

EQUITY GAP: ADVANCING ACCESSIBILITY OF EMERGING MOBILITY SERVICES

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Motivation

- One in four EU citizen report a long-term disability, characterized by limitations in performing everyday activities for a period of six months or longer (Eurostat, 2018)
- Emerging mobility systems like ridepooling or robotaxis might contribute to advance accessibility of transport
-  Benefits like promoting independent travelling for visually impaired persons with autonomous vehicles (Bennett, Vijaygopal, & Kottasz, 2020)
-  Shared mobility systems are also expected to decrease accessibility due to cost-related or skill-related exclusion (Milakis, Gebhardt, Ehebrecht & Lenz, 2020).
- Understanding users' accessibility requirements is a prerequisite for inclusive design
- The affected know best themselves what would make these systems more accessible

The TRIPS project

- **T**Ransport **I**nnovation for vulnerable-to-exclusion **P**eople needs **S**atisfaction
- Funded for 3 years by the EU Horizon 2020 (02/20 – 01/23)

11 Partners

7 Cities



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Project objectives



Objective 1

To understand disabled citizens' mobility needs, mobility barriers, and attitudes towards future mobility solutions



Objective 2

To review trends in future mobility and digital assistive technologies



Objective 3

To develop a co-design-for-all methodology and evaluate resulting mobility solutions in pilot case studies



Objective 4

To engage disabled citizens and institutional actors in developing policy and industry recommendations

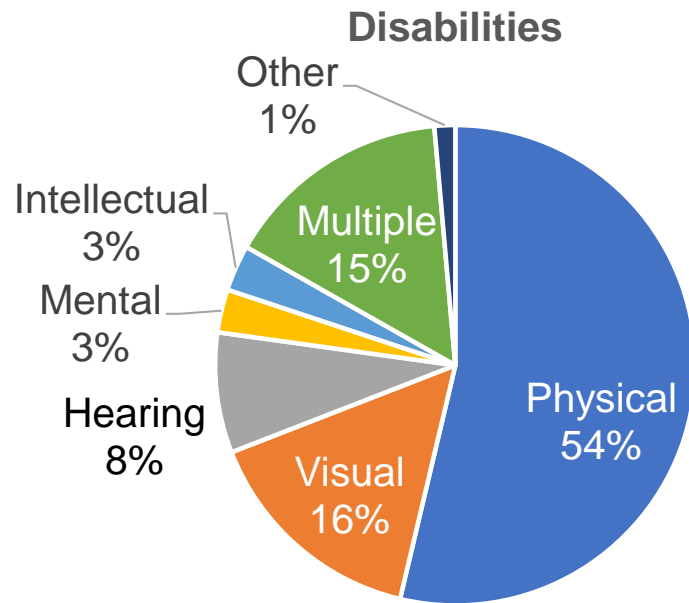
TRIPS Mobility Survey

- Available in 15 languages during winter 2020/21
- Addressed topics:
 - local transport quality and effects of COVID-19 pandemic
 - assessment and use intention of six emerging transport services and technologies
 - suggestions for improvements: “What would you need to make this system work for you?”



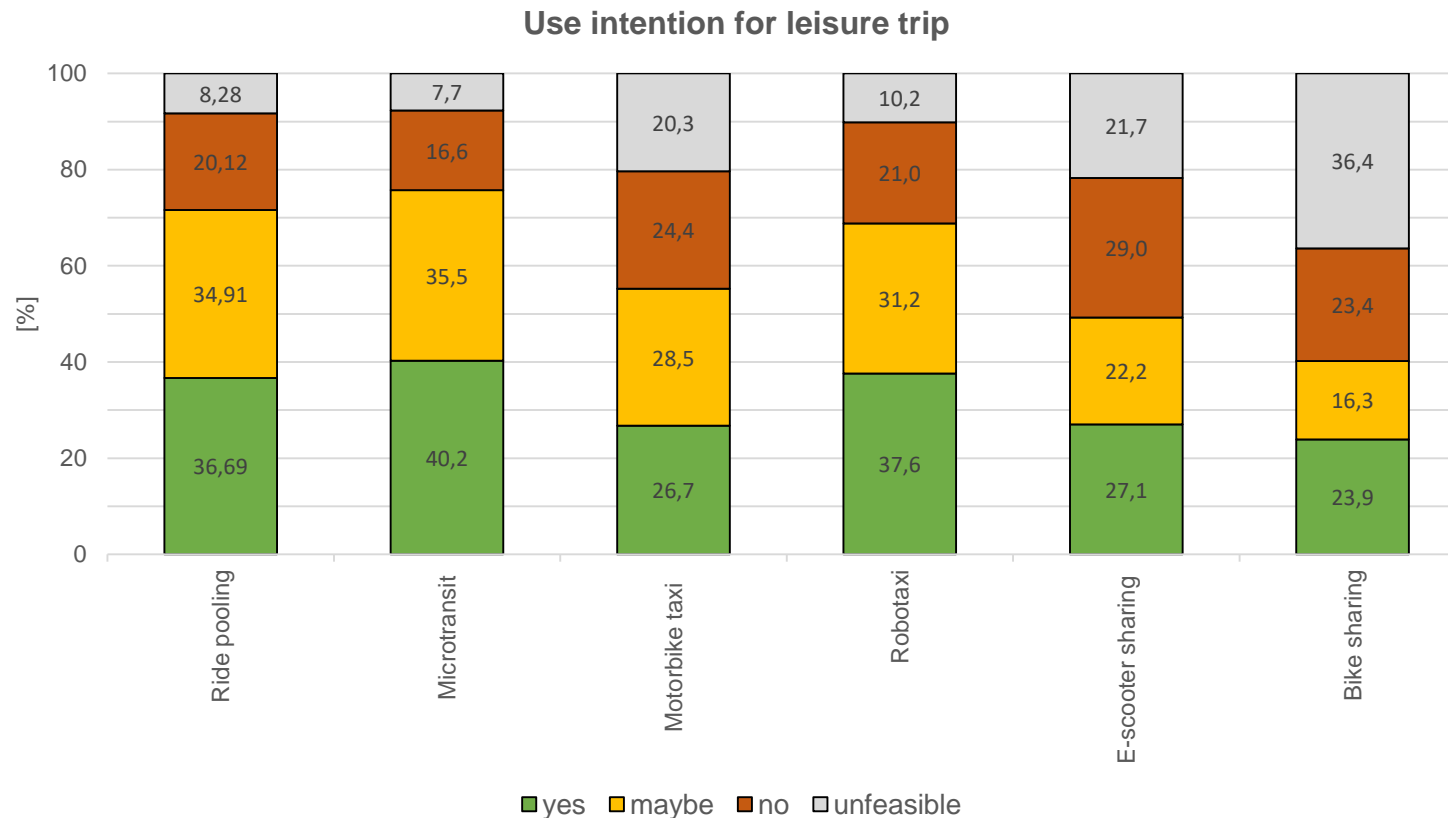
Sample

- N = 553 from 21 European countries
- 46% female participants
- Mean age: 46.4 years ($SD = 15.7$)



Findings - Use intention

- Use intention for shared mobility systems was rather low, especially for two-wheelers and self-controlled means, like bike sharing (Goralzik, König, Alčiauskaitė & Hatzakis, 2021)



Findings – Suggestions for advancing accessibility

- “What would you need to make this system work for you?”
- Inductive category development approach of qualitative content analysis (Mayring, 2004)
- More than 660 suggestions clustered to eight topics:
 1. service design aspects
 2. vehicle design concepts
 3. social awareness and training of staff
 4. policy measures and regulations
 5. infrastructure measures
 6. safety
 7. human-machine-interaction
 8. affordability

| Code System | Robotaxi | Bikesharing | E-scooter sharing | Microtransit | Motorbiketaxi | Ridepooling |
|-----------------------------------|----------|-------------|-------------------|--------------|---------------|-------------|
| service design aspects | | | | | | |
| registration, booking & payment | | | | | | |
| service quality | | | | | | |
| on-demand service | | | | | | |
| door-to-door service | | | | | | |
| availability | | | | | | |
| temporal availability | | | | | | |
| spacial availability | | | | | | |
| shorter travel times | | | | | | |
| reliable and predictable ser | | | | | | |
| vehicle design concepts | | | | | | |
| single-use vehicle / avoidance of | | | | | | |
| entry and exit | | | | | | |
| enough time | | | | | | |
| careful start | | | | | | |
| electric ramp | | | | | | |
| easy access and entry | | | | | | |
| wheelchair accessible | | | | | | |
| space requirements | | | | | | |
| comfort | | | | | | |
| alternatives to wearing a h | | | | | | |
| comfortable seats | | | | | | |
| adapted vehicle concepts | | | | | | |
| availability of seat | | | | | | |
| back rest | | | | | | |
| individually adjustable | | | | | | |
| four-wheelers | | | | | | |
| measures for increasing ste | | | | | | |
| equipped with assistance s | | | | | | |
| electric support | | | | | | |
| additional rebuild | | | | | | |
| handbikes | | | | | | |
| self-driving | | | | | | |
| compatible with wheelchair | | | | | | |
| tricycles | | | | | | |

Suggestions for advancing accessibility

| | Bike sharing | E-scooter sharing | Ride pooling | Microtransit | Robotaxi | Motorbike taxi |
|-----------------------|---|---|---|---|--|--|
| Vehicle design | <ul style="list-style-type: none"> • four-wheelers, tandem, handbikes • electric support • adjustable steering wheel • autonomous driving | <ul style="list-style-type: none"> • additional wheels • self-driving • seat • two-person vehicle for accompanying person • self-balancing | <ul style="list-style-type: none"> • Automatic ramp • legroom | <ul style="list-style-type: none"> • separate compartments • automatic ramp | <ul style="list-style-type: none"> • automatic ramp | <ul style="list-style-type: none"> • wheelchair-compatibility e.g. trailer • rain protection • foot- and armrest • Lowering of the vehicle |
| Service Design | <ul style="list-style-type: none"> • environment monitoring and warning • free-floating | | | | | <ul style="list-style-type: none"> • alternatives to helmet |
| HMI | <ul style="list-style-type: none"> • app without foreign words | <ul style="list-style-type: none"> • easy language with pictorial representation | <ul style="list-style-type: none"> • app book • locatability of virtual stops | <ul style="list-style-type: none"> • Avatar for hearing impaired | <ul style="list-style-type: none"> • transcription, voice commands • multi-sensory identification of pick-up stops | <ul style="list-style-type: none"> • app accessible to screen readers |



Measures for advancing accessibility

Short-term measures

- Offer booking systems that do not require mobile internet access
- Easy-read booking apps
- Provide adapted vehicles like tandems or tricycles in sharing fleet

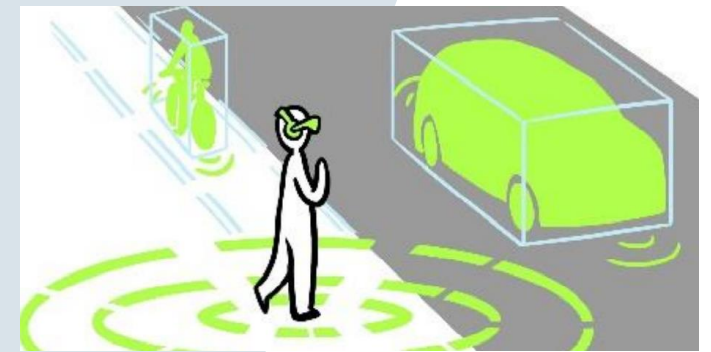
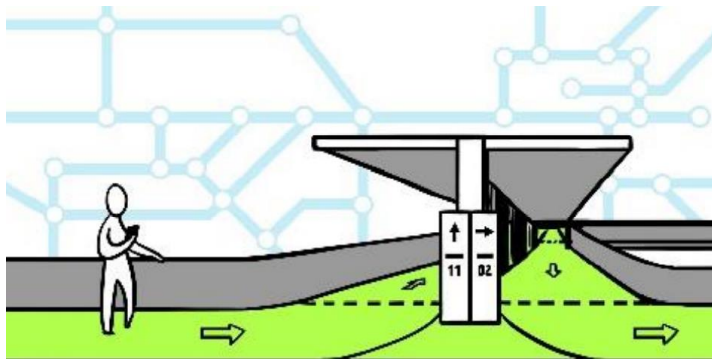
Medium- & long-term measures

- Infrastructure measures like dedicated lanes
- Develop and test compartment concepts in public transport
- Develop ways for virtual stop identification

Most of the suggestions for improvements, such as separate infrastructure or reliable and predictable information, would also benefit people without disabilities.

Next steps

- Revision of the TRIPS Mobility Survey to include other vulnerable-to-exclusion people, like elderly
- Co-creation of inclusive mobility solutions and pilot testing in the seven partner cities
- Development of a comprehensive roadmap with policy and industry recommendations



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Thank you!

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For further information about the project
please visit <https://trips-project.eu/>

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