Appendix 5

Emerging technologies likely to disrupt the industry

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1.1 National Telematics Framework

1.1.1 What is "Telematics"?

Telematics is term frequently used for a set of integrated systems of information, communication and sensors in order to exchange data. Goal is to achieve data exchange in real time, particularly on active use of road network and conditions on network.

Data is collected and exchanged through a set of applications which allow vehicles to digitally communicate to a variety of entities.

Given the sensitivity of information, Australian Government developed a platform for administering applications and processing data under the name "National Telematics Framework". It is currently administered by Transport Certification Australia (TCA) on behalf of the Australian Government. This platform enables development of other applications enabling data collation, data processing or data-based decision making.

1.1.2 How can it be applied?

At present all available applications can be divided into large groups of:

- Vehicle to infrastructure (V2I) applications;
- Vehicle to vehicle (V2V) applications; and
- Vehicle to elsewhere (V2X) applications (ie. origin and destination locations, on road support locations etc.).

The application of telematics feeds development and application of related intelligent technologies. Current information can play a significant role in improving the mobility of people and freight by improving safety, productivity and efficiency outcomes.

1.1.3 What are the benefits?

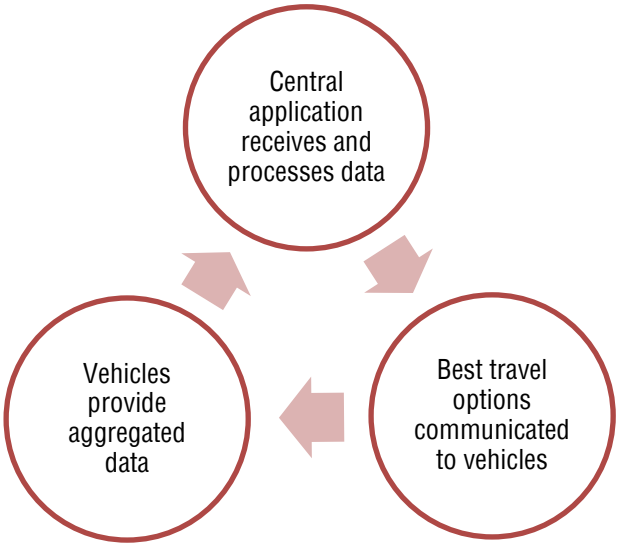
Through provision of information to and from vehicles, monitoring and reporting on vehicles and infrastructure is enabled. This allows for more efficient compliance (in particular on speed and mass of vehicles) and more efficient asset and travel management.

This is going to pave way to connected and cooperative vehicles in first instance and subsequently to automated and autonomous vehicles.

Key objectives of this approach are enhanced efficiency of networks and supply chains and enhanced safety for all road users.

1.2 Intelligent Access Program

Intelligent Access Program (IAP) is one of the first national programs based on use of telematics. It is based on the premise that information provided from moving vehicles can allow for better travel management along freight links.



Vehicles need to be fitted with appropriate devices and software which would track speed, mass and position of the vehicle. Centralised system would use mass and speed related data for ensuring compliance (that heavy vehicles will stay on designated routes) while positioning will be used for tracking congestion, queues and travel times offering guidance to optimised legal access routes for heavy vehicles.

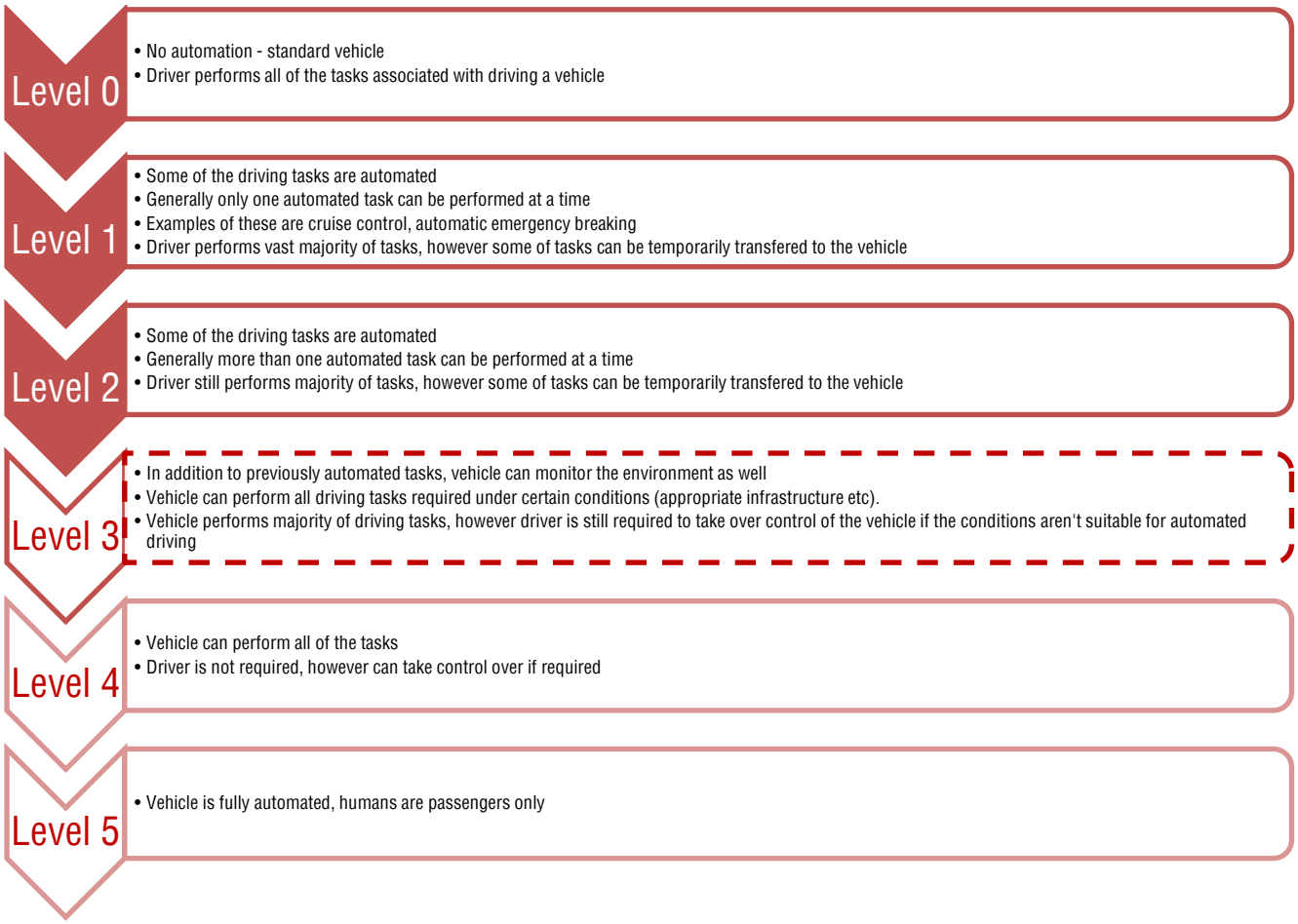
Participation in this program is not mandatory in Western Australia, however the more individual vehicles take part in this program more reliable route advice can be provided. At present only Fremantle Port in Western Australia has implemented IAP system.

1.3 Autonomous Freight Vehicles

With rapid advancement of computing and manufacturing use of connected and autonomous vehicles on roads is imminent. This will completely reform current transportation systems on all levels of mobility. This section will focus only on enabling heavy and freight autonomous vehicles.

Various levels of automation have been discussed, however common consensus at this stage is that six (6) levels of automation can be acknowledged. Level 0 vehicles are traditional vehicles where driver performs all driving tasks, while Level 6 vehicles are vehicles not requiring driver's involvement at any stage. Current operating example of Level 6 vehicle can be found on major airports around the world where shuttle transfers from one terminal to another are fully automated.

The graphic below shows current division of automation levels. At present, research and manufacture of passenger vehicles is in more advanced stages compared to freight vehicles. On current market vehicles up to Level 2 are commercially available while vehicle belonging to Level 3 automation are being tested and developed for commercialisation.



Austroads is conducting extensive research into requirements for enabling autonomous vehicles on roads in Australia. As one of the key challenges identified for enabling autonomous vehicles on freeways and highways (rural and urban) is provision of appropriate infrastructure.

For higher levels of automation to be implemented, the vehicle must be able to monitor the environment, read signage, line marking etc. Prior to full roll out of interactive signage which would enable V2I communication, road signage (vertical and horizontal) must be impeccably maintained so that vehicles with appropriate monitors and machine learning systems can "read" the signage and execute relevant driving tasks. One of current research topics Austroads are looking at Australia wide pertains to opportunities, constraints and overall feasibility of adjusting line marking processes to suit machine vision.

1.3.1 Autonomous vehicles considerations specific to heavy vehicles

In addition to infrastructure challenges, platooning effect (vehicle following) is one of key considerations. Implementation of autonomous heavy vehicles larger loads can be theoretically moved faster, safer and more fuel efficient if several components / vehicles are coupled. Similarly, to existing RAV combination, technology will enable connection of several components, which can act as independent vehicles when required, into new configurations which can travel more efficiently together as all elements "communicate" to each other.

Theoretically, on the key freight routes combinations far exceeding current approved lengths can be achieved. Exact impact on existing bridge structures and pavement composition is yet to be examined, given that freight combination reaching 150m in length will have a momentary impact on bridge structure through weight and constant vibration.

1.3.2 Local access (first and last mile) delivery concepts

With roll out of autonomous heavy vehicles concept of local access – final and first stretch of trajectory, needs to be reconsidered.

Platooning of heavy vehicles can in fact enable multiple vehicles to travel together as one vehicle, saving fuel and time in process of freight movement. Independent vehicles connected to each other eliminate sudden braking and can be organised to have priority on key freight links if these are shared with other modes of transportation.

This can open possibilities to alternative treatment of freight transport where possibly one or more operators can join combinations for a certain distance (for example on freeway or highway) in order to save cost. As the combination is approaching its destination, elements can “decouple” with each separable component accessing its destination independently.

With this option in mind, intersection radius should be designed to accommodate large vehicles only on key roads, and at the entry to an industrial estate “de-coupling” location should be considered.