Certification and standardization needs tailored to the needs of automated driving
Content

- Standardisation and certification activities in FP7 Call 10 projects
  - VRA
    - Standardisation and certification activities
    - Concertation meeting
  - Standardisation in C-ACC and platooning
    - AutoNET2030 - COMPANION - iGAME

- Testing and validation: iGAME & PROSPECT projects

- Other standardisation & certification activities
Content

• Standardisation and certification activities in FP7 Call 10 projects
  – VRA
    • Standardisation and certification activities
    • Concertation meeting
  – Standardisation in C-ACC and platooning
    • AutoNET2030 - COMPANION - iGAME

• Testing and validation: iGAME & PROSPECT projects

• Other standardisation & certification activities
VRA in Short

VRA - Vehicle and Road Automation is a support action funded by the European Union to create a collaboration network of experts and stakeholders working on deployment of automated vehicles and its related infrastructure.
Role of VRA as facilitator for collaboration between national and EU-funded activities

Mission
- Identify relevant activities
- Identify common partners
- Propose collaboration
  - What: topics, gaps
  - How: Level of collaboration
  - When: Timeline

06/05/2016
// Objectives of VRA Support Action

Create an active European network of experts on Vehicle and Road Automation and foster cooperation within the Automation WG.

Contribute to EU-US-JPN trilateral WG on road vehicle automation (EC - US DoT - MLIT).

Identify deployment needs for Vehicle and Road Automation. 

VRA-net.eu/wiki


Promote the Research on Vehicle and Road Automation.
# VRA: Hot Topics Discussed in Sub-WGs of the iMF Automation WG

- **Deployment paths (VOLVO):** Viable business models and deployment paths including socio-economic implications.
- **Regulatory issues (ERTICO):** Clarify current regulatory and liability issues among European countries.
- **Road Worthiness Testing (IDIADA):** Identify needs for standardisation, testing, compliance and certification.
- **Connectivity (ICCS):** Identify additional requirement on C-ITS.
- **Digital infrastructure (HERE - ERTICO):** Identify role of digital maps for automation.
- **Human factors (DLR-TRL-LEEDS):** Identify solutions for driver and other road user interactions.
- **Evaluation of benefits (CTL):** List potential direct and indirect benefits of automation.
- **Controls and decisions (DLR):** Identify gaps in current control and decision solutions.
- **Reliability and CyberSecurity (HTG6):** Clarify reliability concerns and make recommendations.

---

Deliverables available at VRA webpage: [vra-net.eu](http://vra-net.eu)
Standardisation and certification

Objectives
- Convene discussion group meetings to agree on the approach towards standardisation and certification
- Lead and contribute to the European position on standardisation and certification of automation and automated vehicles in Europe
- Contribute to the Tri-Lateral meetings US-EU-Japan
- Promote cooperation between R&D projects through concertation
- Issue a position or white paper on the topic at the end of the project

Outputs
- Topic list regarding standardisation and certification needs and main issues
- Open and public deliverables on standardisation and certification
  - D3.3.1 and D3.3.2 published in VRA webpage: vra-net.eu
  - White paper on road automation (within the IMF AWG)
VRA concertation meetings on standardisation and certification

- Organised annually
- Foster cooperation and harmonisation between FP7 call 10 projects
  - Experts from AdaptIVe, COMPANION, iGAME, AutoNET2030 and VRA
  - Invited guests i.e. from DGs, GRRF and other EU projects on automation
  - Identify common topics that could support standardisation activities within SDOs
- First event June 2015
  - List of topics:
    - V2V Standardization (new messages set and interaction (com. protocol)) and Interoperability
    - ADAS/AD based systems
    - Standardization in terms of interaction, use cases, validation and evaluation methodologies
    - State of the art of Homologation → Feedback from UNECE ITS/AD informal group
VRA concertation meetings on standardisation and certification

- First event June 2015
  - Conclusions:
    - EC big interest in connected automation and standardisation as a tool to foster European advantage
      - PROBLEM Long time for deployment → Roadmap for standardization
    - GRRF not comfortable with SAE levels → Focusing on functions
    - V2X message set & Comms: Ongoing cooperation and some different approaches
    - ADAS/AD: Several ISO activities to amend/create/extend existing standards
    - Need to define which topics should be addressed: Prioritize the topics, i.e. discard those that will be addressed by industry

- NEXT EVENT: Specific workshop in parallel to the iGAME project GCDC competition
  - Dates: 30-31 May 2016
  - Venue: Automotive Campus - Helmond
Content

- Standardisation and certification activities in FP7 Call 10 projects
  - VRA
    - Standardisation and certification activities
    - Concertation meeting
      - Standardisation in C-ACC and platooning
        - AutoNET2030 - COMPANION - iGAME

- Testing and validation: iGAME & PROSPECT projects

- Other standardisation & certification activities
Standardisation in Europe - C-ACC & Platooning

- **ETSI TR 103 299 - C-ACC pre-standardization study**
  - Initiated by ETSI with support of C2C-CC.
  - International harmonization via collaboration with
    - SAE TC DSRC
    - ISO TC204 WG15
  - Scope: definition, use cases, requirements, recommendation on technical specification
  - Extend release 1 standards to support C-ACC: CAMs?

- Participant members from COMPANION, AutoNET2030 & iGAME

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Start of work</td>
<td>Start of work</td>
<td>2014-10-16</td>
</tr>
<tr>
<td>2</td>
<td>Early draft</td>
<td>Early draft</td>
<td>2015-06-19</td>
</tr>
<tr>
<td>4</td>
<td>Stable draft</td>
<td>Stable draft</td>
<td>2016-06-17</td>
</tr>
<tr>
<td>6</td>
<td>Final draft for approval</td>
<td>Final draft for approval</td>
<td>2017-02-01</td>
</tr>
<tr>
<td>7</td>
<td>WG approval</td>
<td>WG approval</td>
<td>2017-02-01</td>
</tr>
<tr>
<td>8</td>
<td>TB approval</td>
<td>TB approval</td>
<td>2017-02-01</td>
</tr>
<tr>
<td>8A</td>
<td>Draft receipt by ETSI Secretariat</td>
<td>Draft receipt by ETSI Secretariat</td>
<td>2017-02-15</td>
</tr>
<tr>
<td>12</td>
<td>Publication</td>
<td>Publication</td>
<td>PU 2017-03-15</td>
</tr>
</tbody>
</table>
Standardisation in Europe - C-ACC & Platooning

• Definition:
  – An in-vehicle driving assistance system that adjusts the vehicle speed to keep a desired time gap with preceding vehicle (target vehicle) to improve driving comfort, reduce fuel consumption, improve road capacity, etc.
  – At least a level 1 automated system, and may participate to higher level automation

• Use Cases:
  – Follow the target vehicle at configured target time gap
  – Follow the target vehicle at automatically adjusted target time gap
  – Single lane of C-ACC string with more than three C-ACC vehicles
  – Co-operation of steering control and C-ACC
Standardisation in Europe - C-ACC & Platooning

iGAME approach

• Message set extension for the iGAME scenarios → iCLCM consisting of 43 messages
  – Discussed with AutoNET2030
• These messages can be classified into the following categories:
  – State: including physical parameter, velocity and position of the vehicles.
  – Control: including parameters used for control purpose, i.e. measure the distance from one vehicle to an following object (safety distance)
  – Event-driven: including information about some events happen, such as road works or an emergency vehicle approaching
• Due to very strict safety measures:
  – some messages are transmitted at a higher frequency of 25Hz.
Standardisation Worldwide

- SAE TC DSRC established “Cooperative Vehicle Task Force” for C-ACC and platooning
  - SAE J2945/6 - message sets for platooning and C-ACC
  - ISO TC204 WG14 - Vehicle/Roadway and Control Systems

- PWI 20035 Intelligent Transport Systems - Cooperative Adaptive Cruise Control (C-ACC) - Performance Requirements and Test Procedures
  - Extends the already available ”ISO 15622 Adaptive Cruise Control Systems”
  - Excerpt from scope: classification of the types of C-ACC, performance requirements, state transition diagrams, test procedures, etc.
  - C-ACC does only longitudinal vehicle speed control, uses time gap control strategy similar to ACC and has similar engagement criteria as ACC
Standardisation needs on C-ACC and Platooning (I)

- Common definition of platooning and C-ACC between SDOs
- New facilities layer protocol (or extension of existing ones)
  - Can current developed protocols for C-ITS (CAM and DENM) be used for platooning?
  - Can current message sets for C-ITS be used for platooning?
- Separate frequency channel for C-ACC and platooning (SCH?)
Standardisation needs on C-ACC and Platooning (II)

- Platoon control centralized or distributed?
  - How much control has the leader?
- Separate security solution for the platoon to reduce overhead
  - C-ITS security much overhead and introduce communication delays that can affect string stability
- How to arrange the platoon based on the truck specifications (brakes, load, height...)?
- How to prove that the system-of-systems is safe enough?
  - Functional Safety - Extend ISO 26262
- User acceptance and human machine interface (HMI)
- Legal framework (driver, safety distance) and liability (insurance)
Content

- Standardisation and certification activities in FP7 Call 10 projects
  - VRA
    - Standardisation and certification activities
    - Concertation meeting
  - Standardisation in C-ACC and platooning
    - AutoNET2030 - COMPANION - iGAME

- Testing and validation: iGAME & PROSPECT projects

- Other standardisation & certification activities
Speed up real-life implementation and interoperability of wireless communication based automated driving accomplished by joint development and demonstration!

Development

- Environmental perception, actuation and interaction
- Wireless communication
- Guaranteed safety
- Mixed-traffic operation

Demonstrating it in a multi-vendor challenge: the 2nd GCDC

- Accelerate multi-vendor solutions, based on an interoperable architecture
- Accelerate standardization, verification and validation tools & methods
- Enhance governmental & public awareness

• Specific workshop on safety and performance:
  The aim is to determine minimum performance and safety of the vehicles in order
  - We gave guidelines but we do not know the specifics of the implementation of each of the teams
  - Each team has a different approach → Safety assessment needs to be multibrand

• Vehicle will be qualified as GCDC participant vehicle once ALL SAFETY stations are passed satisfactorily

• Performance tests were organised so that teams and organisation have a view of their current status
Three stage approach for safety validation

- The team will need to pass these three stages:
  1. **Documentation:** The team must provide a technical description of the vehicle characteristics, team details and so on (Stations 1 and 2).
  2. **Inspection:** An inspection matrix with special relevance of the safety elements of the vehicle.
  3. **Dynamic validation:** Proving ground tests to assess vehicle safety performance
    - Manual driving assessment
    - Override of the AD system
    - Longitudinal and lateral control
1. Override
   • The AD mode must be disconnected if the driver acts on:
     – Steering wheel
     – Brakes
     – Accelerator
     – Emergency button
   • The AD mode can only be reactivated manually

2. Longitudinal control
   • Evaluate the ability of the vehicle to maintain the longitudinal control and to brake in an emergency.
   • Target vehicle as defined in Euro NCAP AEB protocol
   • VRU targets optional

3. Lateral control
   • Evaluate the vehicle capacity to stay in a lane
     – with visible road markings
     – And/or following the Benchmark Vehicle (depending of the technology used)
   • The vehicle shall be able to stay in the defined lane under different test conditions.

Tests based in UNECE regulations, Euro NCAP protocols & Spanish license exemption procedure
PROSPECT aims to significantly improve the effectiveness of active VRU safety systems compared to those currently on the market.

- By better understanding and expanding relevant VRU scenarios
- Improving overall system performance
- Proposing new validation methodologies
Validation

- Realistic traffic scenarios:
  - Instrumented vehicle fleet driving in urban roads
  - Real world scenarios to be reproduced in controlled environments.
- Test methodology and test procedures to be proposed to Euro NCAP:
  - Intervention performance tests considering evasive actions.
  - Unjustified system interventions.
- User acceptance tests:
  - Influence of false warnings and incorrect system interventions.
  - Predictive model of acceptance.

Ongoing data acquisition in Barcelona

Scene capture of video: Barcelona_44

Map: Carrer de Petx, 13, 08001 Barcelona

Pedestrian relative position

TTC
Content

• Standardisation and certification activities in FP7 Call 10 projects
  – VRA
    • Standardisation and certification activities
    • Concertation meeting
  – Standardisation in C-ACC and platooning
    • AutoNET2030 - COMPANION - iGAME

• Testing and validation: iGAME & PROSPECT projects

• Other standardisation & certification activities
//Other standardisation activities

Standardisation and regulation

• Amsterdam declaration (last week)
  – Support from member states and industry on standardisation and regulation

• ISO working groups
  – ISO 26262
    • Extensions suggested by some projects (iGAME & COMPANION)
    • Extensions under work (cybersecurity, failsafe operation, etc...)
  – Other working groups on HMI, ergonomics, ADDR, etc..
  – ISO/TC 22 & ISO/TC 204 projects:
    • Divided highway assist systems (DHAS) - Functional/ operational requirements and test procedures”
    • Partially Automated Lane Change Systems (PALS) - Functional/operational requirements and test procedures
    • Traffic Jam Assist Systems (TJAS)

• UNECE WP.29 ITS/AD working group progress on regulation
• Other non-SDO actors: Openautodrive forum (ADASIS, TISA, NDS, Sensoris, etc...)
Thank you.

Álvaro Arrúe
Project Manager
Connected & automated driving
Alvaro.arrue@idiada.com

Athens, Greece
21-22 APRIL 2016

Technical Workshop