

The Project FRUIT:

A goal-oriented approach to traffic management in Frankfurt am Main and the Rhine-Main Region

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INTRODUCTION

The traffic situation in the city Frankfurt am Main is characterised by 300 000 commuters on a weekday travelling to school and to work; 200 000 of these commuters travel by car, most of them on their own. Heavy traffic jams on main access streets in Frankfurt and its vicinity happen on a regular basis. Public transportation only partly has priority to car traffic or is provided with separate bus lanes. Very often buses are stuck in traffic jams and therefore cannot work as an alternative mode of transportation. In addition, rescue and emergency services as well as supply services are impeded by heavy traffic. As a result, people try to avoid traffic jams by driving through residential areas. Furthermore, more traffic is generated by people looking for parking space. On the one hand, loss of time and accidents are the negative results for road-users; on the other hand noise pollution, car emissions and other impediments by traffic have negative effects on residents, cyclists and pedestrians. On top of that, traffic will further increase in the future according to prognoses. Though growing traffic problems, the attractiveness and basic functions (i.e. living, working, shopping, recreation) of the city as well as of the region are endangered.

In order to solve these problems, there are different approaches, which partly exist and already are applied by other big cities and metropolitan areas. Frankfurt am Main, for instance, established a programme for priority treatment of buses and trams at traffic lights or special bus lanes, which only can be used by public transportation. Furthermore, the City of Frankfurt installed a traffic-actuated control system for traffic lights, defined zones for residential parking and speed-reduced areas where the speed limit is 30 km/h, set up cycling routes and traffic lights, which give priority to pedestrians, reduced parking space in the city centre, etc. However, those measures, which unquestionably are important, are only isolated strategies in order to achieve traffic-relevant goals. Combined (synergetic) effects are rather accidental and not verified.*

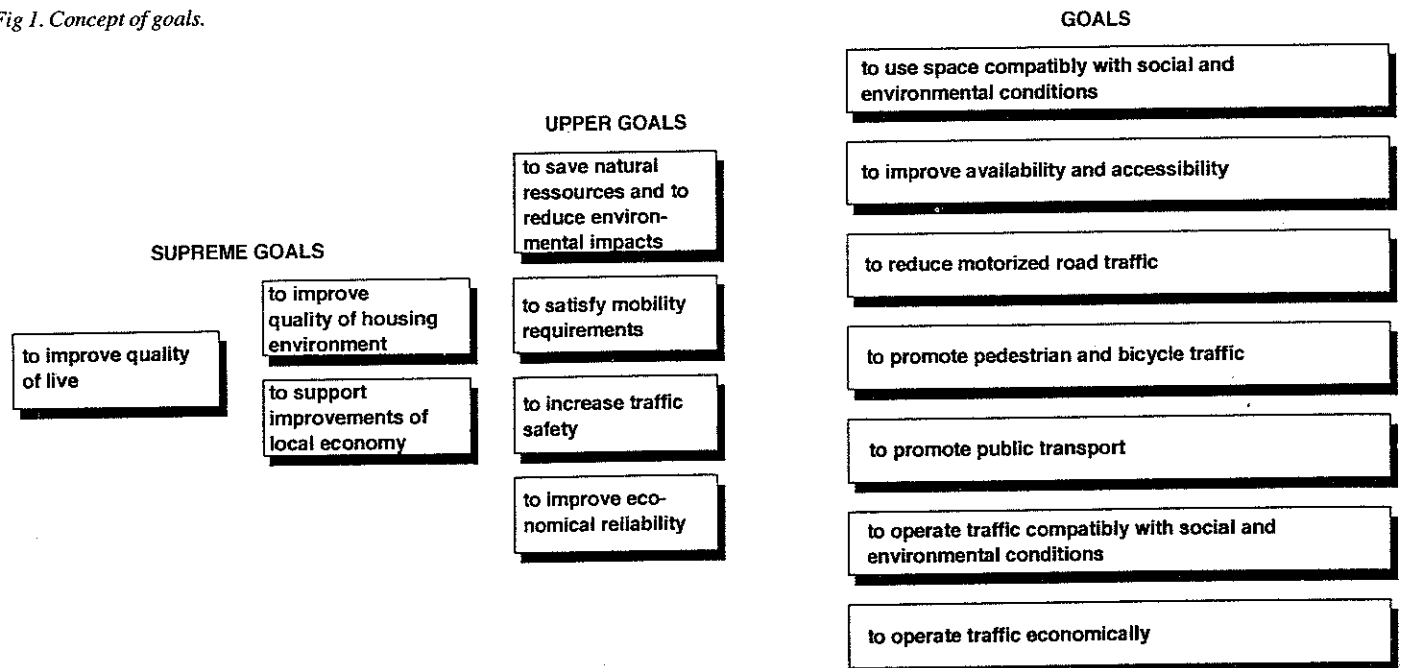
*An example is the reservation of parking space for residents in so-called residential parking zones. The shift of commuting traffic out of these areas is an intentional side-effect, potential effects on the modal split assumed. Which public transportation lines are affected to what extent as a result only can be presumed. It is unclear whether capacity restraints might occur as a direct consequence. In the same way the interdependencies of other measures mentioned above are unknown.

A new, goal-oriented approach

A more far-reaching approach is to develop a concept of traffic management for the City of Frankfurt and the entire Rhine-Main region in order to solve these problems. However, before implementation such measures should be carefully investigated. They should cover both the management of traffic demand and the management of the entire traffic system (supply). On the highest, strategic decision-making level it has to be investigated to what extent these measures contribute to achieve political and planning goals and to what degree they can complement each other within a general concept.

On the basis of this requirement the municipal authority of Frankfurt — represented by its Road Traffic Authority — started the project FRUIT (FRankfurt Urban Integrating Traffic management). FRUIT developed approaches for implementing an integrating strategy of traffic management within an exploration and feasibility study based on a defined goal concept (Fig 1). It established which measures within traffic management and what new types of Advanced Transport Telematics (ATT) are useful, and which measures have to be supplemented, continued and further developed. Subsequently, a fast implementation of combined measures is

Fig 1. Concept of goals.



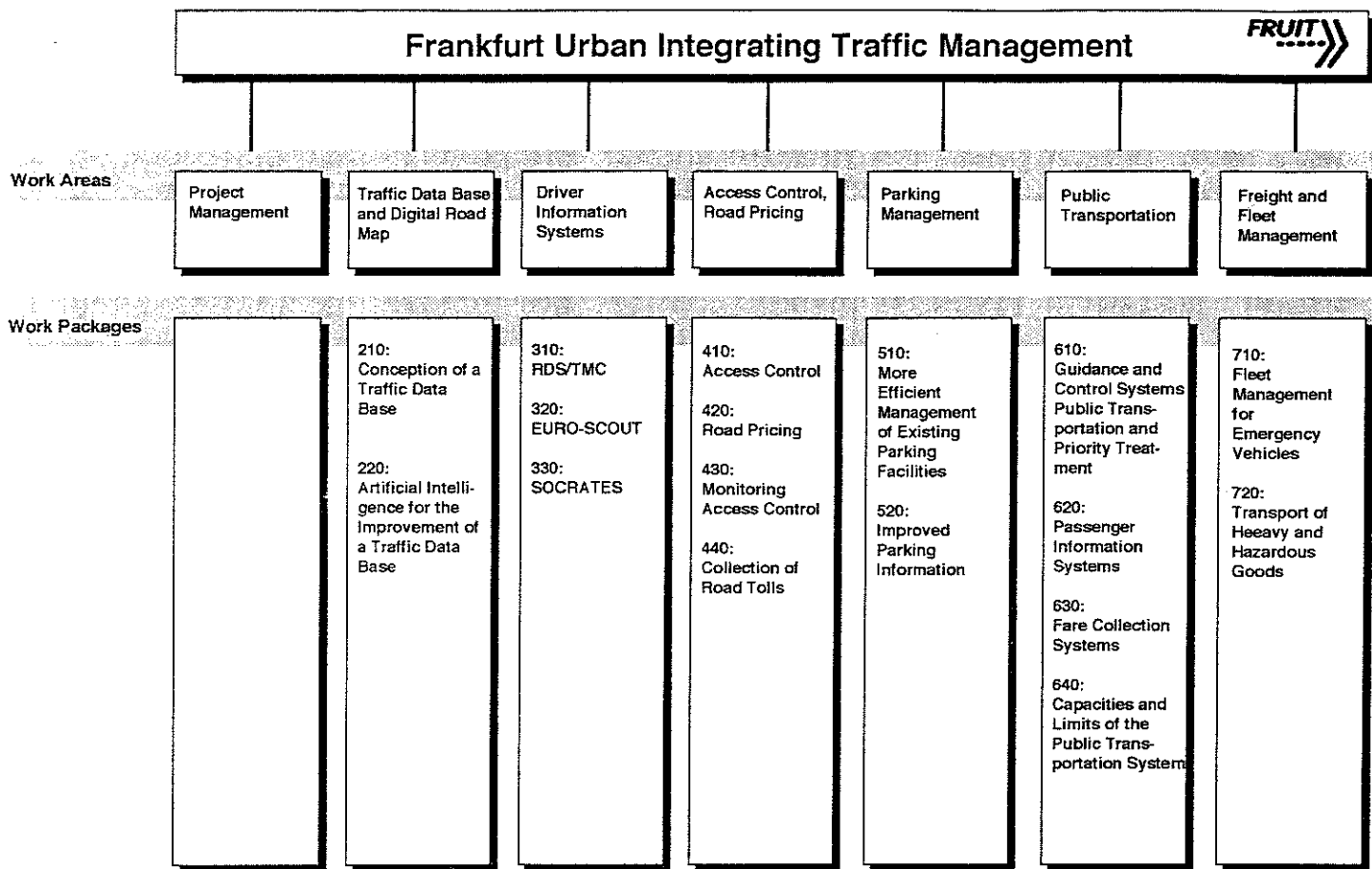


Fig 2. Work areas.

intended. The following statements describe FRUIT in more detail:

- FRUIT goes beyond the investigation of technical feasibility. Rather it concentrates on management measures and, thereby, techniques will be used in a goal-oriented way.
- FRUIT targets to operative measures for traffic management. However, the unit of planning, construction and operation of the system must be considered.
- FRUIT does not look at measures in an isolated way referring only to Frankfurt, but will reflect the very complex relations of Frankfurt with its vicinity. Therefore, traffic management is developed in close co-operation with the State of Hessen and all the other regional decision-making bodies.
- FRUIT focuses on the evaluation of possible measures within traffic management and new techniques which refer to the special situation in Frankfurt.
- Intelligent techniques should be applied in fields, where it is useful. However, costs and benefits have to be considered.
- FRUIT shows which measures should be implemented in Frankfurt within an integrating traffic management strategy and the next steps which have to be taken. As the final result of this exploration and feasibility study there are concrete suggestions for introducing and testing of measures (pilot projects). In areas where this intention cannot be realised, suggestions for

- more consolidated studies are made.
- With the results of FRUIT the City of Frankfurt likes to share the exchange of experience between European major cities in the field of traffic management. Frankfurt joins the POLIS initiative and very much appreciates the possibility of sharing the ATT programme as a partner of the RHAPIT project*.
- FRUIT was not intended only as a study, but it has also introduced a new and intensive form of co-operation between all decision-making bodies in the field of traffic management in the Rhine-Main Region. Therefore, FRUIT set up an organisational framework.

Contents and organisation of the project

The first approach to FRUIT could not consider all issues of traffic management. Due to the limited period of examination, hitherto, the contents are confined to possible operational aspects of traffic management. Issues which go beyond that (e.g. referring to the grading of working and business hours, closing time, etc.) are partly dealt with at other institutions or are partly dealt with not sufficiently enough. In order to meet the standard of an integrating traffic management, they have to be integrated into an overall organisation subsequently.

*RHAPIT is a project of the State of Hessen intending to test the SOCRATES system in a field-trial. SOCRATES is an individual driver information and route guidance system based on communication via GSM mobile telephone networks.

The contents of the project FRUIT were structured system relevant, in the end as well to meet the requirements of the EC research programme DRIVE II (ATT). The structure of organising the project guarantees the consideration of contents related interweavings, which are especially important for integrating traffic management.

The definition of a strategy for integrating traffic management is regarded within FRUIT as generic task. The structure of the project in individual work areas is shown in Fig 2.

Methodology of the study

The following steps mainly were necessary in the course of FRUIT to achieve the project goals described above:

- definition of the concept of goals for traffic management;
- gathering of possible measures and selection of measures to be investigated;
- impact analysis, investigation of feasibility and comparative evaluation of different technical approaches;
- evaluation of measures on the base of the concept of goals;
- grouping of appropriate measures to implement an integrating strategy of traffic strategy of traffic management; and
- definition, evaluation and priority ranking of project proposals.

The concept of goals for traffic management for Frankfurt am Main (Fig 1) was worked out on the basis of politically-formulated

goals. The contents of the project were roughly structured in advance for the project definition and, in the course of the project, specified in detail through participation of important decision-making bodies. Before the selected measures could be evaluated on a strategic level, the extent of their effects had to be defined. Furthermore, their feasibility had to be guaranteed.

INVESTIGATED MEASURES AND THEIR FEASIBILITY

Access control and road pricing

In this work area, first, different opportunities of application for access control and road pricing in Frankfurt am Main were discussed. For the purpose of an extended examination of effects and feasibility, finally some concrete options of access control and collecting road tolls were selected. FRUIT also included the comparison of different technical solutions to monitor access control and to collect road tolls. However, this is not elaborated on further here.

Access control for Frankfurt's extended inner city for vehicles without pollution reducing technology

The investigated access control scheme for the extended inner city of Frankfurt (within the Alleenring, including Sachsenhausen) would affect 255 000 employees and 150 000 residents. This measure was especially investigated in connection with the amendment of the environmental legislature (*Bundesimmissionschutzgesetz*) and should be applied to all vehicles without pollution-reducing technology. This type of access control scheme will not be feasible in the near future. The main reasons are considerable investment measures, which — required for the necessary increase in capacity of the public transportation sector — could not be provided in the short or medium term. Even if vehicles are increasingly equipped with pollution-reducing technology (and as a result traffic-related effects of this measure are decreasing) sufficient capacities presumably cannot be provided before the year 2005. Other substantial problems are due to urban planning related implications and to monitoring this measure.

Access control for Frankfurt's inner city

The possibility of controlling access for cars was investigated for the inner city (the area within the Wallanlagen and around the central train station). This would affect an area with a total population of 13 000 people and 100 000 jobs. It was assumed that the control of access would be in force except on Sundays and National Holidays. The operation of essential traffic would be guaranteed by keeping free the access to car parks, free delivering of goods from the morning until early noon time and by maintaining allowances for certain users and situations. The regulations assumed would particularly restrict access to people travelling to work or to school (approximately 40 per cent would be shifted to other modes of transportation). Journeys for shopping and recreational purposes would be restricted only to a certain extent (approximately 10 per cent would be shifted to other modes of transportation).

Access control would be monitored by a modern and automatic technique. In order to minimise the number of checkpoints, traffic routes would have to be changed on spatially close-defined areas. Introducing this type of an access control scheme should happen area by area, because this would guarantee the smooth introduction, assimilation, flexibility and independence from further measures restricting through traffic. The introduction of access control requires intensive public relations, instructional and educational work as well as information about the restrictions in sufficient distance from the affected area. Generally, there is no indication that the investigated access control scheme for Frankfurt's inner city would not be feasible, if it were politically promoted.

Road pricing

Collecting road tolls in Frankfurt am Main would have to be regarded as a flexible instrument for managing traffic demand. But, altogether, it can be stated that road pricing in Frankfurt am Main will not be feasible in the near future. Since road pricing, which is already applied by several European cities, is an appropriate measure to regulate demand and flow of traffic, the City of Frankfurt am Main should participate in the further development of this issue together with other cities, the Federal States and the Federal Government. Future investments, especially the introduction of electronic techniques for monitoring access control, should consider in anticipation the application of automatic debiting later on.

Public transportation

Currently, in Frankfurt am Main and the Rhine-Main Region numerous measures for the public transportation sector are driven forward by different authorities. Examples are the planning of extending the rail infrastructure in general, considerations for an integral schedule and, of course, overriding reflections on the structure of the new regional transportation authority RMV (*Rhein-Main-Verkehrsverbund*). Furthermore, in Frankfurt am Main there is an extensive investment programme for priority treatment of the entire public transportation system above ground. Therefore, FRUIT only investigated supplementary measures on the operational level.

Parking management

Parking management in Frankfurt and the Rhine-Main Region is already well developed. There are detailed parking management concepts, which include both complete management of parking space in the inner city and residential parking in residential areas. A concept for the Park-and-Ride system in the Rhine-Main Region is in progress, and the dynamic parking guidance system was put into operation. In FRUIT, only supplementary measures were investigated.

Freight and fleet management

For this work area first a very comprehensive analysis of possible measures was conducted.

In order to come to results in the near future and due to the pressing need for action, the issues fleet management of emergency services and monitoring the transport of hazardous and heavy goods were dealt with in a first approach.

Driver information systems

Investigations in this work area focus on three driver information systems: RDS/TMC for transmitting traffic news over the radio; EURO-SCOUT as a route guidance and driver information system using beacons for communication; and SOCRATES, which is a comparable system using the GSM mobile telephone networks as a means of communication.

- From today's point of view, the RDS/TMC system is feasible, because currently it is tested finally in the field-trial BEVEI and is subsequently prepared for introduction in North-Rhine Westphalia and on a federal level. Here, FRUIT has to come up with clarifications, to what extent on the one hand the system can meet urban needs, and on the other hand be incorporated in an integrating system for travel information.
- EURO-SCOUT was already tested in detail in the Berlin field-trial LISB. An introduction of this system in Frankfurt am Main and the Rhine-Main Region generally appears to be feasible. The project FRUIT included an overall evaluation in planning terms as well as a clarification of the basic conditions for its introduction.
- In order to test SOCRATES, in the context of the project RHAPIT a field-trial in the Rhine-Main Region is currently being considered. Due to the system's state of development, which compared to EURO-SCOUT is less advanced, the feasibility study could not clarify all issues in conclusion. Essential differences between SOCRATES and a beacon-based system are less costs of infrastructure on the one hand, which are contrasted with higher costs of equipping cars on the other hand. Furthermore, the possibility of the SOCRATES control centre to influence the traffic flow are presumably smaller.

From a transportation and urban planning point of view a general problem of guidance and information techniques is that these systems make the use of cars even more attractive. This generally counteracts the intention to shift traffic to environmentally and urban compatible modes of transportation in Frankfurt am Main. This argument certainly is correct, provided that the basic conditions do not change (the amount of traffic, the capacity of road infrastructure, restrictions for the motorised road traffic, etc.). Basically, it should be considered, that traffic management measures like the introduction of driver information systems should not be evaluated individually; rather it has to be evaluated as part of a group of measures. Therefore, it can be deduced:

■ mean Δ max. value ▲ min. value — mean + stand. deviation - mean - stand. deviation

Fig 3 (opposite, with key left). Results of the goal weighting.

- Unchanged basic conditions provided, improved quality for motorised road traffic due to driver information systems lead to higher attractiveness and, therefore, to a higher volume of motorised road traffic.
- Restrictive measures for motorised road traffic (reducing the width of streets, introducing separate bus lanes, access control, etc.) provided driver information systems can compensate the loss of quality for those road-users. Depending on the combination of measures the traffic volume either remains constant or even decreases.

Regarding the necessary traffic there is the possibility that some of the restrictive measures which have essential advantages for the general situation will be feasible only through improved information (i.e. driver information).

Traffic database

Reflections on the traffic database differed from the methodology of the other work areas. The traffic database cannot be regarded as a separate measure, rather it is directly dependent from other measures.

Therefore, this work area of FRUIT intended to formulate the requirements of a traffic database and to prepare decisions on its structure. This included an arrangement of all attributes to be incorporated in a traffic database (including a digital road map) and a detailed analysis of a centrally or decentrally structured database conception in the special case of Frankfurt am Main.

A conception of a centralised database with access for all institutions appears to be suitable and feasible. Conceptions of this kind could be extended to a comprehensive management centre later on, where also management decisions are made. However, essential issues and questions about responsibilities and competences still have to be clarified.

EVALUATION

FRUIT had to evaluate comparatively 22 operational measures, which appeared to be feasible. For this purpose, the method of a utility value analysis was selected. Benefits were defined in a strongly formalised procedure by an expert panel according to their subjective assessment and based on their individual expertise.

As a first step, at a seminar on April 1, 1993, the weighting of the seven goals was carried out by a group of experts. In a second step at this seminar the 22 measures were subjected to a strategic evaluation by the experts. Therefore, one representative of each public authority and operator participating in FRUIT, one representative of each participating industrial company, as well as the six working group leaders in FRUIT were invited; altogether 21 experts. The evaluation took place anonymously within the seminar. The experts should not evaluate from the perspective of their institutions, but rather from a personal point of view as an expert participating in FRUIT.

- Parking information at selected locations (information posts at highway inns, petrol stations, etc.)
- On-trip parking information (via driver information systems)
- On-street parking managed as parking in public car parks (separation of street segments and operation as car park)

Work area public transportation

- Priority treatment of the entire transportation system above ground and introduction of a COCS* within the city limits
- Priority treatment of regional bus lines coming from the vicinity into the area of Frankfurt am Main
- Dynamic schedule information in socially secure areas at stations underground
- Schedule information via videotext
- Schedule information via personal computer (PC)
- Electronic pocket timetable
- EURO-SCOUT as passenger information system
- Mobility centre
- Cards for paying tickets by money transfer

Work area freight and fleet management

- Planning of emergency services including infrastructure information, dynamic traffic information and automatic vehicle localisation
- Signal control for prioritisation of emergency vehicles
- Computer-based weigh-in-motion and speed control systems
- Route planning for transport of hazardous and heavy goods

The measures of the work area 'Traffic Database' were not considered by the evaluation, because the traffic database is not an end in itself but rather results from the requirements of other measures.

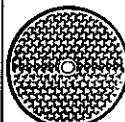
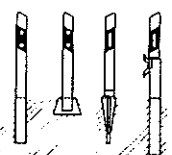
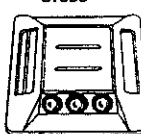


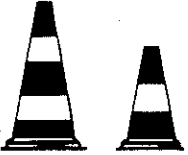
Goals and criteria

The formal procedure in FRUIT and the project goal of a comparative strategic assessment of different traffic management related measures require a structured goal concept, based on politically-formulated goals. The basic idea of the FRUIT goal concept (Fig 1) is to operate traffic compatibly with social and environmental conditions, and to guarantee people's mobility at the same time.

In the case of the goal concept illustrated it is important not to view individual goals separately. Individual goals are not decisive. Rather it is the degree of their achievement, which always depends on the conflicts with other goals. The synergetic effects of goals in the system are regulated by their individually different weighting.

*Computerised Operation Control System for the public transportation system.

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Evaluated measures

The following feasible measures of the different FRUIT work areas were evaluated with regard to their contribution to the achievement of transportation planning related goals:

Work area driver information systems

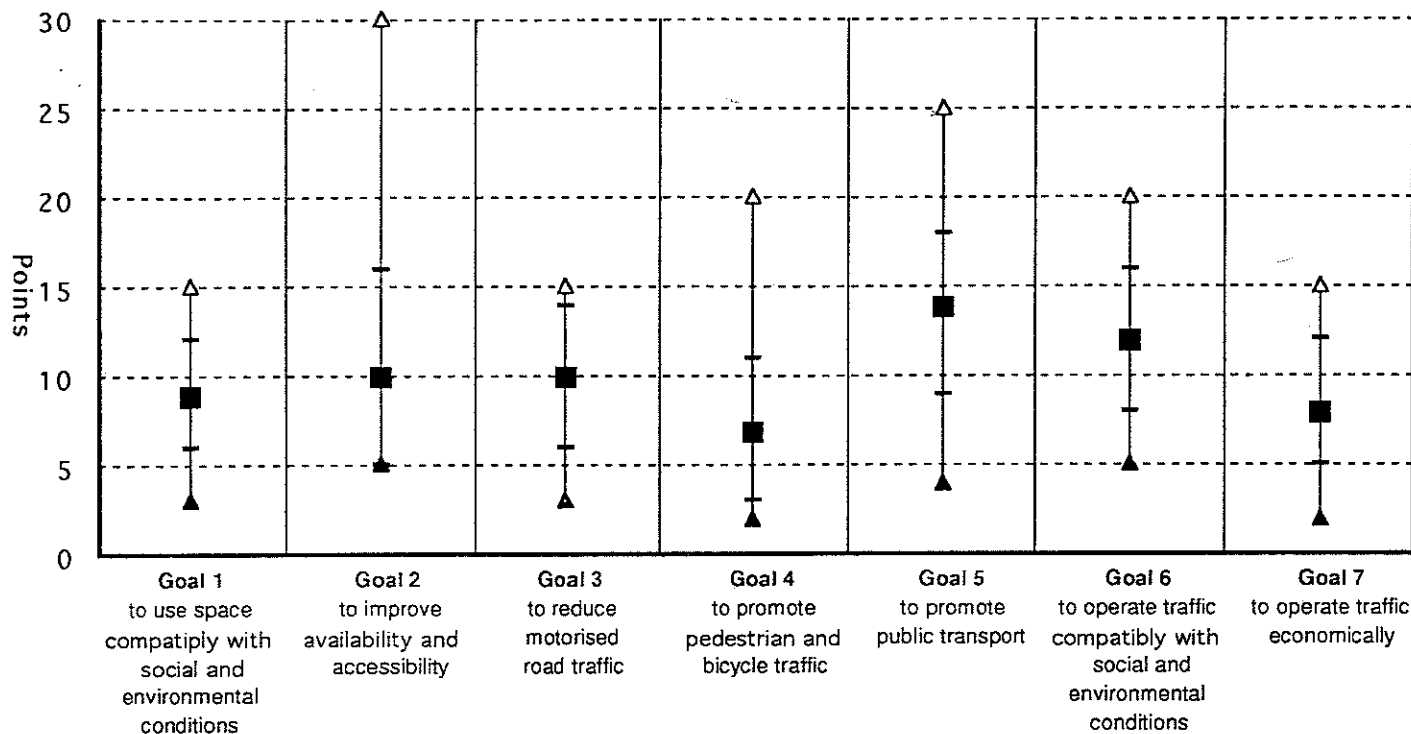
- RDS/TMC
- EURO-SCOUT
- SOCRATES

Work area access control and road pricing

- Access control for Frankfurt's inner city

Work area parking management

- Integrating Park-and-Ride facilities into the parking guidance system
- Pre-trip parking information (via videotext, RDS/TMC at home, etc.)



Criteria which were employed for classification of the respective goal contribution are arranged in Table I. The estimation of quantification of the goal contributions was conducted for the individual measures within the work areas of FRUIT. Afterwards this was presented to the experts in formalised evaluation sheets for the individual measures.

Results

For the goal weighting, the individual experts had the opportunity to weight the seven goals by distributing 70 points in accordance with their personal assessment. The weighting of the goals was analysed for the individual evaluating groups as well as for all evaluators together. Figure 3 presents the experts' results of the evaluation. The following statements can be derived.

- The mean values of the seven goal weights are distributed in a range between 7 and 14 points. Here, the experts give very similar weights to the individual goals (the variation of mean values is only between 9 and 12 points).
- The weighting of the goals 'improvement of availability and accessibility', 'promotion of pedestrian and bicycle traffic' and 'promotion of public transportation' have the largest span.
- 'Promotion of public transportation' is the most weighted goal (14 points), whereas 'promoting pedestrian and bicycle traffic' represents the least weighted goal (7 points). The arithmetic mean of the goal weight for 'promotion of public transportation' is almost twice the value of that for 'promoting pedestrian and bicycle traffic'.

For estimating the goal contributions, the experts had to evaluate for every measure how much it contributes to each of the seven defined goals. Therefore, a scale with seven values had to be used which ranged from -3 (to be assessed very negative) to +3 (to be assessed very positive).

Table I. Goals and criteria for evaluation

Goals	Criteria
To use space compatibly with social and environmental conditions	Surface area of transportation infrastructure inside the city Surface area of transportation infrastructure outside the city Alternative use of space Quality of the city-scape Urban and living quality Location quality
To improve availability and accessibility	Travel time of public transportation Travel time of motorised road traffic
To reduce motorised road traffic	Annual traffic volume of motorised road traffic
To promote pedestrian and bicycle traffic	Annual traffic volume of pedestrian and bicycle traffic Additional surface area of transportation infrastructure for pedestrians and cyclists
To promote public transport	Annual traffic volume of public transportation
To operate traffic compatibly with social and environmental conditions	Annual traffic volume of motorised road traffic Traffic safety Convenience in running the traffic
To operate traffic economically	Capacity use of public transportation Capacity use of motorised road traffic Travel time of public transportation Travel time of motorised road traffic Length of journey

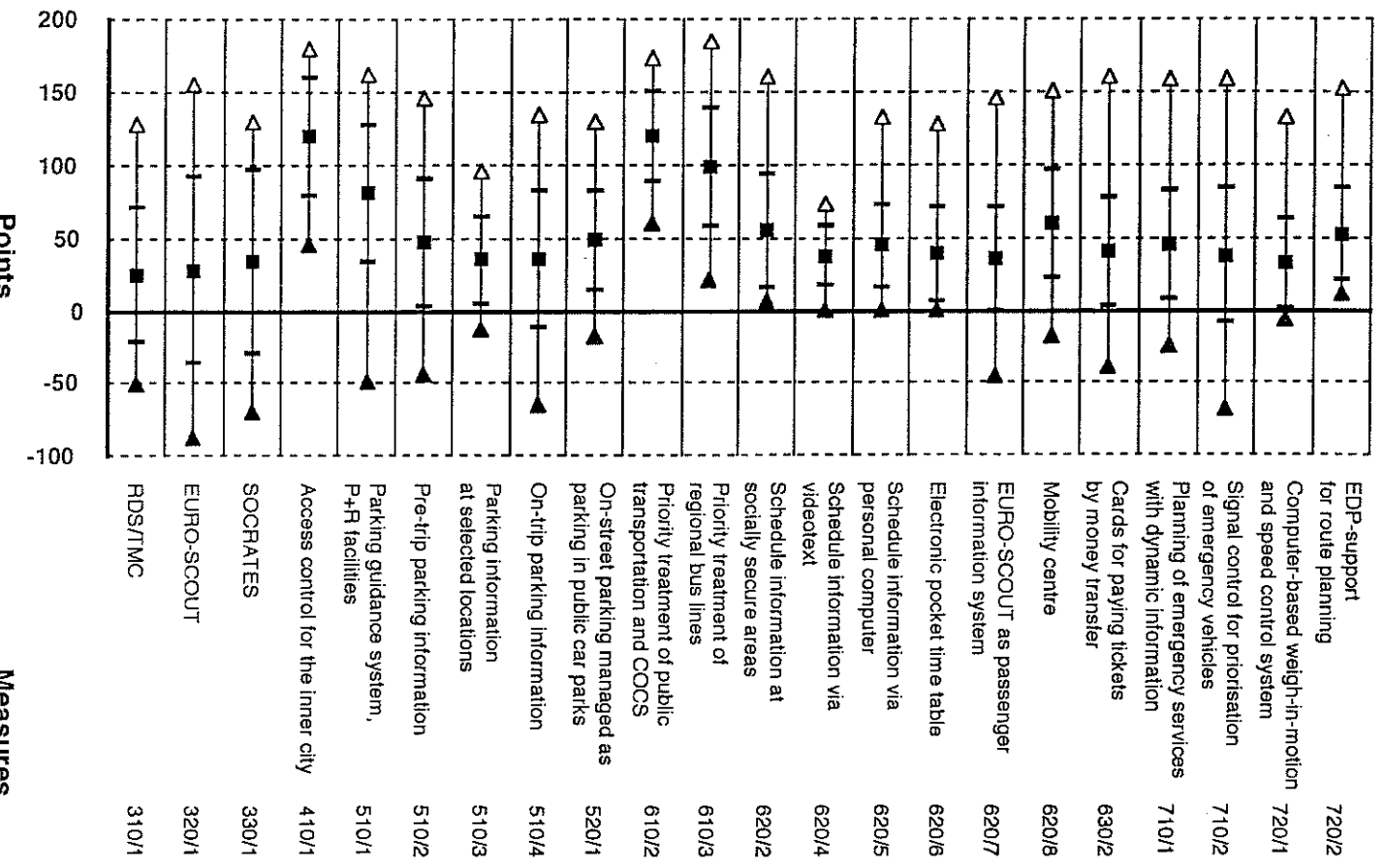
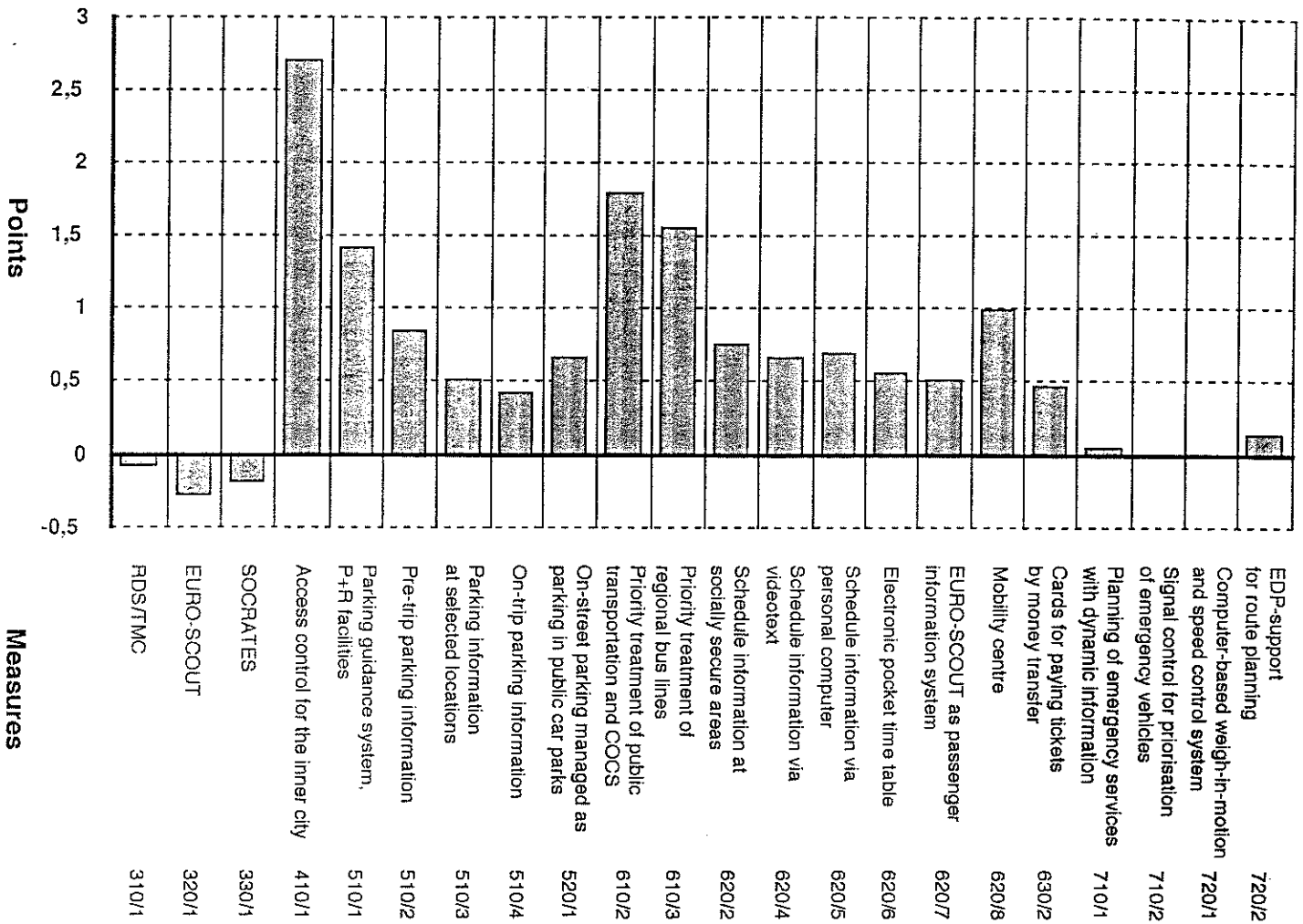


Fig 4 (opposite), Contributions of the measures to the goal 'Reduction of motorised road traffic' — arithmetic means of all experts.

As an example Fig 4 shows the estimated contributions of all individual measures to the goal 'Reduction of motorised road traffic'. Of course, results for other goals are different. Measures which have an estimated negative impact on modal choice, like driver information systems, can contribute significantly to other goals — for example, to the goal 'improvement of availability and accessibility'.

The overall evaluation of the measures results from the assessment of the seven goal contributions and from the goal weighting of all experts questioned (Fig 5). The assessment of the goal contributions through the experts can be regarded as objective and relatively independent from the evaluating persons. However, other persons, lobbies, political pressure groups, etc. could weight the various goals differently according to their own individual opinion.

Therefore, within FRUIT a sensitivity analysis for weighting the goals was conducted. In this context an overall evaluation of the measures considering an equal weighting of the seven goals was also carried through. Altogether, great stability of the results could be detected against changes in weighting goals.

The evaluations results on the base of the weighting by experts and of equal weighting suggest the following statements.

- Based on the sum of the goal contributions, all measures were evaluated positively (mean values):
- There are no significant differences between the results of the measure evaluation due to equal weighting and due to the weighting carried out by experts.
- Measures which are evaluated negatively according to the formula 'arithmetic mean minus standard deviation' due to equal weighting as well as the base of the expert weighting are RDS/TMC, EURO-SCOUT, SOCRATES, on-trip parking information and Signal control for prioritisation of emergency vehicles.
- Following measures due to equal weighting as well as to the experts weighting were assessed excellently positive:
 - access control for Frankfurt's inner city;
 - priority treatment of the entire public transportation system above ground and introduction of a COCS within the city limits;
 - priority treatment of regional bus lines coming from the vicinity into the area of Frankfurt am Main; and
 - integrating Park-and-Ride facilities into the parking guidance system.

Fig 5 (opposite, with key below). Overall evaluation of measures according to the experts' weighting.

GROUPING OF MEASURES

The evaluation showed that all measures investigated within FRUIT and proved to be feasible can make a positive contribution to the goals formulated for Frankfurt am Main. However, this does not mean that every measure should or can be implemented individually and separately, nor that all these measures evaluated should be promoted by the City of Frankfurt itself with the same engagement. In any case, it has to be guaranteed that the measures selected have synergetic effects in a goal-oriented way.

Criteria

The grouping of measures depends on many impacts and as a rule is not to be derived objectively from the basic conditions given. In FRUIT the grouping of measures is based on the following criteria:

- effectiveness (goal achievement);
- functional criteria;
- planning criteria;
- compensating negative goal contributions;
- homogeneous effects; and
- responsibilities for the implementation.

Figure 6 shows the correlations and how they were determined in detail within FRUIT.

Recommendations

Since all measures mentioned above are feasible and their goal contributions were generally evaluated positively, the recommendations basically include all grouped measures to be implemented in Frankfurt am Main.

However, implementation of all mentioned measures will not take place simultaneously. Nevertheless, the presented dependencies in functional and planning terms have to be considered when measures are implemented time after time. This also can be applied to dependencies in order to compensate for negative goal contributions of individual measures.

Therefore, the temporally differentiated implementation of measures also has to take place in subgroups with different priorities. In the following, the recommended subgroups of measures within FRUIT for the City of Frankfurt am Main are listed.

The sub-group of measures with top priority, which presumably has the highest degree of goal achievement, consists of the measures:

- access control for Frankfurt's inner city,
- priority treatment of the entire public transportation system above ground and introduction of a COCS within the city limits,
- priority treatment of regional bus lines coming from the vicinity into the area of Frankfurt am Main, and
- integrating Park-and-Ride facilities into the parking guidance system.

Negative goal contributions of the measure 'access control for the inner city' to the goal 'improvement of availability and accessibility' are compensated by the positive goal contribution of the measure 'priority treatment of the entire public transportation system above ground and introduction of a COCS within the city limits'.

Main element of the sub-group of measures with secondary priority is the mobility centre as a starting point for the data network, which is to be assessed very important. In connection with the COCS this can be developed to a traffic database at least for the public transportation system. This sub-group consists of the following measures:

- mobility centre;
- dynamic schedule information in socially-secure areas at stations underground;
- parking information at locations selected;
- pre-trip parking information;
- schedule information via videotext;
- schedule information via personal computer;
- electronic pocket timetable; and
- priority treatment of the entire public transportation system above ground and introduction of a COCS within the city limits.

The sub-group of measures with tertiary priority consists of the investigated measures referring to freight and fleet management, which should be supplemented further in order to develop urban compatibly commercial traffic.

Since the implementation of all measures requires a traffic database, it has to be started with building up such a system with central data exchange parallel to the implementation of the mentioned group or sub-group of measures.

PROJECT PROPOSALS

Following the assessment on a strategic level, 35 project proposals for those measures were developed, which appeared to be worthwhile to pursue. These proposals show detailed next steps for a period of one or two years. They include the implementation of some measures, and — if measures cannot be realised immediately — further investigations and/or field-trials. Furthermore, recommendations were made for institutions to be included, for preconditions to be created in the future, as well as for costs and temporal dependencies.

In addition to the project proposals of the work areas, comprehensive project proposals for developing traffic management in Frankfurt am Main and the Rhine-Main region were formulated. Here, special emphasis was put on the consequent implementation of measures developed by FRUIT, on a further integration of urban and regional traffic management measures for commercial traffic.

Project proposals were grouped in accordance with the assigned measures and ranked according to their degree of priority.

■ mean	△ max. value	▲ min. value	— mean + stand. deviation	— mean - stand. deviation
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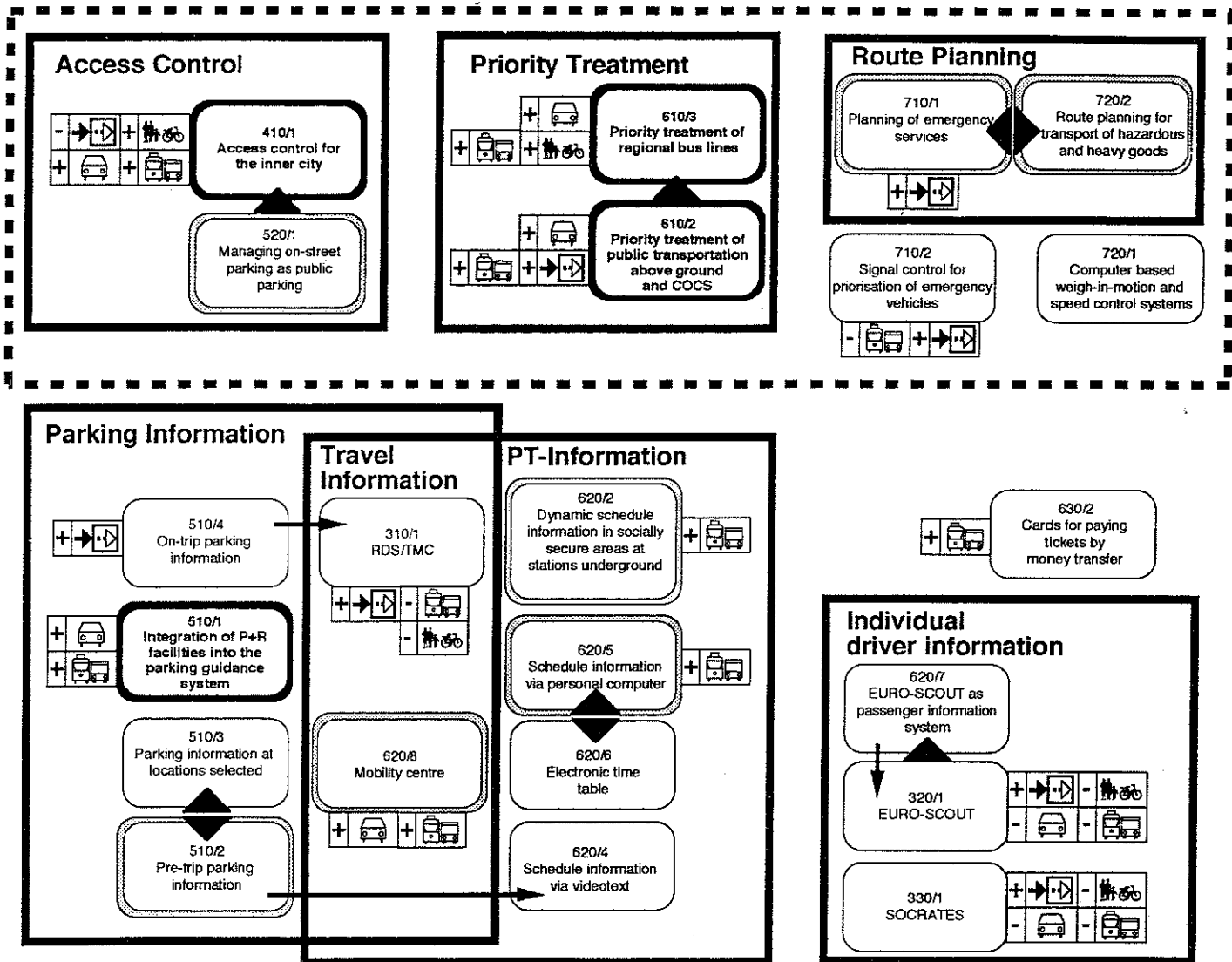


Fig 6. Criteria for grouping the measures.

OUTLOOK

FRUIT is not finished after this study. Rather, traffic management is a process, which will bring up the following main tasks:

- implementation of measures;
- continuing co-operation;
- elaboration of a regional traffic management concept;
- integration of operational considerations for traffic management with planning and other measures; and
- investigation of further operational measures.

Traffic management is essential for shaping future urban life. The authors of this study hope that Frankfurt am Main continues its strategy of handling traffic management issues on the base of an integrating overall concept despite heavy financial restraints. Finally, only this approach can guarantee that measures act in combination in a goal-oriented and efficient way — to achieve compatibility of traffic with urban live for the benefit of all citizens.

ACKNOWLEDGMENTS

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LEGEND

- measures with high goal achievement
- measures with medium goal achievement
- measures with little goal achievement
- measures to be combined from a planning point of view
- functional dependencies

- measure with negative effect on the goal (compensation required) "improvement of availability and accessibility"
- measure with positive effect on the goal (compensation achieved) "improvement of availability and accessibility"
- measure with negative effect on the goal (compensation required) "reduction of motorised road traffic"
- measure with negative effect on the goal (compensation achieved) "reduction of motorised road traffic"
- measure with negative effect on the goal (compensation required) "promotion of pedestrian and bicycle traffic"
- measure with negative effect on the goal (compensation achieved) "promotion of pedestrian and bicycle traffic"
- measure with negative effect on the goal (compensation required) "promotion of public transportation"
- measure with negative effect on the goal (compensation achieved) "promotion of public transportation"