RESULTS FROM CEDR-WORK DONE AROUND INTELLIGENT ACCESS

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Abstract

The purpose with this abstract is to report about the work that we have done around Intelligent Access, later referred to as IA, in CEDR (Conference of European Directors of Roads) working group Road freight transport. CEDR is an organisation of European national road administrations.

Some conclusions from this work are. The survey and in-depth interviews show that many National Road Authorities (NRAs) see the concept of IA as a new enforcement tool and that there are a lot of possibilities both for NRA:s and also for all other stakeholders including for society. Using IA as an enforcement tool is the most obvious interpretation of the concept and when scaling up do other opportunities that the Intelligent Access concept offers become visible, such as better coordination of traffic and logistics. This is to the advantage of the transport companies and shippers, but also to society. In this way, NRAs can improve the quality of their services.

Keywords: Intelligent access, Geofencing, Connected vehicles, Telematics, Smart logistics, Infrastructure access, Standards and regulations, Compliance and enforcement, Fleet management, Digital infrastructure, Greener transport

1. Background

Most road vehicles are today connected and that gives many possibilities to send information both to and from these vehicles. This has enabled many location-based services and applications, for example by geofencing, which can be defined as an application that triggers a response when the vehicle passes a virtual geographic boundary. Australia pioneered using this technology for assuring that school buses comply with regulations and time schedules and was the first country to introduce IAP (Intelligent Access Program) to enabling larger trucks than allowed for general access, so called High Capacity Vehicles, on dedicated roads.

Intelligent Access could be defined in different ways but our definition of IA is as follows:
A regulatory framework using vehicle technology (where the vehicle reports its position and other relevant parameters) to ensure the right vehicle with the right cargo/freight, operates on the right road, at the right time to secure minimum impact on environment, infrastructure, human health & safety, and society.

There are many other areas for which IA Intelligent Access has potential for:
- Better use of existing infrastructure with traffic management based on time and place;
- Less degradation of road infrastructure through improved management of weight, speed and routing of heavy vehicles;
- Realizing climate objectives by reducing congestion and prioritizing climate-friendly vehicles;
- Increasing road safety through, for example, less overloading or insight into safety events in relation to location;
- Management of low emission zones;
- Create a level playing field between carriers, as the risk of truck overloading is reduced;
- Improved control of the transport of abnormal loads and dangerous goods;
- Controlled introduction of High Capacity Vehicles;
- Faster and more controlled processing of transport documents in cross-border transport through digitalization.

This was the reason to why the CEDR working group of Road Freight Transport (Conference of European Directors of Roads) started a task group about IA.
This work started in the first half of 2021 and was in the beginning focused on a report (Asp et al 2022). This paper will mainly present results from the work with the report and that contains activities until May 2022. The report was an intermediate product. We have continued our work since that. We already have information from a GDPR-workshop and at the conference will we also have data to present from the work with a CEDR-Call.
The main goal for the work with the report was to collect best practices about IA and recommendations for implementation. Other goals was to see in which areas NRAs (National road authorities) could see potential in using IA in some way.

2. Completed activities

Following activities has been undertaken to collect information from different stakeholders, mainly NRAs:

1. A survey with a questionnaire were conducted among CEDR members with a response from 12 countries
2. Based on the results of the survey, in-depth interviews were held with 5 countries
3. In collaboration with PIARC, a webinar was organized on January 27, 2022 with the participation of stakeholders from Australia, the Americas and Europe.
4. In collaboration with PIARC, a workshop was organized on October 19, 2022 with the participation of stakeholders from different areas in Europe

Results from these activities has been summarized and analyzed and will be presented in upcoming chapters.

3. Results from questionnaire

In June 2021, CEDR's WG 3.11 Road Freight transport launched a survey on the topic of intelligent access.

The purpose of the survey was to collect knowledge and best practices about how NRAs can use IA and how IA can be implemented. Twelve countries participated in the survey: Austria, Belgium (Wallonia), Denmark, Estonia, Hungary, Iceland, Italy, Lithuania, Netherlands, Norway, Spain and Sweden.

The questions posed in the survey were deliberately kept simple and based on multiple choice. The idea was that as a result, the response could be higher and the in-depth interviews could after that be used to make further inquiries from respondents.

The following questions were asked in the survey and below each question are conclusions from the answers:
1. Has some form of an IA system already been implemented in your country including municipalities etc., or are there plans to do so?
   a. Five of twelve answering countries has implemented IA or plan to do it. This means that seven countries doesn´t do it but as you can see both in comments on this question and further down so can all countries see possibilities with IA. Estonia (mostly timber transports) is in the lead but also Italy (abnormal transports) has IA in real use. Austria, Netherlands and Sweden has planned different form of pilots. It is clear that we have a growing interest for this subject.
2. Which application areas are suitable for IA?
   a. Among answering countries was the possibility to monitor transport of dangerous goods together with control of abnormal transports areas that they saw as most suitable. To manage the entry of vehicles whose weight exceeds a predefined threshold for example on certain bridges and to be able to introduce HCV in a controlled manner had also a "yes" from more than half of the respondents.
3. What policy goals could be achieved with IA?
   a. Better anticipation of driving, traffic and weather conditions
   b. Better distribution of heavy vehicles in time and route
   c. Enforce compliance to the rules such as weight limits
   d. More proactive asset management
   e. Prevention of a quick aging and wear of infrastructure

       f.   Limited budgets for infrastructure
4. What data do you collect, or do you want to collect?
   a. Here we could see that it was mentioned a lot of different sort of data. Most interesting data to collect was position, weight (total and on axle), volume of heavy traffic and vehicle type. What sort of data you want to collect depend a lot on the purpose of collecting and/or planned use of data.
5. What level of reliability does or should this data have?
   a. Most countries says that level of reliability on data should be so good that it can be used for preselection of vehicles for control and for statistical use. Having so good reliability so that you can use data for direct enforcement will probably be interesting in the future but not in the first step.
6. Which parties are involved or should be involved in an IA-system?
   a. Most important were road and vehicle authorities but all stakeholder (OEMs, Logistic service providers, drivers and their unions, shippers, policy makers) needs to be involved.
7. What are or could be the benefits for the parties involved?
   a. Road authorities, make sure that HGV / HCT only uses the granted road net, due to traffic safety and limited road/bridge dimensions. Another area is improved data for impact on infrastructure, asset management and long term planning of maintenance and new infrastructure.
   b. Vehicle authorities, more effective enforcement especially if fines could be issued directly for example based on GPS/weight information.
   c. Policy makers, overall Transport authorities can have better policy and legal framework. Improved control of which vehicles use which roads, and better mechanisms for excluding vehicles from roads they should not be used on.
   d. Shippers, assurance that their logistics are legal e.g. according CSR and that includes more transparent, efficient (less CO_2) and safe logistics.
   e. Interest groups working with privacy protection, knowledge and they can ensure that data protection concerns are addressed, but they would not necessarily benefit from the implementation of IA-systems.
   f. Drivers and their unions, towards all shareholders an awareness regarding legal and social responsibility. It also gives more transparent and equal competition between drivers.
   g. Logistic service providers, CSR and more transparent and effective logistic services.
   h. Truck manufacturers, also here CSR. Most of the data from the vehicles are already available through fleet management systems, but a combination of their own data and data from IA systems could improve the efficiency of their operations. Especially if paired with real-time data on restrictions due to weather conditions.
8. Which new EU regulations, both suggestions on current/upcoming regulations and proposals for new regulations, would stimulate the implementation of IA in Europe?
   a. The only but probably a good suggestion is to use eFTI regulation and eCMR
9. What legal obstacles do you see?
   a. It is obvious that there are obstacles that need to be solved and there are solutions for most of them. Obstacles are widely spread all the way from personal integrity to lack of political willingness.
   b. Other conclusions from comments were:

     i. Important to have benefits/carrots for involved stakeholders and for politicians and policymakers are cost probably deciding (i.e. EU climate targets; rapidly increasing fuel cost etc)
    ii. Only use data for enforcement otherwise it must be anonymized
   iii. Security around data is important and crucial, sensitive information must not be spread

4. Results from in depth interviews

Italy

Through an integrated telematics monitoring system Ulisse (Unified Logistic Infrastructure for Safety and Security) allows for the tracking of vehicles carrying dangerous goods and waste in the Campania Region. The satellite tracking of vehicles on the road and their labelling (which makes it possible to trace all the information relating to the vehicle) helps to mitigate the impacts of any transport accidents and to manage them consciously, knowing the position of the vehicle at the time of the accident and the type of goods transported. The information recorded by the system facilitates an organized and rational management of flows through the planning of itineraries or the "booking" of spaces at the nodes (such as ports and inland freight hubs). In this way, it is possible to plan the activities of loading/unloading and boarding of vehicles and goods. This results in a significant reduction in operating times and costs and speeds up the bureaucratic activities and the movement of goods in the ports.

The Teweb APP is similar to Ulisse but is designed to monitor abnormal loads. [Special Transport: TEWeb | Anas S.p.A. (stradeanas.it)](stradeanas.it)

Netherlands

A pilot on intelligent access started in the Netherlands September 2021. This involves two consortia providing monthly reports with road authorities that will provide insight into the performance of heavy-duty vehicles. The pilot was running until May 2022. The aim of this pilot is to learn by doing and so not all aspects of engagement and operation have been clarified. This pilot is part of a larger project investigating the feasibility and scalability of intelligent access.

This pilot is driven by the need to better understand the use of the road network by heavy-duty vehicles. Aging infrastructure and budget shortages mean it is increasingly important to exercise effective control over the freight load on the road network. This can be done by better spreading heavy commercial vehicles over the network according to route and time. The management of network assets can also be smarter if there is more data (intelligence) on the actual use of the road by heavy vehicles and freight traffic. Another important motivation for conducting an intelligent access pilot is that there is currently no insight into how load exemptions are used. After granting an annual exemption for abnormal loads, it is unknown whether the transporter adheres to the prescribed routes and the agreed maximum weight requirements. The pilot will help track the routes of these approved abnormal loads.
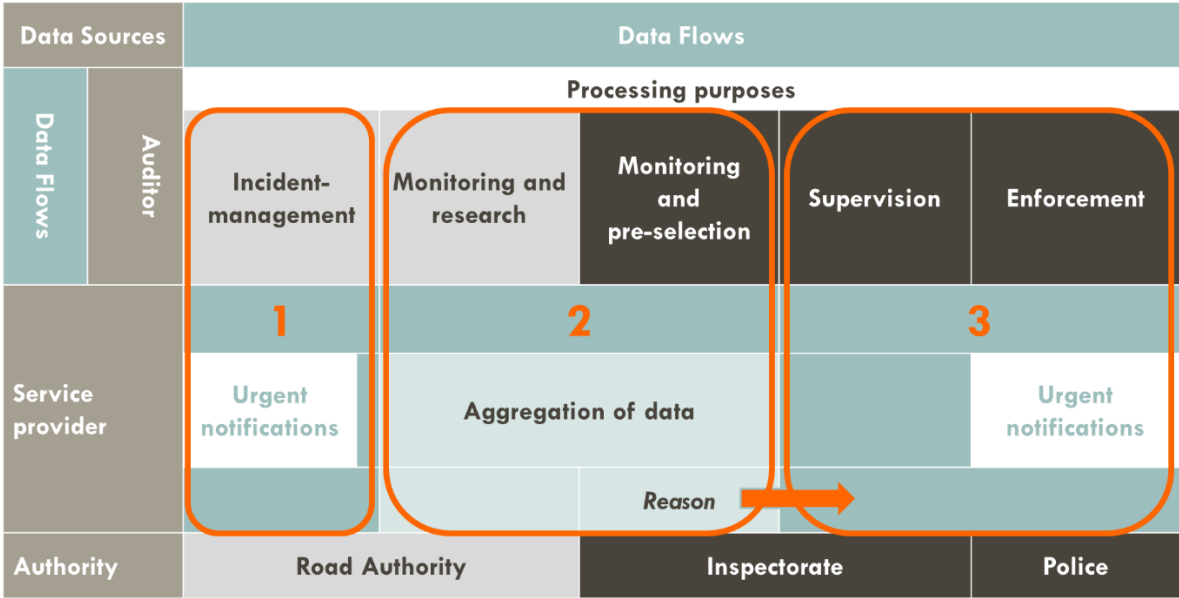
Figure 1 – Showing an overview of IA-pilot in Netherlands

The pilot consortia consist of an Application Service Provider, one or more transport companies and a firm that can analyze and aggregate the data into monthly reports. Public sector agencies include vehicle inspections, police, vehicle authority and the national road authority. An overview of all involved could be seen in figure 1. In time, efforts will be made to create a separate authority that can act as a trusted third party (similar to TCA in the Australian IA-system). In this pilot it is especially important to show policymakers and the market how IA can work and what possibilities it offers.

A report from the pilot will be ready this summer and results from that will be presented at the conference.

Sweden

In Sweden, an IA-system has been developed but it is not yet implemented. It uses already installed fleet management systems. The on-board computer registers GPS position, axel loads, and the ID of the prime mover and all vehicle modules, which is saved in the cloud or directly reported to a telematics service provider (Asp 2016 och Asp 2018).

There are now two ongoing projects on IA in Sweden. One for abnormal loads, se figure 2 below, and one for allowing higher weight then the roads are frozen during wintertime. The second one has now been ongoing for one winter. The main scope there are to control speed when the trucks passes bridges that not are strong enough for ordinary speed. This has worked well and the main obstacle has been to set right coordinates for the trucks geofencing system.
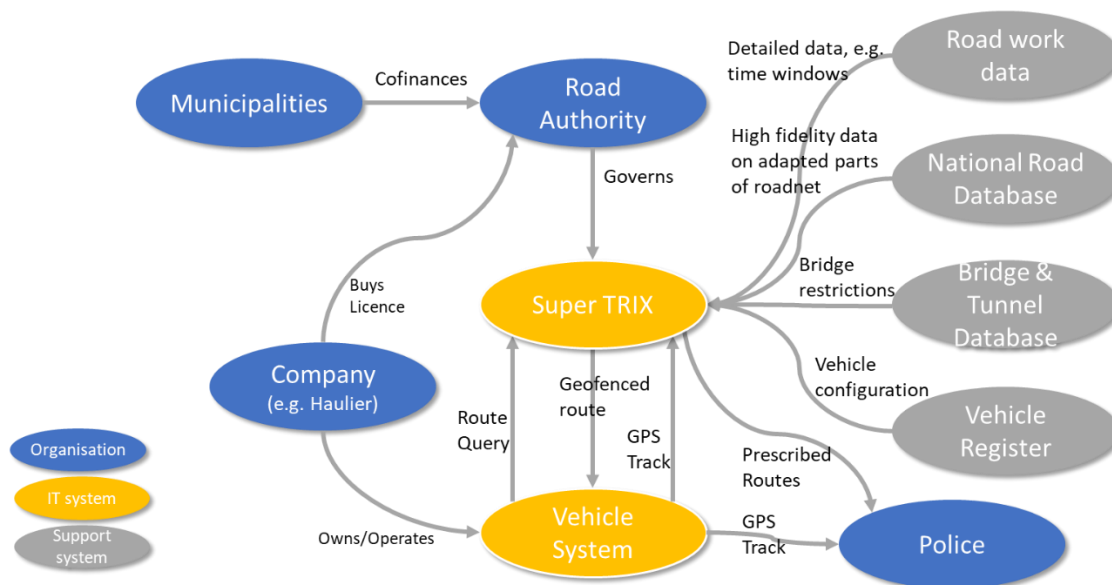
Figure 2 – Showing possible IA-system for abnormal transports in Sweden (RISE)

Estonia

Since 2010 Estonian Transport Agency (ETA) has been developing IA.

In the beginning, it was meant only for the wintertime 52t timber transport, if the pavements were frozen at the min 0,5m depth. At the same time, the strong infra corridors were analysed and mapped. Together was this used in the VELUB system, there it was possible to apply for a special vehicles permit. The VELUB principle is also shown in the figure 3 below.
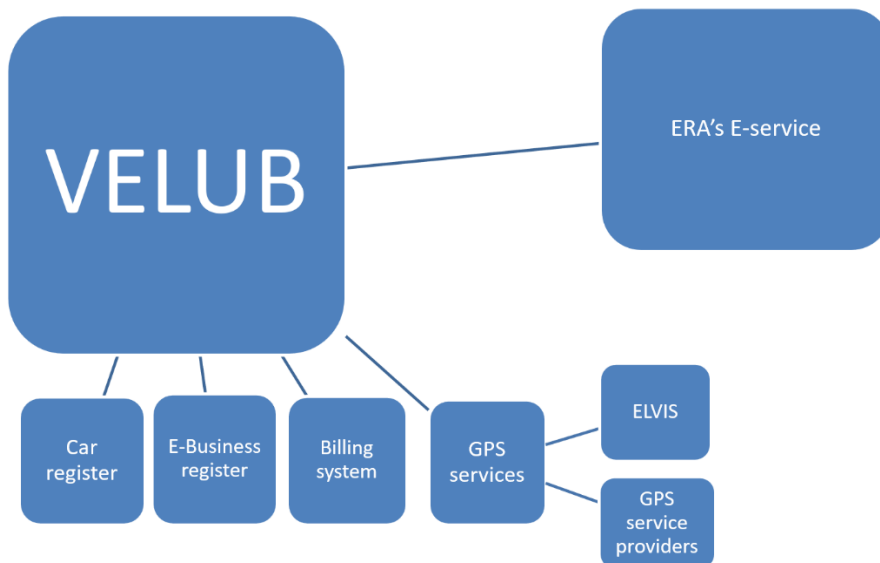

Figure 3 – VELUB system in Estonia

The last years has a lot been done in Estonia in the logistics digitalization area like different new cloud-based logistic systems, some are now in pilot face[1] eCMR | Real-time economy (realtimeeconomy-bsr.eu). Possible future use are, if the heavy vehicle is in the wrong road corridor or has a total mass over the limited value etc, the cloud-based eCMR can send a notice to controlling organizations. It's also possible in the future to make automated direct enforcements as well, like the speed cameras do now (i.e based on Vallonian regulation). Below, in figure 4, are different ways to handle waybills and roles of different parties in a national and global ecosystem.
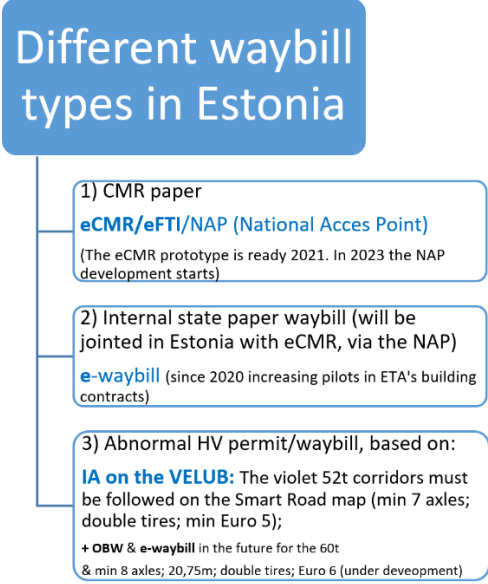

Figure 4 – Showing waybill types in Estonia

An overview of ongoing IA initiatives in Europe can be seen in table 1 below.

Table 1 - Ongoing IA initiatives in Europe

Initiative	Usecase	Initiator	Phase
Estonia	Thaw/freeze fluctuations and HCVs	Government	In operation
Italy	Control of transport of dangerous goods and abnormal loads	Government	In operation
Netherlands	HCVs and abnormal loads	Government	Pilot
Sweden	Abnormal loads, frozen roads	Government	Research/ Pilot
Aeroflex/ZEFES	Introduction of HCVs	Private sector	Research
UVAR	Zero emission zones in cities	Government	Research

5. Results from CEDR-PIARC webinar

5.1 Introduction

CEDR and PIARC jointly organized a webinar to share knowledge and experiences on Intelligent Access Policies for road freight transport with experts from all over the world. Intelligent Access is a logical consequence of the rapid development in the digitization of traffic and logistics and the ambition for more data-driven asset management and enforcement. Below are the main takeaways from presentations and panel discussion summarized. There are also topics for further exploration.

5.2 The main takeaways

Taking advantage of opportunities
Question 1.1: Which Intelligent Access applications are promising from your point of view? Are they covering only new situations or can they be applied also for existing situations?
Question 1.2: Can the implementation only succeed by making it mandatory, because otherwise transport companies are never willing to share data, or would intelligent access also work on a voluntary basis?

Shippers as key stakeholders
Shippers sees intelligent access as a possibility to make access for High Capacity Vehicles acceptable to policy makers. The shippers offer to collect data and make it available on an aggregated level, on the basis of which authorities can gain insight into compliance with regulations.

There is for example a strong link with sustainability. With the help of Intelligent Access, the emissions become transparent, so that the shipper can also demonstrate their ecological footprint for the transport and formulate ambitions for it.

See IA as an "incentive"
What is the main ground for Intelligent Access system? It is a question that was widely debated. Is it enforcement? Or is it to give an incentive to stakeholders? A balance between mandatory and voluntary is somewhat in favour over completely voluntary. Several panel members made statements in that direction. But all emphasized the importance of creating incentives that make it interesting for parties in the logistics chain to share data.

The promises of Intelligent Access
Question 2.1: What are the main benefits of implementing intelligent access from your perspective?
Question 2.2: Are there further benefits for creating new business opportunities, e.g. for the private sector or also further benefits for the public sector?

A new relationship between government and the transport sector
The current system is designed for the 10% who do not want to obey the rules; Intelligent Access is a system that rewards companies that do want to comply with the rules. This is also the reason why Intelligent Access should not be seen as a pure enforcement system.

Intelligent Access entails a fundamental change in the relationship between the transport sector and the government. This is also underlined by the argument that the primary task of the infrastructure is to promote economic growth and that the authorities are service providers. It ties in with the service-providing nature of government.

Possibilities with road-vehicle communication
IA technology can also bring useful information for drivers and vehicle. This will help traffic management and therefore road authorities.

Can IA promote regulatory harmonization?
There are various expectations and statements regarding the relationship between IA and harmonization. Stakeholders who are currently dealing with a patchwork of regulations in different countries hope that IA will lead to harmonization in regulations but that is not obvious. This is an important incentive for certain stakeholders to participate in IA and it is important to further explore this relationship.

Are we ready for IA?
Question 3.1: Are we ready for Intelligent Access applications regarding in-house knowledge and accessibility for the transport companies?
Question 3.2: What are the barriers or success factors for implementation?

Technological readiness
Various domains play a role in technology:
- the telematics in the truck
- the extent to which parties in the supply chain have digitized their own business processes and the extent to which they have also coordinated these business processes
- the way in which data is exchanged in a safe and reliable manner between the market and authorities
- the extent to which authorities are able to receive and process digital messages in their procedures
- the extent to which processes are digitized on the infrastructure side and the possibility to also send data / information to the vehicles (I2V)

When asking the question, "are we ready?", technology must be looked at from all these domains.

Some panel members also made statements about the extent to which the government could/should play a role in promoting technological readiness. This can range from making telematics devices in the vehicle mandatory to promoting the eCMR.

A different attitude is needed
A number of panel members emphasized that it is crucial that the authorities define very precisely which data is needed for which purpose and on which legal basis. It means that the authorities have to analyse more what their needs are and what they want to achieve.

Collaboration between stakeholders who are normally more likely to oppose each other
IA concerns a very wide range of stakeholders. This was shown by the large attendance during the first webinar. It concerns not only road authorities and hauliers, but also all other stakeholders in the logistics chain. That is why attention to the process is indispensable.

Topics for further exploration
What do we want to address in the next webinar:
   1. *Rewarding desirable behaviour instead of punishing undesirable behaviour*
How can we get all stakeholders on board? How do we build in efficient incentives? How can we use the help of shippers? Show the benefits of transparency for all stakeholders involved.
   2. *IA as catalyst for harmonization of regulations*
How can IA promote harmonisation of regulations? If it does not promote harmonisation, what other incentives are there for the transport sector to participate in an IA system on a voluntary basis?
   3. *Transformation of the relationship between transport sector and government*
What change is needed in the attitude of the transport sector on the one side and the government on the other side?
   4. *The organization of trust*
Third party / authority vs block chain? How to secure the reliability of self-declaration system? How do we create information (what is the question we want to answer) with minimum data processing?

6. Results from GDPR-workshop

Main takeaways from the workshop was
   - Legislation about GDPR is not just a barrier there are also possibilities that could be used.
   - There is a distinction between the rules and the interpretation of those rules
   - The underlying principle should by default be to share as little data as possible. The question should therefore not be how could we circumvent the GDPR, the question should be. "Why do I need which data and are there perhaps alternatives that require less personal data."
   - There is a distinction between data and information and usually you don´t need all the data you only need the information you can get from all the data

7. Discussion and Conclusions

The survey and the in-depth interviews shows that many National Road Authorities (NRAs) sees the concept of IA as something with a lot of possibilities.
Using IA as an enforcement tool is the most obvious interpretation of the concept and when scaling up do other opportunities that the Intelligent Access concept offers become visible, such as better coordination of traffic and logistics, better use of infrastructure, control of emission zones, monitoring of abnormal transport and transport of dangerous goods.
This gives possibilities for almost all stakeholders like transport companies and shippers, therefore also for society. In this way, can also NRAs improve the quality of their services. The example from Italy, there you use IA for abnormal transports, shows a use case that give benefits to all involved and showing benefits or incentives for all involved will be important for implementation of IA.
At the heart of the IA concept lies the legislation for the protection of personal data. Also during the panel discussions of the webinar, organizing of trust and legal basis of data collection

appeared to be important issues. To be able to implement many of the use cases of IA so will we need to find adequate solution for these issues.

In Europe, the protection of personal data is regulated in the General Data Protection Regulation (GDPR). It is an advantage that the same law binds all European countries. This was the reason to the GDPR-workshop that were organized in October 2022. At the GDPR workshop, we got insights and that not just about barriers with GDPR but also about possibilities that could and should be used. Again, the importance about saving and sharing as little data as possible was brought up.

8. References

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- Presentations and recording from CEDR-PIARC webinar [CEDR - PIARC Webinar on Intelligent Access: presentation and recording available!](#)