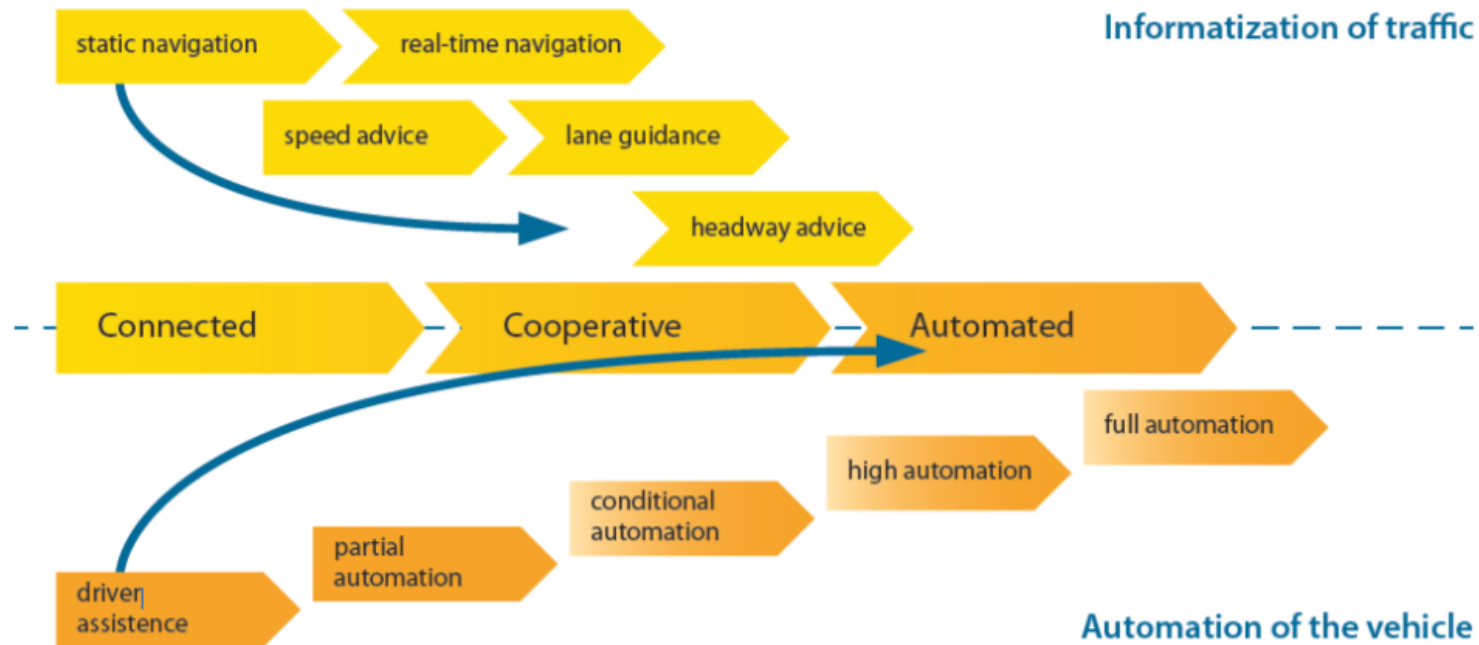# Impact of Automation on Future Traffic Management

Risto Kulmala 22 June 2016

Road vehicle automation

Op de Beek 2016

Elements of Traffic Management

- Automation affects all elements of traffic management

Patey & Wickham 2016

Data acquisition

- From loops, radar, BT, PVD to connected and automated vehicles
- In addition to speed, flow, occupancy, headway also road condition, incidents, infrastructure inventory…
- Accuracy?
- Latency?
- Coverage?
- Marginal benefit <> cost?
- Reduced safety problems related to sensor maintenance, renewal, repair
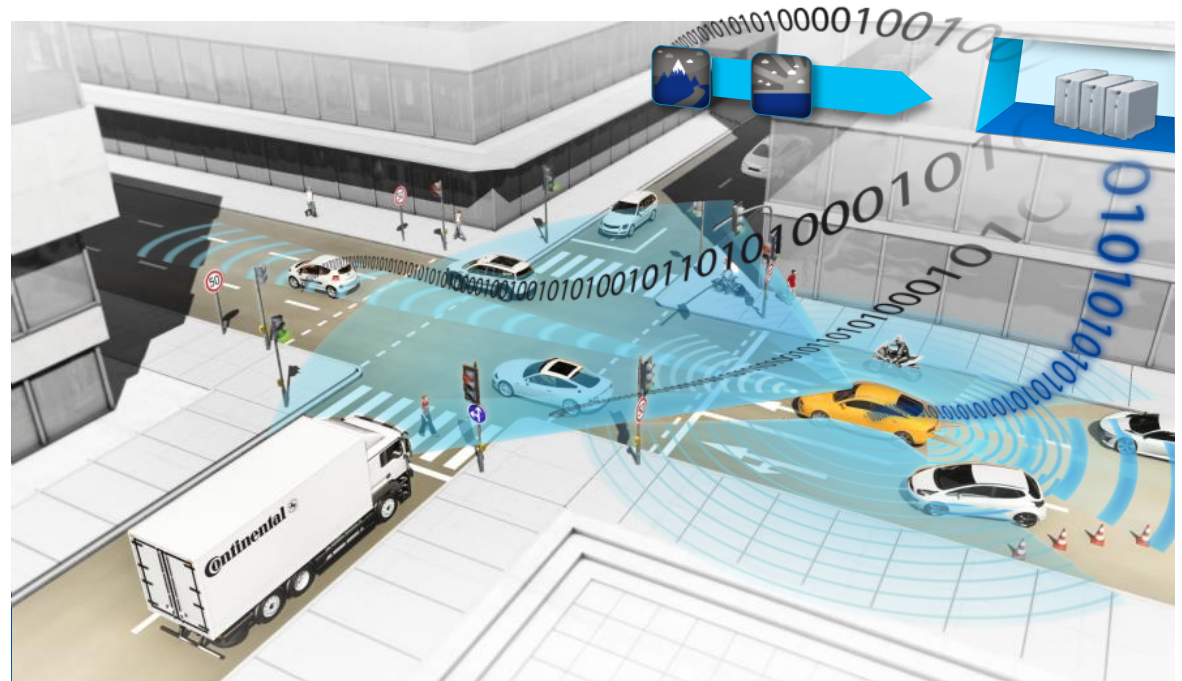
F. Försterling © Continental AG 2014

Processing and control

- Big data fusion
- Validation
- Automation of processes - People as weakest link
- Self-learning
- Self-healing
- Prediction of incidents
- Prevention of incidents
- Predictive response evaluation
- Automated rerouting
- Dynamic traffic management plans
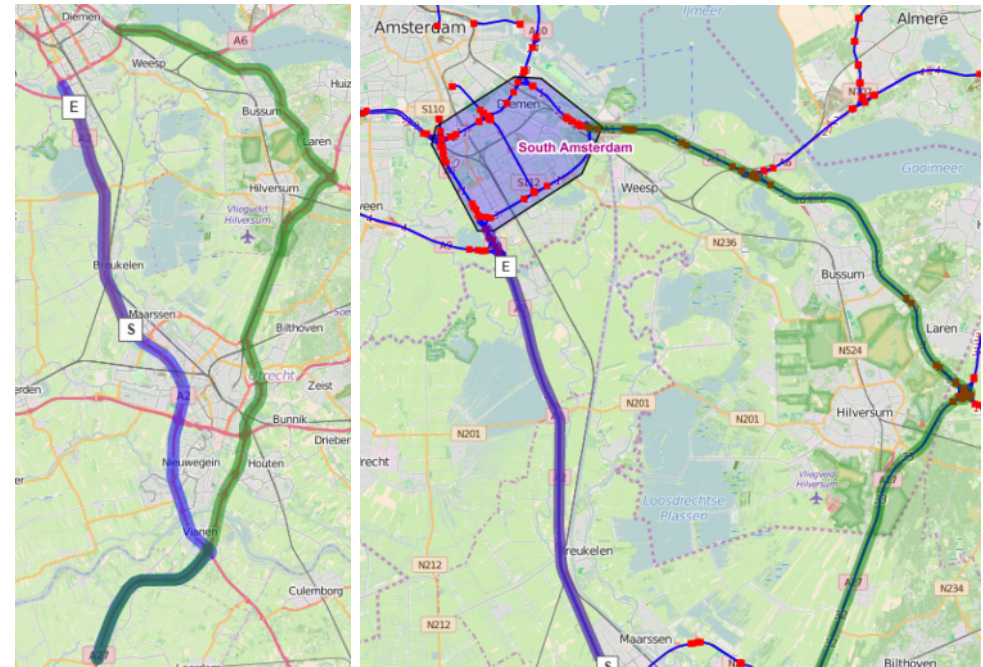
Cornwell & van Hinsbergen 2016

Dissemination

- From VMS, internet, radio, satellite navigation to vehicle applications, in-vehicle displays, smartphones
- From seldom and collective to personalised, frequent, vehicle and destination specific information incl TM plans
- Most effective way of presenting information?
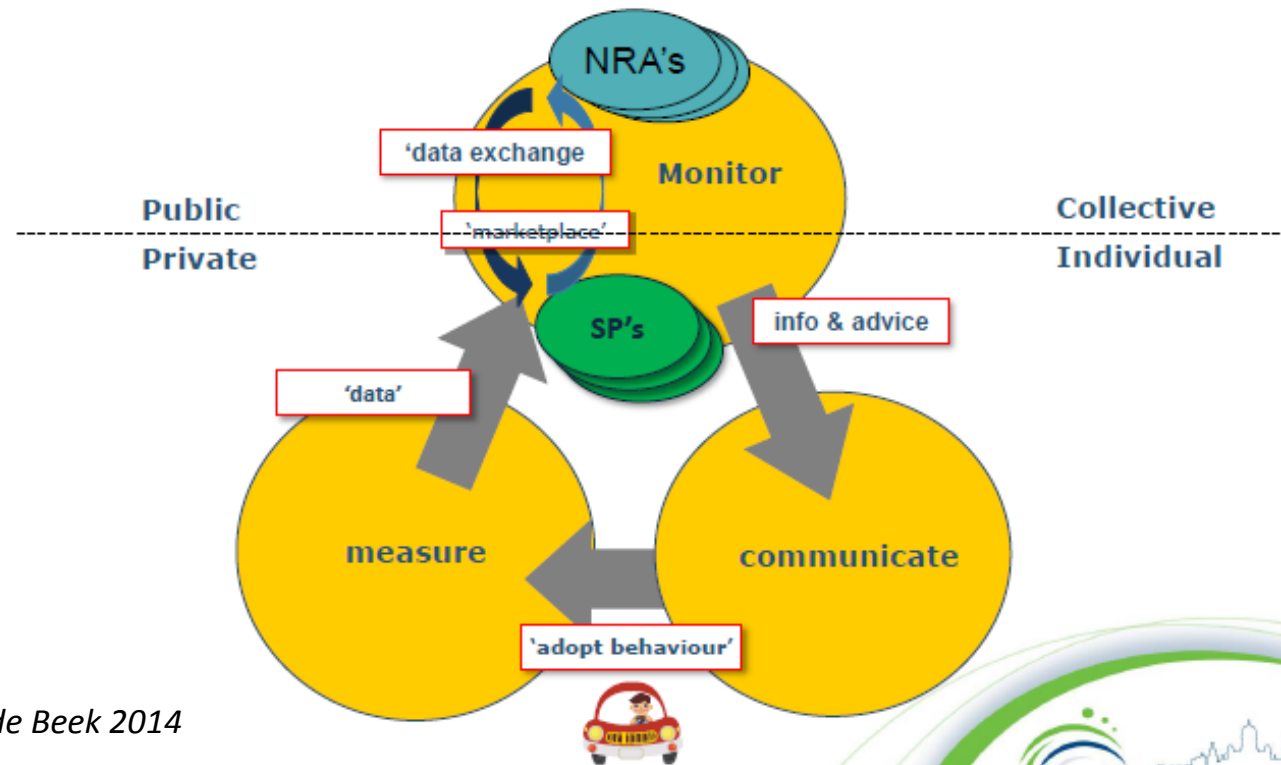- Consistency of in-vehicle and roadside information?

Automobilesreview.com 2016
Japan Today 2016

Traffic manage-ment

Interaction public-private
Selfmanagement situation

Op de Beek 2014

10th ITS EUROPEAN CONGRESS
Helsinki, Finland | 16–19 June 2014

Traffic management

Pro-active network management:
- facilitating road-users from door to door
- monitoring public preconditions (safety, environment)
- pro-active performance requirements for local level
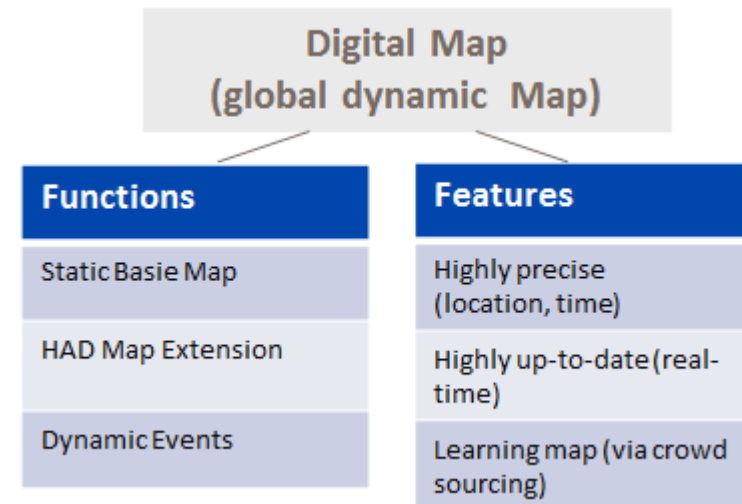
Autonomous, local traffic control:
- road users make their own decisions
- automated execution of local measures
  to establish requested local performance
- vehicles part of traffic system (sensor & actuator)

Op de Beek 2014

Additional requirements

- Schemes to classify infrastructure and road networks (e.g. roadworks ongoing, digital signing, V2X capabilities) included in digital maps
- Communication network and hot spots
- Backoffice systems
- Adequate training of traffic centre personnel
- Awareness of implicatons
- Regulatory framework (liability, data ownership and rights of use, …)
- Cooperation with commitment
- Governance, championship

Digital Map (global dynamic Map)	
Functions	**Features**
Static Basie Map	Highly precise (location, time)
HAD Map Extension	Highly up-to-date (real-time)
Dynamic Events	Learning map (via crowd sourcing)

F. Försterling © Continental AG 2014

Policy impacts

- Interactive traffic management (TM2.0) in a city network (Iordanoupoulos et al 2016):
  - Average network delay -16%
  - CO_2 emissions -6.4%

- Higher performance quality
- More efficient use of capacity
- Optimisation of throughput
- Direct link to road user behaviour
- Safer > less incidents > less congestion

- How to deal with the transition phase with high risk of problems?

TM for level 5 automation

- Traffic management integrated into fleet management?
- Traffic management as a set of fixed and dynamic traffic management plans?

Fifth element 1997

Conclusions

- Automation will affect traffic management profoundly
- All elements affected
  - Data acquisition
  - Processing & control
  - Dissemination
- High impact potential
- Benefit/cost?
- User acceptance?
- Transition phase?
- Major change only for "100%" automation

Thank You!