



EXEMPLARY CUSTOMER FUNCTION (CF)

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What is a customer function?

A customer function is a target-oriented behavior of the product that is tangible to a real or abstract customer. A customer function is assigned to exactly one system.

The complete description of a customer function comprises the following aspects:

1. System to which the CF applies
2. Relation to Operational Design Domain
3. Why do we need a CF?
4. Characteristics of the CF

1. What is an Automated Driving System (ADS)?

“The hardware and software that are collectively capable of performing the entire Dynamic Driving Task (DDT) on a sustained basis, regardless of whether it is limited to a specific operational design domain (ODD); this term is used specifically to describe a Level 3, 4, or 5 driving automation system.” [1]



Within the scope of the VVM customer function a Dual-Mode vehicle is performing a driverless operation, transporting persons as well as luggage within a defined ODD.

“[ADS-Equipped] Dual-Mode Vehicle: An ADS-equipped vehicle designed to enable either driverless operation under routine/normal operating conditions within its given ODD (if any), or operation by an in-vehicle driver, for complete trips.” [1]

2. Operational Design Domain (ODD)

“Operating conditions under which a given driving automation system or feature thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and/or the requisite presence or absence of certain traffic or roadway characteristics.” [1]

Within VVM the ODD is structured using the 6-Layer Model [2].

Further information concerning the ODD is provided in stream 1 and a separate poster (cf. poster “From OD over ODD to FUC and Scenarios”).

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3. Why do we need a CF within VVM?

The CF is needed to have a basic functional description of the **ADS's** behavior in a certain ODD.

Considering this prerequisite, the behavior of the ADS can be derived for the specific Functional Use Cases (FUC) within VVM.

4. Characteristics

- Longitudinal and lateral vehicle motion control up to 60km/h in urban environments as well as 100km/h on highways with or without a target vehicle
- Trajectory planning
- Compliance to relevant traffic regulations
- Handling of specified curve radius and lane width
- Driving on and off Highways
- Highway changes through junctions
- Parking manoeuvres
- Departing from standstill and pulling out into traffic
- Navigation system reactions to traffic jam warnings, road closures and roadworks
- Driving by night with artificial streetlights
- Handling typical weather conditions
- Turns considering oncoming traffic
- Lane changes on multi-lane roads (e.g. Bus stop, cyclists, parking cars)

- Obeying traffic lights
- Obeying pedestrian crossings
- Performing minimal risk manoeuvres
- Adapting to traffic flow

For simplification purposes the following situations are not covered within the exemplary customer function

- Play streets
- Roads with oncoming traffic lacking center lines
- Roundabouts
- Instructions given by police officers and emergency vehicles

References

- [1] Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, SAE International Standard J3016 202104, 2021
- [2] M. Scholtes et al., "6-Layer Model for a Structured Description and Categorization of Urban Traffic and Environment" in *IEEE Access*, vol. 9, pp. 59131-59147, 2021, doi: 10.1109/ACCESS.2021.3072739



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