State-Wide Traffic Information Portal for Bavaria/Germany

Peter Möhl, September 11, 2007
Agenda

> Project Background
> Portal www.bayerninfo.de
> What’s behind the Fancy Web Pages?
  > Transportation planning model
  > Online performance measurement
> Business Model
> Conclusion
Project Background
Bavaria

> Bavaria (English) = Bayern (German)

> Location:
  > In the heart of Europe
  > In the Southeast of Germany

> Size: 27,239 square miles
  > Comparable to South Carolina or Maine

> Population: 12,493,000 inhabitants
  > Comparable to Illinois and Pennsylvania
Bavarian impressions

Munich

Famous castle: Neuschwanstein

The Alps
The Oktoberfest

This year:

September 22 - October 7
What else comes from Bavaria?

Pope Benedict XVI
Portal www.bayerninfo.de
www.bayerninfo.de

> An official website of Bavarian DOT
> Available in English
> First launch 1995
> Relaunched 2006

> Content
  > Traveler Information
  > Traffic Condition
  > Cycling Information
Selection and settings

- Control field
- Region
- Time
- Content
- Settings for color-blind people
- Legend
TRIP INFORMATION FOR ALL MODES OF TRANSPORT

WITH

- public transport (including walk)
- car
- bicycle
- walk

ON
day: 10
month: 09
year: 07

AT
departure time: 14
arrival time: 00

FROM
town/district: München
- streethouse no.: Rathaus München
- stop:
- important points:

TO
town/district: München
- streethouse no.: Allianz Arena
- stop:
- important points:
Traveler information - Selection

- Combination of all modes of transport
  - Public transport
  - Car
  - Bicycle
  - Taxi
  - Walk

- Route advice depends on
  - Traffic condition
  - Forecasts

=> Bayerninfo offers a highly sophisticated intermodal door-to-door routing
## Traveler information - Results

### Route from München, Rathaus München to München, Allianz Arena

<table>
<thead>
<tr>
<th>Date</th>
<th>Departure Time</th>
<th>From</th>
<th>To</th>
<th>Travel Mode</th>
<th>Time (hour:min)</th>
<th>PT Time (hour:min)</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mo, 10.09.2007</td>
<td>14:30 h</td>
<td>Rathaus München</td>
<td>Allianz Arena</td>
<td>Car</td>
<td>00:34</td>
<td>00:21</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Walk</td>
<td>00:34</td>
<td>00:21</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bicycle</td>
<td>00:57</td>
<td>00:57</td>
<td>0</td>
</tr>
</tbody>
</table>

**Map:**
- Green: Car route
- Red: Walk route
- Blue: Bicycle route
- Yellow: Public transport route

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What’s behind the Fancy Web Pages?
Input from various sources

> Public transport
  > Routing engine
  > Timetable

> General purpose traffic
  > Routing engine
  > Roadway detector data
  > Traffic reports
  > Road works

> Common network data
Different approaches for different timeframes

- **Current traffic state**
  - Now
  - +15m
  - +30m
  - +45m

- **Short-term forecast**
  - +60m

- **Mid-term forecast**
  - +14d

- **Long-term forecast**
  - +1y
Services are fed by timeframe dependent data.
Different model based approaches

> Input from different sources

- Current traffic state
- Short-term forecast
- Mid-term forecast
- Long-term forecast

ASDA/FOTO

Transportation planning model
National Transportation Planning Model
VALIDATE – A transportation model for Germany

> Nationwide model for Germany (82 million residents)
> Hourly volumes for major roads
> Uses public (or commercial) digital data sources
> Easy to update!

> **Applications**
>  > Regional and nationwide traffic forecasts
>  > Traffic volumes for billboard marketing
>  > Travel time estimation for navigation systems
Road network processing

- Initial NAVTEQ network for Germany consists of approx. 6 million links
- Removing minor roads
- Generalization by removing two-leg nodes
- Automated, reversible and repeatable process
- Mapping of NAVTEQ attributes to assignment relevant model attributes
- Adding a lower-definition European network
- Final model network consists of 1.4 million links
Traffic Analysis Zones (TAZ)

> Approx. 10,000 residents per TAZ
> 5 to 12 connectors per TAZ
> 7,000 TAZ‘s (currently on-going (refinement to 10,000 TAZ‘s)
Time-of-day travel demand

Monday
Time-of-day (pseudo-dynamic) assignment

ADT assignment

Peak hour (7 am – 8 am)
Result: Time-of-day traffic condition
VALIDATE for Bavaria

> State wide planning model sub-area model of VALIDATE Germany

> VALIDATE is a base for services of www.bayerninfo.de
> VALIDATE is used for long-term forecast
> VALIDATE is used for mid-term forecast
Long-term forecast

> One-time computation of assignments
  > 24 hours per day
  > Different daily patterns

> Forecast for one year
> Update every 6 month

> Sensitivity of services
  > Time delay where the scheduled impact (i.e., road works) occurs
Mid-term forecast

> Initial computation of assignments
  > 24 hours per day
  > Different daily patterns

> Forecast for 14 days
> Daily updates
> Recalculation of 24 x 14 assignments

> Sensitivity of services:
  > Time delay where the scheduled impact (i.e., road works) occurs
  > AND: Consideration of different routes
Online Performance Measurement
Current traffic condition

Spatial interpolation:
simple, but wrong
better: model based

Temporal extrapolation:
Forecasting
For freeways: ASDA/FOTO

Distinction between 3 stages (free flow, constrained flow, traffic jam)
Travel time computation

- Results of ASDA/FOTO are displayed for time and x (time-space diagram)
- Delay can be calculated
Short-term forecast: Clustering process
Short-term forecast based on time series

- Considers measurement until current point in time
- Chooses best fitting time series from pool of representative time series
- Input for ASDA/FOTO short term forecast
Filling the gaps

> Dense detector supply around metropolitan areas
> Perfect base for data completion and forecast with ASDA/FOTO
> VALIDATE is available for whole Bavaria
> Gaps are filled with help of VALIDATE
> Best-case approach
Next steps

- Floating car data
  - Traffic state on secondary network
- Detectors in towns and villages
  - Set up of local approaches for traffic conditions and forecast
- Connection to neighboring traffic management centers
- Guided parking systems
- Events
- Weather
- Public transport reports

=> Requires adaptation of existing models or even integration/development of new methods
Business Model
### PPP Model

<table>
<thead>
<tr>
<th>Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Development</strong></td>
<td><strong>Development</strong></td>
</tr>
<tr>
<td>– Financing infrastructure</td>
<td>– System set up</td>
</tr>
<tr>
<td>– Owner of infrastructure</td>
<td>– Operation concept</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td><strong>Operation</strong></td>
</tr>
<tr>
<td>– Finance support</td>
<td>– Operation of the System</td>
</tr>
<tr>
<td>– Data supply</td>
<td>– Business development</td>
</tr>
<tr>
<td>– Survey of quality and availability</td>
<td>– Sales: Services and Data</td>
</tr>
</tbody>
</table>

#### Bavaria, local authority districts, other users, industry

**Longer-term strategic development**
- VIB as an integrating and interlinking system
- Increasing the data basis
- Develop strong cooperation between VIB and local agencies

#### Public cooperation
PPP Model – Company Structure

- **Private Partners**
  - 100%

- **Operating Company**
  - 100%

- **Contractor**

- **Bavaria State DOT**

- **Local authorities**

- **Public Transit Operators**
  - will join later
User statistics

> September 2006 – April 2007
Conclusion
Conclusion

> Very successful travel information portal
> Reason: High-level services
> Services are based on reliable calculation of traffic condition and forecasts
> Model based approaches are highly sophisticated

> High potential for further services

> PPP an opportunity for both, public and private sectors
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