

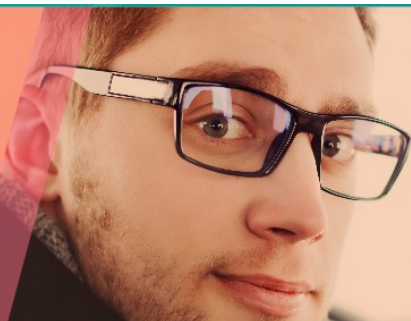
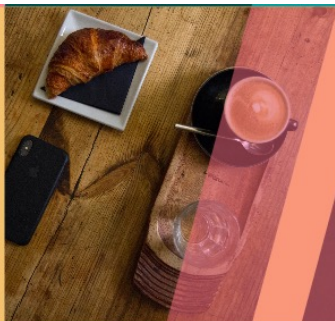


## Parking chauffeur - Results

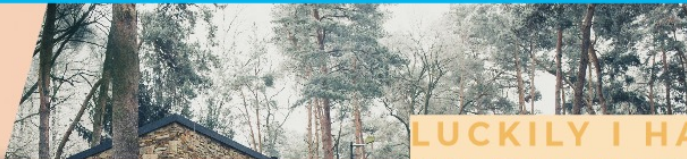
L3Pilot Final Event

**Barbara Metz**  
WIVW

# The parking chauffeur - functionality



## PARKING CHAUFFEUR



LUCKILY I HAVE  
MY PARKING  
BUDDY

The Parking Chauffeur allows the user to request their 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.



# Parking chauffeur – pilot testing

The parking chauffeur was tested

- in five studies
- at three pilot sites

In all studies, driving behaviour with the parking chauffeur active was compared to manual parking.

Users' evaluation of the system was assessed with a common questionnaire used across studies.



# The L3Pilot questionnaire

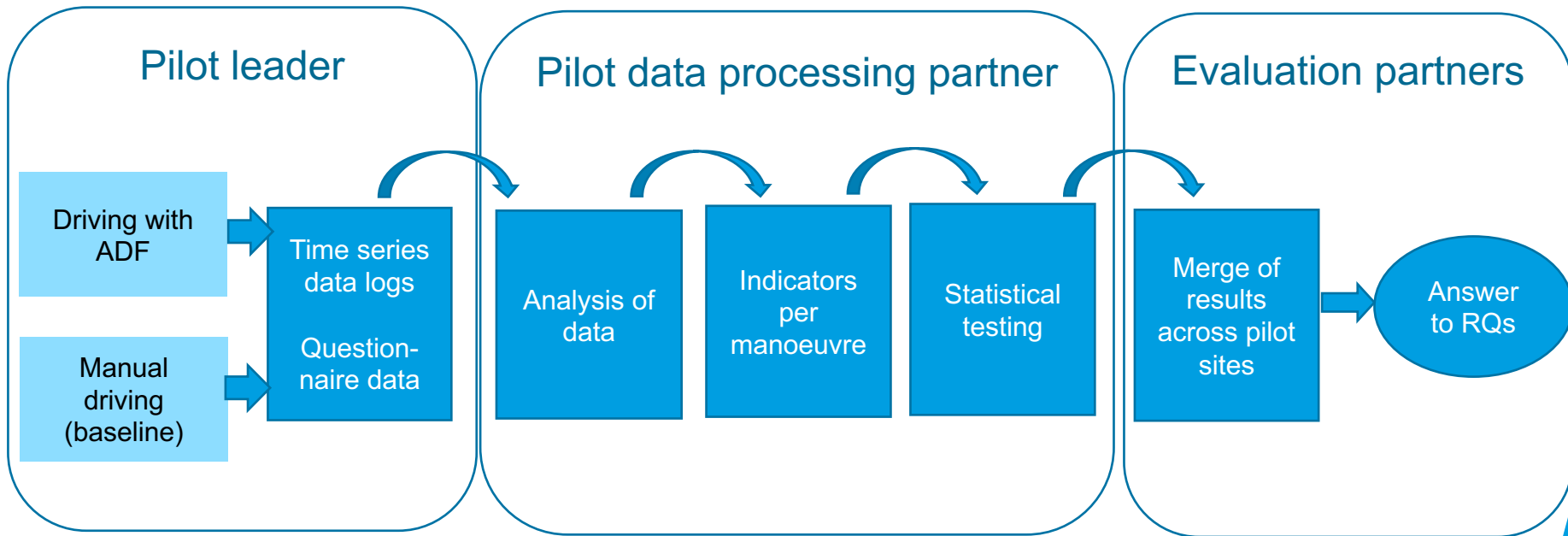
Throughout the project, a common questionnaire was used:

- Developed to specifically answer L3Pilot research questions.
- Adapted to all tested system types.
- Allows merging of data from different studies on the level of single questionnaire items.

The complete questionnaire can be found in  
D3.3 Evaluation Methods

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Don't know
33.a						
33.b						
33.c						
33.d						
33.e						
33.f						
33.g						
33.h						
33.i						
33.j						
33.k						
33.l						
33.m						
33.n						
33.o						
33.p						

# Parking chauffeur – data analysis process



## The parking chauffeur - database

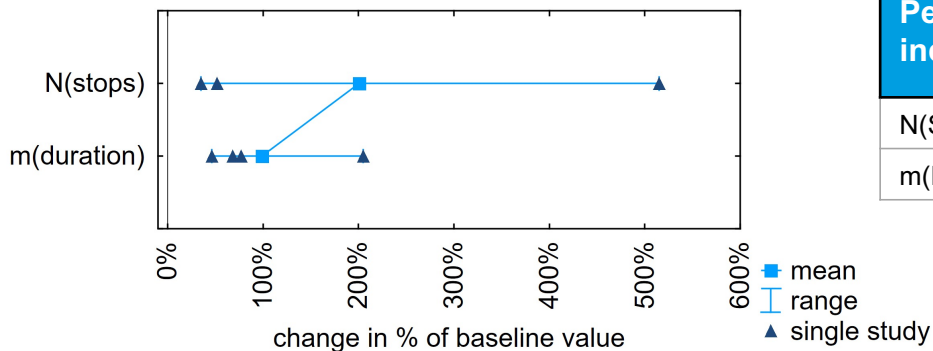
	Study1	Study2	Study3	Study4	Study5
<b>N Driver</b>	65	3	21	20	
<b>Driver type</b>	non-professional	professional	19% professional	5% professional	
<b>Age</b>	41 (sd = 10.8)	29 (sd = 3.6)	47 (sd = 15.9)	39 (sd = 11)	
<b>% Female</b>	23%	0%	0%	30%	
<b>N Manoeuvre Total</b>	692	51	21	1309	1750

For L3Pilot-results, individual results from the 5 studies are combined.

All studies have the same impact on the project results.

# How does the Parking Chauffeur impact the Duration of parking?

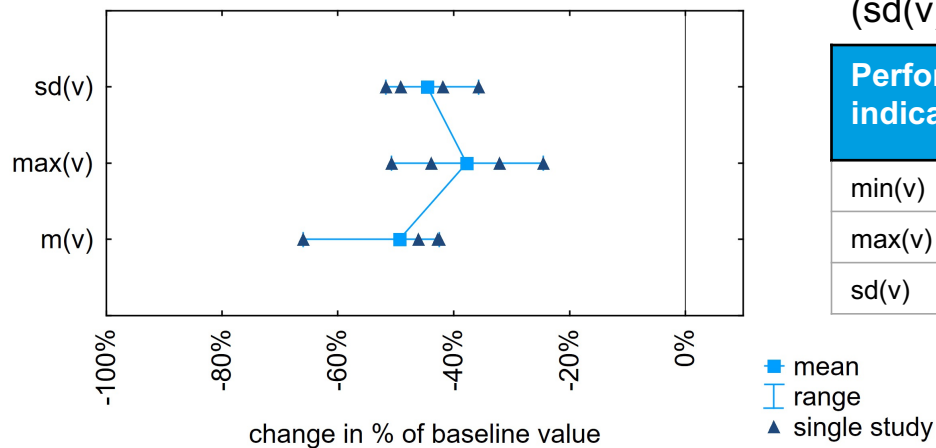
The parking chauffeur needs longer until final position (m(duration)) is reached and makes more stops (N(Stops)) than a human driver.



Performance indicator	N studies	% studies with significant	
		increase	reduction
N(Stops)	4	100%	0%
m(Duration)	5	100%	0%

# How does the Parking Chauffeur impact Speed?

The parking chauffeur drives slower ( $m(v)$ ,  $\min(v)$ ) than a human driver and varies less in speed ( $sd(v)$ ).



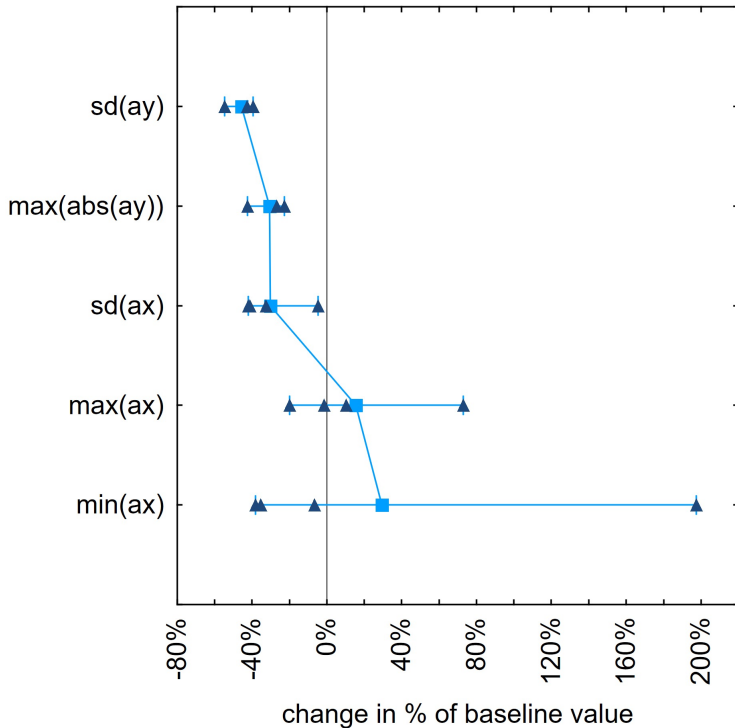
Performance indicator	N studies	% studies with significant	
		increase	reduction
$\min(v)$	5	0%	100%
$\max(v)$	5	0%	100%
$sd(v)$	5	0%	100%



# How does the Parking Chauffeur impact Vehicle Dynamics?

Lateral dynamics ( $\max(\text{abs}(a_y))$ ,  $\text{sd}(a_y)$ ) are reduced for all tested systems.

The impact on longitudinal dynamics ( $\min(a_x)$ ,  $\max(a_x)$ ,  $\text{sd}(a_x)$ ) differs between systems



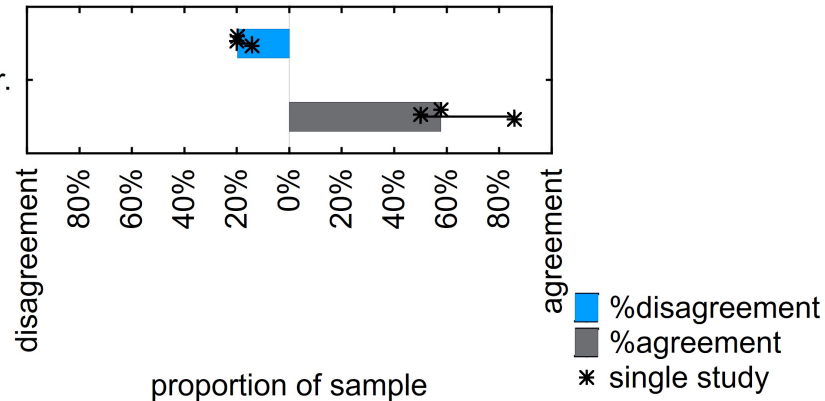
Performance indicator	N studies	% studies with significant	
		increase	reduction
$\min(a_x)$	5	20%	80%
$\max(a_x)$	5	20%	20%
$\text{sd}(a_x)$	5	0%	80%
$\max(\text{abs}(a_y))$	4	0%	100%
$\text{sd}(a_y)$	4	0%	100%

■ mean  
| range  
▲ single study

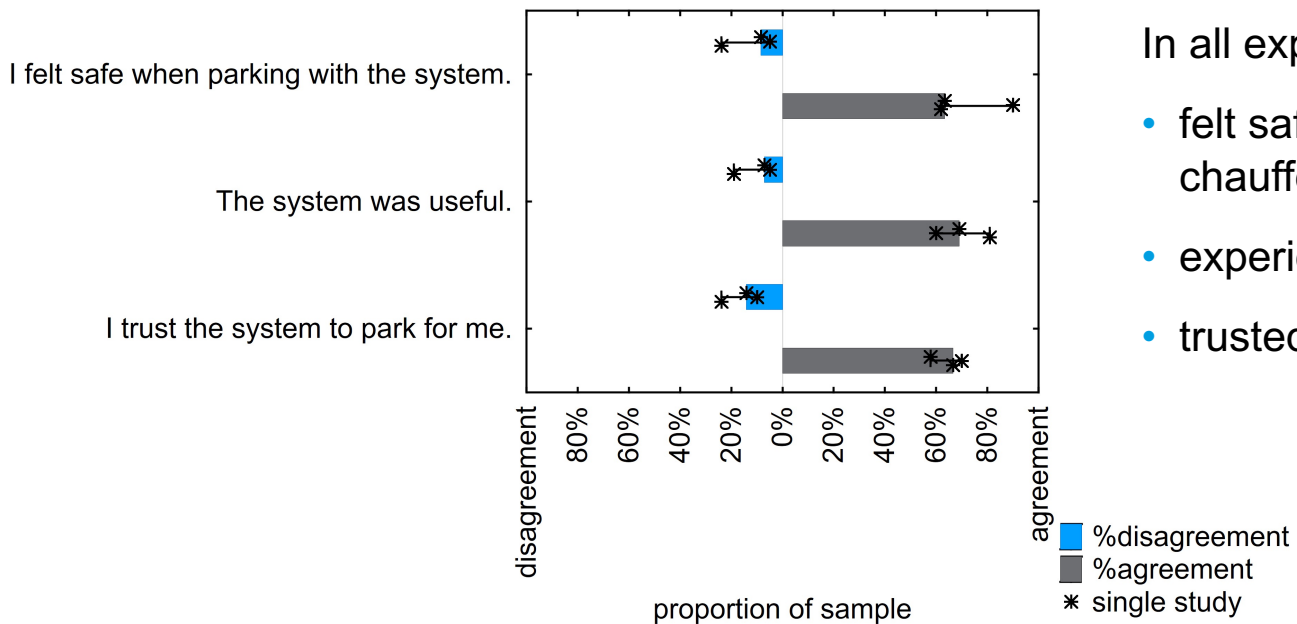
# Are Drivers Willing to Use a Parking Chauffeur?

In all experiments, drivers stated that they would use the parking chauffeur.

I would use this system if it was in my car.



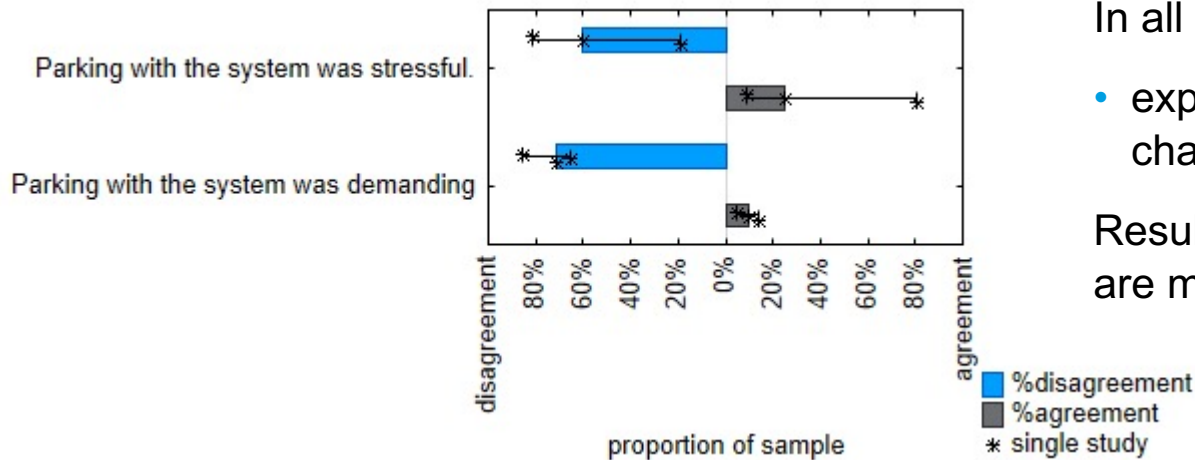
# What Is the User Acceptance of the Parking Chauffeur ?



In all experiments, drivers

- felt safe with the parking chauffeur.
- experienced it as useful.
- trusted the parking chauffeur .

# What Is the Impact of the Parking Chauffeur on Driver State?



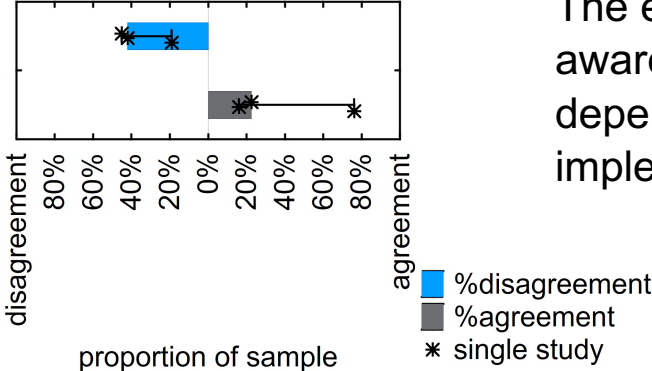
In all experiments, drivers

- experienced the parking chauffeur as not demanding.

Results on experienced stress are mixed.

# What Is the Impact of Parking Chauffeur Use on Driver Awareness?

I was more aware of the surrounding environment.



The effect on the experienced awareness of the environment depends on the system implementation.

# Summary & Conclusions

The parking chauffeur

- Drives slower than a human driver
- Needs more time and stops more frequently

Drivers state that they would use a parking chauffeur and trust the system.

The parking chauffeur is a highly accepted system.

It parks more cautiously than a human driver does.





Thank you for your kind attention.

Barbara Metz  
metz@wivw.de



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