Swiss Transport Research Conference 2005
Monte Verità, Ascona

Intelligent Transport Systems

Concepts and Instruments of Traffic Management

State of the Art

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Contents

Intelligent Transport Systems:

- how do they work?

- applications in Munich

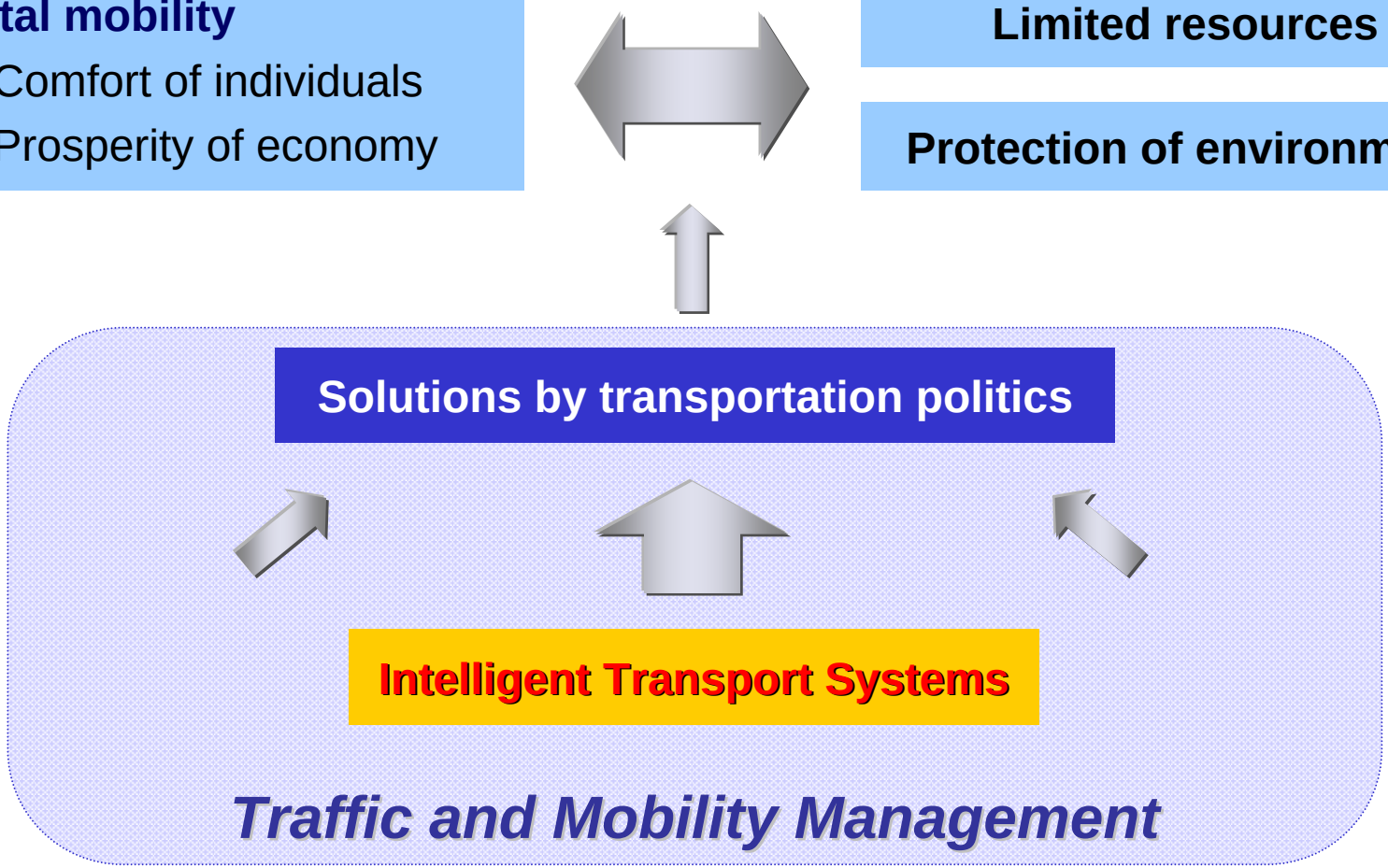
- where are we today?

The approach of Intelligent Transport Systems

Total mobility
- Comfort of individuals
- Prosperity of economy

Limited resources

Protection of environment



ITS-projects in Germany by 2004

'Mobility in Conurbations'
Research Program of
German BMBF (1998-2004)

Objectives of Traffic Management

- **Environment friendly traffic**
- **Safe transportation**
- **Efficient transport system**
- **Comfortable travelling**

to support the overall goal

'Sustainability in Transportation'

General approach of traffic management

by influencing **demand** and **supply**

1. Avoid
   → causes of traffic demand
2. Shift
   → in time / space / mode
3. Operate
   → conformity to overall objectives

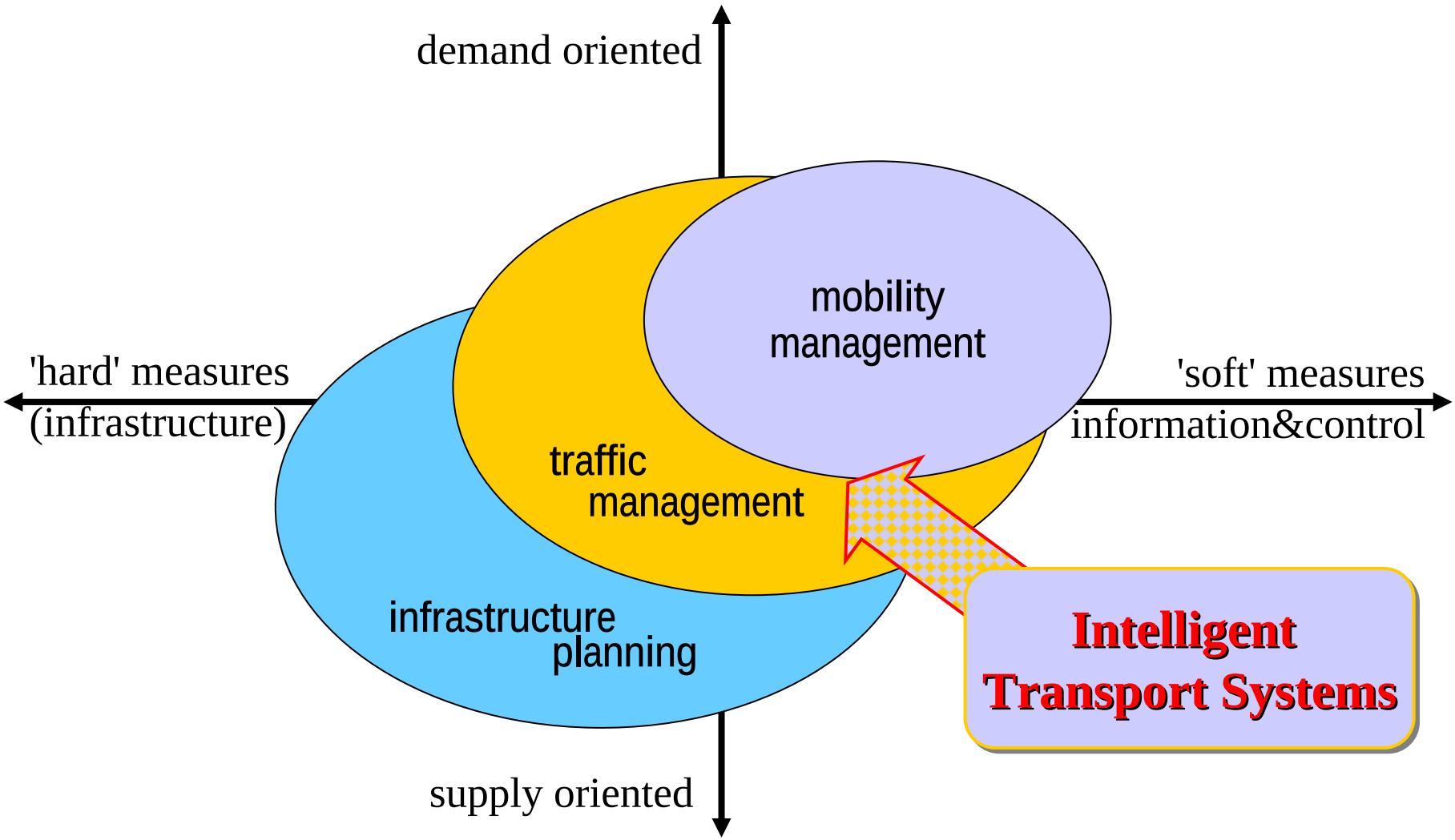
pre - trip

on - trip

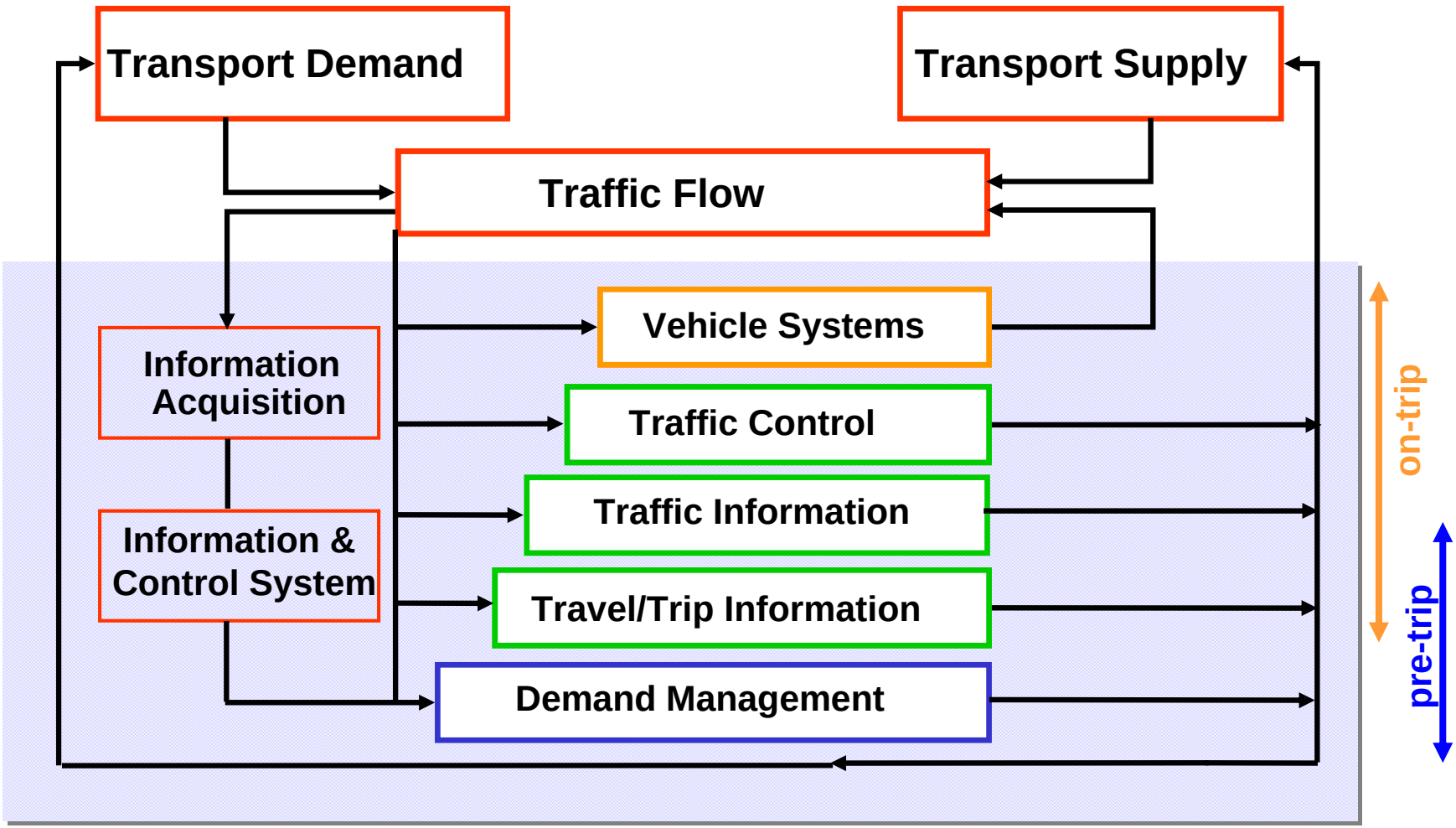
TM is a <u>long-term</u> general concept for cities, conurbations or regions

ITS in the context of

Traffic Management – Mobility Management – Infrastructure Planning

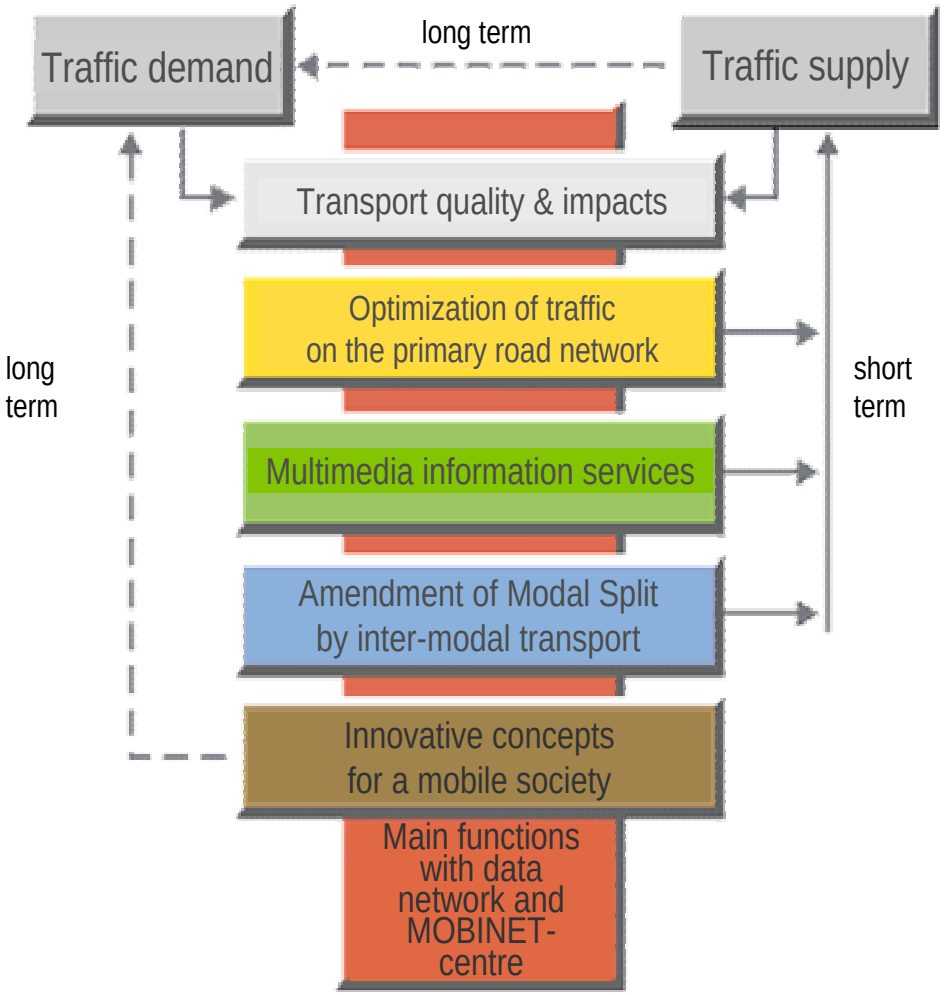


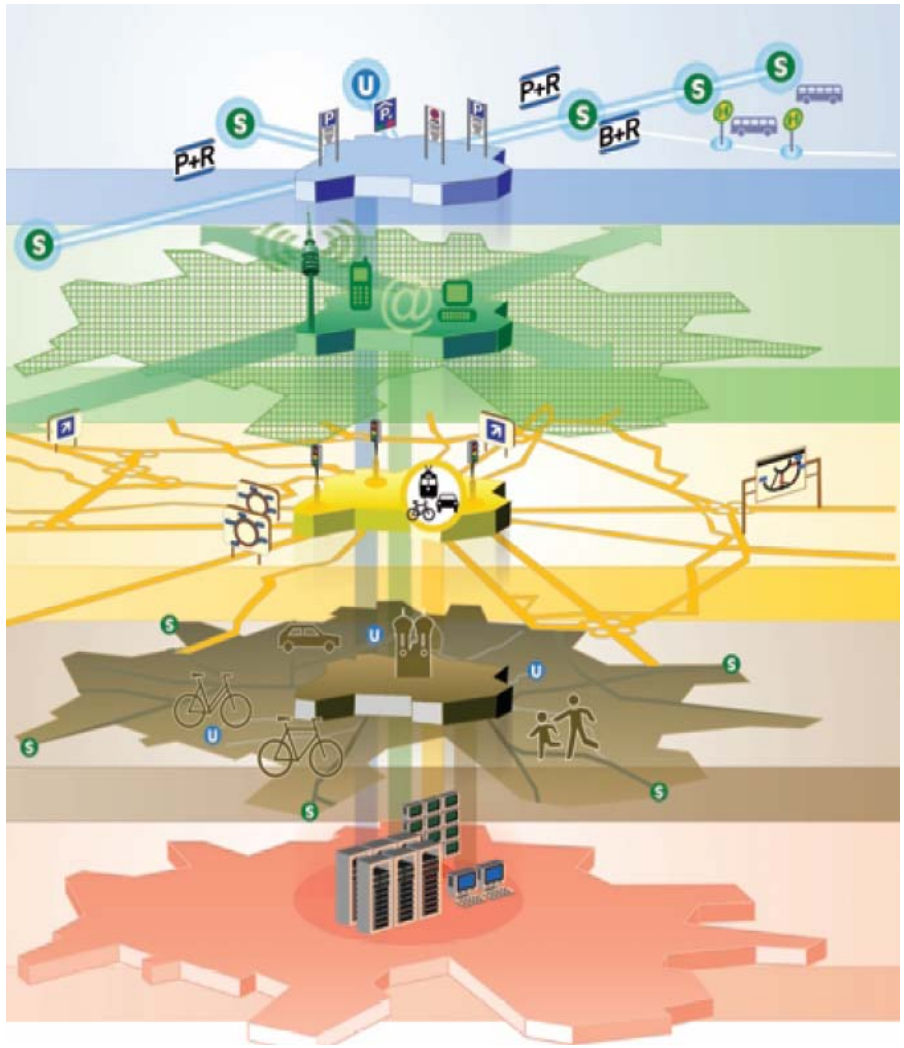
ITS – the functional structure



MOBINET

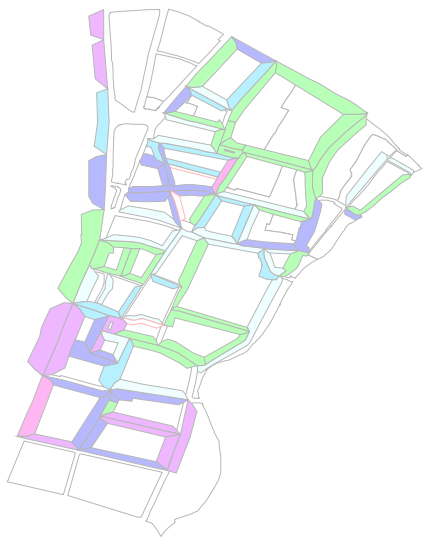
New concepts for Mobility and Traffic Management in Munich



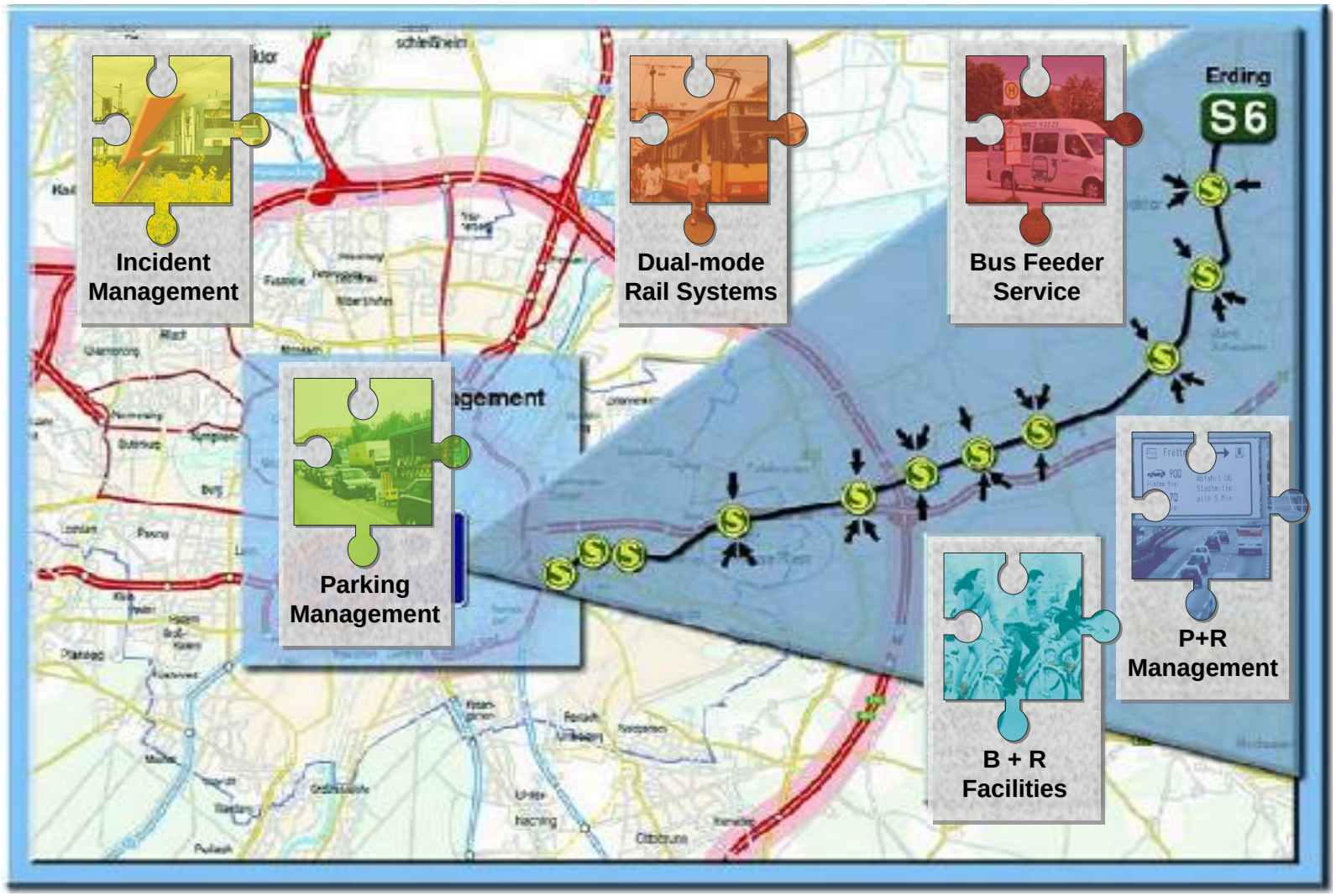


Demand management

- Objectives and Measures
  - →influence transport demand in mode, time and space
  - →traffic flow / parking
    - tolling and pricing
    - inter-modal offers for the traveller
    - public or private mobility advisory services

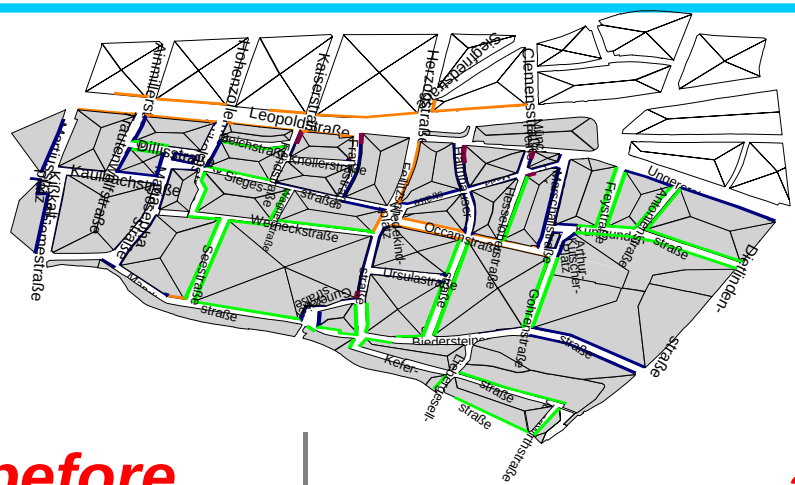


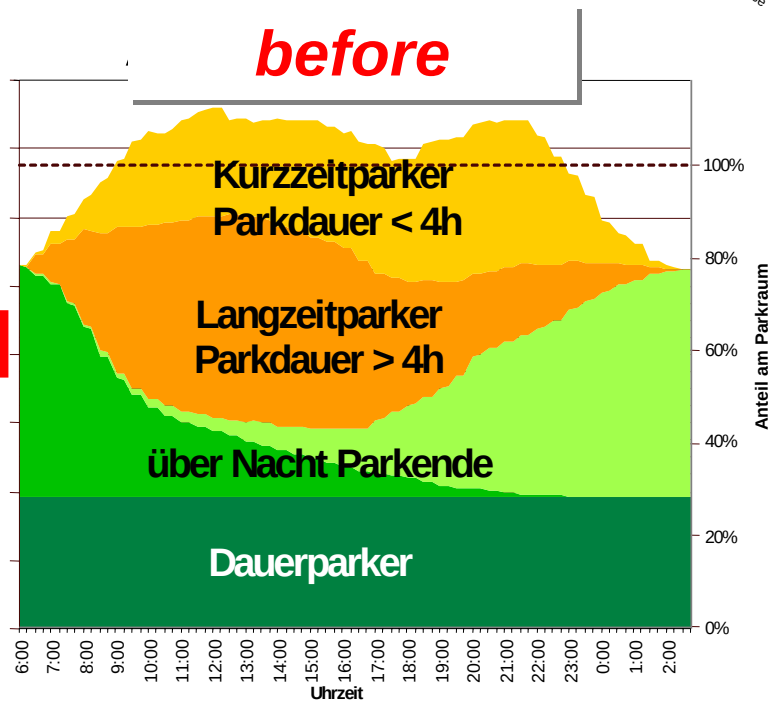
MOBINET-Concept for Amendment of Modal Split
'Push and Pull' for inter-modal transport

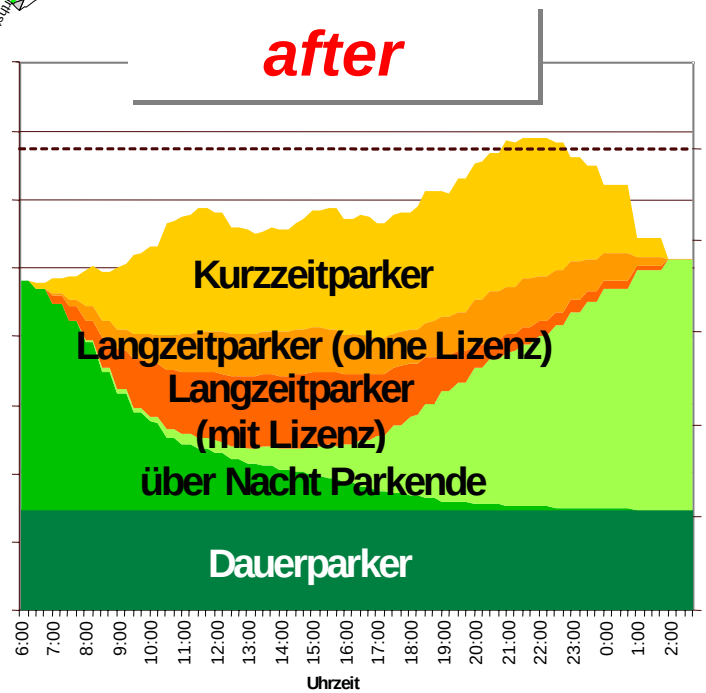


MOBINET-Concept for Amendment of Modal Split

'Push': restrictive management of parking space in the city centre



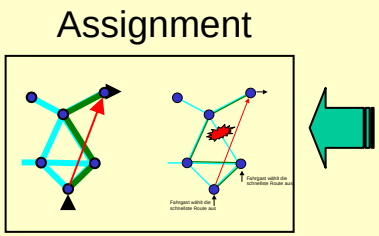


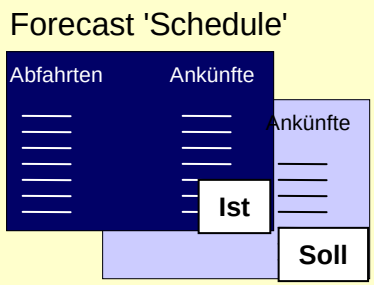


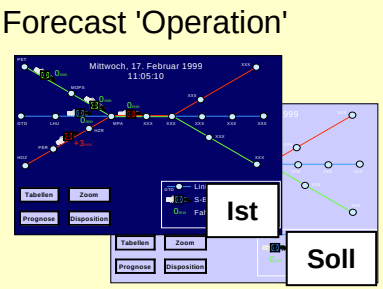
MOBINET-Concept for Amendment of Modal Split

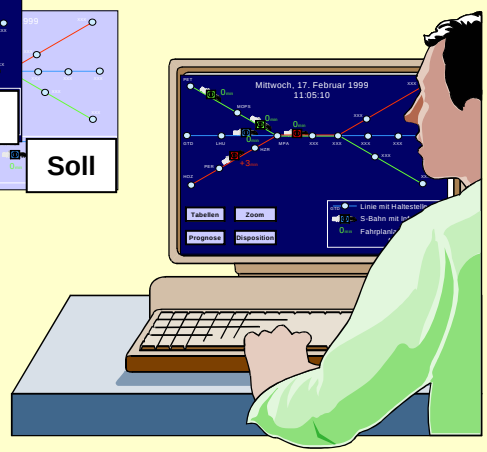
'Pull': Incident management for the light-rail network

online simulation and effects determination
online assessment of control strategies
→ ***fast return to normal operation mode***









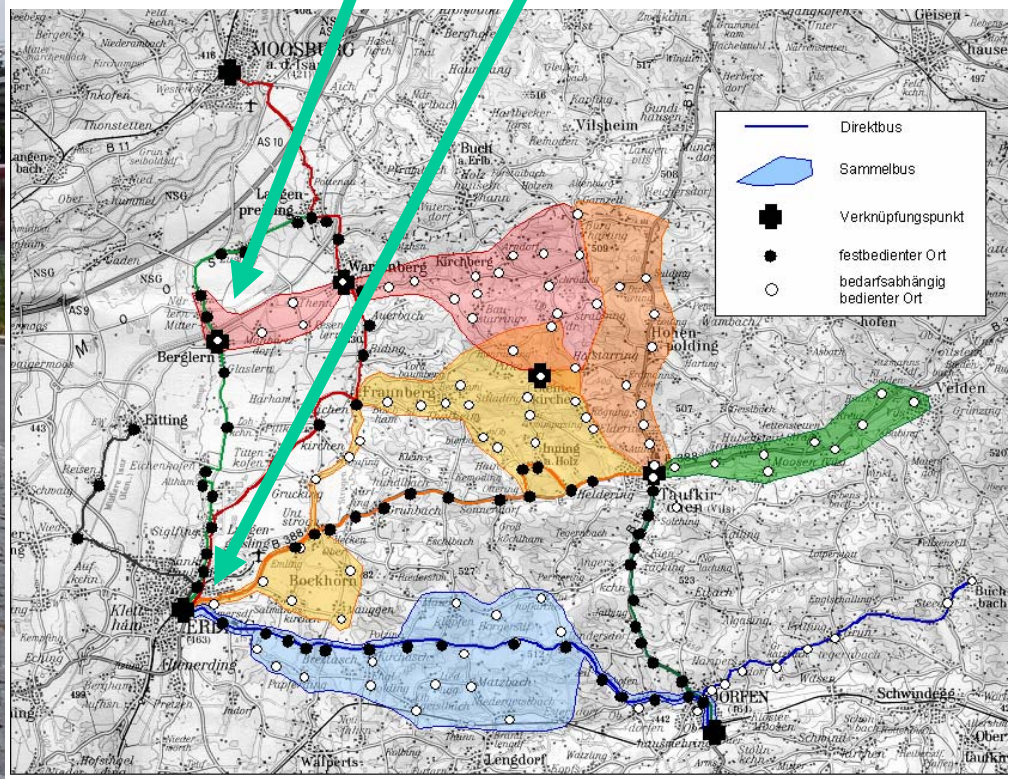
Traveller Information

SALTOS

MOBINET-Concept for Amendment of Modal Split

'Pull': demand responsive PT services

Feeder Services from/to Light Rail

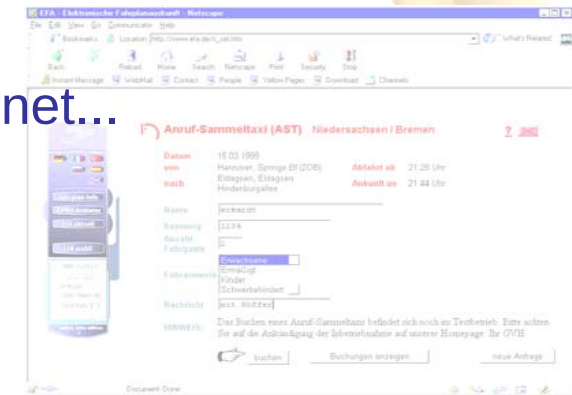


Demand management

- Objectives and Measures
  - →influence transport demand in mode, time and space
  - →traffic flow / parking
    - tolling and pricing
    - inter-modal offers for the traveller
    - public or private mobility advisory services
- Successes and Problems
  - \+ positive results for individual measures in all modes
  - \+ creation of strong public awareness
  - \- danger of shifting the problem
  - \- integration with infrastructure planning

Travel- and traffic information

- Objectives and Measures
  - →improved usage of available multi-modal transport supply in time and space
  - information for planned trips (pre-trip) or for trip-corrections (on-trip)
  - mobility advice...radio...info-terminals...Internet... PT infosystems...dynamic info-panels...



New approaches to traffic information

Collective Route Guidance

Information and
Recommendation

NetzInfo

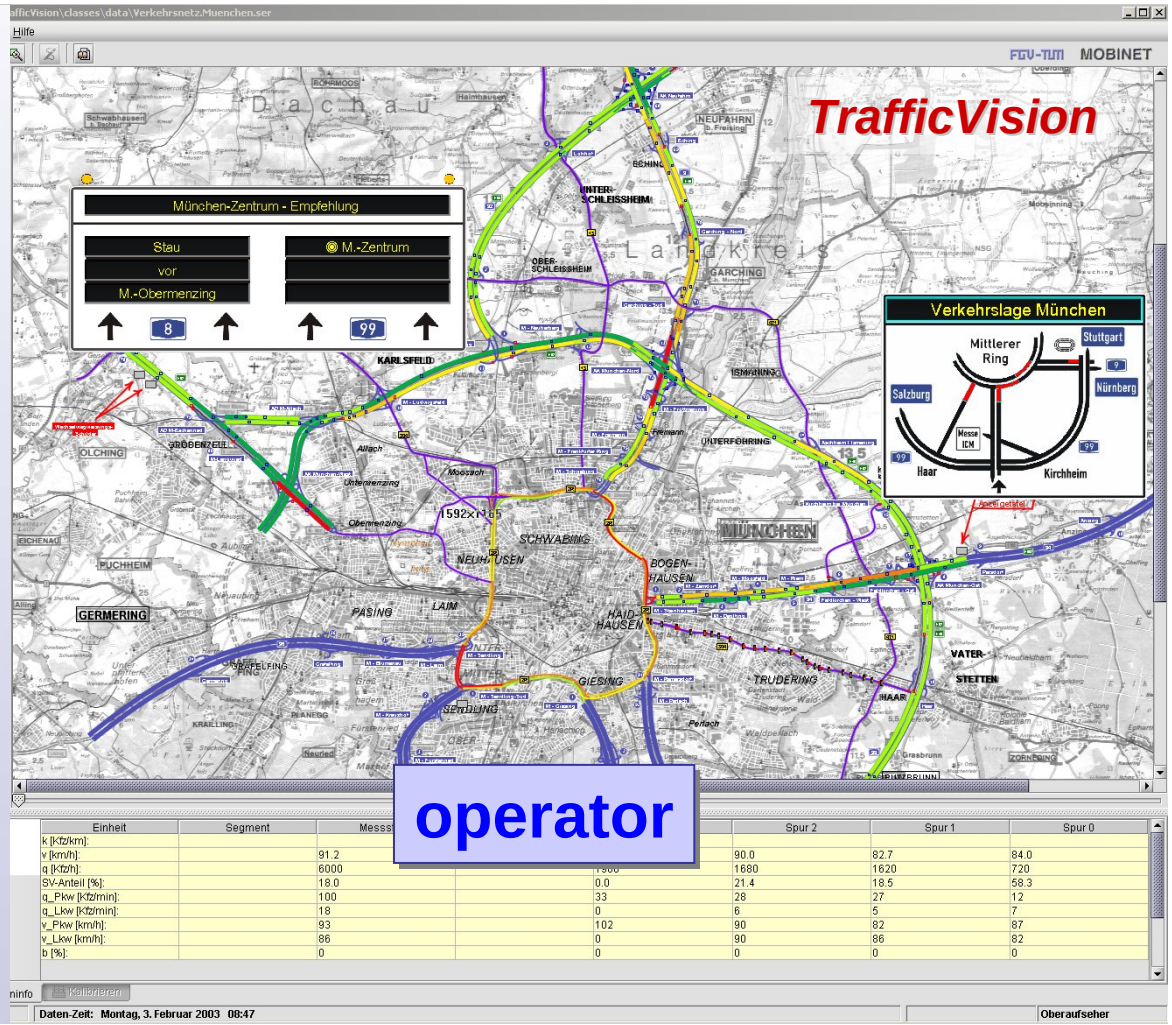
Graphical Display of Traffic Situation on all Main Routes towards Munich

New approaches to traffic information

VisionAir

user

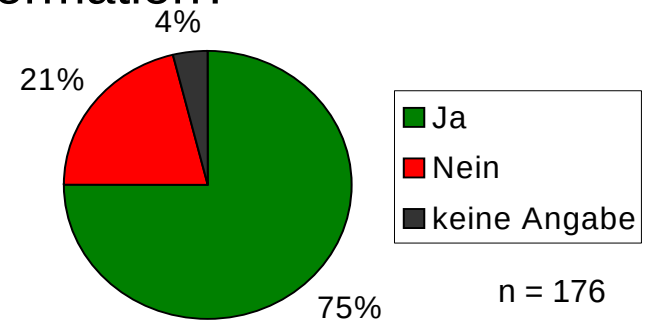
TrafficVision



operator

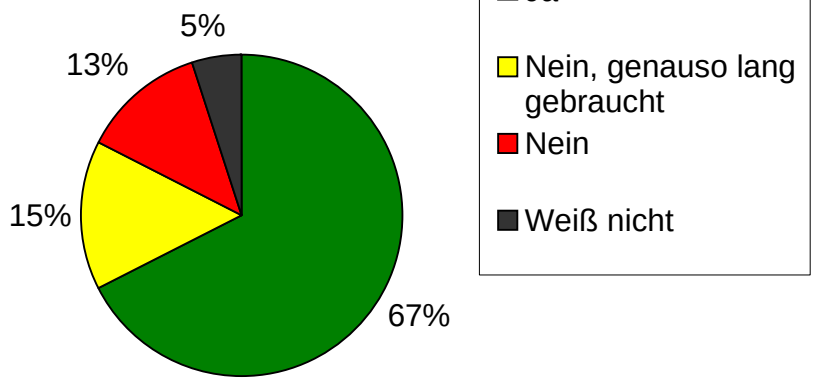
New approaches to traffic information
effects analysis

Do you rely in the information?

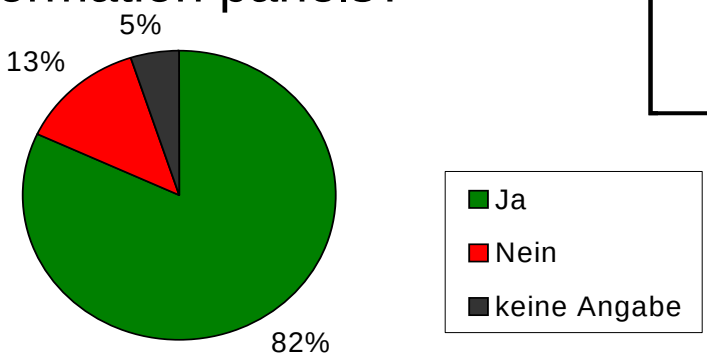


n = 176

Did you save traveltime by the information?



Would you suggest further information panels?

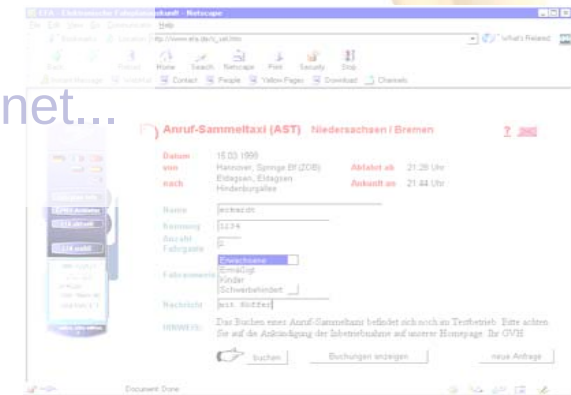


n = 100

sample size: n=200

Travel- and traffic information

- Objectives and Measures
  - →improved usage of available multi-modal transport supply in time and space
  - information for planned trips (pre-trip) or for trip-corrections (on-trip)
  - mobility advice...radio...info-terminals...Internet... PT infosystems...dynamic info-displays...

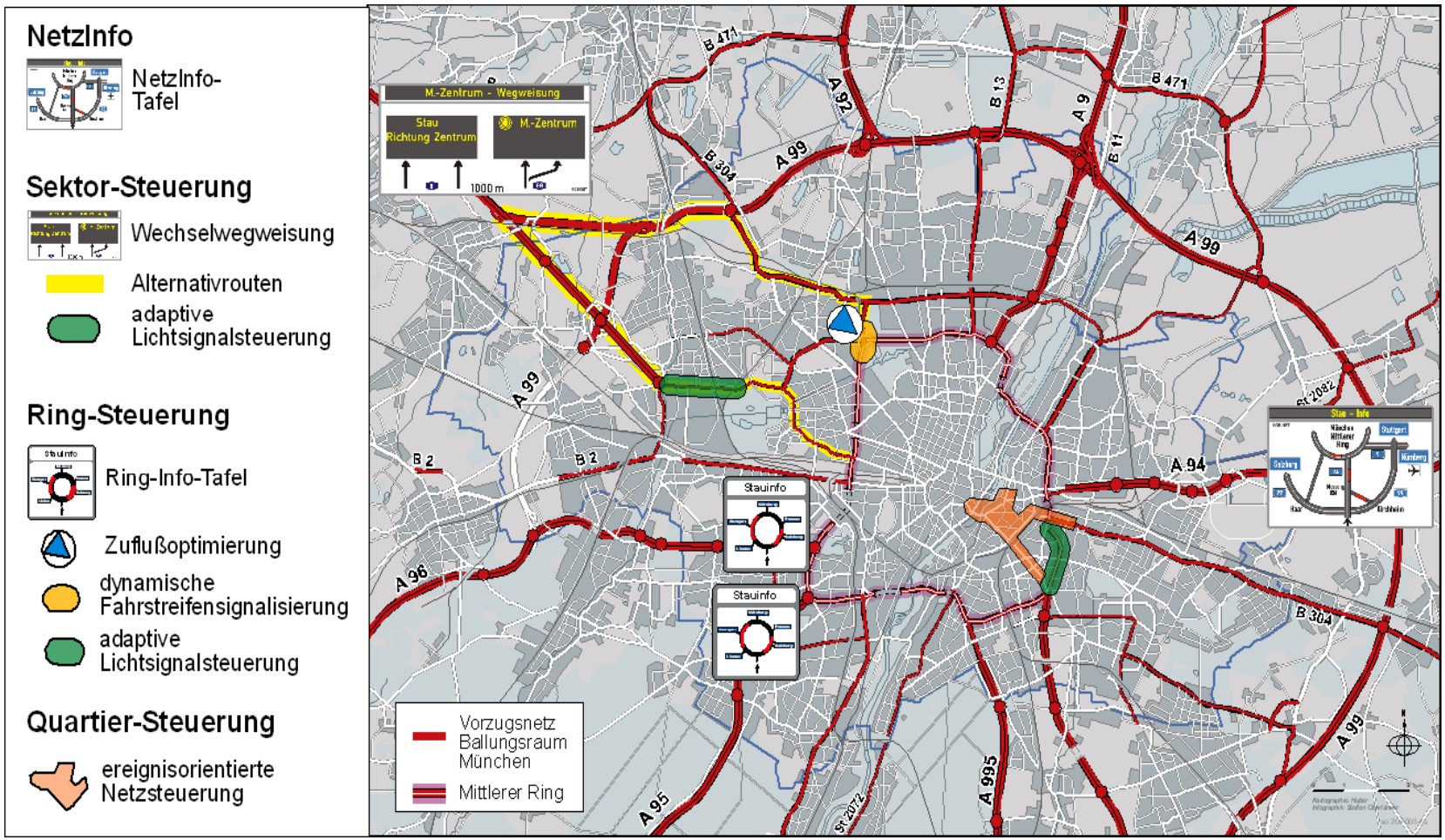


- Successes and Problems
  - \+ mono-modal systems far developed
  - \+ positive effects on travel time and mode shift
  - \- integration, full inter-modality
  - \- individualization of services
  - \- business models for ppp unclear

Traffic control

- Objectives and Measures
  - →optimised usage / adaptation of transport supply
  - guidance and control
  - traffic lights...PT-prioritization...network control... motorway control...ramp metering... strategic control...

Traffic control on the main roads



Traffic control

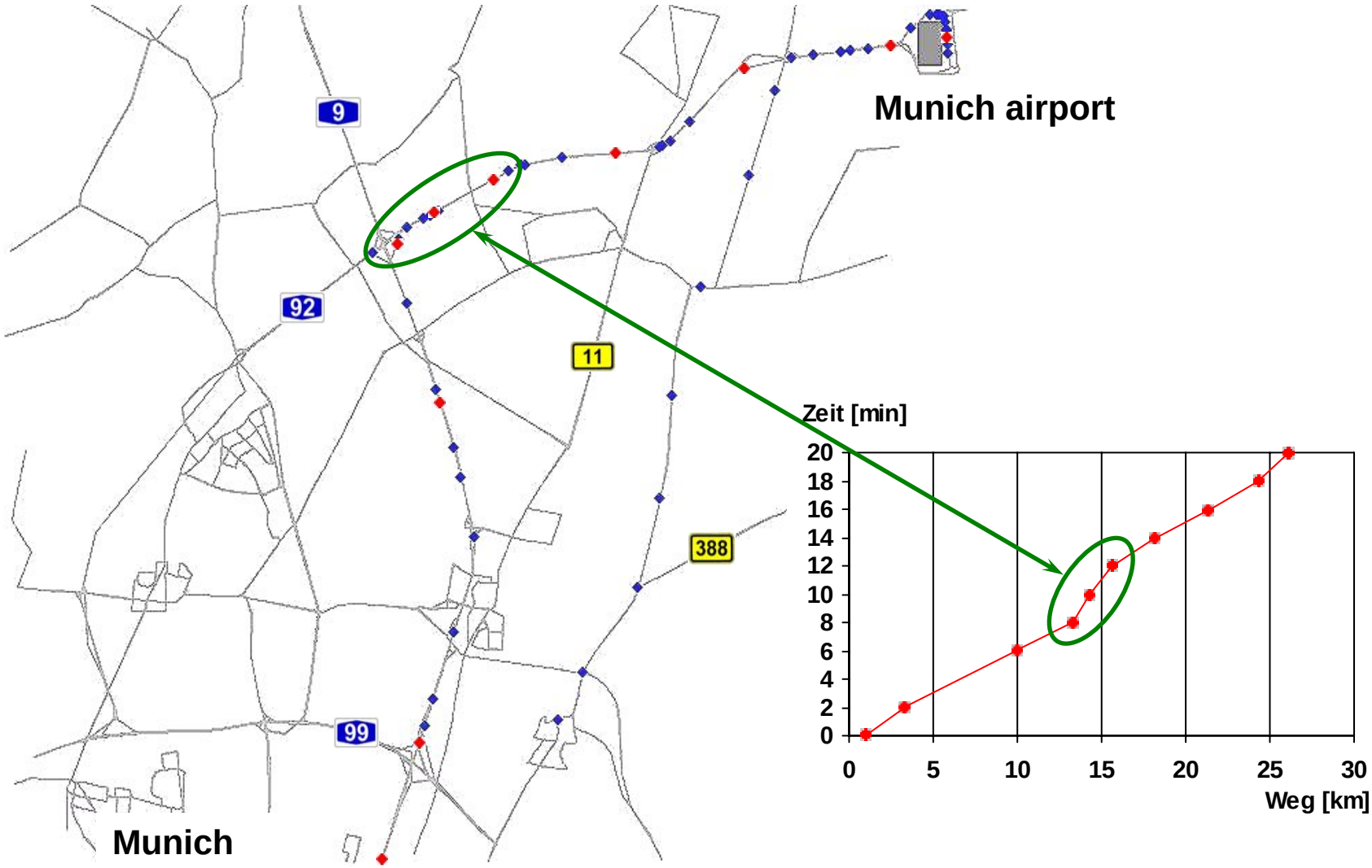
- Objectives and Measures
  - →optimised usage / adaptation of transport supply
  - guidance and control
  - traffic lights...PT-prioritization...network control... motorway control...ramp metering... strategic control...

- Successes and Problems
  - \+ use of various dynamic traffic data
  - \+ increasing adaptiveness of the systems
  - \+ positive effects on efficiency, travel time, emissions
  - \- incompatible architectures
  - \- user- versus system-optimum unsolved
  - \- missing quality surveillance

Vehicle control

- Objectives and Measures
  - →time- and cost-efficient guidance of the traveller under given traffic conditions
  - →improvement of safety and comfort
  - automatic driver assistance
  - information and navigation systems

Use of Floating Car Data
FCD from taxi-fleet



Use of Floating Car Data
Taxi-positions during 9 hours in Munich

Driver Assistance and Warning
GPS-positioning plus DAB/TPEG plus ADAS

Stau zwischen
AS 944 und AS 943;

Stauende AS 943 + 6 km;
Genauigkeit 500m

Achtung! In ungefähr 2
Kilometer Stauende

Polizei warnt
fortlaufend am
Stauende

Tpl 944

6 km

Tpl 943

km

Tpl 942

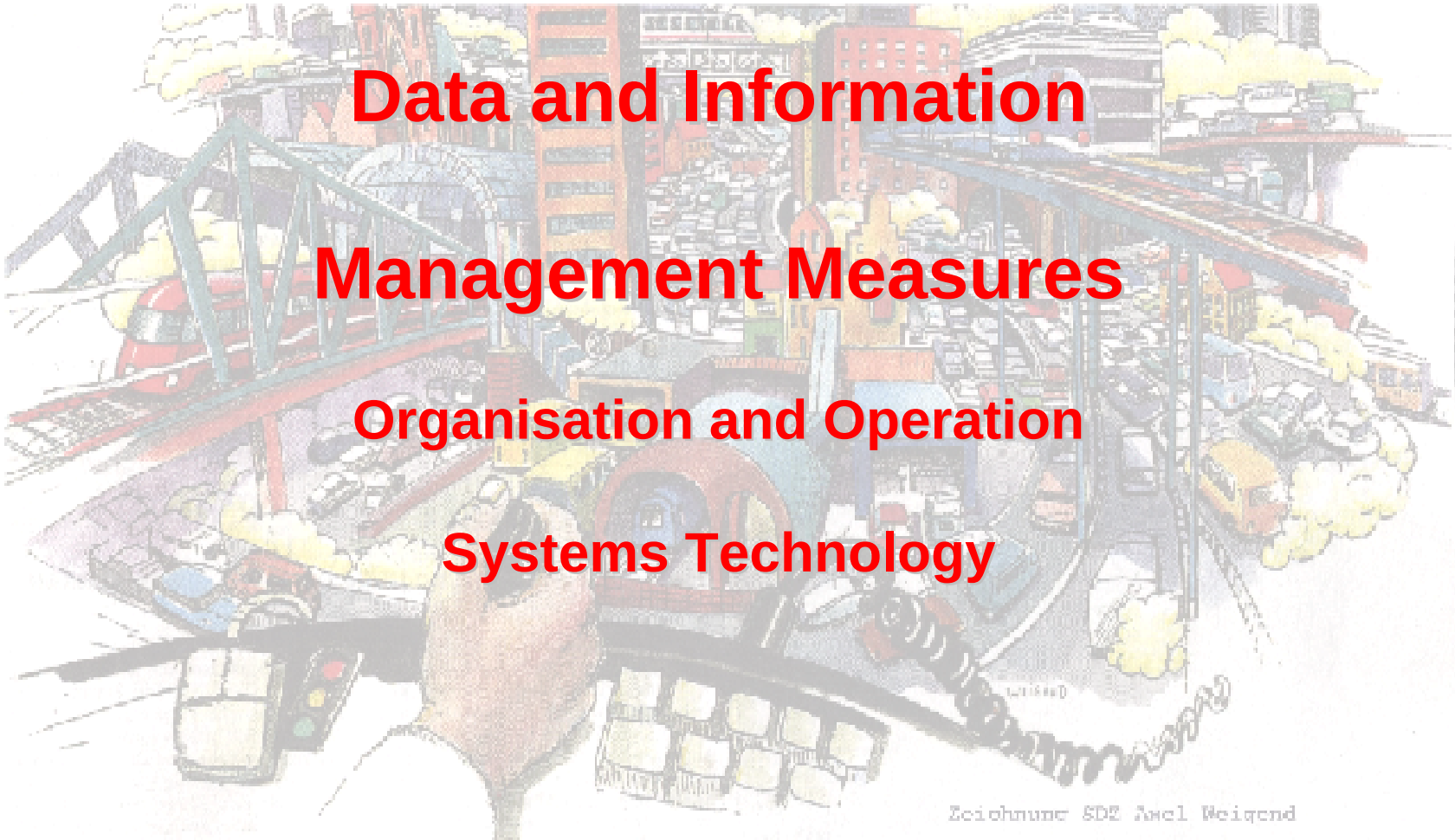
A 75

Vehicle control

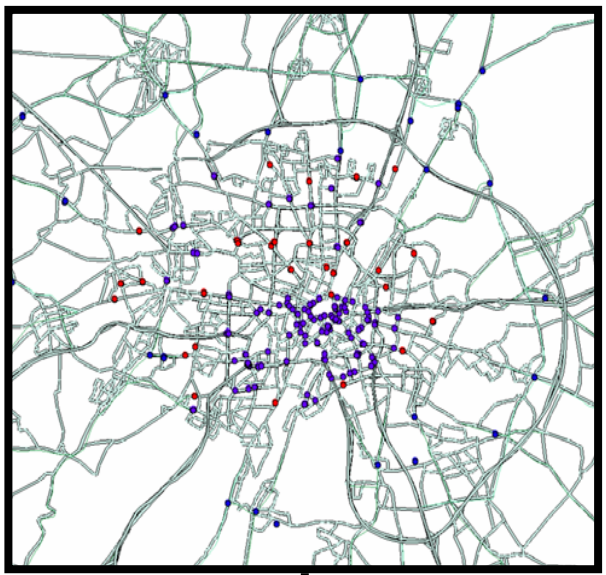
- Objectives and Measures
  - →time- and cost-efficient guidance of the traveller under given traffic conditions
  - →improvement of safety and comfort
    - automatic driver assistance
    - information and navigation systems

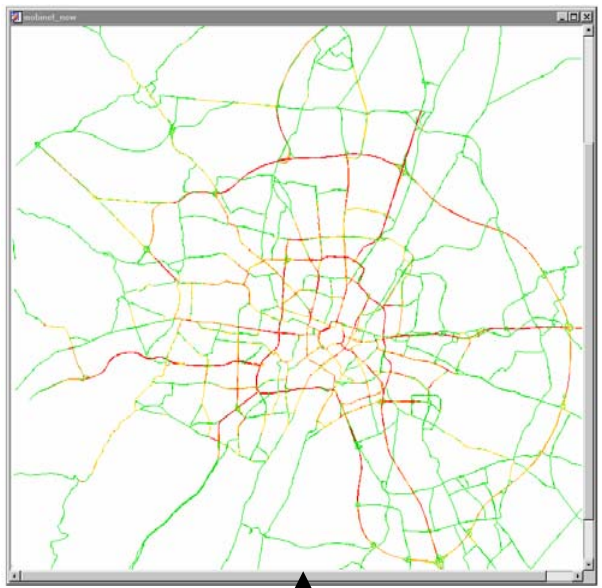
- Successes and Problems
  - \+ static navigation is 'solved'
  - \+ commencing use of floating car data (fcd)
  - \+ time savings for equipped cars, safety gains
  - \- missing traffic responsiveness
  - \- integration collective – individual
  - \- loss of drivers's competence

Integration in Traffic Management
"from Polyphony to Symphony"



Integration in Traffic Management
Integration of Data by Modelling and Fusion





Dynamic Traffic Data

Dynamic Traffic State

DINO

Traffic Assignment

Information Minimizing

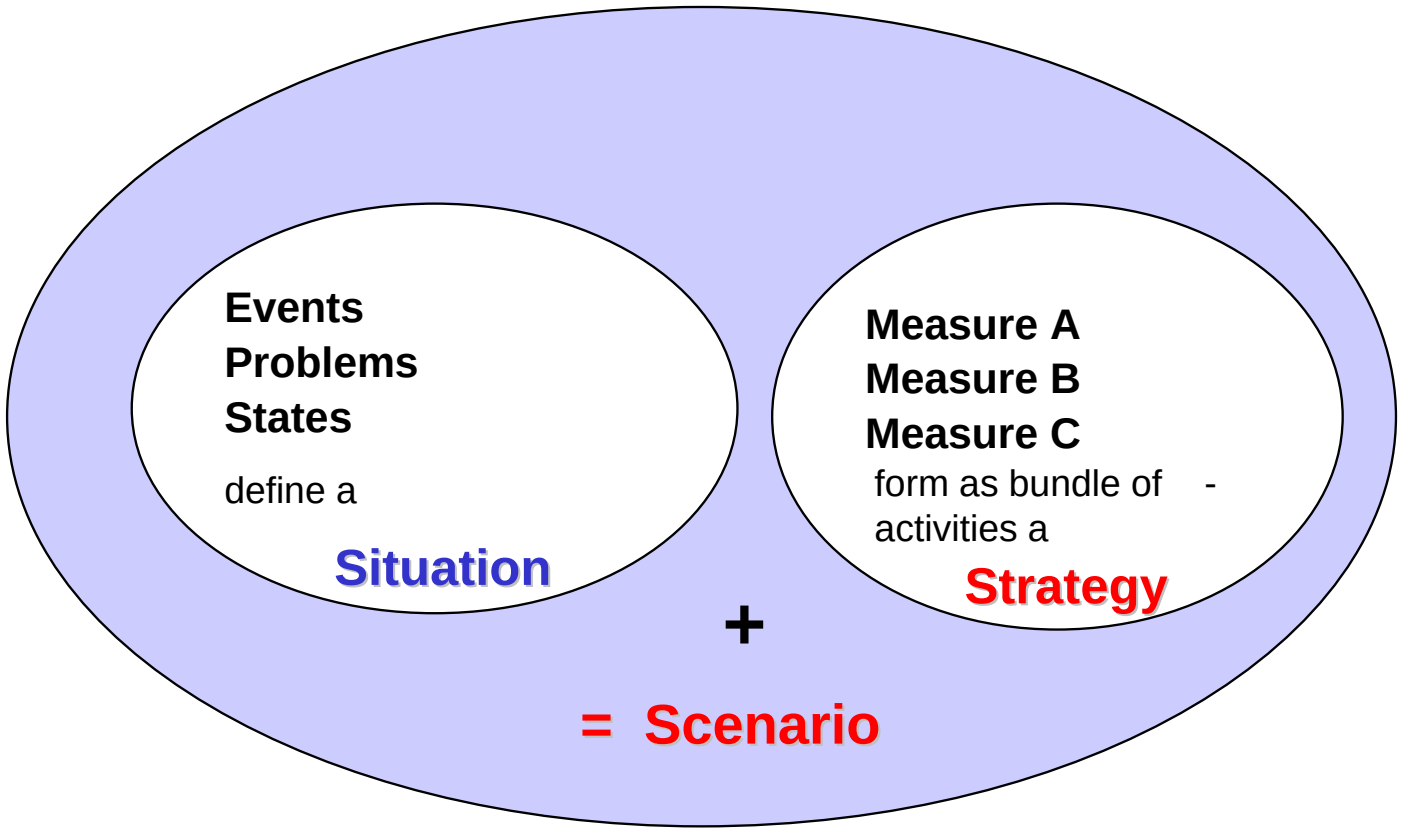
Updating

LOS-calculation

User

Integration in Traffic Management
Integration of Measures by Strategic Control

Principle:

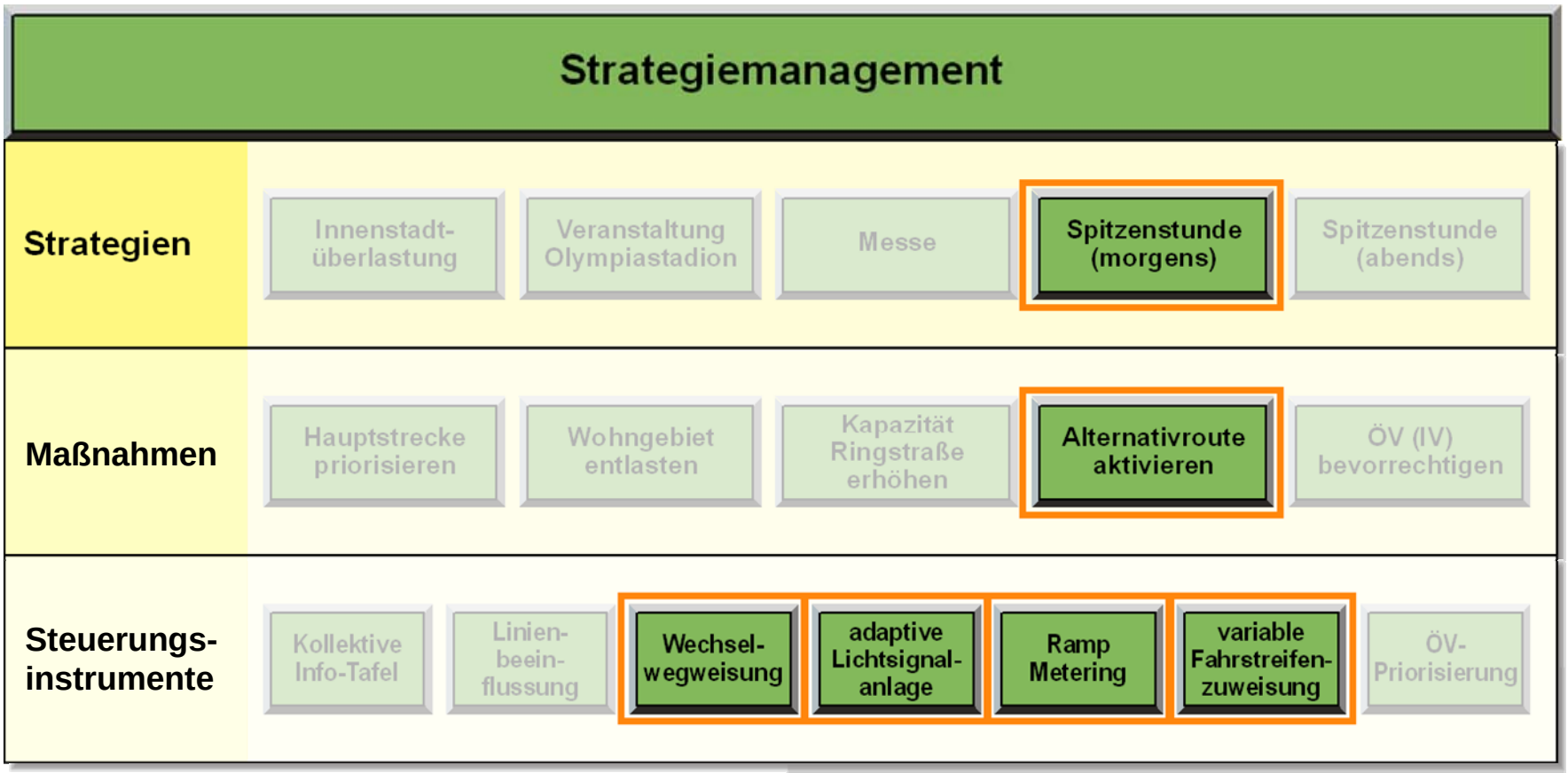


Quelle: FGSV, 2003

Integration in Traffic Management
Integration of Measures by Strategic Control

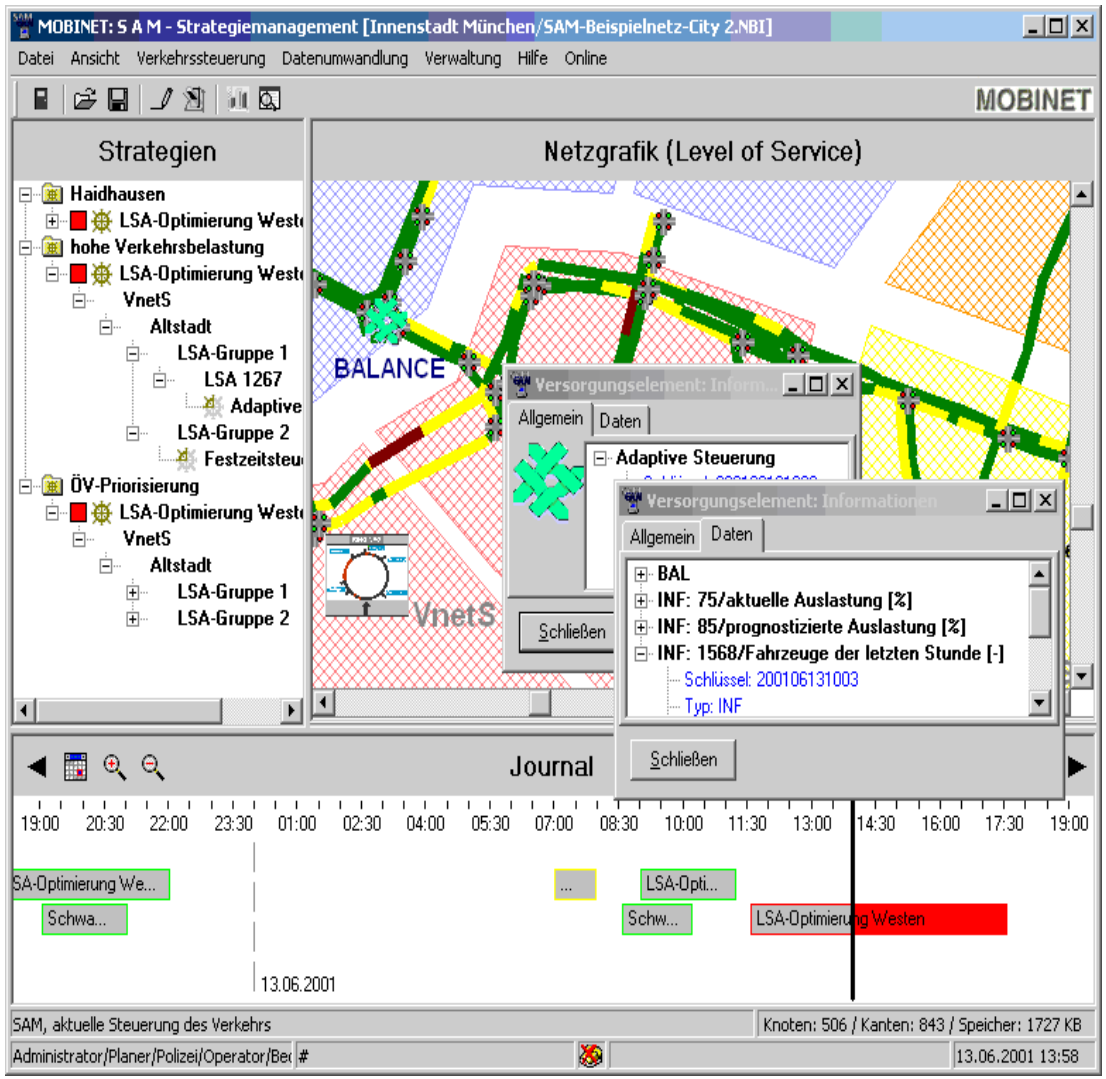
Implementation:

→ hierarchical structure

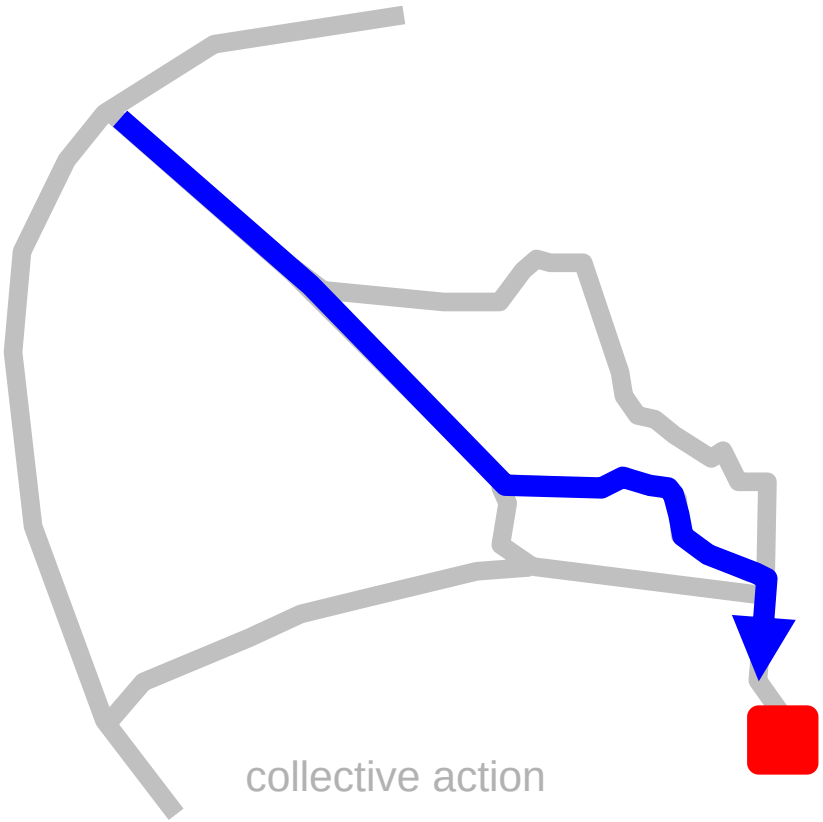


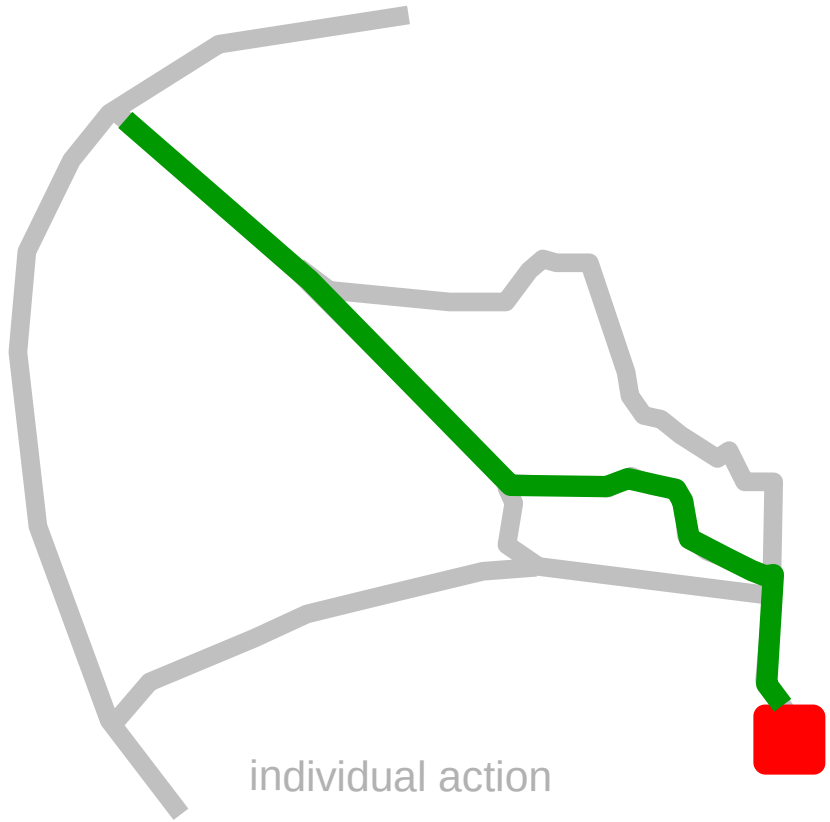
Integration in Traffic Management
Integration of Measures by Strategic Control

tools:



Integration in Traffic Management
Integration of Measures: collective - individual

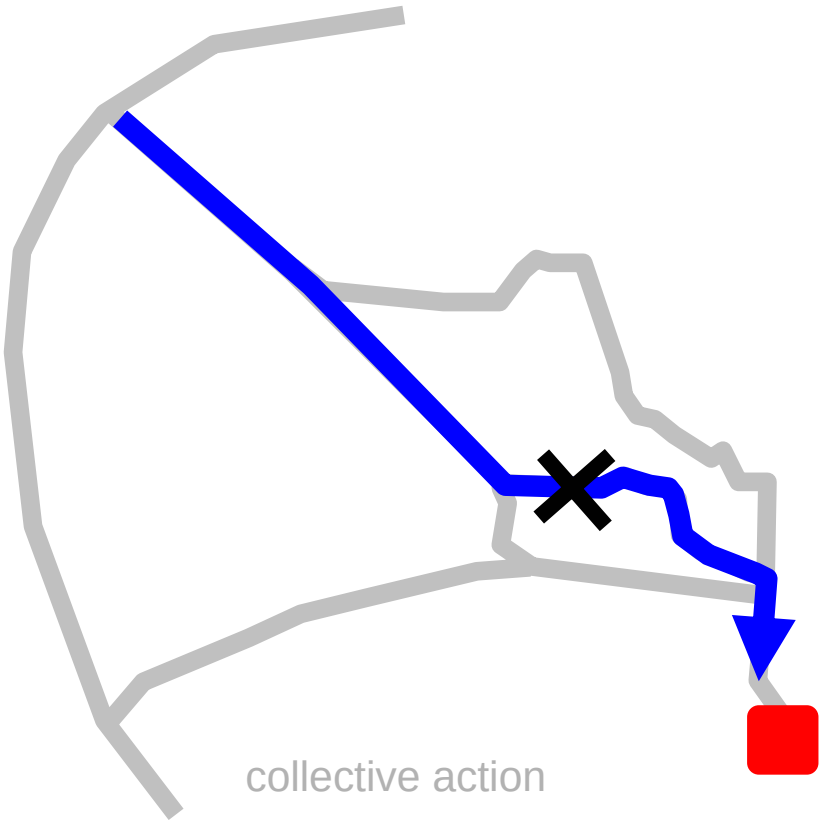




normal flow towards city centre

vehicles are guided via this fastest route

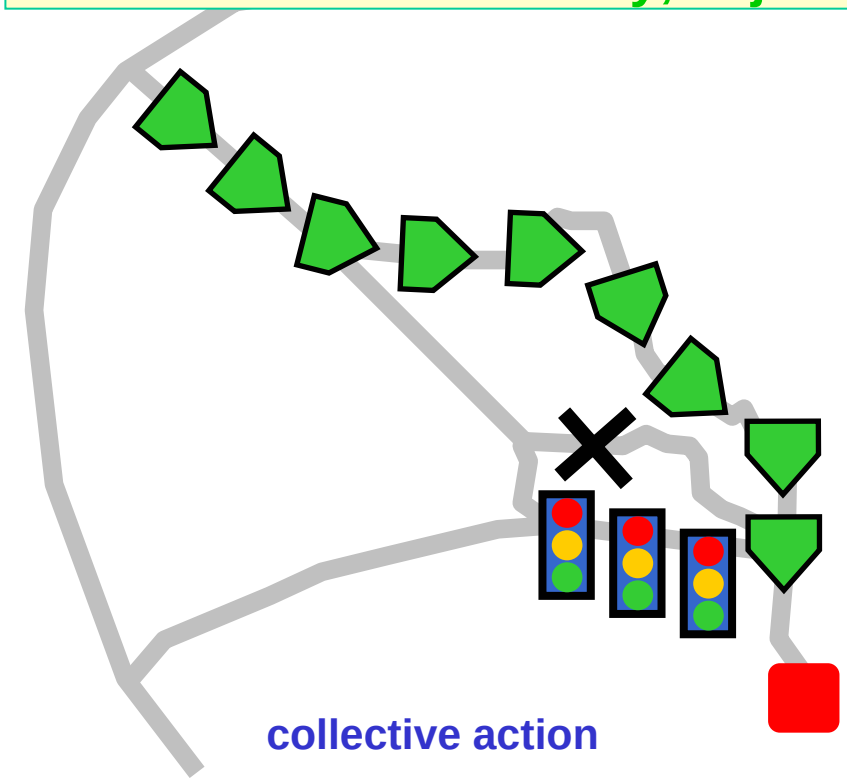
Integration in Traffic Management
Integration of Measures: collective - individual



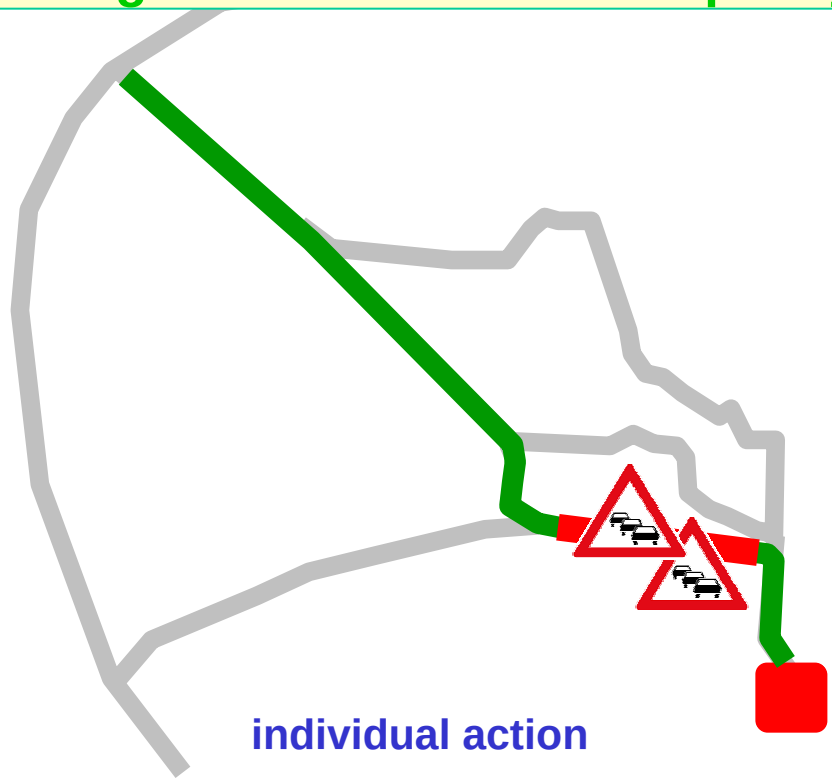
traffic accident on main road

Integration in Traffic Management
Integration of Measures: collective - individual

→ Public strategy:
Green Wave towards city, adjustment of greentimes for more capacity



collective action



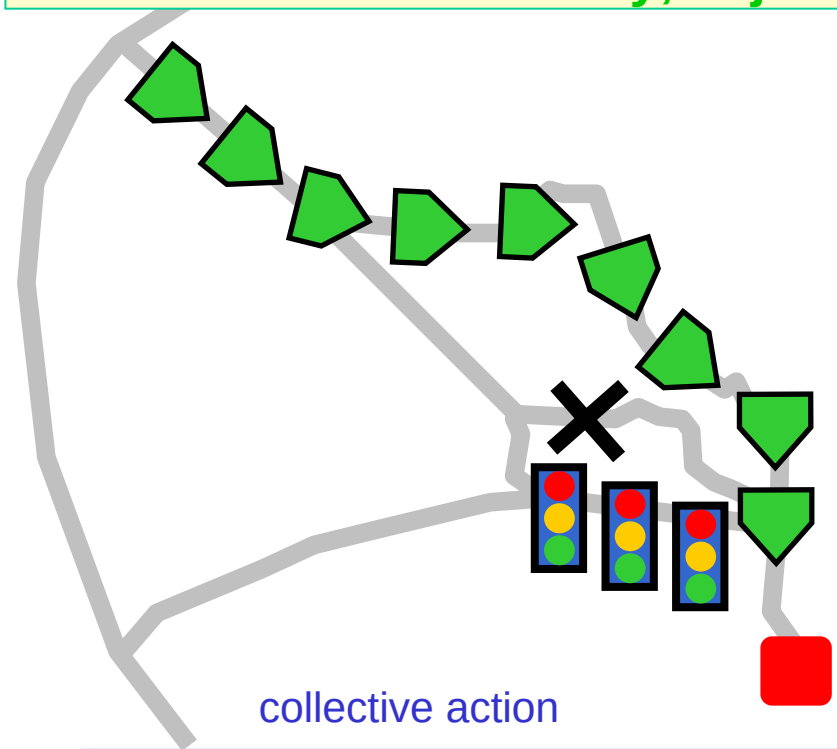
individual action

Incident is broadcast via TMC,
but strategy is unknown

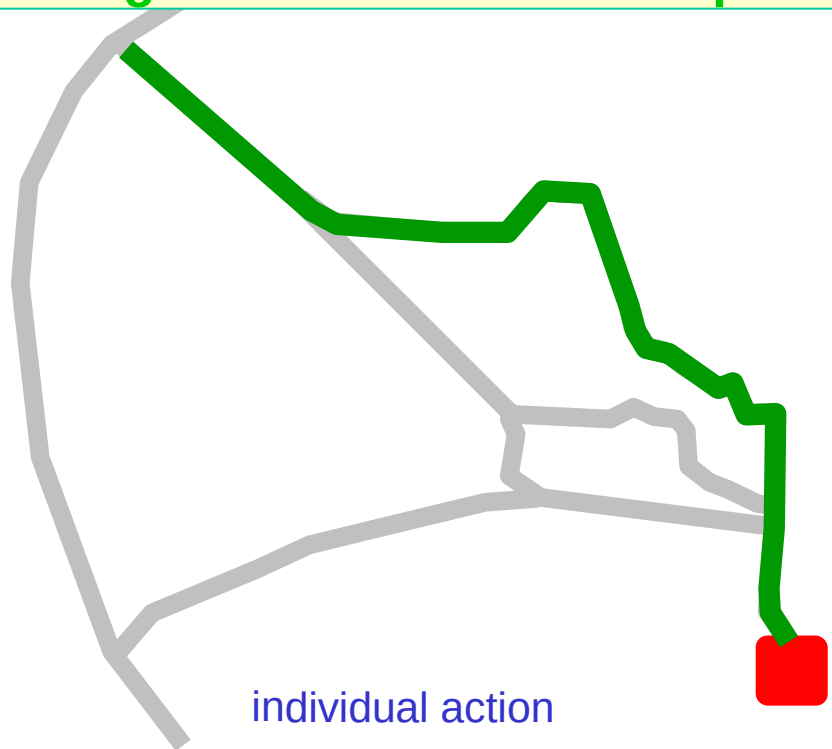
Routing inconsistent with strategy
→ waiting times occur

Integration in Traffic Management
Integration of Measures: collective - individual

→ Public strategy:
Green Wave towards city, adjustment of greentimes for more capacity



collective action

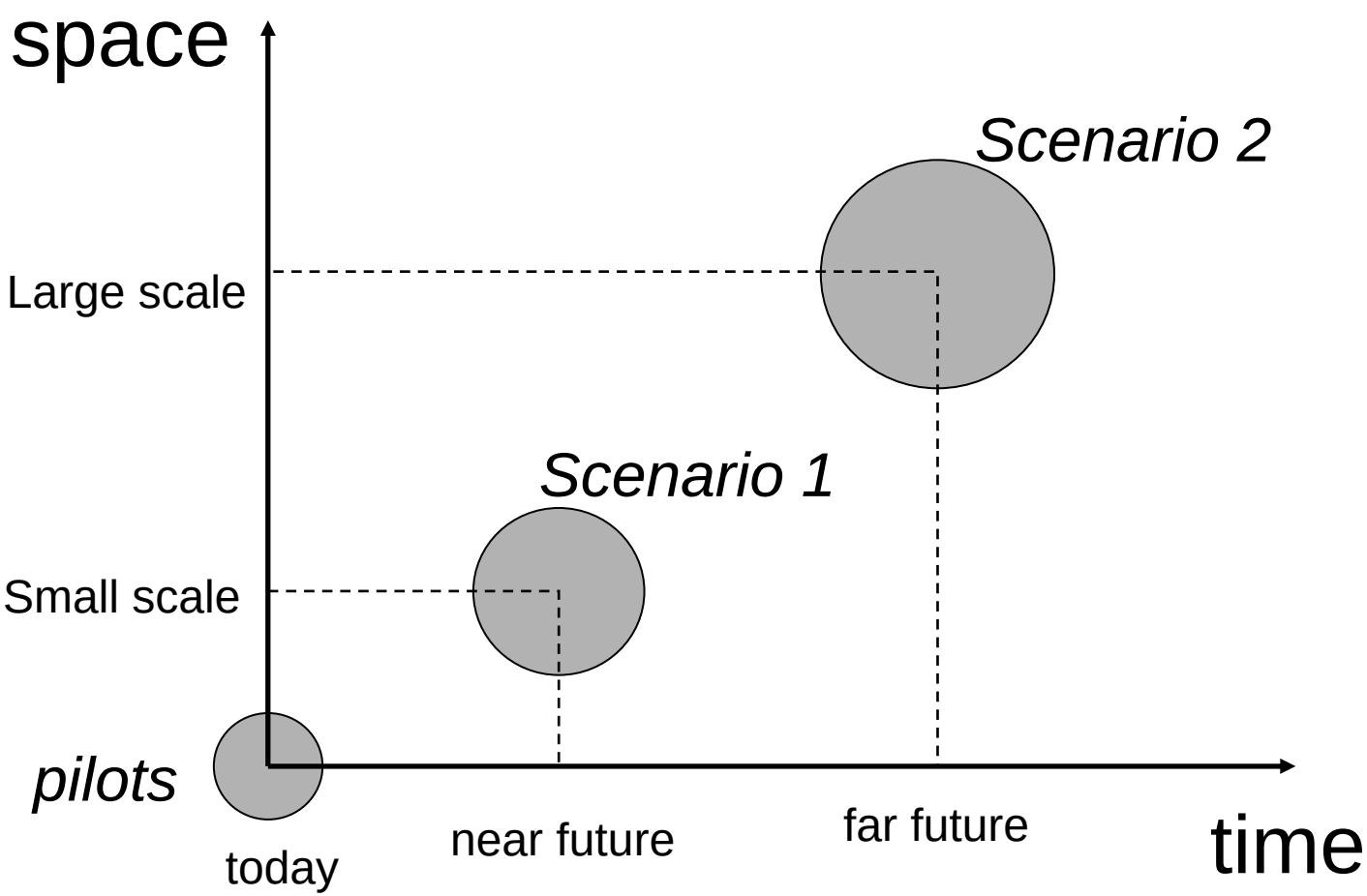


individual action

Traffic Management Centre informs private service provider on collective strategy

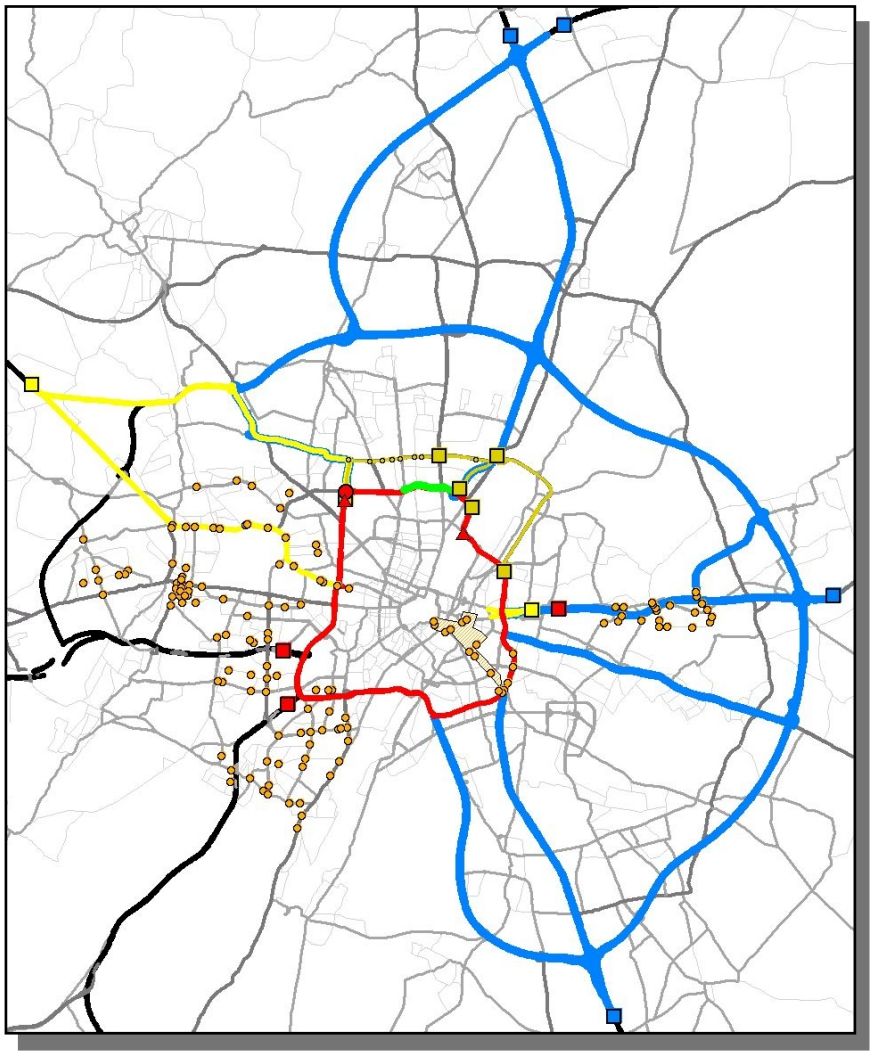
Result:
consistent individual routing
→ best route

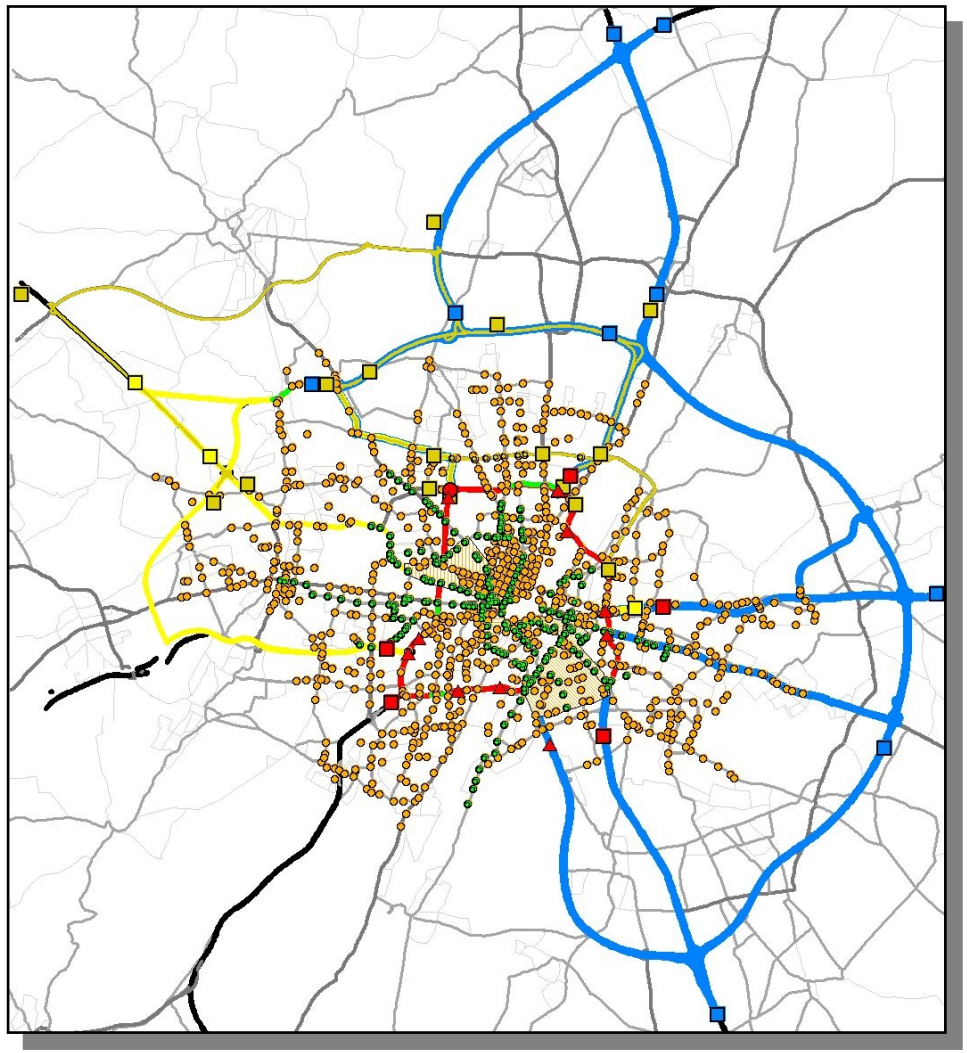
Estimation of effects by scenario techniques



MOBINET

Estimation of effects by scenario techniques





Estimation of effects by scenario techniques

Scenario 1 (small scale)

Reduction of the total **traffic load** of the motorized individual traffic
by 25 mio km (0,13%) per year.
→ Reduction mainly on highly congested and sensitive network sections.

Reduction of **CO_2-emmissions** caused by traffic
by **12.000 tons** (0,3%) per year.

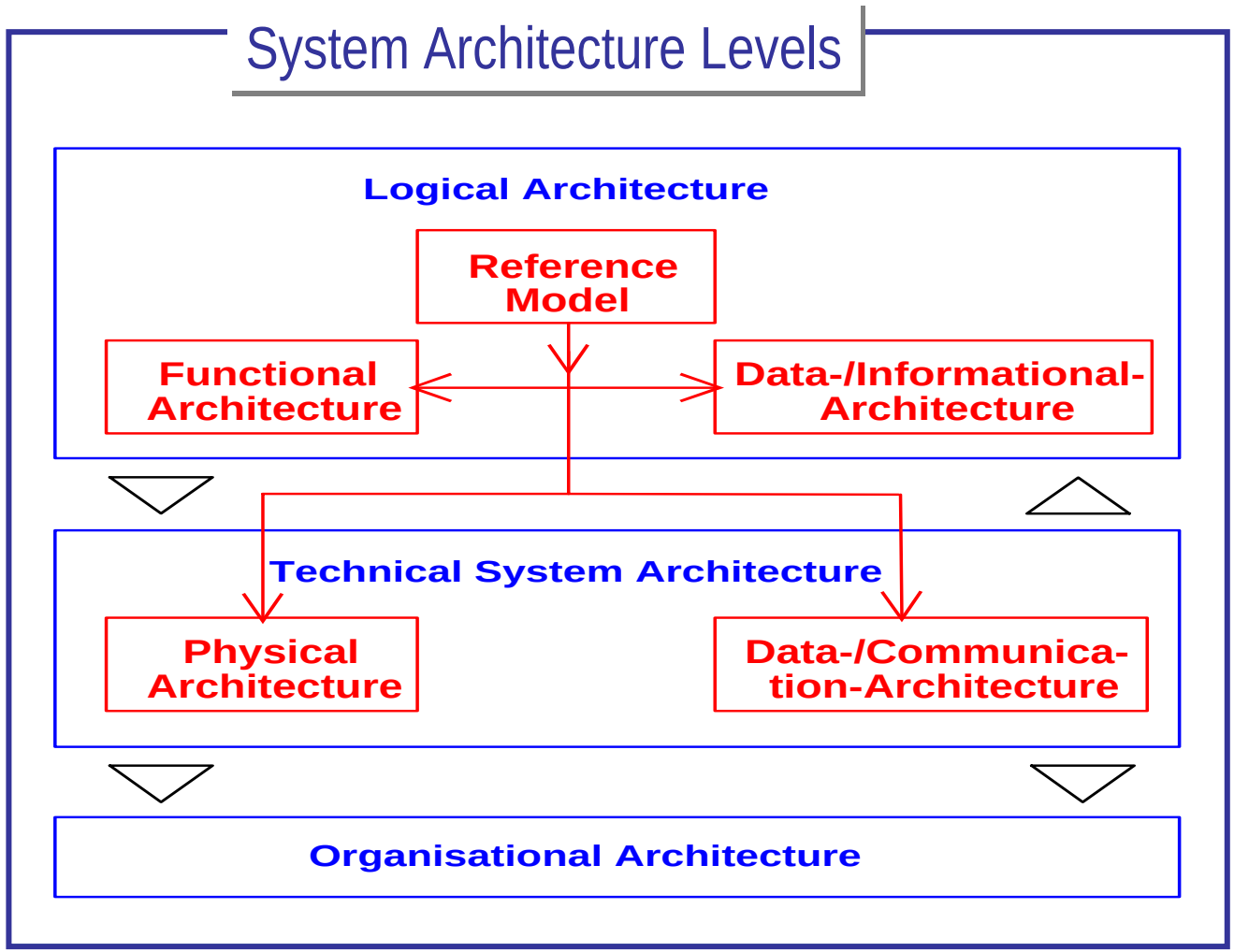
Around **17.000 persons** per day will **change** from individual to public transport.

Estimated **economic benefit** is approx. **30 mio € per year.**

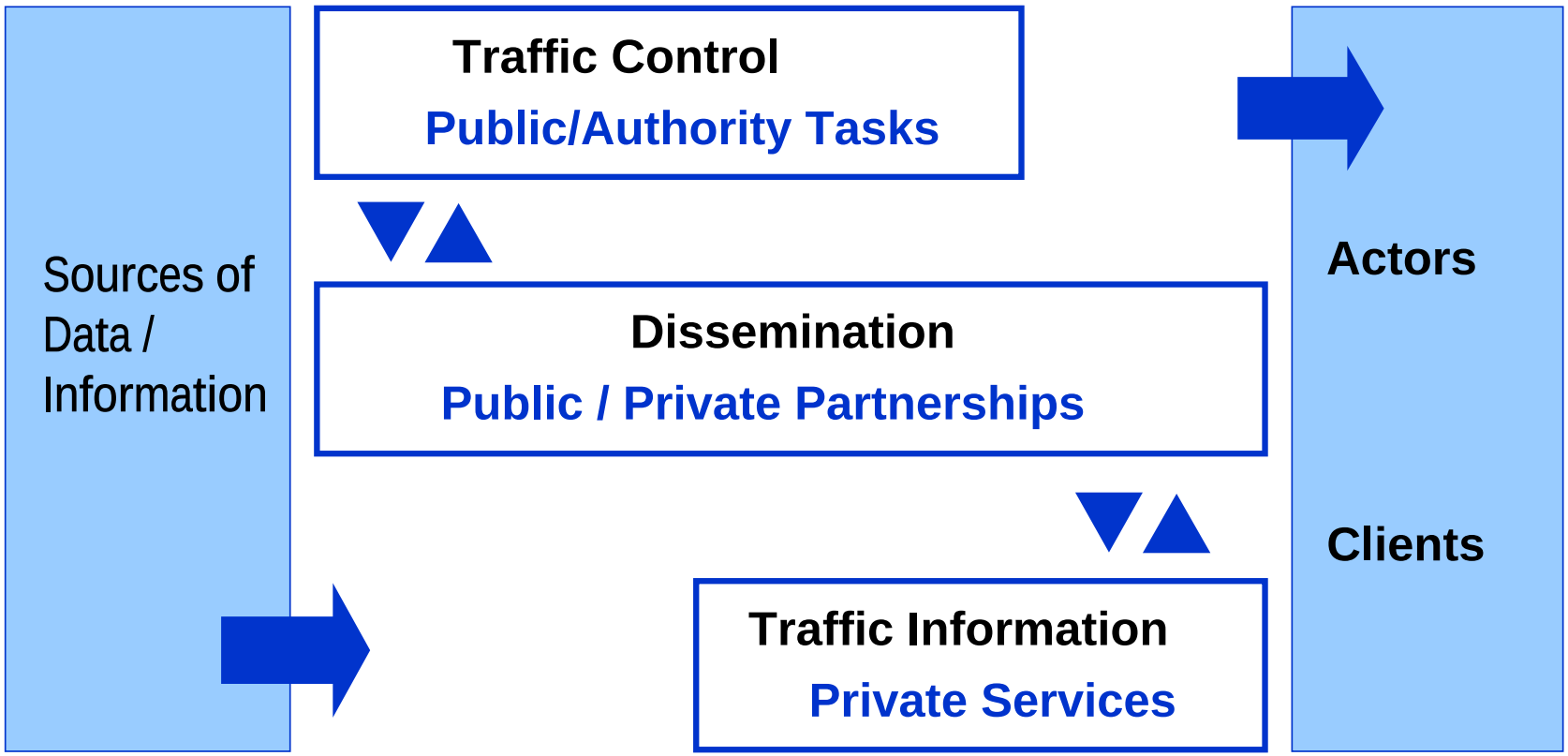
Scenario 2 (large scale)
Reduction of the total **traffic load** of the motorized individual traffic
by 70 mio veh km (0,35%) per year.

Estimated **economic benefit** will rise to approx. **80 mio € per year.**

Implementing ITS: a complex job

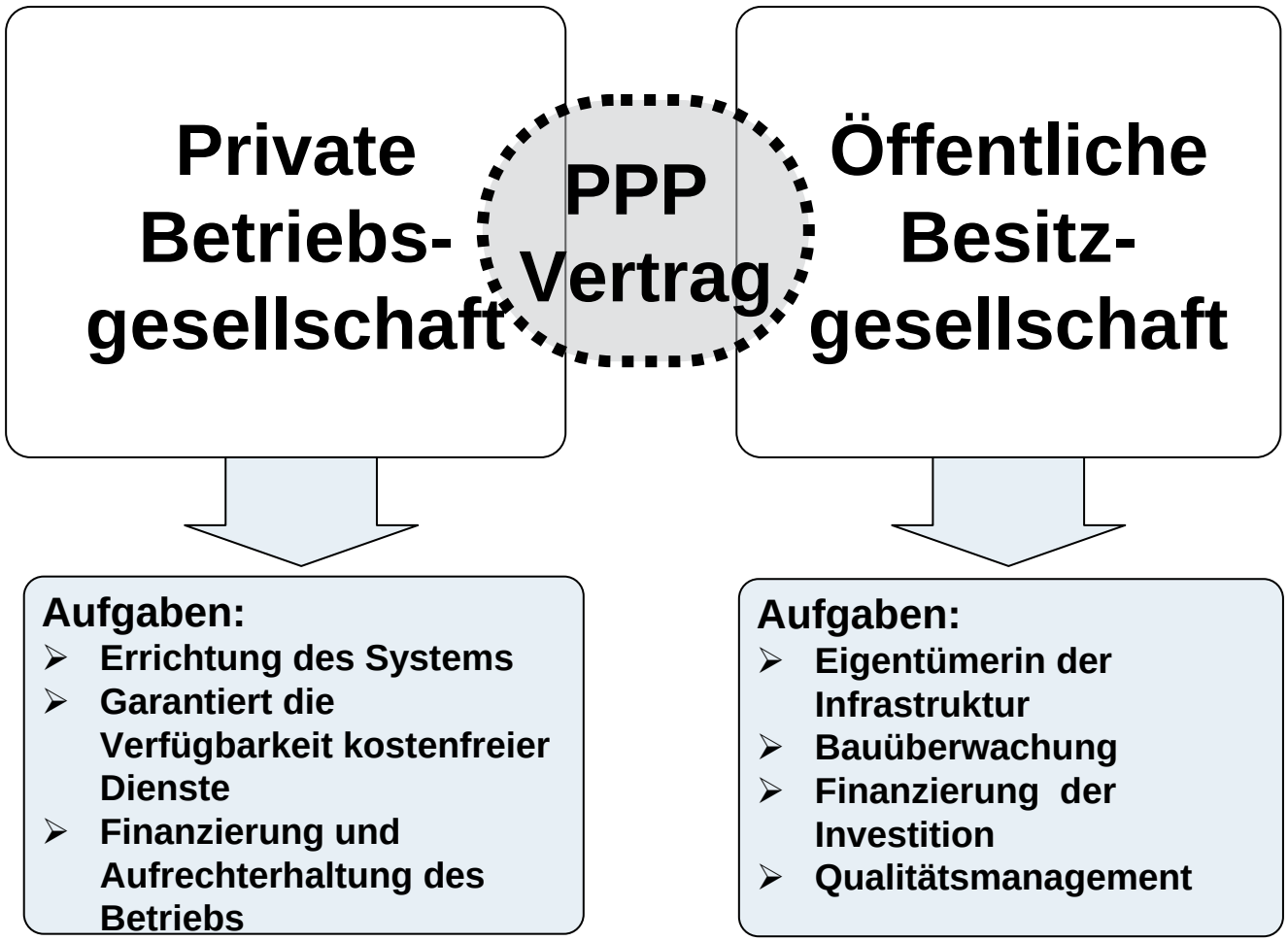


Implementing ITS: organizational approach



Implementing ITS: organizational approach

PPP - approach 'Ruhrpilot', 2005



Intelligent Transport Systems: Where are we today?

- The technologies and concepts of ITS are far developed and have proven their general ability to safeguard and promote mobility.

- BUT:
  The potential of ITS is by far not yet fully used and needs intensive further research, piloting, standardizing and marketing.

Intelligent Transport Systems: Where are we today?

- Important future fields of activity are, e.g.:
  - Organisation of traffic management (public/private services, integration region/city, institutionel aspects,…)
  - Financing of ITS, business models for ppp
  - Integration of infrastructure planning and traffic management
  - Inclusion of commercial transport
  - Consolidation and enlargement of transport databases (demand patterns, environmental data, consistent data models)
  - Integration of individual and collective measures
  - Harmonisation/standardisation of system architectures
  - seamless quality management (systems technology, functions, processes)
  - improvement of general knowledge about costs and benefits

Resume

- Traffic Management and ITS have 'grown-up'.
  → **We enter a period of normality with respect to the very basic and most important measures.**
- Due to its expected effects ITS can be a powerful complementary supplement to infrastructure measures, but not a replacement.
  → **A close integration of traffic management with long-term traffic and infrastructure planning is necessary.**
  → **We need 'ITS Masterplans' !**
- Further activities are requested to gain the full potential of Intelligent Transport Systems.
  → **System architectures, organisation of traffic management, quality supervision are predominant.**


Thank you for your kind attention!