EVOLUTION OF INTELLIGENT ACCESS IN AUSTRALIA – A CASE STUDY IN STAKEHOLDER ENGAGEMENT

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Abstract

During 2018 Australia's Transport Ministers directed Transport Certification Australia (TCA) to identify and lead improvements to Intelligent Access arrangements in Australia.

Since it first became operational and available in 2008, the Intelligent Access Program (IAP) has become an essential component of Australia's heavy vehicle regulatory framework. It is now widely used by road infrastructure managers and regulators to balance productivity, infrastructure and safety outcomes.

A founding concept of the IAP was to use digital technology and data to provide strong assurances that 'the right truck is on the right road'. By using a combination of the Global Navigation Satellite System (GNSS), the Global System for Mobile communications (GSM) and other Information and Communication Technologies (ICT), the IAP was designed to identify and report on situations where a vehicle has travelled on parts of the road network on which it has not been approved. The IAP's emphasis on exception-based reporting helped manage infrastructure and safety risks by managing compliance with road transport law.

Different kinds of Intelligent Access were identified during stakeholder engagement to provide different kinds of data and reporting. In response, new variants of Intelligent Access, known as Road Infrastructure Management (RIM) and the Telematics Monitoring Application (TMA), have been introduced in Australia. The paper highlights the importance of keeping abreast of changing needs and demands from stakeholders, and how strong engagement with, and support from, stakeholders can accelerate the implementation of otherwise challenging reforms.

Keywords: Heavy Vehicles, Asset Management, Digitalisation, Regulatory Framework, Traffic Management, Road Infrastructure Utilisation, Stakeholders, Intelligent Access.

1. Historical review of Intelligent Access in Australia

Intelligent Access has been the subject of numerous papers at HVTT over the last decade. First conceived as a concept in the mid-1990s, Intelligent Access recognised a way to advance productivity, safety and efficiency reforms in Australia utilising emerging in-vehicle technologies, including Global Navigation Satellite System (GNSS), the Global System for Mobile communications (GSM). Digital technologies were recognised as a way to provide greater access to road networks without significant public investment, provided heavy vehicle operators agreed to remote monitoring of vehicles and loads for compliance with their conditions of approval.

The initial conceptual development of Intelligent Access coincided with, and built upon:

- The widespread availability of Global System for Mobile communications (GSM) networks – which provided for the wireless exchange of data; and
- The removal of 'selective availability' of the United States' Global Positioning System (GPS) in May 2000 – which provided reliable GPS signals for location-based services for civilian uses.

The deployment of early technology pilots using GPS and GSM in Australia between 1999 and 2003 informed a national feasibility project into the Intelligent Access Program (IAP) led by Austroads (the collective of the Australian and New Zealand transport agencies, representing all levels of government). Intelligent Access was defined as a system that remotely monitors vehicles to ensure they comply with their agreed operating conditions, ensuring they operate how, where, and when they should. Accordingly, Intelligent Access provides alternatives to better manage the existing road transport compliance task (Austroads 2003). Numerous benefits to road transport agencies were identified, including:

- Improved freight productivity from existing road assets
- Improved road safety
- Reduction in infrastructure wear and improved environmental effects,
- Better managing public perceptions and expectations of heavy vehicle movements, and
- Optimisation of the road freight policy and operations tasks, including optimisation of the on-road enforcement activities.

Further work to progress the IAP in Australia followed the positive findings of the Intelligent Access Feasibility Report. This further work included establishing Transport Certification Australia (TCA) in 2005 to administer Intelligent Access arrangements with technology providers and developing enabling legislation with specific provisions to support the regulatory operation of Intelligent Access by road infrastructure managers and regulators.

The year 2005 saw the first regulatory use of Intelligent Access, to manage the access and compliance of productivity reforms related to vehicles transporting heavier loads. The introduction of IAP to support access arrangements for vehicles operating at Higher Mass Limits (HML) in the Australian jurisdictions of New South Wales and Queensland was transformational for the transport industry. Vehicles operating at HML could significantly

lower transport costs and increase productivity and freight efficiency, with route compliance monitored by IAP.

Since becoming operational and available in 2008, when the first certified Service Providers became available, the IAP became widely used to manage access and compliance across a range of restricted access vehicles throughout Australia. At the time of writing this paper, there are 8,000 Intelligent Access enrolments in Australia.

The IAP is now an integral part of Australia's regulatory landscape for heavy vehicles. It has assisted in granting access to parts of the road network that would otherwise not have been approved for the participating vehicles.

A review of Intelligent Access conducted in 2018 by the National Transport Commission (NTC) identified significant benefits from implementing Intelligent Access. Transport operators that voluntarily use the IAP (particularly freight vehicles) were positive regarding the economic benefits and return from participating in the IAP (NTC 2018). For example, vehicles participating in the IAP – utilising the HML concessions offered in two Australian jurisdictions of Australia – are legally allowed to carry an additional almost 6 tonnes on every trip on a B-Double combination.

2. Matching trucks to roads

Intelligent Access strikes a balance between industry demands and government responsibilities by creating new ways of using the road network and doing business. To achieve this, Intelligent Access relies on the structured roles, responsibilities and interactions between road infrastructure managers, regulators, transport operators and service providers. These interactions and the central coordinating role of TCA are further explored in a separate HVTT16 paper to be presented by Walker and Moulis titled *Understanding Intelligent Access and Policy Transfer Through Social Network Analysis*.

Road infrastructure managers grant access to the road network for specific kinds of heavy vehicle combinations and/or loads. These access entitlements may include Intelligent Access as an operating condition. Where Intelligent Access is a requirement, transport operators must enrol their vehicles in the IAP with a service provider certified by TCA. Certified service providers are responsible for monitoring enrolled vehicles against the access entitlements set by road infrastructure managers. If a certified service provider identifies that a vehicle has been operated inconsistently with the road access entitlements set by a road infrastructure manager, it will send a Non-Compliance Report (NCR) to the relevant authority. The authority – being either the road infrastructure manager that assigned the road access entitlement or a corresponding regulator – can use the NCR to manage compliance and enforcement with the transport operator. To ensure authorities can rely on NCRs for compliance and enforcement purposes, TCA oversights and audits the performance of certified providers against the performance-based functional and technical requirements set by TCA.

As originally designed and implemented in Australia, a central pillar of the IAP was that data reporting to authorities would be limited to exception-based reporting of monitored vehicles.

Exception-based reporting alleviated concerns that Intelligent Access arrangements could be used as a surveillance system by government agencies, impacting the privacy of transport operators and drivers. To cater for these concerns, the IAP incorporated strong 'privacy-by-design' principles, which distanced the collection and use of Intelligent Access data from government. Service providers, therefore, adopt a unique role as part of their certification by TCA by monitoring all activities associated with an enrolled vehicle and determining when a non-compliance event has occurred before sending an NCR to an authority. Figure 1 presents an overview of how data is collected and reported to authorities (road infrastructure managers or regulators) through the IAP.

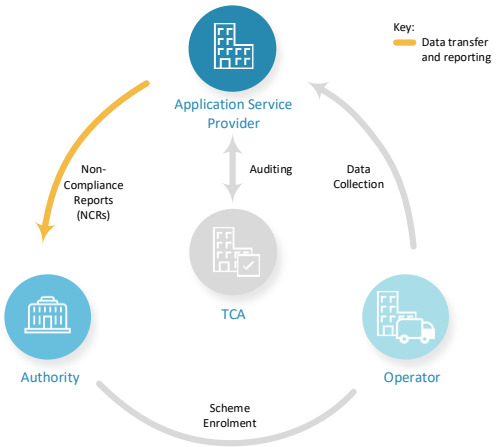

Figure 1 – How data is collected and reported through IAP

Exception-based reporting was crucial to the securing of support from the transport industry for Intelligent Access in Australia. It provided assurances that data collected by service providers would not be scrutinised by authorities when vehicles operating in a manner compliant with their operating conditions. Moreover, it provided protections to transport operators and drivers from regulatory over-reach (where the relative ease of obtaining telematics data could inadvertently encourage a disproportionate level of attention by authorities). Figure 2 presents an example of an exception based Non-Compliance Report (NCR) generated through the IAP, showing a red line as an indicator of the exception.

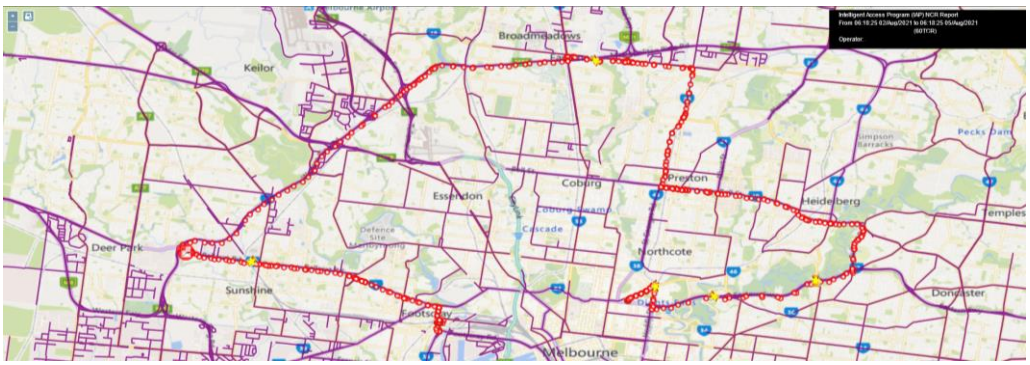

Figure 2 – Example of exception-based NCR generated through the IAP

Over time, however, data availability limitations inherent to the design of the IAP would move from being viewed as a positive to a negative by road infrastructure managers and industry. The pivot towards digital technologies to manage vehicle movements of all kinds on their network led to an evolution of what Intelligent Access arrangements should look like in the future. This culminated in a comprehensive stakeholder engagement exercise work being progressed during 2018 to reimagine the concept of Intelligent Access.

3. Engaging with stakeholders

During 2018 Australia's Transport Ministers requested that Transport Certification Australia (TCA) identify and lead improvements to Intelligent Access arrangements in Australia in response to evolving stakeholder needs. TCA led an extensive program of consultation which directly informed the development of a suite of improvements to Australia's Transport Ministers in November 2018.

The consultation revealed how different stakeholders have specific needs and expectations about Intelligent Access arrangements to deliver improved outcomes relating to road freight productivity, regulatory compliance and heavy vehicle safety. The engagement process identified four inter-related stakeholders involved in the provision and use of intelligent access arrangements:

- Road managers
- Regulators
- Telematics providers
- Transport operators and drivers.

Each stakeholder has different but complementary needs and expectations from the use of Intelligent Access. A stakeholder report, which consolidated feedback received from consultation with stakeholders, informed a package of initiatives to evolve the use of Intelligent Access arrangements presented to Australia's Transport Ministers (TCA 2018).

3.1 What did we do?

TCA applied a stakeholder engagement approach tool used by many government departments and agencies in Australia known as the International Association for Public Participation Spectrum. The Spectrum is presented in Figure 3.

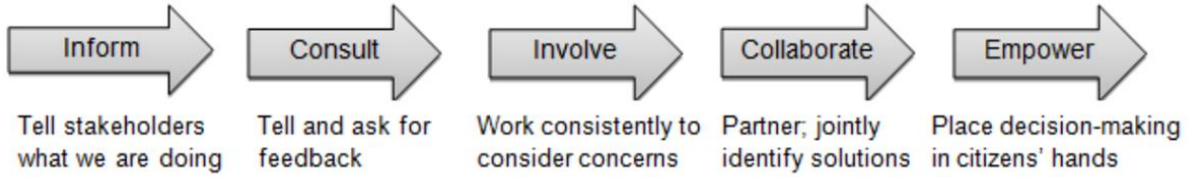

Figure 3 – The International Association for Public Participation Spectrum

A summary of what occurred in each step is presented as follows.

Inform:

TCA communicated its plan to initiate consultation to inform improvements to the IAP to a broad composition of known stakeholders. Public messaging was conveyed through numerous communication channels to reach unidentified parties who could contribute to the engagement process. The significance of the work, and the value of being involved in an initiative that progressed under the auspices of Australia's Transport Ministers, was emphasised during this step.

Consult:

TCA organised a roadshow of face-to-face interviews with stakeholders throughout Australia. Stakeholders included representatives from road infrastructure managers, regulators, transport operators, service providers offering the IAP, other technology providers, and peak bodies and associations. Membership-based peak bodies and associations provided significant value in establishing collective insights into transport operator perceptions – from a cross-section of users in different industry sectors – about Intelligent Access arrangements.

Involve:

TCA adopted a combination of structured and unstructured techniques during interviews with stakeholders to solicit qualitative insights from stakeholders. The focus on interviews recognises the wealth of information not available elsewhere by allowing the interviewee to do the talking (Mintrom 2003). Interviews also enabled a holistic understanding of stakeholders' perspectives, which provided context to the way observations are presented and articulated by different stakeholders. This approach aligns with the constructivist/interpretive paradigm, which focusses on understanding "the world of human experience" (Cohen and Manion 1994). This approach emphasises the "participants' views of the situation being studied" and enables interviewees "to generate or inductively develop a theory or pattern of meanings" (Creswell 2003).

Collaborate:

A stakeholder report which consolidated feedback and observations was made available to stakeholders after the completion of the interview process. The report allowed TCA to seek validation of what had been interpreted from the interviews. It provided an opportunity for stakeholders to make comments and corrections and provide any additional input they thought should be included. The report generated significant value to stakeholders in reflecting their contributions in a written form. Noting that it directly informed a package of initiatives to be presented to Australia's Transport Ministers, the report generated significant buy-in and ownership to the process.

Empower:

The final step of the engagement process involved prioritising the proposed improvements to Intelligent Access based on the collective needs of stakeholders. During this stage it was considered how best to leverage the structured roles, responsibilities and interactions between road infrastructure managers, regulators, transport operators, service providers and TCA to progress the proposed improvements to Intelligent Access.

The structured stakeholder engagement process detailed above delivered strong stakeholder buy-in and support for the package of improvements, which TCA consolidated. A total of 16 initiatives to reimagine Intelligent Access were approved by Australia's Transport Ministers in November 2018.

TCA fast-tracked the development and activation of new variants of Intelligent Access, based on the mutually agreed priorities reached between road infrastructure managers, regulators, transport operators and service providers. The new variants of Intelligent Access, known as Road Infrastructure Management (RIM) and the Telematics Monitoring Application (TMA), are presented in section 6 of this paper.

3.2 What stakeholders told us

Stakeholders provided us with insights that reflected their views and experience with Intelligent Access. Applying the constructivist/interpretive approach to interviews with stakeholders from the prior section of this paper, it became apparent that different stakeholders applied different definitions of what Intelligent Access meant to them.

Through a process of interpreting individual stakeholder feedback – reflecting their perspectives own and contextual environments – we were able to identify three broad areas of common interest to all stakeholder groups:

- Heavy vehicle productivity
- Regulatory compliance
- Heavy vehicle safety.

Stakeholder feedback also revealed that issues relating to Intelligent Access were interwoven with other related matters associated with heavy vehicle access and regulation. It was necessary, therefore, to distinguish between *Intelligent Access* and the *Intelligent Access Program*. This differentiation is essential. *Intelligent Access* refers to the broad use of digital technologies and data to advance heavy vehicle productivity, safety and efficiency reforms. The *Intelligent Access Program* relates specifically to how the IAP operates, as originally designed and implemented in Australia, where the focus is on exception-based reports to road infrastructure managers (or a corresponding regulator) based on detecting non-compliant events involving a monitored IAP vehicle. Feedback from transport operators and drivers were often based on misconceptions about the *perceived* purposes of Intelligent Access and what it means for them. Their perceptions and expectations acted as revealed preferences for what they would like to derive from Intelligent Access arrangements in the future.

TCA observed a need to progress a broader range of use cases for Intelligent Access, which aligned directly to the three broad areas of common interest to all stakeholder groups (see dot points on the previous page). In simple terms, stakeholders firmly told us that Intelligent Access should not be limited to the use of digital technology and data for compliance purposes. Notwithstanding this, road managers and regulators voiced strong support for the core role of the IAP in providing exception-based reporting to manage compliance with a vehicle's operating conditions.

Moreover, road managers or regulators did not seek to retire the IAP for compliance and enforcement purposes. However, road infrastructure managers and regulators recognised that broader uses of Intelligent Access – with different kinds of data reporting and analysis – would be of value in managing road networks, infrastructure life-cycle management, and safety. This is consistent with the 'Supportive Regulatory Frameworks for trucks' outlined in the report *Policies to Extend the Life of Road Assets* (ITF 2018).

Besides the evolving needs and aspirations of road managers and regulators, there was unanimous agreement (affirmed through each of the steps outlined in section 4 of this paper) that there were broader opportunities to transform stakeholders' understanding of Intelligent Access.

4. What was included in the package of improvements?

The package of improvements to Intelligent Access arrangements in Australia, as approved by Australia's Transport Ministers, included 16 separate (but inter-related) initiatives. The improvements responded directly to the consolidated needs and expectations about Intelligent Access from five broad stakeholder categories.

- Road infrastructure managers
- Regulators
- Road infrastructure managers and regulators (common needs)
- Telematics providers
- Transport operators and drivers.

Table 1 presents a summary of the improvements by stakeholder category.

Table 1 - Summary of improvements to Intelligent Access arrangements in Australia

Stakeholder	Proposed improvements
1. Road infrastructure managers	1.1 Introduce a variation of intelligent access to support road asset management and planning application specifically for road managers (Road Infrastructure Management application) 1.2 Enhance the availability of IAP information for research purposes.
2. Regulators	2.1 Optimise electronic conditions to manage critical risks 2.2 Enable on-demand access to telematics data 2.3 Improve the management of enrolments and cancellations 2.4 Improve the management of self-declarations.
3. Road managers and regulators 4. (common needs)	3.1 Enable the use of real-time alerts 3.2 Improve vehicle configuration identification 3.3 Enable new access applications with lower levels of assurance (Telematics Monitoring Application) 3.4 Make the Telematics Analytics Platform (TAP) available more widely.

Stakeholder	Proposed improvements
5. Telematics providers	4.1 Streamline processes for providers to offer applications with lower levels of assurance (through the National Telematics Framework) 4.2 Improve the management of alarms and malfunctions 4.3 Update hardware requirements.
6. Transport operators and drivers	5.1 Enable turn-by-turn navigation/route guidance for heavy vehicle drivers 5.2 Allow transport operator systems to be used for access applications 5.3 Share Non-Compliance Reports (NCRs) with transport operators and drivers.

The following sections of this paper will focus specifically on items 1.1 and 3.3 – the new variants of Intelligent Access: Road Infrastructure Management (RIM) and the Telematics Monitoring Application (TMA). It should be noted that item 3.4 – Telematics Analytics Platform (TAP) – underpins items 1.1 and 3.3 by providing an online web service to view reports and analysis of data derived from RIM and TMA.

5. New variants of Intelligent Access

Two new variants of Intelligent Access (RIM and TMA) are now operating in Australia, which complements the availability of the IAP for compliance management purposes. An illustration of how authorities are applying RIM and TMA is presented in a separate HVTT16 paper by Hill and Greenow, titled *Applying a risk-based approach to road access using telematics*.

5.1 Road Infrastructure Management (RIM)

RIM provides *non-identifiable* vehicle movement data to road infrastructure managers.

For this variant of Intelligent Access, TCA performs a critical role in collecting, securely storing, aggregating and de-identifying data received from service providers who offer RIM to transport operators. Figure 4 provides an overview of how data is collected and reported through RIM. There are two key defining features of RIM:

- All data collected by service providers are transferred to TCA
- TCA aggregates and de-identifies all data before being represented in reports and visualisations to authorities (for RIM, authorities are primarily road infrastructure managers).

Privacy-by-design principles are preserved through the aggregation and anonymisation of data collected through RIM.

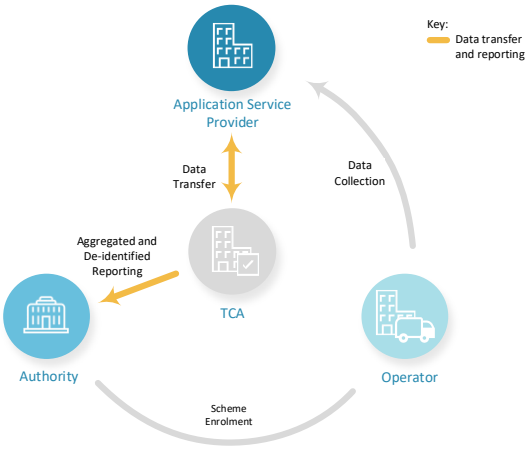

Figure 4 – How data is collected and reported through RIM

TCA makes reports and visualisations to road infrastructure managers through the Telematics Analytics Platform (TAP). An example of the kind of reports generated through RIM is presented in Figure 5, which shows the average speed across the strategic freight corridors in the Australian jurisdiction of New South Wales.

Figure 5 – Example of reports made available through RIM

5.2 Telematics Monitoring Application (TMA)

TMA provides *identifiable* vehicle movement data to regulators.

For this variant of Intelligent Access, TCA performs a critical role in controlling access to identifiable vehicle movement data received from service providers by authorised personnel for compliance management purposes. Figure 6 provides an overview of how data is collected and reported through TMA. There are three key defining features of TMA:

- All data collected by service providers are transferred to TCA
- TCA controls access to authorised personnel within authorities to access visualisations and reports (for TMA, authorities are primarily regulators).

- TCA oversees and audits access the use of data.

Privacy-by-design principles are preserved by TCA controlling access to, and auditing the use of, TMA data by authorised persons within authorities.

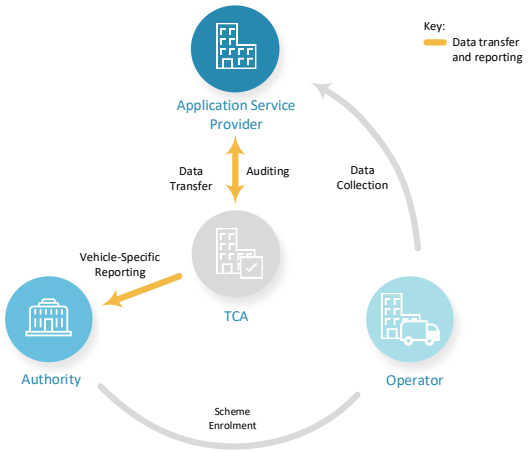

Figure 6 – How data is collected and reported through TMA

An example of the kind of reports generated through TMA (via TAP) is presented in Figure 7. This shows the movements of an individual B-Double combination operating at HML on a single day (noting that the transport operator and vehicle registration number details have been redacted for this paper).

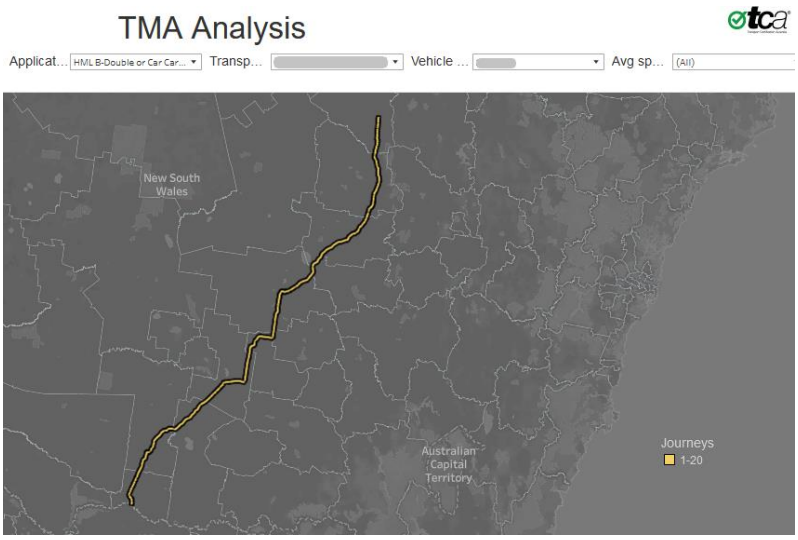

Figure 7 – Example of reports are available through TMA

6. Conclusion

Intelligent Access arrangements have evolved significantly in Australia since 2018. The introduction of new variants of Intelligent Access, specifically RIM and TMA, has explicitly responded to stakeholders' changing needs and demands while maintaining the original intent of the IAP for compliance management purposes.

New variants of Intelligent Access were directly informed by understanding the evolving needs and demands of stakeholders. A structured approach to engagement, referencing the International Association for Public Participation Spectrum, enabled preferences to be revealed from four inter-related stakeholder groups:

- Road managers
- Regulators
- Telematics providers
- Transport operators and drivers.

TCA adopted a combination of structured and unstructured techniques during interviews with stakeholders to solicit qualitative insights from stakeholders. TCA observed there was an unmet need to progress a broader range of use cases for Intelligent Access, which aligned directly to the three broad areas of common interest to all stakeholder groups:

- Heavy vehicle productivity
- Regulatory compliance
- Heavy vehicle safety.

The structured stakeholder engagement process detailed above delivered strong stakeholder buy-in and support for the package of improvements to Intelligent Access. The structured roles, responsibilities and interactions between road infrastructure managers, regulators, transport operators, service providers and TCA were leveraged to deliver new variants of Intelligent Access in a comparatively rapid period. Since its original conception in the mid-1990s, Intelligent Access continues to evolve in response to the demands and expectations of stakeholders. The work on reimagining Intelligent Access in 2018 demonstrates the value of stakeholder engagement, collaboration and empowerment. The approaches conveyed in this paper have the potential to accelerate complex reforms in other complex environments involving heavy vehicle technology and High Capacity Transport (HCT).

7. References

- Austroads. 2003. *Intelligent Access Program (IAP) – Feasibility Project*, Sydney: Austroads.
- Cohen, Louis., and Manion, Lawrence. 1994. Research Methods in Education. Great Britain: Biddles Ltd, Guilford and Kings Lynn.
- Creswell, John. 2003. Research design: Qualitative, quantitative, and mixed methods approaches (2nd ed.). California: Sage Publications.
- International Association of Public Participation. 2021. https://iap2.org.

- International Transport Forum (ITF). 2018. *Policies to Extend the Life of Road Assets*, ITF Research Reports, Paris, OECD Publishing.
- Koniditsiotis, Chris, and Hill, Gavin. 2018. "Re-engineering road networks through On-Board Mass (OBM) systems", HVTT15, Economy on Wheels, 2-5 October, Rotterdam, The Netherlands.
- National Transport Commission (NTC). 2018. *Review of Regulatory Telematics Report*, Melbourne: National Transport Commission.
- Queensland Parliament. 2021. "Heavy Vehicle National Law" https://www.legislation.qld.gov.au/view/whole/html/inforce/current/act-2012-hvnlq.
- Suggett, Dahle. 2012. *Citizen and Stakeholder Participation: Strategies and Challenges for the Australian Public Sector*, Occasional paper no.22, Victoria: Australian and New Zealand School of Government (ANZSOG).
- Transport Certification Australia (TCA). 2016. *Intelligent Access Program: Overview of the IAP Functional and Technical Specificatio*n, Melbourne: Transport Certification Australia.
- Transport Certification Australia (TCA). 2018. *Business Case to Improve the IAP – Stakeholder Report*, Melbourne: Transport Certification Australia.