Final Report for Publication

EUROMOS

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Project Co-ordinator: Volkswagen AG

Partners:
BMW AG
Centro Ricerche Fiat
CSST
DaimlerChrysler AG
Ford Forschungszentrum
INRETS
University of Karlsruhe (IWW)
PSA Peugeot Citroën
Renault
Volvo Technical Research

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EUROMOS

Final Report for Publication
– European Road Mobility Scenarios -

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0. Partnership: About the EUROMOS Project and its team

The EUROMOS project was conducted in cooperation with DG VII within the Road Transport Research Area of the 4th Framework Programme (Tasks 7.3/16). The project partners involved were the following:

- Volkswagen AG (Coordinating contractor = Project Leader)
- Bayerische Motoren Werke AG (Contractor)
- Centro Ricerche FIAT (Contractor)
- Centro Studi sui Systemi di Transporto (Associate Contractor)
- DaimlerChrysler AG (Contractor)
- Ford Forschungzentrum Aachen GmbH (Contractor)
- Institut National de Rechereche sur les Transports et leur Sécurité (Contractor)
- PSA Peugeot Citroën (Contractor)
- Renault Recherche Innovation (Contractor)
- Universität Karlsruhe (IWW) (Contractor)
- Volvo Technological Development Corporation (Contractor)

Most of the project partners are industrial companies; being more specific: the traffic and transportation research departements of the major European automobile enterprises.

Centro Studi sui Sistemi di Transporto is an independant research and consulting group in traffic systems and technology; Institut für Wirtschaftswissenschaften at the University of Karlsruhe is part of a major german technical university. Institut National de Rechereche sur les Transports et leur Sécurité (INRETS) is the leading french research institute in traffic technology and mobility.

1. Executive Summary

The main goal of EUROMOS is to produce **European mobility scenarios for the year 2010 and the Evaluation of certain mobility services under the conditions of these Scenarios**. These scenarios will base on available quantitative and qualitative mobility data of six European agglomerations: Barcelona (Spain), Bordeaux (France), Gothenburg (Sweden), Munich (Germany), Southampton (United Kingdom) and Turin (Italy).

The intended aim of **Deliverable 1** is to provide the reader with a good understanding of the data being collected and an initial overview of the mobility characteristics of the agglomerations chosen for this project (EUROMOS Consortium 1998). The quantitative data are collected in a DataBase, the qualitative ones in a so called InfoBase. The Deliverable 1 describes the time frames, the content and the structure of both the DataBase and the InfoBase. Beyond that, short descriptions of the agglomerations, maps and some initial key figures and charts are provided to compare the different agglomerations.

The work presented in **Deliverable 2** pursues two main aims: Based on an expert analysis of collected data, trends with regard to population, transport network and transport demand will be outlined, the development within the agglomerations will be compared and discussed, and thesis about the future development should be put forward. There are four main points of interest in this deliverable: Frame conditions and transport facilities, Passenger traffic, Freight traffic and Future trends.

The chapters about frame conditions and transport facilities mention the information which is generally valuable for all modes of traffic, e.g. policies, taxation, infrastructure, public transport supply. The passenger traffic considers the mobility behaviour of people, e.g. number of trips or modal split for several trip purposes. The chapter about freight traffic discusses related points of interest, and within the future trends, some available information about the future development in the agglomerations are given. In this case, most of the information is available only on national level.

The **Scenarios** elaborated and presented in **Deliverable 3** are a core element of that research project. Their aim is to describe future developments in European conurbations, especially with respect to transport situation. Based on information from the ”DataBase” and the ”InfoBase”, the research group elaborated following a certain methodology three consistent ”scenario pictures”:

- **BAU-Scenario** Business as ususal Scenario: That is the “Base Case” describing the expected trend development
- **Scenario A** Spread of income levels: Scenario A assumes a divergent economic development (as in BAU) affecting the incomes. It is founded on the following points:
  - Economic globalisation
  - Risks for European economies
  - Increasing unemployment
  - Rising demand for highly specialised staff
  - Immigration of economic refugees
  - Increasing share of incomes out of capital holding

- **Scenario B** Strong traffic demand management: The second alternative Scenario assumes that there will be a need to organise and manage the traffic demand especially in the cities. It is founded on the following points:
  - Economic reasons
  - Deficit in state budget
  - Protection of inhabitants
  - Overcharge of traffic infrastructures in cities, conurbation.

As envisaged in the project proposal and already performed within the prior deliverables, special interest was given to the urban developments in the six countries. Information from the Data- and the InfoBase enabled to derive both quantitative and qualitative results for the scenarios. This also meant a quantitative estimation of future values like degree-of-motorisation, modal-split or length of road network, all as an indicator for traffic development. Urban intercomparisions based on these results will lead - in the further progress - to find out whether common European transport policies will push the countries to a harmonization of the ”standard of life” within Europe, or wheter national / regional aspects will keep dominating the local situation.

The project partners that were responsible for the six selected agglomerations were continuously involved in the elaboration of the quantitative and qualitative descriptors, giving them the actual state of development of the relevant items within the scenario process as well as asking for frequent responses and corrections of several draft versions. They were also responsible for the description parts of their local agglomerations to ensure a well co-ordinated and consistent regional overview on the descriptors.

A ”Scenario picture” as described here, does not only mean a projection of possible development of distinct descriptors but requires an analysis of interference between their contents. This means that contradictions within one scenario are ruled out, or the joint effects of several single trends are explained in detail. Such a ”consistency check” is - in our point of view - the quality sign of a scenario. The assumptions and statements must harmonize all togehter showing a consistent picture of a potential future development. The question is not to identify levels of probability but to extract similar single trends in the mobility development.

As it is not possible to analyse all the data and information collected in the (quantitaive) DataBase and the (qualitative) InfoBase at the same time with sufficient efficiency under the conditions of this project, it was decided to work on a sub-set of most important “Triggers” and “Key descriptors” that were recognised to be of special relevance for the thematic focus on conurbation mobility. These factors (consisting of both quantitative and qualitative items) were elaborated and intensively cross-checked to receive the consistant overall picture, whereas the other descriptors were used for additional investigations only where needed.

In the last step of the project, presented in **Deliverable 4**, a number of Mobility Services or, more precisely, different classes of Mobility services, were collected and evaluated against

the background of the three scenarios regarding their customer attractiveness and integration into the “traffic world context” of the scenarios.

The method used for this purpose is known as «trade-off», whose practical application is describebed in Detail also in the Deliverable. It is founded on the breaking down of a potential offer in attributes (or the essential demands of the consumer) and into modalities (that is to say the different methods of application) which permit us to examine the decisive factors which make a product acceptable to different types of customer.

At first, this qualitative evaluation consists in identifying

- The mobility services by observing current experiments in the different European countries
- The technological progress which supports new mobility services
- Those mobility services most likely to adapt in the short and medium term to our societies' demands and to the requirements of those providing them.

Experts of the group Euromos selected the mobility services in «brainstorming» sessions, starting out from the knowledge acquired in the previous phases of the analysis of 6 agglomerations, and of course their professional experience.

Secondly, on the base of the product evaluation grid, the aim is:

- to clarify the constitutive criteria of services in terms of attributes and modalities in order to systemise a research method for new services in different urban situations.
- to test the pertinence of mobility services in the three environments described in scenarios BAU-A-B.
- to identify the most favourable factors to the development of mobility services in the six sample towns.
- to reveal areas for reflection and work on the mobility services in a new framework.

It must be stressed that this procedure is not a formal prospecting, rather a desire to pose common hypotheses which bring to light the possibilities of conformity between the offer of service and urban mobility demands.

In the result of the evaluation process, a number of similar patterns could be detected, but also a number of factors that are linked to different regional or social background. It may be observed that the success of many service types in the six selected conurbations is strongly correlated to specific urban, social and cultural factors which are to be highlighted only in inter-town-comparison.

At town level , Morphological differences as well as Size effects, are going to determine the success of certain services. At the political level, Town planning traditions as well as the existance or the lack of public transport policies is significant to the public attitudes concerning acceptance or rejection of mobility services. At the cultural level, specific cultural substreams seem to come to the surface in each country, for example:

- the use of advanced technology in France,
- seeking consensus beforehand in Germany,

- the refusal of authoritative direction in Great Britain,
- the great attention to architecture and urban landscape in Italy.

Regarding varying attitudes and behaviour of populations, a cleavage can be observed between the northern and southern countries.

- In the north, they believe education and sensibilisation of the citizen can modify behaviour.
- However in the Latin countries, the authorities do not count on education to change mentalities.

The efficacy of scenario B :It favours, for any city, the emergence of new mobility services. It should be noted that the consideration of all previously studied matters is primordial when analysing new mobility services implementation feasibility (it should thus be taken into account at the service implementation modaliteis).

The analyses of the Euromos experts and external experts' interviews highlight some Strong and constant tendencies:

- Individual mobility is a value of modern society which must not be given up
- The mobility services must be situated in the framework of a foreseeable increase of mobility ; There will be no significant modification in tendencies for the ten to fifteen years to come.
- The objectives of the mobility services will be to satisfy the increasing and specific needs (individuals, groups and trip purposes), proposing satisfactory alternatives to car use.
- The car will keep a central position in the transit organisation, but its status as a personal vehicle (owned) is already changing. Yet, the collective transport system is also changing.
- The mobility services show the role the car can play to regulate individual mobility at the urban level, in the framework of the global transport system.
- The collective transport systems must also be ready to participate in the on-going evolutions. To do this, the experts stress the conditions of successful adaptation to the mobility needs at agglomeration level.
    - Qualitative and quantitative improvement of the public transport offer,
    - Measures to organise the network in terms of accessibility and link up capacity.
    - A spatial organisation that avoids prolongation of the trip routes.
    - The development , integration of new technology.

Many experts question the capacity of public transport operators to initiate innovative solutions. They expect more from the private sector, commercial or not.

The impact of new technology would seem to be decisive to obtain the desired performance from the services :

- In providing information and making it accessible,
- The management of flows,
- Integrated payment, etc…

There is some doubt as to :

- Is there a will to make available to operators or to users the necessary information for an efficient management of transit ?
- What will be the cost of implementing new technology, given that important transactions will be required from the many operators ? Who will pay ?
- Will the users be able to navigate on complex information systems ?
- What guarantees can be given to the final user in terms of viability, cost and security?

The visibility of innovative mobility service is still weak. The car is the personal service par excellence. Its inclusion in the mobility services is not easy to envisage. The experts tend to attribute the function of mobility services to public transports.

This paradoxical situation between the car and personal services is not completely resolved. Mobility services can appear either as a "luxury" reserved to certain social categories (those who can pay for extras) or as a gap filler for the most obvious lacks. (special needs). The mobility services do not yet appear as a real source of economic development, all the more so when consumer behaviour tends towards moderation

Nevertheless technology is becoming sufficiently developed to let us see operators who will be able to provide attractive offers. The question of investment costs and commercialisation remains without an answer.

Mobility services are a credible working perspective if following questions are raised:

- Should one consider the mobility services as gap filler to the lack or the limitation of the public services, or as a source of development of sustainable urban services, thus solvent ?
- How should new population travel behaviour be taken into account to maintain access to the town in the most favourable conditions to their mobility ?
- What opportunities exist in mobility services, given the orientations of urban policies and urban planning at town or suburban level, in the perspective of concerted management ?

2. Objectives of the Project

2.1 Main objectives

The project aimes at the development of mobility scenarios as a tool for evaluating future mobility forcasting future mobility behaviour and evaluating impacts on policies and services.

The scenarios will reveal mobility behaviour of different user segments (e.g. social groups) in different conurbations in Europe. They will include the evaluation of all relevant descriptors (technologies, demographies, policies and service/transport options).

Some of the relevant data will be on national, some on conurbation level. Wherever possible, the data will be collected in a structured database . Small Simple models will ensure the comparability of the data. Since some of the data needed are available only at qualitative level and others cannot be compared accurately, the scenario description will be a qualitative one.

The scenarios allow to assess the market potential of different mobility services and for knowing the user´s requirements on availbale transport options. This assessment will ensure a very close merket view. The data are mainly existing in the hands of the partners and will be added by the results of TTIM projects (e.g. from the DG XIII) and MOTIF.

The scenarios also allow to evaluate transport policies if and how their goals can be achieved. These goals (concerning sustainable mobility) are described already, as well as the possible actions by policy decision makers. The main efforts concern the regional/national comparision of the effects of different polcies on mobility.

2.2 Secondary objectives

The project will bring a marked oriented assessment into the policy descision process. The automotive industry will exchange ist knowledge and experience

The data base will allow compaing conurbations and countries on a very concrete level. In this case defining appropriate indicators will be an important additional objective. Furthermore it can be useful for determining model structures concerning mobility behaviour of different social groups of the total population.

3. Means used to achieve the objectives

The basis of the project is built by a mobility system that describes influences as well as relations between factors and mobility terms. Furthermore the baseline consists of the well experienced process for building comprehensive and consistent scenarios with the help of descriptors and indicators. Also the data input won't be new. In only 12 months the project has to deal with existing data - in contrast to indicators, descriptors and evaluations.

The innovative part is to put these data together, to make them comparable and to drive conclusions about common factors and differences in Europe. The scenario process itself will be the first one on European mobility with the comprehensive understanding that is able to fill in the gaps of existing quantitative data. Therefore the following assessments mainly on policies and services can be driven from a new profound research.

In the following the basics of understanding mobility and the scenario process are shortly outlined. In the references some projects, studies and publications, that contribute to the project, are listed.

3.1 Understanding of Mobility

Today's transport system has evolved gradually to meet numerous mobility patterns. Improving the transport situation necessarily means understanding mechanisms of mobility and transport situations first. In the project mobility is understood as all the movements with changing a location outside households or companies. The influences and relations of mobility can be shown in the following, simplified picture:

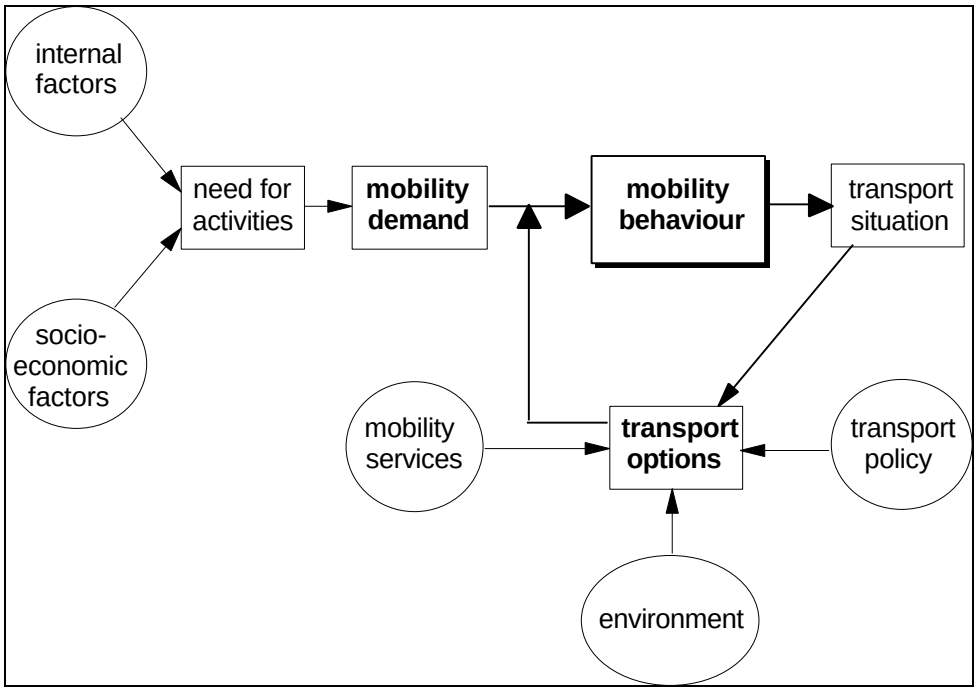


Fig. 1: Influences and relations of mobility

In the focus of research is the mobility behaviour that describes a real action (*e.g.* to take a bus or drive a car). It is in the very most cases done for specific reasons: someone wants to reach a destination. The behaviour results is an activity that results from mobility demand. Demand is caused by need for activities (*e.g.* to go to work). This need is influenced by internal (e.g. psychology, attitudes) and external factors (socio-demographics like age, sex etc.).

Mobility behaviour can be described by a set of parameters (*e.g.* origin, destination, distance, speed, transport mode). As a consequence of passengers` and goods` movements a certain transport situation is reached, being described by additional parameters (*e.g.* traffic density, modal split, average speed).

Mobility behaviour itself results from a complex function integrating individual transport decisions. When assessing the future mobility situation it is not sufficient to describe and extrapolate recent transport situations in a linear analytical way. In contrast, mobility demand has to be examined in the light of given transport options: Mobility is the result of individually optimised choices (*e.g.* to go to work by car in the absence of an efficient public transport system).

Having realised that, transport options need to be investigated stepwise and in depth. Several types of influences have to be considered, as there are a) the expected transport situation, b) environmental influences, c) relevant transport policies, and d) existing mobility services. In this project the actual and estimated future environmental influences are given, like the mobility demand. Only the mobility services and polices are taken as variable because they have to be evaluated.

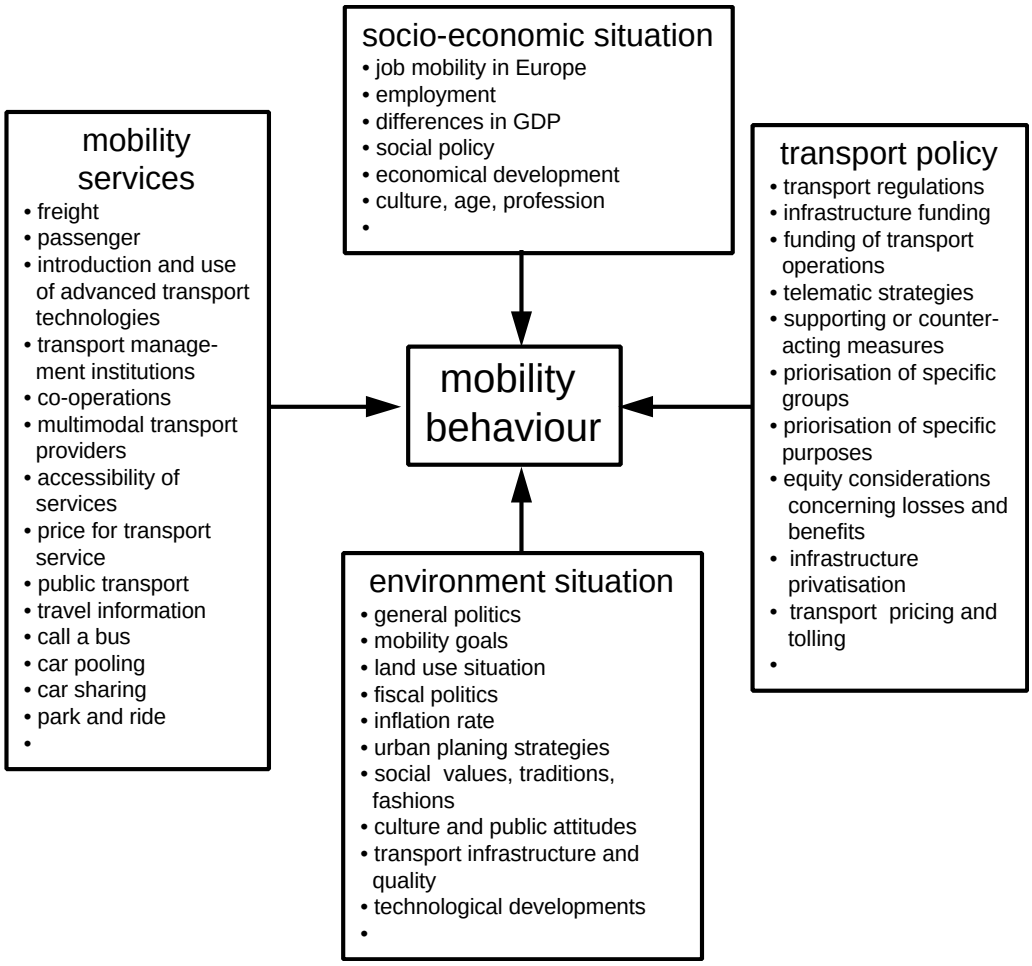


Fig. 2: Influence factors on mobility behaviour

The influence factors themselves have been developed already in numerous previous studies. Therefore the project will refer to them. The above picture gives some examples.

3.2 Workpackage Structure

The projects consists of seven work packages (WP). The first deals with the preparatory work, the last one with the overall project management (for this see chapter Project Management). In WP II we collect and work on the past and actual data and information, in WP III on the future ones. WP IV then tries to make with their help regional comparisons and to build relevant indicators that can be used for the following scenario process, which build the WP V. There scenarios on a regional base are elaborated that allow to vary the results under different political conditions. The exact description of this is already a first result of the process. In WP VI impacts on mobility services, transport policies and the further future (2020) are analysed.

For the success of the project it is important to meet relativly often in workshops. In the workshops the results of the tasks that have been worked before will be presented and discussed. Then the work until the next workshop or deliverable will be distributed. The workshops are not just co-ordination meeting but common working days that are necessary

to elaborate the scenarios. Each partner of the automotive industry has two main responsibilities: insuring the data input and contributing to the scenario process.

The following picture gives an overview of the project workplan:

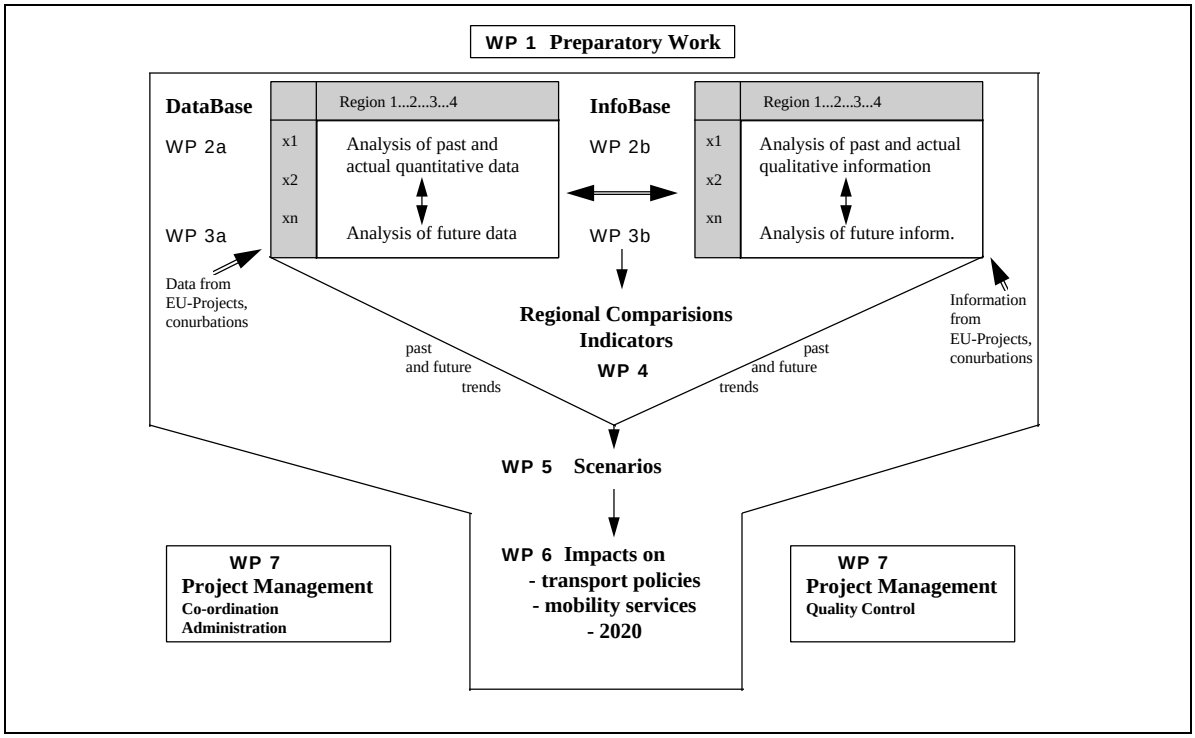


Fig. 3: Project Workplan

3.3 Scenario process

It has always been difficult to predict the future "correctly". Analyses of the future are particularly difficult these days, when rapid change and altered trends are the order of the day, people's values are fundamentally changing and their needs and requirements are increasingly difficult to identify. Scenario techniques are able to outline possible developments systematically and without controversy, and represent conceivable future worlds - even extreme ones. They make it easier to look into the future, however the uncertainties about actual developments still remain. In the special case of the project EUROMOS, the following questions are to be answered:

1. How might conurbations appear in the future, what will be their characteristic features and how might global and regional trends influence each other ?
2. How will traffic behave in future European conurbations?
3. What conclusions arising from developments in the conurbations and traffic in these areas may be drawn, especially concerning mobility-services and logistic concepts ?

3.3.1 Basic procedures and definitions

Several conurbations in Europe are to be examined in terms of passenger and goods transport. The research will include traffic systems and means of transport as well as their organisation, performance and costs on the one hand, and the demand for transport in terms of sources, volume and purposes, including the resulting system requirements, on the other.

The chosen procedure will make full use of the broad base of knowledge available within the EUCar Group and of external sub-contractors, and the findings will be made known in Project Deliverables. Multi-disciplinary teams will develop the major contents of this study in workshops. Information from specialist literature and databases as well as the knowledge of in-house experts of the automotive industry will also be taken into account. These scenarios for traffic and the related environment on a time horizon up to the year 2010 - with a possible outlook to the year 2020 - will be developed with the help of structured scenario models.

3.3.2 The scenario model

The theoretical approach is based on the “Battelle method”. The model employs seven steps to arrive at the scenarios and principal conclusions. The first step defines the project aims and key questions, conurbations and the forecast horizon. The influence analysis in the second step determines both the immediate influences acting on traffic and the relevant environmental aspects (e.g. population / changing values, ecology, the economy and employment, urban / regional planning, science / technology). In addition the mutual effects of all influencing factors will be identified and shown.

The third step identifies the characteristics (descriptors) of each area of influence. The purpose of these is to provide an adequate description of the condition, development and interlinking of these areas of influence. (For example, the descriptors for the area of influence "Economy and Employment" might be economic development, household income, property prices, car ownership.) The possible/probable characteristics of all the descriptors will be established for the period around 2010, together with explanations. As a fourth step the different descriptors and their alternative projections will be evaluated in terms of their consistency. The criterion is the mutual compatibility of each pair of descriptors and their different characteristics. The scenarios to be created are based on highly-consistent groups of descriptors. In this process, “key descriptors” will be selected according to their importance and a possible representative function for other descriptors.

Following a plausibility check, these scenarios will be described and interpreted in their contexts as a fifth step. At the same time the projections for the remaining “non-key” descriptors will be assigned according to the "spirit" of the relevant scenarios. The sixth step is an analysis of consequences on the basis of each descriptor's characteristics. This might include a brainstorming process and a sensitivity analysis to examine the opportunities and risks which arise from the descriptors forming the scenarios, and to identify measures which might make it possible to exploit these or minimise the risks. In the seventh step the derived consequences and measures will be distilled into principal conclusions.

4. Scientific and technical description of the project

4.1 Project scope and approach

The EUROMOS project used a scenario process based on both quantitative and qualitative data to assess the future development of passenger and freight demand at the conurbation level. Prognos, acting as a subcontractor, developed the scope of work for elaborating the scenarios and helped to develop all necessary input.

The potential for mobility and local freight services was evaluated against these scenarios. The six conurbations chosen for this project are listed below:

- Barcelona, Spain
- Bordeaux, France
- Gothenburg, Sweden
- Munich, Germany
- Southampton, United Kingdom
- Turin, Italy

This project took into account European and local transport policy, demographic changes and technological developments in evaluating all transport user groups within the chosen conurbations. The sources of data gathered included existing mobility studies, demographic surveys, public opinion surveys, other European transport research projects, proprietary data from the partner companies, policy papers, expert interviews, and local transport studies.

An initial analysis of the raw data was conducted. Much of the quantitative data was subsequently disregarded due to inconsistencies in the definitions or manner in which the data was collected among the six conurbations. This resulted in a strong reliance on the qualitative information in the scenario development process.

Exceeding the individual scientific know-how provided by the participating project partners and sub-contractors, valuable additional input about the interrelations between town-planning, socio-economic developments and traffic was gathered from several other scientific projects being performed under the 4th EU Framework, such as SCENARIOS or AUTO-OIL. This input reached the project either by direct participation of experts involved in both projects - like the IWW Karlsruhe, PROGNOS or INRETS - or via expert´s participation in workshops like the Bruxelles workshop in September 1998, where a number of non-project-involved experts (e.g. POLIS, AA, UITP) were given room to comment the actual state of EUROMOS, to present their own experience in urban traffic and its interaction with the population or the local authorities involved and to enter fruitful discussions with the EUROMOS participants that lasted for longer periods after the Workshop (e.g. City of Barcelona).

A comparison of the six conurbations was carried out on selected basic data in order to develop an overview of the frame conditions, demographics, transport demands, and future

trends. The conurbations were compared in order to identify common trends among all of the conurbations resulting either from harmonisation in the European Community or among some conurbations based on similar infrastructure or policy.

From all of the data, a subset of figures were selected that would either strongly impact or indicate changes in transport. These figures were either initial "Triggers" or resulting "Key Descriptors" used in the scenario building process led by Prognos, a Swiss firm specialising in economics, transport, and scenario processes. The time frame chosen for the scenario development was 2010. Three scenarios were completed:

- **BAU Scenario**: Business As Usual
- **Alternative Scenario A**: Spread of income levels
- **Alternative Scenario B**: Strong traffic demand management

Each of the six conurbations was evaluated under the three different scenarios.

A list of mobility and delivery services were created based on knowledge of existing services and pilot projects, a brainstorming session, and input from European experts. These services were defined by the partners and then evaluated by the consulting firm Mouvement, Environment, Communication. Mouvement evaluated the potential for success of the services based on criteria important to the consumer under the three scenarios. The resulting list of services for each conurbation under each scenario were then cross checked against the original scenario results for consistency.

The results of the data analysis, the scenarios process, and mobility service assessment all provide valuable insight. The project achieved its objectives by exploring the commonalties and differences in conurbation development, social and economic conditions, and the potential policy decisions that could lead to the market conditions for future mobility services.

A complete set of the four Deliverable Reports and associated Annexes is available from Volkswagen AG, Mrs. Ruth Holling, EUROMOS Project Coordinator.

4.2 DataBase and InfoBase

In order to develop the European mobility scenarios for the year 2010, available quantitative and qualitative mobility data of six European agglomerations was collected. The time frames chosen were 1995 as the base year for current data, 1985 for historical and trend analysis, and an attempt was made to identify a few key projections for 2010. Data was gathered for the cities and the agglomerations as well as for some key national figures. Maps showing the political boundaries and public transport maps and schedules were gathered for the sake of comparison.

The collected quantitative and qualitative data were referred to respectively as the DataBase and the InfoBase. The framework of the DataBase encompassed nearly 4,000 pieces of data while the InfoBase covered nearly 200 entries for each agglomeration. The InfoBase included information on demographics, urban structure, road and public transport

infrastructures, modal split analysis, and commercial traffic data. The InfoBase covered attitudes of the general population, the economy, city regional planning, law and politics, technology, and transport options and demand.

In spite of the harmonisation efforts within the EU, much of the quantitative data was not comparable between countries much less the conurbations. Data specific to transport was all too often either not comparable due to inconsistencies in definitions or the way the data was gathered, or simply did not exist. Data fields that were considered critical were sometimes filled by extrapolating from other available data or by contacting authorities or local experts.

Given the growing concern about transport within conurbations, it is important to note that data is virtually always collected on the basis of political boundaries. Although the city borders are well defined, the agglomerations are not. For anyone interested in the development of transport and mobility in conurbations, it is the change and nature of transport patterns of the agglomeration that is of particular interest. This is the data that most often was non-existent or required extrapolation or other adjustment.

Even greater effort was placed on finding high quality qualitative data. An ad hoc process was established in order to gather information and data from specific studies and documents and interviews with key people. Due to the less than optimal situation concerning comparable quantitative data, it was clear that the scenario process must rely more heavily on this source.

4.3 Analysis and Comparision of the Conurbations

Subsequent to gathering the initial information, several iterations were completed of analysis, data refinement, and de-selection. Comparisons of several key transport indicators were made across all of the conurbations. The following statements summarise the comparisons and analysis:

4.3.1 Urban Development

Two contrary developments of urbanisation can be identified:

- Without political engagement, there is a trend to sub-urbanization: large shopping centres, extensive housing areas with little social infrastructure, and business centres outside the city. (Bordeaux, Munich, Turin).
- Some cities are concentrating development within the traditional city borders. Businesses, shopping and housing areas with high density are established and old industrial areas are being redeveloped. (Gothenburg, Munich, Southampton, Turin).

Urban development	Barcelona	Bordeaux	Gothenburg	Munich	Southampton	Turin
Development in the city						
Development of new business, shopping and housing districts with high density outside of the traditional city center	Services develop around the city center	Activities along the surrounding freeway, new companies near airport	There has been such a trend for many years, but now politicians consider to prohibit any new establishment	Conversion of old faire ground, old marshallig yard, old army compounds, factories (bigger ones)	There is a strong trend to keep shopping, housing and new business inside the city (urban renewal)	Only few at city border
Development of working places at the periphery of the city border	Industrial enterprises settle in the perphery (in industrial zones)	15 working centers are developped along the surrounding freeway	Rather towards the city center	conversion of old airport		
Development in the AmC						
Development of new extensive housing areas with low infrastructure	Because of highly densed cities and expensive land price	Development of new extensive housing areas between freeway and innercity	Only a few new housing areas	Far away from Munich city, partly as "second home park"	Environmental impact given high consideration (in theory), The county needs new housing, but is very selective about where it will be located	The development ist not extensive
Development of new extensive shopping center	New trend since the last 1-2 years	Along the surrounding freeway	The trend is stopped by the politicians	YES	Shopping only in cities	At the city border, usually outside
Development of new extensive industrial enterprises, working places outside city area	Because of highly densed cities and expensive land price	13 subcentres will play in next decade a substantial rol in the outskirts	NO	around new airport	There are only few areas, there is enough space within the city area	No
Special characteristica						
	Decentralisation of city is an important trend in Barcelona	Urbanized area has doubled within 10 years, whereas population has increased only by 20%. Major projects concentrate on housing activities in outskirts and revitalization of inner city (housing, services)	Political programms concentrate urban planning on the city		There is high awareness between urban development and planning traffic. Efforts are now coordinated	

Fig. 4: Urban Development of selected conurbations

4.3.2 Demographic structure and development

- The population growth is greater in the agglomerations than in the cities.
- Cities with high population density are not as attractive for living as cities with lower population densities, therefore inhabitants relocate to the outskirts.
- Cities with a population density below 5,000 inhabitants/km² show a stable or increasing number of inhabitants. High population density cities are experiencing a decrease in population.
- The number of households has increases because of the increasing number of inhabitants and single households.
- There is a homogenisation of the household size in the cities and agglomerations.
- The number and the share of seniors (mobile seniors) is increasing.

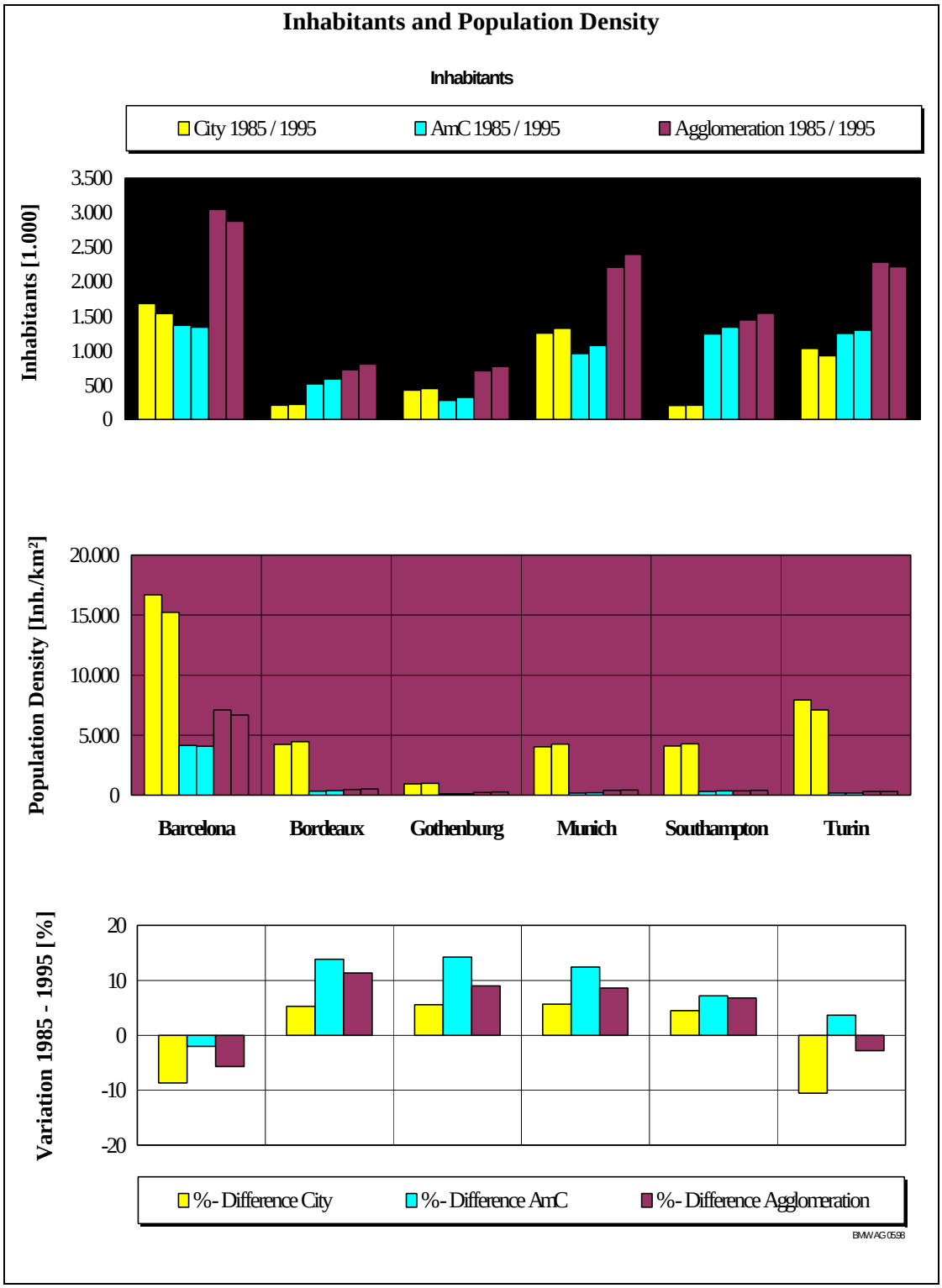


Fig. 5: Inhabitants and Population Density and their variation 1985-1995

4.3.3 Car traffic

- Car ownership has increased in the cities as well as in the agglomerations.
- The increase in car ownership is higher in the city than in the outskirts (except for Bordeaux).
- The number of cars per household is stable over the time.
- The change in GDP/Inhabitant is not an indicator for car ownership.
- The main road network density has no influence on the car ownership within the narrow range of observation.

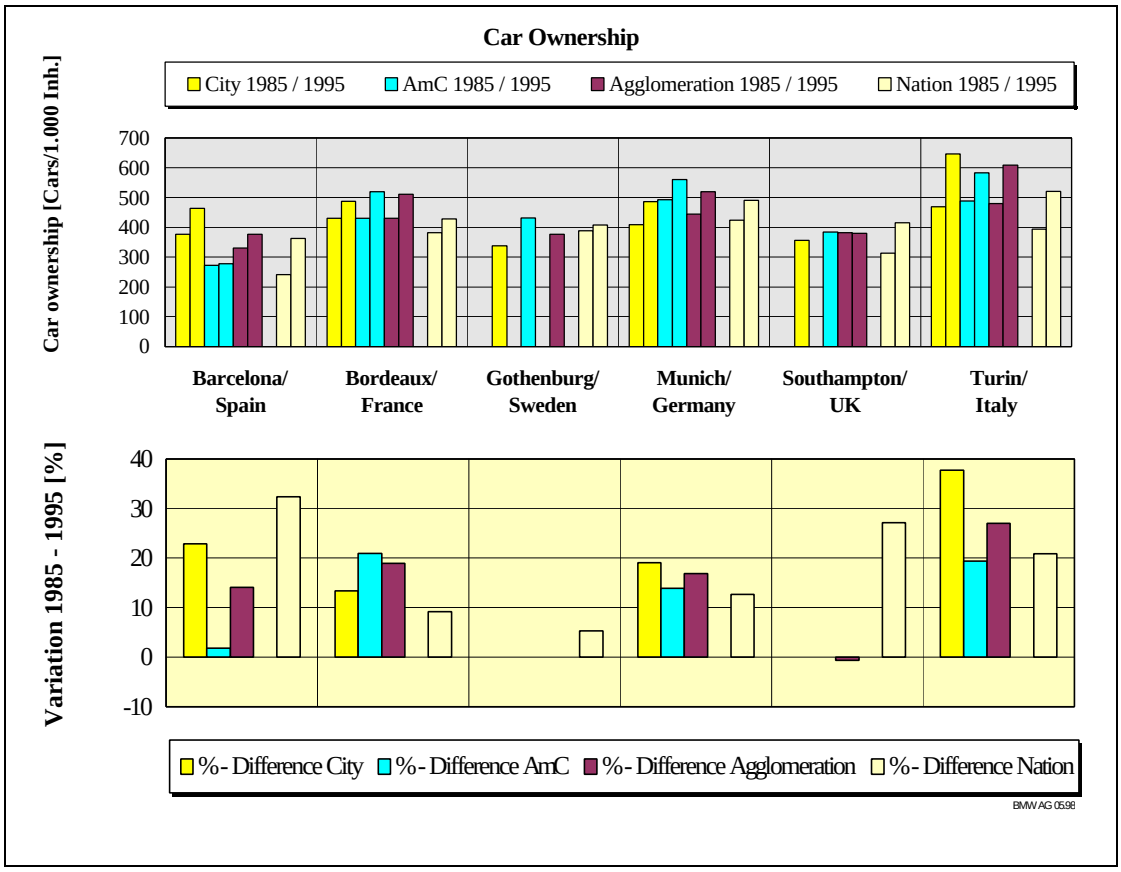


Fig. 6: Car ownership and its variation 1985-1995

4.3.4 Public Transport

- The route length network of the public transport differs depending on the existing systems.
- High densely populated cities offer a better PT-supply.
- The influence of the urban structure has a greater impact on modal split than the PT-supply.
- The level of PT-supply is more important than the technical PT-system (rail or bus) for the modal-split.

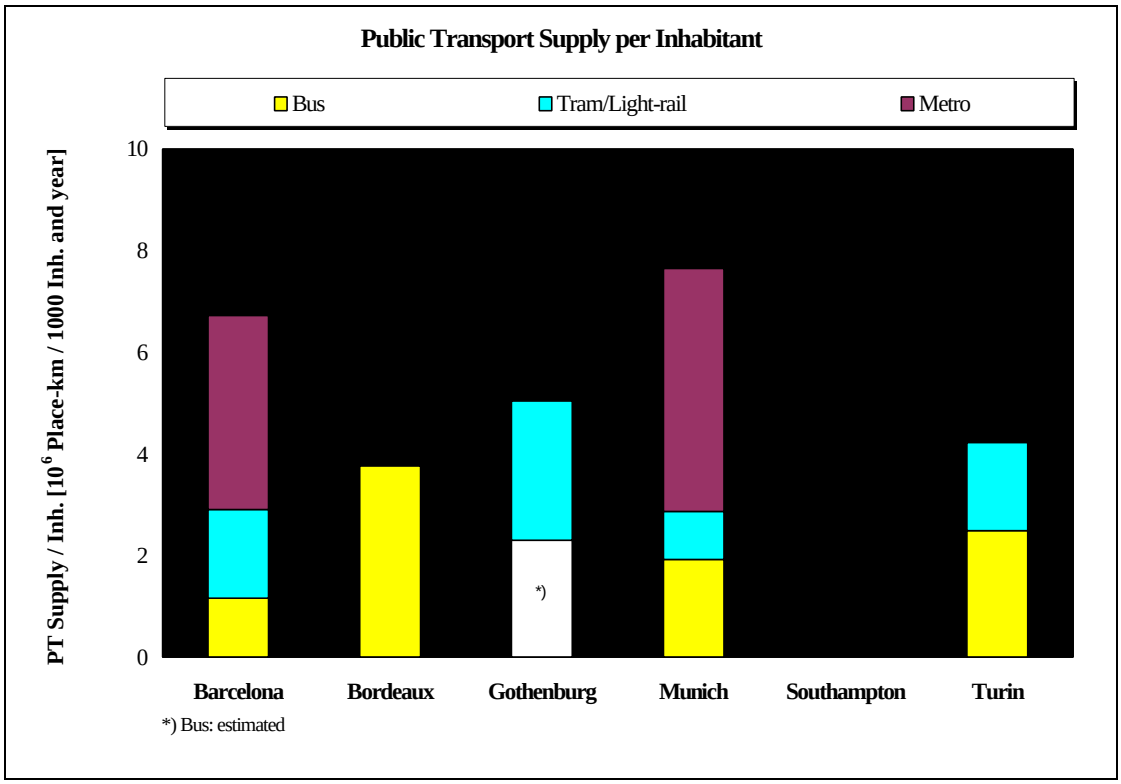


Fig. 7: Public Transport Supplier Inhabitant

4.3.5 Traffic management

- Traffic management includes measures which have a stronger effect on the local traffic situation than on the general one.
- Traffic management has no or only a slight effect on mobility behaviour and on the overall traffic situation.

4.3.6 Mobility behaviour

- High density population cities have a high proportion of pedestrian trips.
- The number of trips/inhabitant is increasing (except for Bordeaux). This is perhaps due to the increasing number of mobile seniors and the increase of leisure time.
- The average trip length is increasing. This is potentially a result of sub-urbanisation.
- The share of car usage is higher in the outskirts than in the city.
- The share of car usage is increasing for all trip purposes.

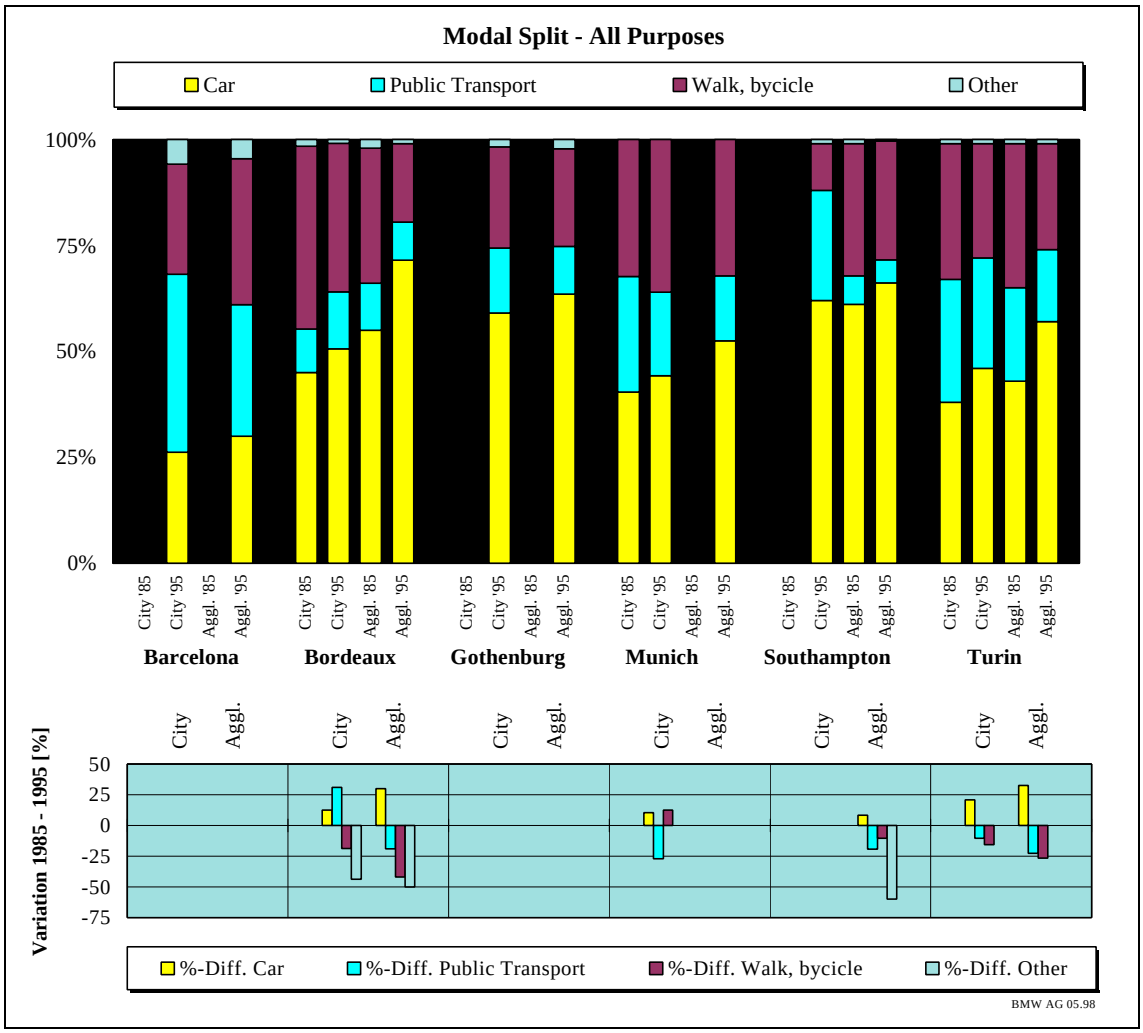


Fig. 8: Modal Split and its variation 1985-1995

4.3.7 Freight traffic

- The density of goods vehicles in regions having an important seaport is higher than in other cities.
- The vehicle density is not correlated with the economic power of a region.
- The density of freight cars outside the city borders is clearly higher that it is within the city.

4.4 The Scenarios

The **scenarios** are a core element of this research project. Based on the information from the DataBase and the InfoBase, three consistent scenarios were elaborated following a modified Batelle methodology (described below)and then applied to each of the six conurbations:

- **BAU-Scenario B**usiness **A**s **U**sual **Scenario**: the "Base Case" describing the expected trend development.

- **Alternative Scenario A**: **Spread of income levels**: Scenario A assumes a less active policy environment and divergening incomes and economic development (as in BAU).
- **Alternative Scenario B: Strong traffic demand management**: The second alternative Scenario assumes that a strong political policy will exist to organise and manage the traffic demand especially in the cities.

The scenario process was based on the Batelle-Method which[1] suggests seven steps as follows:

a) Definition of project aims and key questions.
b) Influence analysis.
c) Identification of the characteristics of each area of influence (descriptors).
d) Consistency check of descriptors.
e) Description and interpretation of the scenarios.
f) Analysis of consequences.
g) Conclusions.

The approach was slightly modified taking into account the scenario expertise of Prognos and specific characteristics of this project. These differences were very minor and served to strengthen the project outcome

The scenarios have an internal hierarchy constituted of three levels:

- the Design explains the philosophy and framework of the scenario;
- the Triggers are the lead variables / independent input parameters;
- and the Key Descriptors are the quantitative and qualitative output describing the scenario outcomes.

The following illustration shows the technical process of the scenario building:

[1] VOLKSWAGEN et al.: EUROMOS - European Road Mobility Scenarios, Technical Annex - Final Version dated 24.11.1997, p 9.

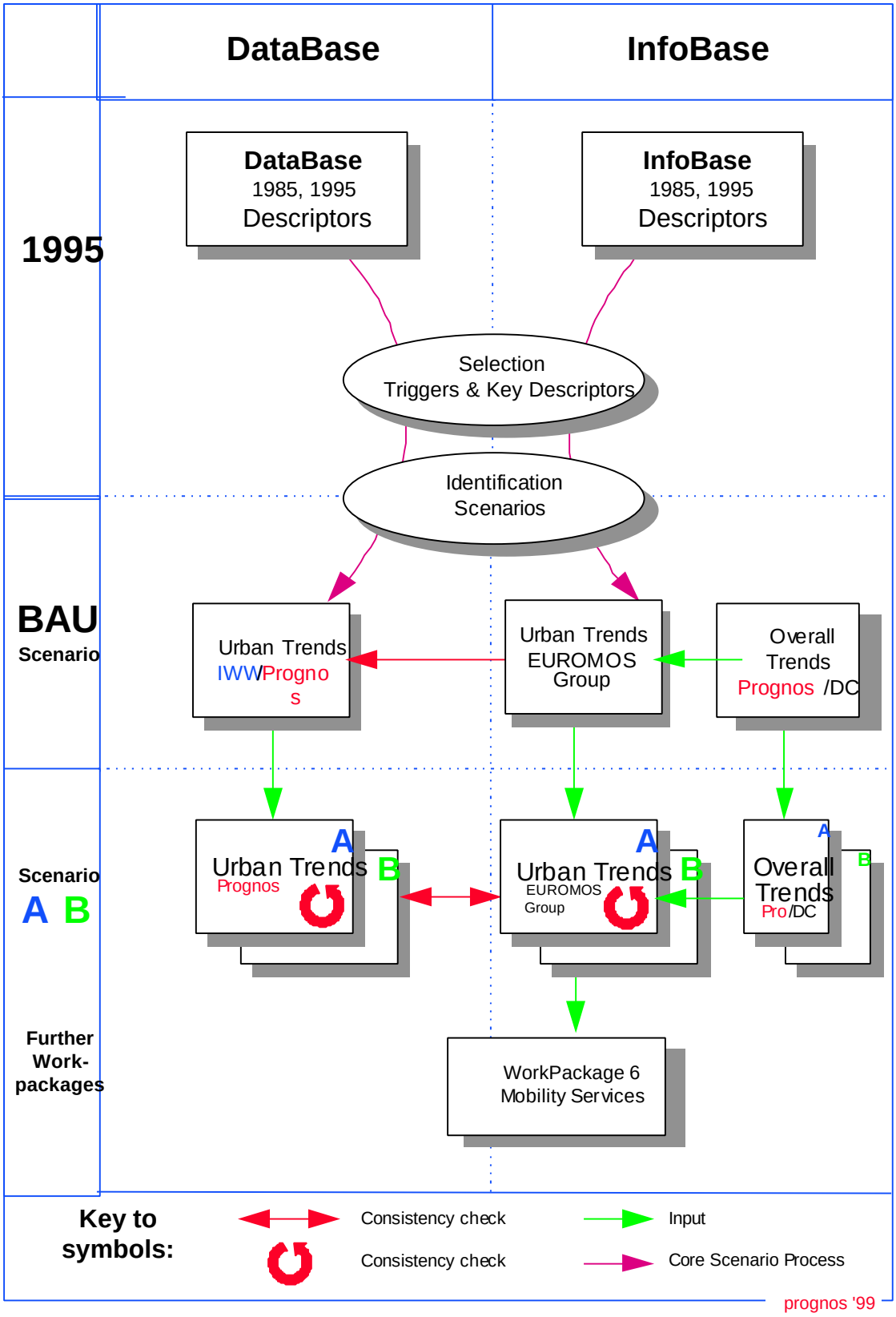


Fig. 9: The Scenario Process

It was necessary to concentrate the scenario writing on selected Triggers and Key Descriptors. A selection of 10 Triggers (5 quantitative and 5 qualitative) and 14 Key Descriptors (4 quantitative and 10 qualitative) was made from the 200 descriptors of the Data- and InfoBases used in the data analysis process. The list is as follows:

Quantitative Triggers	**Quantitative Key Descriptors**
T-1: Inhabitants	K-1: PT seat km offered
T-2: Households	K-2: Length of road network
T-3: Private consumption/inhabitant	K-3: Number of cars
T-4: Cost of fuel	K-4: Modal split - PT / Car / Non-motorised transport / Other
T-5: Average fuel consumption of cars	

Qualitative Triggers	**Qualitative Key Descriptors**
T-A: Changes in income groups	K-A: Attitude towards cars
T-B: Attitude towards mobility	K-B: Safety and security in automobiles and other forms of transport
T-C: Trend in energy availability and price	K-C: Trends in land development
T-D: General environmental politics	K-D: Changes in modal split due to political actions
T-E: Information and communication technology	K-E: Situation for non-motorised traffic
	K-F: Innovative individual transport systems
	K-G: Attractiveness of PT
	K-H: Trend in development of transport infrastructure
	K-I: Trend in work related traffic
	K-J: Importance of goods transport

Fig. 10: Developed Quantitative / Qualitative Triggers and Key Descriptors

The resulting scenarios were carefully cross-checked for consistency. The final assumptions and statements provided pictures of possible future developments. The purpose was not to define levels of probability, but to extract similar trends in mobility development that would provide a framework for assessing the potential for new services.

In order to include all relevant interrelations between the triggers and the key-descriptors, the following tables were created that show the assumed intensity of interaction:

Trigger (line) / Key Descriptor (column)	A	B	C	D	E	F	G	H	I	J
T-A Changes in income groups	++	+	++	+	-	+	-		+	+
T-B Attitude towards mobility	++	+	+	++	++	+	++	+		
T-C Trends in energy availability and price	+		+	++	+	++	+	-	+	++
T-D General environmental policies	-		+	++	++	+	++	++	-	++
T-E Information and communication technology	+	++	++			++	-	-	++	++

Fig. 11: Triggers and Key Descriptors

In the same manner, internal consistancy of the qualitative key-descriptors was checked with the following influence matrix:

	Key Descriptor	A	B	C	D	E	F	G	H	I	J
A	**Attitude towards cars**	A		+	+	+	+	**0**	+	-	
B	**Safety and security in automobiles and other forms of transport**	-	B		-	+	**0**	++			
C	**Trends in land development (multi-/mono purpose usage)**	-	+	C	+	++	+	++	++	++	+
D	**Changes in modal split due to legal or political actions**			+	D	+	++	+	+	-	
E	**Situation for non motorized traffic**		**0**	-		E		-		+	
F	**Innovative individual transport service systems / Multifunctional use of cars**	++	+	-	**0**		F	-	**0**	**0**	
G	**Attractiveness of public transport**	**0**	+	**0**	+	**0**		G	++	+	
H	**Trend in development of transport infrastructure**	+	+	++	++	+	**0**	++	H	**0**	+
I	**Trend in work related traffic**			**0**		**0**	**0**	-	+	I	
J	**Importance of goods-transport**			**0**		-	+		+		J

Lines: Driving Descriptors / Columns: Driven descriptors

Fig. 12: Key Descriptors

Similar matrices apply for the interrelations between qualitative and quantitative triggers and decriptors.

4.4.1 Qualitative Trigger assumptions for the three Scenarios

The following descriptions were selected for the three scenarios

		BAU	A	B
T-A	**Changes in income groups**	➲ Slight spread of levels	➲ STRONG spread: ➲ Winning sectors: - international business - qualified services	➲ BAU
T-B	**Attitude towards mobility** **Population**	➲ Trip length increasing ➲ Further positive attitude	Wealthy: ➲ Moving into "better" residential quarters ➲ High dependency on individual mobility Poor: ➲ Low residential mobility ➲ High dependency on commuting mobility ➲ PT and cheap cars	➲ More consciousness on mobility behaviour due to public restrictions (= local policy measures) ➲ Wealth-dependant revised attitudes towards mobility (corresponding principles to Scenario A, less obvious)
	Politics	➲ Ecological concerns interfere with traditional transport services - favorising non-mot. - transp. management	➲ Less political influence due to restrictet budget and other political priorities ➲ Incentives for private engagement in mobility services ➲ Low importance of public urban planning	Strong political engagement: ➲ Optimisation of traffic demand+supply conditions ➲ Ecological restraints to preserve living conditions ➲ Fundraising for state budget ➲ Increase of CBD attractivity
T-C	**Trends in energy availability and price**	➲ Oil readily available ➲ No increase in raw material price ➲ Alternative energies being tested & introduced, but no major market shares 2010	➲ Same as BAU ➲ Prices will go down, no environmental tax	➲ Increased energy taxes due to stronger political action ➲ Environmental concerns leading to increased taxation? ➲ Energy shortage?
T-D	**General environmental politic**	Increased political activities for environment protection ➲ Climate (Ozone, CO2) ➲ Waste management ➲ Air pollutants issue seems solved in Europa ➲ Harmonisation of national environment policies in Europa ➲ Harmonisation of nat'l environment policies within Europa (taxes, standards)	➲ Reduced political ambitions, but similar issues as BAU ➲ Less iniciative, more reactive policies ➲ Retarded transposition of common international standards ➲ "nationalism"	➲ Increased intensity of political aims ➲ No direct relation between general environmental policies and local measures
T-E	**Information and communication technology**	Strong penetration of i&c technology ➲ Telebanking, teleshopping ➲ Internet access ➲ Modular phoning ➲ Security and misuse aspects can delay development but do not stall it ➲ Health problems (e.G. GSM Mobile phone and brain damage) will be solved somehow	Even stronger penetration ➲ Stronger usage – cheaper services and products ➲ Wider range between high sophisticated and cheaper products/services ➲ Increase of teleworking (for second jobs etc.) ➲ Security and misuse aspects can delay development but do not stall it	Even stronger penetration ➲ Increased telecommunication demand due to traffic management usage ➲ Increased demand to compensate avoided mobility

Fig. 13: Selected descriptors for scenarios

4.4.2 Business-as-usual Scenario (BAU)

The Business-as-usual Scenario (BAU-Scenario) describes the 2010 situation, as it could be expected under "normal" conditions, which are the evolving future developments taking into account experiences and observations of the past. So this BAU-Scenario is no rigid Status-quo-Scenario, which predicts the future e.g. under todays socio-economic situation but it allows an active creativity. This creativity, however, is based on the foreseeable frame-conditions, not on extraordinary developments.

A: Attitude towards cars

- Positive attitude towards cars (cleaner cars, new vehicle technology)
- Environmental concerns will be reduced (cleaner cars)
- Quality of PT is still behind the individual transport means
- Innovative concepts of car-usage will have piloting role for further improvement of image (despite still low market shares)
- Positive image driven by vehicle-technology, telematics and utilisation-models, not by road infrastructure growth/technology

B: Safety and security in automobiles and other forms of transport

- High concern to improve security standards in PT
- Car-Safety: need for theft-protection / for avoiding misuse leading to new locking-technologies
- Road-safety: continuing trend of vehicle-improvements, road-redesign only at selected points
- Security: suitable measures will be taken only in few cities

C: Trends in land development

- Multi-purpose usage in the cities, mono-purpose usage in the outskirts
- Residence shifting to the surrounding areas
- Urban renewal (relocation of residents, attractive city centre)
- Intensive traffic flows between concentrated inner city and disperse outer areas, as well as increasing tangential flows between outer areas

D: Changes in modal split due to political actions

- Urban transport policy aims to reduce individual motorised mobility in CBD
- Expansion and improvement of PT is one main political action
- Trend to integrated transport planning
- Some restrictive measures like limited access to city-centres

E: Situation for non-motorised traffic

- Increasing positive perception
- Urban transport policy supports improvements for walking

- Volume of trips limited because of increasing trip length; regional concentration in central areas (including peripheral centres)
- Continuing competition with short-distance-car-use in peripheral areas due to positive conditions for cars

F: Innovative individual transport service systems / multifunctional use of cars

- Private car ownership remains normal case of car accessibility
- Spread of car types: more mono-purpose cars (in more-car-households), more multifunctional cars (especially for smaller households)
- Only very few - if any - track infrastructure being provided for new traffic systems

G: Attractiveness of public transport

- Great effort to make PT more attractive, mainly on sections with high demand
- Increasing difficulty to attract PT passengers due to dispersing residential and industrial structures outside city centres
- Depends on the integration in an overall urban transport system
- Improved PT systems based on new technical features (info system, security, ...)

H: Trend in development of transport infrastructure

- Dominantly maintenance and improvements for road
- Continuing extension of railbound PT systems
- New roads will be only constructed to relieve bottlenecks (with regional differences in amount)
- Private financed development of transport infrastructure and operations

I: Trend in work related traffic

- Stable volume, but more distribution over time and space
- Private car remains the most important mean of transport in the suburban areas
- New organisation systems (car pooling) will be seldom

J: Importance of goods transport

- Growing demand and restrictions regarding delivery time in CBDs
- Increasing truck traffic due to economic growth and spatial development
- Increasing technical and organisational requirements (cost-pressure, ecological restraints)

4.4.3 Alternative Scenario A "Spread of income levels"

Reasons

- Economic globalisation
- Risks for European national economies:

  - Economic and political interdependence of European countries
  - New locations and increasing availability and density of information force enterprises to react quickly to new market conditions

➔ Increasing unemployment

  - Shift of industrial production to „cheep-wage-countries“
  - Decline of labour-intensive production plants

- Rising demand for highly specialised staff
- Immigration of economic refugees
- Increasing share of income out of capital holdings

Direct consequences

- Increasing dependence on income support
- Increasing public expenditure because of distribution of social security contributions among more people
- „Softening“ of wage scale systems
  - Increasing part of wage/salary depending on success
  - Wagedumping, especially with employees from third countries
- Increasing importance of second jobs
- Change in consumerism
  - Increasing luxurious lifestyle among high-income groups
  - Rising amount of available income needed to pay for daily needs among low income groups
- Creation of new population strata
- Latent crime potential due to high gap between incomes

A: Attitude towards cars

- Generally stronger positive attitude:
  - Car indispensable amongst wealthy population
  - Car remains status symbol for poor people
  - Affordable cars essential for low-income groups to reach working-places
  - Regional spread of traffic flows reduces some peak-traffic-jams
- Quality advantage of car against PT increased because of lower public commitment / investment
- Innovative concepts for car usage aimed at specific social / income groups (including ”affordable” models for the less wealthy)

B: Safety and security in automobiles and other forms of transport

- PT security is stronger issue but is threatened by lower public investment
- Wider range of car-security systems & services according to social level / specific requirements (possibly cheap-but-effective systems for low-income cars?)

- Road safety: Continuing trend of vehicle improvements (same as BAU); road redesign only at very selected publicly maintained reads (see Descriptor H)
- Security-control on PT and on roads will be partially transferred to private services (policy withdrawal)

C: Trends in land development (multi-/mono purpose usage)

- Stronger local separation of usage-purposes (residential separation according to social status), also organisation of shopping and activity-centres according to income-groups
- No general trend in urban development but specific structures according to social status, private investment oriented on specific groups
- More disperse traffic flows caused by complicated pattern of "better" and "cheaper" residential areas, shopping centres etc., effect increased by positive perception of individual cars

D: Changes in modal split due to legal or political actions

- Less political interference in order to change modal split (also in CBD) leading to increasing usage of individual transport
- Difficult situation for public transport due to lower public subsidies / investments, because of critical security situation and due to growing separation between social groups (= difficult user-structures)
- Trend to isolated measures in transport issues
  - less public investment
  - less wishes for integrated systems "for everyone"
  - private investments aimed at special groups (e.g. for their ”specific integrated systems”)

E: Situation for non-motorised traffic

- No improvement in perception, especially because of security aspects
- Lack of integrated transport policy
- Even more increasing trip-lengths (against BAU) give further obstacles to NMT
- Competition with short-distance-car usage in wealthier suburbs

F: Innovative individual transport service systems / Multifunctional use of cars

- Conventional private car still dominating
- Stronger spread of car types according to income levels, e.g.:
  - mono-purpose luxury cars
  - cheap multi-purpose cars
- Improved conditions for several types of car sharing systems, e.g.:
  - luxury and leisure services
  - efficient, cheap provision of mobility

- Introduction of entirely new traffic systems limited to private financed (like shopping centres, ...) or PPP-projects

G: Attractiveness of public transport

- Reduced public subsidy / investment significantly slows or stops PT network expansion. Minor efforts to make PT more attractive, mainly on sections with urgent need for improvement or very high demand.
- Security issue being a major obstacle for PT usage, initiating vicious circle in reducing PT demand (especially amongst women or wealthier people). Possibly to be handled in Public-private-partnerships wherever both sides find their benefits
- Urban spatial development is detrimental for PT-user structures
- Segregation of urban transport into different sub-systems for social classes threatens conventional PT ”for everybody”
- New technical features will only be partially introduced into PT due to financial shortages (Special focus will be on security features and on features/systems reducing operational cost)

H: Trend in development of transport infrastructure

- Regional quality of road maintenance dominated by interests (and financial contributions) of certain income groups; deterioration on other network elements; improvements possible in private-investment-areas
- Private investment into transport infrastructure only at selected (highly profitable or of-special-interest) sections
- Reduced extension of PT-rail systems (only particular lines, profitable or of special interest)

I: Trend in work related traffic

- Possibly some substitution of traffic by teleworking (for ”second jobs” if possible - due to limited ”individual daily travel-time” budget)
- Increasing total traffic performance due to longer trips
- Dominance of private car increasing
- New organisation systems for commuter traffic will emerge where efficient, especially for those who cannot afford own cars

J: Importance of goods transport

- Freight performance increasing due to stronger spatial development and social segregation
- Further dispersion of freight / delivery destinations
- Increased efficiency of freight operators due to intensive use of telecommunication
- Some additional distribution/home-delivery traffic replacing lengthy footwalks of elderly or within insecure areas and because of growth in teleshopping

4.4.4 Alternative Scenario B: "Strong traffic demand management"

Reasons

- Ecological reasons:
  - Distinct environmental pollution in cities / agglomerations (air pollution, noise)
  - Distinct global climate changes
- Deficit in state budget: Taxes or similar charges on different forms of traffic to balance the budget
- Protection of inhabitants
  - Reduce of noise pollution
  - Increase safety on the road
- Overcharge of traffic infrastructure in cities, conurbations
  - Traffic jams
  - No parking places

Different forms of demand management

- Road pricing
- Different forms of regulated access
  - To achieve a better use of transport infrastructure
  - To a whole city or region, to parts of a city
- Restricted access areas
  - To protect inhabitants (safety, noise), compare above
- Control of fuel consumption
  - Higher fuel taxes
  - Tradable licenses
- Control of selling cars
- Traffic management system (traffic cameras, car communication systems)

Direct consequences

- Decrease of motorised individual traffic in cities and agglomerations
- Increase of public transport and non motorised traffic
- Improvement of environmental quality in cities and conurbations
- Specific consequences of particular measures
  - Higher financial burden of low-income groups by higher fuel prices
  - Improvement of the quality of life for inhabitants in areas with restricted access

A: Attitude towards cars

- Attitude towards cars is ambivalent: generally people keep a positive attitude but are well aware of negative impacts (energy, space)
- Very low emission levels

- Attitude towards cars is less linked to the quality standards of PT
- Innovative concepts of car-usage will have piloting role for further improvement of image (despite still low market shares)
- Positive image driven by vehicle-technology, telematics and utilisation-models, not by road infrastructure growth/technology

B: Safety and security in automobiles and other forms of transport

- High concern to improve security standards in PT (same as BAU)
- Car-safety: Need for theft-protection / for avoiding misuse leading to new locking-technologies (same as BAU)
- Road-safety: continuing trend of vehicle-improvements; road redesign only at selected points (same as BAU)
- Security: Suitable measures will be taken only in few cities (same as BAU)

C: Trends in land development (multi-/ mono purpose usage)

- Multi-purpose usage in the cities, mono purpose usage in the outskirts (same as BAU)
- Residence shifting to the surrounding areas (almost no difference to process in BAU, but additional reasons for car users to leave CBD)
- Urban renewal (same as BAU)
- Some reduction in traffic flows to the CBD, but more intensive tangential flows between outer areas (changed destinations due to TDM)

D: Changes in modal split due to legal or political actions

- Urban transport policy strongly aims to reduce individual motorised mobility in CBD
- Expansion and improvement of PT is part of an integrated urban master plan - but sometimes limited by financial capacities
- Oscillating transport policy (trial and error regarding TDM and structural effects in CBD)
- Massive experiences in managing transport demand in the CBD. Political interference aims of making traffic more efficient by TDM

E: Situation for non-motorised traffic

- Higher positive perception than in BAU
- Urban transport policy improves conditions for non-motorised traffic
- Volume of non-motorised trips (on short distances) will increase because of partially reduced trip-lengths (especially inside CBD)
- Improved competition against car use and PT use leading to increased number of non-motorised trips

F: Innovative individual transport service systems / Multifunctional use of cars

- Private car ownership remains normal case of car ownership except areas under strong traffic management (parking restrictions)
- Retarded growth of car stock leading to higher share of multifunctional cars
- Introduction of new car-usage concepts stays slow. Increased traffic cost generally does not hit the possession level but only restricts frequent usage of cars (different from Scenario A where parts of population loose ability to possess cars), exception to this may be the permission to enter CBD
- Infrastructure for new individual traffic systems will be created only by conversion or removal of existing roads (Even less construction of new infrastructures for individual means-of-traffic against BAU)

G: Attractiveness of public transport

- Some key-investment in favour of PT, mainly in TDM areas (but generally no more investment)
- PT must fight for keeping passengers outside of TDM areas in competition to other means-of-transport
- Attractiveness of PT depends on the integration in an overall urban transport system (same as BAU)
- Technical features provide much more advantages for PT (due to increased use of telematics)
- Some modal changes towards non-motorised traffic on short distances due to better NMT environment

H: Trend in development of transport infrastructure

- Redesign of some roads in TDM areas (physical guidance systems, barriers)
- Continuing extension of railbound PT systems - but sometimes limited by financial capacities (similar to BAU)
- New roads will only be constructed to relieve most urgent bottlenecks outside TDM areas (with regional differences in amount)
- Improved infrastructure for non-motorised traffic, esp. in and around TDM areas
- Lower degree of privately financed infrastructure (TDM masterplan limits the engagement / possible financial returns of private ?)

I: Trend in work related traffic

- Reduced volume of physical traffic by private cars in central areas due to TDM-caused teleworking, more distribution over time and space
- Private car remains the most important mean of transport in the suburban areas (same as BAU)
- Some new systems will be introduced in the TDM areas (specific cars allowed to enter restricted areas due to utilisation-model / powering)

J: Importance of goods transport

- Constant demand but more restrictions regarding access times and conditions in TDM-areas
- Truck traffic affected by higher energy costs (but no major changes due to few alternatives)
- New delivery and organisational systems in goods transport complying to TDM restrictions (railbound delivery?)
- Additional home-delivery traffic in TDM areas because of restrictions on private motorised traffic, no replacement of shopping footwalks there

4.4.5 Urban Outlook: Barcelona

Barcelona: Scenario A

In Barcelona the high qualified and internationally experienced people will profit under conditions of Scenario A. Salaries for management jobs will rise. For the low qualified it will get worse to get a job. The jobless rate will increase in the greater Barcelona area. There will be more short term contracts with flexible terms of payment for less qualified functions, these jobs will have less social guarantees. Especially families with medium and low income will be affected negatively. Also immigrants, who will come from southern Spain and northern Africa will live in difficult conditions.

Due to high flat ownership the settlement structure will be only slightly affected. Nevertheless there will be consequences for the development of the area: especially the suburban area, where economic and social developments are more dynamic and less stable, will face negative impacts. There will also be a high concentration of disadvantaged people. The city will be predominantly a place for working, not for living due to high costs of flats.

The public expenditure will be lower due to less revenues from taxes. The government will concentrate it's activities on some core tasks: social peace, economic development.

Barcelona: Scenario B

In Barcelona measures to manage traffic demand will have many reasons concerning all modes of traffic. The road network will have capacity problems leading to more congestion. Other reasons will be the air pollution and the noise, which affects the inhabitants as well as safety problems. Last but not least it will be necessary to save the attractivity of the city with it's commercial, residential and touristical relevance.

The most probable measures to manage traffic demand in Barcelona will be on the one hand restrictions for private traffic like parking management and control in the city, access restrictions in the city and road pricing on the regional motorways. On the other hand there will be measures to improve Public Transport (Extension of LTR, PT-Priorities, improvement of PT-service). These measures will be taken especially to regulate the

private car and motorbike traffic as well as delivery traffic and freight traffic serving the harbour.

The aim of a shift of traffic to Non-motorised traffic, especially in the city will be achieved, also there will be an increasing number of non-motorised trips for short distances. But with the exception of a shift of some commuting traffic from car to PT there will be no effects on traffic in the suburban area.

Barcelona: Quantitative Part

Categories	Dimension	**BAU**	**Scenario A**		**Scenario B**	
				% to BAU		% to BAU
Triggers						
Inhabitants	‘000	1’440.0	1’468.8	2.0 %	1’404.0	-2.5 %
Households	‘000	645.5	651.4	-0.5 %	657.9	0.5 %
Private Cons./Inh.	‘000 $(90)	11.70	11.35	-2.9 %	12.3	5.2 %
Cost of fuel	$(90)/l	0.85	0.79	-7.5 %	0.98	15.0 %
Average car cons.	l/100 km	7.00	7.21	3.0 %	6.48	-7.5 %
Key Descriptors						
PT seat km offered	bn seat-km	21’768	20’214	-7.1 %	23’618	8.5 %
Length of road netw.	km	4’124	4’185	1.5 %	4’104	-0.5 %
Number of cars	‘000	815’430	835’796	2.5 %	811’437	-2.0 %
Modal Split	% of trips	100.0 %	100.0 %		100.0 %	
Car	%	24.0 %	25.5 %	6.3 %	21.5 %	-10.4 %
PT	%	44.5 %	42.0 %	-5.6 %	45.5 %	2.2 %
NMT	%	25.0 %	25.5 %	2.0 %	26.0 %	4.0 %
Other	%	6.5 %	7.0 %	7.7 %	7.0 5	7.7 %

Fig. 14: Quantitative Triggers and Key Descriptors for Barcelona

4.4.6 Urban Outlook: Bordeaux

Bordeaux: Scenario A

In Bordeaux the sectors linked to the international trade (wine, aeronautics industry) and to high level tourism will profit most. Also personnel services will benefit due to stronger demand by high level income groups. An important factor will be the education. The more educated people will profit under conditions of Scenario A. Also the capital owners in the more labour intensive sector will profit from this situation. Low educated young people and elder people will be affected negatively.

However, the unemployment under young people will be reduced due to the mentioned stronger demand for personnel services. But the wages in this sector will decrease. In general it is more realistic, that the state maintains a social policy to protect the incomes of the poor people more or less.

Regarding settlement structure there will be some problems in the inner city and the near suburbs, where the lower income people will live. So in this regions the town budget will be mostly dedicated to rehabilitate social housing. Middle class will move in the outskirts or further away from the city.

Bordeaux: Scenario B

In Bordeaux, one main reason for measures to manage traffic demand will be fuel restrictions due to a renewal of the OPEC-threads beginning 2015. Other reasons will be local environmental problems like noise and air-pollution. Bordeaux will fear to lose its attractivity without measures to manage traffic demand. So the main object of this scenario will be to contain the increase of the mean distance per individual trip (km/trip) and the transport energy consumption.

The most probable measures will be restrictions and regulations for car traffic like parking management, road taxes and drastic speed limitations as well as improvements for the other modes of transport (bicycle lanes, extension of PT network etc.). These measures will be framed by some other regulations to densify the suburbs and create a „town of short trips“: To encourage the proximity between home and work there will be a tax relief on residential property. Also there will be a new land property policy to densify the new urban centres of attraction.

The effects will be a significant increase in the use of PT because of better quality, also an increase of the non motorised mobility in the inner city and little urban centres around the city because of bicycle lanes, park&ride places. Due to the densification of the suburbs, the modal share of PT and non-motorised traffic will rise and the increase of the mean distance per trip will be stopped.

Bordeaux: Quantitative Part

Categories	Dimension	**BAU**	**Scenario A**		**Scenario B**	
				% to BAU		% to BAU
Trigger						
Inhabitants	‘000	230.0	241.5	5.0 %	223.1	-3.0 %
Households	‘000	117.9	116.3	-1.4 %	117.9	0.0 %
Private Cons./Inh.	‘000 $(90)	16.8	15.0	-10.8 %	17.5	4.1 %
Cost of fuel	$(90)/l	1.00	0.98	-2.5 %	1.13	12.5 %
Average car cons.	l/100 km	7.20	7.42	3.0 %	6.84	-5.0 %
Key Descriptors						
PT seat km offered	bn seat-km	3'471	3'295	-1.3 %	3'712	9.0 %
Length of road netw.	km	4’626	4’770	3.1 %	4'274	-7.6 %
Number of cars	‘000	122'000	123'289	1.1 %	118'340	-3.0 %
Modal Split	% of trips	100.0 %	100.0 %		100.0 %	
Car	%	48.0 %	49,0 %	2.1 %	44.5 %	-7.3 %
PT	%	17.0 %	15.5 %	-8.8 %	19.5 %	14.7 %
NMT	%	34.0 %	34.5 %	1.5 %	35.3 %	3.7 %
Other	%	1.0 %	1.0 %	0.0 %	0.7 %	-25.0 %

Fig. 15: Quantitative Triggers and Key Descriptors for Bordeaux

4.4.7 Urban Outlook: Göteborg

Göteborg: Scenario A

The sectors of the local and regional economy of Gothenburg will react on the circumstances of Scenario A as it is shown in the following table:

Strong increase	- electronic and pharmaceutical industries - commercial services - computer services - telecommunication/information services
Increase	- small private service companies - shopping and sales business
Stable	- small industrial business - building and construction industry
Decrease	- large industrial factories - public social services, public administration

This situation will generally lead to greater differences in the wage scale system. Regarding the social classes the structure of three main parts is further emphasised: The upper middle class, those educated people with advanced jobs will profit, because the request for high-qualified employees (e.g. computer engineers) will rise. The second main class is the lower middle class of the poorly educated people with simple jobs (e.g. private service sector). The last main class contains the people who are more or less outside the job market as well as outside the intellectual part of society. For them it will continue to be a big problem to find a job because of a low level of education. The unemployment rate will increase slightly.

Regarding the settlement structure, the difference between „good“ and „bad“ areas will increase.

Göteborg: Scenario B

The main reason for traffic demand management in Gothenburg will be negative external effects by car traffic in terms of safety, pollution, CO2 and barrier effects. In contrast to some other cities, congestion will not be not a big issue. Another aim of traffic demand management will be to raise funding to state budget.

There will be different measures taken to achieve these goals: On the one hand the costs of car usage will increase, e.g. due to road pricing. On the other hand the PT system will be extended in network and service. Also the situation for the non-motorised traffic will become better because inner city streets will be converted into streets with priority for pedestrians. Parking management will be an issue too. This policy is in line with national policies, there are no differences between the local and national level.

The result of these measures could be summarised as a „decreased increase“. In the inner city the traffic levels will be sustained or lowered, outside they may have an slight increase. Due to TDM-measures in Gothenburg business trips and road freight transport will be rationalised and highly efficient due to high costs. In the private sector low income

commuters will be affected most. Rail transport will be promoted strongly but will still face big problems to carry the infrastructure costs.

Göteborg: Quantitative Part

Categories	Dimension	BAU	Scenario A		Scenario B	
				% to BAU		% to BAU
Trigger						
Inhabitants	‘000	459.0	481.9	5.0 %	459.0	0.0 %
Households	‘000	229.5	236.3	2.9 %	241.6	5.3 %
Private Cons./Inh.	‘000 $(90)	17.1	16.6	-2.9 %	17.7	3.2 %
Cost of fuel	$(90)/l	1.00	1.00	0.0 %	1.17	17.0 %
Average car cons.	l/100 km	8.95	7.16	-20.0 %	6.71	-25.0 %
Key Descriptors						
PT seat km offered	bn seat-km	2'124	2'158	1.6 %	2'993	40.9 %
Length of road netw.	km	1'528	1'558	1.9 %	1'524	-0.3 %
Number of cars	‘000	195'000	202'743	4.0 %	184'737	-5.3 %
Modal Split	% of trips	100.0 %	100.0 %		100.0 %	
Car	%	60.0 %	61.0 %	1.7 %	47.5 %	-20.8 %
PT	%	16.0 %	15.0 %	-6.3 %	24.0 %	50.0 %
NMT	%	21.0 %	21.5 %	2.4 %	27.0 %	28.6 %
Other	%	3.0 %	2.5 %	-16.7 %	1.5 %	-50.0 %

Fig. 16: Quantitative Triggers and Key Descriptors for Göteborg

4.4.8 Urban Outlook: München

München: Scenario A

The consequences of the circumstances of Scenario A for Munich for the different sectors are shown in the following table.

Sector	Develop-ment	Reasons
Agriculture	-	Biotechnology, high-tech farms
Industry	+	Increase especially in the agglomeration, less in the city. Reduction of personnel cost which results in competitive products, production of mass-produced articles
Building	-	Decrease due to lack of demand (greater households and smaller apartments), lack of available government investments
Services	++	Two service classes: the official services due to privatisation of public authorities and industry, an a second „grey“ market of services by unemployed or „self-acting“ people offering their intelligence and force to private people
Social services (medicine, care, welfare)	+	Two groups of social services: the public social service to guarantee a basic medical supply. Supplementary medical supply only for people with private insurance
Administration services	-	Reduction of personnel because of privatisation of public tasks. No strong reduction because of the influence of syndicates and socialist parties

Fig. 17: Consequences for economic sectors in Munich as results of Scenario A

As a consequence the wage scale system will spread: On the one side the salaries for the top management will increase. On the other side the wage scale system may be opened to lower salaries (low salary jobs). Especially foreigners from developing countries will work in low cost jobs, while people from Europe and the US will work in management jobs. The share of foreigners in the City, especially from the east and the GUS-countries will increase. The unemployment will be focused on two groups: young people with insufficient education as well as elder people after having lost their jobs. To deal with this situation more people will work honorary or self-acting. Also there will be an increase of people with more than one job.

There will be big effects on settlement structure because of the spread of income levels: „rich" and „poor" people will have their own closed quarters, own shopping facilities, own education and leisure centres. There will be large distances between the quarters. In contrast to other German cities Munich will remain a city of „rich" people. People will change the quarters especially by car due to security-reasons. Inside the quarters walking will be the common transport mode. The city centre will change into a tourist centre.

Public expenditure will decrease strongly because of reduced tax incomes due to lower salaries, high unemployment etc. As a consequence medical care and infrastructure measures will be reduced.

München: Scenario B

In Munich there are three main aims for traffic demand management. The first is to reduce the car usage and shift it to PT or non-motorised traffic, the second is to reduce the traffic impact of the remaining cars, and the third is to increase the road traffic safety. So the affected segments of traffic demand are the motorised private car traffic and the freight and delivery traffic.

The measures which will be taken especially in the inner city areas of Munich are parking restrictions (partially 24h, partially day-time), spatial and time related access limitations and traffic information. This policy will start soon, but it will take 10 to 20 years for fully equipping the road network and the combinations of the several measures. Only in case of strong budget problems they will be cancelled, but there will be a high refinancing by taxes and fees.

As a result the car traffic will shift to other roads, destinations and time slices. The aim of a shift to Public Transport or to Non-motorised transport will be achieved only partly.

München: Quantitative Part

Categories	Dimension	BAU	Scenario A		Scenario B	
				% to BAU		% to BAU
Trigger						
Inhabitants	‘000	1'350.0	1'370.3	1.5 %	1'336.5	-1.0 %
Households	‘000	760.0	761.5	0.2 %	763.9	0.5 %
Private Cons./Inh.	‘000 $(90)	16.7	16.4	-2.3 %	17.2	3.0 %
Cost of fuel	$(90)/l	0.87	0.89	2.5 %	1.00	15.0 %
Average car cons.	l/100 km	8.50	8.08	-5.0 %	7.65	-10.0 %
Key Descriptors						
PT seat km offered	bn seat-km	7'675	7'511	-2.1 %	7'771	1.2 %
Length of road netw.	km	2'531	2'637	4.2 %	2'338	-7.6 %
Number of cars	‘000	810'000	844'063	4.2 %	785'618	-3.0 %
Modal Split	% of trips	100.0 %	100.0 %		100.0 %	
Car	%	45.7 %	47.8 %	4.6 %	43.5 %	-4.8 %
PT	%	22.0 %	20.5 %	-6.8 %	24.0 %	9.1 %
NMT	%	32.2 %	31.6 %	-1.9 %	32.4 %	0.6 %
Other	%	0.1 %	0.1 %	0.0 %	0.1 %	0.0 %

Fig. 18: Quantitative Triggers and Key Descriptors for Munich

4.4.9 Urban Outlook: Southampton

Southampton: Scenario A

Under conditions of Scenario A the whole area will be negatively affected on average because proportionally, there are not many jobs that are high skilled. Though unemployment will probably remain the same, the problem is that the wage structure for the jobs available might decline.

Regarding social classes, only highly educated will continue to profit as demand for their skills remains high and wages as well. Also wealth people continue to hold the majority of the wealth. The lower 40 % of households will likely see a decrease in income in real terms after housing costs are accounted for. There will also be a rising number of woman as head of households with children, who will continue to be in the lower income levels. The rate of foreigners is and will be low in Southampton with no major change against the BAU-Scenario.

As a consequence for the settlement structure the higher incomes will live in greener areas on the border of the city or outside of it while lower incomes concentrate in particular areas around the CBD. To act against this development, planning policy will put an emphasis on urban renewal and mixed use areas. Regarding the development of public expenditure there will be no major change although tax revenues will decrease because wages for a large portion of the population stagnate.

Southampton: Scenario B

Within Southampton, traffic is moderate and there is no reason other than revenue generation to implement strong demand management, although there are some road stretches between Southampton and the surrounding communities, which could become overburdened. But nevertheless the measures will be similar to other cities: A plan of "carrot and stick" will try to discourage private car use and improve PT to make it more attractive. To regulate car traffic there will be parking space management and tolling on some type of the motorways. And there will be measures to improve the system of public transport like bus priority traffic signals, bus only lanes and an increased co-ordination between bus, ferry, and trains. Also there will be an improvement cycle routes and situation for walking.

At the local level, car use during peek hours will be the greatest concern for both commuting and taking children to and from school. But these measures will not have major effects. It is unlikely that private car use will decrease, in fact it may increase due to increase in working women and more older people with driving licenses. The Public transport might be able to stop its decline. Finally it is possible that some very local issues such as reducing school runs by car, walking to shopping etc. may be achieved.

Most actions will occur at the local or county level except for tolling, fuel taxes, or taxation of privately owned business parking. The new national policy will primarily reinforce existing local policy and will not significantly change activities at the local level. And it is to be taken into account, that political backlash in the UK can be severe, so it is unlikely that any government will implement widely any radical or unpopular measures.

Southampton: Quantitative Part

Categories	Dimension	**BAU**	**Scenario A**		**Scenario B**	
				% to BAU		% to BAU
Trigger						
Inhabitants	‘000	205.4	219.8	7.0 %	210.5	2.5 %
Households	‘000	91.3	92.1	0.9 %	93.6	2.5 %
Private Cons./Inh.	‘000 $(90)	15.91	13.5	-15.1 %	16.2	2.0 %
Cost of fuel	$(90)/l	0.96	0.96	0.0 %	1.06	10.0 %
Average car cons.	l/100 km	8.80	8.10	-8.0 %	8.71	-1.0 %
Key Descriptors						
PT seat km offered	bn seat-km	0.643	0.575	-10.5 %	0.702	9.2 %
Length of road netw.	km	600	606	0.9 %	580	-3.4 %
Number of cars	‘000	80'520	84'531	5.0 %	80'912	0.5 %
Modal Split	% of trips	100.0 %	100.0 %		100.0 %	
Car	%	65.0 %	67.0 %	3.1 %	64.0 %	-1.5 %
PT	%	21.0 %	19.0 %	-9.5 %	24.5 %	16.7 %
NMT	%	12.0 %	13.0 %	8.3 %	11.0 %	-8.3 %
Other	%	2.0 %	1.0 %	-50.0 %	0.5 %	-75.0 %

Fig. 19: Quantitative Triggers and Key Descriptors for Southampton

4.4.10 Urban Outlook: Torino

Torino: Scenario A

In Torino, the "winning sectors" in local and regional economy in Scenario A will be telecommunications and services in general (for administration, for industries and social services). Large industrial factories and small commercial services will be affected negatively. The consequences of this development for the wage scale system will lead to more social contrasts and violence but they won't lead to relevant differences regarding mobility demand.

The circumstances of Scenario A will affect all levels of income, either in a negative or in a positive way. People working in services producing high added values will profit because of their specialisation. Also people with capital large enough to be invested are expected to profit. Regarding the age the most affected groups will be young people and people of middle age; regarding the education this will be the middle level. Male will be more affected than female.

As a consequence of the changes in social groups under conditions of Scenario A more people will have to commute. There will be a high concentration of foreign peoples in urban areas, the majority will come from Africa, China, Ex-Yugoslavia and Albania. Their share will increase. On the other hand richer people are expected to move to better and safer areas out of the town. Land use policy will also face large areas of unused industries. Public expenditure in general will be more limited than BAU.

Torino: Scenario B

The most probable measures to manage traffic demand will be in Torino extensive Parking pricing, access control and access pricing. Under conditions of Scenario B especially commuters using own cars (services employers) will be affected. Goods distribution is expected to be regulated in a more efficient way.

In Torino, only the central area will be concerned by traffic management. The reasons are poor availability of parking lots, congestion, pollution and noise, safety and perhaps fuel restrictions, which are now unknown, but could be one reason for such measures in Scenario B. Regarding time slices when traffic management will take place especially the office periods (8.00) and in defined areas (e.g. where the night attractions are concentrated) extended periods will be concerned. The use of cars will be reduced, the urban public transport will be (very) crowded.

In Torino pricing is and will be accepted generally. Other reactions are foreseen when specific users' class will be affected. It is assumed that there will be a certain shift to other modes, e.g. electric bikes and destinations, e.g. for shopping.

The policy of traffic demand management will be enforced, if new now unknown dangerous pollutants will be discovered. Also political changes will have a strong influence on traffic-policy. If demand management is too strong, the rules governing the equilibrium

of the town life could be no more effective. High sensitivity against negative consequences of TDM could push forward mixed strategies, e.g. some TDM-measures will be removed in order to re-improve the accessibility of the CBD by cars.

Torino: Quantitative Part

Categories	Dimension	**BAU**	**Scenario A**		**Scenario B**	
				% to BAU		% to BAU
Trigger						
Inhabitants	'000	805.8	805.8	0.0 %	817.9	1.5 %
Households	'000	413.2	409.2	-1.0 %	428.0	3.6 %
Private Cons./Inh.	'000 $(90)	16.9	15.9	-5.9 %	17.7	4.1 %
Cost of fuel	$(90)/l	1.11	1.12	1.0 %	1.19	7.5 %
Average car cons.	l/100 km	6.90	6.56	-5.0 %	6.21	-10.0 %
Key Descriptors						
PT seat km offered	bn seat-km	4'500	4'051	-10.0 %	5'513	22.5 %
Length of road netw.	km	1'481	1'534	3.6 %	1'488	0.5 %
Number of cars		570'000	572.822	0.5 %	578'550	1.5 %
Modal Split	% of trips	100.0 %	100.0 %		100.0 %	
Car	%	48.0 %	50'0 %	4.2 %	45.0 %	-6.2 %
PT	%	28.0 %	25.5 %	-8.9 %	30.0 %	7.1 %
NMT	%	22.5 %	23.0 %	2.2 %	23.5 %	4.4 %
Other	%	1.5 %	1.5 %	0.0 %	1.5 %	0.0 %

Fig. 20: Quantitative Triggers and Key Descriptors for Torino

4.5 Mobility Services

One of the most important aspects of the project was the approach taken to evaluate the potential for mobility services. Although an understanding of the framework conditions was essential, the truly critical factor was the evaluation of services from the customers point of view. The French consulting firm Mouvement Environmental Communication was engaged to provide expertise in this area.

The initial list of services was the result of a state of the art search followed by a brainstorming session. Questions for a survey were defined and personal interviews were held with 27 experts from a variety of transport related fields from 6 countries.

The list of 16 services resulting from the brainstorming session were:

- Special services for children's mobility (private and public)
- Transport on request services (private and public)
- Special services for disabled people
- Delivery services
- Event mobility services (private and public)
- Parking services
- Self-service car system
- Automatic/intelligent speed adaptation
- Integrated transport service
- Mobility agency
- Flexible car leasing
- Mobility lease
- Capacity management
- Car sharing

The services can be grouped in three categories:

- Services dedicated to the person such as children or event services.
- Services dedicated to demand management such as capacity management or Automatic speed adaptation.
- Services such as car sharing or mobility agencies that accompany changes in individual mobility behaviour.

Each of the services on the resulting list were then verbally described to clarify their potential operating structures and establish a common understanding.

In order to create an instrument able to evaluate and compare these 16 different types of mobility-services, a 23-item list of "attributes" and of their possible "modalities" (values) has been established. Its is being assumed as a precondition that each type of service can be completely characterised by those attributes their corresponding modality. The list of attributes is as follows:

Theme	Attribute	Modalities
Autonomy	Temporal accessibility 1	Postponed Immediate
	Temporal accessibility 2	Day and night Precise timing
	Spatial accessibility	Local Regional National International
	Service operation area	Neighbourhood Agglomeration Wider area
	Social accessibility	Any public Targeted
	Pricing	Free Easily available Selective
	Ownership	Individual Shared Public Third party
	Spatial legibility	Wide Local
	Organisational legibility	Global Specific
Quality of service	Comfort	Physical Psychological
	Easiness of use	Very accessible Initiation required
	Real time information	Displayed On request
	Reception	Human Machine
	Convenience	Real plus
	Reliability	High
Safety	Passive safety	High
	Interactive safety	High
	Communication	High
The environment	Energy	Clean
	Noise	Reduced
	Visual pollution	Reduced
The service management	Investors	Public Private
	Means implemented	Co-operation Act alone
	Tariff system	Imposed Liberalised

Fig. 21: Attributes and Modalities to describe Mobility Services

The attributes and their modalities were then scored related to customer concerns and selected organisational characteristics. This meant an assessment for all attributes for their applicability and level of importance under the three scenario conditions (BAU, Alt. A, Alt. B) for each of the conurbations.

MUNICH			BAU	A	B
Autonomy	Temporal accessibility 1	Postponed	4	4	5
		Immediate	4	4	5
	Temporal accessibility 2	Day and night	4	4	5
		Precise timing	4	5	5
	Spatial accessibility	Local	4	4	5
		Regional	4	4	5
		National	3	3	4
		International	3	3	4
	Services areas	Neighbourhood	5	5	5
		Agglomeration	4	3	4
		More	3	2	4
	Social accessibility	Any public	4	3	5
		Targeted	4	5	4
	Pricing	Free	2	1	1
		Easily available	4	3	4
		Selective	4	5	5
	Ownership	Individual	5	5	4
		Shared	2	1	4
		Public	4	3	4
		Third Party	2	2	2
	Spatial Legibility	Wide	5	5	5
		Local	4	5	4
	Organisational Legibility	Global	5	5	5
		Specific	4	5	5
Quality of service	Comfort	Physical	4	3	4
		Psychological	4	5	4
	Easiness of use	Very accessible	5	5	4
		Initiation required	5	5	4
	Real time information	Displayed	2	2	4
		On request	5	5	5
	Reception	Human	4	5	4
		Machine	4	5	5
	Convenience	Real plus	4	4	4
	Reliability	High	4	5	4
Safety	Passive Safety	High	5	5	4
	Interactive safety	High	4	5	4
	Communication	High	5	5	5
The environment	Energy	Clean	2	2	5
	Noise	Reduced	5	2	5
	Visual pollution	Reduced	4	2	5
	Investors	Public	4	1	4
		Private	4	5	4
The service management	Means implemented	Co-operation	5	3	5
		Act alone	4	5	3
	Tariff system	Imposed	5	3	5
		Liberalised	5	5	2

Fig. 22: Expample for Modality Assessments: Munich onurbation

S1/S2: Special services for children's mobility (private and public)

A special service for young children that provides the safe public transport from door to door with accompanying adults.

Typical example : A small minibus or van picks up the children at home or after school and drives them to a leisure or sports centre. When the activity is over, the same minibus drives the accompanied children back home.

Aim: Even if only for safety reasons, children are very often accompanied by parents to their destination, as they cannot cover long walking distances nor use the regular public transport. This procedure generates a lot of traffic which could be avoided and is time-consuming for the "reduced time budget" of double-working parents. Consequently, there should be some need for accompanying children on lengthy or partially insecure trips between school and home (or leisure areas). It may be expected that there is at least a certain sector of the parent population willing to pay for such a service in order to avoid driving or accompanying their children themselves on such trips.

However, parents would be ready to delegate this task to someone only if the provided service suits their living habits and specific requirements (time, place…). Even more, they have to have complete trust in the competence of the service with regard to security and the capacity to deal with young children. As parents won't compromise with a service taking their children in charge, the specific quality of this service is of primal importance.

Characteristics.

- The promoters of the service may have several interests :
  - Concerning public investors, this service may be a part of their global service quality or public service spirit.
  - Concerning private investors, the service may enlarge the range of customers (new public) or enhance the attractiveness of a leisure centre...etc. This may impose co-operation between various companies and professions.
- The customers may expect :
  - Time saving : no need to drive the children, to wait for them, collect them...
  - Comfort : no need to take the children activities into account when planning the day.
  - Total security, which includes sharp timing, comfort, friendliness of the staff, real easiness of use, maximum vehicle safety…

S3/S4: Transport on request services (private and public)

This is a public transport service that has no regular routes or time schedule. It is open to anyone in isolated areas where public transport is rare. The service has to be requested.

Typical example : A small minibus or van picks up the user at home. The user books a trip a short time before necessary through a hot line. The destination may be decided by the customers or predetermined according to their usual needs (civic centre, commercial centres, cultural centres…). The return trip is planned for a specified time. The route is therefore modified according to the needs of the users in real time. Various examples of such a service exist all over Europe. It is usually operated by the public transport authorities in co-operation with the local authorities.

Involved stakeholders :

Political, administrative : In most countries, the service answers specific needs and is at least monitored by the local authorities, as part of a social and urban policy.

Public : Some countries may have restrictions for private companies, so that only the public sector may develop such a service.

Private : private public transport companies, and private operators may be involved, acting in agreement with the authorities. In some case, the service may be organised by a commercial centre or any such structure.

Aims :

In many urban areas, a regular and effective public transport service cannot be operated : low density suburbs, geographical specificity… This is not a problem for most people as they own a car. However, some people do not have access to a car for economic or other reasons. As part of a social and urban policy, the authorities and the public transport operator may desire to offer a specific service for this category of person. This service simply completes the usual service.

Characteristics.

- The promoters of the service may have several interests :
  - Concerning public investors, this service may be a part of their global service quality or public service spirit.
  - Concerning private investors, the service gives new opportunities to approach a category of customer that could not be reached otherwise (taxi, regular routes…).
  - In the case of a commercial centre, providing such a service is a way to develop customers loyalty.
- The users may expect :
  - A breaking of his confined situation.
  - A gain of mobility
  - A quality of service that reaches the regular service standards but fits in more with the local specificity.

S2: Special service for old or disabled people

A special service for elderly and disabled people that provides safe public transport from door to door with accompanying staff. This service shares many characteristics with the "special service for children" and the "transport on request service".

Typical example : A small minibus or van picks up the user at home. The users book a trip a short time before necessary through a hot line. The destination may be decided by the users or predetermined according to their usual needs (civic centre, commercial centres, hospital…). The return trip is planned for a specified time. The route is therefore modified according to the needs of the user in real time. Various examples of such services exist all over Europe. They are usually operated by the public transport authorities in co-operation with the local authorities.

Involved stakeholders :

Political, administrative : In most countries, the service answers specific needs and is at least monitored by the local authorities, as part of a social and urban policy.

Public : Some countries may have restrictions for private companies, so that only the public sector may develop such a service.

Private : private public transport companies, and private operators may be involved, acting in agreement with the authorities.

Aims : In many urban areas, a regular and effective public transport service cannot be operated : low density suburbs, geographical specificity… This is not a problem for most people as they own a car. However, some people do not have access to a car, whether they are too old to drive safely or disabled. As part of a social and urban policy, the authorities and the public transport operator may wish to offer a specific service for this category of person. This service does not compete with the individual car, but enhances the mobility capacities of "low mobility people".

Characteristics.

- The promoters of the service may have several interests :
  - Concerning public investors, this service may be a part of their global service quality or public service spirit.
  - Concerning private investors, the service gives new opportunities to approach a category of customer that could not be reached otherwise (taxi, regular routes…).
- The customers may expect :
  - A breaking of his confined situation.
  - A gain of mobility
  - Total security, which includes sharp timing, comfort, friendliness of the staff, real easiness of use, maximum vehicle safety…
  - A comfort level that is required due to his condition (old age…) and that cannot be reached with usual services

The service is being evaluated with the same characteristics as “Special services for children, private”

S5: Delivery services

Delivery services to the final consumers.

Typical example : The idea behind treating ”Delivery” as a service regarding individual mobility is to replace passenger traffic - here especially: shopping traffic - by a somewhat more efficient form of goods traffic. The general idea is that a person going shopping has not only to reach the supermarket / warehouse, but also to go back - together with the purchased goods.

Involved stakeholders :

Public : some public services may be involved : social services, public transports….

Private : private investors have maximum interest in this type of project as service providers (car maintenance, fast food…).

Aims : The general principle is a combination of ”Teleshopping” business with ”Freight vehicle fleet management” in order to reduce physical movements of persons and goods and thus generate less physical traffic. In other words: More intensive use of logistic chains for information might reduce use of logistic chains for goods.

The economic restriction is to be more efficient in the total balance than the individual person travelling in his own car or in PT. This proves to be a challenge, because it is necessary to pay for the delivery vehicle and driver, whereas the shopping-customer does not need to receive any payment on his trips. One main type of cost saved by teleshopping and delivery might be the intermediate step in the conventional freight distribution chain from regional freight centres to the individual shops or warehouses, as well as the cost for presenting the goods in display.

Focus of such services is to improve the logistic chain in a business-to-private-customer's approach, therefore creating a somewhat different approach on the service-design compared to the service mentioned above. The Mercedes-Benz experience in optimising delivery vehicle performance can be seen in a number of research projects and demonstration vehicles

As it is common practice amongst urban population to chain several trips (e.g. commuting to work and doing shopping while going home), the total economic balance is difficult to estimate, provided fewer trips than expected are being saved in the passenger sector.

Characteristics.

- The promoters of the service may have several interests :
  - Reaching people who do not want to go to the city centre anymore, or do not want to carry their goods..
  - A better management of traffic flows.
- The customers may expect :
  - Good management of time : service comes to you.
  - A service adapted to his needs : Delivery hours, shopping hours…

S6 / S7: Event mobility services (private and public)

A public transport service operating only on special occasion (concert, major exhibi-tions…). It can also be organised for smaller events such as conferences, meet-ings…

Typical example : This service is based on the concept of the park and ride, and on special routes. On a larger scale, special services can operate between different towns. The idea is that the service is adapted to the event regarding capacity and quality.

Involved stakeholders :.

Political, administrative : licences…

Public : public transport operators, organisation of the event…

Private : private organisation of the event, private transport operators.

Aims :

Special events which attract a lot of people create a transport problem to the organ-ising partners. Most often, they do not have the fleet capacities and know-how to handle and fulfil the transport duties in a safe and convenient manner. As seen dur-ing some of the latest major events, transport companies must be involved and new structural investments are likely to be considerable while their perpetuity is not nec-essarily assured. There is a lot of room for improvement. For each event, the appro-priate system varies according to the urban characteristics, the event requirements and the existing infrastructures. The basic aim is to provide the capacity to manage the floods of people and vehicles. A fleet management service may be required to complete this type of task.

Characteristics.

- The promoters of the service may have several interests :
  - Concerning public investors, the service may be implemented to assure the success of the event and minimise negative side effects on the city's life.
  - Concerning private investors, the service has the same features as public investors.
- The customers may expect :
  - Trip to the event made more easy.
  - A service adapted to their needs : Having driven a long distance by car , they need a parking space and a service to take them to the event. If the user wants a door to door trip, the normal service may not be adapted.
  - Parking facilities adapted to the needs : possibilities to book a space for a few days only, for a month… possibility to book from home…

S8: Parking services

This global service clusters various services offered on the premises of a car park, especially on a park and ride. It includes information, ticketing, various categories of parking space. The idea is to attract the drivers and lead them to use the park and ride facilities.

Typical example : Many services may be provided during the parking time : Service to the driver himself, and service to his car. A basic service to the car would be maintenance as most of such operations only take a few hours like washing, exhaust pipe fixing. Concerning service to the driver, most of "neighbourhood" services can be provided : post office, shoe repair…

Lastly, a parking service is an intermediary service centre on the mobility chain, be-tween the city centre (or working place) and the residential areas.

Involved stakeholders

- Public : some public service (State services) may be involved : social serv-ices, public transports….
- Private : private investors have maximum interest in this type of project as service providers (car maintenance, fast food…).

Aims : When people commute by car, they manage a lot of daily operations (shopping…). Using the public transport usually means less opportunities to perform those activi-ties. In park and ride facilities, their is therefore room for all sorts of services (laundry, information, post office, small shops…). Indeed, people come twice a day, and be-tween, there is time for services such as laundry… In the evening many other serv-ices may be seen as necessary. For the service provider, the idea is simply to be where people are ! Parking is an urban territory where companies can be repre-sented and economically active.

Characteristics

- The promoters of the service may have several interests :
  - Concerning public investors, this service may be a part of their policy to promote park and ride attitudes.
  - Concerning private investors, the service gives new opportunities to approach a category of customer that are mobile and wish to save time. It also gives the opportunity to be where things happen.
- The customers may expect :
  - Good management of time : service comes to you.
  - Suitable opening times (early in the morning…)
  - Better quality of parking environment
  - A service adapted to his needs : He has a car, he is busy and in a hurry. His social class (what can he afford, what does he wants) can be inferred from the geographical situation of the car park.
  - Parking facilities adapted to the needs : possibilities to book a space for a few days only, for a month… possibility to book from home…

S9: Self-service car system

The system gives access to a fleet of cars dispatched in town from a group of sta-tions. The cars are accessible on a self service basis. The total price for the con-sumer depends on how long he has used the car, and the distance has he covered.

Typical example: Renault has set up a system in St Quentin en Yvelyne (Paris) in co-operation with various public (EDF) and private (CGEA, Dassault) investors. It is known as Praxitèle. The public has access to a fleet of electric cars. These are avail-able in specific stations and do not need to be reserved (this is one of the main dif-ferences with car sharing and short location). However they have to be returned to the station of departure. This service is managed thanks to strong electronic and telematic systems.

Involved stakeholders:

Public: some public operators may be involved (public transport operators…)

Private: private investors are usually the leaders of such projects, at least concerning the commercial aspects. They range from the automobile industry to the car renting companies.

Aims :

The idea is to develop short-term renting with maximum efficiency, using new tech-nology management systems and low emission energy sources. Providing access to a car for a public that would otherwise not buy a car (or a second car) at any rate (young people, people living in the city centre), the investors reach a new market and provide an offer which is complementary to public transport and the private car.

Characteristics.

- The promoters of the service may have several interests :
  - Concerning private investors, the service gives new opportunities to develop access to cars in areas where it is becoming more difficult to manage car ownership (city centres).
  - The involvement in such projects also provides an opportunity to monitor and under-stand new urban mobility behaviour.
- The customers may expect :
  - Access to an individual car only when necessary or desired.
  - Tranquillity regarding parking facilities (a space is guaranteed).
  - A new individual mobility opportunity added to the possibility of better management of the global mobility chain (through the time and distance tariff system) and the emer-gence of new mobility strategies.

S10: Automatic/intelligent speed adaptation

This service should in no case be presented or considered as an "anti car-device". The idea is simply that the driver should be informed or receive support from another source in order to avoid driving too fast at crucial locations. The first applications would probably be outside schools on streets with 30 km/h speed limit.

Typical example: One benefit would be that these kind of systems could replace speed bumps. The functionality could be developed to cover other levels of speed limits. One key success factor is probably that these services should be conceived as "informative" and "non-mandatory" If successful, the use of this kind of system would probably justify the lowering of insurance premiums etc. It could also be deployed among younger drivers who are exposed to high accident risks.

Research shows that it is effective even if only about 30% of the vehicles are equipped, the desired effect is achieved on all the vehicles on the street.

Involved stakeholders :

Politics, administrative : Decisional power to implement the system.

Public : management of the system

Private : can develop the system and install it on cars.

Aims:

To limit the speed of cars in specific areas. It can be developed on important roads to help manage the traffic or to limit pollution. It might help the car industry to maintain a good image.

Characteristics

- The promoters of the service may have several interests :
  - Security
  - Traffic management
  - Pollution emission control
- The customers may expect :
  - Security
  - Lower gas consumption…

S11: Integrated transport service

The basics of integrated transport services - covering all modes of transport means - are:

- Pre-trip information (schedules, costs, transport means, alternatives, ...).
- Integrated ticketing and reservation.
- During trip information (delays, incidents and proposals of alternatives, ...).

Typical example : Today, the first applications of integrated pre-trip information services and some on-trip information services are available. Integrated pre-trip in-formation is now offered by " mobility shops " or " mobility centres ", and – e.g. in Germany - a system-wide public transport information service – including a couple of local PT services and the national German railway system – is available on the Inter-net. But a great effort by the user is necessary in the case of integrated routing. Be-yond that, some software firms offer route searching algorithms on the Internet or as a software tool, providing information on average speed and the type of the roads.

The on-trip information systems concentrate on car traffic in the form of route guid-ance and traffic information systems. Traffic information is based on radio messages, today improved by RDS-TMC (Radio Data System – Traffic Message Channel) which is a European standard. This traffic information system will be available all over Europe within the next years. The latest generation of in-vehicle route guidance sys-tems is still capable of treating traffic information transmitted by RDS-TMC or GMS to the vehicle and offering alternative routes to avoid incidents.

Involved stakeholders:

Public : not clear

Private : private companies such as travel agencies, brokers…

Aims:

Avoid going through a regular travel agent (high costs…), obtaining all the information simultaneously.

S12: Mobility agency

Mobility agency: cluster in the same venue, indirect access (information, booking…) to different mobility services, amongst other services (tourist info, theatre booking…). Such a structure should be as multimodal as possible. Consequently, a mobility agency should not give access only to public transport systems, but to any service regarding urban mobility (taxi, car renting…). It should be present in any strategic places such as airports, stations, agglomeration multimodal platforms.

Typical example: This type of service is under experimentation in France (Paris, la Défense) and in Germany (Frankfurt). Here, the Parisian pattern is analysed (Cœur Transport la Défense, "Ville et transport" agency).

Involved stakeholders.

Political, administrative : Ile de France Regional Council, Conseil général des Hauts de Seine (Département), STP (Syndicat des transports Parisiens : Parisian transport Association).

Publics :, RATP, SNCF, EPAD (Etablissement Public pour l'Aménagement de la région de la Défens : Public administration for the planning of la Défense).

Privé : Renault (in this case).

Aims:

As the la Défense multimodal platform is being reorganised, the various stakeholders of the perimeter wish to implement a "true urban exchanges complex". It is in such a perspective that a mobility agency should find its place, in a multimodal platform through which about 300 000 commuters transit daily.

Globally, the "Cœur Défense" ("at the heart of la Défense ‘’) deals with the structural reorganisation of the interchange (trains, Metro, tramway, buses, taxis, individual cars…) and is attentive to global quality, so that the complex fully participates in ur-ban life.

The search for the platform's global quality is truly at the heart of the project.

Characteristics:

The agency ("Ville et transport) participates in the platform's legibility and attractive-ness in every way, and of the business centre. Broad characteristics are : positioning on an exchange platform, proximity of con-nected services.

- the producers expectations of the reorganised platform with the agency centrally located are :
  - Reduction of costs : integration of the different modes (search for fluidity), legibility and accessibility), reduction of maintenance (through rationalisation), growth of the traffic.

- Increasing attractiveness of the area : sustaining the business centre's development, both regarding the agglomeration or to face the competition of London and Frankfurt.
- Urban integration ; Accessibility to the area from the other multimodal platforms of the agglomeration (airports, Châtelet-les Halles, Stations…), increasing the global legibility of the quarter as a whole…

- The consumer can expect :
  - A gain in legibility : static legibility (place identity), dynamic legibility (intermodal movements…).
  - A gain in user friendliness : inter connection of the networks,, easiness of use, proximity of other services… ".
  - A gain in time : interconnection.
  - A gain in mobility : information, interconnection…

S13: Flexible car leasing

This type of service provides the leasing (long term car rental) of vehicle kilometres rather than a specific vehicle.

Typical example : Clients could lease a base vehicle which could then be ex-changed for larger, smaller, or mono-purpose vehicle for varying periods of time throughout the duration of the lease. The vehicles could be leased either directly by the OEM, by the OEM in co-operation with a rental car agency, or by a car leasing service. Pricing would naturally be a competitive issue and based on the type of base vehicle, the type of exchange vehicles, and frequency, timing (school holidays), and duration of exchange.

Involved stakeholders:
Private : car rental companies, the automotive industry.

Aims: Most people own or lease a car that is not always the most adapted to their needs and specific uses. First, the needs for a car vary during the year, and vary according to the usage. In town, most people prefer a compact car, even if a luxury one, while for a business trips, long journeys or holidays, an estate or a luxury sedan might be preferred. Some people might enjoy changing the city compact car for a coupé during the week-end… The renting company would be constantly able to answer the cus-tomer's request.

Characteristics

- The promoters of the service may have several interests :
  - May help develop customer loyalty
  - Concerning the automobile industry, the service gives new opportunities to approach some categories of customer that would normally continue buying small compact cars or low end of the range family cars.
- The customers may expect :
  - A large choice that suits their desires and needs;

S14: Mobility lease

This service would take flexible car leasing a step further. Kilometres of mobility would be leased. This would include a car for personal use, the ability to exchange cars, as well as other modes of transport.

Typical Example : The economics and marketing approach would determine the final form, but the lease could include a certain number of kilometres or trips by air, train, bus and metro, taxi, and car sharing. Transport chip card technology could play a significant role and make the introduction of such a service much easier.

The lease arrangements and pricing could include:

- A predetermined number of trips or kilometres on transport modes other than the car.
- Transport on modes other than the private car could be billed directly to the monthly leasing fee via chip card
- A mobility card would simply allow the purchase of other modal trips at a discount
- Any combination of these ideas

In any case the lease holder would experience door-to-door mobility with minimum hassle, no worries or surprises about payment, and could make much more rational decisions about appropriate car usage.

Involved stakeholders:

Private: car rental companies, the automobile industry, public transport com-panies (railways, urban transport, air carriers…).

Aims:

This service is even more flexible than the "flexible car leasing" service. The aim is to attract "high mobility" populations who usually only use their car in town and perform long distance trips on a regular basis. The basic idea is to offer a wide range of transport modes and mobility services adapted to any needs anywhere.

Characteristics.

- The promoters of the service may have several interests :
  - May help developing customers loyalty (to a car brand, air carriers…)
- The customers may expect :
  - A large choice that fits any mobility desires and needs;

S15: Capacity management

Either as part of a private infrastructure management scheme or a public/private infrastructure partnership, road capacity could be made available for purchase.

Demand management goals would be met, revenues generated could help support the infrastructure, and private companies could exploit their market advantage. This service could apply to ring roads, access roads to the CBD, parking in the CBD or P&R at the city's edge.

Typical example : Taking the example of a segregated lane on the motorway, there is a known maximum number of slots available at any time that still allow for free flowing traffic. This number of slots could be sold (or leased) either directly to car us-ers, or be sold to one or more companies that would re-sell the slots, or OEMs could purchase the right to slots and give them away as a customer benefit. (e.g. There could be a segregated lane on the new toll way going into Paris. Renault could buy the rights to that lane and then drivers would call to make reservations for a slot. Renault drivers could have their slot free or at a reduced price and drivers of other makes would have to pay full price. Or Renault could buy some slots, Daimler-Chrysler could buy some slots, and another private company could buy the rest.

Involved stakeholders :

Political, administrative : local authorities…

Private : motorway management companies, important stakeholders on the service market (Vivendi, Bouygues…)

Aims:

There exists a maximum traffic flow that a road can sustain without traffic jams occur-ring. Although this maximum can easily be calculated, most of the important urban and suburban roads are jammed, at least during peak hours. The management services would permit limiting the access on designated roads so that the flow would be regular. The implementation of such a service would probably be very profitable for the public transport companies.

Characteristics:

- The promoters of the service may have several interests :
  - The service should strongly reduce traffic jams on selected busy roads.
  - It should help develop public transport, as some people won't want (or couldn't afford) to pay for a slot.
  - It may also help develop customer loyalty (automobile industry)
- The customers may expect :
  - A guaranteed minimum traffic level (or limited maximum), and fluidity on the road.

S16: Car sharing

The car sharing service resembles "flexible car leasing". The main difference lies in the fact that the customer cannot keep the car on a full time basis and has to reserve it a short time before needed. However, most of the other features are the same (choice of the vehicle type according to the needs…).

Typical example : Private car sharing services have been developed in the Nether-lands through the "Call a car program". Those services depend on private initiative. The ministries and local authorities did no more than subsidise and promote the systems.

Involved stakeholders:

Political, administrative : Normally none, but may add some incentives.

Public: Normally none

Private: Car renting companies, specific companies, co-operatives… Auto-mobile industry may also be involved.

Aims:

In city centres, a part of the population is beginning to question the advantages of owing a car, such is the hassle involved. Most of those people need a car, but not on a daily basis. What is more, they generally find it hard to find convenient parking space. This service makes it possible to rent a car for a very short time, or for longer. However, the car cannot be kept at home. Indeed, the idea is to maximise the use of each car, to "share" its use. The parking problem disappears, and each car has its own space in the "car sharing station".

Characteristics.

- ? The promoters of the service may have several interests :
  - The service helps to maximise the use of their fleet.
- ? The customers may expect :
  - Guaranteed access to a car when desired.
  - A large choice of car, according to the needs.
  - A lot less of the car owner’s hassles (maintenance, parking…)

Services characterisation and assessment

All services then were described according to the most appropriate modalities of all attributes, so that the modality assessments could indirectively linked to the services themselfes.

S1 : Special public service for children

Autonomy	Temporal accessibility 1	Postponed
	Temporal accessibility 2	Precise timing
	Spatial accessibility	Local
	Services areas	Agglomeration
	Social accessibility	Targeted
	Pricing	Easily available
	Ownership	Public (50%) / Third Party (50%)
	Spatial Legibility	Local
	Organisational Legibility	Specific
Quality of service	Comfort	Physical (50%) / Psychological (50%)
	Easiness of use	Very accessible
	Real time information	On request
	Reception	Human
	Convenience	Real plus
	Reliability	High
Safety	Passive Safety	High
	Interactive safety	
	Communication	High
The environment	Energy	Clean (50%) / Polluting (50%)
	Noise	
	Visual pollution	
	Investors	Public (50%) / Private (50%)
The service management	Means implemented	Co-operation
	Tariff system	Imposed

Fig. 23: Expample for Mobility Service Characterisation: S1 Special service for children, public

The services were then evaluated, based on their attributes, against the conurbations and scenario conditions. This allowed a selection of services with the greatest potential for success for each conurbation under each scenario. The results were reviewed again in detail by the partners to ensure consistency in services, scenario results and knowledge of the conurbations.

No.	Service Name	BCN	BDX	GOT	MUC	SHM	TOR	**Mean**
S1	Special service for children, public	3,9	3,9	3,7	3,8	3,7	3,9	**3,8**
S2	Special service for children, private	4,2	4,0	4,0	4,2	4,3	3,9	**4,1**
S3	On request transp. Service, public	3,7	3,8	3,6	3,7	3,5	3,7	**3,7**
S4	On request transp. Service, private	4,0	3,8	3,8	4,0	4,1	3,7	**3,9**
S5	Delivery service	3,9	3,5	3,7	3,8	3,9	3,7	**3,8**
S6	Event mobility service, public	3,8	4,1	3,7	3,7	3,5	4,1	**3,8**
S7	Event mobility service, private	3,9	4,1	3,8	3,9	3,9	4,0	**4,0**
S8	Parking service	3,4	3,4	3,7	3,4	3,1	3,5	**3,4**
S9	Self ser. Car system / Station car	3,8	4,1	4,0	3,8	3,9	4,1	**3,9**
S10	Automatic / intel. Speed adaptation	3,4	4,1	3,8	3,5	3,2	4,1	**3,7**
S11	Integrated transport services	3,6	3,5	3,9	3,7	3,8	3,5	**3,7**
S12	Mobility agency	3,7	3,6	3,7	3,7	3,8	3,6	**3,7**
S13	Flexible car lease	3,8	3,7	3,7	3,9	4,1	3,6	**3,8**
S14	Mobility lease	3,9	3,8	3,9	4,0	4,0	3,8	**3,9**
S15	Capacity management	3,8	3,6	4,1	3,9	3,9	3,7	**3,8**
S16	Car sharing	3,7	3,4	3,5	3,7	3,9	3,3	**3,6**
	Mean	3,78	3,78	3,78	3,78	3,78	3,78	**3,78**

Fig. 24: Expample for Mobility Service Evaluation: Scenario A results

In the example shown above, the “Parking service” is being assed relatively low under the Scenario A conditions in all cities, which means that the experts assume it not to be attractive. “Special transport services for children”, however aver highly recommended; this may partially be caused by security fears of parents who do not have enough time to accompany their children on their school or leisure trips themselfes.

5. Conclusions

5.1 Scenarios

For the conclusions of the scenario-process there are two questions of direct relevance:

What are the main differences between the BAU-Scenario and both of the alternative scenarios?

Can we expect similar developments (by scenarios) in the six cities or will the local conditions continue to dominate?

5.1.1 Main global differences between the Scenarios

The future in the trend (**BAU Scenario**) - so far as we describe it by our triggers - is widely determined by

- an **increasing mobility** mainly realised by motorised means of transport, respectively by private cars, based on a positive attitude towards mobility
- the non-existence of **energy restrictions** and **drastic ecological concerns**
- an increased **political activity** for the environment, and
- a strong penetration of **information** and **communication technologies.**

In the **BAU Scenario**, we do not expect revolutionary changes in the socio-economical or political context to take place within the next decade. The political discussion about "sustainable" development will lead to some changes in individual behaviour and urban politics but will not force structural changes, because general improvements in energy efficiency (or other technologies) will support the necessary progress. This also harmonises with a political environment that is aimed at "keeping the political majority" for the next elections.

This scenario, however, can not be regarded as "stagnating" or "backwards-oriented" in any way , as it reflects significant (continuous) progress in several technologies as well as significant changes in the demographic structure of population that will take place in the next 20 years. "Providing mobility" for seniors or special groups within the population will , for instance, become a most natural kind of business.

Scenario A assumes that the economic situation will produce a higher diversity of rich and poor people. This is predominantly due to more intensive economic integration of developing countries resulting in an accelerated globalisation. Secondly, the State focuses its activities on social affairs in order to smooth structural changes. It will be - as a consequence - less active in other fields of politics.

According to outlooks for such developments it has been supposed that the income levels will spread in two directions: some companies - and professions within the total labour market - will profit and redistribute the money by higher salaries, other will be forced to abandon or modify their activities with the consequence of job losses or more flexible working contracts. At the end, some social groups must live with reduced personal budgets.

Our key hypothesis is that the big cities in Europe will be hit from such developments with priority. This is why we expect the following tendencies:

- The split in income levels will partly transposed into spatial segregation in the cities
- Compared to the trend in the BAU Scenario, State and urban government is less active in transport planning due to priorities in social affairs. Additionally, the public budgets will have less money.
- Mobility will be considered to be very important: Poor people will try to maintain mobility standards (private cars), and the rich part of population, moreover, will rely on private mobility systems
- Ecological concerns are still prevalent, but have a low priority; energy is somewhat cheaper than in BAU
- Information and communication systems have a better chance to be deployed within the population - but there will be very different systems.

Summed up, Scenario A shows something like a "governmental retreat", giving room for individual decisions with their sometimes negative consequences for the "urban system" as a whole like social segregation and spatial dispersion.

Scenario B has a completely different background: The public authorities are highly interested in controlling and managing the traffic demand with a focus on densely populated areas. . The aim is not to promote a distinct mean of transport but to keep the cities attractive, accessible and healthy. The reasons for this strategy might be global ecological concerns, capacity problems in transport infrastructure and/or local disadvantages for the population incurred by steadily increasing traffic demand.

Adapted to local structure, potential demands and infrastructure capacity, a mixture of different transport systems will be promoted with a fine-tuned transport policy strategy based on push and pull measures: encouraging environmental friendly means of transport and rejecting private car traffic by charges or regulations where other means of transport are more efficient.

The government on local and national level will undertake some efforts to reduce and optimise the traffic demand leading to a traffic system where the philosophy of free access for everyone by every mean of transport will be abandoned. Therefore, we see the following developments:

- The overall **economic situation** is similar to BAU: no additional increase in economic disparities, no higher level of wealth.
- The overall **attitude towards mobility** can be characterised by more consciousness on mobility behaviour, induced partly by a strong political engagement towards a sustainable mobility
- **Energy shortage** and **higher prices**, also caused by higher taxation
- **Environmental concerns** are the on top of the political actions

- New features in **information and communication technology** will help to introduce some traffic management measures and make it more acceptable in the population (substitution of physical mobility).

Summed up, Scenario B gives an impression of an urban system with sometimes heavy political interventions in order to secure local or spatial structures that have been declared "desirable". The strength of the political institutions, however, cannot guarantee all desired developments, as it is more or less often thwarted by the sum of individual decisions to arrange oneself most comfortable within the limits that have been set up.

5.1.2 Harmonisation or dispersion ?

From the general projections as well as from the local pictures up to the year 2010, it seems as if a **number of trends common for all agglomerations will clearly dominate** the former national or regional peculiarities. All cities, for example, stated that globalised business (with international links) should be a "winning sector" in the economy under the "Scenario A" conditions - but, of course, with different emphasis according to those industrial branches that are expected to perform strongly in the international competition. **Bordeaux** expects its fine agricultural export goods to prosper, whereas **Munich** sets a perspective on high-tech industry and financial services. Between the three scenarios, speed and intensity of such trends may differ in certain amount, but the general trend is not being discussed any more.

The **European integration** may therefore be seen as one of the most important success stories that have been written in our century's history. Some regional peculiarities, for example different operator's structure in British public transport, may persist for some time to come, but it is being expected that economic competition under an (almost) equal legislative framework will tend to harmonise such structures into a similar European level within the next decades. With the introduction of the common European currency, the next integration factor is on launch and will continue to assimilate economic life from Portugal to Finland.

As an **overall result**, the various problems concerning traffic and environment in the six conurbations will, therefore, generate similar solutions everywhere. The **general strategies** to solve those problems are:

- Limit as much as possible **individual motorised traffic** in the high dense CBDs
- Improve **public transport** systems by introducing new lines, integrating time tables and tariff schemes
- Increase **road infrastructure capacity** by completing the road network and deploying road telematics
- Support **non-motorised modes** by amending conditions for walking and cycling
- Keep the **CBD** attractive as commercial and cultural city centre

A number of differences in detail solutions will of course result from geographic and topographic peculiarities, like harbour cities with their freight traffic and a major river cutting the agglomeration or mountainous areas where traffic is forced into narrow corridors that favour rapid mass transit. In this perspective, further European research into integrated mobility systems / services and their international harmonisation will prove very valuable as results and innovations will be usable in most of the agglomerations.

It may be a necessary remark that the **development of the conurbations** described in the EUROMOS project themselves might not be followed by their outskirts at the same speed. Most of the six conurbations checked by the project partners are well prospering regions within their nations ("Showpieces") and do have significant economic advantages against the national average or the less developed regions. **Barcelona**, **Bordeaux**, **Gothenburg**, **Munich** and **Torino** certainly host very important advanced commercial enterprises and will benefit better than average from the European and global integration.

The scenarios show in a very general manner that the **urban structures** and **traffic conditions** among a city and its surroundings might differ much more than the situations among the conurbations investigated. Such differences concerning average wealth, household size / family structures, usual travel-distances and modal choice may persist for long time to come, wherever a separation of urban functions will not be corrected: on the one side the high dense economic centre of a city, on the other side large residential areas in the „hinterland“. For Barcelona, Munich and Torino respectively, the trend to develop new areas will be expected and lead to a spatial dispersion. As a consequence, trips lengths will increase and public transport systems are less suitable to offer attractive mobility.

On the other side, there are some divergent developments which underline that there are different situations, habits and solutions. We concentrate on **two aspects**:

- **Safety** and **security** in automobiles and other forms of transport is expected to be developed in a different manner. **Southampton** and **Torino** expect for BAU a decrease of security in public transport, whereas the current level in **Barcelona** is supposed to be maintained. In the other conurbations, security will become an important issue for which new individual solutions appear to be possible.

- The near future of **public transport** under the conditions of the BAU-Scenario provides with two different pictures: Interestingly, the southern Europe conurbations (Barcelona, Bordeaux and Torino) expect an improvement of PT’s attractiveness. In contrast, the level of service will be kept in Gothenburg and Munich whereas Southampton will suffer a further deterioration. Detailed analyses show, moreover, that the reason for poorer PT in Southampton is the privatisation what is, in Gothenburg, the governing factor for improved security.

It is, however, obvious that also in the future some local strategies will interfere and somewhere dominate global trends, and that the urban authorities will reserve the right to find own solutions. On the other side, the common trend of the agglomerations examined within EUROMOS towards a "unified Europe" or even a "globalised village" might, in conclusion, be a perspective that is valid only for the prosperous conurbations. The urgent

traffic and socio-economic problems that must be handled by the city and county administrations, might well be solved with the help of common action principles that need only to be modified gradually according to the specific local circumstances.

5.1.3 The overall trends - independent of scenario

1. Population will increase within the city borders, except the high density cities.

2. The number of households will increase due to continuos reduction in average family / household size. This is especially important in those countries where development is delayed against mittdle European situation.

3. The private consumption will - on average - continue to increase.

These trends are likely to result in an increase in:

- car ownership
- public transport efforts
- decentralisation processes

The modal split is not expected to undergo any drastic changes.

5.2 Mobility Services

5.2.1 Assessment of services

The final scores are presented in the following tables. These tables should be read as follows :

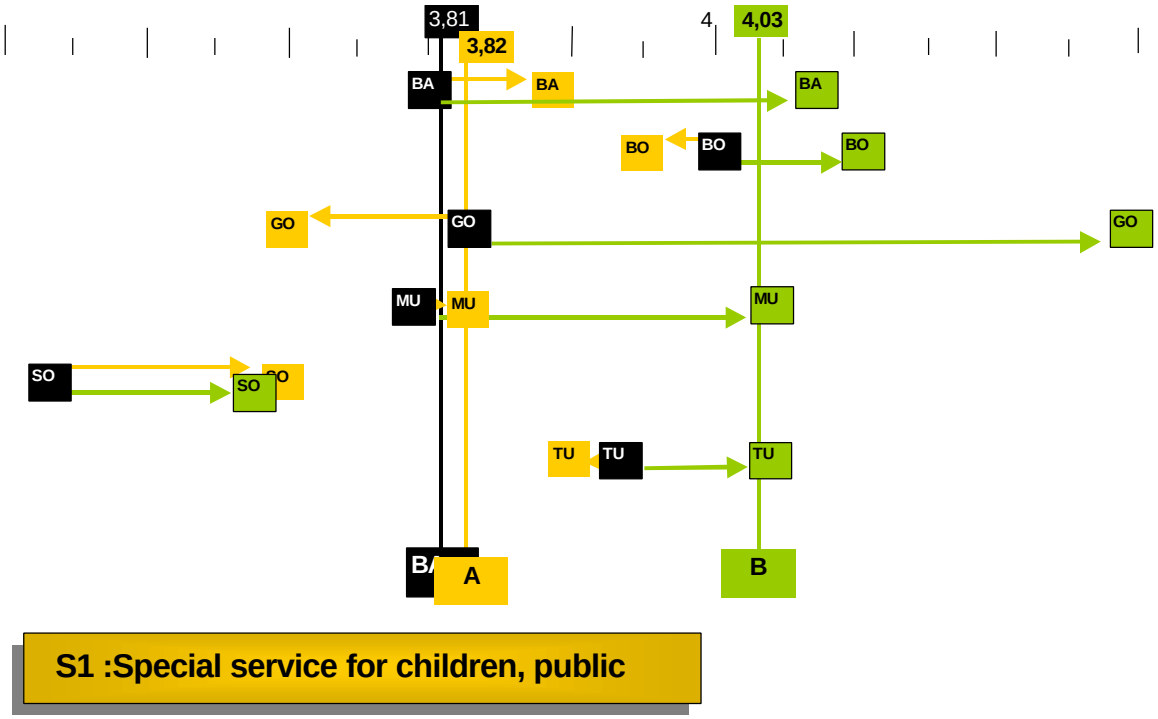
- The higher the final score, the more a service, regarding its modalities (or characteristics), fits in with the consumer’s requirements and financial situation.
- The three vertical lines show the mean score of the service regardless of the city, for each scenario.
- A high final score means that most of its modalities have been judged as significant by the experts for a specific city and a precise scenario.
- More than the service in itself, it is thus its modalities and their implementation that make the service potentially successful. Also, it may sometimes appear strange that a particular service receives a high score. It simply means that its characteristics, taken independently, are relevant. That is why we will later con-centrate more precisely on the modalities and check the consistency of the serv-ices' final score with the description (Triggers and Key descriptors) of the scenar-ios built by Prognos.
- The position of a score for a particular city should be compared with this mean score and with the relative position of the score in the other city for the same sce-nario.
- An interesting and important exercise is to compare the relative position of a score, in the different scenarios, for the same city. The observed "movement" should then be compared with the observed behaviour in the other cities.

- A difference, though it may appear slight in absolute value may be quite important in relative value.
- On these tables, the scores have not been rounded.

How to read final scores : Example of service 1.

S1: Special service for children (public) is taken as an example, other services are presented after this quick introduction.

The figure presents a comparison of the service's scores. Black squares represent the BAU scenario, orange represents Alternative Scenario A and green represents Scenario B. The scores of each city (one score for each scenario) thus appear three times. The arrows indicate the score shift of the service between the scenarios.



Thus, it can globally be observed that concerning the means, the scenario B (4.03) globally favours this service for all the cities, compared with the A and BAU.

The latter are rather close (respectively 3.81 and 3.82).

More precisely, and as an example it appears that in scenario BAU (black), the special public service for children is more pertinent in Bordeaux than in Barcelona. Regarding Bordeaux, the service is more pertinent in scenario B (green), than in scenario B or A (orange).

Remembering that the scores range from 1 to 5, it can be observed that the average score for BAU (3.81), even if lower than A and B is still above the median score (2.5).

It should also be observed that the difference between the scores are wider than it seem (this is due to the chosen scale). Taking the scores of the service in Barcelona, it appears

that the difference between scenario BAU (3.8) and B (4.1) actually is 7.9% ! This still is not a very important difference if we look through all the services !

Gothenburg :

The service is very pertinent in the B scenario (4.29). This score is far higher than the average for all cities (4.03).

If we observe which modalities may explain such a result (which modalities of this service are very pertinent in this city in scenario B, see Results 6.3.), we can see that the involvement of the public sector has great influence, as the other modalities stay close to the global mean (4.03).

Indeed, in the scenario A and B, where the public sector's involvement does not matter (is not significant), the score of this service is close to the mean (B), or slightly under it (A).

Southampton :

We observe that this service is not favoured in Southampton, whatever the scenario, when compared to the other averages. This service obtains a score well under the means in the :

BAU : 3.53 compared with 3.81 for the mean.
A : 3.69 compared with 3.82 for the mean.
B : 3.67 compared with 4.03 for the mean.

In fact, whatever the scenario and the service, the city has a strong reluctance toward the involvement of the public sector ("no way back" said the expert). However, observing the modalities of this service and their pertinence in Southamp-ton, scenario B, we observe that other factors may be involved :

- Low significance of human reception,

- Low significance of physical comfort,

- Low significance of pricing (easily available in this case),

- Very low sensitivity to a service that could use "low pollution en-ergy".

About Southampton, we could ask the following question: Does the deregulation explain this strong and systematic gap regarding other "public sectors services" between Southampton and other cities ?

5.2.2 Influence of scenarios on services development.

Without surprise, the following can be noted:

Scenario A favours private services in all agglomerations. It highlights a potential development for services depending on a high level of mobility and accessible to social groups who can afford to finance their mobility.

Scenario B is a booster for the development of all mobility services in all 6 conurbations in comparison to Scenario A and BAU. It has a relatively strong effect on all mobility

services, especially those which are marked by their mobility management function, run by collective operators either private or public (parking services, capacity management, automatic speed adaptation, etc.) and personal services such as on-request transport services.

Scenario A does not differ much from BAU. This can be explained by the fact that scenario A shares some of the same characteristics with the BAU scenario regarding urban development and urban public space occupying modalities.

5.2.3 Development of services: inter-city comparison in 6 european countries

According to service analyses, as well the experts' statements, it can be observed that the success of mobility services is correlated to specific urban, social and cultural factors. These are:

At town level:	- morphologial differences - size effects
At a political level:	- town planning traditions - existance / lack of public transport policies
At a cultural level:	A specific cultural substratum seems to come to the surface in each country. For example, use of advanced technologies to solve traffic and mobility problems in France, seeking for consensus and organisational solutions in Germany, refusal of any authoritative direction in UK, great attention to architecture and landscape in planning decisions in Italy. A cleavage can also be observed between northern countries which believe in education and sensitisation of citizens to change mobility behaviour, and southern countries (especially France), where the authority does not depend much on educational measures.

5.2.4 Strong and constant tendencies on mobility services

Despite these differences, with few exceptions, all experts highlight constant factors.

- The development of services must be situated in the framework of a foreseeable increase of mobility, with no significant modifications in tendencies for the ten to fifteen years to come.
- Objectives of mobility services will be to satisfy the increasing mobility needs (individuals, collective and trip purpose).

- Constraining measures on car usage, without acceptable alternatives to satisfy mobility needs of consumers and citizens, are not foreseeable. They will not be accepted or will have counterproductive effects on traffic and on city development.

- Whatever town or scenario, car use will remain the heart of mobility, but its usage will (could) evolve in a more regulated transport system in which other modes or more collective car usage will also take place.

- Experts stress the conditions of successful adaptation to mobility needs at agglomeration level. For example:

  - Qualitative and quantitative improvement in public transport offer.
  - Measures to organise the network in terms of accessibility and link up capacities.
  - Spatial organisation and planning that avoids prolongation of the trip routes.

- Development and integration of new technologies.

- Public transport must evolve to take into account new customer needs.

  Rapid transit will need to increase. The question of PT´s adaptation to more dispersed and non-regular mobility needs is open. Experts usually bet on private operators under public control to offer more flexible services.

- The impact of new technologies seems decisive in obtaining the desired performance from mobility services:
  - Providing information and making them accessible
  - Management of flows
  - Integration of payment

  However, there is doubt as to:
  - the will to make information available to operators or to users,
  - the cost of implementing these technologies, given the number of transactions needed to use them
  - the capacity and willingness to pay for it, and
  - the capability of users to navigate through such complex systems.

6. Recommendations

Given the diverse nature of the six conurbations studied, it is very difficult to give recommendations that relate equally to all. Therefore, following recommendations apply to the issues with a common denominator for all conurbations.

6.1 Standardised data availability for comparison

The work on traffic and transport related data led to the demand of a standardisation of definitions, evaluation designs, specifications and availability of the most important data such as the following:

- Defined conurbation area as related to data collection (e.g. for population density, quality of infrastructure)
- Population
- Purchasing power at the conurbational level
- Car ownership and vehicle classification at the conurbational level
- Quality of road network/infrastructure
- Quality of public transport system
- Trip purposes
- Trip rates
- Mobility behaviour

6.2 Learning from scenarios

The scenarios have been detailed for the cities within the regarded conurbations. The results do not automatically cover the effects for the whole conurbation. Specially when having ‘pressure’ on the transportation subject within the city (e.g. strong traffic demand, scenario B) it must be remarked that the region outside the city, still a part of the overall conurbation, is independent of the city administration. The counties can react contradictory to the city.

Transport policy must be regarded as an integrated subject covering the whole conurbation. The main city and the counties within the conurbation must work to achieve common goals, otherwise the regions within a conurbation are under competition.

6.3 Concerning passenger services

The new services, which can be necessary in each of the regarded conurbations, are new forms of public transport enlarging the range of the traditional public transport service. These new forms need regulations and financial funds. To offer new on-demand services

means to offer services between taxi and transit. Neither the regulatory nor the financial environment allow for a private entrepreneur to step into this business.

On-demand services can be seen as a type of collective taxi, a form of public transport, widely spread over the world and very efficient. But it is not possible to offer such a service in Europe due to the competition with existing public transport and taxi services.

The new transport /mobility services are close to the field of public transport. If these new forms are to succeed, the same financial funds must be available for those services as for the existing traditional public transport. In this context, additional operational, administrative and economic research is recommended.

6.4 Concerning delivery services

Presently there is no scheme of modern city logistics implemented which could serve as "best case" or "good practice" for other cities. Nevertheless, the following can be recommended:

- The main effect of improved city logistics is achieved through bundling transport activities. This presupposes that the actors are willing to co-operate.
- A pure change of vehicle and communication technology will not solve existing problems. Technology change has to be embedded in a change of organisation.
- Coupled with town development policy, an integrated freight transport system can contribute to increase the attractiveness of central areas and foster economic competitiveness.

Public/private partnerships are in general the means to stimulate a better co-ordination. The state is needed to provide the necessary institutions, to monitor the scheme and to promote the development by subsidisation in the first phase

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