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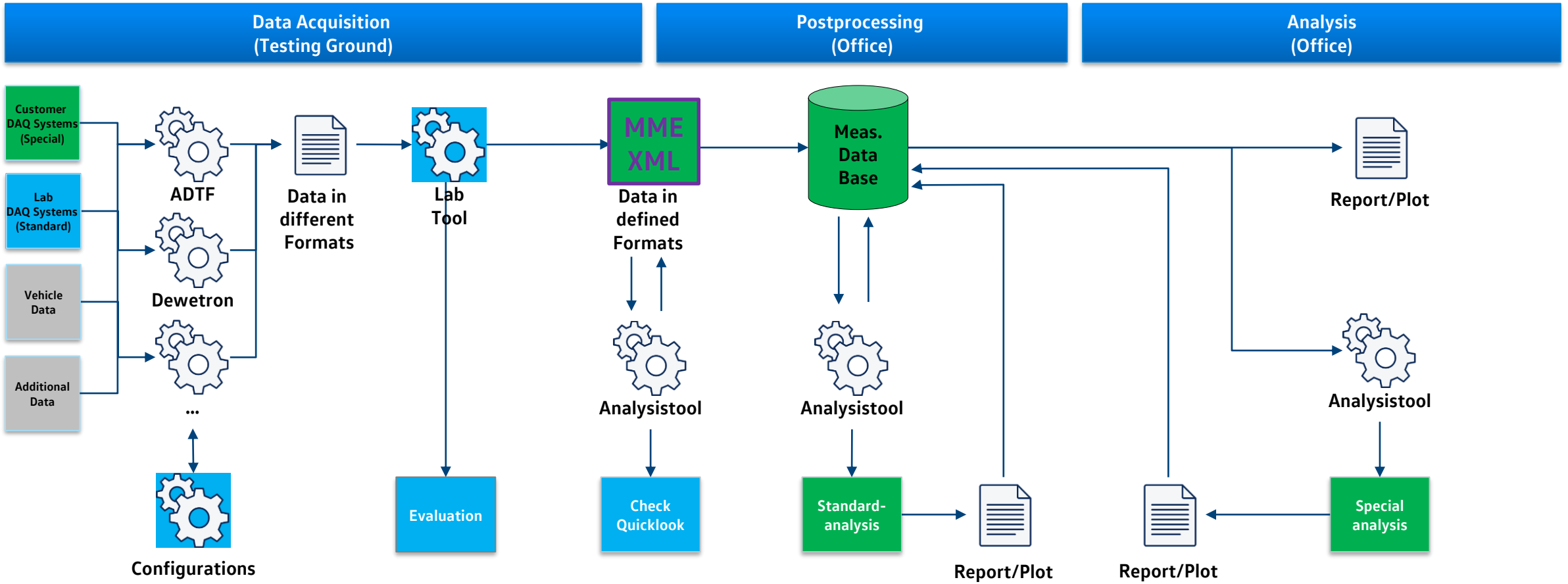
– Radek Codr	Skoda
– Stefan Mogge	TASS
– Peter Derpmann-Hagenström	Volkswagen
– Guido Humm	ZF

Test Analysis - Toolchain
Strategy



Reference Coordinate Systems

Naming according to MME 2.1 RED A chapter 2.3 (Rev 20200218)

Id	Characteristic	Directions	Description	Comments
1DY	VUT dynamic	X Y Z	Dynamic Coordinate System according ISO 8855 moving like the VUT	see figure ISO_ACTIV_16R2_20200617.pdf
2DY	Target dynamic	X Y Z	Dynamic Coordinate System according ISO 8855 moving like the Target	see figure ISO_ACTIV_16R2_20200617.pdf
LOC	Steering Wheel	1 2 3	Local Coordinate System of the Steering Wheel (1 = Longitudinal)	Only the rotation around the longitudinal axis of the steering system is used
NED	NorthEastDown	1 2 3	Stationary Earth fixed Coordinate System (1 = North, 2 = East, 3 = Down)	typically from GPS based systems with units [m]
TST	Testground Static	X Y Z	Coordinate System with Stationary Origin at the Test Ground and Stationary Directions	derived from NED based data by moving the origin to a point at the test ground and rotating to the main driving direction

https://www.iso-mme.org/forum/viewtopic.php?f=149&t=603

Testnomenclature

Proposal according to MME 2.1 RED A chapter 2.14 – 2.16 (Rev 20200218)

- **Type of the test**

  C2C
  VRU
  LSS
  BSD
  SAS, ...

- **Subtype of the test**

  for C2C: CCRs_FCW,
  CCRm_DBS,
  FP-STP_AEB, ...

  for VRU: CPFA_AEB,
  CPLA_FCW
  CBNA_AEB
  CPNC_AEB, ...

- **Regulation**

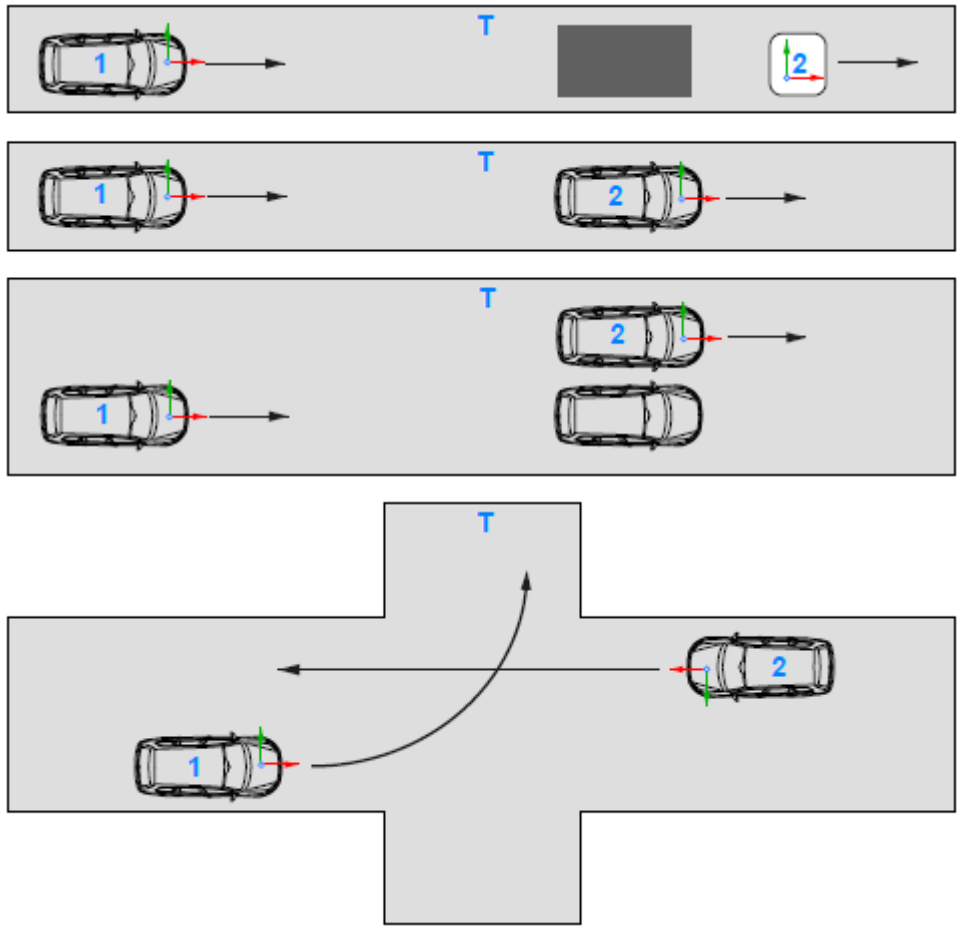
  EuroNCAP_VRU_2020
  CNCAP_C2C_2021
  USNCAP_CIB_2015
  IIHS_VRU_2019, ...

https://www.iso-mme.org/forum/viewtopic.php?f=149&t=603

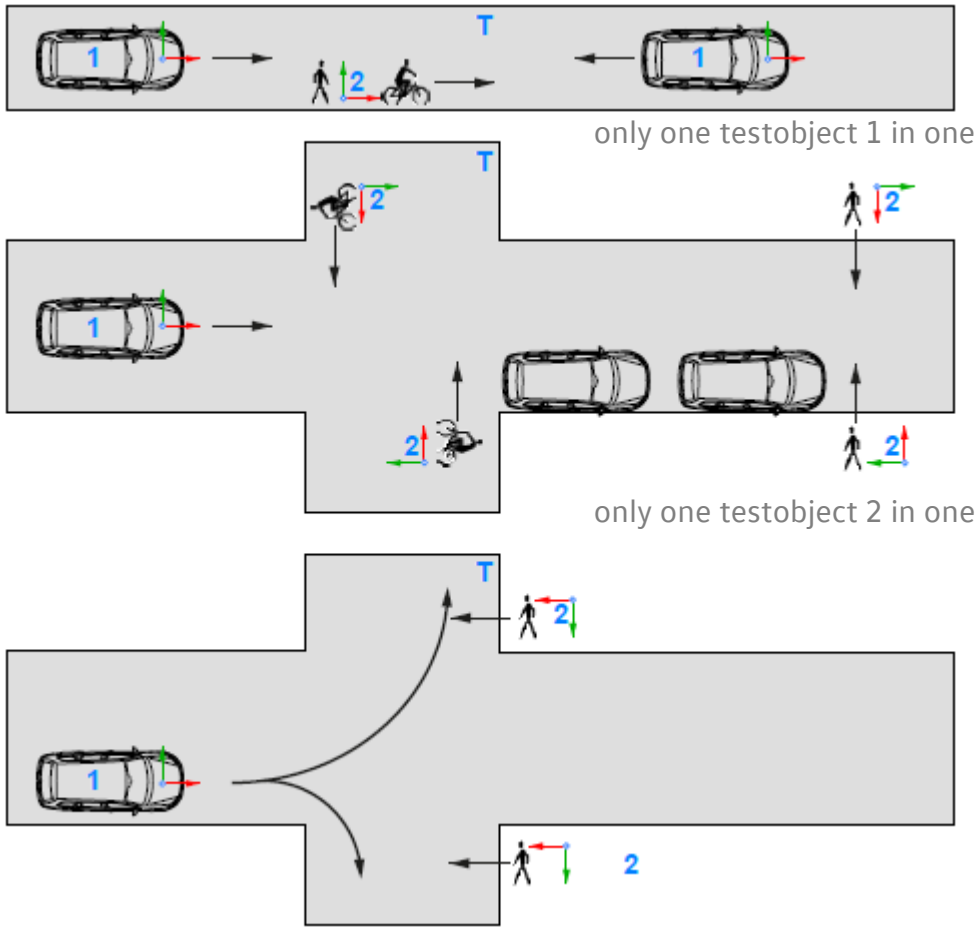
MME 1.6Rev2 and 2.1 – Figure ACTIV

Scenarios

C2C



VRU

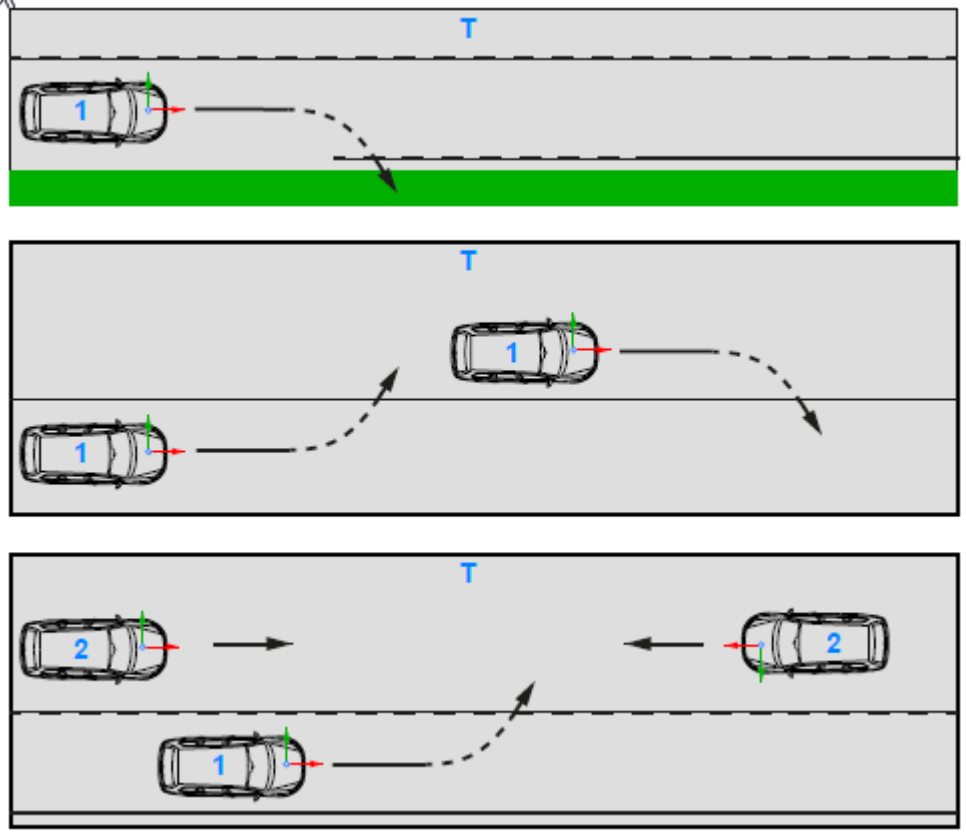


https://www.iso-mme.org/forum/viewtopic.php?f=145&t=640

MME 1.6Rev2 and 2.1 – Figure ACTIV

Scenarios

LSS



only one testobject 1 in one scenario!

only one testobject 2 in one scenario!

https://www.iso-mme.org/forum/viewtopic.php?f=145&t=640

Channel Codes

Example for the usage in different Testprotocols

Stand 04.12.2020						2020	2015	2021	2020	2019	2020
					VW	ENCAP	USNCAP	CNCAP	KNCAP	JNCAP	ANCAP
Channel Code	Unit	RefS	Customer Channel Code	Kommentar	C2C	C2C	C2C	C2C	C2C	C2C	C2C
10TFCW000000EV00	1	-	FCW acustical	Audiosignal	x	x	x	x			
10TTTC010000TI00	s	-	TTC with acc	TTC mit Beschleunigungen	x	o	x	o			
10VEHC000000DSXP	m	TST	VUT Position X		x	x	x	x			
10VEHC000000DSYP	m	TST	VUT Position Y		x	x	x	x			
20VEHC000000DSXP	m	TST	Target Position X		x	x	x	x			
20VEHC000000DSYP	m	TST	Target Position Y		x	x	x	x			
10VEHC000000VEXP	m/s	1DY	VUT Longitudinal Velocity		x	x	x	x			
20VEHC000000VEXP	m/s	2DY	Target Longitudinal Velocity		x	x	x	x			
20VEHC000000VEYP	m/s	2DY	Target Lateral Velocity		x	x	x	x			
10VEHC000000ACXP	m/s2	1DY	VUT Longitudinal Acceleration		x	x	x	x			
20VEHC000000ACXP	m/s2	2DY	Target Longitudinal		x	x	x	x			
10VEHC000000AVZP	rad/s	1DY	VUT Yaw Rate		x	x	x	x			
20VEHC000000AVZP	rad/s	2DY	Target Yaw Rate		x	x	x	x			
10STWL000000AV1P	rad/s	LOC	VUT Steering Wheel Velocity		x	x	x	x			
10PEAC000000DS0P	m	LOC	Accelerator Pedal Position	aus 10PEAC000000VO0P	x	o	o	x			
10PEBR000000DS0P	m	LOC	Brake Pedal Position		x	x		x			
10PEBR000000FO0P	N	LOC	Brake Pedal Force		x	x	x	x			
10VEHC00DI00DCYP	m	LOC	Lateral path error VUT		x	x	x	x			
20VEHC00DI00DCYP	m	LOC	Lateral path error of the GVT		x	x		x			
10PEAC000000VO0P	V	LOC	Accelerator Pedal Command		x	x	x	o			
10PEBR000000VO0P	V	LOC	Brake Pedal Command		x	x		x			
10SENS010000EV00	1	-	CAN prewarning	aus 10SENS010000VO0P	x	x	x	x			
10SENS010000VO0P	V	-	AWV Warnung	2 = Vorwarnung	x	x	x	x			
10SENS020000EV00	1	-	CAN jerk		x	x	x	x			
10SENS030000EV00	1	-	CAN mainwarning		x	x	x	x			
10SENS040000EV00	1	-	CAN PB		x	x	x	x			
10SENS050000EV00	1	-	CAN AEB/ASB	aus 10SENS050000VO0P	x	x	x	x			
10SENS050000VO0P	V	-	Teilbremsung Freigabe	1 = Teilbremsung freigegeben	x	x	x	x			

working status

Channel Codes
Data Exchange - C2C

Limit specified in EuroNCAP Testprotocol:	Limit
Listed in the EuroNCAP Testprotocol:	Listed
Listed in the EuroNCAP TB21:	TB21

	Channel Code	Unit	RefSys	VW Customer Channel Code	Remark	Dataorigin	EuroNC	VW-Plo
1	10PEAC000000DS0P	m	LOC	Accelerator Pedal Position		Brake/Acc-Robot (CBAR)	TB21	x
2	10PEAC000000VO0P	V	LOC	Accelerator Pedal Command		Brake/Acc-Robot (CBAR)	-	-
3	10PEBR000000DS0P	m	LOC	Brake Pedal Position		Brake/Acc-Robot (CBAR)	TB21	x
4	10PEBR000000FO0P	N	LOC	Brake Pedal Force		Brake/Acc-Robot (CBAR)	TB21	x
5	10PEBR000000VO0P	V	LOC	Brake Pedal Command		Brake/Acc-Robot (CBAR)	-	x
6	10SENS010000EV00	1	-	CAN prewarning	calculated from 10SENS010000VO0P	calculated from CAN-Bus Signal	-	x
7	10SENS010000VO0P	V	-	AWV Warnung		CAN-Bus Signal	-	-
8	10SENS020000EV00	1	-	CAN jerk		CAN-Bus Signal	-	x
9	10SENS030000EV00	1	-	CAN mainwarning		CAN-Bus Signal	-	x
10	10SENS040000EV00	1	-	CAN PB		CAN-Bus Signal	-	x
11	10SENS050000EV00	1	-	CAN AEB/ASB	calculated from 10SENS050000VO0P	calculated from CAN-Bus Signal	-	x
12	10SENS050000VO0P	V	-	Teilbremsung Freigabe		CAN-Bus Signal	-	-
13	10SENS060000EV00	1	-	CAN driver ASB		CAN-Bus Signal	-	x
14	10SENS070000VO0P	V	-	CAN VUT requested		CAN-Bus Signal	-	x
15	10STWL000000AV1P	rad/s	LOC	VUT Steering Wheel Velocity		Steering-Robot	Limit	x
16	10TFCW000000EV00	1	-	FCW acustical		Triggerbox	Limit	x
17	10TTTCRD0000TI00	s	-	CAN TTC		CAN-Bus Signal	-	x
18	10VEHC000000ACXP	m/s2	1DY	VUT Longitudinal Acceleration		IMU	TB21	x
19	10VEHC000000AVZP	rad/s	1DY	VUT Yaw Rate		IMU	Limit	x
20	10VEHC000000DSXP	m	TST	VUT Position X	if *Headway Distance* is missing	IMU	TB21	-
21	10VEHC000000DSYP	m	TST	VUT Position Y	if *Distance Lateral* is missing	IMU	TB21	-
22	10VEHC000000VEXP	m/s	1DY	VUT Longitudinal Velocity		IMU	Limit	x
23	10VEHC00DI00DCYP	m	LOC	Lateral Path Error VUT		Steering-Robot	Limit	x
24	10VEHC00DI00DSXP	m	TST	Headway Distance VUT - GVT		calculated resp. ADTF/DEWETRON	Limit	x
25	10VEHC00DI00DSYP	m	TST	Distance GVT - VUT Lateral		calculated	Limit	x
26	20VEHC000000ACXP	m/s2	2DY	Target Longitudinal Acceleration		IMU	Limit	x
27	20VEHC000000AVZP	rad/s	2DY	Target Yaw Rate		IMU	Limit	x
28	20VEHC000000DSXP	m	TST	Target Position X	if *Headway Distance* is missing	IMU	TB21	-
29	20VEHC000000DSYP	m	TST	Target Position Y	if *Distance Lateral* is missing	IMU	TB21	-
30	20VEHC000000VEXP	m/s	2DY	Target Longitudinal Velocity		IMU	Limit	x
31	20VEHC000000VEYP	m/s	2DY	Target Lateral Velocity		IMU	TB21	-
32	20VEHC00DI00DCYP	m	LOC	Lateral Path Error GVT		Target-Robot	Limit	x

Channel Codes
Data Exchange - VRU

Limit specified in EuroNCAP Testprotocol:	Limit
Listed in the EuroNCAP Testprotocol:	Listed
Listed in the EuroNCAP TB21:	TB21

	Channel Code	Unit	RefSys	VW Customer Channel Code	Remark	Dataorigin	EuroNC	VW-Plo
1	10PEAC000000DS0P	m	LOC	Accelerator Pedal Position		Brake/Acc-Robot (CBAR)	TB21	x
2	10PEAC000000VO0P	V	LOC	Accelerator Pedal Command		Brake/Acc-Robot (CBAR)	-	-
3	10PEBR000000DS0P	m	LOC	Brake Pedal Position		Brake/Acc-Robot (CBAR)	TB21	-
4	10SENS010000EV00	1	-	CAN prewarning	calculated from 10SENS010000VO0P	calculated from CAN-Bus Signal	-	x
5	10SENS010000VO0P	V	-	AWV Warnung		CAN-Bus Signal	-	-
6	10SENS020000EV00	1	-	CAN jerk		CAN-Bus Signal	-	x
7	10SENS030000EV00	1	-	CAN mainwarning		CAN-Bus Signal	-	x
8	10SENS040000EV00	1	-	CAN PB		CAN-Bus Signal	-	x
9	10SENS050000EV00	1	-	CAN AEB/ASB	calculated from 10SENS050000VO0P	calculated from CAN-Bus Signal	-	x
10	10SENS050000VO0P	V	-	Teilbremsung Freigabe		CAN-Bus Signal	-	-
11	10SENS060000EV00	1	-	CAN driver ASB		CAN-Bus Signal	-	x
12	10SENS070000VO0P	V	-	CAN VUT requested		CAN-Bus Signal	-	x
13	10STWL000000AV1P	rad/s	LOC	VUT Steering Wheel Velocity		Steering-Robot	Limit	x
14	10TFCW000000EV00	1	-	FCW acustical		Triggerbox	Limit	x
15	10VEHC000000ACXP	m/s2	1DY	VUT Longitudinal Acceleration		IMU	Listed	x
16	10VEHC000000AVZP	rad/s	1DY	VUT Yaw Rate		IMU	Limit	x
17	10VEHC000000DSXP	m	TST	VUT Position X	if *Headway Distance* is missing	IMU	TB21	-
18	10VEHC000000DSYP	m	TST	VUT Position Y	if *Distance Lateral* is missing	IMU	TB21	-
19	10VEHC000000VEXP	m/s	1DY	VUT Longitudinal Velocity		IMU	Limit	x
20	10VEHC00DI00DCYP	m	1DY	Lateral Path Error VUT		Steering-Robot	Limit	x
21	10VEHC00DI00DSXP	m	1DY	Headway Distance VUT-VRU		calculated resp. ADTF/DEWETRON	Limit	x
22	10VEHC00DI00DSYP	m	TST	Distance GVT - VUT Lateral		calculated resp. ADTF/DEWETRON	-	x
23	20CYCL000000DSXP	m	TST	Cyclist Position X	crossing: if *Distance Lateral* is missing	Testrig	-	x
24	20CYCL000000DSYP	m	TST	Cyclist Position Y	longitudinal: if *Distance Lateral* is	Testrig	TB21	x
25	20CYCL000000VEXP	m/s	2DY	Cyclist Longitudinal Velocity		Testrig	-	x
26	20CYCL00DI00DCYP	m	LOC	Cyclist Lateral path error		Testrig	Limit	-
27	20CYCL00DI00VEYP	m/s	2DY	Cyclist Lateral Velocity		Testrig	Limit	-
28	20PEDA000000DSXP	m	TST	Pedestrian (adult) Position X	crossing: if *Distance Lateral* is missing	Testrig	-	x
29	20PEDA000000DSYP	m	TST	Pedestrian (adult) Position Y	longitudinal: if *Distance Lateral* is	Testrig	TB21	x
30	20PEDA000000VEXP	m/s	2DY	Pedestrian (adult) Longitudinal Velocity		Testrig	-	x
31	20PEDA00DI00DCYP	m	LOC	Pedestrian (adult) Lateral path error		Testrig	Limit	-
32	20PEDA00DI00VEYP	m/s	2DY	Pedestrian (adult) Lateral Velocity		Testrig	Limit	-
33	20PEDC000000DSXP	m	TST	Pedestrian (child) Position X	crossing: if *Distance Lateral* is missing	Testrig	-	x
34	20PEDC000000DSYP	m	TST	Pedestrian (child) Position Y	longitudinal: if *Distance Lateral* is	Testrig	TB21	x
35	20PEDC000000VEXP	m/s	2DY	Pedestrian (child) Longitudinal Velocity		Testrig	-	x
36	20PEDC00DI00DCYP	m	LOC	Pedestrian (child) Lateral path error		Testrig	Limit	-
37	20PEDC00DI00VEYP	m/s	2DY	Pedestrian (child) Lateral Velocity		Testrig	Limit	-

Next Steps

- Inquiry for a new physical dimension for digital channels at the next MME TaskForce Meeting
- Discussion with the EuroNCAP staff responsible for the Technical Bulletin 21 about the usage of directions
- Creating a proposal of a Related Electronic Document (RED G) for ISO MME 13499, which gives recommendations for the exchange of data from active safety tests