

Dubai's Code of Practice for Self Driving Vehicles



October 16, 2019
Dubai World Congress
for Self-Driving Transport

Agenda

Introduction

- Dubai and RTA SDV Initiative
- The Purpose of the SDV Code of Practice
- Management and Execution Process

SDV Trial Process & Application Requirements

- Trials Execution Plan
- Traffic Management Plan
- Safety Management Plan
- Trial Requirements

SDV Testing Process

- SDV Testing Process & Requirements
- SDV Testing Stages

Sample Forms



**Rod
Schebesch**

Stantec

Senior Vice
President and
Transportation
Sector Lead



**Qais Abdulla
Al Dhalai**

RTA

Deputy Director
Vehicles Licensing
Department &
Smart Vehicles
Manager



**Dr. Hoda
Alkhzaimi**

NYU Abu Dhabi

Director of Center
of Cyber Security,



**Steve
Severance**

Masdar City

Head of Program
Management and
Investments,



Daniel Baxter

Stantec

ITS Roads &
Vehicles Practice
Lead



Dr. Rula Sadik

Stantec

MENA Regional
Director
Management
Consulting

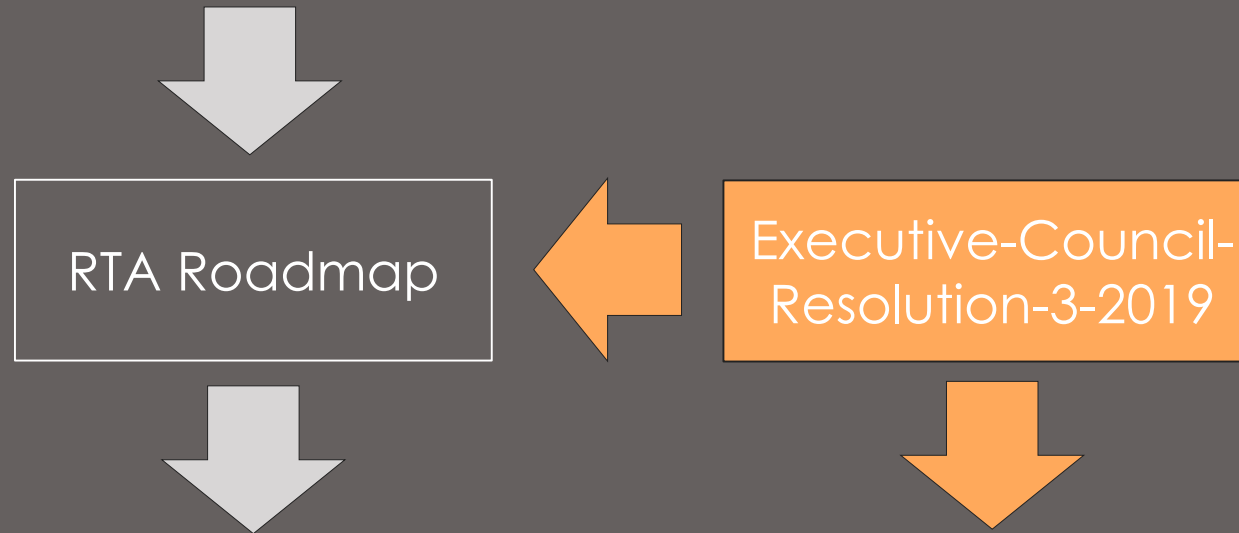
Dubai's Code of Practice for Self Driving Vehicles

Introduction

- Dubai and RTA Self Driving (SD) Initiative
- The purpose of the SDV Code of Practice
- Management and Execution Process
- Exemptions and Constraints



Vision: 25% of the total trips in Dubai to self-driving mode by 2030



Key Enabler: establishment of a Code of Practice (COP) for testing of self-driving vehicles (SDV) in Dubai

SDT Deployment in Dubai

- Safer Travel
- Driver/Passenger Happiness
- Sustainable (SDT) Ecosystem
- Beneficial Impacts

self-Driving Transport
SDT

- Research
- Development
- Prototyping
- System Engineering

DUBAI CODE OF PRACTICE

Risks

Public Acceptance;
Patch Work Regulations;
Vehicle & Technology Failure; Legal,
Insurances, & Regulatory Issues

Two distinctive types of trials/ tests:

TRIALS: requested by external entities - RTA will act as a facilitator/enabler of trials

TESTING: initiated by RTA – for the comprehensive testing of a specific technology



Following the successful completion of a trial, RTA will issue a Trial Completion Certificate (TCC) to the SDV external entity



What is a Trial?

- A **Trial** is a vendor demonstration of the safe use of an SDV technology in conformance with a stated Operational Design Domain (ODD). RTA observes the trial.

What is a Test?

- A **Test** is defined as a proof of some aspect of the SDV trial not yet demonstrated to be safe or conforming.

Observers

Closed or Open Trial Staging
Law Enforcement Cooperation
Public/Media Relations
Participation in Trial
Testing Requirements (if any)

SDV Trial in Dubai

Approved Application
SDV Trial Execution Plan (STEP)
Traffic Management Plan
Safety Management Plan
Defined ODD

SDV Supplier



- Only SAE levels 3, 4 and 5 applications will be accepted in this program.
- The SDV may be required to meet GSO's 42 "Motor Vehicle – General Requirements." However, for low-speed self-driving vehicles (e.g. shuttles) they may only be required to pass an RTA assessment
- Virtual network-wide traffic impact simulation may be required for some vehicle trials. However, the majority of vehicle trials will be exempt from this requirement
- Most large fleet vehicle trials will require some level of network-wide traffic impact simulation
- SDV trials on non-public roads/ transportation facilities (e.g. privately owned) may be exempt
- Application fees are anticipated, however fees may be reduced or waived for SDV trials that contribute directly to RTA program goals

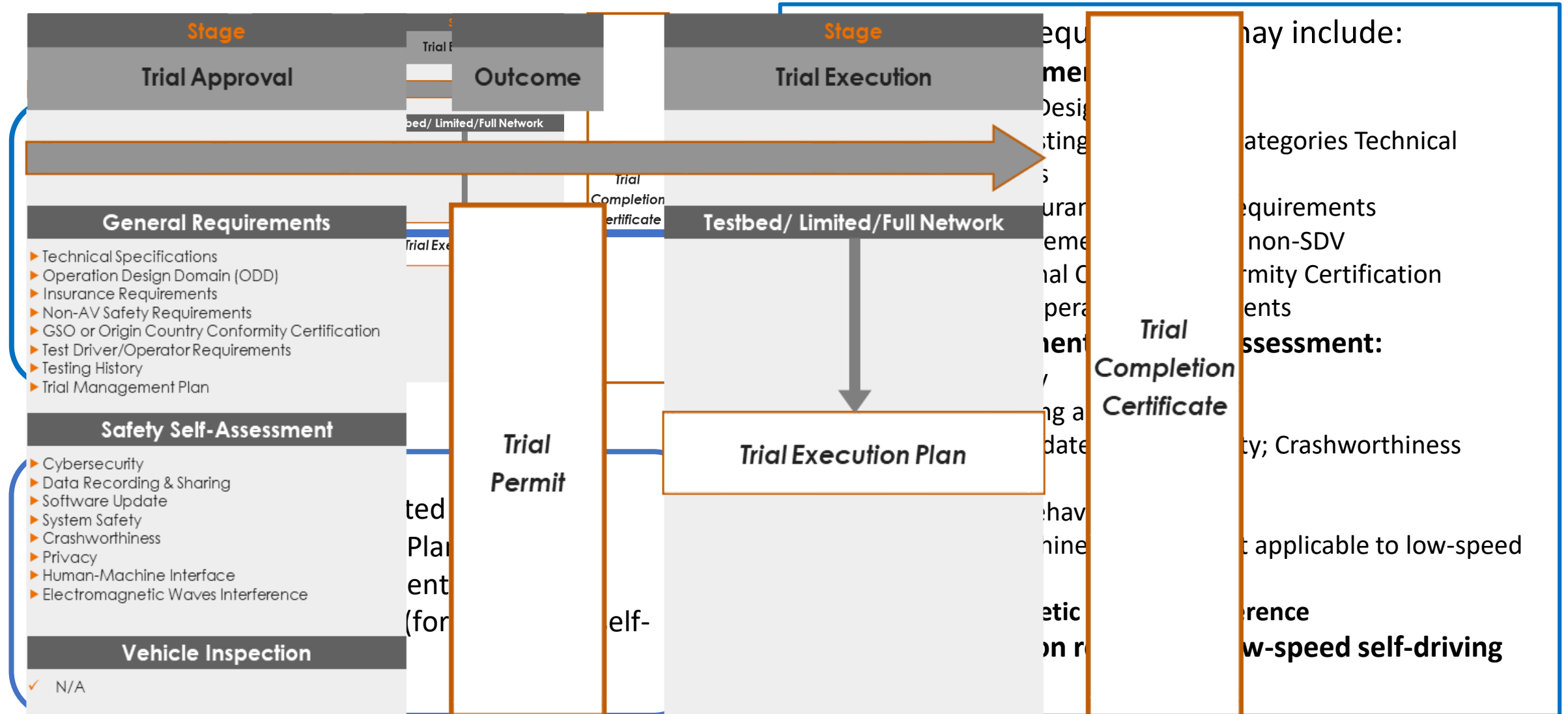
SDV Trial Process & Application Requirements

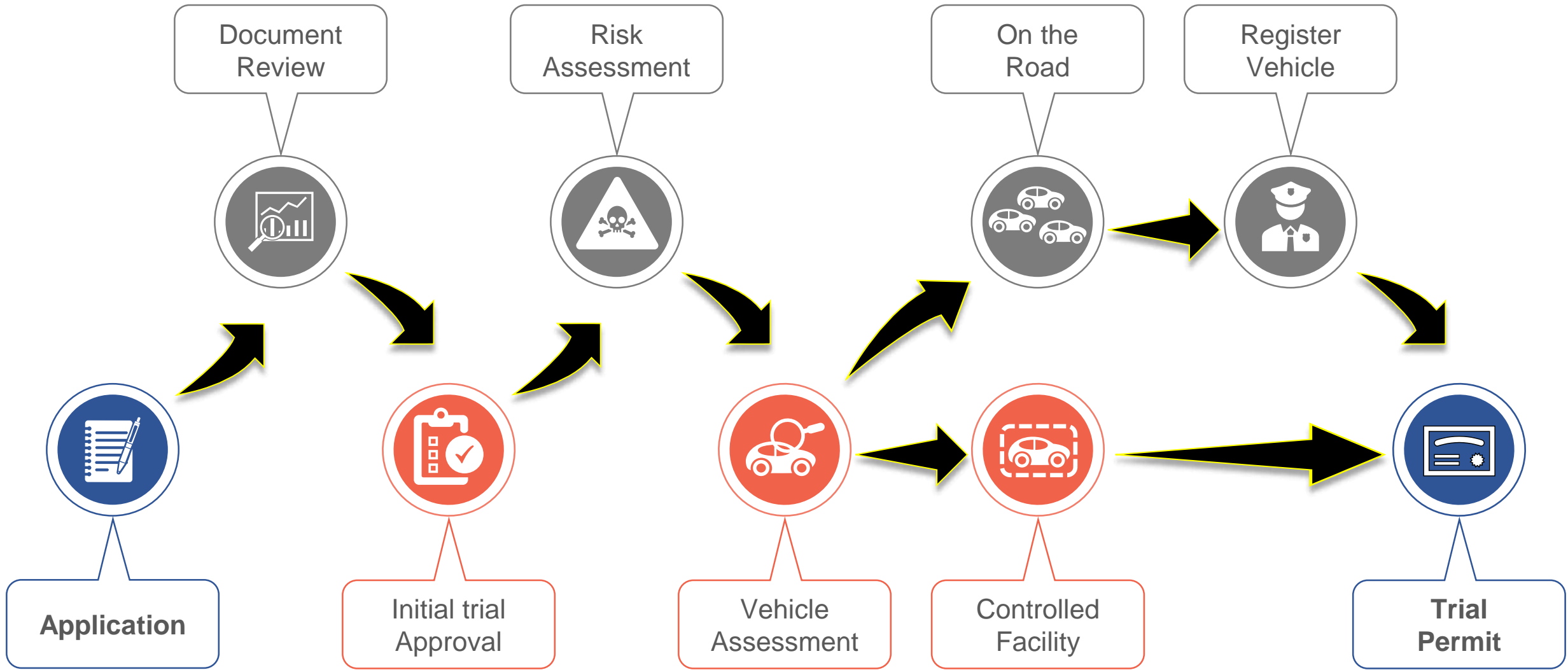
- Trials Execution Plan
- Traffic Management Plan
- Safety Management Plan
- Trialing Requirements

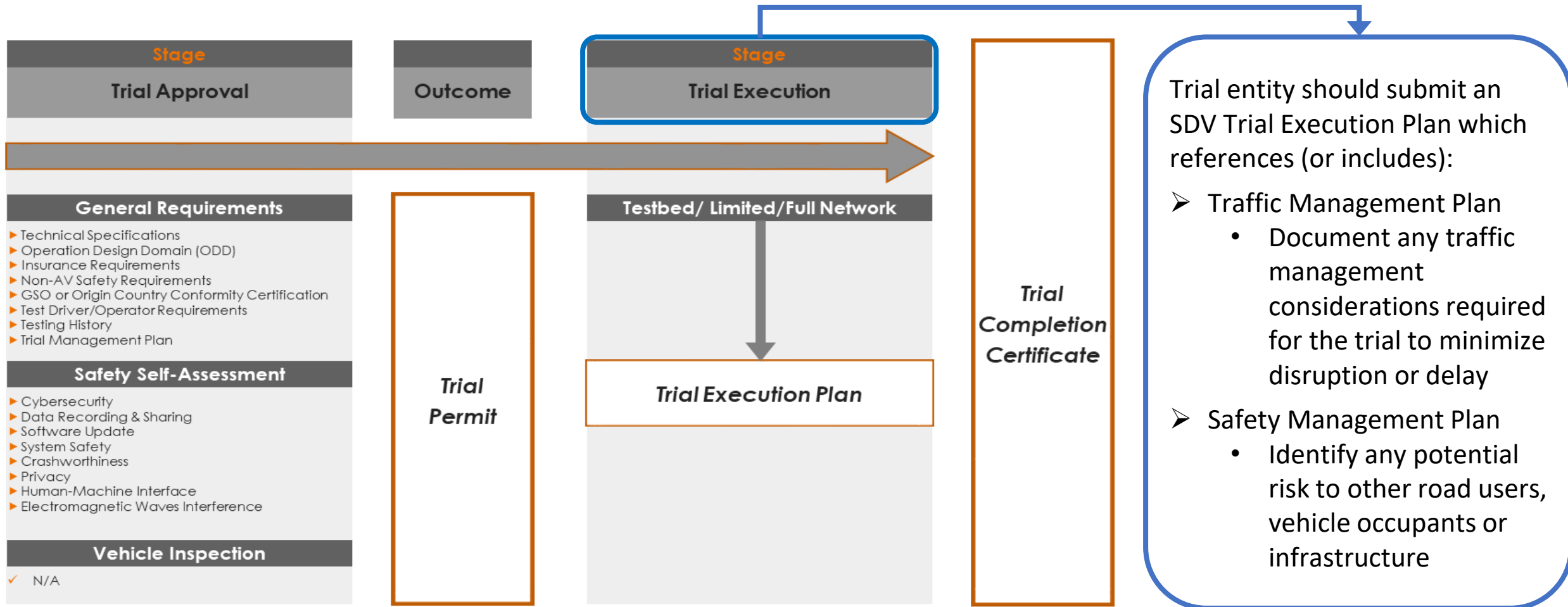


d=2' 8"
a/n

d=2' 8"
a/n







Trial Execution Plan Elements

Traffic
Management
Plan

Safety
Management
Plan

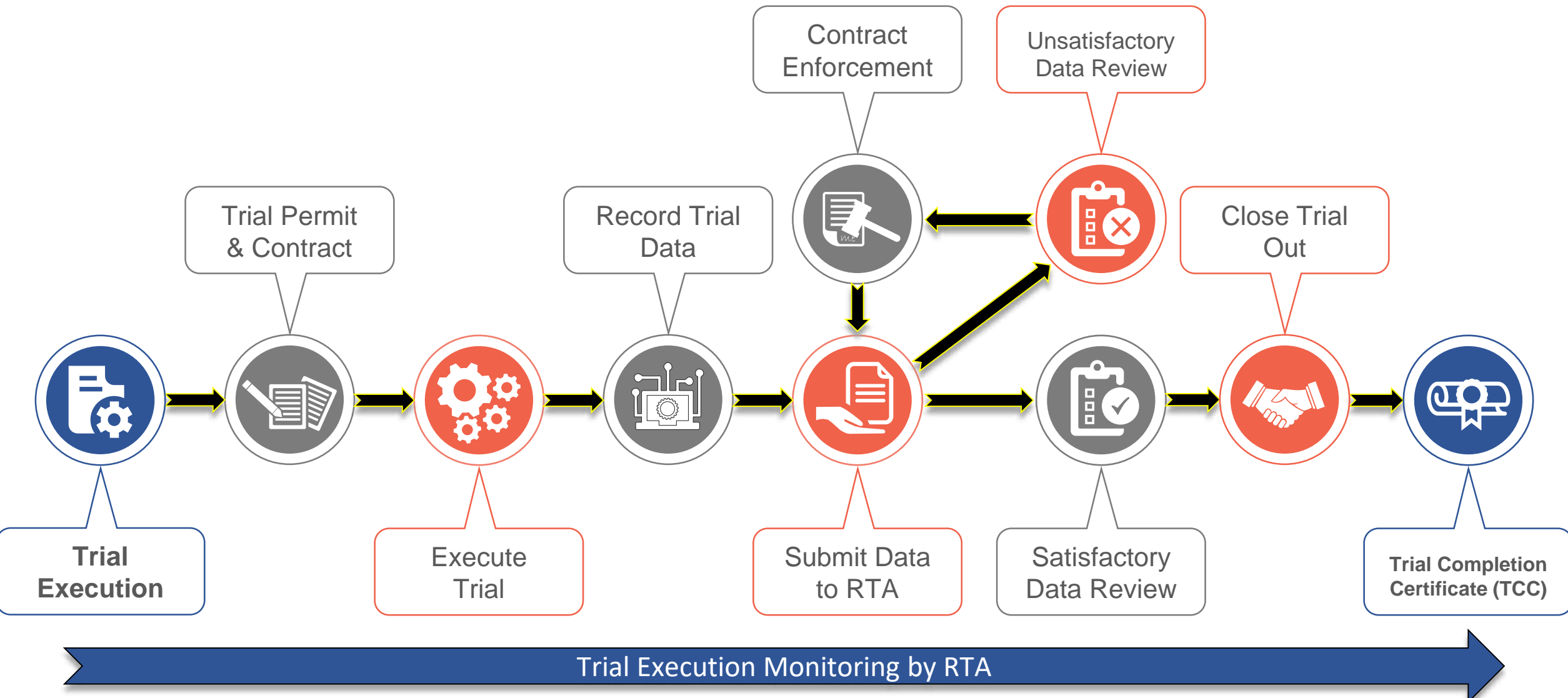
Trial Execution
Schedule

Personnel
Involved in
the Trial

Trial Vehicles

Tests to be
undertaken

Special
Requirements





Road/ lane closure

Police escort requirements

Traffic/ directional signs

New lane marking

Impact on other road users

Traffic management duration and time of day

Stop-start conditions and traffic congestion

Unexpected route detours

Faded marking, flooding and sand on the road

Tram-road interfaces

Cybersecurity and system vulnerability

System malfunction and fail-safe features

Vehicle Risk Assessment

Incident Management and Emergency Contacts

Site Requirements

Risks to the vehicle occupants

Risks to other road users

Risks to the trial location infrastructure

Resilience and recovery functions

Automated and human-controlled driving transition

Driver and insurance requirements Compliance

Electromagnetic Wave Interference



**SAFETY
FIRST**



- Licensure Requirements
- Driver/Operator Requirements
- Driver Qualifications
- Driver/Operator Training
- Duration of Permits or Recertification
- Requirements for Human Interaction with SDV



- Provision of Data/Information for Serious Incidents
 - Data on all crashes including those resulting in a personal injury (fatal or otherwise)
- Provision of Data/Information for Other Incidents
 - Data on minor incident
- SDV Operation Report
 - Periodic reports (quarterly or every 6 months)
- Commercially Sensitive Information
 - All information provided to RTA by the SDV entities will be securely stored and used only in ways described in the permit



- Evidence of insurance, self-driving vehicle manufacturer or technology developer surety bond, or certificate of self-insurance will be required
- Public open road trials coverage is estimated to be up to twenty million AED (AED 20,000,000).

SDV Testing Process

- SDV Testing Framework
- SDV Testing Stages



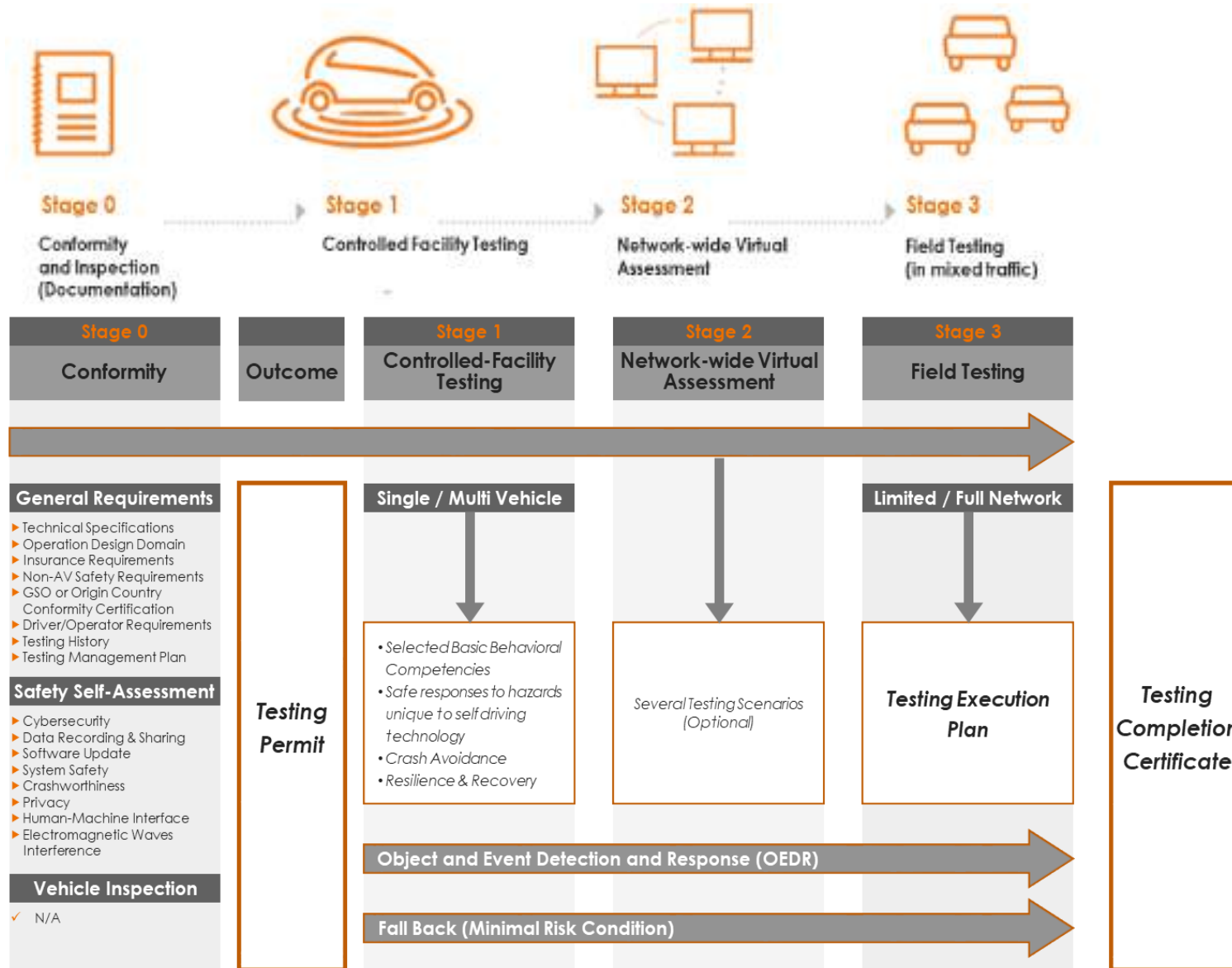
The RTA philosophy toward SDV testing:



To demonstrate safe trials on Dubai roads, verification of provider claims is required, and in some cases testing will be required in both a controlled test facility and subsequently in the mixed traffic network of roads.

Requirements

- When trial does not fully demonstrate safe operation or conformity
- Authorization Requirements for the Testing Entity
- Authorization Requirements for the SDV
- Authorization Requirements for the Driver/Operator of the SDV
- Testing Permits and Procedures



Stage 0: Conformity and Inspection

- General Requirements
 - ODD, history of testing and testing categories,...
- Safety Self-Assessment
 - Testing entities followed acceptable best practices
- Vehicle Inspections (Low-Speed Self-Driving Vehicles)
 - Battery Power and Range, Tire Conditions,...
- Maturity Assessment Process and Approval
 - Mature, developing or rejection

Stage 1: Controlled Facility Testing

- Testing with a single vehicle and/or multiple vehicles
- Report to RTA to advance through this stage

Stage 2: Network-Wide Virtual Assessment

- Optional, not required
- Evaluating the impacts of introducing SDVs on the wider road network in Dubai
- Can be done with microsimulation

Stage 3: Field Testing

- Submission of a comprehensive Stage 3 test plan for RTA's review
- Testing plan should correspond to :
 - SDV type,
 - SDV maturity classification,
 - SDV ODD.
- Provide a stage 3 performance report to RTA



Dubai's Code of Practice for Self Driving Vehicles

Sample Forms

- Document Checklist
- Application Form



SDV Application Checklist

Self-Driving Vehicles Testing Application Checklist

Section 1 - Forms Required		√
Application for Manufacturer Testing Permit		o
Evidence of insurance, self-driving vehicle manufacturer or technology developer surety bond, or certificate of self-insurance in the amount of twenty million AED (AED 20,000,000)		o
Evidence of minimum training and license requirements for driver/operator		o
Application fee of AED 10,000		o
Section 2 - Required Documents		√
Operational Design Domain		o
Testing History and Testing Categories		o
Technical Specifications		o
GSO non-AV Safety Requirements Certificate (Article 42)		o
GSO AV or Country of Origin AV Safety Standards Certification		o
Section 3 - Safety Self-Assessment (Mandatory)		√
Cybersecurity		o
Data Recording & Sharing		o
Software Update		o
System Safety		o
Crashworthiness		o
Privacy		o
Human Machine Interface		o
Electromagnetic Waves Interface		o
Section 4 - Vehicle Inspection for Low-Speed Self-Driving (max operating speed 25km/h) (Optional)		√
Climate Control		o
Passenger Security and Safety		o
Battery Power and Range		o
Tires Conditions		o
AV Lights and Flasher		o
Entrance, Exit, and Emergency		o
Section 5 - IMPORTANT INFORMATION		
Incomplete applications will be returned		
Keep a copy of all documents for your records		
Submit the above required forms and documents to:		
RTA Vehicle Licensing		
PO BOX ...		
Dubai, UAE		
Application questions may be directed to ... (add specific website URL)		

Application for SDV Testing Permit

Self-Driving Vehicles (SDV) Testing Application for Manufacturer or SDV Technology Developer's Testing Permit

APPLICATION TYPE:

Original (AED 10,000)	<input type="checkbox"/>
Renewal (AED 10,000)	<input type="checkbox"/>
Modification (AED 5,000)	<input type="checkbox"/>

INSTRUCTIONS:

Please complete online or print and complete by hand using black or blue ink.

Submit completed and signed form and fees to: [RTA's Vehicle Licensing, P.O.BOX.](#)

Section 1 - Self-Driving Vehicle Testing Entity Information

Name of Manufacturer or Technology Developer	Entity Number
Business Name	
Mailing Address	Telephone Number
Mailing Address (Street, City, State, Country, Zip Code)	
Test No.	

Section 2 - Vehicle Equipped for Testing (list all vehicles in fleet)

Number of Vehicles in Fleet for Testing					
Vehicle Number	State Issued	VIN	Year	Make	Model
Vehicle Number	State Issued	VIN	Year	Make	Model
Vehicle Number	State Issued	VIN	Year	Make	Model
Vehicle Number	State Issued	VIN	Year	Make	Model

Section 3 - Self-Driving Vehicle Driver/Operator

Number of Self-Driving Vehicle Drivers/Operators				
Full Name (Last, First)	Driver License Number	State Issued	Training Type	Training Completion Date
Full Name (Last, First)	Driver License Number	State Issued	Training Type	Training Completion Date
Full Name (Last, First)	Driver License Number	State Issued	Training Type	Training Completion Date

Application for SDV Testing Permit - Continued

Self-Driving Vehicles (SDV) Testing Application for Manufacturer or SDV Technology Developer's Testing Permit				
Full Name (Last, First)	Driver License Number	State Issued	Training Type	Training Completion Date
Section 4 - Applicant Acknowledgement				
<p>1. The self-driving vehicle is being operated solely by drivers/operators designated by the manufacturer and is listed in Section 3 of this form.</p> <p>2. The driver will be seated in the driver's seat at all time and monitors the safe operation of SDV constantly.</p> <p>3. The driver is responsible and able to take over the operation of SDV immediately in the event of a failure or other emergencies.</p> <p>4. The applicant for SDV testing will keep records of all driver, vehicle, and test data and share them with RTA.</p>				<p>INITIALS</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p>
Section 5 - Certification				
<p>I certify (or declare) that all the information provided on this application is accurate and correct. I certify that I am the authorized administrator of the program for the above name employee</p>				<p>Signature</p>

SDV Stage 3 Testing Form Templates

AV's Testing					
Stage 03					
AV Type		Test No.			
Manufacturer	Model	License Plate No.			
Place		Total Mileage			
Testing Entity		Date and Time			
Observer's Name		Signature			
Inputs					
Test plan attached		<input type="checkbox"/>	Passed from previous stage		<input type="checkbox"/>
Maturity Level	Mature	<input type="radio"/>	Developing		<input type="radio"/>
Mapping plan attached		<input type="checkbox"/>	Testing Duration Determined		<input type="checkbox"/>
Maturity Level	Mature	<input type="radio"/>	Safety Plan Attached		<input type="checkbox"/>
	Developing	<input type="radio"/>			
Description					
Test Scenario	Test Description	Passed			Remarks/Comments
		Yes	No	Cond.	
Result					
Lessons Learned					

Dubai's Code of Practice for Self Driving Vehicles

And Now...we need your ideas!



- Questions for discussion will be posed by the Moderator, Rod Schebesch.
- An open mike is provided for audience participation, discussion and comment
- Each question will be answered by the audience members through web site.
- When Poll is Active, ...





Open your smartphone browser and go to
live.voxvote.com

and enter the following code

PIN: 26133

Alternative: Scan this QR-code and you are
immediately logged in



Alternative: Download the VoxVote app from  

Next Steps

- Please contact Stantec or RTA to receive Draft COP documents and subsequent updates
- You may submit written comments on today's presentation to Stantec or RTA no later than December 1, 2020
- All comments will be considered in developing the COP

هيئة الطرق والمواصلات
ROADS & TRANSPORT AUTHORITY



Dr. Ismail Zohdy
Ismail.Zohdy@rta.ae

Eng. Mohamed Zanaty
Mohamed.Zanaty@stantec.com

Eng. Sherief Adam
Sherief.Adam@rta.ae

Eng. Hasan Nasreddine
Hasan.Nasreddine@stantec.com

Questions