« From driving assistances to automated driving"

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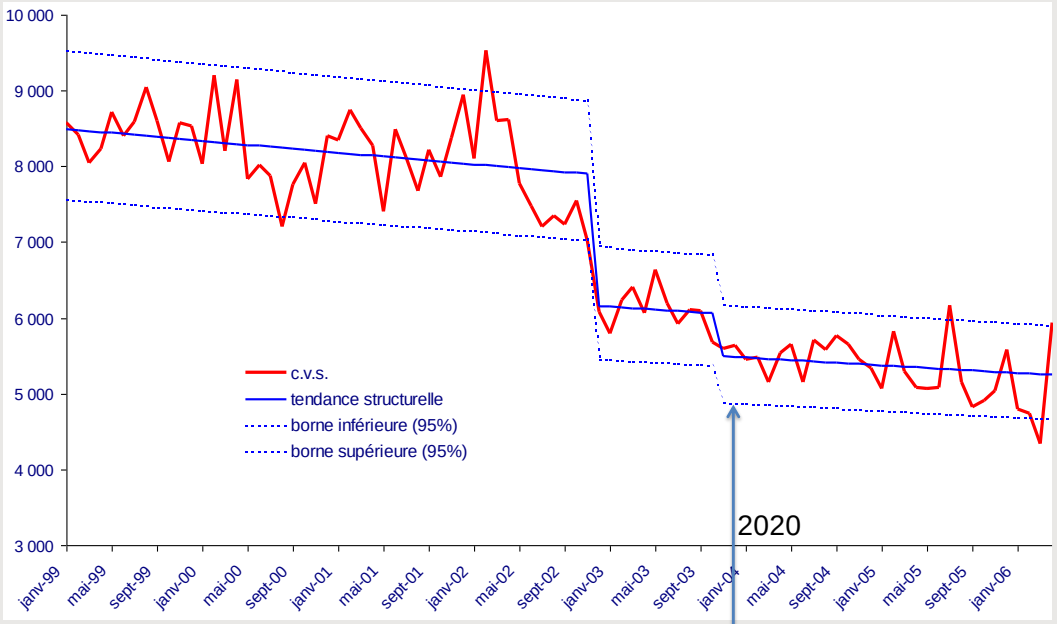
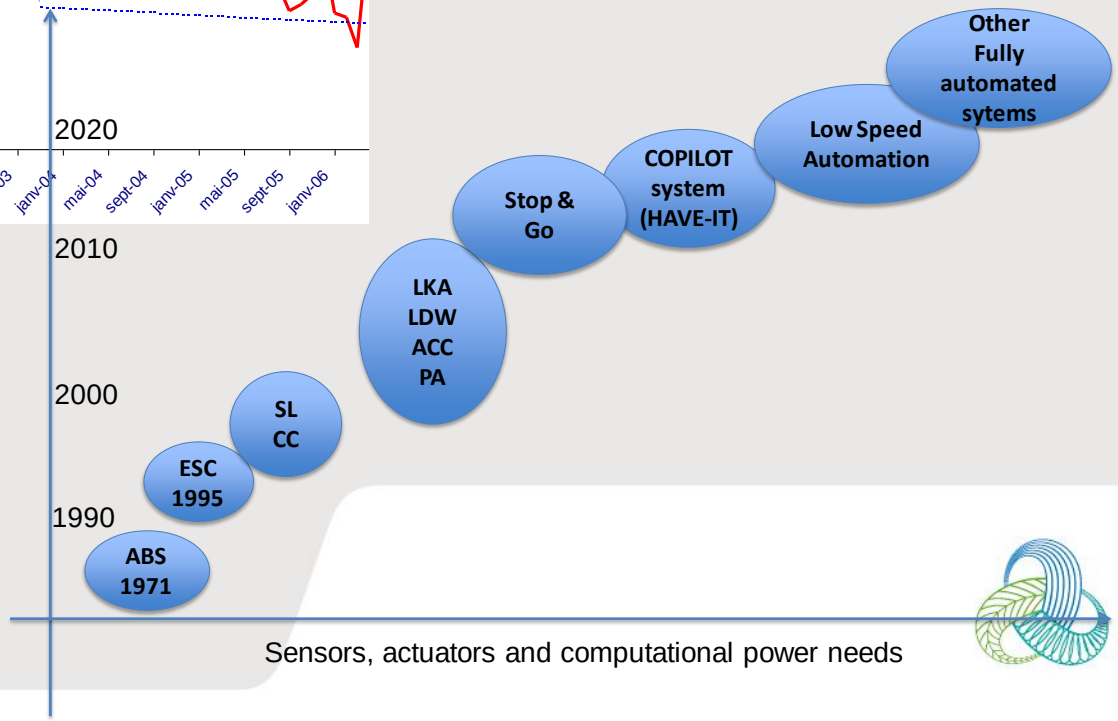
Current State

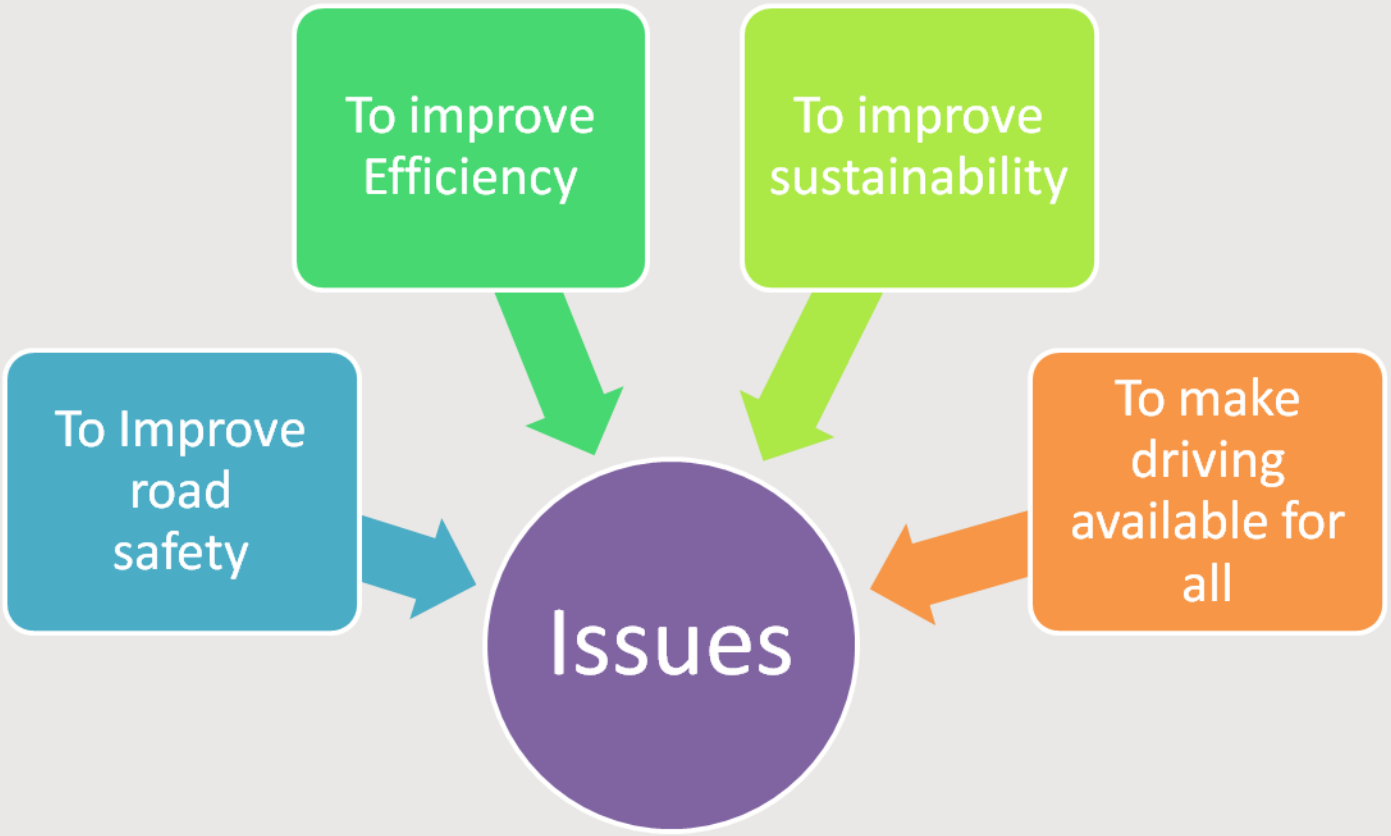


Road and vehicle improvements allow a constant decrease of car fatalities

More efficient sensors and actuators are now embedded in the car



Why automation ?



Automation is a global answer to four important societal issues

See : EU project TRACE, D411, Review of Crash effectiveness of Intelligent Transport System
EU project Prevent – PREVAL on impact of driving assistances

Some definition : automation degrees

from Tom M. Gasser (BAST), evolution within iMobility WG on Automation

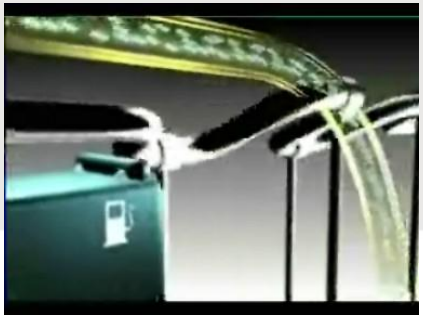
Possible today → In the future

- Driver Only:
  - Human driver executes manual driving task
- Driver Assistance:
  - The driver permanently controls either longitudinal or lateral control. The other task can be automated to a certain extent by the assistance system.
- Partial automation:
  - The system takes over longitudinal and lateral control, the driver shall permanently monitor the system and shall be prepared to take over control at any time.
- High automation:
  - The system takes over longitudinal and lateral control; the driver must no longer permanently monitor the system. In case of a take-over request, the driver must take-over control with a certain time buffer.
- Full automation: “hands-off, feet-off, brain-off”
  - The system takes over longitudinal and lateral control completely and permanently. In case of a take-over request that is not carried out, the system will return to the minimal risk condition by itself.

LAVIA

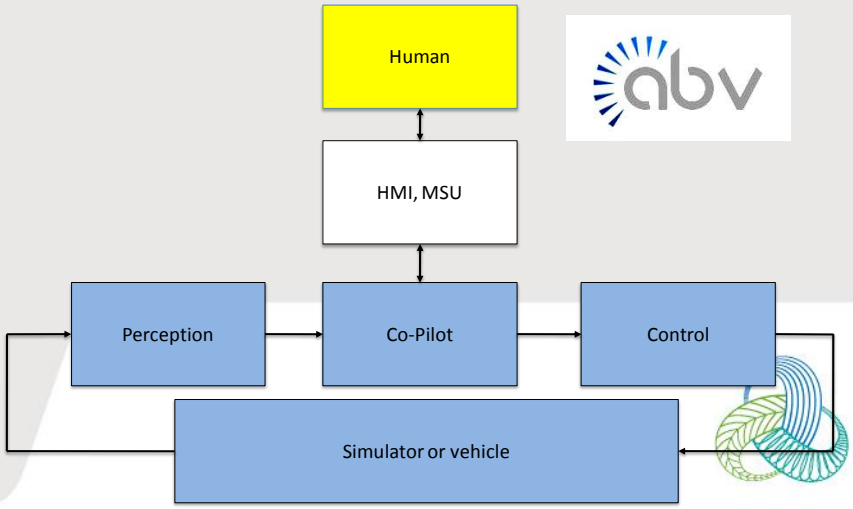
- 1st : Advisory system
  - A warning is displayed on the dashboard if speed limit is exceeded (speed limit display is blinking).
- 2nd: Voluntary active system
  - Throttle is under LAVIA control, such as speed limit cannot be exceeded but the system can be set **OFF/ON** at any time.
- 3rd : Mandatory active system
  - Same as above, but the system is always **ON**.
- "Kick-down"
  - In both active modes, system can be temporarily disabled by pressing the accelerator past a point of resistance

.. Most worldwide studies have demonstrated the effectiveness of ISA on safety



Low Speed Automation

- Allow automation on congested area (ring, intrurban highway)
- Driver and Copilot continuously share the driving task
- Risk evaluation supervizes the decision process and may ask the driver to take over the driving task
- CoPilot always evaluates a minimum risk maneuver

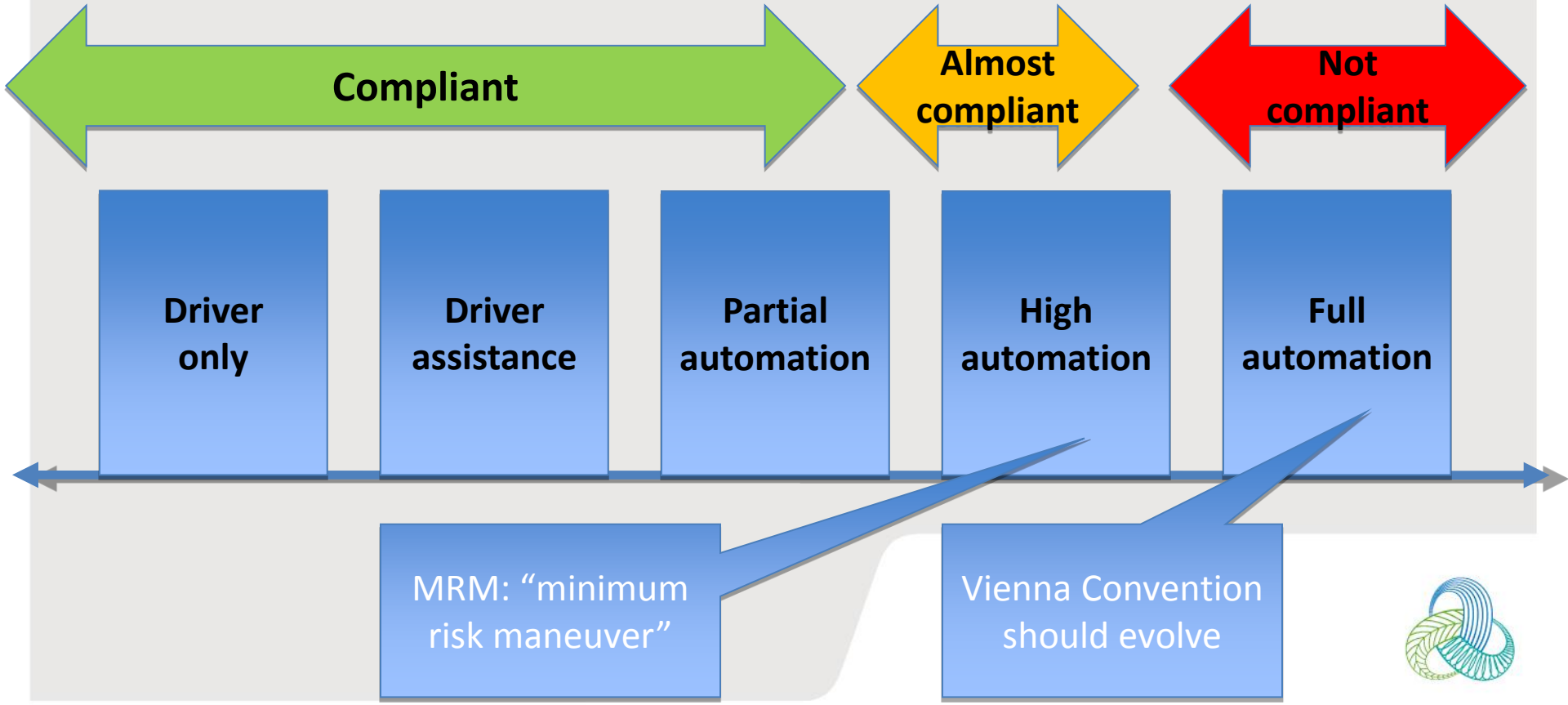


Human-machine interaction : the horse-rider metaphor

- Horse and rider form a whole.
- The rider gives orders to the horse but ...
  ... the horse refuses to execute dangerous orders (e.g. collision, dangerous jump)
- If the rider gives up (no reaction), the horse stops or ... go back home (“MRM” : minimum risk maneuver)

Legal limitation

- Vienna Convention reminder (art. 8.5)
  - Every driver shall at all times be able to control his vehicle …



Thank you for your attention

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