ROad Safety ATTributes exchange infrastructure in Europe

Kees Wevers
NAVTEQ

7th European Congress on ITS, Geneva, 3-6 June 2008
in-vehicle map database

- navigation system >> driving assistance systems
- ADAS assist driver with driving task, and thereby
  - enhance driving comfort and driver performance
  - improve driver and traffic safety
  - increase driving efficiency and road network capacity
- road traffic safety improvement is a major driving force of ADAS development
- functions of the map in ADAS applications
  - provide information about the real world (especially ahead)
  - relate and match sensor information to a real world representation
  - integrate of information from different sensors
requirements for the map are increasing

- for some ADAS applications "standard" map data are sufficient
  - example: Dynamic Pass Predictor (BMW)
- most ADAS applications require:
  - more accurate geometry
  - additional attributes
  - completeness
  - updatedness
- accuracy, completeness and updatedness particularly relevant for:
  - safety-related applications
  - driver satisfaction
map providers drive the roads...

... to continuously update the map database...
... but cannot be everywhere every day

Hence there is a need for ROSATTE
history

- eSafety Working Group on Road Safety
  - provision of data by public authorities (Nov 2002)
- Digital Maps Working Group of the eSafety Forum
  - gradual three-phase approach (Nov 2005)
- MAPS&ADAS project
  - electronic horizon and data sourcing
  - Public Authorities Consultation Platform
  - eight most relevant safety attributes
- public authorities are making the changes for most of these attributes
  - hence they are the most efficient source of these changes
<table>
<thead>
<tr>
<th>prelim. industry priority</th>
<th>PA priority</th>
<th>ADAS Attribute</th>
<th>FINRA FI</th>
<th>NPRA NO</th>
<th>SETRA FR</th>
<th>AWV BE</th>
<th>DfT UK</th>
<th>Jutland DK</th>
<th>RWS AVV NL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>H</td>
<td>legal speed limit</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>2</td>
<td>M - L</td>
<td>traffic signs</td>
<td>M / L</td>
<td>M</td>
<td>L</td>
<td>M</td>
<td>L</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>3</td>
<td>L</td>
<td>lane information</td>
<td>M / L</td>
<td>M</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>4</td>
<td>L</td>
<td>traffic lights</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>5</td>
<td>L</td>
<td>crossings</td>
<td>L</td>
<td>M</td>
<td>L</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>6</td>
<td>H / L</td>
<td>accident hot spots</td>
<td>L</td>
<td>H</td>
<td>None</td>
<td>L</td>
<td>L</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>7</td>
<td>L</td>
<td>slope</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>8</td>
<td>L</td>
<td>banking</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>
the ROSATTE project

- technology and processes for incremental updating from public authorities to map providers and other users
- consortium - 15 partners
  - ERTICO (coordinator)
  - road authorities/operators of Norway, Sweden, The Netherlands, Flanders, Bavaria and France
  - NAVTEQ, Tele Atlas and PTV
  - 2 research institutes, 1 consultancy, 1 university
the ROSATTE project

- main aspects
  - technical and organisational issues, and quality
- focus on changes to sign information
  - legal speed limits
  - priority signs, turn restrictions, warning signs
- static and long-term temporary, but not short-term temporary and dynamic information
the data chain

RA: Road Authority

1. safety-related road attributes
2. regional RA
3. data exchange infrastructure
4. map centre
5. data integration
6. full map in exchange format (e.g. GDF)
7. incr. updates in exchange format (e.g. ActMAP)
8. map release on CD or DVD in specific PSF
9. on-line incr. updates geared to specific PSF
10. in-vehicle system
11. many other data sources

attribute maintenance

national RA storage and maintenance in PA database
data exchange

- multitude of map database solutions on the side of authorities >> need for location referencing
  - point locations, linear locations
  - draw upon existing standards
- message format (protocol)
- metadata, versioning
- aggregation, storage, access
process for incremental updates PAs > MPs

legal order

report on execution of legal order

change of sign

recording in mobile device

upload to local central database

overnight processing/creation of changes

local authority server

aggregation incremental updates

storage of aggregated data

announce to trigger download

national repository

download aggregated updates

data verification/integration

digital map provider

request

download

7th European Congress on ITS, Geneva, 3-6 June 2008
the extended data chain

- ADAS & safety related road attributes
- Public Road Authorities (local/regional/national) storage and maintenance in PA database
- data exchange (especially incremental updates)
- processing & validation of deviations (FeedMAP)
- incr. updates in exch. format (e.g. ActMAP)
- online batch delivery of deviations
- processing & validation of deviations (FeedMAP)
- map release on CD or DVD in specific or generic PSF
- on-line incr. updates: PSF tiles
- many other data sources
- real world survey (drive the roads)
- map providers data capturing database creation data conversion data validation data integration quality control
- map db release db compilation incr. updates
- navigation system
- in-vehicle map database
- driver inputs
- ADAS Horizon Provider
- detection of deviations
- processing of user inputs
- sensor data
- driver inputs
- ADAS applications
- navigation system
- on-line incr. updates: PSF tiles
- full map in exch. format (e.g. GDF)
- incr. updates in exch. format (e.g. ActMAP)
ROSATTE - current status

- project started 01-01-2008
- current focus on WP 1
  - identification of functional, technical, quality and organisational requirements
  - design of an overall architecture
WP1 - reqs and architecture - focus areas

- the maintenance of attributes
  - usable tools for maintenance and update (GIS)
  - quality management of the data quality of the road safety attribute data

- the exchange of attributes
  - metadata describing road safety attributes
  - quality management of the exchange process

- the integration of attributes
  - how the Information providers will use the ROSATTE infrastructure to query metadata and download road safety attributes
  - quality management of the integration process at Information provider systems
WP1 - requirements

- user requirements
  - essentially the requirements brought into the project
    - e.g. incremental updates of attributes
    - attribute aggregation at all authority levels
    - feedback from information provider/map provider when inconsistencies are discovered

- system requirements
  - derived from use cases, process views and component views
    - functional requirements
      - e.g. descriptive metadata descriptions of the attributes
    - non-functional/technical requirements
      - quality requirements
        - e.g. INSPIRE directive
    - context requirements
      - loosely coupled components
WP1 - overall architecture

- functional views
  - user needs
  - use cases
  - in summary: this viewpoint defines the needed functionalities in the ROSATTE infrastructure

- process views
  - UML diagrams are applied to define the needed processes of the ROSATTE infrastructure

- information views
  - conceptual data models define the needed information elements related to the ROSATTE infrastructure

- component views
  - high-level system/component architecture
contact and workshop

- ROSATTE web site
  - www.rosatte.eu

- ROSATTE coordinator
  - Sophie Dupuis <ROSATTE_info@mail.ertico.com>

- ROSATTE workshop
  - 17 September 2008, Paris
another view on the ROSATTE data chain