

# **AUTOMATED DRIVING**

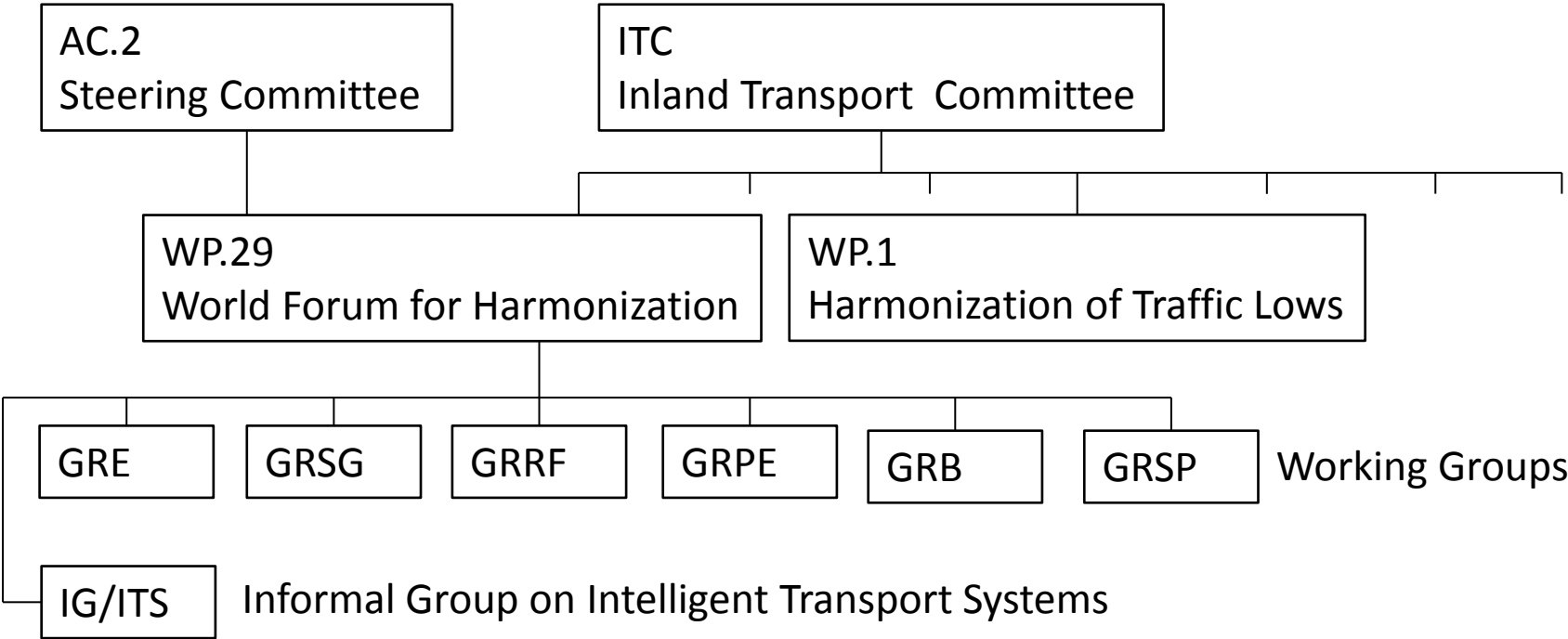
Tasks, possibilities, gaps and difficulties in the international regulatory work

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# Simplified scheme of the organization in Geneva

## WP.29 = World Forum for Harmonization of Road Vehicle Regulations



IG/ITS was founded in 2002-2004

IG/ITS-AD reorganized in 2013-2014

ITC implemented road map for ITS development 2012-2020, short term  
by 2030, medium term

# IG/ITS first period (2002-2013), main activities:

## 1. Specifying three main fields of ITS

- In vehicle systems (IVS)
- Systems connecting vehicle and infrastructure
- Systems used in large fleets (taxi,- bus,- truck companies)

## 2. Concentrating on IVS

- Dealing with Advanced Driver Assistance Systems (ADAS)
- Analysing the „Driver in the loop” process
- Preparing guidelines for the design and development of ADAS

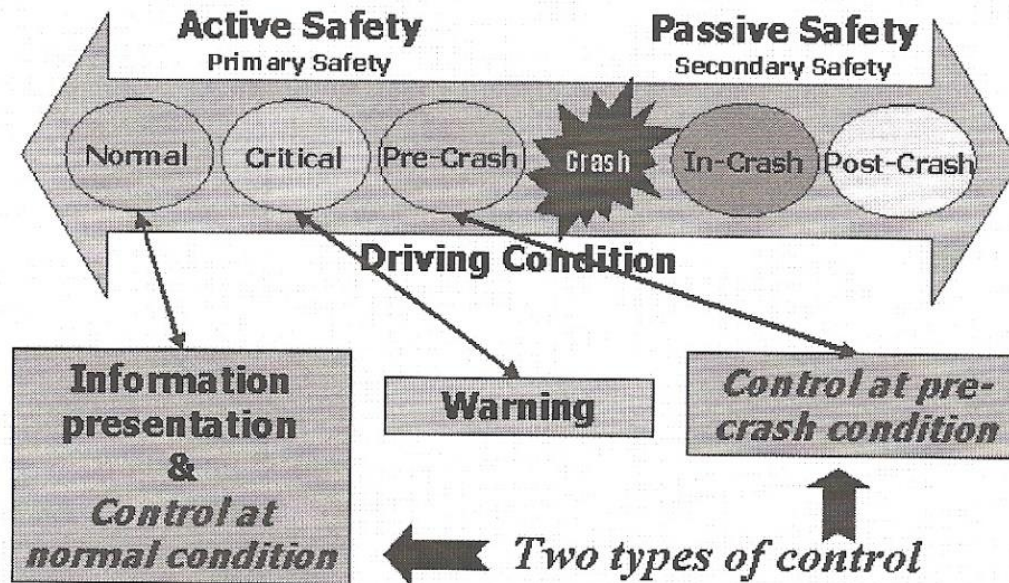
## 3. Main goal of ADAS: to avoid accident, examples:

- ABS anti-lock brake system
- AEBS advanced emergency brake system
- ESC electronic stability control
- RDWS road departure warning system, etc.

#### 4. ADAS functions in relation to the driver

- Giving general information about driving conditions
- Warning about possible danger
- Giving alarm signal
- Taking over the operation (control) from the driver.

#### 5. ADAS according to sequence of driving conditions



# IG/ITS-AD second period (2013 - ) AD = automated driving

## 1. WP.29 recognized:

- the application of ITS-s and telecommunication systems in vehicles is rapidly increasing, the international regulatory activity is behind the time
- the ADAS type approach is not appropriate to handle this issue
- rather wide international cooperation is needed to solve the problem
- IG/ITS-AD shall be reorganized: new organization, way of work, goals to be specified

## 2. For common cogitation, bringing together:

- international and national regulatory bodies (e.g. WP.29, WP.1, NHTSA, etc.)
- international NGO-s: vehicle, part and system manufacturers (e.g. OICA, CLEPA, ITU, etc.)
- national and international standard organizations (e.g. ISO, SAE, FMVSS, BIS, etc.)
- related R /D institutions (e.g. IHRA, JARI, ARAI, etc.)
- etc.

and working together in IG/ITS-AD

### **3. Automated driving means:**

- more than application of IVS-s, ADAS-s.
- during driving the vehicle is interconnected with road infrastructure, GPS, radio communication, etc.
- parallel or connected operation of different Intelligent Systems (IS) and driving functions (DF), like braking, steering, cruising, lighting, etc.
- these IS-s and DF-s may operate on different level of automation
- solution of driver-vehicle interface

### **4. The really first step for IG/ITS-AD, to collect the:**

- existing ITS systems operating already on the roads
- ITS systems being in test phase
- ITS systems being in design stage

### **5. The future regulatory work shall be based:**

- on vehicle function, on driving functions
- change of the present „technology approach”

# LEVELS OF AUTOMATION IN DRIVING

Suggested by OICA, based on SAE levelling

This is not finalized yet, there are no final definitions

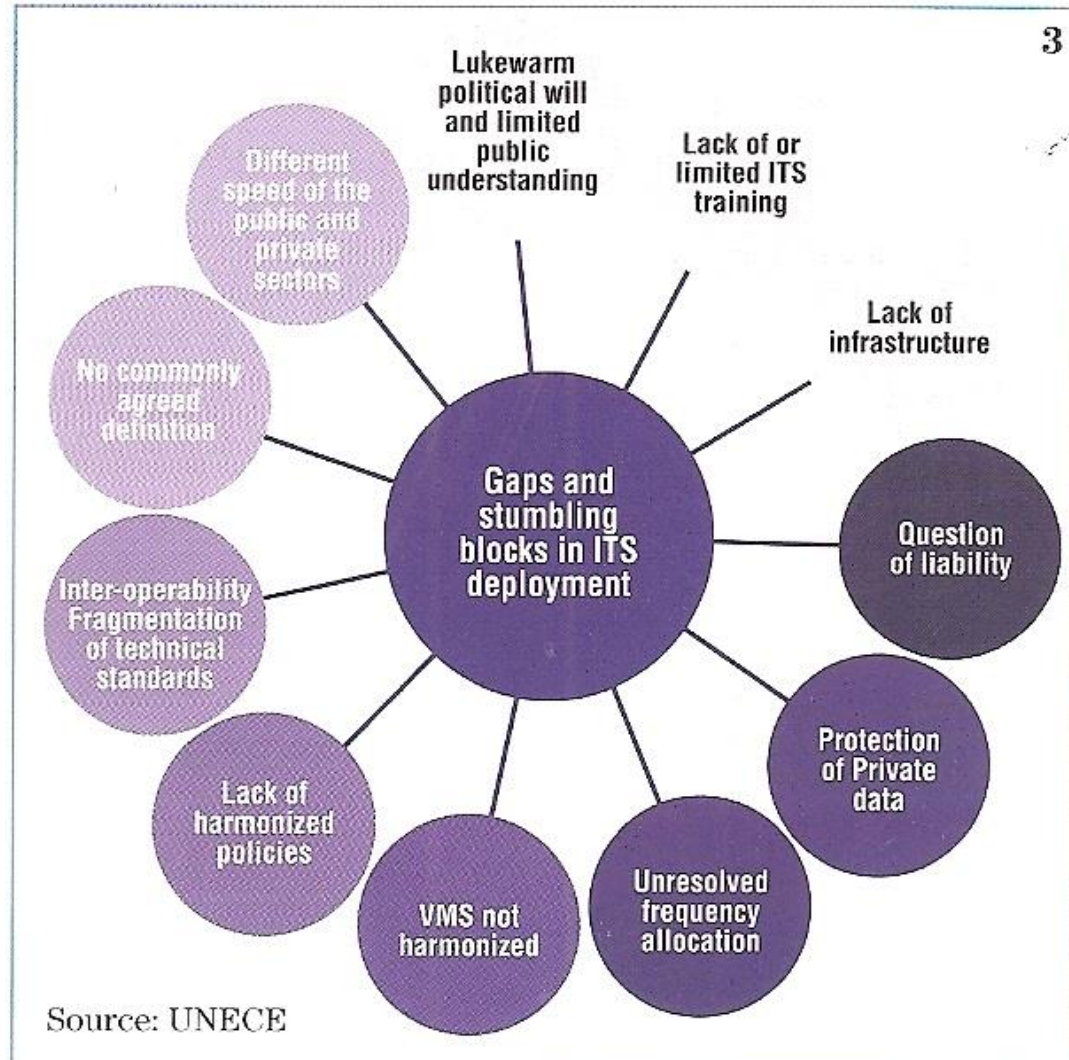
Levels	Role of ITS in driving	Driver (D) role in driving	Remark
0	No ITS in the vehicle	D is driving, doing everything	Only reference level
1	ITS supplies only information	D evaluates, decides, executes	No automation
2	ITS shows proximity of emergency	D decides, executes	<b>Automated</b> driving with different levels of automation
3	ITS gives alarm signal	D executes	
4	ITS executes in emergency	D is out of the process	
5.1	ITS drives in normal cases	D can reset the route if necessary	<b>Autonomous</b> driving
5.2	ITS makes everything	No driver in the vehicle	

5.1. Driver is needed – with driver license – being able to overtake all functions of ITS or just reset the route in case of unwanted obstacle or circumstance.

5.2. No driver, no driver licence, no operating devices (like steering wheel, pedals, switches, etc.)

# PROBLEMS, QUESTIONS TO BE CLEARED UP TO AUTOMATED DRIVING ON PUBLIC ROADS

Collected by IG/ITS-AD in Geneva





# POSSIBLE ROAD MAP FOR IG/ITS-AD, MAIN STAGES

**Main goal:** clear, reliable international regulations for automated driving

## **Short term tasks:**

- Collect all information about ITS and telecommunication systems (shown earlier)
- Specify commonly agreed ideas, concepts, definitions, functions for ITS
- Collect the related obligations, e.g. safety, security, vehicle approval, legal issues, infrastructure, software security, insurance, breakdown of the vehicle, etc.
- Specify and classify different vehicle functions to be automated
- Prepare guidelines for designing automated vehicles.

## **Middle term tasks:**

- Prepare regulations for individual automated functions (level 2)
- Prepare regulations for groups of automated functions (level 3 and 4)
- Check the intercommunication, interface between functions and driver
- Feedback the experiences to the road map

## **Long term tasks:**

- Autonomous driving, learn about it as possible (?) far future goal
- Do not put too much energy into this issue yet

# EXAMPLE I. AMONG THE MAJOR PROBLEMS: DRIVER'S RESPONSIBILITY

## Long-life conflict between WP.1 and WP.29

- WP.1 is responsible for the internationally harmonised traffic laws (1968 Vienna Convention)
- WP.29 is responsible for the approval of vehicles based on ECE Regulations (1958 Geneva Agreement)
- The root of the conflict: the absolute responsibility of the driver in any minute during the driving

**Fact:** millions of vehicle are running on public roads with ADAS systems (ABS, AEBS, ESC, etc.) approved by WP.29.

**Conceivable compromise:** if the ADAS system is approved by WP.29 and there is a switch in the system which can be used by the driver any time (on and off), it complies the absolute responsibility requirement of the driver (?)

But this solution is inadequate in the more complicated **automated driving** on public roads

## EXAMPLE II. AMONG THE MAJOR PROBLEMS: SIGNALS ON PUBLIC ROADS

The automated (and also autonomous) driving is strongly based on the road signals. But:

- The road signals are not unified, standardized neither in one country (e.g. in Hungary), nor on international level (among countries)
- Different signals are used on highways, main roads, rural roads, city streets,
- Different colours are used: white, yellow, red, blue
- Different symbols: continuous line, double line, broken line, arrow, stop sign, written text, etc. to be perceived by automated systems
- Mud, dirt, snow, ice on the road, covering the signals

Internationally harmonised, unified directive would be needed by WP.1 about road signals being suitable for automated driving

This directive shall be put into practice by the countries, knowing that different authorities are responsible for highways, main roads, rural roads, city streets.

This process is incalculable in time.

# SUMMARY, CONCLUSIONS

1. Application of ITS and telecommunication systems in road vehicles is rapidly increasing, the international regulatory activity is behind the time.
2. The ADAS-type approach is not adequate anymore to handle this issue.
3. IG/ITS-AD is reorganised by WP.29: new organization, way of work, tasks and goals are given
4. Integrate the main stakeholders for common work (like international regulatory bodies, vehicle manufacturers, standard organizations, R/D institutions, etc.)
5. Follow the road map: short term, mid term and long term tasks. First step right now: start the work with the integrated stakeholders
6. Concentrate on the automated driving, do not put too much energy into the autonomous driving yet.
7. The conflict between WP.29 and WP.1 resulted endless (more than 10 years) debate about the „absolute responsibility of driver“. No solution yet.
8. The activity of IG/ITS-AD must not stop, block, keep back the development of ITS systems! But keep back the media to proclaim the hope that the autonomous driving is the close future, it is just in front of the door!

Excuse me for this compressed presentation, I was pressed by the given time limit.

The goal of this presentation was not more than showing – on the basis of the international regulatory work – the complexity of the automated (autonomous?) driving

**THANK YOU FOR YOUR KIND  
ATTENTION!**

**(or I hope you slept well)**