

Day 1, October 13

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| 09:00 - 10:00 | Moderator: Sven Oswald Opening Session |
| 09:00 - 09:10 | Aria Etemad, Coordinator L3Pilot, Volkswagen AG |
| 09:10 - 09:20 | Nikolai Ardey, Executive Director Group Innovation, Volkswagen AG |
| 09:20 - 09:30 | Tom Alkim, Policy Officer, European Commission at DG RTD |
| 09:30 - 09:40 | Stefan Deix, Director European Council for Automotive R&D - EUCAR |
| 09:40 - 10:00 | Aria Etemad, Coordinator L3Pilot, Volkswagen AG |
| 10:00 - 11:00 | Break and Exhibition |
| 11:00 - 12:30 | Harmonisation: Frame the Path Code of Practice |
| 11:30 - 11:50 | Piloting Automated Driving |
| 11:50 - 12:20 | Data Handling & Sharing |
| 12:20 - 12:30 | Methodology & Evaluation |
| 12:30 - 14:00 | Lunch, Networking and Exhibition |
| 14:00 - 14:40 | Overall Methodology and Evaluation Framework |
| 14:40 - 15:30 | Technical & Traffic Evaluation |
| 15:30 - 16:00 | Break |
| 16:00 - 17:00 | Technical & User Evaluation User & Acceptance Evaluation |
| 17:00 - 17:15 | Break |
| 17:15 - 18:15 | L3Pilot Published Databases AIM Mobile Traffic Acquisition System Analysis |
| 18:30 - 19:30 | Reception at the L3Pilot Exhibition |

Day 2, October 14

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| 09:00 - 09:10 | EU Support for Large-Scale Cooperation |
| 09:10 - 10:30 | Supplementary Studies for Smart Vehicles and Wizard of Oz Vehicles |
| 10:30 - 11:00 | Break |
| 11:00 - 11:30 | Mobility Impact Assessment |
| 11:30 - 12:30 | Efficiency and Environmental Impact Assessment |
| 12:30 - 14:00 | Lunch & Exhibition |
| 14:00 - 15:30 | Safety Impact Assessment, Quantitative & Qualitative |
| 15:30 - 16:00 | Break |
| 16:00 - 17:00 | Safety Impact Assessment, Scaling up to European Level |
| 17:00 - 17:15 | Break |
| 17:15 - 17:45 | International L3 User Acceptance Survey |
| 17:45 - 18:15 | Collaborative Business Models for Automated Driving |
| 18:15 - 18:30 | Outlook: Towards Deployment of High Automation |
| 18:30 | End of the Final Event |

Find us in hall B3, booth B3EG01.



L3Pilot Driving Demonstrations and Exhibition October 11 - 15, 2021

Welcome to the L3Pilot Final Event.



A couple of years ago it became quite common sense in the automotive industry to dream about how highly automated driving could become reality very soon. Yet, at the same time having vehicles of SAE Level 3 or even Level 4 Automated Driving Functions on public roads seemed like the great challenge, if not unrealistic or dangerous.

Within L3Pilot 34 partners from industry and academics tackled this challenge and put more than 70 fully equipped prototype cars on public roads all across Europe, including cross-border activities. More than 750 test participants drove 400,000 kilometres, half of them in Automated Driving mode.

L3Pilot has clearly shown how fragmented the Operational Design Domains (ODDs) of the functions still are. To extend the ODDs and to make them more continuous on all of Europe's roads, while we celebrate the closing L3Pilot we have already initiated and started the follow-on project: Hi-Drive.

I would like to thank the European Commission for their continuous support of our efforts as well as the European Council for Automotive R&D. I also would like to thank the ITS World Congress 2021 organisers for having us as part of their event and enabling a broad visibility for our work.

My foremost gratitude goes to our partners not only for having successfully accomplished our targets despite a major pandemic crisis, but also for having realised driving demonstrations in and around the City of Hamburg, a huge exhibition and a conference at the highest level. Do not miss out to find online what you learned these days on-site in the aftermath of the Final Event.

For now, join the ride and enjoy your hands-off experience.

Yours faithfully

Aria Etemad

Aria Etemad, L3Pilot Coordinator, Volkswagen AG

Facts

- Duration:** 50 month, September 01, 2017 - October 31, 2021
- Budget:** € 68 million, thereof € 36 million co-funded by the European Union
- Consortium:** 34 partners, among them OEMs, suppliers, research, SMEs, insurers, authorities and user groups, from 12 countries: Austria, Belgium, France, Finland, Germany, Greece, Italy, the Netherlands, Norway, Sweden, Switzerland, United Kingdom



L3Pilot Final Event
Final Conference 13 - 14 OCT
Driving Demonstrations and Exhibition 11 - 15 OCT



All deliverables are available online.



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Supported by the European Council for Automotive R&D (EUCAR)



1,000
drivers
100
cars
10
countries

SAE LEVEL 0 1 2 3 4 5



Automated driving technology has matured over the past ten years to a state in which road tests are required to answer key questions before the systems are introduced to the market. The newly attained level of maturity justified a comprehensive assessment of automated driving, what is happening both inside and outside the vehicles, how vehicle security can be ensured, evaluating safety, other societal impacts and emerging business models.

In the L3Pilot consortium we brought together stakeholders from the whole value chain, including car manufacturers, suppliers, academia, research institutes, infrastructure and governmental agencies, user groups and the insurance sector. The experience of the partners in large-scale testing intelligent vehicle technologies made it possible to create a pan-European testing environment."

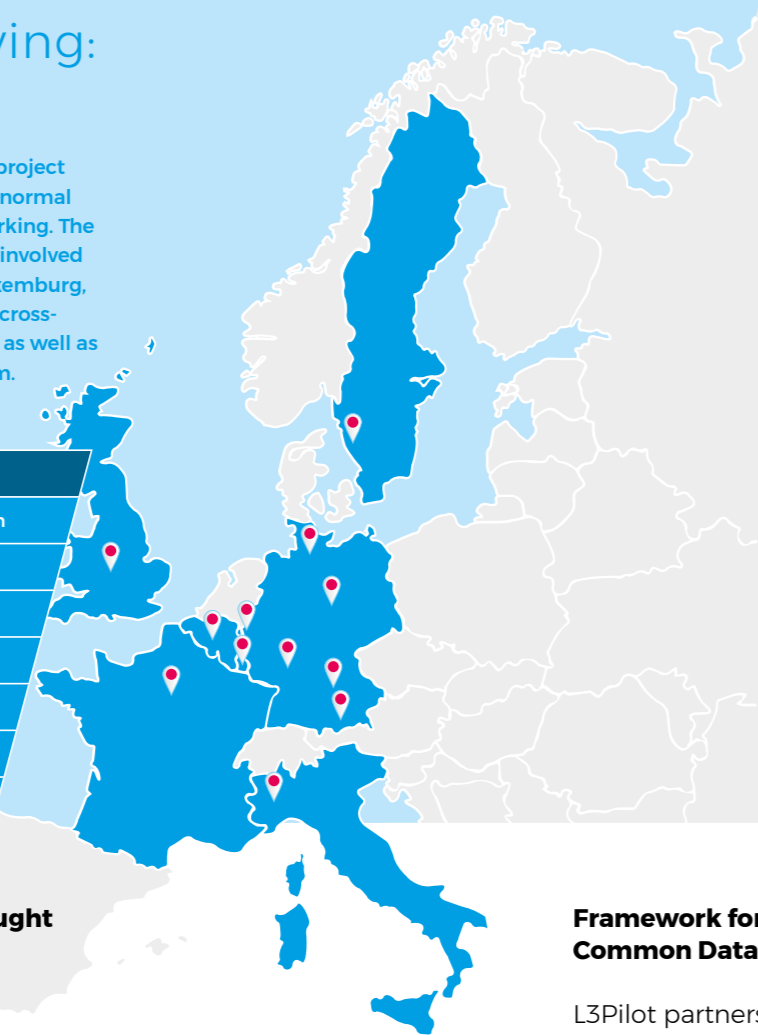
Aria Etemad, Volkswagen AG, L3Pilot Coordinator

Joint European effort boosts automated driving: From piloting to business scenarios

Recent work indicates how automated driving functions can be best validated by means of comprehensive road tests with a sufficiently long operation time and extensive interaction between drivers and testable functions. L3Pilot executed large-scale piloting of automation with developed SAE Level 3 and Level 4 functions exposed to different users and mixed traffic environments in variable conditions.

The consortium of altogether 34 partners made the project come true. 14 partners tested automated systems in normal motorway driving, traffic jams, urban driving and parking. The pilots, executed from April 2019 until February 2021, involved seven countries: Belgium, Germany, France, Italy, Luxembourg, Sweden and the United Kingdom and included two cross-border activities, between Germany and Luxembourg as well as between Germany, Belgium and the United Kingdom.

| Partner | Country | Region | Partner | Country | Region |
|------------|------------|-------------------------|------------|---------|-------------------------|
| Volkswagen | DE | Hamburg, Wolfsburg | Honda | DE | Frankfurt am Main |
| Aptiv | DE, LU, FR | cross-border activities | Ika | DE | Aachen |
| AUDI | DE | Ingolstadt, Neckarsulm | JLR | UK | Coventry |
| BMW | DE | Munich | STLA | FR, DE | cross-border activities |
| CRF | IT | Turin | Renault | FR | Paris and other regions |
| FEV | DE | Aachen, Cologne | Toyota | BE | Brussels |
| Ford | DE, BE, UK | cross-border activities | Volvo Cars | SE | Gothenburg |



Test activities and surveys on a large scale

- **750 test persons** participated in piloting
- **About 600 persons** contributed to detailed supplementary experiments
- **70 test vehicles of 13 different vehicle brands** from a passenger car to a SUV
- **More than 400,000 test kilometres** on motorways, half of them in automated mode and half in manual mode as a baseline for comparison of the user experience and evaluation of the impacts
- **25,000 test kilometres** in urban traffic, **22,200 in automated mode** and **1,800 as a baseline**
- **36,000 respondents** in global surveys

Pan-European testing environment and comprehensive methodology to study the effects of automated driving developed

For the technical work, the piloting activity on public roads presupposed creating first a harmonised Europe-wide piloting environment together with coordinating activities across the piloting community to acquire the required data. Furthermore, to make this happen, an 'operating system' for piloting was needed, and this meant tailoring a methodology to encompass all the requirements needed for automated driving tests in real traffic.

The European tradition brought to the next level: FESTA for automated driving tests

- 128 research questions for all evaluation and impact areas developed: technical and traffic evaluation | user and acceptance evaluation | impact evaluation: mobility, safety, efficiency and environment | socio-economic evaluation.
- More than 70 Derived Measures (DMs) and Performance Indicators (PIs) and over 100 vehicle signals and data logging requirements for answering research and impact questions defined.
- Experimental procedure, tools and evaluation methods for all research questions set.
- New solutions using scenario-based evaluation and for scale-up of impacts to European level developed.

Framework for data sharing created: Common Data Format

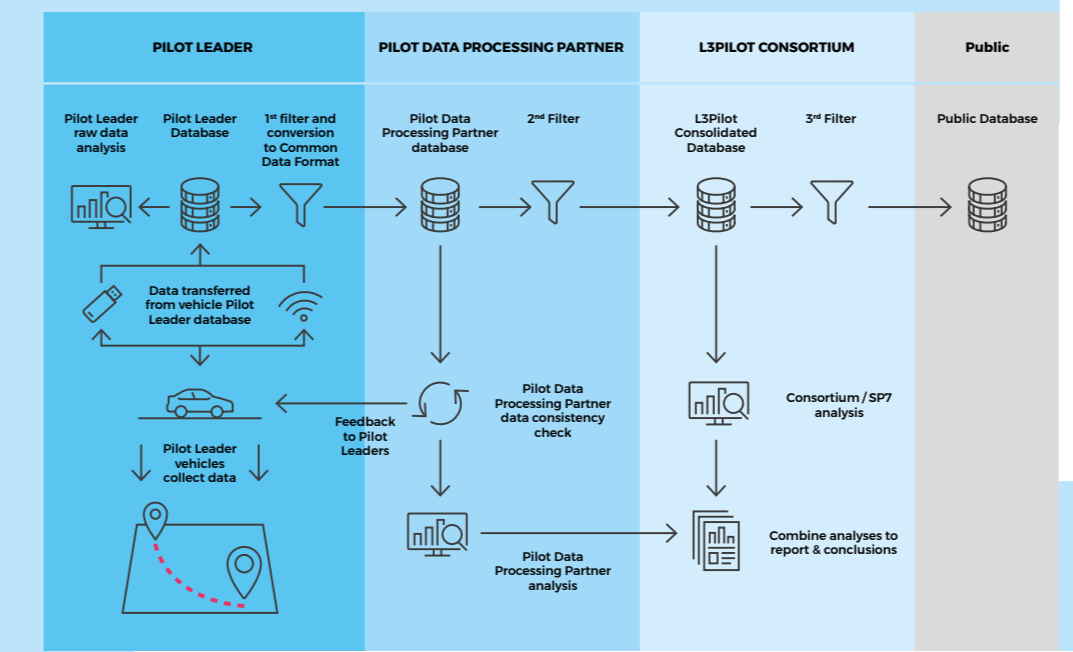
L3Pilot partners succeeded in developing a Common Data Format (CDF) that enables an optimised process of data collection, storage and evaluation. It secures an essential pipeline from data collection to a project-wide tool chain for all analysis of vehicle and related data, e.g. driver, traffic and weather, in the project. This compact and extensible format allows to handle extremely large amounts of field test data collected in pilots and marks an important milestone towards a common Europe-wide piloting environment. As a format harmonised between tens of organisations performing tests in the L3Pilot project, the proposed CDF has the potential to promote data sharing as well as the development of tools and to gain popularity in other projects. The L3Pilot CDF based on the HDF5 data model as well as the conversion scripts have been published on GitHub: github.com/l3pilot/l3pilot-cdf.

Consolidated Database created to handle huge amounts of data in a discreet manner

A Consolidated Database (CDB) was designed and built for the data management and analysis to enable sharing and merging the data from all pilot sites. The research questions aimed at an analysis of the vehicle and driver performance in different experimental conditions – automated driving function off vs. automated driving function on –, road types, e.g. motorway and urban, and specific driving scenarios, such as cut-in, approaching a lead vehicle, following a lead vehicle in a traffic jam. The L3Pilot CDB is a configured instance of the open source Measurify development framework: measurify.org.

L3Pilot Open Data

L3Pilot Open Data contains completely anonymised data on an aggregated level without any direct link to single pilot sites. It enables researchers to investigate the overall behaviour of automated driving functions and human drivers. Furthermore, the L3Pilot partners Volkswagen AG and fka GmbH (linked 3rd party) provided open drone datasets: l3pilot.eu/data.



Supplementary studies to emphasise the focus on the user

L3Pilot carried out extensive supplementary tests. They dealt with user-related experiences that were difficult to address in large-scale piloting due to safety requirements and legal issues. Therefore, supplementary research was planned to study system usage and other relevant user topics with ordinary, non-professional drivers in a safe environment. These studies comprised some 600 subjects.

Code of Practice created to speed up and harmonise the development of automated systems

Equally important was to use the experience gained in the project to build guidelines how to further develop automated technologies in the form of a Code of Practice for the Development of Automated Driving Functions as well as to promote the project findings to stakeholders outside the consortium.



L3Pilot executed a series of showcases bringing the latest technology to the various stakeholder groups.

Evaluating the data

The evaluation of the data focused on four primary areas of analysis: (i) Technical and Traffic evaluation assessed the effect of automated driving on vehicle behaviour and the surrounding traffic. (ii) User and acceptance evaluation assessed users' evaluation and acceptance of automated driving functions and behaviour with the functions.

(iii) Impact assessment focused on the potential impacts of so-called mature automated driving functions on personal mobility, traffic safety, traffic efficiency and the environment. (iv) Socio-economic impact assessment utilised the above analyses to determine monetary values for the estimated effects as well as costs and benefits of automated driving.

Evaluation results at a glimpse

- Increased safety is the main benefit of SAE Level 3 automated driving systems.
- SAE Level 3 automated driving has potential to improve transport network efficiency and to reduce emissions in situations with high traffic volume on motorways.
- Automated driving functions are expected to increase travel quality by enabling non-driving related activities and increasing travel comfort.
- Automated driving functions provide a more stable longitudinal control of the vehicle as well as a better lane keeping performance.
- In more than 60% of take-over situations, it took less than 4 seconds for drivers to react to the take-over request. The reaction time in 99% of situations was below 10 seconds. None of the analysed everyday take-over situations resulted in a critical driving situation.
- Although parking systems perform the manoeuvres at lower speeds, more than two out of three find the system useful and trust it to park.
- Urban automated vehicles may perform slower manoeuvres at intersections, but flow with traffic comparable to human drivers outside of intersections.
- An automated driving system consisting of motorway, urban and parking functions is expected to generate a social benefit that is higher than the social costs of installing it.
- Still, more information is needed on the dynamics of the mature automated driving functions and their interactions with other road users in real traffic.
- The majority of users would be willing to use the motorway (83%), urban (76%) or parking (58%) automated driving functions they tested and with repeated usage, drivers rated them more positively.
- Global user surveys revealed large differences between countries in expressing an intention to use SAE Level 3 automated system. In the East and emerging countries the willingness was highest, whereas technologically developed western countries showed the lowest intention.

Automated driving business scenarios were envisioned and analysed

How the automotive market will make its way through the tumult of digitalisation is difficult to predict. For this reason, L3Pilot explored possible

service concepts providing new mobility solutions and charted the deployment potential for the market introduction of automated vehicles.

L3Pilot Automated Driving Functions



Again, stuck in a traffic jam, like every day. I am so tired of it.

TRAFFIC JAM CHAUFFEUR

THE L3PILOT TRAFFIC JAM CHAUFFEUR SAE L3 RELIEVES the human driver from exhausting manual driving during traffic jams. On motorways and similar roads the car takes over the driving in traffic jam sections up to 60 km/h. When the detection of slow driving vehicles in front indicates a traffic jam, the function can be activated. In some instances, the car changes the lane to react to a slower vehicle ahead or to the road infrastructure, like in case of exit lanes.

With the Motorway Chauffeur SAE L3, the car adapts to various traffic conditions up to 130 km/h. It follows the lane and adjusts speed considering various factors such as keeping a safe distance to the vehicle in front or following the speed limit. If a preceding slower vehicle is detected, the car overtakes automatically as soon as it is safely possible.



System on.

Driver relaxed.

MOTORWAY CHAUFFEUR

The Parking Chauffeur allows the user to request the vehicle to complete manoeuvring into and out of garages and driveways. The car either learns a fixed trajectory from the entrance of the house to the home garage and vice versa or determines a suitable manoeuvre to enter or pull out of a nearby parking position. The Parking Chauffeur has been tested at SAE L3 and L4. This automated driving feature relieves the driver from repeating parking manoeuvres.



Luckily I have my parking buddy.

PARKING CHAUFFEUR

The Urban Chauffeur targets stress-free driving in urban areas. With the Urban Chauffeur the vehicle automatically follows the lane, starts and stops and handles overtaking within cities. When coming to a crossing the car handles right and left turns, recognises on-coming traffic and vulnerable road users such as pedestrians, and selects the correct crossing path, even if no lane marking is present.



Stress-free driving in urban areas.

URBAN CHAUFFEUR

