Integrated Traffic Management – Principles, Measures and Examples

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Introduction

Need for Traffic Management – Need for Integration

- **Mobility** is a major value for people in our societies. However, we do have significant problems (capacity, safety, environment, …)

- **Appropriate infrastructure** is important. But infrastructure alone cannot solve the problems.

- The need to balance travel demand and transport supply will increase (Traffic Management)

**Integration** is needed in **three dimensions**:

- **Conceptual/functional integration** (interconnections, intermodality, integrated information, synergetic bundles of measures, …)

- **Technical/physical integration** (interconnections, multimodal mobility stations, data exchange, ITS architectures, …)

- **Organisational-institutional integration** (cooperation among different institutions, intermodal cooperation, traffic management agencies, …)
Principle 1
Provide sufficient and sustainable financing for transport.
Principle 2
Control transport demand and modal choice.

- Integrated Planning of land-use and transport systems!
- **Control demand.** Influence departure time, transport mode, route, destination …
- Control modal choice.

**PULL:** Care for attractive alternatives. Allow intermodal travel.

**PUSH:** Access control, parking management, road pricing …

**BUT:** To **deteriorate traffic flow** for motorized vehicles in urban areas **is not an appropriate mean** to control mode choice.

**Example measures for medium-sized cities:**
- Integrated planning of land-use and transport systems. Promote public transport. Park+Ride stations. Comprehensive parking management.
Principle 3
Use the instruments of mobility pricing to control demand.

Example measures for medium-sized cities:

Pricing for public transport:
reasonable fares,
job tickets, student tickets,
variable fares by time of the day.

Pricing for parking.
Road Pricing?
Principle 4
Ensure a future-proof design of transport infrastructure.

Our transport systems are changing rapidly. New requirements are emerging.

Examples:
- Urban stations for long-distance bus travel in Germany.
- New requirements for the cycling infrastructure.
- Mobility stations for car-sharing, car-rental/bike-rental systems.
- Charging stations for electric vehicles.
- Changing needs of an aging society.
- Requirements of automated vehicles (lane width, road construction, road markings, parking space in city centres, …)

Transport infrastructure must be flexible and robust against changing requirements.
Principle 5
Operate transport infrastructure dynamically and situation-responsive.

Example measures for medium-sized cities:
Tidal flow systems, actuated traffic signal control, dynamic speed limits, dynamic parking guidance systems, dynamic route signs, on-demand public transport services, ...
Principle 6
Improve traffic safety.

- Traffic Safety remains a most important issue.
- 1,250,000 road deaths worldwide in 2015, highest fatality rates in low-income countries. (Global Status Report on Road Safety 2015)
- 26,000 fatalities on EU roads in 2015. (5,500 less than in 2010)
- Significant improvements achieved in many countries.
- Growing motorization in developing and emerging countries.
- New problems arising. (e.g. use of mobile phones while driving)
- Ambitious political goals. (e.g. “Vision Zero”)
- Need for measures in Engineering, Education, Enforcement.

Principle 7
Apply measures to protect environment and climate.

- Air pollution leads to 467,000 premature deaths in Europe.
  (European Environment Agency: Air quality in Europe - 2016 report.)

- The number of early deaths due to traffic noise and traffic-borne air pollution beats the number of traffic accident fatalities!

- Many measures to protect from noise and air pollution.
  (heavy vehicle bans, low emission zones, speed limits, priority at traffic signals, ...)

- Low emission vehicles (e.g. electrical vehicles) bear a good perspective for environmental compatibility. But sufficient market penetration will need time.

- Climate Protection is another important field of action. Freight traffic needs special attention.

Example measures for medium-sized cities:
Low emission zones. Promote electric vehicles (incl. public vehicle fleet). Provide charging stations.
Principle 8
Consider health impacts.

- People consider HEALTH as a major value.
- Traffic influences health in many ways – positive and negative:
  - Noise and Air Pollution
  - Accidents and Injuries
  - Fitness and Stress
- Exposure depends on many factors:
  - Trip frequency and distance
  - Mode choice
  - Route choice …
- Future traffic management must consider and balance these impacts on health.
Principle 9
Promote new concepts of mobility.

- **Individual value systems** and **mobility behaviour** are changing, specifically in the younger generation.

- **New technologies** enable changes. Internet, smart phones, satellite navigation, and new applications ("Apps") are playing a major role.

- They allow an easy, spontaneous access to **individualised information and services.** (e.g. traffic information services, multimodal routing services, car rental, car sharing, bike rental, ride sharing, taxi sharing, pedestrian navigation, ....)

- The **flexible, situation-responsive behaviour** reduces traffic problems and should be supported.
Principle 10

Aim at a fair balance between multiple impacts.

Cost-optimised traffic signal program

Morning peak hour
cycle time 90 s
no pedestrian requests
coordination of traffic lights

Traffic volume
in the investigated hour:
106 pedestrians
7 cyclists
0 PT vehicles (buses)
1251 passenger cars
17 heavy vehicles

Calculated total costs:
39 €/h

Influence on traffic safety?
Influence on modal choice?

Fuel consumption
53%; 21 €/h
-8 €/h

PM₁₀ Emissions
10%; 4 €/h

NOₓ Emissions
3%; 1 €/h
-1 €/h

CO₂ Emissions
14%; 6 €/h
-2 €/h

Value of waiting time
20%

Fuel and environmental costs
80%

Walking
11%; 4 €/h

Cycling
0%; 0.02 €/h

Motorised individual traffic
8%; 3 €/h
-16 €/h

Heavy traffic
1%; 0.2 €/h

PM₁₀ Emissions
10%; 4 €/h

NOₓ Emissions
3%; 1 €/h
-1 €/h

CO₂ Emissions
14%; 6 €/h
-2 €/h

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Principle 11

Make the quality of traffic transparent and improve it continuously.

- Very often, the real **quality of traffic is not known**, specifically in urban traffic. (e.g. average delay, travel speed, duration until resolving a failure, etc.)

- The interrelations between used resources and traffic quality are **not transparent**.

- **Performance measurements** in traffic and transport should be conducted by independent parties. Execution and supervision should be separated, also in road operations.

- **Frequent quality reports** should prove the achieved quality and support decisions to allocate resources.

- The principles of **quality management** should be applied throughout all fields of traffic and transport!
Principle 12
Create the right institutional framework for intermodal traffic.

- Traffic and Transport must be understood as an holistic system.

- The supplies of different traffic and transport systems must be closely coordinated to allow mobility and transport in every situation.

  **Example London**: Road traffic and public transport are managed by “Transport for London”. To optimise the whole urban transport system also cross-financing is used.

- **Associations of public transport authorities** may provide a good starting point for further development.

- Need for an **integrated traffic management authority** which brings together the competences in public transport and road network operation, not only on a local but on a regional level.
1. Provide sufficient and sustainable financing of transport.
2. Control transport demand and modal choice.
3. Use the instruments of mobility pricing to control demand.
4. Ensure a future-proof design of transport infrastructure.
5. Operate transport infrastructure dynamically and situation-responsive.
6. Improve traffic safety.
7. Apply measures to protect environment and climate.
8. Consider health impacts.
10. Aim at a fair balance between multiple impacts.
11. Make traffic quality transparent and improve it continuously.
12. Create the right institutional framework for intermodal traffic.