

**PARTNERSHIP  
PROGRAM**

## **Discussion Paper:**

### ***In-Vehicle Monitoring Systems (IVMS): Safety through good practice telematics***

#### **Introduction**

While the external environments facing light and heavy vehicle fleet operators differ, operational efficiency and organisational safety are two areas all operators can target to maintain a competitive edge and growth.

The use of telematics, commonly known as In-Vehicle Monitoring Systems (IVMS), continues to grow through the Australian transportation industry as operators take advantage of both operational and safety benefits such technologies provide.

Telematics technologies also play a role in aiding operator compliance, with the National Transport Commission (NTC) encouraging all within the chain of responsibility to 'adopt telematics to increase compliance, safety and productivity outcomes within audit-based schemes, safety management systems and industry schemes.'

To better understand the potential of IVMS, and issues arising from their increasing industry uptake, NRSPP consulted leading figures from the transport industry – including operators, drivers, insurers, technology providers and researchers – to promote collaboration and improve business and safety outcomes. NRSPP has engaged with operators to create case studies of fleet management practices, with links to case studies and other relevant information provided in this paper and in **Appendix B**.

#### **Key points**

While supporting the potential of IVMS, companies and organisations we consulted emphasised that such technologies should be seen as one layer of a company's overall operations, rather than a 'silver bullet', and effective and appropriate management was needed for potential benefits to be realised.

Discussions also revealed that maximising and expanding the benefits of IVMS required collaboration by operators, drivers, insurers, technology providers and researchers, driven by mutually beneficial relationships based on cooperation and a clear understanding of what all parties seek to achieve through telematics (this is outlined in **Appendix A** at the end of this document).

The key points made during our IVMS consultation include:

- IVMS, or telematics, bring operational and safety benefits for transport operators.
- Bottom line benefits include increased fuel efficiency and reduced maintenance and incidents, resulting in lower insurance premiums and downtime costs.
- IVMS can drive improvements in compliance and driver behaviour, through tailored training and counselling, and helps operators improve productivity through efficient real-time resource allocation.
- Introducing technology-based systems can create 'Big Brother' perceptions among the workforce, which makes how a program is implemented crucial.
- Critical aspects of implementation include consulting the workforce (in most cases, drivers) about program introduction, explaining how IVMS makes them safer and their job easier.

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- Implementation should be followed up with the opportunity to provide feedback on how the system is working in practice.
- When choosing a telematics system, consider what you want to achieve and understand which systems will meet the needs of your organisation. Work with providers in reaching this decision.
- While the information collected by your telematics system is important, what you do with that information will determine whether you reach your objectives.
- Accountability, consistency and regular review are hallmarks of effective telematics systems.

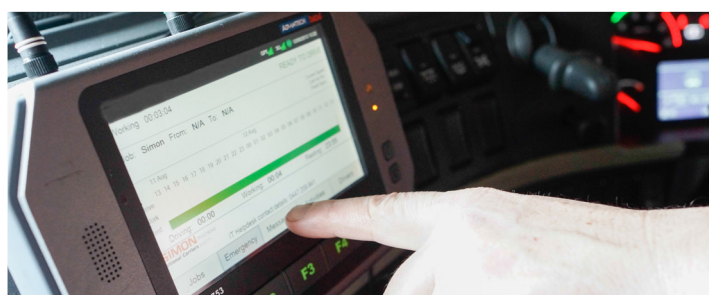
### Real-world applications

Operators have introduced telematics technology for various reasons, ranging from managing specific issues such as driver speed and fatigue through to full integration with job dispatch and on-board displays powered by telematics.

Irrespective of the reason, all stakeholders agree a clear understanding of what an operator wants to achieve is the key in selecting what parameters to measure and therefore the technology suite that will meet current and future needs. To derive safety benefits, telematics should also be seen as one component of a broader 'safety culture' that had to be fostered by management with the active participation of all employees.

IVMS implementations in the transport industry have included:

- GPS tracking to determine vehicle speed, vehicle location (allowing for 'geofencing' and 'waypointing'), harshness of braking and acceleration
- accelerometers to detect harshness of braking, acceleration and cornering with a higher level of accuracy than possible through GPS data alone
- connection to a vehicle computer to monitor seatbelt use, Electronic Stability Control (ESC) and other parameters
- forward and in-cabin cameras, including in-cabin audio recording (IVCS)
- fatigue management compliance
- emergency management for drivers operating alone in remote areas
- tablets allowing for full integration with operations, for example, connection to a freight management system
- real-time rating of driver behaviour, for example, red/yellow/green light display
- electronic logbook
- in-vehicle driver displays offering two-way communication and electronic job dispatch, pre-start inspections and journey plan forms
- integration to back office software with use of APIs.



**Electronic Work Diary being trialled by Simon National Carriers**

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While not a primary focus of this paper, it is worth noting that the Intelligent Access Program (IAP), which monitors the movements of heavy vehicles for Australian road agencies, is a telematics-based compliance system.

### Benefits on the ground

NRSPP engaged with operators of both light and heavy vehicle fleets for a first-hand account of their experiences with implementing telematics. There was significant crossover in the benefits reported despite difference in fleet types and challenges in quantifying benefits. Telstra, however, has been able to quantify a 13% productivity improvement in their working fleet as a result of [telematics](#).

While there were differences in operator goals and implementations, the primary areas telematics systems were seen to target were improved driver behaviour and enhanced operational efficiency.

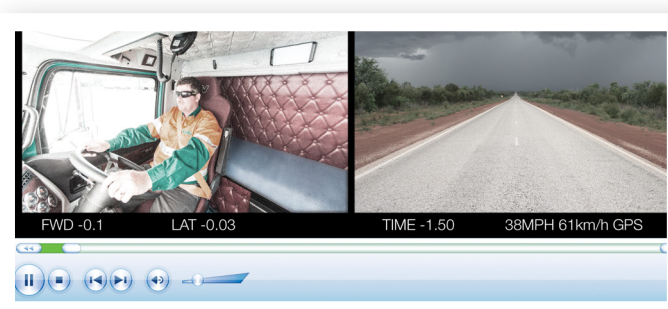
Improved driver behaviour led to:

- increased fuel efficiency
- reduced maintenance
- reduction in incidents resulting in lower insurance premiums and downtime costs.

Operators were also able to:

- improve productivity through real-time allocation of their resources
- ensure driver compliance with vehicle use policies, management of infringements and public complaints.
- improve company reputation and customer service through enhanced performance

### First-hand feedback



**Screenshot of video captured by Toll Holdings IVCS system**

Feedback suggested that the operational and safety benefits achieved by operators who had introduced telematics were complementary. Bringing safety into the operations arena through telematics improved operational performance, and optimising operations may also create safety benefits. One operator believed that a focus on safety and efficiency led to improvements not seen by organisations that focused purely on productivity.

Operators emphasised that positive results can only be achieved through an understanding of which data needs to be collected. While relevant parameters will vary between organisations, [speed](#), [braking](#) and [fatigue](#) were commonly [recorded](#). An effective back office must also be created to manage and act on data collected.

From a safety perspective, there was great variation in technologies used and implementation among operators, ranging from telematics being an integral part of continued improvement in driver performance through individualised driver training to simply ensuring compliance with speed and fatigue regulation. The Fair Work Commission recently upheld the safety benefits of driver-facing cameras and associated audio recordings, suggesting 'the evidence indicates the system can contribute to better safety outcomes in the road transport industry.' Strong connections between safety outcomes and speed and seatbelt use have been established, but further study is required to show that other commonly measured parameters have clear safety benefits. One researcher consulted said further investigation was required to give operators a clear understanding of which technologies offered them and their drivers the greatest safety.

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### **Implementation: Five key considerations**

Consultation with key industry figures demonstrated that there were some common factors required for the successful implementation of a telematics system. These can be grouped into five areas: clearly defined goals, selecting technologies for now and future use, building employee acceptance, real-time monitoring and feedback, and managing information.

#### **1. Clearly defined goals**

- Understand risks to be managed and the leverage to operational efficiencies
- Ensure the system chosen will provide the desired results
- Process should be a collaborative decision between providers and operators
- Ensure telematics is component of a safety culture

### **What are your expectations?**

Successful IVMS implementation requires that both provider and operator have a clear understanding of the operational and safety outcomes expected. Understanding which risks will be managed by the system and what is needed to leverage operational efficiency is critical. If the operator is inundated with data, for example, they may feel overwhelmed and be hesitant to act.

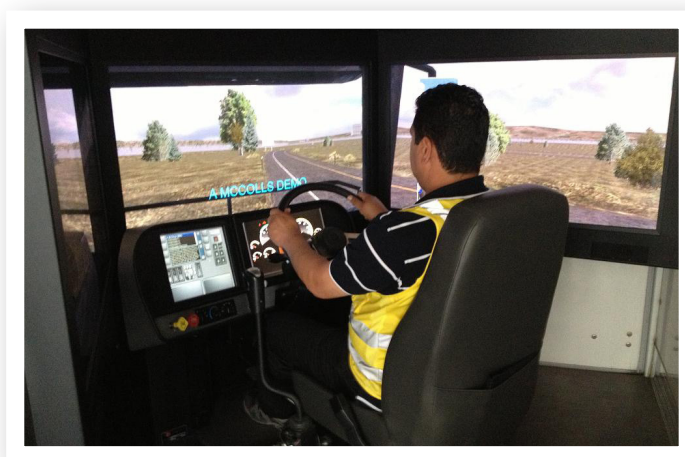
Operators should consider that telematics won't provide results on their own. To contribute to improving safety, telematics are one component of a 'safety culture' that

management seeks to foster and develop. Telematics can help provide the right data and evidence to allow organisations to manage and reduce driver risk. Similarly, improvements in performance are unlikely to occur without an overarching drive towards continued productivity growth. Operators should also consider systems or additional resources they may need to put in place to manage IVMS implementation.

### **Selection of technology**

While operators should research telematics technologies that are available, so they are confident the system will produce the desired results, choosing the technology should be in collaboration with providers. Communication between operators and providers also provides valuable feedback that can assist in guiding further technological development. Beyond improvements to safety and operational efficiency, telematics may have implications for an operator's ability to claim fringe benefits taxes and fuel rebates – all systems installed must be compliant with relevant legislation, for example – and diligence is necessary to ensure installed systems are compatible with all vehicles across a potentially varied fleet.

It also is in the provider's interest to understand how a client's business operates to provide a relevant solution that will meet their needs. Providers must ensure operators receive 'digestible' data that is understandable and actionable.



**Vehicle simulator used by McColl's Transport**



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### 2. Consider current and future needs

- Select suitable technology infrastructure for current and future needs
- Understand the limitations of technologies to avoid a costly retrofit

As telematics is driven by technology whose cost and capabilities are continuously evolving, selecting cost-effective infrastructure to meet current and future needs can present a challenge. While yet to be introduced, heavy vehicle operators should take into account the principles and minimum data requirements that the NTC [has outlined](#).

It is vital operators consider the limitations of the technology they install to ensure that it is appropriate for the task to avoid a costly retrofit or an unworkable system. For example, telematics systems generally relay data via the mobile telephone network, with the option to use satellite transmission when out of range. An incident alert system transmitting via satellite may be unable to acquire line of sight in a rollover, so if rollover is a key concern for a vehicle fleet operating outside mobile network coverage, then this is a key factor to be considered.

### 3. Gaining employee acceptance

- Drivers interact with telematics technologies both in their vehicles and through the actions of management
- Bridge the gap - consider opportunities to get drivers on board with the new system

Drivers interact with telematics technologies both in their vehicles and as a result of management actions taken based on the data collected. Driver acceptance of these technologies is therefore reliant both on what is installed in the vehicle and on management policy.

Technology providers emphasised the importance of 'bridging the gap' that may exist between systems in place and users on the ground. They saw that 'drivers being on board' was critical to successful IVMS operation. Industry experience suggested that driver feelings towards telematics technology were mixed, with some mentioning references to 'Big Brother'. [Toll NOX](#), for example, successfully overcame driver resistance by getting drivers to agree to try their system to build support and developing a code of conduct in response to driver privacy concerns.

Other operators reported their drivers understood why such technology was present and appreciated that it made them safer. When telematics technology managed driver compliance, this was seen as a positive benefit that reduced stress as drivers knew they were operating legally.

Specific strategies may be required to clearly communicate to drivers a consistent message as to where telematics fits into a company's safety and operational [goals](#). Telematics also offers opportunities for [recognition of drivers](#) for excellent performance. Operators may see additional employee acceptance by setting targets for teams rather than individuals, resulting in 'peer pressure' towards improved driving behaviours.

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### 4. Real-time monitoring and feedback

- Altered behaviour through immediate warnings to drivers
- Improved operator flexibility and productivity
- Waypointing and geofencing keep vehicles on track
- Enhanced safety in remote areas

#### Driver side

Drivers can receive warnings in real-time from the telematics system when certain parameters are breached. Real-time rating of driving performance and detailed reports delivered to the driver via a tablet or screen are also possible. One operator emphasised the importance of follow-up with drivers to better understand which alerts would help them and how they would best be delivered. This was found to improve driver perceptions of the system and reduced the number of breaches.

#### Operator side

Tracking the location of all vehicles via telematics drives productivity benefits as operators can allocate resources most effectively and provide an immediate response in an [incident](#). Drivers can be re-routed or reallocated as required, with several operators commenting that they simply 'could not do business' without the logistical flexibility such a system has brought.

Systems were put in place to give real-time feedback to relevant managers when pre-set parameters were breached. These were either actioned immediately or logged for further follow-up, with over-speed and fatigue [events](#) common parameters resulting in immediate notification. Tracking can enhance safety in

remote areas, with emergency management protocols activated based on parameters such as time spent in a single location or failure to report in. An operator that often has vehicles in areas shortly after natural disasters commented that this allowed them to safely manage vehicles travelling on potentially unsafe roads.

Both heavy and light vehicle operators took advantage of 'geofencing', with immediate notification when a vehicle entered or exited a specified zone. The size of zones can be highly customised, with one operator monitoring individual gantries to be passed through for loading and unloading. 'Waypointing' to ensure drivers stay to a pre-determined route to optimise safety was also a common operator-side implementation.

### 5. Management Feedback

- Data management - data can only be actionable with an effective back office structure
- Accountability - appropriate support systems must be in place
- Corrective action - take consistent and immediate action
- Driver training - improve driver skillsets through data-based, individualised counselling and training
- Evolution over time



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### ***Managing information***

Operators must introduce effective policies and procedures to take action on the large amount of data that telematics systems can collect. Feedback should take into account in-vehicle feedback drivers have already received. Technology does not reduce incidents alone; it requires appropriate and effective actions by management. As one stakeholder remarked, the accuracy of data collected was important but how it was used was more important.

There was universal consensus among stakeholders that effective data management was critical for telematics to be useful and effective. Data collected can only be actionable and meaningful if an effective back office structure is present. Whether data management is outsourced or completed in-house, all operators agreed it was important appropriate knowledge and resources were available for data to be useful. Keeping this in mind, operators should consider where IVMS and its associated data management fit into its core business.

Operators must also ensure data collection and management complies with relevant state, territory and federal legislation and that driver privacy concerns are taken seriously (although they should not compromise use of the telematics system).

### ***Accountability***

All operators highlighted the importance of ensuring accountability if telematics systems are to be effective. All experienced operators agreed that to achieve this, supporting systems should be built around the safety and operational goals of the telematics system. Effective accountability systems ensure that all drivers and vehicles are always monitored and breaches are acted on. Drivers must be held accountable for all breaches that occur and their supervisors must be accountable for acting on telematics data collected. This can be managed either through audit or compliance-based approaches, depending on operator size and structure.

### ***Preventing complacency***

Systems must be in place to prevent driver and management complacency. Without regular feedback, drivers may feel that they have no reason to pay attention to their driving habits, while management may end up having a narrow focus on 'trouble' drivers. Even if it falls within acceptable limits, change in a driver's performance may be an early indication that they need help. Recognising and acting on this increased risk gives management an additional opportunity to improve workplace safety and employee welfare.

### ***Taking corrective action***

Operators experienced with telematics take various approaches in how they use collected data and policies on driver behaviour, however all emphasised the importance of consistency, taking immediate action and the possibility of 'false positives'. It was common to test vehicles and telematics systems to ensure their accuracy before engaging with drivers regarding a breach. It was also noted that readings indicating poor driver behaviour, such as harsh braking or acceleration, may be functions of routes taken. This information can be used to improve safety by optimising routes.





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adherence to policy depending on the size of the breach, with three strikes leading to non-negotiable termination, however this only applied to severe breaches of driving guidelines. The general approach focused on using data to further develop and improve driver behaviour.

Technology providers and experienced operators indicated introducing telematics could result in safety performance appearing to worsen in the short term and an increase in breaches, but this was usually the result of more incidents being detected.

### ***Tailored driver training***

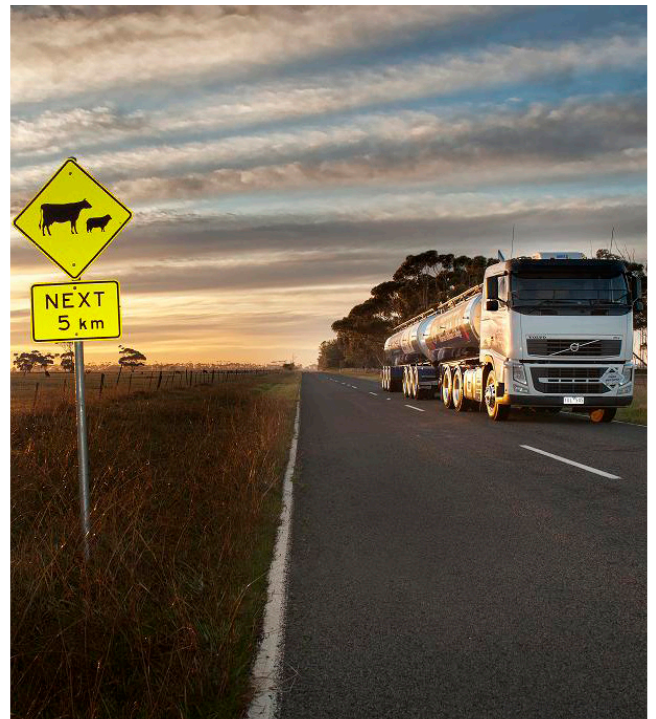
Beyond using telematics to enforce standards of driver behaviour, operators can use them to improve driver behaviour through data-based, individualised counselling and driver training. A common coaching strategy centres on creating Driver Performance Reports, which score drivers against pre-determined indicators. These reports can be integrated with training and coaching strategies or become the impetus for their creation. Use of video recorded in-vehicle can also be used as a basis for training.

For either approach to be successful, operators must be able to recognise at-risk behaviour, demonstrate to drivers the required improvements and implement an action plan that includes further follow-up. Drivers can also be given direct access to collected data to encourage sharing of experiences and the creation of a 'safety culture'. Sharing in-vehicle video footage among drivers can personalise the safety issue, enhancing driver 'buy-in' to an organisational culture that prioritises safety.

### ***Evolution over time***

Operators should consistently re-evaluate the parameters they measure and the thresholds they deem

acceptable. Overlaying data to create heat maps of crashes versus such factors as time of day or presence of 'black spots' may help identify relevant variables and set breach parameters. These 'black spots' may also indicate infrastructure risk, so operators can then work with asset managers such as road agencies to improve safety outcomes and safety of the road network as a whole.





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### Appendix A - A collaborative effort



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### Appendix B - Further resources

Links to NRSP Case Studies

<b>Different Types of Telematics Implementations</b>	<a href="#">Simon National Carriers</a>	<a href="#">Busselton</a>	<a href="#">Telstra</a>	<a href="#">Boral</a>	<a href="#">Toll</a>	<a href="#">McColls</a>
<b>Safety Culture</b>	<a href="#">Simon National Carriers</a>	<a href="#">Bosch</a>	<a href="#">Boral</a>	<a href="#">Toll</a>	<a href="#">McColls</a>	
<b>Telematics Data Recorded</b>	<a href="#">Worley Parsons</a>	<a href="#">Boral</a>	<a href="#">Toll</a>	<a href="#">Hornby</a>		
<b>Geofencing</b>	<a href="#">Busselton Freight Services</a>	<a href="#">Telstra</a>				
<b>Driver Training, Counselling</b>	<a href="#">Boral</a>	<a href="#">Toll</a>	<a href="#">Busselton Freight Services</a>			

