PAsCAL

Enhance driver behaviour & Public Acceptance of Connected & Autonomous vehicles

Pilot 5 Final Event (Conclusions):
Vulnerable travellers in connected transport environments

28/10/2021

H2020-funded under grant agreement No. 769926

Project Overview

1. Summary

PAsCAL: Enhance driver behavior and acceptance of connected, cooperative and automated transport

Start date 06.01.2019
Duration 36 + 6 months
Budget € 3.974.041,25
Funded by H2020

13 partners
7 countries
34 deliverables

2. Activities

SURVEYS

SIMULATIONS

TRAININGS

5 PILOTS

- **High-capacity autonomous bus**
- **Autonomous driving training**
- **Autonomous bus line**
- **Shared connected transport**
- **Vulnerable travellers in connected transport**

Guide2Autonomy

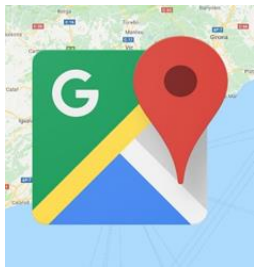
PAsCAL

What is the meaning of…?

1. CAV

Connected and Automated Vehicle:

- Connected to other traffic participants OR automatised processes onboard.
- Examples Connectivity: Google Maps, Uber, ShareNow, next stop indicator.

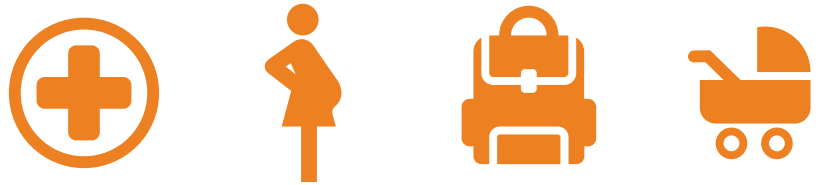


- Examples Automation: Cruise control, stop-and-go, rain detector.

2. Vulnerable travellers

Travellers with mobility constraints, which are for example:

- Temporary: Injuried, pregnant, heavy luggage.



- Permanent: Elderly, blind & partially sighted, wheelchair users.

What is the meaning of…?

3. UI/UX

- **User interface**: visual interface elements (colors, menu bars, typography);
- **User experience**: usability, journey throughout the software, logic.

Pilot 5 - Structure & Table of Contents

Duration: 5 months (March 2021 – July 2021)
Participants: 236 individuals (Avg. citizens, elderly, blind & partially sighted, wheelchair users)

Apertum Testing

- Wave 1
- Wave 2
- Wave 3

F. Kühl, Etelätär

FDGs UICI

- Rome
- Bologna
- Milan
- Naples

F. Sbianchi, EBU - UICI

Apertum UI/UX

- Regular
- Elderly

J. Papí, Etelätär

Interviews

- CRTM

J. Papí, Etelätär

Pilot 5 - Apertum Testing (I)

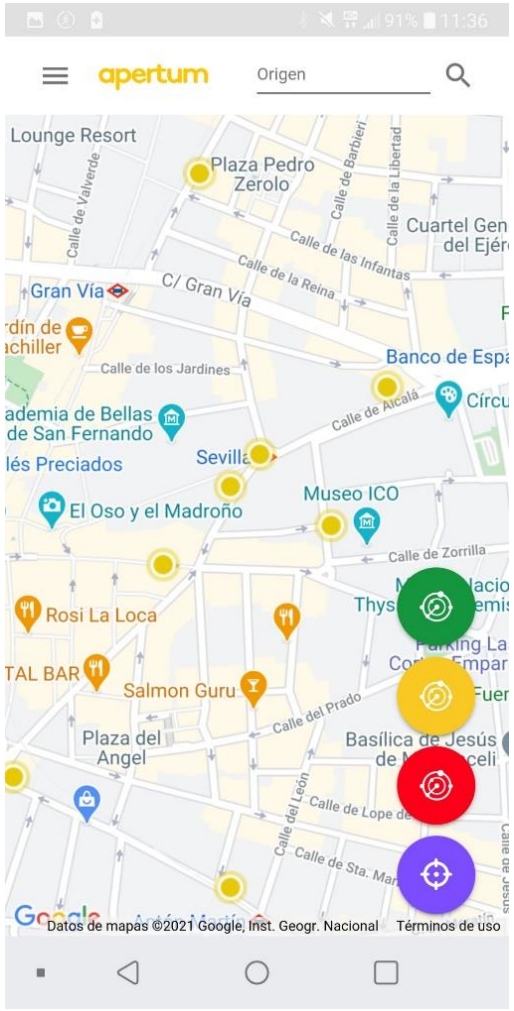
What is Apertum?

Free transport app offering real-time accessible public transport routing to vulnerable transport users by recalculating algorithms:

- **Platforms**: iOS, Android, Web App
- **Deployments**: Madrid, Spain
- **User modes**: 8 modes (wheelchair, elderly, light luggage, with children, pregnant, with pushchair, injured, heavy luggage)
- **Adaptations**: max. walking distance, preferred mode of transport (metro, bus or both)
- **Station criteria**: red, yellow, green stations
- **Information**: Status of station, pictures

Route planning apps

Accessible places apps



Pilot 5 - Apertum Testing (II)

Who participated?

- ***Nadiesolo*** for elderly persons, ***FLM*** for persons in wheelchairs/crutches, ***UAX*** for students.

- 167 participants in 22 separate batches, 7 pilot days, 3 waves

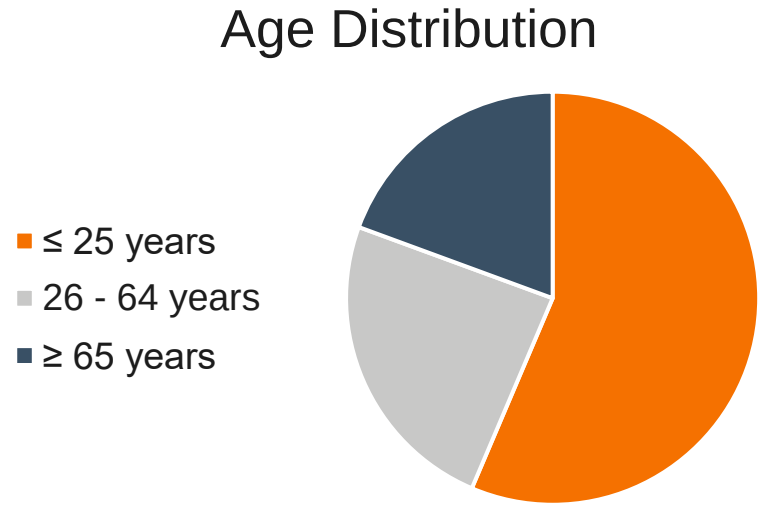
Recruiting	*Category*	*No of batches*	*Size of batches*
Nadie solo	Elderly	6	5-6
FLM	Disabled	6	5
UAX	Students	10	5-15

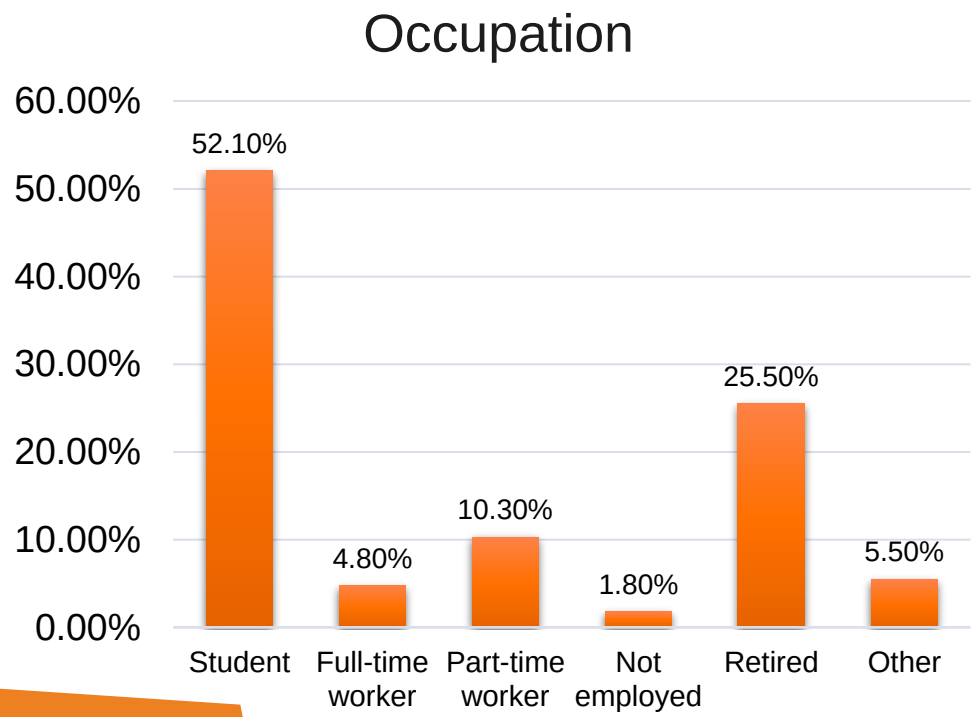
- 3 Scenarios (1 per pilot wave), to test different levels of difficulty.

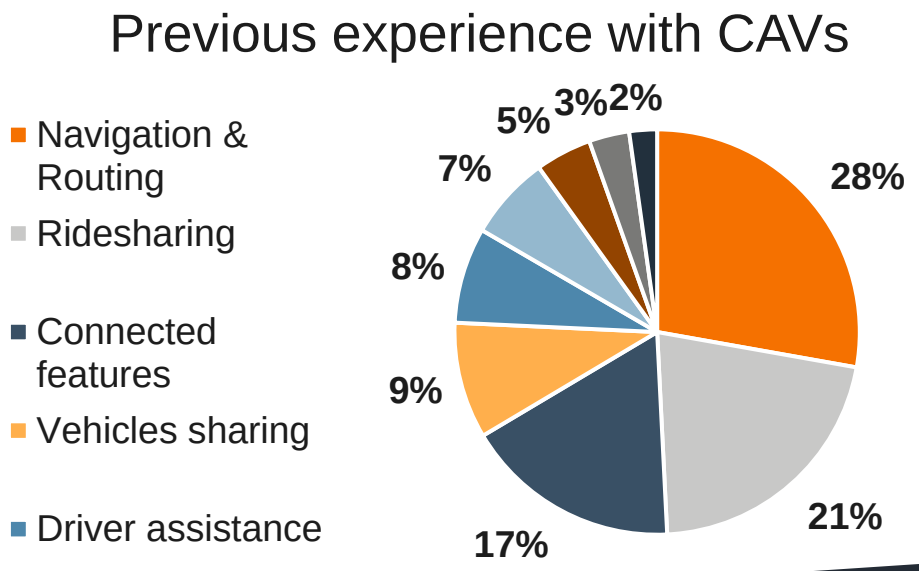
Pilot 5 - Apertum Testing (III)

Pilot 5 - Apertum Testing (IV)

Demographics



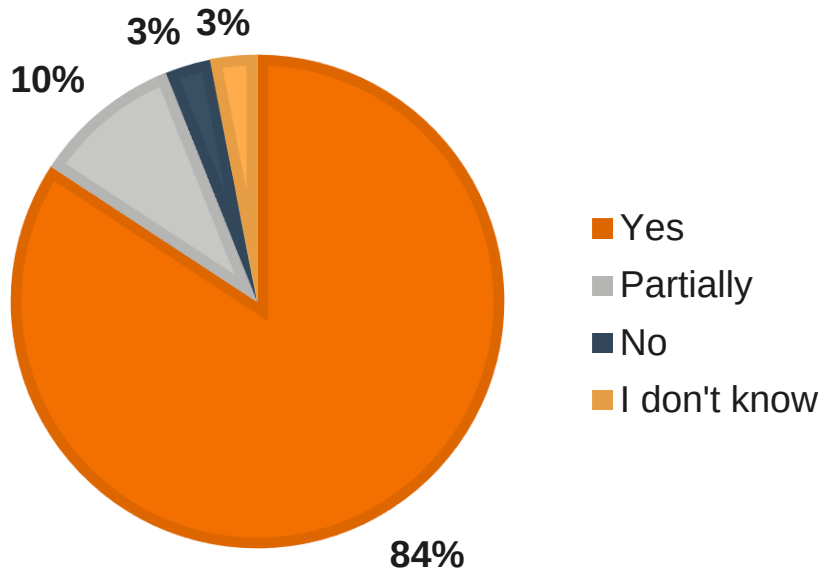




Pilot 5 - Apertum Testing (V)

Connected transport accessibility

Will connected transport help you to travel more independently?



Q14: When using public transport for your urban trips, ...

Q2: Please tell us your age	Very often	Sometimes	Rarely	Never
≤ 25	8.6%	36.6%	46.2%	8.6%
26 - 64	50.0%	22.5%	25.0%	2.5%
≥ 65	21.9%	18.8%	34.4%	25.0%

Q18: Which information do you co...	Checked Percent
Station/stop information (accessibility ...	75.8%
Real-time information about arrivals	68.5%
Accessible routes inside stations	61.2%
Learn in advance if the station/stop is ...	60.0%
Routing adapted to the type of non-co...	47.9%

0.0% 20.0% 40.0% 60.0% 80.0%

Pilot 5 - Apertum Testing (VI)

Conclusions

- Terminology: “CAV” is not intuitive, real-world examples are needed;
- Familiar CAVs: navigation systems, ridesharing services, connected features;
- Unfamiliar CAV technologies: autonomous features;
- 87% believe that connected applications helps to navigate around obstacles;
- Connected features can raise autonomy of travel significantly;
- HMIs today widely non-accessible;
- Aids today widely analogue & non-connected (tactile pavement, mapping of stations, etc.)

Pilot 5 - Apertum Testing (VI)

Recommendations

- **Terminology**: Add Examples of CAV technologies in public communication;
- **Expose the general public** to higher levels of automation in safe environments;
- **Legislation**: render connected accessibility information obligatory across Europe;
- **Investments** in accessible connected transport needed (text-to-speech, audio-cues, height-adjusted ticket machines & entry gates);
- **Indoor-mapping** of stations for different mobility constraints deemed helpful & needed;
- Persons with mobility constraints to be included in **co-creation processes**.

Pilot 5 - Focus Discussion Groups in Italy (I)

The European Blind Union (EBU) and the Italian Union of the Blind and Partially Sighted (UICI) engaged in the PAsCAL project to make sure that the needs of visually impaired people are fully taken onboard when developing new connected mobility solutions.

EBU
The voice of blind and partially sighted people in Europe

Unione Italiana dei Ciechi e degli Ipovedenti ONLUS-APS

Pilot 5 - Focus Discussion Groups in Italy (II)

Objectives

- understand what the main challenges in independent mobility persons with different degrees of visual impairment encounter
- gather what their needs are and what their perception of CAVs and connected mobility in general is as well as their worries and positive expectations about them.

Pilot 5 - Focus Discussion Groups in Italy (III)

4 Focus Group Discussion meetings held in 4 Italian cities

Bologna

Milan

Naples

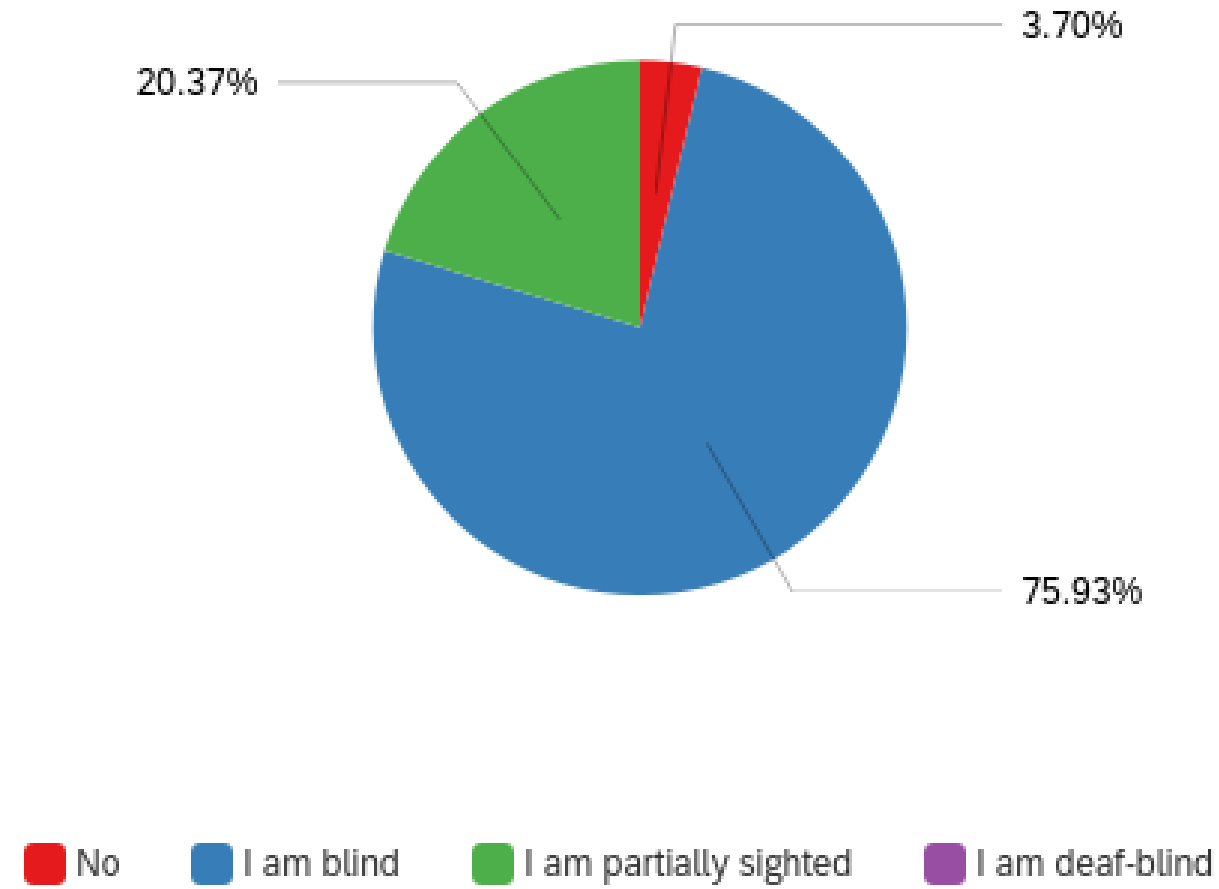
Rome

Why? To get a large variety of perceptions and understand the widest range of needs and requirements in various urban settings.

Pilot 5 - Focus Discussion Groups in Italy (IV)

Group composition

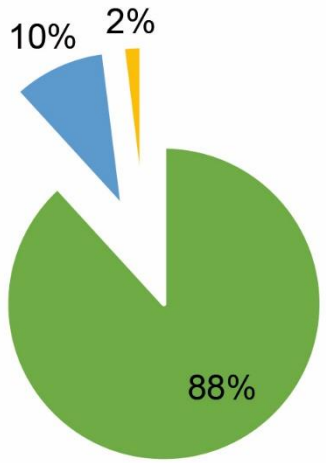
Do you have a visual impairment?



Pilot 5 - Focus Discussion Groups in Italy (V)

Travelling independently

Feelings about travelling alone



- Very important
- Important
- Less important

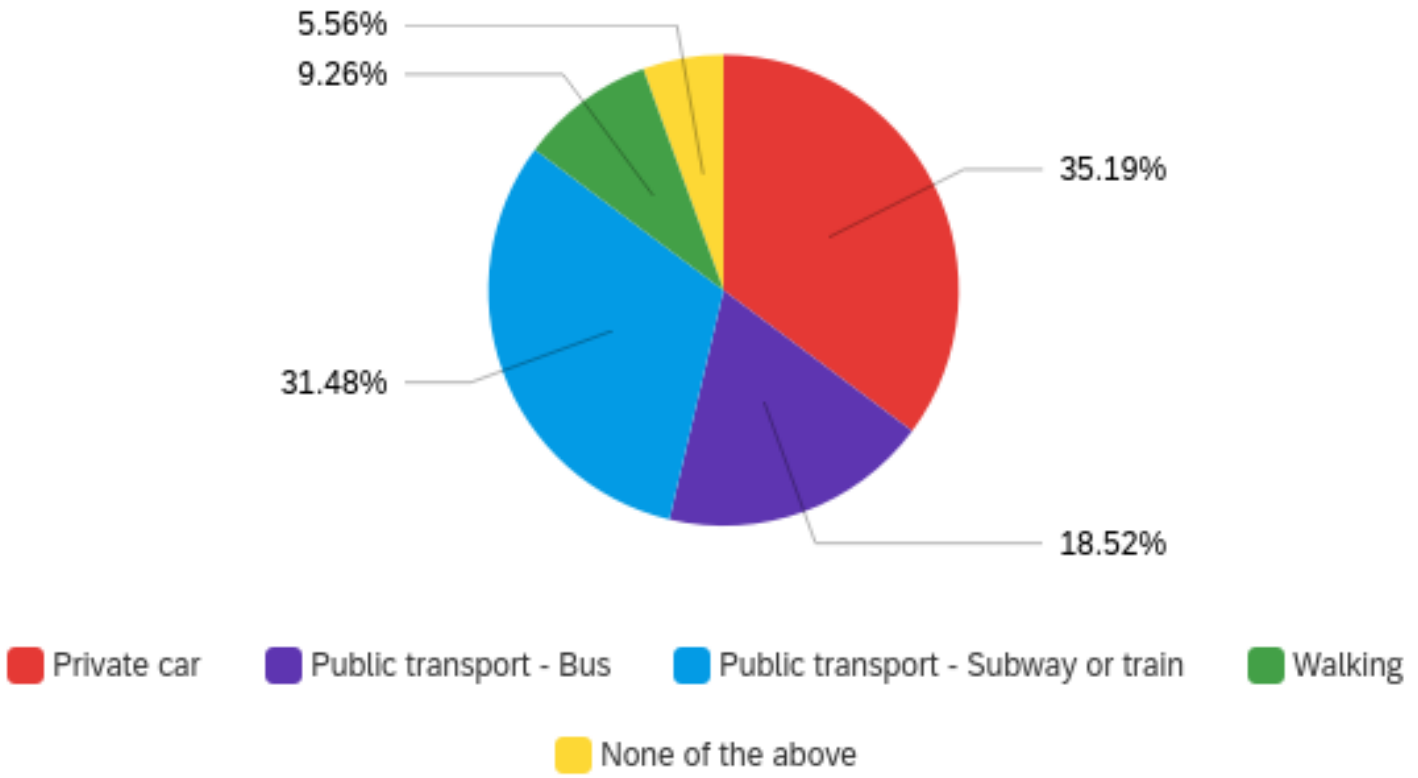
Domanda 13 di 27: Backgrou...	Count	Percent
No	2	3.7%
Only known routes, for short dis...	12	22.2%
Known routes any distance	28	51.9%
Yes, even unknown routes	12	22.2%
Total	54	100.0%

Pilot 5 - Focus Discussion Groups in Italy (VI)

Mobility

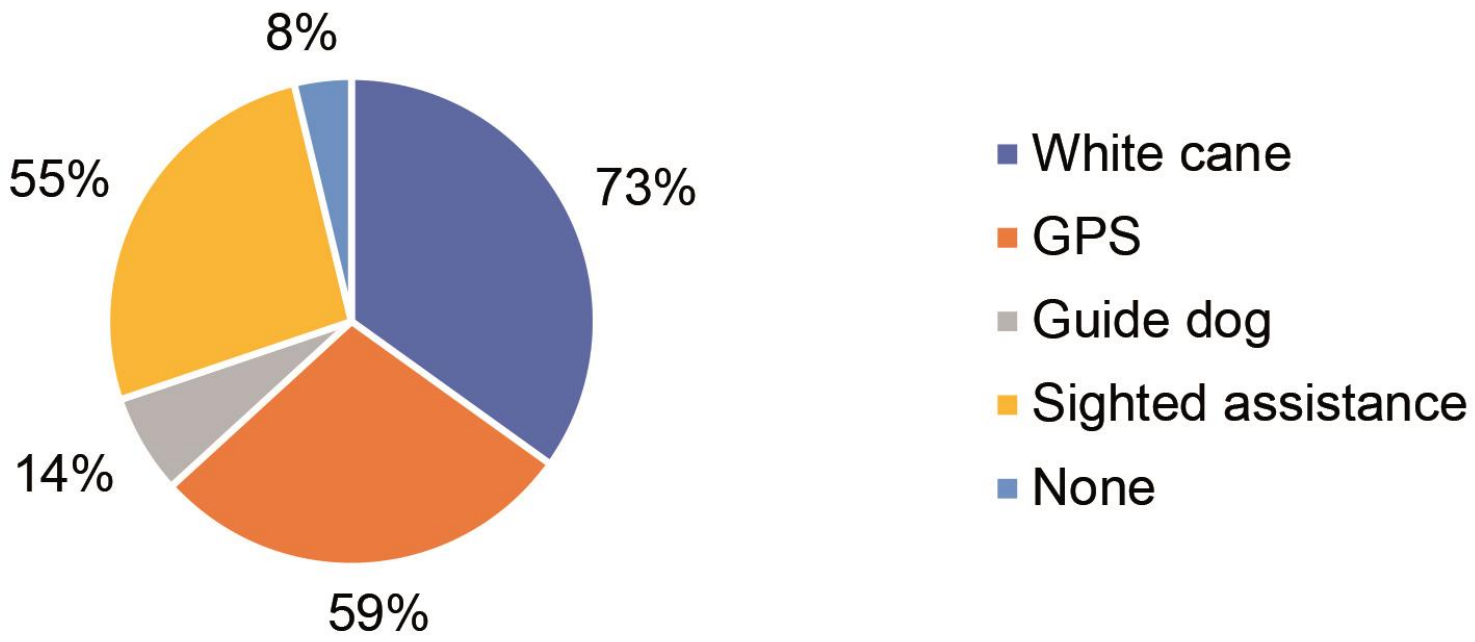
Public transport is still the most commonly used kind of transport. Metro and trains are more used than buses

Which is your preferred transport mode?

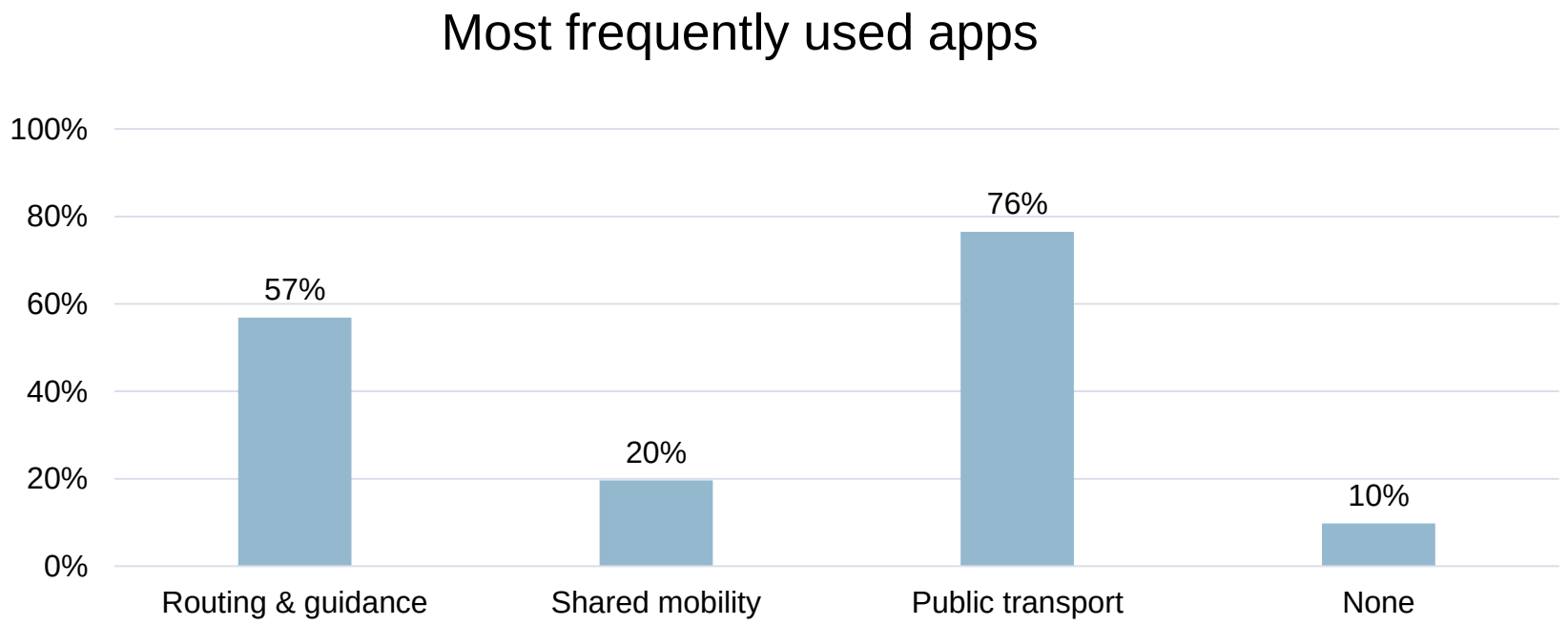


Pilot 5 - Focus Discussion Groups in Italy (VII)

The most common aids for mobility are the white cane, GPS and sighted assistance.



Pilot 5 - Focus Discussion Groups in Italy (VIII)



Pilot 5 - Focus Discussion Groups in Italy (VIII)

Concerns about CAVS

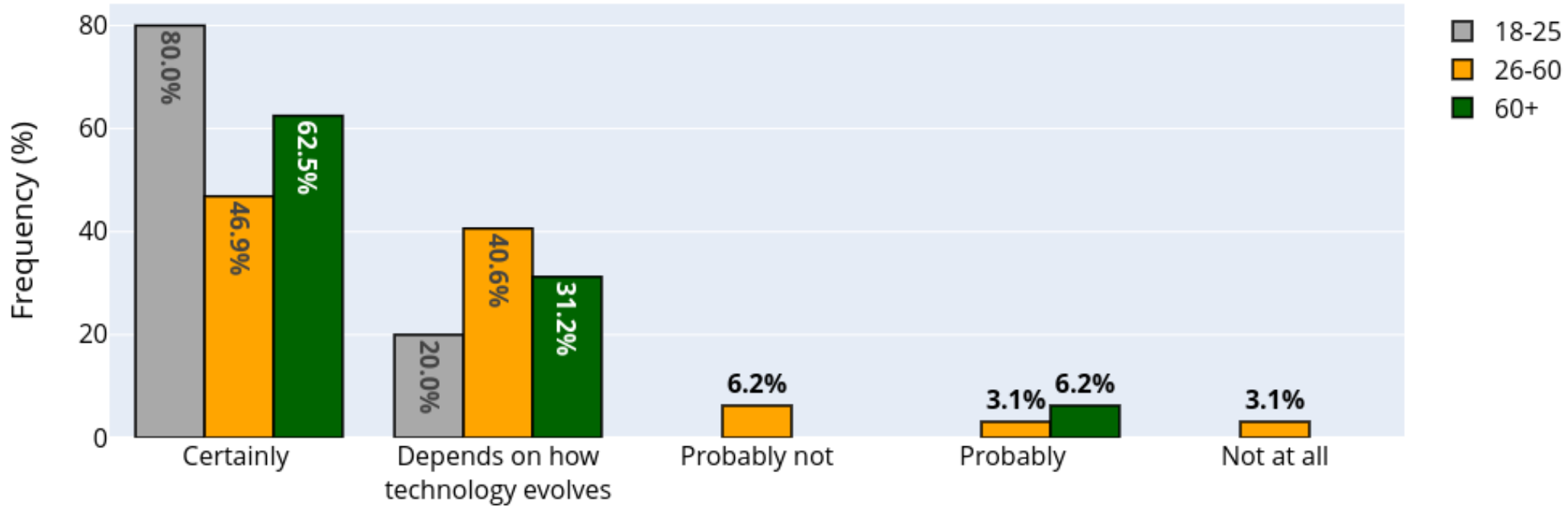
- Safety
- Human surveillance
- “Ethical” programming
- Geo-localisation
- Lack of insurance schemes
- Lack of awareness/willingness of staff related to the correct use of public transport CAVs

Pilot 5 - Focus Discussion Groups in Italy (IX)

Connected and automated mobility seems to be both acceptable and desirable with no substantial distinction among age and disability degree.

Pilot 5 - Focus Discussion Groups in Italy (X)

If CAVs were available, I would use them



Willingness to use driverless vehicles by age

Pilot 5 - Focus Discussion Groups in Italy (XI)

Visual impaired persons' requirements about CAVs

1. Accessible travel and infrastructure information
2. Human-machine interaction
3. Integrated system among CAVs, environmental information and indoor navigation
4. Accessible touch screens used CAVs
5. Safety audio alert in CAVs

Pilot 5 - Focus Discussion Groups in Italy (XII)

CAVs will be a fundamental support only if this technology is part of an accessible transport and urban infrastructure where hardware and software technology takes into consideration the needs of persons with disabilities since the design phase.

Pilot 5 - Apertum UI/UX (I)

2 Peer-Groups à 10 persons

1. *Digital natives*: Students (1.5h)
2. *Digital nomads*: Elderly persons (2h)

Reason: group of 20 is useful to find at least 95% of problems

Agenda

20 min	Introduction & Briefing
20 min	Free usage of application
20-40 min	Tasks 1-4 (Tutorial, Accessible stations in surroundings, 2 scenarios, Report incidence)
20-35 min	Survey
10 min	Debriefing

Pilot 5 - Apertum UI/UX (II)

WAMMI Surveys

Strongly agree
Somewhat agree
Neither agree nor disagree
Somewhat disagree
Strongly disagree

1	This website has much that is of interest to me.
2	It is difficult to move around this website.
3	I can quickly find what I want on this website.
4	This website seems logical to me.
5	This website needs more introductory explanations.
6	The pages on this website are very attractive.
7	I feel in control when I'm using this website.
8	This website is too slow.
9	This website helps me find what I am looking for.
10	Learning to find my way around this website is a problem.
11	I don't like using this website.
12	I can easily contact the people I want to on this website.
13	I feel efficient when I'm using this website.
14	It is difficult to tell if this website has what I want.
15	Using this website for the first time is easy.
16	This website has some annoying features.
17	Remembering where I am on this website is difficult.
18	Using this website is a waste of time.
19	I get what I expect when I click on things on this website.
20	Everything on this website is easy to understand.

Pilot 5 - Apertum UI/UX (III)

Conclusions

- 94% of participants were able to complete all tasks in time;
- 27% needed help: small texts, small buttons, non-inuitive layout & logic;
- Ease of first-time reported via WAMMI:

Strongly agree	33.3%
Somewhat agree	33.3%
Neither agree nor disagree	9.5%
Somewhat disagree	4.8%
Strongly disagree	19.0%

Recommendations

- Elderly people ≠ Digital nomads, techn-savviness higher than expected
- UI/UX needs to be improved further to cater also to new user groups:
  Blind/Partially sighted (Text-2-Voice), reduced hand mobility & hands-free usage

Pilot 5 – Stakeholder interview (I)

CRTM – Consorcio Regional Transportes de Madrid

- Connected transport ≠ increased number of users, BUT **increases loyalty**
- Connected transport ≠ reduce no. of interchanges, BUT **reduces information anxiety** (i.e. in transfers)
- Young users have more intuitive understanding of complex systems, though **digital breach** got smaller due to the COVID-19 pandemic (tele-work)
- Connected transport: **useful in case of breakdown or maintenance works** (when a client is lost to works/breakdowns, sometimes it takes years to be 'recovered back to public transport)'
- New studies should **dis-aggregate user data** (better understanding)
- **Delay of increased connectivity**: data ownership, missing infrastructural investments (including accessibility infrastructures)
- **Great potential** for vulnerable travellers

Pilot 5 – Stakeholder interview (II)

View ahead

- No connected transport is possible without **underlying ‘bricks’ infrastructures**
- Ongoing **accessibility projects**: i) gain space for wheelchair users and ii) apps for visually impaired persons;
- **CAVs allow adaptability**: intelligent occupancy measurements, real-time management, separated bus lanes, autonomous buses & deterrent parking lots

„*Without a working infrastructure at the foundation of connectivity, connected features add little to no value. A generally intact and working transport infrastructure must always come first*.” - CRTM

PAsCAL

Enhance driver behaviour & Public Acceptance of Connected & Autonomous vehicles

Questions?

PAsCAL

Enhance driver behaviour & Public Acceptance of Connected & Autonomous vehicles

Thank you for your attention

etelätär innovation

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