44TH ASECAP STUDY & INFORMATION DAYS 2016

ASECAP position paper on Connected and Automated Driving

G. Toulminet

Intercontinental Hotel
23-25 May 2016

www.asecapdays.com



Organized by ASECAP

Missions of motorway companies

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MADRID 2016

Acting as toll infrastructure operator under a concession contract with the Ministry

- Financing construction – building – maintaining infrastructure
- Operating : safety-incident management – traffic management – toll collection

Responsible for performance in safety and mobility

- To face an increase of traffic
- To face the objective of zero accident
- To face the objective of zero congestion
- To face a target reduction of CO2 emission

A 66% reduction in the fatality rate between 2001 and 2014

Existing intelligent technologies for traffic management

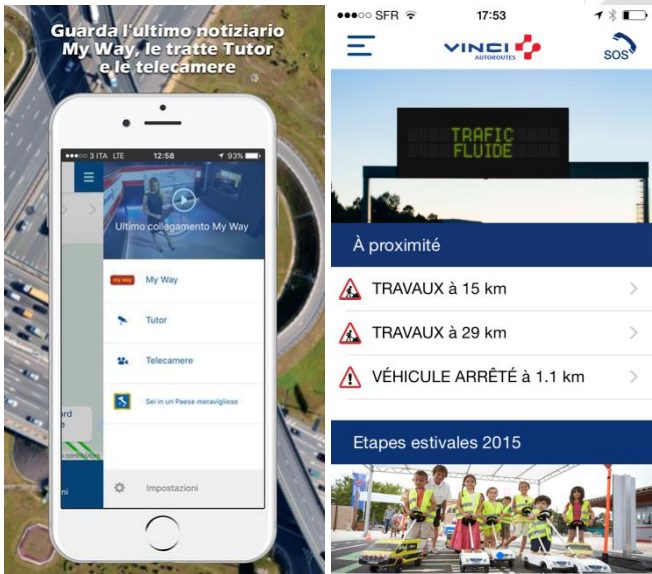
- Session : “Safety a the first priority of toll motorway companies”
- ASECAP report “Life saving chain”

- New infrastructure data collected
  - FCD, Bluetooth

- New interfaces with the driver
  - Smartphone apps

- Usage of collaborative information

- Usage of data directly coming from the vehicle
  - SCOOP@F, Rotterdam-Franckfurt/M.-Vienna corridor project, …(V2I and I2V)
  - TPS eCalls



TPS eCall to motorway operators

PSA PEUGEOT CITROËN

INTER MUTUELLES ASSISTANCE

AUTOROUTES TRAFIC

Motorway operator

- **Real Time Data Feed**
  - Vehicle id, color, brand,…
  - GPS Location
  - Nature of incident
- **Instant Call to the assistance and the motorway operator**

ACC – Automation level 1

Longitudinal control system	Description
ACC	Adapt vehicle speed and distance to a forward vehicle under free-flowing traffic conditions
Full speed range ACC	ACC for free-flowing traffic conditions and congested traffic conditions
Cooperative ACC (standard under development)	Expansion to existing ACC by using wireless communication with preceding vehicles (V2V) and/or the infrastructure (I2V); **It can receive data from the infrastructure, such as recommended speed and time gap setting, to improve traffic flow and safety**

Cooperative speed regulation to improve safety and traffic flow

Forward vehicle collision prevention

Intelligent driver support at speeds above 30 km/h (18 mph)

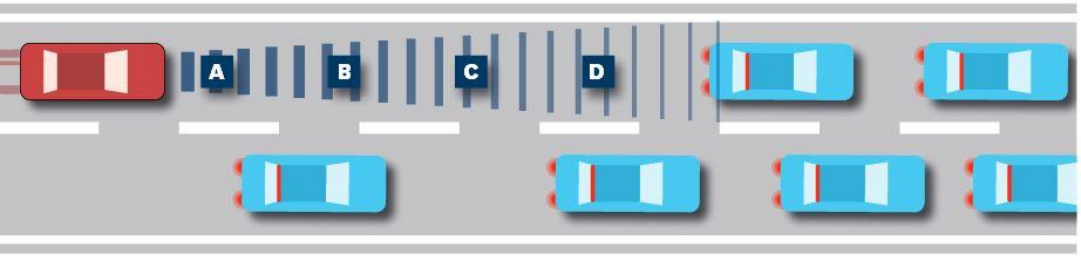
A If the system detects a critical approach to the vehicle ahead and the driver does not react, it prepares the braking system for emergency braking and warns the driver.

B Following the collision warning, the system initiates partial braking to reduce the speed and give the driver valuable time to react.

C If the driver presses the brake pedal, braking support is provided as necessary.

D If the driver does not react and the system assesses the collision to be unavoidable, it initiates full braking in order to mitigate the consequences of the crash.

The design of the Predictive Emergency Braking System may vary depending on the vehicle manufacturer and model.



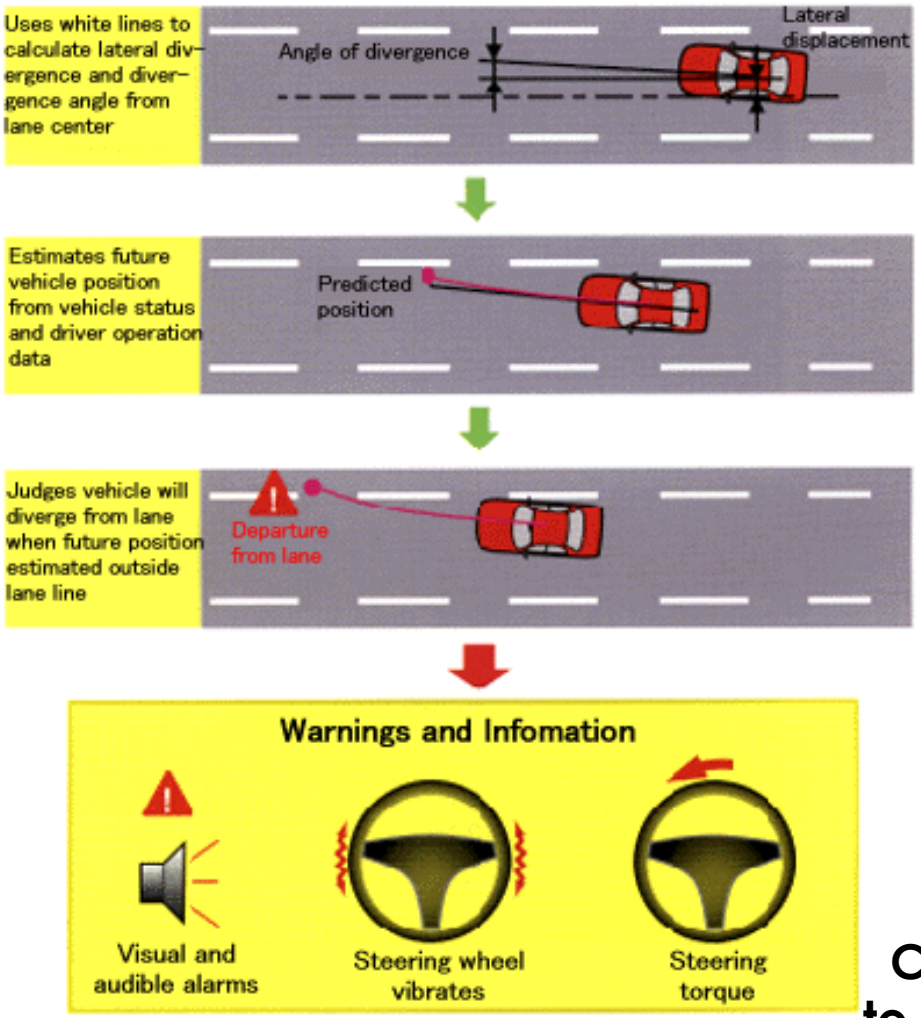
Automation Level 1:
Emergency braking system
www.bosch-mobility-solutions.cz

Mandatory system for new vehicles , for some categories of HGV and large passenger vehicles , by European regulation 661/2009, as well as Lane departure warning

Cooperative emergency braking system (standard under development) :
Use V2V communication to extend the range of vehicle sensors

Emergency braking messages to be sent to approaching vehicles
and infrastructure, for congestion tails detection, traffic information and management

Lane keeping



Lane keeping Assist (Level 1)
www.mitsubishi-motors.com

Lane departure warning (level 0) :
Warn the driver of a lane departure

LDW and LKA do not take any automatic action to prevent possible lane departures

Road Boundary Departure Prevention (standard under development) :
Predict road boundary departures and keep the vehicle within the road boundaries; Acts on vehicles with longitudinal deceleration control to prevent road boundary departures

Cooperative incident warning V2V and V2I to prevent collision by approaching vehicles, for protection of the vehicle, etc.

Analysis of scenarios of deadly accident ASFA network (France) – 2015 data

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Total number of deadly accidents on the ASFA network in 2015 : 148

Scenario	Nb. of deadly accidents
Vehicle control loss	**45**
Rear collisions without direction change	**30**
Collision during lane change	10
Ghost driver	12
Accident with pedestrian(s)	5
Other	8

LV hitting another vehicle
50

HGV hitting another vehicle
37

Scenario	Nb. deadly accident due to a previous accident	Nb.deadly accident due to a previous incident
Collisions with vehicles	**13**	**6**
Accident with pedestrian(s)	8	9
Accident with animals or objects	na	2

Levels of Driving Automation

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Automated driving system levels						Communication levels	
Automated level	Name	Execution of Steering and Acceleration/ Deceleration	Monitoring of Driving Environment	Fallback Performance of Dynamic Driving Task	System Capability (Driving Modes)	Name	Communication Level
Human driver monitors the driving environment							
0	No Automation	Human driver	Human driver	Human driver	n/a	No Communication	0
1	Driver Assistance	Human driver and system	Human driver	Human driver	Some driving modes	Communication Assistance	1
2	Partial Automation	System	Human driver	Human driver	Some driving modes	High Communication	2
Automated driving system ("system") monitors the driving							
3	Conditional Automation	System	System	Human driver	Some driving modes	High Communication	3
4	High Automation	System	System	System	Some driving modes	Full Communication	4
5	Full Automation	System	System	System	All driving modes		5

ASECAP position

1. Safety remains the highest priority and automated driving has the potential of improving safety on our roads.
2. Road safety is based on legal certainty, binding EU-wide security rules, and consistent EU privacy and certification frameworks.
3. Communication between vehicle and infrastructure has to be standardised, to allow vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications amongst all types of vehicles and road networks.
4. The access to vehicle data under fair, reasonable and non-discriminatory conditions is key to safely manage traffic, for both mixed automated and non-automated scenarios.
5. The operation of automated vehicles and their strong interconnection with road operators will require robust data security mechanisms in order to avoid abuses or criminal activities which might influence the safety operation of automated vehicles. ASECAP envisages a European solution across all vehicle brands.
6. New legal frameworks, processes and European standards will have to be put in place assuring the smooth implementation and operation of these innovative 'automated mobility' concepts. European services interoperability will have to be ensured at all time.
7. Consistent and long-term investments are needed to deploy intelligent transport solutions and maximise the potential benefits of automated driving in all the different road environments. Physical infrastructure, by definition, requires a long-term vision and planning and, therefore, a clear European roadmap with indicators and targets must be adopted and uphold across Members States.
8. Well defined and targeted European projects & initiatives in order to approach all automation levels in a harmonised way are needed. It is crucial that such projects are adequately funded, taking into account the framework conditions of road concessionaires.

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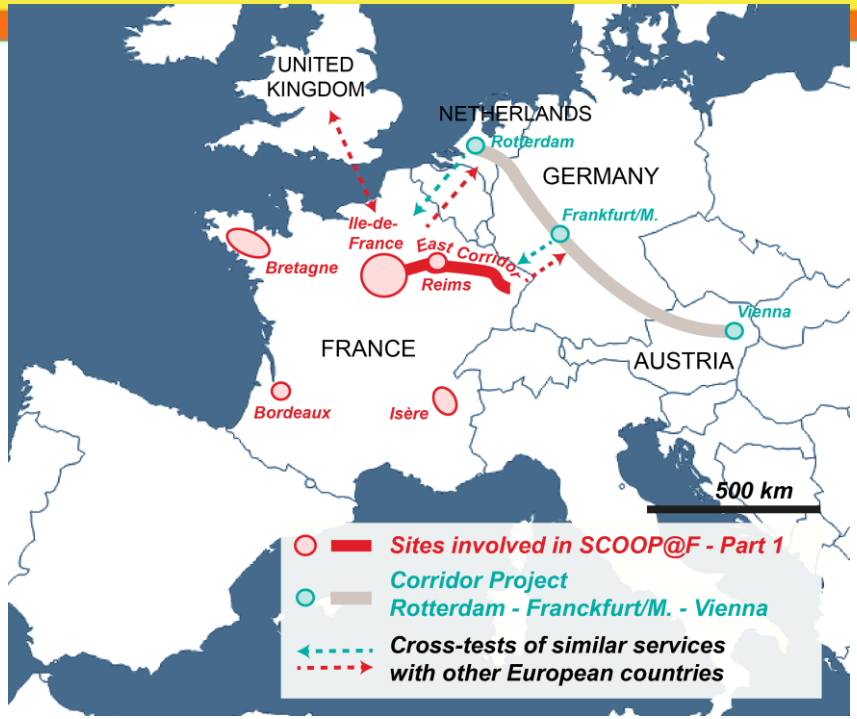
ASECAP

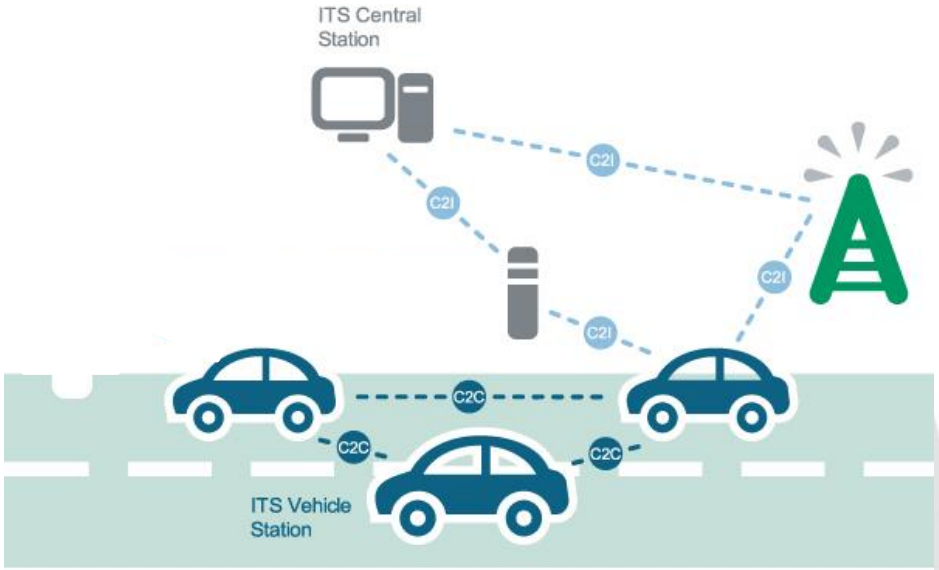
Association Européenne des Concessionnaires
d'Autoroutes et d'Ouvrages à Péage

position paper
on
Connected and Automated Driving

Thank you for your attention

V2I and I2V communication





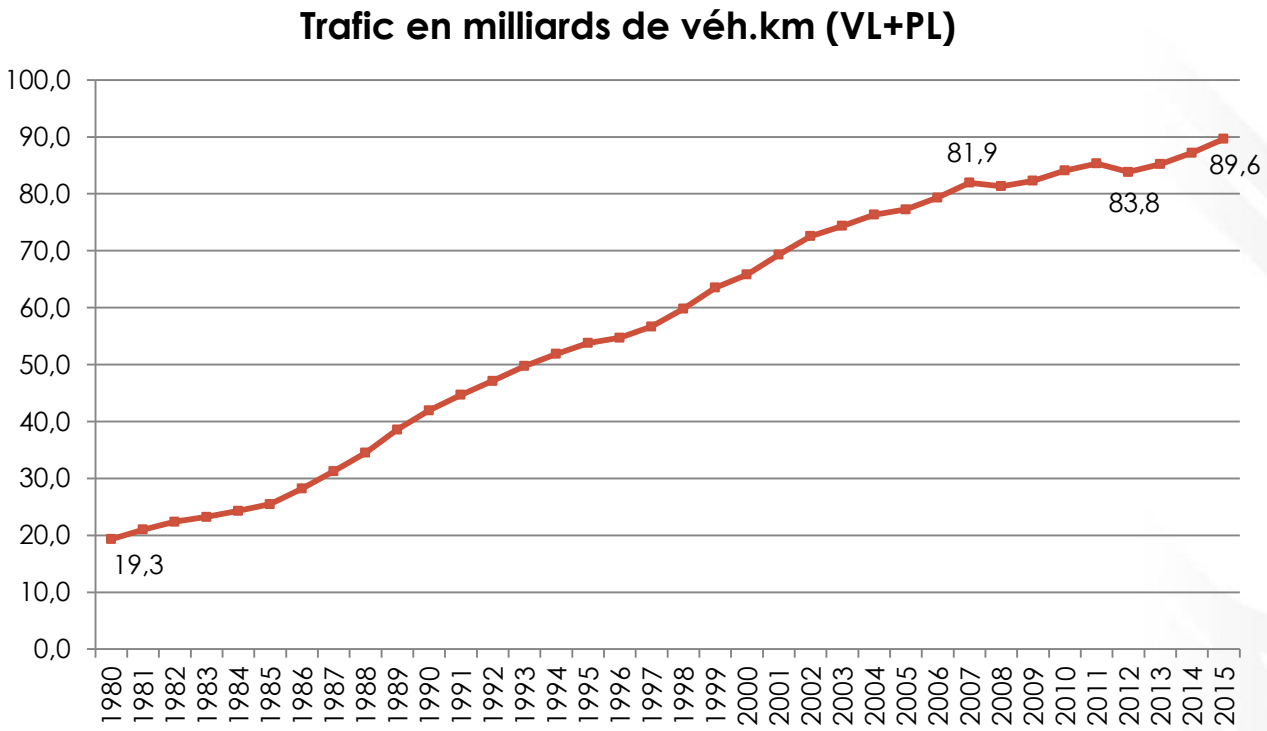
ITS stations to be installed

sanef : 20

ASFINAG : ?????

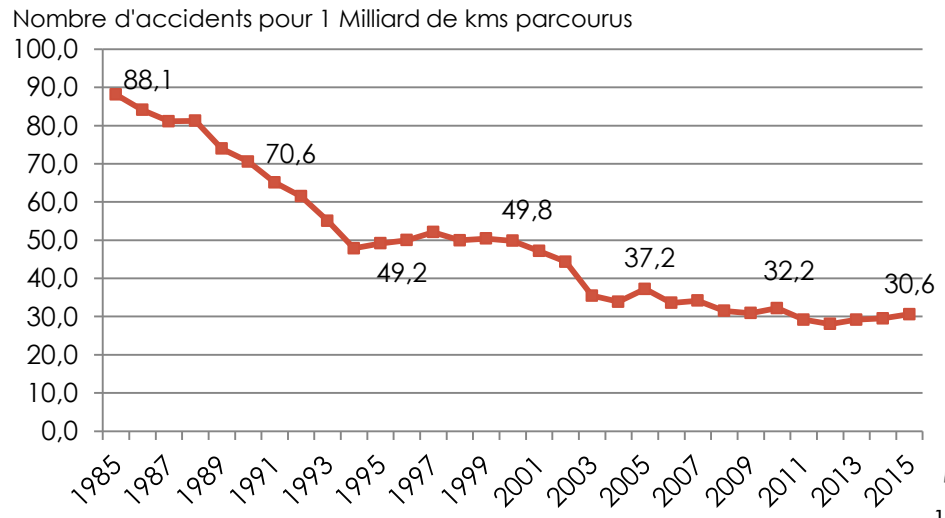
1. Probe vehicle data
2. Road works alerts
3. On board signalling
4. Traffic information
5. Park and ride info

Traffic on the ASFA network

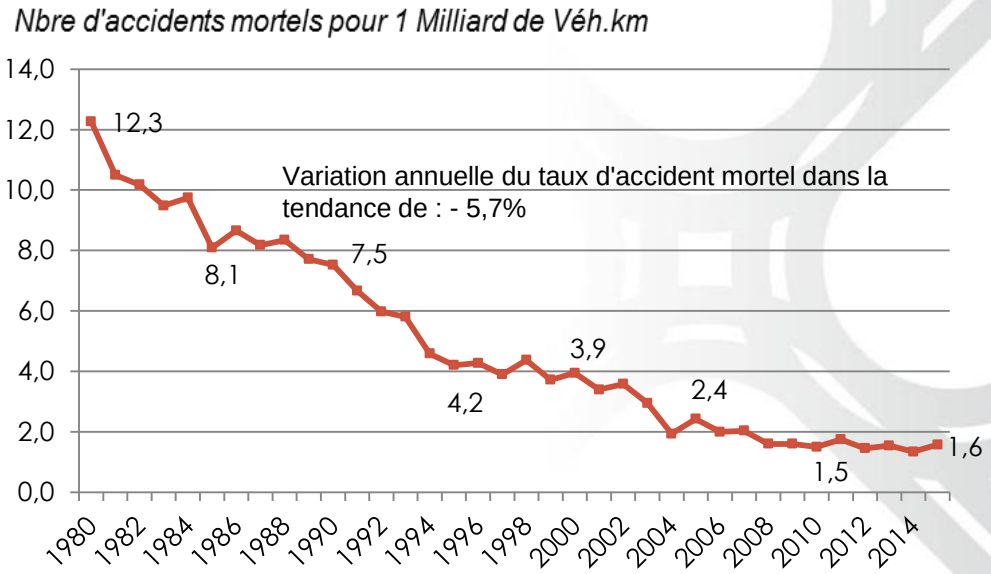


Number of accidents on the ASFA network

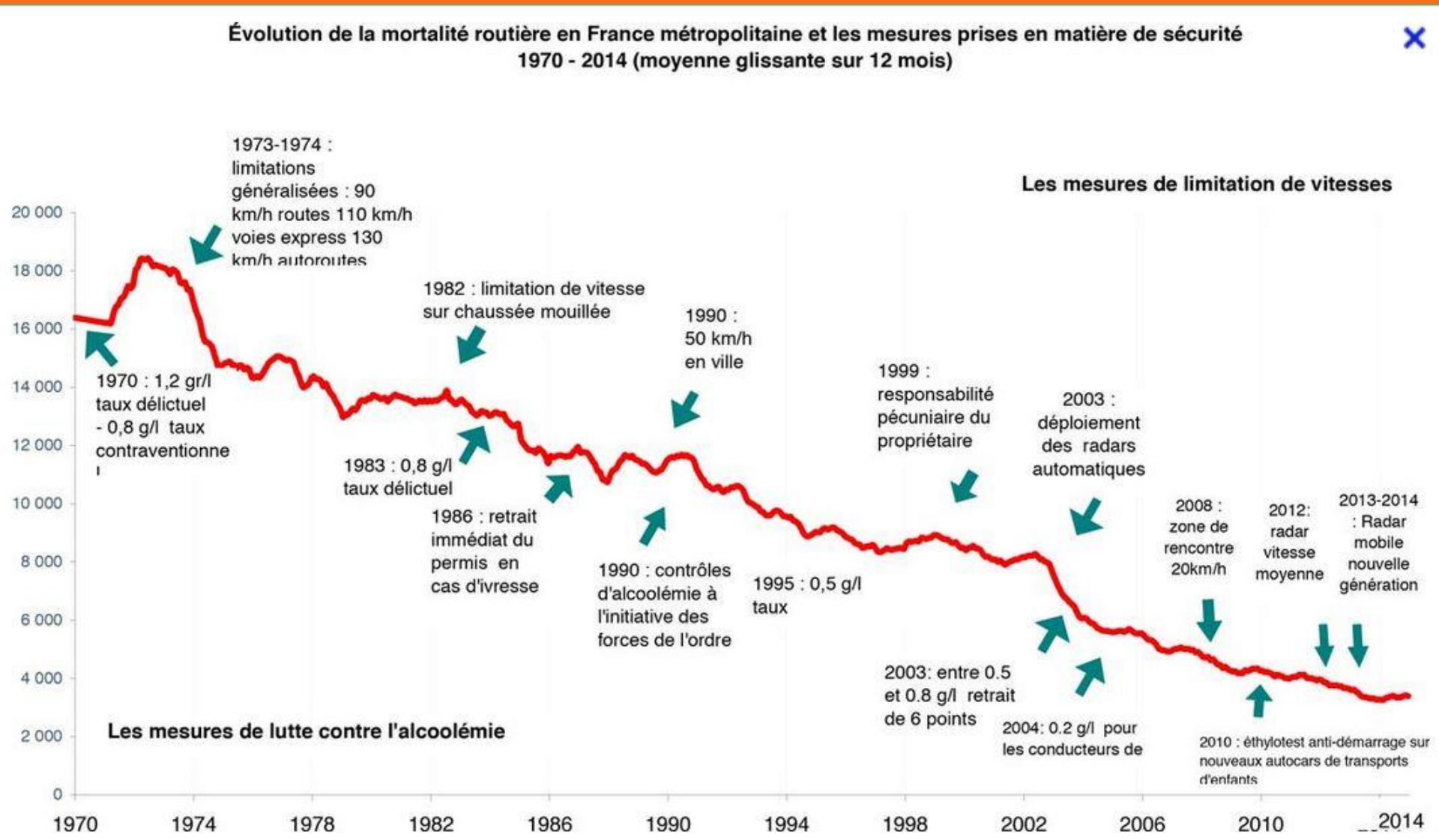
Taux d'accidents corporels entre 1985 et 2015



Taux d'accident mortel de 1980 à 2015



Number of accidents on the ASFA network



European regulations

REGULATION (EC) No 661/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
COMMISSION REGULATION (EU) No 347/2012 → **Emergency braking systems**
COMMISSION REGULATION (EU) No 351/2012→ **Lane departure warning systems**

Safety system	Effective date for new types of vehicle	Effective date for new vehicles	UNECE Class of vehicle and characteristics					
			M1	M2, M3	N1	N2	N3	O3, O4
			Small passenger vehicles	Large passenger vehicles	Light goods vehicles	Heavy goods vehicles up 12 t	Heavy goods vehicles above 12 t	Trailer above 3,5 t
			Seats <= 8 + driver	Seats > 8 + driver	Weight <= 3,5 t	3,5 t < Weight < 12 t	Weight > 12 t	Weight > 3,5 t
Lane departure warning system()	01-11-2013	01-11-2015		Vehicles with Axles <= 3, constructed exclusively for the carriage of seated passagers		Vehicles with Axles <= 3, except semi-trailer towing vehicles with 3,5 t < Weight < 8 t	Vehicles with Axles <= 3	
Emergency braking system(1)	01-11-2013 or 01-11-2016	01-11-2015 or 01-11-2018						
	depending on the braking technology and rear axle suspension system used							