

One Year of Automated Driving Roundtables: Key Takeaways

In the project Network Automated Driving (AD) Regulations, industry actors, authorities, and research institutes meet at quarterly roundtables to discuss and exchange experiences about AD regulations and their implications. This policy brief summarises the insights from the first year of roundtable discussions.

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Laws and regulations are needed to ensure a safe and successful introduction of automated vehicles (AVs) into the transportation system. Well-thought-out rules can maximise the technology's benefits, minimise risks, and foster public trust.

The project **Network Automated Driving Regulations**, focusing on regulatory aspects of automated driving (AD), brings together industry, authorities, and research at quarterly roundtables to enable dialogue and exchange experiences and knowledge that can help support companies to move forward in the AD arena in terms of technology development, testing, and implementation. Additionally, these roundtables provide valuable insights to authorities on how the industry reasons and interprets regulations, and allow authorities to provide input to industry and research. Outcome of the project can also support a smoother collaboration among actors both internationally and within Sweden.

The project **Network Automated Driving Regulations** aims to strategically strengthen Sweden's position in innovation and make Sweden an influential actor in AD policy and regulation development by, amongst other measures, raising the knowledge level of AD regulations among the actors. Find out more at [Drive Sweden](#) and [RISE](#).

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In this **policy brief**, we present some key points and highlights from the roundtable discussions during the first year since the network started.

The discussions have revolved around:

- The need to develop and adapt legislation for AVs and their use.
- Implications related to driverless vehicles and remote drivers/operators in handling, for example, the warning triangle, police controls, emergency vehicles, loading and securing loads, etc.
- What is needed in terms of physical and digital infrastructure for AVs.



Key words: automated driving, autonomous driving, automated vehicles, autonomous vehicles, regulatory development, regulatory landscape.

Disclaimer: The conclusions and viewpoints presented in this policy brief reflect those of the author. Other parties or participants may hold different views.

Automated Driving: Basic Concepts

Abbreviations and Acronyms in This Policy Brief

AD	Automated Driving
ADAS	Advanced Driver Assistance System
ADS	Automated Driving System
AI	Artificial Intelligence
ALKS	Automated Lane Keeping System
AV	Automated Vehicle
DDT	Dynamic Driving Task
EC	European Commission
EU	European Union
GNSS	Global Navigation Satellite System
ISO	International Organization for Standardization
ITS	Intelligent Transport Systems
ODD	Operational Design Domain
SAE	SAE International (previously Society of Automotive Engineers)
UN	United Nations
UNECE	United Nations Economic Commission for Europe
WP.1	Global Forum for Road Traffic Safety (a working group under UNECE)
WP.29	World Forum for Harmonization of Vehicle Regulations (a working group under UNECE)

Automated Driving and Automation Levels

AVs are equipped with an Automated Driving System (ADS) that can independently control and drive the vehicle during all or part of the journey.

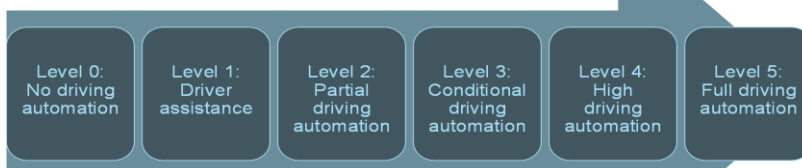
AVs use equipment such as GNSS receivers, sensors, cameras, radars, lidars, etc., to navigate safely. They are typically designed to operate within specific conditions known as the Operational Design Domain (ODD).

The well-known SAE taxonomy, SAE J3016, developed by SAE International and more recently jointly with ISO, divides AD functions into six different automation levels from 0 to 5 (see the **illustration below**). Despite several revisions, the precise boundaries between these levels and the roles of the ADS versus the human remain somewhat unclear due to ongoing technological development and limited practical experience. The purpose is to provide a standardised taxonomy and functional definitions to facilitate the understanding of vehicle automation and the role of the human in this context. It is not intended for regulatory purposes.

According to this taxonomy, AD starts at level 3, where vehicles and drivers are interdependent. The driver can hand over control to the ADS, but when the ADS reaches its limits, it will request that the driver resume manual driving within a certain time frame. At level 4, the ADS can handle more independently but still requires human input in certain situations. At level 5, the ADS should be able to independently handle every type of journey that a human driver can manage (though it remains to be seen if this will ever be the case). Level 2 systems, e.g., ADAS, assist the driver but are not built to handle driving on their own. These systems require the driver to remain attentive to the road scene and the system's performance, and be ready to correct the driving whenever necessary.

AD is often defined as a scenario where the vehicle is driven by an ADS that performs the entire DDT on a sustained basis, even if human assistance may be needed in some situations within its ODD. However, this is currently being discussed. Find out more in our [report](#).

Automation Levels as Defined by SAE International and ISO



A Dedicated Network and Its Recurring Report on Automated Driving Regulations

A Network Dedicated to Discussions on Automated Driving Regulations

In our network, industry actors, authorities, and research institutes meet at **quarterly roundtables** to discuss and exchange experiences about current and upcoming AD regulations and their implications.

The **purpose** is to gain a better understanding of current regulations and ongoing regulatory initiatives at international, EU and national levels, and how they affect the development and deployment of AVs, and the role of the regulations in ensuring the safety of these vehicles and acceptance from users and society at large.

When the actors are gathered around the table, **knowledge transfer** can take place and we can also reach more knowledge together, for instance about which regulations our society needs to integrate AVs safely into the transport system. Such collaborations can contribute to the development of policy and regulations. For instance, the **outcome** of discussions can lead to suggestions for discussions at the UN or EU level, as well as suggestions to the Government Offices of Sweden for Swedish regulations to be on par with international and EU regulations. We continuously follow **the development of UN/EU/SE regulations** relevant to AVs and their use.

The project is **funded** by Vinnova (grant no. 2023-01169) through Drive Sweden and by the partners. It runs from June 2023 until May 2025 under the direction of RISE Research Institutes of Sweden AB (RISE). Besides RISE, the following entities **participate** in the project: Trafikverket, Transportstyrelsen, Aptiv AB, Applied Autonomy AS, Mobility Sweden, Scania AB, Volvo Cars AB, Einride AB, Keolis AB (participated until November 2023), Klimator AB, Kognic AB, Nobina AB, Statens väg- och transportforskningsinstitut (VTI), Asta Zero AB (from December 2023) and Västtrafik AB (from December 2023).



A Recurring Report About the Legislative Landscape Around Automated Driving

A **recurring report** is released from the project every six months that provides an overview of existing and upcoming regulations relevant for automated driving. So far, we have released the report – *Steering the Future: An Overview of Current and Upcoming Regulations in Automated Driving* – in version 0.5 and [version 1.0](#).

The report describes the basis of who regulates what in terms of AVs and AD (UNECE/EU/national level), recent or ongoing regulatory initiatives in several areas that affect AVs and AD, e.g., type approval requirements, traffic rules, driving licence rules, AI and machinery rules, etc. The overview also includes information about the regulatory work in some European countries (limited to a few).



A Webinar in May 2024

At a webinar organised jointly by RISE and Drive Sweden in May 2024, attendees learned more about the project Network AD Regulations and received a deep dive into best practices on how other countries plan to regulate AD. The webinar aimed to provide inspiration and up-to-date information to the project partners and Drive Sweden members. The event was well attended and much appreciated by the participants. We will probably organise other similar events in the future.

The Legal Landscape for Automated Driving

Legal Frameworks and Instruments for Automated Vehicles and Their Use

Rules about vehicles and their use are decided at global, regional and national levels.

Vehicle regulations, which set technical requirements for vehicles and their equipment, are determined primarily at international level by the United Nations Economic Commission for Europe (UNECE) and in our region Europe by the European Union (EU). Both the UNECE and the EU have already adopted some vehicle regulations for AVs. The EU is a contracting party to both the 1958 and 1998 agreements on technical vehicle regulations administered by the UNECE. The EU adopts UN vehicle regulations annexed to these agreements. The EU can also adopt vehicle regulations not covered by UN vehicle regulations. The EU countries can also decide on vehicle regulations not covered by either UN or EU vehicle regulations.

Most of our **traffic rules** originate from international conventions administered by the UNECE: the 1949 Geneva Convention on Road Traffic and the 1968 Vienna Convention on Road Traffic. Most EU countries, but not the EU itself, are contracting parties to these conventions.

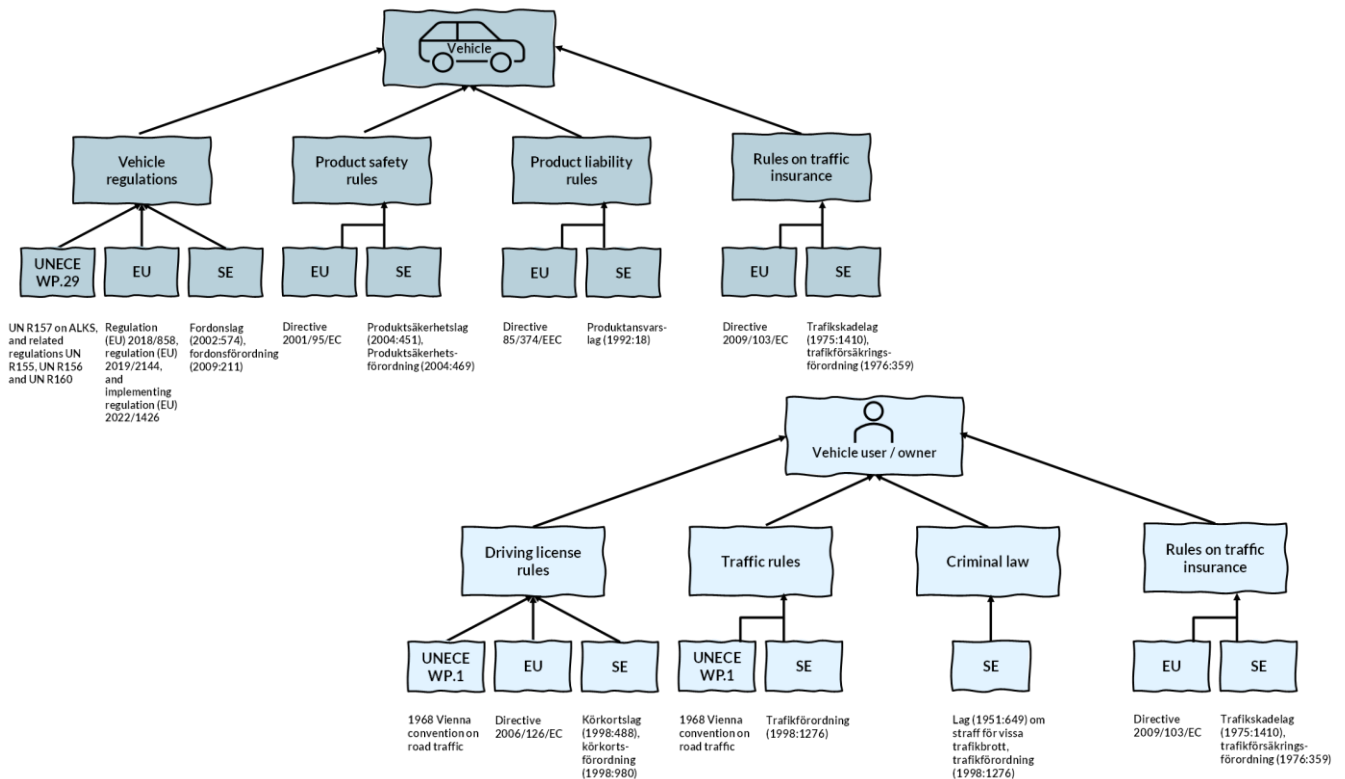
Driving licence rules are essentially harmonised at EU level (and are in turn based on driving licence rules in the Vienna Convention).

Product liability rules and **product safety rules** are mainly developed at the EU level, e.g., Directive 2001/95/EC on general product safety and Directive 85/374/EEC concerning liability for defective products (currently under revision and likely to be replaced by a new directive soon).

Criminal law traditionally belongs to the national level, but, as in other areas of law, national criminal law can be subject to international influence. For certain phenomena, there are international criminal law conventions.

Our Swedish legislation on liability and compensation for damages as a result of motor vehicle traffic and rules on compulsory **traffic insurance** were issued in 1975. This legislation has later been adapted to EU directives. Directive 2009/103/EC currently applies and was amended by the new directive (EU) 2021/2118 on 24 November 2021.

Read more about the legislative landscape around AD in our [report](#) ([link](#)). The **images below** illustrate the legal landscape in two ways: the left image shows the legislation that regulates how vehicles should be designed and equipped, while the right image shows the legislation that governs the user or owner of a vehicle, and at what level this is decided (UN/EU/SE levels). There are alternative ways to illustrate this, and the illustration is not exhaustive in terms of applicable legislation.



Summary of the First Year of Roundtable Discussions

In the network, we discuss how AVs can comply with current traffic rules and seek clarity on how new regulations that are being developed should be applied. We address **four different themes** at our quarterly meetings to achieve this:

Theme 1: Practical Interpretation and Guidance of New and Existing Regulations

In this theme, we discuss specific cases proposed by the partners. We discuss the needs, challenges, and potential solutions for these cases.

The warning triangle is one of our recurring topics. In Sweden, as in many countries, traffic rules require a warning triangle to be placed on the road in case of an accident or emergency stop. This is crucial for road safety, alerting others to slow down and avoid danger, especially on high-speed or low-visibility roads. The Vienna Convention on Road Traffic also emphasises its importance. For driverless vehicles, effective alternatives must be developed, potentially leading to legislative changes. Digital information on road hazards is expected to improve, but it will take time to become reliable and widely available. Until then, alternative solutions must meet or exceed the safety level of the traditional warning triangle. In the U.S., some AV companies have sought exemptions from the requirement, proposing other measures. Discussions within UNECE/WP.1 are recommended to explore equally effective alternatives.

Another recurring topic is how AVs should interact with police and emergency vehicles. Key points include that AVs need to be able to verify police officers and follow their instructions or hand over the control to a remote driver. AVs must also be able to detect emergency vehicles. Harmonised EU regulations and signals are essential for smooth cross-border routes. Solutions should ideally be globally standardised due to the international vehicle market.

Additionally, we explore various non-driving-related tasks. Drivers today perform several tasks besides driving, such as securing loads, ensuring children's seat belt use, and reporting accidents. Without drivers, AVs face practical challenges in these areas. Our discussions suggest differentiating tasks by urgency, with urgent tasks needing human intervention and less urgent tasks handled differently.

Theme 2: Proactive Input to New International Regulations

We stay informed of new AD regulations being

developed within the UNECE and the EU. We discuss how various proposals would affect the development, deployment, and use of AVs, as well as the possible implications of new regulations. Results and suggestions identified can be taken forward by the partners through their channels. While the focus is on international and EU legislation, we also explore national legislation in different countries.

Theme 3: Proactive Input to Swedish Legislation to Be on Par With International Legislation

We discuss how Swedish legislation aligns with international regulations. While vehicle requirements are set at the UN and EU levels, traffic and liability rules are primarily national matters. Swedish legislation, apart from rules for test operations, has not been updated to match the development of vehicle regulations for AVs at the UN and EU levels. Sweden thus does not yet have any regulation that supports the general use of AVs. New liability rules have been proposed but not yet adopted. We have discussed the various inquiries and proposals the Government Office has produced up to this point.

Our discussions have primarily revolved around issues of responsibility and liability, and implications around identifying which roads or areas may be suitable for AVs. The partners have underlined that we need new, adapted legislation, especially regarding the driver's role and responsibilities. We also need a unified and effective legislation.

Theme 4: Proactive Input to Adaptation of Infrastructure

In this theme, the focus is on infrastructure needs to support the development and deployment of AVs. Our discussions highlight the importance of digitalising the road network and key attributes such as traffic regulations. Access to this data is crucial for AVs to navigate safely. EU initiatives aim to improve data access relevant to AVs. However, high-quality datasets are vital for AVs. Ensuring data quality involves organisational, technical, and legal challenges at national and local levels. Previous research indicates that traffic rule data must be captured close to the source to ensure accuracy, as translation methods have proven insufficient. The network discusses these issues to generate input for government, authorities, and municipalities and to identify areas that need further research.

The discussions within each theme will be elaborated on **the following pages**.

Theme 1: Practical Interpretation and Guidance of New and Existing Regulations

Within this theme, we discuss practical interpretation and guidance of new and existing regulations in relation to AVs and their use.

Industry actors experience a need for practical interpretation and guidance regarding regulatory challenges related to AD, not least because today's traffic rules assume a human driver to accompany the vehicle. Although many traffic rules will still be the same for AD as for manual driving, some special rules may be required, e.g., rules about when a human is required. It may also be necessary to adapt certain regulations that are currently aimed at human drivers to ensure road safety.

In this theme, we discuss specific cases proposed by the partners, with the aim to find a mutual ground on interpretation and application of AD regulations. The forum is a neutral platform to discuss challenges and solutions related to the new situation where the vehicle no longer needs a driver to accompany it. Over time, new regulations and court rulings may evolve regarding these situations, but in the meantime, a forum is needed to discuss these issues and find solutions. To support the discussions, we examine international and national rules and practices in relation to the cases and explore solutions available or proposed in other countries.

The Warning Triangle

The warning triangle is one of the topics we repeatedly discuss within the network. While it may seem trivial, it actually exemplifies a real problem that arises with driverless vehicles.

Today's traffic rules in Sweden, as in many other countries, require the placing of a warning triangle on the road in case of an accident or emergency stop. How can this be solved if a driver is no longer accompanying the vehicle? What is an acceptable timespan for (remotely located) drivers to place the warning triangle in case of an accident or incident? Is there any other physical or digital solution that can potentially replace the warning triangle in the future? We discuss all these and more questions regarding the warning triangle within the network.

The problem of not having a person available to place the warning triangle on the road if needed may be more relevant for automated trucks, as the lack of human presence is more likely to occur in their scenarios. For passenger cars, even if they are fully automated, it is more likely that there is a human present in the vehicle, making it easier to solve the issue of placing the warning triangle on the road.

There are clear safety reasons behind today's rule of placing a warning triangle on the road to alert others of a problem. Correct use of the warning triangle can improve road safety and prevent further accidents by giving other road users time to slow down and avoid the danger. This can be particularly important on roads with high speeds or poor visibility.

We are not aware of any research on the impact of the warning triangle in preventing accidents and saving lives. In the absence of such research, we chose to analyse court cases in Sweden to see if it is possible to gain information about real cases where the absence or incorrect placement of warning triangles may have been significant and how it is viewed legally. The research we have done provides some insights into the role of the warning triangle in road accidents.

There are several court cases from which it can be inferred that people have died while the warning triangle was missing or not properly placed on the road. But there are also other factors besides the warning triangle that can improve or worsen road safety in these situations. The courts have considered several such factors in their rulings.

Thus, we know from the court cases that things can go wrong if a warning triangle is not correctly placed on the road after an incident; but we do not know exactly what difference the missing or misplaced warning triangle has had in these cases.

More information about the court cases can be found in the blue column on the next page.



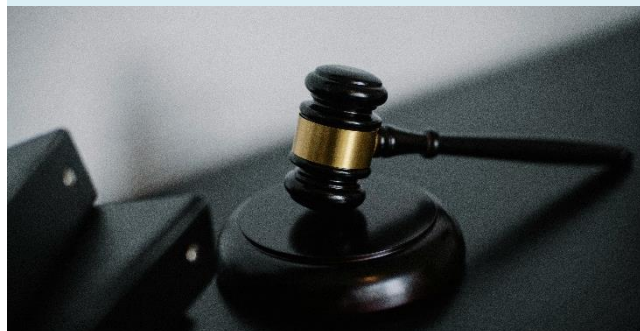
As part of the project, we have reviewed a number of **court judgments** addressing criminal liability in situations where a stationary vehicle has been hit (or people standing outside of that vehicle) and where a warning triangle was not appropriately placed or not placed at all behind the stationary vehicle to warn others.

The court cases show that people have died in these situations. However, it has not been possible to determine from these court judgments the significance of the absence or inappropriate placement of a warning triangle in each accident. Other factors were present, and it cannot be ruled out that these may have played a greater role.

In the studied cases, the courts have investigated whether the driver has committed criminal negligence by not paying enough attention to the surrounding traffic to detect a stationary vehicle in time and avoid a collision. The absence or inappropriate placement of a warning triangle has not been a factor that has led the court to dismiss the charges against the driver who has hit the stationary vehicle (or people outside of that vehicle). Instead, the accused drivers were convicted of crimes because they were deemed not to have paid sufficient attention to the surrounding traffic when colliding with a stationary vehicle. Various factors were considered in these cases, e.g., weather conditions, sight conditions, and that the tailgate of the stationary vehicle was open (it was open in several cases).

Only a part of all the court judgements that may be relevant have been studied so far. These were searched in JUNO by entering the Swedish word for warning triangle (varningstriangel) and filtering the search results on case law. More cases would need to be studied for further information.

Also, without comparative data on incidents where warning triangles were used correctly, it is difficult to measure their effectiveness in preventing accidents. It was also not possible to determine the exact significance of the absence or incorrect placement of warning triangles in each accident from the court cases. However, by examining what other factors courts have considered in accidents with stationary vehicles (e.g., weather and visibility conditions, open tailgates), our study helps identify the wider context in which these accidents occur.



Regardless of the number of lives proven to be saved by warning triangles, it is a functional requirement in the Vienna Convention that all contracting parties have considered important. Since this requirement is difficult to fulfill when a driver is not accompanying the vehicle, a comparable solution should be presented for AD. (Note that even today, it can sometimes be difficult to comply with the warning triangle requirement in all situations, such as if the driver has been seriously injured in the accident.) The industry can develop solutions, and if they are effective enough, there is a possibility that the requirement in the legislation can be changed. The development of such solutions and evaluation of their effect could be investigated in a future research project.

We have also discussed that the availability of digital information about road hazards, such as stationary vehicles on the road, is likely to increase over the years. However, it will probably take a long time before there is reliable information with full coverage and constant updates. It will also take time before all road users can receive this kind of digital dynamic traffic information while travelling.

If the vehicle does not have a person accompanying it, then some other solution is needed. It is probably not justified to make an exception to the warning triangle requirement unless there is another suitable solution that meets the same or higher safety level. What other solutions can be considered that meet the same or higher level of safety as the traditional warning triangle? Perhaps an appropriate visible warning system that can be activated automatically upon certain circumstances or be activated remotely? In the U.S., Waymo and Aurora have applied to a federal agency for a 5-year exemption from the existing warning triangle requirement, citing alternative warning measures that are said to be at least as effective and referring to two studies (no decision is yet available).

We suggest that the issue of the warning triangle should be raised for discussion within UNECE/WP.1. The requirement of the warning triangle in the Swedish road traffic regulation is based on provisions in the Vienna Convention. The issue and how it should be resolved concerns all contracting countries to the convention.

According to the Vienna Convention, it is possible to use other equally effective devices prescribed by the legislation of the country in which the vehicle is registered to fulfil the function of a warning triangle. As a result, it would be possible to adjust the current requirement for a warning triangle in our national legislation in Sweden if there are alternative solutions that could replace it. These solutions need to be as effective as the warning triangle, as required by the Vienna Convention.

Police Controls and Emergency Vehicles

Police controls is another topic that we often discuss within theme 1. The police will occasionally need to interact with AVs and carry out controls. How should this be solved when there is no driver present in the vehicle? And how should AVs detect and act in relation to approaching emergency vehicles?

Our discussions suggest that it is important for the vehicle (or the remotely located driver) to be able to verify that it is indeed a police officer (i.e., police officers should be able to identify themselves to the vehicle). It is not only police controls that need to be considered. For example, how should customs get access to the vehicle to control the load? There are also additional authorities who have the authority to give traffic instructions or carry out certain controls on the roads.

AVs should also be able to recognise emergency vehicles and take appropriate actions. Possible tools to support communication with AVs have also been discussed. It is important to have harmonised regulations, at least at the regional level within Europe. AVs need to be able to drive from Sweden to, for example, Denmark without significant adaptation to different national requirements. Additionally, harmonisation of light and sound signals from emergency vehicles would facilitate the development of AV capabilities to detect emergency vehicles in different countries. Our discussions suggest that solutions need to have global standards, as vehicles are sold on an international market and traffic moves across national borders.



We have also explored the regulatory status of these matters in some countries. From the Netherlands, we have learned that they have the idea that AVs should be able to understand and react to police signals and be able to recognise and prioritise emergency vehicles. The Netherlands does not yet have specific legislation on AD, but work is underway. France has specific legislation on AD. In France, the driver (on-board or remote, where applicable) of an AV must follow summons and instructions from law enforcement, facilitate the passage of vehicles of general interest, and give way to priority vehicles of general interest. Germany has specific legislation for AD, but these rules do not seem to differ when it comes to emergency vehicles. However, there is an interesting rule that requires road users in certain cases to create an emergency corridor to facilitate for emergency vehicles.

Moving a Stationary AV

In connection with the discussions regarding the warning triangle, we have also discussed problems with moving an AV that is stationary, as there can be situations where it might need to be moved by police or other authorities. We have discussed the practicalities around this, such as allowing authorised persons to move a stationary AV if necessary and what the identification process could look like. Some companies active in the U.S. have developed solutions for this in relation to their AVs, but the solutions differ between companies. This makes it complicated for authorities, as they must learn about the processes for AVs from different brands.



Other Tasks Besides Driving

Placing out a warning triangle (discussed above) is only one of the tasks that drivers are responsible for besides driving today. Drivers are also responsible for tasks such as securing loads, ensuring that children wear seatbelts, helping out in connection with a road accident, and reporting wildlife accidents to the police (reporting wildlife accidents to the police is a requirement in Sweden but not necessarily in other countries).

When drivers no longer accompany the vehicle, several practical challenges arise in carrying out these non-driving-related tasks. Who should be responsible for ensuring that these tasks are carried out if the driver is not there, and how can this be solved practically?

We discuss these issues at the roundtables to find practical solutions to fulfil current legal requirements or possibly develop suggestions for future regulations.

Our discussions suggest that one way to distinguish other tasks besides driving is based on urgency. Urgent tasks may require solutions that involve a human interface with dedicated resources, while less urgent tasks may be handled differently, possibly through other solutions (still to be developed). We have also discussed the possibility of the remote driver/operator delegating the practical execution of a task to someone else while still retaining overall responsibility.

These issues will require more attention in upcoming roundtables. Additionally, we collaborate with other projects to exchange insights and ideas.



Theme 2: Proactive Input to New International Regulations

AVs need partly different requirements than previous vehicles. Therefore, it is necessary to develop new vehicle regulations and traffic regulations. The development of such regulations is ongoing at international and EU levels. Collaboration between industry and authorities is essential to develop regulations that will ensure a smooth and safe deployment of AVs.

We (the network) stay informed of these regulatory developments. New legislative initiatives are discussed at the roundtables. Results and suggestions identified can be taken forward by the partners through their channels. (Note that formal suggestions for the development of international regulations from a Swedish perspective are given by the Swedish Government Offices via the representation of each forum; suggestions and input from the industry and other actors may be given via the international representation of each organisation. Findings and proposals identified in this project may be valuable input to any of the formal channels.)

Our focus is on international and EU legislation, but we also explore national legislation in other countries.

It is important to have a harmonised view of how AVs should function and how the infrastructure should be used in Europe. This is especially important for the AV industry so they do not have to develop many country-specific solutions. We have also discussed the trend in different countries of discharging the driver of his/her criminal liability when the ADS operates in accordance with its conditions of use, and the difficulty of imposing criminal liability on a person who has no control over how the ADS performs the DDT. Although liability (especially criminal liability) is primarily regulated at the national level, and there may therefore be differences between countries, it may still be necessary to consider the consequences of regulating liability in ways that are significantly different from other countries. For example, it can lead to the interest in using the technology being significantly lower (or higher) in the country with the deviating legislation compared to other countries.

Both the UNECE and the EU are currently working actively on regulations around AVs and their use. Progress (in both cases) relies on different countries coming to an agreement, which can be challenging, especially for the UNECE where cooperation is required at the global level. A few years ago, the work at the international level progressed slowly, but now it is progressing

much faster. Several legal instruments have already been introduced, and more are under development.

Nevertheless, there is still a lack of regulation in important areas. In addition, there is a lack of consensus regarding which regulations are needed, e.g., regarding the use of AVs. For example, an expert group under UNECE /WP.1 is currently working on developing a new legal instrument to support the safe use of AVs. The work is indeed progressing but is challenged by the fact that all participating countries do not have the same view of what should be achieved. With AD, the legislator needs to balance innovation, safety, and public trust. This is not a simple matter. We follow the work closely.

Research in the field of AD is also ongoing, and we probably still do not have all the necessary knowledge about how AVs and their use should be regulated. This does not mean that we must wait to regulate, but that regulation may need to be revised as we learn.

Theme 3: Proactive Input to Swedish Legislation to Be on Par With International Legislation

Within this theme, we follow and discuss the regulatory development around AVs and their use in Sweden to see how well it aligns with international regulatory developments and, if not, what is needed in that case.

Requirements for vehicles and their equipment are determined primarily at the UN and EU levels, while traffic rules and liability regimes are determined primarily at the national level. The objective of this theme is to generate useful inputs to the Swedish Government Offices to support the development of national legislation for AD.

The technical development of AVs is moving forward, and so are the UN and EU vehicle regulations. However, Swedish legislation has not yet been updated in this field, apart from legislation for test operations with AVs. New traffic and liability rules have been proposed but not yet progressed in the legislative process (see the various activities in the illustration below).

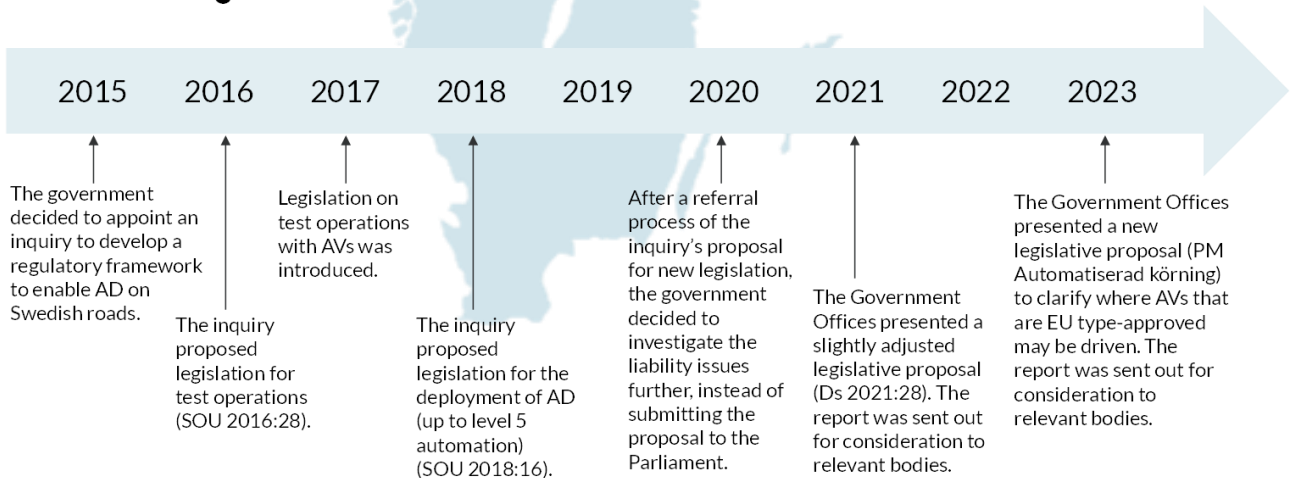
In the network, we have discussed the legislative proposals developed so far by the Government Offices and what is needed going forward. The most recent proposal was sent out for consultation in October 2023. We have discussed the proposal as well as the referral responses from different organisations. Our discussions have mostly revolved around liability issues and implications of identifying which roads/areas might be suitable for AD. Many partners expressed that the latest proposal needs to be adapted if it is to be realised, especially concerning the driver's role and responsibilities. They also underscored the importance of considering previous proposals to achieve a unified and effective legislation for AVs and their use.

We have also compared the Swedish proposals with other countries' approaches to regulate AD. Many countries have begun to rewrite the legislation for a wider adaptation of AD.

In most countries that either already have or are about to introduce legislation on AD, a division of responsibilities and liability is usually envisaged, shared between drivers (or equivalent roles), vehicle owners, and manufacturers. The major innovation in the countries' new legislation usually concerns the driver, who is often assigned a new role with new but fewer tasks and more limited criminal liability. For instance, the regulatory approach may include that the driver (or a similar role) does not need to monitor the DDT but must be ready to intervene if requested by the ADS and can be held liable if they do not. This is similar to what was proposed in SOU 2018:16 and Ds 2021:28, but not in the latest memorandum from the Government Offices, which proposed ordinary traffic and liability rules instead.

Our roundtable discussions suggests that Swedish legislation should broadly follow how other countries have chosen to regulate AD. It can be problematic if our legislation deviates too much from that of other countries, considering that cross-border routes are common in Europe.

Timeline of Legislative Activities for AD in Sweden



Theme 4: Proactive Input to Adaptation of Infrastructure

In this theme, we focus on the potential need to adapt the physical and/or digital infrastructure to support the development and deployment of AVs. We examine what has been researched in the field and identify specific areas that require further investigation. The objective is to generate input to the government, authorities, and municipalities.

At the roundtable discussions, we have discussed the importance of digitalising the road network and important attributes such as traffic rules. Access to this data is important for AVs to navigate safely in traffic and follow traffic rules in the country where they are in operation. In most countries, this data only partially exists today.

Additionally, the data must be complete and accurate. Access to high-quality datasets is particularly important for AVs as there is no longer a driver that performs and monitors the DDT. Unlike human drivers, AVs cannot compensate for data discrepancies. Poor data quality can lead to incorrect interpretations of traffic rules, increasing the risk of accidents.

Legislative and other initiatives that can contribute to access to data relevant for AVs are ongoing at the EU level. For example, recent changes to the EU's ITS legislation entail new obligations for Sweden to ensure access to certain data relevant to ITS services. Some of these data types are also relevant for AVs. The new EU requirements include more data types and a larger road network than before. They cover certain types of road and traffic data, but not all traffic rules. It is also not clear exactly how data quality should be achieved under the EU legislation.

Data quality is an organisational, technical, and legal issue that, depending on the type of data and the data value chain, may need to be resolved at national and local levels. In Sweden, we need to solve this issue regardless of new EU rules, because there is a great need for access to this data, not only to support AD, but also for other needs. The new EU rules are also an important reason to prioritise the issue in Sweden.

In Sweden, we have long had data about the roads and their attributes, but the problem is that the digitalisation is not always done at the source (e.g., by the municipality – which is the only actor that has all the relevant knowledge in relation to a municipal road or traffic regulation). Instead, as a

supplement, digitalisation is sometimes done by the Swedish Transport Administration through a careful translation method. It does not matter that the method is as accurate as possible, it still goes wrong sometimes. Also, market actors create their own solutions to incorporate traffic rule data, often relying on interpretations like information from road signs.

ISO is currently working on a standard for digital traffic rules (METR), which builds on the same idea with translation as a basis. However, the concept can be extended all the way to the decision authority if needed, to be decided in the national implementation of the forthcoming standard.

After using translation methods for many years in Sweden and assessing the quality of the data, we can see that it does not fully work. (Of course, whether it works well or not will be evaluated against the quality you aim for.) This is because the translator does not have – and can never have – all the necessary knowledge about what is to be translated (lacking domain knowledge relevant for data quality). An important conclusion in our recent research has therefore been that traffic rule data must be captured close to the source in order to reach the high data quality needed for some use cases, including AD. (Findings from the Drive Sweden Policy Lab project – Case 4 Future traffic rules; access the project report here: [here](#).)

An important task going forward is to ensure more authorities and municipalities in Sweden produce their own data. Collaborative projects to support this in Sweden are currently taking shape. Within the network, we discuss and investigate any need for further research in the area.

