

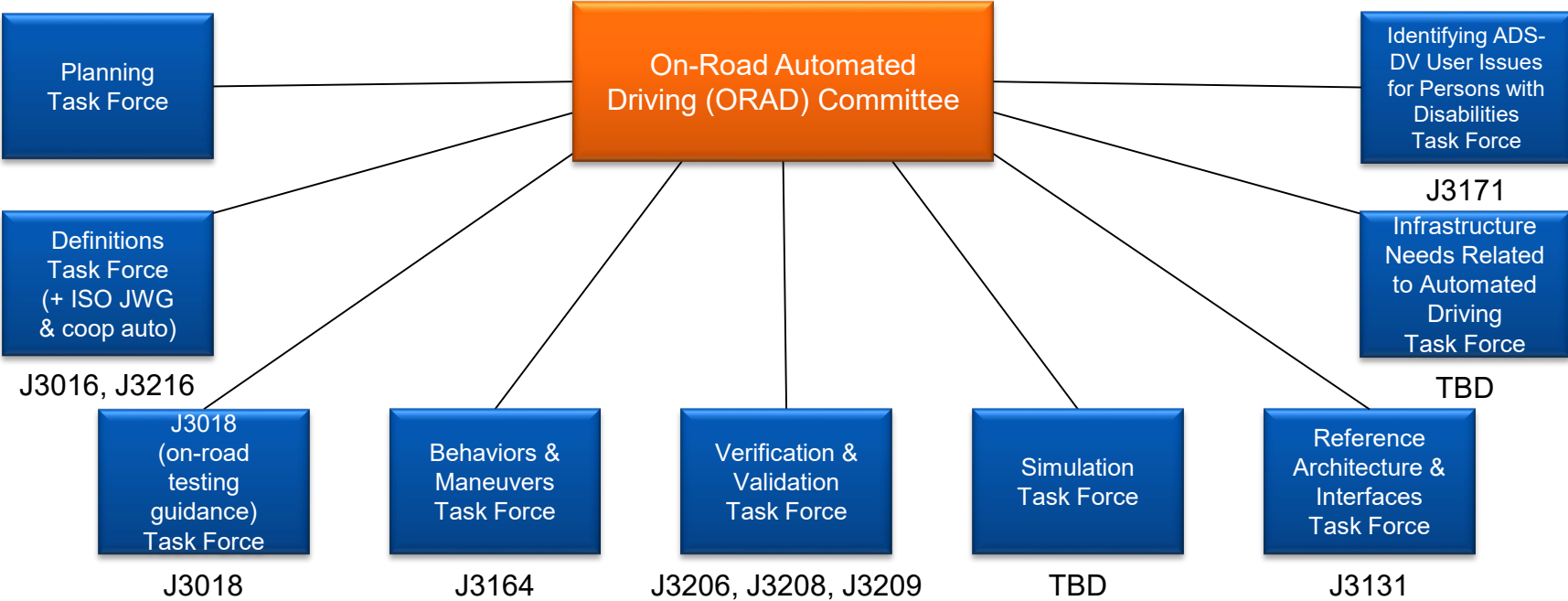
SAE INTERNATIONAL

OVERVIEW OF THE SAE ON-ROAD AUTOMATED DRIVING (ORAD) COMMITTEE ACTIVITIES

Andrew Smart
October 24, 2019



Committee Structure



Proposed Task Forces based upon industry requirements

J3016

- Taxonomy of automation levels and definitions of terms
- 2014 – Information Report
- 2016 – Recommended Practice
- 2018 – Recommended Practice
- Added several new terms, corrected errors, clarified misunderstood concepts
- Ballot passed with minor comments, to be issued shortly

Joint Working Group

- Agreement in 2017 for JWG rules and procedures
- Issue joint documents SAE J3016 / ISO 22736
- “Global harmonization”
- Currently meeting in Singapore



ORAD



TC204/WG14

J3016 Levels of Driving Automation



SAE J3016™ LEVELS OF DRIVING AUTOMATION

	SAE INTERNATIONAL LEVEL 0	SAE INTERNATIONAL LEVEL 1	SAE INTERNATIONAL LEVEL 2	SAE INTERNATIONAL LEVEL 3	SAE INTERNATIONAL LEVEL 4	SAE INTERNATIONAL LEVEL 5
What does the human in the driver's seat have to do?	You <u>are</u> driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You are <u>not</u> driving when these automated driving features are engaged – even if you are seated in “the driver’s seat”		
	You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests, you must drive	These automated driving features will not require you to take over driving	
What do these features do?	These are driver support features			These are automated driving features		
	These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/acceleration support to the driver	These features provide steering AND brake/acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met	This feature can drive the vehicle under all conditions	
Example Features	<ul style="list-style-type: none"> • automatic emergency braking • blind spot warning • lane departure warning 	<ul style="list-style-type: none"> • lane centering OR • adaptive cruise control 	<ul style="list-style-type: none"> • lane centering AND • adaptive cruise control at the same time 	<ul style="list-style-type: none"> • traffic jam chauffeur 	<ul style="list-style-type: none"> • local driverless taxi • pedals/steering wheel may or may not be installed 	<ul style="list-style-type: none"> • same as level 4, but feature can drive everywhere in all conditions

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For a more complete description, please download a free copy of SAE J3016: https://www.sae.org/standards/content/j3016_201806/

J3216

- Taxonomy of cooperative automation and definitions of terms working with FHWA
- Progress continues on defining terms related to types of communication, including informational, intent-sharing, agreement-seeking, and defining participants and devices, including road users and road operators.

J3018

- Guidance for on-road testing of prototype systems
- Applies to levels 3, 4, and 5
- 2015 – Information Report
- 2019 – Information Report, now published
- 2020 – Recommended Practice



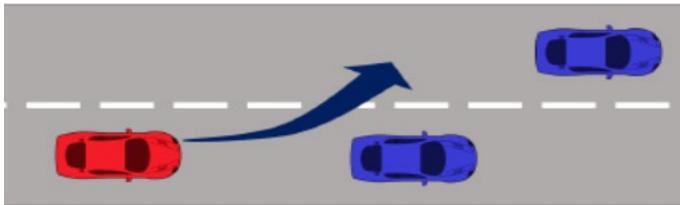
Key Updates

- Background material from 2015 is no longer needed
- Provide more concise information
- Update terms from J3016
- Identify several types of test drivers (based on “early stage” vs. “late-stage” prototype vehicle)
- Classroom instruction, test track training, on-road training, workload management

Behaviors & Maneuvers Task Force

J3164

- Provide definitions, taxonomies, and preliminary best practices for maneuvers and behaviors
- Identifying scenarios and circumstances for achieving a MRC
- Applies to levels 3, 4, & 5
- New Information Report in development



Preliminary Development

- Literature review of behavioral competencies
- Draft of fundamental definitions
- Consider aspects of human behavior that could be incorporated in document
- Generating behavior taxonomy based on:
 - ✓ Ontology of maneuvers
 - ✓ Ontology of operational design domain
 - ✓ Ontology of object and event detection and response

J3092

- Provide definitions, information, best practices, and testing methodologies to support V&V
- Applies to levels 3, 4, & 5
- New Information Report in development

J3206

- Safety principles
- New Information Report in development

Current & Future Development

- Literature review of V&V entities and activities



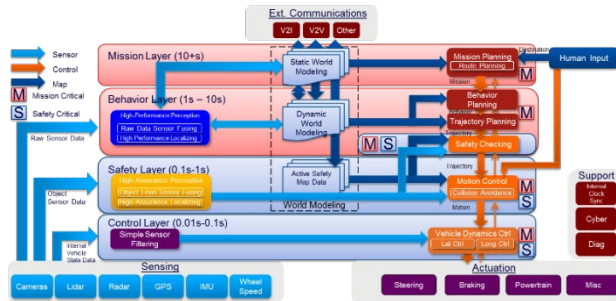
OpenSCENARIO

- Reviewing published safety principles
 - ✓ CAMP Automated Vehicle Research
 - ✓ Intel Responsibility Sensitive Safety
- Measuring conformance to safety principles
- Guidance on using test methodologies
- Guidance on interpreting test results

Reference Architecture & Interfaces Task Force

J3131

- Provide terms and definitions for automated driving software architecture
- Applies to levels 3, 4, & 5
- Currently in development



Content

- Builds upon National Institute of Standards and Technology material
- Enable developers to have common understandings in conversation
- Schematic architecture diagram is only for reference purposes
 - ✓ Does not dictate how an architecture is configured
 - ✓ Does not impose design requirements

Infrastructure Needs Related to Automated Driving Task Force

Scope & Purpose

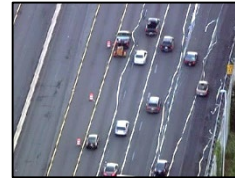
- Develop roadway infrastructure information to support automated technologies while continuing to support human driver needs
- Applies to all automation levels
- Diverse participation
 - ✓ Infrastructure organizations
 - ✓ Automotive industry
 - ✓ Academia

Current Activities

- Interaction with Behaviors & Maneuvers TF
 - ✓ Crosscheck ontology of ODD
- Drafting survey to gather information from stakeholders regarding infrastructure needs
 - ✓ Preliminary list of questions created
 - ✓ Benchmarking SAE cybersecurity survey



Road surface



Lane marking



“3D” crosswalk (Iceland)

Identifying ADS-DV User Issues for Persons with Disabilities TF

J3171

- Gather and develop information on issues for a specific population of users
- Limited to ride sourcing scenarios
- Ingress/egress issues are beyond the scope of this document
- Applies to ADS-DV (see J3016)
- New Information Report
 - ✓ Ballot closed 10.23.19

Activities & Content

- Reviewed existing US driver's license requirements
- Conducted interviews with stakeholders
- Performed literature review
- Universal design principles and guidance for user interfaces



Simulation Task Force

- Recently established based upon increasing importance and use of simulations
- Large interest shown
- Developing scope and specific deliverables
- Need for simulation verification



Current TF Proposals

- AV Test Site Community of Practice
 - Developing scope, objectives and outputs with AV Test site community
- Mapping TF

Contact Information

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