Chain of Responsibility

Core Body of Knowledge for the Generalist OHS Professional

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Abstract

Chain of Responsibility (CoR) places legal obligations on parties within the heavy vehicle road transport supply chain and has implications across various transport industries. Initially developed for the heavy vehicle industry, key principles of CoR, such as shared responsibility, are increasingly being recognised across different modes of transport worldwide. Changes to CoR laws introduced into the Heavy Vehicle National Law (HVNL) in 2018 strengthened alignment with general occupational health and safety (OHS) legislation and emphasised the shared accountability of multiple parties for safety breaches related to the use of heavy vehicles. A person can hold multiple roles in the supply chain, each of which may require different risk-management strategies.

This chapter explores the CoR concept in the context of transport safety. It equips generalist OHS professionals to effectively navigate the multidisciplinary transport sector, particularly with regards to managing the risks to public safety created by the actions or inactions of CoR parties. It provides evidence-based insights that clarify legal obligations under the HVNL and advocates a proactive, informed approach to heavy vehicle safety management that aligns with general OHS laws.

Keywords

Chain of Responsibility, due diligence, duty of care, HVNL, NHVR, primary duty, transport activities, public safety, safety

Contextual reading

For context, readers should refer to *OHS Body of Knowledge* 1.2 Contents, 1.3 Synopsis of the OHS Body of Knowledge, 2 Introduction, and 3 The OHS Professional: International and Australian Perspectives.

Terminology

Depending on the jurisdiction and the organisation, Australian terminology refers to ‘Occupational Health and Safety’ (OHS), ‘Occupational Safety and Health’ (OSH) or ‘Work Health and Safety’ (WHS). Consistent with international practice, this publication uses OHS except for specific reference to the Australian Work Health and Safety (WHS) Act and related legislation.

Jurisdictional application

This chapter includes references to the Australian national heavy vehicle legislation and the Australian model work health and safety legislation. This is in line with the Australian national application of the *OHS Body of Knowledge*. Readers working in other legal jurisdictions should consider these references as examples and refer to the relevant legislation in their jurisdiction of operation.

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1 Introduction

The transport of goods and services by heavy vehicles is a significant contributor to the Australian economy.[1] It impacts businesses large and small and, in turn, is impacted by business activities. Supporting safe heavy vehicle operations and delivering health and safety improvements to drivers are essential elements of ensuring the health, safety and welfare of transport industry workers and other road users.

In 2021 in Australia, 163 people were killed in crashes involving heavy vehicles (representing 15.4% of total road deaths); of these, 119 were not occupants of the heavy vehicles involved but rather occupants of light vehicles or other road users (pedestrians, motorcyclists or cyclists) (BITRE, 2023). In addition to a serious workplace issue, operation of heavy vehicles is a road and community safety issue. The benefits of safe transportation of heavy vehicles extend beyond the transport industry, contributing to the safety of all road users.

The operational landscape of the multifaceted road transport industry features a complex and interdependent network of roles and responsibilities. This network of connections is the basis of the Chain of Responsibility (CoR), forming a web of risk management, accountability and assurance. This chapter aims to guide generalist OHS professionals through the workings of the CoR concept as it applies to heavy vehicle operation, which is regulated by the National Heavy Vehicle Regulator (NHVR) applying the Heavy Vehicle National Law (HVNL).

1.1 Chapter scope

As defined in the HNVL, a *heavy vehicle* is:

> …a vehicle that has a gross vehicle mass (GVM) or aggregate trailer mass (ATM) of more than 4.5 tonnes. The GVM of a vehicle is the maximum it can weigh when fully loaded, as specified by the manufacturer. (NHVR, 2024d)

[1] In 2020-21, 304,224 people were employed in road transport and transport services earned $94.7 billion. In addition, logistics services and transport support services earned $44.1 billion and $12.2 billion, respectively (ABS, 2020-21).

Consequently, the scope of this chapter encompasses vehicles with a GVM exceeding 4.5 tonnes, including vehicles subject to fatigue-management regulations such as those with a GVM of more than 12 tonnes.

The chapter is designed to provide OHS professionals with the knowledge required to effectively advise their organisations on implementing CoR principles, thereby enhancing the safety of drivers, vehicles, other road users and the community. It examines the influence of routine and operational decisions made by individuals engaged in transport activities on road safety, and emphasises the significance of understanding which roles and decisions have a pivotal impact on ensuring safe heavy vehicle transportation.

While providing guidance for OHS professionals on a systems-based risk-management approach to safe operation of heavy vehicles, chapter content is cognisant of the requirements under the HVNL. The HVNL is detailed and subject to regular review and change. OHS professionals should ensure their knowledge remains current concerning any changes to the HVNL as it applies in their state or territory.

This chapter does not cover regulatory requirements for the movement of heavy vehicles, nor does it delve into the specifics of vehicle maintenance or technical specifications. Although the risks associated with driver fatigue, alcohol and other drugs in relation to heavy vehicle operation are addressed, the focus of the chapter is the Chain of Responsibility in ensuring the safety of transport activities. It does not provide an exhaustive analysis of fatigue management,[2] fitness for work, or the management of substance use within the workplace. As it does not focus on the management of risks from a workplace health and safety perspective, risks associated with unloading a vehicle (e.g. working at height, uncontrolled movement of mobile plant, and pedestrian and plant interface) are not addressed.

After considering the extent of safety issues associated with heavy vehicle operation (section 2), the chapter explores the ‘chain of responsibility’ concept and identifies the CoR parties (section 3), explains some important aspects of the heavy vehicle national legislation (section 4) and the boundary of duty associated with safety risk, which extends beyond the traditional workplace to include the public, infrastructure and the environment (section 5). Following brief discussion of an approach to risk management (section 6), the chapter explores the challenges in understanding and controlling heavy vehicle transport hazards and risks (sections 7 and 8) and recommends a systems-based approach to CoR

[2] See *OHS BoK* 20 Fatigue.

management (section 9). The chapter concludes with implications for OHS practice and a summary.

2 Extent of the problem

The *Transport and Logistics Industry 2024 Workforce Plan* (Industry Skills Australia, 2024) highlighted that 239 billion tonne-kilometres[3] of road freight were moved in 2022-2023, with the volume of domestic freight projected to grow by 16.4% between 2024 and 2030.

Truck driving is the most common occupation for Australian males, and one of the nation's most dangerous jobs. Data from 12 years of work-related fatal injury claims revealed that truck drivers had a 13-fold higher risk of a fatal workplace accident than other Australian workers (Xia et al., 2018). Furthermore, while more than 120,000 work-related injury and disease claims were made by truck drivers between 2004 and 2015, vehicle crashes accounted for only 17% of these claims, underscoring the need for comprehensive health and safety strategies in the trucking industry (Xia, 2018).

During the 12 months to the end of September 2024, 154 people died in crashes involving heavy vehicles, with 82 of these deaths involving articulated trucks. A further 16 people died in bus crashes (BITRE, 2024). More statistics relevant to heavy vehicle road freight are included in Figure 1.

[3] A tonne-kilometre (tkm) = the transport of one tonne of freight over one kilometre.

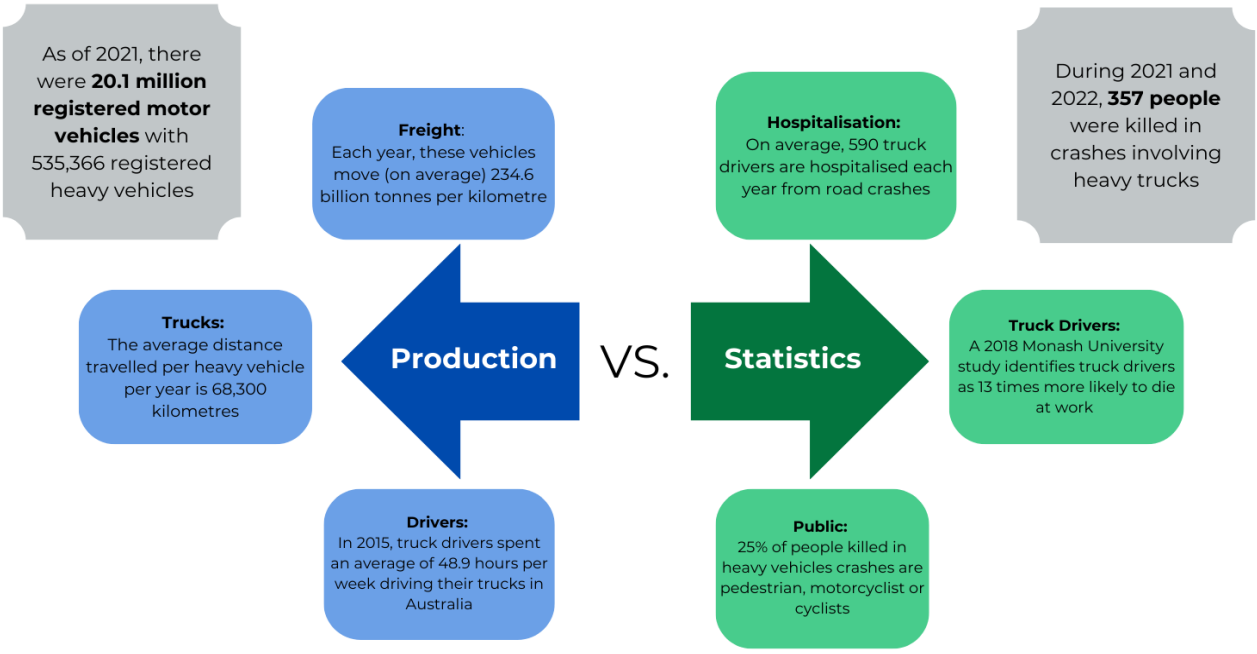

Figure 1: Selected road freight statistics (NTC, 2023; BITRE, 2023; Xia et al., 2018)

Small businesses – i.e. those employing fewer than 15 people (Fair Work Commission, 2024) – provide many employees to the transport and logistics industry, with 204,293 of the 206,327 businesses in the industry having fewer than 20 employees (Industry Skills Australia, 2024). This prevalence of small business contributes to the challenges faced in managing CoR for the industry in various ways, including:

- **Resource limitations**. Small businesses often operate with limited financial and operational resources, which can restrict their ability to invest in comprehensive safety and compliance programs.
- **Knowledge and expertise gaps**. Discharging the primary duty obligation (section 4.1) requires the CoR party (section 3.2) to have a thorough understanding of hazards, risks and controls. Small businesses may lack dedicated safety officers with the expertise to identify risks and recommend appropriate control measures.
- **Fragmentation of the industry**. With many small players, the industry becomes fragmented, making it challenging to achieve uniformity in compliance standards. This can lead to inconsistencies in how CoR responsibilities are managed and promoted across the sector.
- **Contractual pressures**. Small businesses often enter into contracts with larger companies that impose tight deadlines and cost constraints. These pressures can

incentivise or even necessitate corners being cut, including in areas critical to safety (e.g. vehicle maintenance, driver working hours).

- **Communication and collaboration challenges**. Effective CoR management requires clear communication and collaboration among all parties in the chain. The vast number of small businesses complicates these efforts, as establishing and maintaining robust communication channels with each entity can be daunting.
- **Limited access to training and support**. Although there are resources and training programs available to aid businesses in discharging their primary duty, small businesses may not have the same access to these resources as larger enterprises due to cost or lack of awareness, or both.

It might appear that heavy vehicle safety is only an on-road-incident issue that should be addressed through road safety regulations and campaigns. However, many heavy vehicles on the roads are workplaces, whether tool of trade vehicles, delivery service vehicles or road transport. Also, it is simplistic to consider driver behaviour/competence as the single cause of incidents involving a heavy vehicle without considering the broader systemic influences that impact driver behaviour.

Before the introduction of the CoR primary duty (section 4.1), businesses that engaged in heavy vehicle transport could enter contractual arrangements or require restrictive delivery arrangements that influence poor driving behaviours or illegal activities (e.g. reliance on stimulants to remain alert for long distances). Historically, managing these practices was left to the transport operator and the driver. Penalising these parties did not address the root cause of the behaviour or ultimately result in safer outcomes for road users. An industry response was required.

3 The CoR concept

This section outlines the legislative development of the concept of a ‘chain of responsibility’ then explains the concept in terms of the participants or parties, and shared responsibilities.

3.1 Development

In the early 1990s, the Australian Government established the National Road Transport Commission (NRTC) to lead reform of the road transport industry, aiming for a consistent

and efficient national approach to road transport regulation (Moore & McIntyre, 2002). In the late 1990s and early 2000s, discussions about improving road safety began to shift towards a more comprehensive approach that included all parties in the transport supply chain as the industry and regulators started to recognise that responsibilities for road safety breaches often extended beyond the driver.

In 2001, an NRTC Information Paper – *Options for Regulation of the Road Freight Industry* (Ironfield, 2001) – articulated the need for a shared responsibility model in road safety, with new Chain of Responsibility provisions that "recognise that enforcement should not stop with the heavy vehicle's driver but should encompass all parties with control over the behaviour which led to the breach." The paper argued for extending legal accountability across the supply chain, drawing parallels with principles found in workplace health and safety legislation. Following the conceptual groundwork laid by Ironfield (2001) and other discussions, CoR laws that expanded accountability for safety breaches began to be formally introduced into Australian road transport legislation.

The Heavy Vehicle National Law (HVNL), which came into effect in 2014, included CoR provisions, and standardised the approach to safety and accountability across most states and territories. In 2018, amendments were made to the HVNL to strengthen CoR provisions, and align them more closely with workplace health and safety laws. These changes emphasised a proactive risk-management approach to safety in the transport supply chain.

Ongoing efforts to refine and improve HVNL provisions have included leveraging technology for better compliance and safety outcomes. Discussions have expanded to consider the impact of emerging technologies such as telematics[4] and global positioning system (GPS) tracking, and sustainability issues such as emissions reduction and fuel efficiency technologies.[5] A registered industry code of practice under the HVNL – known as the *Master Code* (Safe Trucking and Supply Chains Ltd, 2018) – provided a practical framework for managing safety and compliance with CoR obligations under the HVNL. Developed through collaboration among industry stakeholders and the NHVR, the *Master Code* was intended to give all parties in the supply chain clear guidance on how to meet their risk-management and safety duty responsibilities. This initiative represented an important milestone in the journey towards safer road transport in Australia.

[4] See, for example, *NHVR Regulatory Advice – Heavy Vehicle Safety Technology and Telematics*: https://www.nhvr.gov.au/safety-accreditation-compliance/chain-of-responsibility/regulatory-advice/heavy-vehicle-safety-technology-and-telematics

[5] See, for example, NHVR (2023), *Future Heavy Vehicle Roadmap*: https://www.nhvr.gov.au/files/media/document/276/202306-1371-future-heavy-vehicle-roadmap.pdf

Development of the CoR principle, with evolution from a driver-centric view of compliance to a holistic supply chain approach, has significantly shaped the landscape of road transport safety in Australia (Figure 2). Progression from Ironfield's (2001) foundational concepts to the comprehensive legislative framework in place in 2024 has proved a dynamic and responsive approach to improving road safety and accountability.

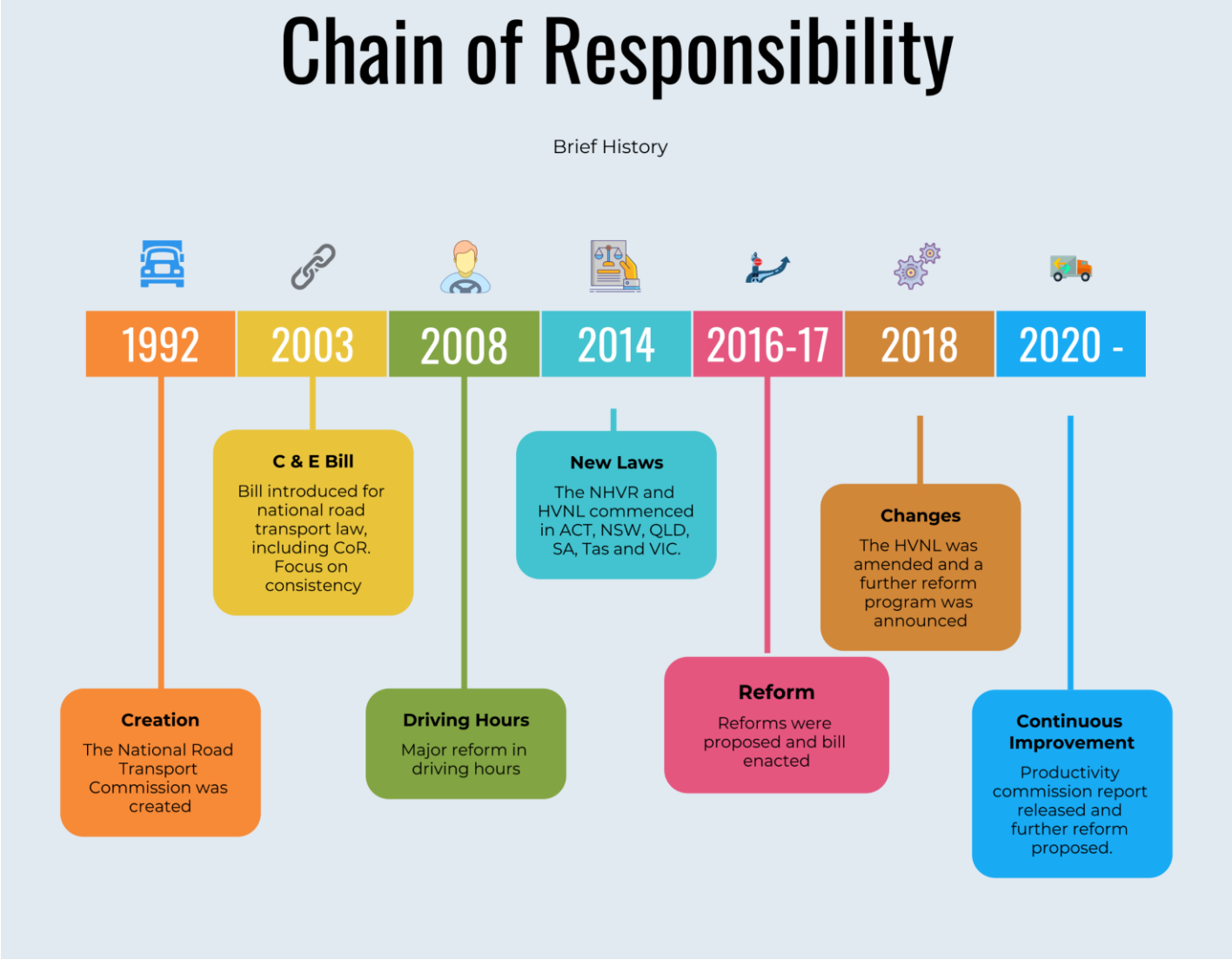

Figure 2: Development of the CoR

3.2 CoR parties

The term ‘chain of responsibility’ encapsulates the concept that each person or position that performs a transport activity can control or influence its safe performance and must make decisions that support safe transport activities to the extent that is reasonably practicable. This notion of concurrent and connected responsibility is considered in conjunction with identified roles with responsibilities and requirements for safe transport activity. The term ‘parties’ is used as the responsibility may rest with a person, position or organisation.

The terms that a particular CoR party agrees on or requires are within their direct control. However, these terms may influence the driver or transport operator to behave in a specific way. For example, terms and conditions that concern delivery timeframes or drop-off windows, such as penalties for delivery delays or payments based on kilometres travelled may directly or indirectly impact driver behaviour (e.g. speed breaches or inappropriate fatigue-management methods). In comparison, consider the possible implications if a penalty was imposed if a prescribed number of workplace inspections were not completed or if more injuries than a specified number were reported.

The HVNL defines the CoR by identifying the parties involved in the transport supply chain and conferring on each of them a responsibility to ensure safety and compliance. Parties to the CoR are related to function. An entity is a party in the CoR when they (whether an individual or a business) perform **any** of the following 10 roles:

1. **Employer**, i.e. employ a heavy vehicle driver or other party in the CoR (e.g. the owner of a small trucking company who employs several drivers)
2. **Prime contractor**, i.e. engage a self-employed person to drive a heavy vehicle under a contract for services (e.g. a logistics company that has contracts with various self-employed drivers to transport goods across the country)
3. **Operator**, i.e. direct the control and use of a heavy vehicle (e.g. the owner of a transport company with several trucks used for interstate deliveries)
4. **Scheduler**, i.e. schedule the transport of goods/passengers in a heavy vehicle or a driver’s work and rest hours (e.g. a freight company transport coordinator who creates driving schedules)
5. **Consignor**, i.e. consign goods for transport by a heavy vehicle (e.g. a manufacturing business that produces consumer electronics and arranges for their products to be transported to retailers)
6. **Consignee**, i.e. receive goods delivered by a heavy vehicle or have consented to being named the recipient of the goods (e.g. a retail store chain that receives shipments of goods from various suppliers)
7. **Packer**, i.e. pack or assemble goods for transport in a heavy vehicle (e.g. distribution centre employees who pack goods onto pallets and ensure goods are securely wrapped and labelled for transport)
8. **Loading manager**, i.e. manage premises where five or more heavy vehicles are loaded or unloaded each day or be responsible for the loading or unloading of goods

(e.g. an industrial facility loading dock manager who oversees the loading of chemical products into tankers)

9. **Loader**, i.e. load a heavy vehicle (e.g. a freight terminal dock worker who loads goods into trailers)
10. **Unloader**, i.e. unload a heavy vehicle (e.g. warehouse workers who receive goods such as construction materials) (NHVR, 2024a,c; Figure 3).[6]

Figure 3: Parties in the CoR (NHVR, 2024c)

[6] The HVNL should be consulted for precise legal definitions and any updates or changes to these roles.

If any of the 10 functions are undertaken, then the person or business is accountable for heavy vehicle safety accordingly. Importantly, “more than half the CoR functions relate to people and businesses that do not own or operate a heavy vehicle” (NHVR, 2024a).

Because driving is not a CoR function, employed drivers are not automatically parties in the CoR; however, a person who owns and drives their own vehicle meets the definition of an ‘operator’ as they direct or control the use of the heavy vehicle. In addition, when drivers take on additional CoR functions (e.g. loading a heavy vehicle), they become CoR parties. Drivers are subject to specific requirements regarding their behaviour and actions, but their employers are tasked with establishing the systems, processes and resources necessary for compliance – an area where OHS professionals play a pivotal role. All heavy vehicle drivers are bound by distinct duties and obligations under the HVNL, regardless of their employment status.

The CoR concept highlights the interconnectedness of various parties' activities within the transport chain, emphasising their collective impact on the safety of drivers and other road users. Even when parties are not directly related, their actions significantly contribute to the overall safety of transport operations. Each decision or action, as a link in the chain, has the potential to either enhance or compromise the safety of heavy vehicle transport. It is crucial to acknowledge that repercussions of these decisions/actions might directly affect the driver, whose capacity to control or mitigate these impacts may be limited. Consequently, the safety of the driver, the vehicle and other road users can be jeopardised by decisions made elsewhere in the CoR, underscoring the importance of a cohesive and safety-oriented approach across all parties involved in the transport process.

A delay in unloading at one depot may result in a vehicle being late for the next scheduled pick-up at a business unrelated to the one where the delay occurred. The risk here is that this delay may pressure the driver to drive faster or miss a rest break to get back on schedule. Ordering/consigning goods with short delivery timeframes or engaging for transport on payment programs that are time- or distance-based may influence poor safety outcomes as drivers may drive for longer than is safe or exceed speed restrictions to maximise payment and/or meet the contractual delivery timeframes.

3.3 Shared responsibility

Shared responsibility – a cornerstone of the CoR framework – emphasises the collective obligation of multiple stakeholders to ensure safety and compliance. The principle of shared responsibility acknowledges that each party in the supply chain (e.g. consignors, operators, loaders, schedulers) possesses a degree of influence and control over the safety outcomes of heavy vehicle operations. While their specific roles may differ, all CoR parties share a common objective – to ensure a vehicle's safety on the road and minimise risk to the public.

Shared responsibility requires effective communication and information exchange among the various parties. In recognising that no single entity can ensure safety in isolation, the CoR framework fosters collaboration, communication and accountability by distributing responsibility across multiple parties and encouraging the parties to work collectively, pooling their expertise and resources to identify hazards and manage risks. By sharing relevant information regarding cargo, routes, schedules and hazards, parties can collectively make informed decisions and coordinate efforts to ensure compliance with HVNL and OHS regulations, and address safety for all road users and the community.

Also, shared responsibility recognises that failure by any CoR party to manage their risks may have cascading effects, potentially endangering the safety of transport personnel, the public and/or the environment. Consequently, all parties are encouraged to act responsibly and proactively to mitigate risks by implementing robust safety management systems.

4 Legislation

With the exception of Western Australia and the Northern Territory, the HVNL has been enacted in all other Australian states and territories, i.e. Queensland, New South Wales, Australian Capital Territory, Victoria, South Australia and Tasmania.[7]

In adopting the legislation, some states have modified some provisions (e.g. in NSW emergency services workers have an exemption from some fatigue requirements). Thus, while the primary duty is the same and national organisations can have a consistent approach to managing the risk, those working on implementing heavy vehicle safety strategies should be familiar with the detail of their state legislation.

This section explains the HVNL primary duty as it applies to CoR parties, how 'executives' need to exercise due diligence, and the wide range of offences under the HVNL.

4.1 Primary duty

[7] See the NHVR list of *Heavy Vehicle National Law and Regulations*: https://www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations

While the primary duty of each CoR party – to ensure the safety of transport activities, so far as is reasonably practicable (NHVR, 2024a) – aligns with the principles of the *Model Work Health and Safety Act 2011* (the WHS Act) (SWA, 2023), it also bears unique characteristics tailored to the road transport sector. Unlike OHS duties, which primarily apply within the confines of a workplace, the HVNL primary duty extends to the consequences of a business's actions and omissions on the road, and focuses on the impact of transport activities (section 4.1.1) on public safety (section 4.1.2), public infrastructure and the environment.

The HVNL encompasses two obligations: the first is risk management and the second is a prohibition on actions (or omissions) that would cause another to breach the law (NHVR, 2024c). This reflects the concept of 'so far as reasonably practicable' (SFARP), a term familiar to OHS professionals, that signifies doing all that is reasonably achievable to ensure safety, considering the likelihood of harm and the severity of its potential impact.

The primary duty prescribes a proactive approach to identifying, assessing and managing risks. Crucially, the HVNL introduces the idea of concurrent duties, underscoring that responsibilities for safety and compliance cannot be outsourced or delegated away. Each party's duty within their area of influence is an independent obligation, ensuring a collective responsibility for safe heavy vehicle operation. This collective approach aims to create a culture of safety and compliance across the entire transport chain, differentiating the HVNL from traditional OHS frameworks by extending duty beyond the workplace to encompass the impact of transport activities on public roads and infrastructure.

4.1.1 Transport activities

In the HVNL, the term *transport activities* refers to “everything you do, or your business does, that’s related to the use of a heavy vehicle on a road” (NHVR, 2024a). In addition to all CoR party functions, this includes business practices and decisions that contribute to the safety and compliance of heavy vehicle operations.

> Transport activities include all the activities associated with the use of a heavy vehicle on a road. It includes safety systems, business processes such as contract negotiation and communication and decision making, as well as the activities normally associated with the transport and logistics sector such as training, scheduling, route planning, managing premises, selecting and maintaining vehicles, packing, loading and unloading. (NHVR, 2024c)

Consequently, transport activities are many and varied. The following examples illustrate the breadth of considerations encompassed by the inclusive definition of transport activities:

- selecting and applying communication systems within transport depots
- selecting and applying cargo-securing equipment
- designing premises where heavy vehicles operate

- recruiting, training and managing employees
- selecting routes and vehicles, and scheduling travel
- maintaining compensation strategies for drivers
- establishing contractual rights to essential safety information
- specifying the materials for cargo wrapping to ensure load integrity
- providing drivers with information on rest stop locations
- arranging the installation of effluent dumps at saleyards
- gathering critical information from customers
- monitoring the health and wellbeing of drivers
- assessing potential business partners
- fitting seat belts in buses.

It is essential to recognise that ensuring the safety of transport activities under the HVNL goes beyond the immediate scope of drivers and loaders. It requires a holistic approach to managing every aspect of heavy vehicle operations and business decisions that impact the safety of the transport chain. This comprehensive perspective ensures that all parties involved in the transport of goods and passengers take proactive steps to identify, assess and mitigate risks, contributing to a safer road environment for everyone.

4.1.2 Public safety

Understanding of the term *public safety* is rooted in the reduction of risk or harm across a wide array of stakeholders and elements, and is interconnected with the concept of *safety risk*. In the HVNL, public safety encompasses the wellbeing and security of a diverse group of individuals and entities, including but not limited to:

- **Vehicle drivers and passengers**, who are at immediate risk from any safety oversights or hazards related to heavy vehicle operation
- **Individuals in the vicinity of road infrastructure and public places** (e.g. pedestrians, cyclists and residents living near roadways), whose safety is impacted by the operation of heavy vehicles
- **Vehicles and loads**, the integrity and security of which are crucial for incident prevention
- **Road infrastructure** (e.g. bridges, tunnels, roads), as damage or degradation can lead to significant risks for all road users and implications for community connectivity and economic activities
- **Environment**, including the prevention of spills and contamination, and other forms of environmental harm that could endanger public health and/or biodiversity. (NHVR, 2024a)

The breadth of the definition of transport activities (section 4.1.1) makes it clear that ensuring public safety under the HVNL is a complex endeavour that goes beyond the immediate operational aspects of heavy vehicle use. It requires a holistic approach that

considers every facet of transport activities – from the design and maintenance of vehicles to the decisions made about routes, loads and operational timings. Each element plays a vital role in mitigating safety risks and enhancing public safety.

4.2 Due diligence

Due diligence under the HVNL (s. 26D) is linked to the primary duty (HVNL s. 26C), emphasising the comprehensive responsibility of ‘executives’ (i.e. executive officers, managers or other persons who take part in managing a business) to ensure safety in transport activities.

> Exercising due diligence means:
>
> - getting and maintaining knowledge about carrying out transport activities safely
> - understanding the nature of the business’s transport activities, including the hazards and risks of those activities
> - ensuring the business has, and uses, the resources needed to eliminate or minimise the hazards and risks created by its transport activities
> - ensuring the business has, and uses, processes to eliminate or minimise the hazards and risks created by its transport activities – and that information about hazards, risks and incidents is received, considered and responded to quickly. (NHVR, 2024a)

The due diligence obligations for executives of a CoR party are consistent with the due diligence provisions in the WHS Act (s. 27; SWA, 2023). These obligations extend beyond mere compliance, embedding a proactive and informed approach to ensuring safety in all facets of transport activities. Due diligence under the HVNL applies to a wide array of management roles within the business structure, including but not limited to directors, CEOs and company secretaries, and extends to individuals overseeing business operations across various regions or divisions.

Integral to the primary duty, the due diligence obligation covers all aspects of heavy vehicle operations, with emphasis on proactive identification and elimination of hazards and risks. This broad interpretation ensures that executives are not solely focused on direct transport activities but also consider how their business's actions and omissions impact heavy vehicle safety and compliance.

Importantly, the HVNL specifies 'safety duties' – including the primary duty and 17 other prescriptive offences – highlighting the vast array of executive responsibilities and the comprehensive nature of these obligations. Given the CoR principal, these duties are not confined to transport and logistics companies but extend to all parties involved in the transport chain. This inclusive approach ensures that all entities, irrespective of whether they have direct involvement with heavy vehicles, contribute to upholding safety standards. To

fulfill due diligence obligations effectively, executives should engage in a variety of activities, including but not limited to:

- Staying informed about heavy vehicle incidents, breaches of the HVNL, and industry practices for safe operation
- Ensuring sufficient resources and systems are in place for safety management
- Keeping updated on legal and regulatory changes affecting heavy vehicle operations
- Participating in safety discussions and reviews of transport activities to ensure risks are comprehensively managed.

In short, the due diligence under the HVNL demands a holistic and engaged approach from executives, who should ensure their entities not only comply with the HVNL but actively promote safety and risk management in every aspect of heavy vehicle operations.

4.3 Offences

The National Heavy Vehicle Regulator (NHVR) administers the HVNL. There are three categories of offence concerning breaches related to vehicle mass, dimension and loading requirements – minor risk, substantial risk and severe risk. A fourth category – critical risk – also applies for fatigue breaches.[8] Beyond these, the HVNL identifies a wide range of offences that directly impact the safety and integrity of heavy vehicle operations.

Offences include but are not limited to:

- Non-compliance with vehicle mass, dimension or loading requirements
- Modification of heavy vehicles without approval
- Alteration of speed-limiting devices or emission control systems
- Non-compliance with mandated work and rest hours or failure to adhere to fatigue record-keeping requirements
- Non-compliance with vehicle standards
- Operation on unauthorised routes
- Non-compliance with conditions of permits/notices or accreditation
- Taking discriminatory action against employees.

[8] For information on HVNL breach categorisation, see https://www.nhvr.gov.au/safety-accreditation-compliance/on-road-compliance-and-enforcement/breach-categorisation

Penalties under the HVNL reflect its intent to address systemic issues and encourage a proactive and integrated approach to safety and compliance. This approach acknowledges the shared responsibility of all stakeholders, ensuring that each contributes to mitigating risks and enhancing overall safety outcomes in line with CoR provisions.[9]

5 The boundary of duty

The traditional view of health and safety responsibilities, hazards and risk management with which OHS professionals are familiar may be referred to as 'inside the workplace fence', that is, inside the area of control and not involving the community/environment at large, even where the workplace may be mobile as in the case of a vehicle or train. Relevant for road transport, however, are the 'outside the fence' actions of various parties.

The WHS Act (s. 7; SWA, 2023) requires employers to ensure the health and safety of *workers*, defined to include employees, contractors, subcontractors, volunteers and others who may be impacted by the operations.[10] In contrast, the CoR duties in the HVNL address *transport activities*, with each party responsible for their area of influence.

Under OHS legislation, the duty translates into obligations regarding the provision of safe systems of work, access and egress, and requirements concerning the provision of information, instruction, training and supervision of risks. In a practical sense, this requires employers to provide their workers with safe workplaces and information and instruction regarding the risks involved in their work, how these will be controlled, and how to perform work safely. The test of the limits of the duty owed is the extent of the control over the workplace and knowledge about the risks within that workplace.

Under the HVNL, safety duty and therefore consideration of risk are owed not only to workers (those undertaking an activity for or related to the business, or those at the workplace), but also to members of the public as well as to infrastructure and the environment. The obligation is to ensure the health and safety of transport activities in the

[9] For the *Schedule of HVNL Penalties, Infringement Penalties and Demerit Points*, see https://www.nhvr.gov.au/law-policies/penalties-and-infringements

[10] See *OHS BoK* 9.2 Work Health and Safety Law in Australia.

workplace and on public roads. The duty requires that a transport activity be assessed for risk when the vehicle is not just within the boundaries of the workplace or control but is part of the transport activity. Management of the identified risks then applies directly to those that can be controlled to influence safe operations outside direct control.

Although the loading of a packaged product into a heavy vehicle may occur within the workplace, the transportation of the product occurs outside the workplace. It is essential that the packaging and load do not create a risk during the transport activity by becoming unstable, which could result in an accident potentially threatening other road users, members of the public, public infrastructure (road or bridge integrity) or the environment.

The heavy vehicle legislation has been amended over time to be more consistent with other health and safety legislative requirements. Should there be a conflict between OHS laws and the HVNL, the OHS laws will prevail. A breach of the HVNL may be admissible in proceedings for a breach of OHS law.

6 Risk management

The HVNL imposes a general duty to control risks similar to that imposed by OHS legislation. Meeting this duty requires understanding the transport activities undertaken and the associated hazards and their potential consequences for other road users, public infrastructure and the environment. While the HVNL does specify actions for control of core hazards, the OHS professional should work with organisational decision-makers and CoR parties to establish and maintain an informed risk-management approach to safe operation of heavy vehicle transport activity. Effective risk management requires an understanding of the concept of risk, the process of risk-management, and hazard- and industry-specific controls.[11]

For the purposes of managing heavy vehicle transport activities, risk can be considered the impact of uncertainty on achievement of objectives, and measured as “a combination of the likelihood and magnitude of specified consequences (not the likelihood of an event and its

[11] See *OHS BoK* 31.1 Risk.

consequences)."[12] Potential consequences to be considered include effects on drivers, other road users, public risk, road infrastructure and the environment and may include personal injury, loss of life, infrastructure or environmental damage, financial loss, brand or reputational harm, and legal ramifications that may impact tenders or obtaining other work.

Risk is situation and context specific – a description or estimate of risk must include who or what is affected and the circumstances that might give rise to the risk. Uncertainty is a characteristic of risk, whether uncertainty of an event, an exposure or the consequences. Estimates of risks and risk-management activities must take account of this inherent uncertainty. This concept of risk recognises that:

> …the purpose of risk management is not to reduce loss at all costs, but to achieve objectives as effectively as possible. In [heavy vehicle transport activities], as in other areas, managers should be actively seeking to take advantage of things that might happen to achieve [operational and safety] objectives, as well as looking for things that might go wrong.[13]

A small logistics company has a fleet of four heavy vehicles operating across a mountainous region known for unpredictable seasonal weather conditions, including sudden and severe snowstorms. These weather events pose a significant risk to safety, efficiency and reliability of the company's operations.

Situation and context specificity: The company recognises that the risk of driving in snowstorms is particularly high for heavy vehicles due to increased stopping distances and the potential for skidding. The affected stakeholders include drivers, other road users, and customers relying on timely deliveries. The context of operating in an area prone to snowstorms necessitates tailored risk-management strategies.

Uncertainty and risk management: Acknowledging the uncertainty of when and how severely a snowstorm might strike, the company decides to implement several risk-management measures. These include investing in advanced weather-monitoring systems to improve forecast accuracy and providing drivers with specialised training for handling heavy vehicles in snowy conditions. Additionally, the company explores the use of alternative routes and schedules to minimise the likelihood of vehicles being caught in dangerous conditions.

Taking advantage of opportunities: Rather than viewing these weather challenges purely as obstacles, the company identifies an opportunity to leverage its preparedness as a competitive advantage. By promoting its robust risk-management strategies and ability to maintain reliable service in all weather conditions, the company aims to attract customers who value dependability and safety. This approach not only mitigates risks but also contributes to achieving operational and safety objectives, demonstrating a proactive and strategic approach to risk management in heavy vehicle transport activities.

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[12] *OHS BoK* 31.1 Risk (p. 4).

[13] *OHS BoK* 31.1 Risk (p. 3).

Risk management involves identifying hazards and sources of risk, assessing risks where required, applying the hierarchy of controls to eliminate or manage risks, and reviewing the effectiveness of controls (Figure 4). Monitoring activities may include audits, compliance checks, inspections and observations, data on equipment or asset utilisation, and the use of lead and lag data. While the HVNL does not contain a requirement for consultation, good risk-management practice will include communication and consultation with workers and others involved in the work or impacted by the activities.[14]

Figure 4: The risk-management process (SWA, 2024, p. 9)

[14] Practical guidance on the risk-management process is provided in the *How to Manage Work Health and Safety Risks: Code of Practice* (SWA, 2024), with a discussion on the implications for OHS professional practice in *OHS BoK* 31.1 Risk.

7 Understanding the hazards and risks

The HVNL is designed to mitigate specific areas of risk within the realm of heavy vehicle transport. These areas include:

- Excessive mass or dimension
- Poorly restrained loads
- Vehicle maintenance and safety
- Speeding
- Fatigue
- Environmental harm.

Subject to specific regulation,[15] these risk categories are framed to address the distinct challenges and hazards they present in the context of road safety and environmental stewardship. While the HVNL provides a regulatory framework for these areas, they are not the only risks to manage. Although critically relevant, 'fitness for work' is addressed more implicitly within the OHS legislation rather than being subject to a separate, specific regulation.

Through various publications, including regulatory advice and codes of practice, the NHVR identifies and elaborates on risks associated with heavy vehicle operations beyond those identified in the HVNL.[16] This comprehensive approach underscores the interconnected nature of these risks and the importance of a holistic perspective in managing and mitigating hazards.

Recognition of hazards and risks as part of an interrelated system is crucial for OHS professionals and others engaged in the management of heavy vehicle safety. It is essential to understand the impact of each hazard and how they can intersect and compound in the safety landscape. This knowledge forms the bedrock for risk assessment, and the design and management of safety systems and processes. Such an approach is integral to fulfilling CoR responsibilities, ensuring that all parties involved in a transport activity contribute to a safer road environment.

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[15] See the NHVR's list of links to Heavy Vehicle National Law and Regulations: https://www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations

[16] See, for example, https://www.nhvr.gov.au/safety-accreditation-compliance/chain-of-responsibility/regulatory-advice

This section considers the sources and impacts of core hazards of vehicle mass, dimension, load and condition, and driver-related hazards of fatigue, impaired fitness for work, inadequate training and speed (Figure 5).

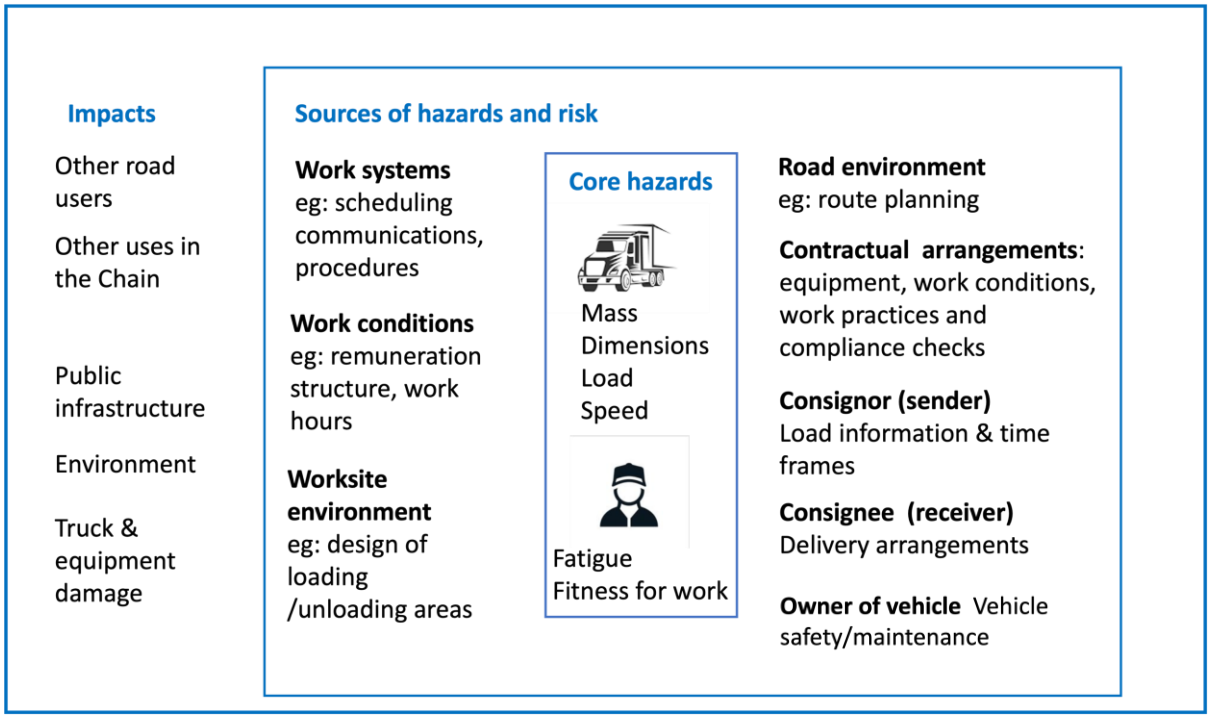

Figure 5: Core hazards and sources of risk

7.1 Vehicle-related hazards

Vehicle-related hazards include mass, dimension, load and condition. Generalist OHS professionals must thoroughly understand the cause and effect of these core hazards.

7.1.1 Mass

In the context of the heavy vehicle industry, *mass* refers to the total weight of a vehicle, including its chassis, body and any load it is carrying.[17] The overall mass of a vehicle impacts its safe and effective operability, with consequences for:

- **Stability.** Excessive or improperly distributed mass can significantly affect a vehicle's stability and manoeuvrability. This can lead to an increased risk of accidents (e.g. loss of control or rollovers) especially at high speeds or in difficult driving conditions.
- **Infrastructure.** Roads, bridges and other infrastructure elements are designed to handle specific weight limits. Overloading vehicles can cause undue stress on these structures, potentially leading to damage or catastrophic failures. This poses a direct risk to the vehicle, its occupants and other users of the infrastructure.
- **Vehicle wear and tear.** Overloaded or unevenly loaded vehicles experience greater wear and tear. This can lead to mechanical failures during operation (e.g. brake failures, tyre blowouts).
- **Emergency response.** In the event of an accident, overloaded or improperly loaded vehicles can complicate emergency response efforts (e.g. heavier vehicles may be more difficult to move or recover, the consequences of a load spill may be more severe).
- **The environment.** Overloading increases fuel consumption and emissions. In the event of an accident, there is a higher risk of environmental contamination, especially if the vehicle is carrying hazardous materials.

7.1.2 Dimension

Governed by the *Heavy Vehicle (Mass, Dimension and Loading) National Regulation*, the dimensions of heavy vehicles – width, height and length – play a pivotal role in the safety and risks associated with heavy vehicle transport.[18] When vehicles exceed standard dimensions, they present significant safety hazards, particularly to other road users and infrastructure.

- **Width hazards.** The standard width limit for a heavy vehicle in Australia is 2.5 metres (with some vehicles up to 2.55 metres permitted), aligning with the typical lane width of 3.5 metres. Vehicles exceeding this width pose serious risks (e.g. side-swiping incidents with other vehicles or roadside objects).
- **Height hazards.** With a general height limit of 4.3 metres for heavy vehicles, there is a risk of interaction with overhead structures and services. Vehicles exceeding this

[17] For general mass limits, see https://www.nhvr.gov.au/road-access/mass-dimension-and-loading/general-mass-and-dimension-limits

[18] For general dimension requirements, see https://www.nhvr.gov.au/road-access/mass-dimension-and-loading/general-mass-and-dimension-limits

limit can cause damage to bridges or overhead wires, with potential consequences such as power outages, structural damage or collapse. In addition to direct risk to the vehicle involved, such incidents present risks to other road users and infrastructure and can cause considerable inconvenience and economic impact.

- **Length and overhang hazards.** Vehicle length limits vary according to the specific vehicle combination. Excessive length or inappropriate load overhang (beyond the lesser of 3.7 metres or 60% of the wheelbase[19]) challenges a vehicle's manoeuvrability and stability and impacts its swept path (i.e. the width required to navigate turns). This increases the likelihood of a vehicle becoming ensnared, jack-knifing or losing control during tight manoeuvres or emergency situations, presenting risk to the driver and surrounding road users, and increasing potential for a multi-vehicle incident. Also, longer vehicles require more time, space and unobstructed vision for safe overtaking.

  The impact of a vehicle's length extends to its stacking distance (i.e. the space it occupies when stationary at traffic lights or level crossings) and the time it takes to initiate movement and clear intersections. Road managers must consider these factors, along with a vehicle's swept path, when assessing and authorising the use of a longer vehicle to ensure that roads on a specific route can accommodate the vehicle without compromising safety or traffic flow. Also, the presence of longer vehicles on unauthorised routes elevates the risk of collisions with other vehicles and infrastructure and disrupts traffic dynamics by obstructing lanes and delaying crossings. Consequently, stringent adherence to vehicle length regulations and route authorisations is essential.

The dimensions of heavy vehicles are not just a matter of regulatory compliance; they are critical factors in ensuring the safety of transport activities. It is essential for generalist OHS professionals to understand the associated risks and advise decision-makers accordingly. Considerations include ensuring that vehicles are loaded within prescribed limits and that any deviations are managed with appropriate safety measures (e.g. route planning or special permits).

7.1.3 Load stability/restraint

It is imperative that a heavy vehicle be meticulously loaded and firmly secured, with a balanced distribution of the load across the vehicle's wheelbase and axles. Improper loading of a heavy vehicle poses significant risks. For example:

- **Objects dislodging.** Incorrectly secured loads can lead to objects dislodging from

[19] Wheelbase applies to rigid heavy vehicles and is the distance from the middle of the front wheel to the middle of the rear wheel combination.

the vehicle and striking other vehicles or pedestrians. This is often the result of failing to properly assess and secure a load's movement potential during transit.

- **Evasive manoeuvres.** Drivers may need to execute evasive manoeuvres to avoid objects that have fallen or are falling from vehicles, a direct consequence of inadequate load-restraint techniques.
- **Spillage.** Poorly secured or overfilled loads can lead to spillage from vehicles, creating hazardous road conditions. This risk is heightened when the loading process is rushed or inadequately supervised.
- **Load colliding with cabin.** In instances of emergency braking, an unevenly distributed or unsecured load can collide with a vehicle's cabin, endangering the driver. This highlights the importance of understanding a load's dynamics and securing it against sudden shifts.
- **Vehicle rollover.** Even if a vehicle is restrained within mass limits, placing too much weight high in the trailer can cause the vehicle to roll while navigating a turn. Load placement should be strategic as well as secure.

The *Heavy Vehicle (Mass, Dimension and Loading) National Regulation* defines maximum load capacities for each axle group of a heavy vehicle, primarily to protect road infrastructure. Strategic placement of loads, aiming for an even weight distribution across axle groups, is vital for vehicle stability during manoeuvres (e.g. braking or cornering). Thus, understanding and complying with mass limits is essential.

Delays in loading or unloading, often due to logistical challenges or unforeseen circumstances, can significantly escalate risks by leading to rushed loading/unloading processes and/or increasing the likelihood of mistakes in weight distribution or securing of a load. Furthermore, unexpected delays might pressure drivers to compensate for lost time, potentially encouraging speeding or less cautious driving, inadequate safety checks or bypassing of safety protocols.

7.1.4 Vehicle condition (standards)

In the framework of the HVNL, the imperative for heavy vehicle standard mandates is embedded in the assurance of operational safety and the enforcement of vehicular compliance to mitigate hazards on public roads. The *Heavy Vehicle (Vehicle Standards) National Regulation* targets the mechanical and physical condition of vehicles as well as the potential for safety risks stemming from the conduct and operational practices of entities beyond direct road use. Such practices may inadvertently compel businesses to operate vehicles that do not meet safety standards, thereby elevating the risk of incidents with grave outcomes.

Many factors contribute to ensuring that heavy vehicles meet safety standards, thereby aligning with the overarching objectives of the HVNL to protect public safety and preserve infrastructure and environmental quality. Focal points of concern include:

- Operational integrity of essential vehicle components (braking system, steering, suspension, tyres) that, if compromised, could dramatically impact vehicular control
- Secure attachment of trailers, facilitated by a fifth wheel coupling and other towing mechanisms
- Vehicle roadworthiness, with attention to, for example, the vehicle's structural integrity, occupant restraint systems, visibility aids (e.g. lights, mirrors), and functionality of the engine and exhaust systems.

7.2 Driver-related hazards

While the driver is not a party in the CoR (Figure 3), a driver who is unfit to drive is a hazard impacting the safe operation of a heavy vehicle. Key driver-related hazards identified through research and practice, and recognised in the HVNL, are fatigue and physical/mental impairment of fitness to drive due to, for example, the effect of alcohol or drugs. Despite increased awareness of issues associated with fitness for work, "'human factors' were found to be responsible for nearly two out of every three serious crashes" (NTARC, 2022, p. 2).[20] A multifaceted national transport sector research project – Driving Health – revealed that truck drivers have a poor physical and mental health profile (e.g. van Vreden et al., 2022; Xia et al., 2021).

This section addresses the driver-related hazards of fatigue, impaired fitness for work due to alcohol or other drugs, inadequate training and inappropriate speed.

7.2.1 Fatigue

In the last two decades, there has been a significant decline in the proportion of major truck accidents resulting from driver fatigue: "[T]he share of accidents attributable to fatigue has fallen from a high of 27.3 per cent in 2005 to…8.2 per cent in 2021" (NTI, 2022a). This improvement has been attributed to the implementation of reforms in driving hours and the standardisation of logbooks to the National Driver Work Diary in 2008, moving away from the industry's former approach of prioritising continuous driving until task completion (NTI, 2022a). Nevertheless, "fatigue remains the biggest cause of truck driver deaths, accounting

[20] According to the *Major Crash Investigation 2022 Report* (NTARC, 2022, p. 8), "the top five causes of 'human factors' crashes in 2021 were Inattention/Distraction (16.3%), Inappropriate speed (12.5%), Inappropriate vehicle positioning (10.5%), Inadequate following distance (8.6%) and Fatigue (8.2%)."

for 34.8 per cent of fatalities" (NTI, 2022a). One of the Driving Health Project research studies found that 62% of truck drivers experienced fatigue while working and 11% admitted "nodding off or falling asleep while driving" (Xia et al., 2021, p. 28).[21]

Heavy vehicle drivers face unique operational challenges that significantly contribute to fatigue. Development of effective strategies to mitigate fatigue-related risks in the transport sector requires an understanding of these challenges:[22]

- **Long driving hours.** The nature of the transport industry often necessitates extended driving hours to meet delivery deadlines. Prolonged periods of driving without adequate breaks can lead to cumulative fatigue, reducing reaction times and impairing decision-making abilities.
- **Irregular shifts and night driving.** Heavy vehicle drivers frequently work irregular schedules, including night shifts that disrupt normal sleep patterns and circadian rhythms. Driving during night hours aligns with the circadian nadir, when the body naturally seeks rest, exacerbating fatigue.
- **Tight scheduling and delivery pressures.** The pressure to adhere to tight delivery schedules can encourage drivers to drive without breaks or at unsafe speeds, both of which increase the risk of fatigue-related incidents.
- **Monotonous road environments.** Long-haul routes often involve extended periods of driving through monotonous road environments, which can lead to sensory under-stimulation and contribute to decreased mental alertness.
- **Sleep disruption and poor sleep quality.** Factors such as sleeping in a vehicle cabin, noise pollution at rest stops, and sleeping at irregular times can significantly disrupt sleep quality. Poor sleep quality, even if the duration is theoretically adequate, does not provide the same restorative benefits as uninterrupted sleep.
- **Physical and mental stress.** Driving a heavy vehicle is physically demanding due to the need for constant vigilance and control and mentally taxing due to the need to navigate traffic, weather conditions and logistical challenges. This ongoing stress contributes to both immediate and long-term fatigue.
- **Health and lifestyle factors.** Poor diet, inadequate exercise, use of stimulants or sedatives, and loneliness can influence a driver's risk of fatigue. Drivers may rely on caffeine or other stimulants to maintain alertness, which can lead to a cycle of poor sleep and increased fatigue.
- **Ergonomic factors in vehicle design.** Poorly designed vehicle cabins that do not

[21] See also Ren et al. (2023).

[22] See the NHVR's information on fatigue management (https://www.nhvr.gov.au/safety-accreditation-compliance/fatigue-management), *OHS Bok* 20 Fatigue and, for example, Dawson and McCulloch (2005). For general information about sleep quality and quantity requirements, see, for example, Chaput et al. (2018) and Hirshkowitz et al. (2015). For information on the Heavy Vehicle Driver Fatigue Project, see CRC for Alertness, Safety and Productivity (2019); for information on the Driving Health Project, see https://drivinghealth.net/

adequately support a driver's posture or provide comfort during long hours can contribute to fatigue and impair a driver's ability to remain alert and responsive.

7.2.2 Impaired fitness for work

A driver's fitness for work is fundamental to safe operation of a vehicle. Alcohol and other drugs (including some prescribed and over-the-counter medications) can impair driving skills, with adverse effects on cognitive function, reaction times, decision-making abilities and overall motor coordination, increasing the likelihood of accidents (Parekh, 2019; NHVR, 2024a).

In assessing the fitness for work of heavy vehicle drivers, it is important to consider the operational causes that can significantly impact their physical and mental wellbeing, beyond the use of alcohol and other drugs. These causes are often intertwined with the daily demands and pressures of the job, which can contribute to unhealthy coping mechanisms and impact overall health. Potential causes of drivers being unfit for work[23] include:

- **Long and irregular working hours.** The demand for long and sometimes irregular working hours can lead to chronic fatigue, disrupted sleep patterns and the temptation to use stimulants or other substances as a coping mechanism.
- **High-stress environment.** The heavy vehicle industry is characterised by high stress due to tight delivery schedules, traffic congestion and the risks inherent in long-haul driving. Chronic stress can lead to psychological issues, including anxiety and depression, which may be inappropriately managed through self-medication with alcohol or other drugs.
- **Physical demands of the job.** The physical demands of driving, including prolonged sitting and the need for constant vigilance, can lead to musculoskeletal problems and fatigue. Drivers might resort to pain medications, some of which could impair cognition and motor coordination.
- **Isolation and lack of social support.** Long hours spent on the road can result in social isolation, which is a risk factor for mental health issues. The absence of a support network and loneliness can make drivers more susceptible to substance abuse as a form of self-medication.
- **Inadequate access to healthcare.** Operational challenges (e.g. irregular schedules and remote working locations) can limit drivers' access to healthcare services. This may result in the neglect of chronic health conditions or reliance on over-the-counter medications instead of seeking professional medical advice.
- **Lack of awareness and education.** Drivers may lack knowledge of the health risks associated with long-term substance use or the dangers of driving under the influence of even seemingly benign medications.

[23] See, for example, Xia et al. (2018, 2021) and van Vreden et al. (2022).

- **Poor workplace/safety culture.** In some cases, a workplace culture that either implicitly condones substance use or does not actively promote healthy lifestyle choices can contribute to the normalisation of risky behaviours among drivers.

Beyond immediate impairment, alcohol and other drugs can have long-term health and psychological effects on drivers. Chronic use can lead to addiction, mental health issues and various physical health problems, further compromising a driver's ability to operate a vehicle safely.

The concerted efforts of the heavy vehicle industry, regulatory bodies and healthcare professionals have been instrumental in mitigating the risks associated with the use/abuse of alcohol and other drugs. As with the approach to managing driver fatigue, ongoing efforts are essential for ensuring the safety and wellbeing of drivers and the broader public.

7.2.3 Inadequate training

Inadequate training of heavy vehicle drivers presents significant safety hazards to the drivers themselves as well as to other road users and the integrity of transported goods.

> Having a heavy vehicle driver's license is not always proof of a driver's ability to safely operate a heavy vehicle. Even if highly skilled and experienced, the driver may need additional training to ensure they can safely and efficiently operate within a particular industry sector and/or a new work environment. (NHVR, 2024b)

The consequences of inadequate driver training are manifold. For example, drivers not proficient in reversing manoeuvres may cause traffic disruptions or accidents, especially in tight loading docks or complex manoeuvring scenarios; the inability to properly unhook and secure trailers can lead to equipment damage, loss of cargo and endangerment of public safety and infrastructure. Inadequately trained drivers may lack the deep understanding of vehicle dynamics and load management necessary for preventing rollovers and ensuring load security. In addition to the grave risks to safety, lack of training on regulatory compliance, including hours of service and load securing, can result in legal penalties for the driver and the employing company. The implications extend beyond immediate safety concerns, affecting road transport reliability and efficiency, and eroding public confidence in the heavy vehicle transport industry.

Lack of appropriate training may be a symptom of the national shortage of truck drivers, which may result in employers hiring drivers with insufficient experience and training.

Addressing the driver shortage with a focus on comprehensive training programs is essential to mitigate these hazards and uphold road safety standards.[24]

7.2.4 Speed

Speed is a major causal factor in heavy vehicle accidents; in 2020, inappropriate speed accounted for 20% of truck occupant fatalities in Australia (NTI, 2022b).

Generalist OHS professionals should understand the fundamental physics behind the stopping distance of a heavy vehicle at speed as this directly informs the risks associated with speeding and the potentially severe consequences of traffic incidents involving heavy vehicles.

- **Inertia and momentum.** Inertia is the tendency of an object to resist changes in its state of motion. A moving truck has momentum, which is the product of its mass and velocity. The greater the momentum, the more force required to change the truck's state of motion, i.e. to stop it. Heavy vehicles have significant mass, so when they are moving at speed, their momentum is considerable. This high momentum means that greater force and more time are needed to bring the truck to a stop.
- **Kinetic energy and stopping distance.** The kinetic energy of a truck increases with the square of its speed. This means that if a truck doubles its speed, its kinetic energy increases by a factor of four. To stop the truck, this kinetic energy must be dissipated, usually through friction between the tyres and the road and the braking system. The higher the kinetic energy, the longer the stopping distance.
- **Friction and braking.** Friction is the force resisting the relative motion of solid surfaces. The friction between a truck's tyres and the road, along with the effectiveness of the brakes, determines how quickly the vehicle can be slowed down and stopped. However, friction has its limits. If a truck is moving too fast, the brakes may not provide enough friction to stop it quickly, leading to longer stopping distances.
- **Overturning.** Higher speeds increase the risk of a truck overturning, especially in turns or sudden manoeuvres. This is due to the centrifugal force, which tends to push the truck outwards in a turn. The higher the speed, the greater this force.
- **Dislodged loads or projectiles.** In the event of sudden braking or a collision, unsecured or poorly secured loads can become dislodged, turning into projectiles.

[24] The National Road Transport Association (NatRoad) has proposed a National Road Freight Workforce Action Plan to address the driver shortage; see https://www.natroad.com.au/national-leadership-to-address-the-truck-driver-shortage/#:~:text=The%20Action%20Plan%20must%20establish,training%2C%20and%20improve%20career%20pathways

This risk is exacerbated by higher speeds, as the kinetic energy of the load is higher.

Accidents at higher speeds are generally more severe, leading to greater safety risk and greater damage to the vehicle, cargo and infrastructure. This results in higher financial costs associated with repairs, clean-up and potential legal liabilities as well as reputational damage for the involved parties. Also, if a truck carrying hazardous materials is involved in an accident, the risk of leakage and environmental contamination or biohazard increases with the severity of the incident.

Table 1 lists stopping distances for "a typical heavy vehicle on dry roads…The distance travelled while braking and the total stopping distance will vary according to conditions" (VicRoads, 2021, p. 81).

Table 1: Heavy vehicle stopping distances (VicRoads, 2021, p. 82)

Stopping distances for different speeds: Assuming – dry road, roadworthy tyres, fit and alert driver				
Speed (km/h)	Distance travelled in metres/second (m/s)	Metres travelled from when the driver sees they have to stop until vehicle begins to slow down (m)	Metres travelled while braking (m)	Total stopping distance in metres (m)
10	2.77	7	6	13
20	5.55	14	9	23
30	8.33	21	17	38
40	11.11	28	27	55
50	13.88	35	38	73
60	16.66	42	55	97
70	19.44	49	74	123
80	22.22	56	102	158
90	25.00	63	122	185
100	27.77	70	145	215

7.3 Sources of hazards and risk

As previously explained, the Chain of Responsibility within the heavy vehicle road transport industry involves various interconnected parties, each contributing to the safe and efficient

movement of goods. This network operates within and external to the traditional workplace. However, it is the systems operating within the various organisations that are often the sources of risk. These systems encompass the totality of the management practices within the organisation, including but not limited to:

- The OHS management system[25]
- Human resources (HR) policies and procedures, including recruitment, contracts, remuneration and work conditions, rostering, skills training and assessment
- Information flow, communications, documentation and procedures
- Contractor management, including specification, selection, on-boarding and compliance monitoring
- Driver management systems, including licensing and fitness for work
- Consignment scheduling.

A medium-sized logistics company is aiming to enhance the safety and efficiency of its operations amidst the intricacies of the CoR. The motivation for adopting a thorough safety strategy stems from a commitment to maintaining a high standard of safety management, ensuring that risks associated with transport activities are well-managed. The company decides to take a holistic approach to safety, starting with the potential integration or enhancement of an OHS management system. Recognising that an existing system may not be in place, the plan includes developing and embedding safety policies and procedures into daily operations, complemented by regular checks and evaluations to spot and mitigate hazards.

Understanding that managing risk also involves addressing human factors, the company revisits its HR practices. This revision focuses on hiring individuals with a strong commitment to safety and ensuring working conditions exceed minimum rest requirements set by awards and enterprise bargaining agreements (EBAs), surpassing even the HVNL standards. Additionally, it includes providing comprehensive training to enhance staff skills continuously.

A key component of the strategy is improving communication within the organisation. By establishing or optimising a centralised communication system, the company aims to ensure everyone stays informed about safety practices and procedures, addressing the challenge of risk linked to poor information flow. For contractor management, the company plans a strict vetting process and ongoing monitoring to confirm that all contractors meet or exceed the company's safety expectations. The approach to vehicle and driver management includes adopting or upgrading to advanced maintenance and monitoring systems. This, along with better route planning and scheduling, is aimed at reducing risks related to vehicle conditions and driving behaviours.

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8 Control of core hazards

[25] See *OHS BoK* 12.2 OHS Management Systems.

This section provides some examples of hazard-specific controls. Detailed information on applicable controls is available in industry guides and NHVR-registered codes of practice,[26] including the *Australian Code for the Transport of Dangerous Goods by Road & Rail* (NTC, 2024), the *Load Restraint Guide 2018* (NTC, 2018) and *Assessing Fitness to Drive* (NTC & Austroads, 2022). Hazard control relevant to heavy vehicle operation requires industry knowledge and experience and the input of those affected, including CoR parties. Specialist advice may be required.

The *Heavy Vehicle (Vehicle Standards) National Regulation* prescribes heavy vehicle operating standards (section 7.1.4). Regular maintenance and inspection requirements form part of meeting the primary duty, and there are offences (section 4.3) associated with driving an unsafe vehicle. Vehicles must be in good mechanical condition and fit for the type of load. While transport operators can directly control these safety risks, non-transport operators can influence the use of safe, compliant vehicles by, for example, providing information on the type of load and any specific load requirements.

Table 2 includes example industry controls for the core hazards discussed in section 7. Many of these controls are 'administrative' in the hierarchy of controls,[27] making a systems approach to managing heavy vehicles vital.

[26] See https://www.nhvr.gov.au/safety-accreditation-compliance/industry-codes-of-practice

[27] See *OHS BoK* 34.1 Prevention and Intervention.

Table 2: Example controls for core hazards

Hazard	CoR party	Reduce risk through engineering, substitution or isolation controls	Administrative controls
Mass **Dimension** **Loading**	Employer Prime Contractor	Implementation of automated load-tracking systems Use of data analytics for trend analysis in mass breaches Real-time reporting tools for drivers and operators	Effective hiring/contracting processes Suitable equipment to move freight safely Appropriate contractual arrangements Consultation with other parties
	Operator	Vehicle alerts to identify breaches Calculation or modelling of mass On-board mass systems Air pressure gauges Regular calibration of mass measurement devices	Processes in place to refuse contracts Appropriate planning and documentation Provision of resources to drivers to check dimensions Access to weighbridges Checking load-restraint system Consultation with other parties Emergency response protocols for load shifting
	Scheduler	Digital route-optimisation software Coordination tools to align vehicle mass and road restrictions Automated compliance alerts based on load and route data	Processes to check dimensions and mass Processes to check route Processes to check permits and conditions Consultation with other parties
	Consignor Consignee	Digital platforms for sharing real-time load data with other CoR parties Appropriate load-restraint systems	Appropriate contracting arrangements Processes to initiate alerts to potential breaches Provision of accurate information Evaluation and monitoring processes

Hazard	CoR party	Reduce risk through engineering, substitution or isolation controls	Administrative controls
			Consultation with other parties
	Packer	Advanced packaging design for better load distribution Smart packaging systems with embedded sensors for monitoring movement during transit Appropriate containment systems	Processes for the provision of accurate documentation for freight Verification and monitoring of packaged goods Test containment systems Consultation with other parties
	Loading manager Loader Unloader	I-driven tools for efficient load arrangement Real-time verification tools for axle load compliance	Processes for the provision and monitoring of accurate documentation of freight Processes for checking vehicle capability Processes for communication with operators, drivers and loaders Appropriate load plans Consultation with other parties
Vehicle condition (standards)	Employer Prime Contractor	Introduction of electric or hybrid heavy vehicles	Effective hiring/contracting processes Appropriate contracts Processes to check third parties Consultation with other parties Fleet renewal programs for compliance with emission and safety standards
	Operator	Electronic stability control Telematic systems Assistance systems Lane tracking Use of advanced driver-assistance systems (ADAS)	Appropriate contracts Processes to monitor vehicle registrations Processes to check vehicle locations and routes Processes for identification of issues Maintenance program Consultation with other parties

Hazard	CoR party	Reduce risk through engineering, substitution or isolation controls	Administrative controls
		AI-based systems for predictive vehicle maintenance	
	Scheduler	Real-time vehicle diagnostics integration with scheduling software	Processes to link schedules with maintenance schedules Processes to monitor vehicles and alert operators
	Consignor Consignee		Effective hiring/contracting processes Appropriate contracts Processes to monitor vehicles and alert operators Consultation with other parties
	Packer		Processes to monitor vehicles and alert operators
	Loading Manager Loader Unloader		Processes to monitor vehicles and alert operators
Speed	Employer Prime Contractor	Integration of speed governors in fleet vehicles Predictive analytics for speed-related risk management	Effective hiring/contracting processes Appropriate contracts Processes to check third parties Monitor documentation Consultation with other parties
	Operator	GPS telematic and matching systems Engine management controls	Appropriate contracts Processes to check third parties Monitor documentation Training programs focused on speed management under various conditions Processes to record incidents of speeding Consultation with other parties

Hazard	CoR party	Reduce risk through engineering, substitution or isolation controls	Administrative controls
	Scheduler	Dynamic scheduling systems that adapt to traffic conditions	Appropriate planning with contingencies Processes for communicating with driver regarding changes
	Consignor Consignee		Appropriate contracts Processes to check third parties Monitor documentation Appropriate planning Consultation with other parties
	Packer		Appropriate planning Processes to communicate delays Consultation with other parties
	Loading Manager Loader Unloader		Appropriate planning Processes to communicate delays Processes to monitor times Consultation with other parties
Fatigue	Employer Prime Contractor	Electronic work diaries Implementation of fatigue risk-management systems (FRMS) Use of wearable technology to monitor driver fatigue levels	Effective hiring/contracting processes Appropriate contracts Processes to check third parties Accurate documentation Awareness training Processes for monitoring and reporting, including self-reporting Consultation with other parties
	Operator	Cab face and eye tracking systems Appropriate sleeper berths	Effective hiring/contracting processes Appropriate contracts

Hazard	CoR party	Reduce risk through engineering, substitution or isolation controls	Administrative controls
		Lane departure, object detections and stability control technologies Integration of AI systems for real-time fatigue detection Access to rest stop scheduling tools	Processes to monitor drivers Processes for welfare checks Processes for monitoring and reporting, including self-reporting Awareness training Accurate records Consultation with other parties
	Scheduler	Collaborative systems to align trip schedules with available rest facilities	Appropriate planning of trip schedules and driver rosters Develop contingency plans
	Consignor Consignee		Effective hiring/contracting processes Appropriate contracts Processes to check third parties Appropriate planning, including timeframes, contingencies and consideration of routes and environmental aspects
	Packer		Awareness training Processes for monitoring and reporting
	Loading Manager Loader Unloader		Awareness training Processes for monitoring and reporting Contingencies for delays Processes for monitoring loading and unloading activities and continual improvement
Fitness for Work	Employer Prime Contractor	Access to fitness-for-duty mobile applications for self-assessments	Effective hiring/contracting processes Appropriate contracts Processes to check third parties Accurate documentation

Hazard	CoR party	Reduce risk through engineering, substitution or isolation controls	Administrative controls
			Awareness training Support systems, e.g. employee assistance programs (EAPs) and wellbeing programs Processes for monitoring and reporting, including self-reporting Consultation with other parties
	Operator	Cab face and eye tracking systems Lane departure, object detections and stability control technologies	Effective hiring/contracting processes Appropriate contracts Effective policies Processes to monitor drivers, e.g. testing programs Processes for welfare checks Processes for monitoring and reporting, including self-reporting Awareness training Support systems, e.g. EAPs and wellbeing programs Accurate records Consultation with other parties
	Scheduler		Appropriate planning of trip schedules and driver rosters Develop contingency plans
	Consignor Consignee		Effective hiring/contracting processes Appropriate contracts Processes to check third parties Accurate records Consultation with other parties
	Packer		Awareness training Processes for monitoring and reporting

Hazard	CoR party	Reduce risk through engineering, substitution or isolation controls	Administrative controls
	Loading Manager Loader Unloader		Awareness training Processes for monitoring and reporting Contingencies for delays

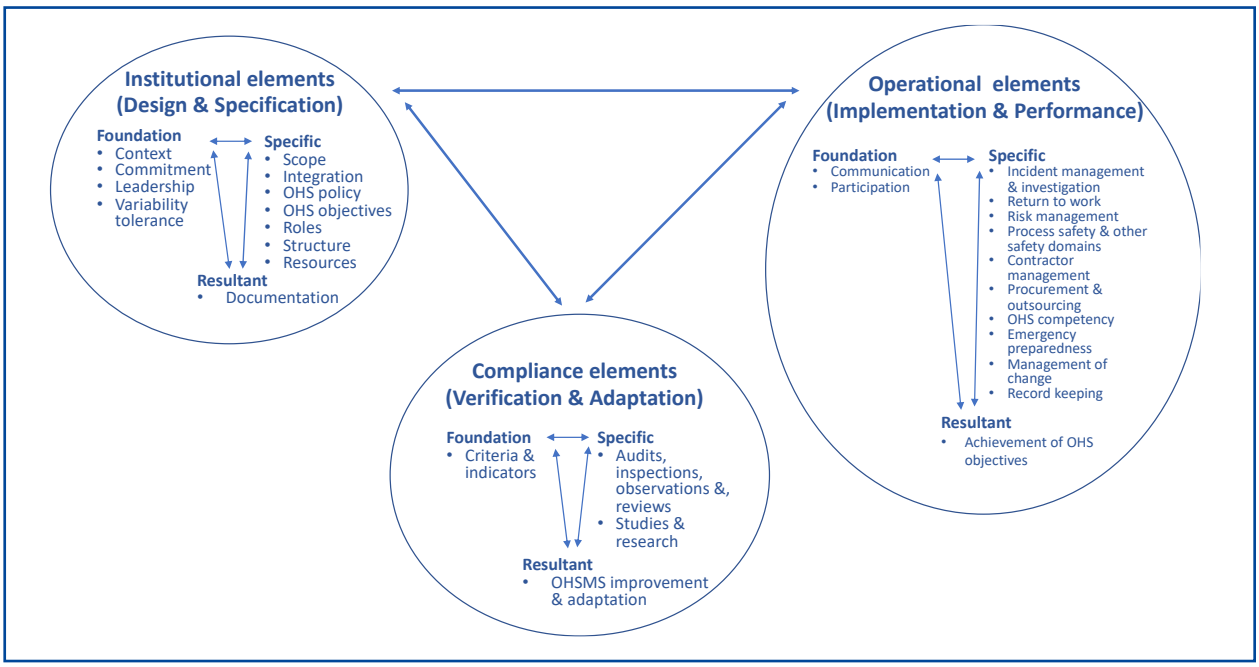
9 A systems approach to managing CoR

The NHVR advises that an effective safety management system should encompass critical elements for overseeing heavy vehicle transport activities (NHVR, 2021). The principles and practices of OHS management systems (OHSMS), which have become synonymous with management of occupational health and safety, can be applied to managing risks associated with the operation of heavy vehicles within the context of the CoR and integrated with the comprehensive OHSMS.

> An OHS management system is a set of tangible and intangible elements that can vary over time but interact in a coordinated manner under the collective purpose to protect and promote the physical and psychological integrity of those present in an occupational setting or directly affected by its occupational activities.[28]

These system elements can be categorised into three dimensions:

- Institutional elements (design and specification level)
- Operational elements (implementation and performance level)
- Compliance elements (verification and adaptation level).[29] (Figure 6)



[28] *OHS BoK* 12.2 OHS Management Systems (p. 4)

[29] *OHS BoK* 12.2 OHS Management Systems (pp. 7-8)

Figure 6: OHSMS organising elements[30]

While most elements will have implications for CoR parties, specific provisions should be considered for some elements. Table 3 provides some suggestions for management system inclusions to address CoR requirements.

[30] *OHS BoK* 12.2 OHS Management Systems (p. 8)

Table 3: Suggested management system inclusions to address CoR requirements

Management system organising element		Suggested inclusions to address CoR requirements
Institutional		
Foundation	Context	Scope of function in CoR defined
	Commitment and leadership	Heavy vehicle operations and CoR explicitly addressed Statement of commitment that organisational and contractual arrangements do not create pressure on delivery times or arrangements, or breach HVNL
	Variability and tolerance	Incorporate the safety management system framework
Specific	Policy	Heavy vehicle operations and CoR explicitly addressed
	Objectives	Objectives clearly stated as they apply to heavy vehicle transport and CoR
	Roles and structure	Heavy vehicle operations and CoR explicitly addressed
	Resources	Ensure vehicle standards, including maintenance Adequate expertise in heavy vehicle operations
Resultant	Documentation	Access to relevant standards and guides Procedures and documents for maintenance of truck standards, loading/unloading, route planning Specified consignment documentation, including load and delivery information
Operational		
Foundation	Communication	Specific arrangements for communication and sharing of information across CoR parties and drivers
	Participation	Participation of CoR parties (While consultation/participation is not a legislated requirement under the HVNL, it is under OHS legislation so makes for good relationships between the CoR parties and effective risk management.) Specific arrangement for workers to participate in design and development of procedures for transport activities
Specific	Incident management and investigation	Incidents reported and investigated include those with actual or potential impacts on other road users, public infrastructure or the environment
	Risk management	Context considers the CoR; scope addresses the broader context of other road users, public infrastructure and the environment
	Contractor management	Include management of contract drivers
	Procurement	Criteria, selection prequalification and on-boarding of contract drivers

Management system organising element		Suggested inclusions to address CoR requirements
	Consignment (new element)	Prequalification of transporters Review of business practices Packaging that meets loading performance standards Provision of accurate information about loads for consignment (e.g. mass, dimensions, centre of gravity, coefficient of friction of packaging material) Loading premises designed to eliminate or minimise driver delay System to manage queueing Monitoring of average loading times and provision of data to transporters and other CoR parties
	Scheduling (new element)	Principles and criteria for rostering Fatigue-management arrangements, including any accreditation Route-planning criteria and processes Communications between schedulers and drivers Contractual right to refuse to load a vehicle if driver is unfit to drive Contractual right to prevent driver from driving if unfit to drive
	OHS competency	Training includes those within the organisation who have functions that make them parties in the CoR OHS professional training on CoR requirements Driver knowledge and skills addressed through recruitment practices, information and training
	Emergency preparedness	Includes potential on-road emergencies with likelihood of harm to other road users, public infrastructure or the environment
	Record keeping	Includes vehicle maintenance records, driver license records, fatigue records, etc.
Compliance		
Specific	Audits, inspections, observations and reviews	Procedures and responsibilities for compliance checks, audit and reporting for heavy vehicle transport activities Processes for addressing non-compliance in consignment arrangements, traffic management and loading arrangements; in addition to vehicle-related incidents, trend analysis includes breaches of contractor and consignment requirements

Although integration of risk-management strategies related to heavy vehicle transport into a comprehensive OHSMS is recommended, it is recognised that many small organisations within the industry may not have the infrastructure to support such formal systems. Adopting a systems approach to safety and compliance offers a structured yet flexible pathway for these organisations to effectively uphold safety standards and meet legislative requirements. This approach encompasses several key strategies tailored to the operational realities of small businesses:

- **Risk assessment and management.** At the core of a systems approach is the proactive identification and management of risks associated with transport activities. Small entities can adopt simplified risk-assessment processes, focusing on identifying critical risks related to CoR (e.g. vehicle maintenance, driver fatigue, packing issues, loading schedules). Checklists and basic assessment tools available from industry associations or regulatory bodies can facilitate this process.
- **Safety policies and procedures.** Developing clear safety policies and procedures tailored to the specific needs and scale of the operation is vital. These should outline the organisation's commitment to safety, specific safety practices and responsibilities under the CoR. Simple, well-communicated policies can significantly impact safety culture and compliance.
- **Training and competency.** Ensuring drivers and other personnel are aware of their roles and responsibilities under the CoR is crucial. Small entities can leverage external training resources, online courses and workshops offered by industry groups to enhance their workforce's competency in safety and compliance matters.
- **Communication and consultation.** Effective communication and consultation mechanisms can help foster a culture of safety and compliance. Regular meetings, safety briefings and open lines of communication can encourage reporting of safety concerns and collaborative problem solving.

1. **Monitoring and review.** Implementing straightforward mechanisms for monitoring compliance and reviewing safety practices is essential. Even without sophisticated systems, maintaining basic records and conducting periodic reviews can help ensure ongoing compliance and safety improvements.

2. **Leveraging technology.** While extensive technological investments may be out of reach, small organisations can explore affordable technology solutions to aid in managing CoR obligations. Simple tracking devices, mobile apps for log-keeping, or software for scheduling and route planning can enhance safety and compliance without significant expense.

By adopting a systems approach, even in a simplified form, small entities can create a structured framework for managing HVNL obligations that aligns with their operational capacity and resources. This facilitates compliance with legislative requirements and contributes to building a safety-conscious culture, while enhancing the overall safety and efficiency of heavy vehicle operations.

10 Implications for OHS practice

Generalist OHS professionals have a significant role to play in bringing their knowledge and experience of systems-based safety management to the management of the heavy vehicle industry. It is recommended that strategies for managing risks associated with heavy vehicle transport activities be seamlessly incorporated into the overarching OHSMS. This approach mandates a collaborative, multidisciplinary effort that unites the expertise of technical specialists in heavy vehicle operations, frontline workers and generalist OHS professionals. By facilitating this integration, OHS professionals can transform risk management of transport activities from a largely administrative process to a fundamental component of organisational operation.

OHS professionals should be able to provide advice on implementing CoR principles and ensuring regulatory compliance. They have a major role in educating and supporting operational transport personnel in activities such as incident management and investigation, risk assessment, contractor management, competency training and emergency preparedness. While some of the more technical aspects of heavy vehicle operation may be managed by transport or fleet operations personnel, OHS professionals should understand the operational aspects of vehicle weights and dimensions, load restraints, vehicle maintenance systems and fatigue management under the HVNL.

OHS professionals will recognise the differences between ‘inside the fence’ management of workplace health and safety and the broader context required in managing heavy vehicle transport safety. They will acknowledge that the scope of management goes beyond that of workplace OHS to include other road users, public infrastructure and the environment.

11 Summary

This chapter introduces the concept of Chain of Responsibility, which moves the focus of safety in heavy vehicle operations from the driver to a responsibility shared by all parties who have influence or make decisions that impact the safety of heavy vehicles on the road. It considers the legislative framework aimed at mitigating risks of transport activities and emphasises the necessity of adopting a systems-based approach to hazard control. The

chapter describes a role for the OHS professional that extends beyond the workplace to encompass risks to public safety.

The number of people killed and injured in heavy vehicle crashes creates an imperative for understanding and managing the hazards and risks associated with heavy vehicles in road transport. The chapter identified core hazards associated with heavy vehicles as mass, dimension, load and condition, and driver-related hazards of fatigue, fitness for work, inadequate training and speed. Sources of these hazards and associated risk include work systems and conditions, worksite and road environments, and contractual arrangements.

Identification and management of the risks requires an integrated, multidisciplinary approach. The chapter identifies the critical OHS management system elements for integration of CoR and heavy vehicle operation requirements and approaches that smaller businesses can take to reduce the risk.

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Appendix

Heavy vehicle categories[31]

The National Heavy Vehicle Regulator (NHVR) identifies two types of heavy vehicles with access to the road network:

General Access Vehicles, which "comply with mass and dimension requirements and do not require a notice or permit to operate on the road network. These vehicles have general access to the road network unless the road is sign-posted otherwise."

Restricted Access Vehicles, which "include class 1, 2 or 3 vehicles [below] that operate under a notice or permit and vehicles operating under higher mass limits (HML) that have restrictions on the parts of the road network they can access."

Class 1 heavy vehicles serve specific functions beyond conventional goods transport:

- *Special purpose vehicles* are motor vehicles or trailers "other than an agricultural vehicle or a tow truck, built for a purpose other than carrying goods [and] considered class 1 heavy vehicles when they do not comply with a prescribed mass or dimension requirement applying to it" (e.g. mobile crane, concrete pump, drill rig, fire truck).
- *Agricultural vehicles, implements and trailers* are categorised as class 1 if they, along with their load, exceed standard mass or dimension limits (e.g. harvesters, tractors, augers, comb trailers, conveyors).
- *Oversize and/or overmass* (OSOM) *vehicles* are vehicles that "alone, or together with their load, exceed prescribed mass or dimension requirements [and are] carrying, or designed for the purpose of carrying, a large indivisible item…This does not include road trains or B-doubles, or vehicles carrying a freight container designed for multimodal transport" (e.g. a prime mover with an extendable trailer or a prime mover and low loader combination).

Class 2 heavy vehicles encompass a diverse range of specialised heavy vehicles, each uniquely designed to perform specific functions:

- A *B-double* is "a prime mover towing two semitrailers [Figure 7], with the first

[31] This appendix is sourced from NHVR information on classes of heavy vehicles: https://www.nhvr.gov.au/road-access/mass-dimension-and-loading/classes-of-heavy-vehicles and https://www.nhvr.gov.au/files/201409-0155-classes-of-heavy-vehicles.pdf

semitrailer being attached directly to the prime mover by a fifth wheel coupling and the second semitrailer being mounted on the rear of the first semitrailer by a fifth wheel coupling on the first semitrailer. A B-double must comply with prescribed mass and dimension requirements" (Figure 7).

- A *road train* is "a motor vehicle towing two or more trailers (excluding converter dollies supporting a trailer). Road trains must comply with prescribed mass and dimension requirements." (e.g. B-triples, which consist of a prime mover towing three semi-trailers, sometimes operate on networks distinct from general road train routes; Figure 7)
- A *bus* "that is longer than 12.5m but less than 14.5m, that complies with prescribed mass and dimension requirements is a class 2 heavy vehicle. These are also known as a 'Controlled Access Bus.'" (Excludes articulated buses.)
- A *vehicle carrier* "is a combination designed and built to carry vehicles on more than one deck that together with its load is longer than 19m or higher than 4.3m."
- A *livestock vehicle* "is a heavy vehicle, or a combination, that is higher than 4.3 m and is built to carry cattle, sheep, pigs or horses."
- *Performance-based standards (PBS) vehicles* "are defined as class 2 heavy vehicles. There are four levels within the PBS Scheme, and these vehicles must meet twenty safety and infrastructure standards and are designed to offer higher levels of safety and productivity. PBS vehicles are able to operate on road networks that have been classified as suitable for their level of performance."

Class 3. "A class 3 heavy vehicle is a heavy vehicle which, together with its load, does not comply with prescribed mass or dimension requirements and is not a class 1 heavy vehicle (HVNL s116 (3)). A truck and dog trailer combination consisting of a rigid truck with 3 or 4 axles towing a dog trailer with 3 or 4 axles weighing more than 42.5t is an example...Other examples might include a B-double or a road train transporting a load wider than 2.5m. Class 3 heavy vehicles do not include PBS vehicles or heavy vehicles complying with prescribed dimension requirements but operating under Concessional Mass Limits (CML) or Higher Mass Limits (HML)."

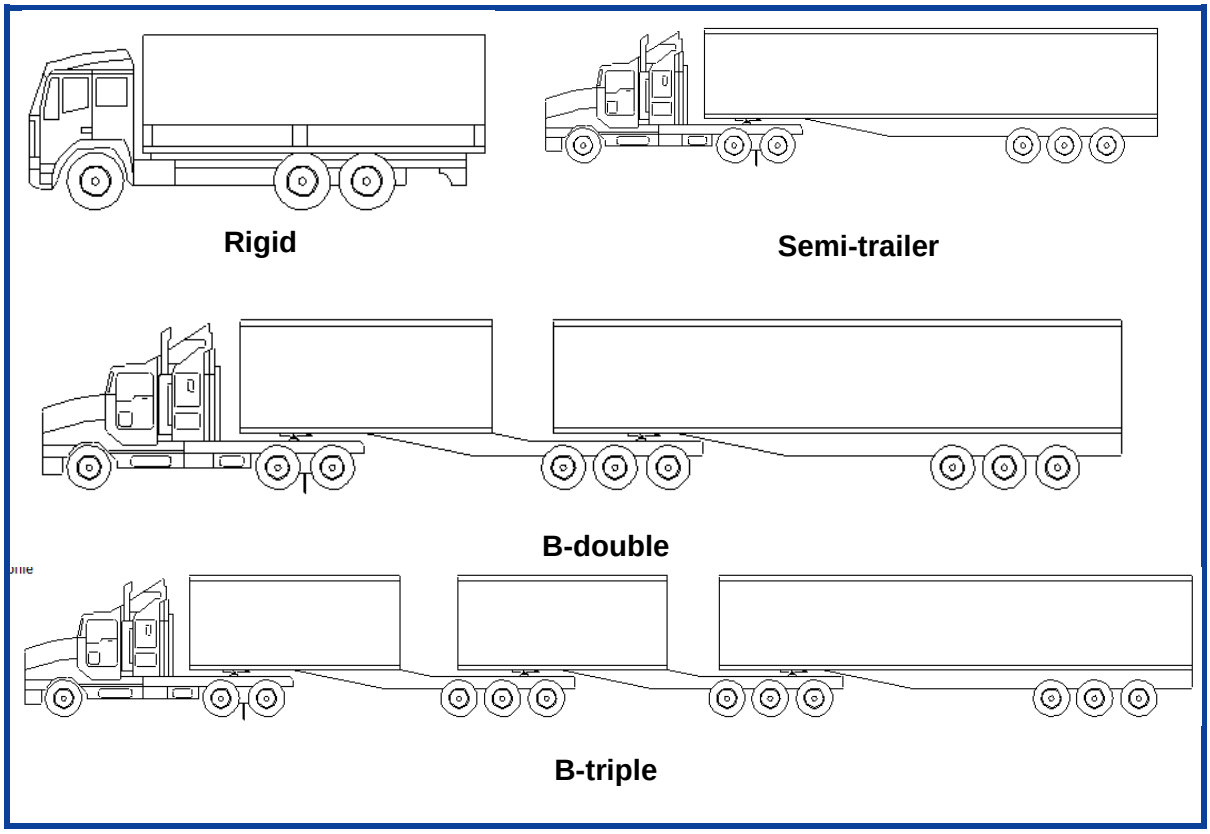

Figure 7: Heavy vehicle combinations