Towards an integrated approach to testing automated driving on public roads

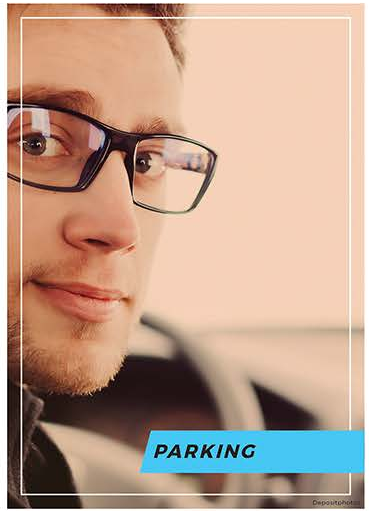
ITS World Congress 2019, Singapore

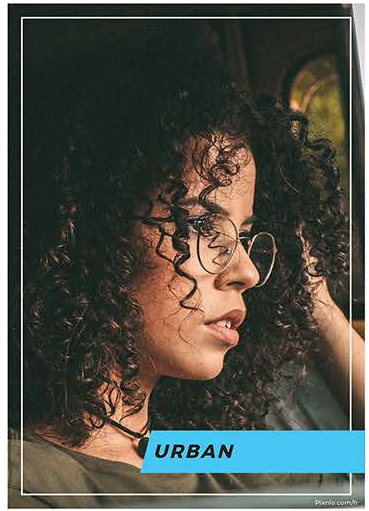
Aria Etemad
Volkswagen Group Innovation


L3Pilot
Driving Automation
1000
drivers
100
cars
10
countries

L3Pilot
Driving Automation

Applications





1,000 drivers **100** cars **10** European countries

Pilot across Europe

COUNTRY / REGION / PARTNER	
BE / Brussels	Toyota
DE / Aachen	Ford / ika
DE / Munich	BMW
DE / Offenbach	Honda
DE / Wolfsburg	VW
DE / Ingolstadt	Audi
FR / Paris and other regions	REN / PSA
IT / Turin and Trento	CRF
LU / *NL*	Aptiv
SE / Gothenburg	Volvo
UK / Coventry	JLR
+ Cross-border activities	

Facts

Supported by eucar EUROPEAN COUNCIL FOR AUTOMOTIVE R&D

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723051.

€68 million BUDGET

48 months DURATION, starting in September 2017

€36 million FUNDING

34 PARTNERS, among them OEMs, suppliers, research, SMEs, insurers, authorities and user groups

12 COUNTRIES involved: Austria, Belgium, France, Finland, Germany, Greece, Italy, Netherlands, Norway, Sweden, Switzerland, UK

Partners

OEMs

VOLKSWAGEN AKTIENGESELLSCHAFT

BMW GROUP

FCA FIAT CHRYSLER AUTOMOBILES

DAIMLER

GROUPE RENAULT

HONDA The Power of Dreams

TOYOTA

Suppliers

APTIV

veoneer

SMEs

Researchers

Insurers

Allianz

Swiss Re

Authority

RDW

User group

L3Pilot Driving Automation

Objectives

1,000 drivers 100 cars 10 European countries Piloting Automated Driving on European Roads.

Methodology

Data

Evaluation

Fleet

Piloting

Code of Practice

PREPARE DRIVE EVALUATE

DEPLOY - Europe-wide Piloting Environment - User Studies - Business Studies


Traffic Jam


Motorway


Parking


Urban

L3Pilot Driving Automation

Objectives

1,000 drivers 100 cars 10 European countries Piloting Automated Driving on European Roads.

Methodology

Data

Evaluation

Fleet

Piloting

Code of Practice

PREPARE

DRIVE

EVALUATE

DEPLOY - Europe-wide Piloting Environment - User Studies - Business Studies

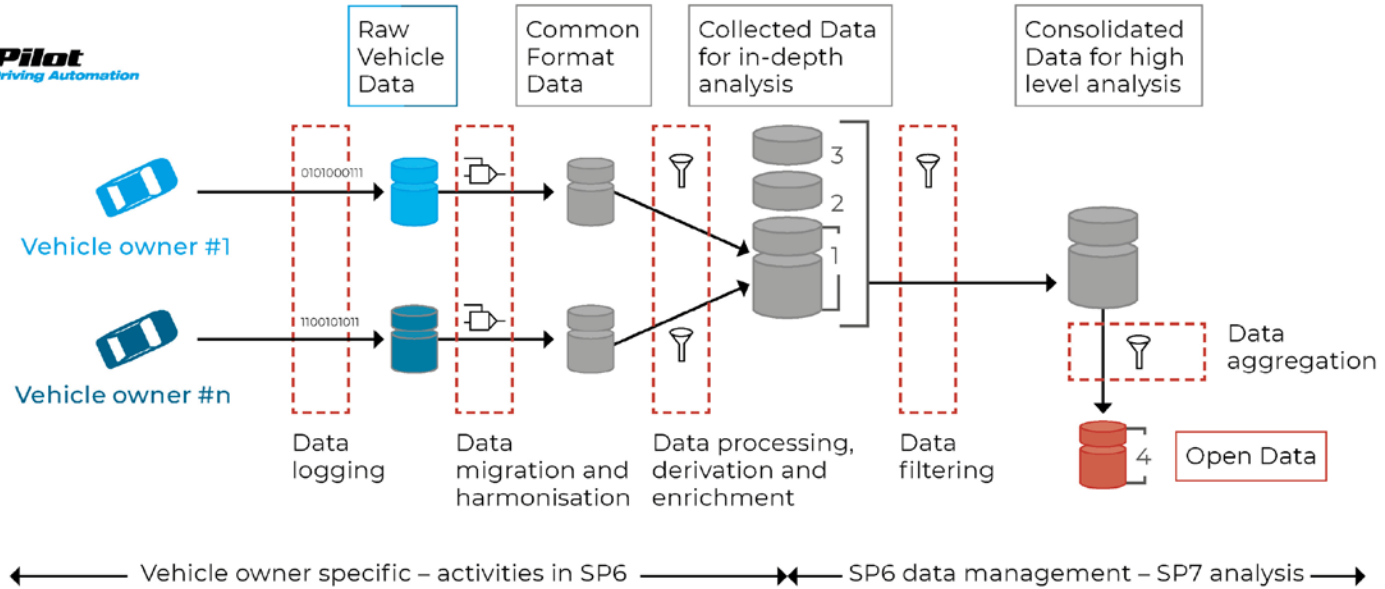
Traffic Jam

Motorway

Parking

Urban

L3Pilot Data Flow



Categories of data:

1 Derived Vehicle Data (CAN, GPS, PIs, video, and/or video annotations)
2 Subjective Data (interviews, questionnaires, simulator studies)
3 External Data (weather, map, infrastructure, other traffic participants, ...)
4 Open Data (aggregated data)

Pseudonymization Process

Confidentiality

Data Detail

Personal information

First name	Last name	Driver ID	SHA256(Driver ID + salt)	Age	Gender	Nationality	…
David	Davidson	001	1a064a72…1afe5341	26	Male	Earth	…
Stan	Stanson	002	b2452fbb…02753647	38	Male	Mars	…
Nelly	Nelson	003	339b0d9a…212960be	29	Female	Venus	…

Master table of participants which only OEM has access to

SHA256 driverID is only link between these

H5 file	Start timestamp	End timestamp	Driver ID	Trip ID (SHA256 of start timestamp + salt)	var
2019-04-23.h5	1530364592574	1530364652474	1a064a72	691ea24d…b79b5524	…
2019-04-24.h5	1530364651438	1530364677843	b2452fbb	4a8c43dd…1d228db6	…
2019-04-25.h5	1530364651778	1530364651234	339b0d9a	dc0d005d…4e26967a	…

H5 data for selected partner

Consolidated database (Consortium has access)

Trip ID	Start timestamp	End timestamp	Max/min/avg var
691ea24d	1530364592574	1530364652474	…
4a8c43dd	1530364651438	1530364677843	…
dc0d005d	1530364651778	1530364651234	…

L3Pilot Common Data Format (L3Pilot CDF)

- In order to facilitate the analysis of data in L3Pilot, a common data format was developed based on experience from previous projects (AdaptIVe, euroFOT, UDrive, etc.)

- The CDF is **made available to the public** via Github: https://github.com/l3pilot/l3pilot-cdf
  - Everyone is invited to use the format and contribute to it
  - Use open source tools and formats to facilitate use in other projects

- Detailed information on the format can be found on http://indexsmart.mirasmart.com/26esv/PDFfiles/26ESV-000043.pdf (public access)

L3Pilot Driving Automation

Objectives

1,000 drivers 100 cars 10 European countries Piloting Automated Driving on European Roads.

Methodology

Data

Evaluation

Fleet

Piloting

Code of Practice

PREPARE → DRIVE → EVALUATE

DEPLOY — Europe-wide Piloting Environment - User Studies - Business Studies

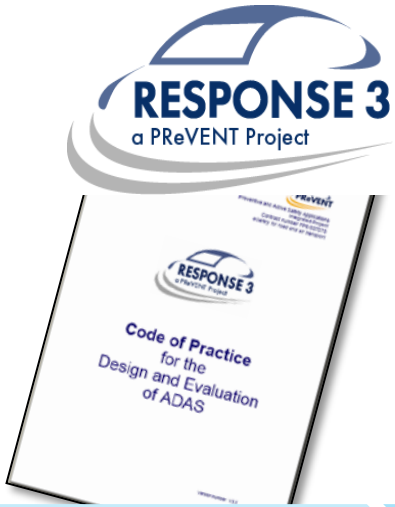

Traffic Jam

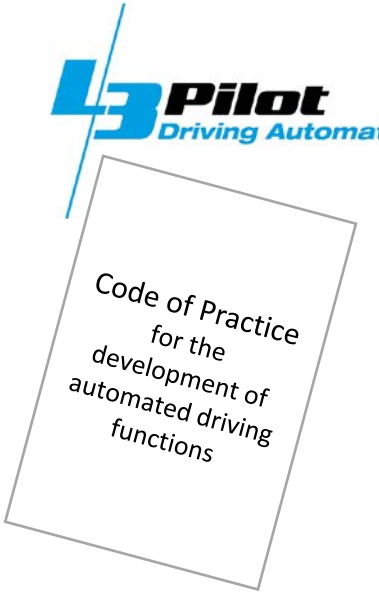

Motorway


Parking


Urban

History of the Code of Practice (CoP)





PReVENT:
RESPONSE 3 „CoP ADAS“

2008 2014

AdaptIVe:
Response 4 „Legal aspects AD“

2017 2017

L3Pilot:
„Code of Practice AD“

2021

Categories of the CoP

Definition Phase | Concept Selection Phase | Design Phase | Validation & Verification Phase | Post Start o. Production Phase

Overall Guidelines and Recommendations
Minimum Risk Manoeuvre, Documentation, Existing Standards

ODD Vehicle Level	ODD Traffic System & Behavioural Design	Safeguarding Automation	Human-Vehicle Integration
			
Function Description, System Limits, Scenarios, Testing etc.	Automated Driving Risks, Mixed Traffic Simulation Approach, Ethics, etc.	Functional Safety, Cybersecurity, SOTIF, Updates etc.	Provide Guidelines for HMI, Mode Awareness/ Confusion, Controllability etc.

L3Pilot Annual Quantitative Survey

Desk Research | Exploration Phase | Model Development | Annual Survey | Impact

- **1st longitudinal study on** user acceptance of AD.
- **Representative**, **quantitative** and **international** approach.
- L3Pilot annual survey will provide **insights into user acceptance and attitudes** towards **automated driving** of the **general public** and its **development over time**.
- 3 public deliverables: **Annual Survey Reports**.
  First report in Q3/2019.

Recommendations for public and private decision-makers

Knowledge about future market potential for AD systems

Development of Automation Acceptance Index (AAI)

Thank you for your kind attention.

Aria Etemad
Volkswagen Group Research
aria.etemad@volkswagen.de

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723051.