A NATIONAL OPERATING STANDARD FOR HEAVY VEHICLE OPERATORS

JANUARY 2021

AUSTRALIAN LOGISTICS COUNCIL
SUPPLY CHAIN EFFICIENCY AND SAFETY

Contents

Australia's Heavy Vehicle National Law should:

- encourage and embrace the use of technology for safety and access purposes;
- ensure operators have suitable safety management systems in place and the capital necessary to ensure the safe operation of heavy vehicles; and
- require operators to have the capital necessary to ensure the safe operation of heavy vehicles.

The Australian Logistics Council (ALC) believes these goals can be enhanced through the incorporation of a **national operating standard** into the Heavy Vehicle National Law (HVNL).

Why?

The *Analysis of Heavy Vehicle Safety Accreditation Schemes in Australia* undertaken for the National Heavy Vehicle Regulator (NHVR), commonly known as the **Medlock report**, found that based on the 2014 *Survey of Motor Vehicle Use* by the Australian Bureau of Statistics, 466,545 vehicles were rigid trucks whilst 96,226 vehicles were articulated vehicles.[1]

Medlock also found there is limited take-up of accreditation schemes. As at October 2017, there were 212 members of the TruckSafe scheme sponsored by the Australian Trucking Association and 6607 operators accredited by the NHVR under the National Heavy Vehicle Accreditation Scheme (NHVAS).

'The low uptake of the current accreditation schemes suggests the market place has decided the schemes aren't fit for purpose.'

There are a number of concerns about the accreditation concept, including:

- the cost;
- the fact that accreditation doesn't appear to reduce the level of enforcement activity on accredited operators; and
- the poor quality of auditors.

1 Medlock Report - https://www.nhvr.gov.au/files/201812-0966-analysis-of-hv-safety-accreditation-schemes-in-aus.pdf : 8

The low uptake of the current accreditation schemes suggests the market place has decided the schemes aren't fit for purpose.

Yet, there is a need to ensure that the nation's heavy vehicle fleet is being operated by those capable of meeting an agreed set of standards.

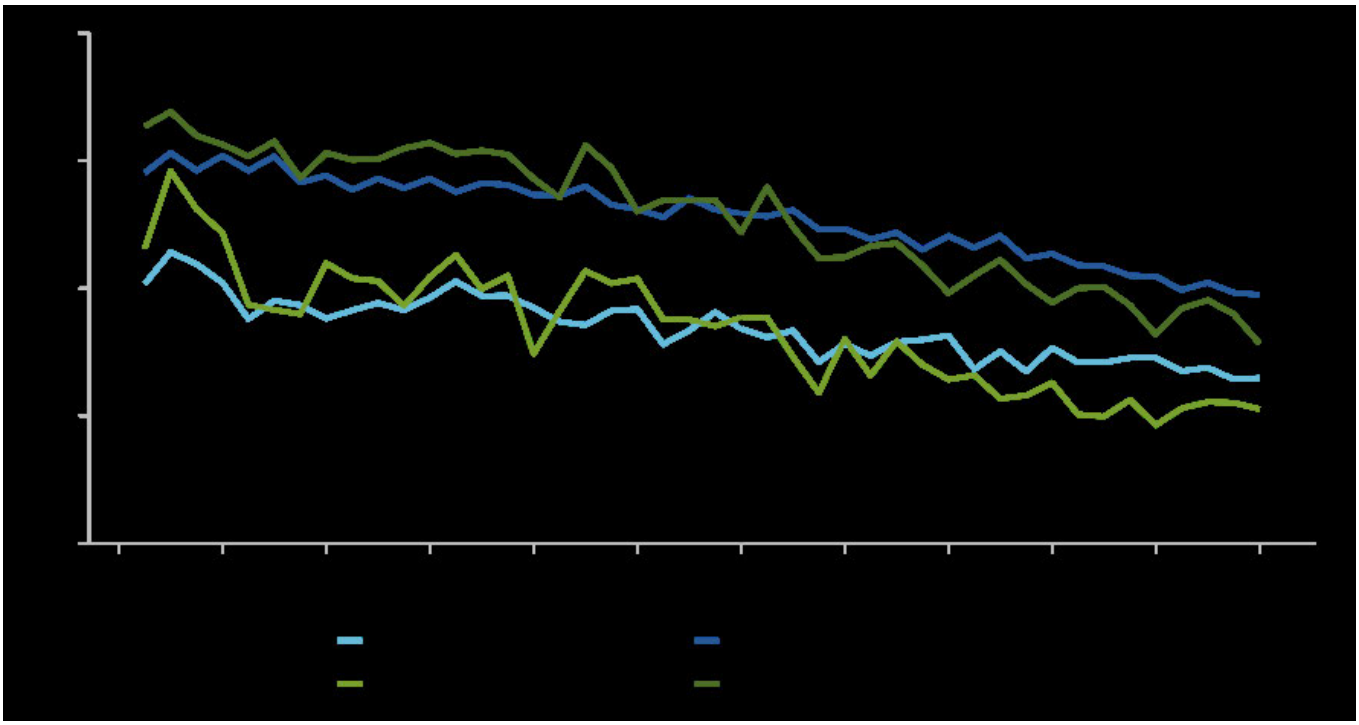
This is because:

- during the 12 months to the end of September 2020, 162 people died in crashes involving heavy trucks. These included 95 deaths crashes involving articulated trucks and 70 deaths involving heavy rigid trucks
- those fatal crashes involving heavy trucks decreased by 9.5 per cent compared with the corresponding period one year earlier and decreased by an average of 4.2 per cent per year over the three years to September 2020[2].

This constitutes far too many deaths.

The Productivity Commission has also observed[3] that the HVNL may not have influenced safety outcomes:

Figure 6.4 **The HVNL does not appear to have significantly affected heavy vehicle safety outcomes** [a,b]
Crashes involving injury or death per billion vehicle kilometres travelled (VKT)



a Non heavy vehicles include all vehicles excluding articulated and heavy rigid trucks. The Commission is aware that a quality assurance process is underway for WA crash statistics before 2012.

b The HVNL commenced on 10 February 2014 in NSW, Vic, ACT, Qld, SA and Tas.

Sources: Commission estimates based on the National Crash Database and BITRE VKT estimates (unpublished).

2 https://www.bitre.gov.au/publications/ongoing/fatal_heavy_vehicle_crashes_quarterly.aspx
3 Productivity Commission (2020) National Transport Regulatory Reform Inquiry Report: https://www.pc.gov.au/inquiries/completed/transport/report/transport.pdf

Finally, some small operators who want to be in the NHVAS (which has compliance audits) can also have:

- some clients, who require to see an audit showing HVNL compliance undertaken by the TruckSafe scheme;
- others clients who insist on an audit conducted using the ALC Master Code Auditing Service (AMCAS) looking for the same thing; and
- if they wish to provide services for some prime contractors, a compliance audit conducted by the contractor

before the client or contractor will engage them.

Having different people auditing the same business management system for HVNL compliance is costly and does not improve safety outcomes.

‘Having different people auditing the same business management system for HVNL compliance is costly and does not improve safety outcomes.’

The Solution – A National Operating Standard

ALC believes a practical solution is the development and implementation of a **National Operating Standard** with the following elements:

1. Creating a list of operators

The first requirement would be for an operator to identify the entity operating a heavy vehicle(s) and the place(s) heavy vehicles are garaged.

Amongst other things it will help monitor and control the incidence of phoenixing in the industry.

2. Making safety management systems mandatory

The second is to require operators to maintain a safety management system (SMS), meeting standards made by the NHVR.

Safety management systems, appropriately scaled to business needs, are a well-known tool designed to manage workplace safety. These are used in industries with significant safety risks, including the aviation, petroleum, chemical, railway and electricity sectors.

'ALC believes a practical solution is the development & implementation of a *National Operating Standard*.'

The enabling legislation could be modelled on NSW laws[4] which require accredited bus and coach operators to have an SMS complying with guidelines made under the bus safety law.[5]

- It is noted that in NSW, taxi operators are also required to maintain and operate an SMS.[6]

One of the SMS standards should be that an operator maintain an SMS complying with what is currently the registered industry code of practice made under Part 13.2 of the HVNL (commonly known as the Master Code).

This would provide:

- communities with assurance that operators have systems in place to manage safety; and
- create productivity gains through a reduction in audit duplications through the provision of a common set of standards

and so encouraging the operators of heavy vehicle safety schemes to mutually recognise each other's audits and so reduce the number of audits that operators have to undergo and pay for.

'One of the SMS standards should be that an operator maintain an SMS complying with the Master Code.'

4 Section 9D of the Passenger Transport Act 1990 (NSW) http://www.austlii.edu.au/cgi-bin/viewdoc/au/legis/nsw/consol_act/pta1990248/s9d.html

5 Found at: https://www.rms.nsw.gov.au/documents/business-industry/buses/boas-safety-management-system-guidelines.pdf

6 Division 2 of Part 2 of the Point to Point (Taxi and Hire Vehicles) Regulation 2017 (NSW) http://www.austlii.edu.au/cgi-bin/viewdoc/au/legis/nsw/consol_reg/ptptahvr2017610/s7.html

3. Ensuring an operator has the capital to maintain a heavy vehicle

The third important element operator to prove to the satisfaction of the NHVR that a nominated amount of capital is available to the business.

Maintenance has been found to be one of the discretionary expenses cut by some operators to make ends meet.

The community must have confidence that heavy operators have available the funds to undertake regular and appropriate vehicle maintenance.

The enabling legislation could be modelled on NSW laws[7] which require accredited bus and coach operators to be able to prove they have access to capital so that vehicles can be maintained.

4. Mandatory collection of data

The fourth important element is to require the mandatory collection of data by heavy vehicles, through the use of equipment compatible with standards made under the National Telematics Framework.

ALC believes data is the 'new oil' for the freight transport industry.

Historically, one of the perceived barriers to mandatory collection of data has been the cost of the equipment required. However, there is little doubt equipment is a lot cheaper since the HVNL was first drafted.

'The community must have confidence that heavy operators have available the funds to undertake regular & appropriate vehicle maintenance.'

ALC members advise that for around $2500 (for hardware) plus approximately $30-$50 a month service fee, a compliant unit can be obtained that provides:

- compliance with NHVAS mass, maintenance and fatigue modules;
- electronic work diaries and electronic fit for duty declarations;
- integration with on board weighing systems, electronic braking systems, transport/freight management systems, distraction monitoring services and cameras,
- applications to calculate Fuel Tax credits, location and speed monitoring services, trailer tracking and driver navigation services; and
- assistance in fuel management and the production of engine information.

7 Regulation 10 of the Passenger Transport (General) Regulation 2017(NSW) http://www.austlii.edu.au/cgi-bin/viewdoc/au/legis/nsw/consol_reg/ptr2017394/s10.html

‘It is no longer feasible to argue that compliance costs outweigh the benefits of mandatory recording of data.’

On this basis, it is no longer feasible to argue that compliance costs outweigh the benefits of mandatory recording of data, which include:

- allowing road owners to fully understand the volumes of heavy vehicle traffic on their network;
- providing NHVR with information on speed and fatigue, where there is cause to investigate;
- providing operators with data that can help them develop their business;
- giving road owners the best data to make decisions as to whether a particular vehicle should access a road; and
- providing data that can be used in a National Freight Data Hub, to enable industry and government freight sector participants make better informed operational, planning andinvestment decisions.[8]

It is finally noted that recommendation 8.2 of the Productivity Commission’s Inquiry ***Report on National Transport Regulatory Reform*** said:

Governments should prioritise the uses of data with the greatest potential to improve productivity in the transport sector. These include facilitating coordination between road users and infrastructure managers to:

- *inform the provision and management of road infrastructure*
- *inform decisions around permits and road access for heavy vehicles*
- *assist in the development and implementation of the Heavy Vehicle Road Reform agenda.*

The Australian Government should give priority to these uses of transport data when developing the National Freight Data Hub.[9]

This recommendation is endorsed by ALC.

8 See Transport and Infrastructure Council (2019) National Freight and Supply Chain Strategy National Action Plan: 22 - https://www.freightaustralia.gov.au/sites/default/files/documents/national-action-plan-august-2019.pdf

9 Productivity Commission National Transport Regulatory Reform Inquiry Report: 33 https://www.pc.gov.au/inquiries/completed/transport/report/transport.pdf

Conclusion

The creation of a National Operating Standard offers the opportunity to enhance the safety and productivity outcomes of heavy vehicle operators – key objectives of the HVNL.

The opportunity should be taken to make these amendments to the National Law, making the legislation fit for the 21st century and beyond.

‘The opportunity should be taken to make these amendments to the National Law, making the legislation fit for the 21st century and beyond.’

ALC Members

Corporate Members

ARTC
LINFOX
NSW Ports
PORT of BRISBANE Here for the future
Port of Melbourne
PORT of NEWCASTLE
QUBE
SCF BUILT TO CONTAIN
TOLL
Woolworths The fresh food people
amazon.com.au

Associates

1Stop
americold
ANL
arc infrastructure
BLUESCOPE
coateshire
coles
CSR
DAIMLER
DARWIN PORT
DHL
DP WORLD Australia
GPT The GPT Group
HINO
JWL JOHN WEST LOGISTICS PTY LTD
LIBERTY
LINX CARGO CARE GROUP
LOSCAM
Metcash
MOOREBANK INTERMODAL COMPANY
MTData A Telstra Company
Northern Territory Airports
ONE RAIL Australia
origin
City of Canning A welcoming and thriving city PARKES SHIRE COUNCIL
PATRICK
PGA MANAGEMENT
QANTAS FREIGHT
Queensland Government
ROYAL WOLF
SEA Electric
STARTRACK
SWIRE
SYD Sydney's Airport
TasPorts
Teletrac Navman
TNT
NSW Transport
Victoria International Container Terminal
VOLVO

National Sponsors

AustralianSuper
City of Canning A welcoming and thriving city
GS1 Australia
insync surveys research consulting
Linde Material Handling
MTData A Telstra Company
nti

Strategic Partners

AUSTRALIAN FOOD & GROCERY COUNCIL
AUSTRALIAN STEEL INSTITUTE
ACRI Australasian Centre for Rail Innovation
IANA INTERMODAL ASSOCIATION OF NORTH AMERICA
INFRASTRUCTURE PARTNERSHIPS AUSTRALIA
FREIGHT AND LOGISTICS COUNCIL OF WA

Research & Universities

CRCNA
DEAKIN UNIVERSITY CSCL Centre for Supply Chain and Logistics
iMOVE

Last updated November 2020

Honorary Fellows

Andrew Ethell, March 2017
Don Telford, March 2016
Ingilby Dickson, March 2015
Ian Murray AM, March 2012
Paul Little AO, February 2011
Peter Gunn AM, February 2011
Ivan Backman AM, May 2010
David Williams OAM, May 2010

@AustLogistics

linkedin.com/company/australian-logistics-council

AUSTRALIAN LOGISTICS COUNCIL

SUPPLY CHAIN EFFICIENCY AND SAFETY

A Single Freight Data Standard for the National Digital Framework

November 2020

Table of Contents

Introduction

It is evident that technology and data will play an increasingly important role in the future operation of Australia's supply chains – allowing Australia to meet its growing freight task more safely and efficiently.

To secure that outcome, there is a significant amount of work to be done to improve both the quality and quantity of data available to policy makers and industry participants regarding the operation of Australia's supply chains.

This Paper sets out the key data elements and standards for achieving this outcome, allowing Australia to more effectively monitor and measure supply chain performance.

It will help promote more efficient deliveries and lower prices for Australian consumers and will also help make certain Australia's export-dependent economy can remain internationally competitive.

The scope of this paper is limited to the movement of freight and heavy vehicles.

Other data elements may be published by other entities that are relevant to other freight modalities. These may be incorporated into this standard as the concept is further developed.

Finally, data aggregators and telematic service providers may also subsequently exchange processes to facilitate the movement of information. This is however out of the scope of this paper.

Further relevant information can be found in the links contained in the **appendix.**

Background & Policy Setting

In May 2018, ALC held its first Supply Chain Technology Summit (the Technology Summit) to discuss how industry can use technology to improve productivity and safety outcomes.

A clear consensus reached at the Technology Summit was the need for data to promote visibility and interoperability.

Visibility is important as it allows improved predictability, efficiency, productivity, and sustainability, reduced need to keep inventory, the identification of bottlenecks and a reduction in fatigue and errors.

It was further noted that data quality is vitally important. New technologies rely on data feeds. If poor data goes in poor information will come out.

Therefore, every company must take responsibility for the information contained in their systems. This is because end to end supply chains have multiple stakeholders that all rely on each other.

At present, the quality of data able to be passed through the supply chain can be quite poor, especially when participants record freight movements using different data systems that cannot 'talk' to each other, or worse still, where freight movements are recorded on manual paper records or not at all.

Errors can frequently occur as the same information is entered on numerous occasions on different systems. Indeed, it is possible for a single container number to be fed into computer systems up to 30 times as the container moves through the supply chain. This is to satisfy the various requirements of customers, port operators, quarantine, customs operations, and other parties involved in a shipment.

This situation could be greatly improved, and supply chain efficiency greatly enhanced, through the adoption of a single data standard in Australia's freight logistics industry.

ALC has a policy requiring heavy vehicles to be fitted with telematics devices for safety and other purposes since 2010. In 2018, the ALC Board subsequently endorsed a policy committing ALC and its membership to working towards the adoption of global data standards by all participants in the Australian Logistics Industry.

GS1 global data standards offer the ISO/IEC 19987 Electronic Product Code Information Services (**EPCIS**) standard and the associated ISO/IEC 19988 Core Business Vocabulary (CBV) that provides the framework for the interoperable sharing of information about the physical movement and the status of objects including products, materials, shipments etc as they travel the supply chain.

In addition, the ability for industry to physically capture data effectively and automatically about shipments and activities is essential to sharing information about them. Typically, either barcodes or Gen 2 UHF RFID tags should be used to link the physical object to the digital information about the 'what' the 'where' the 'when' and the 'why' dimensions so important in ensuring freight visibility. As technologies evolve, other mechanisms such as sensors or IoT devices could be used to automatically capture data.

The National Telematics Framework, which is administered by Transport Certification Australia (TCA) on behalf of government transport authorities, is aligned with ISO 15638 which establishes the Framework for Collaborative Telematics Applications for Regulated Commercial Freight Vehicles which will enable data to be used for safety, compliance and planning purposes.

The possible combination of the data captured using these standards would appear to have the advantage of bringing together under one regime both heavy vehicle and freight movements, which would:

1. assist in the collection of statistics for purposes such as the ABS Transport Satellite Account, through the presentation of information in a uniform format;

2. provide a uniform data format that can be used for those wishing to enhance the visibility of freight in which they have an interest;

3. present information to road managers in a way that would facilitate decisions relating to access to routes by heavy vehicles;

4. assist compliance with legislation; and

5. facilitate planning by both industry and governments.

How to use this document

This document is designed to be used in a modular fashion, selecting the data elements, and the data layers that are applicable to the relevant application. This document aims to create a single set of 'standards' for Australian industry and government to use, and to support safe and efficient data sharing between commercial entities, government entities, data aggregators and technology providers.

The data elements are separated into data 'layers' (see later further details), which may be used independently or collectively, depending upon the needs of the user. For example, a freight forwarder may be primarily interested in data relating to the goods being transported, while another might seek to combine this with data relating to the vehicle as well. Conversely, many data systems collect information

about the identification, characteristics, and movement of a vehicle without any reference to the freight being carried.

We anticipate there will be different users of this document, including:

- Telematics service providers
- Data aggregators
- Transport operators
- Logistics managers
- Freight customers
- Road managers and public purpose analytics users
- Those developing the National Freight Data Hub.[1]

This document aims to provide sufficient information to support interoperability between entities in the freight data chain.

Freight customers may use this document as a reference or requirement for contractors and telematics service providers to comply with in provision of services and data/analytics.

Logistics managers may elect to use this document as a reference to ensure interoperability with other entities such as telematics providers of transport operators, transport operator consignment tracking systems, customer reporting systems etc.

Transport operators may be asked to comply with this document, and either ensure their own commercial systems, or the data services they procure from third parties comply with the standards underpinning this document.

Data aggregators, and **telematics service providers** may be asked to comply with the standards referenced in this document when constructing data schemas, exchange systems and analytics.

Data can be of high public value for **road managers, other government agencies** and research purposes. The ability to access, compare, aggregate, and analyse data efficiently for regulatory, planning, policy or transport operational purposes depends on a level of standardisation in data recording, storage, transmission. Government may elect to reference this document in relation to data sharing arrangements for entities in the freight supply chain sharing data for public purposes.

Potential future areas for development

While out of scope for this document at this time, in the future some of the following areas may be considered for inclusion:

- vehicle movements and characteristics beyond movement (harsh braking, fuel use, vehicle combination details etc)
- real time data transfer to support parcel tracking
- driver identity and behaviour (identity, blood alcohol)
- geographic details such as distribution centre characteristics, rest areas etc. and;
- policy setting with business-to-business connections for real-time freight and parcel tracking etc.

[1] https://www.infrastructure.gov.au/transport/freight/national-freight-data-hub/index.aspx

Where to go for more information:

- For further policy background: http://www.austlogistics.com.au/wp-content/uploads/2018/10/A-Common-Data-Set-for-our-Supply-Chain.pdf
- For further assistance with implementation of GS1 global data standards: email freight.logistics@gs1au.org
- For additional information about the National Telematics Framework please see the TCA.gov.au, or contact us: https://tca.gov.au/contact/

Mapping of current data standards

The constant evolution and improving affordability of technology, together with the use of open data standards, offers tremendous scope to improve the efficiency of Australia's supply chains.

The current model of interoperable data standards includes a suite of inter-related standards, formats, and data definitions for a typical "transport hierarchy" as illustrated below.

Ensuring consistent identification at each layer of the transport hierarchy is of critical importance to lay the correct digital foundations upon which relevant additional data can be captured (and potentially shared) across the supply chain. It is the cornerstone of achieving efficient supply chain visibility. Using the same digital language enables the simplification of integration between parties that use different systems; the absence of which either requires multiple entry and translation of the same data element, paving the very real risk of data errors in the process, while also adding unnecessary costs.

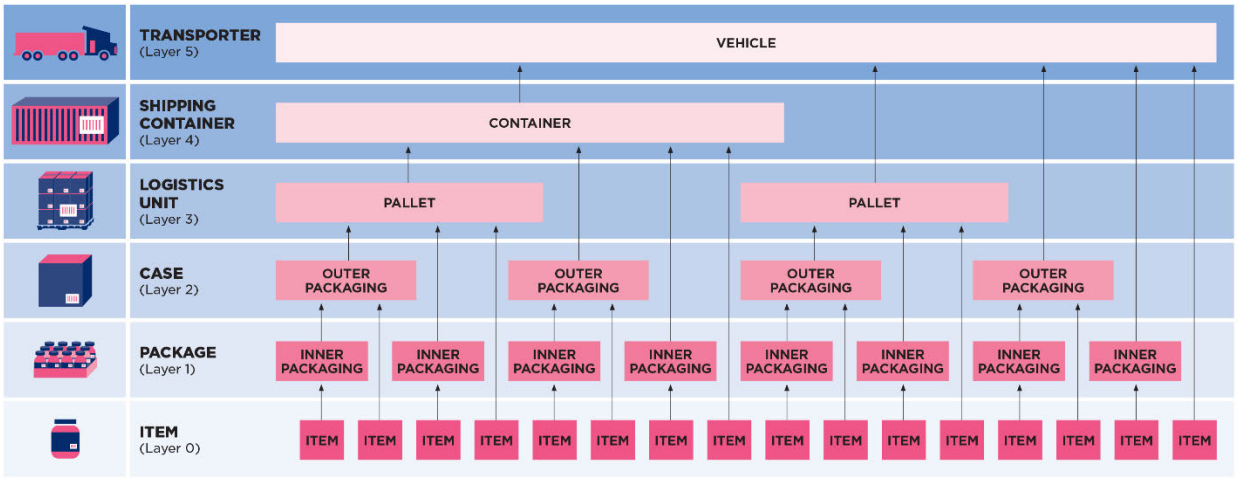


Figure 1: Typical Transport Hierarchy – example of cargo layers

Core data elements

Data elements that are considered common to all supply chains and companies are referred to as being "core" – that is they are used in all like business process types. Core data elements lend themselves to be standardised as there is no value to the process in having different expressions of these data elements. Key transport data requirements relate to:

- Where are transport events taking place – Location Identification
- What is doing the transport – Transport Asset Identification
- What is being transported – Logistic Unit Identification
- Capture and recording of physical transport Events – "What, where, when, why*" (e.g. Container A was at location B at x time/date and it was being "loaded" onto transport asset C)*

The data elements below, relate back to a series of core standards that are referenced in the appendices. These include the:

- **GS1 General Specifications –** are the foundational GS1 global data standards that define how identification keys, data attributes and barcodes must be used in business applications. The primary audience are technically oriented staff members of companies, solution providers and GS1 Member Organisations. They are used as a foundation for other GS1 standards and services to facilitate data exchange processes and access to local and global digital registries such as:
  - GEPIR (Global Electronic Party Information Registry)
  - GS1 Registry Platform
  - GDSN (Global Data Synchronisation Network)
  - GS1 EDI (Electronic Data Interchange), including the GS1 EANCOM and GS1 XML standards
  - GS1 EPCIS (Electronic Product Code Information Service) & associated GS1 CBV (Core Business Vocabulary)
  - National Location Registry
- **National Telematics Framework (NTF) Data Dictionary –** contains a range of potential data elements that are drawn from the National Telematics Framework Data Dictionary, which relates back to the ISO 15638 Intelligent transport systems — Framework for collaborative telematics applications for regulated commercial freight vehicles (TARV). The NTF seeks to improve telematics data interoperability by defining data elements, levels of assurance and business rules for the use of regulatory telematics, but which can also be applicable to the sharing of data for other purposes.

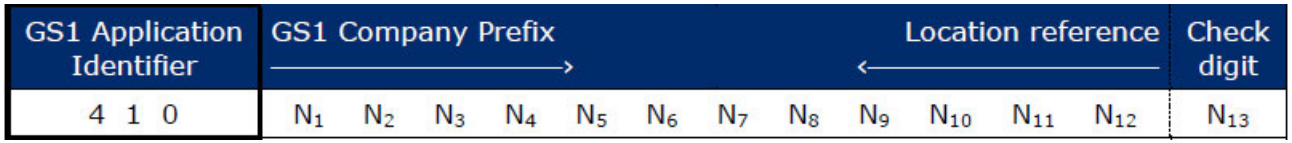
Location data

Location data is fundamental to the physical transport process. The task of efficient pickup and delivery of goods is the cornerstone of the freight sector's operations. The GS1 GLN (Global Location Number) is the key used to identify specific physical locations and to link to additional attributes about that location.

Accurate and timely location master data will be increasingly important to achieving transport task efficiencies and supply chain visibility. Master data can be shared via access to the National Location Registry[2]

Data Element Name	Description	Standards Reference	Required Data Element Format	Mandatory / Optional	Data origin/source
GS1 Global Location Number (GLN)	Globally unique identification code used to identify physical locations, digital locations, and parties in the supply chain. Appended master data can be accessed via the National Location Registry.	ISO/IEC 6523	Numeric 12 digit plus check digit preceded with Application Identifier[3] (410)	Mandatory if applicable	Allocated by the party who owns or has custody of the location

Figure 2: Format of element string GLN



[2] *National Location Registry is the central repository of trusted source data for locations in Australian supply chains.*

[3] *Application Identifiers (AI) provide the meaning, structure, and function of the GS1 system element string so they can be correctly processed in users' application programs. (see GS1 General Specifications for complete list of AIs)*

Layers 0/1/2 – Trade Item data layers

Individual trade items are typically packaged in one or more layers; they can be transported in any one of these layers depending on the requirements of the buyer or the business process being adopted. For all intents and purposes, the transport unit is usually made up of multiple trade items grouped together to create a logistics unit. Most transport companies will track freight at this grouped level depicted in Layer 3 below. For transport companies that do wish to track at the item level, this is made possible by leveraging the item level identification code (GTIN) assigned by the product's brand owner. Trade item data is typically only exchanged between the seller and buyer of the goods; the transport company is often not required to know product details about the trade item except in the case where they are hazardous goods.

Data Element Name	**Description**	**Standards Reference**	**Required Data Element Format**	**Mandatory / Optional**	**Data origin/source**
GS1 Global Trade Item Number	Globally unique identification for individual tradeable items and their respective Units of Measure, eg. Inner pack or outer case.	ISO/IEC 15459-1	Numeric 8,12,13 or 14 digit including check digit preceded by Application Identifier[4] (01)	Optional for transport processes.	Allocated and applied by the brand owner of the trade item.

Figure 3: Format of the Element String GTINs

GS1 Application Identifier	Global Trade Item Number (GTIN)													
	GS1-8 Prefix or GS1 Company Prefix →								← Item reference					Check digit
0 1	0	0	0	0	0	0	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8
0 1	0	0	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}
0 1	0	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}
0 1	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}

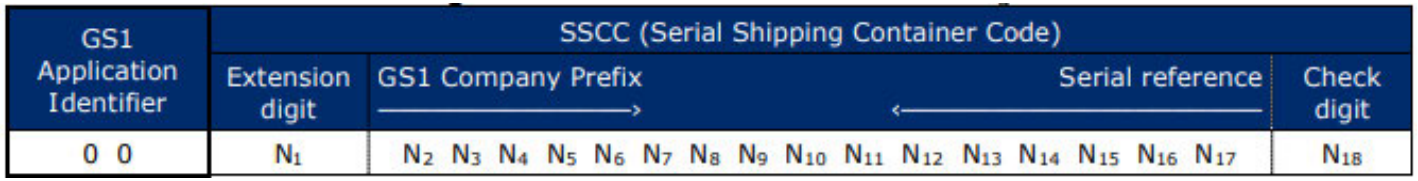
[4] *Application Identifiers (AI) provide the meaning, structure, and function of the GS1 system element string so they can be correctly processed in users' application programs. (see GS1 General Specifications for complete list of AIs)*

Layer 3 – Logistics/Transport unit data layer

In executing a transport task, physical and digital identification of the transport unit is the most critical application of the process to enable streamlined exchange of data about the unit. To avoid re-identification at each point in the chain, the globally unique, Serial Shipping Container Code (SSCC) provides a "license plate" if you will for each distinct transport unit, and is the foundation to allow for end to end tracking, visibility, and supply chain connectivity. This identification key is globally certified for both domestic and international identification of freight units the world over. All transport units should be identified with an SSCC encoded in a compliant barcode, printed on a freight label[5] and affixed to the transport unit so automatic data capture can take place during the physical handling processes at each point in the chain, without need for re-labelling. Data captured electronically can be exchanged with relevant parties. A transport unit may be associated with a consignment which can be identified with a "Global Identification Number for Consignments" (GINC).

Data Element Name	Description	Standards Reference	Required Data Element Format	Mandatory / Optional	Data origin/source
GS1 *Serial Shipping Container Code* (SSCC)	Serialised identification code used to uniquely identify the transport/logistics unit and should be used as the primary and only end to end tracking identifier. *NB: Linked to a transaction reference, the SSCC unpacks the contents of the logistics unit.*	ISO/IEC 15459-1	Numeric 18 digit including an extension digit and a check digit preceded by Application Identifier[6] (00) see figure 2	Mandatory	Applied by the party creating the logistics unit. The mandatory barcode symbology for SSCC is the GS1-128 with options for additional 2D GS1 DataMatrix or GS1 QR code symbologies

Figure 4: Format of the Element String SSCC

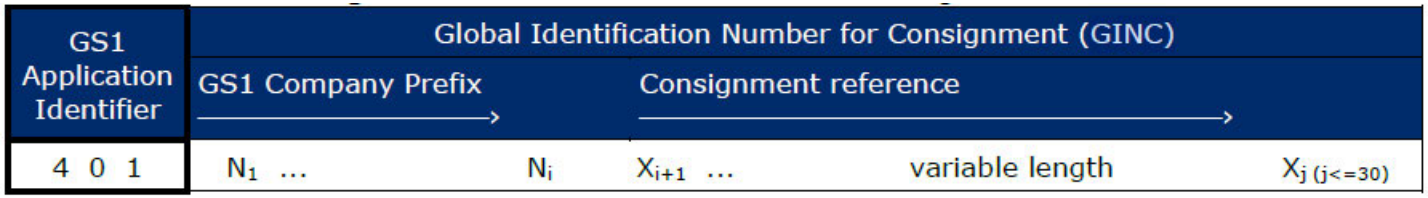


[5] *Freight Labelling guideline can be downloaded from here https://www.gs1au.org/download/gs1au-guideline-australian-freight-labelling.pdf/file*

[6] *Application Identifiers (AI) provide the meaning, structure, and function of the GS1 system element string so they can be correctly processed in users' application programs. (see GS1 General Specifications for complete list of AIs)*

GS1 Global Identification for Consignment (GINC)	Identifies a logical grouping of goods that have been consigned to a freight forwarder and is intended to be transported	ISO/IEC 15418	AN30 character – variable length with preceding AI (401)	Optional	Allocated by a freight forward or carrier acting as a Freight Forwarder.

Figure 3: Format of Element String GINC

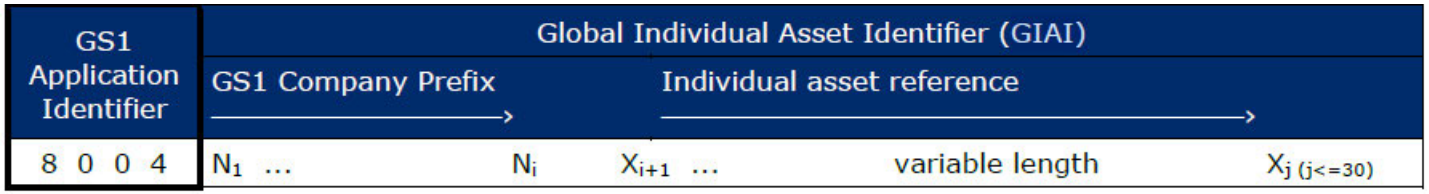


Layer 4 – Container data layer

The container layer can be a shipping container or a ULD in the case of air freight; used for transporting multiple units of freight. The container (or ULD) can be identified with a fixed asset identifier to enable tracking of freight as it is aggregated and disaggregated into and out of these containers.

GS1 Global Individual Asset Identifier (GIAI)	Serialised code used to identify a fixed asset. Eg. Truck or shipping container [could also include BIC code in reference field]	ISO/IEC 15459-4 & 5	AN30 character – variable length with preceding AI (8004)	Optional	Applied by the party who owns the asset

Figure 5: Format of element string GIAI



Layer 5 – Vehicle data layer

Layer 5 relates to data elements that identifies the freight vehicle and relates to its movement and location at any point in time. It should be noted that the NTF Data Dictionary contains a number of fields that are unique to Australia (such as vehicle combination codes), or that have not yet been codified in an International Standard (such as many of the mass-related fields).

A number of the data elements are optional and relate to preferred format should the data be included in a data set.

Data element	Description	Standards Reference	Required Data Element Format	Mandatory /Optional	Data origin/source
Axle Count	Total number of axles present within an axle group or vehicle (as per context)	ISO 15638	Numeric, 1 to 99, count of axles	Optional	On-Board Mass (OBM) and Telematics device or manual entry for static vehicle configurations
Axle Group Count	Total number of axle groups present within a vehicle	ISO 15638	Numeric, 1 to 99, count of axle groups in vehicle combination	Optional	OBM and Telematics device or manual entry for static vehicle configurations
Axle Group Mass	Mass of an individual axle group	NTF Data Dictionary	Numeric, 1 to 999999, measurement in kilograms	Optional	OBM and Telematics device
Gross Vehicle mass	Total mass of vehicle combination	ISO 15638	Numeric, 1 to 999999, measurement in kilograms	Optional	Telematics device
Latitude	Angular distance on a meridian north or south of the equator	ISO 15638	Location at point in time: Decimal from -90.00000 to +90.00000, Relative to the datum GDA94, Decimals: 5.	Mandatory	Telematics device
Load Status	Indication of whether a vehicle is loaded or not	ISO 15638	Numerated, N = No load; L = Load	Optional	Telematics device or manual entry
Longitude	Angular distance east or west from Greenwich meridian	ISO 15638	Location at point in time: Decimal from–180.00000 to +180.00000, Relative to the datum GDA94, Decimals: 5.	Mandatory	Telematics device
Satellite count	Number of satellites used to establish a measurement made by a GNSS receiver	ISO 15638	Numeric, 0-99, (example of a measurement of GNSS precision)	Optional	Telematics device
Self-Declared Mass	Self-declared gross vehicle mass	NTF Data Dictionary	Numeric, 0.0 to 999.9, measurement in metric tonnes, Decimals: 1	Optional	Manual entry

Vehicle Category Name	Human-readable representation of a predefined Vehicle Category	NTF Data Dictionary	Vehicle Category Name is specific to the National Telematics Framework.	Mandatory	Telematics device or manual entry,
Vehicle Identification Number	Unique code, including a serial number, used by the automotive industry to identify a vehicle	Australian vehicle identification processes	String, 17 digits, (eg: [A-HJ-NPR-Z0-9]{17})	Optional	Recorded manually from Vehicle Identification plate
Vehicle Registration Jurisdiction	Unique identifier for the Jurisdiction where a Vehicle Registration was issued by the relevant authority	Australian vehicle identification processes	Enumerated, Values: VIC; NSW; QLD; SA; WA; NT; TAS; ACT; FIRS	Mandatory	Recorded manually for each vehicle
Vehicle Registration Number	Formal identification of a Vehicle Registration issued by the relevant authority for a Jurisdiction to a distinct vehicle	Australian vehicle identification processes	Alphanumeric string, 6-10 digits in length. Combination of Vehicle Registration Number and Vehicle Registration Jurisdiction is a unique identifier for a registered vehicle	Optional	Telematics IVU

This data may be recorded and stored in a wide variety of formats to meet the needs of specific use cases. An example of a data record using some of these fields is illustrated below.

Vehicle registr'n	Registr'n jurisd'n	Vehicle cat (code)	Vehicle cat	Record Date Time	Position Latitude	Position Longitude	Satellite Count	Hdop Value	Spd	Self-declared mass
ABC123	NSW	17	PBS Quad Dog	2018-08-13 05:31:08	-33.85228	151.21067	4	18.5	50.4	40.1
ABC678	NSW	4	Semi Trailer (Quad Axle Trailer)	2018-08-14 05:31:38	-33.85022	151.21192	3	21.3	49.3	40.1

Conclusion

A data standard like that presented in this document could be potentially used as the basis of any Freight Hub developed under the Freight and Supply Chain Strategy endorsed by the former COAG Transport and Infrastructure Council.

Should there be interest in a form of common database like that presented in this paper, several subsequent issues will require consideration.

They include;

1. identifying the type of entity that could act as a custodian of data provided by industry and stored in a data hub;

2. the standards (including security standards) under which the stored data would be kept;

3. how to manage the various permissions granted by particular industry participants – for example, identifying those who are prepared to allow access to more granular information stored in freight hub because they wish to use the system for freight visibility or regulatory compliance purposes as opposed to those only prepared to permit data to be used (particularly by government) in an aggregated, de-identified form as well as ensuring that data is presented in the same format;

4. ensuring that any data provided is done so on a voluntary basis;

5. Privacy - Identifying who may extract information from a freight hub and why;

6. Whether there are any competition law issues that may arise if there is a desirability to transfer between party's non-proprietary information to encourage efficiency in the supply chain;

7. Identifying how intellectual property rights to data held by parties (or rights conferred on third parties by data owners to exclusively use identified data) can be respected;

8. The instruments governing the operation of any freight hub – these could include;

    a. A set of interlocking contracts potentially backed by a form of code of conduct; or

    b. An Act of the Federal Parliament,[7] and;

9. The development of data exchange processes to facilitate the transfer of information between industry participants and others.

[7] *Through the use of the trade and commerce, census and statistics and corporations power contained in s.51 of the Constitution*

However, the establishment of a foundation dataset is clearly the first step in developing the National Freight Data Hub forming part of the Freight and Supply Chain Strategy.

Governance

Responsibility for the continued development and publication of this document vests in the Technology Committee of the Australian Logistics Council.

Appendix

COMPANY INFORMATION

GS1 Australia

GS1 is a neutral, not-for-profit organisation that develops and maintains the most widely used global data standards for efficient business communication.

We are best known for the barcode, named by the BBC as one of “the 50 things that made the world economy”. GS1 standards and services improve supply chain visibility, efficiency, security and productivity across physical and digital channels in the Freight & Logistics sector.

With national Member Organisations in 114 countries, 1.5 million user companies and 6 billion transactions every day, GS1 standards create a common language that supports systems and processes in 25 sectors across the globe.

For more information visit the GS1 Australia website or follow us on LinkedIn and our YouTube channel.

Transport Certification Australia (TCA)

Transport Certification Australia (TCA) is a national organisation that provides assurance services relating to transport technologies and data to enable improved public purpose outcomes from road transport.

Priority outcome areas enabled by our services include improved road safety, transport efficiency, freight productivity, asset management and sustainability.

Key aspects of TCA include:

- An independent not-for-profit entity, with government oversight
- Administration of the National Telematics Framework, including its rules, specifications, agreements, digital infrastructure and other supporting services
- Assurance services that support but are appropriately separated from regulators, policy makers and enforcement activities, and underpin telematics applications and associated information and data services
- Advice that is based on evidence and a deep subject matter knowledge
- Trusted partner to both government and industry stakeholders, enabling a nationally consistent open market, with services covering all road vehicle types and associated digital infrastructure.

List of Referenced Standards

GS1 Global Location Number https://www.gs1.org/standards/id-keys/gln

GS1 Global Trade Item Number https://www.gs1.org/standards/id-keys/gtin

GS1 Serial Shipping Container Code https://www.gs1.org/standards/id-keys/sscc

GS1 Global Identification Number for Consignment https://www.gs1.org/standards/id-keys/ginc

GS1 Global Individual Asset Identifier https://www.gs1.org/standards/id-keys/global-individual-asset-identifier-giai

GS1 EPCIS and Core Business Vocabulary https://www.gs1.org/standards/epcis

GS1 Standards Page https://www.gs1.org/standards

Links to National Freight Strategy

https://www.freightaustralia.gov.au/

Link to ALC Discussion paper

A Common Dataset for our Supply Chain http://www.austlogistics.com.au/wp-content/uploads/2018/10/A-Common-Data-Set-for-our-Supply-Chain.pdf

Links to GS1 Standards and technical documents

GS1 General Specifications https://www.gs1.org/standards/barcodes-epcrfid-id-keys/gs1-general-specifications

Freight Labelling Guideline https://www.gs1au.org/download/gs1au-guideline-australian-freight-labelling.pdf/file

Links to TCA National Telematics Framework documents

TCA National Telematics Framework https://tca.gov.au/national-telematics-framework/

Data Dictionary https://tca.gov.au/national-telematics-framework/

List of Vehicle Category Names (and codes) https://tca.gov.au/publications/?filter=functional-technical-specification

Links to case studies and example ‘videos’

Catch Group Case Study https://www.youtube.com/watch?v=AL5xmJ5DECc