Supporting good decisions to improve transport productivity

Project outcomes report

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NTC AUSTRALIA

National Transport Commission

Report outline

Title	Supporting good decisions to improve transport productivity
Type of report	Project outcomes report
Purpose	To inform transport agencies and Ministers of the outcomes of two NTC projects 'Who moves what where' and the 'National land transport productivity framework' project.
Abstract	This paper is designed to summarise the findings of two National Transport Commission projects: 'Who moves what where', and the 'National land transport productivity framework'. The findings and suggested improvements set out within Chapter 4 are designed to improve strategic information available for transport planning in Australia. They have been developed after extensive consultation with our stakeholders.
Key words	'Who moves what where'; National Land Transport Productivity Framework; productivity, information; transport planning
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Executive summary

The transport and logistics industry is one of the key drivers of the Australian economy. The Australian land transport industry delivers significant value by moving people and freight from where they are, to where they are needed, at the time they are needed. On an average day in Australia, the sector moves:

- passengers more than 1.15 billion kilometres – equivalent to an average daily distance of 49 kilometres per person; and
- nearly five million tonnes of freight – equivalent to approximately 200 kilograms moved for every person.

Overall, it has been estimated that the land transport sector contributes approximately nine per cent of Australia's gross domestic product. Despite this, it is often difficult to find up-to-date and comparable passenger and freight data for road and rail that can help us to identify where the opportunities are to improve productivity, safety and environmental outcomes. The 'Who moves what where' and the 'National land transport productivity' projects have aimed to make it easier for both industry and government to identify blockages to productivity along the supply chain and highlight opportunities for improvement.

Context

Ministers asked us to produce a report with updated and improved information about the transport industry and which summarises its movements. We released the 'Who moves what where' Information Paper to fulfil this request in August 2016. It has subsequently been used in many ways including:

- to support market intelligence reporting by industry
- for government to estimate the transport industry's impact on greenhouse gas emissions
- in advocacy work by industry associations
- as reference material at the Transportation Research Board in the United States
- within industry and government presentations.

Ministers also asked that we suggest opportunities for improved sharing of government and industry data, as well as other mechanisms which could potentially close key data gaps. The suggested areas for improvement will close those gaps and allow us to complete the implementation of the 'National land transport productivity framework' as set out in Chapter 3.

Issues

This report draws together the findings of the two projects undertaken by the NTC between 2015 and 2017.

The NTC's findings and suggested areas of improvement presented at the conclusion of this report are designed to improve the strategic information available to Australian transport planners so that we can, in turn, reform our evidence-base for strategic decision-making across the country.

As a reform agency, we have worked with many of our stakeholders to develop our findings. Some relate to expanding the current work programs of Australia's data collection agencies. Where this is the case, we have ensured the resource and funding implications are made clear.

One of the clear benefits of improving the way we use data is that we can use it to further our understanding of the productivity of the land transport sector in Australia. As our data practices mature, more granular analyses will enable governments and industry to determine where the biggest opportunities are to influence productivity through decision making.

Throughout our time working on these two projects, we have already started to form partnerships to support the improvement of transport planning information. There are many untapped and frankly unknown opportunities that 'open data' presents and the sources of this data extend beyond our traditional stakeholders. We have not only worked with our established stakeholders, but we have

also been working to identify new stakeholders that we can work with to benefit decision makers across Australia. These opportunities and our consultation processes are outlined in Chapter 2.

We visited each interested jurisdiction during June 2017 to discuss the findings as outlined in Chapter 4. In July we consulted with key industry stakeholders on the draft outcomes. The feedback we received was positive and supportive. Relevant comments have been reflected within this final Project outcomes report. This paper forms part of our report to the Transport and Infrastructure Senior Officials' Committee in September 2017 and the Transport and Infrastructure Council in November 2017.

1 Context

Key points

The transport and logistics industry is one of the key drivers of the Australian economy. This report draws together the findings of two separate but interlinked projects undertaken by the National Transport Commission (NTC) to inform Australian transport planning, policy development and subsequent decision making by governments and industry.

Both projects have involved extensive consultation with our stakeholders.

1.1 Objectives

The 'Who moves what where' and 'National land transport productivity framework' projects commenced in November 2015. Together they aim to make it easier for industry and government to identify blockages to productivity along the supply chain and highlight opportunities for improvement.

The 'Who moves what where' project seeks to better inform future planning and policy development by filling information gaps about the market structure of transport operators – road and rail, passenger and freight. The 'National land transport productivity framework' project aims to help decision makers in both government and industry understand where their attention should be focused and the impact their decisions have on land transport productivity by developing a framework to measure productivity trends over time.

This report presents our findings, as well as some areas where we believe improvements could be made. Both are designed to ensure that better information allows the NTC and policy makers around Australia, to design and implement reforms to improve the productivity, safety and environmental performance of Australia's transport systems.

1.2 Background

The transport and logistics industry is one of the key drivers of the Australian economy. Land transport delivers significant value by moving people and freight from where they are, to where they are needed, at the time they are needed. On an average day in Australia, the sector moves:

- passengers more than 1.15 billion kilometres – equivalent to an average daily distance of 49 kilometres per person; and
- nearly five million tonnes of freight – equivalent to approximately 200 kilograms moved for every person.

Overall, it has been estimated that the land transport sector contributes approximately nine per cent of Australia's gross domestic product. Despite this, it is often difficult to find up-to-date and comparable passenger and freight data for road and rail that can assist in transport planning and reform.

To determine whether we could improve this situation, transport ministers approved two projects in November 2015. These were designed to build a better understanding of the nature and composition of the transport sector in Australia and the use of transport networks, as well as measure the productivity of land transport as Australia's population grows and the passenger and freight task also continues to grow as a result.

The findings of each project are highly connected and therefore are being presented to Ministers in a single paper to ensure the full context can be realised.

2 The projects to date

Key points

Both 'Who moves what where' and the National Land Transport Productivity projects have involved extensive consultation with our stakeholders.

With technological advances and proliferation, the volume of data being generated and collected is growing, as the scope to use data to improve our lives.

In progressing these two projects, we have already started to form partnerships which leverage this opportunity and support the improvement of transport planning information.

2.1 Consultation

Both 'Who moves what where' and the National Land Transport Productivity projects have involved extensive consultation with our stakeholders. A summary timeline of the formal consultation processes is included in Table 1.

Table 1. Summary timeline of formal consultation

Date	Process
Jan 2016	Call for data sources from government and industry stakeholders for the 'Who moves what where' information paper
Feb–Mar 2016	Bilateral meetings with government and industry stakeholders for both projects
Jul 2016	'Who moves what where' government and industry workshop
Aug 2016	National Land Transport Productivity Framework issues paper
Aug 2016	'Who moves what where' information paper
Nov 2016	Jurisdiction workshops for both projects
Jan 2017	'Who moves what where' discussion paper
Feb 2017	National Land Transport Productivity Framework focus groups
June 2017	Draft outcomes report – Improving strategic transport planning information
Jun-Jul 2017	Direct consultation with industry and state and territory transport agencies
Sept 2017	Report to TISOC – Improving strategic transport planning information
Nov 2017	Report to Council – Improving strategic transport planning information

This summary report is designed to bring the two projects to an aligned resolution, by providing joint findings and suggested areas for improvement that are designed to improve the strategic information available to transport planners in Australia.

Who moves what where

Ministers asked us to produce a report with updated and improved information about the transport industry and which summarises its movements. We released the 'Who moves what where' Information Paper to fulfil this request in August 2016. It has subsequently been used in many ways including:

- to support market intelligence reporting by industry

- for government to estimate the transport industry's impact on greenhouse gas emissions
- in advocacy work by industry associations
- as reference material at the Transportation Research Board in the United States
- within industry and government presentations and discussion papers.

Ministers also asked us to suggest opportunities for improved sharing of government and industry data, as well as other mechanisms which could potentially close key data gaps. The findings and suggested areas for improvement outlined in this paper have been developed through consultation with our stakeholders. We believe that together with the improvements already underway (discussed in Section 2.3), they will close the key data gaps identified by the 'Who moves what where' project. This will also allow us to successfully complete the implementation of the 'National land transport productivity framework' as set out in Chapter 3.

Chapter 2 of the 'Who moves what where' discussion paper sets out the consultation process we undertook up until January 2017. Comments to the discussion closed on 10 March 2017. We received 16 formal submissions in total, all of which were supportive of the project and its findings. Our final list of findings and suggested areas for improvement have been amended as a result of the feedback received through that process, the modifications include:

- Ensuring we align with, and refer to complementary projects underway in the strategic information space.
- Some findings have been updated to reflect that work in some areas has progressed since the discussion paper was released.
- The suggestion that the Australian Bureau of Statistics (ABS) be supported to scope and cost model the introduction of a Transport Satellite Account (TrSA) has been updated to reflect the current status of that work. Key inclusions of any TrSA are likely to be:
    - contribution of for-hire transport and own-account transport activity to industry gross value-added and GDP (among other aggregates)
    - own-account transport would be treated as a single industry and valued based on the cost of its inputs
    - data may be split by passenger/freight activity and modal data (air, road, rail, water) but not by vehicle type
    - options to estimate profits on own-account transport would be explored
    - transport volume data (that is, number of vehicles) would be subject to quality of the data
    - capital expenditure data by vehicle type may be restricted to road vehicles and all other vehicles; and
    - estimates of transport employment and hours worked would be explored.
- We have suggested that we work with industry associations and through them, their members, to promote the benefits of sharing non-proprietary information across the supply chain. However, we have specified that in particular, this work should consider the recommendations of the Austroads report Investigating the Potential Benefits of enhanced End to End Supply Chain Visibility, including:
- Encouraging use of one common label format to identify freight and one common file format to exchange data throughout the freight transportation process via an industry led adoption program.
- Contribution to the development of a Supply Chain Visibility Strategy to be aligned with the National Freight and Supply Chain Strategy recently announced by the Australian Government.
- The suggestion that the NTC should periodically deliver a 'Who moves what where' style report has been removed. While it was acknowledged that the consolidation of existing information is useful, feedback suggests there is more value in focussing efforts on collecting new data through the Data Collection and Dissemination Plan to be managed by BITRE, as well as the potential introduction of a Transport Satellite Account by the ABS.

- We have removed the suggestion that information gaps identified through the 'Who moves what where' project should be considered in any future review of current vehicle registration systems. It was considered that this would be imposing an additional burden on operators.

National land transport productivity framework

To understand how productively land transport is operating, we first need to understand what is being moved where and by whom. That is why we have been progressing the 'Who moves what where' and National Land Transport Productivity projects in alignment. One of the clear benefits of progressing our suggested areas of improvement is that we can use the improved data to understand the productivity of the land transport sector in Australia. As the implementation matures, the ability to undertake more granular analyses will enable governments and industry to determine where the biggest opportunities are for influencing productivity through decision making.

The NTC released an issues paper during August 2016 setting out some of the issues to consider in developing a productivity framework related to land transport. We took into consideration the comments received to that paper which closed on 6 October 2016. We received 15 submissions from a range of government and industry sources. Stakeholders provided some consistent feedback throughout their submissions to the NTC's issues paper as outlined below.

- Linking the indicators to decision making and interventions: Most respondents noted that while they support the development of a 'National Land Transport Productivity Framework' (the 'framework'), they thought more work needed to be done to 'map' how the proposed indicators are linked to decisions within industry and government; and conversely, what decisions impact which indicators. It was also commonly noted that an industry survey was not necessarily the most effective way to collect information and wherever possible, the measures used should be quantitative rather than subjective (for example, 'satisfaction with') and should not impose an undue reporting burden on industry.
- Independent consultant to develop the framework: Most submissions stated that an independent body (with co-ordination and assistance from the NTC) would be most appropriate to take the work forward. Many submissions requested to be involved in the next steps of the project. As well as visiting each interested jurisdiction to hold a workshop during November 2016, the NTC invited all submitters to participate in focus groups during February 2017. The outcomes of the focus groups are set out below.
- Australian Bureau of Statistics – existing and new measurements: Finally, the submitters commonly suggested expanding current ABS data collections, including the Survey of Motor Vehicle Use (including the Freight Movement Study) and the Multifactor Productivity measurement, to collect information about some of the indicators proposed. In addition to this, there is a collective call across both government and industry and across both projects to introduce a Transport Satellite Account (TrSA) to measure the contribution of the transport industry to the wider Australian economy as a whole.

After considering this feedback, we engaged HoustonKemp Economists to deliver the framework. On 8 February 2017, the NTC and HoustonKemp ran two focus group sessions to consult with industry and government stakeholders on our proposed framework. The sessions were attended by 19 industry representatives and 13 government agency representatives. Attendees were provided with a brief Information Paper beforehand prepared by HoustonKemp that set out a number of specific questions for discussion.

Feedback from both sets of stakeholders indicated that our proposed methods were appropriate. In addition, our proposal to measure land transport productivity between the gates of pick-up and delivery – that is, consider the journey between origin and destination – was met with agreement.

Some parties provided possible improvements, including an approach more focussed on full supply chain productivity, rather than the discrete productivity levels of all separate modes of transport.

Industry stakeholders in particular highlighted the need for a framework to reflect the productivity of freight staging. A few industry parties stipulated that it would be useful to have some modes broken down further – for example, small, medium and large heavy vehicles; and heavy vehicles by ownership type, that is, owner-operators versus larger companies.

The discussion on our proposed inputs and outputs gave rise to a number of further suggestions regarding possible metrics to use, and highlighted some of the difficulties we may face in finding

consistent datasets across Australia. In general, parties were concerned that the data is not currently available to fully apply the framework proposed. However, most stakeholders acknowledged that it makes sense to put preliminary measures in-place and refine them going forward using new data – we can also use the preliminary estimates to highlight data gaps.

Stakeholders also highlighted the benefits that a TrSA could offer in terms of producing data to feed into the framework measurements.

The final framework factors in these comments, as well as further bilateral discussions with some agencies. This is further discussed in Chapter 3.

2.2 Why now?

It is useful to recap on why now is the right time to progress data collection, storage and dissemination. With technological advances and proliferation, the volume of data being generated and collected is growing, as is the scope to use data to improve our lives. Some estimates suggest that 90 per cent of the world's data was generated in just the past two years (IBM, 2016). What's more, most of this data is no longer what could be called 'organised data' such as that found in databases and spreadsheets. Consequently, there is a need to better understand how this affects our consumption and use of data. The world of information management is changing, and to ensure Australians reap the potential benefits, we need to respond and change the way we collect and share data in the transport industry as well.

This was expressed very well by the Productivity Commission in its recent draft report *Data Availability and Use*:

> Increased access to data can facilitate the development of ground-breaking new products and services that fundamentally transform everyday life. Many are widely known – apps that tell you in real time where to find vacant car parking places, the fastest route to travel to the city at the time you want to go, or which electricity provider offers you the best deal given your pattern of energy use, are all examples that rely on data analysis. But better access to and use of data can also benefit business and government through improved operational processes and productivity. Examples abound of new found opportunities – in supply chain logistics, saving time and money; through more cost effective infrastructure and machinery maintenance and planning; improved safety and efficiency in aircraft engines; and in the capacity to better respond to and manage emergencies. And data is critical to building the evidence base to underpin incremental improvements, allowing governments and businesses to offer products and services that are more customised, coordinated or timely. The potential value of data is tremendous, but so too is the scope for Australia to forgo much of this value under the misconception that denial of access would minimise risks (Productivity Commission, 2017).

Note just how much of this statement touches on land transport information and the benefits that can be realised from open data. Data creates information, which in turn creates knowledge. That's why we are progressing these two projects hand-in-hand.

There are different levels of 'open data' and each level should be considered within open data policies. For example de-identified and aggregated data which has no commercial or privacy issues attached can be released publically. There is also data which is able to be shared amongst governments or supply chain partners, but cannot be made publically available.

In its submission to our 'Who moves what where' discussion paper, the Australian Logistics Council referenced the 'Getting technology right' section of the publication *Getting the Supply Chain Right – Building the Economy Through Efficient and Safe Supply Chains*. One of those recommendations was that 'Collaborations that permit the transfer of non-proprietary information across the supply chain should be encouraged'. One of the draft findings outlined in Chapter 4 proposes the NTC commence work in 2018–19 with industry associations and through them, their members, to promote the benefits of sharing information across the supply chain.

In particular, we propose that this work consider the recommendations of the Austroads report *Investigating the Potential Benefits of enhanced End to End Supply Chain Visibility*, which was recently welcomed by the Minister for Infrastructure and Transport. The Minister noted that 'Austroads' pilot studies showed that larger transport businesses which have adopted Global Data Standards (GDS)-based technologies effectively build a capability to create connectivity and improve visibility throughout their supply chains. This may increase costs over the short-term for

smaller transport operators given the complexities of adopting the new GDS-based technologies, but those same operators will definitely see the benefits over the long term.

The independent inquiry into the establishment of the *National Freight and Supply Chain Strategy* will also consider Austroads' findings. There is much to be gained by both government and industry from sharing data in a format appropriate to the level of sensitivity and privacy protection required for the data and now is the time.

Public Inquiry: Data availability and use

The Productivity Commission's 12-month public inquiry investigated ways to improve the availability and use of public and private sector data. The Productivity Commission was required to:

- look at the benefits and costs of making public and private datasets more available
- examine options for collection, sharing and release of data
- identify ways consumers can use and benefit from access to data, particularly data about themselves
- consider how to preserve individual privacy and control over data use.

The inquiry is now complete. Some of the key points included within the draft report were:

- Frameworks and protections developed for data collection and access prior to sweeping digitisation now need reform. This is a global phenomenon and Australia, to its detriment, is not yet participating.
- The substantive argument in favour of making data more available is that opportunities to use it are largely unknown until the data sources themselves are better known, and until data users have been able to undertake discovery of data.
- Lack of trust and numerous barriers to sharing and releasing data are stymieing the use and value of Australia's data.

The Inquiry report suggests that the Productivity Commission would have preferred to find solutions that are non-regulatory; however there is a clear conclusion that legislative changes are needed to implement the Commission's recommended reforms (Productivity Commission, 2017). These primarily involve changes to existing Commonwealth privacy legislation as well as the creation of new legislation — a new *Data Sharing and Release Act* — to facilitate data sharing and release. This Act would be a Commonwealth piece of legislation applying across Australia to all digital data. Key privacy protections would be protected, particularly as they apply to the use of personal information, whilst also ensuring that the new Act facilitates a more open and effective approach to data management. In particular it would mean:

- broad access to key National Interest Datasets should be enabled.
- for datasets designated as national interest, all restrictions to access and use contained in a variety of national and state legislation, and other program-specific policies, would be replaced by new arrangements under the *Data Sharing and Release Act*.
- datasets would be maintained as national assets, access would be substantially streamlined, and linkage with other National Interest Datasets would be feasible.

Initial datasets that may be designated national interest and publicly released could include key registries of businesses, services or assets, and data on activity and usage in areas of substantial public expenditure.

Treating datasets as national interest collections signifies their value as resources collected in the national interest, not merely (as today) for compliance, record-keeping or audit purposes. There is change coming in this space and we need to make sure we are ready to participate in order that the transport sector can benefit rather than be left behind. The findings of this report and the suggested areas for improvement are designed to prepare us to advance the industry to a data rich, evidence-based future.

2.3 Improvements already underway

Throughout the two projects, we have already started to form partnerships to support the

improvement of transport planning information. There are many untapped and frankly unknown opportunities that open data presents and the sources of this data extend beyond our traditional stakeholders. We have not only worked with our established stakeholders, but we have also been working to identify new stakeholders that we can work with to benefit decision makers across Australia.

Integrated Customs System Data

Perhaps the most significant new collaboration we have established is with the Department of Immigration and Border Protection (DIBP). The 'Who moves what where' information paper identified a lack of detailed commodity information, which means planners couldn't map the movements of particular freight types across Australia, or fully understand consumer demand and the related transport network demand. We approached DIBP in mid-2016 and met with Commissioner Roman Quaedvlieg during August. During that meeting we discussed opportunities for transport planners to access non-sensitive data from the DIBP's Integrated Cargo System (ICS) about commodities arriving into and leaving Australian ports. We agreed that at a de-identified, aggregate level this information could significantly aid transport decision making.

The NTC continued work with DIBP at officer level to agree data fields and a report template to be provided to the NTC on a quarterly basis. As there is nothing in the data that identifies individuals or companies, we are also able to provide access to jurisdictions for their own analysis purposes. To do this, the NTC has established a cloud-based solution where all jurisdictions are able to access and download the data. This is a major step forward and will contribute to the evidence base for transport and related decisions made across the country in future. For example, the import data can tell us that four horses were imported via air to Sydney and delivered to Bathurst. They weighed 2216kg and were valued by the importer at $29,900. What it *can't* tell us is where the horses originated overseas and the mode of transport used to deliver the horses from Sydney to Bathurst.

The export data can tell us for example that 68.25kg of men's clothing, with a value of $2,099 was manufactured in New South Wales and exported by air from Sydney to Canada. The exporting business is based in outer Sydney. We can now see this information for all commodities imported to and exported from Australian air and seaports, giving transport planners unprecedented ability to understand commodity movements and values.

The first report was provided for the January – March 2017 quarter. The NTC has developed a SharePoint site where jurisdictions are able to access and download the reports for their own analysis purposes each quarter. Already, the CSIRO has been able to produce some sample freight flow maps utilising the data.

Scoping and costing for a Transport satellite account (TrSA)

Section 3.4 of the 'Who moves what where' discussion paper previously discussed the potential benefits of introducing a TrSA in Australia and this has been gaining support widely across both government and industry.

A TrSA would use the framework, concepts and definitions from the System of National Accounts, supplemented with additional transport related data, to produce a credible and comprehensive measure of the contribution of transport activity to the economy at the national level. It would also provide a framework for the development of state transport satellite accounts in the future

In 2010–11, the ABS produced an information paper on the scope and potential outputs of a TrSA, and produced data which could form the building blocks of the account.

The initial work on the TrSA received interest and support from stakeholders at the time. Ultimately, however, a decision was made to prioritise the expansion of road freight data collection, and the TrSA was not pursued in 2011. Since the release of the freight estimates and given the renewed support for a TrSA, the ABS has been reconsidering options for producing a TrSA in future.

Both projects have identified a commonly held view that a TrSA would be a crucial source of data

which would significantly enhance the informational capabilities of the land transport sector. The development of a TrSA would also significantly add to the metrics available to feed into our 'National land transport productivity framework'. The Commonwealth will fund production of an experimental TrSA during 2017-18, after which the benefits demonstrated will be assessed to determine whether ongoing government funding is warranted.

Data Collection and Dissemination Plan

The Australian Government provided its response to Infrastructure Australia's 15 Year Plan recommendations on 24 November 2016 in a speech by Minister Fletcher entitled 'Building our future, on good advice'. One of the key elements of the response involves a focus on obtaining more and better data in the transport and infrastructure space to ensure analysis and decision-making is underpinned by a robust evidence base. Data 61, the Department of Infrastructure and Regional Development (DIRD) and the Australian Bureau of Statistics (ABS) will all be involved in creating a data collection and dissemination plan to underpin investment decision making. The plan will include the collection and public release of data on the performance of transport services.

We have passed relevant stakeholder comments received to the 'Who moves what where' discussion paper to DIRD. These include that in preparing the data dissemination and collection plan, they should take into consideration:

- the National Road Safety Partnership Program's Data Collection Project;
- the outcomes of New Zealand's Transport Domain Plan approach, which identified the main statistical and information priorities for the transport sector; and
- inclusion of 'active' transport – that is, walking and cycling.

Review of Australian Transport Data Action Network (ATDAN) terms of reference

Something considered within the 'Who moves what where' discussion paper was that a national standard be developed to guide data-sharing between different jurisdictions, and a review of the metrics collected across jurisdictions should be undertaken to allow for better national comparisons.

Subsequent to the 'Who moves what where' discussion paper being released, ATDAN decided it was timely to revisit the purpose and secretariat arrangements for the group. ATDAN is therefore reviewing its terms of reference with a view to providing support for (not duplication of) existing national data initiatives, including the National Policy Framework for and Transport Technology Action Plan, the Government's response to the Infrastructure Australia 15 Year Plan and the Productivity Commission's Data Availability and Use project. One of the suggested areas for improvement is:

By the end of 2018, we suggest that ATDAN:

- encourage adoption of open data standards and access arrangements, and undertake a review of metrics collected across jurisdictions to allow for better national comparisons.
- monitor and report progress in adoption of open data standards and open data access.

This recognises that there are jurisdictions that may have non-compatible legacy systems and our focus should instead be on encouraging methods to better utilise the existing systems and data to compare across jurisdictions. The data sharing arrangement that is agreed upon should be future-proof, i.e. it should cover new data emerging from new technology applications in transport.

Expansion of CSIRO's Transport network strategic investment tool (TraNSIT)

CSIRO developed TraNSIT to analyse both small and large scale investments in the agriculture supply chain, with current applications covering almost all Australian agricultural logistics. While it began with beef in Northern Australia, the tool is currently being applied to broader Australia-wide agriculture transport, comprising more than 25 commodities, as part of the Government's Agricultural Competitiveness White Paper.

TraNSIT currently accommodates 142 million tonnes of agricultural transport and over five million

vehicle movements and 15,000 rail trips per year. This includes the transportation of cattle as well as grains, dairy, poultry, rice, cotton, pigs, sugar, horticulture crops and stock feed. Forestry and sheep will be added in the near future. The tool considers transport from farms to storage, feedlots, processing, export ports, as well as domestic supply chains to distribution centers and retailers. It can be used to manage logistics costs for individual enterprises or whole industries and could be easily extended beyond agriculture and forestry to accommodate other freight

CSIRO is now developing a data visualisation tool for demonstrations purposes, which they aim to develop into a web based tool for industry and government agencies within the next 1-2 years, subject to funding. The tool will be a web interface that allows agencies to model cost effective transport options. It would also allow them to input their own datasets and undertake more localised/ targeted assessments as required.

TraNSIT is now being introduced to Indonesia, Vietnam and Laos with the assistance of the Department of Foreign Affairs and Trade, so it can map the supply chain from Australian farms right through to the end customer, both within and outside Australia. CSIRO also plans to extend TraNSIT to include coastal and international shipping data, as well as more detailed rail data.

The NTC has highlighted the value of this tool to the Inquiry into national freight and supply chain priorities and will continue to be an advocate for the TraNSIT tool.

3 The National land transport productivity framework

Key points

This chapter sets out how we think the land transport productivity framework should be implemented in Australia.

The implementation should be phased, with the NTC producing a Land transport network report in 2019 and BITRE considering development of a Land transport integrated system report as part of the Data Collection and Dissemination Plan.

3.1 The framework

There are many ways that land transport can be defined for the purposes of productivity measurement. We believe that the objective should be to measure the productivity of movement of people and freight by land transport, as this is the key service being provided by land transport. Improvements in the productivity of people and freight movement will deliver benefits directly to the wellbeing of all Australians. Most stakeholders wanted an independent body (with co-ordination and assistance from the NTC) to develop the 'National land transport productivity framework' (the 'framework'). Accordingly, the framework was produced in conjunction with HoustonKemp Economists.

The framework proposes a methodology to estimate land transport productivity in Australia using both existing data and identifying areas where further data would refine the measurement. It proposes as a starting point, that measures of the productivity of the land transport of people and freight be broken down into modes (that is, the productivity of each mode of transport) as well as underlying land transport infrastructure (that is, rail, road, land-side port services and intermodal terminals). These measures would ideally be estimated at both a State and Territory levels as well as at the national level, providing a comprehensive assessment of land transport productivity across Australia.

The proposed breakdown will provide greater insights as to the sources of improvements (or a worsening) in land transport productivity over time by allowing aggregate land transport productivity to be decomposed into its constituent components. It will also allow for a more detailed assessment of the impact on land transport productivity of policies or programs that typically target specific segments of the land transport system. In addition, given data complexities, this approach will also allow the measures to be incrementally developed as data becomes available over time.

A number of sectors (including some branches of the transport sector) have well-established measures of productivity which are used to measure performance. In land transport, users are embedded in the network – and their actions and decisions directly affect the productivity of the sector. The nature of the transport sector therefore requires a productivity framework that extends the measurements used in other sectors, and provides significantly more granular results than produced in other productivity measures.

We have proposed that total factor productivity (TFP) be used as the methodology for estimating land transport productivity. TFP is an index-based approach to measuring productivity, and requires a consideration of outputs compared to inputs. The proposed specific input and output data for each proposed dimension of land transport are set out in detail in the framework.

3.2 Proposed implementation phases

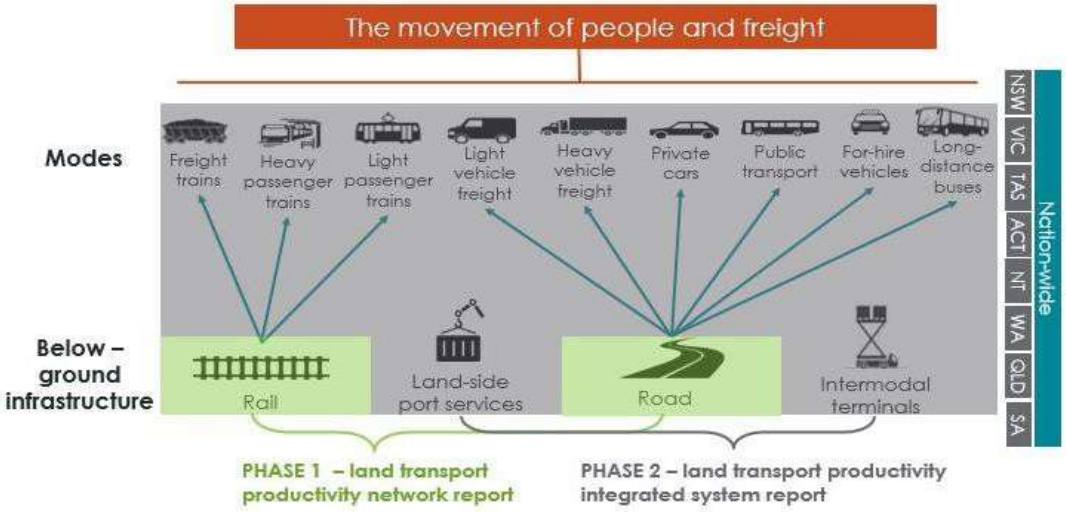
We are proposing that the *National land transport productivity framework* be implemented in two phases. While there is currently insufficient data available to measure all of the metrics identified as productivity measures within the framework, there are preliminary measures that we consider can be developed now. The suggested areas for improvement identified in this report, as well as the projects discussed in Chapter 2, will build on the current availability and use of existing data and fill

information gaps. We will then have the ability to turn that data into knowledge and realise its true value.

Stakeholders agree that despite the current limitations, there is much to be gained from developing a preliminary productivity measure and implementing the framework in a staged fashion. We therefore propose that the framework be implemented as follows:

- **Land transport network report** – a focus on the productivity of road and rail infrastructure initially, that is, exclude measuring inputs and outputs of modes and rather focus on freight and passenger movements across these two networks;
- **Land transport integrated system report** – extend the framework with additional data derived as a result of the suggested improvements in this paper and the projects underway in Chapter 2, to measure above and below land transport, and develop estimates for all dimensions.

Figure 1. Phases of implementation: National land transport productivity framework



Land transport network report: 2017–19

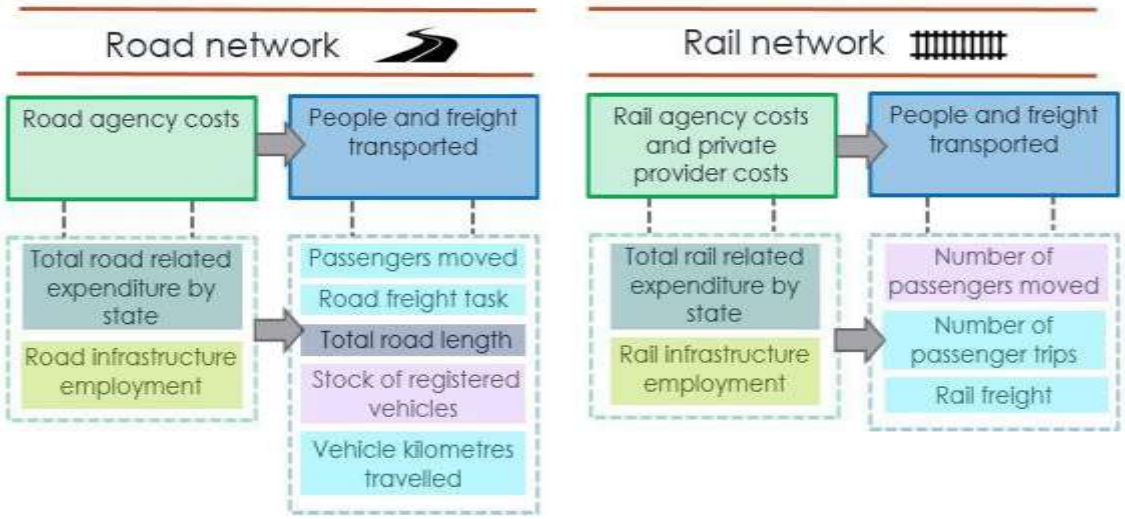
In light of the relatively firm data available currently on the inputs and outputs of Australia's road and rail land transport infrastructure, it would be possible to commence work relatively quickly on developing productivity estimates for road and rail networks by jurisdiction. In particular, there is data available on:

- the inputs to providing road and rail network infrastructure services, for example, labour and capital expenditure costs; and
- the outputs of each of these services, for example, the throughput, capacity and customer numbers.

It is therefore prudent to estimate a productivity measure for these since data is readily available and firm, meaning that the level of accuracy in any estimates developed can be considered to be significantly greater than for the other dimensions.

In Figure 3 we have set out the various input and output dimensions to road and rail land transport infrastructure, which aim to capture inputs to the core services provided by the road and rail infrastructure sectors to be estimated within the Land transport network report. We have also outlined a number of metrics for measuring inputs and outputs for each characterisation that could be applied to estimate productivity – all of which are currently collected and published by BITRE.

Figure 2. Suggested metrics for estimating productivity in the Land transport network report



The input and output metrics can be used to calculate a total factor productivity estimate for the road and rail sectors in Australia. To do so, we would need to do some further work to develop weightings for inputs and outputs in order to develop an index of each for the purpose of estimating the productivity of turning inputs into outputs, as described in the *National land transport productivity report*.

Deciding on the specific weightings to be applied requires consideration of the extent to which each of the outputs should be valued. For example, freight movement may have a higher weight compared to passenger movement, given the propensity of road agencies to build the network to service heavy vehicles. These matters would need to be worked through as part of implementation of the TFP methodology for the road and rail networks.

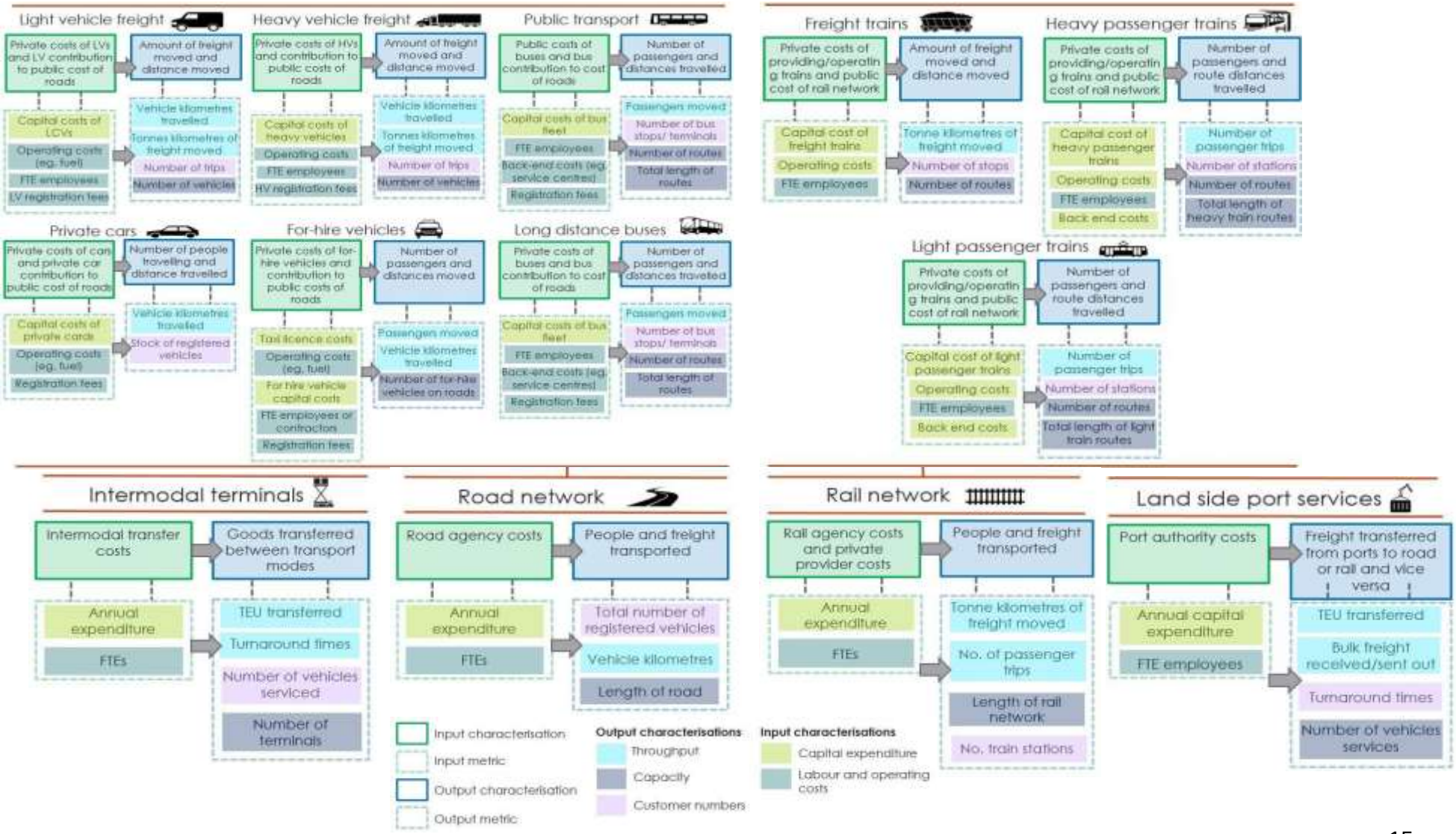
Appropriate weightings would need to be developed with input from states and territories and data collected against the indicators to deliver the first *Land transport network report* by the end of 2019. These reports would continue until replaced with the *Land transport integrated system report*.

Land transport integrated system report: 2018–20

The Land transport integrated system report would incorporate new data that would bolster the productivity measures estimated in the Land transport network report, for example road congestion and road speed performance metrics.

The National land transport productivity framework outlines some of the metrics that could be developed as part of the Land transport integrated system report and these are summarised in Figure 4. The Land transport integrated system report will include the measurement of public transport productivity across states, both by road and by rail. It will also consider how best to link the productivity of each network with the productivity of the modes of transport making use of that network.

Figure 3. Input and output metrics for the Land transport integrated system report



3.3 Administering the framework

Throughout the development of a productivity framework, it has become clear that it is not possible to capture all points of interest in a single measure. For example, the *Land transport network report*'s productivity measure will not capture full supply chain productivity in land transport. Neither will it capture productivity in coastal shipping or domestic air freight, modes which stakeholders highlighted as being strong substitutes for land transport in freight (and clearly domestic air travel is a strong substitute for private road travel). These additional multimodal datasets and analyses are not within the scope of the NTC's land transport remit and we suggest that they be considered as part of a wider measure in the *Land transport integrated system report*. We are therefore proposing that one of Australia's data collection agencies would be best placed to produce the productivity reports using the framework we have developed.

Many of the existing BITRE measures (for example, metrics used within *Waterline and the Truck Productivity report*) could be further developed into a set of national productivity indicators to feed into the *Land transport integrated system report*. BITRE is also leading the Commonwealth's *Data Collection and Dissemination Plan* which forms part of the Government's response to the *Infrastructure Australia 15 Year Plan*. The plan aims to:

- identify key national infrastructure and transport statistics
- develop national infrastructure performance measures
- identify opportunities to use new technologies to collect infrastructure data
- develop means of disseminating data to encourage innovation and improved public and private decision making; and
- promote and identify priority projects that
- fill key data gaps
- develop and report performance relevant to infrastructure operators and customers
- support innovation in data collection and use.

We believe these projects; together with BITRE's wider remit to include waterside port activities and aviation mean that BITRE would be best placed to assume responsibility for reporting. BITRE agrees with this assessment and this is reflected within our draft findings set out in the following chapter.

4 Conclusions

Key points

The NTC has delivered the outcomes expected for both the 'Who moves what where' and the National land transport productivity framework projects.

Our findings and suggested areas for improvement are set out in this chapter.

4.1 Conclusions

Some datasets, such as industry composition, had not been updated in several decades before the 'Who moves what where' information paper was released. By compiling this information and progressing work with other agencies to improve data availability, the NTC can better target its reform agenda to service the transport industry. Government and industry more broadly also have better strategic information to support good decisions and improve transport productivity. In addition, the development of a 'National land transport productivity framework' is an important first step in creating meaningful performance measures to guide our efforts. The framework is already being used to feed into the government's Inquiry into Australia's Freight and Supply Chain Priorities.

We have set out below the desired outcomes and outputs of each project as agreed by Ministers in 2015, together with a description of what the NTC has delivered or proposed against each one.

Table 2. Business case desired outcomes: 'Who moves what where'

Who moves what where: Desired outcomes	
Produce a report with updated and improved information about the transport industry and which summarises its movements.	The 'Who moves what where' Information paper achieved this outcome.
Suggest opportunities for improved sharing of government and industry data, as well as other mechanisms which could potentially close key data gaps.	The suggested areas for improvement listed at Section 4.2 are a summary of the opportunities we have identified in consultation with our stakeholders for improved collection, storage and sharing of industry and government data to close data gaps.
Project outputs	
A public report to Ministers that provides, as a base: ▪ a summary of the kinds of transport usage data that is available, and the surveys and methods used to collect that information. ▪ an update of the ABS and BITRE reports on the makeup of the transport industry which was last produced in 1984 (including facts such as the proportion of the industry with large, medium sized, or very small fleets, the number of operators in the industry and the number of fleets using restricted or other broad classes of vehicles). ▪ a summary of existing high-level information on the movement of passengers and freight on both road and rail, including high-level information on private people movement but	This report will be provided to Ministers together with the research pieces that support the findings and suggested areas of improvement listed at Section 4.2. We believe these outputs will facilitate more evidence-based policy, deliver trend data and prepare for long range transport scenarios.

focusing primarily on commercial transport of goods and people. ▪ a discussion of potential opportunities to utilise modern data collection techniques to improve overall datasets and more cost-effectively gather and analyse freight and passenger transport usage data for both the rail and road sectors. Potential future phases could involve developing more evidence-based forecasts, and long range transport scenarios. These future phases would be scoped in detail following this initial phase and Ministerial support would need to be sought to proceed (through the NTC strategic planning and work program development process).	

Table 3. Business case desired outcomes: National land transport productivity framework

National land transport productivity framework: Desired outcomes	
Identification of the most appropriate cornerstone areas around which performance indicators and strategies could be developed.	We have explored the many ways that land transport can be defined for the purposes of productivity measurement. We believe we need to measure the productive movement of people and freight by land transport, as improvements in the productivity of people and freight movement will deliver benefits directly to the wellbeing of all Australians. These measures should be estimated by mode at both a jurisdictional and national level, providing a comprehensive assessment of land transport productivity across Australia.
Performance indicators which would be measurable outcomes linked to achievement of goals and objectives and based on agreed principles.	Indicators have been developed and proposed across a staged implementation as data availability improves in future. These are explained in Chapter 3.
A performance index to facilitate evaluation of relationship between processes, inputs, outputs and outcomes.	The framework sets out a guide to developing weightings for inputs and outputs in order to develop an index of each indicator for the purpose of estimating total factor productivity.
Identification of data required to measure performance in improving productivity growth and availability of sources for that data.	We have identified both currently available data and data gaps which require filling to expand the reporting possible. The implementation process factors in the transition between the two.

Project outputs	
A report and supporting material that includes: ▪ a high level framework that is suitable for developing a strategy, and action plans to increase productivity in the national land transport sector. ▪ nationally agreed measures that will allow measurement of changes in productivity growth in the sector in a way that informs the effectiveness of investments in the system.	The *National land transport productivity framework* fulfils this outcome, together with the findings and suggested areas for improvement contained in Section 4.2 of this paper.
▪ suggestions for the future development of the framework and additional potential data sources that might be included over time as the maturity of the framework increases, and the usefulness of the analysis in decision making is demonstrated.	

4.2 Findings and suggested areas for improvement

As this paper has set out, the 'Who moves what where' and 'National land transport productivity framework' projects are closely aligned and interdependent. Therefore, we have combined the findings and suggested areas for improvement into a single list which will be reported to Ministers later this year. They include:

Findings

National land transport productivity framework

1. The 'National land transport productivity framework' should be based on a total factor productivity measurement.
2. The 'National land transport productivity framework' should be the framework approved by Ministers for measuring land transport productivity in Australia.
3. The 'National land transport productivity framework' should be used by BITRE to develop land transport productivity estimates as part of the Data collection and dissemination plan.

Suggested areas for improvement

Open data

1. All jurisdictions should develop an open data policy that is in line with their jurisdictional policy by the end of 2018. The policy should encourage data collection and storage methods that enable sharing of data that is flexible, accurate, current, comprehensive and in a format that can be manipulated and linked with other datasets. These policies should be created with appropriate consideration of:
    - the National Policy Framework for Land Transport Technology agreed by TISOC, which states that existing jurisdictional datasets will be consolidated into national- level information in a shared format, and made available through a common portal; and
    - revision at the conclusion of ATDAN's work (see below).
2. The NHVR and the NTC should consider adopting open data policies by the end of 2018. These policies should be created with appropriate consideration of:
    - the National Policy Framework for Land Transport Technology agreed by TISOC, which states that existing jurisdictional datasets will be consolidated into national- level information in a shared format, and made available through a common portal; and

- revision at the conclusion of ATDAN's work (see below).

3. The ONRSR and RISSB should consider adopting open data policies by the end of 2018.
4. We suggest that by the end of 2018, ATDAN:
    - encourage national adoption of open data standards and access arrangements, and undertake a review of metrics collected across jurisdictions to allow for better national comparisons.
    - monitor and report progress in adoption of open data standards and open data access.

Transport Satellite Account

5. The benefits of the experimental Transport Satellite Account should be assessed by ATDAN to determine whether it warrants ongoing government funding.

Supply chain data sharing

6. The NTC should commence work in 2018–19 with industry associations and through them, their members, to promote the benefits of sharing information across the supply chain. In particular, this should consider the recommendations of the Austroads report *Investigating the Potential Benefits of enhanced End to End Supply Chain Visibility*.

4.3 Next steps

Implementation would be timed to align with other related projects in this space.

We visited each interested jurisdiction during June 2017 to discuss this draft outcomes report. In July we consulted with key industry stakeholders on the draft outcomes. This paper forms part of our report to the Transport and Infrastructure Senior Officials' Committee in September 2017 and finally the Transport and Infrastructure Council in November 2017.

Appendix A: References

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