



Field Tests (13:30-14:00)

Methods and results from CATAPULT

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CATAPULT has received funding by the European Union's Horizon 2020 research and innovation programme – URBAN EUROPE - Urban Accessibility and Connectivity Joint Call

What happened so far...

1. Literature research and expert interviews
2. Interviews and workshops with older people and children
3. Survey measuring the impact of the stated needs and requirements



The field studies

Aim: Understanding the needs and requirements of **children, older persons** and **persons with disabilities** towards autonomous vehicles

- 2 field studies in Linköping, Sweden and Pörtlach, Austria in autumn 2021
- Testing of existing autonomous bus shuttle solutions
- Navya and EazyMile autonomous shuttles



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Methods

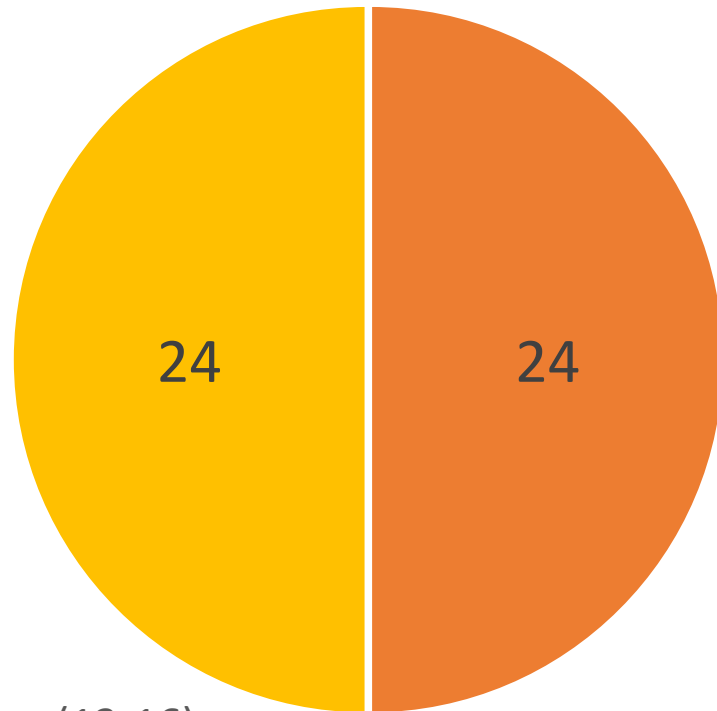
- Observation (AT, SWE)
 - Capture immediate behavior and comments of participants during the ride
- Focus group interviews (AT, SWE)
 - Asking about the experienced needs and barriers
- Questionnaires (AT)
 - Examining participant's assessment of the ride, bus stops and infrastructure as well as general attitudes towards autonomous shuttles.
- Further instruments for children (AT)
 - Concept cartoon
 - Just one step
 - Activity®

AT = Austria, SWE = Sweden



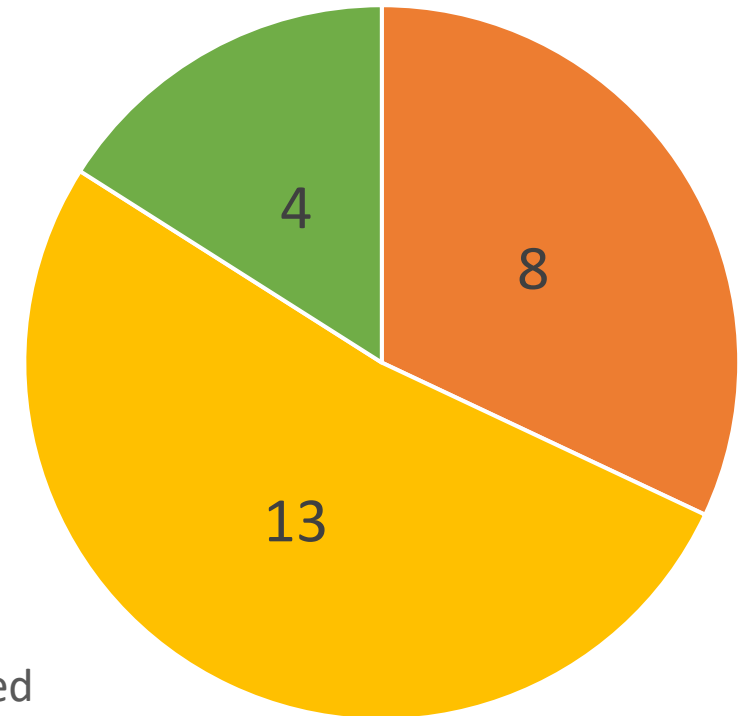
Participants (n = 73)

Pörtlach, Austria



- Children (13-16)
- Older persons (>=65)

Linköping, Sweden

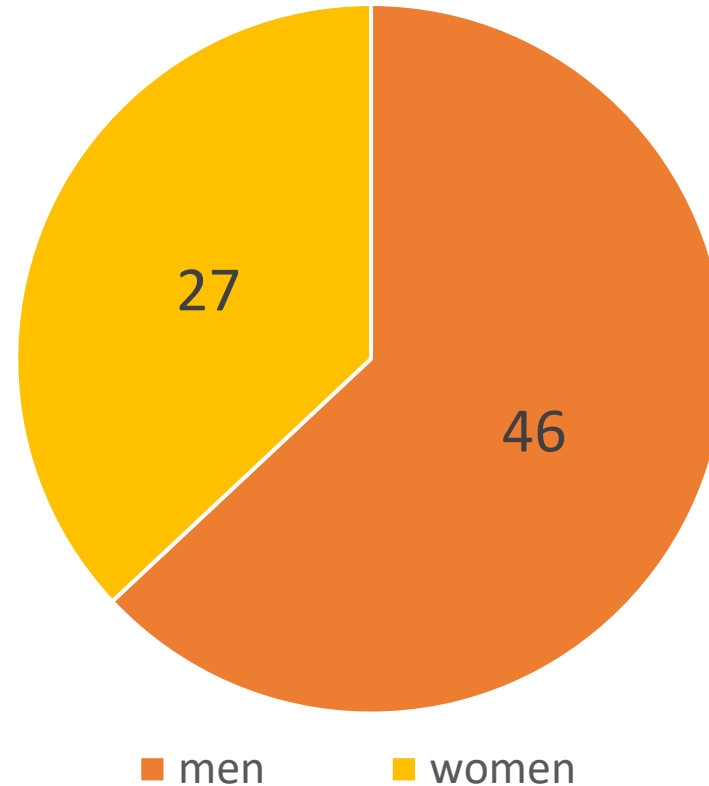


- Visually impaired
- Older persons (>=65)
- Cognitive impairments



Participants (n = 73)

Gender



Results



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Trust in autonomous busses

- Varies throughout the participants
- Depends on
 - Sense of security
 - Contact to outside person
 - Predictability of the bus
 - Sense of control
 - Trust in technology



Acceptability of autonomous busses

- Prior experiences with public transport influences experience
- Perceived safety
 - As a passenger
 - As a road user
- Timetable frequency
- Reliability



Physical accessibility of autonomous busses

Bus stop

- Distribution of bus stops. Small distances
- Safe, regulated and barrier-free infrastructure in the surrounding of the bus stop (e.g. crossing help)
- Physical layout and maintenance of the bus stops. Visibility

On the bus

- Duration of time the doors are opened
- Enough spots and space for wheelchairs, walkers, strollers, cargo and animals
- Physical button placement
- Wheelchair-ramp
- Adjustable suspension



Information management

- Human factor in ticketing and information management
- Available route tables at the bus stop (legible, braille, multilingual)
- Available apps, websites
- Acoustic callouts and signals as well as visual displays
- Self-explanatory bus use
- Detailed information explaining the current behaviour of the bus



Comfort

- Hard breaking maneuvers and jerky behavior unpleasant
- Busses are very slow
- Sufficient comfortable seating possibilities mandatory
- Enough grab handles and rails
- Seatbelts
- Dedicated space for luggage
- More toilets



Communication

- Remote operator or support via intercom or telephone
 - Ability to get into contact
- Passenger
 - Communicating assistance needs and requirements (e.g. getting off the bus)
 - Plain instructions in the event of incidents
- Communication of the bus with other road users
 - Plain instructions
 - No need for passengers to take action

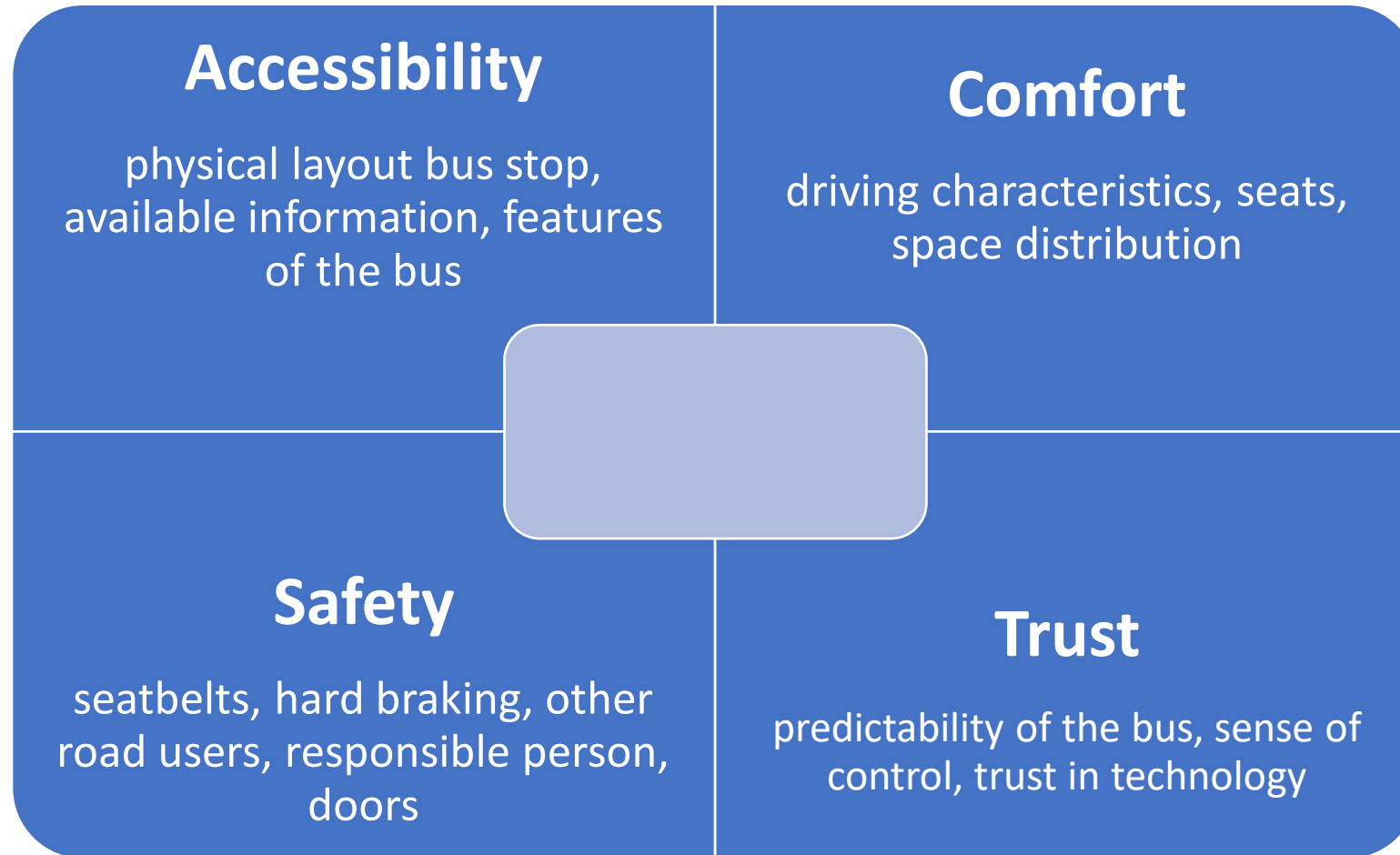


Potential Use Cases

- Shuttle service from car park to destination (e.g. city center)
- Within large bounded areas (e.g. shopping district, hospital complex etc.)
- Complementing public transport
- Sightseeing
- School bus
- On-Demand service
- In smaller cities connecting all POIs (shops, restaurants, doctors) and living areas
- Routes with little (oncoming) traffic, curves and intersections



Conclusions



Sufficient information about bus behavior

Communication with operators, bus and other road users

Use Cases: Small trips at specific places



Discussion

- Could you imagine using an autonomous shuttle in the future? If not, what's stopping you?
- What disadvantages or advantages for children, older people and disabled persons do you see when there are driverless buses?
- What could driverless buses be used for? What could be potential use-cases?
- What should the offer of the driverless bus look like? Should the offer work like a public bus or like a taxi? Or completely different?

