Submitted by France Document No. ITS/AD-12-07
(12th ITS/AD, 22 June 2017, agenda item 3-4)

Automated vehicles
Horizontal regulation

Preliminary considerations

Xavier DELACHE,
Directorate general for infrastructure, transport and the sea
Pierre BAZZUCCHI
Directorate general for energy and climate

ITS/AD informal meeting, June 22, 2017

Outline

- Context and grounds to act
- Importance of definitions
- Regulation “philosophy”
- Considerations on validation
- References

Context and grounds to act

- Need for a systemic approach
  - # vehicle components / functions
  - Interactions vehicle / driver / driving environment
  - Connectivity
  - Learning systems

- Need for a comprehensive approach
  - Increasing variety of use cases
    - # automated functions
    - # driving conditions or design domains
    - # triggering + transition conditions

Importance of definitions

- Vehicle's subsystems
  - Driver
  - Automation systems
  - HMI's
  - Vehicle's ECU + components

- Use cases =
  - Operational design domain (= driving environment)
  - Automation functionnalities (= automated manœuvres)
  - Triggering (= activation / desactivation) conditions
  - Driving task-sharing

Horizontal regulation “philosophy” (1)

- **Regulation domains**
  - ***Non use-case specific :***
    - Data recording and sharing, Privacy, Cyber security
    - System safety
    - Perception functions
  - ***Use-case specific :***
    - ***Operation domain***
      - definition
      - recognition
    - ***Driver’s attitude***
      - expections
      - monitoring
    - ***Automation functions***
      - Elementary functions
      - Triggering (activation / desactivation) conditions
      - Transition procedures
      - Emergency and minimal risk manoeuvers
      - Logigram of manoeuvers

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Ministère de l'Écologie, du Développement durable et de l'Énergie

Horizontal regulation “philosophy” (2)

- Use case description
- Use case criticity analysis → critical situations and events
- Use case requirements =
  - Horizontal
    - Events and situations criticity-independent
      - Perception functions
      - Operation domain recognition
      - HMIs (incl drivers monitoring)
    - Events and situations criticity-dependent
      - Situations and events responses (incl minimal risk manouevres)
  - Vertical
    - Non automatic functions
    - ADAS
  - *NB : articulation horizontal / vertical to be clarified*

Validation approaches and tools (1)

- **Validation approaches' simplistic taxonomy**
  - ***Types (levels) of requirements***
    - Situation and event aknowledgment
    - Response
      - Availability
      - Functional description
      - Required functionnalities
      - Required performance
  - ***Types (levels) of verification***
    - Self declared
    - Evidence-based declared
    - Third party certified
    - Authority tested
  - ***Validation tools***
    - Documentation screeing or analysis
    - Simulations
    - Tests (one driver or multi-drivers)

Validation approaches and tools (2)

- **A possible proportionate framework**

Level of verification / ***Level of criticity***	Self-declaration	Evidence based	Certified	Tested
Criticity level 1	■	■		
Criticity level 2	■	■	■	
Criticity level 3	■		■	
Criticity level 4	■	■	■	
Criticity level 5		■	■	■

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Ministère de l'Écologie, du Développement durable et de l'Énergie

Some references

- 1. ACSF-11-09 - (EC) Commission study on vehicle certification
- 2. AdaptIVe-SP2-v12-DL-D2.1 System Classification
- 3. Villa_Ladenburg_Use_Cases_English_Release
- 4. Pegasus_Validation of assisted and automated driving systems
- 5. Pegasus_Safety assurance based on an objective identification of scenarios
- 6. From development to type approval
- 7. AdaptIVve evaluation methodology for automated vehicles
- 8. Requirements on tools for assessment and validation of assisted and automated driving systems
- 9. Safety Assurance for Highly Automated Driving - The PEGASUS Approach
- 10. AUTONET Prototype validation report and performance analysis
- 11. Assessment of the ISO 26262 Standard, “Road Vehicles – Functional Safety”
- 12. Best Practices for Embedded Software Testing of Safety Compliant Systems – National Instruments
- 13. Certification for Autonomous Driving
- 14. Challenges in applying the ISO 26262 for driver assistance systems
- 15. ISO 26262 in Practice – Resolving Myths with
- 16. Challenges in Autonomous Vehicle Testing and Validation
- 17. Interactive Safety Analysis Framework of Autonomous Intelligent
- 18. Driving to Safety
- 19. A Philosophy for Developing Trust in Self - Driving Cars
- 20. NHTSA guidance + various research reports: