for a new approach to statistical information. Let me very quickly draw your attention to a number of key features that are dictating the European transport scene.

Transport is essentially a derived demand and is largely driven by outside forces. However, the relationship between demand and supply is complex and difficult to understand and model. Moreover, supply of large transport infrastructure takes some years to implement. Concentrating on basic issues, we can see that that between 1970 and 1995 the growth of the EU economy - averaging around 2.5% p.a. – led in turn to a growth of passenger kms - 2.9% p.a. and of freight tonne/kms. - 2.7%pa (see the graph J). This pattern can be explained by a combination of factors such as increased disposable income and leisure time for passengers and the reduction in real transport costs in the production function facing industrialists in the EU. Overall, the economy has become more transport intensive and this trend shows little sign of changing. 

Arguably, what has really become more transport intensive is society, not the economy although the implications are the same:

**Table 1**

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<th>1970</th>
<th>1995</th>
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<tr>
<td>Pkm per ECU GDP</td>
<td>1000</td>
<td>809</td>
<td>881</td>
</tr>
<tr>
<td>Tkm per ECU GDP</td>
<td>1000</td>
<td>438</td>
<td>464</td>
</tr>
<tr>
<td>pkm per capita</td>
<td>7280</td>
<td>13453</td>
<td>85%</td>
</tr>
<tr>
<td>tkm per capita</td>
<td>3941</td>
<td>7082</td>
<td>80%</td>
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You all know this picture very well. The transport industry and those working to support it quietly congratulate themselves on the success that these figures apparently represent. The problem is:
what do we do for the future? It is abundantly clear that transport faces a number of major potential challenges.

The current version of the CTP dates from 1992 when the main aim of the Community was to establish the Single Market. The principal objective of the CTP was to create the right situation for a Single Market in transport. This implied that the existing panoply of rules and regulations, many of which varied between Member States and had no strong justification, should be reviewed.

**Graph 1**

![Graph showing development of mobility in the EU](image)

However, the aim was not de-regulation as such but rather allowing the application of market principles to situations where management and efficiency in general would improve. Overall, the results have been positive. Efficiency has increased and costs in the transport sector have dropped and, as the graph shows, demand has increased and is likely to continue. However, problems have arisen due to the fact that many of the measures accompanying liberalisation intended to counter market imperfections have not been properly implemented nor enforced - particularly in the road haulage sector. This has led to a situation where the freight sector as a whole has had low rates of profitability and quite frankly often survived on the basis of widespread illegal operation. As far as passenger traffic is concerned, the considerable increase in movement has been due to increased car ownership, leisure time and disposable income. This has been combined in many areas with a lack of proper attention to relationship between transport and land use planning in general.

As a starting point for the review of the Common transport policy, a number of main areas where changes are called for have been identified:

- First, traffic flow and congestion.
- Second, safety standards and their harmonisation.
- Third, the environment.
- Fourth, energy use and security.
- Fifth, the structure of the transport sector.
Let me start by **congestion**. The transport industry has thrived largely on a process of introducing market principles to replace government rules and regulations plus some remarkable technical progress. This is why transport has become relatively cheaper in the last twenty years - in some cases considerably - like aviation. The initial increase in transport demand was taken up by using the available capacity in the system. The period of major growth in the 70’s and 80’s coincided with the construction of an extensive network of motorways covering much of the EU. Since the eighties, a somewhat smaller network of high-speed rail lines is also being built. These major infrastructure works provided great extra capacity on the main inter-city routes. However, new infrastructure was not provided everywhere - due to a combination of financial and technical difficulties - and the EU stepped in with the Trans-European networks – TENs - to help provide the solution. The Member States and the EU through TENs are still working to improve the supply of infrastructure capacity. Substantial Community aid has been devoted to transport infrastructure through the Structural, Cohesion and TEN funds. But the growth of demand has largely outstripped availability on many key routes notably in and around the great conurbations. I have not mentioned the problem of urban congestion where, if anything, the problems are even more acute than on the inter-urban systems.

For the future, latent demand shows no clear signs of reducing and the question of mobility and how we can sustain it, has become ever more difficult to tackle. The Commission’s view is that it is physically and financially impossible to build ourselves out of the problem; it is also clearly difficult to envisage any form of regulatory restraint on mobility. The Commission’s policy is rather to accommodate demand within the system but to use all the spare capacity available and divert some traffic from the congested road system to other modes. Organisation has to help investment: no matter the quality of the hardware, a network may be useless without good software, and the transport network is not an exception.

Second, **safety**. This is essentially a problem of road transport and despite the progress that has been made - fatalities have dropped by 40% since 1970 - they still number over 40,000 pa. The striking fact here is the considerable difference between Member States: from 240 deaths per million inhabitants in Portugal to 60 in Sweden were the two EU extreme cases in 1998. If there were common standards, casualties would be much reduced. Another question is raised with the advent of new technology which can pose new risks but at the same time needs to have a safety case that allows operation. One answer to treating this problem is the creation of an European agency that takes responsibility for safety management as a whole.

Third, congestion comes from traffic and most of the increase in EU transport has been on the road system (2% pa for passengers since 1990, and 3.7% pa for freight - although air transport has grown at nearly 7% pa from a small base). With this increase in traffic comes an increase in **emissions**. These emissions can for simplicity be separate into two - but they cannot really be separated, as I will explain. The category that gave rise for most concern initially, was the so called ‘local emissions’, fumes, particulates, noise etc that lower the standards of life in big cities and certain specific rural areas alike. Although there has been success in tackling these emissions, they are clearly linked to the second category: the “Green house” gases; where efforts to reduce emissions from the ‘tail pipe’ have been successful, CO2 emissions have actually increased. Nevertheless, a voluntary agreement with the European car industry promises to reduce total emissions from new cars by approximately 25% by 2008.

Fourth, **energy** is a future potential problem due to the dependence of the transport sector on oil. In 1997, 66% of oil (petrol) was used in the transport sector (53% in 1985). Two modes - road transport 84% and air 13% - use almost 90% of all petrol. As the EU becomes more dependent on imported resources and as transport demand continues to increase, the problem in terms of price and guaranteed availability becomes evident.
These areas are the key to success of European transport policy in the future. If these are to be the key elements of Transport policy, what does this imply for statistics?

Although I am suggesting that we should look again at the type of statistics that we collect, in no way I want to put in question what is called the ‘traditional’ statistical work. Indeed, one area that is missing is a long standing request of DG TREN : to have a region to region matrix of OD flows broken down by type of traffic. This should be capable of being allocated to modes. In the absence of such a matrix, it is really very difficult to develop plans for infrastructure development at the European level. Moreover, as we are increasingly reliant on private investment, good data have to be provided on demand to allow for an accurate risk assessment.

Another rather standard area concerns the preparation of a regular, or even permanent, system of forecasts of traffic in the Community. In the past, DG VII in co-operation with ESTAT, worked on numerous forecast; there has been and indeed still is work underway in the Framework Programme for research. However, if our efforts in this area are to be successful, they need to be better organised and conducted on a regular basis. The forecasting work to date has certainly been valuable but it has been ad-hoc in nature. There has been no agreed base which would allow various strategies to be compared. This is essential for any form of planning. One of the advantages of the merger between DGs is the possibility of developing best practice from both. In the energy area, there is the the so-called ‘Shared Analysis’ project which involves a five year period of work and associates experts from Member States with the analysis. I believe it would be very useful for the transport sector to develop in the same way and to put together a forecasting platform for all our activities in this area including in the research programmes. This will certainly be something I would like to follow up with my colleagues in ESTAT.

In its report on the revision of the TEN-T guidelines, the Commission proposes the setting up of a permanent observatory composed of a network of transport data and forecast institutions in Europe who would co-operate in collecting, assessing and forecasting traffic and environmental data on the TEN network.

Moving away from traditional statistics, DG TREN has prepared a so-called pocket book on transport statistics. This is a sort of compendium of information from many sources that clearly does not have the same cachet that is associated with the volumes of ESTAT but this has to be balanced against the large coverage provided. Indeed, it is no way an attempt to be a competitor to ESTAT but rather to complement the work of the office. It is in fact a response to the need that I outlined earlier to have rapid early warning of what is happening. It is planned to develop the pocket books, plural because there is also one for energy, in a way that maintains their complementarity with the work of ESTAT. Indeed, one possibility would be to produce a combined pocket book for transport and energy that gave an interpretation of the available information in relation to the main sectors of the two industries.

The pocket books can also made available on the Internet and this form of dissemination will be further developed.

When considering the future, it is also important to take account of the emerging ‘New Economy’ and its implications for transport and statistics. Although e-commerce today only involves one percent of retail turnover in Europe, it is forecast to five per cent by 2003. It is expected that ordering via the Internet will induce diffuse transport flows handled by small delivery vehicles. However, the existing legal act on road transport statistics has thresholds that such traffic will not be registered in most EU countries. Should this be revised ? This is only one example of the
possible impact of the New Economy to consider. However, although there are challenges, there are opportunities also – what about using GPS in vehicles to establish O & D surveys?

In conclusion, I have identified what I believe to be the main drivers of transport policy in the coming years. I have not outlined a magic solution to the problems of the transport sector because I do not believe that one exists. Transport has to run faster to stay in the same place, transport policy is in the same situation. What this implies for statistics is clearly that we want more information rather than less and we need it quicker. The quality label attached to the information coming from ESTAT will be essential for many areas but there will also be an increasing need for rapidly available indicators that flag up changes that need the early attention of policy makers. My general impression is that we will need more data sets and a wider coverage of subjects but perhaps in less detail. Recent moves call for more modal combinations, more countries to be included and much improved information on passenger movements. The role of ESTAT, with the active support of DG TREN, is to provide this sort of service for the Community: I am confident that, if the two DGs can maintain and build upon the good contacts that currently exists, this objective will be achieved.

References


EU TRANSPORT POLICIES AND STATISTICAL DATA REQUIREMENTS

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The discussion paper prepared for this seminar by Eurostat raises so many questions that it is impossible to answer them exhaustively in a speech that is necessarily limited in length. I believe in any case that it is more important to identify the general principles of Community statistical policy, which must underlie any programme, than to attempt to provide technical answers to the issues raised.

Having said this, I will first present the arguments in favour of developing a statistical system that allows the public authorities to carry out their various roles efficiently. I will then briefly deal with how to choose priority areas, what sort of statistical data meet transport policy requirements and how to collect these data.

1. Why statistics?

The answers to the question "What statistical data are needed at European level in the transport sector at the dawn of the 21st century?" depend totally on how one conceives the role of public authorities in the economy, whether at Member State or European Union level. The role of the public authorities naturally reflects the economic system adopted, and the European economy is clearly a market economy, so a gradual movement towards liberalisation and therefore towards a form of operation more in keeping with that of a market economy is most probably inevitable.

However, this observation, or - to be more correct - this conviction - does not suffice to define the present or future role of public authorities and the resulting requirements for statistical data. The form and extent of economic policy are not entirely dictated by the requirements of a market economy. Even in a highly liberalised economy, the State does have a role to play, and various types and degrees of government intervention are altogether possible in the context of a market economy.

We believe that three factors justify government intervention, for different ends and using different means, but all of which depend on the existence of an appropriate statistical data system.

1.1

A market economy which is based on competition is one which enables consumers to choose from among several offers the one that corresponds most exactly to their requirements, taking into account their financial means. It therefore presupposes the existence of a number of suppliers with the ability to convince their potential or existing clients of the specific qualities of the product or service they are selling. To persuade their clientele, they must convince them that they offer the best price and quality and they are obliged continually to improve their production and distribution processes to stay "in the market".

There is obviously the temptation to use every possible means to reduce the cost or improve the quality of the product or service they are supplying. Consequently, even in a "liberal" economy, the public authorities must establish certain "safeguards" and lay down ground rules. Whatever the sector of activity - and so this applies as much to transport as to any other sector - these rules concern at least four areas and consist of:
- specific legislation condemning anti-competitive practices, agreements between producers, abuse of a dominant position, misleading advertising, dumping prices etc.;

- social legislation prohibiting employment practices that are considered unfair;

- safety legislation aimed at protecting individuals, be they company staff, those who buy the products or services, or third parties whose life or health could be endangered by the producers’ activity;

- environmental legislation aimed at reducing whatever pollution or nuisance is caused by the production process.

These general rules, which apply to all sectors of activity, can be tailored to the particular requirements of the sector in question. The specific characteristics of the transport sector are such that the relevant body of legislation and rules is particularly well developed.

1.2

We also acknowledge that the public authorities’ responsibility does not stop at laying down the rules of the game, ensuring they are observed and punishing those who disobey them, even though these tasks form a major part of transport policy. The public authorities do in fact have a duty to regulate the market.

This assertion may be questioned by those who believe, as economic theory teaches, that the dynamics of competition are sufficient to achieve this regulation and attain optimum operation. However, although strongly convinced that competition is the best system for running an economy, we do not believe that a market can be handed over entirely to the forces of competition. First, because competition is necessarily imperfect and the theoretical conditions for achieving optimum operation are not - and cannot be - met. Secondly, because the functioning of the economy produces effects that the market cannot take into account ("external factors"). Lastly, because the public authorities cannot ignore the consequences, be they short-term or structural, of a "mechanistic" operation of the competitive system. Such consequences could include adjustments that have a serious impact on employment, or long-term developments creating imbalances between different areas.

Turning specifically to the transport sector, the regulatory role of the public authorities is to address two concerns. A "sectoral" concern, which, though not specific to this sector, still merits particular attention in that market conditions are very far from "pure and perfect" competition and, in fact, the risks of long-lasting and sometimes self-sustaining imbalances are high. Secondly, there is a "general" concern, taking into account the far-reaching impact of the operation of the transport system on many aspects of economic and social life.

We fully acknowledge that, in a market economy, the regulating role of the public authorities does not entitle them to intervene directly: since they lay down the rules of the game, and intervene as referees to avoid the game getting out of hand, they cannot also be players. We likewise concede that the forms and degrees of public intervention deemed "tolerable" cannot be the same as in an "interventionist" economy. However, we maintain that, even in a liberalised economy, public authorities do have responsibilities. They may be expressed in different terms, result in different actions, but are in no way diminished and are probably more difficult to exercise. In a word, at the dawn of the 21st century, the European market economy needs a transport policy.

Clearly, a policy cannot be effectively implemented “in the dark”. There is no doubt that fixing the general objectives which public authorities wish to pursue is part of a political approach that does not always concern itself with knowing the economic and social situation but is primarily based on
arbitrarily chosen policy considerations. However, the essential prerequisite for defining precisely what objectives should be met, what means to use, the nature and type of actions necessary to achieve these aims, is to have both qualitative and quantitative data available that are both plentiful and accurate. The data must make it possible to diagnose the current situation, simulate the effects of various possible courses of action, select the most effective and, once these actions have been decided upon and implemented, see that they are put into practice.

The statistical data needed must allow the current economic situation to be closely monitored, so that the public authorities can be alerted rapidly any "slippage" and thus be able to react speedily. The data must also allow identification of longer-term changes which, although less pronounced in the short term, reflect a structural trend. Both series taken at frequent intervals and long series, where possible homogeneous, are therefore equally necessary.

1.3

The role of the public authorities does not end with laying down appropriate rules and implementing a regulatory policy. They are also directly responsible for establishing statistical data and making them available to economic actors, citizens and elected representatives.

In a market economy, the economic actors determine the nature and level of supply and demand for all commercial goods and services. For example, in the area of transport, by their individual behaviour and the collective result of their actions, operators define the production of transport services to meet the needs of the economy. It is their responsibility to evaluate these requirements and their potential for development, to devise their strategies accordingly, and mobilise and adopt the necessary means to implement them. These choices cannot result just from simple intuition and must be guided by analysis that is as precise as possible of future trends, both short-term as regards what resources need to be committed quickly, and longer-term analyses to decide what resources are to be earmarked on a permanent basis. It is their task to make these analyses either "in-house" or using a consultant.

These analyses are necessarily based on very diverse statistical data, specifically concerning the sector of activity or, on a broader scale, the social and economic environment.

Similarly, in their day-to-day management, operators must be able to compare their performances with those of their competitors, gauge their supply in relation to market prices and so on.

For these reasons, operators request information, directly or through their professional organisations, from the public services in charge of statistical data.

It is obviously not feasible for these services to reply to every one of these requests, since they are often too specific, and taking the place of economic operators in carry out the studies they consider necessary to conduct their business most definitely is not part of the public authorities' role. On the contrary, their responsibility is to provide general information, as well as more specific information.

In this regard, it is not easy to define the circumstances in which the statistical services must, or conversely must not, meet these requests. However, we can at least enumerate the arguments that need to be considered:

- The frequency of the requests is a guide to the economic operators' judgement of the value of having such data available.

- The collective nature of the request (number of operators wishing to have such information available).
- The cost of collecting and making the data available. From this point of view, the cost of data collection by a public body must be compared with that of collection by private bodies or consultants. Possible savings of taxpayers’ money, (or advantages in terms of improved quality), from collecting data by the first method must be taken into account. There are, of course, many cases where private production simply cannot replace the public production of data.

- The amount of financial contribution that requesters are prepared to pay.

It is probably useful to point out that the more "liberal", an economy, the greater the needs of the economic players for information, and, hence, the greater the number of requests made to the public authorities.

In points 1.1. and 1.2., we emphasised the public authorities' own data requirements for defining and implementing their policies. However, the assumption here was that transport policies are the product of a particular department or of the minister responsible for transport. This type of approach is somewhat "bureaucratic", and not particularly democratic!

So much is at stake in the area of transport policy, because of its impact on citizens' daily lives and nations' long-term future, that it must be at the heart of political debate. In fact, this issue is becoming more and more politically relevant. This is demonstrated by the number of concerns expressed, questions asked and politicians lobbied by various interest and pressure groups on issues such as the quality of urban life, equality of provision between different areas and the environment, and how all of these tie in with transport. It is regrettable that these issues are often approached in ideological terms, and that the debate is not always based on a rigorous knowledge of the facts.

The public authorities’ responsibility is clearly to supply "reliable" information which can sustain and inform the ongoing democratic debate and promote the spread of a "transport culture", to make this debate more objective and effective.

2. Statistics: in what areas?

We have seen that the public authorities' remit can be divided into three separate but often overlapping objectives. These are: laying down the rules for fair competition; enacting regulations and supplying data to the whole of society. While it is relatively easy to identify the areas in which statistics are needed in order to meet the first aim; it is much more difficult to know what statistics public authorities will need to meet the second and third objectives.

Under the first objective, we identified four areas in which those responsible for transport policy must lay down the rules, ensure they are applied and sanction any non-compliance. These areas are the conditions of competition, social conditions, safety and environmental impact. If the rules are to be effective, it is important to know and understand fully the situations they are intended to regulate, to decide whether the existing rules should be changed, define precisely how and predict the effects – which may possibly be negative – the planned change would have.

Unfortunately, all too often these conditions are not met and measures are taken on the basis of purely subjective criteria and not on the basis of an informed economic analysis. And yet it is a simple matter to draw up the list of necessary information, sector by sector. By way of example, and without claiming to be exhaustive, we can name:

- In the area of competition legislation: the structure of the sector, by enterprise, and the financial relations between them (groups); price levels.
- In the social field: working conditions and especially working hours and salary and wage levels.

- In the area of safety: accidents at work and road accidents.

- In the environmental field: the number of vehicles on the roads, energy consumption, pollutant emissions etc.

To monitor the application of the rules adopted in the various areas, logic dictates that the public authorities must enact administrative provisions which provide them with accurate information on how the rules are observed and what measures are taken to sanction non-compliance. But, in this area too, the dictates of logic do not always apply.

As regards the second objective, one of the main difficulties in deciding what information should be collected is that it is very difficult to know what statistics the public authorities will need in the immediate, short-term or long term future. An area that may seem secondary today can tomorrow turn out to be a key area for grasping and understanding unexpected developments. Economic data are by nature a perishable product that must be seized as soon as it appears and that is very often impossible to reconstitute. In any event, the objective must be to have general outline information, within the context of which the more specific data collection, in response to specific needs that may arise, can be organised coherently when necessary.

We shall therefore make no attempt to establish a list of the statistics that must be produced, which would in any case overlap to a degree with the data needed for the public authorities to carry out their regulatory duty properly. We will just point out that the needs are essentially economic in nature, that the data must therefore often be expressed in terms of value or be used as a basis on which to measure values. The data must be able to be integrated within a programme such as the National Accounts that alone can allow the type of analysis needed to inform regulatory policy, within a general and coherent framework.

However, the statistics that have interested the European Union to date are mainly those relating to the measurement of levels of use of the different forms of transport expressed in physical units (number of travellers and travellers carried, numbers of tonnes loaded and kilometre-tonnes recorded, number of vehicle kilometres). There are those who strongly criticise reference to such figures, saying that what is important in an economic approach to the transport sector and analysis of its contribution to the general economy is estimating the value of the services created, and the only measurements considered significant are those which are expressed in money terms. We do not share this point of view, and believe that transport and traffic statistics, even when they are expressed in physical units, are not only useful, but necessary.

However, they are not sufficient and we feel it is essential to develop these value-based data. Here also, without claiming to be exhaustive, we must stress the importance of collecting data on the operators providing the transport or associated services, the conditions of their production processes, how production is financed and, by extension, consumer and public authority expenditure, i.e. prices.

Establishing a normative list of information that public authorities must be able to make available to requesters, be they economic operators, associations, elected representatives or citizens etc., is equally impossible. The only rule we can suggest is that statistical services must listen to requesters. To do this, it is essential to set up the structures for dialogue linking the services which produce the statistics and the consumers of these statistics, such that the latter can express their requirements and be associated with the process of defining statistical programmes, as regards both production and dissemination.
Such structures are all the more vital for the economic operators, since they are involved both in using the statistics that are compiled and in producing them, because the statistical services turn to them to collect data concerning their activities. This collection will be much more efficient if these players are involved in the decisions and are in agreement with both the principles and the methods of conducting these surveys.

3. Who collects the statistics?

Up to now we have spoken in terms of the requirements of the "public authorities", a loose or even vague term that designates all the institutions responsible for transport policies. Depending on one's geographic or institutional perspective, it may be the European Union, the Member States or even the regions. The purpose of this seminar is to discuss the establishment of a Community statistical programme, and it is questionable to what extent the text presented above is suited to this specific institutional framework. This in turn raises the question of how to position a European transport policy in relation to the Member States' national policies.

Community transport policy covers, to some extent, sectors which, because of the geographical area concerned or the topics covered, are very specific. This is the case, for example, in the area of infrastructures and their use, in that the EU intends to promote the construction of trans-European networks (which in any case extend beyond current European Union territory). The data needed to conduct this policy are more than just an aggregation of national statistics. Even in other areas where the geographical size of the Member States is relevant, European policy tends to transcend "local" concerns and also involves the collecting of data that cannot currently be obtained by simply aggregating the statistics collected at national level in order to meet individual countries' requirements.

Furthermore, Community transport policy is tending to encompass an ever-greater variety of areas and topics, supporting national policies whose actions are increasingly constrained by European regulations or directives. It does not follow, however, that there is such as thing as a European transport market, and even if one can imagine that the impact of the common policy will become more and more decisive, there nevertheless remains scope and plenty of room for manoeuvre for national policies. These policies, however, will have to take into account as a priority not only Community guidelines, but also the trend towards unification of the markets: competition between transport operators in the various Member States makes it impossible (and this phenomenon will become increasingly marked in the future) to implement policies without knowing what is being done on other Member States' markets in the tax and social policy fields, for example.

These considerations make developing a Community statistical programme a complex undertaking, because although the programme must first and foremost cater for the specific needs of the European Union policies, it must also rely on data collection carried out upstream at Member State level, and supply these same States downstream with data on transport in the other Member States.

A tempting solution to the question of meeting the specific needs associated with Community policy might be an equally specific collection mechanism which, instead of relying on the Member States' resources, is based on the use of private consultancies. This solution may be justified to meet ad hoc requirements for data. It cannot be used to set up a permanent mechanism, whose effectiveness would depend on the people or organisations questioned being obliged to reply. In addition, in this type of situation, it is quite clear that statistics form part of the state prerogative of public authorities. Subcontracting to the national statistical services therefore seems the only possible solution.

It follows that the bulk of the data that the Commission requires, either for its own purposes, or to make available to the Member States, will continue to come from the Member States themselves.
The current mechanism, based on obligations defined by regulations or on voluntary partnerships, clearly needs to be improved significantly in various areas. Despite the progress achieved, the comparability of data is still not really satisfactory, the quality of data is often inconsistent, it still takes too long to collect and make data available, and the areas covered are too limited.

Unfortunately, it is clear that these weaknesses are making it impossible for Member States and operators in the Member States to have proper access to information on other Member States that they need in order to define their own policies and strategies. This information will become even more vital in the future as the European dimension of the economies is strengthened. This assertion can be illustrated by two particularly illuminating examples: it is not possible to access data, early enough to allow corrective measures to be taken where necessary, on the trend in the market share of national transport operators compared with transport operators from other countries operating on the market for the carriage of goods by road. The same is true, for example, of the figures for cabotage by foreign hauliers.

The lack of a Community response to these legitimate needs for information may lead to the setting up of expensive observation systems of limited effectiveness which would be unnecessary if the infrastructures that are supposed to meet these requirements were functioning correctly.

We are well aware of the difficulty of making national statistical systems converge towards common standards, and we realise that the cost of obtaining data is high. However, as information is recognised as a factor of strategic importance in modern economies, and even more so as these economies are becoming liberalised, it is essential that Community and national public authorities acknowledge the size of the task facing them if they are to meet the requirements of enlightened policy-making.
EVALUATING TRANSPORT POLICIES AND MEASURING USER
ACCEPTABILITY AND ATTITUDES

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Introduction and background

The AA is Europe’s second largest motoring organisation. It provides roadside assistance and a range of motoring consumer benefits and services to almost ten million of Britain’s motorists.

Since it was founded in 1905 the AA has been at the forefront of motoring in Britain – looking after the needs and concerns of early motoring pioneers to those of today’s high tech motorists.

The AA has sister clubs in Europe, like the ADAC in Germany and the ANWB in Holland, and it is also a member of the Alliance International Tourisme (AIT), a worldwide body of motoring and tourism organisations. Like the AA Europe’s motoring organisations, as well as serving the needs of their members and customers, also work to protect motorists from policies that may have an adverse impact on their motoring.

User opinion

When motoring began in Britain we quickly found that there would be policies which adversely affected a motorist’s enjoyment of this new pastime. The police would set speed traps – they hid behind hedges and used stop watches to catch unsuspecting motorists. Frustrated by police tactics a band of motorists got together and sought to outwit the police – they employed “scouts” on pedal cycles to warn of the speed traps – the AA was formed and that is how the famous AA salute started. This is a very early example of user acceptability but it shows that harsh action will meet stiff opposition. The same can be true of many policies which are implemented on an unsuspecting or hostile public – even today.

Fortunately we do things differently today, our motives are perhaps no different because we still seek to look after the needs and concerns of our members. The difference is that we now use their opinions to shape our policy in advance rather provide a “rear-guard” action. Our policies are developed and then used to influence Government policy.

We believe very strongly that successful policies (in our case motoring policies) can only be successful if they are based on an accurate assessment of the problem, good research and a real understanding of how and why people want to own and use cars. If we do not understand what motivates people to “motor” we can never develop policies that will be readily accepted by them. In all EU countries the motoring population is a very large proportion of the voting population and so Governments need to be very sensitive to motoring public opinion or else they will not find favour at the ballot box.

The AA’s research arm is extensive and has been for decades. It has been at the forefront of measuring changes in Britain’s motoring population. Of course there were commercial reasons for
doing this not least knowing our market - the profile of driver ages, the average age of passing the
driving test, the number of cars per household, the age profile of cars in use and so on.

**The Great British Motorist**

In Britain motoring is seen as a right, everyone has a view on Government policy to motorists,
everyone has a motoring tale to tell – a dangerous road, should older drivers be banned?  We pay
too much tax, why is more not spent on roads, why are towns trying to ban cars? And so on. In the
seventies Britain’s roads were growing fast but so was the traffic. Motorists became “consumers”
of government motoring policies and the road system. The AA’s research did not just cover
commercial issues it also sought to take in views on the range of motoring opinion issues mentioned
above. These views were obtained in monthly surveys of AA members and motorists in general.

The AA’s first “Great British Motorist” (GBM) survey was undertaken in xx. The ad hoc surveys
allowed us to define the typical British Motorist at various key periods. In 1991 the GBM defined
the typical British Motorist as:

- A married man.
- Aged between 25 and 44.
- The owner and user of his own car.
- Holding a driving licence for over 10 years.

The AA’s research has continued month in month out since the 1970’s. We use a variety of
methods commissioning, short telephone polls of motoring opinion to arranging major pieces of
work involving focus groups or large quantitative surveys.

In 1997 we published “Living With The Car” which was a compilation of various research surveys.
This was a landmark publication which received wide acclaim and which influenced government
policy – we were told that the Prime Minister found it an invaluable aid when considering broad
issues of “motoring opinion”.

We decided then to progress major pieces of work which pulled together policy and attitudes on a
wide range of motoring and transport issues. The Great British Motorist survey was revived and in
1998 we published “The Great British Motorist – Lesson from the Past Visions for the Future”.

This was another landmark document for the AA. It looked at travel and transport in Britain
spanning 50 years – what were and are the issues now? What has changed? Where has change
occurred? Who has been part of this change? Why do problems seem so huge?

GBM 1998 established that:

- in Britain we failed to understand what a rising standard of living would mean for car
  ownership;
- despite growing prosperity nothing like enough was put aside to provide modern transport
  infrastructure;
- from the early 1970’s major developments alongside motorways and at the edges of towns were
  allowed to occur despite the transport and social consequences
- now too many journeys can only be made by car
- despite the “overheating” caused by the rapid growth in car ownership and use its impact on
  society has been generally for the good.
The Great British Motorist 2000 – Lessons from European transport and travel

Since the earliest days of motoring, the British have taken their cars to mainland Europe. During 1999, an estimated 8 million people, travelling in 3.5 million cars, will have crossed the Channel on holiday or business.

Our surveys of transport and travel show up all the ambiguities felt by the British in their relationship with the rest of Europe: so much is the same but there are so many real national differences. They show what we do well – road safety is the shining example – and where we lag behind.

France is the destination for most British motorists. A generation ago, the British motorist made derogatory remarks about the quality of French roads. They squeezed the last expensive drops of lower grade French fuel from their tanks on the drive to Calais and then queued to fill up as they came off the ferry at Dover.

Today the picture is reversed. Britain has the most expensive fuel in Europe and the fill-up is on the French side. And the trip to and from the British Channel ports will be characterised by roadworks and hold-ups on Western Europe's most congested roads.

What is true on the roads is just as true for rail. The Eurostar from Paris or Brussels cuts its travel speed in half as it enters Britain. The missing high-speed rail link between London and Ashford will be a least a decade late in arriving. Planning and transport finance systems have shown themselves incapable of delivering key transport upgrades whatever they are – roads, rail, or airports.

The comparison also holds for cities. A generation ago, London Underground could still be talked of as one of the finest and most comprehensive networks in the world. Not today. Its shabby, crowded services are operated with antiquated equipment that frequently fails.

At the root of the problem is the run down in investment. This has affected every link in the chain – poor maintenance, low quality, inadequate capacity, and bad day-to-day management.

The Great British Motorist 2000 has much to entertain. But it has a serious purpose. There are lessons both for motoring and for wider transport policy by benchmarking ourselves with the best in Europe.

So what did GBM 2000 tell us?

In just a decade, visits from Britain to mainland Europe with a car have doubled to about 8 million people and 3.5 million cars a year. There is great interest in Europe and how the UK compares. The Great British Motorist 2000 looks at how British motorists get to mainland Europe, differences in Europeans’ travel and their transport infrastructure, and the different concerns European motorists have.

Every year more than one in seven British motorists take their car abroad.

- Holiday trips to France in the summer dominate these journeys. There are more than 15 times the number of trips to France with a car than to any other country.

- The Channel Tunnel now takes more than a quarter of all motorists going abroad with their car.
Patterns of travel differ across Europe. Some of the key factors affecting them are: how far people live from work; density of population; and the degree of urbanisation in a country.

- The British have the longest commute times in Europe – on average 46 minutes to get to work and back again, compared with a European average of 38 minutes.

- The Dutch live closest to each other, with 333 persons/km², and the Finns furthest apart (20 persons/km²).

- The UK has 240 persons/km², but Scotland has 66 persons/km², and south-east England at 653 persons/km², getting on for double the Netherlands’.

- Belgium is the most urban country in Europe, followed by Britain and the Netherlands.

Populations are growing, slowly in most parts of Europe, but faster in others, and generally by 5-15 per cent since the early 1970s. Britain is at the low end of this range. Where there are changes is in the mix of the population, with the population ageing.

- The Swedes and Italians lead the way with proportionally more older people.

Generally, there is a move of populations from the inner areas of cities as people move to the suburbs – 5-15 per cent in many cities in the last 30 years, and more in some others. Some cities, such as Manchester and Zurich, have retained people in their inner areas.

Car ownership per head of population has been increasing in every part of Europe but the Swedes, Dutch and French slowed down or plateaued in the mid-1990s. Car ownership is strongly linked to prosperity. Historically, any slowing in the growth of car ownership has been linked to recession in national economies.

Car ownership is higher in rural areas than in towns and cities, reflecting the cost and difficulty of parking and easier access to public transport in urban areas. Denmark demonstrates the distortions induced by a high car purchase tax – lower car ownership and cars used more intensively. Car ownership can also be affected by a reduction in the number of young people reaching driving age.

- Car ownership in the UK is low compared with the European Union (EU) average (376 cars per 1,000 persons in 1997, compared with 450).

Transport by road dominates travel throughout Europe (with an average of 12,548 km travelled per person per year):

- About 80 per cent of this travel is by car, proportionally more by the Greeks, Irish and British (all 86-87 per cent)…

- …but less by the Austrians and Danes (73 per cent) where the terrain and good alternatives make public transport and cycling attractive.

- Drivers in the UK are those most likely to say that their car is extremely or very important to them, and most likely to experience car crime.

- The Danes and Dutch cycle a lot and the British and several other nationalities very little. It is unlikely that the UK target of doubling cycling by 2002 (compared with 1996 levels) will be met.
• The British make the least use of non-car modes of transport of all European countries.

National stereotypes seem to be borne out by the statistics and by what people say about themselves:

• The Germans reflect their relative prosperity – high car ownership, drive comparatively few small cars and are well-insured.

• Many French drivers say that they drink alcohol most days, but very little, and 75 per cent say they drive after drinking, but are not above the legal limit.

• Italians are more likely to drive small cars, to drive fast and not to wear a seat belt.

• Swedes have big cars, use seat-belts routinely and seldom drive after drinking alcohol.

• The British lie near the average on most measures although they tend towards larger cars (many company-purchased as new), comprehensive insurance and, reflecting a change in attitudes over the last 10 years, almost half say they never drive after drinking. The British are far from complacent – they have one of the best road safety records but also express more concern compared with most other countries about road safety issues.

• Portugal is one of the poorest countries in Europe; its motorists again have relatively small cars and their road safety record is one of the worst in Europe.

Motorists show a loyalty to cars manufactured in their own country:

• The French buy Renault (27 per cent of the market), Peugeot (17 per cent) and Citroen (12 per cent). The Italians buy Fiat (33 per cent of the market). The picture is similar in Germany - Volkswagen (21 per cent) and Opel (16 per cent). The Spanish buy Seat (20 per cent of the market) but there are also large numbers of Renault and Peugeot.

• The British buy Ford (20 per cent), Vauxhall (14 per cent) and Rover (11 per cent), together with Japanese makes (13 per cent).

• The Swedes are loyal to the Volvo (24 per cent). It dominates the market to a degree comparable with Fiat in Italy.

• In the Netherlands, Denmark and Switzerland where there is no indigenous manufacturing, Ford, Volkswagen, Opel/GM and Japanese manufacturers lead the market.

• The British pay more than the rest of Europe for most of their cars.

There is variation in some of the negative effects of the car between country:

• The British, Icelanders, Norwegians and Swedes enjoy the safest travel in Europe.

• From the figures that are available, the accident risk per vehicle kilometre in Portugal is particularly high – almost four times that in Britain.
• Parts of Britain’s national road network are more congested than anywhere else in western Europe.

Some of the environmental effects of road transport such as noise, vibration, and pollutants vary considerably from place to place, as do the approaches taken to treat them. For example:

• Pollutant levels in Athens and other hot, still southern European cities such as Milan and Turin are often double those in similarly-sized cities in the UK.

As part of The Great British Motorist 2000, motorists in six European countries were asked to rank their concerns from a list of 10 from issues known to worry UK motorists: fuel costs; government tax-take from fuel; the lack of investment in roads and (separately) public transport; car crime; traffic congestion; the poor driving behaviour of other drivers; proposals for paying to use roads; the effect of the car on the environment; the risk of being injured in a road accident. 4,168 motorists in Germany, France, Italy, the Netherlands, Spain and the UK were questioned.

• The cost of petrol or diesel features highest in the list of concerns, followed by the amount of tax taken by government and the poor behaviour of other drivers. 49 per cent of all motorists rank the cost of fuel in their top three concerns.

• Of the 10 issues, motorists are least concerned about the effect of the car on the environment. Only 15 per cent rank the effect of the car on the environment in their top three concerns.

• The Germans are those most concerned (relative to other concerns) about the cost of fuel, followed by the French. 85 per cent of German motorists (and 56 per cent of French) rank the cost of fuel in their top three concerns (compared with 45 per cent of British motorists). The Germans, French and British are those most concerned about the level of tax-take in fuel.

• The British are those most concerned about the lack of investment in both roads and public transport. 26 per cent of British motorists rank investment in roads in their top three concerns (compared with the average of 19 per cent).

• The Dutch are most concerned about the behaviour of other drivers on their roads (only the Dutch rated this higher than concern about the cost of fuel and the tax-take issue) but there is also concern from the Spaniards, French and Italians. 60 per cent of Dutch motorists rank the behaviour of other drivers in their top three concerns (compared with 24 per cent of British motorists).

• The cost of fuel is more of an issue in rural areas across Europe than in urban areas. 55 per cent of motorists in rural areas rank the cost of fuel as one of their three main concerns (compared with 44 per cent in urban areas).

There are differences within Britain (the survey did not include motorists in Northern Ireland) and within other countries:

• The Scots are concerned about lack of investment in roads and about proposals for paying for the use of roads. 40 per cent of Scots motorists rank proposals to charge for the use of roads in their top three concerns (compared with only 18 per cent in Britain as a whole).

• In London there is concern about lack of investment in public transport and about the effect of the car on the environment. 33 per cent of motorists in London rank the effect of the car on the environment in their top three concerns (compared with 16 per cent in Britain as a whole, 26 per
cent in Paris, 19 per cent in Madrid and 8 per cent in the cities Amsterdam/Rotterdam/The Hague).

- Compared with Parisians, Londoners show a greater concern over lack of investment in both roads and public transport and about car crime.

- 63 per cent of motorists in the Amsterdam/Rotterdam/The Hague areas rank concern about proposals for paying for the use of roads in their top three concerns (compared with just 15 per cent in Paris, 13 per cent in London and 11 per cent in Madrid).

- 38 per cent of motorists in Italy’s south and the Mediterranean islands rank poor driver behaviour of others in their top three concerns (compared with 33 per cent in Italy as a whole).

There are individual differences across Europe:

- Men are generally more concerned than women about cost issues (fuel prices and tax-take) – 51 per cent of men rank the issue of the cost of fuel in their top three concerns (compared with 47 per cent of women). The comparable figures for tax-take are 41 per cent (men) and 33 per cent (women).

- …whereas women are more concerned about the poor driver behaviour of others and the risk of being involved in an accident. 42 per cent of women rank the issue of poor driver behaviour in their top three concerns (compared with 33 per cent of men).

- 57 per cent of motorists under 25 rank the cost of fuel in their top three concerns (compared with 49 per cent of all motorists). Younger motorists are more likely than older motorists to be concerned about the cost of fuel.

Relative to GDP, the most recent figures from the European Union show that in 1996 British road-users had the second lowest investment in infrastructure of any European country (only the Danes invest less).

- In 1996 the UK was taxing at the upper end of the European range of overall road taxation. Since then the fuel tax escalator will have increased the tax take.

- Britain’s high motoring taxation and low road and transport spending is deeply unpopular – AA research shows that 82 per cent of motorists believe it is unacceptable that so little of their motoring taxes is invested in roads and public transport.

- In 1999 the British motorist paid the highest price for petrol and diesel in the EU.

**Benchmarking with mainland Europe**

In many areas of Europe, the UK does not do things as well as its EU partners. Road safety is an exception, but there is still huge scope to reduce deaths and casualties. Action is needed to overcome the UK’s motoring and transport problems to meet the concerns of motorists identified in this study.

- The UK has taxed high and invested low. It must invest at the same level as the rest of Europe if the transport system is to be made as good as mainland Europe’s – typically double today’s annual amount of £6 billion.
• The fuel tax escalator, introduced under a “green” cloak to raise revenue, should be scrapped immediately.

• Road tolls, collected a private company or independent authority, are broadly tolerated across Europe where it is clear that the money raised is flowing directly into the provision of new roads, bridges and tunnels. No country in Europe has implemented a system of road pricing that manages the demand for roads by matching it to the supply available. Government must rebuild the trust that what motorists pay will be spent on better roads and transport.

• There is no need for the UK to have the worst car crime rate in Europe. Improving enforcement, securing car parks and increasing motorist’s awareness of how to protect themselves will help. Manufacturers must continue to make their vehicles more secure.

• UK private car buyers pay more for new cars than others in Europe. Privileged exemptions from full competition for car manufacturers and dealers expire in 2001. If a new exemption deal does not bring clear advantage to the consumer, the exemption must be scrapped.

• First to industrialise, the UK has been a leader out of industrialisation. The subsequent decentralisation goes some way to explaining the UK’s long commute times and low patronage of public transport. Measures to counter land-use planning that reinforce unnecessary car use must be further developed.

• Upgrades to the UK’s roads and transport system take generations and what is then delivered is often far less than originally conceived. A proper debate and consultation on what needs to be done must be followed by clear, realistic investment decisions on what to implement by when. Programmes must take no more than 5-7 years to deliver.

• Successful European transport systems typically have an enabling strategic authority that oversees the total roads and transport service and commissions services from service providers. In London, the Mayor’s electoral authority must be harnessed to reverse chronic road and transport decline and demonstrate a better way forward that can serve as an example to the rest of the UK.

• The UK has invested too little in quality modes of transport to make them attractive alternatives to the car. Better public transport can and should carry more of the transport strain but it can only reduce the amount of overall travel by car at the margin.

• The UK is poorly served by major roads and motorways and many are overcrowded. Traffic management, bypasses, improved links to the regions, targeted widening (using tunnels where there are pressing environmental constraints), and priority lanes where they are justified (but they must be additional, not replacements) offer solutions.

• Toxic emissions are falling as a result of better technology and ever-tightening regulations. The UK must raise awareness of the importance of vehicle maintenance in reducing toxic emissions, take enforcement action against wilful gross polluters, advocate yet further tightening of heavy diesel regulations in the light of technological development, and seek fair and efficient ways to scrap the oldest, most polluting vehicles.

• Car manufacturers must fulfil or exceed their important agreement with the European Commission to develop and sell ever more fuel efficient vehicles and meet the motorists’ proportionate share in the reduction of “greenhouse” emissions.
- The best of European streetscape design, particularly that providing for pedestrians and cyclists and treating noise, should be adopted.

- Although many other parts of Europe do not generally have the traffic density and congestion encountered in the UK, many have more technology to manage incidents and congestion. The UK must adopt and implement European best practice.

**Conclusions**

The impact of GBM 2000 was significant. The media were particularly interested in the report which cast Britain as a “poor relation” compared to the rest of its EU partners. Within hours of the launch of the report the Deputy Prime Minister and Transport Secretary, John Prescott, at an urgently arranged “Motorists Summit” said:

“Our aim is simple and ambitious – to transform our transport infrastructure over the next 10 years and make Britain's transport the rival of any in Europe”.

Tracking motorist’s attitudes and concerns is essential to governments and road user organisations. Such information can be used to help formulate government policy – or abandon it! Key “user” statistics can help representative bodies develop their policies and campaign effectively for members and customers.

Recognising the true needs and attitudes of citizens at a time of great change is crucial to the development and implementation of transport and motoring policies that “go with the grain” of peoples lives.
2\textsuperscript{nd} plenary session:

Changes in transport geography, data needs
CHANGES IN TRANSPORT GEOGRAPHY: A USERS PERSPECTIVE ON DATA NEEDS

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1. Introduction

1.1 At the dawn of the 3rd Millennium, it must be appropriate to ask whether, in all spheres of society, the right people have the right access to the right information. Access to global information is now widely available through the Internet: critically though, the issue is whether the right information is available.

1.2 This paper is written from the perspective of a user of transport statistics, struggling to obtain the necessary information for the business decision or the academic research, and therefore is not written from the purist view of statistics. In transport modelling statistics are fundamental: the phrase “rubbish-in, rubbish-out” remains as true at the beginning of the 3rd Millennium as it did in the last decade of the 2nd.

1.3 In the UK, the Transport Statistics User Group [TSUG] represents the needs of both academia and commerce, as an independent, non-profit making professional body of users of transport statistics. The aims of TSUG are:

- to identify problems in the provision and understanding of transport statistics and to discuss solutions with the responsible authorities
- to provide a forum for exchange of views and information between users and providers
- to encourage the use of transport statistics through publicity and education

1.4 Clearly, these are laudable aims, though can only be fully achieved if TSUG is truly representative of the whole population of organisations and individuals with an interest in transport statistics. With a membership of about 150 organisations, primarily focussed on London and the South East, it is acknowledged that there is a need for the TSUG to reflect the changes in transport geography within the UK. This is particularly true with the devolution of responsibility from central Government to the Scottish and Welsh Assemblies and to local government. The challenge of how to respond to changes in transport geography is therefore as relevant to TSUG as it is to Eurostat.

1.5 In this paper, the needs of transport statistics resulting from changes in transport geography are considered from a research perspective of transport modelling: just one of many core uses of transport statistics.

2. The Transport Modelling Problems

2.1 Transport models have geographic boundaries (see Figure 1): whether local, regional, national and (now more commonly) international. Dependent upon the objective of the research, appropriate boundaries are defined, within which the forecasts will be made. Typically though, no transport model operates in isolation. For example, very local junction models for signalling of highway flows require information from regional (and possibly national) models on local and strategic traffic flows through the junction. These interfaces
themselves will have geographic boundaries, with commonly buffer zones outside the core simulation area, for which only information for strategic journeys into or through the core area is required.

2.2 It could be argued that there is a relationship between the level of disaggregation of data required and the geographic scope of the model. This is shown diagrammatically in Figure 1. For example, the level of information required for the local junction model is very different to a regional multi-modal model or to an international high-speed passenger rail demand model. For the junction model, very specific local routing, speed and timing of the journey is required, with no information necessary on actual journey origin or destination or journey purpose. For the international rail model, perceptions of the service quality across all modes and service frequency are more important than the actual departure time of the train service and (probably) more important than the actual origin and destination of the journey.

![Diagram](image)

Figure 1: Different Geographical Transport Model Types

2.3 Figure 2 presents the illustrative relationships between model complexity (and probably functionality) and the geographical area covered by the transport model. The area of the circles is indicative of the typical size of the models (with the exception of the very local junction model); with local and regional models commonly more complex than national and international models. Here there is commonly differentiation of purpose, between planning models at local and regional levels and policy models at national and international levels. Taking a current issue, the impact of fuel prices and taxes on the transport networks and economy is normally assessed at national and international levels and not specifically at the local urban level (though clearly such long-term fiscal policies and economic changes may impact on the viability of local transport schemes).
Figure 2: Model and Data Collection Complexity

2.4 Again, it could be argued that there is a relationship between the geographical scope of the model and the difficulty of data collection. This is illustrated in Figure 2. For example, the collection of information for the local junction model is relatively easy, with 100% samples generally obtained through manual observations of traffic flows, at relatively low-cost.

2.5 Life for the transport modeller though becomes more complicated with regional multi-modal models, where it is rare (certainly in the UK) for local or regional governments to hold comprehensive transport survey information. Commonly the base information is not available or, if it is, is out of date. For example, extensive household and journey surveys were undertaken in London and the South East for the London Area Travel Survey in 1991. The logistics and the cost of the surveys mean that this is only available every 10-years. Reliance on the (private sector) transport operators unfortunately is not generally the answer, as either the information is not available or is collected on an inconsistent basis to other information or is deemed confidential by the operator. To base transport planning and policy on transport statistics which may be up to 10 years old must be challenged in the 3rd Millennium.

2.6 Automated forms of data collection are increasingly more important in the armoury of the transport statistician, including ticket sales databases and gating and vehicle weighing. Unfortunately though such systems rarely provide all the information required by the transport modeller. The ticket sales database only provides information on the public transport origin and destination and not the actual origin and destination, and may not provide the time of journey, with journey purpose at best inferred by the type of ticket purchased. With increasing use of stored-value tickets and zonal ticket systems, the disaggregate journey information once again is becoming increasingly difficult to obtain, without some form of passenger survey.

2.7 For this paper, this “academic” perspective of transport modelling is best considered within the context of a specific transport problem to highlight the transport statistics needs in the 3rd Millennium.
3. Cross-Channel Passenger Rail Services

3.1 Eurostar services have been operating through the Channel Tunnel since May 1995, between London (Waterloo) and Paris and Brussels. In 1996, London & Continental Railways [LCR] won the right to finance and operate the Channel Tunnel Rail Link [CTRL], the new high-speed railway linking the Channel Tunnel and London (St Pancras). The first stage [CTRL1], due to be completed in 2003, will provide a high-speed link part way to London (Waterloo); the second stage [CTRL2], due to be completed in 2007, will provide high-speed track throughout to a new international station at London (St Pancras). As a result of lower than forecast Eurostar traffic, however LCR ran into financial difficulty. In 1998, as part of a deal with the UK government to solve the problem, LCR awarded a 10-year contract to run the UK-part of Eurostar to a separate train operating company (Inter-Capital and Regional Rail Limited). Passenger volumes continue to grow and should exceed 7m in 2000 and construction of CTRL1 progresses on schedule.

3.2 With the poor performance of the core inter-capital service, the opportunities for the proposed UK regional Eurostar services were reviewed in 1999. Arthur D Little Ltd [ADL] was commissioned by the UK government to undertake an independent report into the feasibility and viability of the service. This research was summarised in the ADL Report “Review of Regional Eurostar Services” (February 2000).

3.3 With dramatic growth in cross-Channel journeys (see Figure 3) and 81m single trips between the UK and continental Europe in 1998, the relatively low Eurostar volumes may seem surprising. Clearly though, not all the cross-Channel market is accessible to Eurostar services, and even less to regional UK Eurostar services (see Figure 4).

![Figure 3: Growth in journeys to/from UK, France and Belgium](image-url)
3.4 Recognising the wealth of transport statistics available through the comprehensive International Passenger Survey, which forms the “backbone” of many international transport models, where are there short-comings in the available transport statistics for a study such as the regional UK Eurostar commission? Key issues include, for example, the availability of:

- detailed mode specific journey information (for the ADL study this was only available for Eurostar)

- service quality information, including passenger value of service attributes (again, only for Eurostar services, with the airlines and airport operators unwilling for surveys of air passengers to be undertaken for competing companies)

- current and time-series price information (whilst headline air fares are generally available, these are not available for the low-cost carriers such as Virgin Express whose sales are Internet-based)

- regional and local economic indicators including forecasts

- standard service information including highway journey times
4. Conclusions of a Users Perspective on Data Needs of the Changes in Transport Geography

4.1 From extensive experience within the transport industry as a user of transport statistics, it is clear that the right people only sometimes have the right access to the right information.

4.2 No doubt, much of the time the right information is available somewhere, though it is not always clear who holds what information. The TSUG publishes annually a directory of contacts and sources for transport statistics, as there is a void in the UK for such basic information. Certainly consistency between statistics providers (whether local, regional, national or international) and with historic datasets are fundamental to transport modeller and economist.

4.3 Whether the problem of the right people having the right access to the right information can be resolved may be just as problematic as the collection of the information in the first place. Transport statistics will remain commercially confidential for the great part and the definition of right therefore will be open to discussion with the private sector operators. Whether there will ever be agreement on the common availability of all transport statistics will be a major challenge for the 3rd Millennium.
INTRODUCTION

The subject of this paper is about changes in transport geography and resulting consequences for transport data collection. This subject can be approached in a lot of different ways. It has been chosen here to illustrate the phenomenon of “geographical distance” in transport in relation with the growing complexity of the organisation of freight transport, and the consequences it has on data needs.

The “extended” geography of (freight) transport, and the subsequent complexity of its organisation, as well as the requirement to provide information which is useful for policy makers, has led to the introduction of the concept of “transport chain”. This conceptual approach will be followed by a statistical approach of the concept, with a presentation of some applications.

The focus in this paper lies on the complexity of transport organisation in an open Europe, by approaching the differences and changes between direct transport and indirect transport where most attention is paid to freight transport. It appears that due to a number of reasons the long(er) distance indirect freight transport grows much faster than short distance direct transport. As a result of this, freight transport will be carried out by using more complex transport chains in the future. This growth in more complex transport chains occurs not only for transport chains with transhipment between different transport modes but also for transport chains with transhipment between the same transport modes (road) in distribution centres.

In the first chapter the results of a number of forecasts for the year 2020 are shown. On the basis of these forecasts comparisons are made for current pattern and future pattern between passenger transport and freight transport and between unimodal transport and multimodal transport. From these comparisons it can be concluded that complex freight transport chains will grow rapidly in the future. The second chapter describes in more detail the transport chain concept in general and why there will come a growing need for transport chain data in the future. This chapter is followed in chapter three by an example of an application in the case of Alpine corridors, that makes use of transport chain data. This example shows the usefulness of such data. To gather transport chain data is much more difficult than to gather “standard” trade and transport data. A first approach to retrieve detailed transport chain data is described in chapter four. It concerns in the MYSTIC 4th Framework research project the results of shipper surveys where transport chains are followed from the first origin up to the final destination and information is gathered all along the chain. Finally in the last chapter conclusions are given.

1. Changes in transport geography

In this chapter a number of forecasting results are used to analyse changes in transport geography. On the basis of these forecasts, the change in “geographical distance” in transport is illustrated which results in more complex (organisational) freight transport chains in the future.
In the figures 1 and 2 for passenger transport the loaded road networks (number of cars per day) are shown for the years 1995 and 2020 for Western Europe. The forecast for the year 2020 is based on the reference scenario in the “European Transport Forecast 2020” project. This reference scenario includes moderate changes in economic growth and transport policy; i.e. no extreme changes take place.

These two figures show that the highest car traffic intensities on the road network occur in the urban areas in Europe (for example the Ruhrgebiet in Germany or the Randstad in the Netherlands). From a comparison between the years 1995 and 2020 changes in road intensities can be observed. Most of these changes take place in or around the urban areas that have already high car intensities.

In the figures 3 and 4 the loaded road networks (number of trucks per day) for freight transport for the years 1995 and 2020 for Western Europe are presented. These figures are based on the same project and reference scenario as for the passenger figures and therefore the passenger and the freight figures are comparable.

These figures show that the high truck traffic intensities do not only occur in the urban areas but also between these areas. A comparison between the 1995 and 2020 figures demonstrates that there is substantial growth in freight transport and this holds not only for short distance urban transport but also for long distance transport between regions. Interesting application of these maps should be a confrontation between the foreseen TEN networks and the results of traffic intensities resulting from forecasts of transport demand.

From these comparisons it becomes clear that there are some differences in transport pattern and transport growth between passenger transport and freight transport. In passenger transport the largest car intensities are observed in the urban areas while for freight transport the largest truck intensities occur not only in urban areas but also for long distance transport between different regions. Also the growth of freight transport appears to be substantially higher than the growth of passenger transport (although the changes in the figures depend to some extent upon the ranges chosen in the legends) and this higher growth of freight transport mainly concerns long distance transport. Although the maps are not independent from the scaling of traffic flows, these conclusions are enforced by other studies on (freight) transport behaviour.

\textit{Figure 1} \hspace{1cm} \textit{Passenger transport 1995 (number of cars per day)}
Figure 2  Passenger transport 2020 (number of cars per day)

Source: European Transport Forecast 2020 - IWW / NEA / MKmetric

Figure 3  Freight transport 1995 (number of trucks per day)

Source: European Transport Forecast 2020 - IWW / NEA / MKmetric
**Figure 4**  
*Freight transport 2020 (number of trucks per day)*

As described before, the growth of freight transport appears to be substantially higher than the growth of passenger transport and this higher growth of freight transport mainly concerns long distance transport demand. But this conclusion might be influenced by the ranges chosen in the figures and the fact they apply to passenger transport and freight transport demand measured in vehicles and not in vehicles kilometres. Therefore, also the growth of the vehicle kilometres for passenger transport and for freight transport is calculated for the years 2000, 2010 and 2020. This growth is shown in figure 5 and this figure confirms the conclusion that the growth of freight transport will be substantially higher than the growth of passenger transport.

**Figure 5**  
*Growth of vehicle kilometres (index 1995 = 100)*

Source: European Transport Forecast 2020 - IWW / NEA / MKmetric
The maps and figures presented hereunder are based upon the Community transport simulation system built up by NEA, the so-called NEAC transport simulation system.

In figure 6 the average distances of direct freight transport and indirect freight transport are shown for 10 commodity groups. Direct transport (unimodal transport) is transport with one mode used between origin and destination, indirect transport (multimodal transport) is transport with more than one transport mode used (before and after transhipment). This figure is illustrated to give an idea of the differences in average distance between unimodal and multimodal transport. Multimodal transport especially takes place on long distance transport relations and indeed the average distance of multimodal transport is much higher than the average distance of unimodal transport.

**Figure 6**  
_Average distance direct and indirect transport_  
_(international intra-EU transport)_

From the previous figures it has become clear that long distance freight transport will increase substantially in the future and as a result of this more complex transport chains (multimodal transport) will be used because for long distance transport it becomes more efficient or unavoidable to use multimodal transport.

Apart from the growth of long distance transport in Western Europe there is another reason why long distance transport (by multimodal transport chains) will grow in the future. This reason is that in the near future a number of Eastern European countries will become member of the European Community.

An example is shown in figure 7 where the index of the total trade between Spain and Hungary is presented. This figure shows that the trade in 2015 will be almost 3.5 times higher than in 1996. Because it concerns long distance freight transport between Western Europe and Eastern Europe, this is also potential trade for multimodal transport chain transport.

When a large part of the growth is ‘transported’ by long distance multimodal chains in the future, this will result into a stronger role of road transport (several legs along the chain or connecting legs) and subsequently a “geographical extension” of the use of road modality.
Finally in the figures 8 and 9 the growth of the ton-km by distance class is presented during the period 1989 - 1995 (where the year 1989 is the base year). The results are shown separately for the export and the import.

A general conclusion from these results is that the growth of the ton-km figures is higher for the long distance classes compared with short distance classes.

One remark has to be made: the data for the year 1993 shows a break in the trend compared with the data for the other years. The explanation for this is probably that the registration changes of trade after 1992 have effected data. Because the year 1993 is the first year without high quality customs data this is probably the reason for this break.

Concluding this section it can be said that already for the years 1989 to 1995 a growth can be observed for especially the higher distance classes. Apart from the high growth of long distance transport in Western Europe, this growth is increased by the entering of a number of Eastern European countries to the European Union. Because for long distance freight transport it becomes more efficient to use multimodal transport, it is foreseen that the use of complex transport chains will grow substantially in the future, and that road transport will have a major role to play in absence of serious alternatives. Certainly the creation of a European statistical instrument based upon the concept of transport chain will contribute to a clearer definition of appropriate measures. How to apply this concept is the next question.
Figure 8  
Growth of ton-km per distance class (1989 = base year); export (international intra-EU transport)

![Graph showing the growth of ton-km per distance class for export.](image)

Source: TREX (COMEXT) database – Eurostat / NEAC database - NEA

Figure 9  
Growth of ton-km per distance class (1989 = base year); import (international intra-EU transport)

![Graph showing the growth of ton-km per distance class for import.](image)

Source: TREX (COMEXT) database – Eurostat / NEAC database - NEA

2. The transport chain concept

In this section the transport chain concept is described in more detail. First an example of a transport chain is given after which a segmentation of trade into transport chains is given and an example of a corridor analysis (to show the relation with and the importance of transport chains) is presented.
In figure 10 we follow a computer from its place of production in point A to the consumer. The computer is transported by truck to point B where it is stuffed in a container together with other commodities. This container is transported by truck to point C where the truck goes on a ship to be transported to point D (Ro-Ro). In point D the truck drives of the ship and goes to point E where the container is unloaded from the truck and stripped. The computer now is loaded on another truck to be transported to point F. In point F Value Added Logistics (VAL) takes place; the computer is put in another box together with additional features like cables, mouse and users manual.

The computer is now transported to point G where it is transhipped on a train to be transported to point H. Finally it is transhipped again on a truck to be transported to point I.

**Figure 10**  
*Example of a transport chain: transportation of a computer*

This example reflects the possible complexity of a disaggregated transport chain. But there are other possible ways to approach the transport chain concept in a more aggregated view. After this example of a single shipment transported by multiple transport modes an overview is given of total trade between Spain and Germany. Figure 11 illustrates the different segments of transport flows. The largest part of the total trade is transported by unimodal transport (road and rail) but also a substantial part is transported by multimodal transport (sea transport in combination with an inland transport mode). To overcome congestion and pollution problems caused by road transport in many countries short sea shipping transport is or will be promoted. Therefore, the multimodal transport will probably grow in the future on this specific relation.
Figure 11  Segmentation of transport flows from Spain to Germany

Another way to show the importance and the application of the transport chain concept is shown in a corridor analysis. In figure 12 the corridor Poland – the Netherlands is illustrated. When all transport between Poland and the Netherlands is analysed, not only transport and trade between these countries is of relevance, but also trade between for example Poland and the USA via the Netherlands or trade between the United Kingdom and the Russian Federation via Poland and/or the Netherlands. Formulated in a different way, for a corridor analyse between two countries not only the trade between these countries is relevant, but all trade for which transport takes place between the countries. In case only unimodal trade data is available it is not possible to take all transport flows into account on a corridor. In case multimodal trade data is made available this becomes possible.
3. An example of an application to show the usefulness and to demonstrate the feasibility of a transport chain data base

This section describes an example of an application to show the usefulness of transport chain data and demonstrates the feasibility of building up a database according to the (aggregated) transport chain concept.

This example is taken from the CONCERTO/MESUDEMO 4th Framework projects where the question was arisen how to approach the policy issue of the promotion of combined transport through the Alps. This led to the choice of the transport chain approach of flows and to the question whether a Policy instrument using this concept was feasible. In a pilot study the feasibility of building up an Alpine Transport policy Information System (ATIS) was examined. Particularly the question arose whether it was possible to analyse the TransAlpine crossings for all trade of Italy in a way transport chains are pictured: not only where does the truck come from, but where does the good carried come from, where does it go to, and which other routes and mode combinations are used for this trade relation. It implicate for example that short sea shipping should be part of the ATIS database, as an alternative to Alpine crossings (think about the trade relation Spain to Italy).
In figure 13 the needed information is shown for the relation London – Milan when different data sources are used. In case only TREX data from EUROSTAT would be used, only the following would be known: trade from the UK to Italy with mode sea at the UK side and mode road at the Italian side. Compared with the first description of the chain, in this case a lot of information is missing. In addition this TREX information over the mode will be lacking in the future (new INTRASTAT regulation).

The CAFT survey data at the borders with Switzerland and Italy also show that a part of the chain can be described, but not completely. This example shows that it is very important to have (or to construct) high quality transport chain data otherwise parts of the chain will be missing.

**Figure 13** The TransAlpine transport chain in the ATIS project

![Diagram of the TransAlpine transport chain](image-url)
Alpine freight transport chain database structure

- Origin
- Destination
- transhipment location
- mode at origin
- mode at destination
- commodity group
- total flow volume in tonnes per Alpine crossing

By combining several sources of data through a complex hierarchical procedure developed in this pilot Alpine study, it has been possible to build up an information database as described in figure 14. In the figures 15 and 16 examples are shown of the possibilities when this high quality transport chain data is available or has been constructed.

In figure 15 an overview is given of the structure of road transport flows over the Brenner. From such a figure it becomes clear what are the most important flows with the highest volumes and what are the origins and destinations that use the Brenner to transport flows. Interesting is the spreading of origins and destinations. Such a figure of transport flows could be easily completed by a description of all alternative transport chains through other crossings. In addition one might be interested by the exact origin and destination of the good: for example are the goods carried by road from Rotterdam coming from America or elsewhere? In this case maritime connections directly to Italy might be an alternative to Alpine crossings. All these types of analysis requires a transport chain approach which has been successfully implemented in the ATIS pilot study.

Figure 16 presents the trade by road between Spain and Italy. This figure shows that for this trade almost all flows are transported via the Ventimiglia corridor, a very low volume over the Mont-Cenis corridor and the other corridors are not used at all. Here again a study of potentials through (high-speed) maritime connections might open perspectives of alternatives routes. The ATIS database is ready for such a study.

Concluding the section it can be said that it is very important to have transport chain data to have good insight in transport flows.
Figure 15  
Structure of flows over the Brenner (road transport)

Figure 16  
Trade between Spain and Italy (road transport)
4. A first approach to retrieve detailed transport chain data; the MYSTIC shipper survey

As described in previous sections, it is very important to have high quality transport chain data. However, it is very difficult to get this kind of data. The ATIS pilot study has taken benefit of the collection of detailed traffic survey information at the borders. The question arises whether a transport chain data collection is achievable. In the MYSTIC shipper surveys a first attempt has been made to retrieve detailed transport chain data. The MYSTIC shipper survey is a 4th framework project for the European Commission that has been carried out by INRETS (France) and NEA (the Netherlands).

The aim of the MYSTIC project is:
“Follow shipments from the first origin to the final destination and gather as much information as possible along the complete international transport chain.”

In this project not only shippers have been interviewed but also operators and customers.

This project has been very useful to get an idea of the difficulties and possibilities of carrying out such a shipper survey. Amongst a number of other conclusions the most important conclusions in relation with this paper are the following:

- It is difficult to get a high response rate with such a detailed shipper survey.
- The share of complex transport chains is high; not only many multimodal chains are found but also many unimodal transport chains with different operators and via a number of different distribution centers. Figure 17 illustrates the variety of transport chains as a result of shipper analysis in MYSTIC on export relations of the Netherlands and 3 regions in France.

**Figure 17**  Transport chain distribution resulting from the shippers surveys in the MYSTIC project (exports of the Netherlands and 3 regions in France)
5. Conclusions

In this paper it has been shown that long distance freight transport will grow much faster compared with passenger transport in the future. As a result of this change in transport geography, multimodal transport which becomes more efficient for long distance transport will grow substantially in the future. This growth is not only the result of the economic growth in Western Europe but is also caused to some extent by the entering of a number of Eastern European countries to the European Union.

Therefore it also becomes more important to have high quality transport chain data and the usefulness and applicability of this kind of data has been shown in this paper.

Because it is very difficult to get this kind of data new methods and procedures have to be developed to retrieve the data. A first approach to do this, the MYSTIC shipper survey, has been described briefly. In the mean time the ATIS pilot study has demonstrated the feasibility and the usefulness of a transport information system based upon the transport chain concept, by using and combining existing sources.
1st workshop:

EU TRANSPORT POLICIES, DATA COLLECTION
STATISTICS ON GOODS TRANSPORT IN TRANSITION
A NEW SYSTEM FOR COMBINING TRANSPORT DATA WITH RELATED INFORMATION

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Summary: The disappearance of the internal European borders urged the need for new information on international goods flows. Together with the larger customers of transport information in 1999 the Transition project was started at Statistics Netherlands to look for alternatives. This project will lead to detailed transport information, which can be linked with other available transport related information. It certainly must lead to new figures about transit and the goods transport chain.

A complete different and new approach to transport and traffic at Statistics Netherlands is being implemented in a complete new system for transport data. According to this approach a new system is built based on a new architecture. The new flexible structure of the system makes it possible to view transport from every requested point of interest. Links to and combinations with transport related data are made easily. As a first tryout for the system transport data was integrated with international trade data. From this integrated system new figures could be derived on transit through the Netherlands. In future links can be made to passenger transport, information on transport enterprises, GIS systems, production and consumption and many other transport related information.

Key words: transport statistics, transport information, transport related information, transport chain, linking and combining data, object orientation, domain classes, domain modelling, harmonisation, integration.

1 Introduction

Since 1974 Statistics Netherlands (CBS) produces statistics on international goods flows from, to and through the Netherlands. This information was based on customs information that was collected for clearance at the Dutch borders. At the start of the Single Market in 1993 this clearance disappeared for the larger part. So, the quality of information became very poor. Especially information about transit was suffering from the lack of data. The black spot became even larger when the European Union was enlarged with Austria, Finland and Sweden.

Also information from transport enterprises is collected yearly. This information is elementary in the information flow to Eurostat. Eurostat receives information according the Directives and Regulations. The information is collected per mode of transport and consists of data about the journeys and the transported goods. There is no information about the transport chain and information about goods is not very detailed. For example the major part of the goods in container can not be classified.

The use of statistics on goods transport is spread widely and very divers. The figures are used by the Government, port authorities and many consultants. Their interest lies in making models to forecast flows of goods and the distribution of goods per mode of transport from the ports to the European hinterland.

Because of the quick deterioration of the data after 1995 several Dutch parties decided to do something about the poor quality. In 1998 Statistics Netherlands, NEA Transport research and...
training, Rotterdam Port Authorities and the Transport Research centre of the Dutch Ministry (AVV) initiated the project TRANSITIE. The purpose of the project was to set up a new information system for data about goods flows in relation to the Netherlands. The system definitely should produce new total figures for transit. Also, for the long-term the system should produce transport chains.

The first phase of the project was to find out which data is available and could be used. In this initial phase the project was classified under the European project MESUDEMO as a pilot for combining statistical data.

Primarily, CBS is responsible for the organisation and maintenance of the project. Therefore, it was decided that after the initial phase CBS would completely take over the project. The Dutch Ministry of Transport, Public Works and Water Management is co-financing the project. The earlier partners of the project together with other important users of the data are informed twice a year about the progress and the results. They also participate in the discussion about need new information.

At this moment, the ultimate goal of the project is a complete new information system for transport and transport related data at Statistics Netherlands. The system is based on a completely different view on transport. It creates easy possibilities to link and combine the transport data with other in-house and external data sources. Paragraph 2 focuses on the user demands for transport information. The model that underlies the system is described in paragraph 3. The new definition of transport results also in a revolutionary system architecture. A description of the systems architecture is given in paragraph 4.

As a pilot for the first phase of the project it was tried to harmonise the existing transport statistics for a number of key variables. Furthermore, the transport information has been integrated with the existing information about import and export in the Netherlands. This integration results in new figures for incoming and outgoing transit in the Netherlands. An overview of the results of the first phase is presented in paragraph 5.

Finally, paragraph 6 gives information about the enlargement of the project in future.

2 User needs

2.1 The collection and use of transport statistics in general

Transport information has been collected for a long period and is crucial in decision making in transport policy. Actual and historical information is necessary. A consistent view on the transport market and its development is essential. Users do need data for different purposes. For every type of application there is another set of demands on the information.

In recent years insight on how and to what end data collection has changed. On one hand the budget has declined and there is a policy directive to lower the burden on respondents. On the other hand the need for information becomes larger. There are more European rules (Directives and Regulations) and there is a request for recent figures. This means that the focus should be on better use of available formation instead of more surveys. A modern and flexible system for the processing of transport data becomes urgent.

The TRANSITIE project has a broad scope and will meet a number of old wishes and new demands on transport data quality, availability and applicability.
2.2 User demands on transport data

The Department of Traffic and Transport of CBS has had a lot of users for statistics on goods flows. Large customers of CBS use the data in digital form. These users are interested in national and international goods flows with information about the goods as well as about the journeys and if possible information about the transport chain.

Together with NEA in earlier investigations the users needs were defined [1]. In general they can be summarised as:

- only one figure for transport per mode of transport;
- information about the transport chain and the goods chain;
- information about region to region transport and journeys within Europe;
- detailed information about the goods (weight, volume, value, type);
- information about intermodal/multimodal/combined transport;
- transport prices and transportation costs;
- information linked to information about the enterprises;
- information linked with production and consumption data;
- information linked with GIS applications.

These needs are not fully met at this moment. The loss of the border crossing information from customs even has enlarged the problem. These questions of main customers have lead to the start of the TRANSITIE project.

2.3 The application of transport data

As a main user of transport information the Dutch Ministry of Transport, Public Works and Water Management is interested in as much as possible combined and integrated data. The figures are used for policy, for forecasting and for maintenance purposes.

However statistics are considered important, there are large gaps in the available information. The TRANSITIE project focuses especially on these gaps in the data collection.

In general four main applications for transport information can be distinguished.

A. research (behaviour, describing the transport branch)
B. models (prognoses, simulation, assignment);
C. policy making (instruments/decisions);
D. evaluation (monitoring/benchmarking).

A. Research

Starting point for good research is a constant and reliable set of data. The measurement of the actual situation in a year should be of a constant quality. For research purposes the data should also have enough details to investigate relations between modes and between economic activity and transport. Especially the consequences from economic growth for the growth of freight transport is important in the line of traffic and environmental issues.

At this moment most statistics are set up for one mode only. There are no interactions within the collecting and processing of raw data between statistics for different modes. Sometimes this leads to conflicting data.
B. Models

There are different types of models in which transport data is used. For policy use the making of prognoses is essential. It is necessary to know what will happen in future in order to make long term plans and decisions. Models for simulations and/or assignments are used for policy research to investigate the consequences of policy decisions. All of these models ask a certain level of detail for the input data. Besides, it is necessary to be able to integrate the data with a digital geographical network.

At the moment, the loss of data on transit is the major problem. In order to combine information on goods production/consumption and goods transport the complete chain must be known from start to end. Especially one needs to know if the good will stay in the country or not.

C. Policy making

The Netherlands has a history in making long-term transport policy plans. In these plans the goals are set to relevant themes. The themes for the coming years will be:

Pricing (road pricing, new technologies), better use of capabilities of infrastructure /load volume, environment issues, main-ports, intermodal transport and chain-mobility

For these policy-plans the results of research and models are used as well as direct information from statistics. At this moment for some of these new policy themes there is information missing to get full insight in the actual situation.

D. Evaluation

For monitoring/benchmarking purposes a constant quality of the set of data that is used is essential. It is also essential to have clear definitions. To compare the modes of transport statistics with the same dimensions and quality are necessary.

2.4 Results from TRANSITIE for the use of transport data

For the above mentioned four applications of transport data and information the TRANSITIE project makes a large step forward. It integrates and combines different statistical sources and the result is a multimodal statistic. The level of detail of information will be larger because of the better use of available information. New combination can be made.

The loss of transit information is restored and will make research and modelling application more complete. The new approach on the storage and combining possibilities of the developed IT model will lead to new insights. It will eventually be possible to follow the good or container through its chain. Also the vehicles and ships in can be followed to measure their use of the infrastructure.

Next paragraphs will explain in detail the concept and the system of TRANSITIE.

3 A different approach to transport

3.1 In general

From the TRANSITIE point of view is tried to work with a different and more fundamental approach of transport and traffic concepts. Current CBS representation and storage techniques strongly rely on the observations as recorded in the collection process. Mostly, it is just a reflection
of the primary registration of the transport activity. Eventually the recorded data is enriched with other available data before the definite statistical relevant output is made. But that is all.

During the first phases of the project it was considered to review the process in a different way. The principal idea was to structure from a domain driven point of view into essential concepts of transport. In the traditional process the data supplied by the transport enterprise was the heart of the system. The new system started with a thorough modelling phase in which concepts and their relationships are defined. It was focused on the fundamental concepts and attributes. Also it was tried to identify derivative concepts, relationships and attributes. Afterwards, the key concepts were mapped onto the domain classes in the design model. After this, it was seen how the registered data fits in the model. So, not the data but the domain is modelled.

3.2 Demands from IT-perspective

To develop the concepts and architecture of the system the following system demands are necessary:

1. **Generic** – the new concept must be view independent. This means, for every reviewer it should be neutral to his particular domain of interest. Of course, this should be within the limits of the traffic/transportation domain;

2. **Integration** – all transport flows and modes should fit in it;

3. **Standardisation** – all modes should use the same domains and all rules should apply to them equally;

4. **Flexibility** – the system should be easily adaptable to other classifications. This flexibility should not influence the fundamental information;

5. **Time independence** – The system should be applicable for time dependent classifications and issues.

6. **Transparency** – Codes, translations, rules for production and decision should be explicable, easy to localise and accessible.

7. **Transport structure** – It should be possible to represent mixed transport structures

Considering this the system concepts can be divided in two categories, the primary and secondary concept.

3.3 Primary concept

From an IT-perspective the driving force behind the domain modelling is object orientation. This is the guide in dealing with concepts and their relations and expressing them. The concept also can be discussed with user without any disturbance concerning implementation. It should reflect to the perception of the users.

The base for the system should be the collected information. This information has to be translated into facts to which in a later stadium statistical methods can be applied. So, the first purpose is to define the facts to distinguish. The new idea is to see the information as collection of only those attributes which reflect real-time events and involved objects. So, only the basic information should be translated into fundamental facts.
Transport and traffic are movements from one location to another in which means of transport and cargo (goods, persons or even information) are involved. The activities that can take place at different locations, such as loading and unloading, can be seen as complementary. In the new system these activities are fundamental. Therefore, not the state (for example: the goods are inside a vehicle) but the change in state (loading and unloading activity) is the essential fact. The changing of the state is mostly recorded, but sometimes (over a given period) only can be derived afterwards. If a transport mean passes different points of observation (e.g. locks, bridges, borders) the state of the transport mean is recorded. If this state of the transport mean differs from last recorded state, one or several unloading or loading events (or both) have taken place. So, the fundamental fact to be recorded is the change of state. In the new system the definition for change of state is the event. For example, to load, to unload, to pass, to start, to stop or even to wait can be seen as events.

The event is directly related to number of variables, namely time, location, means of transport and cargo. This directly leads to a so-called 5-tuple (event, time, location, means of transport, cargo).

<table>
<thead>
<tr>
<th>Tuple 1</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>A</td>
</tr>
<tr>
<td>Time</td>
<td>t</td>
</tr>
<tr>
<td>Cargo</td>
<td>Cargo 1</td>
</tr>
<tr>
<td>Means of transport</td>
<td>Means 1</td>
</tr>
</tbody>
</table>

This will be the base for the new system. For example: transport from a place A to B is recorded with two tupelos. These two tupelos share the same cargo and means of transport. The recorded events and locations are different. For location A, the event is loading; for location B, the event is unloading.

So, all relevant changes in states or relationship between real life objects are recorded. These objects exist independently of any relation. This is relevant in the design of the information system.
Scheme 1: Class diagram for transport

If the events are studied as a time-ordered sequence, transport or traffic can be derived from it. Dependent of which of the co-ordinates of the tuple we take as independent variable we see the different perspectives appear this case the co-ordinates of the tuples are the independent variables. In case cargo is seen as an independent variable, the (cargo) route can be deducted. This can be done by following the cargo in time on different locations and loaded on possible different means of transport. Furthermore, in case location is seen as independent variable (constant factor), the flow of goods and traffic (for each mode of transport) on a certain location can be monitored.

By describing all locations as nodes in a graph and all routes as edges of that graph transport becomes a time-sorted road within the graph. Every pair of successive nodes indicates a part in the graph of the complete infrastructure network.

3.4 Secondary concept

Apart from the fundamental aspects of the new system there also are new problems, or maybe challenges to work on. For the five items of the tuple the following problems can be distinguished.

For location

The problem with location is the diversity and granularity of the locations. Organising all locations in a hierarchical way (tree-structure) could solve this problem. For example, this means that crossing the border on a specific location or pass through a country could conceptually be handled in the same way. If a country is seen as a road network, then crossing that particular country says nothing about the route in that part of the network. This approach applies also to the associated event.

For cargo

Cargo is considered as a generalisation of freight, passengers and information. Therefore, the TRANSITIE-model can be used for more than only goods. However, a specific problem related to is the problem of classification. Different goods classifications, applicable in time should be possible. This problem is solved by explicitly uncoupling the essence and presence of a code. So, the meaning and the word (say the word in the classification) are seen as a relation in time. Linking the meaning to the real world object in the first place can do this. Afterwards the code-representation is linked to meaning.
For means of transport

For modelling purposes the means of transport have the same properties compared with locations. There are different means of transport with different characteristics. For every mode of transport population sizes and changebility rates differ. Using a more general concept for means of transport solves this problem. In the tupelo the vehicle stands for an abstract vehicle but in a fact in the system the substitution take place with a real identifiable mean. For the sake of reproducibly, the correct value of attributes on a given date must be handled.

For persons

Persons are not explicitly named in the previous model (except as cargo). However they are always present as owner or user of a means of transport or as target or source of the cargo. Conceptually, the model can deal with natural as well as company entities in a similar way.

In case of insufficient information to identify the means of transport or persons the concept of generic instance is used. This certainly hold for the above mentioned latter two. In each class this generic instance represents the anonymous instance of that class to which some attributes can be assigned. For example, think about the anonymous Dutch person of 46 years old or the anonymous barge with a known loading capacity.

4. A new system architecture

The concepts as described in chapter 3 are mapped onto a software-architecture. However there are some refinements. As already mentioned, there are persistent objects whose particular instance are independent from the existence of an event. Further, the identified classes are translated straight on to computational objects.

Concepts as location, means of transport, enterprises (or better instances of these) have a meaning that survives their temporal use in some tuples. For this registers are created to support the instances of these classes. So, if an object is involved in an event, the actual values of the object is not copied, only a reference. The objects will handle the previous mentioned versioning-problem himself in a way that objects have time-dependent attributes. Consequently, the core of the TRANSITIE-system is this set of persistent objects. The relationship is established later.

A number of subsystems can be recognised. All these subsystems focus on one fundamental concept and support this. The subsystems can be divided in:

a. Goods classifications (NSTR, Dangerous goods): all classifications of (dangerous) goods to be used. Also the relations between classifications and some extra descriptive features of them can be used;

b. Means of transport (cars, ships, aircraft’s and so on): the collection of all means of transport complemented with some historical data about it;

c. Persons: all persons (natural or institutional), which are in one or other way involved in transportation or traffic;

d. Infrastructure: All information about locations together with descriptive information within the scope of the project. Also relation between locations.
Important is that each subsystem has three main parts:

- a definition part, which describes the used attributes, the interpretation and the allowed values (the so called meta data);

- a interface part, which hides and unlinks the offered functionality and the actual implementation for other subsystems;

- an internal database that contains the persistent objects.

The facts (the really dynamics events) are build upon these “registers” and connect objects from these domains. These domains consist of the subsystem transport eventually linked with other subsystems (for example international trade). Above this all, a management system controls authorisation and other specific constraints.

Scheme 2: High level diagram of subsystems of transport

The lines between the systems indicate a dependency, for example a possible owner-relationship. The mapping of the domain-model onto the software architecture is obvious.

**Advantages of the new architecture**

- Users are focussed on relations between concepts because of their enlargements and central role.

- Generic approach: all flow information fits in the same conceptual model and structure, independent of the peculiarities;

- View independent: the system should be useful for transport as well as traffic and other transport related information;
- 1-to-1 mapping of real worlds objects into computational objects;
- Consistent figures from different views forced by an unique storage of identifiable objects;
- Synergy: solved problems and solutions can be enlarged to other possible flows;
- Smaller distance between domain and implementation;
- Clear split between the registration of facts and statistical operations;
- Possibility to reflect shifts in actual data to different view of objects;
- Rules for processing are independent and not based on one mode of transport;
- Classifications positioned outside the core of the system.

5 Combining existing sources (first phase)

5.1 A new meta-database

Before the new system could be set up a complete meta-database with definitions and classifications is created. Every definition and classification was rebuilt. All coding systems also have been modified and harmonised. Furthermore the new meta-database consists of:

System for classifying variables and codelists

All variables and codelists also are part of a larger system. Therefore groups of variables are defined. These groups consist of basic elements from the new system: events, locations and means of transport.

Coding systems

All definitions have been made up in a very early stadium. The number of locations and categories of goods are very divers. Therefore the database should be flexible in this way. New classification and coding systems must be easy adaptable.

Conversion and derivability

To reflect the information from the functional goods transport statistics into the new system rules for conversion and derivation have to be laid down in the meta-database. The rules also must be used for harmonising between the modes.

Statistical maps

For all functional transport statistics maps are made dealing with the most important issues. This information is essential for interpreting figures. The complete set of maps gives a complete overview of all available information. The maps are completed with some key figures.

After the new meta-database was built it was the main purpose of the first phase to create harmonised information on international goods flows from, to and through the Netherlands for as much as possible variables. These figures should be the key figures for the model before further integration with other information can take place.
5.2 Harmonisation

The first step in the project was to harmonise the different functional goods transport statistics. These statistics are purely modality based. Harmonisation of the different modes was a must.

The output of the functional statistics is used to fulfil the various requirements of the EU directives and regulations. The information is received from transport enterprises within the various modes. Information is collected about inland as well as international transport for every movement in relation with the Dutch territory. There are legal obligations for all enterprises (Dutch and foreign) to deliver information about traffic and transport to the Dutch authorities. However there is one exception, namely for the road transport statistics. For this, information is requested only from Dutch enterprises.

Because functional statistics are the key figures for the new approach, road transport in the Netherlands by foreign companies has to be estimated. This was done by using information from the Eurostat database NEW CRONOS. With this information estimates could be made for the EEA countries. For the Eastern European countries information from the pilot project for road transport statistics in 1997 was used.

For the purpose of harmonisation separate analyses have taken place. The most important thing to do was recalculating the gross+ weight\(^1\) into gross weight\(^2\). All functional transport statistics are based on the gross+ weight. For harmonisation purposes all these weights have been translated into gross weights. Definitions of weight and length of containers also were harmonised. Furthermore several geographic classifications are synchronised.

Special attention is given to the classifications of the goods. Within the functional transport statistics almost every mode of transport has its own classification. Road, rail and inland shipping can be classified according to the NSTR 2-digit classification (52 groups). Maritime statistics have only 8 headings and within air transport statistics no groups of goods can be distinguished.

5.3 Integration

The next step was to integrate the transport data with the available transport related trade data. This data is received from the Department of International Trade at Statistics Netherlands. The data consists of information about intra and extra-European import and export related to the Netherlands. Source for the Intra-European trade is the INTRASTAT system. The information about Extra-European trade is gathered from customs information (on paper and electronically). To combine this trade with transport information, recalculation of trade data was necessary in a various number of ways, for example

- recalculation from net weight of the goods to gross weight;
- recalculating the so-called zero-weight into weight. For several goods the amount of goods has to be defined by other measurement unit, for example volume, number square meters;
- adding goods from bonded warehouses, which have been imported in the Netherlands at the moment of leaving the warehouse.

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1 Gross+ weight = the net weight of the goods supplemented with the weight of the elementary wrapping material and eventually the weight of the container

2 Gross weight = net weight of the good supplemented with the wrapping material
Scheme 3: Harmonisation and integration of goods transport data.

The integration should be carried out top-down. Starting on the highest level of aggregation and slowly working down to the requested level of detail.

For the start of the integration procedure the sum of all international transported goods within the functional statistics (FS) is set equal to the sum of a goods for which trade has taken place. The variable to be compared is the gross weight of the goods. So, the base equation is:

\[ \sum \text{gross weight (FS)} = \sum \text{gross weight (trade)} \]

Next other variables are added to the model. Only a few variables can be used, namely flow (inwards, outwards), mode of transport, goods classification, country, and region and container indication.

*Flow (F)*:

For the functional statistics the flow can be divided into inwards and outwards. For trade four flows can be distinguished: import, export, incoming and outgoing transit. Here, goods in bonded warehouses are seen as goods in transit. By using this information the equation can be translated into:

\[ \sum \text{gross weight (inwards)} = \sum \text{gross weight (import)} + \sum \text{gross weight (incoming transit)} \]

\[ \sum \text{gross weight (outwards)} = \sum \text{gross weight (export)} + \sum \text{gross weight (outgoing transit)} \]
So, the basic equation is elaborated to two equations. By combining the transport and trade information the total of incoming and outgoing transit can be calculated in this manner.

In a further phase of the integration the model can be enhanced with the variables mode of transport, goods classification and region.

*Mode of transport (M):*

The functional statistics are mode based. The trade information states the transport mode at the crossing the borders. So, therefore the basic equation can be expanded to a full cross of these variables (F x M). The equation exists of 2 x 6 = 12 equations from which the incoming and outgoing transit can be estimated.

*Goods Classification (G):*

Before adding the goods to the model their classification should be harmonised. Then, the model can be extended to a model with crossings for flow, mode of transport and goods classification (F x M x G). This leads to 2 x 6 x 52 = 624 equations from which for each stratum the incoming and outgoing transit can be estimated. In case the goods classification can not be harmonisation the integration model should be changed into a model with fewer equation.

F x M1 x G1 + F x M2 x G2 + F x M3 x G3.

At this moment the functional statistics have 3 different goods classification:

G1 = classification for road, rail, pipeline and inland shipping (NSTR 2-digit);
G2 = classification for maritime transport (8 headings);
G3 = classification for air transport (1 heading).
M1 = road, rail, pipeline and inland shipping;
M2 = maritime transport
M3 = air transport.
F x M1 x G1 consists of 2 x 4 x 52 = 416 equations;
F x M2 x G2 consists of 2 x 1 x 8 = 16 equations;
F x M3 x G3 consists of 2 x 1 x 1 = 2 equations.

This leads to 440 different equations from which transit figures can be estimated.

For the short-term the crossing of F x M was carried out for 1997 and 1998. For the longer term also the goods classification will be added to the model. After that it will be seen whether the crossing can be carried out for other variables like container indication and region or county of loading/unloading and origin/destination. However this will lead to a lot of problems.

Within the functional transport statistics the goods classification NSTR (group 99) consists for the larger part of goods in containers, which can not be divided into other categories. Trade data gives reliable information for goods in container, especially for extra-European trade. For solving the 440 equations a further distinguishing of the goods is necessary. To use container information in the model identification whether goods are transported in containers should be added to the model. The number of equations will be duplicated.

Adding a geographical component to the model causes an enormous expansion of the model. The problems of connecting country of loading/unloading and country of origin/destination are probably not solvable.
Table 1: Variables to be harmonised and integrated on short-term (S) and long-term (L)

<table>
<thead>
<tr>
<th>Required variables</th>
<th>Variables integrated (transport and trade)</th>
<th>Variables harmonised</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variables (countable):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (gross)</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Weight (gross+)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Number of loaded/empty containers/TEU</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Number of trips/journey</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>Load capacity</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td><strong>Variables (descriptive):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport flow (2a) (national/international)</td>
<td>L</td>
<td>S</td>
</tr>
<tr>
<td>Direction (loaded/unloaded)</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Trade flow (4) (Import, export, incoming and outgoing transit)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Mode of transport</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Nationality of the transport enterprise</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>Classification of goods (NSTR-2 digit)</td>
<td>L</td>
<td>S</td>
</tr>
<tr>
<td>Type of goods (containerised or not)</td>
<td>L</td>
<td>S</td>
</tr>
<tr>
<td>Classification dangerous goods</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Region of origin/destination</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>Region of loading/unloading</td>
<td>L</td>
<td>S</td>
</tr>
<tr>
<td>Region of transhipment in the Netherlands</td>
<td>L</td>
<td></td>
</tr>
</tbody>
</table>

5.4 The first results of combining transport and trade information

For the years 1997 and 1998 the harmonisation and integration has taken place. A new data set has been created from which tables across modes can be made very easily. The results of the combining of the transport and trade data can be found in the next tables.

Table 2: International goods flows per mode of transport, 1997 (million tonnes).

<table>
<thead>
<tr>
<th>Mode of transport</th>
<th>Inwards</th>
<th>Import</th>
<th>Incoming transit</th>
<th>Outwards</th>
<th>Export</th>
<th>Outgoing transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>458,4</td>
<td>284,8</td>
<td>173,6</td>
<td>399,1</td>
<td>223,3</td>
<td>175,8</td>
</tr>
<tr>
<td>Maritime transport</td>
<td>308,2</td>
<td>147,7</td>
<td>160,5</td>
<td>84,2</td>
<td>43,0</td>
<td>41,2</td>
</tr>
<tr>
<td>Inland shipping</td>
<td>50,5</td>
<td>34,7</td>
<td>15,8</td>
<td>136,8</td>
<td>49,5</td>
<td>87,3</td>
</tr>
<tr>
<td>Road transport</td>
<td>76,4</td>
<td>83,2</td>
<td>-6,8</td>
<td>82,3</td>
<td>83,3</td>
<td>-1,0</td>
</tr>
<tr>
<td>Rail transport</td>
<td>6,2</td>
<td>2,5</td>
<td>3,7</td>
<td>11,7</td>
<td>4,8</td>
<td>6,9</td>
</tr>
<tr>
<td>Air transport</td>
<td>0,6</td>
<td>0,2</td>
<td>0,4</td>
<td>0,6</td>
<td>0,3</td>
<td>0,3</td>
</tr>
<tr>
<td>Pipeline</td>
<td>16,5</td>
<td>16,5</td>
<td>0,0</td>
<td>83,5</td>
<td>42,4</td>
<td>41,1</td>
</tr>
</tbody>
</table>
Table 3: International goods flows per mode of transport, 1998 (millions tonnes).

<table>
<thead>
<tr>
<th>Mode of transport</th>
<th>Inwards</th>
<th>Import</th>
<th>Incoming transit</th>
<th>Outwards</th>
<th>Export</th>
<th>Outgoing transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>469,3</td>
<td>302,2</td>
<td>167,5</td>
<td>393,3</td>
<td>234,4</td>
<td>158,9</td>
</tr>
<tr>
<td>Maritime transport</td>
<td>314,6</td>
<td>157,0</td>
<td>157,6</td>
<td>81,1</td>
<td>41,5</td>
<td>39,4</td>
</tr>
<tr>
<td>Inland shipping</td>
<td>51,1</td>
<td>35,5</td>
<td>15,6</td>
<td>129,9</td>
<td>51,3</td>
<td>78,6</td>
</tr>
<tr>
<td>Road transport</td>
<td>81,5</td>
<td>92,0</td>
<td>-10,5</td>
<td>86,8</td>
<td>96,1</td>
<td>-9,3</td>
</tr>
<tr>
<td>Rail transport</td>
<td>7,0</td>
<td>2,9</td>
<td>4,1</td>
<td>13,3</td>
<td>4,8</td>
<td>8,5</td>
</tr>
<tr>
<td>Air transport</td>
<td>0,6</td>
<td>0,3</td>
<td>0,3</td>
<td>0,6</td>
<td>0,3</td>
<td>0,3</td>
</tr>
<tr>
<td>Pipeline</td>
<td>14,5</td>
<td>14,5</td>
<td>0</td>
<td>81,6</td>
<td>40,2</td>
<td>41,4</td>
</tr>
</tbody>
</table>

The overestimate of the import and export by road causes the negative value for incoming and outgoing transit. Its is caused by a wrong declaration by some enterprises. In some cases the real mode of transport is not known. The interest for good transport information in trade documents is very poor. However when combining transport and trade figures the information about the mode of transport should be good.

6 Plans for the future

Concerning a further combination of trade and transport information Statistics Netherlands highly depends from the SLIM proposals. If for intra-European trade the mode of transport becomes an optional variable, then the model can not be used anymore. However, the new system is not only built to link transport and trade data. Due to the architecture of the new system there are many other possibilities. By just connecting the information to one of the five basic elements of the system all combinations can be created. For transport and trade the connection was the event and the means of transport.

Combining with passenger transport data

Another step will be the combination of goods transport data with passenger transport data. Passengers can be seen as the owner of the transportation mean or as a kind of cargo. So, the person becomes connected directly to the basic element means of transport or cargo.

For the inland transport the results from the Onderzoek Verplaatsingsgedrag (Dutch household Survey on passenger mobility) will be used. The projection of this data on to the infrastructure (possibly by using the digital network of the Ministry of Transport) gives a complete overview of the traffic within the Netherlands. Quick transformed data could be helpful for monitoring flows of goods and passengers.

Combining with institutional information

The means of transport also can be linked with information about the transport enterprises. So, functional transport information can be linked with institutional information. For example, number of employees, turnover and investments can be reflected on the transport itself.

Regarding passengers from the point of view as institutions, personal information can be added. For example age, sex, income, expenditure and employability of the person can be added to the system.

Combining with information about production and consumption

Goods transport can be linked with information from production and consumption areas. Goods flows can be monitored. This also leads to compatible information about investments and turnover
for all branches, not only the transport branches. It automatically links transport information with National Accounts.

**Combining with information about effects of transport**

Links can be lead between the means of transport and effects of use of this means. So, for example fuel consumption, pollution or accidents easily can be ascribed to persons and institutions.

**Conclusion**

*Thinking about all those possibilities almost all statistical information can be linked by the use of this new architecture. So, maybe in future Statistics Netherlands is able to use only one large system for holding all statistical information about and related to transport. The great advantage is that all information can be seen from every point of interest. In case this should happen, one could state that the start of the Single Market was the lead to a new, flexible and efficient information system at Statistics Netherlands.*

*So maybe as what Andrew Dwelly [2] said: “That what was started as a small project becomes a victim of its own success - and becomes a big project”.*

**Literature**


PROFESSIONAL ORGANISATIONS AS SPECIFIC AGENTS: THE CASE OF UIC (INTERNATIONAL UNION OF RAILWAYS)

IS IT NECESSARY TO MOVE TO A MORE EFFICIENT PROCESS IN WHICH PART OF THE PRODUCTION OF COMMUNITY STATISTICS ARE DECENTRALISED TO SPECIFIC AGENTS?

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The first part will present the role and the objectives of UIC in an attempt to understand the action that Professional Organisations such as UIC could play in data collection for International Organisations\(^1\).

The second part will analyse these objectives in comparison with International Organisations’ ones to evaluate the advantages for International Organisations to co-operate.

Some concrete examples of already existing co-operation and future tasks are listed in the third part.

1. **What is UIC?**

Created in 1927, UIC offers guarantees on statistics compiled in an international environment with its main known publication “International Railway Statistics” since 1932.

Based on leaflets, rules defined and applied by UIC member, UIC has been co-operating with International Organisation for many years.

1.1. **Goals**

- Harmonisation of railway activity
- Project management in various fields (technical, economics, …)
- Carrying out international studies on the future of the railway and the transport modes
- Being the mouthpiece of the railway world (cooperate with external organisations : international organisations, professional organisations, …)

1.2. **Consequence for statistics objectives**

- To be the mouthpiece of the railway world -> cover more railway undertakings than its members in its statistics publications
- To produce statistics tables on railway activity
- To reflect on new statistical variables
- To cooperate with external organisations : international organisations, professional organisations
- To furnish quality data (objectivity) : “International Railway Statistics” publication based on leaflet 398-1 R
- To agree on common statistics definitions

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\(^{1}\) The word “international organisation”, used in this paper, concerns the European Union (where Eurostat is a directorate general of this supranational institution ), the United Nations, the World Bank,…

12th CEIES seminar-- Community transport statistics at the dawn of the 3rd millennium
1.3. Statistical organisation structure at UIC

1.4. UIC Statistics Information System

6 publications (for any customer)
- International Railway Statistics (World) : first issued in 1932
- Supplementary Railway Statistics (World)
- Chronological Railway Statistics (World) : from 1900 to 1999 for some variables
- Synopsis (World)
- International freight traffic from Railway to Railway (Europe)
- Quarterly Statistics on passenger and freight traffic (up to 2000 : Europe, from 2001 : world)

Data Storage
- Up to 1999 : Excel files and Access Database for annual railway-related data only
- From 2000 : RAILISA: new database opened on Internet, very flexible allowing the addition of new variables, integrating all transport modes, ...

2. What could offer UIC as a specific agent ?

Because Professional Organisations such as UIC and International Organisations work at an international level, the benefits from co-operation are obvious. The benefits from an International Organisation point of view are listed below and then summarised by type of gain.
2.1. Comparison between a Professional Organisation (PO) such as UIC and an International Organisation (IO) for statistical purposes

<table>
<thead>
<tr>
<th>PO (UIC)</th>
<th>IO</th>
<th>Advantage for IO to co-operate</th>
</tr>
</thead>
</table>
| **Objective : To be the leading representative of railway activity**  
- only members have to provide data*  
- done by other railway undertakings on a co-operation basis (new trend in the last 2/3 years)  
- geographic coverage = world | - IO are based on national administrations which provide data for all railways undertakings  
- geographic coverage is limited | The difference in geographic coverage has a major impact on definitions, new variables, with a view to their comparison. |
| *UIC’s members cover almost every leading railway undertaking in the world | | |
| **Objective : To reflect on new variables**  
- Role: to promote railway activity  
-> Seek out new variables which highlight new activities | - Role: to monitor transport activity | Take the work done on new variables (definitions, choice of the most relevant indicators, …) and check whether it is relevant to its monitoring role |
| Advantages  
- Direct contacts with railway undertakings  
- World view | | |
| **Objective : To agree on common definitions**  
- world view  
Examples  
- High Speed (Europe/Japan)  
- variables are based on a region  
- the new Eurostat regulation will be implemented at UIC for all European members (CEEC* countries included) | - geographic coverage is limited | Compare its definitions with a wider range of countries |
<p>| *CEEC : Central and Eastern European Countries | | |</p>
<table>
<thead>
<tr>
<th>Objective : To manage data confidentiality</th>
<th>Objective : To create the structure for the work to be carried out</th>
<th>Objective : Objectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>- one part of the data is confidential at railway undertaking level</td>
<td>- Official correspondents</td>
<td>UIC rules</td>
</tr>
<tr>
<td>- confidential data obtained on a co-operation basis</td>
<td>- Official correspondents</td>
<td>Procedures to ensure quality (same organisation as IO)</td>
</tr>
<tr>
<td></td>
<td>- Railway Statistics Working Group</td>
<td>First UIC Statistics publication = 1932</td>
</tr>
<tr>
<td></td>
<td>- Transport division as central hub</td>
<td>Long tradition of co-operation with IO</td>
</tr>
<tr>
<td></td>
<td>- users : UIC working groups, international organisations, consultants, periodicals, ...</td>
<td>Direct contacts with Railway experts who are usually the same ones for national administrations</td>
</tr>
<tr>
<td></td>
<td>- IO like Eurostat can use legal tools to obtain data</td>
<td>IO rules</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedures to ensure quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IO are based on national administrations which represent all transport modes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No special advantage, quality of data is the same, maybe with a slight advantage for PO given that its direct contact people, who are experts, may spot errors very quickly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The current differences stem from different definitions or difficulties in finding the same variables in different sources</td>
</tr>
</tbody>
</table>

*NB: THERE IS NO REAL CONFIDENTIALITY PROBLEM AS SUCH
Companies are willing to volunteer data on a mutual cooperative basis if they stand to benefit from it*

*If a PO such as UIC is to become a specific agent working for an IO, finalise existing co-operation by means of a contractual agreement between PO and IO (as between IO and national administration)*
2.2. PO as specific agents for IO: main benefits for IO

- PO like UIC have a world view
- Work already under way on new relevant variables (definitions, choice of indicators, statistics tables, …)
- Avoid several sources for same information
- UIC internal organisation mirrors an International Organisation structure
- UIC has direct contacts with railway experts
- One contact person at UIC: can answer for several railways from several countries

- comparability of the data
- gain time to monitor transport activities
- gain time, enhance data quality
- Transparency
- Gain time, manage data confidentiality
- Gain time

To conclude this second part, it is very important to mention that, whatever the relations between PO and IO, other stakeholders, such as National Administrations, Railways Undertakings, …, also have a role to play in order to meet user needs.

3. Concrete examples of statistical international co-operation

3.1. Existing co-operation

- UIC - Eurostat-ECMT-ECE/UN: joint questionnaire on transport statistics
  - terminology
  - exchange of railway data
  - advice on new variables
- UIC - Eurostat-ECMT-ECE/UN meetings: participation as observer
- UIC - IO Publications. Examples: DG TREN “EU Transport in figures”
  EUROSTAT “Statistics in Focus”
  ECE/UN: “Annual Bulletin of Transport Statistics”

3.2. Future co-operation in short term

UIC - Eurostat: new regulation on railway statistics

3.3. Future co-operation in medium term

- UIC – World Bank

UIC has showed a clear determination to co-operate with international organisations through active participation in meetings, exchange of data and passing on requests from international organisations.

A recognition of professional organisations such as UIC with a clear definition of the tasks involved in this co-operation will certainly help to gain time and efficiency on this work.
REPORT FROM 1st WORKSHOP

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Mr. Smeets' paper on the Dutch Transitie Project

The new Dutch data system aims at giving much more information based on existing data. One of the scopes being that rearranging the obtained data from the Functional Statistics gives more flexible possibilities for analysis without extending the burden on respondent.

Users' needs also are met in the sense that the storage of data is not excluding any application of the existing data. So analysis demanded today do not put restraints on the future use of the data system.

In the Dutch system data is attributed to

- Objects that are existing regardless of their relations
- Relations between objects reflecting real time events

The core objects of the data model are

- Location
- Time
- Cargo
- Means of transport

More objects like person may be applied.

The relations between the objects can be interpreted as loading, unloading, start or stop

If location is kept constant information on the handling of goods in a given place can be compiled. Is the cargo kept constant the route of the cargo (transport chain) can be followed. Similarly the vehicle route (traffic) can be established keeping the vehicle constant.

But the data analysis require that the objects are identified in a unique way. The system allows for coding of the basic objects using a hierarchical scheme depending on the data available, e.g. the location can be coded on country regional or local level, and the time dimension can be year, quarter, month or day. The details of the possible analysis are of cause restricted by the level of details in the data input.

Analysis of attributes such as the weight of goods requires application of same definition for all modes of transport. Transformation of weight to "weight plus" including the weight of the container can be carried out using external information.

Gaps like missing transit data can be bridged applying information from Trade Statistics.
Similarly other details not known from the existing Functional Statistics may be estimated based on external information on typical flows of goods. E.g. Rotterdam was imputed as place of unloading for transit goods coming from Poland.

Putting more detailed information or estimates into the system increases the room for analysis. The question was raised on how far a National Statistical Office could go in filling gaps with estimates without losing its credibility.

To present statistics on the goods chain detailed information is needed on the transhipments and on the means of transport. In this case the model is dependent on information on transit flows and on transport by foreign road vehicles. To obtain such data co-operation with the other European producers of statistics is essential.

TRANSITIE underline the needs for using harmonised definitions and classifications in the global statistical system. If this objective is met synergy can be obtained from merging transport data with data from other statistical systems like Trade Statistics, as described in the presented paper, or Enterprise Statistics, adding economic data to the analysis.

To sum up:

TRANSITIE is a general data model that is independent of the actual physical implementation. It calls for harmonisation of definitions of common variables and classifications used in the Functional Statistics and in other statistical models. The benefits being the possibilities for making analysis of transport activities based on merger of data from different data sources and systems.

The paper of Mr. Gardiol, UIC, on decentralisation of Community statistics using professional organisations as agents

UIC, The International Railway Union, was described as the mouthpiece of railway world. UIC is involved in promoting railway activities, in seeking out variables and definitions on new railway activities. It has global experience, is trusted confidential data and is representing the railway companies in various international fora.

UIC may be given a role as an agent for EUROSTAT based on a contractual agreement. This may imply benefits to EUROSTAT and to the member states in form of

- World wide comparability of data, as UIC covers most of the world
- Timely data (UIC has published 1999 data in October 2000)
- High quality data as UIC has the expertise
- Avoidance of double collection of same data

Mr. Gardiol referred to the draft EU Parliament and Council Regulation on railway statistics. Here UIC might have a role to play as submitter of traffic flow data for segments of lines.

Some questions were raised on the objectivity of a professional organisation like UIC wearing two hats:

- Promotion of the interest of its members
- Supplier of data that might be used against the interest of its members
But examples of non-problematic use of statistics collected by professional organisations were also mentioned. If government has the oversight concerning the quality of the collected data outsourcing was not felt a problem.

In case of co-operation with a professional organisation it was recommended that the agency be based on a contract. Some warning was raised concerning the situation at the time of the expiration of the contract. Here the official statistics would be in a poor position.

Confidentiality was also noted as a delimiting factor. Especially in getting detailed information. A contrary argument was raised that the enterprises often would be ready to disclose detailed data if they were to receive similar in return. Further it was claimed that the confidentiality aspect would decrease with the age of the information. After two years of time most data would not be considered confidential any more.

To sum up:

Professional organisations collect and possess useful data. Therefore they may be given a role in supplying data to the official statistics if the caveats concerning biased statistics and confidentiality can be tackled.
2nd workshop:

CHANGES IN TRANSPORT GEOGRAPHY, DATA COLLECTION
HOW WILL COMMUNITY TRANSPORT STATISTICS BE INFLUENCED BY CHANGES IN TRANSPORT GEOGRAPHY

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1. BACKGROUND – WORKSHOP OBJECTIVES

These have been defined in the terms of reference of both the 2nd Plenary session and this workshop, covering changes in transport geography, data needs and data collection.

“The enlargement of the Union and the development of Pan-European transport are considerably changing the geography of transport. The increasing distances to be covered are likely to amplify the disparity of operating conditions of the different modes of transport. As for data needs, is it necessary to extend the scope of official transport statistics to cover, not only the physical aspects of transport, but also its global economic aspects (use of infrastructure, comparative costs, environmental accounts, etc)?…… The Transport Trans-European Network is a major component of building Europe. Are there domains in transport statistics where only data on European level are necessary and if so, what would be the consequences for data collection.”

2. INTRODUCTION

My interest in this topic arises from desk research undertaken whilst preparing a report recently published by Financial Times Business. This was on the subject of pan-European transport (Pan European Transport, Market Trends and Opportunities FT- 1999). As the title indicates, the perspective of the report, and hence of the research, was that of providers and users of commercial transport services. Data was sought that would define particular passenger and freight transport markets and market sectors, especially within the European Union. This requirement falls within the remit of the ‘Scope and Mission of Community Transport Statistics’, part of which is to meet ‘the information needs of national and regional administrations, the private sector, research and citizens as far as Community transport statistics are concerned.’ (Eurostat Background Document - Community Transport Statistics Why, What, Who, How – 22 March 2000 p.3)

More specifically, this paper will concentrate on the subject allocated for the consideration of this workshop, as set out in the background document under the heading ‘Future Prospects’. In particular, it will address the issue ‘how will community transport statistics be influenced by changes in transport geography’ and the possible implications of such changes for transport data users and producers.

The enlargement of the Union and the development of Pan-European transport have also affected other dimensions of the European transport market, and hence other issues are also inevitably touched on in this paper. Such issues include changes to the relevance of the transport mode and the role of the state as defining characteristics of transport markets.

The opinions expressed in this paper are expressed in the context of certain difficulties I had in accessing relevant statistics in the form needed to illustrate my theme when writing the ‘Pan-European Transport’ Report. I hope that such personal views will be helpful, but I do not presume to suggest that they will necessarily coincide with those of other commercial users of European transport statistics.
3. **ASSESSMENT OF DATA NEEDS**

3.1 **Whose data needs?**

I have restricted myself to considering the transport data needs of the commercial sector, including transport providers, transport users and others such as fund managers and private investors. These users need data about the **market** for transport services. I have deliberately described such users as belonging to the **commercial** sector rather than the **private** sector, since all participants in the market need much the same data whether or not they are state bodies, public corporations, individuals or privately owned enterprises. Ownership does not affect the need for data about the market, and is not a particularly relevant issue. For instance, national postal administrations compete with privately owned firms for the same business in the express parcels market.

3.2 **Why does the commercial sector need EU transport statistics?**

Organisations in the commercial sector need to define and measure the market for transport services for a variety of reasons:

- suppliers of transport services need such information, projected into the future, as a basis for operational and investment planning. They need information on which to identify opportunities for new services and increase market shares;
- financial investors in the market have similar needs;
- transport users need an indication of the extent to which suppliers in the different transport modes address their needs for passenger or freight transport.

3.3 **How have the commercial sector’s data needs been affected by recent developments in the EU transport market?**

There have been many recent developments that have affected the market for transport services in the European Union, and hence the need for statistical data. Partly as a result of market liberalisation and the privatisation of transport institutions, current definitions are less relevant to the needs of the market than they were. These include definitions of geographical boundaries between markets. They also include institutional boundaries between state-owned and privately owned bodies and between regulated and deregulated sectors of the transport industry. There are several examples of such developments that are relevant to the present discussion. For instance:

- an example taken from the field of passenger transport is provided by the opening of services through the Channel Tunnel, both the through-rail services provided by Eurostar from London to Paris and Brussels, and the car-carrying tourist shuttle services operated by Eurotunnel between Folkestone and Sangatte. On the routes from London to Paris and Brussels there is now effectively one market, not defined according to mode, on what was previously considered to be a short haul air market. ‘Eurostar’ services (via the tunnel) compete head-to-head with air on these routes. At the same time a new international rail service has been created, with a need for new statistical definitions. On the cross Channel tourist shuttles, a new competitor has emerged, this time competing with the short-sea car-carrying ferries. Again, head-to-head competition has emerged, between modes, within a single market.

- another example of a market where pre-existing boundaries between geographical entities and transport modes have been eroded is provided by the pan-European express parcels and courier business. Liberalisation of rates, and freedom of entry for operators has meant that the Single European Market has long been a reality in this sector. From the viewpoint of the shipper, what
is mainly required is the safe and timely delivery of the consignment. Whilst there may also be other criteria the client may wish to see met, the mechanics of the supply chain operation, and the particular mode or modes of transport to be used are unlikely to feature high on any list of such criteria. Also, as already indicated, the boundaries between public and private sector have also been eroded in that national postal administrations compete with privately owned firms for the same business in this market.

In all of these examples, the mode of transport no longer defines the market, whilst new geographical definitions are needed.

3.4 What are the sector’s current data needs?

(This paragraph represents my own personal views, but these have been heavily influenced by work done by many others in the field of transport statistics, in particular, contributions made by speakers and other participants in seminars organised in recent years by the London-based Transport Statistics Users Group. The most recent of these was a seminar on freight statistics, addressed by Simon Chapman, an economist with the Freight Transport Association, Bill Eadie of specialist consultancy Baxter Eadie, and Tom Smart of survey specialists ‘Topflight’ Decision Support.)

3.4.1. Main transport data requirements of the commercial sector

The main transport data requirements of the commercial sector may be identified as follows:
- information is needed about the supply of transport, as measured by indicators of the extent of the transport infrastructure and investment in it, and by levels of service provision (e.g. routes and frequencies of service, vehicle kilometres etc);
- data on the market and its components are required in terms of both value and volume of transport;
- current and historic data are required to permit the identification of trends;
- where transport markets are served by more than one mode, information on the modal split is also needed;
- the geographical units to which the data relate need to correspond with real world definitions of what constitutes a particular market.

In more detail, users need information about the levels of usage, in terms of passenger journeys, passenger kilometres, freight uplifted, tonne kilometres performed etc.

Different organisations will seek information by specific market sector, defined according to the commercial realities that prevail in that sector. For instance, freight markets may be defined according to size of consignment, nature of goods carried, timeliness of delivery etc.

3.4.2 The geographical dimension

Passenger markets are likely to be defined by journey purpose and region/country of residence. However, in both cases the geographical dimension will be important in defining international and domestic transport, and country or region of origin/sale of passenger or freight demand. The market or market segment about which information is required, may or may not correspond with markets defined in terms of traditional (existing) geographical boundaries between geographical units, or categorised according to mode of transport.

Geography remains an important criterion for the user of transport services, but as the pan-European dimension becomes more relevant, so the national dimension recedes in importance. This
has implications for transport statistics as for statistics relating to other fields of economic activity. At present, the background documentation identifies three levels of transport statistics (international, national and regional). However, in order to provide a measure of pan-European transport, additional levels need to be produced. In particular, international transport needs to be subdivided into transport between Member States, and transport between Member States and other countries.

A key question to be addressed in this workshop is: **are there domains in transport statistics where only data on European level are necessary?** The answer depends on purposes for which statistics are required. There are certainly domains in transport statistics where data at the European level are necessary, but it seems unlikely that this requirement would remove the need for statistics to be collected at the national level (i.e. there are few domains where only data at the European level are needed). The question is posed in the context of the Transport TENs, but from the viewpoint of the commercial user of transport statistics, there are many other contexts in which Europe-wide statistics may be needed.

There are some differences between needs of governments, at whatever level, national or Community, and the needs of other users, academics and businesses. So long as national governments exist, they are likely to continue to require national statistics to inform national policy development.

However, it is probably true that in many transport markets, national boundaries are becoming irrelevant. The external European frontier will become the relevant ‘national’ boundary. Current national boundaries will represent boundaries between what will effectively become, from an economic, if not a political perspective, larger EU regions.

### 3.4.3 Disaggregated data

So far, the emphasis in this paper has been the need for data at the aggregate level. Clearly, individual businesses will have a large variety of different needs for disaggregated data. Many commercial users will have a need for detailed origin and destination data for both passenger and freight markets. Particularly in freight markets, there is also likely to be a need for information on routes, transfer points and consignment characteristics. There will also be a need to track the transport chain for inter-modal transport (unit loads). Such data are likely to be provided by the users themselves in many ways, including:

- via EDI or other technologies (e.g. satellite-based systems) used routinely in logistics operations, providing a complete door-to-door record;
- through co-operative industry-wide research, shipper surveys, use of exporter panels and other commercially commissioned surveys;
- from records generated by reservations systems and customer databases of airlines and other passenger operators;

Many of these methods provide continuing online data collection and access, enabling tailor-made analyses to be produced. Databases may record complete characteristics of a passenger journey or freight trip. Most data can be provided electronically, but must be captured from a variety of disparate and differently structured systems, not designed with compatibility with other systems in mind. However, crosschecks can be made to provide external data calibration. Some data collection systems (e.g. Topflight) provide a breakdown by:
- agent (e.g. freight integrator/haulier)
- carrier (e.g. airline/ shipping line/ rail operator
- service type (e.g. airfreight or express/ road freight or express/ Ro/Ro containerised and/or multimodal freight)

3.5 **Difficulties in meeting data requirement**

This list of requirements may be something of a ‘tall order’, for a variety of reasons:
- data may be collected as a by-product of an operational ‘process’ and hence may not always provide appropriate measures of the market;
- surveys to provide such data in a more appropriate form can be expensive;
- companies responsible for particular modes of transport may collect data according to historical definitions that may not match those used for other modes;
- particular modes of transport may start to compete in markets where they were previously absent;
- in a dynamic world, existing definitions of geographical markets, and the boundaries between them, may change;
- Data may not exist and be prohibitively expensive to gather through surveys, and some form of ‘guesstimation’ may be needed.

3.6 **Comments on current definitions and data**

Whilst recognising such difficulties, it may nevertheless be appropriate to consider the extent to which the ‘scope and mission’ of Community Transport Statistics and currently available published statistics meet the needs outlined above. (See ‘Eurostat Background Document - Community Transport Statistics Why, What, Who, How – 22 March 2000’ p.3’, and ‘Transport in Figures’ (January 2000 edition). These publications are the main documents referred to in this paper. They clearly represent only the tip of the iceberg of the EU’s large transport statistical resource. However, since all this material may not be familiar to everyone attending this seminar, these summary documents have been taken as a useful basis for purposes of illustrating one of the main points made in this paper (i.e. that data are not routinely recorded in such a way as to enable the intra-European dimension to be readily identified.)

3.6.1 **Definitions in ‘Background document’**

The background document indicates that Community transport statistics relate to transport as both a function and an economic activity, and that this function is defined by quantities (of passengers and goods transported), types of goods, journeys, vehicles, and infrastructure. This concern with function focuses on operational characteristics, and is not particularly compatible with an approach that seeks to measure the size of, and trends in, particular transport markets. In general, such operational statistics may or may not provide what is required.

The fact that modes increasingly compete in the same markets means that it is important that consistent definitions are adopted across modes. This is not always the case at present. (See Background Document Annexes 3, 4,5,6,& 7 and APPENDIX 1 of this Paper.) This is particularly true for the varying definitions of national transport that are used. For example, in the case of road transport, ‘national transport’ signifies transport within the reporting country, in which the vehicle is registered, but for most other modes it signifies transport between two places located in the reporting country, regardless of the country of registration.
There is a corresponding mismatch in the definition of cabotage. This is defined, from an operator perspective, as international transport (i.e. it takes place in a country other than the reporting country). However, from a market perspective it forms part of the national (domestic) transport of that other country, albeit transport undertaken by a foreign operator. The present classification reflects an operator focus rather than a market focus.

3.6.2 Data content and presentation in ‘Transport in Figures’

‘Transport in Figures’ is constantly being improved and updated, and was a major source of data for the ‘Pan-European Transport’ Report. Nevertheless, the data do not meet the requirements as set out above in the following respects:

- the definition of ‘national transport’ differs between modes (See Appendix 1);
- there is very limited aggregate data on pan-European transport (i.e. transport within and between individual EU Member States). This is probably partly attributable to the lack of consistency in the definition of ‘national transport’, but apart from this reason, it is not always clear whether this is due to lack of data, or lack of appreciation of the value of an alternative presentation;
- data is classified and analysed according to criteria that are among the least relevant for those interested in transport markets (e.g. public versus private sector, analyses of single modes, analysis by country of vehicle registration);
- in liberalised (deregulated) transport markets organisational & institutional detail (e.g. nationality of carrier) may be important but is secondary for most purposes;
- summary international and cross trade statistics should distinguish intra-EU from other international movements. This is only currently shown for international freight transport by sea (Table 4.14) and air traffic between countries (Table 5.13).

Although this emphasis may be the result of the way in which statistics have been traditionally collected by operations departments, it does not help company managers and others seeking to understand the dimensions of particular market segments, whether defined in terms of geographical or other characteristics.

4. Consequences for data collection.

I should stress that my perspective here is that of a user of statistics, and my comments regarding the implications for data collection need to be assessed by those responsible for the practicalities. Nevertheless, I hope they will be of some value as a statement of a target to be aimed for, made from the perspective of one such user.

The main conclusion from para 3.6 is that differences of definition and variations in the data collection process mean that it is difficult to gain an appreciation of the overall intra-European transport dimension, perhaps the most significant dimension for many transport markets, where national boundaries are becoming less relevant. In many instances, the data collected by national governments are categorised according to country of ownership or vehicle registration and then summarised by reporting country rather than the relevant market criterion. This appears to be the case both for data on the market (passengers, passenger kilometres, tonnes, tonne kilometres etc) and for data relating to transport capacity provision (vehicle kilometres, seat kilometres, capacity tonne kilometres etc).
Hence, the main consequences of changes in the geography of transport for data collection relate both to the definitions used and the methods by which data are collected.

The key geographical sectors of the market are:-

- intra-Europe (national)
- intra-Europe (international)
- other international

At the stage when the system for the collection of the data is being specified, it should provide for input data to be coded so as to permit geographical aggregation under these headings to take place. This should be the case whether the data arise from some operational process, or are derived from surveys, whether they relate to single-mode or multi-modal operations, or whether they relate to traffic or capacity.

For some individual modes, this objective is already largely achieved, with data already collected in a form that enables such aggregation to take place. This is true for most data relating to national (domestic) transport, and for most international air transport data.

However, where other international data are concerned this is far less likely to be the case, with ‘intra-European (international)’ movements not readily distinguishable from ‘other international’ movements. This lacks is particularly marked in the case of international transport by road, and inter-modal transport.

Para 3.4.3. above outlines some of the methods currently used to derive the data needed to achieve the operational, financial, marketing and other management objectives of firms. It is suggested that these methods could be extended to meet the wider need for aggregate statistical data in the form required to support macro transport policy formation.

Research of the kind already referred to as providing data to individual companies would also enable aggregate statistics to be produced, albeit with due regard for the need to safeguard commercial confidentiality. New technologies may also enable data, produced as part of routine operational procedures by individual firms, to be reported to Eurostat or other collecting agency. This may provide a lower cost solution to data collection than the mounting of expensive sample surveys (either by individual companies, trade associations, other industry wide groupings or by Eurostat itself).
### APPENDIX 1. SUMMARY OF DATA COLLECTION METHODOLOGY AND DEFINITIONS

#### TABLE 1. METHODOLOGY

<table>
<thead>
<tr>
<th>General Description</th>
<th>Data are reported by Member States based on various surveys and administrative documents, and are transmitted to Eurostat via the national statistical office or other national authority.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variations/ additions by mode:</td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>Surveys are conducted by Member States on the basis of questionnaires sent to a sample of vehicle owners. Vehicles registered in the Member State are covered in respect of all operations, whether inside or outside the country of registration.</td>
</tr>
<tr>
<td>Rail</td>
<td>Data are provided by, and in respect of, the operations of the main railway operating companies. In general, data are extracted from consignment notes and other operating records. In some cases the rail operators submit data directly to Eurostat.</td>
</tr>
<tr>
<td>Inland Waterway</td>
<td>Depending on the Member State, data collection is carried out either by the national statistical office or other national authority, or by various specialised bodies in the field of inland waterway transport, such as port authorities or navigation offices.</td>
</tr>
<tr>
<td>Maritime</td>
<td>Some data collected by individual ports.</td>
</tr>
<tr>
<td>Air</td>
<td>Data collected mainly by national airports</td>
</tr>
</tbody>
</table>


#### TABLE 2. DEFINITION: REPORTING COUNTRY

<table>
<thead>
<tr>
<th>General Definition</th>
<th>The country which collects the data and transmits them to Eurostat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variations/ additions by mode:</td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>Each country reports data only for vehicles registered in the reporting country.</td>
</tr>
<tr>
<td>Rail</td>
<td>Each country reports data for the main railway network on its national territory. Data are not reported for railways, which are not part of the main railway network.</td>
</tr>
<tr>
<td>Inland Waterway</td>
<td>Each country reports data for inland waterways on its national territory, irrespective of the nationality of the vessels carrying the goods</td>
</tr>
<tr>
<td>Maritime</td>
<td>Each country reports data for vessels entering or leaving seaports on its national territory, irrespective of the nationality of the vessels carrying the goods</td>
</tr>
<tr>
<td>Air</td>
<td>General definition applies</td>
</tr>
</tbody>
</table>

### TABLE 3. DEFINITION: NATIONAL TRANSPORT

<table>
<thead>
<tr>
<th>General Definition</th>
<th>Transport between two places located in the reporting country.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variations/additions by mode:</strong></td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>Transport within the reporting country, in which the vehicle is registered</td>
</tr>
<tr>
<td>Rail</td>
<td>General definition applies</td>
</tr>
<tr>
<td>Inland Waterway</td>
<td>General definition applies</td>
</tr>
<tr>
<td>Maritime</td>
<td>Transport between two ports (or offshore installations) located in the reporting country.</td>
</tr>
<tr>
<td>Air</td>
<td>General definition applies</td>
</tr>
</tbody>
</table>


### TABLE 4. DEFINITION: INTERNATIONAL TRANSPORT

<table>
<thead>
<tr>
<th>General Definition</th>
<th>Transport between a place in the reporting country and a place in another country.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variations/additions by mode:</strong></td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>Transport between the country of registration and another country (includes cross trade, and cabotage)</td>
</tr>
<tr>
<td>Rail</td>
<td></td>
</tr>
<tr>
<td>Inland Waterway</td>
<td></td>
</tr>
<tr>
<td>Maritime</td>
<td>Transport between a <strong>port</strong> in the reporting country and a <strong>port</strong> in another country.</td>
</tr>
<tr>
<td>Air</td>
<td>Transport between an <strong>airport</strong> in the reporting country and an <strong>airport</strong> in another country.</td>
</tr>
</tbody>
</table>

EUROPEAN TRANSPORT OBSERVATION:
A TRADITIONAL PROBLEM CALLING FOR GROUND-BREAKING INITIATIVES

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The question of the specific nature of the information necessary to inform European transport policy and the choice of infrastructures of European interest is one of the most frequently asked questions concerning research on information systems under the 4th and 5th FRDPs.

It is claim by some that all that needs to be done at European level is to summarise the information produced at national level by removing superfluous detail, generally by analogy with maps, in which the scale increases with the size of the territory covered: who would think of making a map of Europe with a scale of 1:25 000? According to others, however, the European dimension is supposed to bring about a qualitative change in the totally new characteristics of the information to be taken into account: as if the problems of intermodality, or of sustainable mobility, did not become real until expressed on a Europe-wide scale.

Is it because we are unable to arrive at a consensus on either of these opposing views that practical progress on the European transport information system is so slow? It is a fact that the ETIS (European Transport Information System) is still very largely a concept in search of a precise definition. Let us therefore try to get a clearer view.

The European-format transport snapshot: telescopic lens or wide-angle?

The question of choices with regard to trans-European infrastructure networks is particularly suitable for illustrating the question. The following argument is often heard: the legitimacy of European intervention in infrastructures is based on the supranational nature of concerns regarding mobility: whether we are dealing with the continuity of national networks – the famous missing links - , with major European arteries carrying considerable flows between Member States or between them and countries outside the Union or, lastly, with better integration of the peripheral areas of the Union. All that is needed, therefore, is to know the origin and destination of the flows which these networks can help to improve at the level of major areas, without having to enter into the sort of detail which an examination of national infrastructure projects usually requires.

This argument fails to take account of two facts which are as commonplace as they are unavoidable.

On the one hand, although what justifies Community intervention generally does fall under one of the three types of reason mentioned above, the factor relating to long-distance traffic, and a fortiori international traffic, which despite the increasing integration of the national territories still suffers from a noticeable "border effect", mostly accounts for a minority, even a very small minority, of the total traffic which might be carried by the infrastructure projects concerned. Particularly when we consider the dominant mode which is road transport, it is well known that the average motorway journey is regional rather than interregional. The economic, or socio-economic, viability of most of the projects cannot therefore be assessed without taking account of the other traffic components, precisely those which require the level of detail (let us say NUTS 3 in geographical terms as a working basis, even if this covers situations which vary from country to country) commonly achieved in national or regional studies.
On the other hand, even if only international traffic is considered, it would be a grave error to think that the corresponding mobility amounts to nothing more than a journey from the point of entry to the point of exit on the corresponding main network (let us say, for the sake of brevity, the trans-European network). On the contrary, this network is all the more likely to carry only a fraction of the total movements between origin and destination if it is high in the hierarchy of high-speed networks: thus the catchment area of an airport is on average larger than that of a TGV (French high-speed train) station, which in turn is larger than that of a motorway interchange. This means that, in order to simulate an international journey on the main network, we should know the origin/destination at a sufficiently detailed level, if necessary infra-NUTS 3, to determine which artery of the main network will be used and where the entry and exit points will be. This is all the more essential if we consider that, with a view to proper coordination of the various levels of intervention in infrastructure, it is also desirable to make sure that there is compatibility, in terms of capacity and level of service offered, between European expenditure on the main network and expenditure on the subsidiary network, under the principle of subsidiarity, by lower-level territorial authorities.

How many problems could have been avoided if major projects had been designed with an eye to uniform quality of service from beginning to end rather than performance on an isolated section: taking account of the adequate layout of access routes in the cost of a capital project like the fixed cross-Channel link; ensuring continuity between TGV and regional rail transport; efficient and direct transport services to major airports.

From this point de view, therefore, there is nothing specific about European information, which is subject to the same requirements as information of national or regional interest. This has a twofold effect on the design of a European transport database, which the conclusions of the MESUDMO research consortium which are now being drawn up should highlight: namely, that the content of such a database should on no account be merely an aggregation of the content of the national databases (where they exist, which is far from being the case for all the countries and for all fields of transport) but should provide as wide and as flexible access as possible to the information available at national level; and that consequently the architecture of this database must be designed not in centralised mode but in terms of operation as part of a database network in relational mode, with care being taken to provide a double procedure for (a) harmonising/consolidating existing national or infra-national data indispensable for the coherence of European analysis, with the inevitable consequence that the basic information would be less rich as a result of being reduced to the lowest common denominator, and (b) directly accessing the basic data so that they can be used with all their problem-solving potential.

*Does the European dimension transcend the need for transport information?*

An argument very frequently put forward to support the view that new information completely different from that traditionally collected by the Member States is essential for underpinning the construction of Europe is that the objectives pursued by the Commission are radically different from those pursued by each country individually and could not therefore be validly informed by data designed for a different purpose. Let us try to apply this reasoning to a few examples.

It is commonly accepted that more sustainable mobility can be achieved by shifting road traffic (and, where appropriate, air traffic) to less harmful modes of transport such as railways. In most cases (i.e. excluding special branch lines for freight and excluding the siting of houses and businesses in the immediate vicinity of railway stations) this necessarily involves providing efficient transport chains (via an exchange centre or a multimodal platform) or combined transport (car-couchette trains, "rolling road" combined transport). And some may have had the impression
that the concept of a transport chain was a very recent discovery by Brussels. Although it is true that
making long international journeys through ecologically sensitive areas calls especially for the
consideration of transport chains, the need for this type of information has long been felt by, for
example, countries which are concerned about their external trade transiting via major ports and
about possible loss of traffic to major rival foreign ports which are more competitive: and this is one
of the reasons why surveys on shippers have been carried out in France to monitor shipments from
the sender's premises to the recipient.

Another example, transalpine goods transport, is currently one of the main topics of concern in
European transport policy, regarding both the negotiations with Switzerland on the conditions for
easing the transit restrictions on Community HGVs and the major capital projects being designed
(Lyon-Turin high-speed rail link, Brenner tunnel) or the potential for transferring overland transit to
maritime or sea-river cabotage. The need for thorough knowledge of transalpine flows is thus
clearly felt by the Commission. There is, in fact, a joint initiative by three alpine countries - Austria,
Switzerland and France - which has resulted in the creation of a database on overland flows together
with a jointly designed road survey. This initiative has obtained a posteriori support from the
Commission, which implicitly recognised its relevance in the light of European concerns by making
it the technical basis of the negotiations on how Swiss transit quotas for vehicles over 28 tonnes are
to be distributed among European Union countries with effect from 2001.

It would therefore seem that the ideal profile of the embryonic European transport information
system is again no different from that of the national systems. At first sight, this is a factor
favourable to the creation of the ETIS both from a technical point of view, since useful information
is more likely to be already available in one form or another in at least some of the Member States,
and from a political point of view, since this should make it easier to achieve a consensus on the
selection of the indicators which will feed the European information system. From this point of
view, it is tempting to suggest that the relevant proposal drawn up by the INFOSTAT research
consortium as part of a research project submitted at the time of the first invitation to tender for the
4th FRDP should be put forward for discussion by the Member States, which is the best way of
getting it approved once the adjustments made necessary by the criticisms of this "guide list of
indicators" have been made.

But does this mean that the ETIS can be created simply by juxtaposing 15 sets of national data?
Certainly not, for a number of powerful reasons in which we should seek the truly specific nature of
the ETIS.

Statistical harmonisation, myth or reality?

The first of these reason is the differences between the structures of the information systems of the
various countries. Thirty years' experience of Community harmonisation of statistics via the
Directives enables us to assess not only the virtues but also the limitations of this approach. While it
has proved possible in the field of road freight statistics to arrive at a consensus among the countries
on the objectives to be achieved by making these objectives more ambitious (on two occasions,
corresponding to the first and second extensions of the road transport Directive) with regard to the
most demanding axes in terms of representativeness, i.e. the temporal axis with the transition to
quarterly provision of information and the spatial axis with the provision of matrices at NUTS 3
level, we are still a long way from collecting information according to a uniform methodology
throughout Europe.

It is probably illusory, in view of the inertia of the national statistical systems, to hope to progress
from an obligation to provide results, which produces data on common variables, to an obligation to
provide the means, which ensures that data are collected according to a uniform methodology, i.e.
the results are genuinely comparable. This is all the more true since the constraints to which the data-collection process is subject (pressure on budgetary resources, limiting the burden on businesses, commercial data confidentiality, preservation of individual freedoms) leave each statistical system ever less room for manoeuvre, while the starting situations vary to a greater or lesser extent from country to country. The solution is therefore probably to devise benchmarks capable of combining heterogeneous and partial observations.

The urgent need for European-scale benchmarks to achieve consistency in national information

A number of developments carried out recently under the 4th and 5th FRDPs or ad hoc multinational cooperation programmes seem to point to this.

In the field of long-distance passenger transport, the recommendations of the COST 305 project ultimately produced the DATELINE project, the aim of which is to conduct a harmonised European household survey. The work of the MEST research consortium which preceded it and the pilot surveys conducted by Eurostat provide a fairly sound reference for the adoption of an optimum methodology. The challenge is thus to achieve a situation in which the countries adhere to a protocol common to all the observations in the context of an arrangement which gives priority to partnership with the national statistical institutes. If we fail in this, the prospect of an aggregated flow matrix capable of serving as an instrument for ensuring the consistency of the countless estimates of disaggregated origin-destination flows, some of which are based on cordon surveys, some on counting and some on a combination of various statistical sources and expert statements, would give way to an exercise in behavioural analysis for which there is no need to set up a representative European sample, with the resources this would require, in order to obtain a typology of contrasting contexts for identifying different types of behaviour.

With regard to goods transport, the main gap in a statistical system which, by the way, is far more structured than in the field of passenger transport thanks to the Directives on modal statistics, concerns the knowledge of the transport chain from beginning to end, from the producer establishment or the warehouse to the customer. In addition, from a European perspective, the considerable reduction in information from customs sources following the introduction of the Single Market in 1993, particularly as regards intra-Community trade, resulted in the disappearance of the only medium for this type of information. In a field where the relative volume of international flows is much greater than for the mobility of individuals, it was therefore essential to develop tools adapted to the European dimension. This is what part of the work of the MYSTIC research consortium dealt with via the feasibility test on the extension of surveys on shippers, mainly initiated by France in 1988, to include monitoring international chains beyond the borders of the country of consignment. Ultimately, the more widespread use of automatic data exchange could, if it is accompanied by the standardisation that is indispensable, provide an alternative to this type of survey, which is very rich but undeniably complex.

The continual growth of traffic in the major European transport corridors, which is due mainly to the globalisation of the economy, the decentralisation of production, changes in the logistical organisation of businesses and the corresponding increase in distances travelled, is an increasing source of concern owing to the saturation of infrastructures and the resulting negative environmental impact, particularly in sensitive areas such as mountain regions. Transalpine routes, which are a classic example of this, have thus recently been the subject of coordinated observation of goods flows along them on the joint initiative of Austria, France and Switzerland, thus marking the beginning of a stage further than the first cooperative venture in 1994. Surveys of HGV drivers at the main crossing points in the great Alpine curve stretching from Vienna to Ventimiglia, supplemented by data supplied by rail operators, were used to estimate the volume and structure of virtually all transalpine long-distance goods flows for the whole of 1999, on the basis of common
descriptors laid down in a fully harmonised collection methodology. This operation has already been applied in practice for the first time: in the above-mentioned calculation of the distribution among Community countries of the Swiss transit quotas for HGVs over 28 tonnes when initial quotas for this type of traffic were introduced with effect from 1 January 2001.

Observation of cross-border flows which calls for special promotion of the European level

The attempt by the above-mentioned MYSTIC project to create a European-scale origin-destination matrix of long-distance passenger flows clearly highlighted the difference between information on interregional travel within a single country, which is relatively plentiful on average, and information on international travel, where there are infinitely more gaps. At least two reasons explain this situation, which is a second justification for a specific Community initiative.

Since it is set up nationally, the system for observing long-distance passenger mobility almost always gives priority to the national considerations of the country concerned. If it is based on household surveys, these normally describe only mobility within the national borders. And if by chance, as is the case in France, all mobility, including international mobility, is covered, the observation still covers residents only, so that the information gap concerning the mobility of non-residents on the national territory depends on a very hypothetical exchange of data with other countries which have similar observations. If it is based on passenger surveys, these surveys are generally conducted, at least in the case of road traffic as the dominant mode, at points in the network where the scale of traffic has implications for the layout or operation of the infrastructures. This mostly excludes border areas, which are the only areas in which international flows account for a high proportion of total traffic.

Precisely because of this relative weakness in global traffic, international mobility is typically affected by the most common apparent paradox of statistics, namely that the smaller a phenomenon is in quantitative terms, the greater the resources needed to observe it. This means that, even where there is a concern to ensure that the observation fully covers international mobility, the lack of consistency of the information collected on this variable limits its statistical relevance to a few global estimators, since estimating origin-destination flows with an acceptable confidence interval, even on the basis of highly aggregated zoning, is in most cases impossible to achieve.

Thus, even in the case of countries which have doubtless advanced furthest in the creation of origin-destination flow matrices, namely Germany, by means of a complex process combining numerous information sources, formalised modelling and expert statements, the flows between Germany and its neighbours are estimated only at a very high zoning level totally different from that used for the national territory, so that combining such data with the statistics of these countries is hampered by all manner of non-comparability factors (global flow versus mobility of residents, total population versus population above an age threshold, different thresholds defining long distance, etc.), which obviously point to the need for a benchmark as referred to above.

There is thus every reason why Europe should act to promote the observation of international mobility, not by developing specific tools but, in total synergy with the existing national observation systems, by reinforcing those components of the systems which are best able to portray this type of mobility. By putting forward such a proposal we automatically highlight one of the main contradictions between what is politically correct from a European point of view and the requirements of observation, since effective observation of international flows, particularly in terms of origin/destination, implies that they have to be surveyed where they are most concentrated, both in absolute volume and as a proportion of total traffic, i.e. in the immediate vicinity of frontiers. Stopping traffic at borders is regarded as an obstacle to the free movement of persons and goods in the Single Market and as contrary to the policy of removing national frontiers within the Union. It is
this same policy consideration which has led to a considerable reduction in "customs" transport information supplied by shippers of goods to intra-Community destinations. Attempts are currently being made to reconstitute this information, which is in any case imperfect, by mobilising human and financial resources which give the observation a cost/effectiveness ratio which is probably far inferior to the previous situation, and it would be very instructive to estimate by exactly how much. It would therefore be most salutory to draw lessons from this first statistical regression, in the proper sense of the term, by putting an end to the hypocrisy which consists, for example, in loudly calling for better knowledge of journeys across the Alps and the Pyrenees, which are mostly cross-border journeys, while vetoing border surveys on principle.

Objectivity, on the contrary, enables us to recognise that there is a well-know inadequacy of observation at borders and that Community aid for conducting such observations is highly desirable, not only by helping to finance surveys at these points but also by helping to equip them with efficient automatic counting stations so that they can extrapolate the results of these surveys to total traffic while respecting the temporal variability of the flows.

For European interoperability of transport information networks

Interoperability in the field of transport technologies first appeared as a necessity in the field of physical infrastructures (compatibility of the track gauges of the various rail networks, for example) before it became evident that it was also just as important for the operation of the systems (in terms of compatibility between ways of operating rolling stock, continuity of the service offered or ticket pricing). Similarly, interoperability in the field of transport information systems does not only cover the aspect of the homogeneity of their data content and the harmonisation of the statistical methods used to collect them. The harmonisation of the technologies used both to acquire and to represent such information is also a vital factor.

The European scale seems in most cases to be the minimum, and perhaps at the same time optimum, level at which we should consider standardising these technologies for data acquisition and representation. An initial example of this is provided by the work of the European TEST research consortium on the various tools capable of facilitating in future the collection of data required for studying long-distance mobility as defined by the MEST project which preceded it: whether it involves the collection of the spatial and temporal coordinates of journeys by means of on-board GPS, the derived use of information required for the applications of ticketing systems or of Internet surveys, it is clear that there is an advantage in having a uniform conception of the entire European territory if we wish to achieve best practice in this field.

Another example: collecting information on goods movements and the characteristics of these goods by extracting EDI (Electronic Data Interchange) messages from the "statistical segments", which would be a very attractive alternative to conducting "shipper" surveys to collect the information required for describing the transport chain, is currently hampered, as excellently demonstrated by the work of the MYSTIC consortium in this field, not only by the very inadequate availability of this technique in a number of economic sectors and among transport chain operators, but also by the absence of standardisation of these EDI messages, which makes it impossible to finalise standardised procedures for extracting statistical information segments.

The last example: the full exploitation in the transport field of the considerable spatialised analysis potential of Geographical Information Systems (GIS) presupposes that there is harmonisation at European level of the geo-codification systems selected for plotting territorial units like the arcs and nodal points of transport networks and for interrelating them, which is something that a number of European research consortia, particularly GEOSYSTRANS, are technically working towards or on which coordinated work has been done, e.g. in the RADEF group composed of the road transport
authorities of the various European countries, or the MESUDEMO research projects.

*An organisation largely still to be invented for managing at European level information produced mainly at subsidiary territorial levels*

Compared - as it often tends to be - with the United States, Europe has an fundamental originality resulting from the way it has been constructed. While the American Union developed gradually from an institutional no man’s land as the frontier moved further west, the European Union groups countries which operate in ways which, although fairly different, are all solidly structured. For the production of public statistics, this means - in general and particularly in the field of transport - that, even if the responsibilities of the individual states in the US federation are considerable, those of the federal state remain essential, and that the federal state has in any case been able to impose a common approach which has been gradually implemented by the individual states, thus ensuring that the entire system is very uniform and that it is relatively easy to aggregate at national level information collected at subsidiary territorial level.

The situation is totally different in Europe, where the production of data remains to all intents and purposes an exclusively national prerogative (possibly shared with the regions in the most highly decentralised Member States such as Spain). This means that the European statistical body was from the outset engaged in collecting the data supplied by the Member States, while attempting by means of the "Directives" on statistics (now more often Regulations) to promote the harmonisation of these data, and not in producing information on its own account like the national statistical institutes. We just have to look at Eurostat's difficulty in processing within acceptable time limits the information transmitted by the Member States to provide feedback on the entire European coverage, after carrying out the necessary checking and harmonisation to ensure that the overall material is consistent, to realise that we are not dealing with an information producer in the usual sense but much more with a regulatory body which pools the information produced by its national correspondents.

It is clear that, even if we keep to the present system of producing transport information of European interest, we need to design for the future a more effective way of organising it so that at least second-degree information can be produced, i.e. a "summary" of basic national information. It is only by doing this that, for example, we can hope that, by exploiting information transmitted in application of the second extension of the road statistics Directive, it will ultimately be possible for countries to dispense with specific observations - as carried out by France on two occasions, in 1992/1993 and in 1999 - of goods traffic in transit across their territory, since the addition in this extension of a variable concerning transit countries in the description of the journeys surveyed should make it possible to deduce this traffic from the surveys of their own hauliers carried out by the other countries. Care will also have to be taken to ensure that the sampling rates applied make it possible to use the corresponding surveys as a basis for estimating the characteristics - especially the spatial characteristics - of these transit flows, which are generally better portrayed by traffic surveys at the appropriate crossing points (cf. the considerations concerning border surveys above).

But if we accept the need - advocated at the beginning of this paper - for the specific production of European benchmark information, this also raises the question of "first-degree" production, which is now obviously very much at the experimental stage. An excellent illustration of this tentative phase is provided by the DATELINE consortium's current approach to the observation of long-distance mobility. Efforts are being made, on the one hand, to develop throughout the Union an observation which complies with a harmonised collection methodology and, on the other, to take maximum advantage of the synergies with the national systems already in place or being launched by giving preference to partnership with the national statistical institutes at the level of each of the *national*
versions of the survey. In view of the de facto diversity of national practices, it is anyone's guess whether the two approaches will be compatible.

As for the alternative, which we are bound to consider in view of the possibility of a refusal to cooperate on the part of certain National Statistical Institutes, it would seem that for the Commission there is no question, whether in Eurostat or in any other form, of acquiring its own capacity for conducting surveys, but that it will subcontract the conduct of surveys in the countries concerned to a private survey institute. This brings us to the last special feature of the European transport information system, and at the same time to what is perhaps the most fundamental question regarding its future, namely the relations between the production of information in the public interest and the management of this production according to market economy rules.

*Where we find the strategic nature of economic information and the political nature of the decisions on it*

The very real gaps in the transport information system, particularly regarding international transport, have led a number of consultancy firms to develop their own databases to provide as solid a basis as possible for the forecasting or evaluation work entrusted to them by national and European authorities, public institutions, trade federations or major private organisations. Since the consultancy firms in question obviously did not have the financial means to conduct very costly data-collection operations, they created these databases of necessity by making considerable use of modelling on the basis of a combination of recorded data and parameters of various origins. These modelling exercises were in many cases conducted with a great deal of scientific rigour, which does not, however, necessarily mean that the results are reliable.

As a result of the experience gained in this way, these consultancy firms are among the most motivated to participate in the work resulting from the recent invitations to tender for European research on transport information systems, and to put forward proposals not only for improving these information systems but also for setting up bodies to manage the new systems to be introduced, such as observatories of the effects of major infrastructure works, for example. The ability of the best of these consultants to carry out such a task is not in doubt. What is in doubt is the status which this is likely to confer on information compiled and managed in this way, the lack of transparency which might result concerning the way in which this information is produced, and the loss of public control of the design and dissemination of this information. All the more so since it is to be feared that, with the public resources available for observation becoming increasingly scarce, there will be a great temptation on the part of institutional clients to limit their expenditure by granting consultants the right to operate commercially the databases set up in this way, while retaining sole right of operation at least at a detailed level by means of commercial contracts with operators interested in the market-research potential of these databases. This involves a twofold risk of directly prejudicing the public accessibility of the information and of indirectly encouraging operators to shift the balance between observation and estimation by modelling at the expense of observation, so as to increase the cost/effectiveness ratio of the operation at their level.

In all, if we had to single out a fundamental conclusion to be drawn from these considerations on whether there are fields of transport where only European information is required, I would be tempted to state that it is because there is probably no realistic alternative to the jigsaw approach for creating the future European Transport Information System (ETIS, the French version of which - SITE - is more evocative!) that its creation requires above all the faultless direction and coordination of the activities of the many players involved so that they manage to hold their own against the countless centrifugal forces which will constantly threaten to deflect the tool from the purposes for which it can legitimately be used. Since this is such an ambitious undertaking, succeeding in it would definitely be no mean achievement.
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REPORT FROM 2\textsuperscript{nd} WORKSHOP

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In simple terms, Workshop 2, “Changes in Transport Geography, data collection”, considered the question

“Are there domains where data on a European level are necessary, and if so what are the consequences for data collection?”

The workshop panel provided four different perspectives

- A commercial users perspective from Mr Done
- A policy perspective from Mr Houee
- A data collectors perspective from Mr Rostek
- A perspective from a prospective EU Member from Ms Bahata

In addition, there were numerous contributions from the floor with wide ranging perspectives.

This summary of the workshop is not in sequential order but distils the workshop proceedings into the following considerations of the two linked questions that the workshop addressed. The two linked questions were

- Are there domains where data on a European level are necessary?
- And if so, what are the consequences for data collection?

The first question or consideration

“Are there domains where data on a European level are necessary?”

The conclusion of the workshop was yes and not only is data on a European level necessary it is required more than ever.

Ultimately statistics must meet the needs of all users. Liberalisation of the transport and distribution industries, privatisation and globalisation is driving the need for European level statistics in the commercial sector. For many organisations information at a national level is less important than information at a European level particularly if the statistics can measure market values as well as market volumes. For slightly different reasons policy decisions at a European level requires more European level data, particularly if the Transport Trans-European network is to be a major component of building Europe. Investment in the Trans-European transport infrastructure for whatever political, economic or social initiative requires not only international origin and destination information but also relatively detailed national information.

The main requirement of data on a European level is detailed international origin and destination flows of passengers and freight. This cannot simply be achieved by the aggregation of national data, particularly in the area of road transport.
The current availability, presentation and accessibility of European level statistics was called into question. In short, the provision of European level information is inadequate and something needs to be done.

The second question or consideration

What are the consequences for data collection?

Under the existing frame works of data collection it would be extremely problematic to provide

a) Detailed O & D flaw data at a European level
b) Aggregate information on existing market volumes
c) Aggregate information on new measures such as market values and environmental costs.

The major problem is that there is that there are not the resources at national statistical offices to provide for these new demands. The resources of most statistical offices are declining and even in those offices where budgets and resources have not been cut overall transport budgets are often squeezed.

The scope of Europe should be enlarged to include applicant countries and before joining they should be prepared to provide statistics at the broadly harmonised level currently provided by member states.

The workshop/speakers offered four main solutions to the provision of European level statistics and the problem of lack of resources. They were

1) Harmonisation
2) Benchmarking and cross-border observations
3) IT
4) Private sector

1) Harmonisation

Complete harmonisation to satisfy some European level requirement is almost a non-starter not only as there is lack of resources but also because of the history of data collection in member states. For many years member states have drawn samples from different directories of populations therefore even if the same survey methodology is used the interpretation of resultant statistics have to differ.

2) Benchmarking & observation of cross border flows

In order to achieve some measure of consistency in national information for international European level OD movements Mr Houee called for the development of benchmarks to combine heterogeneous and partial observations and observation of cross border flows.

Examples of specific projects were given where a common approach and/or a common protocol was used in several countries to provide project specific requirements. These common protocols and approaches can be used as benchmarks for European level flows and reconcile national inconsistencies.

One of the major problems of origin and destination flows at a European level is the lack of detailed information of cross-border movements at a national level. This could be overcome by observation
of cross-border flows. Mr Houee call for a specific Community initiative in this regard. He proposed that Community aid for conducting observations at borders is highly desirable. This could take the form of finance, benchmark protocol and help to equip efficient automatic counting stations.

3) IT

The use of IT was raised several times during the workshop. The imaginative use of IT could cut down resources needed for data collection particularly for resource stretched NSO Statistical Offices.

The community should take a role in ensuring the interoperability of transport information systems to ensure homogeneity of data content and harmonisation of statistical methods used to collect them.

There were several studies mentioned by Mr Houee using EDI, GIS, GPS and other systems. It should be an aim that the use of systems is harmonised throughout Europe. This would pave the way for harmonised data collection of the jigsaw information required at a European level.

4) Private sector

The private sector had developed databases and models to provide European level information. They are used by both the private and public sector and plug a gap in transport information requirements at a European level. Most of the information in these systems are derived or extrapolated but they lack raw harmonised data.

If the public sector allows the private sector to increase the provision of European level information due to lack of resources the balance will shift to modelling rather than observation and public access to information will diminish.

There were many other issues raised during the workshop which fell outside the above framework. They included:

1. With the lack of resources should European level information be taken out of the national framework.
2. There are legal issues for the collection of European level information to be overcome.
3. Make existing data better should perhaps take precedent over collecting additional data

Through the myriad of issues, opposing forces and constraints it was suggested by Mr Houee that the community needs to set up a co-ordinating body for a European Transport Information System to ensure that European information requirements are met, information is harmonised and collected in the best way.
2\textsuperscript{nd} day:

3\textsuperscript{rd} workshop:

\textbf{TRANSPORT IN THE NET ECONOMY}
TRANSPORT IN THE NET ECONOMY

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Introduction

I think it is useful to start this paper with a brief review of the current situation regarding the worldwide transport system, in an attempt to highlight some of its special features and to mention some of its strong points and some of its critical aspects. I believe in fact that a review of this kind is a necessary preliminary to tackling the topic of this paper, which deals with the changing aspects of transport in connection with what is called the net economy.

I do not intend to dwell on the thorough and radical changes that this sector has experienced in recent times, nor on the reasons behind these changes. Instead, I want to cover only those aspects which in my view are important and which are typical of transport geography at the start of the 21st century.

It goes without saying that the sector is closely related to the economic developments, as well as the adverse effects, that occur worldwide. As a result of such events, the epicentre of the world's economy gradually shifted from the Mediterranean to the Atlantic before coming to rest in the Pacific. The main cause of this was the tremendous development of a number of economic systems located in that area. This has naturally prompted a parallel development of demand for transport services, particularly marked in some areas, which in turn has given impetus to a significant effort to respond on the supply side. The results that have emerged can, on the whole, be deemed positive.

The increase in demand and the development of traffic have been particularly intense in certain geographic areas. In this connection, special mention can be made of southeast Asia, where progress has surged ahead, albeit with a varied pattern of development.

In a global system, typified by deep and increasing interaction, recent years have seen attention sharply focused on logistic operations, which rightly have been considered the only type of operation capable of ensuring that the infrastructure system - which in general terms is definitely inadequate - can cope with rapidly rising demand.

It has to be said that until a few years ago accessibility seemed to be less important as factor of logistic organisation, thanks to the low cost of fuel and the virtual omnipresence of road transport. Nowadays, various pressures are pushing in the opposite direction. Indeed, new faster transport networks require new and more sophisticated infrastructure on top of the existing transport structures, creating new focal points of accessibility. There is also the emergence of strategic mega-projects that will create global network connections, while new high-speed telecommunications networks (ISDN) and satellite communications are successfully complementing existing networks and creating hubs of rapid access to information.

There has been an unprecedented increase in the demand for passenger and goods transport and information exchange, both internationally and between and within regions. This is leading to the internationalisation and globalisation of economic processes, thereby increasing the dependence of cities and regions on access to transport and information networks.
Network systems

It is perhaps a good idea at this point to clarify the notion of network in connection with transport systems in their spatial context. The fact is that network connectivity seems to have become a key element in industrial economies, capable of combining the benefits derived from decentralised decision-making processes with the advantages of synergy.

Thanks to the efficient use of networks, both economies of scale and economies of purpose can be achieved in the widest sense.

Of course, there is no single notion of network, since there is a whole range of networks that can be identified. For our purposes here, the main networks are:

- physical networks;
- intangible networks;
- organisational networks.

Leaving a more thorough analysis of these concepts for later, I can say at this point that networks in the sense they are most commonly understood represent means for operators using the services to attain one or more objectives. Interaction between various operators is therefore a prerequisite for the construction of networks. The structural set-up of networks involves an obvious and significant geographic element, requiring organisation and coordination. Again with regard to the geographical element, it should be said that the system of networks prompts a rearrangement of the hierarchical structure of local centres, which is often very different from the previous structure.

It must be said that substantial changes have occurred with regard to the supply of network services. Apart from technological factors, other elements such as geopolitical circumstances and types of economic system have played a part in this.

In the past, networks were regarded as “natural monopolies” and were heavily influenced by political decisions affecting their control and management. The new feature that has emerged in recent years is the steadily declining influence that government can - or wants - to have in the management of network systems. This has resulted in situations more open to competition, with intense exchanges between complex and interlinked systems of undertakings in their attempts, based on fundamental control of networks, to grab dominant positions in the new economy, or rather in the globalised economy.

It is an ongoing process, and in many cases the eventual outcome is not yet apparent, since it is very difficult to predict when the situation is changing so much. However, the process has already indicated some significant consequences, especially with regard to the affirmation of the principle that adequate payment must be made for the services provided by networks. This was a principle that was disregarded in the past and even now it not always applied. The result was the persistence of all kinds of disruptive effects - financial, territorial, environmental - with regard to the proper use of resources.

The probable competitive expansion of the networks market therefore seems likely to allow further progress in affirming this principle.

European transport networks

It has to be emphasised that international competition is a necessary requirement if there is to be a significant improvement in the quality of network services, which are overly subject in structure and development to outdated national policies geared to short-term domestic objectives rather than farsighted options for the medium and long term. This is especially true for continental Europe,
where because of its geopolitical composition it has been particularly difficult to push through the idea of a networked system of infrastructure. It must nevertheless be said that recent valiant efforts by the EU give cause for hope in the future, even if the road ahead is long and arduous.

The positive aspects of recent Community policy include, without doubt, the definition of Trans-European Networks (TEN), which sets out the future structure of the transport system for a Europe that is totally integrated in every aspect. There is no point dwelling here on the features of this ambitious EU project, which indeed represents one of the key elements in the organisation of the European economic system, and also for its dealings with the rest of the world. I simply want to stress at this point the importance of moving from the admirable plans that have been announced to the implementation stage, at least with regard to the parts of the project that are a matter of priority in the process of bringing the continent closer together.

In this regard, it must be remembered that much of Europe's infrastructure is out of date, and therefore unsuitable when it comes to coping with a demand that is not only increasing very fast but also requires, in terms of quality, increasingly sophisticated services from the transport system.

It follows from this that there is a need for heavy investment, which does not seem to be available at present, and certainly not on the scale required. Such investment should of course, as a matter of priority, be geared to bringing in peripheral regions, especially in eastern Europe, where major outlets for the continent's production are likely to be found in the future.

The efforts that are required with regard to infrastructure in Europe will ease the pressure of space that affects many cities, with the costs of urban concentration offset by the advantages of a development that is more widespread in geographic terms. It is clear that the creation of multimodal corridors will not only aid more widespread development but will lead to significant changes in the structure of development, since the large-scale high-quality infrastructure that is introduced will provide impetus in the regions that are traversed and will upgrade urban areas that are currently on the fringe of things.

The European places that will be most attractive will thus be those where high-quality transport infrastructure and information and communication systems of similar quality come together. Other attractive features - and this is something that is already happening - will include the availability of an increasingly skilled labour force and a first-rate environment (in the broadest sense).

The primary objective, however, is to ensure that the positive effects of transport networks are not hampered, or overwhelmed, in these new development areas by the negative aspects such as pollution, congestion, etc. This is one of the problems that need to be considered in connection with European integration and development. But there are others that are also worth mentioning:

- sharing the benefits of integration among nations and regions;
- socioeconomic disparities between central and peripheral areas;
- sustainable economic development at national and regional level;
- need to pursue the objective of efficiency with proper consideration for social equality and environmental protection.

These issues need to be tackled and solved by means of suitable political strategies to be implemented at supranational, national and regional level. The approach should preferably be top-down, i.e. prompted by guidelines and decisions drawn up at supranational level.
Missing links

The ideas outlined above should be used to look at the problem caused by the lack of essential links for the completion of an integrated transport system. First of all, some thought should be given to the approach used so far to tackle the salient problems relating to the development - which in some respects is overwhelming - of the demand for transport. The usual approach has been to provide a complicated and inadequate supply in response to a rapidly expanding demand. This can be called a demand-oriented policy, and its consequences in terms of increasing congestion and environmental degradation are apparent to everyone. In spite of this, there is scant move towards supply-oriented policies, i.e. the introduction of decisions geared to implementing suitable action in order to guide and manage the development of transport demand.

There is a variety of reasons for this attitude - and they are slow to change - in spite of efforts that are being made at various levels. The fact is that policy-making in Europe remains basically nationalistic. Many countries' policies are usually formulated and implemented in isolation, with an emphasis on finding domestic solutions for separate problems and without a proper assessment of the effects of synergy to be derived from a coordinated and coherent plan for implementing a transport system based on advanced infrastructure networks backed by equally advanced information and communication structures.

Shortcomings in infrastructure are aggravated by organisational and management failings, and this has a negative effect on the profitability of the investment, which is not insignificant, that is earmarked for the sector.

As a result of these attitudes - although they are not solely to blame - the situation in Europe is characterised by many bottlenecks as a result of the “missing links” and their negative impact. The consequences of this are especially serious, given that each link in the transport chain relies very much on the others. This is particularly true for regions where the main points of infrastructure are located (ports, airports, transfer points) and those that have to cope with greater volumes of heavy traffic.

The fact is that economic growth in Europe tends to be concentrated along a few axes marked by high population density and a broad range of economic activities in every production sector. The best known of these economic concentrations is the north-south “blue banana”, which crosses Europe from Scandinavia to the Po valley in northern Italy. As a rule, the more important axes run north-south, which has always until now been the main direction of traffic flows.

This situation seems likely to become more firmly entrenched as a result of the strong revival shown by almost every region around the Mediterranean. These regions are increasing in importance as destinations and sources of traffic. On the other hand, this vigorous revival of the Mediterranean area is also prompting the need to exploit one or more east-west routes. The old idea of creating a multimodal link running from the Iberian peninsula across central Europe as far as Kiev - a corridor that has been given the auspicious name of the “sunbelt” - has many ardent supporters nowadays. The route, however, is divided into two distinct parts: one linking Iberia with Italy and the other running between northeast Italy and Russia. The second part is known as “Corridor No 5” in the TEN scheme. While the first part crosses an area where there is already strong economic development - although not quite on the same scale as along the “blue banana” - the second is characterised by increasingly weak infrastructure and less economic development as the route moves eastwards.

However, along the various axes that make up the European network, there are many missing links, stemming from a variety of causes, including:
- lack of specific infrastructure;
- lack of strategic links between different modes of transport;
- lack of critical factors ensuring the suitable operation of a network.

Underlying the “missing link” concept is the rightful assumption that the performance of infrastructure that is incomplete or inadequately linked to the rest of the system is well below the maximum performance level that could be attained in ideal circumstances.

Assessment criteria for network systems

The way in which a network can be designed and developed can be assessed using five types of success factor that can be displayed as a pentagonal prism (Nijkamp, 1994). The five factors are:

- Hardware
This refers to the availability of a network of high-quality international transport connections. If this is to be attained at European level, there are many missing links that need to be completed, the lack of intermodal links over short and long distances needs to be remedied, and the absence of arrangements to promote new technologies needs to be rectified.

- Software
This refers to the existence of computer-based services for infrastructure users. The main shortcomings at present concern the differing types of logistics services that are available, the lack of coordination and computer systems for both operators and users of infrastructure (EDI, or Electronic Data Interchange) and inadequate use of new methods of transport planning.

- Orgware
This refers to the whole range of regulatory, administrative, legal, management and coordination activities, on both the demand side and the supply side of transport. It covers the institutional set-up, both public and private, of the transport system. The main shortcomings concern the lack of precise political ideas, ranging from poor coordination at regional, national and supranational level with regard to the formulation of infrastructure projects to the management aspects of such projects. There is also no real European approach to market access or to support for intermodal transport, which need to be achieved through appropriate regulations and suitable promotion campaigns.

- Finware
This refers not only to the economic and legal aspects regarding the funding of new infrastructure but also the means of going about it. The current situation shows the inadequate level of involvement of private capital in the “project financing” of major infrastructure projects, as well as the lack of uniform systems of charging users. Also worth mentioning is the failure to exploit the full potential of the transport market’s readiness to be satisfied.

- Ecoware
This refers to the environmental and ecological aspects relating to the transport system and concerns both operators and users. The main problems at the moment concern the lack of a single vision in tackling the problem, together with the lack of standardised rules and controls. In addition, adequate incentives to improve vehicle technology and standards for proper territorial planning are both lacking. There is also unsatisfactory application of the “polluter pays” principle.

Transport undertakings in a network economy

I now want to move on to an analysis of the transport system from the point of view of the undertakings involved in it, i.e. the users of the services provided by the infrastructure network.
The situation that has evolved, the globalisation of markets, has of course led to profound and radical changes in the system of transport undertakings, although it is not possible to detect a single trend that can be applied to every mode of transport. It must also be said that the individual role of the various modes has been greatly reshaped by the spread of intermodal transport using containers.

These factors, which have been vitally important for the development of goods traffic, have prompted a rethink about the size and organisation of firms. The conditions have in fact been created for combined operations, both horizontally (within the same mode of transport) and vertically (between different modes of transport).

There has been a definite trend towards increasing the size of firms, and this has especially affected some parts of the transport sector. The most obvious examples of this come from sea transport, where a significant share of the most advanced shipping, i.e. container ships, belongs to a small number of large concerns with significant financial resources.

A similar situation is developing in air transport, where the most interesting alliances generally involve airlines that retain their identity while operating as a part of a group with coordinated and similar objectives.

It is also interesting to see what is happening in rail transport, where there is a switch to private ownership or at least to types of management involving stricter financial control than in the past.

These are pointers that need to be followed with careful attention. Indeed, it is to be hoped that the railways can quickly expand their range of services - and there is tremendous need for this - to bring about a transport system that is more balanced and more mindful of environmental concerns.

One aspect that stands out with regard to the changes in rail transport is the trend towards separating infrastructure and management. This is a new feature of significant import, because it opens the way to a more efficient and competitive structure, even for this mode of transport which is so often a monopoly.

It would be good, therefore, if rail transport played a bigger role in supplying transport services, for passenger as well as goods traffic. This could come about more effectively if high-speed services could be expanded. Another reason for advocating a greater role for rail transport is to take traffic off the roads, which nowadays account for a large share of passenger and goods traffic. In terms of energy use and environmental impact, this is hardly a good thing. It must be clear, however, that this is not an attempt to jump on the band wagon and criticise a mode of transport that thanks to its adaptability and flexibility has made a tremendous contribution to economic development in many parts of the world. I just want to point out that there is a need to tackle and deal with problems that we should have faced up to decades ago. If we had acted in time, we could have avoided the serious repercussions that we see around us every day. Road transport is in fact the mode that has moved less than the others towards integrated operations. The result is that the supply of road transport services is very fragmented, and in general it seems to be a long way from a structure that in terms of size can offer economies of scale and effective and efficient operations.

From the angle of management as well as of infrastructure, therefore, there is still a long and arduous road to be covered to arrive at situations conducive to satisfying a demand that is constantly increasing and continually insisting on expert answers from the transport system as a whole.

**Role of transport for undertakings in the net economy**

After this comment on the system of transport undertakings, we can move on to look at how production operates in a market that is strongly influenced and conditioned by network structures.
This means taking a more detailed look at some of the features that typify firms that have to operate in the greatly globalised economy that is synonymous with the net economy. These include both actual transport undertakings, that are in the forefront of coping with the changing economic environment, and other firms for which transport is nevertheless a major factor in company profitability.

Transport supply - taken to mean transport services on offer, rather than physical infrastructure - must adapt to the need for increasingly widespread distribution of goods. In this case, the supply of goods, and therefore the provision of transport services, becomes an integral part of the production process for the firms involved, with success or failure often depending on it.

This becomes particularly relevant in the case of firms that are involved in e-commerce, or which are exploiting the development potential offered by the Internet and its special means of contact between seller and consumer. For those undertakings which, for want of a better term, we can call e-firms, the transport of the goods that are produced and/or sold becomes one of the main cost elements, since the other fixed and capital costs that conventional firms normally have to bear are in theory reduced. The location of the warehouses of an firm involved in e-commerce is no longer dependent on the physical location of the market, and locations can be chosen where rents are lower. The size of the premises that are needed is also smaller on account of the flexibility offered by “virtual offices” consisting of a PC linked to a telephone line.

**Data and information in support of transport operations**

We shall now have a look at the significant elements that are necessary to ensure undertakings' greater efficiency and how these elements affect the transport sector.

Spatial information and data are certainly the factors that, now more than ever, can ensure a definite competitive edge for those who have access to them and who have the means and the nous to make consistent use of them. It has been calculated that 80% of existing data has some spatial connotation, whether geographic coordinates, post codes, addresses, or whatever. Thanks in particular to geographic information technologies, data of this kind have in recent years become more abundant, cheaper and more accurate, thereby making it easier to some extent to find out “what's where”. However, the problems that can arise from an incorrect reading of the information should not be ignored.

It is difficult for undertakings not to consider the spatial/territorial factor when making their commercial policy decisions, especially in view of the increasing importance of the transport system with all its problems.

Proper management of a region's resources, and consequently of the various components of its transport system, can represent not only a problem in terms of economic policy at government level but also a means for a firm to achieve profit. An example of this is Amazon.com, one of the most striking instances of an undertaking that operates solely on the Internet. In spite of its success in terms of hits on its site and items sold, its weak point lies in its delivery times and its logistic chain. These are the vital features and at the same time the Achilles heel of such firms.

The economic operators that are present in specific areas therefore need to have a detailed picture of the local and global situation. In order to avoid wasting resources and to achieve a competitive edge, they need to know the location and economic and social circumstances of their customers. Using this information, they will be able to manage in a more targeted and efficient manner where to site stores and how to organise delivery and restocking. Special attention will also have to be focused on knowing the location of means of transport, and thus of goods in transit. This will help to cut transport time and costs, thanks to the use of programs to determine the best routes. It also
allows means of transport to be displayed on digital maps, a feature than can in turn be sold to customers as a guarantee that their delivery will arrive on time. There are some courier companies (such as UPS) that offer this service to customers, allowing them for an extra fee to follow packages in real time as they move.

Let me now briefly review the various types of information and data that are needed by transport operators who want to make the most of their resources. First of all, there are data and information on the actual means of transport: location, speed, mechanical problems, driver performance, divergence from scheduled route (which can be important, in order to ensure cargo safety, in countries where security can be a problem). Next comes information on the state of infrastructure: availability of certain roads or routes, possible congestion or hazards. This kind of information will prove especially useful when ITS (Intelligent Transport Systems) are widespread and in common use. Lastly, but no less important, there is information concerning transport resources from the strictly administrative and bureaucratic angle. If undertakings, whether involved in transport or not, are operating in a global and supranational market, it is important to think about the rules and regulations that govern trade and transport in countries other than their own. Also, there are still obstacles and barriers to the free movement of people and goods in Europe, especially when you consider the customs barriers that still exist between the EU and non-member countries. Indeed, there are still restrictions within the Union as a result of differences that persist with regard to the management of infrastructure or means of transport.

The process of acquiring and managing spatial information involves a variety of technologies that are now developing and spreading very quickly. I am referring to the geographic information technologies mentioned earlier. These include remote sensing, which uses satellites and aerial photography to obtain accurate and detailed ground pictures. There are many undertakings that are interested in this technology, and especially the end product, i.e. the digital maps that the technology can provide. Another innovation is the Geographic Information System (GIS), that makes it possible to exploit geographic information in an increasingly efficient and effective manner.

Other technologies, such as the Global Positioning System (GPS), make it possible to locate vehicles, goods and people with precision and to collect new spatial information quickly.

We should not forget mobile phones, which can be used for transmitting location information in real time and for connecting to the Internet. It is thus not only geographic information technologies in their various forms that have an important role to play in managing an undertaking's logistics in a network economy. As already pointed out, the Internet is both a prime site where new markets are being created and also a place where spatial information can be consulted and then selected and distributed appropriately. The Internet not only allows a firm to distribute in-house information to its staff but also provides a site where clients can find the information and services they actually want.
Bibliography


TRANSPORT IN THE NET ECONOMY

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Introduction

The e-business market is growing with astonishing speed. It is estimated by Forrester Research that
turnover for business transacted over the Internet will exceed USD 1,300,000 million by the year
2003 with business-to-business transactions accounting for 95 percent of this figure. Logistics will
be the key for successful fulfilment and Danzas has continued to focus on being at the forefront of
e-business solutions. In 1997 Danzas implemented its worldwide Internet-based Tracking Tracking
(TT) capability, which allows customers to follow the progress of their consignment from point of
departure to delivery. The scope of our Internet service offerings was extended in rapid order, e.g.
with the Order Monitoring System and with on-line booking capabilities for any mode of transport.
The Order Monitoring System provides comprehensive details about the customer order. Given that
all order data is entered electronically, customers can monitor the status of each order with their
suppliers and plan accordingly if any change occurs in the supply chain.

Logistics services are a key success factor in those e-commerce ventures that include the physical
exchange of products. The set up and planning of transport / logistics solutions depends on the type
of business model that determines the way in which business over the Net is conducted. This paper
will give a brief overview of major e-commerce models and highlight their impact on the type of
data needed to support the efficient implementation of solutions.

B2b e-commerce re-defines the role of logistics providers, who are challenged to establish new
infrastructures. This paper explores the new functions of our industry and the data requirements to
fulfil the demands the net e-conomy places on us.

The new technology, which drives all e-commerce ventures can provide ample information and this
document highlights the potential, but also the difficulties transport data collection may pose.

Business models for e-market places

The Internet is reshaping worldwide economy. Professor Garth Saloner of the Center for Electronic
Business and Commerce from the Stanford University puts it this way: “We really are in the midst
of a major revolution that is restructuring the supply chains in which firms operate and deliver
goods and services to customers. It’s the order of importance of the Industrial Revolution or the
invention of electricity, and we’re extremely fortunate that it’s happening in our back yard.”

The Web is a ready made marketplace – essentially $ 1 trillion worth of network connections,
computer power, and limitless databases full of information. And it’s available largely free to
anyone with a phone line and a personal computer. Anywhere in the world. Anytime, day or night.
In short, the Net offers an entry point to all comers in every market and industry.

The value of e-commerce transactions, while still small relative to the size of the economy,
continues to grow at a remarkable rate. More significant than the dollar amount of these
transactions, however, are the new business processes e-commerce enables and the new business
models it is generating. Both the new Internet-based and the traditional producers of goods and
services are transforming their business processes into e-commerce processes in an effort to lower costs, improve customer service, and increase productivity.

There is more than one way to conduct business over the Net. Here's a brief rundown of major e-commerce models, along with advantages and limitations of each:

- **Sell-side system**: A commerce-enabled Web site administered by the selling organization.
  
  **Positive**: Usually free to buyers.
  
  **Negative**: Difficult to locate on the Web.
  
  No way for buyers to track or control spending.

- **EDI (Electronic Data Interchange)**
  
  EDI predates the Internet, chronologically and technologically, and it gained a level of acceptance before the Internet was even taken seriously. However, it will likely start to show its age in coming years.
  
  The problem with EDI is that it is conducted over expensive proprietary networks, whereas the Internet is a public network requiring only nominal access fees. Moreover, EDI is limited to exchanging purchase orders, whereas the Internet integrates the total business chain from delivering product information to offering customer service. For the sake of economy and interoperability, more and more buying organisations will likely opt for private extranets rather than proprietary EDI networks.

- **Electronic marketplace**: An aggregate of electronic catalogues from suppliers in a vertical market, administered by a third-party firm.
  
  **Positive**: One-stop sourcing solution for buyers.
  
  **Negative**: Still no way for buyers to track or control spending patterns.

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**Buy-side system**: A Net-based procurement application hosted and administered by the buying organization. Requisitioners source from preferred suppliers on their company intranet, within the limits of automatically enforced buying rules set by purchasing management.

  **Positive**: Buying organization can reduce off-catalog buying and build leverage with fewer suppliers.
  
  Reduced cycle times.

  System integrates with back-office systems, automating administrative tasks and freeing buyers to add value.

  **Negative**: Very expensive ($250,000 to $5 million) to implement.
  
  Costly and cumbersome catalog management.
  
  Can "wash out" distinctions of supplier-buyer relationships.
- **Online trading community**: (also known as transactive content intermediaries) An online marketplace maintained by a third-party technology vendor, where multiple buyers and multiple suppliers in a vertical market can conduct business.

  **Positive**: Does not require buyers to invest in costly buy-side procurement software.
  Provides e-commerce opportunities for smaller firms.
  Eases catalogue maintenance for suppliers, with a 'publish- once' model.
  Preserves quality of buyer-supplier relationships

  **Negative**: Not many suppliers currently offer service.

- **Internet auction**: Mostly a sell-side application, where companies can move excess and obsolete (E&O) inventory. Multiple buyers place bids for goods, normally against upward price pressure. There are commodity auctions (oil, natural gas, electricity), independent auctions (first-run and surplus manufacturing goods), and private auctions (geared toward resellers and dealers, rather than end users).

  **Positive**: Buyers may realize marginal savings in transaction costs.

  **Negative**: Benefits accrue mostly to sellers, who can make revenue on inventory normally written off as zero at the bottom line.
  Like any sell-side model, buyers cannot track and control spending patterns.

The Internet puts the customer in charge as never before. Until the Net, buyers faced huge obstacles to extracting the best prices and service. Research was time-consuming, and everyone from producer to retailer guarded information. For many companies, customer ignorance was a profit centre.

Electronic commerce is the intersection of

\[ e\text{-com} = \text{MARKET SEGMENTATION} + \text{CHANNEL STRATEGY} + \text{TECHNOLOGY & INFRASTRUCTURE} \]

It is important to understand and implement all three
- Each is as important as the others
- Successful e-Comm initiatives encompass all Three
- Failures emphasise one over the others

Statistics are an important tool to take decisions on the Channel Strategy and to define the Technology and Infrastructure an e-Commerce company will use. Information requirements are for example:

- Size of target audiences
- Fragmentation of target audiences
- Location of target audiences
- Spend of target audiences
- Buying patterns

**Impact of new e-market places on logistics services**

Business-to-business (b2b) and business-to-consumer (b2c) e-commerce platforms are a new way to target audiences. The products remain unchanged, but selling, buying and distribution processes are revolutionised. The sizes of audiences increase, as geographical boundaries become meaningless. The novelty and strength of e-commerce is the potential to multiply the number of clients / suppliers that can be serviced simultaneously through a structured administrative system. The high degree of automation this allows results in lower order processing / administration costs. To operate successfully as a logistics provider to e-commerce platforms, logistics companies must have a dense network, which covers the geographical areas their clients target and must be able to automate their pricing, order taking and follow up systems.

Danzas is currently developing a concept for an electronic information and communications platform - termed e-hub. It will enable the full integration of all parties involved in the supply chain and offers various optimisation possibilities and complete data transparency. Using the customer's website as the gateway and linking it to Danzas data systems will allow us to take over the whole range of logistics activities from demand forecasting, material planning, supplier management, transport, warehousing, inventory control, order fulfilment up to customer delivery and customer services.

The ultimate goal is a global logistics offering that is optimised along the entire supply chain of customer, forwarder and supplier and linked to financial institutions to guarantee payment.

Realisation and adaptation to specific client target groups necessitates detailed information. Transport pricing is a typical example. Tariffs are based on the following parameters:

- Cost of transport
  - Vehicle depreciation and maintenance / fuel / employment costs
- Capacity utilisation
  - Weight and volume define capacity. Depending on the commodities transported, transport capacity may be restricted. A container full of lead will fill the weight carrying capacity, a container full of feathers will use the volume capacity. Both products sensibly combined will literally double the containers carrying potential.
- Traffic balance
  - Transport cannot be stored and repositioning costs form part of the calculation. Tariffs are influenced by costs that will be incurred to move the container from the point of discharge to the point from where the next load will be collected.
To create a meaningful point-to-point tariff system, the geographical area in consideration must be segmented into tariff zones of less than 75km radius. A tariff covering the main parts of W. Europe would contain in excess of 160,000 tariff tables. Tariffs differ depending on the commodity transported. Traditionally, product sources and places of consumption are known when transport tariffs are formulated. This is not true for the net economy. Depending on the e-commerce business model, source, place of consumption or both are unknown in advance. Statistics play an important role in determining the routes that will encounter the biggest demand and the quantities that are likely to be transported.

**Statistical requirements to plan e-commerce logistics infrastructures**

Anyone who has surfed the net to buy a book, order take-away food or book a flight has been involved in customer-oriented e-commerce - today more commonly known as e-business. E-business in the business-to-business world, however, is more complex. It encompasses every aspect of business processing and logistics services, starting from advertising through order tracking and monitoring right up to order fulfilment.

![Total Supply Chain](image)

We as Logistics Providers must not only understand our core business. In addition, we have also to comprehend the supply chain of our clients, e.g. which materials do they use (handling characteristics), which industries do supply (materials and services), which demands are placed on their products (places of consumption, maximum lead-times etc.). In a traditional environment, our clients could furnish their logistics provider with data from statistics they gathered as part of their business.

Our client, who informed us, first knew about change. The speed of change was such that we could adjust, despite the time lag.

The traditional client – logistic supplier relationship blurs in the net economy. Our challenge is to move from the position of logistics provider to the role of logistics partner, who is aware of trends within the client’s industry and who pro-actively foresees changes. To achieve that, we must have an overview of those industries interacting with our clients, we must know where his potential clients and his potential buyers are located. In addition we must be aware of trends that will influence our client’s business.
Transport data collection

The engines of net commerce are linked databases, which will hold the statistical information that is required. However, it is important to ensure that data is gathered correctly and that there is no double-counting / omissions. There is also a question in which context data will be collected and whether this can be done using traditional reporting systems (e.g. Intrastat).

There is no geographical link between the location of an Internet business and the political / geographical area were services provided by that business manifest themselves in transport / logistics. One of our clients sells product, which is manufactured in China, to India – client and web-server are based in the heart of Europe. Conversely, business on other continents can trigger Inter-European transportation.

In the course of this year, Danzas build up integrated systems with some of their e-commerce clients. Tariff enquiries, transport orders, tracking and tracing of the order fulfilment have been largely automated in close co-operation with companies, whose business model allowed their e-channels to be linked with our systems.

However, such close interfacing is not always possible. In many cases, e-commerce manifests itself as a traditional transport order to the Logistics Company. From a transport / logistics operator’s point of view, such companies do not distinguish themselves from traditional business.

To obtain pure, net commerce related data, an approach via the e-commerce companies, i.e. the websites seems to promise better results than an advance via the transport / logistics providers, who cannot always distinguish between business from the net e-comomy and more traditional sources.

Summary

The e-business market is growing rapidly. Transport and logistics are the means to physically link vendor & seller – business partner that are likely to be separated by significant distances. Furthermore, the electronic link between all participants in the supply chain shortens the time, which is needed to react to any changes. There are a number of business models for e-commerce and the set-up and planning of transport / logistics solutions depends on the way in which business over the net is conducted. Decisions our clients must take on their e-Channel Strategy and decisions we must take on infrastructure rely on good and detailed intelligence on the industries we are dealing with, their competitive environment and the trends in their. In order to plan our infrastructure, we must have information on the routes where demand will be high and the kind of goods we are likely to move. In theory, all the information will be available in electronic format, as net commerce is driven by linked databases, which hold the information that is required. However, the e-conomic players may be located in different geographic / political areas than those were the transports take place. Transport / logistics providers are not in a position to provide data specifically relating to e-commerce, because they deal with traditional transport orders in many cases where e-commerce is a front-end.

B2b net commerce has already started in earnest and will conquer a significant share of transactions between business partners. The success of these ventures largely depends on their ability to deliver the goods they promise. Reliable data is essential for transport / logistics suppliers to fulfil their key function in this environment and to create the infrastructures that this technological revolution demands.
REPORT FROM 3rd WORKSHOP

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Summary

During the third workshop two papers were presented. The first contribution by Professor Borruso, President of ISTIEE, gave a more general view to transport networks. Attention was given to the current situation of the world-wide transport system, its strong points, its critical aspects and the necessity of having data available for the future. The second contribution by Mr. Kuehler of Danzas focussed on the growing market of e-business. Several major business models were presented together with their impact on the type of data, which is needed to support the efficient implementations of solutions. The discussant Mr. Ott postulated three questions to the audience concerning the possibility to use available data from ITS and mobile initiatives and the methods to collect it. The discussion focussed mainly on the availability of relevant data, collection procedures now and in future and on the problems related to confidentiality.

1. Contribution of Professor Borruso (brief summary)

The transport sector is changing rapidly in the last years. The major cause for this is the world-wide economic development. Last year special attention is given to logistic operations. There are three kinds of networks, namely physical, intangible and organisational networks. For setting up new faster transport networks more sophisticated infrastructure on the top of the existing one is needed drastically. Because of the fact that the larger part of Europe’s infrastructure is outdated, heavy investments have to be made. In order to improve the quality of a European wide network international competition is a necessary requirement. Recent developments on an European level concerning the definition of Transport European Networks (TEN) give hope for the future.

Industrial economies depend on network connectivity. The existing missing links (lack of infrastructure and strategic links between modes of transport) cause bottlenecks, so special attention should be paid to these missing links. They are mainly due to the fact that policy making is basically nationalistic. Setting up new sophisticated networks causes problems, which should be tackled top down by politicians.

Globalisation of markets led to profound and radical changes. For example the role of modes has been reshaped by containerisation. Undertakings become a different role in the net economy. New data is required to support transport the operator. Spatial information and a detailed picture of the local and global position are needed. For example, information about modes of transport, state of infrastructure and administrative information is a must. The process of managing and acquiring spatial information involves a variety of new modern technologies. The use of Internet has many advantages.

To be able to be competitive in relation with the new net economy the transport sector should first decide about the quality and value of the next three points of focus:

1. an internal reshape of balance;
2. adaptation of the network infrastructure;
3. use of operative and sophisticated technologies.
2. Contribution of Mr. Kuebler (brief summary)

The e-business market is growing rapidly. Therefore, logistics will be the main key for successful fulfilment. Business to business redefines the role of the logistic provider. It creates a challenge to establish new infrastructure. Both the new Internet based and the traditional producers of goods and services are transforming their business processes into e-commerce processes in an effort to lower costs, improve customer service and increase productivity. The set up and planning of transport depends on the type of business model that determines the way in which business over the net is conducted. If the major e-commerce models are used, every specific model has its own data needs.

For supporting decision making on Channel Strategy and for defining the technology and infrastructure for an e-commerce company statistics are an important tool. The new e-market has great impact on logistic services because the target audience is not limited by physical boundaries. To realise and adapt to specific client target groups detailed information is necessary. The complete supply-chain of the clients should be clear.

The traditional data collection has the problem of the lack of geographical links. The engines of net commerce are linked databases, containing the complete statistical information that is needed. However, it is important that the data will be used in the correct way. The trouble is where to find complete, no double counted and consistent data. For the moment all transactions on the web have a common focal point, namely the web-site. So, the web-site owner would be the perfect source for obtaining required data.

3. Introduction to discussion by Mr. E. Ott (brief summary)

The world is changing very fast since the spread of the Internet. The use of Internet will increase in several ways. Internet will play a larger role concerning accessibility to data and services. Other new technologic initiatives as ITS (data collection & communications), Wireless Networks and mobile devices will come up. E-business will lead to Mobile or M-business. The request for information will become bigger.

The change in data availability in future should deal with problems concerning:

- public responsibilities and collection requirements;
- private competition and success;
- national/regional Economic growth;
- evolving areas of interest as geographies and statistics.

Data can be used for:

- GIS organisation distributing GIS
- Commercial/Business mapping and location finders;
- Location bases services;
- Information sharing and data access;
- Logistics planning.

One of the major problems at this moment is the collection of data, which can be used. Were should the data come from and who will collect it? Is there a special role in this for national statistical institutes or EUROSTAT?
4. Discussion

To start the discussion Mr. Ott asked the audience of the workshop three questions, namely:

1. Can Eurostat or another central body facilitate a “virtual community” for statistical data sharing?

2. Do individual nations have the resources to begin to build their own statistical warehouses for a European Transport extranet?

For these two questions the audience had no answer. However there was a reaction to the third question:

Can transportation planners and statisticians take advantage of new data from ITS and mobile commerce initiatives?

This question opened the discussion. The next remarks and comments were made:

1. How to deal with the large discrepancy between available official data and required data? European directives and regulations and even national laws can not easily be changed or adapted. So, the time-lack between necessity and availability of data will be very large.

2. It was agreed that statisticians would like to use the available data. However the problem would be how to collect the data and from whom. Should statistical institutes deal or alliance with commercial institutes to exchange data? Where should one start.

3. How to deal with problems concerning confidentiality. Statistical institutes never can sell information on an individual base.

4. The lack of data is not unknown. It’s also obvious that more data should be available. So, the only thing, which can be done, is to set out the final goal and get started.
4th workshop:

INTELLIGENT TRANSPORT SYSTEMS
STATISTICAL MONITORING OF THE WORKING HOURS OF LORRY DRIVERS ON THE BASIS OF TACHOGRAPH DISCS: THE FRENCH EXPERIENCE

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Like some other European statistics departments dealing with transport, the economics and statistics department (SES) of France's Ministry of Infrastructure, Transport and Housing is testing in a variety of fields the feasibility of using the information that transport firms have in their operational databases, instead of sending out statistical surveys in the form of printed questionnaires.

The use of this existing information, which can also be transmitted to the statistical service in the form of computerised data, offers many advantages: lightening of the burden on firms and the statistical service, correlative possibility of expanding sample sizes, elimination of possible input errors, shorter deadlines, etc. However, the introduction of such a collection system requires a number of problems to be solved: rethink of survey methodology (especially sampling plans), acceptance by firms of the new procedure both in technical terms and in terms of commercial confidentiality, when the statistical service is seeking to obtain more information in order to improve statistical accuracy.

At SES, the statistical tools are ready to test this new method of statistical collection in connection with the physical description of the carriage of goods by road, as laid down in Council Regulation (EC) No 1172/98 of 25 May 1998 on statistical returns in respect of the carriage of goods by road. But there is another trial under way in this extremely sensitive area of lorry drivers' working hours: it relates to the statistical monitoring of drivers' working hours on the basis of tachograph records.

1. WORKING HOURS OF LORRY DRIVERS

A basic question - but hard to monitor

Apart from statistics describing traffic and transport in physical terms and short-term or structural data on the operations of haulage firms, another topic that interests the authorities, professionals, unions, academics and researchers (and, for some time now, the general public) refers to the working conditions of drivers, especially those involved in freight operations.

The working conditions of such lorry drivers are arduous, and working hours in particular are exceptionally long. The average working week in France in January 1999 was 36.6 hours for all employees, and 39.9 hours for those in the transport sector [1]. But the working week for drivers in the road haulage sector, for those working at least five days a week, amounted in the second half of 1999 to an average of 50 hours for drivers returning home at night, and about 60 hours for drivers who were away from home for at least one night a week, with the highest figures being recorded by long-distance drivers who were away for at least four nights in the week [2].

The situation of French lorry drivers is not unusual in Europe [3].

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1 The figures in brackets refer to the bibliography.
In addition, lorry drivers were excluded in 1993 from general European legislation on working conditions (Directive 93/104/EC). A special regulation had been applied to them: Council Regulation (EEC) No 3820/85, which basically refers only to driving periods and lays down a maximum "daily driving period" of nine hours, which may be extended twice in any one week to ten hours.

Road haulage in France has for a number of years been engaged in a process of cutting the working hours of drivers. Also, in addition to the extensive surveys carried out at fairly long intervals (1983, 1993, 1999) [4], the statisticians were asked in 1995 to introduce a short-term survey to monitor trends in the working hours of lorry drivers, with a view to assessing the effects of the measures taken in this particularly sensitive sector.

**Conventional survey involving interviews with drivers**

The organisation of the short-term survey had to cope with the lack of any readily usable sampling base, with up-to-date addresses, of lorry drivers. For the extensive survey of 1983, the sample had been compiled at great expense, using the fact that heavy goods drivers must undergo a regular medical check-up. The drivers were preselected at the actual medical centres, after checking that they did in fact belong to the target population (it is possible to hold an HGV licence without being employed as a lorry driver). An investigator then visited the drivers in their homes, first to leave a "logbook" and then to collect it after it had been completed by the drivers. In the case of the 1993 survey, a sample was compiled on the basis of the 1990 census, but the quality of the base was patchy. There is a high turnover of lorry drivers, who often change firms, and they change their home addresses with particular frequency.

This meant that selecting a sample with a view to sending investigators to drivers' homes was not feasible for the short-term survey. The statisticians therefore opted for roadside inquiries, approaching drivers at service areas and transport cafés and using a quota method based for matching purposes on the extensive survey of 1993. The questions were put by an investigator, who used the driver's answers to complete the questionnaire. Working hours were calculated on the basis of questions concerning work on each day of the previous week and relating to the total number of hours actually at the wheel, rest time and other time on duty. There was also a question about total working time in the previous month, and actual driving time excluding rest periods during the month. But it became clear that when drivers were asked after the event, they were not always capable of providing reliable information on "other time on duty" in the last week, and the problem increased with the length of time on duty. It was for this reason that the periods of "other time" reported by drivers had to be matched against the results of the extensive survey of 1993, which had been based solely on "logbooks".

This type of approach meant that the short-term survey of drivers' working hours was very costly, and the results - because of the way they were linked to the data of the extensive survey - were open to criticism because of structural effects and the fact that the extensive survey was old and therefore unsuitable.

This is why it was decided to organise a new extensive survey. This was carried out in 1999 and the results are in the process of being compiled.

At the same time, other ideas on the subject have resulted in a plan for a short-term survey of drivers' working hours based on tachograph records.

**2. USING THE CONTENT OF TACHOGRAPH DISCS**

**Administrative processing for check purposes by inspection authorities**

The mechanical tachograph discs in current use can break down drivers' activities as follows:

- driving time;
• working time other than driving (loading/unloading, administrative or business formalities, vehicle maintenance, etc);
• waiting time;
• rest time.

A tachograph must be fitted to all vehicles with a total permissible laden weight of 3.5 tonnes or more. Discs can be read visually by authorised inspectors, to check compliance with regulations on working hours, or by a computer using special software.

These checks relate to discs of a person or of a set of people, who are often "selected" by inspectors because of possible non-compliance with the regulations. There has occasionally been wider use of the data, but the firms and drivers were not selected on the basis of random sampling.

Statistical processing of disc data

The use of tachograph data was obviously an option that statisticians needed to explore, since such use could provide a more accurate measurement of the working periods that were recorded.

In addition, it would solve the problems of "memory lapses" by drivers, and thus the need to relate the data to an earlier extensive survey.

Lastly, it emerged that both haulier federations and drivers' trade unions welcomed the use of tachograph data to compile statistics.

The remaining problem concerned the sampling base.

The problem of the sampling base

The vital question of the sampling base was solved by using the database of annual social data returns maintained by INSEE, the French national statistical office.

These returns are filed at the start of every year by all establishments (whatever their activity) and detail for each employee the wages paid in the previous year. For each employee, there is information about his professional category and his address on 1 January.

These returns go to the tax authorities and to the social security bodies. Copies are also sent to INSEE, however, which uses them for statistical purposes to get a detailed picture of employment and wages. Since 1999, the statistical departments at the ministries have also had access to this information via INSEE.

It was thus possible, after approval from the Commission Nationale de l'Informatique et des Libertés (national data-processing and liberties commission), to select with INSEE a two-tier random sample:
- selection of a sample of 1 000 road haulage firms, stratified by size and activity of the units;
- selection among the sample firms of a sample of 7 000 lorry drivers (as defined by their socioprofessional category), whose names were communicated to SES by INSEE.

SES thus has a "reference base" from which it can draw a "sample panel" of drivers. Checks have to be made to ensure that the selected drivers actually work at the firms and that the vehicles they drive are fitted with tachographs.
This phase is currently (July 2000) under way. The answers that are obtained will then be used to select a sample of about 200 firms and 750 drivers.

August 2000 survey

The actual survey will involve asking the firms every three months for a month's tachograph discs (about 20-25) for each of the selected drivers.

The quarterly survey will be divided evenly among the three months of the quarterly period and will consider 250 drivers each month. The first sequence began in August 2000.

To read the discs, SES will use software that was developed on the market to allow transport firms to manage drivers' working time and calculate their wages.

After a few quarters, during which the conventional short-term survey and the trial survey on drivers' working hours using tachographs will both be conducted, the situation will be reviewed. A decision will be taken on the future of the data collection system, for the short-term and extensive surveys, given that regular questioning of drivers will still be needed to cover time not recorded by the discs and to supplement the data on working hours by other information on other aspects of working conditions.

3. POSSIBILITIES OFFERED BY THE GRADUAL INTRODUCTION OF ELECTRONIC TACHOGRAPHS

On 9 March 2000 the Committee for Adaptation to Technical Progress, a Commission body comprising representatives of the Member States, approved the technical specifications of the electronic recording equipment for road haulage vehicles.

The new recording equipment will allow the digital recording of data on the conditions of use of the vehicle and of the driver's activity time. The accuracy of the data that are collected, their protection and the opportunities for processing them will improve the effectiveness of the checks under European regulations of drivers' rest and driving time, and will also make it easier to check working time under national regulations.

The publication of the specifications of the electronic recording equipment in the Official Journal of the European Communities, scheduled for the end of 2000, will set a time limit of 24 months, at the end of which the new equipment will be compulsory in all newly-registered vehicles and, when recording equipment is replaced, in most vehicles registered since 1 January 1996. The equipment should thus be in service by the end of 2002.

It will be possible to process the data supplied by this equipment by using data management devices that can be attached. SES will then test the collection, not of the actual discs, but of the matching information that firms will have in their databases. Although some firms already use software to read tachograph discs and organise the information in databases, it will be the gradual generalisation of the system that will allow statisticians to use the computerised data in a cost-effective manner.

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USE OF INTELLIGENT TRANSPORT SYSTEMS IN THE COLLECTION OF ROAD FREIGHT DATA

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Increasing numbers of trucks are becoming 'intelligent' or 'technology-enabled', with on-board tracking devices, in-cab mobile data communication and sensors monitoring a range of operational indices. Companies are installing this equipment to achieve more efficient fleet management. It is enabling them to improve the utilisation of vehicle assets, raise standards of delivery service and mitigate the effects of traffic congestion on distribution operations. It also, however, offers the potential to transform the collection of official road freight statistics. Using this equipment it should be possible both to extend the range of freight indices and to improve the accuracy with which they are recorded. This paper reviews the different forms of vehicle tracking, the types of freight transport data that can be collected by this means and the practical issues that will have to be resolved for this to become a major source of official freight statistics.

Road Freight Information Systems

Broadly speaking there are four types of systems:

1. Road-based telematics:
   Sensors embedded in the road surface have been used for many years to provide automated traffic counts. They have crudely differentiated commercial vehicles by axle numbers and axle loading. Weigh-in-motion devices have also been installed to assess the degree of vehicle overloading. These systems have not attempted to identify or track individual vehicles and provide data only for a limited number of points on the road network.

   They are an efficient means of collecting aggregate data on the volume, composition and timing of traffic flows on particular road links. Such information is essential for both transport policy formulation and the management of road infrastructure.

   More recently overhead sensors have been installed commercially, mainly on motorway bridges, to monitor traffic conditions on a real-time basis and provide road users with advanced warning of congestion. When accumulated over several years, this traffic flow data can be used to measure congestion trends and develop models capable of predicting the probability of differing degrees of congestion occurring on particular road links at particular times. The analysis of this historical traffic data again yields valuable information for policy-makers and network managers. These systems, however, monitor overall rates of traffic flow and seldom differentiate vehicle types.

2. Roadside Scanning of Individual Vehicles:
   By equipping vehicles with automatic vehicle identification (AVI), in the form of machine-readable labels or electronic transponders, it is possible for road-side sensors to track individual vehicles. Such systems have been used mainly for road tolling, though can be used to collect vehicle-specific data on the distances travelled on particular roads and average speeds. Their effectiveness as a source of road freight data largely depends on the density of sensors across the road network and the agreement of operators to the use of vehicle-specific records for general statistical purposes.
3. Geographical Positioning Systems:
Satellite tracking of vehicles allows their position to be monitored on a continuous basis at any point on the road network and at any time. The installation of GPS systems helps companies to manage their fleets on a real-time basis, improving vehicle utilisation, cutting transport costs and raising standards of delivery service. Retrospective analysis of the routing and scheduling data permits accurate calculation of vehicle-kms, split by road type and geographical area, vehicle speeds, delays and overall time utilisation of vehicle assets.

4. Intelligent Vehicles:
Such vehicles have two-way communication with an operating centre (or 'hub') and are equipped with numerous on-board sensors to monitor various aspects of vehicle and driver performance. The operational and performance data can either be transmitted on a real-time basis to the hub using 'in-cab mobile data communications' or recorded for downloading into the company computer when the vehicle returns to its base. Data, on such things as payload weight, pallet numbers and product type, can also be entered manually into the on-board monitoring devices to supplement the automated monitoring of a range of operational indicators. Sensors now exist to measure internal cube utilisation, though there are still very few examples of this technology being applied commercially.

The remainder of this paper will focus on the statistical opportunities likely to be created as an increasing proportion of the commercial vehicle fleet becomes 'intelligent'.

 Adoption of Intelligent Vehicle Technology

No general statistics are available on the numbers of trucks with GPS, in-cab mobile data communication and on-board sensors. A recent survey conducted in the UK suggested that only 0.3% of commercial vehicle fleets contained one or more trucks which were 'technology-enabled'. This study predicted that by 2005 around 5% of fleets would have at least some intelligent vehicles. The rate of adoption of this technology is predicted to increase sharply as the real cost of installing the equipment and subscribing to road information networks steadily declines. Over the next few years vehicle manufacturers are likely to install much of this equipment as standard, further depressing its unit cost. Some manufactures are likely to link the installation of the equipment to a road information service which they will offer part of a value-adding package 3. This will enable them to provide tailored vehicle maintenance programmes for particular vehicles and advice on general fleet management.

Vehicle operators will be encouraged, if not forced, to adopt this technology by, on the one hand, the growth of traffic congestion and, on the other, the continued tightening of customer delivery requirements. By giving operators full 'visibility' of their fleets at all times, the new GPS-based road information systems will help them to adapt their logistical operations to an increasingly congested road network.

 Data Requirements

Those companies which have so far installed vehicle tracking and monitoring equipment have seen it primarily as a short-term fleet management tool and been mainly interested in the positioning data. The opportunity for retrospective analysis of vehicle and fleet performance has been a secondary consideration. Many companies have been uncertain which key performance indicators to track and how to analyse the vehicle records they have accumulated. One UK company providing a vehicle tracking service has already build up computer records on over 8 million trips, with a range of operational and performance values for each trip. 'Data mining' these existing
databases could shed new light on the workings of the road freight system, but will require the development of new software tools.

Companies are interested in performance and efficiency measures, whereas government statistical agencies have been more concerned with aggregate measures of freight traffic, expressed as tonnes-lifted, tonne-kms and vehicle-kms (loaded and empty). These aggregate measures can be accurately derived from the new road information systems. The distances travelled by each vehicle are closely monitored by the GPS. Data on payload weight, required for the tonnes-lifted and tonne-km estimates, has to be input manually at present. In the longer term, the integration of road information systems with order fulfilment software will obviate the need for this manual process.

The use of GPS data will not only permit faster and more accurate calculation of vehicle-kms, tonnes-lifted and tonne-kms; it will also allow the disaggregation of this data by road link, geographical area and time of day to a much lower level than was possible using the traditional postal questionnaire survey. The accuracy of tonne-kilometre estimates for delivery rounds with five or more collections / drops will be enhanced once the precise configuration of the route is known. New data will also be available on the speed at which road freight is moved at different times of day and on different roads.

Governments, like companies, are paying greater attention to vehicle utilisation and fuel efficiency and hence are likely to have an interest in the broad range of KPIs that be cheaply and easily monitored by road information systems. Care must be taken to select KPIs which are useful and meaningful to operators, policy-makers and researchers. Efforts have been made in the UK to devise a standard set of KPIs for trucking operations which meets the requirements of both industry and government. These KPIs have been used to quantify economic and environmental best-practice in road freight operations and provide a benchmarking service for participating companies. Five sets of KPIs have been adopted:

1. **Vehicle loading:** measured by weight, pallet numbers and average pallet height.

2. **Empty running** and running with returning handling equipment

3. **Time utilisation** split into seven categories: running on the road (including legal breaks), on the road but stationary during the daily driver rest-period, being loaded or unloaded (including time spent on manoeuvring / paperwork), preloaded and awaiting departure, delayed or otherwise inactive, undergoing maintenance or repair and empty and stationary.

4. **Fuel efficiency:** of both the vehicle engine and refrigeration equipment

5. **Deviations from schedule** with causes divided into six categories: problem at collection point (consigning company’s responsibility), problem at delivery point (receiving company’s responsibility), own company actions, traffic congestion, equipment breakdown and lack of a driver.

These KPIs have been applied in two 'synchronised audits' of vehicle fleets in the UK food sector. Participating companies monitored the efficiency of their road transport operations using these KPIs over the same 48 hour periods. They were asked to enter three types of data into a standard spreadsheet in accordance with an agreed set of instructions:

1. General data on the vehicle fleet
2. Data on all trips performed during the 48 hour period
3. Hourly audit of the vehicle activity during this period.
In October 1998, 36 fleets were surveyed comprising a total of approximately 2300 vehicles. During the 48 hour period, they made roughly 12,000 trips and travelled 1.16 million kilometres. Figure 1 shows how the time utilisation of these vehicles varied over the 48 hour cycle. One of the main objectives of the survey was to enable companies to benchmark the efficiency of their road freight operations. Table 1 shows how the energy intensity of delivery operations, expressed as milli-litres of fuel consumed per pallet-km, varied across the food supply chain.

The 36 companies which took part in the October 1998 audit were asked to what extent the KPI data were routinely collected or had to be recorded specially for the survey. On a scale of 1 (routine collection) to 5 (specially recorded), the mean score was three. 40% of the managers routinely collected much of the data, though in only three cases did this involve the use of 'intelligent' vehicle systems. As more vehicles become 'intelligent', KPI audits of this type will be greatly facilitated and can become fairly routine.

**Figure 1: Time Utilisation of the Surveyed Vehicles over a 48 hour Period.**
Table 1: Average energy intensity of different types of distribution operation: (fuel consumption by the tractor units of 38 tonne articulated vehicles)

<table>
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<th>Type of Distribution</th>
<th>Average (ml)</th>
<th>Standard Deviation (ml)</th>
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<tbody>
<tr>
<td>All fleets</td>
<td>33.4</td>
<td>12.6</td>
</tr>
<tr>
<td>Temperature-controlled primary distribution</td>
<td>34.2</td>
<td>9.3</td>
</tr>
<tr>
<td>Ambient primary distribution</td>
<td>21.4</td>
<td>7.8</td>
</tr>
<tr>
<td>Dedicated distribution to supermarkets</td>
<td>34.8</td>
<td>12.7</td>
</tr>
<tr>
<td>Dedicated distribution to other retail / catering outlets</td>
<td>29.1</td>
<td>13.9</td>
</tr>
<tr>
<td>Multi-user distribution to retail / catering outlets</td>
<td>45.5</td>
<td>17.9</td>
</tr>
</tbody>
</table>

**Practical Problems**

Although the technology now exists to revolutionise the compilation of road freight statistics, its use by government statisticians is likely to be constrained by a number of factors, mainly:

*Reluctance of companies to grant access to existing vehicle data bases:* As much of the road freight data that governments require will be routinely collected by commercial road information systems, it would seem sensible simply to tap into these existing data bases, anonymising the records and respecting the usual confidentiality constraints. This will, however, require company consent, in contrast to the current postal questionnaire surveys to which companies are legally obliged to contribute.

*Unrepresentative samples:* If data were only collected from vehicles equipped with tracking equipment and sensors, the sample would be biased towards newer vehicles operated by larger, more progressive companies, probably clustered in particular sectors and regions. For the foreseeable future, 'technology-enabled' vehicles are likely to form a minority of the total vehicle fleet.

*Lack of standardisation between road information systems:* There is already a lack of standardisation between road information networks in the collection and coding of tracking information and choice of KPIs. This will make it difficult to pool freight data drawn from different networks.

**Future Scenarios**

Given these constraints, it is likely that the new goods vehicle tracking and monitoring systems will, over the next 5-10 years, supplement rather than supplant the existing methods of collecting official freight statistics. Those companies running 'technology-enabled' vehicles will find it easier to meet their statutory obligations to provide operating data on sample vehicles. To ensure the statistical validity of the sample, the main instrument of data collection is likely to remain the postal questionnaire, distributed to operators of a random sample of vehicles.

The use of new vehicle-based IT systems will also make it easier for companies to take part in KPI audits. These are worthy of public support, partly because they give government planners and policy-makers a detailed insight into the utilisation of vehicle capacity, energy efficiency and the environmental impact of road freight operations, but also because they foster industry-wide programmes of performance measurement and improvement.
Agencies providing vehicle tracking / road information services and their client companies should be encouraged to share their data with government statisticians to add depth to the traditional forms of road freight survey. The vast amounts of spatially-disaggregated road freight data that could be captured from these systems could greatly assist the development of freight traffic forecasting models and the planning and management of road infrastructure. As explained above, relying solely on data supplied by companies operating fleets of 'intelligent' vehicles would be likely to skew the results. To obtain more representative coverage of the road freight industry, governments could fund the temporary installation of tracking equipment in a broad sample of vehicles. It has been estimated in the UK that this might cost around £200-300 per month for a large goods vehicle. When set against the wealth of statistical information that can be generated by the continuous tracking of a vehicle for a month, this would seem a cost-effective form of data collection.

By installing tracking and monitoring equipment temporarily in sample vehicles one would, however, run the risk of inducing a Hawthorne effect 4. This effect occurs when staff change their behaviour because they know they are being watched.

Transport managers might use the sample vehicle(s) more intensively during the monitoring period to create a good impression, while, for a similar reason, drivers might follow more direct routes, slow down and drive more fuel efficiently. It is also possible that companies which continuously track their vehicles, will experience a permanent Hawthorne effect. While this is likely to be beneficial to the economy and environment, it poses an interesting dilemma for government statisticians.

References

1. Trafficmaster 'Motorway Congestion Index.' London 1998


REPORT FROM 4th WORKSHOP

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Workshop number 4 at this Seminar was devoted to the statistical applications of intelligent transport systems (ITS). While the widespread application of information society technologies to the various modes of transport may have seemed far-fetched, even in recent years, it is now common practice. For historical reasons, air, and to some extent maritime, transport have been using the new technologies for several years now. Land transport has been quick to made up ground in recent years, however, to the point where intelligent land vehicles are commonly discussed nowadays. There is, however, still a long way to go before the applications which are available become standard.

Statistics are a logical by-product of this use of information and telecommunications. Unfortunately, the time constraints on this Seminar prevented Workshop No. 4 from going into the many available examples of intelligent systems applied to air and maritime transport statistics. However, and perhaps appropriately, given that road transport has the least experience in this field, two speakers did present very interesting cases of the use of intelligent transport systems to compile statistics in this area.

The first speaker, Mrs. Claudine Laguzet, of the Ministry of Infrastructure, Transport and Housing in France, presented an initial experiment conducted in the ministry's economics and statistics department to collect statistics on lorry driver's working hours using current mechanical, or analogue, tachographs which, as we all know, will be replaced by digital tachographs in the not too distant future.

The economics and statistics department set out to conduct a short-term survey of drivers' hours using data on mechanical tachograph discs with the specific aim of exploring this new source of data, a device which must be fitted to lorries with a total permissible laden weight of more than 3.5 tonnes. Tachograph discs which can easily be read by IT routines provide a more accurate measurement of driving time than surveys and had the support of the hauliers' organisations and the trade unions.

A two-tier random sample was selected (enterprises in the first tier, drivers in the second) from the computer record of annual social data declarations of France's Institut National de la Statistique et des Études Économiques (INSEE). In the survey itself, enterprises were asked every three months to provide one month's discs for every chosen driver (a sample panel of about 200 enterprises and 750 drivers). After a few quarters, a decision will be taken on the future of the data collection system once this trial survey and the traditional short-term survey based on interviews are compared.

Mrs. Laguzet also drew attention to the possibilities offered by the new electronic tachograph, the specifications for which the technical committee established by the European Commission approved at EU level on 9 March 2000.
In principle, by late 2002 it will be obligatory to fit electronic tachographs on lorries registered after 1 January 1996. This will open up a wealth of opportunities, and the gradual generalisation of this system will make it possible for statisticians to guarantee satisfactory standards of cost effectiveness in using these computerised data.

In the second presentation, Professor Alan McKinnon, of the Logistics Research Centre of Heriot-Watt University, Edinburgh, drew attention to the growing potential of freight companies' use of "intelligent" lorries fitted with equipment using the new information technologies. A recent study in the United Kingdom showed that, while only 0.3% of the vehicle fleet is currently fitted with satellite positioning (GPS) sensors and mobile data communications, this percentage will rise to 5% in 2006 and will increase exponentially as the unit cost of the equipment falls. Firms which have installed this equipment see it as a tactical fleet management instrument. While they are interested in performance and efficiency measures, transport statisticians prefer to have aggregate measures of traffic, expressed as tonnes lifted, tonne-kilometres and vehicle-kilometres (loaded and empty). The availability of large computerised records of data from intelligent on-board systems will make it possible to calculate these data more quickly and will also enable them to be disaggregated by geographical areas and periods of time with much greater accuracy than traditional surveys permit. Additional data, such as the speed of transport in each area and period, will also be available.

Professor McKinnon reported considerable efforts in the United Kingdom to create a standard group of basic performance indicators for road freight enterprises which lend themselves to comparative analysis (benchmarking). These were:

1) vehicle loading;  
2) empty running;  
3) time utilisation;  
4) fuel efficiency;  
5) deviations from schedule.

Professor McKinnon presented the results of two synchronised audits of this kind conducted in United Kingdom food hauliers over the same 48-hour periods, when 2 600 vehicles belonging to 36 enterprises made 12 000 trips over more than one million kilometres. 40% of the managers routinely collected much of the data, although in only three cases did this involve the use of intelligent vehicles. Professor McKinnon emphasised that legal instruments will be required to have enterprises make the data compiled by the new intelligent systems available to statisticians and recalled the problem posed by the lack of standardisation between road information systems. Over the next ten years, these data will supplement rather than supplant the traditional methods of collecting transport statistics. The professor argued that the use of new information systems to facilitate performance audits of enterprises deserved public support, and that agencies providing road information or vehicle tracking services should be encouraged to share their data with statistical offices. Furthermore, studies based solely on the data provided by the enterprises operating the current limited numbers of vehicles fitted with intelligent systems could skew results, for which reason governments could fund the temporary installation of tracking equipment in a broad sample of vehicles.

To sum up, both speakers' papers can be said clearly to show the future of statistics on road transport while also reflecting the problems associated with the use of these new technologies. It is already clear that systems development is moving in this direction, and the example which currently bears out both presentations is the launch on 1 January 2001 of the new Swiss electronic toll system for heavy vehicles, which combines short-range communications equipment for tolls (DSRC at 5.8Ghz) and an on-board system of a GPS receiver associated with the tachograph. The Swiss government will provide this equipment free of charge to any foreign operators who volunteer to
use it. The announcement that a similar system will be constructed on German motorways by 2003 only confirms the prospects of wholesale use of this kind of system in the near future. The possible statistical uses of these new systems, and the ease with which data can be transmitted over distances using DSRC communication and GSM messages in association with the GPS positioning system and other on-board and land electronics are evident.
CLOSING SESSION
KEY CONCLUSIONS OF THE MADRID SEMINAR

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In the context of preparing the next 5-year Statistical Programme, which will start in 2003, and knowing that Eurostat needs to prepare for changes in this field, the seminar has made it possible to find answers to three questions:

1. Why change?

- because official transport statistics, constrained by its budgets, tends to concentrate on a narrow range of activities and therefore risks becoming less relevant, leading to even greater pressure on budgets and in turn even less relevance;

- because for transport, Europe is already a single market. Therefore there is a need to adapt the data collection infrastructure and the concepts of transport statistics to achieve harmonisation between countries and aggregation to the European level;

- transport is growing faster than the economy as a whole, and this tendency will be reinforced by certain radical structural changes in the economy, such as the “net economy” described in several papers at this seminar.

2. What should be changed?

- it emerged clearly from the seminar that it is no longer sufficient to construct European transport statistics only through the aggregation of national statistics. The Trans-European transport Networks (TEN) need to be matched by trans-national data which will make it possible to evaluate the impact and the efficiency of investment in the transport TEN. This inevitably goes beyond a purely national framework. This raises some important issues on the interchange of data and the construction of “virtual data warehouses” on a European scale. The next Statistical Programme will have to give priority to the data needed to work at this European scale.

- there should be data on costs and prices in addition to the existing physical and enterprise data, ensuring a statistical coverage of the transport market as a whole;

- the transport chain should be represented in statistics;

- there should be up to date short-term indicators for transport at the European scale;

- there should be better links with other domains of official statistics (social and economic data, trade data…).
3. **How can change be achieved?**

- it will not be possible to advance only through the logic of steadily expanding resources. In order to do new things, it will be necessary to review the costs and benefits of existing activities. It will also be necessary to exploit synergies between official statistics and similar kinds of data collected in the private sector. It may be necessary to stop some statistical activities which are no longer useful; it may be possible to reduce costs by using certain new technologies;

- it will be necessary to modify the concepts used in transport statistics, and to move away from those concepts which are now outmoded. New concepts will be needed which reflect the kinds of operations characteristic of modern transport enterprises;

- more importance should be attached to the dialogue with users, including both “upstream users” - the transport enterprises themselves - and “downstream users” such as consultants and researchers, in order to identify the statistical information which is really needed;

- given that the aim is to create a "European data warehouse", what is the correct role for Eurostat? Various scenarios exists, including the centralised or distributed models;

- it is necessary to consider how we can better use the information already collected. More use can be made of modelling to link data already collected for different modes under Community legal acts in order to provide information on the transport chain. The seminar provided a number of examples of models used in this way.
CONCLUDING REMARKS

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The seminar brought together an impressive group of users and producers of transport statistics, from both private and public sectors. The object of the seminar was to provide input to the formulation of Eurostat’s Community Transport Statistical Programme 2003-2007; in that respect and in the size and structure of the seminar, it marked a development on previous CEIES seminars.

A wide range of topics was dealt with in the seminar. The topics can be grouped into two broad sets. The first concerns the data themselves. Here, the three main issues were:

(1) the challenges to traditional transport statistics posed by such developments as deregulation and privatisation, the elimination of customs duties, and the abolition of border controls;
(2) the need for new data; for example, data on economic value and prices, which are important for national accounts and policy evaluation; air transport statistics; and the effect of e-business on transport patterns;
(3) the emergence of new methods of data collection.

All received detailed consideration both in papers and in the discussion that followed.

The second set concerns the relationship between data collection agencies in the private and public sector. Large amounts of transport statistics are gathered by the private sector, some by big transport undertakings for their own use, some by professional consultants and data vendors. Part of this private sector activity is funded by Government ministries. Statistics so collected are often commercially sensitive; they will not readily be made available for public access. Further, data definitions and methods of collection are not standardised; for example, data will often be highly model based. The public sector is also diverse; it includes National Statistics Institutes (NSIs) and publicly owned transport concerns. There was much discussion on the interaction between private and public sectors. The necessity for NSIs and Eurostat to engage with the private sector was accepted, but the difficulties of resolving how best to do it were acknowledged. The problems for NSIs caused by the particular legal basis for much of their activities were raised by some participants.

Ultimately the success of the seminar will be gauged by its contribution to the Programme being prepared by Daniel Byk and his colleagues. Determining the allocation of resources among so many competing claims and formulating a workable relationship with the private sector represent a major challenge. One can only wish them success in their work.
ATTENDANCE LIST
# Attendance List

**Eurostat**
- Daniel BYK
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- Josée NOLLEN
- Nicole LAUWERIJS
- Åsa JACOB

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- Patrick T. GEARY, NUI Maynooth
- Ullrich HEILEMANN, Rhein.-Westf. Institut für Wirtschaftsforschung
- Luigi FREY
- Ingrid WILLOCH

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**European Environment Agency**
- Hermann PEIFER

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- Alma HASKO, Institute of Statistics

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- Friedrich MANNAS, Statistics Austria

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- Keith JOHNSTON, Eurocontrol - CODA
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**ECMT**
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<tr>
<th>Country</th>
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