



# ENSEMBLE

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### ENSEMBLE

ENabling SafE Multi-Brand pLatooning for Europe

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## Revision history

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## FIGURES

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Figure 1: Functional diagram dynamic exemptions.

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# 1. EXECUTIVE SUMMARY

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## 1.1. Context

Platooning technology has made significant advances in the last decade, but to achieve the next step towards deployment of truck platooning, an integral multi-brand approach is required. Aiming for Europe-wide deployment of platooning, ‘multi-brand’ solutions are paramount. It is the ambition of ENSEMBLE to realise pre-standards for interoperability between trucks, platoons and logistics solution providers, to speed up actual market pick-up of (sub)system development and implementation and to enable harmonisation of legal frameworks in the member states.

## 1.2. Project scope

The main goal of the ENSEMBLE project is to pave the way for the adoption of multi-brand truck platooning in Europe to improve fuel economy, traffic safety and throughput. This has been demonstrated by driving up to seven differently branded trucks in one (or more) platoon(s) under real world traffic conditions across national borders. During the years, the project goals were:

- Year 1: setting the specifications and developing a reference design with acceptance criteria
- Year 2 and 3: implementing this reference design on the OEM own trucks as well as perform impact assessments with several criteria
- Year 4: focus on testing the multi-brand platoons on test tracks and international public roads

The technical results have been evaluated against the initial requirements. Also, the impact on fuel consumption, drivers and other road users has been established. In the end, all activities within the project aim to accelerate the deployment of multi-brand truck platooning in Europe.

## 1.3. Abstract of this Deliverable

This deliverable guides the reader briefly into the world of ‘regulations and exemptions’ that are related to the deployment of automation in transport. Since platooning technology can be regarded as a subset of ‘automation’, the ENSEMBLE project had to deal with today’s regulations and the ‘change procedures’ that are traditionally applied by road authorities. The inventory of those state-of-the-art regulations, as well as the work performed on the ENSEMBLE public live demo event (Barcelona-Sitges (Spain) September 2021), revealed that these exemption processes are difficult and take a lot of resources and efforts.

ENSEMBLE has also specified the Platooning Autonomous Function (PAF). The PAF gives the vision of the ENSEMBLE Partners for the future of platooning. PAF, however requires new regulations, that are non-existing now, nor are the procedures in place, in individual states, nor across Europe to quickly create such regulations. Even if we only consider the need for exemptions



for deploying the Platooning Autonomous Function in a live demo, procedures, needed knowledge is not present yet at most of the road authorities.

These roadblocks inspired and triggered thinking on how we can potentially overcome those roadblocks. This document reveals an interesting idea dynamic exemptions. It describes the idea, and it lines out potential steps how this idea can be materialised and deployed.

## 2. INTRODUCTION

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### 2.1. Background

The deliverable is inspired upon the work done in WP6: Especially the preparation and execution of D6.10 ENSEMBLE regulatory framework-State of the art and D6.12 V2 report on mutual recognition. These 2 deliverables worked on insights of today's regulations, and their processes. Especially D6.12 reveals the effort taken by the ENSEMBLE project to finally get the authorisation by the involved road authorities to perform the public live demo event in Barcelona (September 2021). Various presentations and discussion within the ETPC1 were also inspirational to the content of this deliverable.

### 2.2. Aim

During the ENSEMBLE project various discussions and presentations were shared amongst the partners that inspired the content for this deliverable. This deliverable raises an interesting thought and concept on how we can quicker introduce automation, and in particular platooning technology and applications on the road.

It invites the reader to further think on the subject and to stimulate thoughts on the topic. Of course, the reader is invited to take contact with the editors, for further after-project discussion on possible concrete steps that can be taken in the direction of development or even deployment, as after ENSEMBLE project activities.

### 2.3. Structure of this report

The deliverable will first have a brief review of the results obtained in the mentioned deliverables. It will mention the observed problems and roadblocks for deployment of platooning on the road from a regulatory perspective.

Further chapters reveal the inspiration sources that the editors were getting to know during their various interaction with project partners and external projects.

The last chapters will describe an interesting idea how we can progress in a quicker deployment and how we can potentially progress on this idea. Finally, concluding statements follow.

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<sup>1</sup> ETPC: European Truck Platooning Challenge; a de facto multi stake holder platform guided under ERTICO and UGE, formed by ACEA, CEDR, CLEPA, IRU associations . It gathers the industry to follow up on all Platoon technology and projects , known in the world, and organizes frequent discussion and presentation events.



## 3. REGULATORY AND EXEMPTIONS BACKGROUND

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The following content is immediately derived from existing ENSEMBLE deliverables. It is the purpose to help the reader to get acquainted with the material.

### 3.1. Regulatory framework state of the art

This content is derived from ENSEMBLE D6.10: ENSEMBLE regulatory framework – state of the art.

The document gives an in-depth analysis of the regulatory framework, and it puts this overview in relation to the needs for Platooning.

The following is an extract of chapters that the reader is invited to dive in, according his interest The titles give an overview of the regulatory framework concerning vehicles and their systems and components.

Regarding the United Nations and European level: Vehicle and component regulatory framework

This regulatory review starts with a global vision of the Working Groups in Geneva and Brussels.

#### **Regulations from the United Nations Economical Commission of Europe (UNECE)**

One of its main areas of work is Transport. Their main objective is to promote sustainable transport, which is safe, clean, and competitive, through the development of freight and personal mobility by inland transport modes, by improving traffic safety, environmental performance, energy efficiency, inland transport security and efficient service provision in the transport sector.

#### **Regulations and directives of the European Commission**

##### *EU Regulations*

Regulations (EU) from the European Union, in Brussels, (previously named Regulations (EC) from European Commission), are the most direct form of EU law - as soon as they are passed, they have binding legal force throughout every Member State, on a par with national laws. National governments do not have to take action themselves to implement EU regulations. Regulations are passed either jointly by the EU Council and European Parliament, or by the Commission alone.

##### *EU Directives*

Directives (EU) and Directives (EC) from the European Union and the European Commission in Brussels are addressed to national authorities, who must then take action to make them part of national law, and decisions, which apply in specific cases only, involving particular authorities or individuals.

#### Regarding the local level: **Local legislation for vehicle use and infrastructure**

The use of the vehicles such as traffic rules, driving licenses or the general interaction between vehicles are regulated by both the EU directives and the national regulations.

Local bodies can be identified as Ministries that directorate a public service, national/regional administrations, or others.

## **3.2. Exemptions, background**

This content is derived from

- ENSEMBLE D6.10: ENSEMBLE regulatory framework – state of the art (Tobar et al. 2019)
- ENSEMBLE D6.12: V2 Report on mutual recognition (Luján et al., 2022)

### **3.2.1. Reason for exemptions**

Up to now, requirements for platooning are not covered by any regulation or standard. On one hand, and with the purpose of improving road safety, in December 2019 the European Union introduced the General Safety Regulation (EU) 2019/2144, which introduces advanced safety requirements that will be regulated as of 2022 (Luján, C., et al., 2022)

The European Commission decided that, due to its potential, platooning can bring safer, cleaner and more efficient transport in the future. As a consequence, relevant standards and regulatory framework would be needed in order to encourage such technology in a safe manner.

On the other hand, within UNECE and the World Forum for Harmonization of Vehicle Regulations (WP.29), GRVA (Group of Experts on Automated Driving) is the group that discusses all the aspects related to autonomous driving and proposes recommendations or guidelines that may become new UN Regulations.

During 2019, a framework document on automated/autonomous driving (WP29-177-19) was presented as the basis for further development of a series of vehicle safety topics (always looking for a higher level of safety). As a result of the growing importance of autonomous and connected vehicles, in 2018 WP.29 started to develop a dedicated subsidiary working party called GRVA. Taking into account the main objectives reflected in the framework document for automated vehicles, different informal groups were established in order to address different topics.



While there is not yet a new regulation establishing the platooning requirements, there are other procedures that allow an exemption for new technologies or new concepts. Any Member State may grant a provisional approval to these technologies for its territory.

### 3.2.2. Exemption procedures

In 2018, the European Commission presented a guideline for an exemption procedure for the EU approval of automated vehicles.

The main purpose of the document is to harmonize the approach of the Member States when approving unforeseen technologies under EU rules. These new concepts that are not compatible with existing rules, may obtain an exemption through Article 20 of Directive 2007/46/EC, which will be replaced by Article 39 of Regulation (EU) No 858/2018 on vehicle approval and market surveillance. With the guideline, this exception is standardized ensuring the safety of the vehicle, transparency between Member States and mutual recognition.

*“1. Member States may, on application by the manufacturer, grant an EC type-approval in respect of a type of system, component or separate technical unit that incorporates technologies or concepts which are incompatible with one or more regulatory acts listed in Part I of Annex IV, subject to authorization being granted by the Commission in accordance with the procedure referred to in Article 40(3)”*

The approval of the system may be granted by the European Commission by means of an implementing act based on the guidelines, giving validity to the approval that can be limited to 36 months or by number of units. (Further details in the respective deliverable)

### 3.2.3. Experiences gained in obtaining exemptions

#### *ETPC challenge 2016 experience*

The ETPC Challenge 2016 experience stated that the main issue in the exemption process was to get partially automated trucks to drive safely on Europe’s roads and across its borders.

European legislation already stipulates that vehicle complying with requirements may be freely registered in any member state. However, this Challenge covered modified vehicles whereby special technology could control the distance between them, being able to reduce the distance below the current limit. (Tobar, M., et al., 2019)

ETPC reviewed the approval process and highlighted the institutes and procedures involved. For each country considered for the Challenge, the following questions were answered:

1. Vehicle authorities: which is/are the national institute(s) to which vehicle modification should be reported?
2. Application policy and procedure (if applicable): what information should be provided and how?

3. Vehicle assessment and testing: how do the authorities assess vehicle functioning?
4. The permit: how is the applicant informed of the authority's decision?

### *ENSEMBLE Public live event experience*

The original set up of the ENSEMBLE live public demo was envisioned to happen as a cross border event between Rotterdam harbour as a HUB (The Netherlands) and Antwerp Harbor as a HUB (Belgium-Flanders region). Later on, it was decided to execute the live test in Barcelona, Catalonia, Spain.

That is the reason why D6.12 (Lujan et al, 2022) focusses on the research of the involved authorities and their exemption procedures in those countries. Especially the Spanish case was fully worked out and the necessary approvals were granted to every involved OEM in ENSEMBLE.

For Netherlands and Belgium Flanders, the ENSEMBLE project got a good insight on the involved authorities and their requirements.

Especially Belgium is not an obvious case, as the Flemish and federal Belgium road authorities were involved. Although an excellent co-operating was observed between the two (equally levelled) authorities, the ENSEMBLE project had to find out the detailed authorities that they were assigned to.

### **3.3. Discussion groups**

Besides the regulation and exemption instances, there are also a lot of discussion groups involved in identifying, developing and proposing inputs for future automation related regulations. These are e.g.

- Harmonization of Vehicle Regulations (WP.29) UNECE
- Global Forum for Road Traffic Safety (WP.1) UNECE

European Commission and its Directorate-General sections

### **3.4. European Union strategy on truck platooning**

The Commission has identified the automation use cases which are relevant from a public policy perspective for the next decade, but will remain open to considering other possible new use cases being developed in the next years. They expect that truck platooning convoys will be available by 2020 (Tobar, M., et al., 2019).

On vehicle-to-vehicle communications, the Commission follows a technology-neutral approach in line with the EU Strategy on Cooperative Intelligent Transport Systems and has not proposed mandatory deployment of specific technologies at this stage. However, for certain applications such as platooning there is an expressed need for regulation to ensure data standardisation and of vehicle communication protocols across different brands and ensure proper response from the vehicles. Platooning can lead to an automation use case, where vehicle-to-vehicle communication is essential.



The Commission is proposing to regulate platooning under the revision of the General Safety Regulation for motor vehicles to ensure standardization of data exchange across different brands. The implementing legislation will build on the results of the call on platooning (2018-2020) in the Horizon 2020 research, and innovation framework program and complement the delegated Regulation on Cooperative Intelligent Transport Systems.

### **3.5. Conclusions**

It is clear that the lead time, efforts, resources and investment to identify, develop, adopt and deploy new regulations are enormous. We experience this fact already today, as the process to introduce these types of regulations is already taken off with a lot of initiatives since almost a decade ago. At this moment, the necessary resources, only to follow up what is going on, is tremendous and requires leading specialists with vast experience and expertise.

The exemption processes are quite defined and supported by the EU, but also complex, and very locally oriented. Experts can guide specific projects in their goals and objectives in reasonable times (a 1-to-2-year lead time).

## 4. IMPACTS ON THE ENSEMBLE PROJECT

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The ENSEMBLE project defined, developed, implemented, and live demonstrated, the necessary protocols and functionality for the Platooning Support Function (PSF), which is based on mature and proven technology. This multi-brand solution is ready for standardisation and is able to cope with all the different use cases encountered in current traffic. The PSF fits within the current legislation.

ENSEMBLE has also specified the Platooning Autonomous Function (PAF). The PAF gives the vision of the ENSEMBLE Partners for the future of platooning. It foresees a driver in the first truck followed by driverless trucks travelling from hub to hub. In this case, the V2V connectivity between the trucks acts as an enabler contributing to the automation of the following vehicles. The PAF is placed between a support function and a fully autonomous truck. This is because following trucks still have the first truck's driver to navigate through traffic and reach the destination. The PAF does not fit into the current legislation in European countries. The legislation around following distances, alert human drivers and drive-and-resting time need to be modified in order to enable the Platooning.

Finally, the open road tests of ENSEMBLE were carried out in Spain the past September 2021, for this reason all the requirements for license exemptions of automated and connected vehicles are explained in detail. In this matter Spain has different procedures depending on the SAE level of the system, as for SAE levels lower than three no proving ground tests are required. After an official discussion with the Spanish road authority and considering that in the Platooning Support Function the drivers are always responsible for the actions of the system, it was considered that an exemption procedure for conventional vehicles could be done in order to make things easier. This application is done through TRAZA, a Spanish Road Authority tool exclusive for allowing license exemptions for new technologies not covered by Instruction 15/V-113.

### 4.1. ETPC Vision 2022 and Platooning Support Function

At the moment the decision was taken for the PSF, it was interesting to know how this PSF could reach the market. Therefore, within the ETPC, a specific action was taken to identify the expectations how platooning would look like (read: How it could be deployed on the roads) in 2022. In a first workshop some requirements were established. In a second workshop we tried to match these requirements with the PSF properties. It turned out that the match was almost 100%. (see also Arbeit de Chalendar & Daems, 2020 and 2022)

#### **VISION 2022: Platooning specification 2022:**

Derived from this vision the following information is important for a check on the specifications for deployment of platooning in Europe in 2022.

- SAE level 1 compliant
- Platooning should be able to cope with dedicated platoon areas in geo-fenced

environment. We aim for platooning on 2 lanes one direction (e.g. highways)

- Longitudinal control
- Gap >0.8 s
- Assisted level only-driver remains responsible
- Traffic mgt. control interface to be identified
- Number of truck in a platoon  $\leq 3$
- Trucks need to be able to communicate their 'platoon capability-level' (tbd. in detail)
- Verify the compliance of applied sensor specs in relation to this specification
- Be able to implement the first version of ADAS services
  - Look through capability
  - Steering guidance e.g. for roadworks, traffic jams, uphill or downhill driving (joint acceleration and deceleration)
  - Intercom possibility for the drivers
  - Service interface capability (e.g. to allow services for parking and traffic light priority etc.)
  - Any support in the spec to a better 'Handling dangerous goods. The specification should describe how interaction with Traffic Management services can be done, what is needed and how it is implemented. Care has to be taken that whatever is necessary, can be implemented and is ready in 2022.
  - Specification should cope with cybersecurity
- Specification should enable data exchange (see further)
- Avoid the need for an extra 'driver license level' for truck drivers dealing with platoons.

## 4.2. Intermediate conclusions

The conclusion is that the Platooning Support Function is suited for and can comply with the current regulations and expectations. The exemptions that were needed to allow the Platooning Support Function for a public live demo event were related to the technical modifications as prototypes, that were established in each of the trucks. These prototypes were deviations from the vehicle compliance attests. So, obtaining the exemptions for these prototypes was necessary for each OEM.

## 5. INSPIRATION RESOURCES

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### 5.1. Desired regulations and exemptions process requirements

We will phrase some ‘desired’ requirements for future regulations and exemptions for the Platooning Autonomous Function (PAF). This chapter is not going to explicitly state the desired new regulations that are necessary to support Automation and PAF in particular. Many other projects, and CCAM in particular, address this topic.

- 1) Regulations are fixed for a long time and difficult to change. Therefore, we should find methodologies to improve the lead time process for identifying, adapting or creating new regulations.
- 2) Apparently, obtaining the necessary exemptions is a process that is better controlled, well defined, and supported by EC rules. Still, these processes take considerable time and are quite administrative. The question is if we can automate them?

### 5.2. Aeroflex project<sup>2</sup>

The Aeroflex project was identified as a co-operation project for ENSEMBLE (ENSEMBLE D6.14, Schmeitz, A.,2022)

Aeroflex formulated the following urgencies and ambitions:

- Increasing complexity of managing social issues: sustainability, congestion, liveability, global competitiveness etc.
- Increasing complexity and inefficiency of the transport task: jungle of local, regional and national rules restrictions, driver shortage, investment uncertainties, low margins, etc.

Aeroflex insight is that digitalization can help connecting, not without the presence of willing institutions and companies.

How could a High-Capacity Transport (HTC)-network for the road infrastructure be established? The project moto is: **‘The right vehicle on the right road’**, introduced by the concept of **‘intelligent access’**. Intelligent Access means that the permit is subject to the condition that carriers must make GPS data and data on the total weight and axle loads available to the authorities for inspection.

Intelligent Access fits in with the ambition of digital transport as well as the digitization of enforcement and offers opportunities for:

- More effective asset management
- Less traffic load through linkage between traffic management and logistics planning
- Customization becomes standard.

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<sup>2</sup> <https://aeroflex-project.eu>

### 5.3. TN-ITS ERTICO innovation platform<sup>3</sup> and NAPCORE CEF European project<sup>4</sup>

TN-ITS (Transportation Network for ITS (intelligent transport systems)) is a 'generic' brand-like name, identifying both:

- A trusted and a market driven Mobility Data Exchange Service currently implemented in 14 Member States based upon the CEN TC278 WG.
- An Innovation platform (Under ERTICO platform umbrella)

It's an essential building block for today's and future mobility data space, contributing to the NAP federation architecture and implementation.

TN-ITS is part of the newly adopted RTTI and TN-ITS data is accessible via the European NAP (National Access Point) federated architecture (in construction via the NAPCORE project). The Commission has adopted a delegated act supplementing Directive 2010/40/EU, which was done on 02 February 2022. The new Delegated Regulation will repeal Delegated Regulation (EU) No 2015/962 from 1 January 2025.<sup>5</sup>

TN-ITS relates to regulatory and trusted authoritative data, originating by the Member state, regional and city authorities. Services using the TN-ITS standard interface are market driven:

- TODAY: There is a need for accurate maps
- TOMORROW: A necessity to support applications like ISA
- 2025+: Supporting Regulations for Automated drive, etc.

### 5.4. ETPC platooning event 2016

The European Truck Platooning Challenge (ETPC) initiative was launched in early 2016 under the Dutch Presidency of the EU. A large demo was organised in some EU Member States with cross-border trips of six mono-brand platoons converging to Rotterdam in the Netherlands (ETPC, 2016). The ETPC opened a long-term vision for the management of heavy goods vehicles on major European corridors. It offers a unique opportunity for manufacturers and OEMs to develop autonomous and intelligent heavy vehicles, and for infrastructure managers to experiment the

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<sup>3</sup> <https://tn-its.eu>

<sup>4</sup> <http://napcore.eu>

<sup>5</sup> [https://transport.ec.europa.eu/news/european-commission-adopts-new-initiatives-sustainable-and-smart-mobility-2022-02-02\\_en](https://transport.ec.europa.eu/news/european-commission-adopts-new-initiatives-sustainable-and-smart-mobility-2022-02-02_en)

EUR-Lex - C(2022)492 - EN - EUR-Lex (europa.eu)

<sup>6</sup> : <https://ertico.partnerwise.be/what-is-truck-platooning/https://www.acea.auto/fact/what-is-the-european-truck-platooning-challenge/; https://ertico.partnerwise.be/what-is-truck-platooning/>

concept on a large scale, to formulate conditions for its safe and acceptable implementation, particularly for other users and transport companies, and to assess potential benefits. The ETPC promotes cooperation between manufacturers and road authorities. The challenge offers a platform for all partners, industrials, OEMs, logisticians, research institutes and public authorities to strengthen their mutual efforts. The objective is now to allow platoons made up of vehicles of different brands to circulate safely in the EU. An Amsterdam Declaration was signed by the EU Transport Ministers to join their efforts developing autonomous and connected vehicles. A high-level group is continuing this work in relation to ETPC.

The network consists of six supporting associations (steering members): European Automobile Manufacturers' Association (ACEA), Conference of European Road Directors (CEDR), European Association of Automotive Suppliers (CLEPA), Association of European Vehicle and Driver Registration Authorities (EReg), European Shippers' Council (ESC) and International Road Union (IRU). The 6 European OEMs (DAF, Daimler, Iveco, MAN, Scania and Volvo) and research organizations (TNO, University of Amsterdam, IFSTTAR) are members, as well as governmental bodies and other stakeholders from the transport sector. The network comprises about 150 people. The main objectives of ETPC are further developing missions and roadmap:

- To promote truck platooning to provide safer, more efficient freight transport, creating new jobs and economic growth in the traffic and transport sector.
- Fostering cooperation between states, automotive industry, and other related sectors to deploy commercially viable truck platooning services.
- Providing a platform for cross-stakeholder dialogue defining the necessary technical, regulatory and organisational framework.
- Ensuring a coherent, continuous and consistent way forward.

## 5.5. Recent online digital regulatory tools

### 5.5.1. Vecto

Vecto7 is the new simulation tool that has been developed by the European Commission and is for determining CO<sub>2</sub> emissions and Fuel Consumption from Heavy Duty Vehicles (trucks, buses and coaches) with a Gross Vehicle Weight above 3500 kg (Tobar, M., et al., 2019). From January 2019 the tool is mandatory for new trucks under certain vehicle categories in application under type approval.

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<sup>7</sup> [https://ec.europa.eu/clima/eu-action/transport-emissions/road-transport-reducing-co2-emissions-vehicles/vehicle-energy-consumption-calculation-tool-vecto\\_nl](https://ec.europa.eu/clima/eu-action/transport-emissions/road-transport-reducing-co2-emissions-vehicles/vehicle-energy-consumption-calculation-tool-vecto_nl)

As of 2019, the CO<sub>2</sub> emissions and fuel consumption data determined with VECTO, together with other related parameters are reported to the Commission and made publicly available for each of those new trucks.

This is an example of a ‘regulatory’ online calculation tool. It is however not in real time, but merely a simulation tool, based upon data provided for each new truck.

### 5.5.2. ISAD levels

ISAD levels were defined in the Inframix project<sup>8</sup>. In order to classify and harmonize the capabilities of a road infrastructure to support and guide automated vehicles, a simple classification scheme is proposed, similar to SAE levels for the automated vehicle capabilities. These levels can be assigned to parts of the network in order to give automated vehicles and their operators guidance on the “readiness” of the road network for the coming highway automation era.

Norway and Sweden have already mapped ISAD levels to their networks. TN-ITS has digitalised the ISAD levels.

This is also an example of a digital online database and data exchange with the potential to become a regulatory tool.

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<sup>8</sup> <https://www.inframix.eu/infrastructure-categorization/>

## 6. THE IDEA OF DYNAMIC EXEMPTIONS

### 6.1. What is a dynamic exemption

A Real Time and Time limited exemption on a certain existing regulation by means of issuing a digital certificate to allow a certain transport on a certain trajectory at a certain time (see Arbeit de Chalendar & Daems, 2022)

The HAN university Nijmegen developed the digital infrastructure that allows transports to verify their fit to the infrastructure. It returns an answer to the question: is a certain transport possible from A to B, taking into account the physical infrastructure and the properties of the transport (e.g. weight, length, width, turning properties). The tool itself was demonstrated in 2019, as a prototype. The digital map data was taken from various sources.

During a meeting with the HAN University Nijmegen (Mr D Kural) (August 2019), we discussed the role and potential discussing the role and potential of this tool related to platooning. It became clear that such a tool could also be used to determine if a certain transport using a platoon with certain properties can be possible to drive on the infrastructure from start to destination. In fact, if this possibility is determined, one can interpret the result as the basis on which an exemption for this transport can be granted.

### 6.2. Functional diagram of the dynamic exemption

Figure 1 illustrates the basis of the dynamic exemption idea.

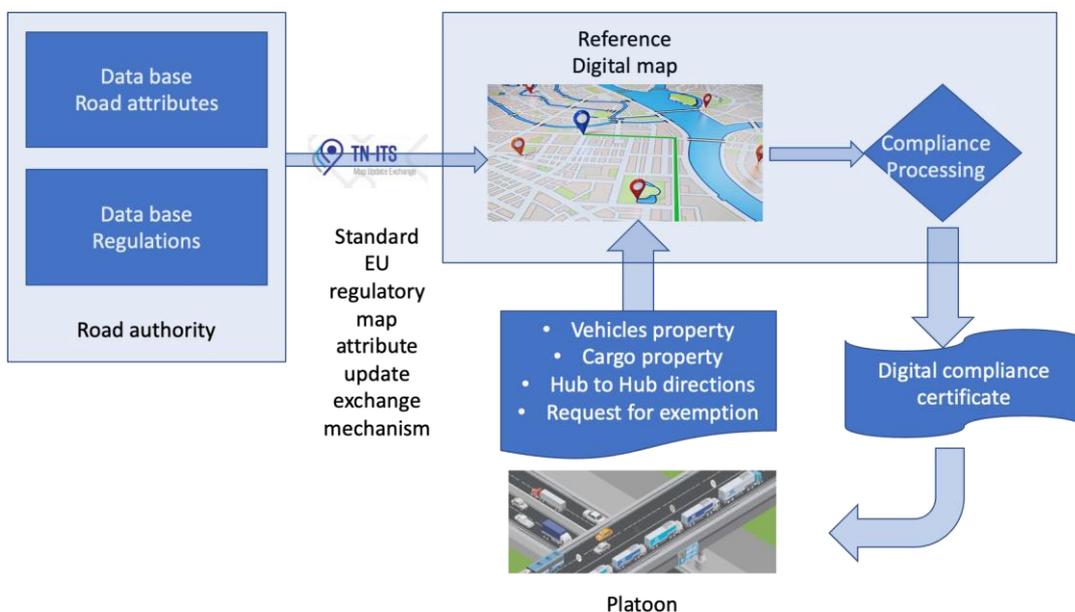


Figure 1: Functional diagram dynamic exemptions.

A platoon would like to transport goods and cargo from A to B. Therefore, it sends a request to the online service, if this transport is feasible, given the road infrastructure between A and B. One can think of extending this question, related to the actual traffic or prognose of the traffic at the time of transport

The map used at Falcon was based on arbitrary data. In fact, it makes sense to use as a data feed the authoritative nature of TN-ITS, making use of authority defined road data. The roadmap of this type of data indicates that it evolves to become regulatory data. The map would have a legal status, and therefore, the derived data processes can issue a digital regulatory exemption. Of course, this requires that the data processor itself is compliant to regulatory requirements and procedures. As we have seen in chapter, these processes are quite well known, and well documented, and therefore, there is a good chance that they can be automated.

TN-ITS ERTICO innovation platform, together with NAPCORE partners discuss how the process of compliance, authenticity and trust can be supported throughout the data chain. Probably the map can exist out of so called RTTI static data<sup>9</sup> (addressed within TN-ITS as ‘base layer data’) and RTTI dynamic data (Addressed within TN-ITS as ‘service layer data’). Dynamic data is provided by the DATEXII mechanism, part of the federated NAP EU structure, as (to be) defined by NAPCORE. DATEX II could support the momentary traffic related data, that is required to grant a digital exemption to the transport for a certain time and trajectory.

### 6.3. Potential benefits

During the ETPC event November 2019 the potential benefits of the dynamic exemption idea were presented.

- No immediate need to change existing regulations
  - The methodology supports the issuing of Real time exemptions on the existing regulations
  - Automatic compliance calculation if a road fits the need of the transport
- Backwards compatibility
  - Intermediate solution to quickly allow automation on the road
  - Issue an exemption for a particular situation
  - Fall back to non–automated drive if the exemption cannot be granted.

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<sup>9</sup> The commission recently adopted the Revision of the Delegated Regulation 2015-962 (RTTI) with strict mentioning of the role of TN-ITS

## 6.4. Potential impact on the generic automation deployment

The concept of Dynamic exemptions can have a big influence on improving the market deployment of automation. Today, automation technology is in strong evolution, L3 and L4 automation is being demonstrated (with dedicated ODD), but it is generally observed by the industry that the discussions on the subject of needed regulations (and other subjects like ‘handling liabilities in case of accidents’) evolve slowly and cannot keep up the pace with technology evolution. This hampers the introduction of automation solutions to the market.

If we could find a methodology to further work out the concept, the dynamic exemption concept can be applied to any automation case. An automated vehicle (of combination of vehicles such as a platoon) would request the permission for driving a certain trajectory on a given time.

The Dynamic exemption tool could calculate in real time the compliance of the request to the installed infrastructure, and traffic condition and could issue the electronic exemption (certificate) to the vehicle. This could allow L3 /L4 on certain roads in certain conditions. If the exemption is not granted, the human driver has to retake control and drive the vehicle itself.



## 7. CONCLUSIONS AND PROPOSED NEXT STEPS

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This deliverable guides the reader briefly into the world of ‘regulations and exemptions’ that are related to the deployment of automation in transport. Since platooning technology can be regarded as a subset of ‘automation’, the ENSEMBLE project had to deal with today’s regulations and the ‘change procedures’ that are traditionally applied by road authorities. The inventory of those state-of-the-art regulations, as well as the work performed on the ENSEMBLE public live demo event (Barcelona-Sitges (Spain) September 2021), revealed that these exemption processes are difficult and take a lot of resources and efforts.

ENSEMBLE has also specified the Platooning Autonomous Function (PAF). The PAF gives the vision of the ENSEMBLE Partners for the future of platooning. PAF, however requires new regulations, that are non-existing now, nor are the procedures in place, in individual states, nor across Europe to quickly create such regulations. Even if we only consider the need for exemptions for deploying the Platooning Autonomous Function in a live demo, procedures, needed knowledge is not present yet at most of the road authorities.

These roadblocks inspired and triggered thinking on how we can potentially overcome those roadblocks. This document reveals an interesting idea dynamic exemptions. It describes the idea, and it lines out potential steps how this idea can be materialised and deployed.

The document describes the concept in a TRL2<sup>10</sup> status. The complete scientific work that needs to be done to bring this concept from TRL 2 to TRL9 will take time and effort. We hereby launch a call for support and to find opportunities to move the idea forward to reality.

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<sup>10</sup> [https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014\\_2015/annexes/h2020-wp1415-annex-g-trl\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf)

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