SUSTAINABLE URBAN MOBILITY PLAN TRAINING WORKSHOP

Module 3 – Information Gathering & Analysis
SUMP Analysis:

Data Collection & Analysis

• Essential for SUMPs to include:
  – evidence on existing transport conditions
  – assessment of impact of proposed transport interventions
• Mode share of walking, cycling, transit and public transport (bus) presented separately
• Aim to simplify presentation of transport data where possible:
  – Usage levels of public transport, walking and cycling
  – Easy to read maps and graphical presentation
    • Numbers of passengers per hour on core corridors
SUMP Analysis:

Data Collection & Analysis

• Transport system data includes:
  – Street network: footways & cycle ways
  – Street management: regulated parking, off/on-street parking, accident backspots
  – Public transport systems: bus corridors, rapid transit, peak hour frequencies & occupancy, accessibility within 5-minute walk etc.

• Integrated Land Use Data:
  – Integrated land use models are used to predict land use impacts of transport investment
  – Demographic information on population, population densities and future population
SUMP Analysis:

Data Collection & Analysis

- Mobility planning relies on availability of accurate data together with robust modelling techniques
- Data gaps and limited ability to use transport demand models
- Importance of Non-Motorised Transport (NMT) Modes:
  - Towns/cities often lack data on non-motorised transport
    - Importance of walking & cycling is often underplayed within UMPs
    - Future transport scenarios NMT facilities often not considered
SUMP Analysis:

Data Collection & Analysis

- Accuracy and Completeness of Transport Data
- SUMP’s include travel demand models – focus on 4 key travel decisions:
  - How often do we travel?
  - What is our destination?
  - What mode of transport do we use?
  - Which route do we follow?
SUMP Analysis: **Data Collection & Analysis**

- **Importance of good survey methods:**
  - Household travel surveys for information on travel characteristics
  - Sample needs to be representative of the city population

- **Potential to ignore short and non-motorised trips:**
  - Walking & cycling trips are often neglected
  - Average trip lengths and walk mode share important land use indicator:
    - Trips shorter than 1 km indicates close mix of land uses
    - Focus on transport/land use planning could aim to maximise/replicate this to reduce demand for motorised travel
SUMP Analysis:

Data Collection & Analysis

Data Access and Sensitivity

• Significant transport, economic, geo-social, travel, public health and environment data available.
• Data held in wide range of locations & requires sharing of resources across a number of internal and external organisations.
• Important to ensure that all partners willing to share their own data with the other partners.
• Data confidentially can create friction or unwillingness to cooperate among partners (eg. public transport data):
  – Issue needs careful handling to avoid cooperation problems:
  – Clear statement of why the data is required and showing the benefits to be generated by use of data
  – Explanation of how the data will be used and held by the SUMP authority
• Agreement of partners how data is collected and shared (data platform, process, etc.) – aim is for all partners to rely on a single common set of information.
SUMP Analysis:
Data Collection & Analysis

- SUMP’s follow 4-step model dealing with transport network:
  - Trip generation
  - Trip distribution
  - Modal split
  - Trip assignment

- Travel demand analysis relies on survey data on existing transport conditions

- Collecting reliable data is essential to estimate demand for potential transport services
SUMP Analysis:

**Data Collection & Analysis**

- Origin/Destination surveys
- Journey time surveys
- Traffic counts
- Public transport counts
- Car park counts

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SUMP Analysis:
Data Collection & Analysis

- Interactive voting and assessment of key issues
- Gains honest and open feedback
- Instantly canvases opinion of group
- Provides interesting stimulus
- Used in York’s development of Local Transport Plan:
  - Feedback on key issues & scenario options

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SUMP Analysis:

**Ceske Budejovice Integrated Transport Plan**

- Ceske Budejovice Integrated Transport Plan:
  - Comprehensive analysis of public transport data
  - Aimed to review current performance and help test new routes
  - Examining supply & demand aspects

- **Graphical outputs** helped to identify services with too low / too high occupancy level
SUMP Analysis:

*Ceske Budejovice Integrated Transport Plan*
Aims in accessibility mapping:
- To identify ‘weak’ points in the coverage of the existing network
- To verify proposed improvements (introduction of new bus stops)
Operational Layers

☐ T1 Omezení vjezdu nákladní dopravy

☐ K1 Kartogram dopravního zatížení IAD ve vozidlech za 24 hodin

☐ K2 Kartogram dopravního zatížení VD v osobách za 24 hodin

☐ K3 Kartogram dopravního zatížení cyklistů za dobu průzkumu (8 hodin)

☐ C1 Hodnocení cyklistické dopravy na celé síti

SUMP Analysis:

Opava Urban Mobility Plan
SUMP Analysis: Opava Urban Mobility Plan

Operational Layers

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SUMP Analysis:
Opava Urban Mobility Plan

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SUMP Analysis:
Opava Urban Mobility Plan

Operational Layers

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SUMP Analysis:
Opava Urban Mobility Plan

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Image of a map with various routes and markers.
SUMP Analysis: Opava Urban Mobility Plan

Operational Layers
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Sofia Trolleybus Network - Speed

Area of slow speed

Legend
- Trolley bus stops

Speed - kph
- 3 - 12
- 12 - 15
- 15 - 20
- 20 - 25
- 25 - 55
• Routes 5, 12 and 22 analysed
• Segregated sections do not show high speeds
Sofia Bus Routes - Speed

- Route 260 analysed
- Delays shown on Ring Road
Gibraltar Transport: Speed Review

- Average speed across all time periods is 20km/h
- Traffic fastest during PM Peak (23km/h)
- Varied speeds across the journeys
Gibraltar Household Surveys Summary

Average No. of Trips, Journey Time for Trips Originating and ending in each Zone, Main mode of travel

Spain
Ave. No of Trips per person 2.7
Ave. Journey Times
By departure zone: 31m41
By destination: 41m47
Main mode:
Walking (>5m): 32%
Walking (<5m): 22%

North
Ave. No of Trips per person 2.7
Ave. Journey Times
By departure zone: 16m47
By destination: 15m00
Main mode:
Walking (>5m): 32%
Walking (<5m): 22%

Eastside
Ave. No of Trips per person 2.9
Ave. Journey Times
By departure zone: 16m42
By destination: 16m22
Main mode:
Car (as pass): 35%
Car (as driver): 19%

Upper Rock
Ave. No of Trips per person 2.6
Ave. Journey Times
By departure zone: 17m39
By destination: 18m41
Main mode:
Car (as driver): 30%
Car (as pass): 30%

Westside
Ave. No of Trips per person 2.9
Ave. Journey Times
By departure zone: 16m42
By destination: 16m22
Main mode:
Walking (>5m): 38%
Walking (<5m): 20%

South District
Ave. No of Trips per person 2.8
Ave. Journey Times
By departure zone: 16m13
By destination: 16m42
Main mode:
Car (as driver): 29%
Motorcycle: 20%

Europa
Ave. No of Trips per person 3.1
Ave. Journey Times
By departure zone: 17m22
By destination: 35m51
Main mode:
Car (as driver): 49%
Car (as pass): 21%

Old Town
Ave. No of Trips per person 2.7
Ave. Journey Times
By departure zone: 16m43
By destination: 16m06
Main mode:
Walking (>5m): 38%
Walking (<5m): 19%

Average
Ave. No of Trips per person 2.6
Ave. Journey Times
By origin: 19m22
By destination: 22m19
Walking (>5m): 30%
Car (as driver): 19%
Gibraltar Online Transport Survey

Mode Split for Educations/Schools Trips (base = 74)

- Bus or coach: 6.8%
- Car (as passenger): 4.1%
- Car Driver (on your own): 9.5%
- Car Driver (with passenger/s): 43.2%
- Cycle: 2.7%
- Motorbike or moped: 5.4%
- Walk: 28.4%

Mode Split for Leisure/Retail Trips (base = 263)

- Bus or coach: 5.3%
- Car (as passenger): 8.4%
- Car Driver (on your own): 18.6%
- Car Driver (with passenger/s): 40.3%
- Cycle: 2.7%
- Motorbike or moped: 11.0%
- Other: 0.4%
- Taxi: 0.8%
- Walk: 12.5%
SUMP Information Gathering: Some key thoughts

- **Data and information** on current & future urban mobility critical to success of an SUMP
- **Quality of data** obtained = **quality of SUMP**
- Consider **all modes of transport** (including pedestrians/cyclists)
- Make **best use of existing data sets** where possible
- Mixture of **qualitative** and **quantitative data** to support UMP
- Use of **innovative ways** to analyse & present data
  - Online data analysis to actively engage with stakeholders
  - Use data/information to **gain consensus** on scale of urban mobility issues and problems
SUMP Analysis Tools – Transport Model: What is a Traffic Model?

• A mathematical representation of the real world

• Based on observation of real life travellers

• Used to predict how people will behave and how the transport network will respond:
  
  o In the future
  
  o When you implement different schemes/policies
Strategic Transport Assessment: 
SUMP Modelling

• Why do we need a transport model?
  – to inform the Sustainable Urban Mobility Plan process
  – to support capital investment in the towns/cities
  – to provide quantitative and objective evidence to support long term vision for urban areas

• What considerations for a good transport model for EU cities:
  – Data
  – Functionality
  – Software
SUMP Transport Modelling:

What is a model used for?

- What will happen if we do nothing?
- Predict future problems, related to growth (economy & population)
- How effective are alternative interventions?
- Helps decide on the best option
- Help obtain funding for infrastructure from banks or financial institutions
SUMP Transport Modelling: How does it Work?

Transport Supply

Transport Demand

Traffic Flows
Public Transport Patronage
SUMP Transport Modelling:

How does it Work?

Transport Supply

- Roads:
  - Lengths
  - Speeds
  - Capacity
  - Car Parking (location, capacity and costs)
  - Junction Type

- Public transport provision
  - Bus Routes
  - Times
  - Fares

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SUMP Transport Modelling:

Transport Demand Aspects

- Include:
  - Mode of travel?
  - Purpose of trip?
  - Where do people want to go?

- Need to take account different types of travellers – residents/tourists/commuters

- Requires good quality survey data for model to give realistic results
SUMP Transport Modelling: How the demand is calculated

- Area being modelled is split into “zones”
- The number of trips made between each zone is calculated to form a table or “matrix”
- The number of trips that start or end in a “zone” depends on the population/number of households:
  - Household surveys will give average trip rates which can then be factored to total population levels
- Where people travel from and to determined from surveys

Zones – for areas of a town/city
SUMP Transport Modelling:

*Demand is connected to the supply*

- Area being modelled is split into “Zones”
- Zones are connected to the road network to allow the trips to be allocated onto roads
- Routings through network worked out through an iterative process
SUMP Transport Modelling:

Traffic on the Network
SUMP Transport Modelling:

*Does the Model work?*

- Outputs from the Base Transport Model compared with observed data:
  - Traffic Counts
  - Journey times
- Never be a perfect match:
  - Guidelines exist on how close the match needs to be for the model to be considered to be acceptable (calibration/validation task)
SUMP Transport Modelling: Forecasting

Base Year Model

Population changes
Committed network changes

Forecast Year Model (Do Min)

Network Changes
Demand Changes

Scenario 1
Scenario 2
Scenario 3

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SUMP Transport Modelling:

Modelling Outputs

Congestion Hot Spots

Link flows

KEY
<70% of capacity  
70-85% of capacity  
>85% of capacity

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**SUMP Transport Modelling: Examples of Modelling Outputs**

Network wide comparisons of options

![Graph showing AM Peak Network Wide Average Journey Time (compared to “do nothing”) for Development Scenario 2 with options Opt 1, Opt 2, Opt 3, and Opt 4.](image)
• Software is a tool, a platform for delivery, \textbf{NOT} the driving force!

• There are a number of commercial packages that can do the job!

• Recommended approach is to use commercial off the shelf software – continuously maintained and improved

• Issues to consider:
  – Who will own and run the model?
  – What is most used software (access to skills)
  – Software investment
SUMP Transport Modelling:
Modelling: Challenges

Number of key challenges:

• Model process complexity

• Inadequate care to calibrate travel demand models:
  – Inability of the model to accurately represent existing travel behaviours
  – Calibration task should seek to check quality of model
  – Observed and predicted volumes across many points in the city
SUMP Transport Modelling:
Modelling: Challenges

• Robust evaluation process required to ensure the model accurately reflects the reality of the transport system

• Calibration of model through:
  – Vehicles: Predicted vs observed screenline vehicle counts
  – Public Transport:
    • Predicted vs observed screenline vehicle counts
    • Predicted vs observed screenline passenger volumes on public transport modes
    • Predicted vs observed boardings per route on public transport modes
    • Operated public transport km vs vehicle-km within the model
  – Non-motorised transport:
    • Predicted vs observed screenline pedestrian and cyclist counts
Neglect of Induced Travel Demand

- Increase in level of road infrastructure often likely to induce additional vehicle travel
- Wide range of negative impacts on transport performance:
  - Increased downstream congestion
  - Increased road and parking costs
  - Propensity for more accidents
  - Greater energy consumption and pollution emissions

SUMPs should include specific performance indicators for:
- Actual number of households owning private vehicles
- Number of kilometres travelled by private vehicles each year
### Table 2-1: Levels of Towns/Cities for Functional Regional Analyses

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td><strong>Population</strong></td>
<td><strong>Population</strong></td>
</tr>
<tr>
<td>&gt;100,000 persons</td>
<td>40,000 to 100,000 persons</td>
<td>&lt;40,000 persons</td>
</tr>
<tr>
<td><strong>Public Transport</strong></td>
<td><strong>Public Transport</strong></td>
<td><strong>Public Transport</strong></td>
</tr>
<tr>
<td>Complex network with intersecting routes and multiple modes (tram, bus, trolleybus, maxi-taxi)</td>
<td>Moderate network of public transport services that may include multiple modes and some interchange opportunities</td>
<td>Very few public transport routes, or no services</td>
</tr>
<tr>
<td><strong>Road Network</strong></td>
<td><strong>Road Network</strong></td>
<td><strong>Road Network</strong></td>
</tr>
<tr>
<td>Dense road network with a large urban area, numerous routing options for many trips, and with traffic congestion appearing during periods of the typical day.</td>
<td>Compact urban centre fed by a number of defined approach roads, and with different routing options for traffic travelling into/through the urban area.</td>
<td>Simple road network comprising a small number of main roads passing through the area, and with limited opportunities for choosing different routes</td>
</tr>
</tbody>
</table>
## SUMP Transport Modelling: Model Hierarchy

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable Demand Model</td>
<td>Assignment Model</td>
<td>Simple Model</td>
</tr>
<tr>
<td>Includes:</td>
<td>Includes:</td>
<td>Includes:</td>
</tr>
<tr>
<td>ROAD NETWORK</td>
<td>ROAD NETWORK</td>
<td>PRIVATE TRANSPORT NETWORK</td>
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<tr>
<td>PUBLIC TRANSPORT NETWORK</td>
<td>TRIP GENERATION MODEL</td>
<td>LINK FLOWS ON ROADS</td>
</tr>
<tr>
<td>TRANSPORT SERVICES</td>
<td>DEMAND MATRICES</td>
<td>JUNCTION MODELS</td>
</tr>
<tr>
<td>TRIP GENERATION MODEL</td>
<td>ASSIGNMENT MODELLING</td>
<td>SIMPLE MODE SHARE MODEL</td>
</tr>
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<td>ASSIGNMENT MODEL</td>
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<tr>
<td>MODE SHARE MODEL</td>
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**Table 4-1: Transport Model Functionality for Urban Areas**
For info or further questions on this workshop and the activities of the JASPERS Networking Platform, please contact:

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