

REMOVE: REQUIREMENTS FOR ENFORCEMENT OF OVERLOADED VEHICLES IN EUROPE

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Abstract

Previous European projects on Weigh-in-Motion (WAVE, COST323, Top Trial) were mainly technical and showed that WIM-technology is ready for a wider application in enforcement of overloading. Overloading by heavy trucks is recognised throughout the European Union as a serious problem: it results in additional road maintenance costs, unfair competition and impacts negatively on road safety. The use of WIM-systems offers a number of applications that can increase compliance with regulations; not only by more efficient and effective enforcement, but also by additional use of information from WIM-systems. The REMOVE project was initiated to facilitate the broader use of WIM-technology in the European enforcement of overloading and better compliance with regulations.

The objective of the REMOVE project is to prepare requirements for the harmonised and interoperable deployment of Weigh-in-Motion systems in the enforcement of overloading throughout the EU. The 4 work packages cover the following aspects: operational issues, legal issues and technical issues as well as a cost/benefit analysis. The project has a unique consortium consisting of enforcement agencies, ministries of transport, research institutes and representatives of the transport branch. The project commenced in April 2004 and was completed in April 2006. This paper is based on the final report of the REMOVE project. It presents an overview of the work that has been done within the project, the conclusions and the recommendations to the EU-Commission.

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1. INTRODUCTION.

1.1 History

After completing previous EU projects (COST-323 (2002), WAVE, TOP TRIAL) under several Framework Programmes that had mainly been focusing on the technological side of Weigh-in-Motion it was recognised by the public authorities that these projects needed a follow up, focussing on the possible applications for the enforcement of overloading. Some of these applications are already used in several EU Member States (and abroad), others are under development and would require a new way of working for the enforcement agencies. At the same time it was noticed that there are big differences in the operating enforcement practices and legal regulations concerning (over-)loading. From the point of view of the transport industry this is unacceptable and there is a strong need for a more level playing field. Both enforcement agencies and the transport industry recognised a need for a harmonised approach/strategy of the enforcement of overloading in the EU and the use of WIM-technology.

1.2 Overloading

Road transport of goods by overloaded trucks creates a number of serious problems on Europe's road network:

1. Unfair competition. Overloading creates an illegal and unfair advantage for some operators allowing them to charge lower prices for the same journey; this often causes non compliance in all kinds of other areas;
2. Safety. It is clear, although sometimes difficult to prove, that overloaded trucks pose an added risk to road safety. Some of the issues involved are: longer braking distances, a decrease in stability / steerability / manoeuvrability / controllability of the vehicle;
3. Additional maintenance costs. Overloading the total permitted weight generally results in accelerated aging of structures such as bridges, viaducts and the substructure of roads. Overloading of various axles generally results in an accelerated ageing of the road surface.

As road transport by trucks increases, these problems become more severe. The problem of overloading is often caused by deliberate non-compliance, however in some cases the overloading is done unintentionally e.g. when part of the load of a truck is removed which may result in overloading of an axle due to a change in the distribution of weight on the vehicle.

1.3 Enforcement

Traditional overloading enforcement by the police or by traffic inspectorates is strictly repressive, requires a lot of staff, is inefficient and only controls a fraction of the total trucks fleet. Furthermore the manual selection method is often biased. Weigh-in-Motion systems in combination with other ICT applications, (such as digital imaging, vehicle identification and the use of various databases), offer a basis for a new type of enforcement. Weigh-in-Motion offers the potential to the enforcement agencies to increase the number of checks on trucks significantly. At the same time it enables free flow for non overloaded vehicles. A few EU member states have some expertise in using WIM for pre-selection of overloaded vehicles. However, this application only scratches the surface when considering the full potential of WIM. Since these are all national (pilot) projects and overloading is an international problem by nature there is a need for an international EU-wide coordination. This coordinated approach (strategy) should incorporate not only relevant technical issues but also operational and legal issues.

2. THE REMOVE PROJECT

2.1 General

The name ‘REMOVE’ stands for Requirements for EnforceMent of Overloaded Vehicles in Europe. The proposal for the REMOVE project was submitted to the Directorate-General for Energy and Transport (DGTRN) of the European Commission as part of the Call for Proposals for a Grand Application Transport 2003. The proposal was accepted and the REMOVE project officially commenced in April 2004. The total costs for the REMOVE project are Euro 450.000. The total work is done in 66 man months within the duration of the project of 24 months.

The consortium of the REMOVE project was unique because it included enforcement agencies, ministries of transport and the transport industry. This cooperation enabled the development of new enforcement strategies that are acceptable for all, as well as discussion on more structural solutions to solve overloading problems in future. The International Road Transport Union (IRU) therefore played an important role in this project. The project was lead by TISPOL which is the European network of traffic police forces with 16 members, 4 candidate members and 2 members from outside the EU. The other representative from the enforcement community is ECR, the European organisation of traffic inspectorates with 8 members. This created a wide basis for consultation and expertise and has led to broad support for the findings of this project. The participation of the Ministries of Transport of Germany, France and The Netherlands guaranteed input from a road management point of view and experience regarding Weigh-in-Motion. Expertise from the Czech Technical University of Prague, LCPC and DWW and ARCADIS completed the consortium.

The general objective of the REMOVE project was to present to the European Commission the requirements (strategical, tactical, legal technical, operational) for the harmonised and interoperable deployment of Weigh-in-Motion systems in the enforcement of overloading throughout the EU. The findings and recommendations of this project could be the basis for an EU-directive regarding fair, efficient and effective enforcement of overloading in the EU.

2.2 Project Structure

The REMOVE project consisted of five work packages that were all closely related. The overall picture of the structure of the project is shown in Figure 1.

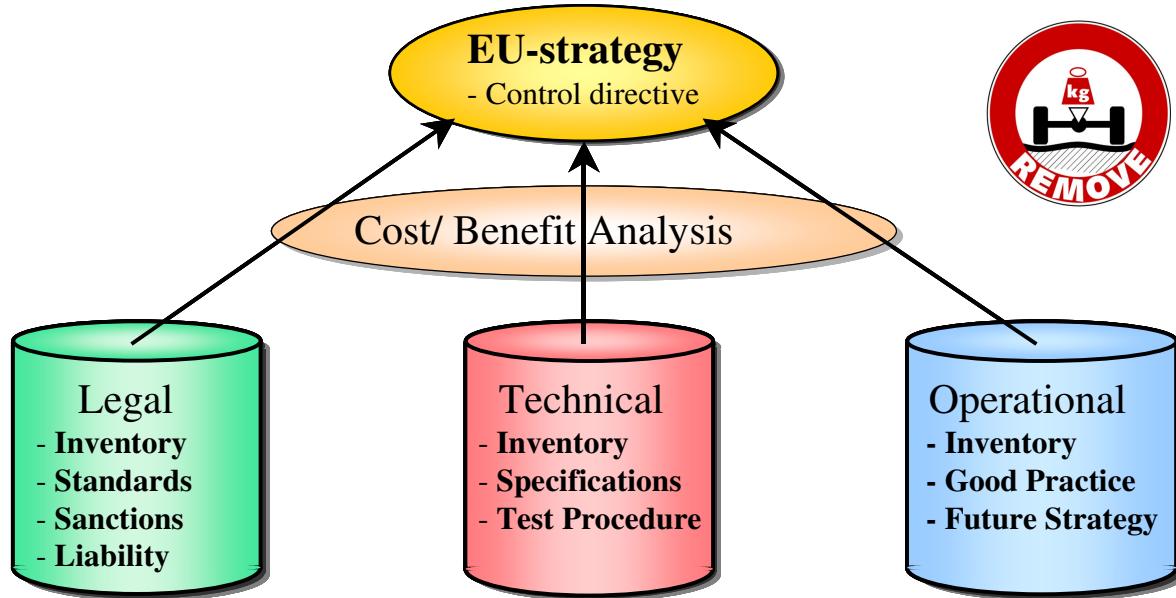


Figure 1 - Structure of the REMOVE project

In the "Legal Issues Work Package" recommendations were developed to provide a solid legal basis for the introduction of Weigh-in-Motion systems, the following products were delivered:

1. Inventory of the present situation within the EU. An overview of the situation in the various EU member states regarding legal acceptance of the use of axle/vehicle weighing equipment and an overview of the available WIM technology;
2. Required standards for legal acceptance. Defining and describing the various conditions that are needed from a legal point of view to establish enforcement legislation;
3. Sanctions. An overview of the level of fines and other sanctions as applied at present in the various EU member states. It considers the implications of the present approach for the transport industry as well as for the enforcement agencies;
4. The liability for overloading. The relationship and responsibilities for vehicle loading between the driver, transport operator and shipper are considered.

In the "Work Package Technical Issues" technical specifications and procedures for acceptance of the different Weigh-In-Motion applications for enforcement were set up. This includes:

1. Inventory of WIM technology. An inventory of existing technology and (technical) specifications for (high speed) WIM systems;
2. Specifications. This product consists of functional and technical specifications for WIM-systems to be used for enforcement applications. The specifications are a combination of what is operationally required and what is technically possible;
3. Test Procedure. The establishment of a test protocol, defining and describing the procedures legal acceptance of WIM-systems that is both practical and well founded.

The "Work Package Operational Issues" is about the exchange of operational good experiences between enforcement agencies, in order to benefit from the lessons learned by others and to adopt successful procedures from others. This consisted of:

1. Inventory, an overview of the existing operational procedures and practises in the EU member states;
2. Good Practice, the best of the existing enforcement practices of the EU member states;
3. Future Enforcement Strategy. A recommendation on how to organise the enforcement of overloading in the future including the various ways in which WIM systems can be deployed.

The "Work Package Cost/Benefit Analysis". A cost benefit analysis is an important tool in the process of building political awareness regarding the advantages of (the use of WIM for) enforcement of overloading. The following products were delivered:

1. Damage to infrastructure. Based on available information an estimate, based on previous research, of the costs of repair of damage to the Trans European Road Network (TERN), due to overloaded trucks was presented;
2. Efficiency of enforcement. A model was derived to compare the cost, required to build, maintain and operate WIM-systems for different enforcement applications.

3. RESULTS

3.1 Current situation

The first task of the REMOVE project was to get an overview of the current situation concerning overloading of heavy vehicles in the EU-15 (the 15 'original' EU member states before the enlargement in April 2004). Where available, the situation in new member states and neighbouring countries was incorporated. Through the enforcement networks (TISPOL and ECR) and the IRU a questionnaire was sent to a relatively large number of organizations. Although not all organizations answered the questionnaire the general picture that emerged was that of diversity. The problem of overloading is dealt with at a national level only with considerable differences between the member states. Even though there are standardized maximum limits for international transport, there is no standardisation in the national limits, sanctions, liabilities, operational procedures, specifications (WIM-) systems. Despite all the differences some 'red lines' could be detected: Overloading is still a serious problem, estimates vary from 10 – 25% of all trucks are overloaded. Enforcement is (almost) the only way that is used to address the overloading problem with no cooperation between the government agencies and the transport industry. The effectiveness and efficiency of the enforcement efforts are seen as limited, even though no accurate records are available. The (felt) change to get detected when overloaded is very low, maybe less than 1%. Finally there is currently very limited WIM- or ICT-technology used in enforcement procedures.

3.2 Vision

The REMOVE project developed a vision of how the problem of overloading should be dealt with in the future. Essential in this vision is that the end goal is an increase in the Compliance with loading regulations in the whole of the EU. Compliance can be achieved through a

combination of enforcement AND prevention. The way to improve compliance is through harmonization and the use of technology. The overall picture of the REMOVE vision is given in Figure 2.

Prevention.

Instead of the current focus on enforcement alone, there should also be a focus on solving the underlying problems of overloading. For this it is essential that government agencies and the transport industry work together as there is general consensus that overloading is unwanted. There should be a system to separate the ‘good’ companies from the ‘bad’ through monitoring of the behaviour and company profiling. For this a network of WIM-systems could be used as a way of screening the behaviour of transport companies. The REMOVE project expects an approach through quality control and incentives for compliance to be very effective, similar to the Australian Intelligent Access Program.

Enforcement

Besides prevention, enforcement remains an important part in the REMOVE vision. However some changes are required to make it fair, proportionate and effective. The first is to work towards standard operational procedures in all EU member states. In this way the transport companies will know what to expect when subjected to enforcement.

Secondly the use of modern WIM- and ICT-technology should be incorporated in the enforcement strategies. Finally since overloading is an international problem by nature there should be a focus on cross-border enforcement. The key element in cross-border enforcement is the legal basis for data exchange; this involves data acceptance and data quality assurance.

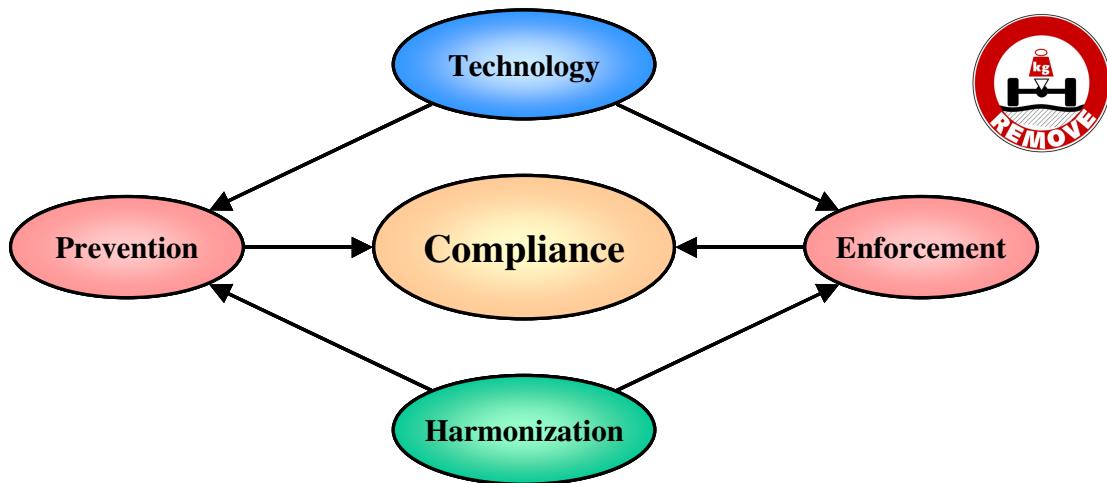


Figure 2 - The REMOVE vision

Technology

As mentioned previously, the use of modern technology should be the basis in the development of new enforcement procedures/strategies. For example there should be an intelligent mix of the different application of WIM-systems, (see paragraph 3.3.), to match specific overloading problems. Since there are many ways in how, when and where overloading occurs there is no single ‘magic’ enforcement application that can solve all problems. For cross-border enforcement it is essential to have international standards, for example the functional and

technical specifications for WIM-systems to be used for the different enforcement applications. For this it is essential that enforcement agencies and technical specialists work closely together, to avoid problems such as ‘over-specifying’ by enforcement agencies.

Harmonization

From a legal, operational and technical transport point of view there is a strong need for harmonization in order to create a more level playing field for the transport industry and a more effective enforcement for the government agencies. The harmonization should cover the maximum loading limits, the sanctions when overloaded, the issue of who is liable for overloading and the tolerances of weighing equipment used for enforcement.

3.3 Applications of WIM

When discussing possibilities of Weigh-in-Motion systems for enforcement it became clear that there was a need for a standard description of the different applications. The following applications also formed the basis for the functional and technical specifications formulated in the project.

1. Human Selection

Traditionally, Large Goods Vehicles were selected and weighed by enforcement officer(s) using their own judgement without the use of (high speed) WIM technology. Here the officer uses his/her field experience to select overloaded vehicles based on external characteristics. The selected vehicle is then escorted to a location for static (or in some countries Low Speed) weighing, which is currently the only legally accepted method for enforcement.

2. Statistics & Planning

In this case the data measured by a WIM system or a network of Systems-systems is stored in a central database. The data gathered is used to generate statistical overviews on the loading situation on a specific road or road network. Such overviews are traditionally used by road administration authorities for road design and road maintenance. Enforcement agencies can use this overview in the planning of enforcement activities, when and where control units are deployed. The statistics are also an important tool in the evaluation of the effects of enforcement activities.

3. Pre-selection

The System-system weighs all passing vehicles, when it detects an overloaded vehicle, an image of the vehicle is taken and the target vehicle is guided to the ‘Static weighing area’. The measurements taken by the WIM-system are ‘only’ an indication that the truck involved is probably overloaded. The measurements and digital photos can not directly be used as evidence in legal procedures. There are two possibilities for the selection and guidance of the target vehicle from the traffic to the static weighing area: Human Escort and Automatic Escort.

4. Problem Solving

The aim of Problem Solving is not to achieve compliance through the enforcement of the regulations or by the imposition of penalties, but to resolve the problems that underlie offences. There are two sub applications: “Direct Feedback” and “Company Profiling”. Direct Feedback,

in this case the System-system, is used to warn passing trucks directly when they are overloaded. The basic system set up consists of a System-system connected to a traffic sign. Company Profiling, in this case the System-system, stores all measured data, (including the photos), of all overloaded vehicles in the database. Based on this information companies are selected that qualify for further action. This action may vary from the sending of a warning letter, a visit to the company for an inspection or further legal action.

5. Direct Enforcement

In this case the evidence for the prosecution of an overloaded vehicle is directly based on the measurement by a weighing system. Within the procedure of Direct Enforcement both “Automatic Enforcement” and “Manual Enforcement” are possible. For Automatic Direct Enforcement the procedure from the measurement to prosecution can be completely automated and is similar to that of automatic speed enforcement. Manual Direct enforcement will always require some element of ‘human interaction’.

6. Intelligence

Intelligence is a collection of applications using the power of modern ICT to combine all possible forms of collaborative data and aggregate the information into intelligence for policing or enforcement application. These may not be aimed exclusively at the problem of overloading. Here the data recorded by a network of Systems-systems distributed over the Trans European Road Network (TERN) is stored in a number of databases. This way the behaviour of specific vehicles can be monitored as they move over the TERN. Possible applications are: the monitoring of transport of dangerous or illegal goods or average speed enforcement, driving and resting times and issues of national security

3.4 Achieving compliance

Figure 3 shows all aspects discussed in paragraphs 3.1, 3.2 and 3.3 in one figure, starting from the current situation and leading to the future situation where a level playing field is realised through prevention and enforcement, using a combination of the various applications of WIM. The project estimates that in order for all technical, legal and standardization issues to be resolved another 12 years of work would be required. However, the current state of technology and legislation offers possibilities to take the following steps forward in the interim:

1. The issue of harmonised enforcement should be examined. (level of penalties and liability)
2. The enforcement strategy provides a clear harmonised path for enforcement agencies to work toward a more unified approach aiming at compliance, rather than enforcement alone. More specifically, enforcement agencies should be encouraged to consider a Problem Solving methodology.
3. Exchange of information between enforcement agencies in different member states (intelligence) is required because the cross border use of heavy goods vehicles for the movement of freight is increasing. To be able to collect, evaluate and share intelligence with their neighbours is VITAL in combating cross border crime, but also in the scope of levelling the playing field.
4. This project has produced the most advanced user requirements for enforcement agencies engaged in the detection of overweight vehicles, and use case functions for the most

effective use. This report would see these being presented to enforcement agencies as the most effective way to proceed, as it both maximizes the use of existing technology and is compatible with advanced WIM technology.

These measures can be implemented within a short to medium time span, whilst the technological and legislative issues for fully automated WIM are continued to be worked upon.

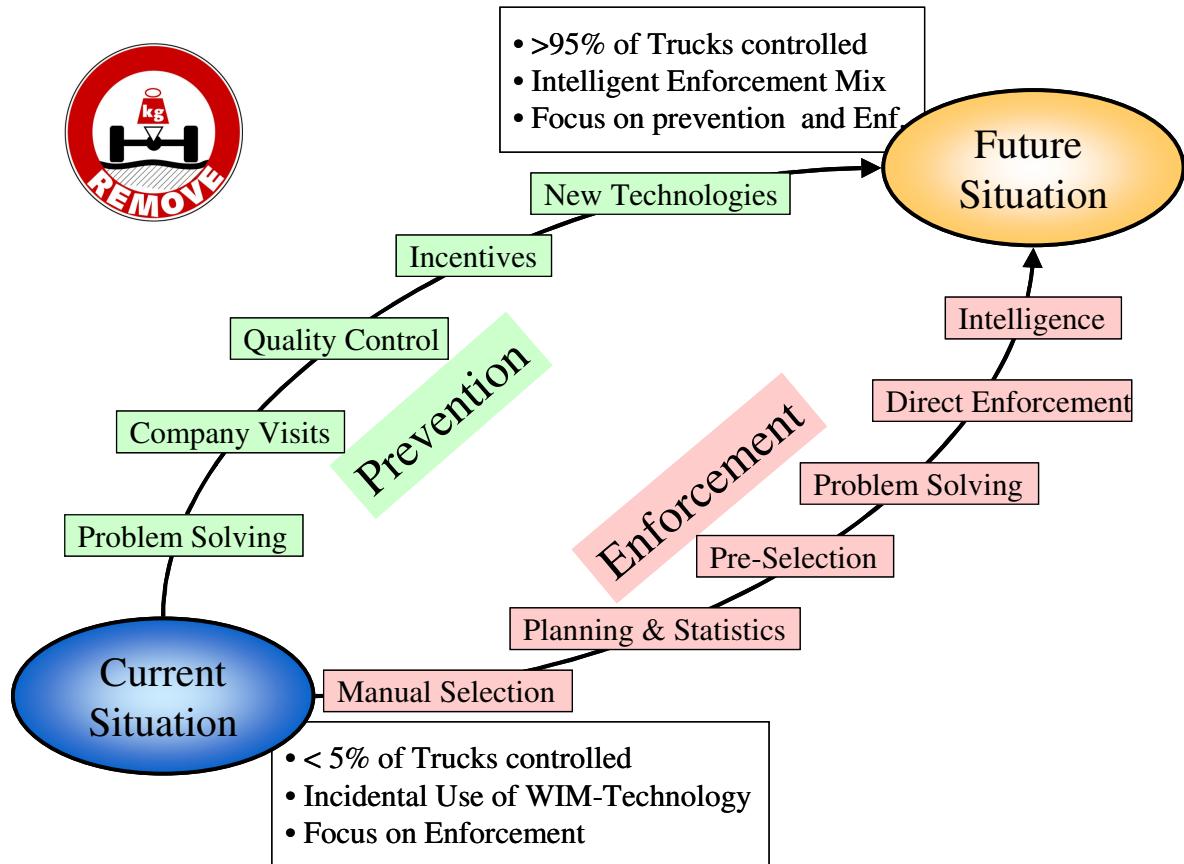


Figure 3 – Prevention + Enforcement

3.5 Recommendations.

The recommendations of the REMOVE project describe concrete steps to move from the current situation that came out of the questionnaire to the vision of the future situation. The main recommendations are combined similar to the general vision as shown in Figure 3.

- Identification of possibilities for introduction of a quality assurance programme such as the Australian Intelligent Access Programme;
- Establish a legal basis for cross-border enforcement and adaptation of the principles and operational models presented in the EU-projects VERA-2 and CAPTIVE;
- The sharing of intelligence between enforcement agencies on overloaded vehicles in order to be able to make company profiles;

- Harmonization of sanctions on overloading and if possible the maximum loading limits across member states;
- Promotion of the process whereby the liability and the chain of responsibility for stakeholders for overloaded vehicles is equally agreed across member states;
- Harmonisation of the specifications and quality control for WIM-systems for all applications except direct enforcement in the form of an EU-code of practice.
- Preparation of a set of technical specifications for (high speed) WIM-systems intended for direct enforcement as a virtual annex of the Measuring Instruments Directive (MID);
- Creation of a legally accepted EU-standard for Vehicle Identification and Classification both in the form of standardized vehicle number plates and Electronic Vehicle Identification;
- Encouragement of the development of in-vehicle weighing equipment.

These recommendations are a condensed version of the official recommendations that will be part of the REMOVE final report. This final report will be available from the authors and at the REMOVE-website <http://wimusers.free.fr/>

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