Smart shared mobility hubs: the future of hubs for vulnerable users

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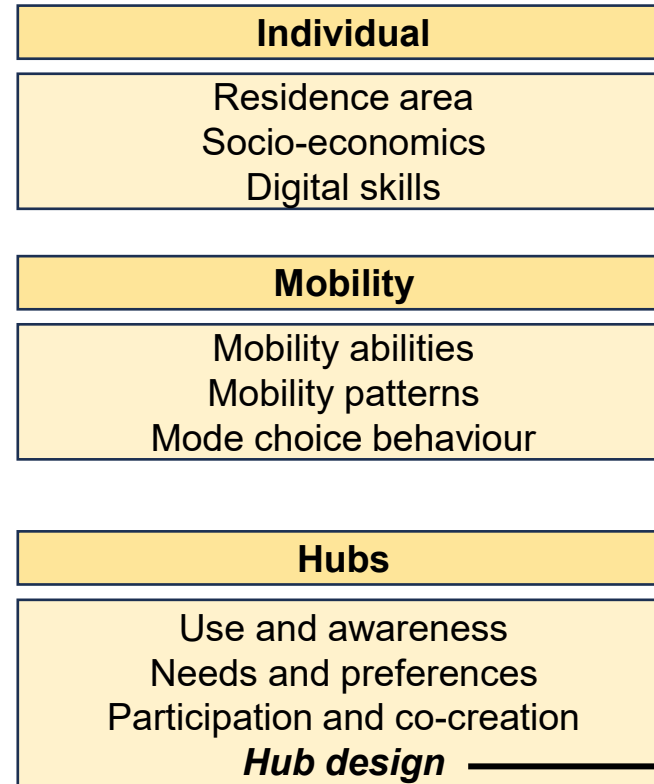
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Contents

SmartHubs survey

▶ **Objectives**
  ▶ **Current usage** of hubs and shared mobility
  ▶ Who are the **potential users** of hubs?
  ▶ What are the **barriers of use** for different user groups?
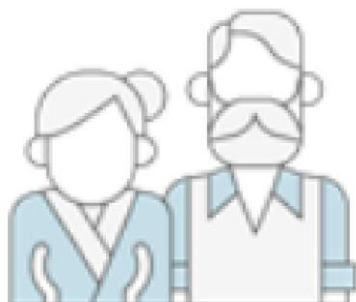 ▶ How much people are **willing to pay** for a smart hub?

▶ **Data gathering:**
  ▶ Online panels, assisted survey and online distribution
  ▶ December 2022 – March 2023
  ▶ Vienna, Brussels, Munich and Metropolitan Region Rotterdam – The Hague (MRDH)
  ▶ N = 2515

Individual
Residence area
Socio-economics
Digital skills

Mobility
Mobility abilities
Mobility patterns
Mode choice behaviour

Hubs
Use and awareness
Needs and preferences
Participation and co-creation
Hub design

ERA-NET Cofund Urban Accessibility and Connectivity

Vulnerable-to-exclusion (V2E)

Low-income   Older people   Female   Migrants   Mobility impaired   Low digital mobility skills

The visualizations of the V2E-groups were adopted from the INDIMO project (INDIMO, 2022)

Assisted surveys

▶ **Assisted surveys of vulnerable to exclusion groups**
  - ▶ Lower Austria: 1 interview event in Pillichsdorf
  - ▶ Brussels: 1 event and on-street data collection
  - ▶ Munich: on-campus data collection
 - ▶ Rotterdam/the Hague: 4 visits to community centers

Sample targets

Minimum sample requirements- planned (2000) / realized (2515)

|	Brussels	Munich	Rotterdam-the Hague	Vienna-Lower Austria
Sample size	500 / 589	500 / 542	500 / 805	500 / 579
Females	50%, min= 100 / 277	50%, min= 100 / 261	50%, min= 100 / 440	50%, min= 100 / 300
Older (>65 years)	~7%, min= 35 / 87	~12%, min 60 / 30	~ 10%, min= 50 / 206	~4%, min= 100 / 69
Low income	50%, min= 200 / 138	100 / 168	50%, min= 200 / 120	20%, min= 100 / 109
Low education	100* / 113	100* / 153	50%, min= 200 / 215	~11%, min= 50* / 212
Low digital skills	25 / 59	25 / 19	25 / 42	25 / 23
Rural	-	-	-	20%

Sample

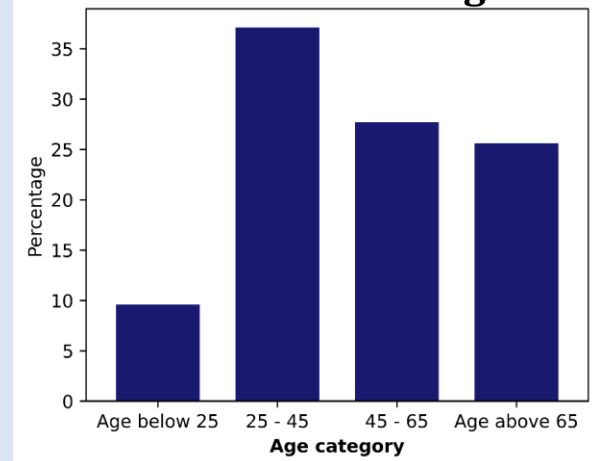N=2515
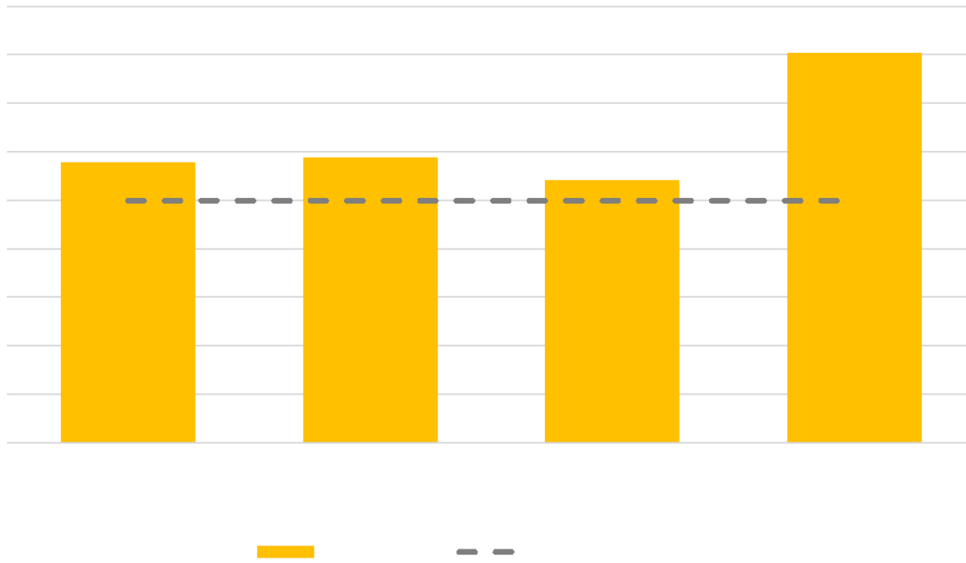
Vienna-Lower Austria
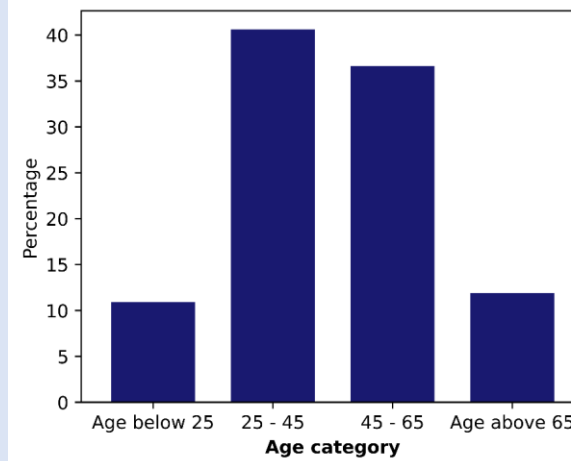
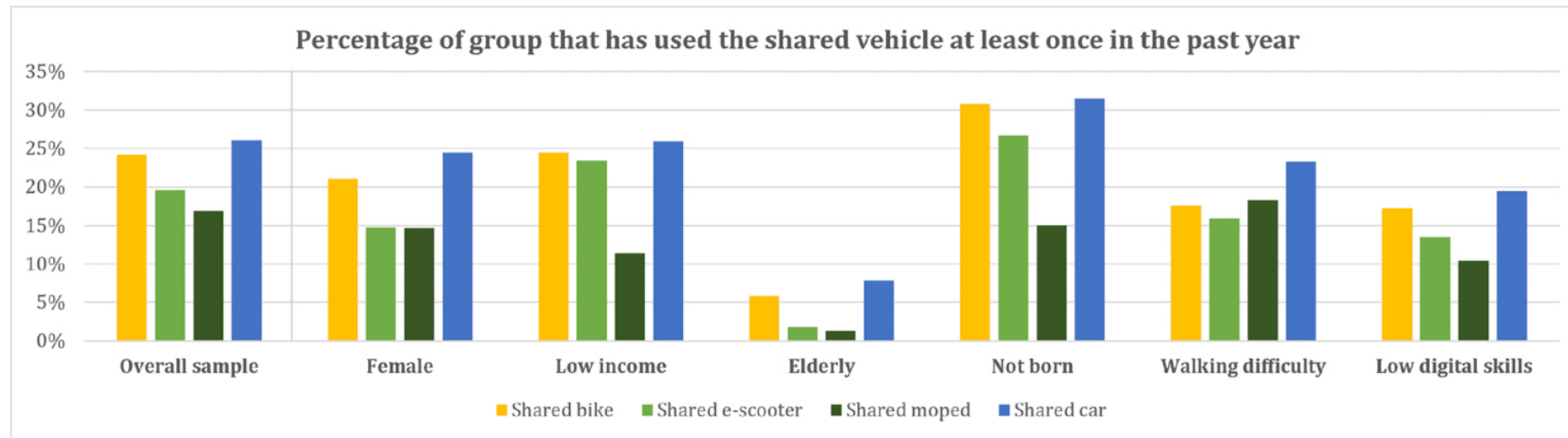### Brussels
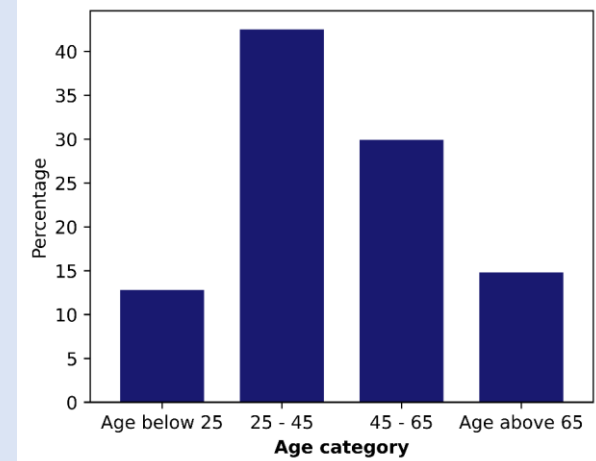
Munich
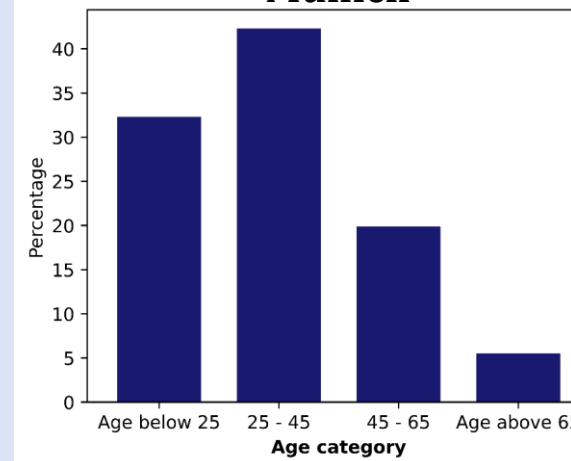
Rotterdam-the Hague

1. Current use of shared vehicles at a hub

Current use of shared modes at a hub

V2E groups

▶ 44% have used some form of shared mobility at a hub at least once
  ▶ Older people lowest
  ▶ Migrants highest

Percentage of group that has used the shared vehicle at least once in the past year

Legend: Shared bike · Shared e-scooter · Shared moped · Shared car

Categories: Overall sample, Female, Low income, Elderly, Not born, Walking difficulty, Low digital skills
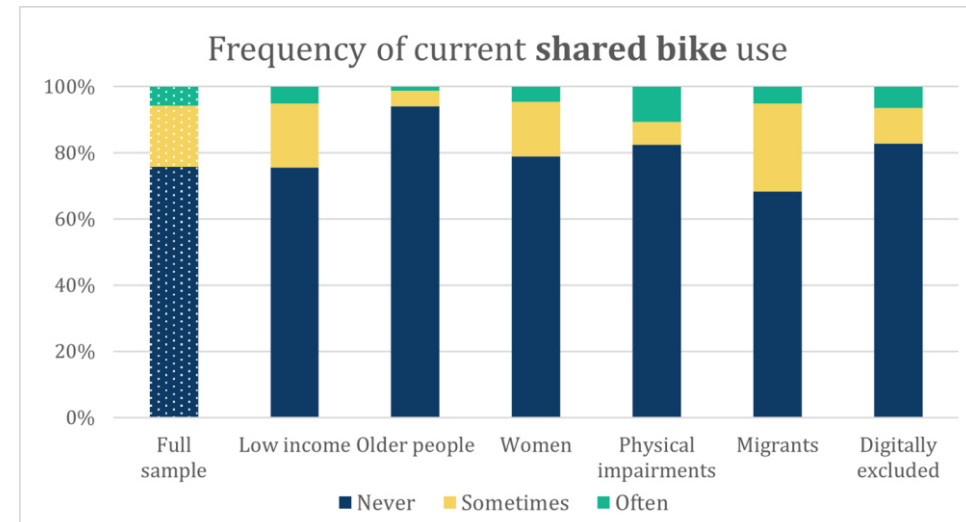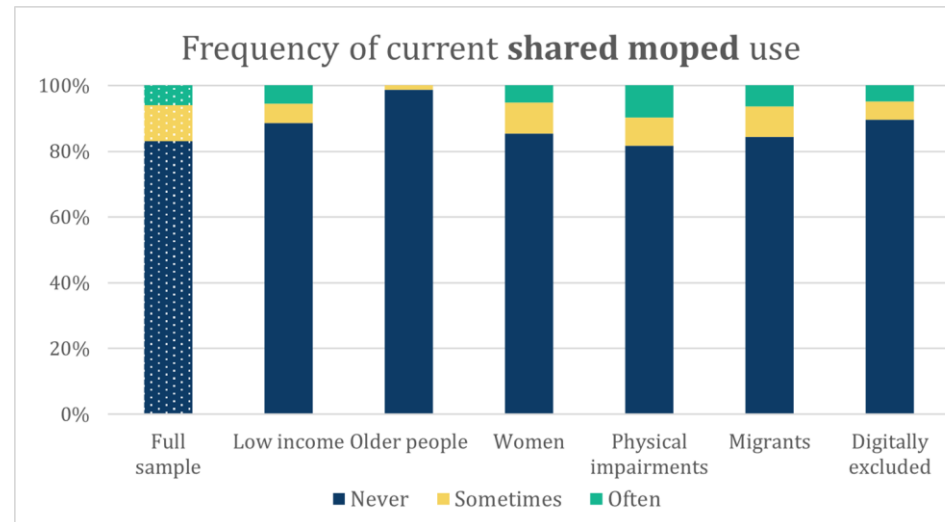
Current use of shared modes at a hub, per mode

V2E groups

▶ Shared car was mostly used

▶ Lowest: Older people
▶ Highest: Migrants

Frequency of current **shared car** use

Frequency of current **shared e-scooter** use

Frequency of current **shared moped** use

Frequency of current **shared bike** use
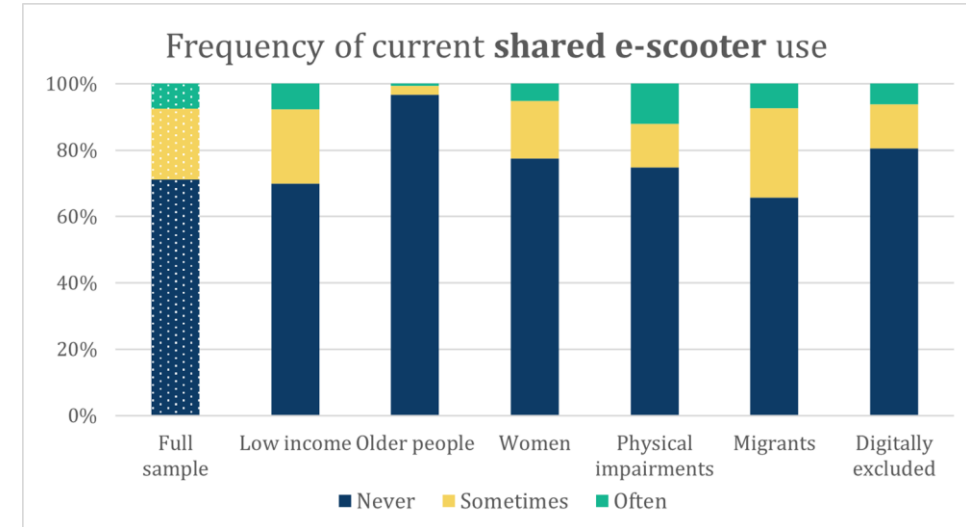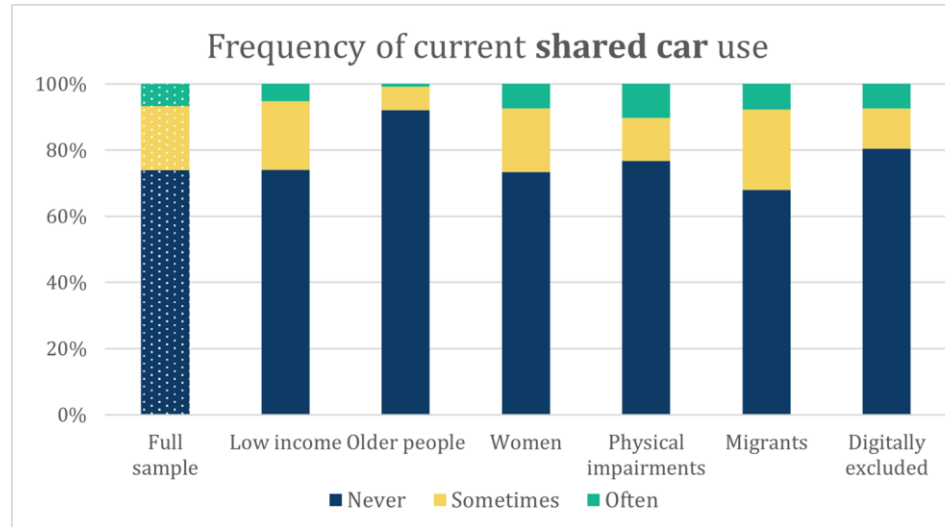
2. Intention to use shared vehicles at a hub

Intention to use shared modes at a hub

What determines use?

▶ On average, **20,8% positive** on the use of shared vehicles at hub in the future
  ▶ E-scooter: 23.9%
  ▶ Moped: 17.3%

Likelihood to use a shared moped at a mobility hub in the future

Intention to use shared modes at a hub

What determines use?

▶ On average, 20,8% positive on the use of shared vehicles at hub in the future
  ▶ E-scooter: 23.9%
  ▶ Moped: 17.3%

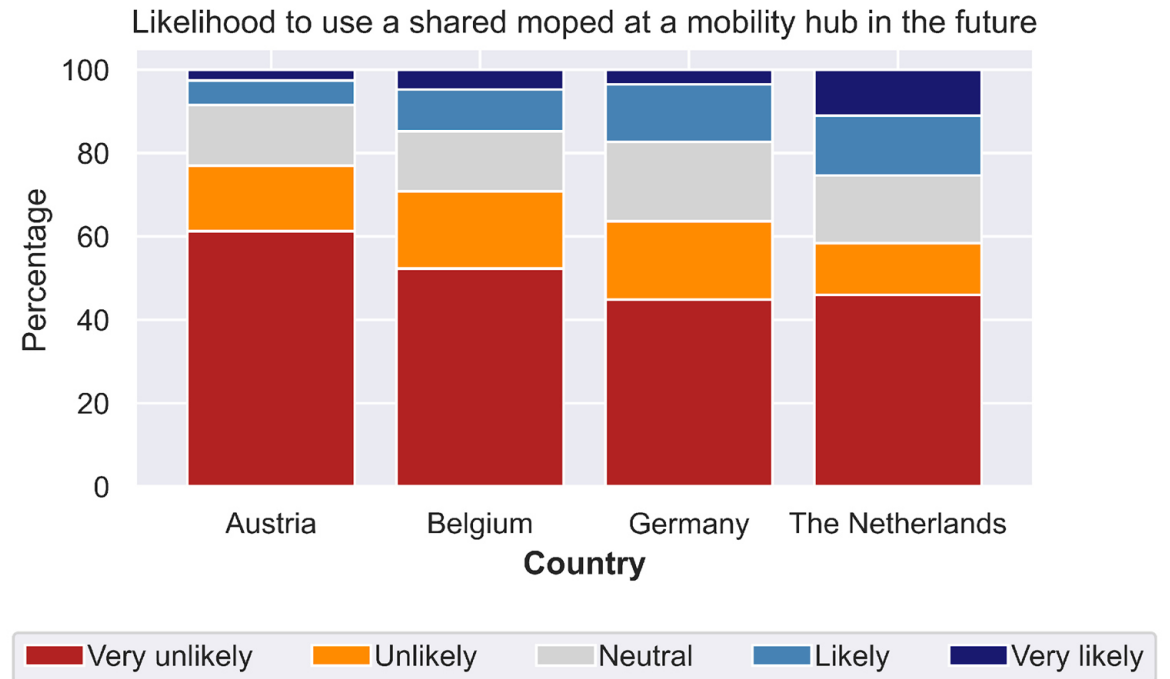▶ Respondents with a **positive intention** to use a **shared vehicle** at a hub are:

Younger	**Theoretical educated**	**PT users**	**Digitally skilled**
Age ---> Intention [-0.034 (<.001)]	Compulsory edu. ---> Intention [-0.538 (<.001)]	PT use = never ---> Intention [-0.839 (<.001)]	DS = level 0/1 ---> intention [-0.512 (<.001)]

Data
Results based on OLR model
DV: Intention to use moped, car, bike at hub
N = 2055 (Full sample)
Mc Fadden R-square: 0.095

Intention to use shared modes at a hub

V2E-groups (*vulnerable-to-exclusion*), with a **lower intention** to use **shared vehicles at a hub:**

Older people

Lower educated

Digitally excluded

Intention to use shared modes at a hub

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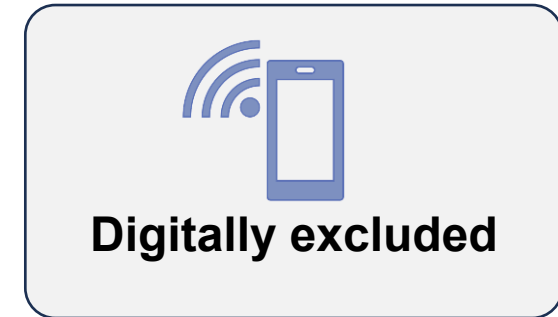
V2E-groups have additional preferences and **barriers**:

- Prefer own vehicle
- Not safe
- Does not fulfil my travel needs

- Too expensive
- I don't know how to use it

- Not safe
- I don't know how to use it
- Don't trust shared modes

3. Preferences at the hub & willingness to pay

SmartHubs Integration Ladder

		Physical Integration	Digital Integration	Democratic Integration
Smart mobility hub	4	Conflict free & place making	Integration of societal goals and policies & considerations of universal design principals	Social learning
	3	Visibility & branding	Integration of services offers & considerations of universal design principals	Integration of different knowledge
	2	Wayfinding & considerations of universal design principles	Integration of booking and payment & considerations of universal design principals	Deliberative engagement of stakeholders, including (vulnerable) user groups
Mobility hub	1	Acceptable walking distance to shared and public transport & minimum inclusive design standards	Digital integration of information	Appropriate representation of stakeholder interests, no or limited attention for vulnerable user groups
Single mobility services	0	No physical integration	No digital integration	No stakeholder involvement & consideration of (vulnerable) user needs

Importance of mobility hub elements

How important is it to have [x] at the hub? (Likert Scale)

(a)　　　(b)　　　(c)　　　(d)　　　(e)

► **Most valued hub facilities**:
(d) Information (wayfinding, travel info)
(e) Application (MaaS: plan, book & pay)

	Eastern Austria	Brussels	Munich	MRDH	Full Sample
Group size	579	589	542	805	2515
a. Different mobility options	2,25	1,41	3,62	2,14	2,17
b. Different services	4,28	4,08	4,88	3,05	3,94
c. Different landscaping elements	4,31	3,42	4,65	1,43	2,99
d. Information	7,45	5,32	6,81	4,20	5,63
e. Digital integration	6,19	2,52	10,37	6,41	5,28

Willingness to pay
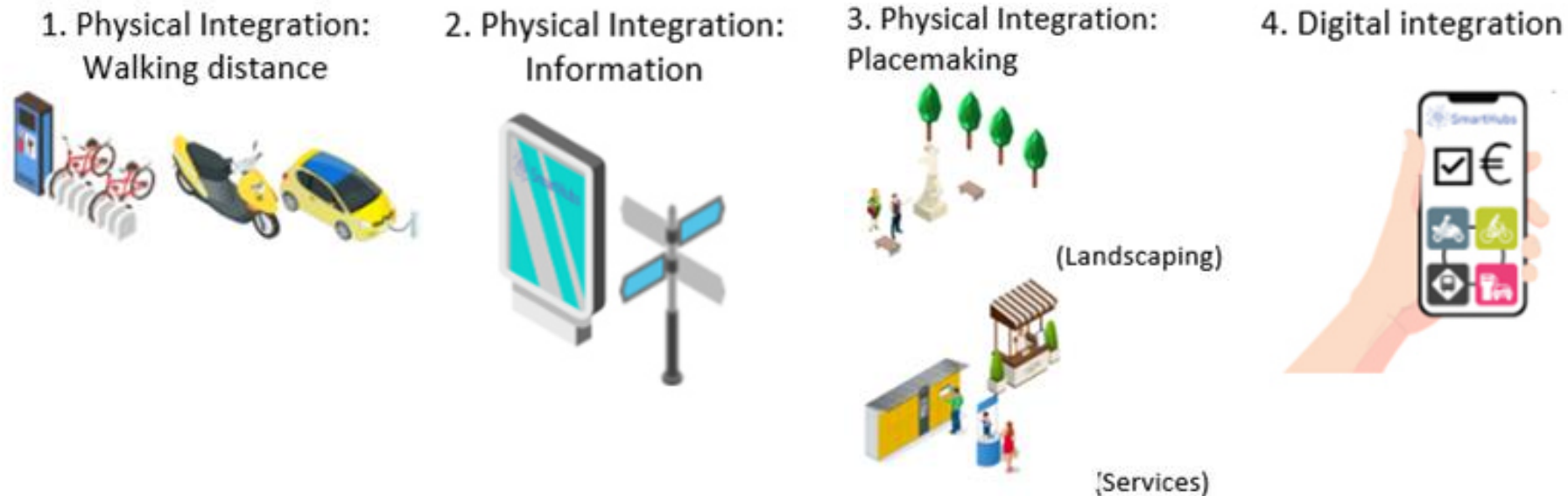
Trade-off between elements of mobility hubs

1. Physical Integration: Walking distance

2. Physical Integration: Information

3. Physical Integration: Placemaking

(Landscaping)

(Services)

4. Digital integration

5. Additional costs on monthly municipal taxes

Method: Stated Choice Experiment
5 attributes, 3 levels each (6 choice cards per respondent)
Model: utility-maximization (Mixed-logit model)
Willingness-to-pay: Coefficient (1...4)/ Coefficient (5)

Willingness to pay

Trade-off between elements of mobility hubs

1. Physical Integration:
Walking distance

Level 3: public transport stop and shared modes at walking distance

Level 2: shared modes are placed together, but not within walking distance from public transport stop

Level 1: public transport stop only (shared modes are all scattered and not within walking distance)

Physical Integration

Smart mobility hub	4	Conflict free & place making
	3	Visibility & branding
	2	Wayfinding & considerations of universal design principles
Mobility hub	1	Acceptable walking distance to shared and public transport & minimum inclusive design standards
Single mobility services	0	No physical integration
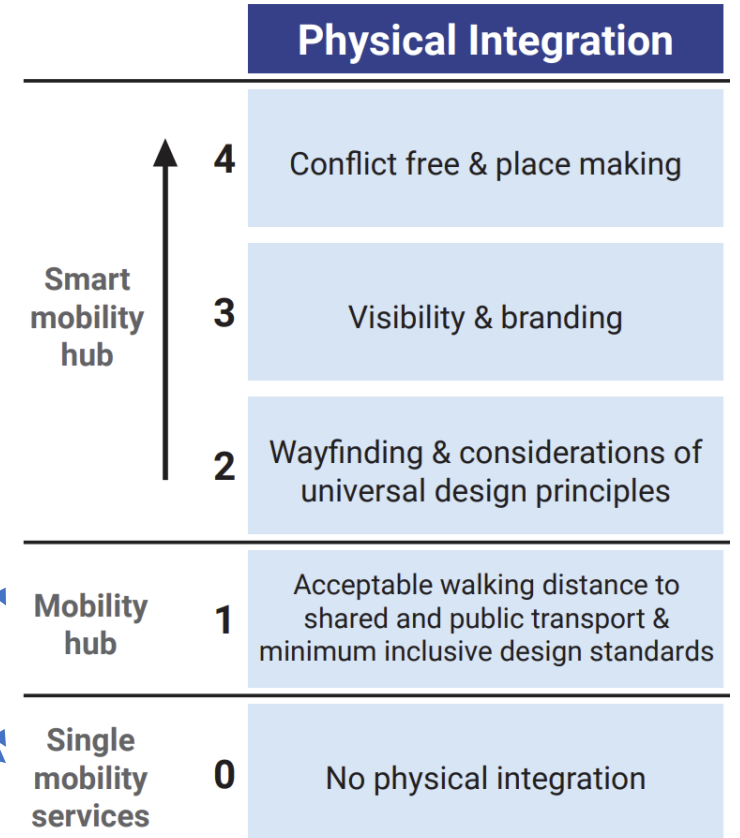
Willingness to pay

Trade-off between elements of mobility hubs

2. Physical Integration: Information

Level 3: digital display and signage for all modes
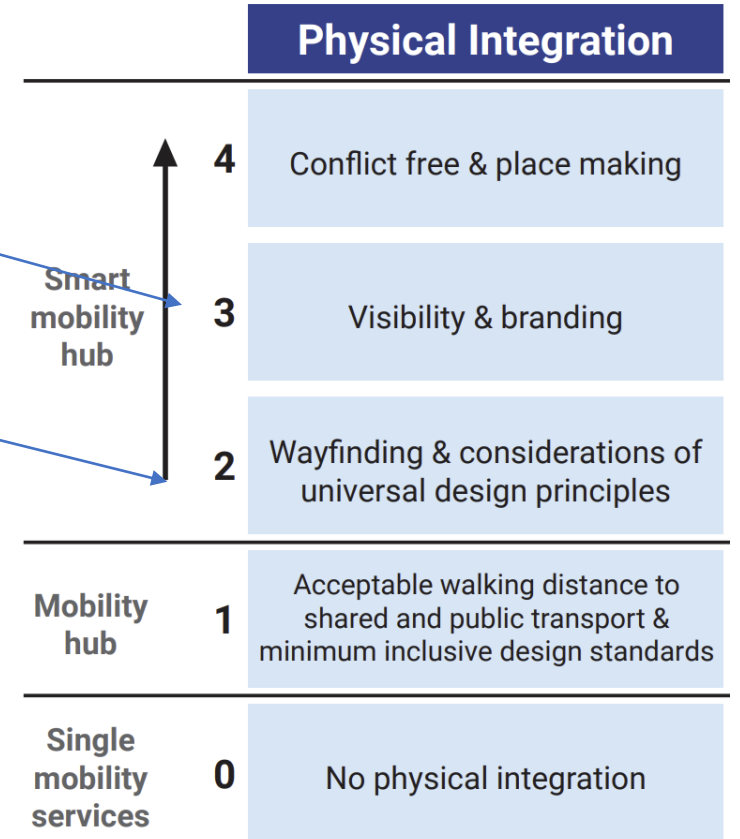
Level 2: signage for all modes

Level 1: no signage, no digital display

Physical Integration

Smart mobility hub	4	Conflict free & place making
	3	Visibility & branding
	2	Wayfinding & considerations of universal design principles
Mobility hub	1	Acceptable walking distance to shared and public transport & minimum inclusive design standards
Single mobility services	0	No physical integration

Willingness to pay

Trade-off between elements of mobility hubs

3. Physical Integration: Placemaking

(Landscaping)

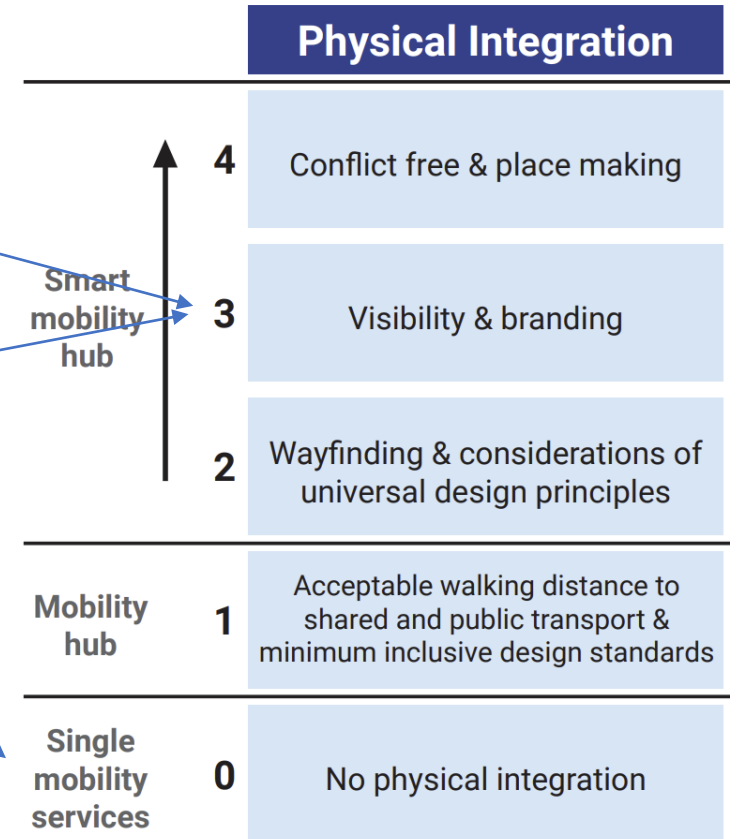(Services)

Level 3: services (cafe, package locker, information kiosk)

Level 2: landscaping (green, benches, art)

Level 1: no landscaping, no services

Physical Integration

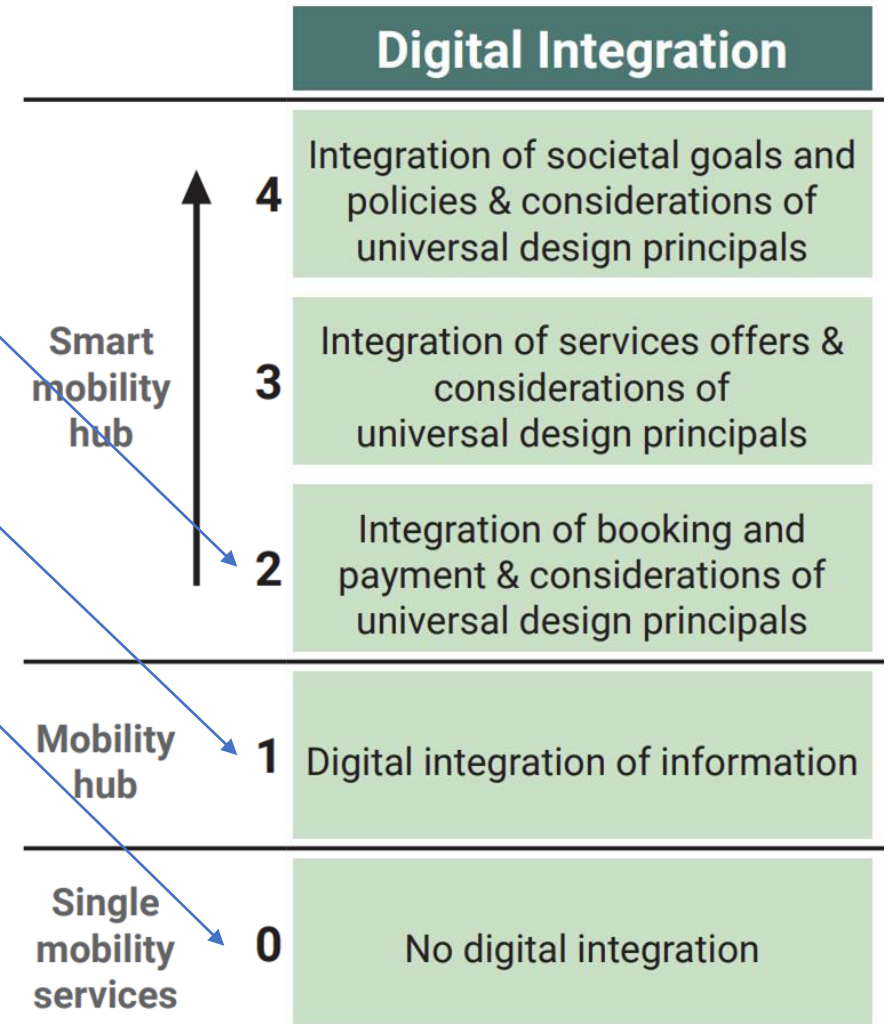|		
Smart mobility hub	4	Conflict free & place making
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	2	Wayfinding & considerations of universal design principles
Mobility hub	1	Acceptable walking distance to shared and public transport & minimum inclusive design standards
Single mobility services	0	No physical integration

Willingness to pay

Trade-off between elements of mobility hubs

4. Digital integration

Level 3: modes are fully integrated for trip planning, booking and payment

Level 2: modes are integrated for trip planning

Level 1: no integration between the modes

Digital Integration

Smart mobility hub

4 — Integration of societal goals and policies & considerations of universal design principals

3 — Integration of services offers & considerations of universal design principals

2 — Integration of booking and payment & considerations of universal design principals

Mobility hub

1 — Digital integration of information

Single mobility services

0 — No digital integration

Willingness to pay
Trade-off between elements of mobility hubs

5. Additional costs on monthly municipal taxes

Level 1: no costs

Level 2: 5 Euros per month

Level 3: 10 Euros per month

Method: Stated Choice Experiment
5 attributes, 3 levels each (6 choice cards per respondent)
Model: utility-maximization (Mixed-logit model)
Willingness-to-pay: Coefficient (1…4)/ Coefficient (5)

Willingness to pay
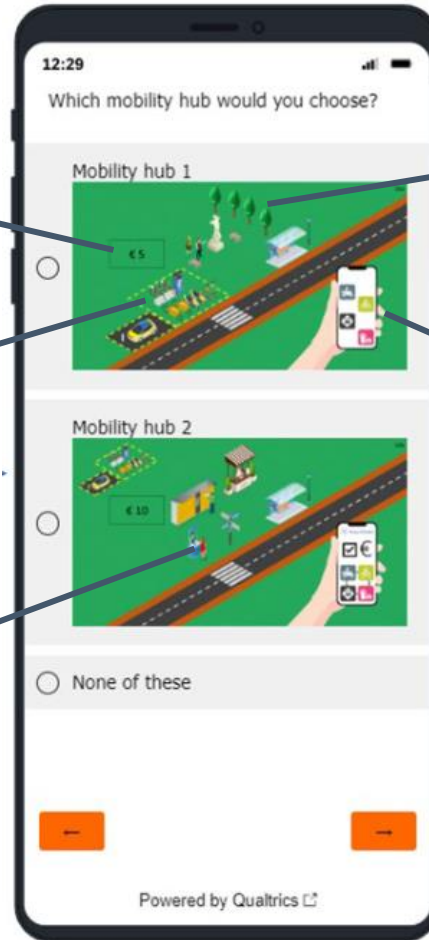## Trade-off between elements of mobility hubs

Costs

Placemaking
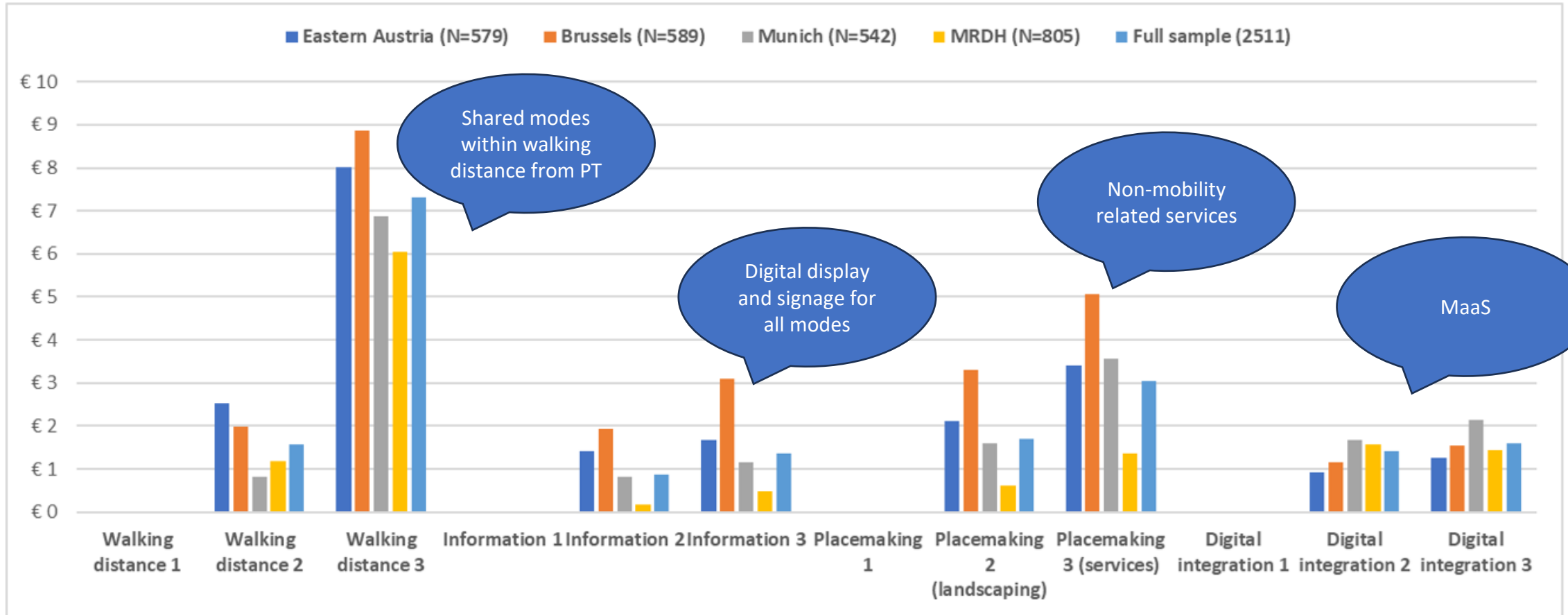
Walking distance

Digital app

Information

Data
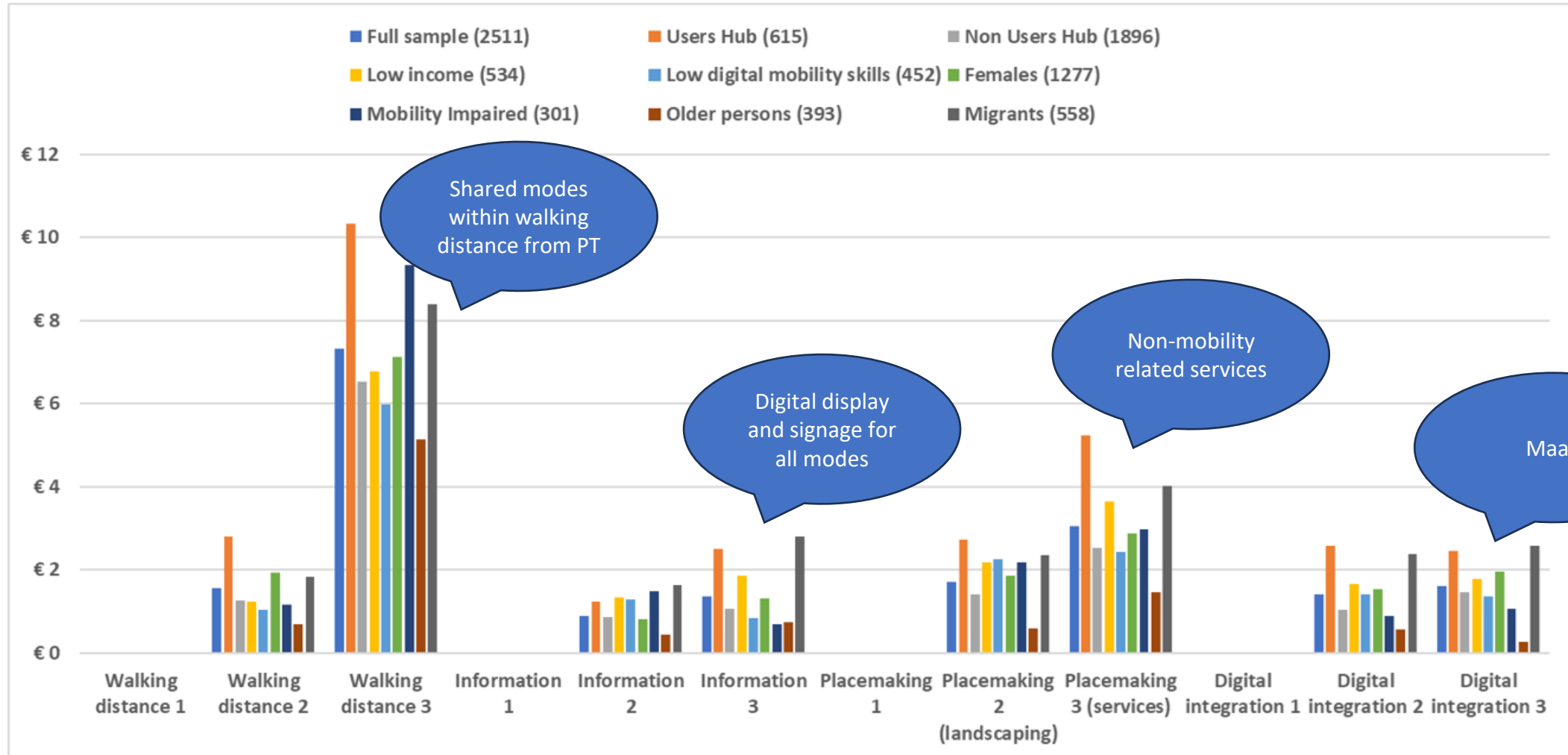N = 2511 (full SmartHubs sample)

Willingness to pay

Differences between Living Lab locations

Willingness to pay

Differences between (vulnerable-to-exclusion) groups

Conclusions

- Which factors determine the intention to use shared transport at hubs?
  - Age, education level, current public transport use and digital skills

- Which elements do people consider important for a hub?
  - Information facilities and digital applications, but the willingness to pay is low
  - Highest willingness to pay for: proximity to shared transport and public transport
  - Placemaking to be arranged by government and/or transport operators

- Vulnerable groups?
  - Inclusive design, availability of (analog) help/assistance and costs

- When developing a hub: what is the target group
  - Function, design, costs?
  - Other needs: democratic integration

Looking forward to your questions!

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