



Rijkswaterstaat
Ministry of Infrastructure
and Water Management

Intelligent Access in Europe

The quest to master complexity by connecting infrastructure to its use by heavy duty vehicles

Loes Aarts
3rd Regional Seminar ISWIM, 7 July 2022

1

Good afternoon dear listeners, I would like to thank the organizers of the 3rd Regional Seminar of ISWIM for giving me the opportunity to do this presentation. My name is Loes Aarts and I am working as a senior advisor freight transport for Rijkswaterstaat, the National Road Authority of the Netherlands. My presentation is about Intelligent Access in Europe.



Content

- Overview of 4 initiatives of Intelligent Access in Europe
- Similarities and differences between the initiatives
- Similar development: RIS
- What to do with all the data?
- Intelligent Access and Weigh-in-Motion

2

What can you expect from this presentation. By the end I hope you feel informed about the 4 Intelligent Access initiatives in 4 countries in Europe, that is Italy, Estonia. The Netherlands and Sweden. I will tell something about a similar development in inland waterways, by explaining the concept of River Information Services. I will raise the important issue of what to do with all the data. And I will end with a free thinking about how Intelligent Access could be related to WIM in the future.



What is meant by Intelligent Access in this presentation?

Intelligent Access means that access to the public road for heavy duty vehicles, is monitored by self-reporting with the help of telematics.

- Various application options for authorities
- The key to success is to create mutual benefit for the transport sector and society.

3

First, for those who are not familiar with the concept of Intelligent Access, I will start with an explanation of the concept in a nutshell. Intelligent Access means that access to the public road for heavy duty vehicles, is monitored by self-reporting with the help of telematics. This means that pre-trip and on-trip data is collected from different sources and made available for authorities by transport companies. Currently heavy duty vehicles are like black boxes on the road. Checking compliance with regulations by enforcement agencies is more like a cat and mouse game. And this whilst the data is already present in the vehicle and is read remotely by the transport companies themselves.

The data that is generated can be used in various ways, in the form of the source data or on an aggregated level. The data can be used for, for example, enforcement, asset management, traffic management or the coordination of traffic and logistics.

The key to success is to create mutual benefit for the transport sector and society. An advantage that can be created is that transport companies that share data are allowed to use certain routes that are otherwise inaccessible.



General description of the initiatives

USE CASE	...
STATUS	...
MOTIVE	...
TRIGGER	...
TECHNOLOGY	...

4

I have tried to present the four examples in a standardized way. In this and the next slide I will explain how I do this. I start with a general description of the initiative for each case, that means: what is the use case? for example abnormal loads transport; What is the status of the initiative? Which goal or goals are intended to be achieved; and what was the immediate reason, the trigger, to introduce the concept. Finally, I briefly mention which technique is used.



Description of the data flow

SOURCE OF DATA	SERVICE PROVIDER	DATA FLOW	RECEIVER
...	...	<i>No processing of data</i>	
	
	
		<i>Aggregation of data</i>	
	
DATA		LEGAL BASE	
...	
	

5

In every second slide of each initiative I give a description of the data flow. Which parties are involved? What data is collected? Is the data processed or not? How is the data used, for what purpose? And what is the legal basis for the use of the data? The latter is important to determine whether the sharing of data fits within the framework of the General Data Protection Regulation. This is legislation for the protection of personal data that applies in the same way to all European Member States.



Italy I (TEWEB)



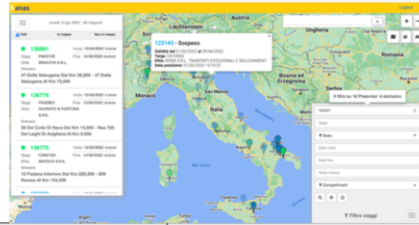
USE CASE	Abnormal loads transport
STATUS	In operation since 2017
MOTIVE	Monitoring how and how often an exemption is used (enforcement and traffic management)
TRIGGER	Digitization of the exemption process
TECHNOLOGY	Application on the mobile phone

6

The first country is Italy. TEWEB is an app that can be downloaded on a mobile phone. Transporters of abnormal loads, both nationally and internationally, are obliged to report to the authorities the start of their trip. When this registration process was digitized in 2017, it was no longer possible to do this in any other way than via the TEWEB app. ANAS, the relevant road authority, saw an opportunity to greatly improve control of non-compliance by ensuring that they can track abnormal loads transport in real time. The moment a driver registers the transport his position is read via GPS. ANAS can see on screens in control rooms all abnormal load transports that are underway at a particular moment.



Italy II



SOURCE OF DATA	DATA FLOW	RECEIVER
Vehicle and transport companies	<i>No processing of the data</i>	
	When vehicle is stopped, data can be read	Enforcement agencies
	Monitoring and real-time tracking	Road Authority
DATA	LEGAL BASE	
Position, Time, Documents	Mandate for law enforcement	Enforcement Agencies
	Legal obligation for abnormal loads to register the journey prior to the journey	Road Authority

7

In the Italian TEWEB, the GPS data goes directly from the vehicle to the servers of the road authority. The data is not processed. The GPS data is linked to the data contained in the transport documents, so that each transport can be identified. If the vehicle is stopped, the police can read the data in the TEWEB app. The legal basis for the road authority is the legal obligation of the transport company to report an abnormal loads transport to the road authority before the start of the journey. The TEWEB app can also be used to provide on-trip traffic information to the driver.



Estonia I (VELUB)



USE CASE	High Capacity Vehicles
STATUS	In operation
MOTIVE	To use heavy duty vehicles and the infrastructure in the most optimal and safe way, in accordance with the regulations (traffic management, increasing productivity and enforcement)
TRIGGER	Rapid changes in thaw and freezing periods as a result of climate change and digitization process of traffic management
TECHNOLOGY	Application on the mobile phone

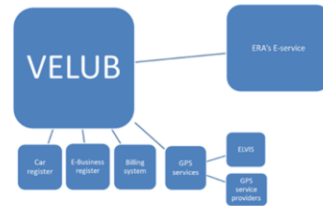
8

VELUB is a permit system for abnormal loads transport in Estonia. Around 2015 a revision of this permit system took place for specifically 48/52t timber transports. The main reason for the revision was that the old system could not cope well with the increased fluctuation and uncertainty within freeze-thaw cycles because of climate change. Permits for 48/52t timber transports could not be used all year round. With the digitization of the process, the use of permits can be dynamically tuned to the availability of roads in view of the weather condition. VELUB has now evolved into a permit system with the objective to use heavy duty vehicles and the infrastructure in the most optimal and safe way, in accordance with the regulations.

As with the Italian TEWEB-system, an application is used on the mobile phone.



Estonia II



SOURCE OF DATA	DATA FLOW	RECEIVER
Vehicle and transport companies	<i>No processing of data</i>	
	When vehicle is stopped, data can be read	Enforcement agencies
	Monitoring and real-time tracking	Road Authority
DATA	LEGAL BASE	
Position, Time, Documents, Weights (via OBW)	Mandate for law enforcement	Enforcement Agencies
	<i>(Not known to the author)</i>	Road Authority

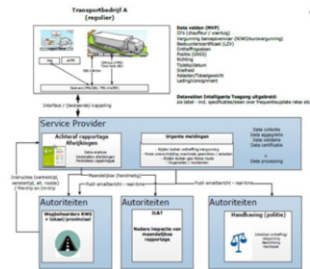
9

An important difference with TEWEB is that in the Estonian VELUB system, also data about the weights is collected dynamically via OBW and shared in real-time with the authorities. Up till now, this data cannot be used as evidence for prosecution.

The revised VELUB system works as follows: the driver registers the 48/52t timber transport in the VELUB system. While loading the driver activates the e-cargo paper via mobile app. Before the driver starts driving, he enters the loaded total weight in the app. This is obviously a weak element, because the driver can consciously or unconsciously enter incorrect data. The further development that is foreseen makes it possible that a warning can be issued if you are not driving on permitted routes and that OBW data is passed directly from the vehicle to the enforcement authorities.



The Netherlands I



USE CASE	HCVs transport
STATUS	Pilot 2021-2022
MOTIVE	Initially protection of the infrastructure due to aging infrastructure (multipurpose: enforcement, asset management, road safety, sustainability, quality of life, traffic and incident management, promoting efficiency, digitization and collaboration in the supply chain)
TRIGGER	Introduction of HCVs and failure of WIM systems
TECHNOLOGY	Cloud technology

The Netherlands, like other western European countries, is struggling with aging infrastructure because a large part of the network, especially bridges, were built in the 1960s and 1970s and are now at the end of their technical lifetime. Since the expectations still take into account a growth in freight traffic by road, awareness has grown to gain more insight and control, especially on freight vehicles in the heavy segment.

The use case in the Netherlands is the EMS1 (25.25m/60t). It was assumed that transport companies are not eager to share data, but unexpectedly, it turned out that transport companies were not all that reluctant to share data. Two transport companies are voluntarily participating in the pilot. One transport company wants to be able to make CO2 emissions of the transport transparent to the shipper. The other transport company wants overloading to be tackled more effectively in order to create a genuine level playing field.

Another trigger for the IA pilot is the condition of the WIM systems. For several reasons the Netherlands has the greatest difficulty in keeping the in-road WIM systems in good condition. Besides organizational issues, the soft surface of the Dutch road network plays a decisive role. The Netherlands is located in a delta. The

unevenness in the road surface makes the in-road WIM measurements very unreliable.

The Dutch system does not use an application on the mobile phone, but Cloud Technology.

The Netherlands II



SOURCE OF DATA	SERVICE PROVIDER	DATA FLOW	RECEIVER
Vehicle and transport companies	Processing of data and facilitation of urgent notifications	<i>No processing of data: Urgent notification in specific occasions</i>	
		If pre-determined threshold values are exceeded, opportunity to stop the vehicle for inspection	Police
		Using for pre-selection	Inspectorate
		In the event of a serious accident	Road Authority
		<i>Aggregation of data</i>	
		Monitoring the use of the road network	Road Authority
DATA		LEGAL BASE	
Pre-trip (a.o. documents, cargo, weights) and on-trip (position, time, speed, fuel consumption, emissions, safety events)		Mandate for law enforcement	Enforcement Agencies
		Statutory duties of the road authority	Road Authority

11

In the design of the Intelligent Access pilot in the Netherlands, the data is kept as close as possible to the source. Between the transport companies and the receivers of the data is a service provider that aggregates the data into information that can no longer be traced back to individual vehicles or people. This data is made available to the authorities by means of monthly reports.

The data that is collected is divided into pre-trip and on-trip data. Pre-trip data includes documents, cargo data and when the vehicle is loaded, the weight is determined statically. On-trip data is about position, time, speed, fuel consumption, emissions and safety events such as harsh braking.

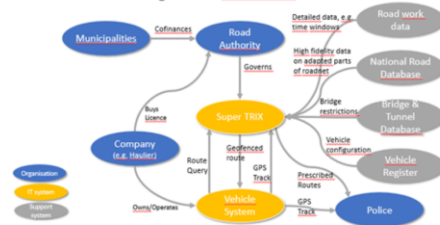
Only in specific situations does a notification with the source data go directly to the enforcement authorities. This is the case when predetermined weight limits are exceeded or an unauthorized route is used for more than a predetermined time. However, the police cannot use this data as evidence, but can stop the vehicle in question. The only time a road authority receives an urgent notification is in the event of a serious accident. In this case it is for example relevant to know what the cargo is.

The legal basis for the road authority is its legal duties from its role as exemption provider (together with the vehicle authority), its responsibility for constructive and road safety and incident management. To be able to perform these tasks properly, you need to have insight into the use of the road by truck traffic.

SWEDEN I



Sweden Abnormal transports Scenario – Digital Self declaration



USE CASE	HCVs on frozen roads; HCVs used for the transport of building materials in cities; and abnormal loads
STATUS	3 pilots in the winter of 2022-2023
MOTIVE	To make road freight transport more sustainable by using HCVs without negative effects on assets and road safety (sustainability, enforcement, asset management)
TRIGGER	Introduction of HCVs
TECHNOLOGY	Cloud technology

Of all four initiatives, Sweden will be embarking on the biggest adventure with the planned pilots next winter. I will explain that in the next slide. The main use cases are the EMS1 and the EMS2 (32m/74t), which can be admitted in a controlled manner with the help of Intelligent Access, either in areas where the bridges are vulnerable or in more complex traffic situations in cities. The main underlying objective is to make freight transport by road more sustainable by facilitating controlled scaling up. Just like the Netherlands, Sweden uses Cloud Technology.



Sweden II

SOURCE OF DATA	SERVICE PROVIDER	DATA FLOW	RECEIVER
Vehicle and transport companies	Facilitation of data processing	<i>No processing of data</i>	
		Evidence for prosecution	Enforcement agencies
		Real-time tracking	Road Authority
		<i>Aggregation of data</i>	
		Monitoring the use of the road network	Road Authority
DATA		LEGAL BASE	
Position, Time, Weights via OBW, Fuel consumption, emissions		Mandate for law enforcement	Enforcement Agencies
		Authority that grants exemptions	Road Authority

13

The big difference with the Netherlands is that in the Swedish set-up source data is shared directly with authorities and is used for tracking transport and can also be used as evidence for prosecution. That makes the privacy challenge quite big. The enforcement task remains a task for the enforcement agencies.

The data that is collected concerns position, time, weights (via OBW), fuel consumption and emissions.

As with all other initiatives, the legal basis lies in the role of the road authority as an exemption or permit issuer.



Similarities

1. Primarily software based;
2. All initiatives are initiated by road authorities;
3. All use cases are transports that require special permits;
4. Always fits in a bigger picture;
5. It never is a pure enforcement tool alone



In the next three slides we take a closer look at the main similarities and differences between the initiatives. In terms of similarities, I would like to mention five of them here.

1. All intelligent access systems are primarily software and not hardware based.
2. All initiatives are initiated by road authorities. This shows that there is a gap between digitization processes in the supply chain and in road management itself, on the one hand, and the lack of insight into the use of the road by heavy duty vehicles on the other.
3. All use cases concern special forms of transport that require a permit or an exemption. You can set conditions for exemptions and permits, including the condition for sharing data. You do not have that option with regular transport.
4. In each country, the initiative fits into a bigger picture:
 - Italy: digitization of traffic and transport,
 - Estonia: digitization of traffic management and connecting to the eCMR
 - Sweden: making road freight transport more sustainable,
 - The Netherlands: integration of systems to achieve different policy goals.
5. It often starts with enforcement, but it is never a pure enforcement tool alone. After the Intelligent Access concept has been introduced, many more applications can be added that in the longer term have a greater importance and scope than

enforcement.



Differences I

1. Degree of complexity; 2. Differences in application of which legal basis;
3. Differences in scaling options

15

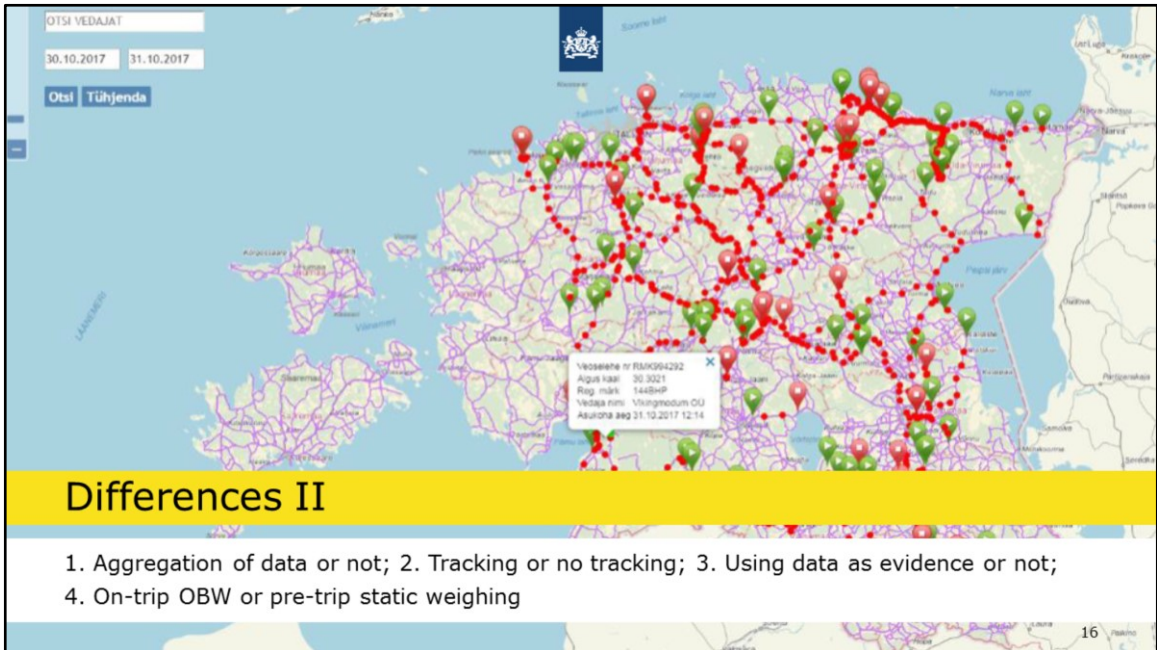
The general differences are,

1. the difference in complexity. Based on application, use of data, technology used, which and how much data is collected, the following order with respect to complexity is:

Italy – Estonia – the Netherlands – Sweden

2. The legal base: all initiatives rely on the frameworks for granting exemptions or permits. There are two exceptions worth mentioning. Notable are the plans in Estonia, to use the EC/96/53 Directive for Weights and dimensions as the legal basis for international haulers that want to drive with a permit in Estonia. In the Netherlands, not only the framework for granting exemption is used as a legal basis, but also the legal duties of the road authority. For privacy experts, this is an unusual application of a legal basis. The legality of sharing data is not immediately clear, but is more a matter of interpretation.

3. Some IA models lend themselves better to upscaling than others. The more source data, rather than aggregated data, is shared, the greater the hurdle that needs to be overcome around privacy. That makes a pilot less scalable.



Other differences between initiatives regarding data and data processing are: 1. Aggregation of data or not; 2. Tracking or no tracking; 3. Using data as evidence or not; 4. On-trip OBW or pre-trip static weighing



Digitization is taking place in many areas. The stage of development differs. An area that is close to freight transport by road is the transport of goods by inland waterways. Here the digitization process, connecting the infrastructure with its use by shipping, is already much more developed. It is about River Information Services.

With River Information Services (RIS), information can be exchanged about and with ships in a standardized manner throughout Europe, for example about their cargo and their route. From the control room, the traffic manager on duty, position his cursor on a ship and all data relating to the ship, the cargo, the voyage and ownership appear in a cloud above the arrow on the screen.

The field of application is very broad, so RIS forms a platform for both traffic and transport processes by increasing safety and efficiency. RIS is a system under development. New applications are still being added. The broad application of RIS, addressing both public and private interests, provides a glimpse into what Intelligent Access could develop in the future.



One is the desire to collect data on the basis of which the use of the road by heavy duty vehicles can be better monitored. Second is what the dashboard will look like. In the initiatives, attention is often first paid to the data architecture, the required technology and the governance. How the data is ultimately used, which directly touches on the actual purpose of Intelligent Access, is often the final piece.

How to ultimately present the data in such a way that insight is gained into the use of the road by heavy truck traffic is not easy. There are many variables that can be combined in different ways: per day, per hour, during peak periods or at night, per week, per month, per year, per road section, per corridor, etc. There is still a world to win here. Road authorities can consult experts within their organization in the field of determining Performance Indicators or performing statistical operations.



Intelligent Access and WIM

Current situation	Up to 2030	From 2030
Road-based weighing system (WIM) is the only system that produces data about truck weights while in motion.	In addition to the road-based weighing system (WIM), Intelligent Access is used for specific categories of truck combinations.	In addition to Intelligent Access, bridge-WIM is used.
WIM-data used for asset management and enforcement on overloading.	WIM-data used for asset management and enforcement on overloading (entire truck fleet). IA-data used for monitoring and enforcement in broad sense on specific categories of heavy duty vehicles.	IA-data used for monitoring and enforcement in broad sense on specific categories of heavy duty vehicles. Bridge-WIM-data used for asset management.

19

The question also arises as to how a development like Intelligent Access compares to in-road Weigh-in-Motion. After all, WIM is the central topic of this seminar. It is food for discussion and that is why I have given a somewhat provocative perspective in this table. But of course I don't have a crystal ball.

In the current situation a road-based weighing system (WIM) is the only system that produces data about truck weights while in motion. WIM data is used for asset management and enforcement on overloading. As the implementation of Intelligent Access continues to take shape, both systems will increasingly coexist up to 2030. Initially, Intelligent Access will only be applied to specific categories of heavy duty vehicle fleet. From 2030, when Intelligent Access is applied to all heavy duty vehicles, the balance will change permanently. Intelligent Access takes over the enforcement function of the in-road WIM systems. We say goodbye to the weighing loops, but Bridge-WIM remains. This gives the road authority such specific data that Intelligent Access cannot provide.

I leave it to you to determine whether this is a realistic view of the future.



Thanks for your attention

loes.aarts@rws.nl



20

That brings me to the end of my presentation. I don't know if there are cycling fans among you. They probably know that the Tour de France is in its first week. Today the 6th stage will be held. There are two of your fellow countrymen in the peloton: Louis Meintjes and Reinardt Janse van Rensburg, nicknamed The Beast. Let's hope for good performances in the Tour from these two fast riders on the bike.

If you have any questions about the Tour de France or Intelligent Access in Europe, you can see my email address here. Thank you for your attention.