

TRansport Innovation for disabled People needs Satisfaction



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Abstract	<p>This report seeks to investigate and describe the lived experience of travel amongst persons with a disability and apply the emerging technology concepts to seek innovations to address the difficulties experienced. This report describes the findings of user evaluations of mobility solutions and linked services and the design concepts developed during seven co-design workshops implemented in different European countries under the participation of users with a disability, public transport providers and other stakeholders in accessible transport.</p> <p>The workshop results are presented and analysed in the section on the methodology applied for the workshops' design and implementation.</p>
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Acronyms

Abbreviations	Explanation
AR	Augmented Reality
CUT	Core user team
DfA	Design for all
DoA	Description of Action
IoT	Internet of Things
LUL	Local user lead
MDI	Mobility Divide Index
PEST-analysis	Political, Economic, Social, Technological analysis
RtD	Research through design / Research through Art and Design
RTLS	Real time location system
TRIPS	TRansport Innovation for disabled People needs Satisfaction
TRL	Technology Readiness Level
UD	Universal design
UNCRPD	United Nation's Convention on the Rights of Persons with Disabilities
WHO	World Health Organization
WP	Work package



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1. Summary

The objective of the TRIPS project's Task 4.2, "**Evaluate Mobility Trends and Develop Design Concepts**", is to evaluate future inclusive digital mobility solutions from a user perspective and outline alternative propositions where necessary.

To meet this objective, seven workshops were held in different European countries involving transport service users with disabilities, representatives of the public transport sector and assistive technology and accessibility experts. During the workshops, difficulties and barriers experienced by service users were reported and analysed. Also, innovative concepts for future mobility scenarios were discussed. Participants suggested additional ideas for disruptive innovative solutions and incremental ideas based on more or less existing technologies.

The objective of Task 4.3, "**Assess Institutional Drivers and Barriers to Adopting**", is to understand institutional barriers to developing inclusive mobility alternatives that are attractive to users. A 2nd series of workshops was held with the same participants to discuss and analyse the previously developed concepts' possible impact and feasibility.

In this deliverable D4.2, the workshop methodologies are presented and the outcomes of the workshops. In deliverable D4.3, the workshops' results are presented, and their possible impact and feasibility further analysed.

A key finding was that people with a disability welcomed innovative technologies that would address mobility barriers and mitigate and reduce their impact in the future. This process should be continued, and the co-design workshop model seems to have the potential to do so successfully. Regular workshops hosted by lead organisations could help foster opportunities and contribute to the successful implementation of design concepts.

In combination with other WP4 deliverables, this report outlines a set of priority areas for innovation and key accessibility indicators for future mobility solutions and services for inclusive digital transport systems to be further explored in WP6 and WP7.



2. Introduction

This deliverable reports on work undertaken in WP4, more specifically under task 4.2. and 4.3. and should be read in conjunction with D4.3.

2.1. Objectives

WP4 serves as a bridge between WP2 and WP3 on the one hand and WP6 and WP7. In WP2, the barriers that travellers with disabilities experience have been identified with the local user teams. In WP3, desk research into the impact of the technological development on transportation trends, accessibility and assistive technology has shaped a picture of the rapidly developing technical context relevant for the TRIPS co-production activities of WP6. The objectives of Tasks 4.2., 4.3. and 4.4. were to synthesis this information and evaluate and prioritise inclusive mobility challenges and solutions as groundwork for WP6 and WP7.

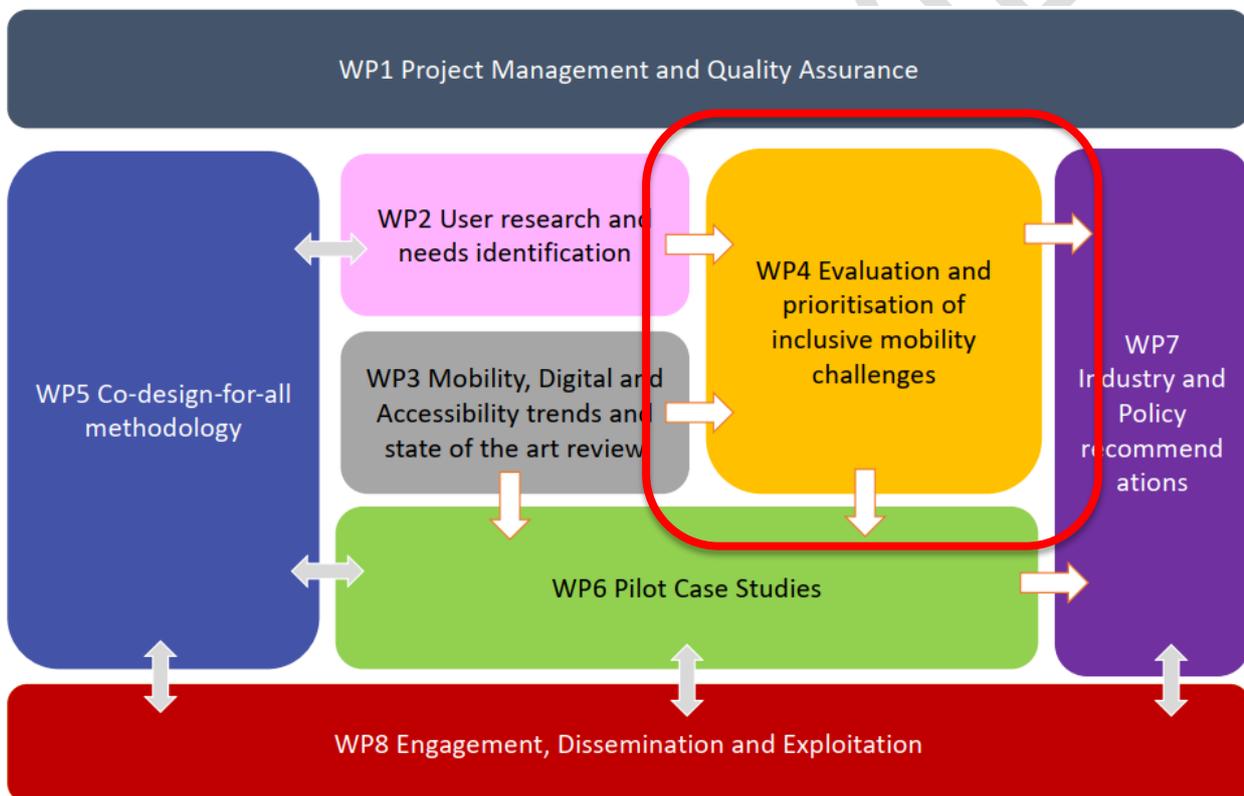


Figure 1 Workstreams within the TRIPS project

A co-design and co-production methodology was chosen and implemented for workshops with different stakeholder groups, focused on developing design concepts for inclusive mobility and transportation (T4.2.) and identifying the institutional and broader barriers for their realisation (T4.3.).

In the description of action (DoA) Task 4.2. sought to conduct "five sandboxing workshops to:



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(a), assess the accessibility of future mobility solutions (as identified in WP3) and anticipate unmet needs and

(b) explore plausible innovations across transport, ICT and accessibility to address them".

Task 4.2 would bring together "30 users, transport, ICT and accessibility experts to review mobility solutions together and co-develop Design Concepts of future mobility solutions that are equally accessible, intuitive and friendly to all users".

Task 4.3 promised "a series of workshops (5) for institutional actors with users' participation to discuss the institutional barriers to the appropriation and implementation of suggested technologies and discuss potential solutions. Users will also participate in these workshops to understand the practical implications and offer alternative solutions and ideas acceptable by the community. This will result in a cost and benefits analysis of the mobility solutions, an assessment of their Technology Readiness Levels (TRL) that indicates the likelihood and readiness of the transport ecosystem to adopt them, and a list of contextual, policy, social, cultural and other factors beyond the agency of the ecosystem that should be resolved to unlock their adoption. They will inform a list of policy recommendations for validation and inclusion in the roadmap developed in WP7."

Finally, Task 4.4 leads to a Prioritised List of Potential Inclusive Mobility Solutions, to be handed over to WP6 to scope the work in the pilot cities/regions. This is undertaken in conjunction with the implementation of the new metric (*the Mobility Divide Index as developed under Task 4.1. / D4.1.*), measuring the accessibility of transport from the perspective of the disabled user.

2.2. Implementation challenges

Four factors have majorly impacted the implementation of the tasks as per the DoA, leading to an adaptation of the original approach:

1. **The pandemic** has made it impossible to organise the workshops as initially planned: in a central location using the maximum engagement tools to involve participants and stimulate their creative thinking. This has led to the decision to move all workshops online and to abandon the centralised approach.
2. The **wish to involve as many stakeholders as possible**, particularly persons with a disability, and **lower the barriers to participation**. This has led to the decision to focus on workshops in the TRIPS project's national languages, namely Portuguese, Swedish, Bulgarian, Croatian, Italian, French and English (pilot workshop). It has been possible to reach three crucial objectives: a) involving more people, b) facilitating co-design by removing linguistic barriers, particularly for users, and c) supporting the project's dissemination nationally.
3. The strategic goal to build both content connections between WP2 and WP6 and provide **continuity in the involvement in the project implementation**. It would have been against the project's nature to foster co-production, not involve persons with disabilities and transportation providers working in WP6 to evaluate and prioritise the innovative ideas coming from WP4.
4. The **awareness that "prioritisation" is difficult** when the group of transportation service users is not homogeneous. Neither are the contextual factors in the cities that determine the feasibility of solutions. The only factors that reasonably can inform prioritisation are the Technology Readiness Level (TRL) and the expected



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impact and incidence criteria. However, where a degree of consistency across cities can be identified, a concept is applicable in the broadest range of settings. Those ideas are given additional weighting to inform the prioritised list. Such ideas are likely to be of interest to the most significant number of locations and, hence, can access the broader markets and potentially reduce unit cost.

As a result, the choice was made to organise the data collection as one co-production process involving all stakeholders at the national/city level in two different workshops: the first focusing on co-design of innovative solutions for inclusive mobility and transportation, the second on the technology-related, social, political and economic barriers to their realisation, as well as on their potential impact and incidence in case of completion. The first workshop's expected outcome was a list of currently experienced challenges for disabled travellers and innovative ideas for their solution. The second workshop's desired output was an analysis of the feasibility and desirability of the solutions.

This deliverable is a description of the workshop methodologies applied, a report on their implementation, and a description of the design solutions.

In deliverable 4.3 we will report on the same ideas according to feasibility and desirability, leading to different prioritisation based on different criteria.



3. Methodology and Approach

3.1. General approach: co-design and co-production

The workshop design approach was firmly based upon the four tenets of the TRIPS participatory framework. Participatory inquiry; Participatory ethos; Components; and Practical strategies. These provided the basis of the workshop design. We sought to reflect the cultural, interpersonal, structural and policy-related conditions unique to each of the participants, recognising the diversity of their roles related to transport and their lived experience. Further details about the theoretical framework can be found in deliverable D5.1.

To ensure a shared understanding of the barriers and opportunities across the groups of participants, the workshop design encouraged co-production, co-design and co-creation of ideas in an open and honest atmosphere, drawing upon information and examples prepared in advance to illustrate both barriers and opportunities.

The workshops gave room for discussing and brainstorming ideas with the option for additional interviews as required. It was recognised that participants faced particular challenges due to the pandemic as travel and transport had become extremely limited and constrained. The limitations of public transport to support social distancing were clear. The fear was expressed that possible long-term damage to operators' business could limit their willingness to explore innovative solutions.

Such constraints and parameters only stress the need for workshops based upon co-design and co-production to recognise all participants' everyday experience and let go of prior assumptions of what each person brings to the design process. As a result, facilitating co-design and co-production during this period required a flexible approach and facilitators to flexibly respond to the direction the participants wished to take in the discussions whilst bearing in mind the desired result and purpose of the workshops.

3.2. Workshop design

The TRIPS workshops were planned to deliver a series of transport innovations that have been co-designed by stakeholders and incorporate a degree of evaluation for potential mitigations. In preparing the workshops, it was essential to recognise that because of Covid and public response, local needs in each of the partner cities would vary and, with this, the design of the final delivery. As a result, the workshops were planned as a series of units that partners could combine for use in 1 day, 2 day or 3-day workshops of variable length and delivered online or in face-to-face meetings if feasible.

The units' design was tested in an English-speaking pilot workshop before reviewing and updating each partner city's content and translation.

In introducing the units, a series of objectives were outlined to focus on the desired outcomes. These objectives were defined as:

- To generate as many accessible mobility ideas coming directly from users with a disability.
- To understand what makes these ideas desirable.
- To discuss how we can turn some of these ideas into reality.



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- To discuss what are the barriers we will face and what we can do about them altogether.
- To create a prioritised list of co-designing ideas that we can select from for WP6 of the TRIPS project.
- To create a barrier list to overcome and partners to progress towards signing an MoU to address these barriers in WP7.

UNIT 1 - Our Travel (estimated time 50 minutes)

Unit 1 focussed on participants considering how they currently travel and how they would describe their ideal future scenarios.

At the end of the unit, participants should have: -

- Outlined a recent journey made.
- Listed the different forms of transport used.
- Identified the most popular forms of transport.
- Identified the parts of a journey that were most challenging.
- Suggested why these are difficult.

UNIT 2 - Future Travel Concepts (estimated time 75 minutes)

Unit 2 focused on describing some of the innovative technologies that could impact travel and suggested that innovation could influence a new form of accessible transport or address a specific barrier experienced using current transport solutions.

At the end of this unit, participants should have:

- Reviewed examples of design concepts.
- Imagined examples of their transport design concepts.
- Considered potential barriers at each stage of a journey.
- Discovered emerging technologies that could support accessible travel.
- Considered how new and emerging technologies could address specific barriers experienced.

UNIT 3 - Impact of Our Concepts (estimated time 60 minutes)

Unit 3 sought to add detail to the design ideas generated in Unit 2 and began evaluating those design concepts by considering each idea's impact and desirability. The evaluation used some of the principles utilised in the design of the Mobility Divide Index (MDI) within the TRIPS project.

The MDI is a multi-level indicator designed to measure the gap that citizens with access needs must overcome to use public transport in the same way non-disabled citizens do.

The structure of the index has been shaped as a multi-level framework, comprising a set of factors organized under discreet dimensions that, in combination, reflect different facets of the mobility divide.

For the workshops, a “Light-MDI” methodology was designed to rate the expected impacts of the design concepts. This excludes factors associated with each dimension from consideration. In essence, the “Light-MDI” has been designed to allow participants to express their positive expectations and even concerns, motivate them to focus on



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different aspects and discuss differences in their expectations that may reveal assumptions about the design concepts. At the end of the unit, the participants should have:

- Added detail to the design concepts and solutions.
- Completed an example of a solution to identify how valuable it would be to travellers with a disability.
- Discussed and considered further examples to highlight the value of each.
- Suggested and begun to prioritise the innovations which appeared to offer the most significant impact.

UNIT 4 - Making the Concepts Real (estimated time 60 minutes)

Unit 4 sought to bring together the design concepts to consider the factors that would enable or limit the capacity to implement the innovation in each city. Each design concept was investigated using a PEST analysis tool through which stakeholders considered the design through the lens of Political, Economic, Social and Technology perspectives. This analysis leads to the identification of enablers, constraints and mitigations for each concept.

At the end of the unit, participants should have:

- Summarised everything completed to date.
- Understood the PEST analysis and considered each perspective.
- Considered the enablers, challenges and mitigations that would influence the implementation of each concept.
- Produced a final list of ideas with suggested opinions of impact and ease of implementation.

3.3. Pilot Workshops Review

An initial set of resources to support the planned workshops were developed during September and October 2020, and two pilot workshops with the materials were delivered in English in November 2020. AAATE team members primarily led the workshops with support from partners.

Attendance of the pilot workshops was by invitation and included subject matter specialists, and local user leads from some of the target cities. This allowed the workshops to offer a dual role in introducing some of the workshop concepts to the cities to prepare them for local delivery in January 2021.

Twenty-three people attended workshop 1 and 16 for workshop 2; many recruited from outside the consortium among those having shown interest in the project.

The content was divided into two parts, broadly focussed on travel experiences and design concepts in part 1 and analysis of desirability and feasibility in part 2. A bridging activity between the two workshops helped to ensure continuity between the two sessions.

In this case, the pilot workshops were delivered on consecutive Saturdays 14 and 21 November 2020. While these dates were acceptable to those attending, some concern



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was expressed that when the workshops were offered locally, weekends would not be the preferred option.

Key actions based on the feedback received included:

1. Ensure that all participants receive the slides before the sessions to familiarise themselves with the content.
2. Slides and materials should be in an accessible format suitable for use by those with print impairments, including low vision.
3. Slide content should be reduced to reduce visual complexity.
4. Options to receive content in word document would be welcomed by some attendees.
5. A guide to support the local facilitators to explain how to deliver the workshop would be beneficial.
6. Additional guidance for facilitators as footnotes to content would help in the delivery.
7. Task descriptions needed to be more concise, primarily to support translation.
8. It was essential to ensure that facilitators clearly stated the aims and purpose at the workshops' beginning.
9. Offer alternative means of capturing ideas that were appropriate to the audience.
10. Do not spend too long introducing the team and ice-breaking as participants would prefer to engage in the work as soon as possible.
11. Ensure that discussion in any online chat is shared with the group and facilitators.
12. If possible, during the exercises, display a timer counting down the available time.
13. During the exercises, repeat the question/task every 2 minutes or give an additional prompt to help participants.
14. Between the exercises, come back to the bigger picture, always set every new exercise into the context of the workshop's overarching objective concisely.
15. Allow time for two people to share their answers after every exercise to make it more interactive and inspiring.
16. Remind people periodically to state their name when starting to speak.

It was also noted that the timings of the sessions might not be appropriate to all settings. To address this, the materials should be produced on a more modular basis so that cities could recombine them when workshops times varied or where the number of workshops changed. At the design stage, the restrictions on group meetings varied across cities, and it was noted that the content should be suitable for being presented in both a physical meeting room and virtual. In practice, those might need to be blended with some participants physically present and others attending remotely.

The feedback also noted some concerns, especially amongst attendees with a disability, that they wished to focus on immediate transportation issues (incremental change) rather than new and innovative transport approaches. Whilst this was recognised, it was important that the project explored innovation in both the short and longer-term. As a result, the content and facilitators were encouraged to stress the value of both approaches.

As a result of the feedback in the pilot workshops, the following actions were taken.

- All content was made accessible according to best practice guidelines.



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- All content and support materials were produced in a modular format for use by cities.
- Content was revised to streamline running time and reduce the time that could be considered non-productive.
- A guide for facilitators was produced, alongside delivery notes in the slide deck.
- Each city was allocated an AAATE member to help prepare the workshops and take further feedback to guide facilitators and those supporting the workshops.
- A more comprehensive range of innovative design concepts was incorporated to represent the variety of user needs and potential solutions.

UNDER REVIEW



4. Workshop implementation

4.1. Recruitment

The recruitment of the participants to the workshop was managed through different channels. In each country, a core group of organisers was identified with a potential facilitator, organiser and Zoom technician. Each core group was supported by a project staff member of AAATE who had several organisational meetings with the local teams to prepare the workshops. An invitation flyer was designed in English and translated into some of the languages.



Figure 2 Map of Europe with the cities where the workshops were held

At first, the Local User Leads were approached and asked to involve a group of persons with disabilities. In the countries with a local partner organisation (Portugal, Croatia and Italy), this partner was actively engaged and invited to share responsibility for the workshops' organisation. AAATE approached its members and network in the countries involved and, in this way, managed to find facilitators and participants for Portugal, Sweden, Bulgaria, Belgium and Italy. Also, UITP played an active role in recruiting participants from the world of public transport. This turned out to be a beneficial contribution in Bulgaria and Belgium, where the transportation providers are not well connected to the project yet. The overall result is summarised in table 1, which shows the total number of participants per country and stakeholder group involved in at least one of the two or three workshops. Details are provided in Annex 1.

City	Persons with disabilities	People with expertise in transportation	People with expertise in ICT/AT /Accessibility	Other
Croatia	7	3	6	1
Italy	8	6	5	3
Portugal	5	2	3	2
Sweden	6	5	4	2
Bulgaria	7	2	4	3
Belgium	6	3	3	4
Total (100 participants)	38	21	27	14
Dry run pilot (English)	3	2	12	5

Table 1 Participants per country in at least one of the two/three workshops



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Some workshop participants have different roles and therefore belong to different categories at the same time. The category of "Other" includes participants from the city authorities as well. Further details about participants and their participation in the workshops can be found in Annex 1.

4.2. Timetable

The workshops were implemented according to the following timetable (table 2):

Country	Team (F)=facilitator	January 2021 (weeks)					February 2021
		1	2	3	4	5	
Croatia	Ognjen Andrić (F) Mustafa Sharifi		8/01/21	13/01/21	18/01/21		
Italy	Riccardo Magni (F) Cristiana Mameli (F) Evert-Jan Hoogerwerf			11/01/21	18/01/21		
Sweden	Jamie Bolling (F) David Rusaw (F) Sofi Fristedt			14/01/21	22/01/21		
Belgium	Timothy Ghilain (F) Merlin Gillard & Fabrizio Albani Nadia Hadad			14/01/21		28/01/21	
Portugal	Diogo Martins (F) Sérgio Lopes (F) Pedro Encarnação João Vieira					26/01/21 29/01/21	
Bulgaria	Maurice Grinberg (F) Evgeniya Hristova Kapka Panayotova Mitko Nikolov					29/01/21	05/02/21

Table 2 Calendar of the workshops

1 st Workshop	
2 nd Workshop	
3 rd Workshop	

4.3. Tools

To support the local teams, documents were prepared, including:

- A Guidance document (Annex 2) covering the following topics:
 - Objectives and general expected outcomes



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- Recruitment of participants: advice on the number of participants and composition of the group (travellers with disabilities, AT and accessibility experts, transportation providers...)
- General scheme for planning workshop organisation at national level, including advice for recruitment and definition of roles (facilitator, technical manager, tutor)
- Scheme of co-design workshop execution: plan for the four units
- Accessibility advice list: referred to the lesson learned during the Dry-Run experience
- Technical guide about the management of Zoom platform, such as breakout room functions
- Slide presentations following the workshop flow with content input for the discussions, exercises, and time management indications.
- A reporting template for the local teams to record the workshop outcomes and outputs and report to the task leaders.

The AAATE Zoom room was made available for those that needed it, with all necessary features, such as breakout rooms, and, where required, technical assistance and training in its use.

4.4. Accessibility of the workshops

The dry-run pilot workshops in English provided valuable information on strategies to make online workshops as accessible as possible. Video captioning was tested, both delivered through human intervention and machine translation, but the latter proved not to be of sufficient quality. Also, indications to improve the accessibility of the workshops and the participation of all were prepared and included in the guidance document for the organising teams. The document is included under Annex 2.

Accessibility requirements were checked at the moment of registration. During the Italian workshop, sign-language interpretation was booked but cancelled at the last minute due to the illness of the participant who required it. In other workshops, the importance of ensuring that slides and resources were made available to participants in advance was noted as being of value. The final slides and materials were created in line with good practice and international accessibility standards and guidance. This allowed individual users to present and reformat materials into a preferred style on their local machine. Customisations that were reported included changing fonts and sizes, changing colours and contrasts, and saving the slides into a word document where the format was more familiar.

The challenges of machine translation and captioning vary according to language. Whilst the quality of such captions in English may be as high as 95%, this drops significantly in other languages or does not function at all.

4.5. Participant feedback on workshop design

The workshops were designed to facilitate future replication if desired. It was recognised in the design team that one-off workshops to consider the implementation of innovative solutions to mobility issues could only provide a “snapshot” in time. The issues faced, and



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the potential solutions evolve, the capacity to replicate and repeat workshops regularly would have added value to cities, people with a disability and transport operators.

As a result, participants and local leads acting as facilitators were asked to include feedback on the workshops' effectiveness and any key issues that arose in delivery to help inform any future iterations of the workshop design. The feedback was provided in written form as part of the workshop report, and AAATE team members undertook a review of the workshops with facilitators following the events.

Each city produced feedback on the process of participation during the workshops. These identified some common factors and a range of specific issues related to individual countries summarised below.

Croatian workshop (Zagreb)

- Relatively short breaks of 5 days each between workshop sessions.
- Minor technical problems with some participants, which did not affect the implementation of the workshop.
- Some of the TRIPS workshop participants could have experienced some bias to the ongoing activities within the "Accessible Zagreb" initiative.
- After introducing the common PEST framework, the participants went into discussion and analysis within the group session. It seemed to be beneficial to organise an additional workshop 4, focused on PEST itself. This would give the participants time between workshop 3 and workshop 4 to perform the individual reflection exercise on PEST analysis for the proposed mobility design concepts. Workshop 4 would be built on the resulting "homework" of a personal PEST analysis.

Portuguese workshop (Lisbon)

- The workshops were conducted across two mornings, of three hours each. The whole group was split into two, with the same persons across the workshop sessions, when needed. The timings within the workshops were broadly respected, with an average 10min late ending each session. At the end of the first session, the plenary was reduced, and participants submitted content by email for use in the second session.
- The facilitators found that the PEST analysis was interesting and went well and that the overall structure was effective. Although if the workshop was rerun, it would be beneficial to complete all of the exercises fully.
- Participants found the diversity of technologies in units 1 and 2 quite challenging; some felt too futuristic, while others were seen as overlapping with current technologies.
- The only accommodation required was to send the slides to one participant in advance of the workshops; this may be beneficial to all participants in the future.

Swedish workshop (Stockholm)

- Facilitators and participants felt that the workshop was well organised and that the facilitators worked well together as a team. There was great diversity within the participant group, which contributed knowledge to many different perspectives.



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There was a good level of attendance, and the zoom platform functioned well, including breakout rooms.

- One facilitator found the process of leading the workshop whilst sharing the screen and content quite challenging. If the workshop occurred again, she would prefer to divide the roles so that one person shared the PowerPoint and acted as host, including admitting people into the conference. This approach seemed to work better for the second part of the workshops.
- Roles evolved as the workshops were delivered with notetaking, support, and clarifications offered by others in the facilitation team. This helps relieve the pressure on whoever is leading the core content. Having a risk plan was important as one facilitator was unwell on the day, and plans had to change at short notice.
- Participants were active and offered insight from different perspectives, decisions about the use of breakout rooms were taken based on the number of participants during each unit.
- One specific accommodation has to be made as one participant was familiar with but not entirely fluent in Swedish. This need was supported with additional language interpretation both before and after the sessions.

Bulgarian workshop (Sofia)

- Sofia facilitators team organised two co-design workshop sessions.
- A subset of the participants was very active and provided most of the required feedback. The activity of participants with disabilities was high. There was one complaint by the participant with impaired vision that not all the texts were read aloud.
- Due to the active participation of about 5 participants, it was decided to proceed without room breaking.
- Time management could be better. The start and the presentation of the participants took quite a long time, and Unit 2 had to be carried out with some time constraints. Part of the delay was also due to the sharing of existing barriers in the Travel cycle, which was decided to be essential and a sound basis for Unit 2-4.
- It was decided that based on the distributed assignments, participants would send additional proposals and comments by email. Further ideas were generated offline and were later evaluated using MDI and PEST analyses during the second workshop and offline. Some answers and evaluations were sent later by email.
- In the second workshop, two companies' representatives took an active part and gave ideas about transportation means and transport organisation.

Italian workshop (Cagliari / Bologna)

- The discussion benefitted from the Italian translation of the presentation material. There were more participants than expected, so It was not always easy to keep the conversation on track as some tended to approach the workshop from a more political perspective.
- In the end, the PEST analysis of the generated ideas was limited by lack of time: so, participants were asked to perform additional "homework" to refine co-design.



- Few technical problems with some participants, which did not affect the workshop's implementation: they were mainly referred to the management and participation in "breakout rooms" activities.

Belgian workshop (Brussels)

- The workshops in Brussels spent significant time to recruit people from the transportation world and the local authorities. UITP played an essential role in convincing the local transportation company STIB to send a delegate.
- Overall, the workshops went well. Both users and providers reflected critically on the suggestion to develop mobility concepts using technologies. Providers insisted on the importance of universal design and standardisation. It was way more important for participants to improve the accessibility of existing public transport (using technology) than to develop other modes, primarily automated modes, seen as impersonal, dangerous, and unrealistic.
- Participants wanted to share their experience and focus on significant problems. They all seemed interested in new ideas.
- No specific accessibility accommodations were required.

4.6. *Lessons learned*

Following a review of the workshops' feedback, we can identify some lessons learned to inform future iterations. These can be divided into the three phases of the workshop design: preparation, delivery and collation.

The preparation phase is important in ensuring that the time spent in the workshop is productive. To achieve this, there is a considerable value in ensuring a shared understanding of some of the key concepts that will be introduced during the process of codesign. The preparation of briefing documents for participants that introduce those concepts and invite them to reflect upon them before the workshop is likely to stimulate creativity and innovation during the workshops themselves. For the TRIPS workshop subject matter, these could include

- What are the emerging technologies, including use in other areas of life?
- What do we mean by disability and the social model of disability?
- What are the barriers experienced in transport and mobility by people with a disability?

Following the distribution of such materials in accessible formats, a short online quiz to verify the suitability with participants would be valuable.

The delivery phase builds upon the preparation and should more clearly focus on applying emerging technologies to designing solutions the current barriers experienced. Again, the importance of preparation and shared understanding emerged. It was clear from the workshop feedback that a group activity that followed a common worked example was an especially constructive manner of ensuring that both participants and group facilitators consistently delivered the activities. All participants' questions or confusions were addressed before the group work, which helped ensure respondents' consistent quality. Similarly, it is valuable to ensure that all facilitators and group leaders have undertaken the tasks in a pilot workshop to understand the tasks and desired outcomes.



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It was not possible for the team that designed the workshops to be present at every event. Whilst this did not adversely impact the process, there was evidence suggesting that having a team member who had been immersed in the discussion and resources was beneficial to the workshop team.

The final phase addressed reporting the workshop outcomes and sharing the experience with the TRIPS project team. The local teams undertook notetaking, and where possible, the workshops were recorded. The notetaking and recording quality varied depending upon the notetaker's expertise and experience and the time allocated to plenary sessions. In some cases, rapporteurs found it challenging to capture all of the discussion and equally difficult to summarise after the event. Having prepared feedback sheets based on the workshops' experience, with clear and succinct questions to answer, which included screenshots as examples of participants' recommendations, has helped to harmonise the type of feedback received.

The workshops' feedback should be seen in the context of an underlying move from physical to virtual interactions. Although most participants had some experience contributing in this way, the level of interaction and focus required was more intense than was typical. This is likely to become less of an issue as more of these forms of events are held. But it should be recognised that participants' capacity to contribute fully in an online forum is considerably less than in physical settings. Levels of eyestrain, discomfort and attention all vary and require some further consideration in the future.



5. Workshop outcomes

5.1. Personal travel experiences and barriers

During the first part of the workshops, participants were asked to reflect on their current travel habits and experiences. Many travellers with disabilities experience significant mobility restrictions, leading to a smaller range of options in terms of travel means. Many are willing or obliged to use public transportation, but accessing the services revealed significant barriers. The discussion was enriched by introducing the typical phases of a door-to-door trip and representing them on the cycle, as reproduced in figure 3.

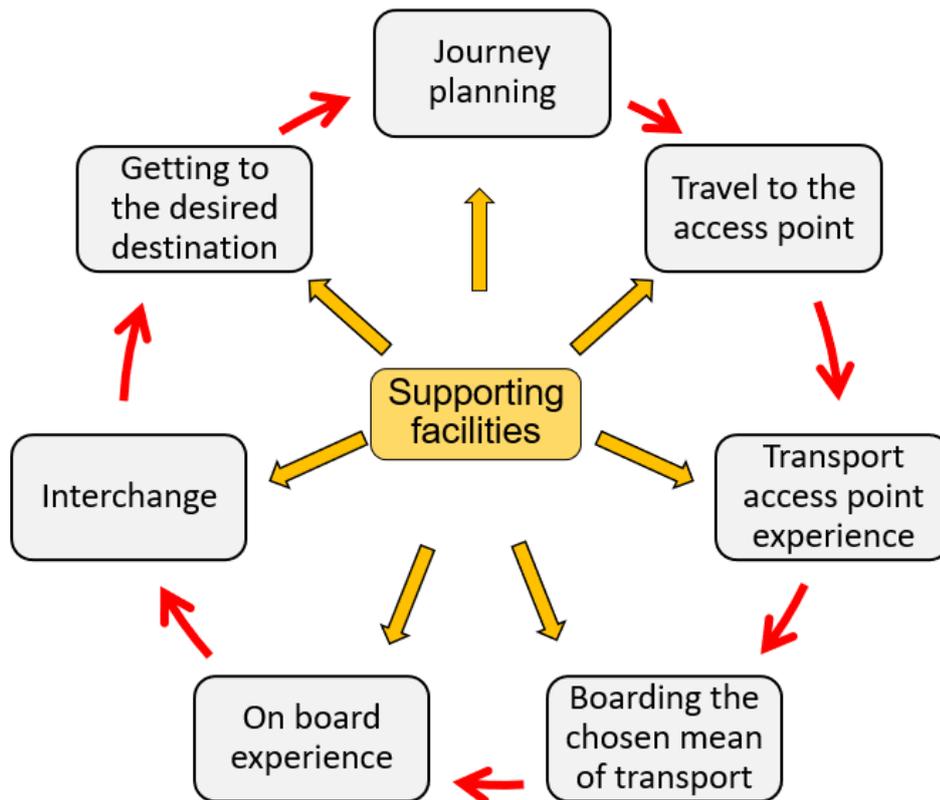


Figure 3 Typical phases of a journey

The result is a partial overview of barriers compared to the overview made in deliverable D2.2 but reflecting on them inspired most of the ideas developed in the following units of the workshops.

5.1.1. Description of common barriers city by city

What follows is an overview of reported travel experiences and barriers/difficulties discussed during the various workshops. Most of them were recorded during the first part of the workshop. Others came up during the discussions. The reported difficulties are



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directly taken from the workshop reports to leave voices as authentic as possible. In the next section (5.1.2) they are further analysed.

Croatian workshop (Zagreb)

Experience of wheelchair users

- The cable car entrance platform is small, and the cable car cabin is not adapted for persons with disabilities.
- The tram stations are not of adequate height concerning the tram (getting on and off trams and cable cars/funiculars)
- An inability to get to the selected station because the platforms do not work, so he has to go to the station one kilometer away (getting on and off buses)
- Users are dependent exclusively on ZET (transit authority responsible for public transport in Zagreb) customised transport. It takes a long time to get a ride and needs advance notice; the system is slow, and you cannot get a ride if the user changes location (rigid specialised transport system)

Experience of users with a visual impairment

- In case of works or renovations at stations, the environment becomes unsafe for movement (unexpected obstacles - unsafe environment)
- There is no information on whether a new or old type of train is arriving at the platform (lack of [vehicle] information)
- If there are changes in the schedule of arrivals, stations or vehicles (lack of information on schedules, changes, redirects)

Experience of persons who are deaf or hard of hearing

- Visual information is non-existent, and speech information is not useful (lack of visual information)

Personal stories

- Roman, who uses a wheelchair, often must go one stop away from his home and return a kilometer alone, as that stop is not adapted to the height of the bus/tram.
- When travelling to lectures, he sometimes has to use a funicular not adapted for persons with disabilities. When he goes by public transport, he must use an assistant to help him get on and off various public transport vehicles.
- When Kristina goes to Zagreb, she uses public transport. In most cases, the drivers are approachable and kind; they lower the ramp, and she is more independent since she uses an electric wheelchair. It happened to her that taxi drivers would cancel their ride when they came to pick her up because they did not want to drive a person with a disability.
- Tomislav prepares for the trip online at home. However, it often happens that the train (depending on whether it is an old or a new model) does not stop on his platform, and he finds himself in a completely unknown environment. He must examine the terrain before leaving the train and rely on other people for information.



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- Ivana is often in a situation where her bus or tram is standing still or redirected unplanned. She did not receive the information since the driver announced on the loudspeaker. Since she can't hear, it's hard to get information from a fellow passenger. There are also problems with movement on surfaces that are not well lit, be it platforms, stations, underpasses, tunnels, since deaf people can be affected by an impaired sense of balance.

Portuguese workshop (Lisbon)

In Lisbon, the barriers and challenges experienced were discussed across the range of disabilities represented. Many of these were felt to be experienced in common by the participants. A vital issue for many was that access to public transport infrastructure was challenging due to poor maintenance or broken or poorly functioning equipment. As a result, the ease of embarking and disembarking is compromised. Poor infrastructure design also contributed to a system dependent upon people, requiring accessible transport or accommodations when travelling to be booked in advance.

Orientation could be challenging for many with a low quality of signage and minimal accessible wayfinding signs available. The lack of information was further exacerbated by a perceived lack of training around the needs of passengers with a disability.

These attitudinal and behavioural barriers were regarded as significant by workshop participants. These included other passengers and travellers' behaviour, which resulted in barriers being created, such as bus stops being blocked by cars and poor communication.

The workshop participants stressed that many of these barriers were very common in their experience. Poor maintenance, signage and infrastructure design led to procedural hurdle and unusable resources. When coupled with the lack of training and poor behaviour by other passengers and travellers, it was unsurprising that participants felt a sense of frustration.

One participant described how she travels from her house to the university. She travelled by train and then by wheelchair until she reached the university. She explained that she stopped using the door-to-door bus service since the driver refused to drive into the university campus even when authorised. This appeared to reflect a systemic issue of training and knowledge by passenger facing employees.

Swedish workshop (Stockholm)

Experience of wheelchair users

- Elevators out of use leading to passengers having to re-board the metro to travel to another station.
- There are level differences between old and new boats with the dock when boarding or leaving the boat in Stockholm.
- Varying dimensions were reported as difficult. This made an entire trip difficult depending on how wide a wheelchair or mobility aid might be.

Experience of a blind person

- Ticketing systems are complicated for buying, acquiring and validating tickets.



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- Problems with information in general and knowing if there is a place on the bus or metro when wanting to board.

Experience of a deaf person

- Problems with information in general and knowing if there is a place on the bus or metro when wanting to board.

Other reported difficulties

- Many of the participants' experiences impacted all travelers but were especially challenging for those with a disability. Notable was the inconsistent application of standards, and the lack of fully accessible information in various formats or inclusive design created new barriers.
- One participant shared his experience of being picked up by the special transport on time and could catch the preferred boat as planned, and the personnel were friendly and helpful. But barriers emerged when he and his assistant experienced level differences between older and newer boats and between the boats and the dock, making transition difficult or impossible.
- A second participant described her journey using the special taxi to the airport in Hännösand, then the plane to Stockholm, and the Arlanda Express to the central station and metro to Farsta, where she works. The trip went smoothly, but she is often unsure how long the journey will take as she is not familiar with the travel system. Sometimes the elevator in Farsta does not work, and then it is complicated. She tried once to take the escalator, but the wheelchair slid, and both she and the personal assistant were afraid. Now when this occurs, she boards the next train and then takes the bus to the office.
- A third participant had travelled to experience all the different transport options. He travelled by bus, metro, train and plane. He found that the ticket system was the most problematic issue, and when forms of transport were integrated, it could be challenging to find somewhere to sit whilst waiting at an interchange.
- Participants noted that taking the train is normal in Stockholm and found it to be predictable. Others find it better to take buses. It felt more secure than taking the metro underground as if there was an issue. It was easier to leave and replan the journey.

Bulgarian workshop (Sofia)

Experience of wheelchair users

- Common problems were reported with car parking at reserved spaces for people with disabilities. Spaces were either occupied by people who did not have the right to park, or there was insufficient space between parked cars preventing access by wheelchair.
- Problems with non-working lifts at metro-stations and need to enquire before travelling regarding connections to buses.
- Sometimes the buses stop far from the sidewalk and it is impossible to use the specialised step without the help of other travelers. Sometimes, it is challenging to get off if there are no people to help.



Summary of reported difficulties.

- Most reported difficulties came from people using a wheelchair. For those participants, some means of transportation are not accessible, such as some buses and trams.
- For public transport, the most preferred options are the metro and some bus lines. However, even their use has many difficulties like non-working lifts, bad conditions of the sidewalks and streets inhibiting easy reaching of the metro stations.
- Non-working lifts require careful preliminary planning and access to information about the lifts' status for the metro stations of interest.
- When considering the buses, it was felt that due to drivers' insufficient qualification and attitude towards people with disabilities, getting on and off the bus required help from several people, sometimes lifting the wheelchair by hand.
- Specialised transport, organised by Sofia municipality is cheap but unreliable concerning schedules, security during travels, drivers' attitude. Sometimes, this means of transportation is not available for up to 9 days ahead.

Italian workshop (Cagliari / Bologna)

Experience of wheelchair users

- Sidewalk irregularities and damage reduced the chance to reach the bus-stop and (sometimes) the functionality of the onboard platform provided on the bus (impeding access at the end)
- The onboarding procedure should be performed easily and in an independent way
- Accessibility of stop booking buttons
- The place in the bus is not adequately protected against the pushing action of other passengers

Experience of a blind person

- Missing tactile guidance to the bus-stop
- Difficulties in recognising and identifying the bus line number as approaches the bus-stop
- Accessibility of stop booking buttons inside the bus

Experience of a deaf person

- During interchanges, contextual indications should be all available

Personal stories

- The bus stop is far from my house, so I need the car to reach it: "in case of delay on bus scheduled arrival (), the best option, for me, it is to continue the journey by car" (wheelchair user)
- "I need bus equipped with a platform to access: no all buses are equipped with it, my travel has uncertainty and delays" (wheelchair user)
- "I use urban buses, my travel starts just out of my home, because I need help to reach the bus stop, this is part of the accessibility problem, so accessibility is not just a problem of transport vehicles" (blind)



Below is a summary of the discussion on barriers in Italy. They are reported on the journey phases scheme, introduced in deliverable D3.3, as shared during the conversation.

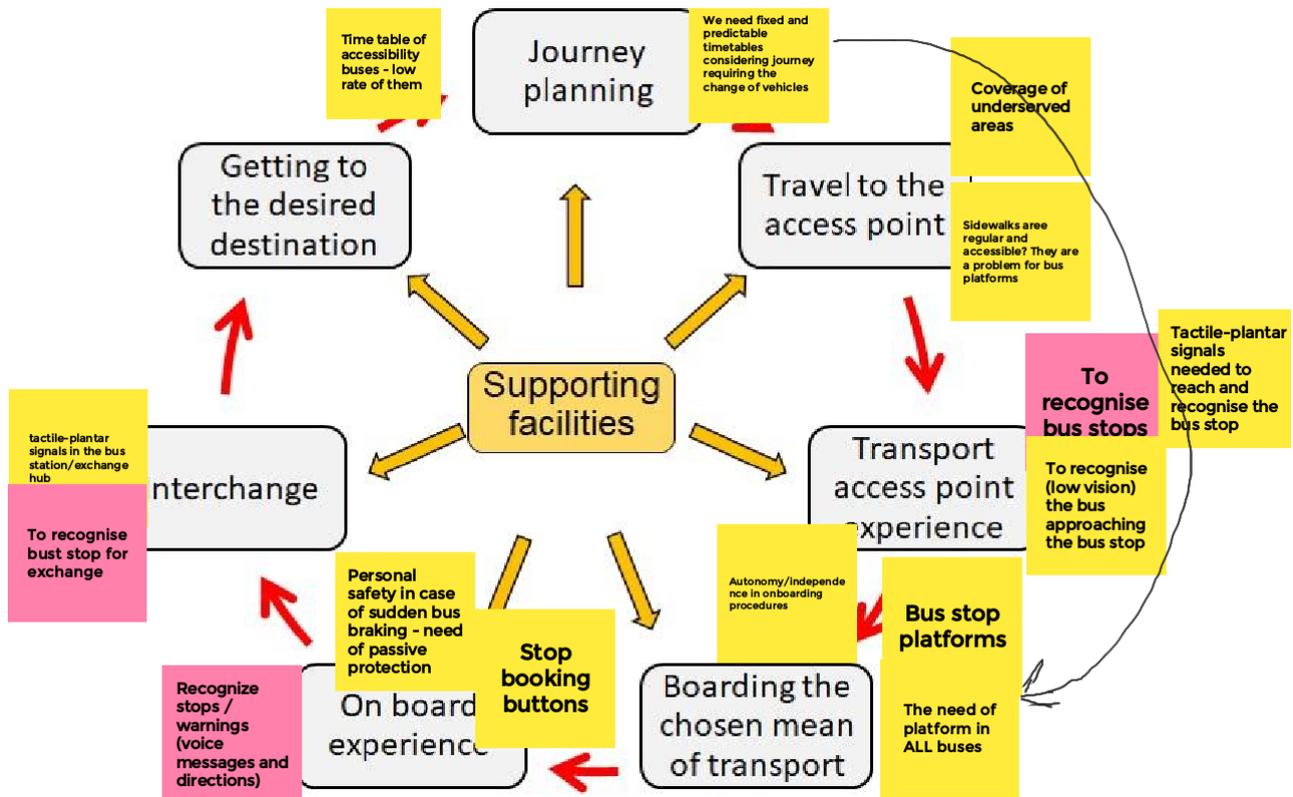


Figure 4 Barriers encountered by the participants in the Italian workshop

Belgian workshop (Brussels)

Experience of wheelchair users

- Bus ramps are available, but bus drivers are not trained to welcome disabled travelers on board.
- It happens that lifts are out of order in some stations, but there is no indication, information or signalisation.
- There is a substantial vertical barrier between the platform and (older) trains (SNCB) + older trams in Brussels.
- Mobile handles on handrails are positioned too high for people in wheelchairs.

Experience of a visually impaired person

- Podotactile signalisation on train platforms is missing, only a white band that is not always contrasted.
- There is difficulty finding the “open door” push button on trains (they are located too far from the door) or trams (there is no contrast).
- There are no vocal signals in the metro, making it impossible to know which line calls into the station.



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Personal stories

- When Mark (who uses a wheelchair) waits for a tram, he may find that it has stairs that are too high when a tram arrives, and he must wait for another or seek another way.
- Jean, who has a visual impairment, has difficulties seeing which station it is. The boards with the station's name are too spaced out, so sometimes he cannot know the name, especially if the board is not contrasted.
- Jean also has trouble finding the “open door” button on trains. It is sometimes too far from the door, so is he afraid that the door will close again before he can board the train.
- Alexandra has osteoporosis: if she gets a blow, it will have serious consequences. When in a vehicle, she needs to find a seat, but her impairment is invisible, and people may insult her when she asks for a seat.

Most difficult steps reported

- Access to the platform and access to the vehicle when there is no platform or not high enough.
- To get out of the house quickly enough by the time the taxi arrives.
- Signals in the station. It is often difficult to find the staff that have been requested, and phone calls to a charged number are required or time to seek support. Staff usually wait on the platform ignoring the challenge of passing through the barrier.
- The layout of buses and trams makes it difficult to move inside the vehicle when a stroller is being used by another passenger who may occupy much space. There are signal problems at the largest stations at interchanges and a lack of benches on the platforms.
- Frequent unexpected malfunctions of a lift or a bus ramp require a considerable detour. Including the availability of lifts directly in the main STIB app would be helpful. The sensitivity of the card reader at the gate can vary.
- Interchange at some stations can be problematic. There are stairs in the middle of the platform at Midi station, so I need to take one lift upwards and one lift downwards.
- Access to the platform: difficulties with the large gates that can block off access.

5.1.2. Analysis of outcomes: barriers and concerns of present travels

For a more in-depth understanding of the reported barriers, the authors have listed them in table 4 and added for each barrier the following information:

- Whether the barrier affects all travellers or travellers with a specific impairment (e.g. Physical/Motor, Visual, Hearing, Cognitive).
- The category of barriers, as listed in table 3. The authors have developed this classification by grouping several barriers.



Category of barriers	Code
Environmental and A rchitectural B arriers	AB
Inaccessible design of I nterfaces	IN
Lack of multiple C ommunication channels	CO
Lack of specific R elevant I nformation	RI
Lack of functioning A ssistive E quipment (e.g. maintenance)	AE
C ultural and attitudinal B arriers	CB
Lack of resilience in case of U nexpected E vents (emergency or changing conditions)	UE

Table 3 Categories of barriers

- The journey phases majorly involved: Planning, Travel to access point, Access point experience, Boarding, Onboard experience, Interchange, Arriving at destination (see D3.2.).
- The impact of the barrier. The extent to which the barrier impedes the journey.
 - Critical: a barrier is critical when it is likely to prevent a journey to take place.
 - Disturbing: a barrier is disturbing when it can only be overcome with significant effort.
 - Annoying: a barrier that creates frustration but does not cause interruptions or delays in the journey.

This system of “labels” has been proposed and initially attributed by the authors based on their experience. A specific label attribution to each barrier was validated and reviewed during a meeting on 15 March 2021 with the Local User Leads (LUL’s) and the workshop facilitators. In case of significant differences in opinions or casting votes, the label indicating the highest impact was chosen for inclusion in the table.

- The light-MDI dimensions majorly affected by the barrier. These dimensions are:
 - Ability to travel independently.
 - Having a fast journey
 - Having a comfortable journey
 - Having a safe journey
 - Having a convenient journey
 - Having an affordable journey
 - Travelling with no concern about the protection of personal data
- The country code(s) identifying the workshop(s) where the barrier was highlighted and discussed.

Based on this mix of quantitative and qualitative information, the authors have attempted to calculate a specific impact value reported in the last column of the table for each barrier.

The **total impact value** of a specific barrier is a relative number obtained by multiplying the number of the MDI dimensions affected and the number of occurrences (number of country workshops), with a specific impact multiplier factor using the formula (applied to each barrier):



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$$Tot\ Impact\ value_{(Barrier)} = (Impact\ Mult\ factor) * (Nr\ occurrences) * (Nr\ MDI\ dim\ addressed)$$

Based on the LUL's and facilitators' contribution during the March 15th interactive meeting, the following impact multiplier factors have been established.

Impact of barrier	Impact Multiplier Factor
Critical	4,45
Disturbing	2,65
Annoying	1

UNDER REVIEW



Classification table (Table 4)

Short description of Concerns and Issues	Relevant to All or Disability specific	Barrier category	Phase(s) of the journey majorly affected	Impact of the barrier			MDI dimension affected						(Authentic) comments	Country code	Total Impact Value		
				critical	disturbing	annoying	Independence	Time needed	Comfort-able	Safe	Convenient	Afford-able				Privacy	
Sidewalk condition impedes the use of the bus platform for boarding	Physical Visual	AB	Access point Boarding experience	X			X			X					Sometimes it impedes the use of the bus platform	IT P BG	26,7
Stop-booking push buttons are not located in an accessible position	Physical Visual	IN	Onboard experience		X					X					The help of others sometimes is requested	IT	2,65
Location and visibility of door opening buttons	Visual	IN	Boarding experience		X					X					Difficulties in finding the button (not clearly indicated) and fear of closing door before boarding (distance from the door)	B	2,65
Lack of vocal signals to guide recognition of bus lines and guiding boarding	Visual	CO	Boarding		X		X		X						Help of others is required.	B BG	10,6



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Short description of Concerns and Issues	Relevant to All or Disability specific	Barrier category	Phase(s) of the journey majorly affected	Impact of the barrier			MDI dimension affected							(Authentic) comments	Country code	Total Impact Value	
				critical	disturbing	annoying	Independence	Time needed	Comfort-able	Safe	Convenient	Afford-able	Privacy				
The place in the bus is not adequately protected against the pushing action of other passengers	Physical	AB	Onboard experience			X				X					concerns about their own physical safety in some circumstances	IT BG	2
The onboarding procedure is difficult and cannot be performed independently	Physical	AB	Boarding experience		X		X								asking for the help of others is a stigmatising experience	IT P BG	7,95
Missing podotactile guidance to the bus-stop and in stations	Visual	CO	Travel to access point Access point Interchange		X		X								asking for the help of others not always possible	IT B	5,3
Non-accessible wayfinding in stations	Visual	CO	Access point Interchange		X		X		X						Colour contrast, size of letters, illumination, etc.	B	5,3
Impossibility to recognise the bus line number when it is approaching the bus-stop	Visual	CO	Access point interchange		X		X								asking for the help of others not always possible	IT	2,65



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Short description of Concerns and Issues	Relevant to All or Disability specific	Barrier category	Phase(s) of the journey majorly affected	Impact of the barrier			MDI dimension affected						(Authentic) comments	Country code	Total Impact Value	
				critical	disturbing	annoying	Independence	Time needed	Comfort-able	Safe	Convenient	Afford-able				Privacy
During interchanges, contextual indications are missing	Visual Hearing	CO	Interchange Access point		X		X		X					sometimes it could impede journey completion (missing connection) asking for the help of others is a stigmatising experience	IT S	10,6
The cable car entrance platform is too small, and the cable car cabin is not adapted for access.	Physical	AB	Access point Boarding experience	X			X		X					it is uncomfortable, and help is needed	HR	8,9
Bad design of stations	Physical	AB	Access points Interchange		X			X	X					Stairs, bad location of lifts, lack of benches to rest	B BG	4
Inability to get to the selected station because the platforms and their equipment (like lifts and elevators) do not work	Physical	AE	Access point Boarding experience	X			X	X	X					It may be impossible to continue travelling without waiting for a new vehicle to arrive.	HR BG	26,7



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Short description of Concerns and Issues	Relevant to All or Disability specific	Barrier category	Phase(s) of the journey majorly affected	Impact of the barrier			MDI dimension affected						(Authentic) comments	Country code	Total Impact Value	
				critical	disturbing	annoying	Independence	Time needed	Comfort-able	Safe	Convenient	Afford-able				Privacy
Customised transport, it takes a long time to get a ride, and needs advance notice, the system is slow	Physical	AE	Journey planning			X		X	X		X			you need to adapt to system rigidity	HR BG	6
In case of works or renovations at stations, the environment becomes unsafe	Visual	UE	Access point Interchange	X						X				it could be dangerous asking for the help of others	HR P	8,9
In case of changes in the travel schedules, stations or vehicles, relevant information is not provided (schedules changes, indications, redirections)	Visual	UE	Access point Interchange		X		X	X	X					sometimes it could impede journey completion (missing connection) asking for the help of others	HR P S	23,85
Visual information is non-existent, and speech information is not useful	Hearing	CO	Interchange Access point		X		X		X					sometimes it could impede journey completion (missing connection) asking for the help of others is a stigmatising experience	HR P S	15,9



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Short description of Concerns and Issues	Relevant to All or Disability specific	Barrier category	Phase(s) of the journey majorly affected	Impact of the barrier			MDI dimension affected							(Authentic) comments	Country code	Total Impact Value	
				critical	disturbing	annoying	Independence	Time needed	Comfort-able	Safe	Convenient	Afford-able	Privacy				
Vertical barriers in boarding trains, trams and buses	Physical	AB	Boarding	X			X	X				X			it often leads to time loss waiting for an accessible vehicle	B BG	26,7
Ramps are available, but bus drivers are not trained to use them	Physical	CB	Boarding experience	X			X								it could impede journey completion	B P BG	13,35
Lack of low-level handgrips	Physical	AB	Onboard experience		X					X					Hand grips are for standing travellers	B BG	5,3
Barriers within vehicles. Lack of space for maneuvering	Physical	AB	Onboard experience		X				X						Space is limited.	B	2,65
Lifts in stations can be out of order without prior information	Physical	UE	Access point Interchange	X			X								asking for the help of others is a stigmatising experience	B P BG	13,35
Poor maintenance of access and equipment creates unanticipated barriers	All	AE	Access point Interchange	X			X			X	X				Anxiety over safety and unanticipated barriers creates an unwillingness to travel or extra costs	P BG	26,7



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Short description of Concerns and Issues	Relevant to All or Disability specific	Barrier category	Phase(s) of the journey majorly affected	Impact of the barrier			MDI dimension affected						(Authentic) comments	Country code	Total Impact Value		
				critical	disturbing	annoying	Independence	Time needed	Comfort-able	Safe	Convenient	Afford-able				Privacy	
Passenger/Traveller attitudes and behaviour	All	CB	Access Point Onboard experience Interchange		X		x		x		x		x		Failure to address barriers created by other passengers and travellers impacts ease of travel & undermines accessibility. Sometimes disability is not visible, but special needs occur.	P B	21,2
Impatience of service providers	All	CB	Access point		X								x		Time to reach booked taxi and the driver departs without the passenger	B	2,65
Accessibility of ticketing systems	All	IN	Planning including payment Boarding Interchange	X			x	x					x	x	Inaccessible kiosks or ticketing create barriers for all users needing to take extra time or request help	S	17,8
Inconsistent standards	Physical	CB	Interchange	X			x			x					Dimensions of doors, steps and levels can vary, making transfers difficult or impossible	S	8,9

Table 4 Classification table of barriers and difficulties encountered while travelling, as reported during the workshops



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As evidenced in deliverable D.2.2, some of the barriers to accessibility of urban transport occur across locations. Even where specifications refer to contextual factors such as "cable cars" in Zagreb, some obstacles recur and are reported in multiple workshops. The country codes reference this for each barrier.

The workshops' results can be compared to the identified barriers from the qualitative user research in WP2. In the 41 conducted interviews, most of the addressed barriers were related to the cluster "public awareness and assistance" (see figure 5). Equally, "Cultural and attitudinal Barriers" identified in the workshops could be assigned to this cluster.

Some of the other barriers identified during the workshops refer to the broad category in D2.2 of "infrastructure", including "Sidewalk condition impedes the use of the bus platform for boarding" and "Inability to get to the selected station because the platforms and their equipment (like lifts and elevators) do not work". These are classified in **Architectural Barriers (AB)** and **Lack of Assistive Equipment (AE)** functioning. Figure 5 (next page) shows the relationships between D.2.2 and D.4.2 barrier categories, allowing us to make some considerations.

"Environmental and **Architectural Barriers**" (AB) jointly with "Inaccessible design of **Interfaces**" (IN) and "Lack of functioning **Assistive Equipment**" (AE) sum up to an absolute value of 76,15, which is 47% of the total. They are all assigned to a cluster of categories (vehicles, infrastructures, stops and stations and regulations), summing up to a total score of 410, representing 46% of the barriers.

The barrier that received the highest score relates to the cluster "Information provision and communication" of the user research (18% of the total (888)). Approximately the same percentage was found for the "Lack of multiple Communication channels" (CO) barrier category from the country workshops.

Both comparative calculations on data seem to confirm the consistency and the robustness of both evaluative research designs.

Barriers related to the general service quality, such as services at night or long lead times for booking, were not emphasized in the workshops. The specific concern about "Lack of resilience in case of Unexpected Events" arose as a well-represented barrier category in the workshop's travel stories.



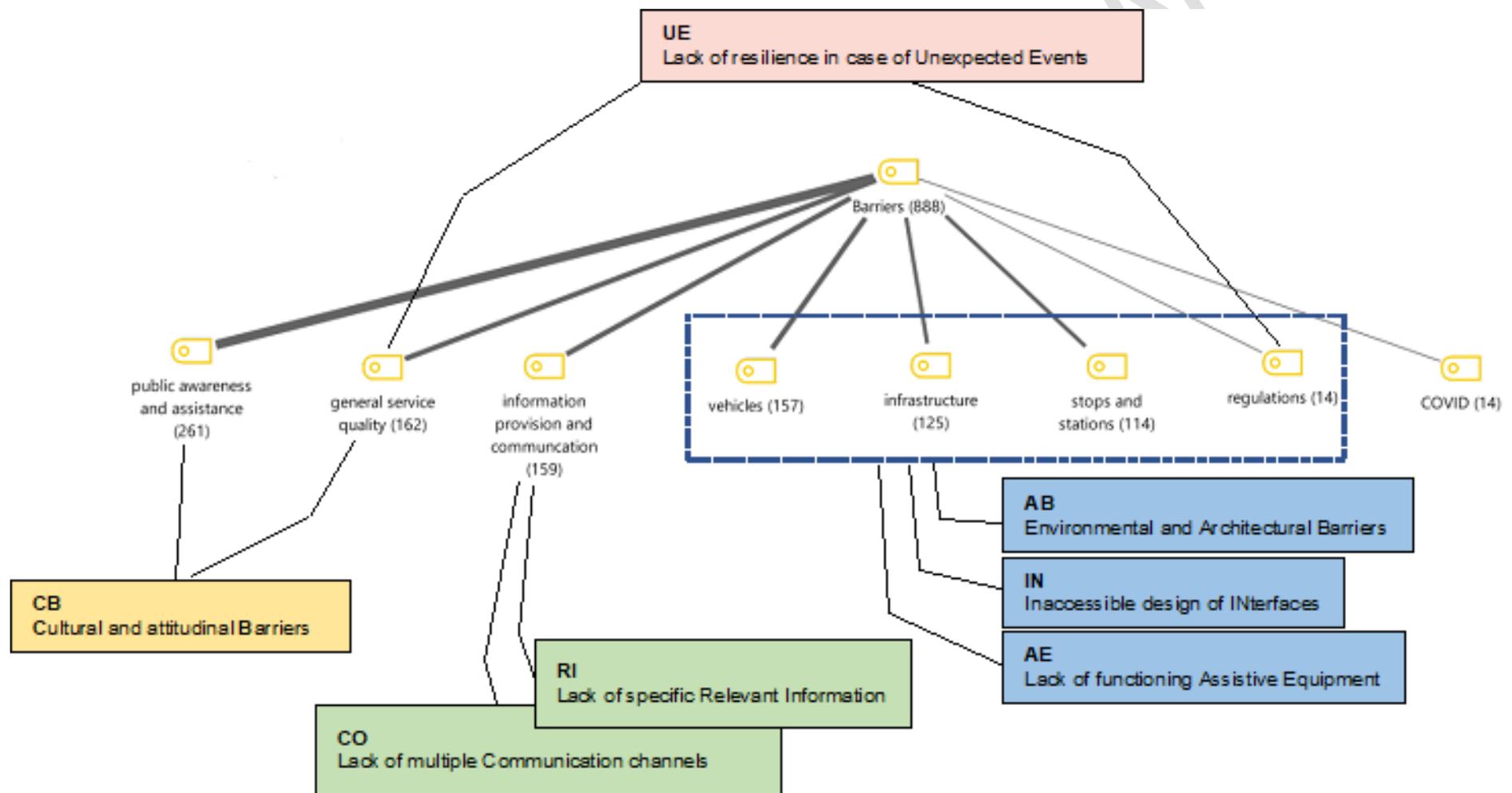


Figure 5 Matching the categories of barriers retrieved during the workshops with the WP2 survey results



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Some considerations should be made regarding the workshop outcomes:

- The results come from a limited number of users, especially those with disabilities, asking them about their observations based on personal knowledge and experience.
- The workshop structure and duration limited the time available to gather details of the barriers described by participants.
- In the workshop reports, facilitators were asked to synthesise “core” aspects of obstacles identified during the discussion. This allowed these to be collected and categorised.
- Significant statistical elaboration of data is not justified based on the numbers represented and the sample stratification.

However:

Although the workshop audience size is not statistically relevant, the participants were persons who were experienced and motivated to consider transportation barriers, who were able to contribute with ideas and concepts that could improve the travel experience of people with disabilities.

Data reported in the table could nevertheless be assessed from several perspectives, and they help to present a picture of what are considered obstacles and barriers by the workshops' audience.

The following further analysis is proposed:

- Analysis by categories of barriers: evidencing the prevalence of barrier “typologies” from user reports.
- Analysis by journey phase: evidencing the travel step where obstacles are perceived as more challenging for the journey execution.
- Analysis of MDI dimensions and Impacts: evidencing the correlation (frequency) of dimensions and severity (impact) in barriers reported by users.
- Analysis of weighted MDI dimensions: evidencing each MDI dimension's summative value through all the barriers weighted based on impact.

The analysis seeks to consider the outcomes and obtain a view of the recurring issues and their relative impact. Such analysis should suggest plausible scenarios for the implementation of innovations in urban transport.

Analysis by category of barriers

This analysis involves an understanding of the perceived impact of each category of barriers. It is obtained by summing for all barriers belonging to the same category a specific value which is obtained by multiplying the number of occurrences of a barrier with the impact multiplier factor associated to it. The calculation is represented by the following formula.

$$Tot\ Impact\ value_{(Barrier\ Category)} = \sum_{barrier \in Barrier\ Category} (Impact\ Mult\ factor) * (Nr\ occurrences)$$

The higher the value, the greater the impact of the barriers was perceived to be.



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Code	Category of barriers	Value
AB	Environmental and A rchitectural B arriers	46,60
UE	Lack of resilience in case of U nexpected E vents (emergency or changing conditions)	30,20
CO	Lack of multiple C ommunication channels	29,15
CB	C ultural and attitudinal B arriers	25,75
AE	Lack of functioning A ssistive E quipment (e.g. maintenance)	19,80
IN	Inaccessible design of I nterfaces	9,75
RI	Lack of specific R elevant I nformation	0

Table 5 Impact of categories of barriers

The proportions of these values can be graphically represented as in Figure 6.

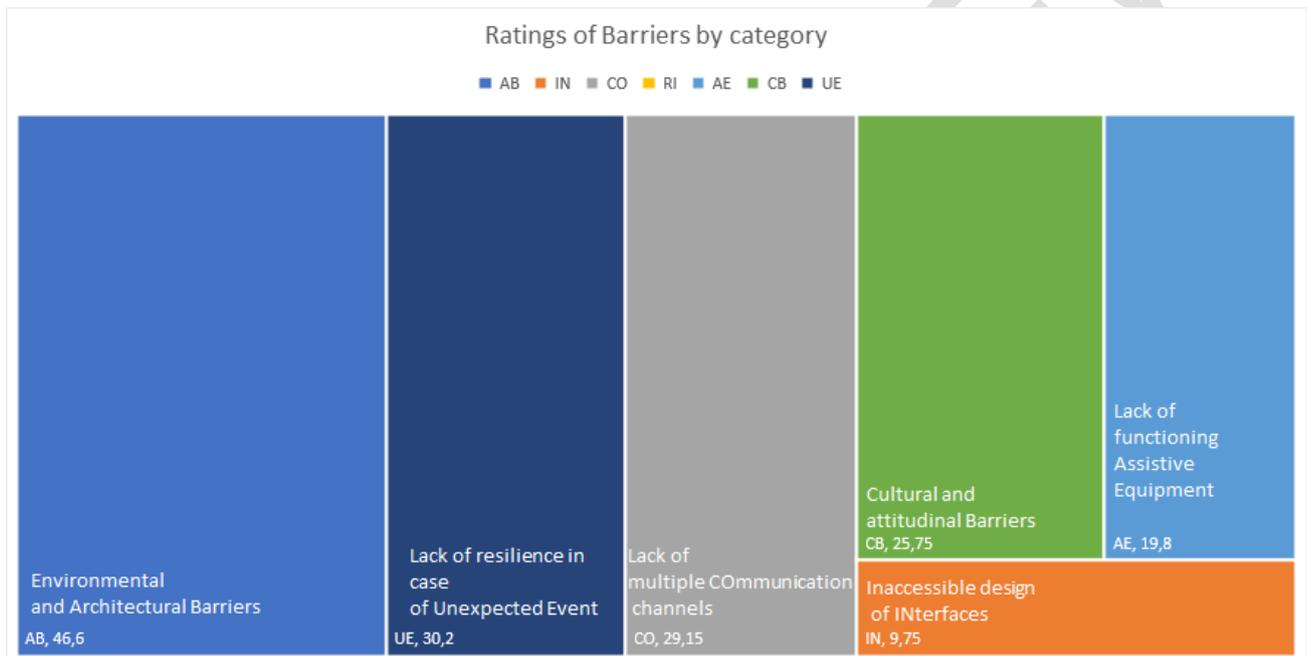


Figure 6 Graphic representation of the impact of the different categories of barriers

Discussion

The qualitative analysis provides evidence of the relevance of user concerns of physical/infrastructural barriers (mainly at the point of access and boarding) and of all barriers related to the absence of alternative communication channels (which are essential during the boarding and onboard experience). Participants described insecurity in dealing with unexpected events (i.e. journey disruption due to industrial action, remediation works that change pathways inside stations). This seemed a critical aspect: the perception is that accessibility issues are neglected during such events.

Participants highlighted their perceptions of a lack of maintenance of assistive equipment (i.e. boarding platforms not working.) and the persistent cultural gap against people with different functional profiles. Some noted that assistive equipment resources were often limited to initial installation and lacked resources for annual maintenance for all vehicles



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and transportation apparatuses. Others reported barriers derived from the negative attitudes of other travellers and the transportation provider’s personnel. This might suggest the need for a “cultural” and “educational” campaign alongside improvements in the accessibility of infrastructure.

Analysis by Journey Phase

This analysis investigates the relationship between barriers and the “journey cycle” that was introduced in WP3. It suggests

- the number of barriers which are referred to a specific phase
- the number of occurrences given by the number of barriers multiplied by the number of national workshops presenting them (i.e. occurrence of each barrier).

The result is represented in table 6 below.

Phases of the journey	Number barriers	Number occurrences
Journey Planning	2	3
Travel to access point	1	2
Transport access point experience	15	30
Boarding the chosen mean of transport	9	18
On board experience	5	8
Interchange	13	25
Getting to the desired destination	0	0

Table 6 Number of barriers and occurrences by Journey Phase

The proportional representation is depicted in the diagram (Figure 7) below.



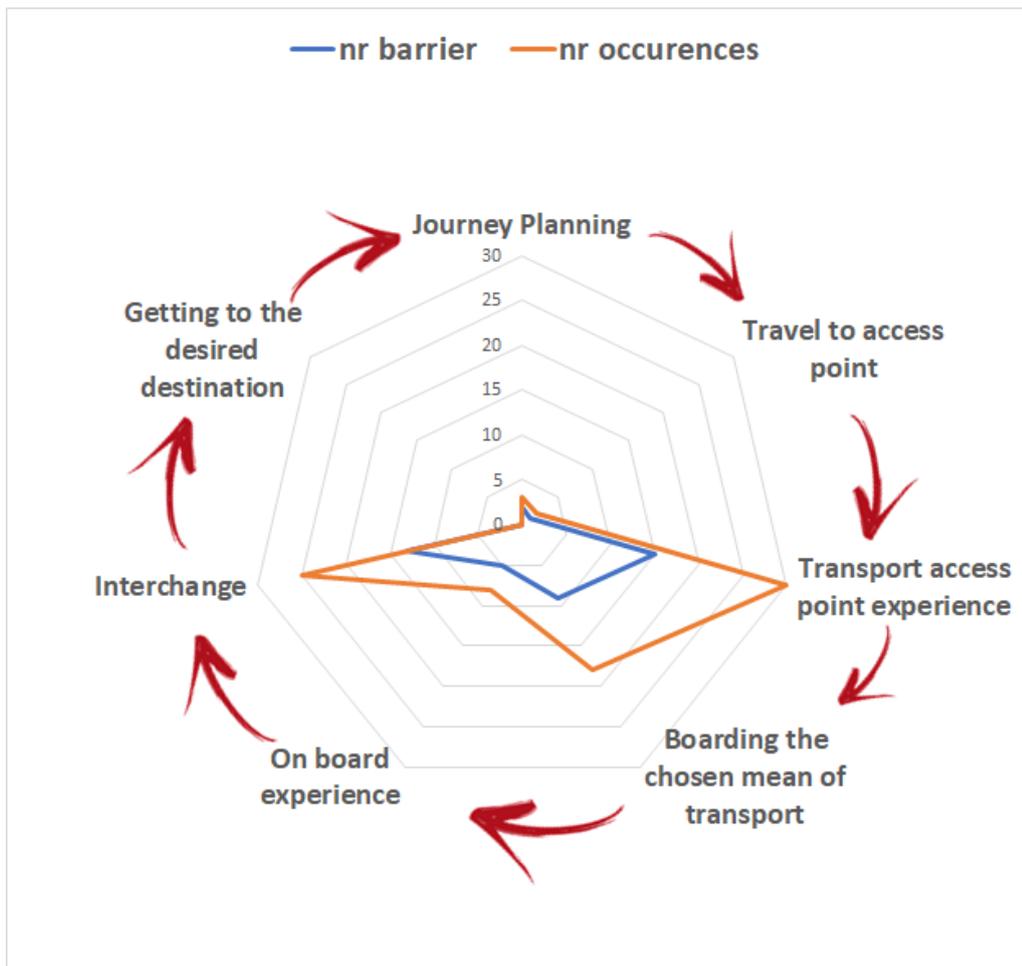


Figure 7 Proportional representation of barriers related to journey phases

Discussion

The radar graph demonstrates that:

- Accessibility at the **transport access point** (i.e. bus stop, station) is the biggest issue according to the workshop participants: it is related to both infrastructural and communication barriers.
- The same concerns relate to **interchange** and are even more critical when coincidences occur, and spatial orientation is constrained by the architectural design of the interchange point.
- **Boarding** remains a concern as it depends on the equipment provided for the transport mean (not installed in all vehicles of the transportation provider fleet), relying on its maintenance status. The general perception of the attitude of personnel and other travellers is not helping to mitigate the problem.
- **The onboard experience** is not satisfactory: for some users. One problem is the absence of alternative communication channels to understand the destinations and upcoming stops and the poor design of vehicles (i.e. identification and localization of handgrips and stop-booking buttons).



Analysis of MDI dimensions and Impacts

In this analysis, we can observe correlations between the MDI dimensions in the “light-MDI” used during the workshops and the impact value for each barrier reported by users. In calculating occurrences, table 7 below is obtained.

	Independence	Time needed	Comfortable	Safe	Convenient	Affordable	Privacy
Critical	9	3	2	4	3	1	0
Disturbing	9	2	10	1	2	1	0
Annoying	0	1	1	1	1	0	0

Table 7 MDI dimensions and impacts

The graphical representation below (Figure 8) clarifies the evidence.

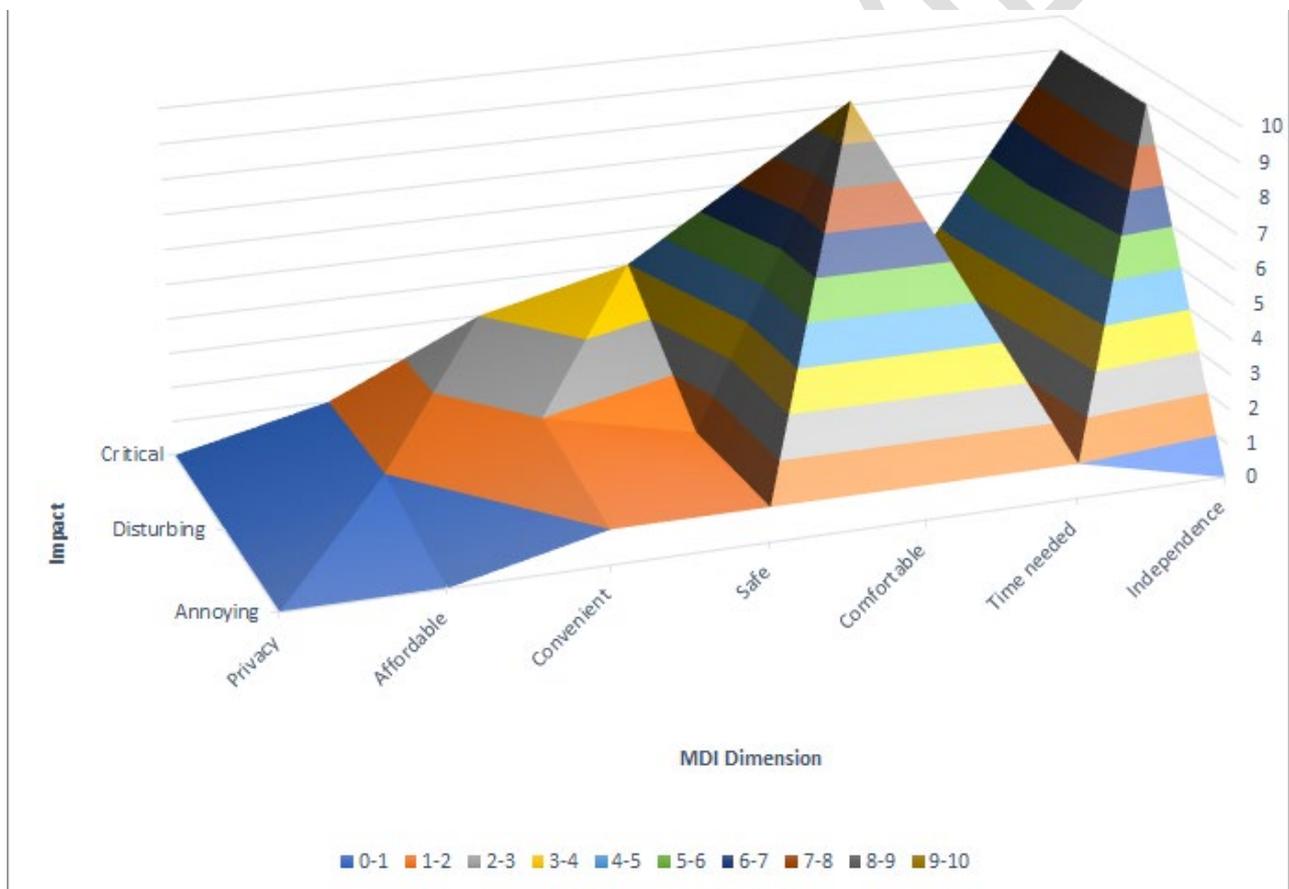


Figure 8 Graphical representation of the MDI dimensions

Discussion

The distribution suggests a high correlation of obstacles reported with some MDI dimensions (Independence, Comfortable, Safe, Convenient, Time needed) and low or null correlation with others (Affordable, Privacy). Furthermore:



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- The Independence dimension mainly relates to barriers reported during the workshops with a high impact (critical or disturbing) on a journey (even if this finding is anticipated).
- The comfort dimension seems to be more important than the others. The impact values mainly refer to the “disturbing” impact with a drop for “annoying”.
- The Safe and Convenient Time needed dimensions demonstrate a similar trend related to barriers with “critical” lowering to 1 occurrence for “annoying”.
- Affordability and Privacy appear as dimensions that have little correlation with the barriers listed. For Privacy, no concerns were expressed.

Analysis of weighted MDI dimensions

The research team has sought to produce a “weighted” ratio of each MDI dimension’s value for each of the barriers using different impact values (critical, disturbing, annoying). Each barrier, and the related MDI factors, has been rated according to the impact on travel.

The occurrence of a barrier relates to the number of countries where it was detected and described. During analysis, barriers have been clustered together based on their similarities, giving a picture of recurring claims from users; in this case, a multiplier factor is created based on the number of occurrences of the barrier.

Based on these, the calculation to obtain a weighted value for each MDI dimension is created through the following formula:

$$\text{Weighed value}_{(MDI\ dimension)} = \sum_{1st\ barrier}^{last\ barrier} (\text{Impact value}) * (\text{Number of occurrences})$$

These results are reported below (Table 8)

MDI factor	Weighted value
Independence	130,45
Comfortable	59,75
Safe	42,9
Time needed	34,2
Convenient	32,2
Affordable	9,75
Privacy	0

Table 8 MDI dimensions and impacts

An overview of the results is represented in the following figure (figure 9), where areas are proportioned to values.



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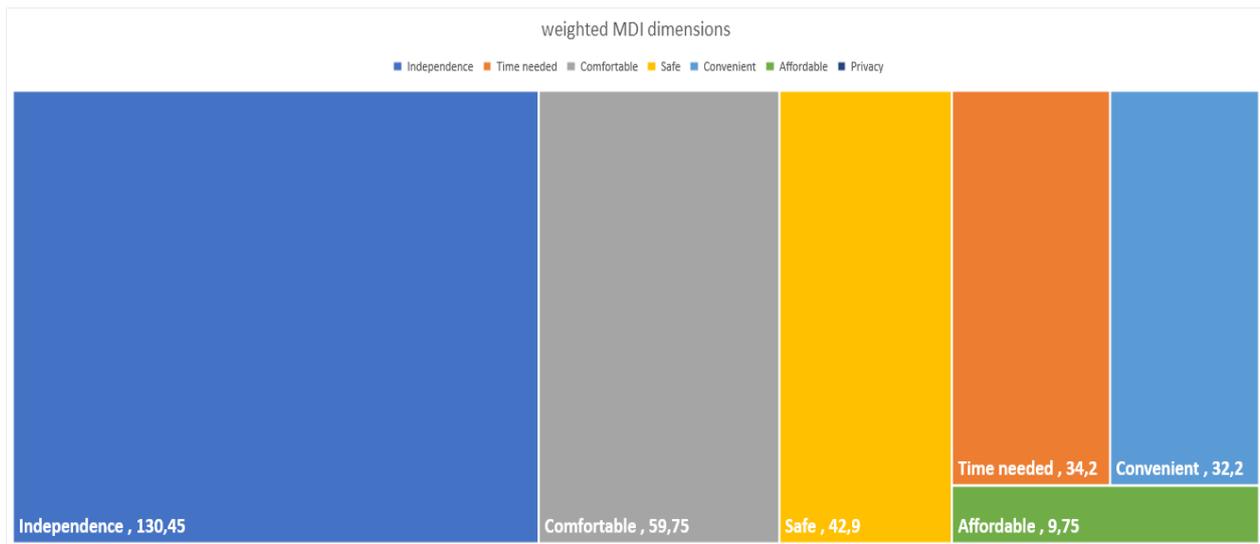


Figure 9 Weighted MDI dimensions

Discussion

As already noticed in analysis, some dimensions appear to occur less and relate to barriers that are not seen to be critical to travel. For example, “Privacy” did not appear as a dimension that was regarded as significant at this stage of analysis. This fact suggests further questions about users' perception regarding the protection of private data and the relative importance of this issue compared to more immediate and frequent obstacles to travel.

The factors with the highest values are “Independence” and “Comfort”.

Independence (130,45) is a crucial issue that arises from the group. The opportunity to plan and undertake travel relates to the objectives of the TRIPS project. However, participants' recurring comment identified perceived stigma created by needing to request help to complete a journey, such as boarding and disembarkation.

Comfort (59,75) builds upon the concept of accessibility: and seeks to ensure parity of dignity throughout travel. This included access to information without needing to request aid.

Safety (42,9) is not perceived as the most critical issue: it is a matter of relative importance and urgency of the expressed need, which, for our participants, is focused on Independence

The time needed (34,2) is related to the need to adopt accessibility and UD concepts to all the stages of a journey, including transport means. In many cases, waiting for transportation was time-consuming and a real obstacle to undertaking a planned journey.

Convenience (32,2) The same reflections arose as for “Time needed”.

Affordability (9,75) This appears to be a minor concern for most participants or, as already noted, not a significant problem at present. Some users with disabilities preferred to travel in private cars or taxis, which incurred additional costs but reduced the barriers of accessibility, delay, and stigma.



As a next step these results could be compared with the results obtained by Task 4.1.in weighting the MDI dimensions and factors. Further work on harmonisation might be required.

5.2. Co-designed concepts for future mobility

In this section, we describe the concepts for mobility solutions that were developed in the workshops.

For the development of co-designed concepts, we divide the ideas into two groups. The first group are the "big" ideas. These are technologies that would impact many or all of the stages of a journey. For instance, an autonomous vehicle would entirely disrupt the options for transport for many people with a disability, reducing many of the barriers experienced currently at each stage of a journey. In many respects, such disruptive innovations seek to "wipe the slate clean" and literally may seek to reinvent the wheel.

Alternatively, there are incremental ideas and innovations. These are ideas that are more tightly focused on one or more specific steps within a journey and seek to remove, reduce or mitigate the barriers that have been experienced. An example might be a wearable notification bracelet, which alerts a driver of a vehicle that a person with a disability is seeking to board and may need additional time or assistance. Such wearable technology addresses the specific issues around embarkation and disembarkation at a station or stop. Such an idea would not seek to address other barriers, such as access to information that may also be experienced as difficult.

In the following sections, both big ideas and incremental ideas produced during the co-design workshops are listed. Each idea, or concept, has received a unique code composed of the following elements:

A letter that indicated the nature of the idea distinguished between big ideas and incremental ideas: B = big idea, I = incremental idea.

A country code of two letters: BE = Belgium, BG = Bulgaria, EU = European, HR = Croatia, IT = Italian, PO = Portugal, SE = Sweden.

A number to simply order the ideas of the same nature produced in the same workshop.

Thanks to the collaboration of partner DLR for some of these ideas graphical representations have been made.

5.2.1. Big ideas

Summary table

Concept code	Title + short description
B-BE01	Smart platform/robot/ramp
B-BG01	Adaptive jeep-transformer car
B-BG02	An autonomous car which can be rented for individual use
B-BG03	"Levitating" wheelchair



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B-BG04	Socially interactive and inclusive public transport
B-BG05	Assistive robot to facilitate boarding transportation means
B-EU01	Smart Mobility Cane
B-EU02	Accessible cable car
B-EU03	Mobile walkways city network
B-EU04	Assistive buddy robot
B-EU05	Autonomous motorcycle - wheelchair transporter
B-IT01	Robo-Taxi with universal access and on-call service
B-IT02	LIDAR 3D Reconstruction of the Environment

Table 9 Big ideas summary table

Description of big ideas

Belgian workshop (Brussels)

B-BE01	Smart platform/robot/ramp
Short description	Platform/Robot/ramp usable in the station or to access different kinds of transports (linked to a smartphone application)
Benefits	This idea was mainly considered very interesting by participants but very difficult to implement. However, it stresses the previously mentioned difficulties of disabled persons in stations, and more globally to access public transports.
Outcomes	To overcome different barriers and to travel without human assistance.
Features	Intelligent robotic device overcoming vertical barriers

Bulgarian workshop (Sofia)

B-BG01	Adaptive jeep-transformer car
Brief description:	A multi-purpose car that can overcome any obstacle, terrains and can be adapted for wheelchair users, including automatic ramp and transforming capabilities like in the movie "Transformers".
What I like about this idea	Such vehicles guarantee higher security for the travellers, compared to the other proposed concepts
It would enable me to	Such cars can give drivers with disabilities the same possibilities which are available for drivers without disabilities
My transport fix would have the following features:	Small in size and for single person use, they will better integrate into the usual road traffic For use in health care for emergency and rescue missions

B-BG02	An autonomous car which can be rented for individual use
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Brief description:	An autonomous smart car without a driver which can be rented for individual use. Uses face recognition to adapt to the passenger's needs and wishes automatically.
What I like about this idea	This would greatly help to improve the independence and autonomy of persons with disabilities Autonomous cars would teach other drivers to drive more carefully
It would enable me to	Increase the mobility level of PwD in everyday life without bothering too much about trip planning
My transport fix would have the following features:	A user-friendly flexible booking system Adaptive features for multimedia usage Information systems about the environment

B-BG03	"Levitating" wheelchair
Brief description:	A wheelchair that can fly at low altitude and avoid traffic jams and obstacles. No need for other means of transportation. It can go anywhere, uses drones and is robotised
What I like about this idea	No need to use another transportation – autonomy There is no need to adapt public transport when the wheelchair can make its own transitions
It would enable me to	Go anywhere and be flexible To easily avoid obstacles
My transport fix would have the following features:	Integration of PwD into public life by increased mobility Weather forecasting Safety and protection mechanisms





Figure 10 Levitating wheelchair

B-BG04	Socially interactive and inclusive public transport
Brief description:	Transport focusing on travel's social aspects (bus, wagon), accessible to all, with all possible comfort (refreshments served, etc.), adapted to wheelchairs and passengers with disabilities and promoted social interaction.
What I like about this idea	The social side of travelling together with other people. It would attract a number of people with disabilities to travel together.
It would enable me to	Enjoy travelling while getting to my destination. Quality of life would increase through positive social life and related emotions.
My transport fix would have the following features:	<p>Social gamification for mixing up PwD and the rest</p> <p>Boarding and getting off assistance service</p> <p>Stops on demand are generally possible</p>
B-BG05	Assistive robots to facilitate boarding transportation means
Brief description:	Using the internet of things, robots to facilitate getting on and off by exchanging information between, e.g. the wheelchair and the transportation means for appropriate automated assistance, ramp usage, etc.



What I like about this idea	Additional automated help for the existing public transportation means
It would enable me to	To easily get on and off using their wheelchair without the assistance of staff, drivers or other people
My transport fix would have the following features:	Always charged battery through power stations Inform the bus driver and staff about the exact stop location Multimedia user-friendly interface for people with disabilities

European workshop (Dry run pilot)

B-EU01	Smart mobility cane
Brief description:	Smart mobility cane that acts as a navigator with an audio feed into the ears to identify barriers
What I like about this idea	It dramatically increases the safety and independence of visually impaired people
It would enable me to	Independently walk and move around, especially in the new and unknown environments
My transport fix would have the following features:	Rechargeable battery Adjustable size to be used in different contexts

B-EU02	Accessible cable car
Brief description:	An accessible cable car system that you can easily enter and depart and which carries you above the traffic
What I like about this idea	Integration in a shared vision for the city and accessible transport Replacement / superimposing of infrastructure Diversification of talent pool for companies
It would enable me to	To quickly move between inner city and peripheral areas
My transport fix would have the following features:	Infrastructure and living space arrangement/integration Seamlessly integrated accessibility

B-EU03	Mobile walkways city network
Brief description:	A city-wide network of rapid mobile walkways where people can automatically get on and off safely
What I like about this idea	Existing technology like in the airports and metro stations



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	Good accessibility
It would enable me to	Easily move around the city without a car
My transport fix would have the following features:	Safety and security integration Luggage line

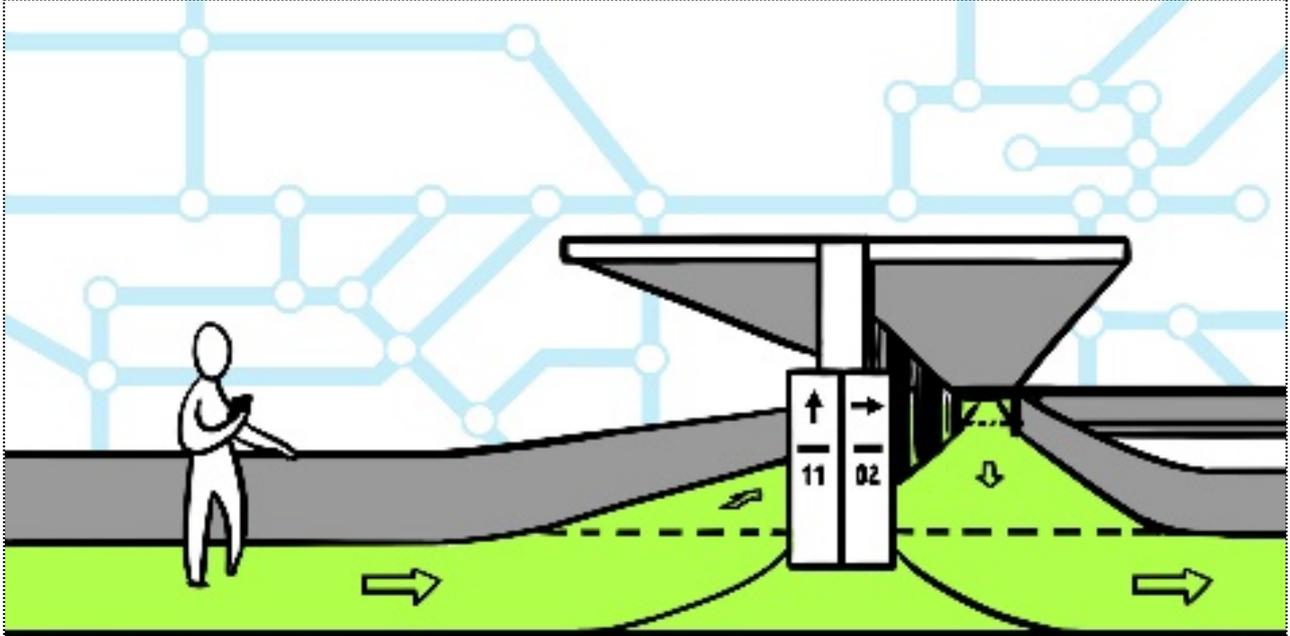


Figure 11 Mobile walkways city network

B-EU04	Assistive buddy robot
Brief description:	A travel buddy robot that follows you and can carry luggage, support you with information, and provide support in case of the need to transfer from one position or vehicle to another
What I like about this idea	Advanced futuristic technology use for people with disabilities The social aspect of not being lonely while travelling
It would enable me to	To freely walk home after shopping or while starting/ending the long journey
My transport fix would have the following features:	Booking features, pay as you go model Buddy robot can independently return to its base charging station



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Figure 12 Assistive buddy robot

B-EU05	Autonomous motorcycle - wheelchair transporter
Brief description:	A self-driving "motorcycle" that can be hired when needed that can carry a wheelchair
What I like about this idea	Integration of personalised solutions
It would enable me to	To be "cool" like other bikers while using a wheelchair
My transport fix would have the following features:	Privately run Universally designed modes of transport and services Mainstream accessibility

Italian workshop (Bologna/Cagliari)

B-IT01	Robo-taxi with universal access and on-call service
Brief description:	The universal access Robotaxi is equipped with assistive technologies that make it usable even by users with disabilities or other specific needs. It provides on-call public transport and can be booked via the call centre or a universal access app. It can be individual or collective.
What I like about this idea	it can guarantee independent and effective mobility because this also allows people with specific needs (e.g. mobility impaired, visually impaired, etc.) to travel alone, reaching the desired destinations when needed.
It would enable me to	Innovative transport solution integrating AI, Automatic Guidance, Accessibility for all (UD), mixed type of transport (individual and collective)



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My transport fix would have the following features:	Accessibility and convenience Usability Timely coverage of needs
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B-IT02	LIDAR 3D reconstruction of the environment
Brief description:	Reconstruction of the environment using LIDAR and identification of obstacles
What I like about this idea	It is wearable and not bulky, and because this allows the visually impaired to have a precise reconstruction of the external environment
It would enable me to	Safely navigate through the built environment to access transport, interchange between vehicle and disembark safely and smoothly.
My transport fix would have the following features:	<p>Glasses equipped with a LIDAR sensor and headphones for sending alerts.</p> <p>The glasses transmit what they detect through LIDAR to the phone, which processes the information and transmits the alerts to the headphones.</p> <p>Third parties may develop various apps, which interface through standardised communication to glasses to process the information differently according to the information you want to send to the user (wearer).</p>



Figure 13 LIDAR 3D reconstruction of the environment



5.2.2. Incremental ideas

Summary table

Concept code	Title + short description
I-BE01	Travel planner
I-BE02	Vocal assistant
I-BE03	Smart bracelet
I-BG01	Context and user-friendly app for accessible planning and city travels
I-EU01	Smart Navigation Tool
I-EU02	Ramps remote control for self-boarding
I-EU03	A fully accessible downtown pedestrian zone
I-EU04	Accessible parking app
I-HR01	Integrated information system in public transport
I-IT01	SMARTMAPP: App for navigation specifically for the visually impaired and blind
I-IT02	Wearable accessibility
I-IT03	Smart Glass Accessibility
I-IT04	I Go Where I Want - VaDo.V.
I-IT05	App-accessible
I-IT06	Mixed reality
I-IT07	Connettiamoci (Let's connect)
I-IT08	Intelligent Bus Stop
I-PO01	Adapted eScooter
I-PO02	Route planner and information App for PRM
I-SE01	Accessible design of transport
I-SE02	Identifying and overview of the flex area

Table 10 Incremental ideas summary table

Description of incremental ideas

Belgian workshop (Brussels)

I-BE01	Travel planner
Brief description:	Website or application to plan your travel for people with reduced mobility and adapting journey or displacement depending on the disability (wheelchair, hearing or visual disabilities)
What I like about this idea	The participants discussed this idea and stressed that it could be beneficial because it offers autonomy and information.
It would enable me to	To travel independently and to receive relevant information.
My transport fix would have the following features	Complementary ideas were: map the stations and undergrounds, clearly describe the path and accessibility between 2 means of transport.



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I-BE02	Vocal assistant
Brief description:	Improvement of vocal assistance for all kinds of public transports (train, metro, bus etc.)
What I like about this idea	It allows me to access information when I need it without making specific requests or being dependent on individual assistance. Such announcements could be made onboard but accessed via a Bluetooth headset if the information is distracting or intrusive to others.
It would enable me to	Travel more confidently and safely, promoting independence
My transport fix would have the following features:	Clear audio announcements in local language Location-based announcements. Accessed via onboard speakers or personal headset

I-BE03	Smart bracelets
Brief description:	Detecting bracelets to pay automatically
What I like about this idea	The participants positively received this idea because it facilitates the journey of the disabled person and its autonomy, but the question of personal data protection was raised.
It would enable me to	Make payments simply and easily without the need to access kiosks and ticketing systems. Have a reduced risk of missing journeys or travelling illegally as a result of unintended errors when booking.
My transport fix would have the following features:	Personal wearable linked to my account and credit card that approves payments based on passing a gate or beacon at the beginning and end of a journey.

Bulgarian workshop (Sofia)

I-BG01	Context and user-friendly app for accessible planning and city travels
Brief description:	Application for computer, tablet or smartphone, which uses the internet of things to communicate with all transportation means, considers user needs and disabilities when suggesting schedules and itineraries. The information provided by the App is context and user-dependent and allows planning and travels within the city with variants and information.
What I like about this idea	User-friendliness and adaptability for user needs



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It would enable me to	Save time Easy update the travelling information
My transport fix would have the following features:	A user-friendly app would require little preliminary knowledge and skills Languages of the Annex include Roma, Turkish, etc.

European workshop (Dry run pilot)

I-EU01	Smart Navigation Tool
Brief description:	Smart Navigation Tool - that helps you avoid obstacles and guides you to your target location
What I like about this idea	Different interfaces with universal design for providing feedback/interaction for different needs. A community-based approach to use real-time data from users
It would enable me to	Contact persons in unplanned situations, like incidents
My transport fix would have the following features:	Interface for transferring complaints/problems/wrong information to authorities and service provider. The synchronisation of data from different sources Fall-back system

I-EU02	Ramps remote control for self-boarding
Brief description:	A system to give the user control of automatic ramps when they are near a train door to allow self-boarding and exit
What I like about this idea	Higher independence level Less need for additional assistance staff
It would enable me to	To easily self-board and get-off the train, train, or metro
My transport fix would have the following features:	User-friendly interface to control the automatic ramp Enhanced safety via communication with public transport vehicles



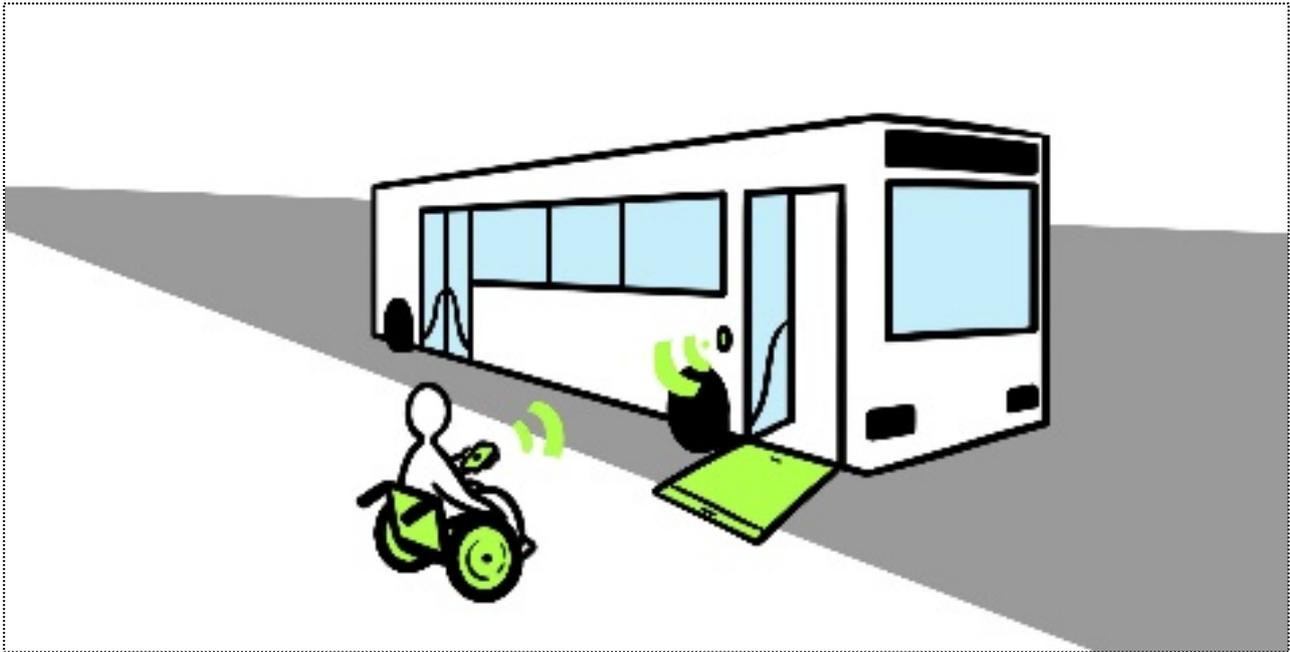


Figure 14 Ramps remote control for self-boarding

I-EU03	A fully accessible downtown pedestrian zone
Brief description:	A universally designed pedestrian zone in town centres with reduced motorised traffic and full of accessibility aids (signs, ramps, etc.) with easy access to buses and trains
What I like about this idea	It would boost more accessibility to public transport in smaller cities
It would enable me to	Socialise while shopping, exercising or walking the downtown
My transport fix would have the following features:	Perfect integration with public transport Freely available parking space nearby Allowance to bring individual micro-mobility devices

I-EU04	Accessible parking app
Brief description:	An app to guide you to accessible parking spots that are updated in real-time
What I like about this idea	Decreased air and noise pollution rates. Less traffic in the city centre
It would enable me to	Quickly find accessible parking without touring around
My transport fix would have the following features:	Managing people traffic for easier parking



Croatian workshop (Zagreb)

I-HR01	Integrated information system in public transport
Brief description:	A system that covers all travel stages, available via a smartphone app, or optionally as a separate device for users who do not use a smartphone/touch-screen technology.
What I like about this idea	It is modern, easily interchangeable depending on new situations, technologies, needs, easy to use, and accessible to everyone.
It would enable me to	To keep up with all the traffic changes, to be able to use public transport on my own and just like everyone else, and most importantly that we do not have to be dependent on other people's help and be in insecure situations.
My transport fix would have the following features:	<p>1. User identification: enables the identification of the user with the specification of the type of disability, i.e. mobility restrictions.</p> <p>2. Authorisation for access to services and services in space: allows access and adaptation to users' needs in real-time. Applicable for elevators, escalators, ramps, traffic lights, parking lots, etc.</p> <p>3. Navigation through integration with Google Maps: involves mapping the city with an emphasis on barriers that reduce mobility in different types of disabilities; allows movement through the city and access to public transport services.</p> <p>4. Reservation of specialised transport: enables reservation in real-time; includes an algorithm that finds optimal routes to increase efficiency and make the service available to as many users as possible.</p> <p>The system will be based on:</p> <p>1. Global Positioning System (GPS / Galileo) - to determine the position in space</p> <p>2. Digital compass (magnetometer) - to determine the orientation in space.</p> <p>3. Wireless Internet (GSM / Wi-Fi) - for real-time data update</p> <p>4. Wireless connection and information exchange (NFC / RFID / Bluetooth) - to access the IoT network</p>

Italian workshop (Cagliari / Bologna)

I-IT01	SMARTMAPP
Brief description:	App for navigation specifically for the visually impaired and blind
What I like about this idea	It is cheap and practical (App on an owned smartphone)
It would enable me to	Because this allows me to use public transport better independently



My transport fix would have the following features:	<p>To intervene in a lean way on the lack of infrastructures by replacing the tactile floor or other types of infrastructural signalling</p> <p>To calculate the route from point A to point B with an indication of the streets</p> <p>To report significant elements (bus stop, pedestrian crossing</p>
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I-IT02	Wearable accessibility
Brief description:	A wearable that facilitates accessibility to vehicles
What I like about this idea	<p>It allows the user to:</p> <p>Open the doors of the vehicle or activate the ramp in case of need (e.g. emergency)</p> <p>Know in the vicinity of the arrival of the vehicle, which will be its route of stops to follow</p>
It would enable me to	To be able to notify the driver in advance that he/she will have to welcome and allow the disabled user to board (and any communications vice versa)
My transport fix would have the following features:	<p>A wearable (e.g. smartwatch) that provides voice information to the disabled user</p> <p>IoT device that allows communication with the means of transport</p> <p>The application provided to the driver to receive information from the disabled user and vice versa</p>

I-IT03	Smart Glass Accessibility
Brief description:	A wearable that facilitates accessibility to vehicles
What I like about this idea	<p>Smart glass that facilitates access to vehicles</p> <p>What I like about the idea is because it allows the user to:</p> <p>Open the doors of the vehicle or activate the ramp in case of need (e.g. emergency)</p> <p>Know in the vicinity of the arrival of the vehicle, which will be its route of stops to follow</p>
It would enable me to	To be able to notify the driver in advance that he will have to welcome and allow the disabled user to board (and any communications vice versa)
My transport fix would have the following features:	<p>Smartglass allows to provide visual information to the disabled user</p> <p>IoT device that includes communication with the means of transport</p> <p>The application provided to the driver to receive information from the disabled user and vice versa</p>

I-IT04	I Go Where I Want
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Brief description:	APP with integrated path systems and as accessible as possible for travel between various destinations (e.g. homework path, also for leisure time, such as house to a public park, house to museum, etc.)
What I like about this idea	The App lets me know the path. I can choose it from any alternatives (if possible), especially if it is new because this allows me to have greater certainty, first, to be able to face it and with which means, and then to know how and when I can go back
It would enable me to	Find the pathways of my journey
My transport fix would have the following features:	<p>The offer of one or more (if possible) complete alternative routes, from the starting point to the arrival (and to the internal movements to the place of arrival, for example, a park, a museum, etc.)</p> <p>With the integration of more modes of travel and means of transport (from car to public transport, but also by bike or on foot) and with the greatest accessibility for all possible</p> <p>Have an assessment of the travel times and the various means of transport that I have / can take, even if I move with a wheelchair or if I have visual or hearing difficulties</p> <p>To be able to evaluate the reverse route, back (important for extra-urban places such as parks, etc. and for the evening hours or holidays, when the frequency of public transport thins out)</p> <p>Signalling of points of interest along the routes (stop, toilet, catering, etc.)</p>

I-IT05	App-accessible
Brief description:	An app that contains information on the accessibility of the public transport network stops, with additional cartographic information on the equipped and passable or non-passable routes for non-ambulatory users who travel by wheelchair to services or points of attraction (located within 300 meters from the stop)
What I like about this idea	It allows you to plan your travel by giving information on the accessibility of the public transport network stops and the out-of-stop equipped routes
It would enable me to	Advanced wayfinding integrating local and contextual info
My transport fix would have the following features:	It would be accessible via APP with the possibility of cartographic consultation of information, by selecting the code or address of the origin and destination stop, with a display of accessible or not accessible routes

I-IT06	Mixed reality
Brief description:	Coverage of the environment by MR services, which allow its use even to those with specific disabilities (e.g. visually impaired, deaf, people with intellectual disabilities, etc.)



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What I like about this idea	It does not isolate the user from the real world but allows him to get more information that can be relaunched, for example, on smartphones integrated with the same functionality. This allows the user to move with greater knowledge in the environment and possibly, for example, to call a means of transport.
It would enable me to	Smart pathway finder with integrated MR services (made accessible for a range of disabilities)
My transport fix would have the following features:	Ease of use Integration with smartphones and/or other popular and low-cost devices

I-IT07	Connettiamoci (Let's connect)
Brief description:	Improving the ability of a disabled person to plan a trip at a stop. Improve the planning ability of the driver affected by the request. Empower those present on board vehicles
What I like about this idea	The disabled person would have access to real-time information with all the possible alternatives to meet their needs. This allows me to improve the whole travel experience by facilitating public transport even by disabled users. It also enables drivers' work by allowing them to verify in advance the feasibility of transporting the disabled person and avoiding possible misunderstandings. It also engages those present on the vehicle to adopt virtuous behaviour towards the future passenger.
It would enable me to	Journey planning with real-time updated information
My transport fix would have the following features:	Interactivity (with onboard vehicle systems) Answers in real-time Operation via speech synthesis Integration with other apps

I-IT08	Intelligent Bus Stop
Brief description:	Proximity sensors for bus stops with a warning to drivers - orientation and presence signalling for users with visual limitations
What I like about this idea	It integrates an innovative solution to an existing APP; this allows people with visual sensory disabilities to find their way more easily and not miss the bus because the driver is alerted about the traveller's presence at the bus stop.
It would enable me to	Real-time location system (RTLS) technology applied to an intelligent bus stop that communicates with bus vehicle and with user app
My transport fix would have the following features:	Easily implemented on existing APPs Accessible to users with visual sensory disabilities Also helpful in booking buses with platforms directly from the stop



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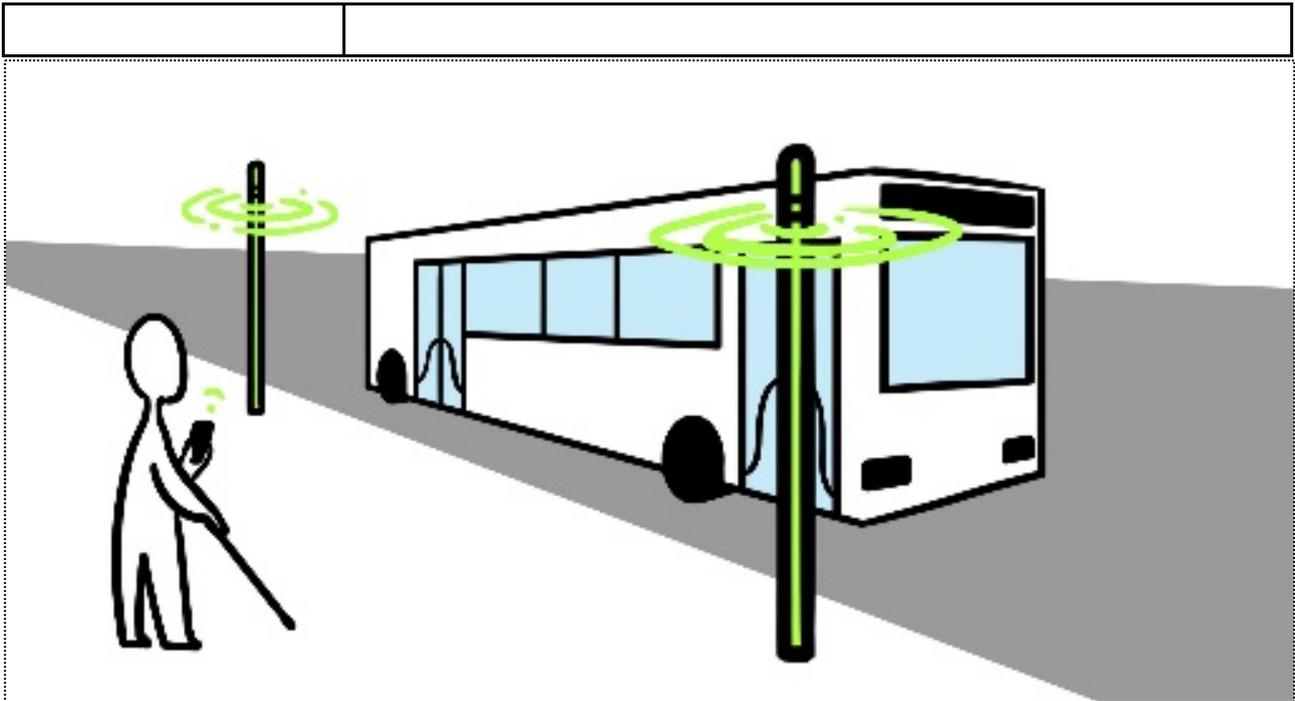


Figure 15 Intelligent Bus Stop

Portuguese workshop (Lisbon)

I-PO01	Adapted eScooter
Brief description:	An eScooter system is individually owned or requested by an app
What I like about this idea	Flexibility
It would enable me to	Move to any part of the city at any time.
My transport fix would have the following features:	Navigation Ease of use Flexibility

I-PO02	Route planner and information App for PRM
Brief description:	An app capable of calculating the best routes and display helpful information for PRM
What I like about this idea	Provides information to help us plan our trips and offers real-time information
It would enable me to	It enables us to plan with better information and avoid situations where there is broken-down equipment



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My transport fix would have the following features:	Provide better information Provide real-time information
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Swedish workshop (Stockholm)

I-SE01	Accessible design of transport
Brief description:	Making buses/trains accessible with a wheelchair and other technical equipment and baby strollers
What I like about this idea	It is accessible
It would enable me to	This would enable me to travel without losing time waiting for the next bus, which is accessible
My transport fix would have the following features:	A more flexible area in the transport cars No raised areas in the back of the bus Easy to board

I-SE02	Identifying and overview of the flex area
Brief description:	A system with a view of the flex areas that can communicate to the traveller if the next bus is accessible and room to board
What I like about this idea	Save me time and helps with planning
It would enable me to	Let me know if I can travel or not
My transport fix would have the following features:	Data that gives an overview of the flex area on the transport



6. Discussion

Several trends and results arise from the data gathered; these findings can inform transport operators seeking to enhance access and inclusion of people with disabilities to transport services.

1. Solutions that are based on widely available consumer technologies such as phones and smartwatches are valued.

Analysis of the solutions identified suggests that consumer technologies upon which access to mobility can be built are widely welcomed by all stakeholders. Emerging technologies can be identified that significantly improve both location-based data and the representation of that data to the user. The cost is reduced substantially by basing such solutions upon mobile, portable, and wearable consumer technologies. The answer can be applied to much broader populations than just those with disabilities.

2. People with disabilities find it challenging to think about long-term mobility options as they seek more immediate improvements rather than hoping for significant steps in the long term.

Advocacy and consideration of innovation opportunities, especially disruptive innovation, can be challenging for many people with a disability. This has been reflected in wider discussions about medium to long term change and emerging solutions. For instance, many in the deaf community have suggested that research into “signing avatars” is misguided when they believe that what is required is higher numbers of people who are trained and confident in sign language. Similarly, the development of all-terrain wheelchairs, including those able to manage stairs, has been decried when activists believe that it diverts attention away from the need for ramps.

For many people with a disability, the promise of solutions in 5-10 years does not address their current experience. When engaged in the discussion, they are most likely to focus on addressing immediate barriers that can be addressed rapidly. Many of the solutions identified focussed on barriers to one aspect of mobility, rather than exploring the wider opportunity of travelling in new ways.

3. Physical access remains a significant area of concern and dominates feedback from those with a physical disability.

Physical access to transport is a dynamic field. Some physical access barriers result from poor design of buildings and vehicles, but other barriers are temporary and transient. Such barriers may result in a lack of physical access, but the cause may be a lack of awareness or unknowing attitudes from the community, including other travellers.

The solutions that people with physical disabilities identified often used emerging technologies as forms of guidance and support to avoid barriers rather than



address all of the obstacles. The use of digital technology to inform and guide was further extended by technologies that provided forms of control, including opening gates, connecting to powered ramps, making payments.

Many of these concepts provided the basis of tools that could be used by any traveller, making transport faster and more secure.

4. Wayfinding and access to usable information are highly regarded by those with print impairments and hearing loss.

Access to information about journeys, including orientation and wayfinding, was consistently identified as a need by many participants. Location-based services that provided information about the environment and facilities such as restrooms and exits allowed a high level of independence during the journey. Access to the information in various digital formats offered the opportunity to support those with a sensory need and those with cognitive impairments who found traditional media hard to interpret. Those with physical impairments found maps and books challenging to manipulate. The more such resources were made available online and in accessible formats, the greater the benefit.

One specific aspect that was highlighted was to ensure that such information was updated dynamically with data related to obstacles and barriers. By including directionality and orientation, the risks of becoming lost and requiring assistance were decreased.

5. Improvements to navigation and orientation at each stage of the journey would be valued.

Building upon the need for orientation and wayfinding information was a need for consistency across the journey stages. This is especially important when the form of transport varied at one or more stages of the journey. Finding an accessible route to the next transport stop and identifying any barriers that were likely reduced the potential anxiety for travellers with a disability.

If such resources were dedicated to one transport provider only, then the benefits were significantly reduced, as specific stress points in the process dictated journey experience. Understanding that journeys are door to door, not station to station, is essential in planning such tools.

6. Long term, disruptive innovations based on independent travel were valued.

Whilst long term planning was challenging to some participants, there was a clear trend towards valuing those ideas that offered genuine potential for independent mobility. The most significant example of this was based on the opportunities for autonomous vehicles. Whilst there was reasonable scepticism about how readily such vehicles could be widely available, there was a high degree of positive feedback on such vehicles' impact once the technical and safety aspects were addressed.



Such vehicles were also welcomed as having potential added value by reducing the demand for personal vehicles, reducing city congestion and related pollution with its impact on health and the environment.

7. Journey planning was identified as being of value, especially where such plans could be updated dynamically in the light of changing circumstances.

The challenges of planning successful journeys had been highlighted by many in the workshops. The potential of journey planning systems that were updated in real-time, presented using augmented reality of mobile and wearable devices, was perceived as having a significant impact. The combination of form and format of information, with critical updates based on continuously updated data, was felt to have considerable potential to reduce the planning time and the related negative impact upon people with a disability.

8. Maintenance of the social dimension to travel was highlighted as desirable.

One additional dimension that stakeholders considered was the value of social interactions through public and shared transport systems. There was concern that if systems evolved to be primarily individual and personal, shared spaces' opportunities would be reduced.

For many people with a disability, one of the most critical impacts of limited mobility was the sense of social isolation. At their best, shared transport supports travel to locations where shared experience could occur, such as workplace, mall, college, or entertainment place, but the transports were in themselves intrinsically social. Whilst such interactions with strangers were governed by social norms, many valued the opportunity for engagement offered by proximity to others.

9. Preconceptions over the cost of innovations were a concern.

Such preconceptions were mitigated by an appreciation of the potential of disruptive transport systems that were of benefit to all travellers but which, if based on inclusive principles, could have significant benefits to those with a disability. This encouraged many ideas to be built upon mainstream consumer technologies with diverse purposes to reduce costs and maximise value.

10. Learning from existing practice.

Some of the incremental ideas suggested already exist in some cities. In principle, this could make further implementation much more straightforward regarding technology development (twinning replication activities between cities are possible).



7. Conclusion

This report sought to describe the findings developed through a series of seven co-design workshops that considered user evaluations of mobility solutions and linked services leading to a series of design concepts for further evaluation of feasibility of implementation.

The design concepts were divided into two sets, disruptive “big” ideas that sought revolutionary change to forms of transport and incremental changes that address barriers to one or more stages or steps within a journey.

In adopting a co-design approach to the workshops, it was for many of the stakeholders the first time that an opportunity to explore these issues together had been created. The importance of creating an environment within which all stakeholders, regardless of experience and background could contribute should not be understated. As such for many the workshops were the first steps in a longer process, some of which will be addressed through further work packages within TRIPS, in particular WP5 and WP6.

It should be recognised that the workshops took place at the height of the mobility restrictions caused by public health policy in many of the countries. It is difficult to gauge the extent to which additional fears of illness, loss of jobs and access to education and anxiety over the cost to the public purse of the pandemic impacted upon the insights and concepts provided. For many with a disability, the lived barriers of the past were further exacerbated at this time.

Living with the barriers created is both frustrating and damaging to the lives of those with disabilities. Their input tended to seek progress as soon as possible, and many participants found it difficult to consider long term approaches over short term fixes. As a result, many of the design concepts explored how to resolve a single barrier to mobility, rather than exploring the wider opportunity of travelling in new ways. Where “out-of-the-box” thinking was encouraged, many participants qualified that as “less relevant” or “waste of time”.

Those design concepts were related not only to the specific stage of a journey, but also to the nature of the disability experienced. Many of the concepts developed sought to address the needs of one cluster of needs, which was to lead to further challenges in prioritising design concepts in the analysis to follow. For those with a physical disability, barriers in the built environment were repeatedly identified, whilst for those with sensory needs, access to information, orientation and wayfinding were of greater concern.

One group of travellers with a disability that were not easily engaged were those with cognitive impairments. Further workshops that specifically addressed their needs might be beneficial going forwards.

Despite these limitations and constraints, it was clear that across workshops there was enthusiasm for some forms of long term, disruptive innovations, which sought to address independent travel. The most significant example of these was the emergence of autonomous vehicles. Despite some scepticism about how soon such vehicles would be available, there was recognition that such development would have a positive impact on personal mobility for many people with a disability. It is useful to note that the value of such vehicles was rated more favourably when constructed as shared vehicles, with the



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potential for social interaction whilst travelling and a positive impact upon the environment.

When considering incremental technologies, there was great interest in those solutions that were based upon widely available consumer technologies such as phones and smartwatches. The use of familiar technologies was both welcomed by stakeholders and at an early stage seemed to have fewer impediments to implementation. Such design concepts could target a specific group of needs such as obstacle avoidance, or through a universal design approach reduce a specific barrier for all users such as journey planning. By building upon widely available platforms some of the anxieties and preconception over excessive cost and level of investment required were addressed.

We recognise that not all of the innovations valued by stakeholders were completely new. In many cases the incremental ideas suggested already existed in some cities. In principle, this could make further implementation much more straightforward regarding technology development (twinning replication activities between cities are possible).

In conclusion, the workshop model's use to establish a dialogue between stakeholders had great potential to be replicated and developed. Regular workshops hosted by lead organisations could help build future opportunities and contribute to the successful implementation of design concepts. WP6 will provide many opportunities for the project partners and the local core user teams to build further upon the data collected during the co-design and co-production workshops of WP4.



Annex 1 – Codesign workshop participant list city

Croatian workshop (Zagreb)

Attendee Number	Role	City
Attendee 1	PWD - transport user	Zagreb
Attendee 2	PWD - It expert and transport user	Zagreb
Attendee 3	PWD - It expert and transport user (muscular dystrophy, electric wheelchair)	Zagreb
Attendee 4	Co – moderator	Zagreb
Attendee 5	PWD - deaf person	Zagreb
Attendee 6	PWD	Zagreb
Attendee 7	PWD - legal expert (muscular dystrophy, regular wheelchair)	Zagreb
Attendee 8	REHA technologist, centre for professional rehabilitation	Zagreb
Attendee 9	Asst. Prof. Ph. D. Department of Information and Communications Traffic, Authority in Disability and Assistive Technologies	Zagreb
Attendee 10	IT expert - software developer, focus on AT solutions for physical impairments	Zagreb
Attendee 11	Zagreb electric tram representative	Zagreb
Attendee 12	Traffic engineer	Zagreb
Attendee 13	Advisor of the Mayor (PWD - blind person)	Zagreb

Italian workshop (Cagliari / Bologna)

Attendee Number	Role	City
Attendee 1	PWD – low vision (LUL-Cagliari) - Facilitator	Cagliari
Attendee 2	(LUL)	Bologna
Attendee 3	PWD – blind (CUT)	Cagliari
Attendee 4	PWD (CUT-Cagliari)	Cagliari
Attendee 5	PWD – wheelchair user (CUT-Cagliari)	Cagliari
Attendee 6	City mobility service (CTM-Cagliari)	Cagliari
Attendee 7	City mobility service (CTM-Cagliari)	Cagliari
Attendee 8	PWD – Political representative of PWD (Consulta Sup. Handicap Bo)	Bologna



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Attendee 8	(AAATE) – Zoom technician	
Attendee 10	Representative of Deaf Association (Ens Cagliari)	Cagliari
Attendee 11	(Tbridge)	
Attendee 12	(AAATE) - Facilitator	
Attendee 13	City mobility service (SRM-Bologna)	Bologna
Attendee 14	City mobility service (SRM-Bologna)	Bologna
Attendee 15	PWD (CUT-Bologna)	Bologna
Attendee 16	PWD – wheelchair user (CUT-Bologna)	Bologna
Attendee 17	Disability Manager–Bologna	Bologna
Attendee 18	UD and Digital Assistive Technology expert (CRA-Bologna) - Facilitator	Bologna
Attendee 19	Accessibility expert (CAAD-Bologna)	Bologna
Attendee 20	Digital Assistive technology expert (CRA-Bologna)	Bologna
Attendee 21	Disability manager Cagliari	Cagliari
Attendee 22	City mobility service (CTM-Cagliari)	Cagliari

Portuguese workshop (Lisbon)

Attendee Number	Role	City
Attendee 1	Facilitator	Lisbon
Attendee 2	Facilitator	Lisbon
Attendee 3	Zoom technician, AAATE	Lisbon
Attendee 4	Carris	Lisbon
Attendee 5	User-expert	Lisbon
Attendee 6	User-expert	Lisbon
Attendee 7	User-expert	Lisbon
Attendee 8	Lisbon Municipality – Pedestrian Accessibility Plan	Lisbon
Attendee 9	User-expert	Lisbon
Attendee 10	Carris - Depot manager	Lisbon
Attendee 11	Infraestruturas de Portugal – Studies and Inovation	Lisbon

Swedish workshop (Stockholm)

Attendee Number	Role	Description	City
Attendee 1	Director of Independent Living Institute	Trips Core group – mobility impairment and immigrant	Stockholm



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Attendee 2	Project leader – Right from the start and PhD student Universal Design	Trips Core group – seeing impairment	Stockholm
Attendee 3	Begripsam	Trips core group and transport expert/statistics gathering	Stockholm
Attendee 4	Disabled Refugees Welcome	Trips core group – mobility impairment and immigrant	Stockholm
Attendee 5	Disabled Refugees Welcome	Trips core group – mobility impairment and refugee	Stockholm
Attendee 6	DHR	Trips core group – mobility impairment	Stockholm
Attendee 7	JAG	Trips core group – mobility and cognitive impairment	Stockholm
Attendee 8	Trafikförvaltning Stockholm – Accessibility Strategist	Trips extended working group - Transport authority	Stockholm
Attendee 9	Trafikverket	Trips extended working group - Transport authority	Stockholm
Attendee 10	Trafikanalys	Trips extended working group - Transport expert	Stockholm
Attendee 11	Jönköping University	Expert assistive tech	Stockholm
Attendee 12	Jönköping University	Expert assistive tech	Stockholm
Attendee 13	Nationellt kunskapscentrum för kollektivtrafik	Expert Assistive tech	Stockholm
Attendee 14	Härnösandskommun	Expert transport	Stockholm
Attendee 15	Independent Living Institute	Expert disability	Stockholm

Bulgarian workshop (Sofia)

Attendee Number	Role	City
Attendee 1	Independent Living NGO, Zoom technician	Sofia
Attendee 2	participant	Sofia
Attendee 3	participant	Sofia
Attendee 4	participant	Sofia
Attendee 5	Accessibility expert	Sofia
Attendee 6	participant	Sofia
Attendee 7	participant	Sofia
Attendee 8	participant	Sofia
Attendee 9	participant	Sofia



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Attendee 10	City Mobility, Client sat	Sofia
Attendee 11	City Mobility, Sofia	Sofia
Attendee 12	ASSIST-AT foundation, facilitator, note taker	Sofia
Attendee 13	ASSIST-AT foundation, facilitator, note taker	Sofia

Belgian workshop (Brussels)

Attendee Number	Function	Brussels
Attendee 1	Person with disability	Brussels
Attendee 2	Person with disability	Brussels
Attendee 3	Person with disability	Brussels
Attendee 4	Person with disability	Brussels
Attendee 5	Person with disability	Brussels
Attendee 6	STIB Transportation provider	Brussels
Attendee 7	Regional tourist office: Accessibility Expert	Brussels
Attendee 8	Accessibility Expert (AAATE)	Brussels
Attendee 9	Adapted taxis Transportation provider	Brussels
Attendee 10	Facilitator (EASPD)	Brussels
Attendee 11	ENIL	Brussels
Attendee 12	(AMT)	Brussels
Attendee 13	(AMT)	Brussels
Attendee 14	Technical support (EASPD)	Brussels
Attendee 15	Brussels-Mobility	Brussels
Attendee 16	Person with disability	Brussels

European workshop (Dry run pilot in English)

Attendee Number	Notes	Role
Attendee 1	ENIL	
Attendee 2	ENIL	
Attendee 3	LUL of Cagliari	Learner as a future facilitator
Attendee 4	LUL of Sofia	Workshop co-organiser in Sofia
Attendee 5	LUL of Zagreb	
Attendee 6	LUL of Brussels	Workshop co-organiser in Brussels



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Attendee 7	TRIPS AAATE WG	Facilitator
Attendee 8	TRIPS AAATE WG	Facilitator
Attendee 9	TRIPS AAATE WG	Notetaker
Attendee 10	National Disability Authority in Ireland	Expert in standardisation
Attendee 11	Centre for Excellence in Universal Design, Ireland	Expert in Universal Design
Attendee 12	Usability lab at the Department of Cognitive Science and Psychology, New Bulgarian University	Expert-Potential workshop organiser in Sofia
Attendee 13	University of Lisbon	Expert- Potential workshop organiser in Lisbon
Attendee 14	DLR	Expert
Attendee 15	DLR	Presenter, Notetaker
Attendee 16	DLR	PhD Student
Attendee 17	TUE Methods expert	Facilitator
Attendee 18	TUE Methods expert	Observer
Attendee 19	City of Zagreb	
Attendee 20	AIAS Bologna	AT expert
Attendee 21	AAATE	Notetaker
Attendee 22	AAATE	Notetaker
Attendee 23	AAATE	
Attendee 24	UITP	
Attendee 25	TUE, design student	



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Annex 2 - Guidance document

GUIDANCE DOCUMENT FOR TRIPS CO-DESIGN WORKSHOPS ON FUTURE MOBILITY SOLUTIONS

Introduction

This document aims to guide those that are actively involved in the organization and delivery of the co-design workshops in the different national languages.

It is made based on two online pilot workshops held on the 14th and the 21st of November 2020. Following the evaluation of those first workshops, various elements have been thoroughly revised.

We trust that the information provided below is helpful and detailed reading is recommended.

The workshops in the overall project design

The co-design workshops we would like to implement in the national languages of the cities involved in the project have a specific function in the TRIPS project design. They act as a “bridge” between WP 2 and 3 which focussed on barriers encountered by travellers with disabilities and state of the art innovations in mobility, technology and assistive solutions, and the work of the local teams in the cities in WP6. The TRIPS project is on innovation in the transportation sector and how the forward-looking solutions could be right from the start co-designed with travellers with disabilities. In WP6, we work with cities at a local level, engaging with local user groups, transportation providers and institutions. Together we reflect on the co-design and co-production of scenarios and solutions. The co-design workshops seek to involve all stakeholders in a creative exercise to produce imaginative solutions to facilitate comfortable and safe travel for all. Additionally, we aim to train ourselves in assessing these solutions for their feasibility and sustainability. The workshops will provide a useful first exercise for the local teams to work with tools such as “accessible online workshops”, the Mobility Divide Index and the PEST analysis, as well as with concepts such as mobility solutions, design concepts, co-design, mobility scenarios, etc.

Objectives of the workshops

SUMMARY

The workshops aim to reflect together on how future mobility scenarios should look like to be as inclusive as possible. The idea is to have ourselves inspired by examples of how emerging technologies might change the way we travel and help to overcome the difficulties we meet. Together we will develop some innovative ideas and discuss, as a group, their feasibility.

MORE IN DETAIL



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1. To create a set of design concepts based on blue-sky thinking with no limitations
2. To review design concepts for barriers to implementation identifying both potential barriers and potential mitigations
3. To create a prioritized list of design concepts with capacity for implementation in the cities
4. To test tools and techniques of co-development of innovative approaches to mobility solutions

Expected outcomes

SUMMARY

At the end of the workshops, we will have developed between 2 and 5 innovative ideas for mobility in urban areas (so-called design concepts). For each, we will produce have a list of enablers and barriers for implementation in the given format (Annex 1).

MORE IN DETAIL

1. To establish a model of co-design tools and techniques to facilitate shared planning of innovative, accessible mobility solutions
2. To develop design concepts that offer disruptive innovative thinking to make personal mobility and transport accessible
3. To identify specific innovations to address barriers to current transport systems that would increase ease of access for people with a disability
4. Review of outputs of workshops for feasibility and potential implementation using a PEST framework of influences. (Political, Economic, Social, Technological)
5. To identify possible actions and mitigations that would address barriers in the short, medium and long term
6. To produce a sample prioritized list of potential inclusive mobility solutions based upon clear inclusion and exclusion criteria including the potential impact
7. To serve WP6 in scoping the work in the pilot cities/regions. This includes the implementation of the MDI to measure the accessibility of transport systems from the perspective of disabled users.

Recruitment of participants

For each workshop the ideal expected number of participants is between 11-16, preferably composed as such:

- 4-6 persons with disabilities
- 2-3 AT or accessibility experts
- 2-3 Transportation providers
- 2-3 Representatives of local authorities
- 1 expert on emerging technologies

The meetings have to take into account accessibility requirements. For further guidance, see the section on Accessibility.



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Planning (incl. deadlines) & Roles

The first step is to define for each language version, **a core group of people** that feel responsible for the workshop organization. Someone from the AAATE TRIPS Team will assist them:

Several people have already said they were interested in being involved:

Croatia: 3 persons. AAATE coach: Evert-Jan Hoogerwerf

Portugal: 3 persons. AAATE coach: David Banes

Bulgaria: 2 persons. AAATE coach: Evert-Jan Hoogerwerf

Sweden: 2 persons. AAATE coach: David Banes

Italy: 2 persons. AAATE coach: Evert-Jan Hoogerwerf

Belgium (French spoken): 3 persons. AAATE coach: Evert-Jan Hoogerwerf

The second step is probably to **define/coordinate the dates of the workshops** first, before recruiting the participants. Experience has shown that the process can be organized as 2 online workshops of 3 hours per workshop OR as 3 online workshops of 2 hours per workshop. Both models require a total of 6 workshop hours. It is recommended to plan at least a one week break time between workshops to give enough time for a small homework and further preparation.

Please note that we will need the report sent to us before the end of January 2021. This will mean that the workshops have to be scheduled in January, or, if possible, shortly before Christmas 2020.

The third step is to start to recruit the participants. Participants can be recruited in different ways. Firstly, by checking your networks, colleagues, and people at the local level will be involved in the project, especially in WP6. It may be useful to share among the core group a spreadsheet in Google Drive with the names and emails of the persons that have committed to join. Such a file will facilitate planning and further communication.

The fourth step is to define roles - who is doing what and how clearly. The following tasks have to be considered before, during and after the meeting. Ideally, there would be 3 people taking roles and managing the process: one for the technical aspects of organizing an online event, one for content development and facilitation, and one for organizational issues. Based on the interest and competences of the people involved, these roles and tasks could also be distributed differently.

Before the workshop	During the workshop	After the workshop
Technical manager -Identify the platform and get acquaintance with its features (see below under technicalities)	Technical manager -Open the meeting room 30 minutes before the workshop -Let people in -Check that everybody is okay with the system	Technical manager -Save the messages in the chat (before closing the meeting) -Save the recording



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-Identify accessibility needs and how they can be addressed	-Activate speech-to-text recording and video captioning -Manage breakout rooms if these are foreseen	
Content manager/facilitator -Understand the format and the provided material. -If needed, identify an expert to support the explanation of the technologies -Translation of the materials that will be shown -Identify accessibility needs and how they can be addressed	Content manager/facilitator -Welcome the participants and make sure they are at ease. -Facilitate the workshop. -Make sure all participants have the opportunity to speak if they wish.	Content manager/facilitator -Collect the outputs of the workshop -Elaborate final versions. -Translate these into English. -Prepare a short report (1 page) on the workshop.
Contact person or tutor -Coordinate the recruitment -Keep the list of participants -Send out the invitation -Make sure that all participants have the information they need.	Contact person or tutor -Make sure that all are there that should be there. -Keep an eye on the chat room and report relevant observations in the group. -Keep the time -In case of breakout rooms, facilitate one of the breakout rooms.	Contact person or tutor -Support the content manager with the reporting -Send a message thanking the participants and attaching the report

Step 5 is to prepare for the workshops and to manage these according to the roles and task descriptions above.

Everyone undertaking a role should be briefed on accessibility and facilitating inclusive meetings. See the section on Accessibility for more information.

Typical structure for the workshops

The following is a proposal for the structuring of the workshops. Naturally, modifications are possible based on the confidence that the workshops facilitators have with the topic that will be discussed and with the development of alternative strategies to come to the expected outcomes. It is based on 6 hours of work, including breaks, although some parts may be slightly reduced in length, depending on the possibilities.

The core components are:

1. Our travel
2. Future travel stories - developing design concepts
3. Impact of our concepts



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4. Making the concepts real

Although it is nice to work on different concepts and to value to contribution of all, at the end of Unit 3 the group will have to reduce the number of concepts that will be subject to the PEST analysis in Unit 4 (2-3 per sub-group in Unit 4). The Mobility Divide Index rating can be the right tool to do this as it is based on assessing potential impact of the solution.

Potential Programme (example)

Session 1 – Our Travel (50-60 minutes)

This session will get us to think of how we travel today and our ideal scenarios for the future

At the end of this unit you will have

- Outlined a recent journey that you made
- Listed the different forms of transport that we used
- Identified the most popular forms of transport
- Identified the parts of a journey that are most challenging
- Suggested why these are difficult:
 - 1.1 My travel story (individual activity 10 minutes)
 - 1.2 Travel options and rationale (whole group 15 minutes)
 - 1.3 Stages of a journey (whole group 15 minutes)
 - 1.4 Conclusion
- Summarise
- What forms of transport do we use?
- Which are the most popular forms of transport?
- Why do we think they are popular?
- Which steps in a journey are the most difficult?
- Why are they difficult

Session 2 – Future Travel Concepts (75 minutes)

At the end of this unit, you will have

- Reviewed some design concepts as examples
- Imagined some design concepts of our own
- Thought about barriers at each stage of a journey
- Discovered some of the emerging technologies that could change our journey
- Thought about how the new technologies could fix the barriers

2.1 Introduce design concepts (whole group 10 minutes)

2.2 Review and discuss concepts (whole group 10 minutes)



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2.3 Imagine our own concepts (small groups 15 minutes)

2.4 Review group ideas (whole group 10 minutes)

2.5 Addressing journey barriers with new technologies (whole group and individuals 15 minutes)

2.6 Review solutions to journey barriers (whole group 10 minutes)

2.7 Conclusion

- Summarise the big ideas that have been created – does everyone understand the ideas?
- Summarise the barriers for each step of a journey that have been listed
- Summarise some of the ideas for fixing the barriers using new technology
- Identify the five ideas that you think could be most beneficial – include at least 2 big ideas and 2 ideas that address specific stages

Session 3 – Impact of our concepts (50-60 minutes)

At the end of this unit you will have

- Added detail to our ideas and solutions
- Worked through an example of a solution to identify how helpful it would be
- Worked through some further examples in small groups to discuss and agree how helpful they might be
- Suggested which innovations might have the greatest impact

3.1 Refining the travel concepts (small groups 20 minutes)

3.2 Worked example of a travel concept (Whole group 5-10 minutes)

3.3 Reviewing our concepts (20 minutes small groups)

3.4 Conclusion

- Summarise the solutions and ideas you have had
- Which seem to be the most popular?
- Why do we like these?

Session 4 Making the Concepts Real (90 minutes)

By the end of this unit, you will have

- Summarised everything we have done so far
- Introduced PEST analysis
- Thought about the enablers, challenges and mitigations in implementing each idea
- Produced a final list of ideas which a measure of impact and ease of implementation

4.1 Summary of journey stages and new technologies (whole group 10-15 minutes)



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4.2 Summary of our concepts, the technologies and our judgements on impact (whole group 5 minutes)

4.3 Introducing PEST including worked example (whole group 25 minutes)

4.4 Undertaking PEST on 2 or 3 design examples per group (small groups 30 minutes)

4.5 Plenary and feedback of PEST (Whole group 15 minutes)

4.6 Conclusion (Whole group 5 minutes)

- What have we done
- We have looked at one or more design concepts and considered which would have the greatest impact
- We have thought about
 - What might help make this real?
 - What might stop us making this real?
 - How can we address the problems?
- We now have ideas and plans

4.7 Congratulations – Lets explain the next steps (whole group 5 minutes)

How will AAATE and other partners support you?

We will help you with:

- A flyer to help with the recruitment
- PowerPoint slides and formats for informing the workshop and facilitating the reporting in English
- For those that wish by making the AAATE ZOOM platform available.
- By organizing a ZOOM training event for those that wish.
- By providing you advice.

AAATE will not be able to contribute to costs related to making workshops accessible (e.g. video captioning, sign language interpretation, etc.). Full TRIPS partners (Zagreb, TBridge/SRM, CARRIS) may be able to use savings from their travel budget for these costs. Others might ask the project coordinator for financial support.

Accessibility requirements

Accessible meetings are organized in a way that people of all abilities can participate. Several things should be organized before the workshop, some things considered during the workshop.

Pre-workshop:

- Organize captioning (sub-titling) for the workshop **(at least 1 week before!)**
 - you might know a national captioning service or a hard-of-hearing/deaf association in your country might be able to advise you on a good service provider



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- check with your captioning service how they integrate with Zoom (or the platform you are choosing for the workshop)
- if you have never used captioning or have trouble finding a service provider you can ask AAATE for help/advice
- Send out before the event a list of things people should have available during the workshop
 - for example, a pen and paper or note-taking programme open and ready
- Share the agenda with participants and describe already roughly what kind of exercise people will be asked to participate in

Beginning of the workshop:

- State very clearly in 1-2 sentences the goal and intended outcome of the workshop
- Share “good practice” guidelines with moderators to read out in the beginning
 - how to turn on captioning
 - to always state the name when starting to speak
 - how to use the chat
 - where to find the mute button
 - when to switch on/off video
 - etc.
- Have a round of introduction of organizing team and participants
- Share (accessible!) worksheets with the participants that have all the work questions / prompting sentences / short exercise description included
- You can consider also using a Google Form or other accessible online document where people can fill their answers online if they prefer
- In the introduction word, describe the agenda and action points
 - For example, we will start with a series of exercises/open questions, where people will be asked to respond and write answers down on paper or in an online form. These exercises will be around 7 minutes each, and we will collect the answers at the end of the workshop.
 - For example, in the second half of the workshop, we will divide into groups. They will work on for xx minutes.

For facilitators:

- Do not assume that everybody can read the chat
- Have a chat moderator reading out periodically what is written there
- Once an access need is indicated, integrate it smoothly without calling out the person again!
- Describe all visual material (slides, pictures etc.) concisely (serves low-vision, blind and dyslexic participants)
- During the exercises display a timer counting down
- During the exercises (where people work for themselves) repeat the question/task every 2 minutes or give an additional prompt that can help participants
- Between the exercises, come back to the bigger picture, always set every new exercise into the context of the overarching objective of the workshop (concisely of course!)



- Have 1-2 people share their answers after every exercise to make it more interactive and inspiring
- Display a timer for the breaks
- Remind people periodically to state their name when starting to speak
- Consider using a whiteboard for the brainstorming and group exercises (e.g. Miro, Jamboard)
- Save the chat – should be saved as a local file on your computer, make sure to secure it right after the session
- In Zoom, have a person monitoring the chat during the workshop and have an eye on “raised hands” and other inter-active communications tools in Zoom which allow people to indicate they have something to say without interrupting the speaker
- Stick to the time! Do not go over time.

If you have questions, do not hesitate to contact AAATE (Evert-Jan or Sabine) - we are happy to help!

Technicalities

Saving accessibility features, the platform to be used for the workshop can be the one that is more comfortable for the organizer and participants. For the workshop held in 14 and 21 of November the AAATE team used **ZOOM platform** that allows all the functions needed during the workshop execution, into specific:

- To allow the chance to all participants (starting from facilitators and notetakers) to present contents (PPT, Doc..), so to help to be effective during open discussions
- To allow the chance to all participants to rename themselves, helping their identification during the workshop
- To have a chat with one-to-one (for example: useful for rapid messages between facilitator and notetaker) and one-to-all, collecting ideas, comments etc.
- To allow to save the chat content at the end of the session (Zoom makes this automatically)
- As for as accessibility needs: to permit the activation of captioning function: that means a participant writing captions, or connecting an external service, in case, caption transcript should be saved at the end of the workshop session
- To provide recording feature (note to declare the activation of this function at the beginning of workshop), which is needed to save and report the activities done
- To allow the configuration of “breakout rooms” as needed for dividing participants into sub-groups: the participants moved in each room should include a “local” facilitator and notetaker to manage and report the discussion in the sub-group
- To permit recording option for each breakout room too.

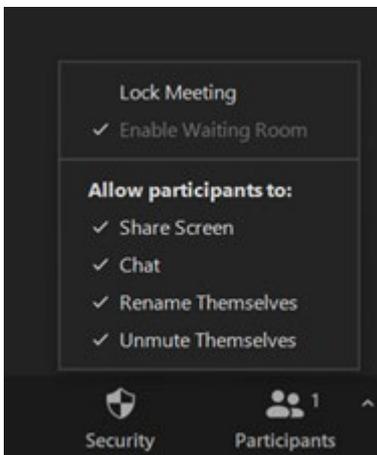
In the following, we are adding some notes on how to manage these technical functions on ZOOM platform that we recommend.



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Main Zoom window: under “**Security**” you find the setting needed to assign rights to participants, be sure to give to all the rights as shown in the figure next.



To allow the Captioning functions select the icon CC in the bottom bar of the Zoom main window.



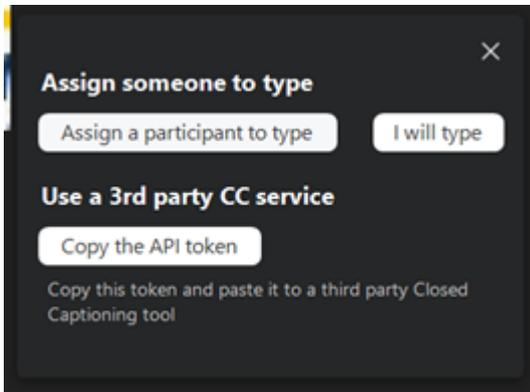
Then select the right option:



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- a) Assigning to a participant the task to produce the captioned text during the workshop execution
- b) Generating the code needed by external services (human or automatic) that will create the captions showed on the screen

The figure clarifies the options in the menu.



Consider making some tests before the starting time of the virtual meeting, to be sure that it works properly.



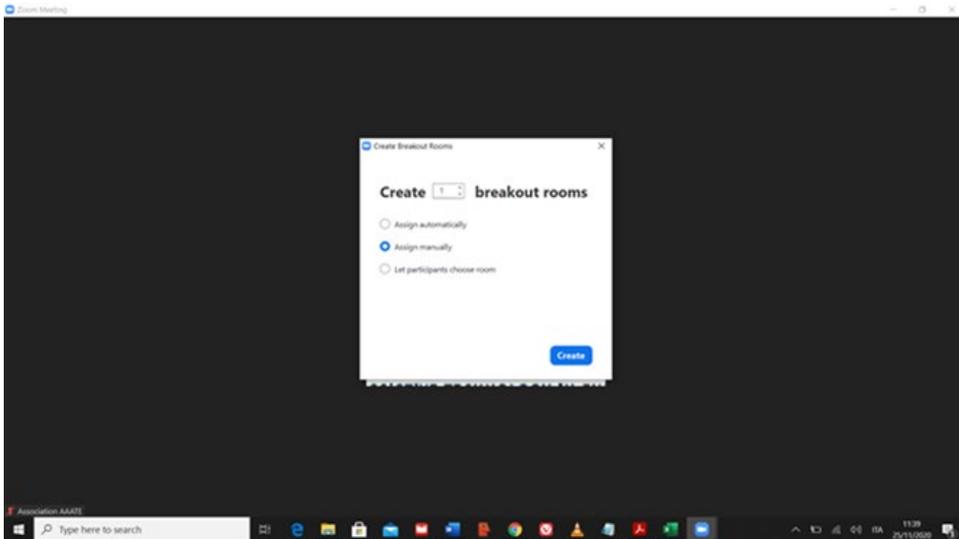
To break the participant in groups, ZOOM offers a specific function:

- Allowing the distribution of participants (that should be managed manually to assure a consistent distribution of the representative in the rooms)
- Allowing to fix the time limit for the work of groups (the same for all rooms and cannot be changed once the rooms are activated).

The figures below may help.



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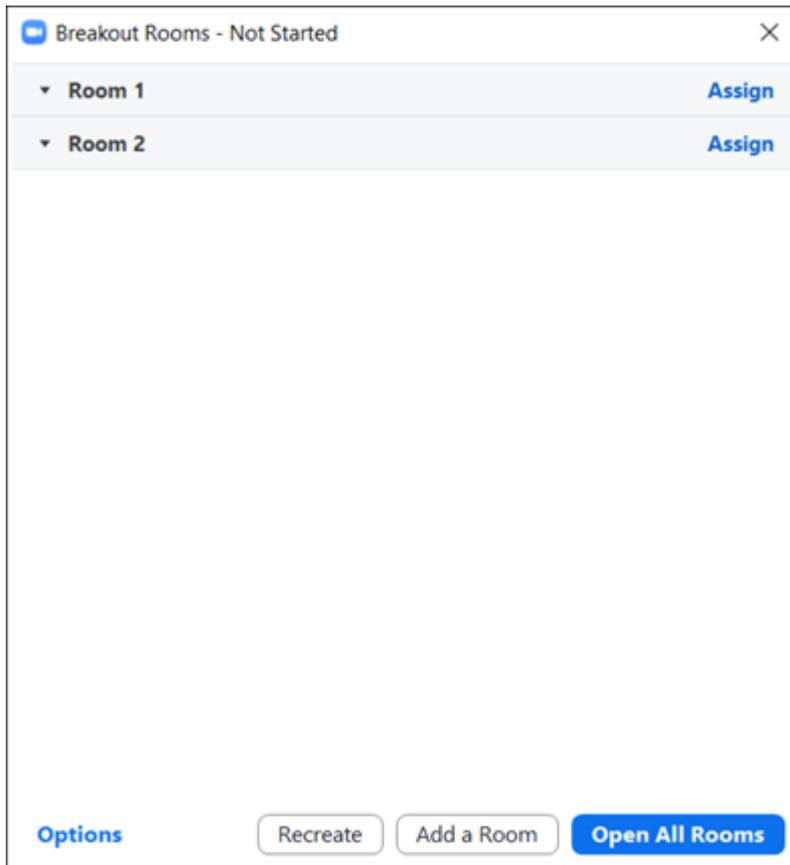
At the beginning the number of rooms to be created is requested.

PLEASE NOTE THAT MAIN ROOM REMAINS ACTIVE THROUGHOUT AND COULD BE USED AS AN ADDITIONAL ROOM FOR A GROUP (the main room is the only one with the caption feature available).

In the same window, YOU HAVE TO SELECT “**Assign manually**”, giving you the chance to create the group with participants you choose.

Once you have created the Rooms and decided the policy to assign participants, you can pre-assign participants to a Room and decide who wish to stay in the Main Room.





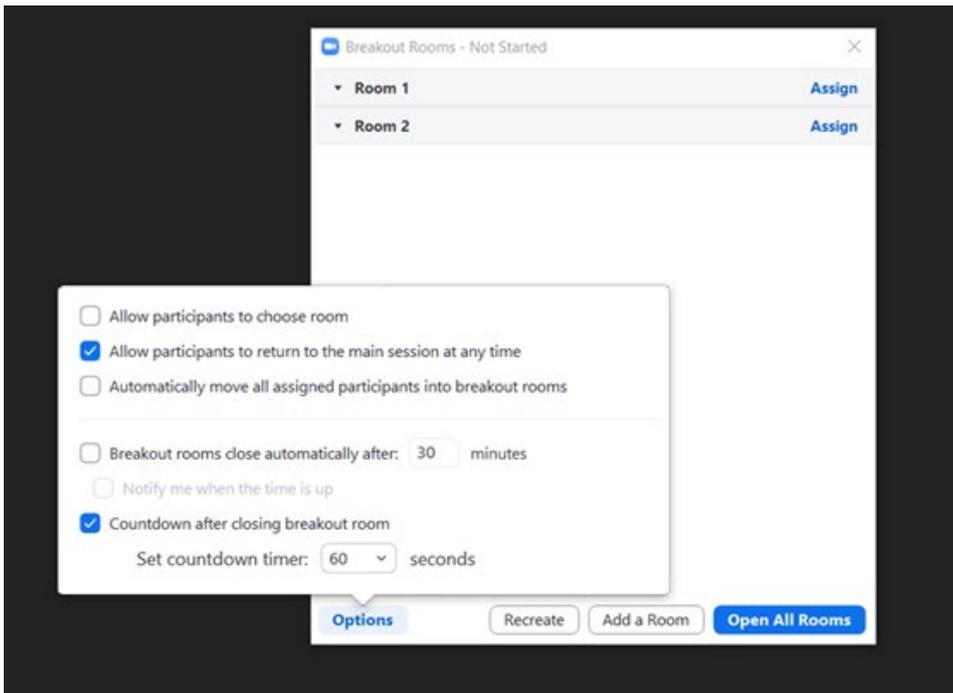
Selecting "Assign" the list of all participants is given: through a checkbox you can to assign them to a Room.

NOTE: UNTIL YOU SELECT "OPEN ALL ROOMS" THE PARTICIPANTS STAY IN THE MAIN ROOM

Before choosing to open all rooms, you have to decide the duration of the sub-group work, using the "Options" menu, as shown below.



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As explained before, you have to deselect the chance for participants to return in the main session at any time, “forcing” their participation in the sub-group for the assigned time. A timer will appear with a countdown (you can select how much time before) just to advise the participants about the end of the given slot in the breakout room.

Once in the Main Room again, you can repeat the process, exploiting the rooms with already assigned participants.

