



Australian Government

Department of Infrastructure,
Transport, Regional Development,
Communications and the Arts



Automated Driving System Entity in-service obligations

This paper **expands** on previous policy work

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Overview

The Automated Driving System Entity (ADSE) is responsible for managing the safety risks associated with the Automated Driving System (ADS) over the course of its design life (the length of time the ADSE has nominated to support the ADS).

The Automated Vehicle Safety Law (AVSL) will impose a range of obligations on the ADSE through a general safety duty and supporting prescriptive duties, executive officer due diligence obligations, prescriptive requirements for repairs, maintenance and modifications, and data reporting and recording obligations.

This paper covers the proposed ADSE in-service obligations and seeks feedback.

Key points

The ADSE must ensure the ADSs it is responsible for operate safely. Safety duties included in the AVSL will require ADSEs to identify, take responsibility for, and actively manage safety risks for an ADS.

Prescriptive safety duties support the general safety duty and provide more information about the expectations on an ADSE to ensure the safety of its ADS.

Under the AVSL, executive officers of the ADSE will have due diligence obligations. This recognises the influence that senior officers have on the actions of an ADSE in complying with its duties and obligations.

The AVSL will also include requirements for repairs, maintenance and modifications of an ADS. These requirements aim to manage the safety risks of work performed on an ADS, including significant modifications made to the ADS.

Reporting and data recording obligations on ADSEs will help the regulator to understand emerging safety risks, and how an ADSE is meeting its duties and obligations under the AVSL.

Consultation question

We welcome feedback on all elements of the regulatory framework. In relation to the proposed ADSE in-service obligations, we are especially interested in the following.

6. Are there other modifications that should be considered significant? Is there other information an ADSE should provide when seeking authorisation for a significant modification?

Safety duties

Once an ADSE has been certified, it is responsible for ensuring that the ADS operates safely. Safety duties are an important part of achieving this. Safety duties require ADSEs to identify, take responsibility for, and actively manage safety risks for an ADS.

A principles-based approach

Safety duties are part of a principles-based approach to regulation. This means focusing on whether the parties that are being regulated are achieving the purposes of the regulation, rather than using rules or standards to prescribe the exact actions of the regulated party. Safety duties are already used as part of principles-based regulation in Australia; for example, in the model work health and safety laws, the Heavy Vehicle National Law, the Rail Safety National Law and the Marine Safety (Domestic Commercial Vessel) National Law.

A principles-based approach is useful for regulating the in-service safety of ADSs because:

- it is likely to capture a wider range of the risks, including new and emerging risks, compared with a prescriptive-based approach
- it allows for safety risks to be identified and proactively managed by the party with the most influence on the safety of an ADS, and with the expertise to identify and mitigate those risks
- it provides flexibility and promotes innovation by allowing different approaches to mitigating safety risks depending on technology and business models, while also allowing for changes in response to improved technology and knowledge
- it encourages a safety culture within ADSEs by making them, rather than the regulator, responsible for identifying and mitigating risks, which will motivate ADSEs to prevent or mitigate safety risks before an incident happens, allowing the regulator to target specific risk areas and reducing the overall costs and burden of regulation.

The safety duties we plan to include in the AVSL identify the safety outcomes that ADSEs are expected to achieve, but do not set out how an ADSE must meet the safety duties. This will give ADSEs flexibility to use different approaches to managing safety risk based on what is suitable for the different types of ADS and the different business models used by ADSEs.

The safety duties can be divided into three categories:

1. **the general safety duty** – a primary or overarching safety duty of the ADSE
2. **the prescriptive safety duties** – specific duties that are intended to support, but not limit, the application of the general safety duty
3. **the executive officer due diligence obligation** – an obligation that requires ADSE executive officers to ensure the ADSE meets its general safety duty.

Under the AVSL, a person or company with a safety duty will not be able to transfer it to someone else. It will be possible to have more than one safety duty, and more than one person could hold the same safety duty at the same time.

These duties are further explained in the following sections.

General safety duty

The general safety duty requires the ADSE to ensure, so far as is reasonably practicable, the safe operation of its ADS(s). This duty would:

- apply for the design life of the ADS (the period for which the ADSE has committed to supporting the ADS)
- make the ADSE accountable for the safe operation of the ADS
- apply to all aspects of ADS operation.

An ADSE can determine how it will ensure the safe operation of its ADS 'so far as is reasonably practicable'. There are multiple ways an ADSE could ensure it meets the outcome of the safe operation of an ADS. When determining what is reasonably practicable at a particular time, the ADSE would need to weigh up all relevant matters including:

- the likelihood of a hazard or the risk occurring
- how much harm could result from the hazard or the risk
- what the person concerned knows, or should reasonably know, about
 - the hazard or the risk
 - ways of eliminating or minimising the risk
- whether ways to eliminate or minimise the risk are available and suitable
- the cost associated with available ways of eliminating or minimising the risk, including in relation to the likelihood and potential harm of the risk.

The ADSE's safety management system will include information about how the ADSE plans to ensure it will meet the general safety duty and other requirements in the AVSL, including how it will assess, monitor and respond to safety risks when its ADS is in service. The information in the safety management system will also help the new regulator to understand how the ADSE is meeting its duties and obligations. More information is available in the [Safety management system for vehicles with an ADS](#) paper.

Prescriptive safety duties

Prescriptive duties support the general safety duty. They give more information about the expectations placed on an ADSE to ensure the safety of its ADS. The prescriptive duties do not limit the general safety duty. As with the general safety duty, the prescriptive duties identify the outcome the ADSE needs to achieve, but the ADSE has flexibility in how it achieves this outcome. Each of the prescriptive duties is explained further below.

Safety management system

As part of ADSE certification, the regulator will consider the ADSE's safety management system, which sets out how the ADSE intends to identify and manage the safety risks of its ADS over its design life. This prescriptive safety duty is aimed at ensuring that the safety management system is used in practice, and improved over time.

The duty will require an ADSE to implement, review and update its safety management system throughout the design life of its ADS.

We expect that the ADSE would adopt a coordinated and systematic approach to identifying, managing and addressing safety risks for the design life of the ADS. This includes:

- implementing its safety management system
- continually assessing its safety management system and identifying the specific actions it needs to take to continue to ensure the safe operation of its ADS.

The process would account for things like:

- improvements in technology
- changes to road infrastructure
- improved information about the operational design domain
- data the ADSE has collected about the safety performance of the ADS
- improved evidence and knowledge about ADS safety more broadly.

Law enforcement and emergency services interaction protocol

As with the safety management system, the regulator will also consider the ADSE's law enforcement and emergency services interaction protocol (LEESIP) at certification. This prescriptive duty aims to ensure the LEESIP is implemented when the ADS is in service and improved over time.

The duty will require an ADSE to implement, review and update its LEESIP throughout the design life of its ADS(s).

As part of meeting this duty, ADSEs will be expected to keep up to date with new practices or procedures for an ADS interacting with on-road law enforcement officers or emergency services personnel (first responders).

The regulator may make changes to the minimum requirements for a LEESIP or provide additional guidance or directions in relation to the LEESIP. Under this duty, it is expected that the ADSE would make necessary changes to the LEESIP as a result of updated requirements, guidance or directions.

Compliance with national road vehicle standards

When an application is made to first provide an ADS to the Australian market, there will be an assessment of whether the ADS (and the vehicle the ADS is in) meets the national road vehicle standards (sometimes referred to as Australian Design Rules). These standards will set out technical requirements about how an ADS should operate safely. More information about approvals processes when a vehicle is first provided is in the [Requirements when a vehicle with an ADS is first provided](#) paper.

The duty requires that an ADSE ensure that the ADS continues to operate in compliance with the national road vehicle standards that apply to an ADS, including later or amended national road vehicle standards if the amendments are important for safety, so far as is reasonably practicable.

As part of meeting this duty, an ADSE would need to ensure an ADS at least continued to comply with the standards that applied when the vehicle was first provided to the Australian market.

However, ADSs are an emerging technology, so the relevant national standards may be updated and improved over time. Where updates to the standards are made to address safety-critical issues that were not appropriately managed by the previous versions of the standards, an ADSE would be expected to ensure the ADS complies with the more recent version of the standard. In this situation, we expect that the regulator will provide directions and guidance as required.

Road traffic laws

Existing road traffic laws apply to human drivers, and provide a consistent set of requirements for drivers that help vehicles move safely, efficiently and predictably on public roads. When ADSs are operating on roads alongside vehicles with human drivers, it is important that they also act safely and predictably.

This duty will require an ADSE to ensure that an ADS operates in ways consistent with the road traffic laws that apply to the driving task. If an ADS does not comply with road traffic laws this would be notified to the regulator, which would then consider whether there is potential breach of the ADSE's safety duties and seek to address any emerging safety issues.

Preventing the operation of an unsafe ADS

An ADSE will have a duty to prevent the operation of an ADS when the ADSE is aware the ADS is unsafe, so far as is reasonably practicable.

This duty would require an ADSE to prevent an ADS operating if the ADS does not respond appropriately to faults in the system or if it becomes unsafe for any other reason.

The ADSE would need to stop the ADS from operating as soon as it is aware that an ADS is operating unsafely or that it could operate unsafely the next time it is activated (for example, due to errors in the software or hardware, or malicious or accidental interference).

Updates and upgrades to the ADS

An ADSE will have a duty to actively manage the ongoing safe operation of the ADS, including how updates and/or upgrades to ADS software and hardware would be administered once the ADS is in service.

The ADSE would need to ensure, as far as reasonably practicable, that:

- all system updates and upgrades (whether to hardware or software) are installed safely
- it prevents the ADS from operating until all safety-critical system updates and upgrades are completed successfully
- any system failures once an update or upgrade is installed are detected and addressed.

This duty recognises that incomplete or incorrect download or installation of any system update or upgrade could result in an ADS operating unsafely.

The ADSE must stop the ADS from operating, at least temporarily, if safety-critical upgrades are not installed or if system failures are detected following the installation of any upgrades or updates.

If the update or upgrade is a significant modification, the ADSE would need to seek authorisation from the regulator before proceeding. More information about requirements for modifications is presented later in this paper.

Education for ADS users and other relevant parties

The ADSE will be required to provide education and training to users to ensure that people who own or use an ADS are aware of their obligations when they use the ADS. This will also reduce safety risks over the design life of the ADS.

The ADSE would determine the content and delivery of any education or training, taking into account the ADS technology and any technical requirements included in applicable national road vehicle standards.

In meeting this duty, we expect the ADSE to consider, for example:

- training users to safely engage, operate, override or disengage the ADS
- making sure owners and users understand their obligations and responsibilities
- making sure users understand the ADS's capabilities, including its operational design domain and level of automation, as well as any use limitations and restrictions on modifications
- educating owners and users on how ongoing system updates and upgrades are implemented and why they are important
- educating owners and users on how to facilitate necessary maintenance and repair of the ADS
- ensuring relevant information is accurately conveyed to owners and users given the level of employee, dealer and distributor understanding of the technology and operation.

Preventing interference with the ADS

The ADSE will be required to consider potential risks to the safe operation of the ADS arising from the actions of third parties, including interference with or negligent use of the vehicle or the ADS. This duty does not mean that an ADSE can be held responsible for the actions of third parties. Such actions will be covered by third-party interference offences. More information is available in the [Third-party interference with an ADS](#) paper.

The duty will require an ADSE to make efforts to ensure the ADS cannot be interfered with by third parties, so far as is reasonably practicable.

As part of meeting this duty, an ADSE would need to:

- consider third-party interference risks and take positive steps to mitigate or address risks arising from potential interference by third parties

- protect its ADS-interfacing networks and facilities to prevent unauthorised access and third-party interference (for example, by encrypting updates).

Additional prescriptive safety duties

As ADSs are deployed and we understand more about the risks associated with the in-service operation of ADSs, it may be appropriate to specify additional safety duties. The AVSL will include the ability to set new prescriptive duties in the form of a legislative instrument. An ADSE would be required to comply with these safety duties.

Executive officer due diligence obligation

To ensure an ADSE complies with its duties, and to provide accountability when there is a breach, the AVSL will place due diligence obligations on the ADSE's executive officers. This recognises the influence that senior officers have on the actions and omissions (things that have not been done) of an ADSE in complying with its duties and obligations.

An executive officer of an ADSE would need to exercise due diligence, making reasonable efforts to ensure the ADSE complies with its safety duties.¹ The obligation would apply to officers of the ADSE that are in a position to influence the ADSE's compliance with its safety duties. The obligation would apply to the extent that an executive officer could personally influence the ADSE's compliance with the relevant safety duty.

The obligation would include ensuring the ADSE meets its general safety duty and the prescriptive safety duties. The obligation would also include, but would not be limited to, the officer taking reasonable steps to:

- gain knowledge and keep up to date about automated vehicle safety matters
- ensure the ADSE has the right resources (including staff) and processes in place and uses those resources and processes to eliminate or minimise automated vehicle safety risks
- ensure the ADSE has the right processes to receive and respond to reports of safety-related incidents, hazards or issues, and processes to comply with the general safety duty
- verify that the processes and resources set out above are being used.

To meet their due diligence obligation, we expect that executive officers will be able to rely on the advice of others they have good reason to believe are expert and reliable.

To assist executive officers and ADSEs to meet the due diligence obligation, the regulator would be able to develop guidance to support ADSEs to meet the general safety duty.

Repairs, maintenance and modifications

As well as principles-based safety duties, the AVSL will include more specific requirements for repairs, modifications and maintenance of an ADS.

Authorising repairers, maintainers and modifiers

ADSs are technically complex systems. Work on an ADS by a person who does not have the right knowledge, skills, guidance and equipment could result in an ADS operating unsafely.

Elements of the regulatory framework that help address risks relating to repairs, maintenance and modifications include safety duties on ADSEs and the proposed third-party interference offence,

¹ It is proposed that an executive officer may be convicted of the offence even if the ADSE has not been proceeded against for, or convicted of, an offence relating to the safety duty.

which includes performing repairs or modifications on an ADS that are not authorised by an ADSE (see the [Third-party interference with an ADS](#) paper for further information).

Repairers, maintainers and modifiers are parties that could have a significant influence on the safety of an ADS. Even if the ADSE does everything that is reasonably practicable to ensure the safety of its ADS, the acts or omissions of a person repairing, maintaining or modifying an ADS may still result in safety risks.

We are seeking feedback on whether it is necessary to include further measures in the AVSL to address the potential influence of repairers, maintainers and modifiers on ADS safety.

More information and consultation questions related to these measures are in the [Additional measures for repairers, maintainers and modifiers](#) paper.

Modifications

Most ADSs will be modified during their design life. Modifications could vary from minor bug fixes or updates to ADS software through to hardware or software changes that substantially alter the way the ADS operates. The AVSL will include different approaches to regulating modifications, depending on how significant the modification is.

An ADSE or a person authorised by the ADSE would be permitted to make a minor modification to an ADS without any additional authorisation from the regulator. A minor modification is any modification to the ADS that is not a significant modification (more information on significant modifications is in the next section).

Understanding the modifications that have been made to an ADS may be important to understanding the way an ADSE is meeting its duties and obligations under the AVSL or be helpful when investigating a safety incident. To support this information being available, an ADSE must keep a log of all in-service modifications to its ADSs. This would include both minor and significant modifications. The ADSE would need to provide the regulator with access to this log upon request.

Significant modifications

A significant modification would be one that changes how or when the ADS performs the dynamic driving task. Significant modifications could result in safety risks if not managed appropriately. They may also impact the way an ADSE needs to meet its other duties and obligations under the AVSL. The AVSL will include requirements that an ADSE must meet before it proceeds with a significant modification.

What is considered a significant modification would be specified in a legislative instrument. This will allow them to be more easily updated as we learn more about ADS operation and technology. Significant modifications could include:

- changes to the functionality of the ADS that was declared at first provision or when receiving aftermarket installation approval
- an extension to the design life of the ADS beyond what was declared at certification
- installation or removal of ADS components that affects ADS performance or results in the ADS becoming noncompliant with the relevant national road vehicle standards
- replacement of ADS components with parts that have different performance characteristics
- changes to the level of automation of the ADS
- an expansion of the operational design domain.

An ADSE will be expected to approach the regulator if it thinks a planned modification will be a significant modification, or if it is unsure whether a modification is significant or not.

Before performing a significant modification, an ADSE would need to give evidence to the regulator about:

- how the modified ADS will continue to meet the technical requirements of the applicable national road vehicle standards (this relates to the safety duty to maintain compliance with the applicable national road vehicle standards)
- how it has updated the safety management system and/or LEESIP, if necessary, so there continues to be appropriate systems in place to ensure compliance with the safety duties and the LEESIP continues to meet minimum requirements
- how the ADSE will be able to support the ADS across any extension of the ADS's design life arising from the modification, and meet the ADSE certification requirements throughout that additional period.

The regulator will consider the evidence provided by the ADSE about the significant modification and either:

- accept the evidence and authorise the ADSE to proceed with the modification
- not accept the evidence, and provide the ADSE with a written notice that it is not authorised to proceed.

A significant modification could be carried out by the ADSE or by a modifier that has been authorised by the ADSE, but the ADSE should have sufficient oversight of any modifications performed.

Consultation question

6. Are there other modifications that should be considered significant? Is there other information an ADSE should provide when seeking authorisation for a significant modification?

Reporting: notification and data recording obligations

Reporting by the ADSE, and other parties that have an influence over the safety of an ADS, will help the new regulator understand how duties and obligations under the AVSL are being met. It will also assist with identifying systemic safety issues. Data recording obligations will support the regulator in using its powers and functions.

Notification obligations

An ADSE will be required to notify the new regulator of systemic safety issues, the suspension of operation of ADS in specific circumstances, safety incidents and breaches of road laws, instances of third-party interference and any voluntary recall.

Systemic safety issues

Safety issues that affect an ADS could be due to an issue that is common across all ADSs of that type. They could also be relevant to other types of ADS.

It is important that the regulator is aware of systemic issues to understand how an ADSE is meeting its safety duties and to identify any need to manage broader or fleet-wide safety issues.

An ADSE will need to notify the regulator when it becomes aware of any safety issue affecting its ADS that could be systemic; that is, if it could affect other ADSs, either within the ADSE's own fleet or more broadly. The notification would need to be made as soon as practicable.

Examples of potential systemic safety issues an ADSE should report to the regulator include:

- patterns of ADS behaviour that result in safety issues (for example, failing to detect pedestrians or bicycles)
- patterns of crashes, safety incidents or traffic law breaches involving its ADSs
- patterns of ADS behaviour in response to certain variables (for example, lighting, weather, road type and design).

Our understanding of the types of safety issues that could be indicative of systemic issues will develop over time. The regulator could issue nonmandatory guidance about what could be a systemic safety issue.

Suspension of operation

An ADSE must notify the regulator when the operation of an ADS has been suspended if:

- safety-critical upgrades or updates are not installed
- system failures are detected following the installation of any upgrades or updates.

This notification would need to be made as soon as practicable.

Safety incidents and road traffic law breaches

Knowing about significant safety incidents and road traffic law breaches will help the regulator understand how the ADSE is upholding its safety duties and supporting an ADS to operate safely and comply with road traffic laws. This information will also help identify patterns of safety incidents and performance across all ADSs, which may help to identify systemic safety issues.

An ADSE must notify the regulator of all significant safety incidents and road traffic law breaches. For example:

- a breach of a road traffic law that occurs when an ADS is engaged, including during transition of control with the fallback-ready user
- any instances where an infringement notice has been issued in relation to the operation of an automated vehicle with an ADS the ADSE is responsible for (noting that it is not intended that infringements under state and territory road traffic laws will be used for ADSE compliance and enforcement purposes)
- any other significant safety incidents involving the ADS.

The regulator would be able to issue guidance on the types of safety incidents considered 'significant'.

The notification would need to be made as soon as practicable.

Third-party interference

ADSEs are not responsible for the actions of third parties, but it will be useful for the regulator to be notified of third-party interference attempts.

An ADSE must notify the regulator when it detects any attempted third-party interference on its ADS. Examples of third-party interference with an ADS include:

- unauthorised access, modification or impairment of the existing ADS software
- unauthorised installation of new software (for example, spyware, malware, gridlockware²)
- unauthorised access, modification or impairment of the ADS hardware (for example, disabling/modifying a sensor, camera, microphone or other components that form part of the ADS)

² Gridlockware refers to code intended to disable a vehicle until a ransom is paid.

- unauthorised installation of new hardware as part of the ADS
- deliberate engagement of an ADS that has been disengaged by an ADSE or suspended by an ADSE at the direction of the regulator
- repairs of an ADS or changes to an operational design domain that have not been authorised by the ADSE or the regulator
- interference with non-ADS components of an automated vehicle that compromise the safety of an ADS.

The notification would need to be made as soon as practicable.

The regulator may notify state and territory law enforcement of the third-party interference attempt, where it relates to third-party interference offences in state and territory law. Commonwealth law enforcement agencies may also be notified where the third-party interference attempt relates to offences in Commonwealth law. More information about these offences is in the [Third-party interference with an ADS](#) paper.

Voluntary recalls

A supplier, including an ADSE, that takes voluntary action to recall an ADS or part of an ADS will need to notify the regulator of the recall, if the ADS or ADS component is being recalled because:

- the ADS will or may cause injury to any person
- a reasonably foreseeable use (including a misuse) of the ADS will or may cause injury to any person
- the ADS does not, or it is likely that it does not, comply with the applicable national road vehicle standards
- the ADS is recalled in combination with, or after notifying the regulator under, the other safety reporting obligations detailed above
- the ADS has been recalled to enable or ensure compliance by an ADSE with its safety duties and obligations under the AVSL.

This requirement would apply to suppliers broadly, not just ADSEs, because a supplier of parts of an ADS may not be an ADSE.

The supplier would also need to notify the regulator of any remedial actions that will be taken. The notice to the regulator of the recall action would be required within 2 days of the supplier taking action.

More information on voluntary and compulsory recalls is in the [Recalls of automated vehicles](#) paper.

Data recording obligations

Data recording by the ADSE will support the regulator in exercising powers and functions such as audit, monitoring and investigation. Records will also assist other affected parties; for example, when determining liability after a road crash. An ADSE will need to produce the information recorded under the data recording obligations upon request by the regulator.

The data recorded under these obligations will need to be collected, used, stored and disclosed according to the requirements in the [Information management requirements](#) paper.

Maintaining data recording and sharing capability

As part of the certification process, an ADSE will need to demonstrate it has certain data recording and sharing capabilities to support a range of purposes, including road traffic law enforcement, insurance claims, determination of liability and investigation of safety incidents.

The AVSL will require ADSEs to record all the data necessary to maintain compliance with its certification data recording and sharing capability requirement, as well as data relating to the

enforcement of road traffic laws and road safety incidents. This will ensure that the capabilities declared at the time the ADSE is certified are implemented in practice.

This data recording obligation would require an ADSE to ensure:

- that its data recording capabilities and activities are, at a minimum, implemented consistently with the information the ADSE provided at certification
- any data recorders continue to be functional and any other procedures used to capture necessary data are maintained, including data recorded to identify whether the ADS was in control of the vehicle at a point in time, the level of automation engaged, transition demands and minimum risk manoeuvres.

Recording safety incidents

Where an ADSE reports a safety incident or breach of road traffic law under the reporting obligations set out above, it would be required to keep a record of the incident and any action it took to address the safety incident or road traffic law breach.

This obligation would also require the ADSE to record other safety incidents that did not reach the threshold for reporting to the regulator. This requirement will enable the regulator to use its audit powers to understand an ADSE's compliance with its duties under the AVSL and may also help to identify and investigate systemic safety issues.

Recording repairs and maintenance

An ADSE will be required to keep records of all ADS repairs and maintenance. While the regulator will not generally have a direct role in overseeing repairs or maintenance of an ADS, being able to access records of repairs and maintenance will help the regulator to exercise its audit and other compliance powers, and may help to identify systemic safety issues.

Recording recall actions

As set out in the notification obligations section above, ADSEs and other relevant suppliers will need to notify the regulator of certain voluntary recall actions. The ADSE or supplier may also take other voluntary recall actions that do not need to be notified to the regulator; for example, recalls not related to a safety issue.

An ADSE will need to keep records of all recall actions undertaken for the ADSs it is responsible for. This would include:

- voluntary recall actions that were notified to the regulator
- voluntary recall actions that were not required to be notified to the regulator
- compulsory recall actions.