



From research questions and study design
to common data format

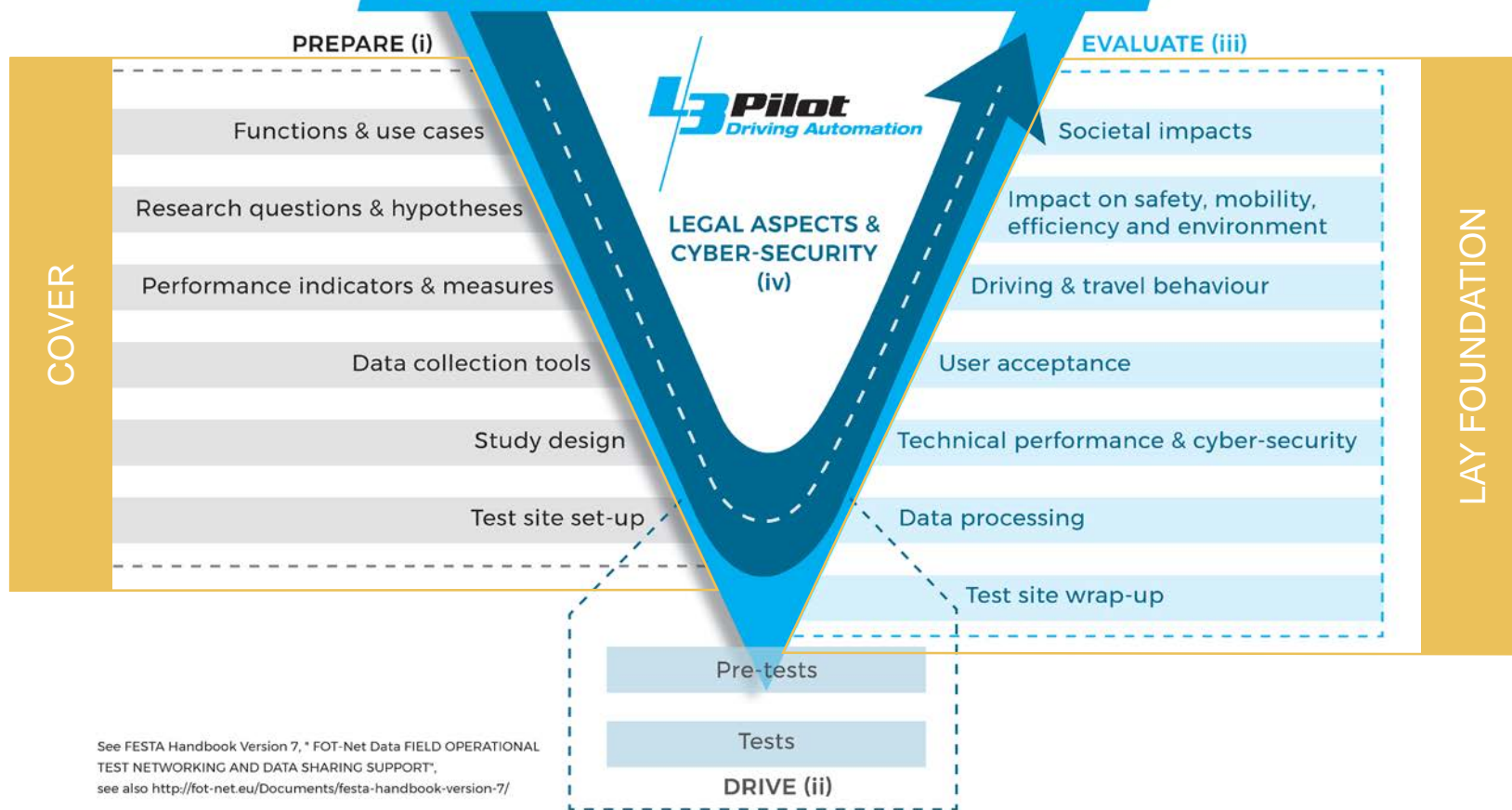
ITS European Congress

6 June 2019, Eindhoven

Satu Innamaa
VTT



FESTA Implementation Plan adapted to L3PILOT



See FESTA Handbook Version 7, "FOT-Net Data FIELD OPERATIONAL TEST NETWORKING AND DATA SHARING SUPPORT", see also <http://fot-net.eu/Documents/festa-handbook-version-7/>

From theories and AD function descriptions to research questions



Theories of impact areas



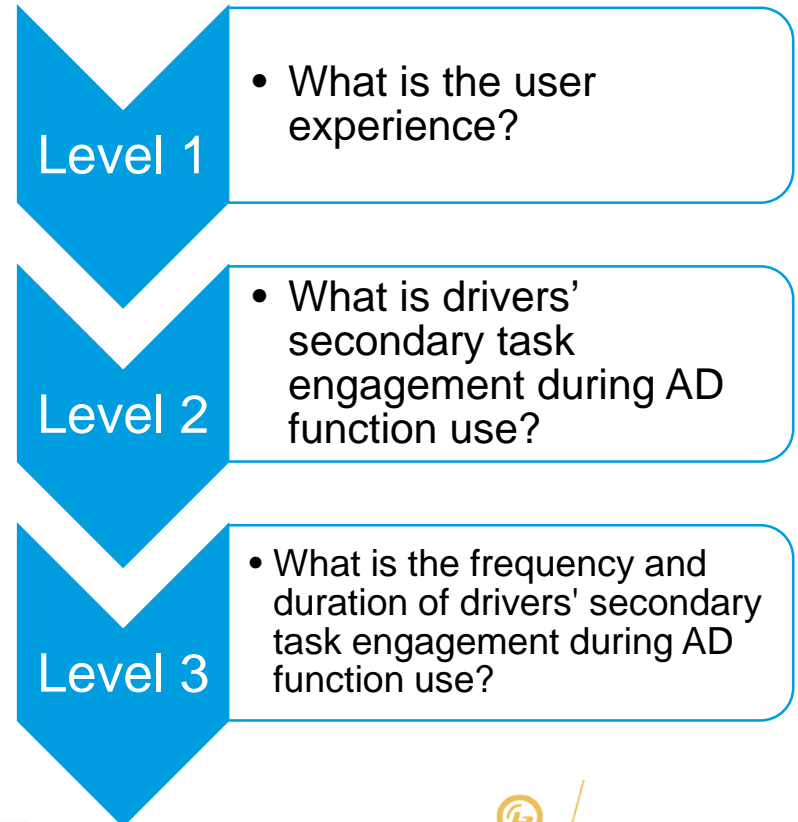
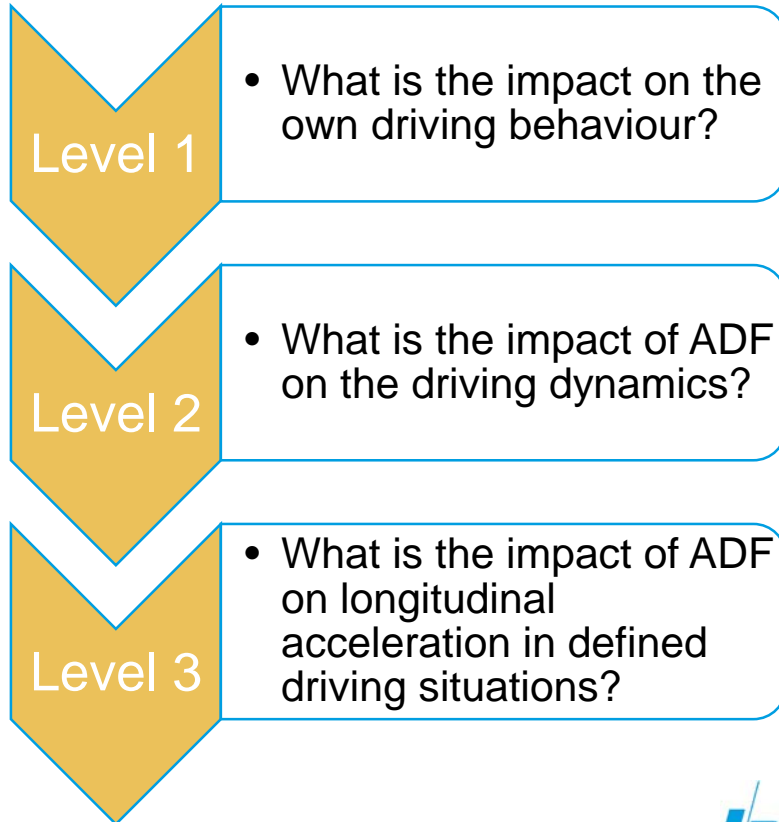
Early descriptions of AD functions



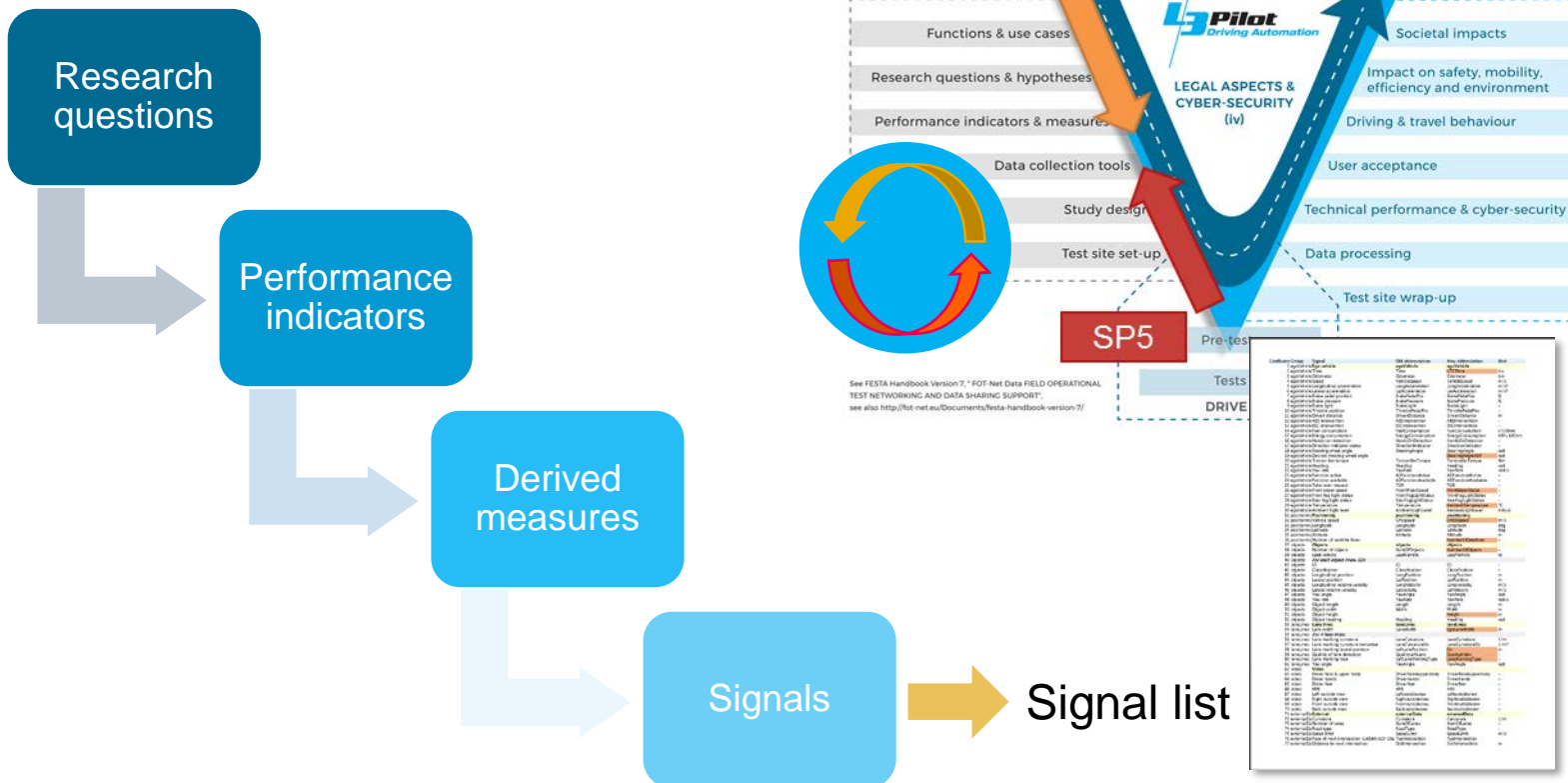
Research questions (3 levels) for all evaluation and impact areas:

- **Technical & traffic evaluation:** System performance, Driving behaviour (28 level-3 RQs)
- **User & acceptance evaluation:** User experience (21 level-3 RQs)
- **Impact evaluation:** Mobility, Safety, Efficiency, Environment (21 level-3 RQs)
- **Socio-economic evaluation:** Socio-economics (5 level-3 RQs)

Examples of research questions

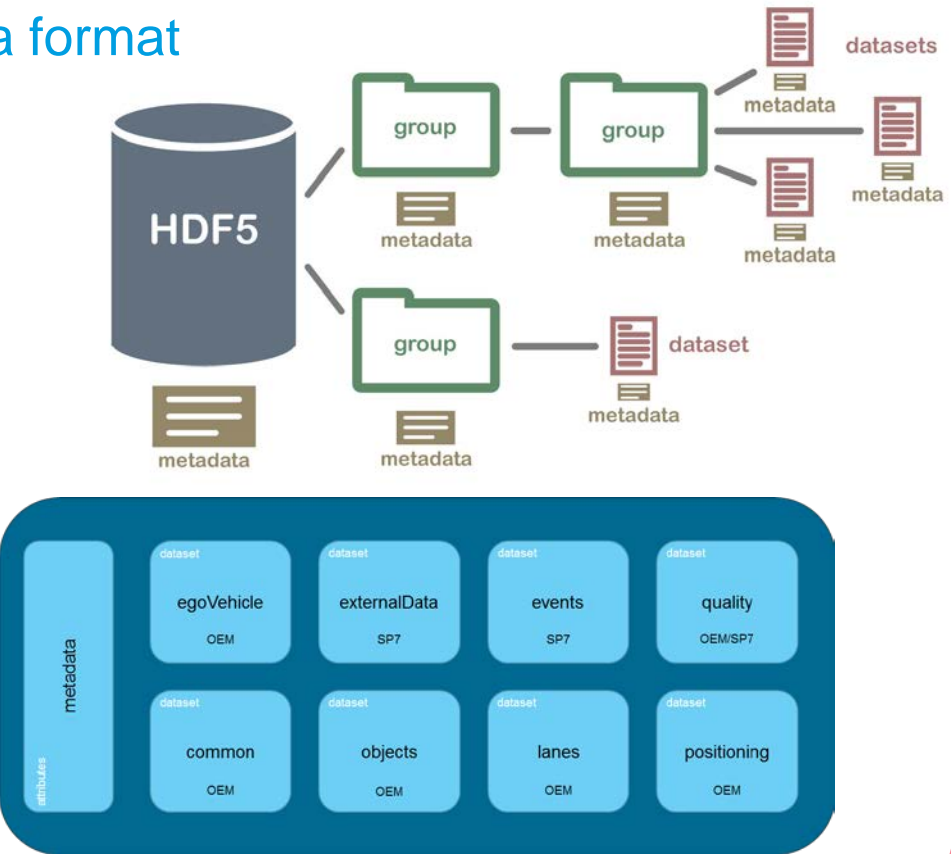


From research questions to signal list



From signal list to common data format

Common Group	Signal	Old abbreviation	New abbreviation	Unit
1	egoVehicle Eye vehicle	egoVehicle	egoVehicle	-
2	egoVehicle Time	Time	Time	ms
3	egoVehicle Distance	Distance	Distance	m
4	egoVehicle Speed	Velocity	VelocitySpeed	m/s
5	egoVehicle Longitudinal acceleration	LongAcceleration	LongAcceleration	m/s ²
6	egoVehicle Lateral acceleration	LateralAcceleration	LateralAcceleration	m/s ²
7	egoVehicle Basic position	BasicPosition	BasicPosition	N
8	egoVehicle Basic position	BasicPosition	BasicPosition	N
9	egoVehicle Thrusts position	ThrustsPosition	ThrustsPosition	-
10	egoVehicle Drive distance	DriveDistance	DriveDistance	m
11	egoVehicle AEI intervention	AEIIntervention	AEIIntervention	-
12	egoVehicle ECI intervention	ECIIntervention	ECIIntervention	-
13	egoVehicle Fuel consumption	FuelConsumption	FuelConsumption	l/100km
14	egoVehicle Energy consumption	EnergyConsumption	EnergyConsumption	kWh/100km
15	egoVehicle Hand-on detection	HandOnDetection	HandOnDetection	-
16	egoVehicle Direction indicator status	DirectionIndicator	DirectionIndicator	-
17	egoVehicle Steering wheel angle	SteeringAngle	SteeringAngle	rad
18	egoVehicle Desired steering wheel angle	DesiredSteeringAngle	DesiredSteeringAngle	rad
19	egoVehicle Steering wheel torque	SteeringWheelTorque	SteeringWheelTorque	rad
20	egoVehicle Heating	Heating	Heating	rad
21	egoVehicle Fan rate	FanRate	FanRate	rad/s
22	egoVehicle Function active	ADFunctionActive	ADFunctionActive	-
23	egoVehicle Function available	ADFunctionAvailable	ADFunctionAvailable	-
24	egoVehicle Tare-over request	TOR	TOR	-
25	egoVehicle Front fog light status	FrontFogLightStatus	FrontFogLightStatus	-
26	egoVehicle Rear fog light status	RearFogLightStatus	RearFogLightStatus	-
27	egoVehicle Ambient light level	AmbientLightLevel	AmbientLightLevel	lux
28	position Positioning	Positioning	Positioning	lat/lon
29	position Vehicle speed	VehicleSpeed	VehicleSpeed	m/s
30	position Longitude	Longitude	Longitude	deg
31	position Latitude	Latitude	Latitude	deg
32	position Altitude	Altitude	Altitude	m
33	position Number of satellite fixes	Objects	Objects	-
34	position Number of objects	NumberObjects	NumberObjects	m
35	position Last vehicle	LastVehicle	LastVehicle	id
36	objects For each object (max. 250)	Classification	Classification	-
37	objects ID	ID	ID	-
38	objects Classification	Classification	Classification	-
39	objects Longitudinal position	LongPosition	LongPosition	m
40	objects Lateral position	LateralPosition	LateralPosition	m
41	objects Longitudinal relative velocity	LongVelocity	LongVelocity	m/s
42	objects Lateral relative velocity	LateralVelocity	LateralVelocity	m/s
43	objects Turn angle	TurnAngle	TurnAngle	rad
44	objects Turn rate	TurnRate	TurnRate	rad/s
45	objects Object length	Length	Length	m
46	objects Object width	Width	Width	m
47	objects Object height	Height	Height	rad
48	lanes Lane lines	LaneLines	LaneLines	m
49	lanes Lane width	LaneWidth	LaneWidth	m
50	lanes Lane marking centerline	LaneMarkingCenterline	LaneMarkingCenterline	line
51	lanes Lane marking centerline derivative	LaneMarkingCenterlineDerivative	LaneMarkingCenterlineDerivative	line
52	lanes Lane marking lateral position	LaneMarkingLateralPosition	LaneMarkingLateralPosition	line
53	lanes Lane marking lane position	QualityLane	QualityLane	-
54	lanes Lane marking type	LaneMarkingType	LaneMarkingType	rad
55	lanes Turn angle	TurnAngle	TurnAngle	rad
56	lanes Wheel	Wheel	Wheel	-
57	lanes Drive force & slip body	DriveForceAndSlipBody	DriveForceAndSlipBody	-
58	lanes Drive force	DriveForce	DriveForce	-
59	lanes Drive slip	DriveSlip	DriveSlip	-
60	lanes Lateral deviation	LateralDeviation	LateralDeviation	-
61	lanes Lateral deviation rate	LateralDeviationRate	LateralDeviationRate	-
62	lanes Front outside view	FrontOutsideView	FrontOutsideView	-
63	lanes Front inside view	FrontInsideView	FrontInsideView	-
64	lanes Back outside view	BackOutsideView	BackOutsideView	-
65	lanes Back inside view	BackInsideView	BackInsideView	-
66	intermediate External	ExternalData	ExternalData	-
67	intermediate Camera	Camera	Camera	line
68	intermediate Number of lanes	NumberOfLanes	NumberOfLanes	-
69	intermediate Road type	RoadType	RoadType	-
70	intermediate Speed limit	SpeedLimit	SpeedLimit	m/s
71	intermediate Type of road interaction	TypeOfRoadInteraction	TypeOfRoadInteraction	-
72	intermediate Distance to road interaction	DistanceToRoadInteraction	DistanceToRoadInteraction	m



Experimental procedure set-up



Experimental procedures: Approaches, participants, study design (incl. baseline)

- Aim: Sufficient commonalities to be able to make harmonised evaluation

Step 1: Description of alternatives

- Alternatives
- Pros & cons
- **Minimum requirements**

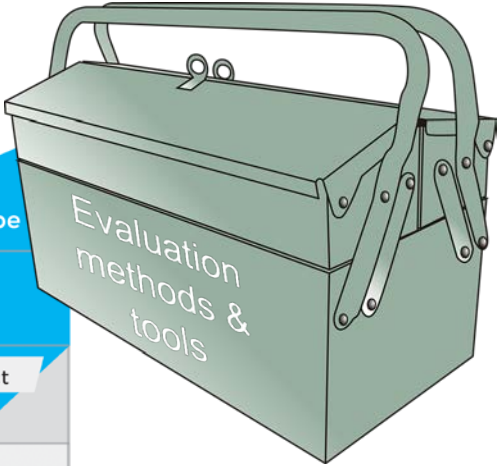
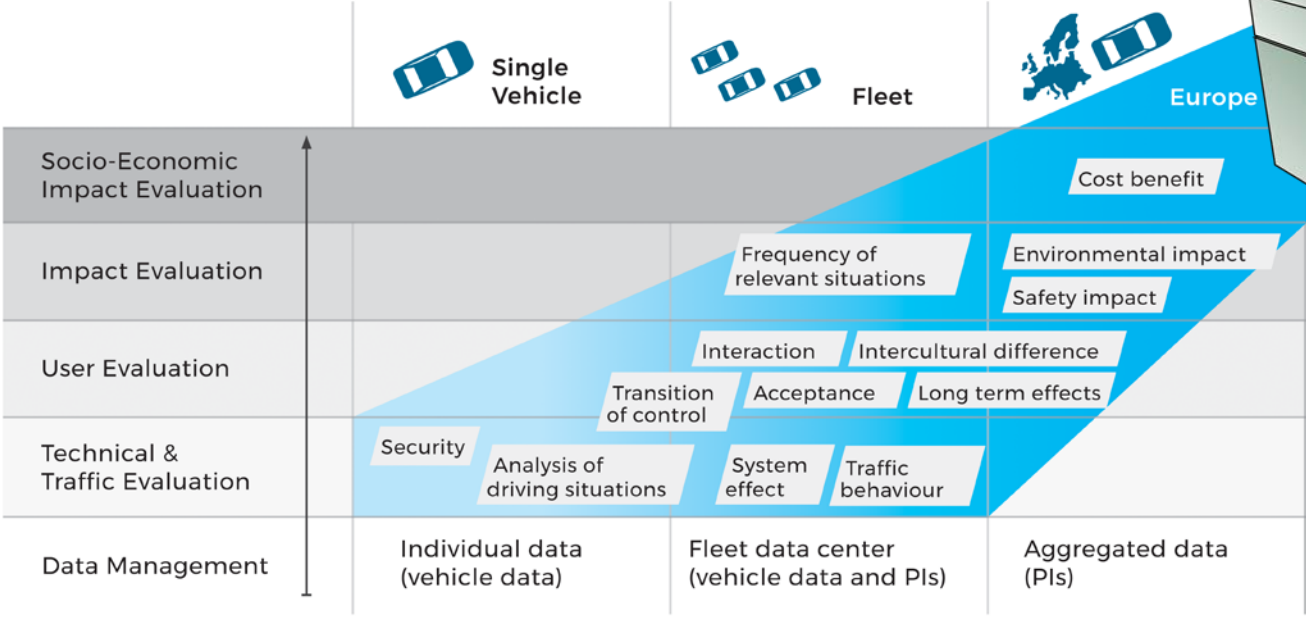


Step 2: Pilot site consultation

- **Support** on how to implement the methodology into practice
- Awareness of optimal solution vs. **Best practical solution** for a pilot study



Development of toolbox of evaluation methods: From analysis of direct field measurements to high-level socio-economic impact assessment



Foundation for successful evaluation

- Harmonised approaches across pilot sites, established partnerships between evaluation and pilots
- Smooth data flow from pilots via tools to all evaluation methods
- Multidisciplinary evaluation methodology
- Well-defined and tested evaluation plan for all research questions





Thank you for your kind attention.

Satu Innamaa
Satu.Innamaa@vtt.fi
+358 40 761 0717



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