

# Focus session

## B3: Digital shift in mobility – How can we get everyone on board?

9.00–10.30





# Ensuring inclusivity and accessibility in digital mobility systems – the case of Flanders

Shila Abdi, DMOW

ECOMM - Turku

1 June 2022



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°875542.

# Table of content

- **What is Dignity project?**
- The role of Flanders
- Co-creating inclusivity and accessibility in Flanders
- Key home messages

## Aim DIGNITY project

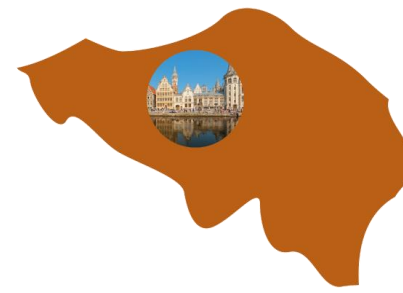
- Sustainable, integrated and user-friendly digital travel system accessible to all
- Focus on the needs of vulnerable to exclusion end-users
- 4 pilots:



Tilburg (NL)



Barcelona (SP)



Flanders (BE)



Ancona (IT)

# Table of content

- What is Dignity project?
- **The role of Flanders**
- Co-creating inclusivity and accessibility in Flanders
- Key home messages

## The role of Flanders

- Digitalization of mobility and transport systems
- Vulnerable to exclusion groups:
  - Older people – digital capabilities, reduced feeling in the fingertips, ...
  - People with disabilities – not able to use a smartphone, ...
  - Inhabitants of rural areas – reduced provision of public transport



# How can we make digital mobility systems accessible and inclusive for these groups?

- Co-creation



# Table of content

- What is Dignity project?
- The role of Flanders
- **Co-creating inclusivity and accessibility in Flanders**
- Key home messages



# Co-creation

- 3 co-creation workshops face-to-face
- Part I:
  - Current usage and challenges of digital public transport
- Part II:
  - **Co-creating solutions** on how to address these challenges identified by the end users



# Co-creation workshop Flanders

Characteristics of the participants	N (N = 15)
<b>Gender</b>	
Men	12
Women	3
<b>Age</b>	
55 - 64	3
65 - 74	9
75 - 84	2
85+	1
<b>Digital capabilities*</b>	
High	2
Medium	8
Low	3
<b>Disability</b>	
Auditory	1
Visual	1
Physical and/or wheelchair	2
Speech	1
<b>No disability</b>	10

\* 2 participants did not fill out the digital capabilities item

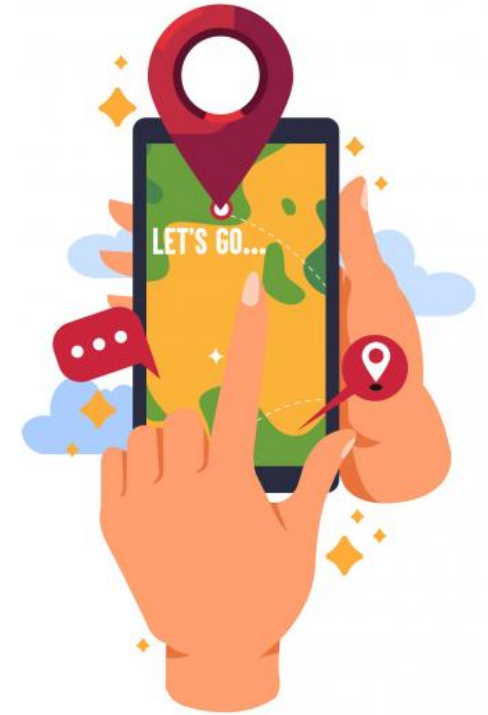
# 1. Top down approach



- Accessibility and inclusion means uniformity across Flanders. Some matters should not depend on local governments:
  - Standard platforms at train stations (the same height)
  - Height of the bust stops for easy boarding

## 2. User-friendly app

- Simple language, no English words, no jargon
- Clear icons (disability)
- Search functions
- Announce information visually and auditory: speech recognition system that automatically switches to subtitles and vice versa



### 3. Training and sensibilisation for end-users

- How to use a smartphone
- How to connect to Wi-Fi
- How to download the app
- Travel information (search functions)
- How to buy a ticket
- Perform updates
- Internet use



## 4. Non-digital solutions

- Real-time information at the train, tram and bus stops:
  - Connections between public transport
  - Possible delays and detours
- Important for elderly people who don't have a smartphone, lose feeling in their fingertips, people with low digital capabilities and people with disabilities
- This real-time information is mainly provided at the stations, but not at the stops further away or at main (touristic) point




Lijn	Bestemming	Dienstregeling	Vertrek over min.
1	Evergem	17:39	1
21	Melle Leeuw	17:40	
1	Wondelgem	17:42	2
4	Gravensteen	17:43	3
22	Gentbrugge Dc	17:47	6
1	Evergem	17:47	7
4	Gravensteen	17:50	10
1	Wondelgem	17:52	12



LIJN	BESTEMMING	VERTREK	PERRON
2	KESSEL-LO NULSBERG	15:27	5
338	GASTHUISBERG	15:28	2
370	GASTHUISBERG	15:29	2
316	KARINEN METRO	15:30	8
337	OVERIJSE TERLANEN	15:30	10
361	BRUSSEL NOORD	15:30	8
362	KARINEN METRO	15:30	8
16	GASTHUISBERG	15:31	2
338	TIEKEN	15:31	3
370	DIEST	15:31	9
8	RIERDEEK DE BORRE	15:32	3
2	NEVERLEE CAMPUS	15:33	6
358	BRUSSEL NOORD	15:34	8

## 5. Involve end-users

- Involve older people and people with disabilities in the decision making process because they have the necessary experience and expertise
  - Designing an app
  - (Reflection of) Policy on inclusive digital mobility

# Table of content

- What is Dignity project?
- The role of Flanders
- Co-creating inclusivity and accessibility in Flanders
- **Key home messages**



## Key messages

- Inclusivity and accessibility is a joint effort
- Involve vulnerable to exclusion end-users in the decision making process (development of an app, service, product, policy) because they have the necessary experience and expertise



# Thank you!

Shila Abdi  
shila.abdi@mow.vlaanderen.be



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°875542.



# mec

INCLUSIVE AND ACCESSIBLE MOBILITY SOLUTIONS FOR PEOPLE  
WITH A VISUAL IMPAIRMENT

PIETER-JAN VANDENBERGHE

# MOBILITY AND LOGISTICS TEAM



# PROJECT OBJECTIVES



INDIMO

#1

To improve the understanding of the **users' needs** towards the digital transport system.

#4

To foster the **Universal Design** approach throughout the planning and design process of digital application and services, both for accessibility and inclusion.

#2

To improve knowledge about **users' requirements** in personalised digital transport systems.

#5

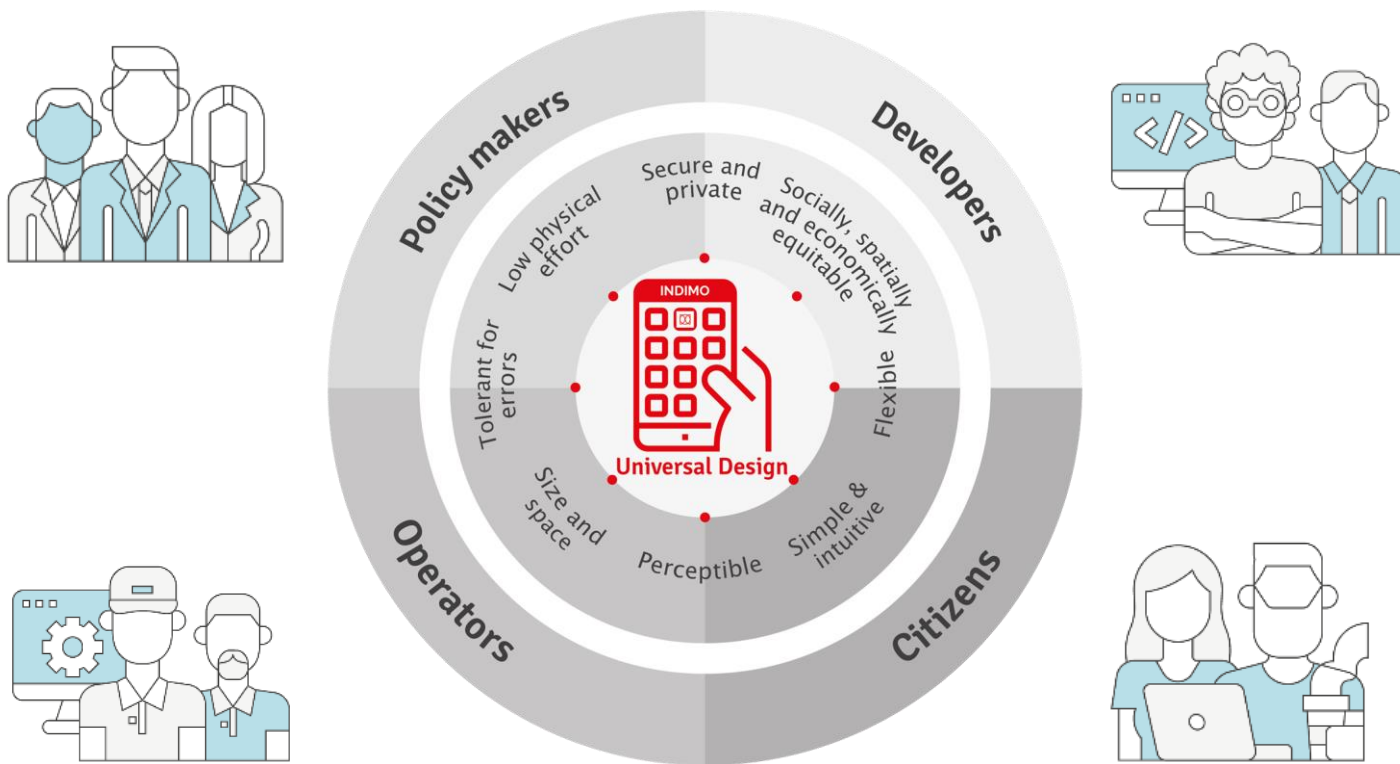
To influence **future policy** by feeding project results into European, regional and local policy making.

#3

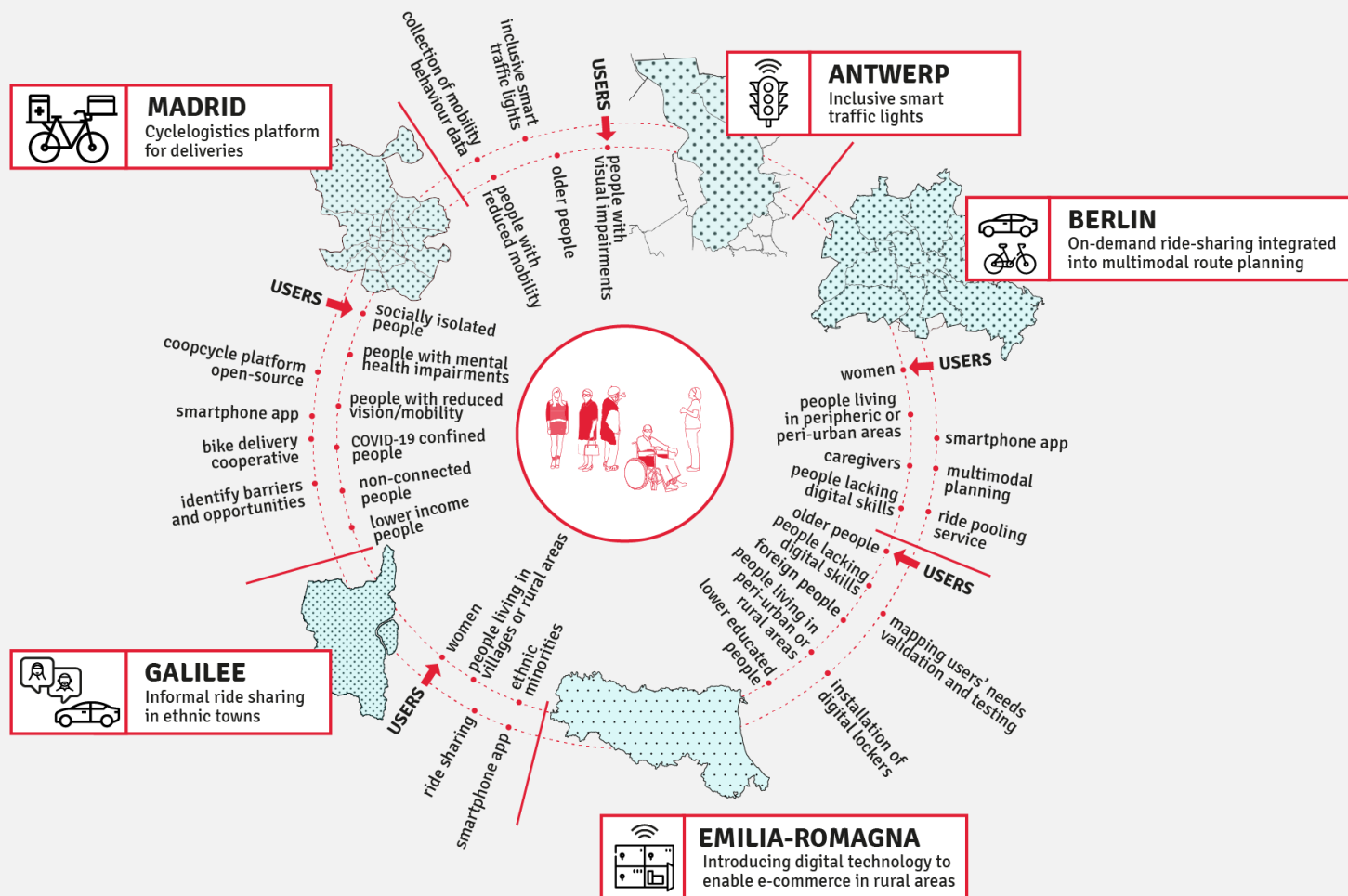
To **co-create tools** that can help engineers, developers, operators and policy makers to generate an inclusive, universally accessible personalised digital transport system.



# CONCEPT AND METHODOLOGY



# PILOT PROJECTS







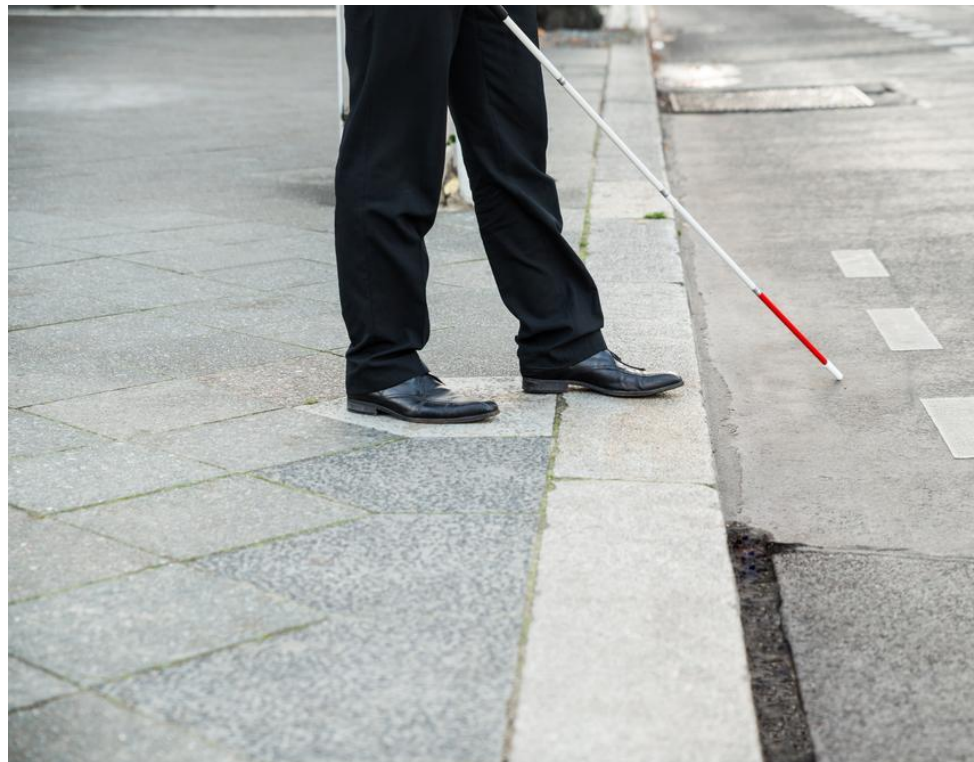
# INDIMO

INCLUSIVE DIGITAL MOBILITY SOLUTIONS





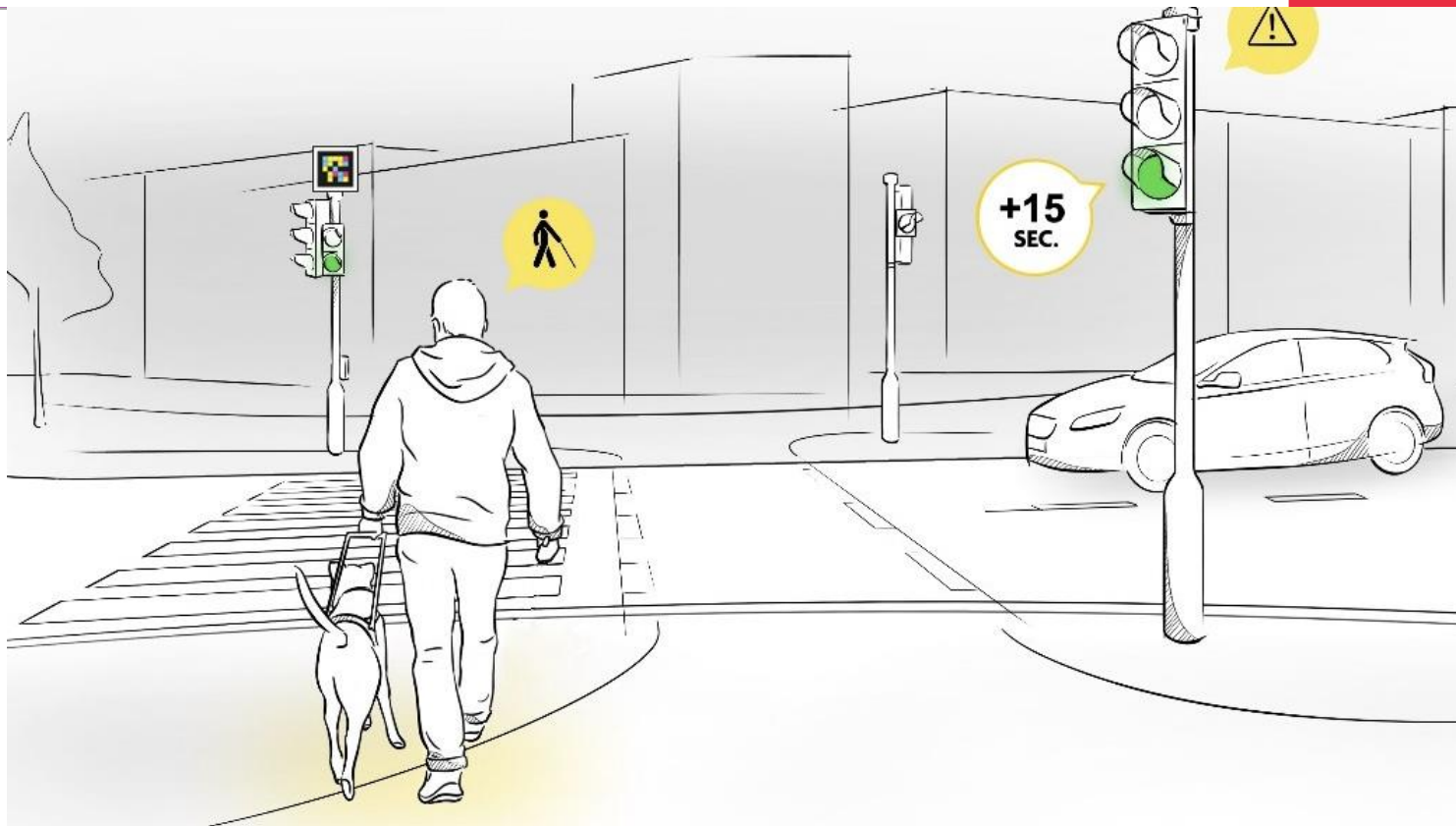
- **Confidence** varies
- **Signalized crosswalks** are a pain
  - Where is the crosswalk? (Is there even a crosswalk or traffic light?)
  - Is it green or red?
  - Orientation: which way am I going?
- Often **fixed routes**, not many new trajectories



# MOBILE ACCESSIBLE PEDESTRIAN SIGNAL



INDIMO



- **Proof of Concept** that enables blind and visually impaired people to cross signalized intersections safely
- Connects to **smart traffic light controllers** through an online data platform
- **Real-time** signal phase and timing



# DESIGN – DEVELOP – TEST – REPEAT



INDIMO

- **Mock-up designs**
- Apply **Universal Design** principles
- **Test** with end-users
- Improve



# RESULTS REAL-LIFE TEST WITH USERS

- Improved **safety perception**
- **Empowered** to try new routes
- **Integration** with other navigation tools
- Integrating **extra info** (e.g. real-time data on roadblocks, building accessibility, ...)
- Major **differences** amongst participants





# TECHNICAL LIMITATIONS AND ASPIRATIONS



INDIMO

- Regular accessible pedestrian signal (APS)
  - Sound is a guide to find crosswalk
  - Sound is a guide to cross in a straight line
- **Smart** accessible pedestrian signal
  - Best of both worlds
  - Activates automatically, no need to push a button
  - Activates only when it is needed
  - Can provide more information through an app
- Semantics matter
  - Traffic light controller
  - Traffic control installation
- **Standardization**
  - Make inclusive design part of the smart intersection
- **Integration** with navigation tools



# LESSONS LEARNED



Involve all stakeholders from beginning to end



Short feedback loops



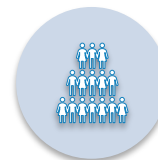
Research, start small, visualize, universal design



Reach out to others, communication is key



Expectation management



Don't forget active road users

## REACH OUT TO THIRD PARTIES







■ [www.indimoproject.eu](http://www.indimoproject.eu)



Pieter-Jan.Vandenberghe@imec.be

# The European Accessibility Observatory

Background and Next Steps

# A new approach to Designing Transport Systems free of Mobility Barriers



## PROJECT DESCRIPTION

- 11 partners
- 7 European city demonstrators

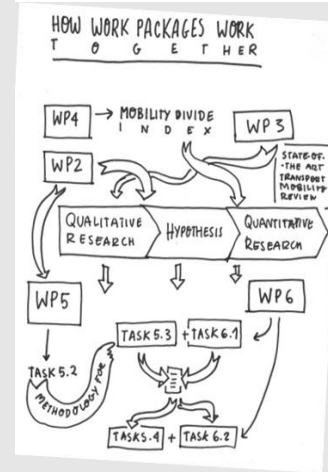


The project is funded by the EU H2020 agenda until January 2023



## METHODOLOGY

Working groups in 7 pilot cities comprising persons with disabilities and industry representatives develop a **co-design methodology to promote and include all relevant stakeholders** in designing, developing and deploying accessible mobility solutions.



The Mobility Divide Index (MDI) is a composite indicator that combines together all facets of travel experience of people with disabilities.

The **Mobility Divide Index** is the overall gap that users with disabilities must overcome to use public transport in the same ways citizens without disabilities can.

**Ensuring equal access opportunities means to cancel the Mobility Divide**

## INDEX DIMENSIONS

- ❖ **Affordability gap:** the condition of not requiring relevant extra costs resulting in financial hardship
- ❖ **Autonomy gap:** the ability to travel autonomously, with no need for assistance
- ❖ **Travel Time gap:** the extra time necessary to reach the destinations
- ❖ **Comfort gap:** the ease of access and use of the transport services, equipment and facilities
- ❖ **Convenience gap:** the condition of fitting in well with travellers own needs and expectations
- ❖ **Safety gap:** the condition of not being exposed to unreasonable risks because of the impairment

**The beta version of an MDI app** is released this month to allow users to audit their accessibility of their cities. It will be tested by users in the 7 pilot cities and subsequently by follower cities.

Users feedback will be published online to establish transparency on accessibility issues and set the foundations of the EU Accessibility Observatory

## EXPECTED OUTCOMES

- Launch of a **political declaration at Lecco, Italy** in July 2022, driven by user research insights
- Co-signing of a **Memorandum of Understanding** to commit to a joint accessibility innovation and policy agenda between expected January 2023.
- An **online course (MOOC)** on co-designing together with people with disabilities
- Creation **EU Accessibility Observatory** based on a user-derived mobility divide index



# Our Motivation

Disabled people said that when it comes to accessibility:

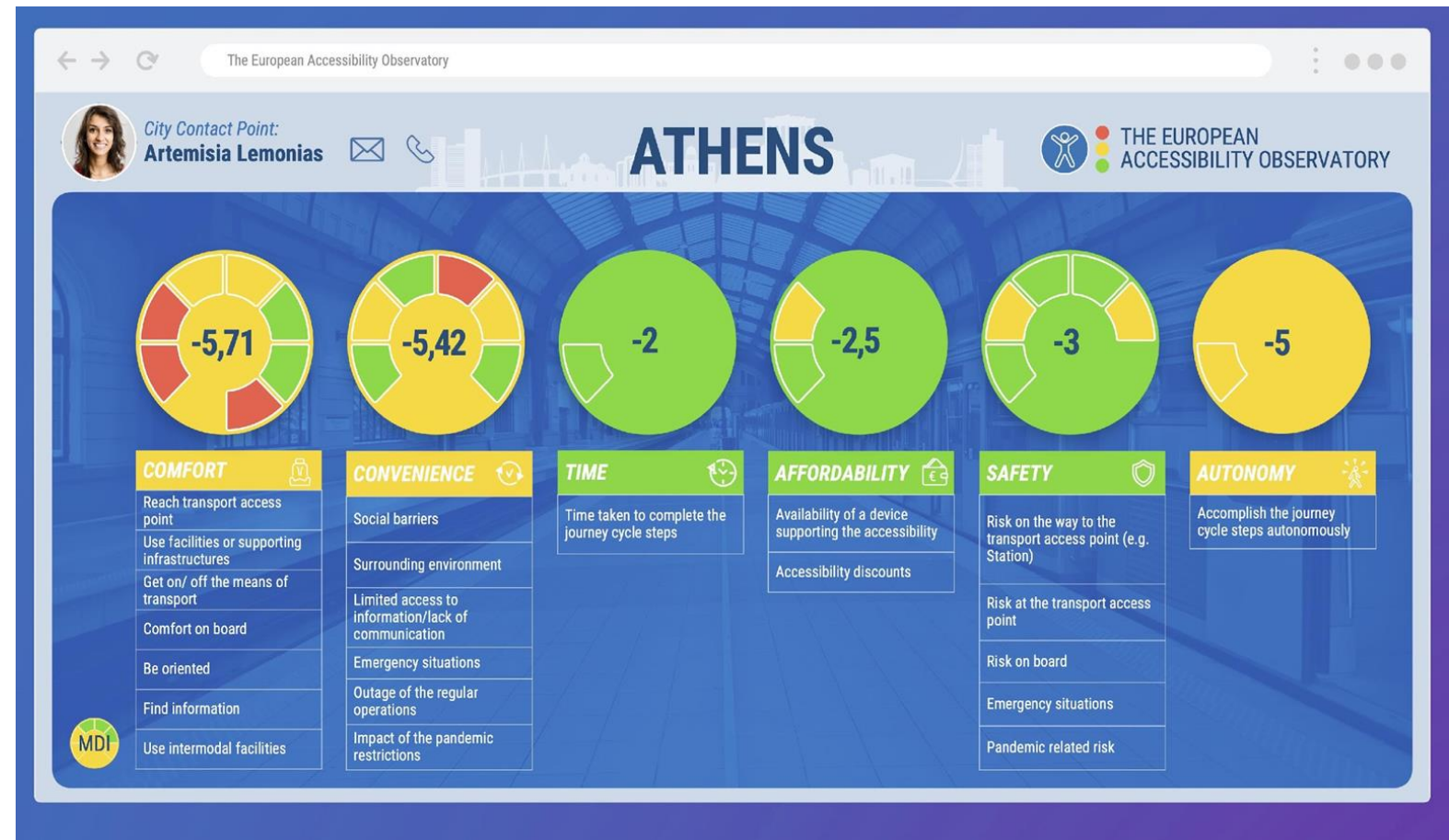
- Our complaints are not taken seriously
- Our complaints do not lead to any change
- How the transport sector measures accessibility, has nothing to do with how we experience accessibility
- Accessibility auditing is a box-ticking exercise
- Accessibility relies on self-auditing by transport operators and is biased
- Accessibility auditing processes are not transparent

# Our Response

## Mobility Divide Index App

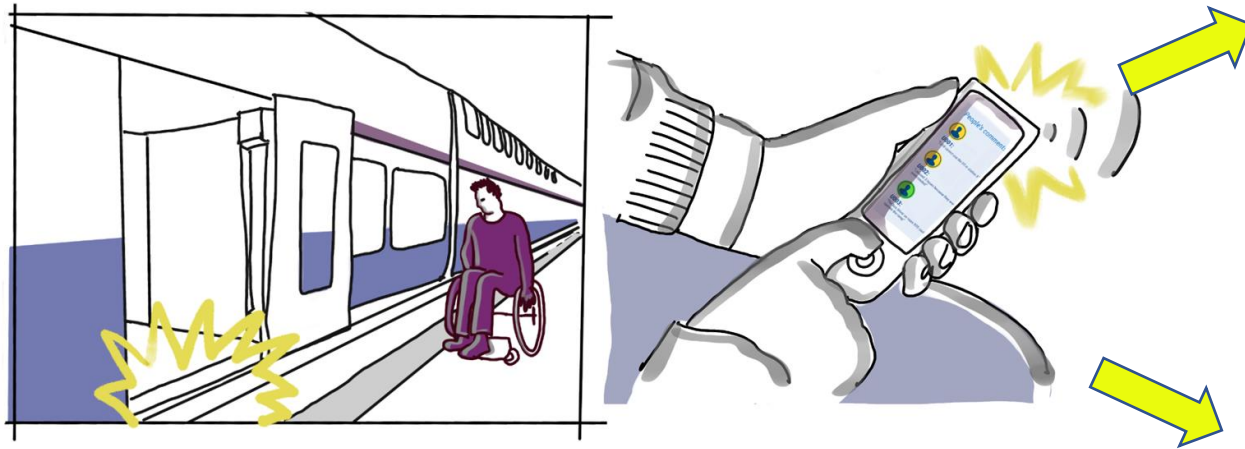
Disabled users can:

- **Crowd-audit the accessibility of transport based on a user-derived index**
- **visualises findings into actionable information** for urban & transport planners/operators

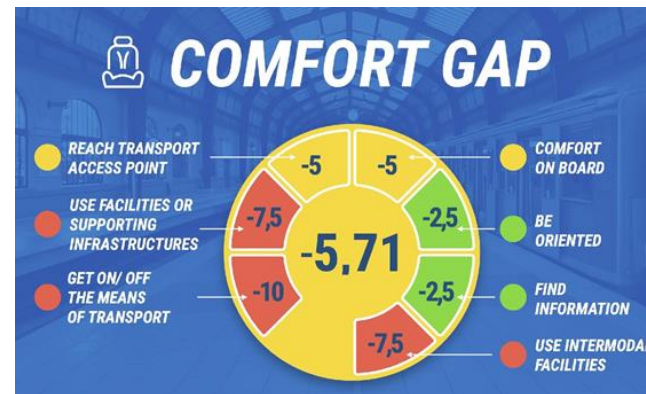




# Accessibility auditing on-the-go!

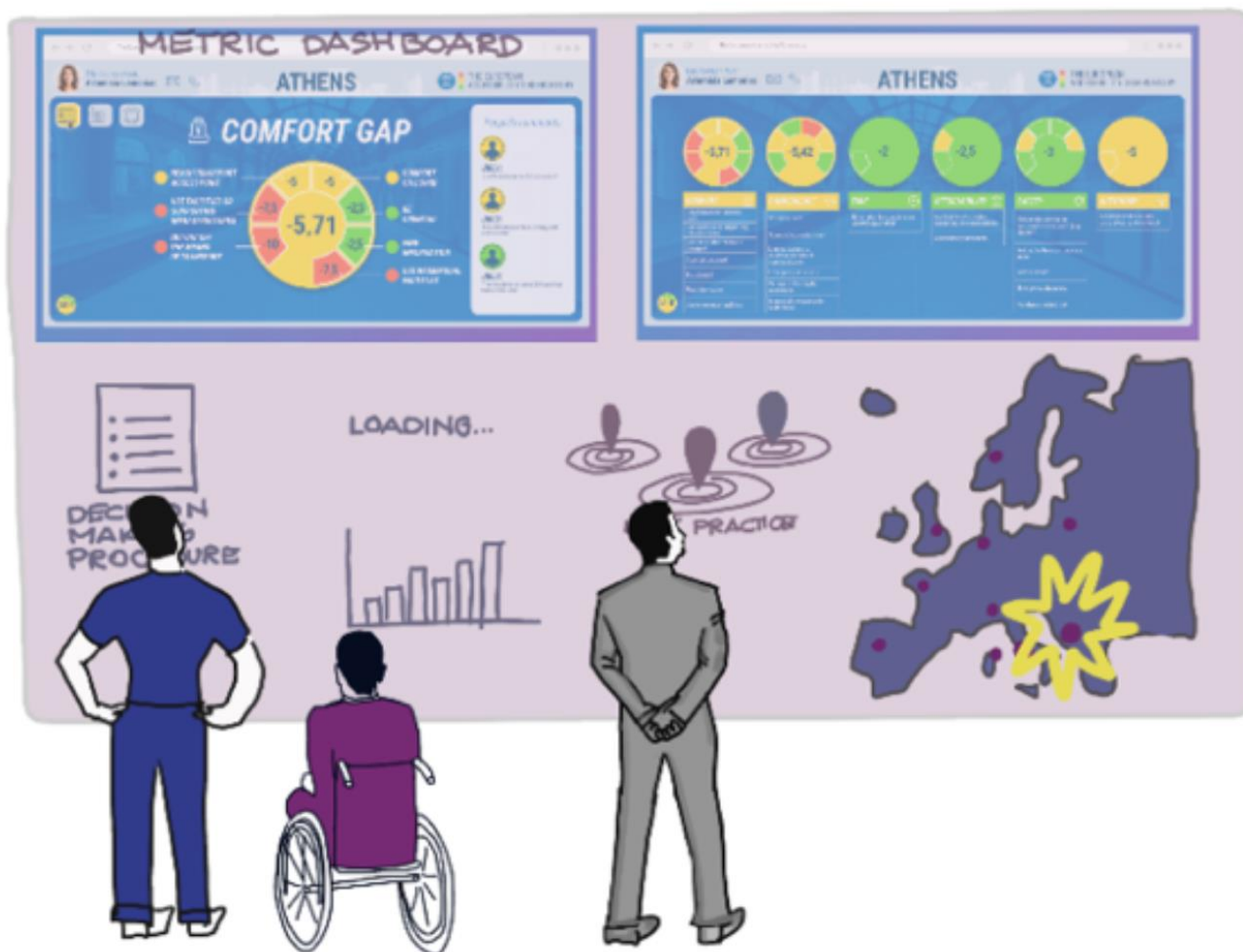


Alerts and suggestions are forwarded to the local transport operator, for a **quick resolution of the problem**



**Transport planners** are aware of the needs for innovation and improvements

# The European Accessibility Observatory



A **public dashboard** that visualizes:

- the results of the users' **MDI ratings** for each city, per mode, per type of disability
- **the response commitments** of transport operators and authorities towards redressing them





# THE EUROPEAN ACCESSIBILITY OBSERVATORY

Current state of  
accessibility  
of each city



## Owners



ADVANCING  
PUBLIC  
TRANSPORT





City Contact Point:  
**Artemisia Lemonias**



# ATHENS



THE EUROPEAN  
ACCESSIBILITY OBSERVATORY



**TRAVEL TIME**



-2

-2,5



**AFFORDABILITY**

**CONVENIENCE**



-5,42

**MDI**  
**-3,94**

-3



**SAFETY**

**COMFORT**



-5,71

-5



**AUTONOMY**

Provides visibility of feedback and status of institutional responses



## Commitments

DESCRIPTION	INCIDENT NO.	MDI DIMENSION	RESPONSIBLE	STATUS
Reduce Peak time ticket fair	IN4302	Affordability	Mayor's office	In discussion
Maintenance of train ramps	IN584	Convenience	Transport operator X	In progress





City Contact Point:  
**Artemisia Lemonias**



# ATHENS



THE EUROPEAN  
ACCESSIBILITY OBSERVATORY



## COMFORT GAP

Turns  
feedback  
into  
actionable  
information  
for policy  
makers and  
transport  
operators

● **REACH TRANSPORT  
ACCESS POINT**

● **USE FACILITIES OR  
SUPPORTING  
INFRASTRUCTURES**

● **GET ON/ OFF  
THE MEANS  
OF TRANSPORT**

● **COMFORT  
ON BOARD**

● **BE  
ORIENTED**

● **FIND  
INFORMATION**

● **USE INTERMODAL  
FACILITIES**



### People's comments:



**U001:**

"I still cannot use the lift in station X"



**U002:**

"I missed 3 buses because they were overcrowded"



**U003:**

"The bus driver on route X95 could not operate the ramp"



# Thank you for listening



To learn more about our project  
go to: <https://trips-project.eu>

For more information or to  
test our MDI app in your city,  
please contact:

Cino Repeto  
[c.repetto@tbridge.it](mailto:c.repetto@tbridge.it)



**T BRIDGE**  
BV TECHGROUP





# Accessibility and inclusive design in public transport in practice

Mike Bradley, University of Cambridge

June 2022



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°875542.

# Accessibility and inclusive design in public transport?

- Who can be excluded?
- Why can we be excluded?
- How can we measure exclusion?
- How can we design for inclusion?



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°875542.

# Why can we be excluded?

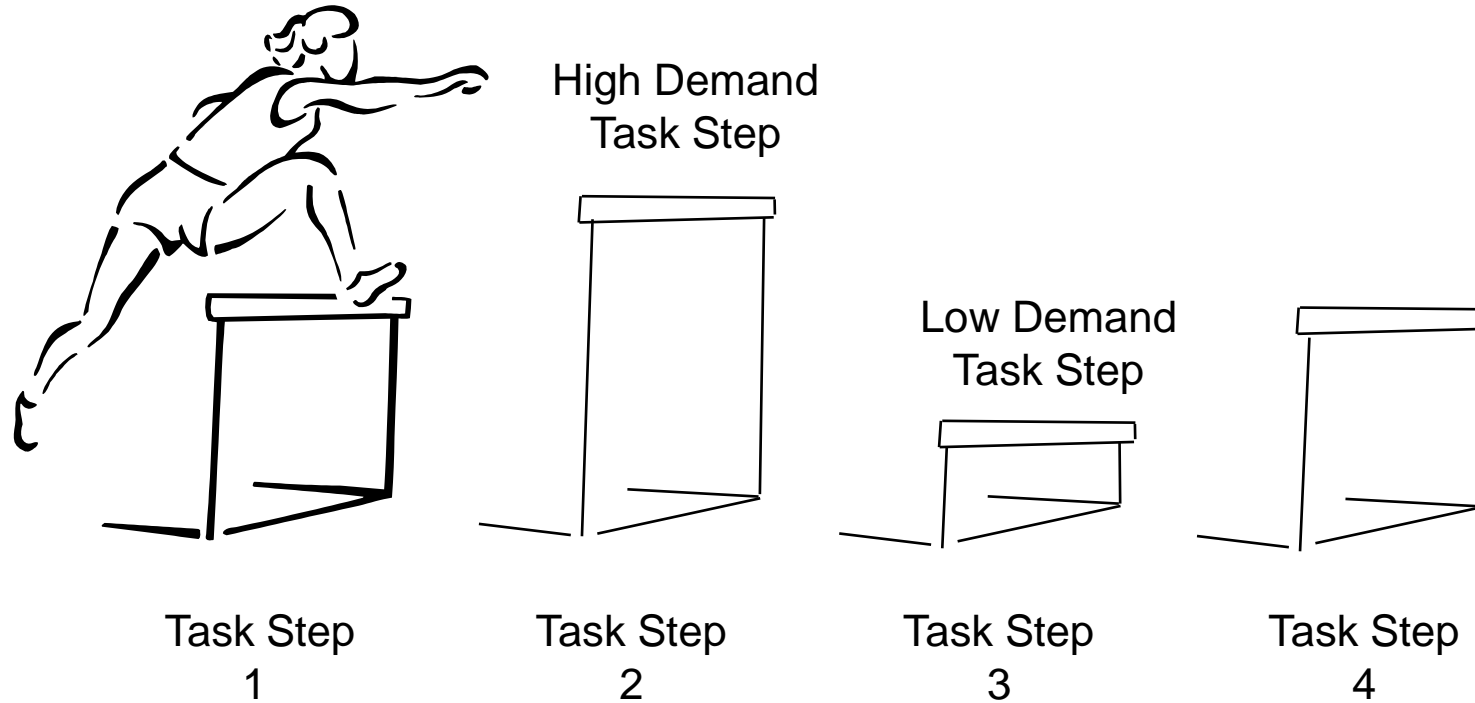
**Capability: User**



**Demand: Task**



# Each step is a hurdle than places demands on our capabilities



For the entire user journey....



# Capability vs. Demand...



Vision



Hearing



Thinking



Reach & Dexterity



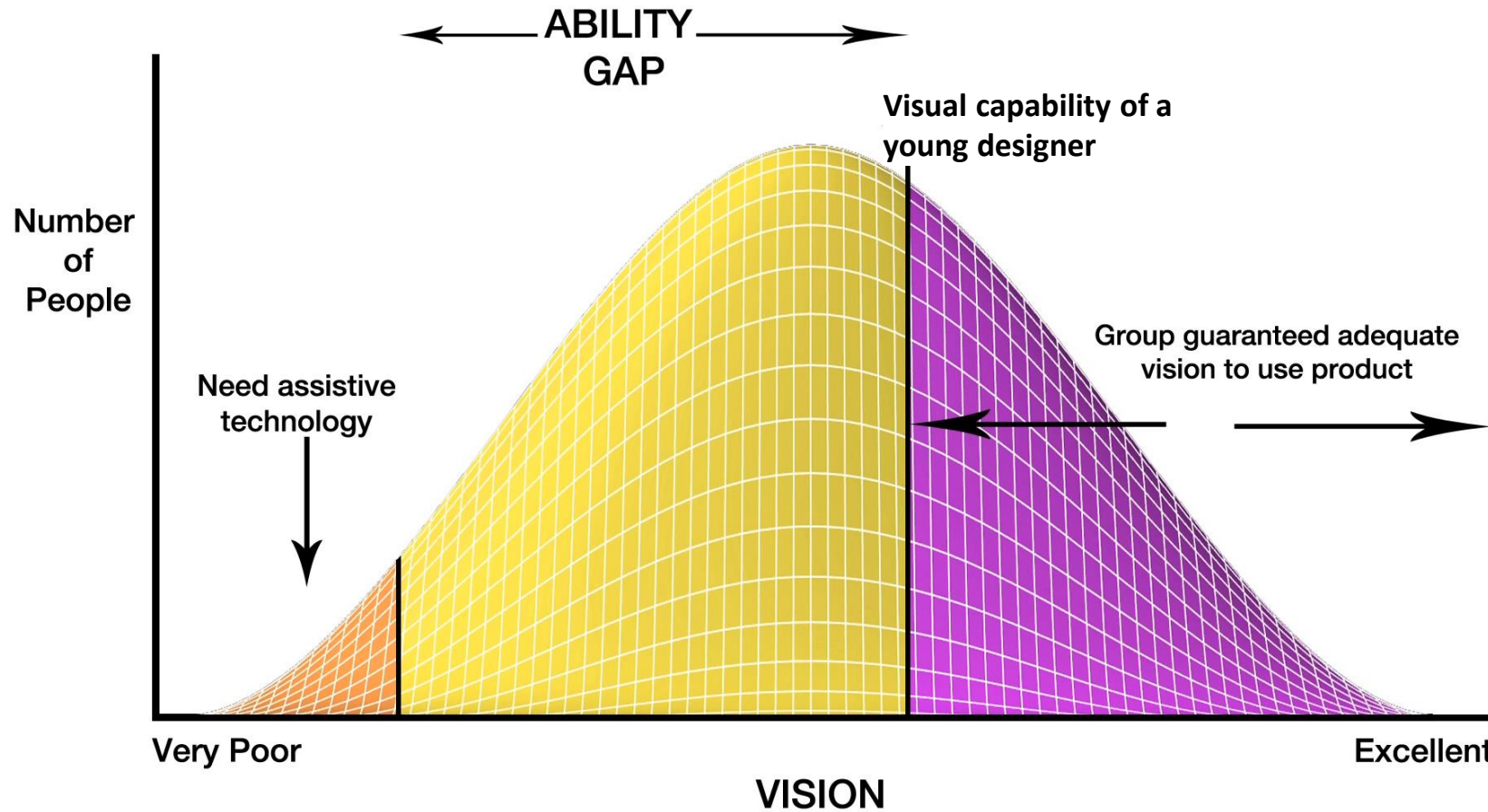
Mobility

Products place a demand on our capabilities (vision, hearing, thinking, reach+dexterity and mobility)

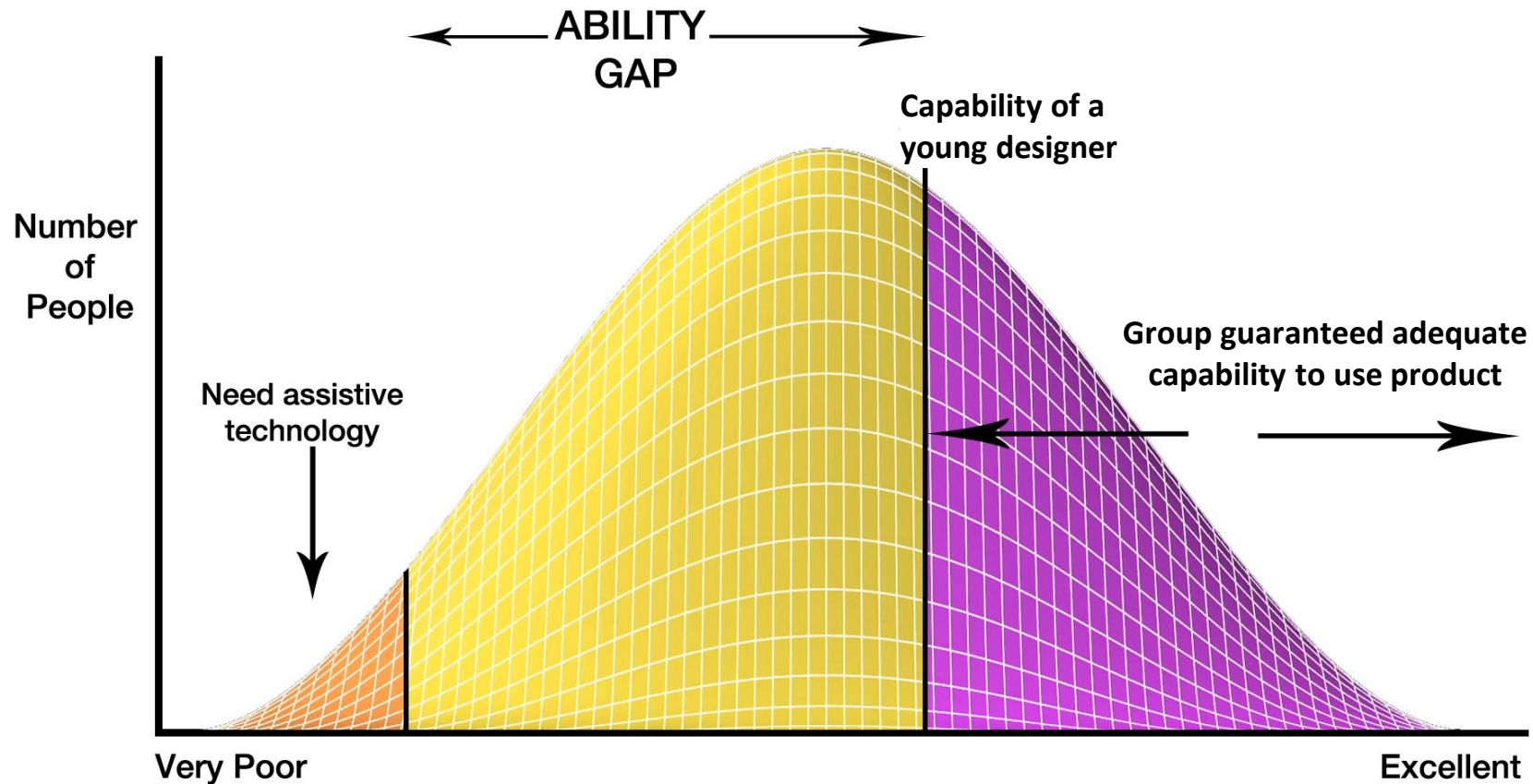
Demand  $\leftrightarrow$  capability

- Demand  $>$  capability  $\Rightarrow$  excluded
- Demand  $<$  capability  $\Rightarrow$  difficulty
- Demand  $\ll$  capability  $\Rightarrow$  easy

# Vision: I can see it, I think it's fine ...



# Not just about vision...



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°875542.

# Who can be excluded?

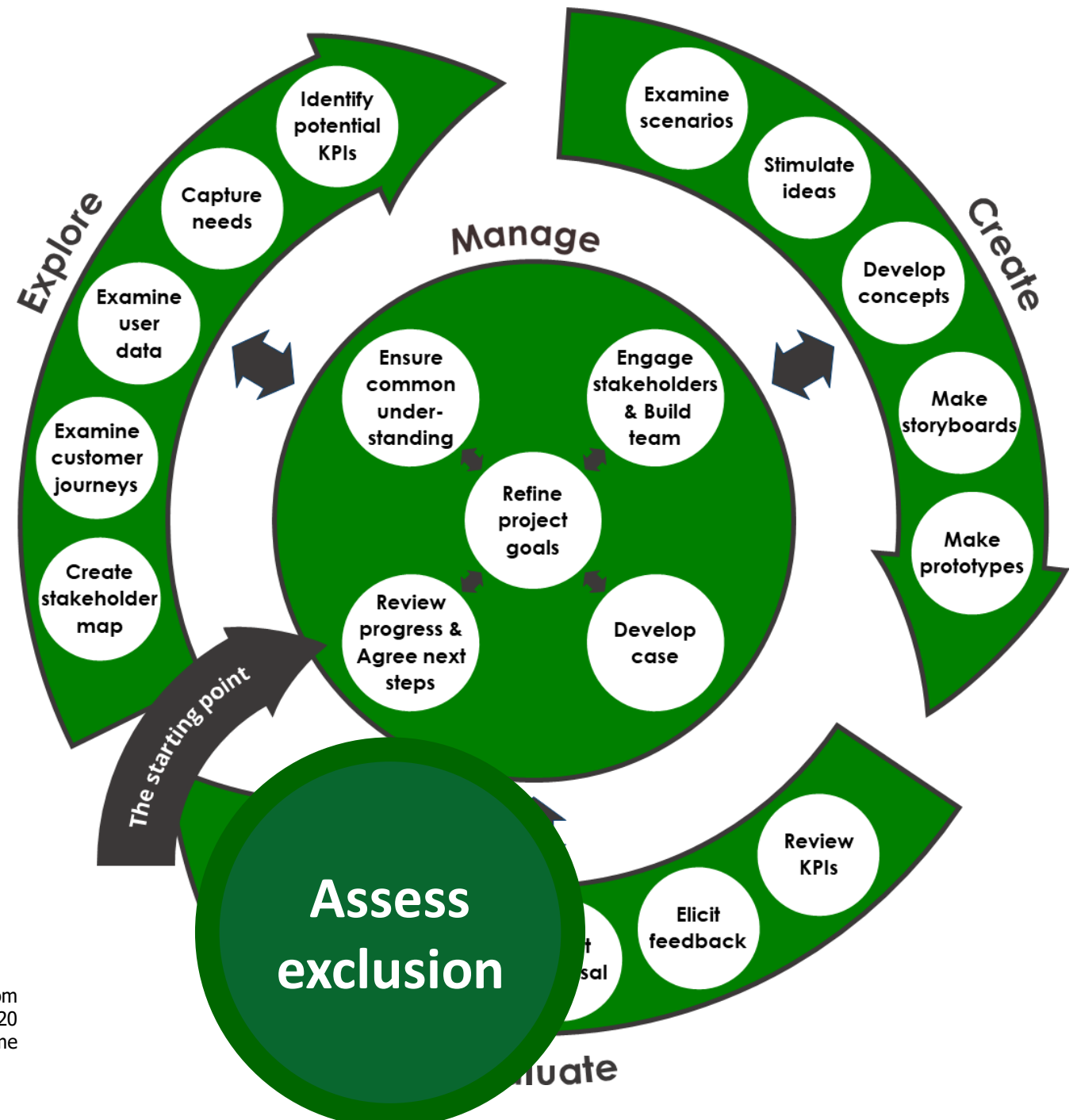
It is normal to be *different*



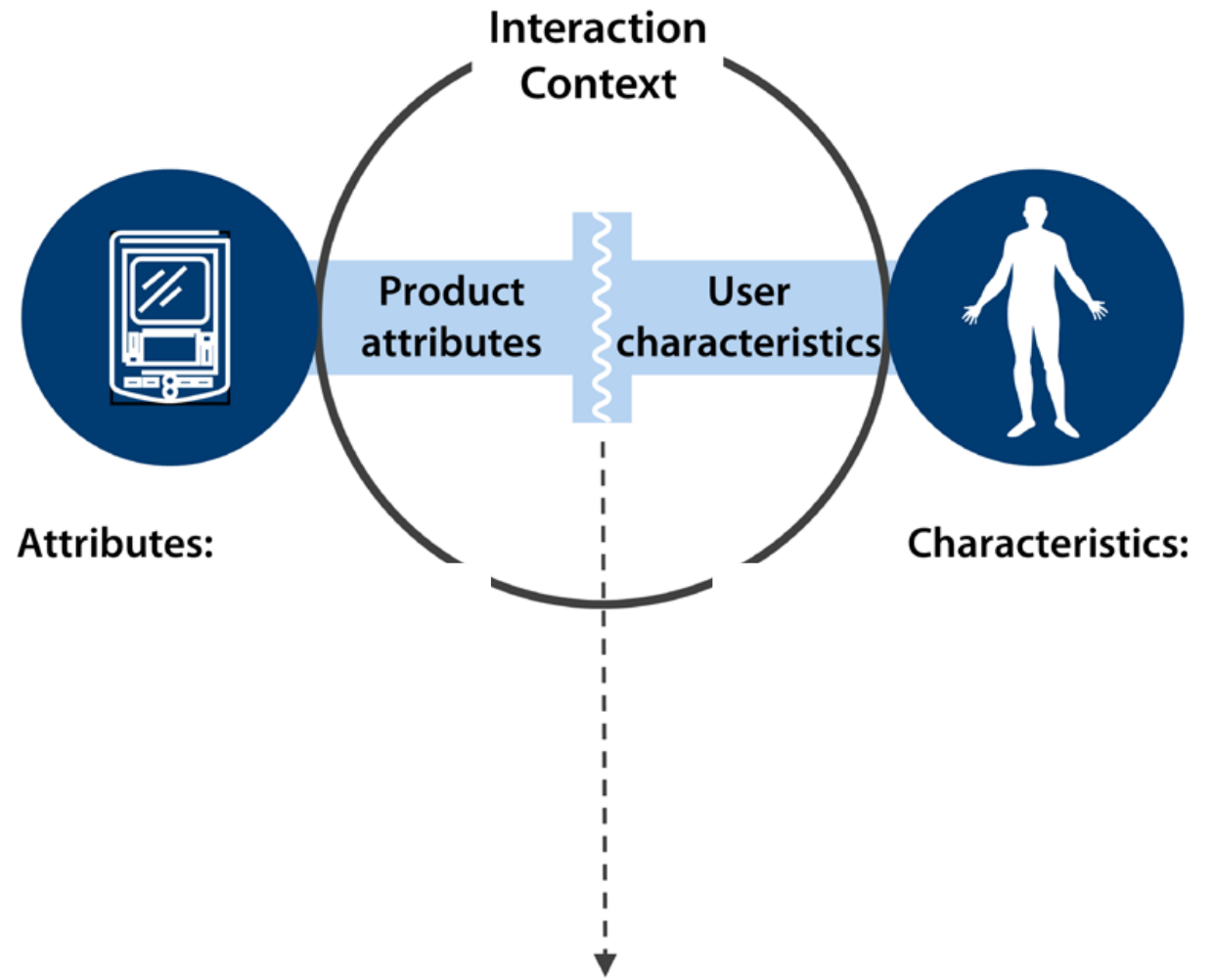
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°875542.

# Inclusive Design Wheel Process

- A framework for designing inclusive solutions



# Relationship between user characteristics & **digital** product/service demands

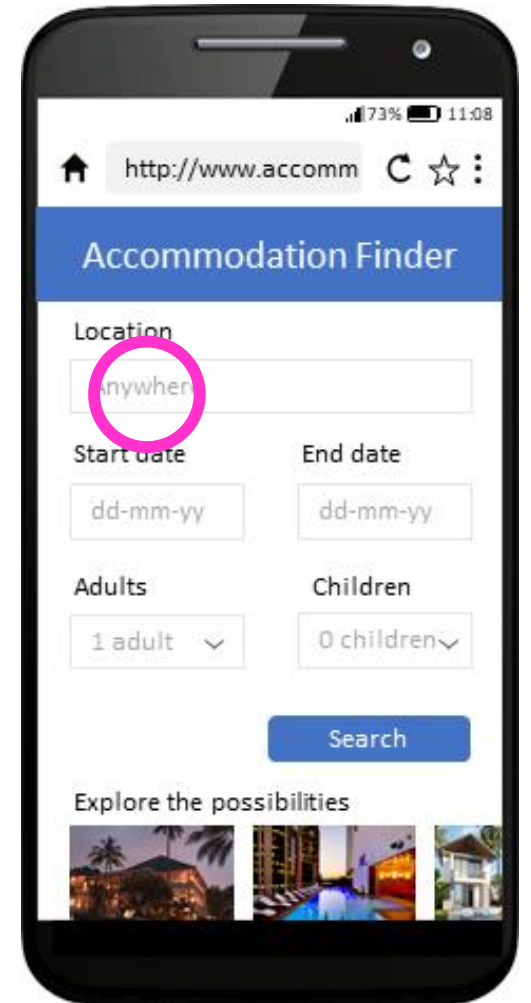
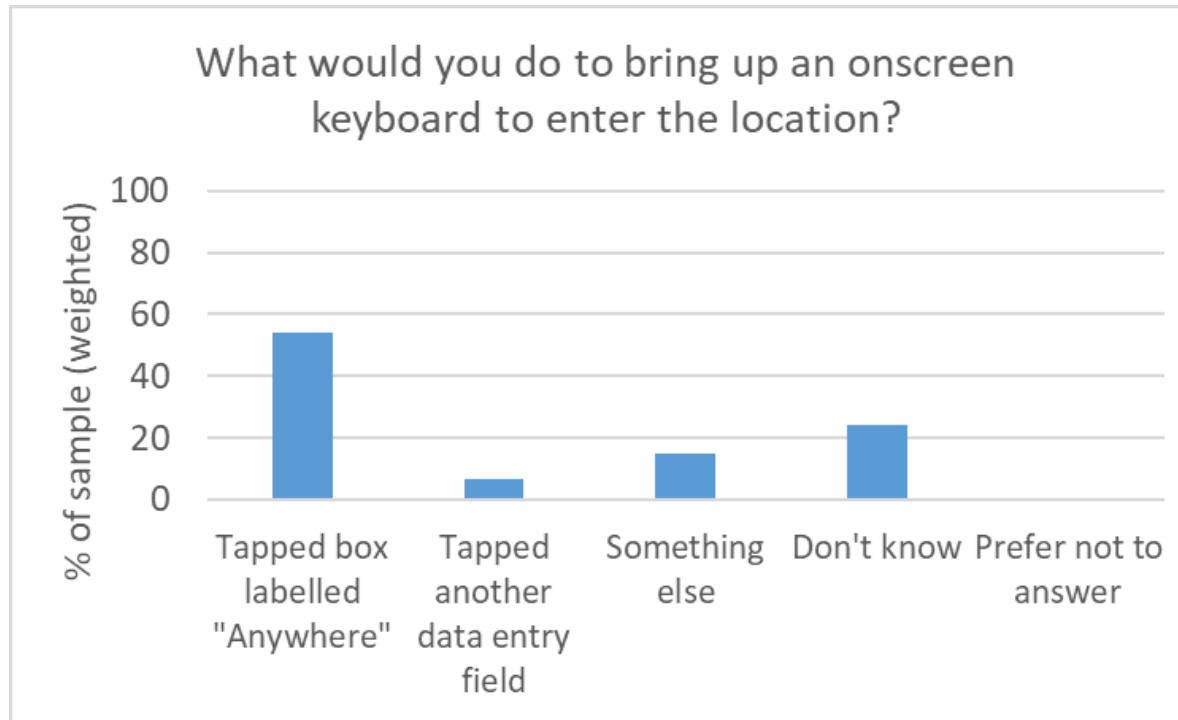


Adapted from Goodman-Deane, J., Bradley, M., Waller, S., Clarkson, P.J. (2020b). Quantifying exclusion for digital products and interfaces. CWUAAT 2020 (10th Cambridge Workshop on Universal Access and Assistive Technology), Cambridge, UK, March 2020, Springer



# Performance test 7: Bring up an onscreen keyboard to enter the location in the search

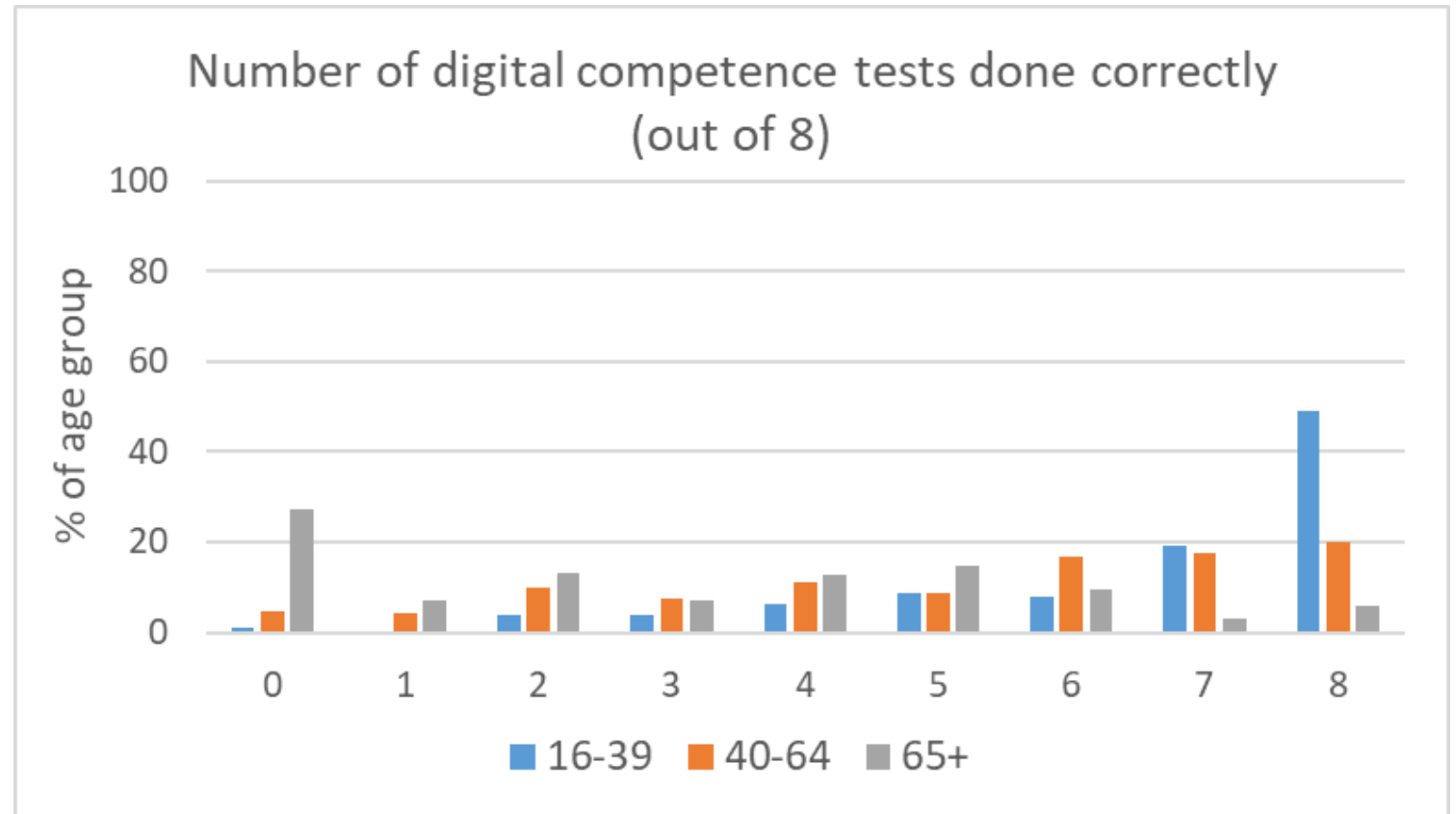
- UK data: Overall 54% responded correctly
- This is a very important task for users of transport apps who often need to type in locations.



The correct response is circled in pink

# Technology competence

- Participants were given eight interface tasks. The number of tasks performed correctly declined with age.
- 52% of over 65s got **fewer than half** of the tests correct
- 27% of over 65s did not get **any** tests correct.
- 45% of over 75s did not get **any** tests correct



## Survey questions and derived variables corresponding to each digital access requirement

























Survey questions	Derived digital access
Do you own a smartphone? = Yes OR Do you own a mobile phone that is not a smartphone? = Yes	Has access to a mobile phone

# Technology access related exclusion for adult populations

Type of service interaction	Exclusion (%) based on the difficulty of use of the specific digital interface	Italy n = 1002	UK n = 338
A service that requires the user to ...			
Interact with a fixed installation (e.g. screen, kiosk, machine) in a public location that does not require any other equipment.	0% *	0% *	0% *

Note that the exclusion is likely to be higher when the difficulty of use of the specific digital interface is also considered

# Cluster analysis based personas

Persona	Related cluster	Cluster size	Competence with technology*	Use of technology		Attitudes to technology	
				Frequency of use	Range of activities	Desire to engage	Willingness to explore
Derek 	1	12% 	Very low (0.5)	Very low	Very low	Very low	Very low
Joshua 	2	3% 	Very low (2.0)	Very high	Moderate	Moderate	Low
Ida 	3	8% 	Very low (2.5)	Very low	Very low	Low	Moderate
William 	4	9% 	Low (4.0)	Low	Low	Low	Low
Nancy 	5	6% 	Low (4.0)	High	Moderate	Low	High
Maria 	6	6% 	Low (4.5)	Very high	Very high	High	High
Kamal 	7	7% 	Moderate (6.0)	High	Moderate	Low	Low
Anna 	8	14% 	Moderate (6.5)	High	High	Moderate	High
Robert 	9	2% 	High (7.0)	Very low	Very low	Low	Moderate
Laura 	10	8% 	High (7.0)	High	Low	Low	High
Eric 	11	9% 	High (7.5)	Very high	Very high	High	Moderate
Sam 	12	16% 	High (7.5)	Very high	Very high	High	Very high

Key to Characteristics

Very low

Low

Moderate

High

Very high

# Sum-up

- Inclusive design aspires to include as many people as reasonably possible – some people are always likely to be excluded
- Understanding capability in the population you design for is very important – hence the digital exclusion surveys
- Designing to accommodate digitally excluded may require non-digital solutions



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°875542.

# Thank you for your attention!

- Are there any questions?

## Acknowledgements

This research was carried out as part of the DIGNITY project which received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 875542. We would like to thank all the research partners on this project for their input into designing and carrying out the survey.

The UK survey was funded by DFT as part of the RSSB's TOC'16 project: Towards the Inclusive Railway in collaboration with Siemens Mobility, Keolis Amey Docklands, and Astutim.

Mike Bradley: [mdb54@cam.ac.uk](mailto:mdb54@cam.ac.uk)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°875542.





## Session B3 - Digital shift in mobility: How can we get everyone on board?







**How many people in  
the EU have not even  
basic digital skills?**



**197 million**



**How many people in Europe live with some kind of a disability?**



**135 million**

# Leaving no one behind



Lower-income citizens



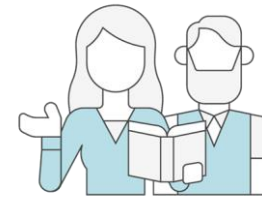
People living in peri-urban or rural areas



Ethnic minorities



Foreigners



Lower-educated citizens



Caregivers



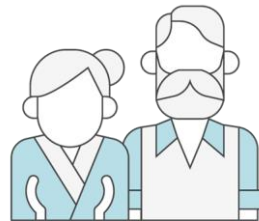
Women



People lacking digital skills



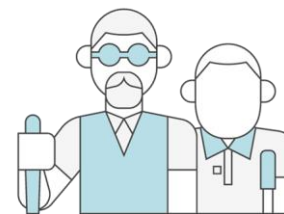
Non-connected people



Older people



People with mental health impairments



People with reduced vision or mobility

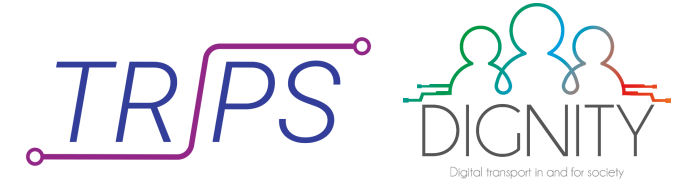


Socially isolated people

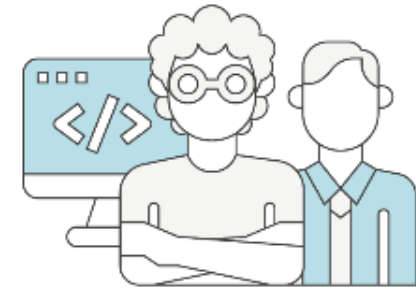


Covid-19 confined people

# Key stakeholders to make mobility more inclusive



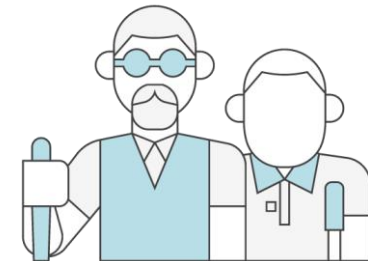
Policy  
makers



Developers



Operators



Users and non-  
users



# Agenda



**Accessibility and inclusive design in public transport in practice**

Mike Bradley, Inclusive Design Group, University of Cambridge, UK, (DIGNITY project)

**Ensuring inclusivity and accessibility in digital mobility systems – the case of Flanders**

Abdi Shila, Flemish Ministry of Mobility and Public Works, Belgium (DIGNITY Project)

**Designing and developing inclusive and accessible mobility solutions for people with a visual impairment: lessons learned from the INDIMO-project**

Pieter-Jan Vandenberghe, developer, imec, Mobility and Logistics Cluster, Belgium (INDIMO project)

**The European Accessibility Observatory – Transparent auditing of urban transport based on a user-centric, mobility divide index (MDI)**

Tally Hatzakis, researcher, Trilateral Research (TRIPS project)

**Panel discussion**



[www.indimoproject.eu](http://www.indimoproject.eu)



[trips-project.eu](http://trips-project.eu)



[www.dignity-project.eu](http://www.dignity-project.eu)