Title of paper:

Commercial Vehicle Enforcement as a solution for Cabotage and Road Safety in Europe

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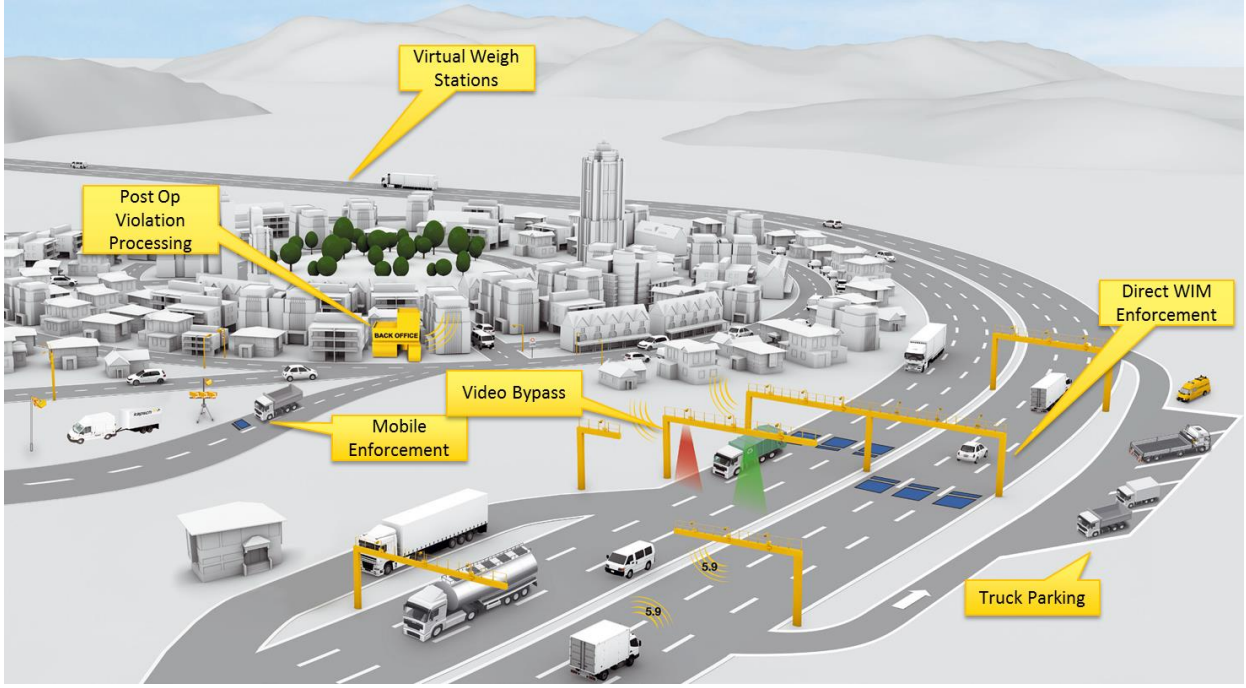

Figure 1- Commercial Vehicle Enforcement system overview example

1 - Stakes and Objectives

Traffic of commercial vehicles is a main source of safety risks on the road, road damages and maintenance costs for the infrastructure. The implementation of automated roadside safety inspection for commercial vehicles is an opportunity to boost traffic safety, reduce infrastructure and maintenance costs and to create a plain level field for hauliers. This leads to fair competition between hauliers and traffic modes.

2 - Description of the current situation, baseline data or data to be acquired in the future

The European Union has a very complex regulatory framework. To the existing regulation for Cabotage describing limits in terms of days and operations a non-resident haulier can perform. There are also the Smart Tachograph and the new Weights & Dimensions EU Regulations which open the

door to reading of tachograph data and weight control through DSRC interfaces. And all the information needs to be handled with care within the limits of the Data Protection and Privacy directives.

France transported in 2013 340 millions tonnes-kilometer of freight, of which 289 where on road. In figures 2 and 3 it is clear that since year 2000 and after the European crisis road transportation is getting more and more important in terms of volume.

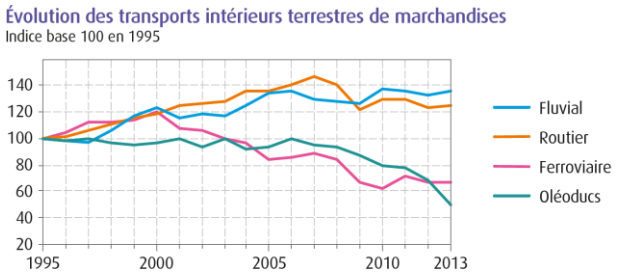

Figure 2 – Évolution de la production de transport.

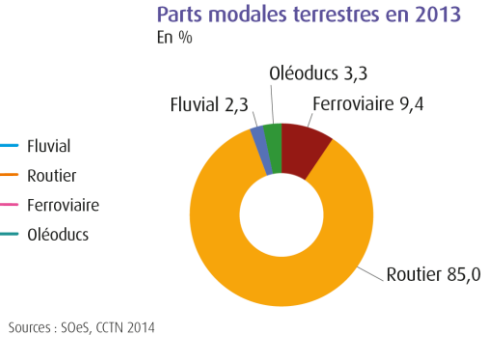

Figure 3 – Parts modales terrestres en 2013

On the other hand there were 53,8 million heavy vehicles in Europe in 2013 and almost 1,1 billion freight transport journeys in 2014. In this scenario the relevance of the French companies in the international exchange of goods is getting stable at a concerning 15%.

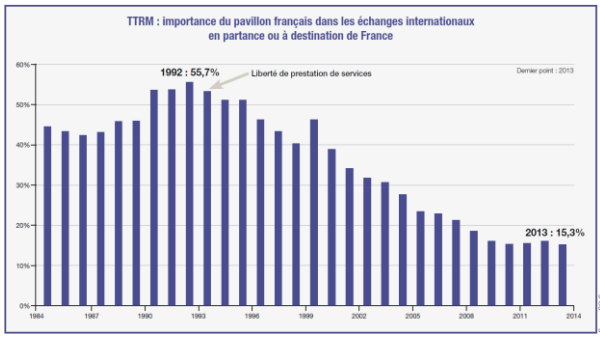

Figure 4 – Importance du pavillon français dans les échanges internationaux.

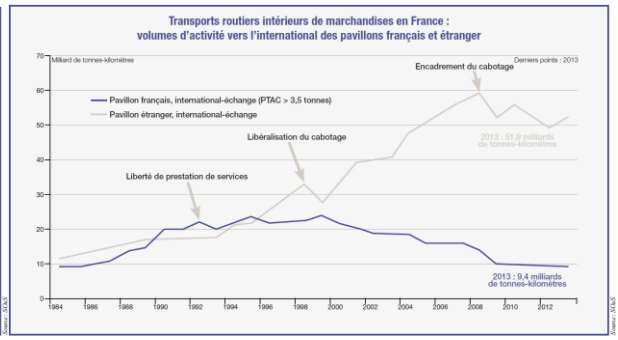

Figure 5 – Transports routiers intérieurs de marchandises en France.

3 - Concept, technologies and innovative methodology, progress ways

A Kapsch multi-faceted CVE system combining transponder reads, Automatic Number Plate Readers (ANPR), and potentially Weigh-In-Motion coupled with a sophisticated enforcement back office checking the records against local and national databases is capable of accurately identify violators traveling on European motorways.

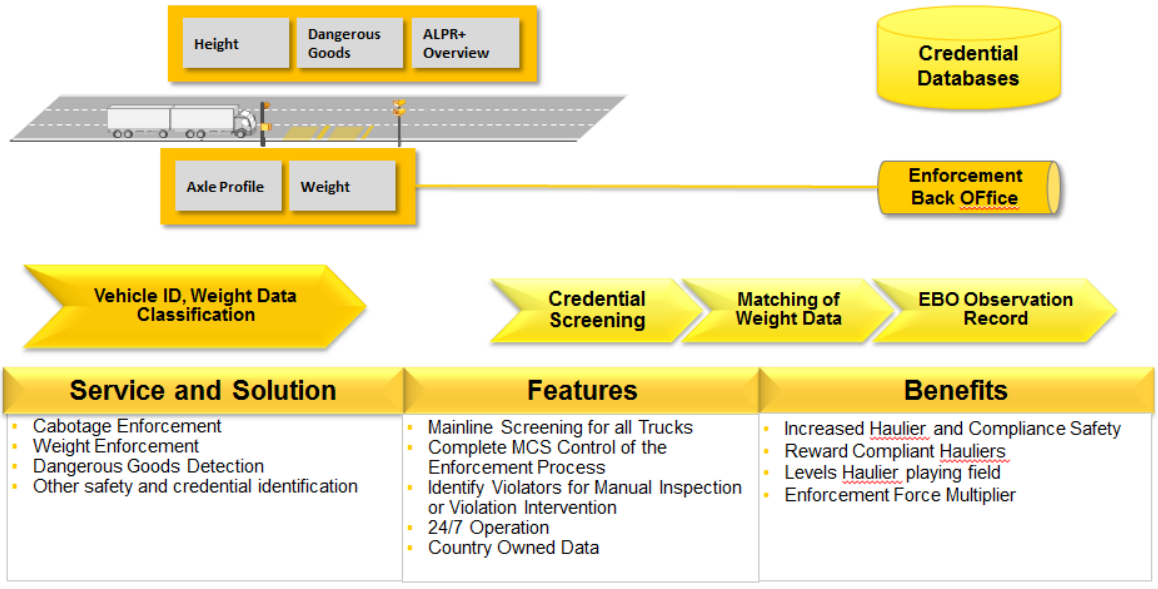

Figure 6- CVE services

Cabotage enforcement is the core service of the Kapsch CVE solution but secondary or immediate expansion available services are weight enforcement, hazardous goods identification and other safety and credential identications which may be of interest. The system is scalabe in such a manner which lends itself to add-on services as the needs of the region require or demand.

4 - Experiments and Returns of Experience

(Detailed results on Commercial vehilce and WIM Direct enforcmeent will be provided for the AITEC conference 2017)

The WIM installation in France consists of High Speed Weigh-in-Motion components, which are installed along the road, in defined positions, to monitor vehicle parameters like speed, length, gross weight, axle weight, axle group weight, vehicle class. The system is composed by several components some of them are mandatory but others could be added, to provide additional data and functionality. The WIM Controller component will receive signals from components present in the road. The data is translated into useful data, like vehicle parameters – date and time of detection, lane, driving direction, head, gap, length, speed, number of axles, class, distance between axles, wheel weights, axle weights and gross weight of each vehicle.

So the WIM pilot configuration in France consists of the following layout:

1. Inductive loop
2. WIM Kistler Lineas® Sensor
3. Dual Tire Sensor
4. Temperature Sensor
5. Overview Camera
6. ANPR Camera
7. Gantry
8. Lane / WIM Controller
9. GPS Antenna
10. 3D Scanner
11. Over Height Vehicle Detection
12. VMS (Variable Message Sign)

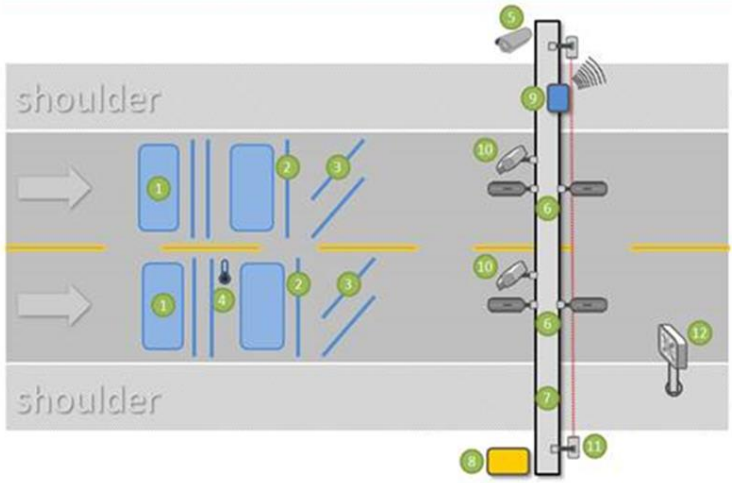

Figure 7- WIM layout example

The KAPSCH Weigh-In-Motion System provides a unique validity check functionality. Due to driving behavior or defects on vehicles passages are marked as non-valid measurements. The Validity Check System enables Direct Enforcement by showing 0 Validity flags, this means that the measurement is 100% valid and ready for Direct Enforcement, see French WIM site example at figure 8 (latest update following for ATEC ITS conference):

Automatic Direct Enforcement valid measurements (Oct'15-May'16)

100% valid measurements	**%**
for trucks >3,5t	**84,78%**

Figure 8- WIM site France valid measurements

5 - Deployments and results scored

In June 2016 the first CVE was installed in Indiana, US. This solution is designed as complementary to already existing static scales and used to boost the efficiency of the enforcement agents. It uses WIM to do pre-selection for the static scale and it can perform direct enforcement when the scale is out of business hours.

Automatic Direct Enforcement valid measurements (June'16)

100% valid measurements	**%**
for trucks >3,5t	**73,63%**

Figure 9- WIM site USA valid measurements

(Latest detailed results will be available mid of January 2017 and provided at the AITEC conference 2017)

In 2015 further WIM stations were installed and installed as a WIM enforcement pilot in countries like France and Austria. *(Detailed result for Franc see chapter 4 and latest values will be provided mid of Januray 2017 for the AITEC conference 2017)*

Automatic Direct Enforcement valid measurements (Oct'15-April'16)

100% valid measurements	**%**
all 3 WIM Stations	**62,4%**
WIM station on highway	
A1 (Haag)	66,7%
A2 (Guntramsdorf)	49,1%
A9 (Mautern)	75,6%

Figure 10- 3 WIM sites in Austria valid measurements

Another example is the Kapsch WIM Pilot in Brno, Czech. These WIM systems have shown a 68% rate of 100% valid measurements (see figure 11). The majority of the invalid measurements are due to the way the vehicles are driven (deliberately or not) with wheels in adjacent lanes or the drivers zig-zagged, braked or accelerated. The next version of the Kapsch system uses three sets of sensors across adjacent lines which increases the proportion of useable readings.

Automatic Direct Enforcement valid measurements (Sept'12-April'13)

100% valid measurements	**%**
for trucks >3,5t	**67,96%**

Figure 11- WIM site in Czech Republic valid measurements

6 - Conclusion

Nowadays truck overloading and non-compliance is a serious problem with negative impacts on infrastructure, safety and environment and distorts competition between hauliers and transport modes. Some carriers tend to operate outside of complaince regulations taking non-compliance as an operational risk in order to lower operational cost and earn contracts with lower bids. Trucking associations and carriers alike promote enforcement as a method towards improving or leveling the competitive playing field and thus support systems such as a cabotage enforcement system.

Automated roadside safety inspection as described above could lead to more safety and compliance on the roads with less financial resources.

Technology is readily available to enable automatic roadside safety inspection whilst also saving time and costs for both public authorities and hauliers. Automated roadside safety inspection will become an important part to avoid more uncontrolled heavy goods traffic, helps to save money in the maintenance of roads, reduce environmental impacts as well as provide a fair competition road for the future.

References

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