

Intermodality and ITS in Frankfurt Rhein-Main

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SUMMARY

This article gives an overview on the development of traffic management and ITS implementations in Frankfurt am Main. It considers the integration of Frankfurt as a part of the Rhein-Main Region and identifies organisational aspects as an important factor for a successful development. In Frankfurt, a comprehensive bundle of measures for traffic management has been realised during the last years. In addition to those measures, which are more or less related to one mode only, some measures and projects are highlighted with regard to intermodality. Some experiences with Mobility Service Centres and plans for a dynamic Park+Ride Guidance and Information System are described. The development of integrated strategies for traffic management and of an intermodal traffic management centre are identified as important prerequisites for an effective traffic management in Frankfurt Rhein-Main.

MAIN CHARACTERISTICS OF THE CITY AND THE REGION

The City of Frankfurt am Main with 645.000 inhabitants is part of the Rhein-Main Region which is populated by about 3.8 million people. This region is a homogeneous, polycentric metropolitan area with an high degree of functional interdependencies. The extension of the entire region is about 9.700 square kilometres. There are 1.9 Million jobs located in the region, 40 % of these jobs in Frankfurt am Main on only one tenth of the region's total area.

The region does not form an administrative integrated unit. It is governed by different administrative bodies, and there is no single transport planning authority either. In the area of public transport a regional authority RMV Rhein-Main-Verkehrsverbund has been founded in 1994. The RMV encompasses 15 districts and 11 cities (the largest diameter in North-South direction being app. 230 km), 135 transport operators with a total fleet of 6.000 vehicles, 43 rail- and 780 bus-lines. The Rhein-Main-Verkehrsverbund is unique not only with regard to the services offered but also with regard to the underlying organisational structures facilitating the cooperation of a large number of public and private institutions and transport companies.

The high density of conurbation areas in the region including Wiesbaden, Offenbach, and Darmstadt imply the need to facilitate interconnectivity within and between all traffic modes. Partly due to this high demand in interconnective networks and its positioning on important trans-European corridors of road, rail, air and water travel, the Rhein-Main Region has long been among the first in actively promoting intermodality and multimodality measures.

TRANSPORT PROBLEMS, POLICIES AND TARGETS

Problems by commuting traffic, traffic jams, delays in road traffic as well as in public transport systems, and non predictable travel times are some of the major problems the region is facing. For example, Frankfurt am Main with about 200.000 of 290.000 commuters travelling by car every weekday suffers on heavy traffic jams on its main access roads.

To solve these problems, the ITS projects FRUIT and RHAPIT (1992-94) developed a basis for traffic management for the Rhein-Main Region and the City of Frankfurt am Main [1]. In these projects, goals for traffic management have been defined on the political and strategic level which are still a guideline for ITS implementation in the Rhein-Main Region. The main goals are:

- To use space compatibly with social and environmental conditions.
- To improve availability and accessibility for the necessary car traffic and forms of transportation which are more ecological.
- To reduce (unnecessary) motorised car traffic.
- To promote public transport.
- To promote pedestrian and bicycle traffic.
- To operate traffic compatibly with social and environmental conditions.
- To operate traffic ecologically.

In the Rhein-Main Region, ITS measures always have to be regarded as complementary, integrated measures within an overall transportation planning (including parking management schemes, traffic calming, Park + Ride concepts and other non-technical measures). And it were always bundles of measures and not single measures which were considered to reach the goals of traffic management mentioned above.

ORGANISATION OF TRANSPORT AND ITS ACTORS

The large number of cities and authorities and the concentration of transport networks in the Rhein-Main Region led to a corresponding large number of actors and responsibilities in the field of ITS. Of course, the cities themselves, like Frankfurt am Main, partly already participated in the development of ITS strategies. A very important actor is the Hessian State Government (represented by Hessisches Landesamt für Straßen- und Verkehrswesen) which is highly interested in the development and implementation of new ITS strategies and responsible for regional projects and the integration of federal as well as regional and local aspects. Transport and ITS is also brought forward by regional players like the DB AG (German Rail), the Flughafen Frankfurt Main AG (Frankfurt Airport Authority) and the RMV. These institutions are interested in ITS systems to improve their networks towards more efficiency. Like the cities, they are trying to get integrated in other regional projects to increase the benefits for their customers and to reduce the costs.

An important progress towards better co-operation was gained in 1998 by founding the ZIV - Zentrum für integrierte Verkehrssysteme (Institute for Integrated Traffic and Transport Systems) and the FIV - Förderverein für integrierte Verkehrssysteme (Association for Promoting Integrated Traffic and Transport Systems). The FIV offers a platform to exchange

information and to co-operate for communities, transport operators, industrial partners, consultants and other institutions. Shareholders of the ZIV are German Rail (DB Regio AG), Frankfurt Airport Authority, RMV and FIV. The ZIV is an institute at Darmstadt University of Technology and supported by the Hessian State Ministry for Economy and Transport. As a competence centre for traffic and transport research the ZIV will support transfer between research and practice, co-ordinate activities in the Rhein-Main Region and initiate new developments.

SOME INTERMODAL ITS MEASURES

In Frankfurt, a comprehensive bundle of measures for traffic management has been realised during the last years. For example, this includes

- parking management (implementation of dynamic PGI system, parking pricing, reservation of parking space for residents),
- computer controlled operation system for public transport vehicles,
- priority treatment of public transport for all tram and bus lines (using infrared detection and radio transmission at 320 intersections, reservation of separate bus lanes and installation of separate signals),
- speed limit 30 km/h in app. 200 residential areas,
- advanced traffic signal control with green waves and using traffic signals for access reduction,
- more pedestrian crossings in the inner city and an enhanced bicycle route network,
- passenger information systems et al..

In addition to these measures, each of them related more or less to one mode only, some measures and projects should be highlighted with regard to intermodality.

Mobility Service Centres

Within the ENTERPRICE project, an intermodal mobility service centre (MSC) named "Verkehrinsel" has been established at Frankfurt's City Centre (Hauptwache). The MSC offers information and booking services for all transport modes, making intensive use of ITS technologies. It is operated in a joint venture by the City of Frankfurt, the State of Hesse, the Rhein-Main public transport authority RMV and Frankfurt's urban PT operator VGF. Within one year only, 100.000 people used the services of the MSC, and it already gained some profit in this first year. Another MSC was already opened at Frankfurt Airport, other MSC's in the Region will follow.

Park+Ride Guidance and Information System

The City of Frankfurt already has implemented a comprehensive dynamic parking guidance and information system for the inner city [2]. It already covers 23 parking garages with 12.800 parking spaces and includes 90 dynamic signs. This system which provides information already at the main access roads to Frankfurt will be enhanced by a new P+R

Guidance and Information System. This will include an integration of P+R signs in the variable message signs on the motorways.

Integrated Intermodal Traffic Management Center

The traffic control centre of Frankfurt am Main already has been expanded significantly during the last years towards a traffic management centre. The PROTIC (**P**re-trip and **O**n-trip Traffic Information Centre) already offers various services (**Figure 1**). Today, PROTIC data inputs already come from

- data collection in the parking garages (parking guidance and information system),
- the roadworks and events coordination centre,
- the Mobility and Traffic Information Centre (MOTIC) of the Hessian Road and Traffic Authority and
- the urban traffic control system of Frankfurt am Main.

Heading for an intermodal traffic management centre, additional interfaces will be established during the next years to the control centres of public transport, taxis, police department, fire department, to the freight control centre, and to control centres of other cities.

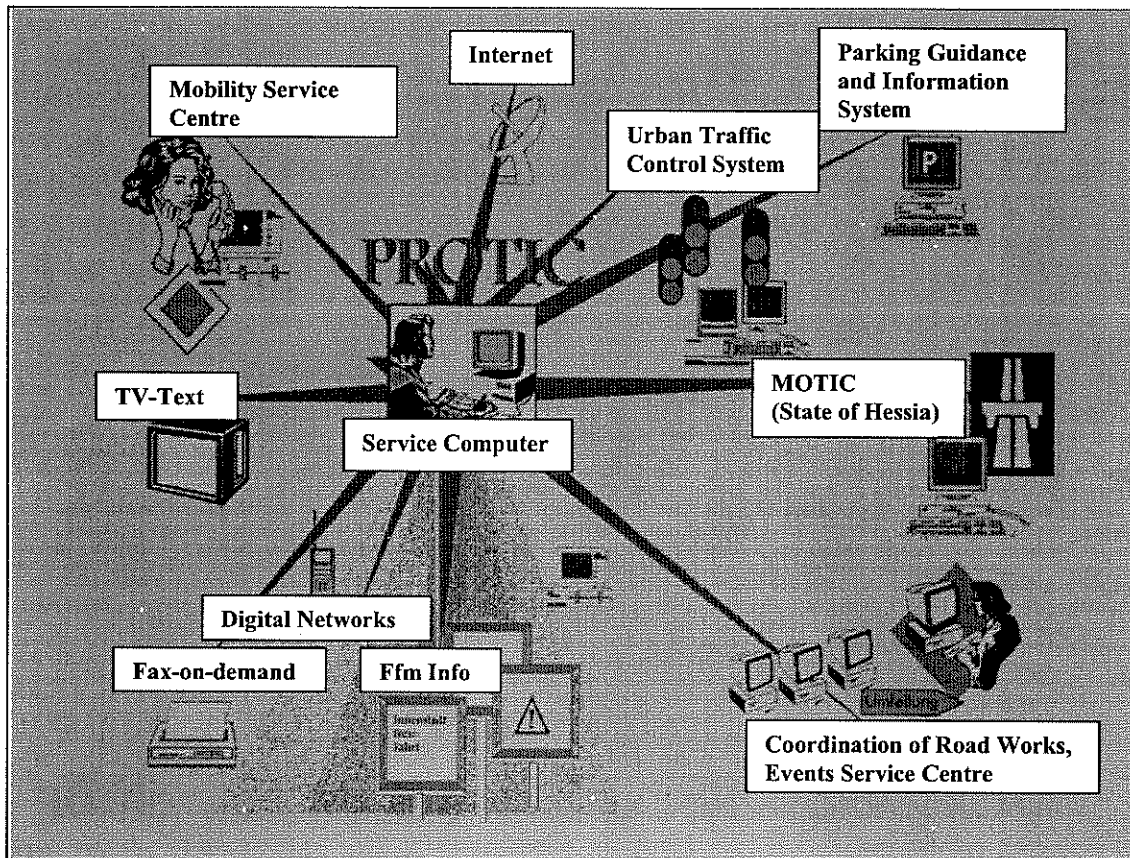


Figure 1: Services of Frankfurt's PROTIC

Output of Frankfurt's traffic management centre is already provided via Internet (<http://www.stadt-frankfurt.de>), DAB (digital audio broadcasting), fax on demand (+49-69-25 700 770), TV text (HR3, page 571 to 573), the mobility service centre and telephone hotline. In future, also RDS/TMC, roadside variable message signs and other media will be used for information services.

Main tasks of Frankfurt's future intermodal traffic management centre will include:

- To produce an intermodal report on traffic situation including traffic prognosis (using simulation tools) and an assessment of this situation.
- To control intermodal traffic based on pre-defined, network-related traffic management strategies.
- To gain concertation of such traffic management strategies with regional partners.
- To give recommendations to other control centres in case of unexpected situations.
- To provide intermodal traffic information for various information service providers.

WAYflow

The national four-year ITS project WAYflow has been started in October 1998. The goals of this project, which is joined by all relevant partners for traffic management in the Rhein-Main Region and several industrial partners, are:

- To initialise a regional traffic management including the development of intermodal traffic management strategies.
- To develop an intermodal regional traffic data base with distributed data storage based on a multi-agent system.
- To develop the "MobiChip" for individualised personal travel assistance.

In order to reach a high efficiency of the project, the following aspects will be considered:

- Regarding to the individual wishes and expectations of the relevant target groups,
- integration of other projects like City-FCD (Floating Car Data),
- exploitation of existing know-how by an extensive Public Private Partnership with following central partners: RMV, HLSV (Hessian State Road and Traffic Authority), Philips Semiconductors, debis IT Services; scientific support by ZIV at Darmstadt University of Technology,
- field tests to examine general and technical functionality,
- practical realisation and durable operation of WAYflow systems,
- evaluation of the results (acceptance, effects on traffic and compatibility with other regions and problems).

WAYFLOW MOBIMANAGEMENT

First, the organisational preconditions for a regional and intermodal cooperation between transport operators, local authorities and institutions will be created. Further on, the aim is to develop short-term effective control strategies for a dynamic traffic management. Therefore, suitable single measures are collected, analysed concerning responsibilities and fundamental traffic effects, evaluated and systematically integrated in a concept of actions. This concept has to be actualised permanently. In case of occurring problems or incidents the corresponding actions will be activated then (e.g. traffic control and information systems). The abilities of microscopic simulation for data completion, traffic forecasts and verification of chosen control strategies, will be examined as well. Therefore, existing simulation tools

will be compared and evaluated. At least, one chosen simulation tool will be proved in the frame of the WAYflow project.

WAYFLOW INFOPOOL

Instead of collecting the multimodal traffic data centrally in a huge data base, a new innovative “multi agent system” will be developed. It arranges the necessary connections in a decentralised network to existing suppliers of traffic information in order to enable a data exchange in spite of different data formats. Responsibility and updating of the data remain at the local authorities. For example, a traveller starts an inquiry via internet or from a public information terminal. “Interface agents” search suppliers of relevant information and transfer the problem to them. The investigated data is then collected and presented as summarised, edited information to the traveller. A big challenge in the development of this multi agent system are the different standards of the existing local systems, the safety of data and interests of involved partners which make it necessary to define different grades of data access.

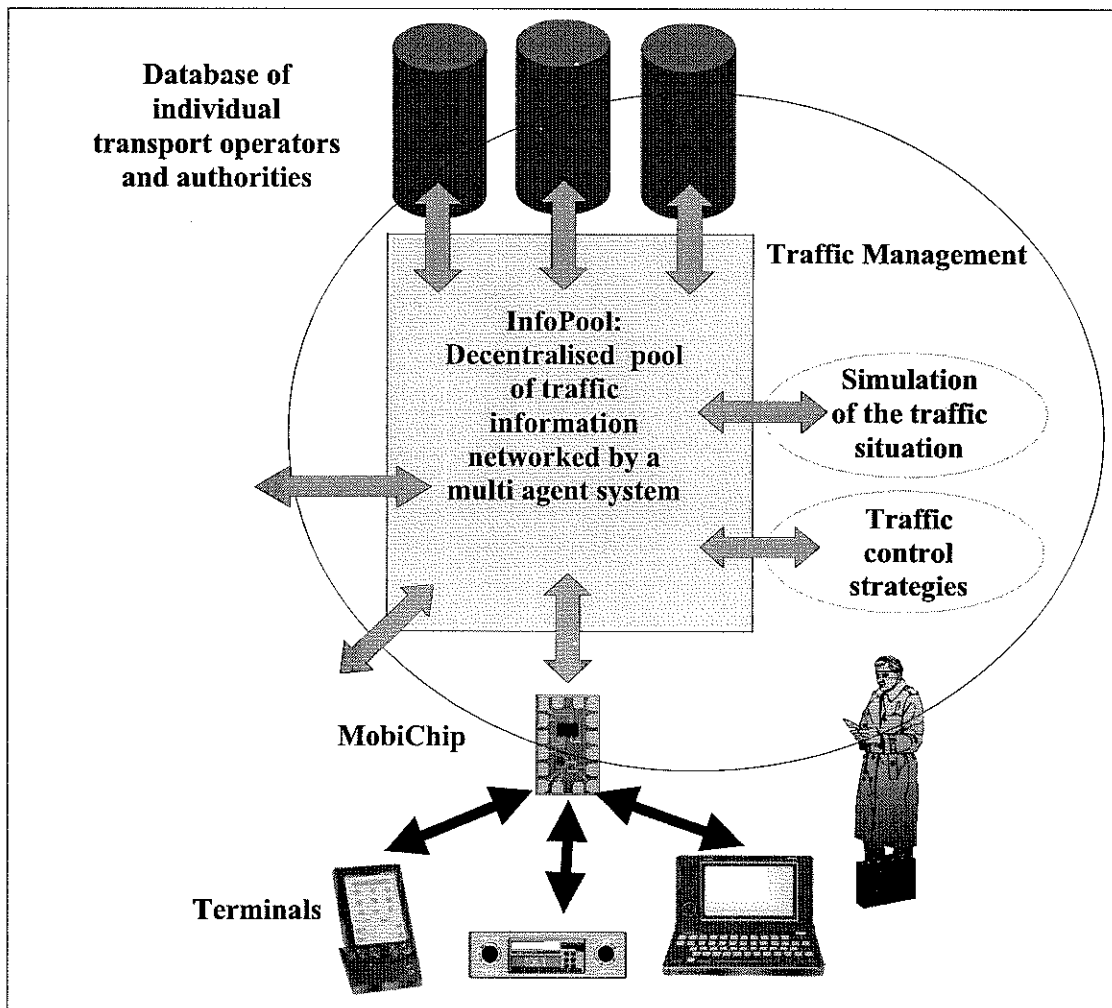


Figure 2: WAYflow concept

WAYFLOW MOBICHIP

In this part of WAYflow, a software is developed which offers an individually geared mobility advice, apart from conventional functions. One form of application will be on a chip card (for example telephone cards and credit cards). This MobiChip is one of the interfaces between the traveller and the above-mentioned Infopool. It supplies the user with relevant data and actualises automatically the profile of its user's traffic behaviour. In public transport for example, the chip analyses the ordinary ticket bookings (daily destinations, 1st or 2nd class, individual preferences concerning means of transport, number of changes,...). When booking a ticket again or searching for information with the MobiChip, the traveller needs simply to confirm or to modify the suggested inputs. This saves time and makes travelling with PT easier. Possible MobiChip terminals are laptops, portable phones or ticket machines.

OUTLOOK

Although the City of Frankfurt and the Rhein-Main Region have gained a high standard in traffic management and some significant progress in the implementation process for ITS there is still further development needed. Major aims for future activities include

- To develop an overall strategic ITS implementation plan for cities and region based on well defined strategies for dynamic traffic management.
- To learn more about useful bundles of measures and their impacts, highlighting intermodality aspects.
- To develop strategies and actions to integrate other cities and communities of the region in the ITS planning and implementation process.
- To exchange experiences with other cities and regions on an European level.
- To contribute to the European harmonisation process in traffic management and to consider such developments in regional planning.

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