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# NEW DEVELOPMENTS IN URBAN AND REGIONAL TRAFFIC AND TRANSPORT PLANNING—a Report from Germany

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## ABSTRACT

Modern urban and regional traffic and transport planning has to be carried out according to a sophisticated planning process. It must be goal-oriented. The main goals should be the reduction of private car traffic and the operation of the remaining car traffic compatibly with social and environmental conditions but also the improving of accessibility and the ensuring of cost-effective operating of traffic and transport. There are goals' conflicts.

Urban and regional traffic and transport planning has to be performed in two different ways on two different levels of planning. All measures for improving the traffic and transport situation have to form a bundle, in which the measures of traffic and transport management play a decisive role.

Some new developments demonstrate the current fields of activity of urban and regional traffic and transport planners.

## 1. INTRODUCTORY REMARKS

The urban and regional traffic and transport problems of today are mainly caused by the masses of automobiles. Car traffic dominates us. Nearly all people want to drive a car. The price for doing this is high : accidents, noise, airpollution, land consumption, visual intrusions, hinderances and self-blockings, stress, costs...

The future situation will become even worse. The integration of East and West Germany, the European Common Market in 1993 and the further opening of the borders to the East European countries as well as fundamental structural developments in the field of economy will generate more traffic and transport. In Germany (about 80 mill. inhabitants now), private car traffic is forecast from the year 1988 to 2010 by about 34% on the short-distance level and by about 41% on the long-distance one. Freight transport on roads is forecast to increase by 81%. All figures refer to a status-quo prognosis, that means the traffic and transport scene is assumed to develop without being managed (INTRAPLAN, 1991 ; KESSEL+PARTNER, 1991).

Concerning the cities and their regions we can

state that urban settlements continue to expand into suburban and rural areas. This will create more private car traffic. See Fig. 1.

Against this background of the present and future traffic and transport problems we have to develop measures for improving the situation and for preventing future problems respectively. We do this (or we should do this) via a sophisticated planning process, considering new goals and applying modern methods and appropriate procedures.

## 2. METHODS AND PROCEDURES

We define "planning" as the systematical preparation and performance of decision-processes oriented to the objective of creating a desired state. Therefore planning is a goal-oriented activity. There is no beginning, and there is no end. Plans are documentations of specific momentary stages of the planning process. Planning has to be a continuously running process with permanent recurrences of feed-backs. See Fig.2 (FGSV, 1985).

The several fields of activity within the different planning stages in Fig.2 may be further differentiated, for example by tests of environmen-

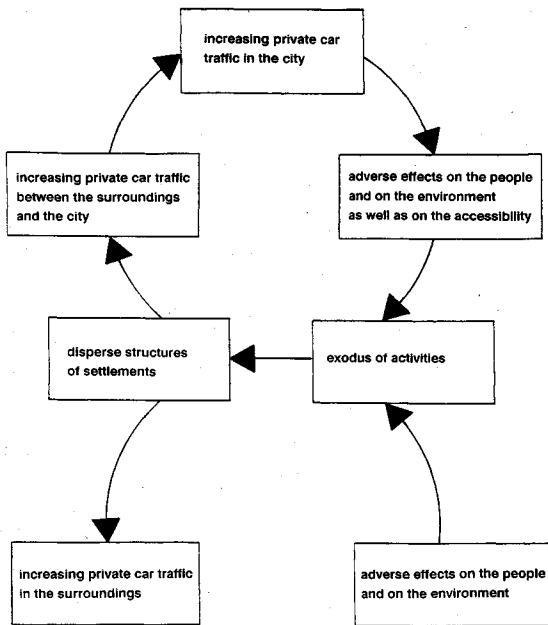


Fig.1

tal compatibility and/or of social compatibility.

From the today's point of view former traffic and transport master plans in most cases were inadequate with respect to methods, procedures and contents. Concerning the contents old traffic master plans mainly treated only the motorized car traffic. With respect to the procedure former traffic master plans mainly gave preference to analytical investigations. Too much emphasis was given to traffic counts. This changed with the wide-spread use of computers. From now on preference was given to profound computing travel demand, travel matrices, modal split and traffic assignment. Creative and innovative planning still was a seldom event... The former methodical approach may also be criticized. According to the procedure of most disciplines within the field of civil engineering also traffic and transport engineers related their planning and design works to counted or forecast traffic data. Traffic data was considered as a given invariable fact. Meanwhile, the methodical approach has changed. Especially in urban and regional areas, traffic and transport planning has to be performed on two different levels of planning in two different ways. See Fig. 3. Only on the level of tactics it is correct to plan, to design and to operate traffic and transport systems according to the traffic and transport data. Here, for example, the objective must be making the "rest" of travel demand, which could

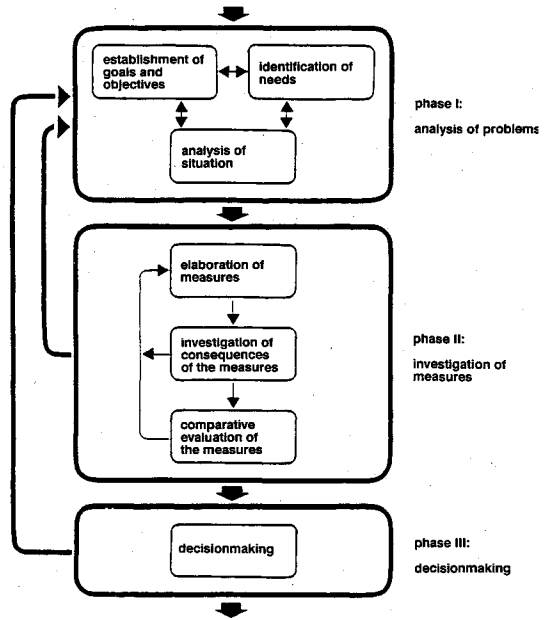
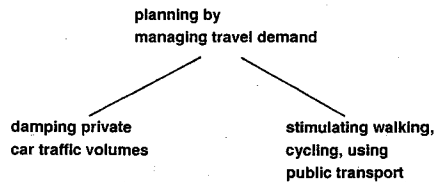


Fig.2

level of strategy ("macro-planning")



level of tactics ("micro-planning")

planning according to traffic and transport patterns

Fig.3

not be avoided or which was not shifted to walking, cycling, and using public transport, compatible with the urban conditions. This may, for example, mean the establishing of area-wide urban speed limit zones of 30 km/h. This may also, mentioning another example, mean the operation of coordinated signal systems ("green waves") with unconventionally low speeds. According to economics the generalized rule may be formulated that the supply is the instrument by which the demand can be influenced.

What may be understood with "compatible with the urban conditions" is shown in Fig.4 (see also BECKMANN, 1991).

It is very difficult to solve the problems of defining the extreme values of the social and environmental effects under the very specific local

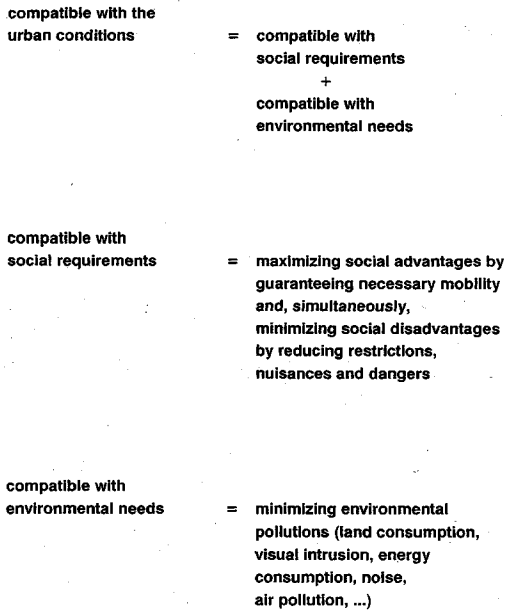


Fig.4

conditions. Generally speaking, Northern Europeans will then judge traffic and transport to be compatible with the urban conditions when pedestrians, cyclists and public transport predominate private car traffic. Therefore the urban traffic and transport scene may be called "compatible with the urban conditions" if there is an utmost minimum of private car traffic. This portion of private car traffic is called the "necessary" one. That means, only necessary car trips are admitted. This amount can at least be "zero", for example in pedestrian areas during specific hours of a day. It is clear, that the amount of "necessary private car traffic" cannot be defined in general. This has to be done within the planning process by political decisions for the very specific local conditions.

According to the traffic and transport planning process (Fig.2) goals and objectives have to be established. This is being done in the phase "analysis of problems" together with the citizens and the politicians in the form of a scientific political consulting process. The established goal-system(s) may or must be changed during the planning process.

Goals and objectives change from time to time and from locality to locality, because they are based on specific interests of different persons or groups of persons. It has become very difficult to establish a goal-system today, because the positive and negative effects of private car traffic are judged differently. Many people like the motor-

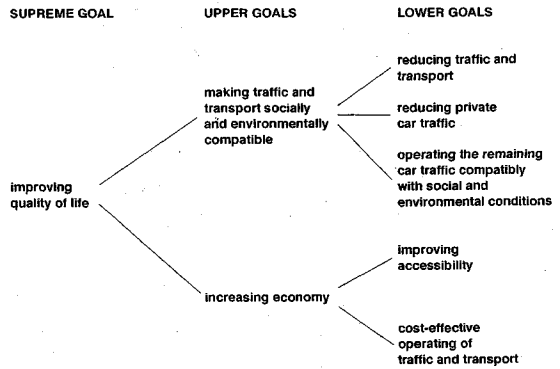


Fig.5

car, some others curse it. But also the car-owners themselves are fond of the car or hate it, depending on whether it is their own one or not. The changing of values and attitudes does not correspond to the individual behaviour patterns. Car usage is still determined from habits and thoughtlessness.

An example of a generalized goal-system, by which traffic and transport may become compatible with the urban conditions, is shown in Fig.5. Of course, this goal-system has to be differentiated according to the very specific local conditions.

Every goal-system contains goals' conflicts. They may arise especially between the goals of improving accessibility and cost effective operating of traffic and transport on the one hand and the goals with environmental aspects on the other.

According to the very many goals, which are thought to be reached by traffic and transport planning there is a large variety of measures which are proposed to be applied. This variety of proposals reaches from the postulation of drastic reduction of private car traffic by creating more pedestrian traffic, cycle traffic and public transport until to the postulation of promoting private car traffic by building more garages, parking facilities and roads and streets.

The measures for improving the traffic and transport situation, which have to be developed according the politically laid down goal-system, must form a bundle of "push-and-pull" measures. As practical experience has shown, stimulating the usage of public transport, for example, will be only effective if, at the same time, damping private car traffic is done. Concerning freight transport we have to develop measures which shift the modal split towards railway and shipping.

It should be a fundamental rule to practise

**Traffic management measures in private car traffic :**

- increase of mineral taxes
- taxes for car ownership
- reduction of privileges for car users
- road pricing
- privileges for car pools (additional fees or holidays for non-motorists)
- ramp metering
- control of access
- keeping out car traffic of urban areas
- area-wide parking control (residential parking, pay parking, limited parking duration, ...)
- reduction of private parking
- speed reduction
- traffic calming
- operating traffic control systems goal-oriented to socially and environmentally compatible car traffic (including restrictions on car traffic by signal control)

Fig.6

“free market economy”, that means : for driving and riding people should pay the real price. This can easier be said than be done.

The most important part of a goal-oriented bundle of measures is the traffic and transport management. It guarantees shorttime realisation and high effectiveness. In addition it is comparatively cheap. Traffic and transport management may be defined as the organizing of traffic and transport in a physically existing traffic and transport system. As an example Fig.6 shows some mutual measures of traffic and transport management concerning the private car traffic.

### 3. SOME NEW DEVELOPMENTS

There are still many specific technical questions being discussed. In order to illustrate the widespread efforts of solving or even reducing the urban and regional traffic and transport problems some aspects out of the large variety of hardware and software developments in this field will be dealt with here shortly.

But before this will be done, some remarks about the general German urban and regional planning problems of today, namely how the East German cities may handle their traffic and transport problems, shall be made.

Nobody could expect that the reunification of the two German states would come so early and so suddenly. After the peaceful revolution in the former German Democratic Republic (GDR) in 1989, the GDR joined the Federal Republic of Germany on October 3, 1990. The early effects were total freedom and free market and-in the traffic and transport scene—a rapid increase of

car-ownership. The consequences were increasing private car traffic and decreasing public transport. Freight transport shifted from railway (Deutsche Reichsbahn) to highways, roads and streets. The utmost negative side-effect was the increase of the number of traffic accidents.

The situation in urban and regional traffic and transport in Eastern German cities may in brief be characterized as follows : Only some inner districts in a few bigger cities were rebuilt after World War II, for example in East Berlin, Dresden, Leipzig and Chemnitz (“Karl-Marx-Stadt”). There we can find broad roads and streets, big flats (also in rural areas, mostly with ugly architecture), but also restored historical buildings, like churches and castles. The smaller cities and towns kept to their old traditional structures. Almost all facilities—not only traffic and transport ones—and the houses are in a very bad state. But : the old urban structures are a great heritage and an enormous chance for keeping the urban picture and shape alive, which was not the case in many West German cities which were rebuilt rapidly and with modern (say : bad) architecture and according to the rapidly growing private car traffic, shortly after the end of World War II. Another chance of the Eastern German cities is the restauration of their facilities on the highest technological level. But the urban renewal will take much time and will cost much money. And : many Eastern German politicians, citizens and experts are not yet familiar with modern democratic planning processes...

Now a few informations on some new developments.

#### Traffic Calming

In order to improve the urban environment including the improvement of traffic safety, comprehensive studies were carried out in six German cities of different sizes and structures for over about ten years with financial support by some Federal ministries. Many experiences were gathered concerning methods and procedures, participation of the citizens, specific measures (for damping private car traffic and for stimulating walking, cycling and using public transport; town-shaping) as well as concerning legal and financial questions. Guidelines and technical standards were derived or will be established, for example concerning the design of local and main roads and streets. Since 1990 cities are legally enabled to apply area-wide speed-limits of 30 km/h. But until now it is still not quite clear which the advantages of such “speed 30-zones” are with respect to noise, air-pollution and fuel-consumption. On the other hand it could be significantly

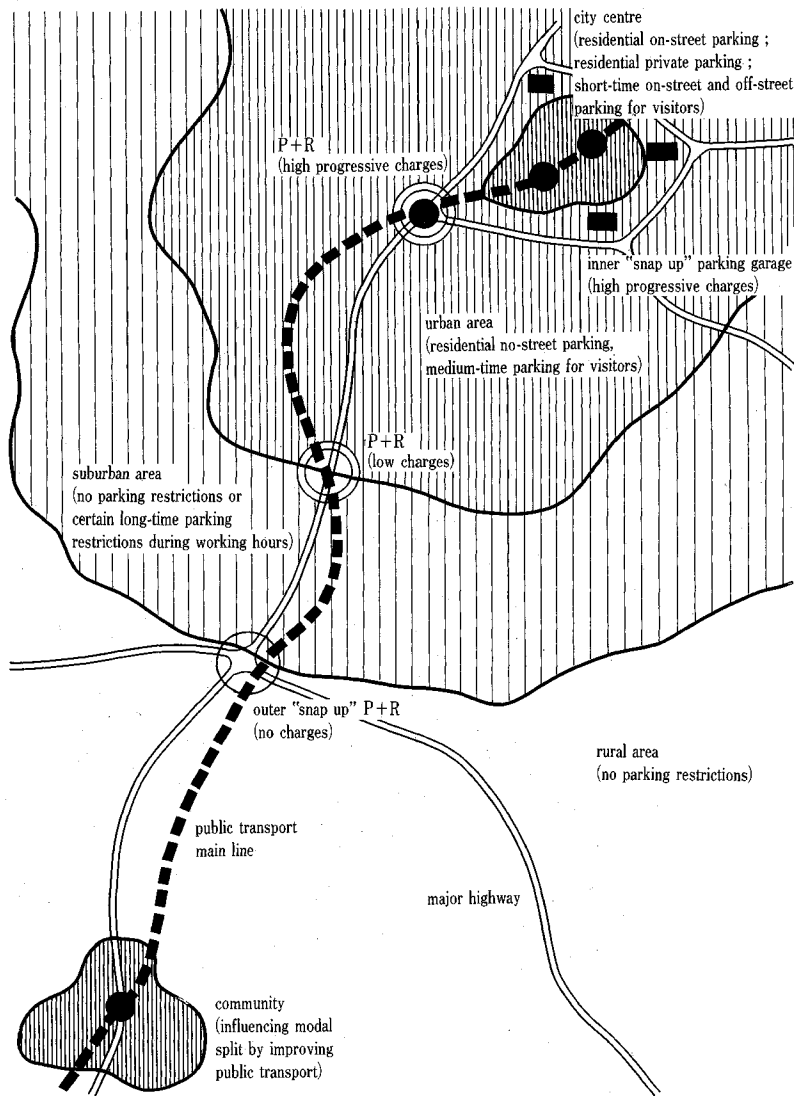


Fig.7

proved by before-and-after-studies that traffic safety can be remarkably increased.

It might be mentioned that, before the area-wide speed limit zoning became legal, there were two philosophies. The first one postulated that the normal speed limit in urban areas should be 50 km/h, exceptions down to 30 km/h had to be ordered by traffic signs for specific roads or parts of the road network. The other one postulated that the normal urban speed limit had to be 30 m/h, and exceptions (for main roads and streets) should be ordered by traffic signs. The Federal German government at least decided to enact the rules according to the first philosophy. But until now the controversial discussions did not come to an end.

### Parking Management

Within the bundle of "push-and-pull" measures for reducing (undesired) private car traffic, area-wide parking management has proved to be a very effective and realistic "adjusting screw". The parking managing procedure has to start with classifying car users into residents, visitors (including customers, goods-vehicles and service-vehicles), and employees. For these different groups different parking permissions must be assigned. Emergency cars, police and similar services must be allowed to enter the city centre and to park therein at every time in contrast to other users. It proved to be best to assign parking permissions as follows :

**residents** : residential on-street parking (park-

ing permits) ; private off-street parking

**visitors :** short-time on-street parking (temporal restrictions, parking meters, parking disc zoning), parking garages

**employees :** long-time on-street parking prohibited, only private parking allowed.

The design of an area-wide parking management scheme requires a comprehensive planning process, starting from a profound local analysis down to specific design work.

Park-and-ride concepts are an integral part of area-wide parking management schemes. Until now the existing park-and-ride facilities in German cities are rather small. Exceptions are the cities of Hamburg and Munich. In the past, many experts meant that park-and-ride can only work in large and densely populated agglomeration areas with rapid rail systems. Today, more and more medium-size cities plan park-and-ride facilities at their peripheries. In some cases they are being planned as one measure within the so-called "cooperative traffic management" schemes. Especially big automobile firms proposed and promoted such facilities.

Fig.7 shows a simplified sketch which illustrates an areawide parking management scheme including park-and-ride.

#### **Priority Programs for Public Transport**

Many priority programmes were developed for speeding up trams and buses. In every case they consist of a bundle of measures. The most important and most effective measures therein are priority schemes at traffic lights and transit lanes for buses and bus sluices. At traffic lights public transport can either be integrated into the co-ordinated signal systems ("green waves") for private car traffic or utmost priority to public transport can be given by the strategy of "immediate green", suppressing the green waves of private car traffic. There is a tendency towards the second mentioned strategy. This strategy also includes the traffic management measure of environmentally oriented "queuing management". That means that queues of private cars at traffic lights in the urban areas are avoided by producing queues at traffic lights at the periphery of the city at non environmentally sensitive locations. There are also bus stops or trams stops with parking facilities which shall stimulate car drivers to park their cars there and use public transport.

Most federal states provide financial assistance to such priority measures in urban and suburban areas.

#### **Renaissance of Light Rail**

In Germany, as well as in other European countries, public transport has a long tradition. There is a large variety of public transport means, conventional and unconventional ones.

Despite of big investments into metros and regional train systems in West German urban and suburban areas in the Seventies and Eighties, public surface transport (bus, tram, light rail) holds remarkable shares in total patronage, for example 44% in Hamburg, 42% in Frankfurt/Main, and 39% in Munich. In most German cities up to 300,000 inhabitants, buses and trams or buses alone are the only public transport means.

At the end of World War II, all German cities with more than 100,000 inhabitants had close-meshed networks of trams. During the following two decades most tram networks were abolished or even recut. Because of the car-oriented traffic and transport policy at this time public transport was mainly considered as metro-systems in the big cities and as bus-only-systems in the medium sized cities (TOPP, 1991).

Meanwhile, urban traffic and transport policy has changed. It has become common opinion that trams and light rails above ground meet the people's needs much better with respect to orientation, usage, distances to stops, urban experience and public awareness. Incidentally, the costs for investment and operation of onground public transport is about only ten percent of those of underground systems.

Therefore, the former abolitions and recuts of tram networks are replaced by re-introductions and extensions. These measures are heavily being discussed. In Saarbrücken (about 200,000 inhabitants), a comprehensive study compared different public transport systems, such as bus system, advanced tram system, mini-metro and cabin systems. It came to the result that a tram system proved to be the best with respect to economics, accessibility and town shaping. Tram is now being installed in this city (KIRCHHOFF, 1990).

Even in our biggest German cities Berlin and Hamburg tram systems shall be rebuilt. In the Eastern part of Berlin the tram has survived, and now plans are developed to extend the tram system also to the Western part of the city.

A new idea of modern operating tram systems was born in Karlsruhe. In that agglomeration area there live about 500,000 inhabitants. The stations of the Federal railways are situated 3 to 4 kilometres from the inner city. The existing tracks of the Federal railway and the urban tram were linked together. The vehicles can operate

with the two different electrical systems because they have dual current engines. The tram now serves the region as well as the city including the main pedestrian mall (LUDWIG ; DRECHSLER, 1991).

#### **New Tariff Systems in Public Transport**

There are many new developments in the field of public transport in German cities which belong to the software. This is, for example, the tariff. Different new tickets were developed. They all bear attractive names, for example "environmental ticket". Some ones allow a family of up to five persons use only one ticket during several hours of a day or on Saturday and Sunday, or they can be used by different persons alternatively in the whole agglomeration area. One new development is the "job-ticket" which is being payed by the employers and which shall cause a better usage of public transport by the employees.

Similar to a job-ticket is the "students' ticket" which for the first time in Germany was applied in Darmstadt. Since the winter-semester 1991/92 the identity card of the students of the Technical University and of two High Schools in Darmstadt (altogether about 30.000 students) is the ticket for all buses and trams (of the Darmstadt Public Transport Company) in the Darmstadt region. A solidary amount of only 24,— DM (now ; in 1991/92 only 14,— DM) had to be payed by every student for the whole semester, i.e. only 4,— DM per month. In addition, in the main quarters of the Technical University an area-wide parking management is in operation (parking is restricted to persons who are not able to use public transport or to whom using public transport would be an unreasonable demand). The result of the "students' ticket" was remarkable. By comprehensive interviews it was found that the number of students which live in Darmstadt City and use public transport increased by about 100% and that the number of students which live in the surroundings and use public transport increased by about 33%. The reduction of private car traffic of the students corresponds to these above mentioned figures. As a side-effect the image of public transport improved. The "students' ticket" proved to be a psychologically convenient ticket (PLANUNGSBÜRO RETZKO+TOPP, 1992).

It may again be learned that only a combination of attractive public transport and of parking restrictions can produce diversions from private car traffic to public transport.

#### **Co-operative Traffic Management**

As well as in many agglomeration areas all over the world also in Germany co-operative

traffic management schemes are being developed. They all aim at the goal to achieve better sharing of the service of different traffic and transport systems within a comprehensive co-ordinated communication network. The city of Munich started this sophisticated procedure at first. Other cities, like Berlin, Bochum, Frankfurt/Main, Hannover, Köln and Stuttgart followed. In most cases, the local activities are integrated in European research programmes.

Whereas many other German cities started the project from the basis of so-called "intelligent technical systems", the city of Frankfurt/Main and the Land Hessen tried to avoid the increase in attractivity for private car usage and started an integrated approach. Accordingly the Frankfurt Urban Integrated Traffic Management (FRUIT) is based on a goal-system which includes the politically fixed objectives of the city parliament. Parts of the FRUIT-study are : integrated strategy of traffic and transport management, traffic data support system, driver information system, access control and road-pricing, parking control, public transport and freight and fleet transport management. The main characteristics of the exploration and feasibility study are : 1) not to be only a technical study, 2) to consider planning, design, construction and operation as a whole, 3) to cover not only the area of the city but also the rural region, 4) to evaluate the different technical and non-technical measures, 5) to consider cost-benefit relationships, 6) to develop specific single measures which can be applied in a short-term procedure, 7) to elaborate contributions to current European research projects and 8) to stimulate co-operations between the very many administrations, offices, companies and others in the Rhein-Main-area (BOLTZE, 1992).

The study was finished in summer 1993. We do hope that reliable measures can be applied in order to improve the Frankfurt/Main traffic and transport situation which is now characterized by the fact that nearly 200,000 commuting people using private cars produce adverse effects to about 630,000 inhabitants of the city of Frankfurt/Main, to themselves and to their common urban environment.

#### **4. FINAL REMARKS**

The problems of today in the field of urban and regional traffic and transport may not be solved totally until tomorrow at every place, but they can be reduced to a level of compatibility to the human beings and to their environment. Experts know what should be done. But until now the politicians tend to avoid unpopular decisions



which might lead to a drastic improvement of the current and future traffic and transport scene.

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