

Connected Vehicles. Who's in the driving seat? 接続されている車。誰が運転席にですか

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*Giles Perkins,
Business Development Director,
Intelligent Transport*

Introduction

The connected vehicle / autonomous vehicle is here / or, it's coming soon!

- Barriers of legislation, policy, operations
- In-vehicle rapid development
- Pace of technology development vs. planning & investment

- Will 'traditional' ITS be superfluous?
- If market leads who retains network 'control'?
- How will responsibilities change?

- Discuss 3 likely scenarios...



The current situation

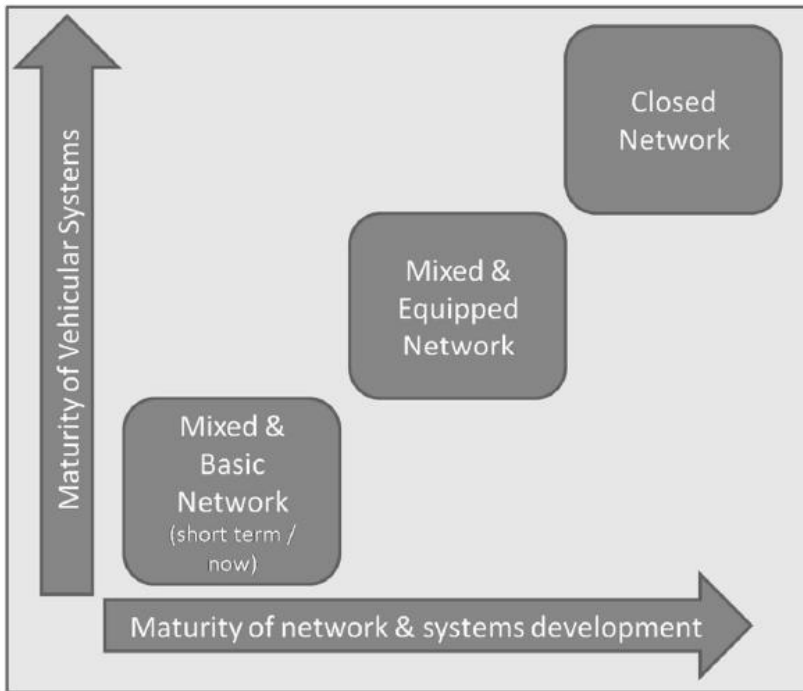
Parties involved include:

- **Driver** – Vienna Convention ‘... *driver must be in control of his/her vehicle at all times...*’
- **Vehicle Manufacturers** – requirements for testing & roadworthiness
- **Policy Maker** – legal framework incl. legislation, standards
- **Road Network Operator** – ‘*maintain optimal conditions on the road network in relation to supply & demand*’
- **And others** – cyclist, pedestrians etc.

Question: How will this situation change with rapid developments in technology and move towards increasingly autonomous vehicles?



Likely network scenarios



- **Mixed & basic** – mix of human drivers, limited autonomy V2I communications to reinforce traditional monitoring and information.
- **Mixed & equipped** – mix of human drivers, autonomous vehicles and cooperative vehicle. V2I and V2V present, with vehicle convoys/ platoons.
- **Closed network** – open to use only by vehicles equipped to certain standards.

Mixed & basic

– short term, happening now

- **Driver** – safety benefits from improving in-vehicle systems
- **Policy Maker** – standards, licensing, enforcement, security etc.
- **Vehicle manufacturer** – V2I required
- **Road Network Operator** – provide capability for V2I communications



Mixed & equipped

– challenge of defining / assigning liabilities

- **Driver** – autonomy, convoys & V2V will change driving environment and improve safety. RNO to provide enablers?
- **Policy Maker** – as above...plus consideration of level of automation and infrastructure provision, fail safe, liability – basic vs.. autonomous; ‘damage’ hierarchy?
- **Vehicle manufacturer** – V2I & V2V comms. required.
- **Road Network Operator** – rural vs. urban vs. strategic network needs? Maintenance requirements? Greater control? Autonomous vehicles use different data sources?



VS.



Closed network

– full automation, a closed system

- **Driver** – does no driver = a passenger?
- **Policy Maker** – as above; minimum standards?
Frequency of testing? Fail safe?
- **Vehicle manufacturer** – systems, V2I & V2V,
liability, safety
- **Road Network Operator** – almost ‘hands off’,
a ‘railway’?



A potential model for analysis

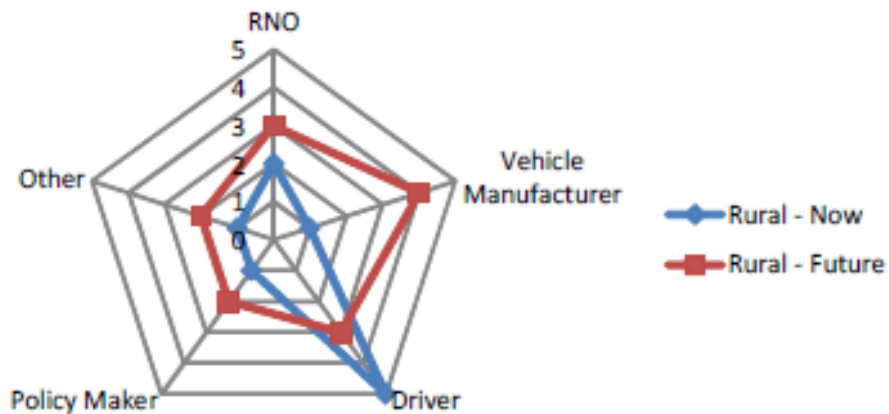
- Risk/Hazard Analysis approach
- Using a typical commuter journey
- 3 possible scenarios:
 - Rural road
 - Motorway / expressway
 - Urban road



A rural road

- 'Mixed and basic' fleet
- Some V2I technology
- **Event:** a vehicle misreads lines / signs and leaves the carriageway

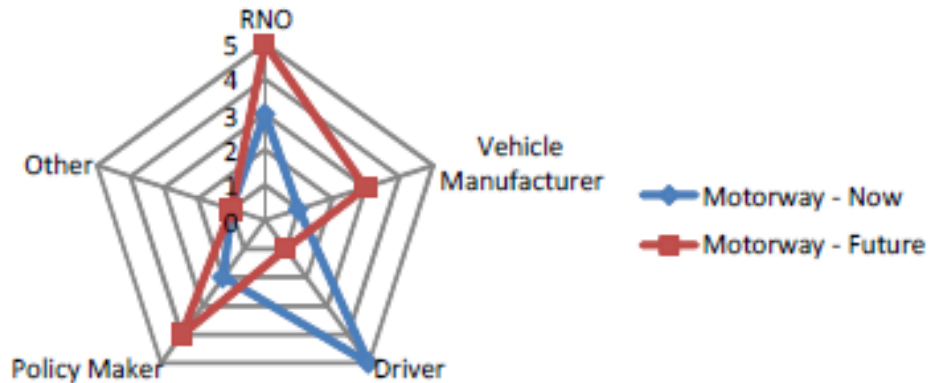
Rural - Potential Shift in Liability



A motorway / expressway

- 'Restricted access' Level 4 vehicles
- Significant V2V, V2I technology
- **Event:** ice or snow on the highway

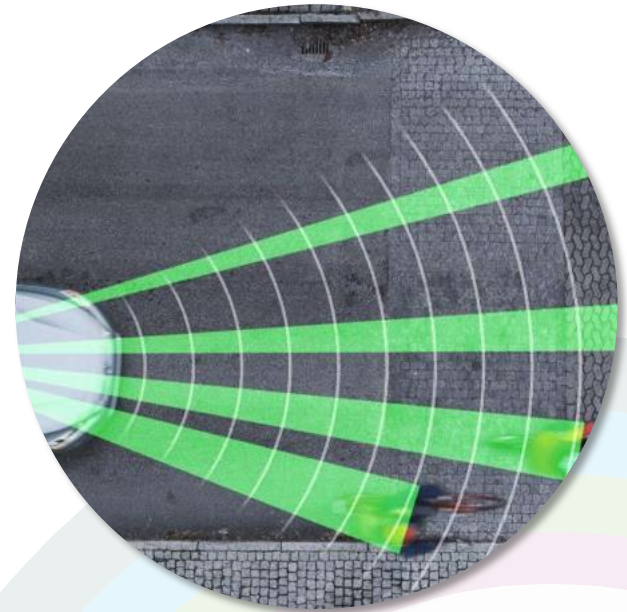
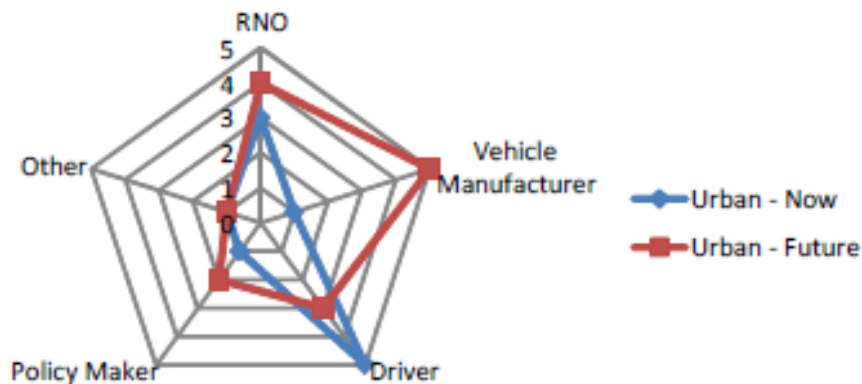
Motorway - Potential Shift in Liability



An urban road / city street

- 'Mixed and equipped' road users
- Some V2V & V2I technology
- **Event:** a pedestrian steps into road, causing a cyclist to swerve

Urban – Potential Shift in Liability



For discussion

- Complexity of 'mixed & equipped'
- Demands on RNOs will change
- Change in liabilities and responsibilities
- Framework for responsibilities?
- How to transition safely and effectively
- RNOs need a clear strategy
- Greater liabilities inappropriately allocated?
- RNO control and ability to manage?



Thank you ありがとう

Giles Perkins,
Business Development Director,
Intelligent Transport

giles.perkins@mouchel.com
+44 7966 201401

www.mouchel.com