TRANS 3
Multi-modal travel information service for transport in the tri-national agglomeration of Basel based on real time data

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Abstract

TRANS 3 is a research project in the fifth framework programme of the European Union.

The service offers a pre-trip information for regional transportation in the tri-national urban and suburban area of Basel extending over France, Germany and Switzerland, allowing a direct comparison between routes and travel times for car, for public transport, for bicycle and in appropriate cases for Park&Ride or Bike&Ride journeys. Travel times and routes will be based on real-time data on road traffic, on public transport, and on car park occupancy. These data, which do not cover homogeneously the agglomeration's network, will be combined with timetable, statistical, and modelling data. The service will be delivered to the users by Internet and will be free of charge.

The main objectives of the project are to:

- transfer an existing system to another city
- develop a sustainable and user friendly information service
- manage the demand
- promote public and intermodal transport
- strengthen identity and self-understanding of TAB region

The service will be offered in German and French under:

    www.transbasel.com (German)   **www.transbale.com (French)**

Additional aspects covered in the presentation:

- Requirements of transport authorities, road operators, PT operators with respect to multi-modal and intermodal information

- Integration of real-time data (sensor and event data), timetable, statistical and historic data (Daily/weekly and seasonal variations of base travel times), and modelling data

- user-friendliness and usability testing.

Keywords

TRANS 3 – Pre-trip – travel information – multi-modal –Swiss Transport Research Conference – STRC 2001 – Monte Verità

1. Introduction

In recent years the increasing need to improve mobility and combat congestion problems have caused a rapid development of new traffic information technologies. A great number of systems is already deployed to optimise the traffic data collection and processing. Today the possibility to access these data by the public gives the users the opportunity to inform themselves about the current traffic situation and the attractiveness of the different modes of transport available.

TRANS-3 will trial a multimodal pre-trip travel information service for regional transportation in the tri-national urban and suburban area of Basel extending over France, Germany and Switzerland. The service will be offered to the users over Internet and will be free of charge.

The service will provided during a one-year trial period. The trial operation will allow the evaluation of the service in terms of its use by travellers, of its impact on traveller's behaviour, and of organisational and technical requirements for service operation. On the basis of the evaluation results, a business model for long-term operation of the service will be proposed.

The trial operation is planned to start in June 2001. In the preceding phase of the project (August 2000 to June 2001) the multi-modal travel information service has to be defined, and the system supporting the service has to be specified and implemented. During this phase, the project's most important characteristic is that it intends to adapt an existing core system to a new situation.

The core system is the demonstrator of a multi-modal journey planning service, based on real-time information and delivered over the Internet (http://www.montrajet.com), which has been developed by the CAPITALS PLUS project for a test zone in the region of Paris.

Accordingly, the heart of the TRANS 3 service will be a multi-modal journey planning function based on real-time and estimated traffic data.

A tri-national consortium with representation of transport authorities, road and public transport operators, and technology providers is setting up the real time service. For the trial period, the consortium also operates this multi-modal information service.

TRANS 3 is a research project in the IST-Programme of the fifth framework programme of the European Union.

2.   Tri-national Agglomeration Basel

The project covers the tri-national agglomeration of Basel (TAB) spreading over France, Germany and Switzerland. Some 700'000 inhabitants live in this area of a diameter of 30km.

Figure 1   Tri-national Agglomeration Basel
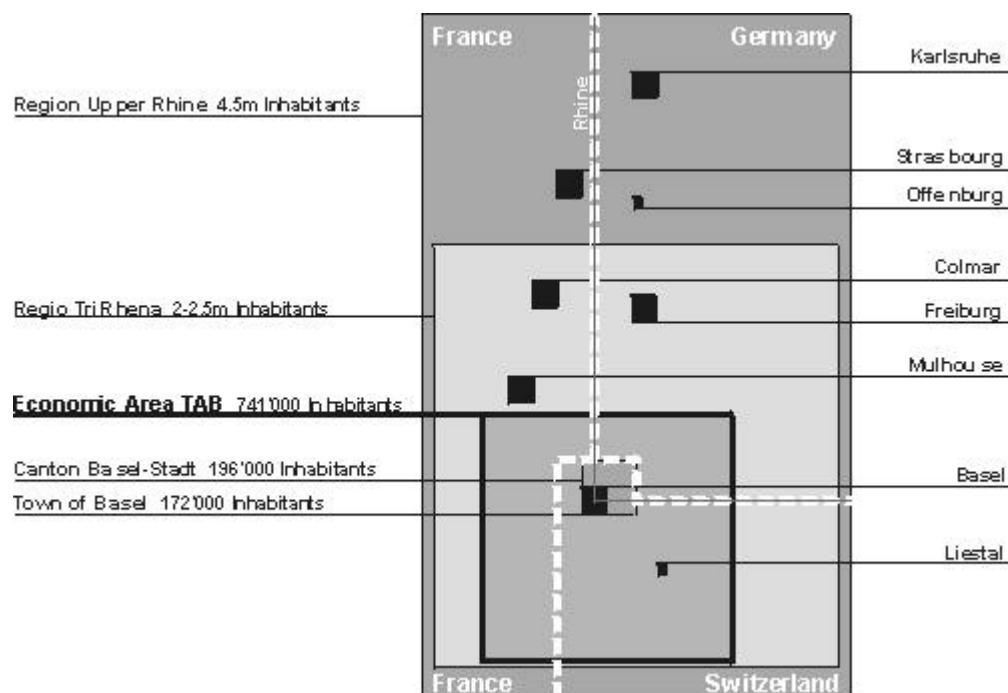
Trips between the different countries are quite common for all sort of trips (business, shopping, leisure etc.). Some public transport lines also cross the border. There are about 30'000 commuters per day travelling from France and about 20'000 from Germany to Switzerland every morning.

The bicycle mode plays an important role within the city of Basel (17% modal split) and neighbouring villages.

3. Objectives

The main objectives of the TRANS 3 are to:

- transfer an existing system to another city

- develop a sustainable and user friendly information service

- manage the demand

- promote public and intermodal transport

- strengthen identity and self-understanding of TAB region

Transfer existing system from Paris to Tri-national Agglomeration of Basel (TAB)

As the project is a take-up action one interest is to show the ability to transfer a system developed for Paris to a medium-sized city with its own needs.

Develop a sustainable and user friendly information service

The information service is user friendly. Users should be able to get the relevant information with no effort. The users of the service should be able to give comments to the operator.

The system should not require a lot of manual work for daily operation. The acquisition of dynamic data is handled automatically. Changes in the static data or network data shall be treated with little effort to implement. Hence the data exchange between the system and data suppliers (e.g. new time table data) should be done using existing (or where missing defined) standards.

Manage the demand

The information service shall influence the travel behaviour of its users. With the received information from the TRANS 3 service the user shall make one of the following choices:

- Use of alternative routes / parkings
  According to the actual traffic situation another route to the destination or the use of another parking may be faster than the normal or known route of the user.

- Use of alternative travel modes
  With the presentation of 5 different modes the user learns to know the approximate travel time with an alternative mode. It should be respected that modal choice options may be limited for certain users (e.g. non-availability of a car, transportation of heavy goods).

- Change departure times
  The information of congestion on the normal route can let the user change his departure time to avoid the longer travel time.

- Trip substitution
  The information of an increased travel duration can lead to renounce the trip or to choose a another or closer destination (e.g. for shopping or leisure trips).

Promote public and intermodal transport

The public authorities within the TAB region want to decrease road traffic and encourage commuters to use the public transport for their trips, or at least for part of trips. Therefore the PT attraction must be increased, one the one hand by adapted schedules and pricing, on the other hand by adequate information systems.

Cross-border commuter traffic has a very low modal share of PT, while the share of PT in the Swiss part of the TRANS 3 network is comparatively high. As the Park and Ride (P&R) areas along the public transport lines are not used sufficiently, the users attention shall be drawn to the possibility and advantages of P&R.

Within the city of Basel the bicycle mode plays an important role (17% modal split). Given the small distances also for cross-border trips it is possible that the bicycle mode can be promoted by giving information on travel time by bicycle and Bike and Ride (B&R).

Strengthen identity and self-understanding of TAB region

It is a political goal to strengthen identity and self-understanding of the TAB region. Interconnected transportation networks (Public transport and Intermodal) facilitate this process.

Due to the cross border movements it is necessary that the networks cooperate closely. There are commuter trains and busses crossing the borders every day, but still PT schedules and traffic information systems are loosely coupled and should work more closely together in the future.

It is necessary that the traffic system operators cooperate closely across the border. TRANS 3 is the first attempt to collect data of all three countries and to display data in a unified format.

4. Pre-trip travel information service

4.1 Description of service

The main service offered to the users is a pre-trip travel information service.[1] For a traveller's origin-destination pair, and a given departure or arrival time, the service will propose best routes and associated travel times for following five modes:

- Private car

- Public Transport

- Bicycle

- Private car and public transport

Table 1   Information offered to the users in TRANS 3

Info type	Mode	Type of data
Static/historic data	Public transport	Link travel and interchange times
	Public transport	Timetable data
	Road transport	Link travel times, Volume-/Delay- Functions, variations day time/year
	Modal transfer	Average walking times for modal transfer
Event information	Public transport	Disturbances, accidents and diversions from PT operations centres
	Road transport	Speed limitations, lane reductions, TMC messages
Dynamic sensor data	Public transport	Real-time train positions departure times
	Road transport	Real-time traffic volumes, speeds and SIREDO data
	Modal transfer	Free / occupied parking spaces

The service will be offered in German and French under:

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[1]   Beside of the pre-trip travel information service also other service are planned to be offered, e.g. motorway traffic state (see 4.4)

www.transbasel.com (German)   www.transbale.com (French)

4.2   Route and travel time computation

From the Multi-modal traffic modal of Basel (GVM) the road network and the associated link travel times and their variations over time (hourly/daily/weekly) for cars and bicycles have been used as basis for the TRANS 3 network. Some extensions mainly in the French and German area have been necessary. The public transport network and timetables of all operators have been integrated. Modal transfer is only possible at designated nodes (P&R, B&R) of the network. Walking times are considered at beginning, end of a trip and at modal transfer.

The TRANS 3 area is divided into zones. Every zone is linked to the multi-modal network. The routes are computed from zone to zone, i.e. all houses in a zone receive the same result for a request with the same destination. The travel time between an individual address in a zone and the TRANS 3 network is constant wherever the house is situated in the zone. Routes and travel times are based on real-time and expectational information. The real time data are provided by different telematics systems for road traffic, parking lot and public transport management.

TRANS 3 will implement a system which integrates heterogeneous traffic and travel information. The system will acquire dynamic data in real time. It will be connected by permanent data links to control centres of:

- road operators equipped with automatic traffic sensors

- public transport operators

- parking lot operators.

Further, the system will be provided periodically with timetable data for public transport. Finally, the system comprises a database with static information. In particular, this information includes:

- average travel times on road links

- average times for pedestrian links involved in modal changes.

The system treats all data in formats adapted to the TMC Alert C and Alert Plus protocols. It will implement standardised interfaces to the data providers' internal information systems.

The system will comprise a 24 h prediction tool, which computes and constantly updates expectional travel time values on the basis of recorded time series. Second, it will comprise a route planning tool on a multimodal network, computing best routes including intermodal car-public transport travel. These two tools have been developed by the CAPITALS PLUS project for a prototype pre-trip travel information service in the Paris region. TRANS 3 will take up the technology developed for the prototype, and elaborate a system adapted to the specific needs of the trial region.

4.3   System architecture

The system architecture is illustrated below. The system is composed of three subsystems. The Data Acquisition System is connected to the various real-time information sources. It centralises the real-time information and transmits it to the Computation System. The Computation System manages a dynamic database, and a static database containing timetables and static network information. It operates the route computation and the travel time prediction tool, regularly updating the expectional values held in the dynamic database. It answers the requests coming from the Internet Server. The Internet Server delivers the travel information to the users. It is connected to a geographical database containing regional and local maps displayed by the WWW interface. The elements of the geographical database originate from the Basel region GVM Transport Model (Gesamtverkehrsmodell Region Basel) and from digital maps. The geographical database will be customised for the TRANS 3 service.

The system will be implemented in the trial region. Computation System and Internet Server will be doubly implemented, a copy for fallback, maintenance and development being localised at CBC.

Figure 2   System architecture
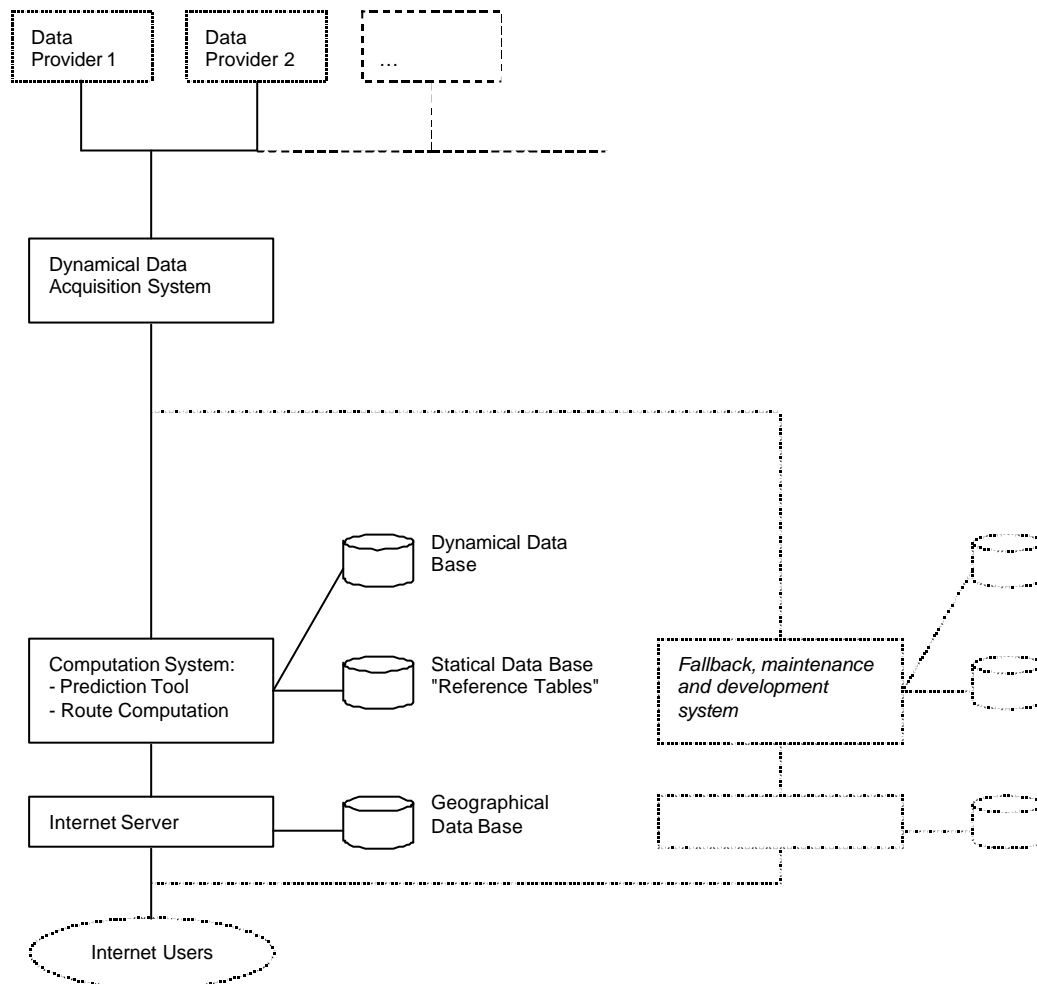
4.4   Other Services

Beside the main service «Pre-trip Travel Information» some other services are planned to be offered during the project (not described in this paper):

- Parking Occupancy Service
- Public transport delays
- Webcam service
- City road traffic state

- Motorway traffic state
- Client-based services
- Mobile Service (SMS/WAP)
- Voice Service

4.5   Phases of development

4.5.1   Stage 1: TRANS 3 Initial Service

In a first phase the service starts with static data, i.e. average speeds on road links, time tables for public transport, and historical data, i.e. daily/weekly variations known by the operator. The user declares the start point via a graphical interface, by clicking the point on the map showing the streets and, invisible to the users, the zones of the TRANS 3 network. Every zone has at least one node which serves as starting point for the computation. The same applies with the destination.

If already available real-time sensor data from Basel City Public Transport (BVB), Parking Guidance System Basel (PPS) and the Motorway Traffic Management System A2/A3 as well as RDS-TMC Messages will be integrated.

4.5.2   Stage 2: TRANS 3 Service Enhancement

In the second phase more and more real-time data will be integrated and an input of origin and destination by address and points of interest will be offered. During the trial period there will be adaptations to already implemented services and also new services will be implemented if no unexpected problems occur.

4.5.3   Stage 3: TRANS 3 Service Future Enhancement

In a third phase an adress-to-adress network can be implemented.. The first and last part of every journey can be computed also by additional links (e.g. links for pedestrians, bicycles or cars).

5.   Participants

- RAPP AG, Basel, Switzerland (Project Management)

- Carte Blanche Conseil, Paris, France (Financial and administrative Co-ordinator)

- R. Keller & Partner AG, Muttenz, Switzerland

- Rosenthaler + Partner AG, Muttenz, Switzerland

- Basler Verkehrsbetriebe, Basel, Switzerland

- Landratsamt Lörrach, Germany

- Société des Autoroutes Paris-Rhin-Rhône, France

- Schweizerische Bundesbahnen, Berne, Switzerland

- Polizei- und Militärdepartement Basel-Stadt, Basel, Switzerland

- Kanton Baselland, Bau- und Umweltschutzdirektion, Liestal, Switzerland

- Kanton Basel-Stadt, Wirtschafts- und Sozialdepartement, Basel, Switzerland

- Swiss Federal Roads Office, Berne, Switzerland

- Dienst für Gesamtverkehrsfragen, Berne, Switzerland

Appendix: Abbreviations

TAB   Tri-national Agglomeration of Basel

PT   Public Transport

P&R   Park and Ride

B&R   Bike and Ride

GVM   Gesamtverkehrsmodel (Multi-modal Traffic Model)

CBC   Carte Blanche Conseil

PPS   Parking Guidance System

BVB   Basler Verkehrsbetriebe (Basel City Public Transport)

RDS-TMC Radio Data System Traffic Message Channel