



Challenges of producing accessibility data for public transport and travel chains

Authors: M.Saarela, A.Partanen

The Ninth International Conference on Universal Accessibility in the Internet of Things and Smart Environments SMART ACCESSIBILITY 2024

Presenter: Atte Partanen

Häme University of Applied Sciences, Hämeenlinna, Finland
atte.partanen@hamk.fi

Barcelona, Spain, May 26-30, 2024



Ed.D Merja Saarela

merja.saarela@hamk.fi

Professional Experience:

- Principle research scientist at Häme University of Applied Sciences
- Research manager of Multidisciplinary and Assistive Technologies Research Group (MATEC)



Atte Partanen

atte.partanen@hamk.fi

Professional Experience:

- Solution Specialist at Häme University of Applied Sciences
- Lead on IoT development in Digital Solutions and Platforms Research Group

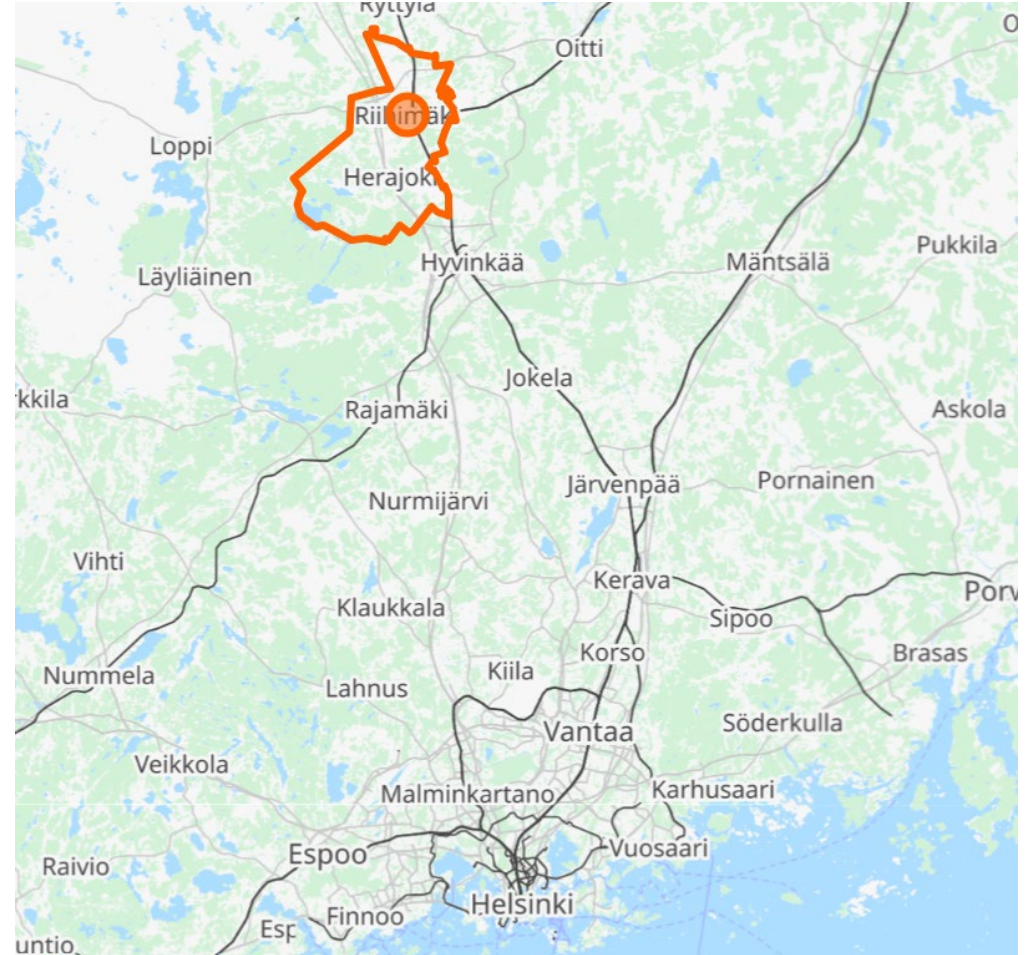


Research group projects and interests

- As a research group multisensory and assistive technologies team (MATEC) is interested in transport/mobility and its accessibility, Accessibility of digital services, and data production. MATEC focuses on developing high-tech assistive solutions like location-aware mobile services, multimodal 3D maps, IoT, and next-gen haptics to promote learning and independent living. Their cross-disciplinary research, based on the Triple or Fourth Helix model, is conducted in real-life settings, aiming to strengthen multisensory data detection and usability.
- ELMA – The project aims to identify the essential accessibility data needed for accessible mobility by mapping the travel experiences of temporarily or more permanently disabled people across the whole travel chain
- Filka (smart mobility for all) – **In the application process**, the project aims to promote the possibilities of using public transport and the accessibility of the mobility environment in urban planning. The project will create a concept for Smart City in Riihimäki, which will develop smart mobility solutions for all city residents and strengthen the perspective of universal accessibility and accessibility. The innovation arenas present national and international concepts that illustrate and model solutions to various challenges in the digital twin.
- Interreg project: **In the planning process**: Project is about the use case of using EU ERSAD-model implementation in the City of Riihimäki in Finland. As part of Ukraine co-project: Access for All: Transforming Public Transport Stops in Ukraine city of Lviv into Inclusive Spaces | Interreg Europe - Sharing solutions for better policy.

Study area

- The demand for accessibility increases when aiming to make the entire travel process barrier-free and integrate various forms of movement into personalized, seamless travel experiences delivered digitally through a unified service.
- This research focuses on the city of Riihimäki in Finland with a population of approx. 29 000.



- Disability Statistics
 - Europe: 87 million have permanent disabilities or temporary obstacles.
 - Finland: Nearly 19% of people have various disabilities.
- Various Types of Functional Skills
 - Physical or Motor Disability
 - Visual Impairment
 - Auditory Disability or Hearing Impairment
 - Aging
 - Temporary Difficulties
- European Union's Strategy & Finnish Transport Services Act
 - Sustainable and Smart Mobility Strategy (2020)
 - Intelligent Transport Systems (ITS) Directive 2010/40/EU
 - Act Transport Services (643/2017)

Goals

results are included in the study

- Mapping accessibility of mobility services, service processes, travel chains, and hubs from the perspective of individuals with temporary or permanent impairments
- Acquiring knowledge about the accessibility information offered in the public transport travel chain

Phase 1: Mapping Accessibility

Phase 2: Defining Critical Accessibility Information

- Defining critical accessibility information about mobility services, service processes, nodes, and infrastructure within the travel chain.
- User perspective and in relation to official sources of essential accessibility data.

- Defining the actors of the Mobility as a Service (MaaS) architecture responsible for providing barrier-free movement services in the city and region of Riihimäki.

Phase 3: Defining MaaS Actors



Multiple sources of information on travel planning and accessibility websites

1. Opas.matka.fi –Website information of travel chain Riihimäki-Tikkurila-Airport.

10:08 Riihimäki > Raide 1
Myös R klo 10:30 ja R klo 10:55
VR

10:39 Tikkurila > Raide 1
Kävele 5 min (200 m)

10:44 Tikkurila >

10:56 Tikkurila > Raide 5
Myös I klo 11:06 ja I klo 11:16
VR

11:03 Lentoasema > Raide 2
Kävele 13 min (800 m)

11:16 Helsinki-Vantaan lentoasema
Lentokenttä, Vantaa

2. Accessibility information in FINAP-database

3. Planning an accessible train journey on the VR website

Esteettömyys ja muut palvelut

LIIKENNEVÄLINEIDEN ESTEETTÖMYYS

Taattu saatavuus Ei ilmoitettu
Rajoitettu saatavuus Kyytiä

INFOPALVELUIDEN ESTEETTÖMYYS

Taattu saatavuus Ei ilmoitettu
Rajoitettu saatavuus Ei ilmoitettu

KULJETETTAVAT APUVÄLINEET

Taattu saatavuus Ei ilmoitettu
Rajoitettu saatavuus Pyörätuoli, kainalosauvat, rollaattori, kävelykeppi

Lisätietoja esteettömyydestä

Muut palvelut Ei ilmoitettu
Esteettömyystietojen verkkosivu <https://www.vr.fi/palvelut-junassa/esteeton-junan>
Taattujen esteettömyyspalveluiden lisätiedot Ei ilmoitettu
Rajoitettujen esteettömyyspalveluiden lisätiedot Ei ilmoitettu

4. Description of VR's Tikkurila station

Esteettömä

- Rautatieasemien**
VR:n palvelupisteet ja li...
- Avustamispalvelu**
Tarvitsetko apua asem...
- Lähiliikenteen ran**
Jos käytät pyörätuolia,
- Vinkit sujuvaan juu**

Tikkurilan rautatieasema

✓ Lippuautomaatti ✓ WC

Asemakartat

Asemakartoista löydät metro-, bussi- ja juna-asemien sekä n...
liityntäliikenteen lähialuekartat. Kartat on luokiteltu asematy...
esimerkiksi metroasemien kohdalta löydät myös kyseisen m...
bussiliikenteen.

Karttojen linjatiedot ovat saavutettavassa muodossa [Reittio...](#)

Juna-asemat

Järvenpään, Ainolan ja Saunakallion sekä...
ovat [Väyläviraston verkkosivuilla](#) (vayla.fi).

- Aviapolis
- Espoo
- Helsinki (päärautatieasema)
- Hiekkaharju
- Huopalahti
- Ilmala
- Jokela
- Jorvas
- Kannelmäki
- Kaukahti
- Kauniainen

Tikkurilan
Ratatie 11
01300 Vantaa

Näytä kartta

Lippujen myynti

✓ Lippuautomaatti
✗ Ei VR:n palvelupistettä

5. HSL's Tikkurila train station map

6. Description of HSL platforms and tracks on the Tikkurila train station map

Tikkurila
Dickursby

Vyöhyke
Zon/Zone C

Liikenne palvelu
Lähtö- ja saapumistiedot
Platform maintenance, Finnish Transport Infrastructure Agency

liikenne palvelu
Neuvonta ja palvelus: Me pe 9-16
Information and Service, Me pe 9-16
Rådgivning och service: Mån-fre 9-16
0295 020 600
0295 020 601

Aseman osoite
Station address
Address of the station

HSL Asiakaspalvelu
HSL Customer Service
09 4766 4000
Ma-pe klo 9-18, arviot 9-18
Ma-pe klo 9-18, arviot 9-18
Ma-pe klo 9-18, arviot 9-18
Ma-pe klo 9-18, arviot 9-18

Researching travel chains: data

- The results of the interview survey have focused on travel planning and implementation
- During the project, the material was collected through interviews, a questionnaire, and physical excursions
- The interviews have taken into account different user groups, people with reduced mobility and functional disabilities, with which we have tried to produce as multimodal a perspective on accessibility and challenges as possible
- The data collection was carried out using the snowball sampling method

Research target group

Target group deviation for different diseases and conditions			
<i>Disease/Condition</i>	<i>Count of PwDs</i>	<i>Assistive Devices/Services</i>	<i>Information and Communication Technology</i>
Physical or motor disability	6	Wheelchair (1x), Occasional Electric Wheelchair (1x), Electric wheelchair (4x)	Computer, Smartphone
Visual impairment, Blindness	3	White cane (3x), Guide dog (1x)	Computer, Smartphone
Visual impairment, Low Vision	1	None	Computer, Smartphone
Aging with Temporary physical difficulties	3	Assistant	Computer, Smartphone

- Age range 40-82 years
- Types of trips in the target group
 - Riihimäki – Lahti – Riihimäki
 - Riihimäki – Tikkurila – Helsinki
Vantaa Airport – Tikkurila –
Riihimäki
 - Internal travel in Riihimäki
 - Longer domestic trips from
Riihimäki

Difficulties in the travel chain

Challenges of travel chain phases	
<i>Preliminary phase</i>	<i>Implementation phase</i>
Travel booking challenges	The challenges of means of transport
Challenges of needed accessibility information of routes, junctions, and vehicles	The need for information while traveling
Lack of customer services and challenges of assistance services	The challenges of assisting
The challenges of reserving, buying, and getting hold of a ticket	The challenges of nodes



Accessibility Data Analysis of data sources

Data sources for accessibility information present		
<i>Data source name</i>	<i>File format</i>	<i>Accessibility</i>
GTFS	Data presented in CSV files which are collected in a ZIP file.	wheelchair accessible, wheelchair boarding
NAP	Data presented in GeoJSON. It utilizes the JSON file format for representing geographical data structures.	boarding-assistance assistance-dog-space, accessible vehicle, low-floor, step-free-access, suitable-for-wheelchairs, suitable-for-stretchers
NeTEx	Data is presented in XML file format which is a markup language for organizing and storing data in a structured format.	Wheelchair access, Step free access, Escalator free access, Lift free access, Audible signs available, Visual signs available
VR	Website	Written information
Matkahuolto	Website	Written information
Opas.matka.fi	Website	Written information

Understanding Different Interfaces

- Accessibility data is analyzed from various sources to comprehend diverse interfaces.

Impact of Data Formats

- Data formats vary, influencing presentation and machine-readability.

Challenges Faced

- Locating accessibility information on service provider websites can be challenging.
- GTFS format in Finland focuses on singular events and lacks comprehensive accessibility details.
- Multiformat data lacks essential information on various types of disabilities.
- Machine-readable data sources predominantly emphasize wheelchair access for accessibility.

- Addressing diverse user needs through varied data formats is crucial for comprehensive accessibility.
- Improved data presentation and guidelines can enhance user experience and meet accessibility needs effectively.
- The study identifies the need for clearer definitions and better integration of essential accessibility information in data sources. The challenges faced by Persons with Disabilities (PwDs) can be addressed through six major improvement themes: Improving Accessibility Information, Enhancing Assistance Services, Utilizing Technological Solutions, Collaboration Among Stakeholders, Improving Guidance Accessibility, Customer Services and Location Accessibility
- Accessible travel chains are crucial for social equality and justice. Barrier-free travel ensures that all people, including those with reduced mobility, can travel independently and without barriers. Features like barrier-free stops, stations, elevators, multi-sensory signs, raised platforms, and low-floor train carriages improve the travel experience for everyone.

Conclusion and future work

Key findings

- The comparison of accessibility information needs with current definitions and production processes in databases and data sources highlights significant areas for improvement.
- This analysis offers valuable insights for the development of public transport systems and seamless travel chains, ultimately enhancing the travel experience for all passengers.

Legal and Ethical Considerations guiding

- Legal frameworks and ethical guidelines stress the importance of equal treatment for all passengers.
- Accommodating the diverse needs of individuals is crucial during the development and execution of public transportation systems and services.



Thank you!
Questions?

Presenter: Atte Partanen

Solution Specialist in Häme University of Applied Sciences, Hämeenlinna, Finland
atte.partanen@hamk.fi

Barcelona, Spain, May 26-30, 2024

