Integrated Traffic Management – Principles, Measures and Examples

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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)

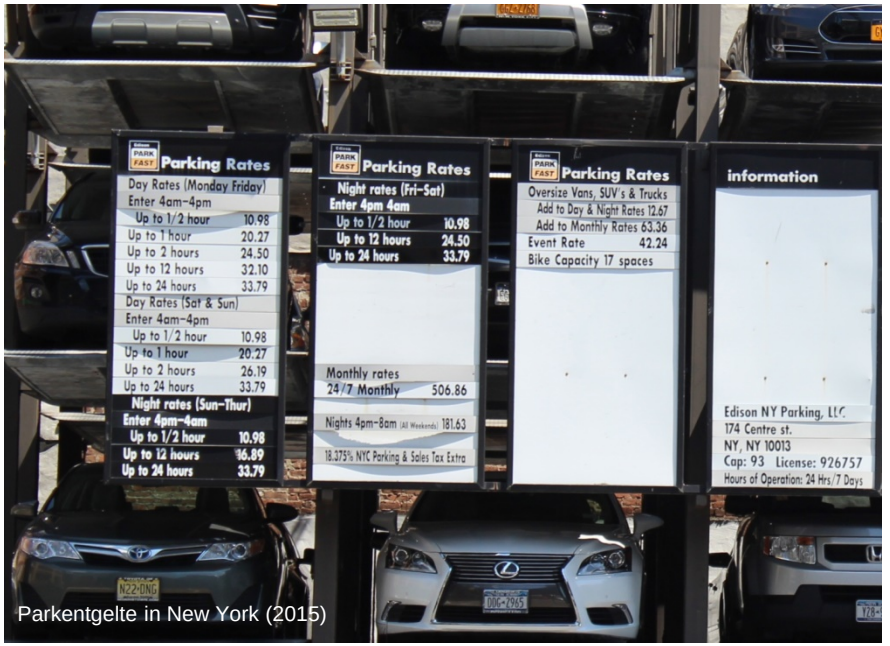
Integration is needed in **three dimensions**:

- **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.

Mautstation an der Sydney Harbour Bridge (2014)



Parkentgelte in New York (2015)

City Maut in London (2007)

Darmstadt, B3 (2012)

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Principle 2

Control transport demand and modal choice.

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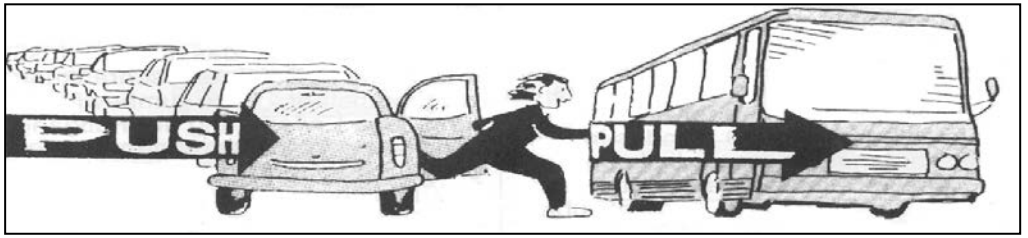
- **Integrated Planning of land-use and transport systems!**
- **Control demand**. Influence departure time, transport mode, route, destination …
- **Control modal choice**.



Source:
TOPP, 1992

- **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.

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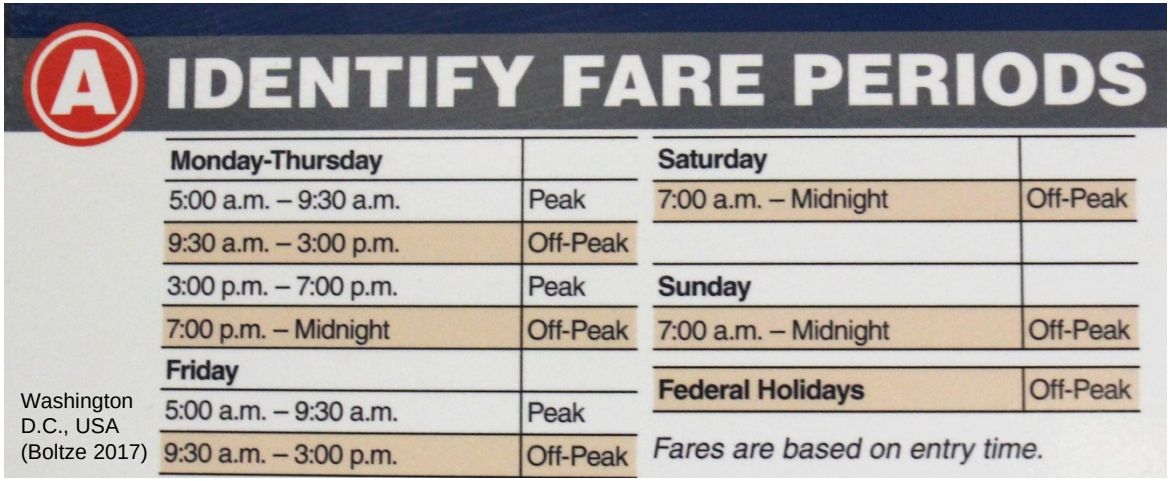
Principle 3

Use the instruments of mobility pricing to control demand.



A IDENTIFY FARE PERIODS

Monday-Thursday	
5:00 a.m. – 9:30 a.m.	Peak
9:30 a.m. – 3:00 p.m.	Off-Peak
3:00 p.m. – 7:00 p.m.	Peak
7:00 p.m. – Midnight	Off-Peak
Friday	
5:00 a.m. – 9:30 a.m.	Peak
9:30 a.m. – 3:00 p.m.	Off-Peak

Saturday	
7:00 a.m. – Midnight	Off-Peak
Sunday	
7:00 a.m. – Midnight	Off-Peak
Federal Holidays	Off-Peak

Fares are based on entry time.

Washington D.C., USA (Boltze 2017)

ERP in Singapore (Source: www.lta.gov.sg)

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.

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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.

Tidal Flow System in Rio de Janeiro (2012)

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.

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- **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.**

Pictures: Feuerwehr Wörth (2004)

Principle 7

Apply measures to protect environment and climate.

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- **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.

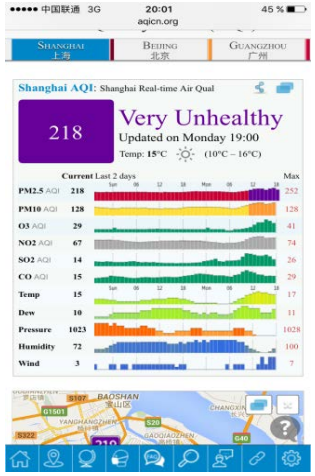
Example measures for medium-sized cities:
Low emission zones. Promote electric vehicles (incl. public vehicle fleet). Provide charging stations.

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.


Smog in Beijing, China
Source: www.zmescience.com

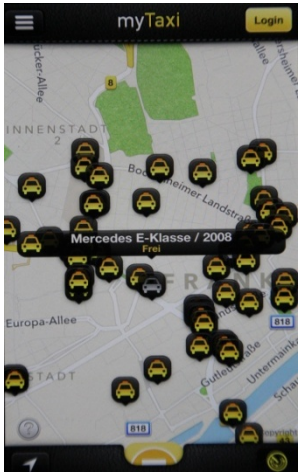


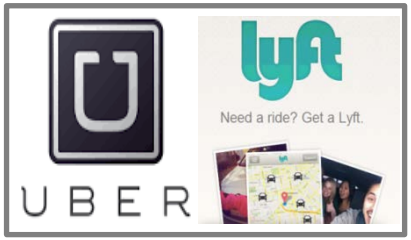

HCMC, Vietnam (2012)

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.





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Principle 10

Aim at a fair balance between multiple impacts.

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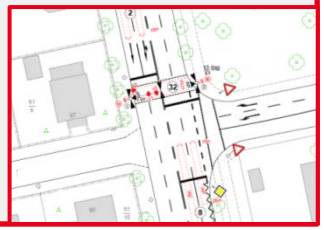
Cost-optimised traffic signal program

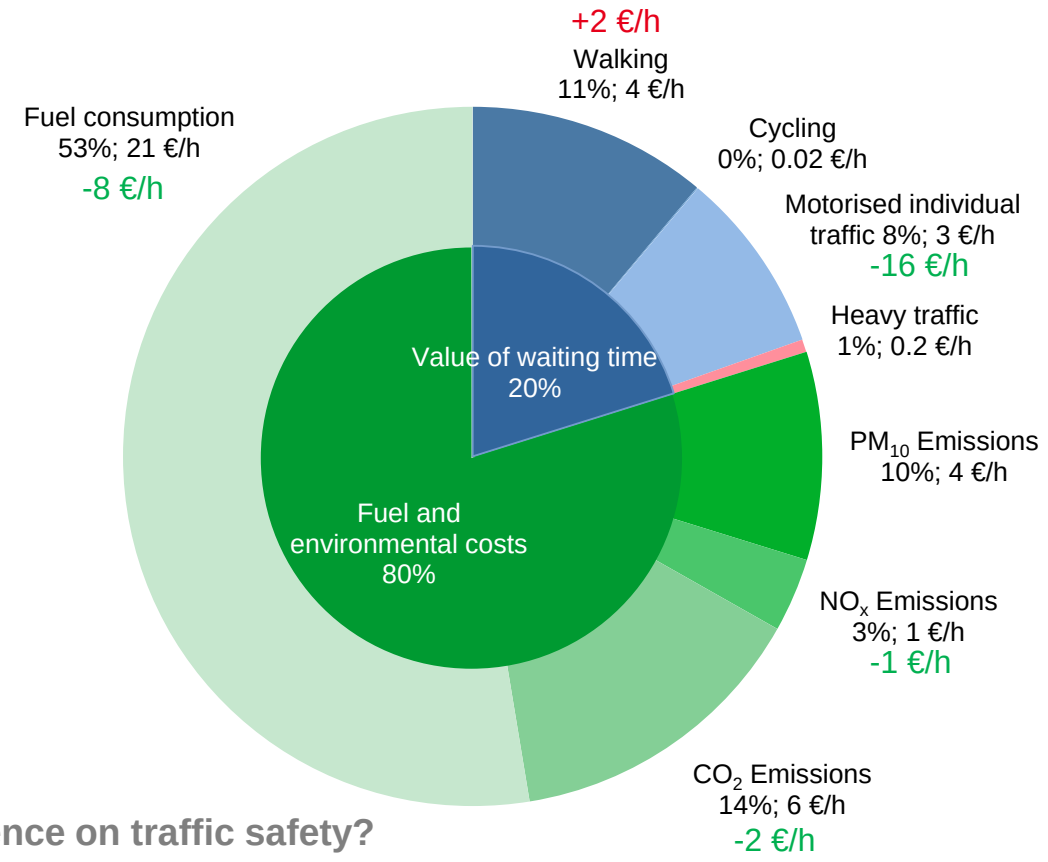
Morning peak hour
cycle time 90 s
no pedestrian requests
coordination of traffic lights

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?

Fachgebiet Verkehrsplanung und Verkehrstechnik

Principle 11

Make the quality of traffic transparent and improve it continuously.

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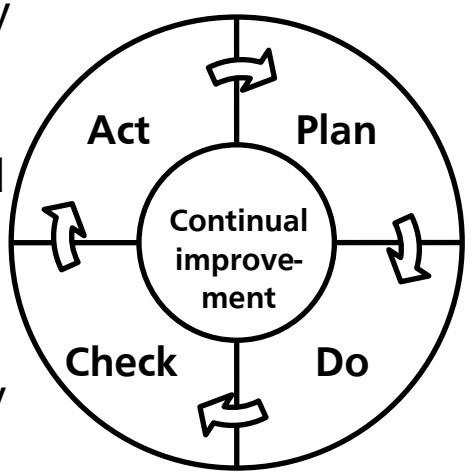
- Very often, the real **quality of traffic is not known**, specifically in urban traffic. (e.g. average delay, travel speed, duration until resolving a failure, etc.)

- 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.

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- 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.

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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.
9. Promote new concepts of mobility.
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.