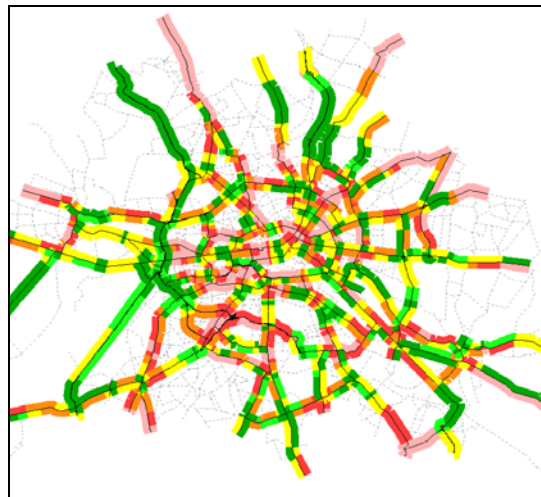


Report

Use of PTV-Software in the traffic management centre (VMZ) Berlin

Presentation at the 11th *ptv vision* User Group Meeting
2001

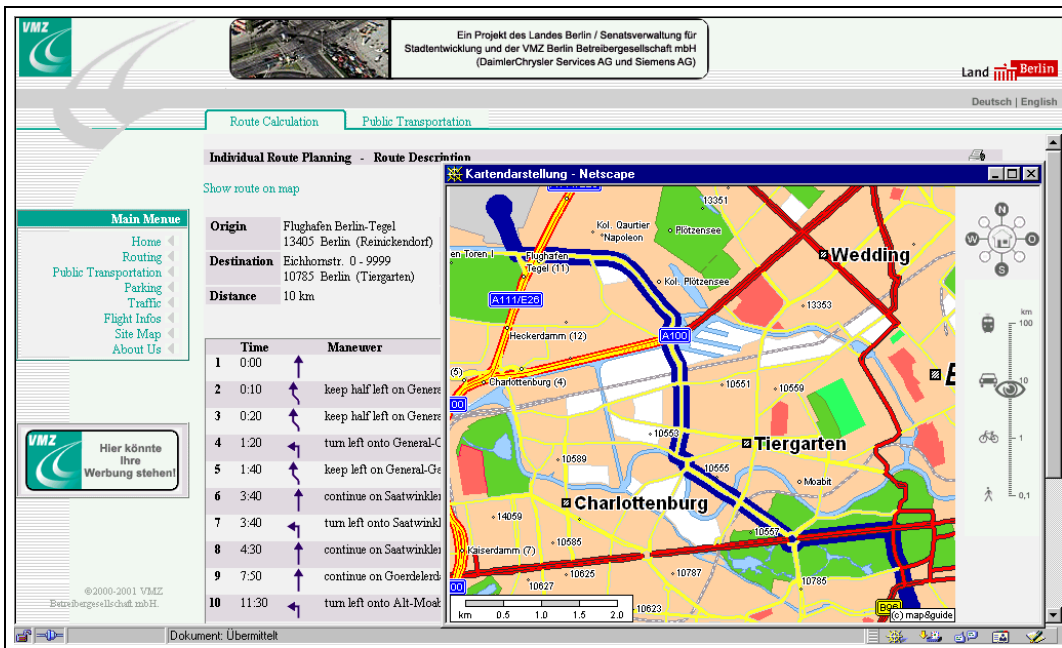
(Peter Vortisch, PTV AG Karlsruhe)



Berlin, October 2001

What does VMZ have to offer?

Breathing in the Berlin air in the German congestion capital isn't as healthy as you'd think. However an ambitious project aims to greatly improve the traffic situation in Berlin. In July the first VMZ Berlin (Traffic management centre) services went on-line. A route planner is available on the internet for private transport together with information on the car-park situation and public transport timetables with a link to the BVG (Berlin transport company) homepage. In the future car drivers will even be able to know pre-trip where there is a danger of congestion or they can be re-routed past congestion on-trip by mobile phone. Intermodal routing and much more is also being planned. The service is being built up gradually and can be accessed at www.vmpzberlin.de.



The screenshot displays the VMZ Berlin website interface for route calculation. It features a main menu on the left, a route description section, a maneuver table, and a map view.

Main Menu:

- Home
- Routing
- Public Transportation
- Parking
- Traffic
- Flight Infos
- Site Map
- About Us

Route Calculation - Public Transportation

Individual Route Planning - Route Description

Show route on map

Origin: Flughafen Berlin-Tegel
13405 Berlin (Reinickendorf)

Destination: Eichhornstr. 0 - 9999
10785 Berlin (Tiergarten)

Distance: 10 km

Time	Maneuver
1 0:00	
2 0:10	keep half left on General-C
3 0:20	keep half left on General-C
4 1:20	turn left onto General-C
5 1:40	keep left on General-C
6 3:40	continue on Saatwänkle
7 3:40	turn left onto Saatwänkle
8 4:30	continue on Saatwänkle
9 7:50	continue on Goerdelerd.
10 11:30	turn left onto Alt-Moak

The map view shows a route from Flughafen Berlin-Tegel to Eichhornstr. 0 - 9999, passing through Charlottenburg and Tiergarten. The map includes a scale bar (0 to 2.0 km) and a compass.

Continuos development: The VMZ website

In October 2000 the Federal State of Berlin, represented by the senate government, placed an order with a consortium consisting of debis Mobility Services (in overall charge) and Siemens AG for a traffic management centre and a detection network to be set up.

debis and Siemens mutually form an operating company which will later include the BVG and the municipal railway. VMZ Berlin will run this as a private enterprise in the next ten years - public funds will not be effected. In founding the VMZ a number of orders were placed with other companies, in particular PTV, OneStepAhead and IVU.

Aim: As much mobility as possible in and around Berlin

All information relevant to Berlin traffic is gathered at VMZ. Existing data sources will also be integrated and linked to new additional information sources. As well as this a detection network with almost 150 measuring points will be created over Berlin which documents the current traffic situation and which serves as a basis for short, medium and long term traffic development forecasts.

Information on parking possibilities are gathered at the VMZ and traffic restrictions due to special events or roadworks are collected. In order to improve mobility possibilities in and around Berlin the integration of all traffic systems is the highest precept for VMZ. For this reason they are continuously exchanging data with the public transport's central offices and the Berlin airport.

Up-to-the-minute information for everyone

The collected data are used by VMZ to provide the Berlin population and visitors with various services which are aimed to ease mobility in the capital. All incoming data are evaluated and made available either for further processing or directly for the user via Internet and mobile phone.

For example roads at risk of congestion can be avoided using the current and forecasted traffic conditions. The intermodal router shows the traveller the fastest route while taking the current traffic conditions into account and in combination with various modes of transport. If the journey proves faster using public transport the timetable can be printed immediately.

The collective Internet services are free of charge, however the individual services using mobile devices, such as navigation systems in cars or WAP mobile phones are not.

The technology

Two-phase implementation

The project should be completed within 30 months from 1st November 2001. This is a major project. The contents will be implemented in two phases. Phase 1 contains various information systems on roadworks, special events and parking possibilities, eight information boards to dynamically control traffic, 55 measuring stations and so-called above-ground detectors type "Traffic Eye Universal" (TEU), which monitor the situation from a bird's-eye view. The TEU detectors provide cross-section data. They collect volume and speed data with ca. 60 transfers a day. As historical data are also sent with each transfer, at the end of each day a complete time series is available for the measuring point.

In the first phase the construction of the content platform, which will contain all contents relevant to traffic in Berlin, will also start together with the construction of a service platform with intermodal route search and routing right down to address level for private transport displayed on digital maps.

Phase 2 completes the VMZ Berlin with 14 additional information boards and 77 TEU, 26 RDS/TMC detectors (Radio-Data-System/Traffic-Message-Channel), the final construction of the content platform private transport, a middle and long-term forecast and a short-term forecast of the traffic conditions, a content platform for public transport and with extended functions to the service platform.

Dynamic and intermodal routing

A central service by VMZ Berlin is the intermodal route planner. On behalf of debis Mobility Services fundamental parts of the service platform and the services required will be created in a joint project by PTV and the Stuttgart company OneStepAhead.

The **dynamic router** for private transport allows the entry of a start and destination. In Berlin and surrounding area the assignment of addresses is street and house number exact. Additional entry possibilities for start and destination are public transport network stops, P+R car parks and points of interest, for example sights. The route calculation can also be performed to a parking slot near to the actual destination (Parking-slot routing) and considers up to three stop-off points on the route.

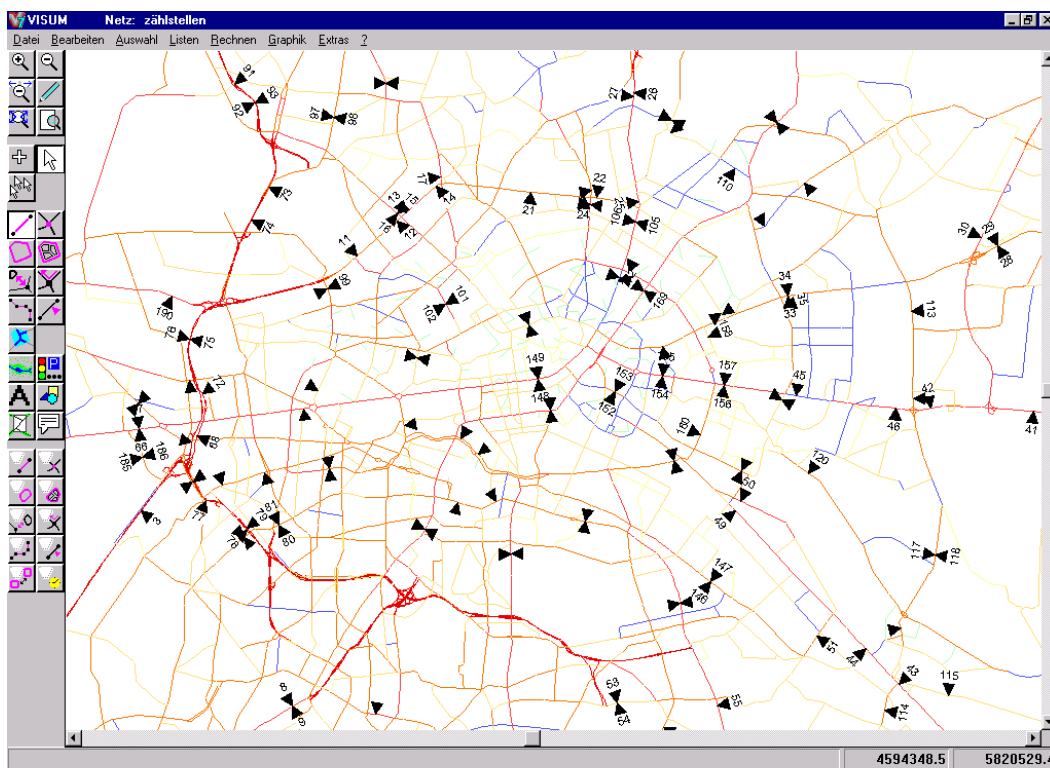
The **intermodal router** allows a combination of routes in private and public transport. A connection is made at identified P+R car parks. The definition of these transfer points is performed in the network maintenance module. The network can be continuously updated in the VMZ with this module. This guarantees that route recommendations are of consistently excellent quality. With an intermodal route search the customer can specify, for example, whether he wishes to start his route with a car and if he wishes to change to public transport if necessary. The mapping component transfers the network to an optically pleasing map display and visualises the route.

The **network database**, a routable network, which contains every road in Berlin, will be combined with the German trunk road network PRISMA (primary street map) by PTV. The basis of the detailed network of the Berlin area is the digital map from Navtech. In order to be able to link the network data with additional traffic attributes or geodata such as dynamic travel times or traffic information, a database for managing all network-related information will be constructed. This includes, for example, traffic attributes on the route and turn-off regulations, parking slots or roadwork information. The tool for maintaining the navigation network was developed by PTV on the basis of the traffic planning system VISUM.

Traffic condition and forecast on the content platform

The current traffic conditions in the main road network will be calculated in the VMZ Berlin content platform and further developments are forecasted. The technical environment will be formed from a CONCERT traffic control computer from the Siemens company. It contains various modules, such as central data storage, communication with the detectors, strategic control and the interface to the service platform, traffic control centres, road-sign control, parking information system and road-work management.

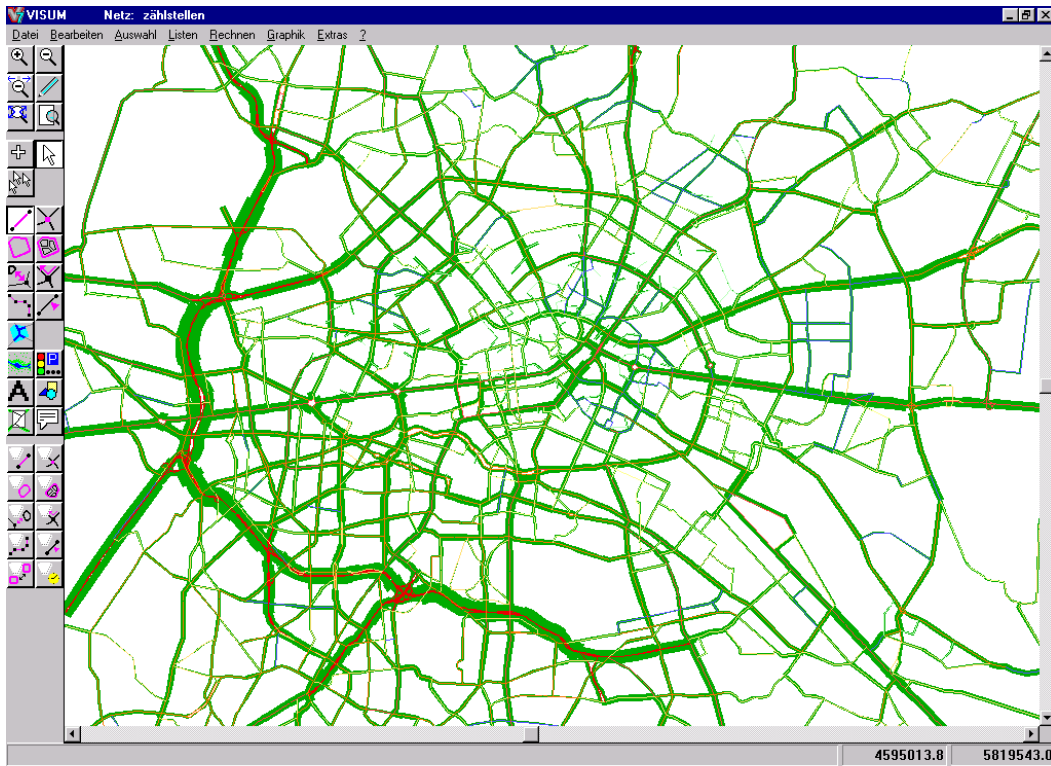
The simulation module MONET (modelling networks) for the traffic condition generation and short-term forecast is also one of the components. MONET is developed by PTV. It implements the traffic procedures which are also used by VISUM online, the traffic management software from PTV.



Planned measuring locations for the VMZ Berlin

MONET completes the data by calculating the **complete traffic conditions** in the network on the basis of static and dynamic data. In the parts of the road network which are not directly measured by detectors, the traffic conditions calculation is performed with the help of a route estimation procedure and a measured value propagation procedure. In addition the program forecasts the future traffic conditions for the next 15-30 minutes using **traffic flow simulation**. In doing so it access the data in the central data base and also saves the calculated data there.

MONET works permanently without any need of a user input. The calculation of the current and forecasted traffic conditions are updated in 5 to 15 minute cycles.



Traffic flow on individual road sections, displayed using VISUM

The PTV architecture for traffic management centres: VISUM online and the eServer components

In order to use the existing infrastructure to its best traffic management centres are being built up around the world. They take control measures which are effective in the short-term and they take their information from various data sources to ensure that founded decisions are guaranteed. This also includes the extensive knowledge of the current and future traffic conditions.

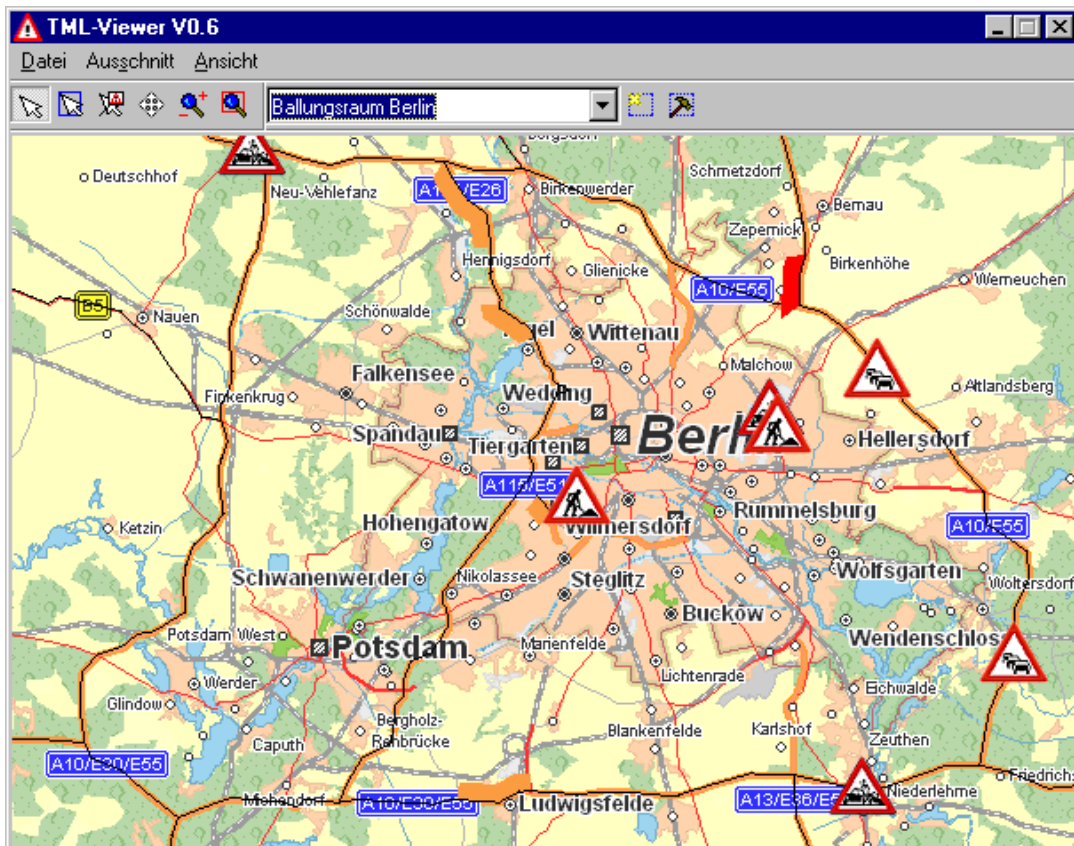
Up until now there was a difference between various task fields in city management headquarters and in motorway management centres. However more and more European cities are taking interest in a integrated traffic system. After all, commuters, business people and suppliers travel on motorways and in the cities.

One of the first traffic management centres to work with both systems was the move GmbH centre, who were responsible for the EXPO 2000 in Hanover, Germany. Database and modelling software were made available by PTV. VISUM online was developed especially for traffic management centres using existing components from ptv vision, the office package for transport planning and traffic engineering and many additional features.

The traffic management software VISUM online was improved and extended based on the experiences gained in Hanover. All system components are based on a standardised database which serves as central communication pool. All system interfaces from and to an installation's technical system environment are constructed in such a way as to store the information necessary for traffic management in a database in a standardised form. This ensures that an optimum link to existing systems in diverse environments is guaranteed with minimum transfer effort. VISUM online is particularly compatible with the traffic control computer system "Concert" from Siemens which is clearly demonstrated in Berlin. The network database is also kept in the central data base. If necessary it can be generated from a digital road network, e.g. from Navtech. It is particularly useful if a VISUM model is already available for the application area from the urban planning procedure.

While in Hanover the system's display components were still created by a project partner, however PTV has stoked them up and has created the product TML (Traffic management layer), a high-quality software for dynamically displaying traffic conditions and traffic messages as well as a workplace for the traffic reporter in the traffic management centres. TML is also based on the VISUM online database and for this reason can be integrated seamlessly in the existing system environment.

The information which is calculated in VISUM online is often not only used for controlling traffic, it is also intended for the general population - the Internet is an excellent medium for this. PTV provides its family of "eServers" for creating an individual website. These components provide the display of map sections (eMap-Server) including traffic reports (eTraffic) and traffic conditions (eTML) and also static and dynamic routing (eRouteServer). And so that the user knows where the journey starts and finishes, there is the eGeocoder which understands addresses right down to the house-number and finds them on the map. The small "e" which appears in all of these names informs expert that these components are compatible with an internet interface, which means they can become a part of the website in a simple and standardised way. In addition they can be scaled to any extent, i.e. with an increasing number of requests further computers can be equipped with these components without the architecture having to be modified.



Message display at the reporter's workplace

In total the modular architecture in VISUM online, TML and the eServers create a system provided by PTV which can flexibly and individually respond to individual requirements without having to sacrifice the economic and technical advantages of standardised components.