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UNIVERSITY OF TWENTE.







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Introduction to SmartHubs



Introduction to the SmartHubs Project Karst Geurs (University of Twente)



Mobility Hubs in Vienna & Launch Open Data Platform Christoph Kirchberger (TU Vienna)















Mobility hubs can be seen as an **A1: Mobility components:** interface between the transport network and spatial structure of an area. Mobility hubs include a range of different components, This diagram illustrates some of the most commonly used components:

- Public Transport
- A2: Mobility components: Non - public transport
- **B: Mobility related** components
- C: Non-mobility & Urban realm improvement

- · Car share: back to base, one way, electric.
- Bike share: back to base. one way, electric.
- Cargo bike share, cargo bike logistics store
- Other future micro-mobility options e.g. e-scooters, moped share
- Ride sharing

Branded pillar

Mobility hubs require a prominent sign or pillar with a common brand to make them visible to the public. The inclusion of a digital elements in a pillar can provide:

- Access to a local transport website for information on services
- A journey planning service for multi-modal trips
- A way finding option for local walking and cycling trips
- Registration and ticketing
- Customer services.

B: MOBILITY RELATED COMPONENTS

EV car charging

C: NON-MOBILITY &

URBAN REALM IMPROVEMENT Package delivery lockers

Mini fitness or play area

Outdoor water fountain

Café and Co-working space

- Bike parking, (Standard, covered, restricted access, EV charging)
- Bike repair, pumps

European Commission

- Digital pillar, (transport info, ticketing, way finding, walk distances, local services
- Child car seats, bike seats & trailers
- Community concierge parcel last mile delivery

C: NON-MOBILITY & URBAN REALM IMPROVEMENT

A1: MOBILITY COMPONENTS - PUBLIC TRANSPORT MODES & OTHER PICK UP /DROP OFF:

 Demand responsive mini-buses (all one

points)

Ride hailing,

(shared) taxis

Bus

Tram

Rail

- Improved public realm, safer crossings, step free access, road repairs, adjustments for disabilities.
- Waiting area space, covered, seating, planting, artwork, kiosks for coffee etc.
- Wi-Fi, phone charging

CoMoUK, 2019. UK Mobility Hub Guidance.





Smart Mobility Hubs as a game changer towards inclusive, sustainable urban mobility and accessibility in European cities (May 2021-May 2024)

Full partners

UNIVERSITY OF TWENTE.







Living Labs and Associate partners

- Rotterdam-The Hague (NLD): Gemeente Rotterdam, Gemeente Den Haag, MRDH, HTM, RET, NS Stations, CROW
- Munich (GER): Munich PT (MVV),
 City of Munich, UPS
- Brussels (BEL): Anderlecht, Brussels mobility
- Vienna (AUT): Fed. Govt. Lower Austria, ITS Vienna region, Aspern-mobil LAB, Mobility Lab Graz, Stadt Umland Management Wien, 3420AG
- Istanbul (TUR): Istanbul Metropolitan Municipality















WP2 – synthesis and review

- Mobility hubs provide an integrated planning approach
- Three important dimensions: physical, digital and social integration.
- Universal design principles are minimum requirements
- Interactive open data platform: expert crowd mapping

The SmartHubs Ladder

DESCRIPTION OF THE MULTIDIMENSIONAL MOBILITY HUB TYPOLOGY









ıbs	Physical integration	Digital integration	Democratic integration				
4	Conflict free and place making	Integration of societal goals and policies, and consideration of universal design principles	Social learning				
3	Visibility and branding	Integration of service offers and consideration of universal design principles	Integration of different knowledge				
2	Wayfinding and consideration of universal design principles	Integration of booking and payment and consideration of universal design principles	Deliberative engagement of stakeholders, including (vulnerable) user groups				
1	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				
0	No physical integration	No digital integration	No stakeholder involvement and consideration of (vulnerable) user needs				





SmartHubs		Hubs	Physical integration	Digital integration	Democratic integration	
	Smart Mobility Hub	4	Conflict free and place making	Integration of societal goals and policies, and consideration of universal design principles	Social learning	
		3	Visibility and branding	Integration of service offers and consideration of universal design principles	Integration of different knowledge	
		2	Wayfinding and consideration of universal design principles	Integration of booking and payment and consideration of universal design principles	Deliberative engagement of stakeholders, including (vulnerable) user groups	
	Mobility hub	1	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 and consideration of (vulnerable) user needs	













Mobility hubs by country, and physical, digital and democratic integration dimensions

Country	No.	Physical	Digital	Democratic	SmartHub
Country		(>Level 2)	(>Level 2)	(>Level 2)	(>Level 2)
Austria	15	9	8	2	
Italy	8	5	5	3	2
Netherlands	8	2	0	1	
France	7	4	0	0	
Switzerland	4	3	1	0	
Other countries	20	11	5	3	1
Total	62	34	19	9	5







Conclusions

- Mobility hubs can have a range of components, and differ in size and functionality.
- Most mobility hubs in Europe are not yet *Smart* based on physical, digital and democratic integration levels
- The "smarter" the mobility hub, the higher the expected impact on user behaviour and societal impacts
- How much impact can we expect from a SmartHub? application of SmartHubs tools (co-design games, appraisal tools, surveys, interviews) in the Living Labs









www.smartmobilityhubs.eu



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Good practice and Open Data Platform

International Symposium on Inclusive Mobility Hubs 19.05.2022, Den Haag

Christoph Kirchberger TU Wien, Research Unit Transportation System Planning (MOVE)

ERA-NET Cofund Urban Accessibility and Connectivity









Talk inventory

(1) Context - Eastern Austrian Mobility Station "Ecosystem"

(2) **The case** - WienMobil Station network

(3) Insights and learnings – inclusion from design to operation

(4) **Open data for benchmarking** – Showcasing the Smart Hubs Open Data Platform









(1) Context



















Mobility Station "Ecosystem" (Eastern Austria)



LISA (public) – 4+5





ÖBB 360 (public) – 2+1



Easymobil (public) – 2+1





MO.point (private) – 10+5





















(2) The case









Wien Mobil Stations – Origin and motivation











Fast growing network across whole city























Governance – planning and strategy







Governance – operation







(3) Insights and learnings







Measures to support inclusion

Design and development

- User Experience Labs (e.g. on station plans, orientation, non-digital user of stations) with participants recruited from Wiener Linien customers (newsletter)
- Associations for the disabled, deaf and visually impaired were involved in design of physical station elements in JourFixe Working group
- WienMobil Rad und Auto contractor are able to provide barrier free services



PROJEKT

User Experience Labs - Begleitung von Themenabenden für KundInnen der Wiener Linien









Measures to support inclusion

Planning

- Mobility agency present in traffic commission to decide on Mobility station, also focusing on needs of mobility impaired persons
- Representation of the interests of people with disabilities has to be involved in planning phase
- Implementation have to follow certain standards on barrier free design (e.g. ÖNORM B 1600 which also includes colour schemes)



– Funktionsabhängige Mindestwerte f
ür den Helligkeitskontrast

Kontrast- stufe	Funktion	Kontrast K zwischen dem Lichtreflexions- grad ^a LVR von zwei Oberflächen K = LRV ₁ - LRV ₂	Beis	piele	
I	Warnung, Sicherheit, Beschriftung: Potentielle Gefahren und Hinder- nisse (zB Stufen, Poller, Glas-	<i>K</i> ≥ 50	Kontraststufe I LRV1 LRV2 LRV1 LRV2		
	flächen), Information (zB Beschilderung, Leitsystem)		60 1 0	67 16	
			<i>K</i> = 50	<i>K</i> = 51	
			66 14	59 9	
			<i>K</i> = 52	<i>K</i> = 50	
	Orientierung, Führung:		Kontraststufe II		
Ш	Große Oberflächen (zB Wände, Fußboden, Türen, Decke), Elemen- te und Bauteile, welche die Orien- tierung erleichtern (zB Handlauf, Schalter und Taster, taktile Boden- leitlinien)	<i>K</i> ≥ 30	LRV ₁ LRV ₂	LRV ₁ LRV ₂	
			60 22	67 29	
			<i>K</i> = 38	<i>K</i> = 38	
			66 33	59 22	
			<i>K</i> = 33	<i>K</i> = 37	

Die Messung des *LRV* (Light Reflectance Value) erfolgt mittels Spectrophotometer. *LRV*-Werte zwischen 0 (schwarz) und 100 (weiß) werden von Herstellern von Farben und Oberflächermaterialien ermittelt und zur Verfügung gestellt (zB RAL 7016 Antrazitgrau entspricht *LRV* 8, RAL 9016 Verkehrsweiß entspricht *LRV* 87). *LRV*-Werte gelten für eine Mindestbeleuchtungsstärke von 100 Lux. Die *LRV*-Werte dürfen auch annähernd über den Grauwert einer Farbe bestimmt werden.

URBAN

EUROPE

© Austrian Standards Institute







Measures to support inclusion

Operation:

- Digital Skills training with focus on multimodal WienMobil App
- Test events at station areas
- Central online-Reporting system to notify regarding existing barriers
- Part of services can be booked through phone



Digital Fit: Trainings für Senior*innen

Wir haben einiges vor. Im Rahmen unserer Digitalisierungsoffensive werden dieses Jahr endlich unsere langersehnten und kostenlosen Kurse rund um die WienMobil App stattfinden. Wir laden Sie herzlich ein, unsere App in gemütlicher Runde ein bisschen besser kennenzulernen.







© Stadt Wien







Possible / planned measures

- Include Wien Mobil Stations into POPTIS System for visual impaired persons
- E-Charging network planned to be made accessible for mobility impaired persons
- Fully barrier free pilot station (including wheelchairready car-sharing and trike in the bike sharing)
- Gestures-Avatar to include Wien Mobil services



Wegbeschreibung Alaudagasse von Vorpla

Startseite Poptis Übersicht Standort Alternativer Gehweg als mp.3 abspielen Download mp3

Übersicht

Bild Die U-Bahn Station Alaudagasse ist eine unterirdische Station. Sie verfügt üt Die Bahnsteigmitte wird durch eine Querlinie markiert, die zur Notrufeinrichtung Am Ende des Bahnsteigs in Fahrtrichtung Leopoldau führen eine Stiege und ein L Am Ende des Bahnsteigs in Fahrtrichtung Oberlaa führen eine Stiege und ein Lift Wikipedia Link

Standort vor U-Bahneinhausung

Bild geradeaus, entlang der Leitlinie bis zum Gußgitterrost. Bild Station Alaudagasse Zugang Alaudagasse, geradeaus, 3 Meter, entlang der Lei Bild Querlinie, Linksdrehung, 3 Meter, entlang der Leitlinie bis zum Lift. Bild Rufsäule, geradeaus, die Rufsäule befindet sich in der Mitte der Doppelliftgrn Bild Lift Niveau 0, abwärts, Bild Lift Niveau minus 2, 3 Meter, geradeaus, entlang Bild Querlinie, geradeaus, 14 Meter, entlang der Stiegenbrüstung und weiter entla Bild Querlinie, Rechtsdrehung, 3 Meter, entlang der Stiegenbrüstung und weiter entla Bild Ausweigung Sicherheitslinie, Linksdrehung, 58 Meter, entlang der Sicherheitslin Bild Statudort U-Bahnbahnsteig, Rechtsdrehung, Bild U1 Richtung Oberlaa

Alternativer Gehweg Wegbeschreibung Alaudag

Im Falle einer Lift oder Fahrtreppenstörung beginnt die Wegbeschreibung beim Li Lift Niveau 0, Bild Kehrtwendung, 6 Meter, entlang der Leitlinie bis zum Aufmerl Bild Stiegenaustritt, abwärts, über eine zweiläufig gegenläufige Stiege mit einem : Bild Stiegenantritt, 11 Meter, geradeaus, entlang der Wand bis zum Stiegenaustritt Bild Stiegenaustritt, 3 Meter, geradeaus bis zur Querlinie. Links auspendeln. Bild Stiegenantritt, 3 Meter, geradeaus 58 Meter, entlang der Sicherheitslin Bild Stadort U-Bahnbahnsteig, Rechtsdrehung, Bild U1 Richtung Oberlaa

als mp.3 abspielen



zur Startauswahl - POPTIS - Wegbeschreibungen im U Bahnnetz zur barrierefreien Startseite zu den Standardseiten der Wiener Linien

© Wiener Linien, Hilfsgemeinschaf der Blinden und Sehschwachen Österreichs









(4) Open data for benchmarking









Smart Hubs Open Data Plattform (ODP)

The ODP is the **first cross-project open data platform for mobility hubs** learning cases!

This Semantic-media Wiki based platform allows to ...

- ... collect data on mobility hubs following a **standardized layout** ... **compare** similar hubs
- ... analyze integration levels connected to other characteristics
- ... generate cross-network **overview** in regions
- ... download data for further analyses
- ... collectively edit and contribute!

ERA-NET Cofund Urban Accessibility and Connectivity





in the database: 72 Hubs (9 of which are Case Studies in the SmartHubs Project), 17 Mobility Hub Networks, 64 Mobility Providers






Wien Mobil examples on the plattform



PHYSICAL INTEGRATION

DIGITAL INTEGRATION

DEMOCRATIC INTEGRATION

Level 2 (target: Level 2)

scattered, also between public ar space- good visible from the Tran maps show the location of vehicle

Level 2 (target: Level 2)

integration through MO.Point App Reservation and booking only thra App. Information about vehicles ir understand the usage. Intuitive re 24h service hotline available

Level 1 (target: Level 3) Discussion-process with property







Invitation to contribute!

We are happy to welcome new contributors on the OPD, you can register on your own -> Self-Registration Link

As editor you are able to ...

- ... create new hubs
- ... create new **research projects** (and link them to hubs) ... create new **providers** (and link them to hubs) ... create new **networks** (and link them to hubs) ... add information to other hubs in the ODP ... add pictures (only copyright-free content!) to hubs

For any technical assistance reach out to lukas.knott@tuwien.ac.at!

Username
Christoph Kirchberger
Password
•••••
It is recommended to use a unique password that you are not using on any other website.
Confirm password
Enter password again
Email address (optional)
Enter your email address
Real name (optional)
Real name is optional. If provided, it may be used to give you attribution for your work.
Create your account











Contacts

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Design Games as Co-Creation Tools

International Symposium on Inclusive Mobility Hubs 19.05.2022, Den Haag

Hilda Tellioğlu, Gerfried Mikusch, Marko Kadić TU Wien, Research Unit Artifact-Based Computing & User Research (ACUR)

ERA-NET Cofund Urban Accessibility and Connectivity

European Commissio URBANCEUROPE





SmartHubs Design Game

- A participatory co-creation tool for designing mobility hubs
- Engaging with users and other stakeholders
- Individual design supported by templates and guidance
- Adaptive to different real-life settings in various Living Labs











SmartHubs Design Game



 Development of a Design Game Sandbox based on the Seestadt Design Game: Blank analogue Design Game

Ready to be used by Living Labs



 Introduction of AR elements on a small and large scale to the Design Game: Mixed reality Design Game

Implementation in progress, prototype available

Application in urban areas:
 Real life Design Game

Basic ideas and concept in planning









URBANEUROPE

Analog Design Game

- Classic analog game designed by the Living Labs
- Typical gaming material (e.g., tokens, dice, cards, play money)
- Additional mobility and projectrelated material
- Extensive guidelines for supporting individual design









Design Game & Augmented Reality (AR)

- Adding virtual elements to the analog game
- Enabling a new digital gaming experience
- Interacting with real and virtual objects
- Providing additional information layers







Design Game & Augmented Reality (AR)

- Adding virtual elements to the analog game
- Enabling a new digital gaming experience
- Interacting with real and virtual objects
- Providing additional information layers





Real life Design Game

- The next step
- Putting the game into the real world
- Playing in real urban areas supported by AR
- Getting design insights in real settings













Join our breakout group to test the AR design game!

International Symposium on Inclusive Mobility Hubs 19.05.2022, Den Haag

Hilda Tellioğlu, Gerfried Mikusch, Marko Kadić TU Wien, Research Unit Artifact-Based Computing & User Research (ACUR)

ERA-NET Cofund Urban Accessibility and Connectivity

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Governance of mobility hubs

SYMPOSIUM: Co-Creating Smart Mobility Hubs 19.05.2022, The Hague Presenting: Julia Hansel, M.Sc. (WWU) Supervision: Prof. Dr. Antonia Graf WP02 Task 2.4 Policy and Governance Frameworks

ERA-NET Cofund Urban Accessibility and Connectivity







Our Task in a Nutshell...

RQ: How does the governance framework influence the implementation and operation of mobility hubs?

Output: D2.3 Governance frameworks for mobility hubs in the five living lab areas (October 2022)

Theory: Combined Framework of Governance Arrangements & Smart Mobility Governance

Case Selection: Four SmartHubs Examples

Preview: Breakout Session









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Preview: Breakout Session





Governance of Mobility Hubs



Research gap: Few academic literature on governance of mobility hubs or multimodal/ shared / ... mobility (Marsden and Reardon 2017)

Shift from government to governance (Leroy, Arts 2006)

- Multi-level governance
- Multi-sector governance
- Multi-actor governance

→ Combined Framework of Governance Arrangements & Smart Mobility Governance

ERA-NET Cofund Urban Accessibility and Connectivity







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Preview: Breakout Session







Case selection



Source:

Anderlecht, Conseil & The Haugue, Haagse Markt: Google Maps / Street View (13.05.2022) Munich, TUM Campus & Vienna, Bruno-Marek-Allee, OPD SmartHubs <u>https://data.smartmobilityhubs.eu/wiki/Main_Page (13.05.2022)</u>







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Preview: Breakout Session

RQ: How does the governance framework influence the implementation and operation of mobility hubs?

Which of these aspects are important in your work?

 \rightarrow Short Voting & Discussion













Thank you!

Antonia Graf, antonia.graf@uni-muenster.de Julia Hansel, julia.hansel@uni-muenster.de

ERA-NET Cofund Urban Accessibility and Connectivity





MOBILITY HUBS AND VULNERABLE-TO-EXCLUSION CITIZENS

-

100

0

107

5



Jesse Pappers

SMARTHUBS PROJECT AIM

> Examine if mobility hubs are a game changer regarding the mobility and logistics choices of citizens and promote inclusive sustainable urban mobility.





FREE-FLOATING CARSHARING IN BRUSSELS YOUNG, MALE & EDUCATED

76,7% male

26-39 years



69,4% university diploma

62,1% car owners

Wiegmann et al., 2020



Mobility hubs and vulnerable-to-exclusion citizens 14-6-2022 | 66

E-SCOOTERS IN BRUSSELS YOUNG, MALE & EDUCATED

66% male

33,4 years



53% university diploma

47% uses regularly

Brussel Mobiliteit, 2019



Mobility hubs and vulnerable-to-exclusion citizens 14-6-2022 | 67

SMART MOBILITY HUBSVULNERABLE-TO-EXCLUSION CITIZENS



SMART MOBILITY HUBS DISCUSSION POINTS

- Which barriers do certain groups experience when traveling through mobility hubs?
- How can barriers to mobility be reduced?
- From a cost-effectiveness perspective, is it desirable that mobility hub are made accessible for more diverse groups?



Mobility hubs and vulnerable-to-exclusion citizens 14-6-2022 | 69

Car sharing:	Photo by Autodelen.net on Flickr
Multimodal:	Photo by Autodelen.net on Flickr
E-scooter:	Photo by Creative Christians on Unsplash
Wheelchair:	Photo by <u>Jon Tyson</u> on <u>Unsplash</u>
Subway:	Photo by <u>Alex Eckermann</u> on <u>Unsplash</u>



Mobility hubs and vulnerable-to-exclusion citizens 14-6-2022 | 70



Breakout Groups



ERA-NET Cofund Urban Accessibility and Connectivity













hub Groningen Drenthe

Public transport and hubtaxi provide accessibility for everyone

#door-to-door transport









So a hub helps us with ...



A inclusive mobilitysystem










A sustainable future







... but most important ...



Making the life of people easier!





× × × Interreg |

eHUBS

North-West Europe

EHUBS: SMART, SHARED, GREEN MOBILITY HUBS 2019 - 2022

The Amsterdam Approach to shape mobility of the future

City of Amsterdam Diederik Basta Project manager

19 May 2022





North-West Europe eHUBS

eHUBS are?

oppin

Clusters of shared electric mobility

Tailored to local conditions and needs

Linked in a network

Available in different sizes

Integrated in MaaS ecosystems



The Amsterdam Approach

"When involving and empowering citizens in designing their eHUBS from the start. They will be more inclined in changing their mobility behaviour"

So what did we do?

Put people first

Event Event Ev

Lobi

Even

Bari

Lob

Eve

Voting on location, modes and transport operator

Social Value case









X City of X Amsterdam



Thank you

d.a.basta@amsterdam.nl +316-10602521

www.amsterdam.nl/buurthubs www.nweurope.eu/ehubs



kennis over zien

Kennis Over Zien

3 expertise organizations and 2 target group representatives work together to develop and share knowledge about visual impairments. Our aim is to provide all stakeholders with knowledge to create an inclusive and accessible society

www.kennisoverzien.nl

<u>Séverine Kas | Accessibility.nl</u> Architect, consultant





Bartiméus:









Inclusion and accessibility

Active on topics such as:

- (Inclusive) Design & Building
- Shared Space/Public Space
- Stations(squares)
- Light and lightning
- Navigation (indoor and outdoor)
- Route guidance-Accessibility in guidelines
- Standards
- Digital accessibility
- Inclusion and social accessibility

Together with partners; including VNG, CROW, OVLNL, ProRail, NEN, Land Registry (Kadaster), Ministries

Integrale aanpak openbare verlichting

Op weg naar een toegankelijke openbare ruimte Afwegingskader 1.0



Some Facts

- Travelling and mobility: 70% of people with a visual impairment have difficulty traveling & mobility (including public space, public transport and buildings)
- **2. Digital accessibility**: 2.3 million people have problems with digital accessibility.
- **3. inclusive design:** when people with disabilities are already taken into account in the design, others also benefit. (wayfinding, curb cut, etc)



Lang niet toegankelijk

Ervaringen van Nederlanders met een lichamelijke beperking als spiegel van de samenleving



Narrative on use of mobility and tools









Narrative on use of mobility and tools





Opportunities and risks inclusive hubs

1. Opportunities

- Mobility as a sharing service? (MaaSs)
- Automated vehicles
- Reachability: urban and rural
- All benefits for energy and mobility transition

2. Risks

- Accessibility physical and digital
- Usability
- Recognizability
- Every region its own supplier/app/feel and look?
- Door to door needs a service or crowd source minded vision



kennis 🔿

over zien



Martin Courtz, Province of Drenthe Diederik Basta, City of Amsterdam Séverine Kas, KennisOverZien

Mariet de Haas, City of Rotterdam Charles Huijts, City of The Hague Sandra Nijenstein, HTM Halmar Kranenburg, RET











- Follow the SmartHubs project:
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 - Twitter: <u>@smart hubs</u>
 - LinkedIn https://www.linkedin.com/company/smarthubs





