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INTEGRATED ITS SYSTEMS: EXPERIENCES AND TRENDS

Vito Mauro

X CONGRESO INTERNACIONAL ITS
X SIMPOSIO DEL ASFALTO
II SEMINARIO INTERNACIONAL DE PAVIMENTOS DE HORMIGÓN
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A short look at

- Main applications in Traffic Management
- Potential and benefits

Based on author's experience

- Major R&D programs in Europe
- Practical application

THE SCENARIO FOR ITS DEPLOYMENT

Reducing impacts/energy consumption/space use/cost, by:

- Better vehicles
- Good Planning
- Better infrastructure
- Traffic/Transport management

Avoiding a continuous increase in demand through:

- Demand management
- Traffic Calming
- Enforcement

PROVEN BENEFITS FROM ITS

BENEFITS PROVIDED BY
ITS HAVE BEEN DEMONSTRATED

ACCIDENT REDUCTION OF 30%
CONGESTION REDUCTION OF 15%
ENERGY CONSUMPTION REDUCED BY 20%

VERY HIGH BENEFIT/COST RATIO

e.Safety Forum, EU

FINDINGS and TRENDS

Traffic Management – (e.g. UTC) is the basis of any improvement

Travel time reductions

From 10% up to 30%

Congestion reduction

Safety improvement

TREND:
Toward “adaptive” control

Fighting against congestion ..

Before …..

Bucuresti 2007

Fighting against congestion ...

… and after …

GOOD TRAFFIC MANAGEMENT
“CAN DO” also in «impossible» situations

Bucuresti 2010

Public Transport: an important component for “sustainability”

.. but it is badly affected by congestion …

- Increase in costs
- Reduction of appeal
- Reduction of space

Answers:

- **Reserved lanes**
- **Public Transport Management**
- **PT priority**

Parking Management is becoming more and more important

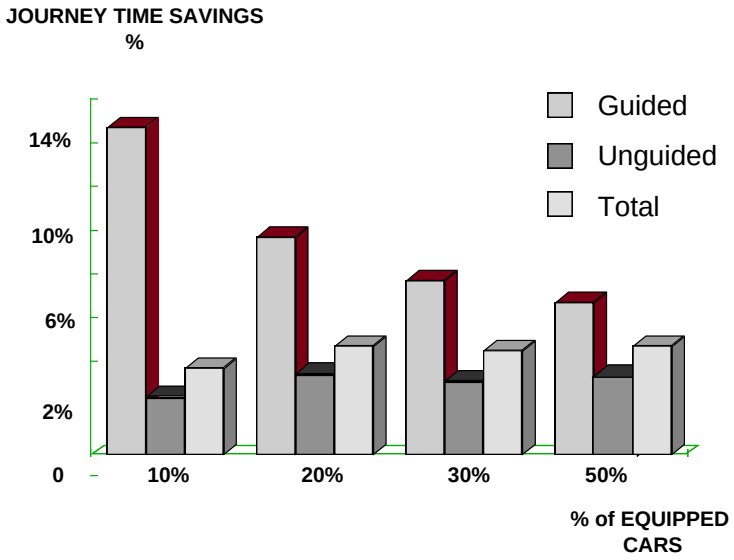
.. vehicles searching for parking increase traffic ..

- Up to 30%

ITS technologies help

- **monitoring**
- **informing**
- **Booking!**

ITS: INFORMATION SERVICES



High benefits shown:
Fuel consumption (-12%)
Travel time (up to -15%)
Modal shift (3%)
Social benefits

Information services can help
- distributing demand
- lowering congestion
- reducing trip length
- increasing PT use

Journey time savings with dynamic
routing strategy on congested network
(Source DRIVE Margot)

INFORMATION IS USEFUL:

To System Operators:
so they can implement coherent planning and actions (traffic light control, fleet management, etc).

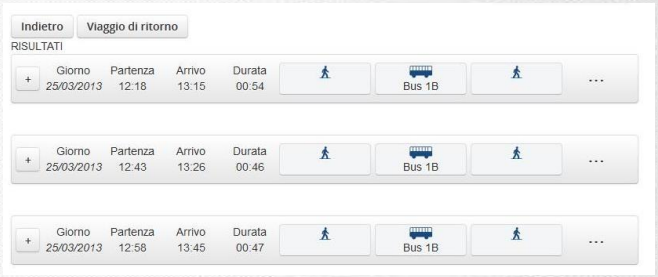
To the Travellers:

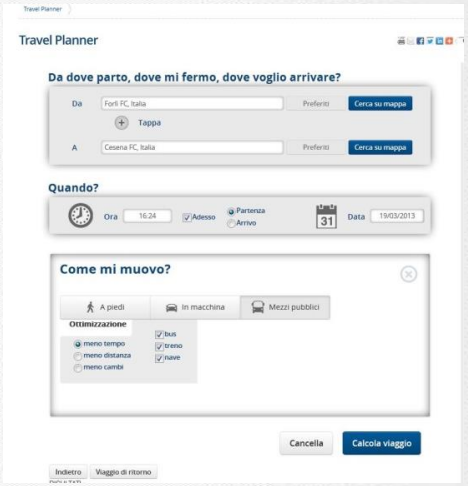
(through service operators and many channels) to help choose the best route, best means of transport, optimal departure time, etc.

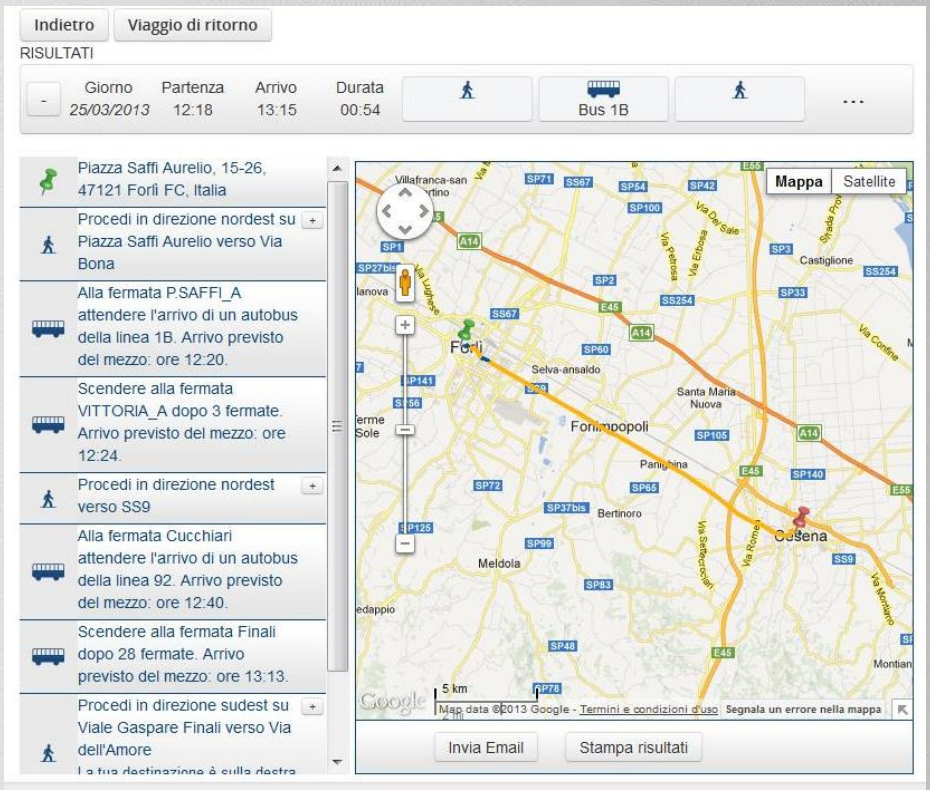
TREND:
Personal connection
Crowd sourcing

Dynamic Travel Planning

- Door-to-door with personal choices
- Multimodal trips
- Dynamic travel times







NEW OPPORTUNITIES FOR ITS

CONNECTED WORLD

AUTOMATED DRIVING

CONNECTED WORLD

- PERSONS (TRAVELLERS)
  - majority is «connected» today

The «informed» traveller makes better choices

- VEHICLES
  - Long-range – growing penetration today
  - V2V/V2I – ready to come (?) in few years

Vehicles become «sensors»
Direct source for ITS
Vehicle «cooperate»

- «THINGS» (e.g. detectors)
  - Expected to penetrate the market heavily

Low cost, efficient, pervasive monitoring

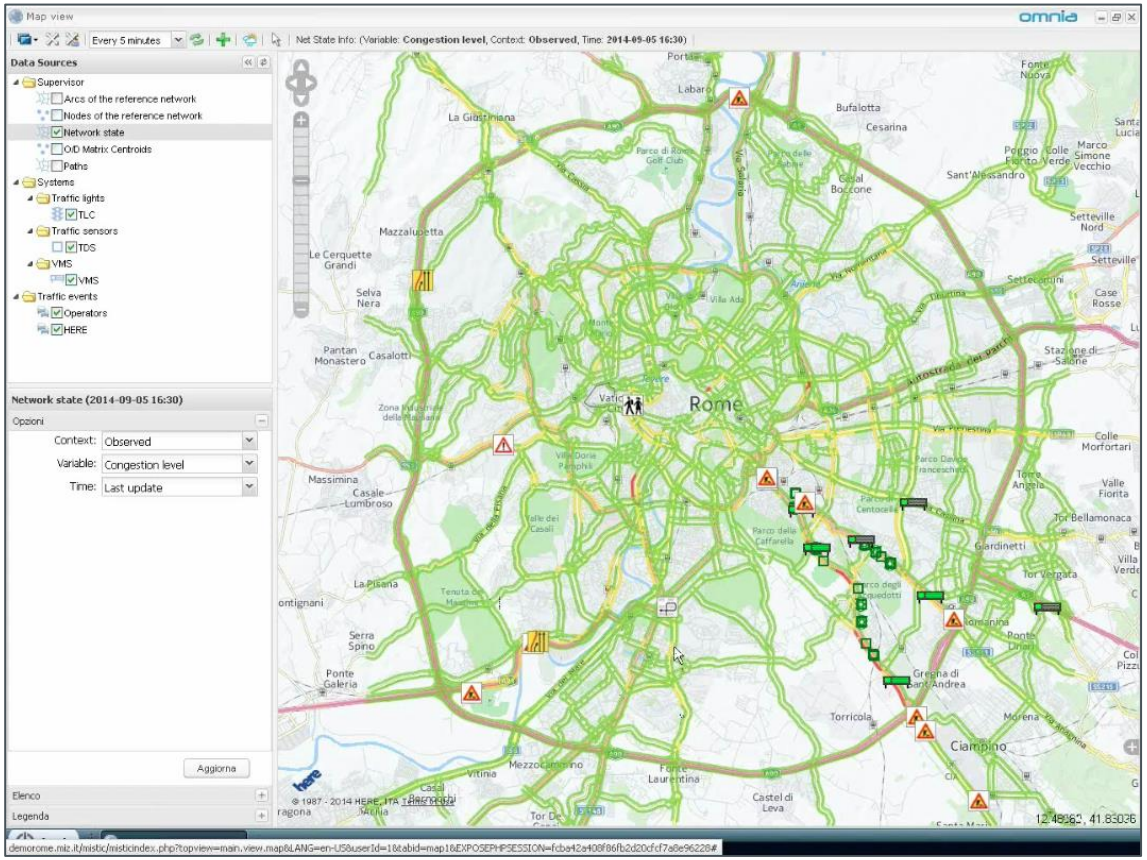
Traffic data from everywhere to everywhere
Traffic info to every «actor»

ADVANCED TRAFFIC ANALYTICS

"Big Data" analytics using sensors, car data, others:

- Estimate traffic conditions where sensors are not available/sufficient
- **Predict traffic flows and congestion**
- Validate traffic events and identify anomalies

Enabling accurate and timely traveller information



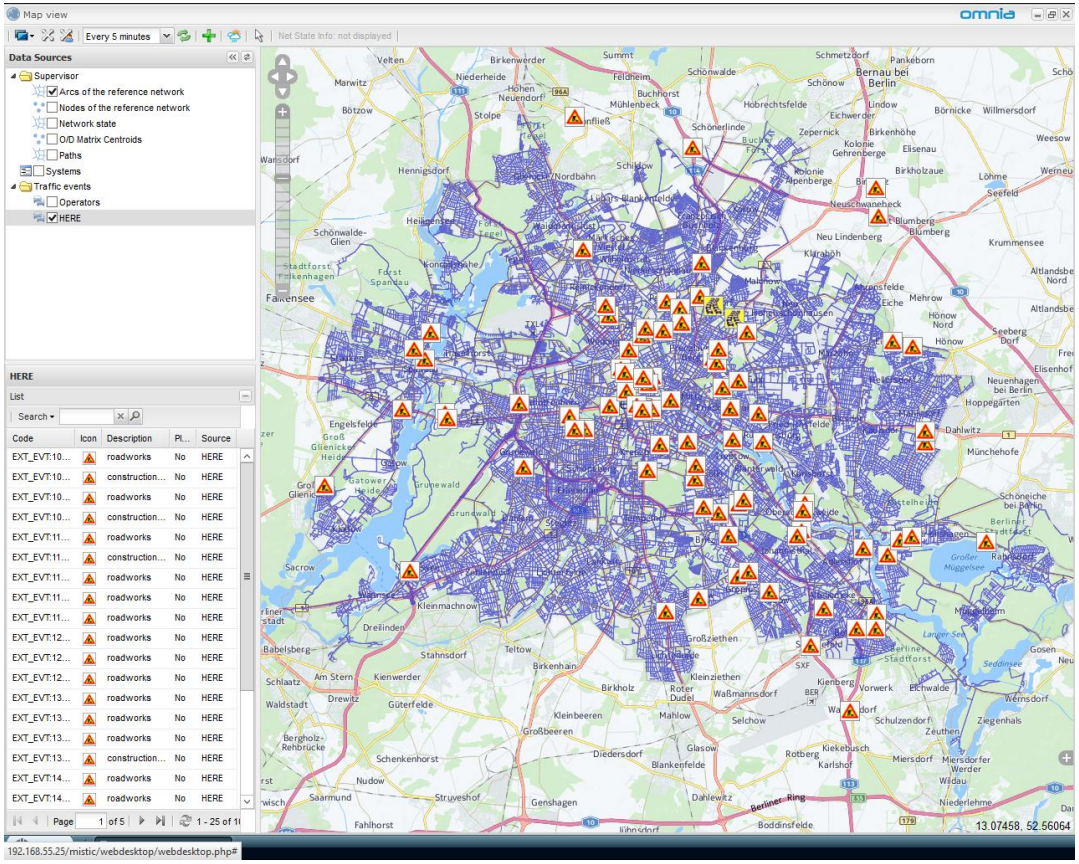
ADVANCED TRAFFIC ANALYTICS

"Big Data" analytics using sensors, car data, others:

NEXT STEP

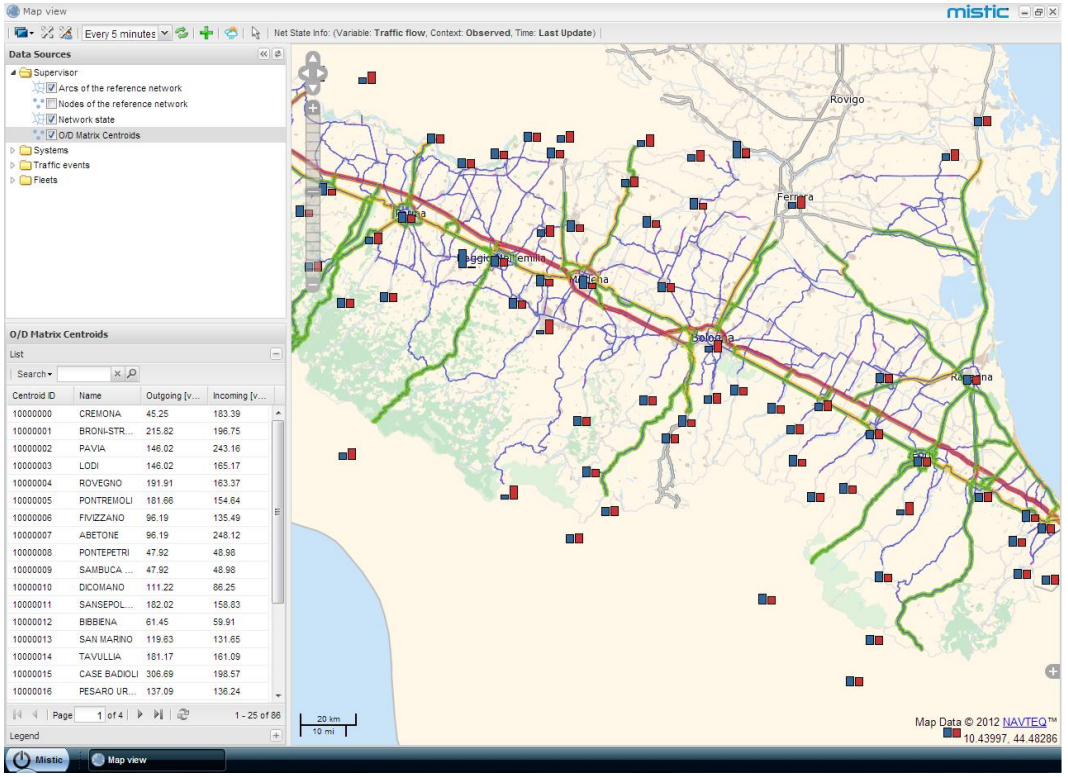
- Improve on-line demand modelling (e.g. on-line O/D estimation for user classes; on-line assignment)
- Improve on-line event detection

DYNAMIC NETWORK CONTROL

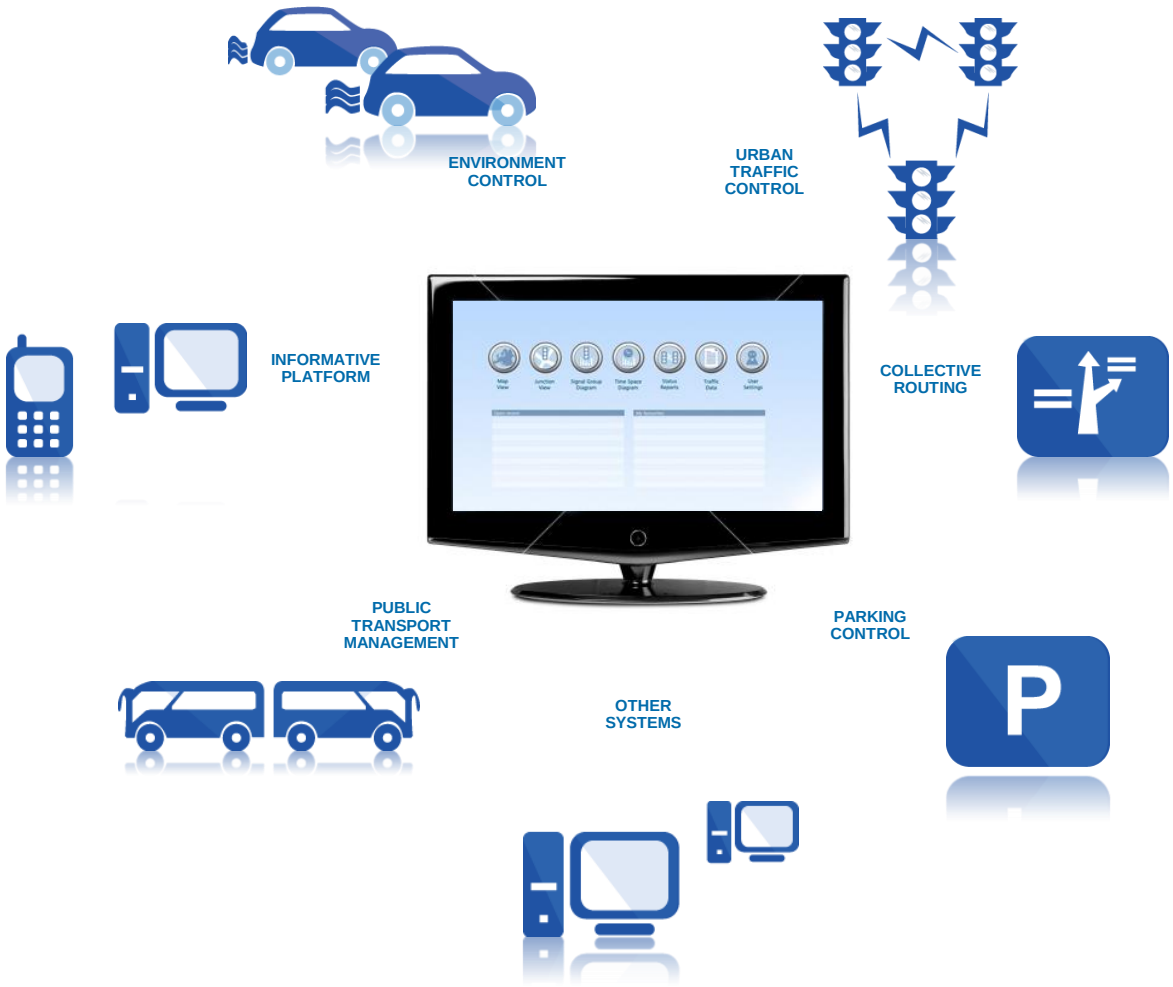


Data analytics at regional level

Integration of vehicle data expand ITS capabilities to wide regions and «mixed» road networks



THE KEYWORD IS INTEGRATION

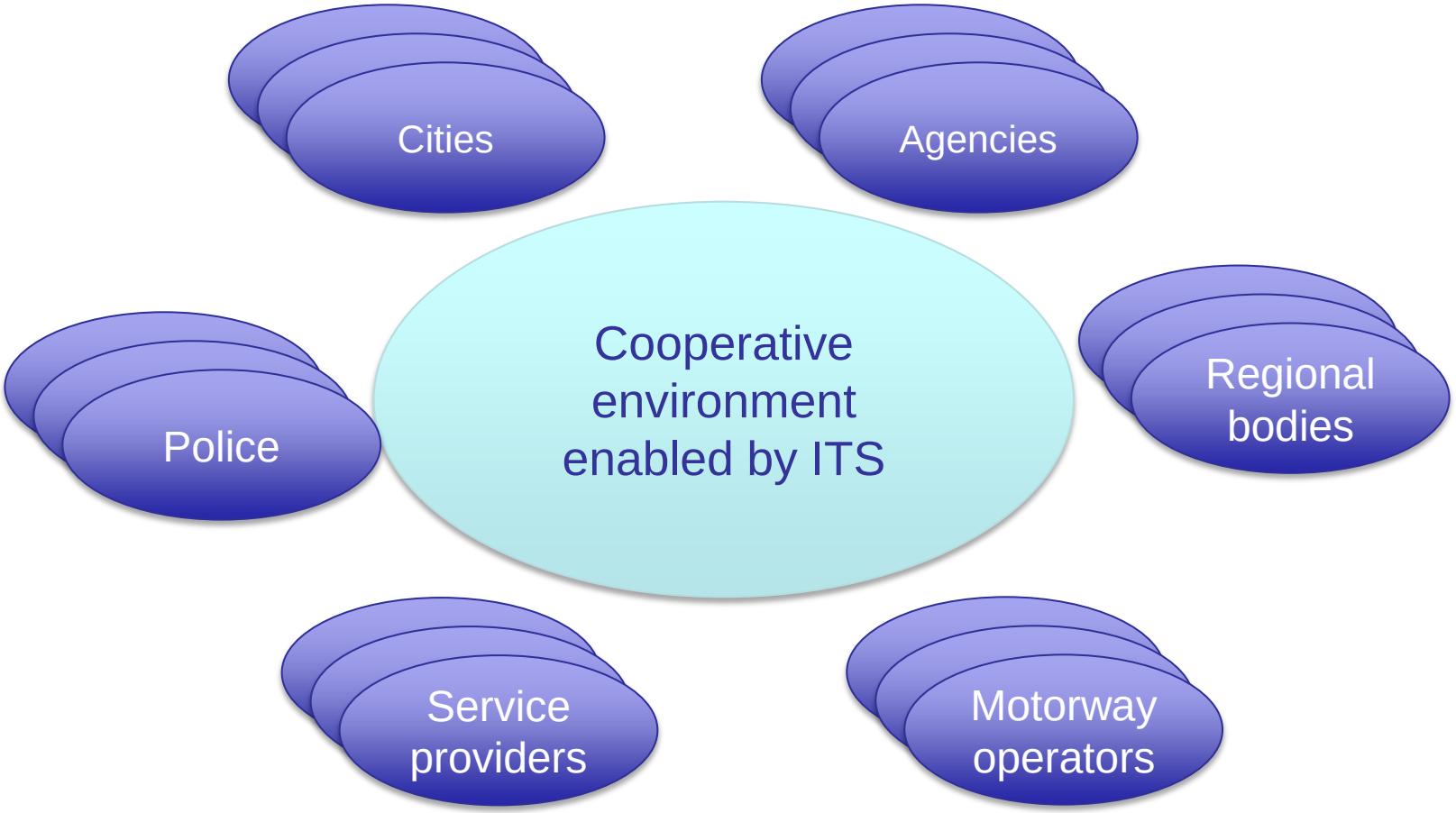


Trend: “OPEN” systems

- **Gradual implementation**
- **Adapted to local needs**
- **Legacy systems can be included**

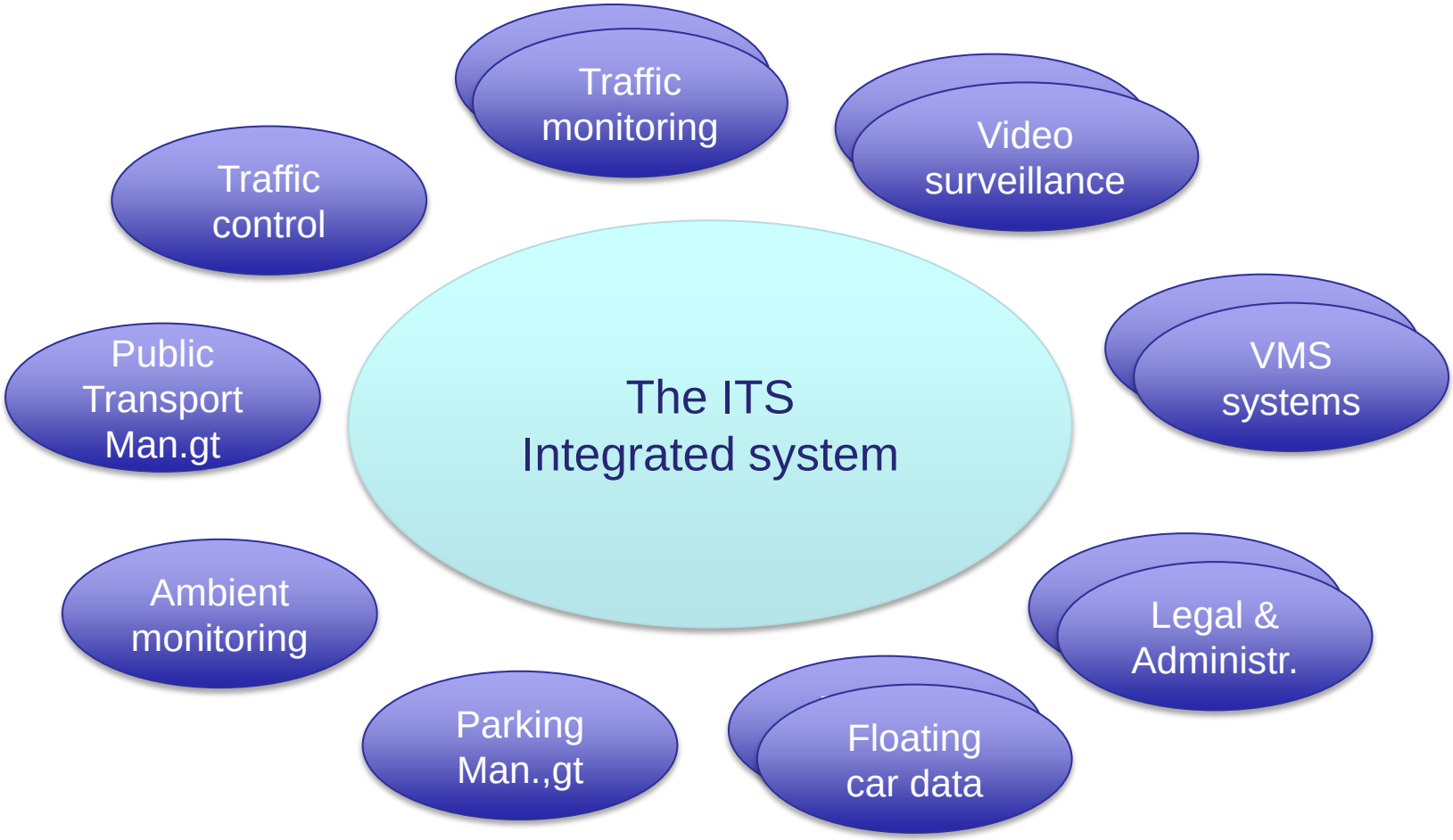
On example: TOSCANA region

The organizational chart

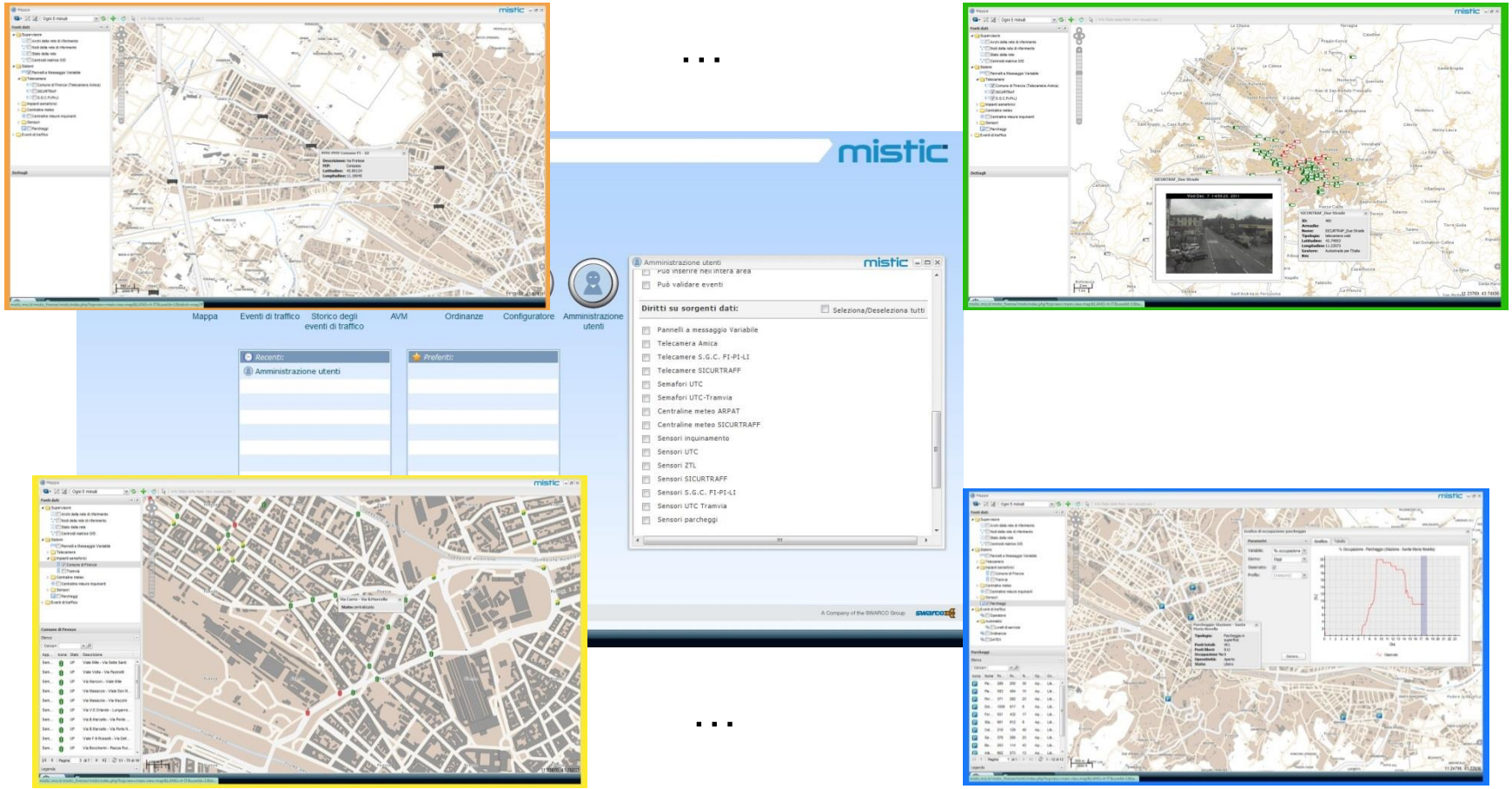


One example: TOSCANA region

The «system» view



Result: an open, regional, multioperator ITS platform



Demand Management is needed

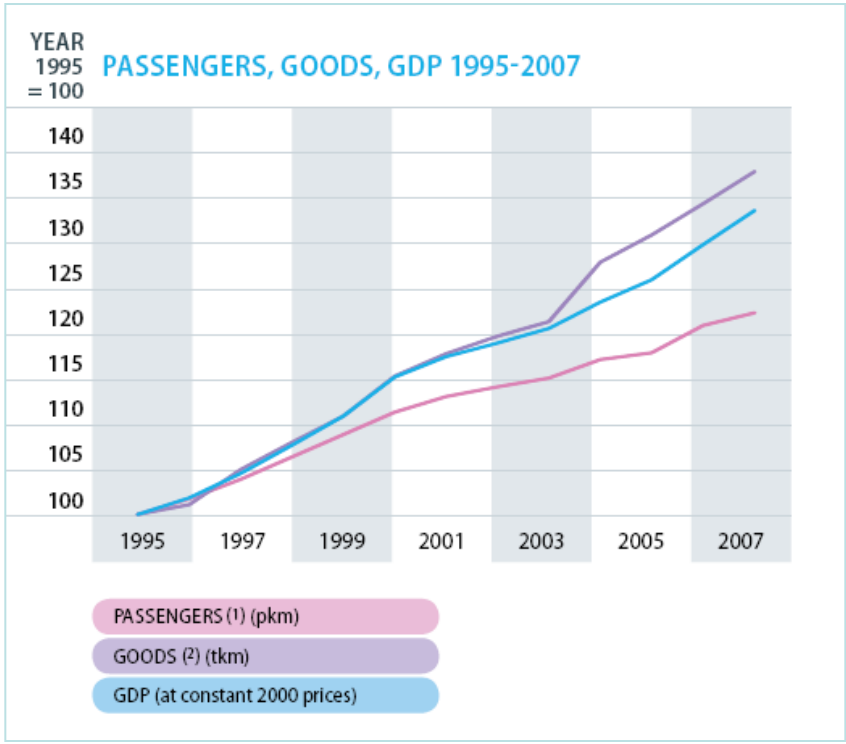
Car usage is very attractive … and continuously increasing

Increasing traffic efficiency (alone) will attract new car use

Demand management is needed

- parking restrictions
- access control
- traffic calming
- Enforcement
- “tolling”

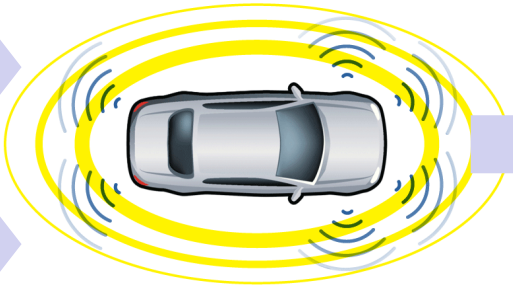
(parking, enforcement and tolling also provide revenues)



A POSSIBLE “NEAR FUTURE” SCENARIO

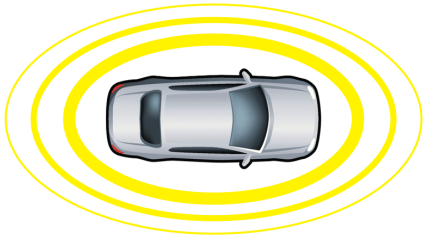
Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors



Connected Automated Vehicle

Leverages autonomous automated and connected vehicles



Connected Vehicle

Communicates with nearby vehicles and infrastructure

V2V V2I

Source: US DoT

Example: TRAFFIC LIGHT ASSISTANT

When approaching the intersection: speed advice

- Smoother journey
- Saves fuel/emissions
- Increases efficiency of the intersection

When waiting for green: time to green & start-stop activation

- Reduces stress
- Saves fuel/emissions
- Increases efficiency of the intersection

MY CONCLUSIONS

A POSITIVE view of ITS

ITS is feasible

- in any context
- after good planning
- in line with specific city needs
- with limited efforts (cost/time)

ITS provides substantial benefits

- relief from congestion
- decrease of travel times (up to 30%)
- increase of safety (up to 50%!)
- decrease of pollution and energy consumption
- running costs savings

ITS can "pay for itself"

- e.g. Public Transport priority
- enforcement
- charging schemes

SUGGESTIONS

CONSIDER THE FULL LIFE CYCLE!

correct planning
positive use of technology
(open systems/technology independent)
efficient deployment
(project management)
effective maintenance
of equipment (assistance contract)
of traffic models (local engineering team)

SUGGESTIONS

LOOK for a combination of “IMPROVEMENTS” and “DEMAND MANAGEMENT” (for medium/long term benefits)

CONSIDER THE FULL LIFE CYCLE!

- correct planning
- important to build consensus
- **positive use of technology**
  - **(open systems/technology independent)**

An urban ITS system will last for 15/20 years
Technology today changes much faster!

- effective maintenance
  - of equipment (assistance contract)
  - of traffic models (local engineering team)

SUGGESTIONS

LOOK for a combination of “IMPROVEMENTS” and “DEMAND MANAGEMENT” (for medium/long term benefits)

CONSIDER THE FULL LIFE CYCLE!

- correct planning
- important to build consensus
- positive use of technology
  - (open systems/technology independent)
- efficient deployment
  - (project management)
- **effective maintenance**
  - of equipment (assistance contract)

Traffic in cities changes continuously.
Traffic models have to be adapted.
A loss of 5-10% in efficiency – every year – has been estimated
Adaptive ITS systems are a positive answer