Esri User Conference 2017

Key Performance Indicators for Bavarian Roads using Insights for ArcGIS

San Diego, July 11, 2017
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www.innenministerium.bayern.de
Major Road Network in Bavaria

Motorways: 2,500 km
Federal Roads: 6,000 km
State Roads: 14,500 km
County Roads: 19,000 km
Road Administration – Responsibilities

Planning

Services

Maintenance

Construction

Operation
Road-Information-System – BAYSIS
Structuring Information

GeoDesign mit GIS Datenbestand

- BIM Daten
- GeoDesign für Planer und Ingenieure
  - 3D CAD BIM Modelle von Infrastruktur – Gebäude
  - Straßen – Schiene - Brücken
- Infrastruktur, Utilities Telekommunikation
- Transport und Verkehr
- Bauüberwachung
- Umweltverträglichkeit
- Facility Management
- Vermessung
- Fernerkundung
- Landnutzung
- 3D Stadtmodelle
- Kataster
- Geländemodell
- Topografie

Geodaten nach Branche / Anwendung

Geobasisdaten / GDI
BAYSIS MapWindow – Sharing maps
Platform for Road Infrastructure Informations

source: Esri / OBB
Mobility in Germany – MID 2016

Sampling design and questionnaire dimensions

source: http://mobilitaet-in-deutschland.de/

user satisfaction about road network
KPI – Key Performance Indicators
KPIs Manual – Australia

Performance Scorecard

Snapshot

Road Safety
- % Community satisfaction: 88%
- % accidents completed on time: 99%
- % of contracts completed on budget: 92%

Officer Road Safety
- % effectiveness of road safety awareness: 85%
- % of OPR projects completed on time: 99%
- % of OPR projects completed on budget: 100%

Road Efficiency Road Management
- % of contracts completed on time: 94%
- % of contracts completed on budget: 100%
- Average delays per million traffic kilometers: 115

State Development
- % of contracts completed on time: 100%
- % of contracts completed on budget: 100%
- Average road maintenance per million traffic kilometers: 115

Road Maintenance
- % smooth travel exposure: 100%
- % community satisfaction: 100%
- % traffic signals: 92%
- % availability of traffic signals: 91%

Road Access
- % of roads completed on time: 99%
- % of roads completed on budget: 100%
- % of contracts completed on time: 100%
- % of contracts completed on budget: 100%

source:
Annual Report, Main Roads Western Australia, 2013
### Benchmarking Highways England 2015

<table>
<thead>
<tr>
<th>Performance KPI</th>
<th>Killed or Seriously Injured</th>
<th>Total KSI on network and/or KSI/km</th>
<th>Definitional issues of ‘serious injury’</th>
</tr>
</thead>
<tbody>
<tr>
<td>User satisfaction with road network based on survey</td>
<td>%</td>
<td></td>
<td>Definitional issues of ‘user satisfaction’</td>
</tr>
<tr>
<td>Network available to users</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorway incidents cleared within an hour</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average delay</td>
<td>Time lost per vehicle per mile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise important areas mitigated</td>
<td>Number</td>
<td>Specific to Highways England</td>
<td></td>
</tr>
<tr>
<td>Delivery of improved biodiversity</td>
<td>Plan achievement by deadline</td>
<td>Specific to Highways England</td>
<td></td>
</tr>
<tr>
<td>New and upgraded cycle crossings</td>
<td>Number</td>
<td>Specific to Highways England</td>
<td></td>
</tr>
<tr>
<td>Savings on capex</td>
<td>£</td>
<td>Specific to Highways England</td>
<td></td>
</tr>
<tr>
<td>Delivery plan progress</td>
<td>Achievement by deadline</td>
<td>Specific to Highways England</td>
<td></td>
</tr>
<tr>
<td>Pavement assets that do not require further investigation for possible maintenance</td>
<td>%</td>
<td>Comparability issue</td>
<td></td>
</tr>
</tbody>
</table>
Indicators

Performance-Kennzahlen für strategische Managementebene

Status quo Kennzahlen

Disparität Kennzahlen

Dynamik Kennzahlen

Regionen (Teilnetze)

Zeitperiode

Status quo Kennzahlen

Status quo Kennzahlen

Status quo Kennzahlen

Status quo Kennzahlen

Status quo Kennzahlen

Status quo Kennzahlen

... Disparität Kennzahlen

... Dynamik Kennzahlen

... ...

... ...

... ...

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Spatial differentiation

District authorities – Building authorities – Regional planning associations – Counties

(and – not shown here – cities/communities)
Temporal developments (e.g. three campaigns)

Example: Change of focal point of maintenance needs over time
Benchmarking Infrastructure in Bavaria

<table>
<thead>
<tr>
<th>Groups of performance indicators</th>
<th>Basic Data</th>
<th>Infrastructure</th>
<th>Maintenance</th>
<th>Availability</th>
<th>Safety</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators focusing on stakeholder issues</td>
<td>Diversity in social, economic and social structure</td>
<td>assets of infrastructure (roads, bridges, tunnels, …)</td>
<td>Condition and maintenance of the infrastructure, depreciation</td>
<td>Availability, reliability, ensuring mobility</td>
<td>Accident rate and density, Road safety work</td>
<td>Cost of infrastructure deployment</td>
</tr>
<tr>
<td>degree of freedom</td>
<td>fixed</td>
<td>nonfixed</td>
<td>nonfixed</td>
<td>nonfixed</td>
<td>midfixed</td>
<td>midfixed</td>
</tr>
</tbody>
</table>

Special Examples:
- Asset → User satisfaction with road network
- Safety → Motorway incidents cleared within an hour
- Administration → work progress – project costs
Portal for ArcGIS – Explore, Analyze, Iterate

source: www.esri.com/products/arcgis-capabilities/insights
Looking for information
BAYSIS MapWindow – Layers as services

www.baysis.bayern.de/web/content/geodaten/wfs.aspx
Using data to create content
Insights for ArcGIS workbooks
Time Slider for Story Map

- Population – projection 2034

work in progress
Commuters – flowing in and out

work in progress
Preparing data with Insights for ArcGIS
Presenting data with Insights for ArcGIS

state of maintainance

workplace mobility and traffic accidents
Mobility Analytics Dashboard

Informationen zur Mobilitätspolitik

Im GIS Portal des Bayerischen Straßeninformationssystems BMSG

Mobilitätspolitik als Auftrag

Moderne, leistungsfähige, zuverlässige und sichere Infrastrukturen sich in besonderstem Maße auf die Wirtschaft und die Bürger. Sie ermöglichen eine umfassende Wahrnehmung von Mobilität, wobei Mobilität das grundlegende Verständnis von baulicher, mobiler, sozialer, psychologischer, beruflicher oder landläufiger Freiheit, die der jeweiligen Einzelnen Personen bestimmt – und das ihre gesellschaftliche Position in der Gesellschaft bestimmt.
Enabling Mobility by Deep Learning from Big Data