

# A view from the 'Embassy'

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# ITS TOOLS . . .

## Combine

- Information Technology
- Communications
- Sensors
- Maps and Databases

To deliver journeys/services that are

- More efficient
- Safer
- More comfortable

For Rail, Air, Maritime and Road

# The early years

- Lot of ex-military hardware
- Expensive, large, power-hungry GPS
- 2G cellphones
- PC 'horsepower' low until ~ 1995
- Japan focus on car navigation
- US focus on eCall
- Europe focus on traffic management and info
- Safety used to justify EC funding
- Everything developing in silos
- Car C<sup>o</sup>s wildly over-optimistic on CVHS

# Policies Processes

# Tools

System capacity

Improved safety

Better public transport

Demand management

Costs attribution

More efficient logistics

Reduced congestion

User behaviour/response

Traveller Information

E-Safety (ADAS, ISA, )

Location-based Services

Road User Charging

Deployment Issues

CVHS (Intelligent Vehicles + Intelligent Infrastructure )

E-Ticketing

Smart cards

Traffic control & management

- Vehicle / road comms
- Cellular telephony
- Microwave comms
- Data modelling / processing
- SatNav, Route Guidance
- Digital mapping
- Position location & GPS
- Electronic vehicle identification
- Display techniques
- e-commerce, e-purses
- Biometrics and ID
- Image processing, ANPR
- Transponder design
- Human Factors & ergonomics
- Real-time Information
- Cost - benefit and evaluation
- Risk Assessment
- Architecture & standards
- Business models
- IT and power computing
- Data Privacy

# Today ITS is in delivered in sectors

Vehicles

Infrastructure

Energy networks

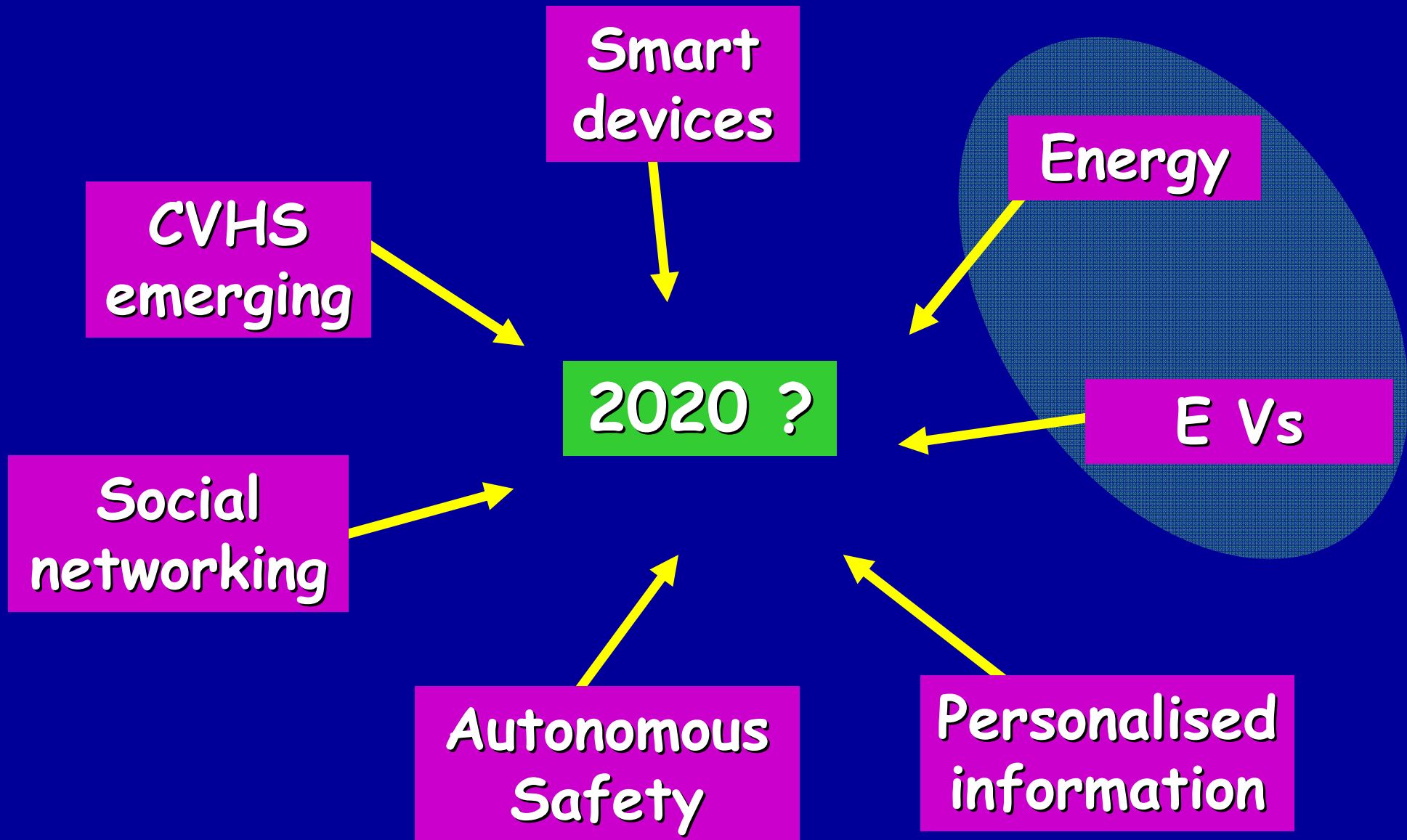
Wireless networks

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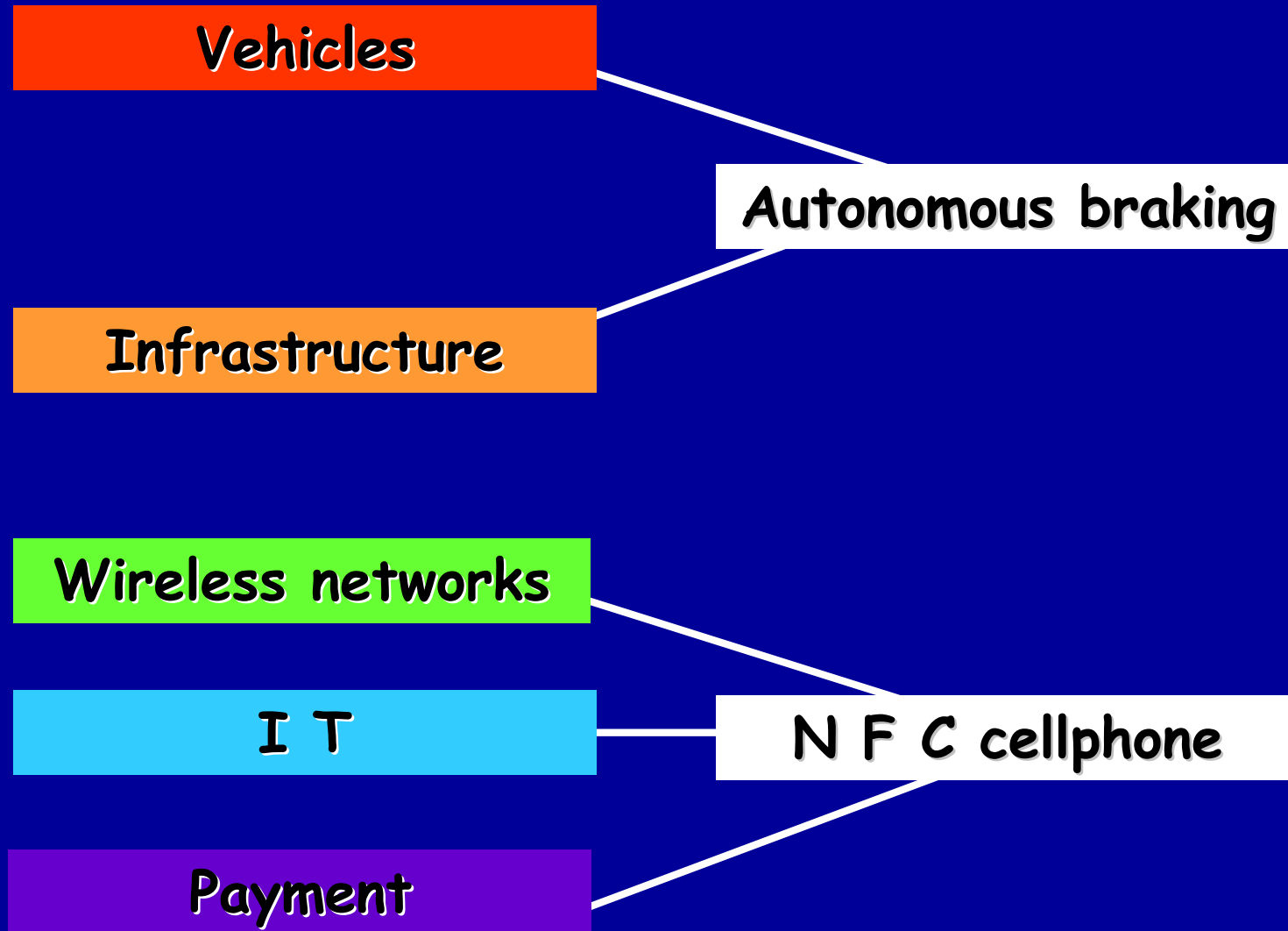
Maps / GPS

Payment

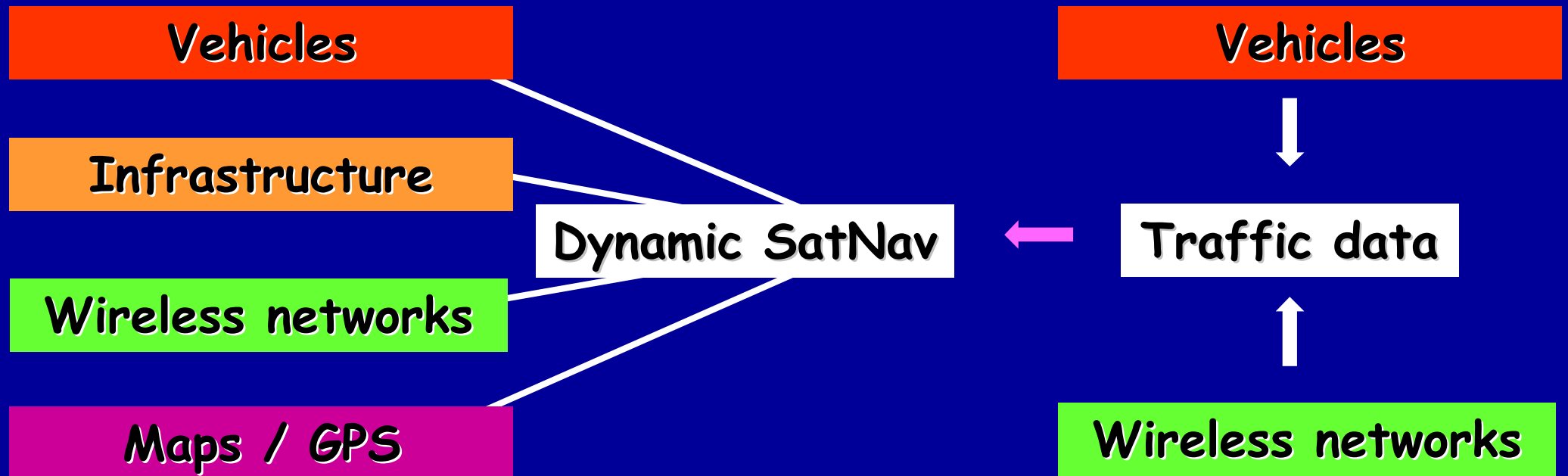
# 7 Reasons why ITS / transport will change



# And is changing 1



# And is changing 2



# And is changing 3

Vehicles

Energy networks

Wireless networks

Maps / GPS

Payment

EV recharge  
point location

# The future is convergence and services

Vehicles

Infrastructure

Energy networks

Wireless networks

IT

Maps / GPS

Payment

Safety

Time Efficiency

Fuel/Energy Economy

Resource Efficiency

Comfort

Personalised information

Personal security

# Three examples

Resource efficiency / throughput

Road and vehicle safety

Traveller Information

# Pressures on transport networks 1

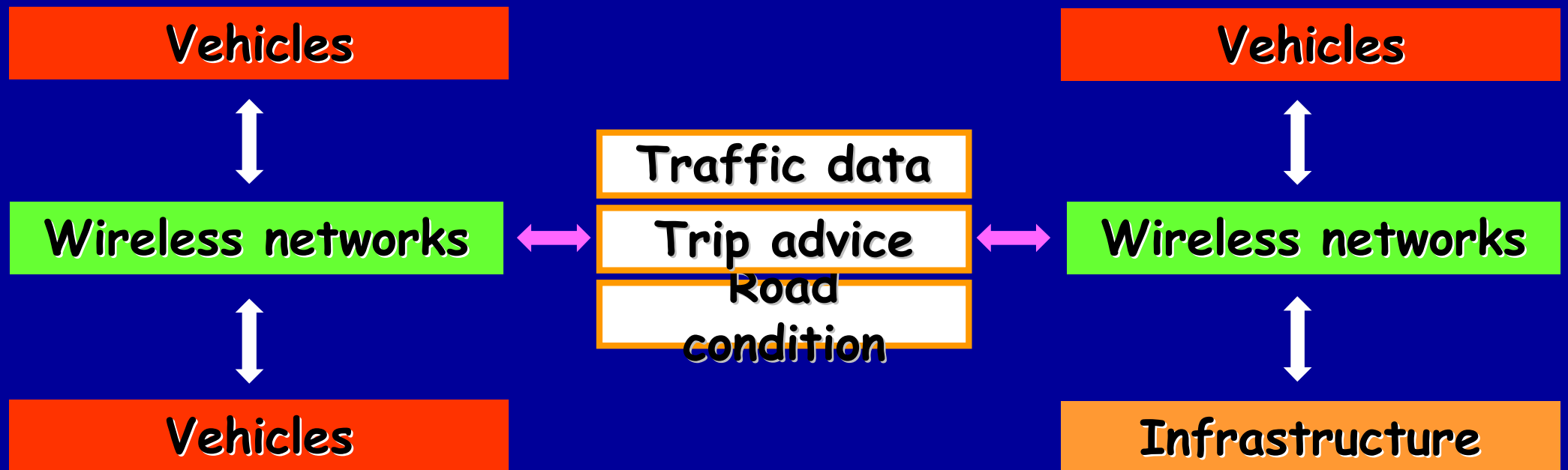
- More throughput
- Improved safety
- Reduced environmental impact
  - emissions
  - noise levels
  - visual intrusion
- Better integration with public transport
- More reliable/predictable freight trips

# Pressures on transport networks 2

- Changing trends:
  - population age distribution
  - e-shopping
  - tourism & leisure
  - teleworking
  - business location
  - flexible office hours, manufacturing *etc*
  - widespread personal 'smart' devices
- Need flexibility & fast response to change

# The CVHS solution

Remove the silos; introduce convergence



# CVHS - a strategic vision

Cooperative Vehicle-Highway Systems: joining up smarter roads and smarter vehicles using wireless

- Big wins in road safety & network management
- Safer vehicles, more driver support & assistance = fewer accidents
- Better prediction and management of traffic flow = less congestion, reduced emissions and reduced energy consumption
- Less scope for disruption to traffic by drivers
- Range of new products and services for automotive manufacturers and ITS industry
- Widespread recognition of societal and commercial benefits

# Easy CVHS toolbox

- Traffic & traveller information
- Adaptive route guidance
- Controlled traffic flow
- Latitudinal / longitudinal support
- Long<sup>al</sup> collision avoidance
- Lat<sup>al</sup> collision avoidance
- Platooning / convoying



Hard

# Pressures on transport networks 3

- More throughput ✓ CVHS
- Improved safety ✓ CVHS
- Reduced environmental impact ✓ CVHS
  - emissions ✓ CVHS
  - noise levels ✓ CVHS
  - visual intrusion X CVHS
- Better integration with public transport ✓ CVHS
- More reliable/predictable freight trips ✓ CVHS

# Evolution: Now-2020



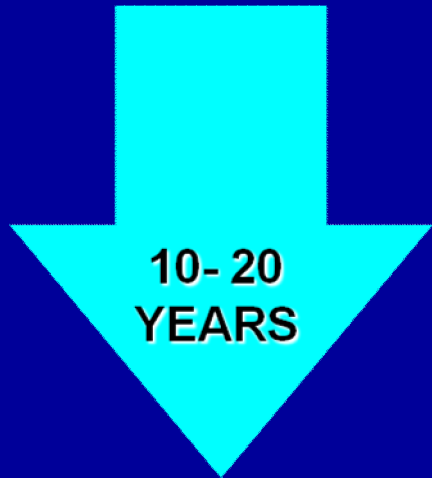
- Driver in full control of vehicle \*
- Speed/behaviour monitored by Police
- Real-time information on traffic
- Driver assisted by in-car technology (electronic stability programmes; side manoeuvre, longitudinal collision warning; autonomous braking)



- External speed alert (ISA)
- Real-time information on journeys
- Motorway charging introduced ?
- Driver in command, rather than control

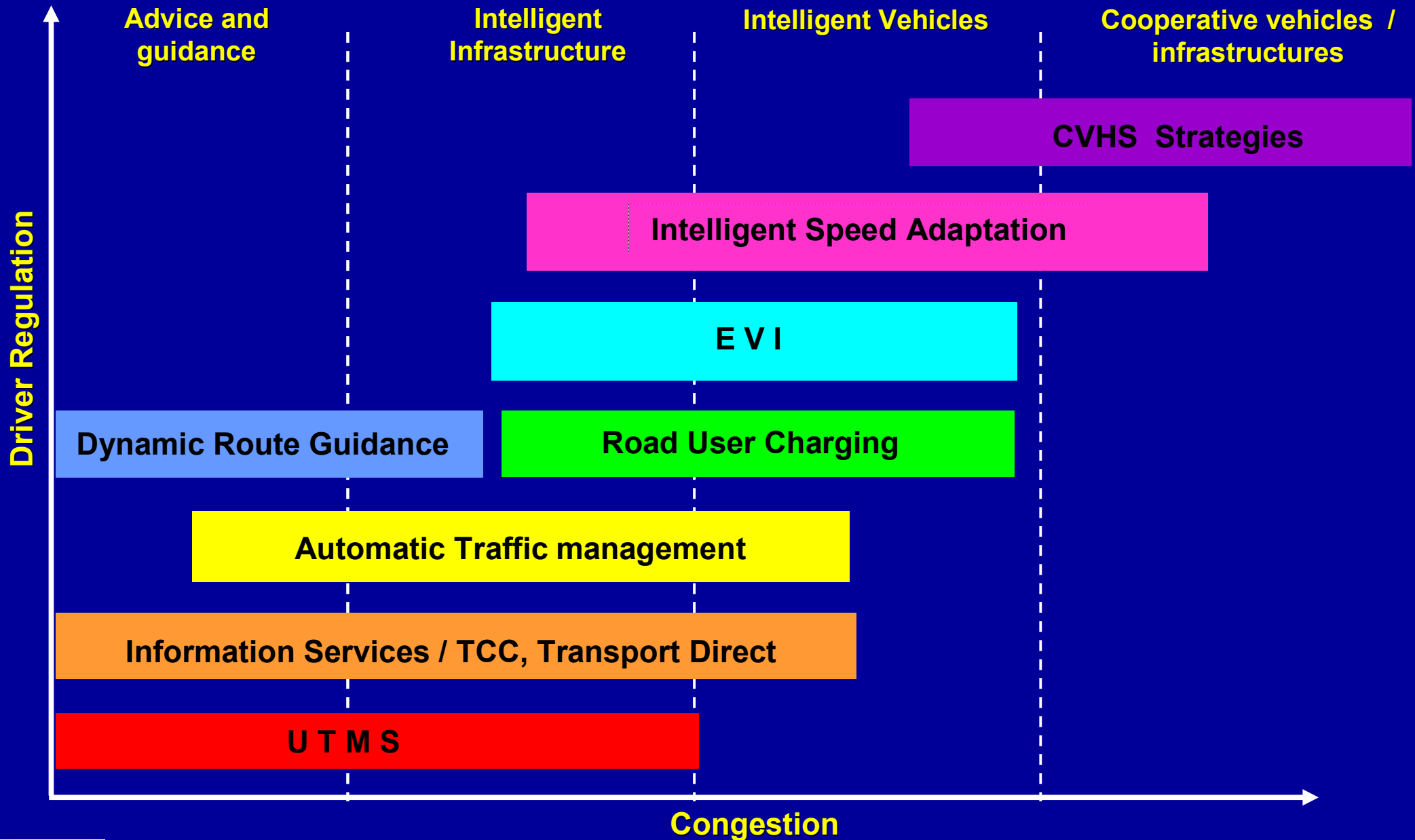
\* Except Airbag; ABS etc

# Evolution: 2020-2035

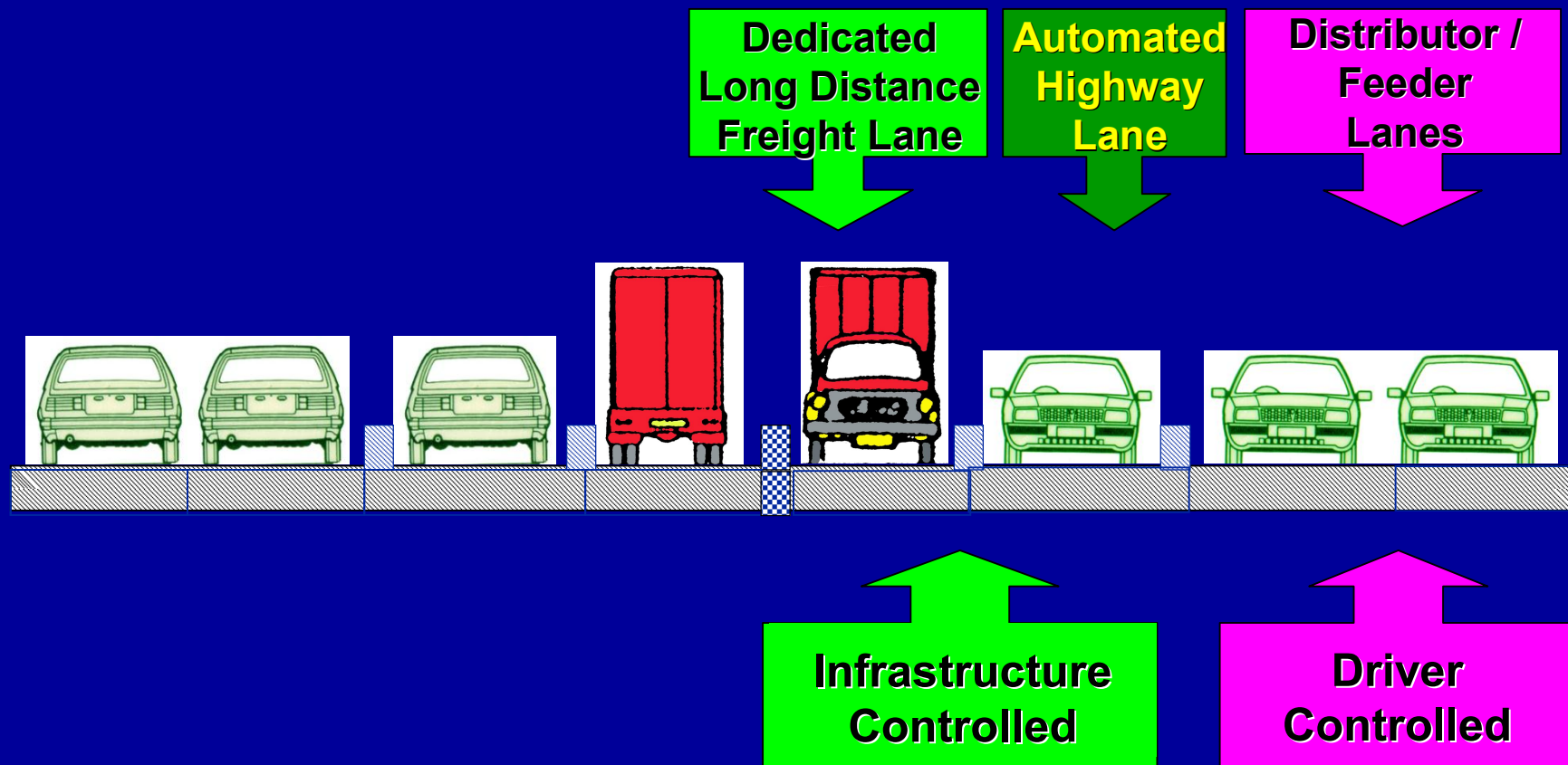


- Cooperative platoons of vehicles
- External speed control
- Driver manoeuvre over-ride
- In-car office systems accepted
- Automated highways: users are passengers
- Mode choice by price and journey needs
- Public transport "units" for hire

# Strategic Traffic Management



# A Future Strategic Network ?



# Three examples

Road and vehicle safety

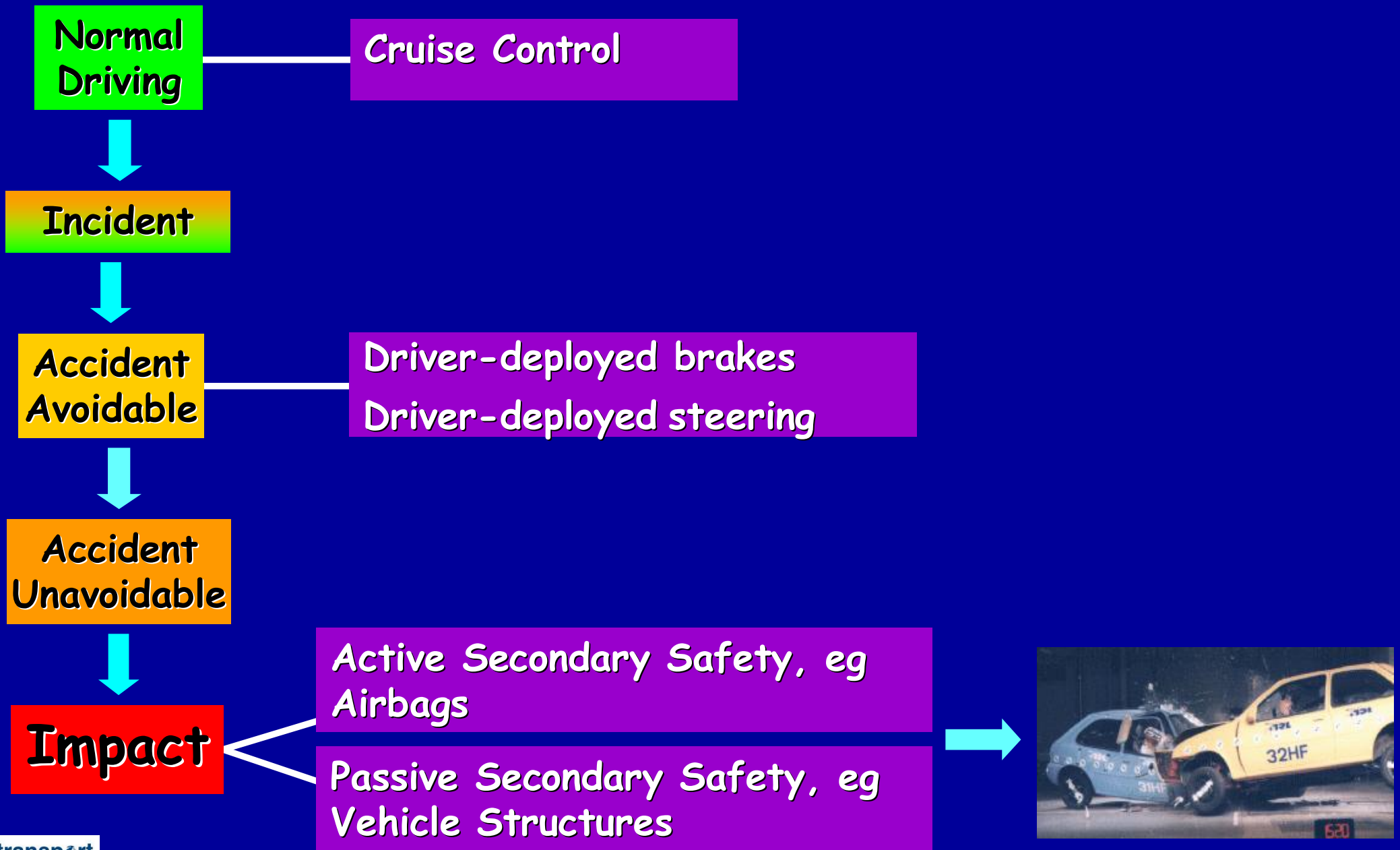
# Where we were - 1960s

- Seat belts uncommon - lap or static belts
- Low understanding of injury causes
- Little in-vehicle crash protection
- No vehicle behaviour sensors
- Child seats not invented
- No common braking standards
- Minimum tread depth requirements
- No EuroNCAP

# Where we are now

- Europe leads in understanding injury accidents
- New programmes to understand accident causation
- 12+ Airbags in some cars
- Consumer ratings for child seats
- EuroNCAP - 5 stars typical/Pedestrian pro 4 stars
- Most new cars have a stability programme
- Advanced sensor-driven controls becoming norm
- Intelligent systems entering the market
- Concerns over driver-in-loop / HM interaction

# Conventional vehicle's accident



# Intelligent vehicle's accident

Normal Driving

Intelligent Speed Adaptation  
Driver Drowsiness Monitor  
Lane Departure Warning  
Co-op Vehicle-Highway System  
Electronic Vehicle Identification



Accident Seems likely  
Start mitigation actions

Lat / Long Collision Warning  
Lat / Long Collision Override  
Electronic Stability Procedure  
Boost brake system pressure  
Pre-tension seat belts  
Configure air bag triggers  
Configure suspension for impact

Accident avoided or less serious  
Gains to: Safety, NHS, Industry as road user, Industry as employer

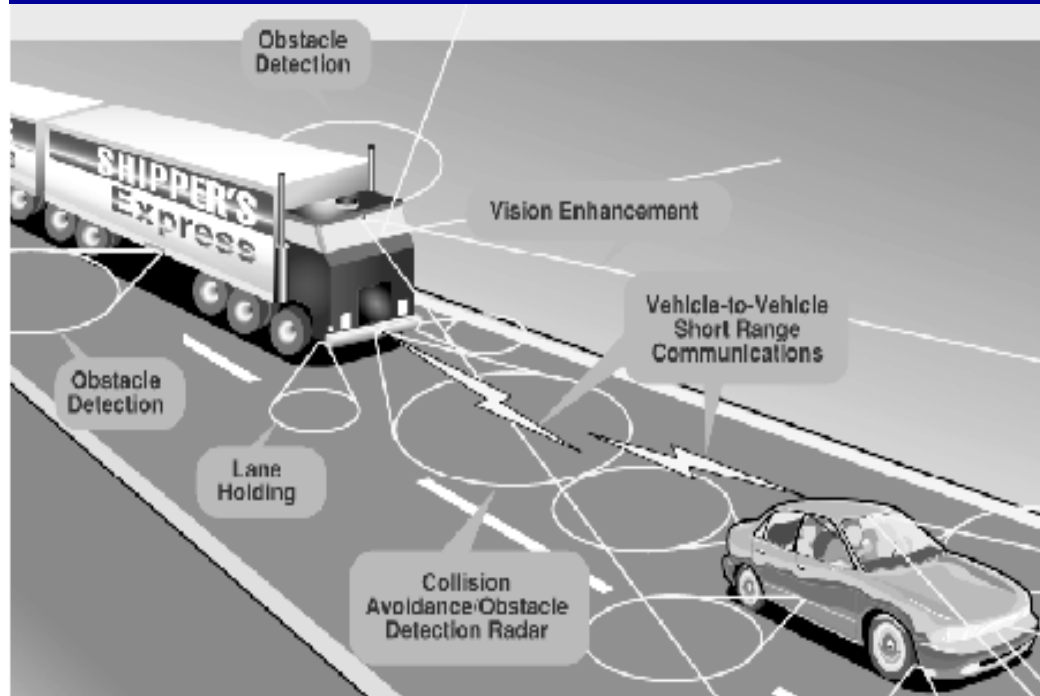
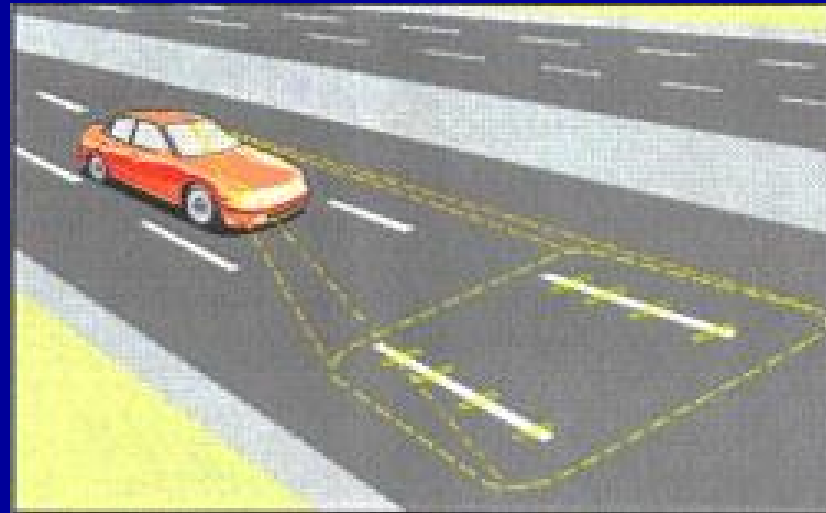
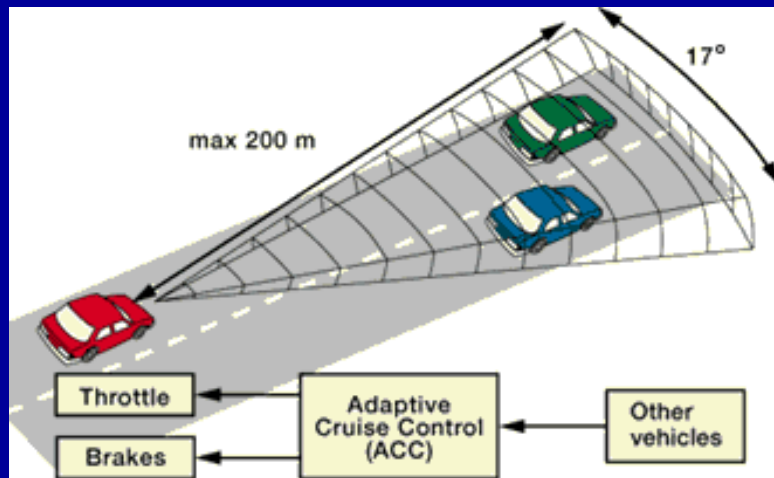


Impact

Airbags  
Vehicle Structures  
e-Call 999 service  
Incident location report



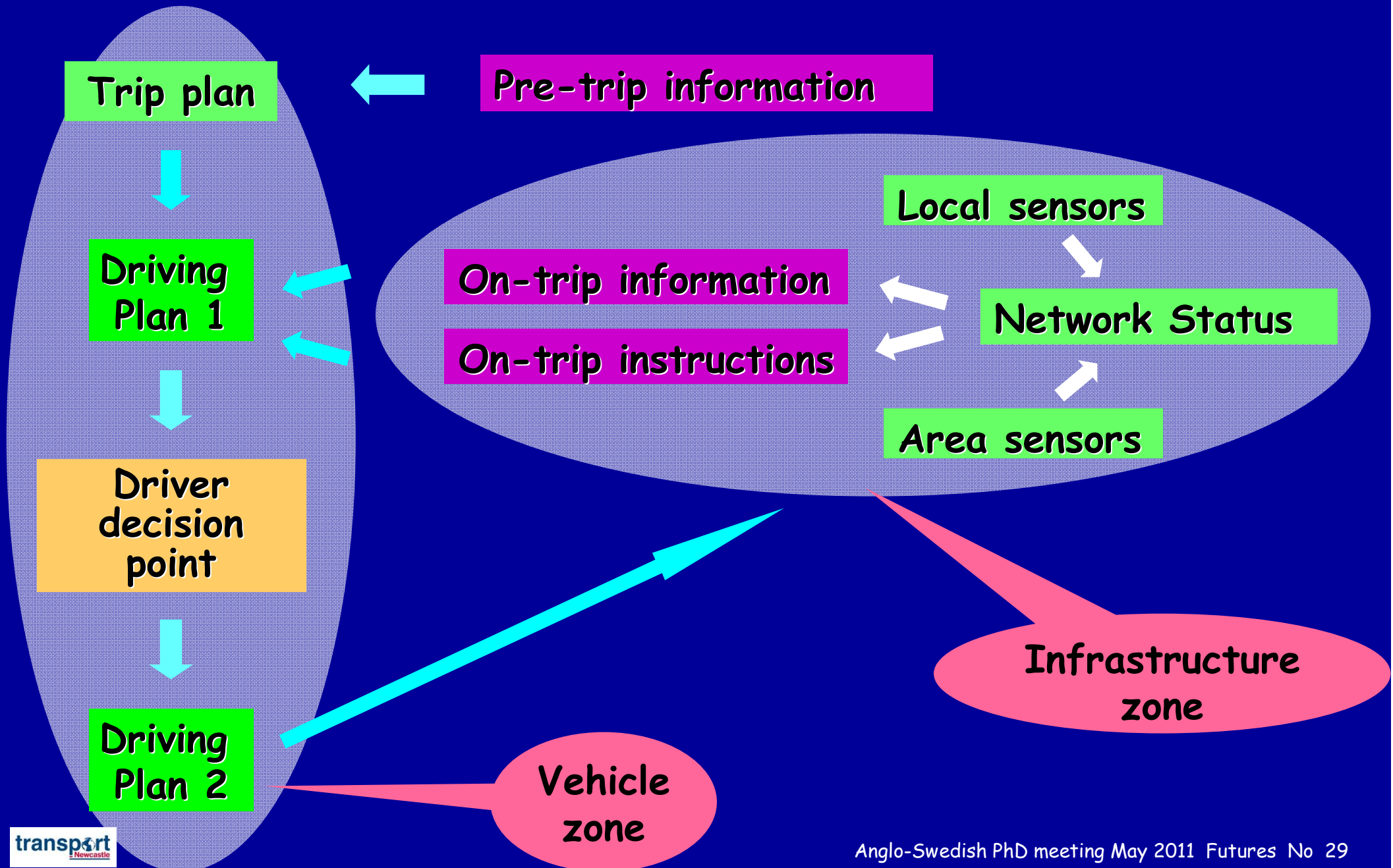
# Vehicles will be part of infrastructure



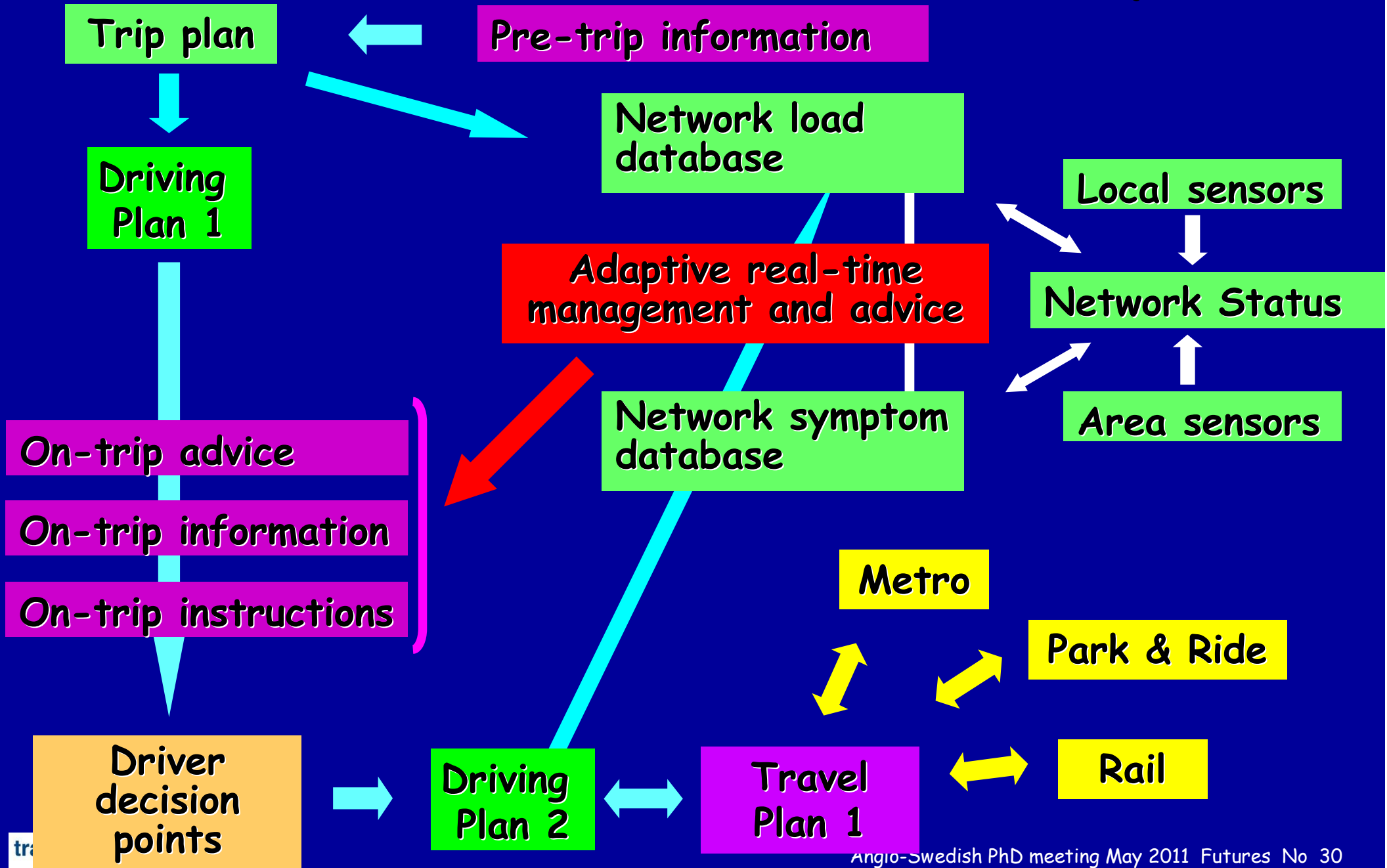
# Three examples

## Traveller Information

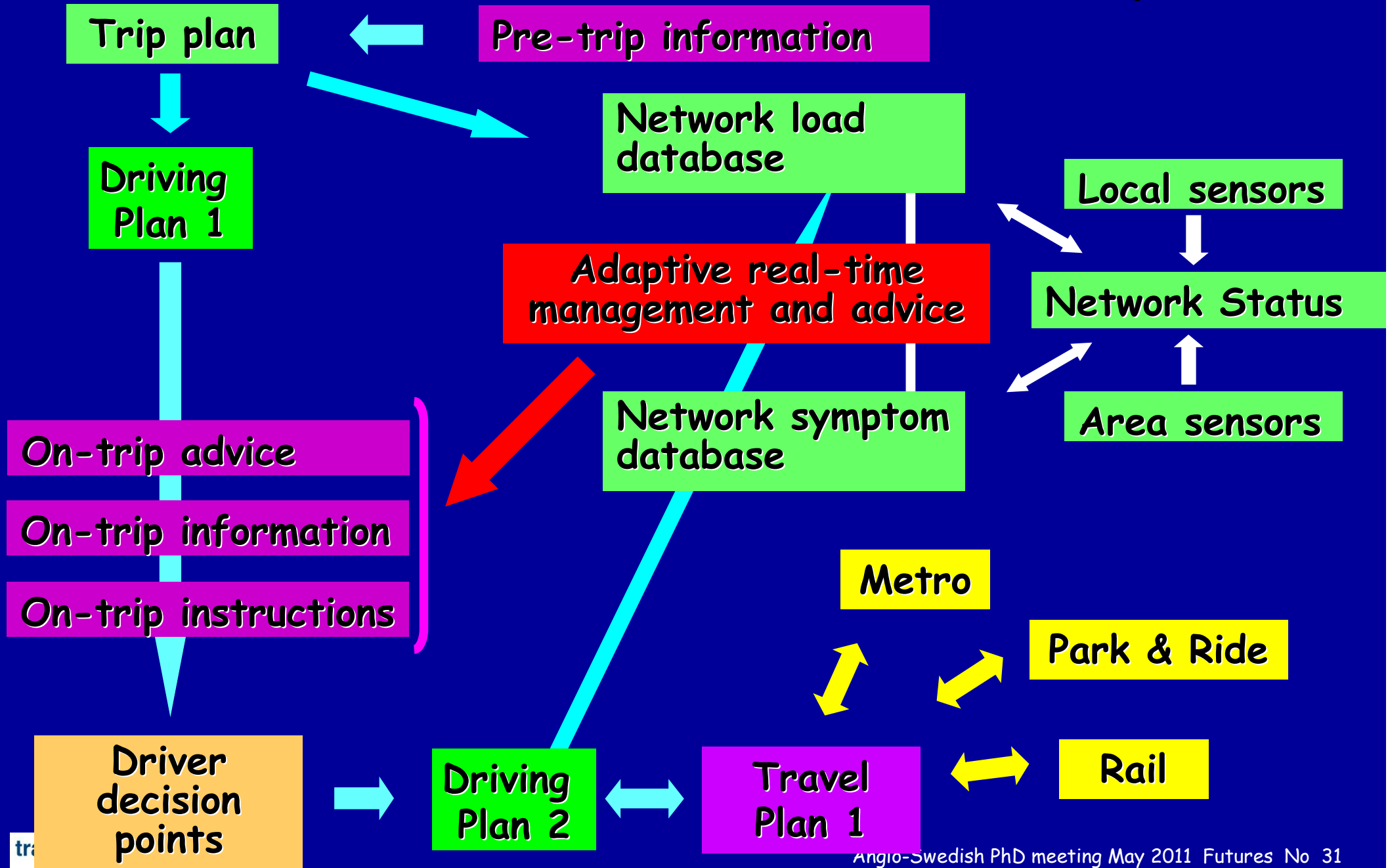
# Road Traffic Info 2008-style



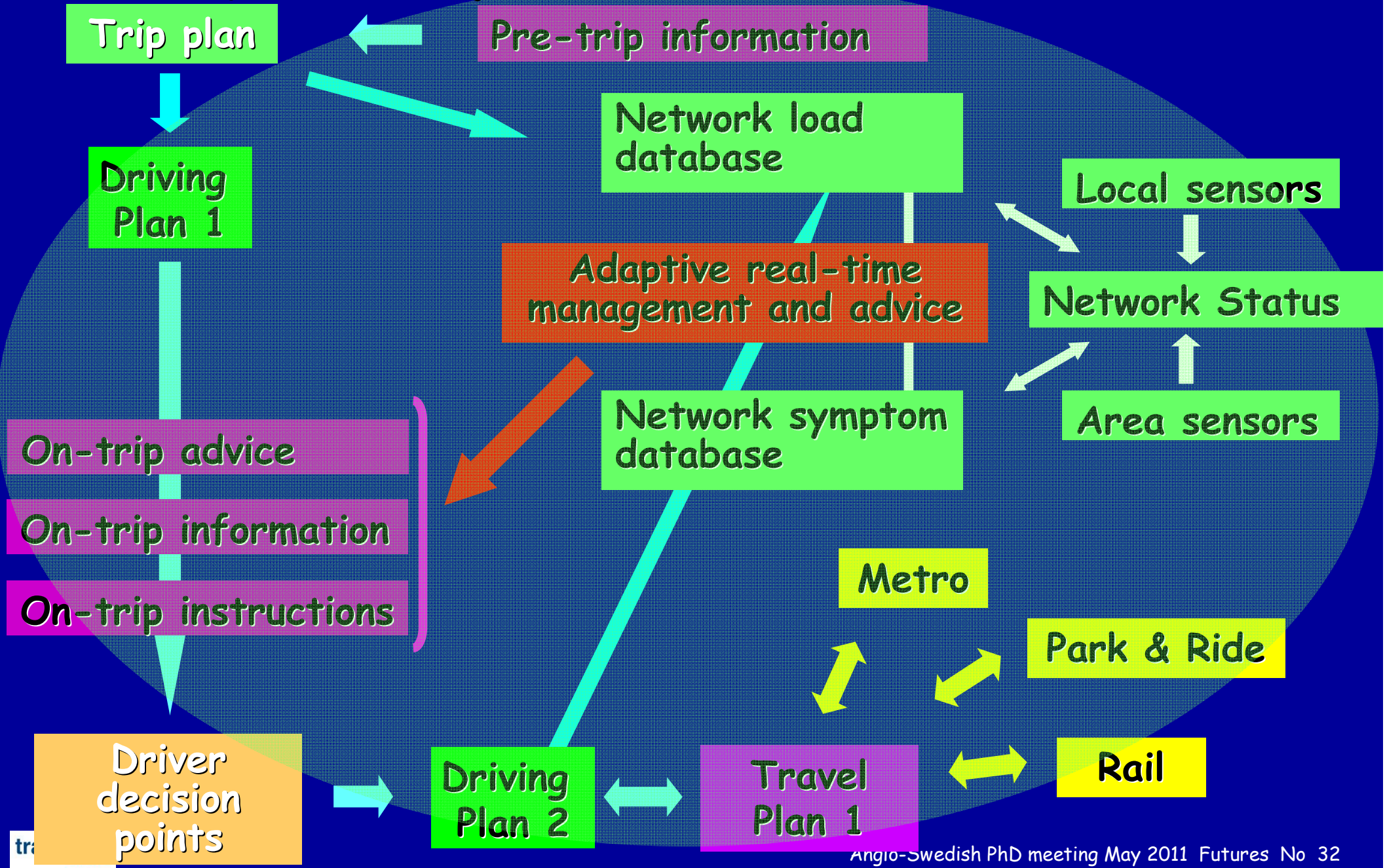
# Road Traffic Info 2015-style



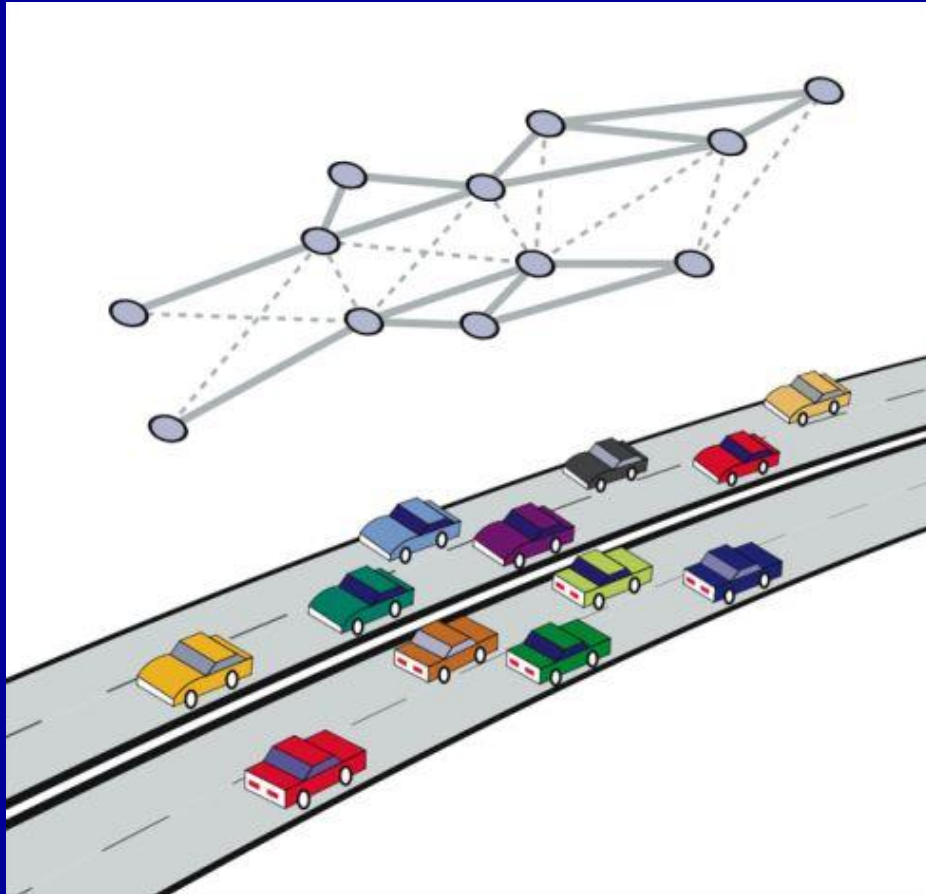
# Road Traffic Info 2015-style



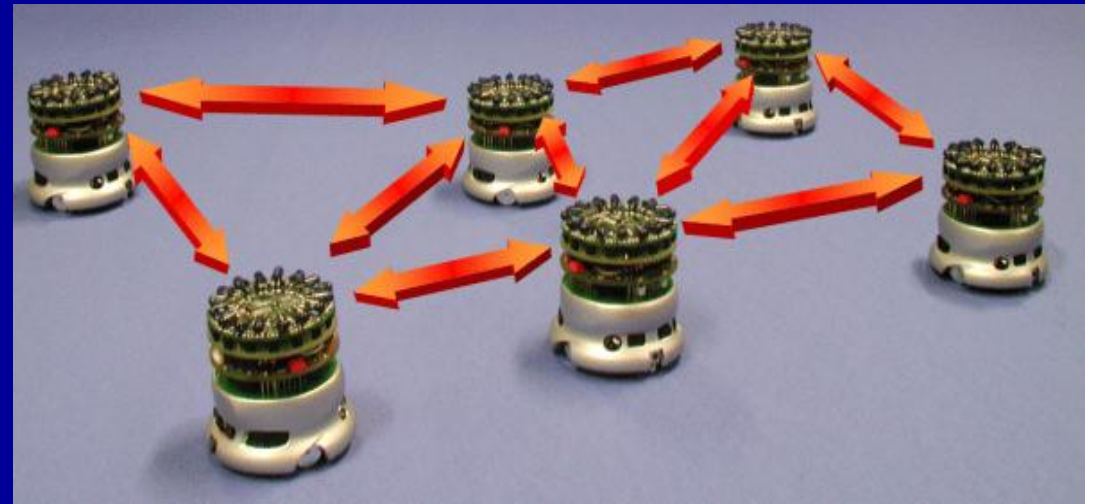
# Ubiquitous personalised information



# Information will be part of infrastructure

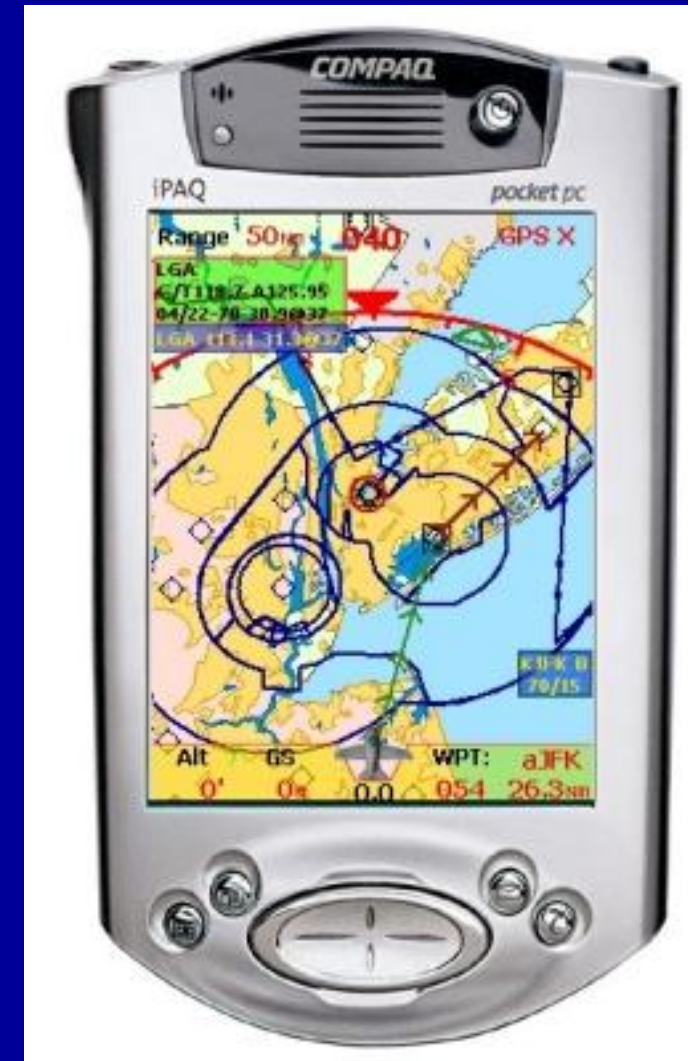


A mobile *ad hoc* network — a number of mobile information devices cooperate to form a dynamic computing network without fixed infrastructure.

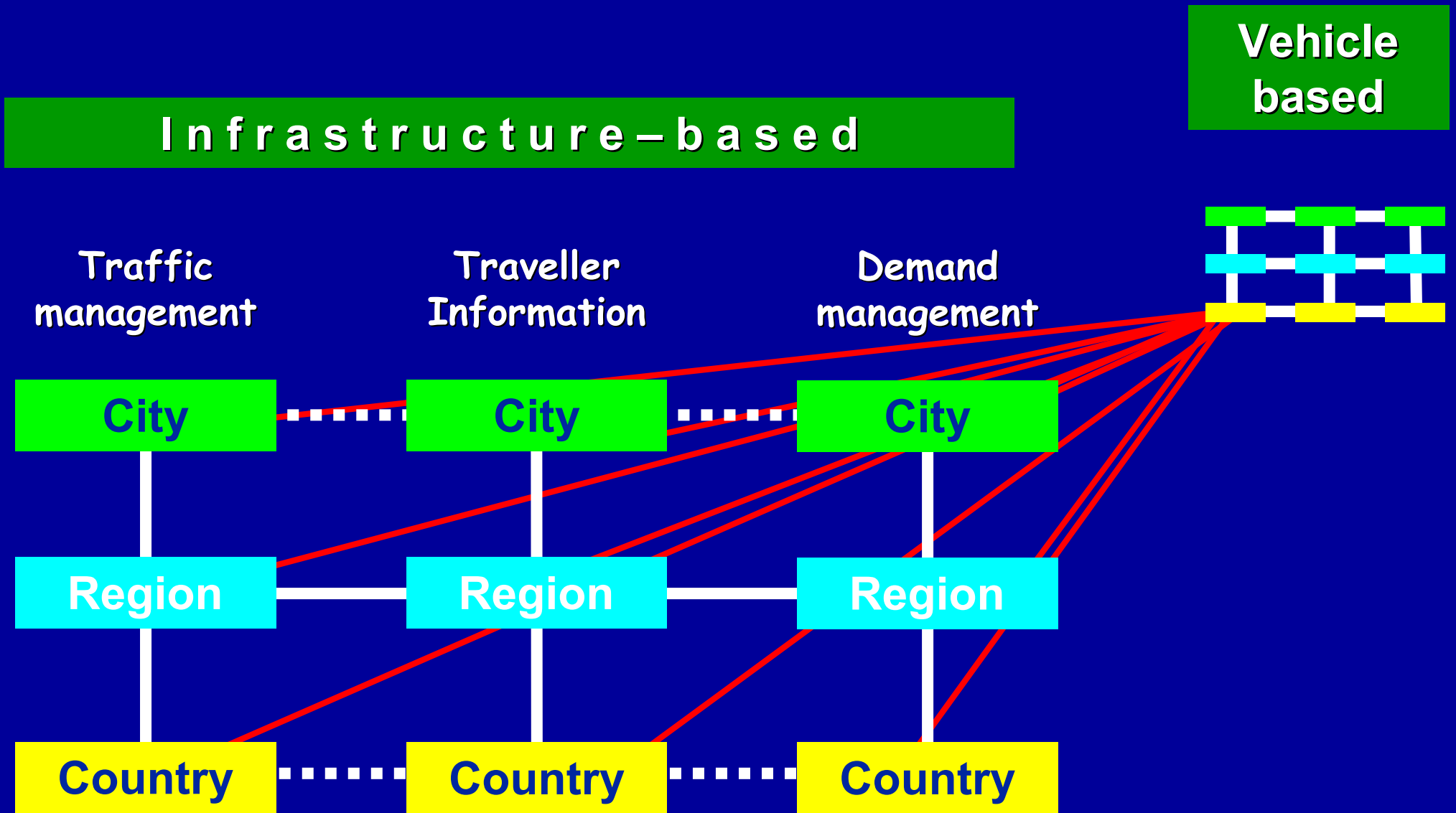


# Personal support will use infrastructure

- New Generation hand-helds
  - location based services
  - personalised information delivery
  - plan trips
  - buy travel slots
  - guide between modes
  - healthy travel options
  - monitor environment
  - <http://www.transportdirect.info>



# We will move to complete integration



# The future is convergence and services

Safety

Time Efficiency

Fuel/Energy Economy

Resource Efficiency

Comfort

Personalised information

Personal security

Personal  
wireless  
devices

Ubiquitous  
personalised  
information