MISTRA
Switzerland’s road and motorway management system
Geospatial World Forum
8 May 2014, Geneva

Christoph Käser
Swiss Federal Roads Office (FEDRO)
www.astra.admin.ch
Contents

1. The Swiss Federal Roads Office FEDRO: duties and current situation
2. MISTRA road and motorway management system
3. Example of technical application (road maintenance)
Objectives and duties of the Federal Roads Office (FEDRO)

a. To complete the motorway network and preserve its substance
b. To secure the functionality of the motorway network
c. To guarantee access for road users and vehicles
d. To improve the safety of road users
e. To reduce the burden on the environment attributable to road traffic

- Preparation of decisions relating to road transport policy
- Supervision of the country’s motorways and roads of national importance
Federal Roads Office (FEDRO)
Traffic volume (2012)
Traffic safety, motorway network (2012)

Serious accidents on motorways/expressways
Traffic safety in Switzerland as a whole

Some key expenditure data: Investments (1990 to 2010)
# Inventory of objects on the motorway network

Status as of October 2013: 14,629 objects

<table>
<thead>
<tr>
<th>Objektgruppe Fahrbahn</th>
<th>Anzahl</th>
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<tbody>
<tr>
<td>Strecken ohne Richtungstrennung ~ 400 km</td>
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<td>Strecken mit Richtungstrennung ~ 1‘400 km</td>
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<td>Zubringerstrassen</td>
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<td>Unterhaltswege</td>
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<table>
<thead>
<tr>
<th>Objektgruppe Kunstbauten</th>
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GWF MISTRA, 8 May 2014, Geneva
Bundesamt für Strassen ASTRA
### Inventory of objects on the motorway network

#### Status as of October 2013

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<th>Objektgruppe</th>
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<tr>
<td><strong>Objektgruppe Tunnel</strong></td>
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<tr>
<td>Bergmännische- / Tagbau-Tunnels</td>
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<td><strong>Objektgruppe Galerien</strong></td>
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<td>Werkhöfe und Stützpunkte</td>
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High degree of network complexity

Fig 4.3.2.c  Network complexity

- Bridges (%)
- Tunnels (%)
- Add length ramps (%)

Length % of total network

AT CH DK ES FL FR HU IE IT NL PT SE UK
Contents

1. Swiss Federal Roads Office (FEDRO): duties and current situation

2. MISTRA road and motorway management system

3. Example of technical application (road maintenance)
What is MISTRA?

MISTRA stands for Management Information System for Roads and Traffic. Its purpose is to support strategic, conceptual and operational processes within the realm of the duties of FEDRO. These processes involve specifications for road network planning, road development and utilisation, as well as for any other tasks that fall within the scope of duties of the owners and operators of the country’s road networks.

This geographic information and communication system for roads and traffic is being developed in close cooperation with the cantons, municipal authorities and various federal authorities, as well as a broad variety of specialists.
Overview of MISTRA

Static road & infrastructure data

- Routes
- Structures and tunnels
- Equipment management system
- Motorway management system
- Urban area management system
- Operational/maintenance
- Real estate and contract management system
- Traffic monitoring
- Accidents
- Routes for cyclists and pedestrians
- Others…
Introduction of 10 applications between 2007 & 2010

2007
- IVS-GIS
- VMON
- DWH VMON
- SB
- LVS

2008
- BS

2010
- VU
- DWH VU+ADMAS+MOFIS
- BSAS
- TRA
- LBK
Introduction of 9 applications between 2011 & 2013

2011 KUBA5  
DWH TDcost+ETC  
VUGIS

2012 IBBS  
BUS

2013 SABA  
EMSG  
LV
Introduction of MISTRA in the cantons: framework agreement

Status as of 2014

No introduction planned
Agreement pending
Agreement in preparation
Agreement signed
Contents

1. The Swiss Federal Roads Office FEDRO: duties and current situation

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KH3

Text auf allen Fusszeilen anpassen:

GWF MISTRA, 8 May 2014, Geneva
Swiss Federal Roads Office (FEDRO)
Keith Hewlett, 4/23/2014
Motivation for MISTRA Trassee

- Trassee includes the entire foundation and surface structure for the roadway as well as the areas left and right of the roadway
- Documentation of the road vicinity:
  - Geometry and utilization
  - Roadway construction and condition
  - Guardrail system
  - Drainage, noise protection walls and wildlife fences
  - Road marking and signalization
- Replacement of the federal and cantonal system STRADA
Goals Trassee

Geometry and utilization

Road width

Road construction width
Goals Trassee

Roadway construction and condition

[Diagram showing components of a roadway: Cover layer, Bearing layer, Base layer, Pavement, Foundation]

[Images of a roadway showing different conditions]
Goals Trassee

Guardrail system / noise protection walls
Goals Trassee

- Pavement Management System (PMS)
- Emperical PMS process:
  - Belongs to object view
  - Create maintenance objects at critical locations
  - Assign maintenance tasks
  - Schedule maintenance objects and tasks
Selection on map
Graph of Road Axis
Data Lists

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<th>U-Entfernung</th>
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Details

- Raum / Zeit / Fach
- Bemerkungen
- Datum
- System
- Projekt: ZEHN009 / 2009 / Roburès à grand rendement, 2009
- Breite [m]: 3.500
- Länge [m]: 10.000
- Fläche [m²]: 36.250
- Methoden-Typ: SWW, SWarty, W-Wert (maxSW, Wmax), Längsbelastung
- Text zum Methoden-Typ
- Hilfsmittel: ARA, ARAN
- Note 1: 0.880
- Wert 1: 1.600
- Wert 2: 4.670
- Wert 3: 8.250
- Messabstand [m]: 0.100
- Messgeschwindigkeit [km/h]: 80
- Stehende: -1. Äusserer Fahrtreifen der Stammmitte mit Nutzung in Achselrichtung
- Bewertungsregel: 2. SW_V1.3

GWF MISTRA, 8. May 2014, Geneva
Bundesamt für Strassen ASTRA
Cross-section
Objects and their Representations
Queries
Create a Maintenance Object
Workpackage and Simulation
History with Reference Date
Reports
### Statistische Werte zur Note

<table>
<thead>
<tr>
<th>Fahrhahmenmermal</th>
<th>Durchschnitt</th>
<th>Min</th>
<th>Max</th>
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### Statistische Werte zum Alter

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### Verteilung nach Notenklassen

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<th>Notenklasse</th>
<th>Fläche [m²]</th>
<th>Fläche [%]</th>
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</thead>
<tbody>
<tr>
<td>gut (0 &lt;= Note &lt;= 1)</td>
<td>8'932'069.57 [m²]</td>
<td>27.32%</td>
</tr>
<tr>
<td>mittel (1 &lt;= Note &lt;= 2)</td>
<td>16'623'087.80 [m²]</td>
<td>50.85%</td>
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<tr>
<td>ausreichend (2 &lt;= Note &lt;= 3)</td>
<td>8'957'033.64 [m²]</td>
<td>18.85%</td>
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<tr>
<td>krisch (3 &lt;= Note &lt;= 4)</td>
<td>1'507'498.88 [m²]</td>
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<td>schlecht (4 &lt;= Note &lt;= 5)</td>
<td>84'511.49 [m²]</td>
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<tr>
<td>Gesamtfläche Fahrhahmenmermal</td>
<td>32'652'781.89 [m²]</td>
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### Verteilung nach Notenklassen (Diagramm)
Statistics

• 20’000 roadway geometries
• 60’000 roadway structures
• 24 roadway attributes:
  • Currently there are 60K datasets for each attribute and survey for the federal highway system
  • Data is available for 3 surveys, surveys are done every 4 years
• Overall 2 Mio. roadway attributes
Performance

Performance for 60’000 objects

- ca. 3s for map display
- ca. 20s for data list

- Up to 100’000 objects can be displayed in the data list