



Collaboration, Innovation and Resilience: Championing a Digital Generation

Brisbane, Australia 6-10 April

# Enhancing the Explainability of Urban Walkability Assessments. A 3D Visualization Approach for Elderly Accessibility in Germany

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## Walkability metrics vs. Routing applications

- Walkability: accessibility of amenities within reasonable walking distance. Popular to compare and monitor the path to the 15-min city strategy
- Although similar algorithms like Dijkstra's are used, urban planning assesses walkability differently than routing in navigation systems.
- Routing focuses on the individual user, answering questions like, "How long will it take me to walk to the selected restaurant?" or "What is the shortest route to this destination?"
- In contrast, urban walkability assessments usually involve aggregated analyses.
  - A prominent example is the Walk Score, which provides an overall assessment of a city, neighbourhood, or grid cell by evaluating the accessibility of multiple facilities starting from this spatial unit.

## Walk Score – a popular walkability assesment tool

- The Walk Score evaluates pedestrian accessibility by considering the proximity to various facilities such as bookstores, libraries, schools, parks, restaurants, and music stores etc.
- These facilities are assigned specific weights, reflecting their relative importance in determining the walkability of an area
  - Essential services like grocery stores, schools, and parks may receive higher weights
  - Restaurants, cafes, libraries, and other leisure facilities might be given moderate weight
  - Specialty stores like music stores or bookstores typically have lower weights in comparison



## Walk Score – a popular walkability assesment tool

- Additionally, the Walk Score includes a distance function that ensures amenities closer to the assessed location are given more weight
- All relevant facilities or service locations that can be reached within a walking time of 20 minutes are taken into account

## About the Scores in the Walk Score

### Walk Score®

### Description

**90–100**

#### **Walker's Paradise**

Daily errands do not require a car.

**70–89**

#### **Very Walkable**

Most errands can be accomplished on foot.

**50–69**

#### **Somewhat Walkable**

Some errands can be accomplished on foot.

**25–49**

#### **Car-Dependent**

Most errands require a car.

**0–24**

#### **Car-Dependent**

Almost all errands require a car.

### Somewhat Walkable ?

Eight Mile Plains, Brisbane

Commute to **Downtown Brisbane**

 15 min  36 min  60+ min  60+ min [View Routes](#)

 Favorite

 Map

Walk Score  
**63**

#### **Somewhat Walkable**

Some errands can be accomplished on foot.

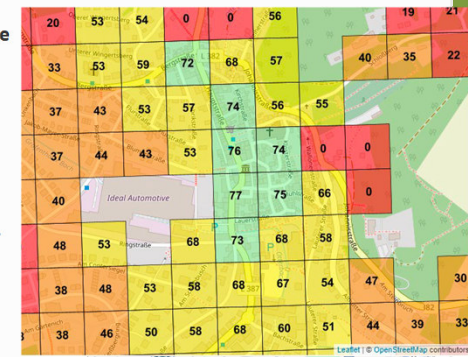
Transit Score  
**56**

#### **Good Transit**

Many nearby public transportation options.

[About your score](#)

[Add scores to your site](#)



## Shortcomings

- The Walk Score follows a proprietary approach:
  - The exact weighting system used by Walk Score is proprietary and not publicly disclosed in full detail
  - The US-company behind the Walk Score modelled it with the average citizen in mind.
- What about certain age-groups with specific needs like the elderly?



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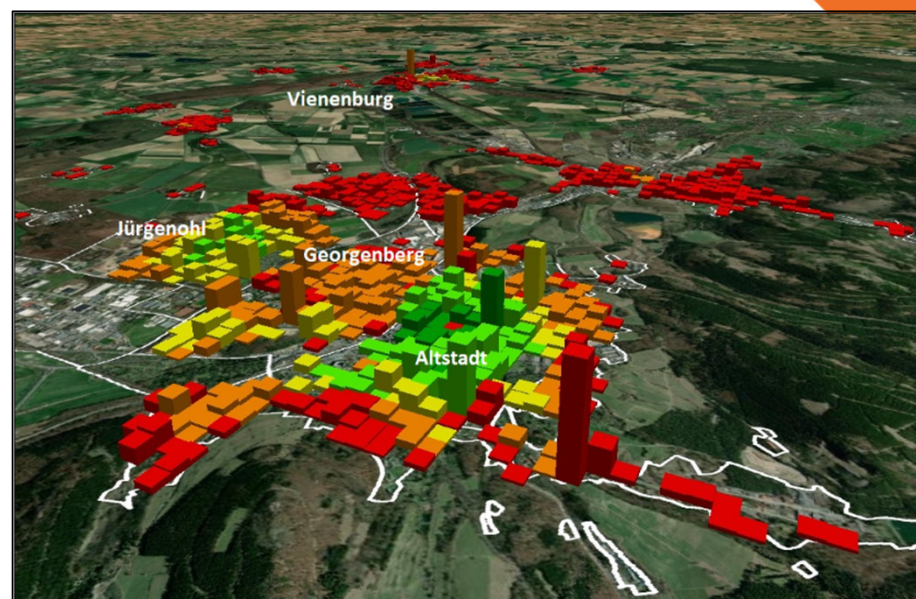
## Shortcomings, leading to the Walk Score for the elderly

- Delivers aggregated scores/values and displays destinations, but what about the route from start to goal? Which way was calculated? Is the way accessible for anyone, what about stairs, slopes, narrow passages that cannot be navigated with a walker?
- We have integrated such barriers and data into an innovative approach inspired by Walk Score, including a specific selection of facilities, their weighting, and the walking speed of seniors – in an earlier project at Mainz University of Applied Sciences
- But how to properly display this information, without losing the strength of the Walk score, which is: Easy Information provision in a spatial context: Easy to compare different areas. Easy and efficient in finding areas with a lack of supply?

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## Visualisation

- Following the principle of "Overview First - Details On Demand" (Shneiderman 1996), the prototype first shows a general 3D map
- Why does 3D makes sense for visualisation: adds a dimension



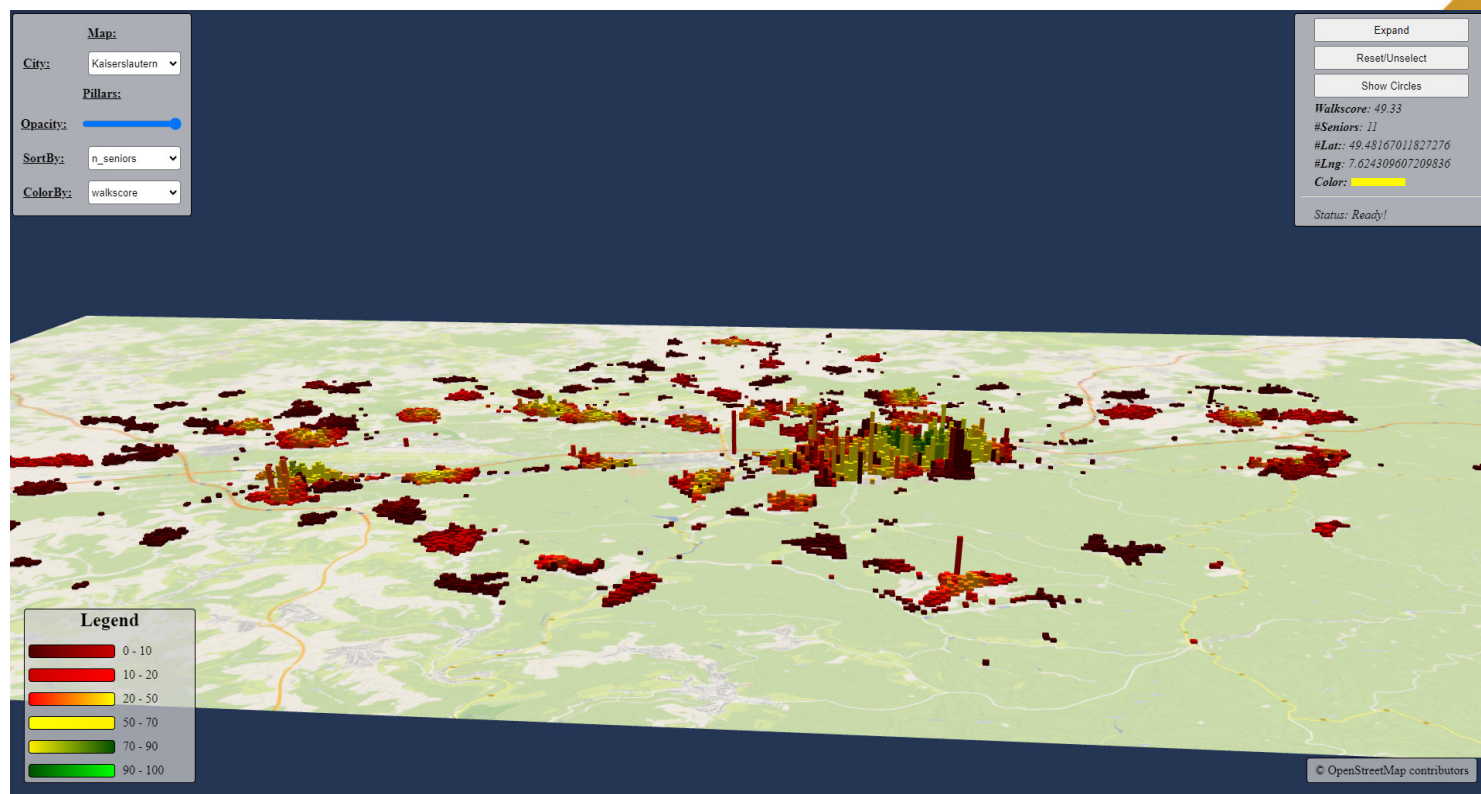
Walk Score for the elderly,  
Goslar, Germany, traffic light  
colors

→ differences between center  
and fringes

3D – High column: a lot elderly



## Visualisation - 3D web client



Walk Score and population figures for the country district and the city of Kaiserslautern.

→ Walk Score in suburbs frequently worse than in the city.

→ Several places where many elderly meet a bad Walk Score



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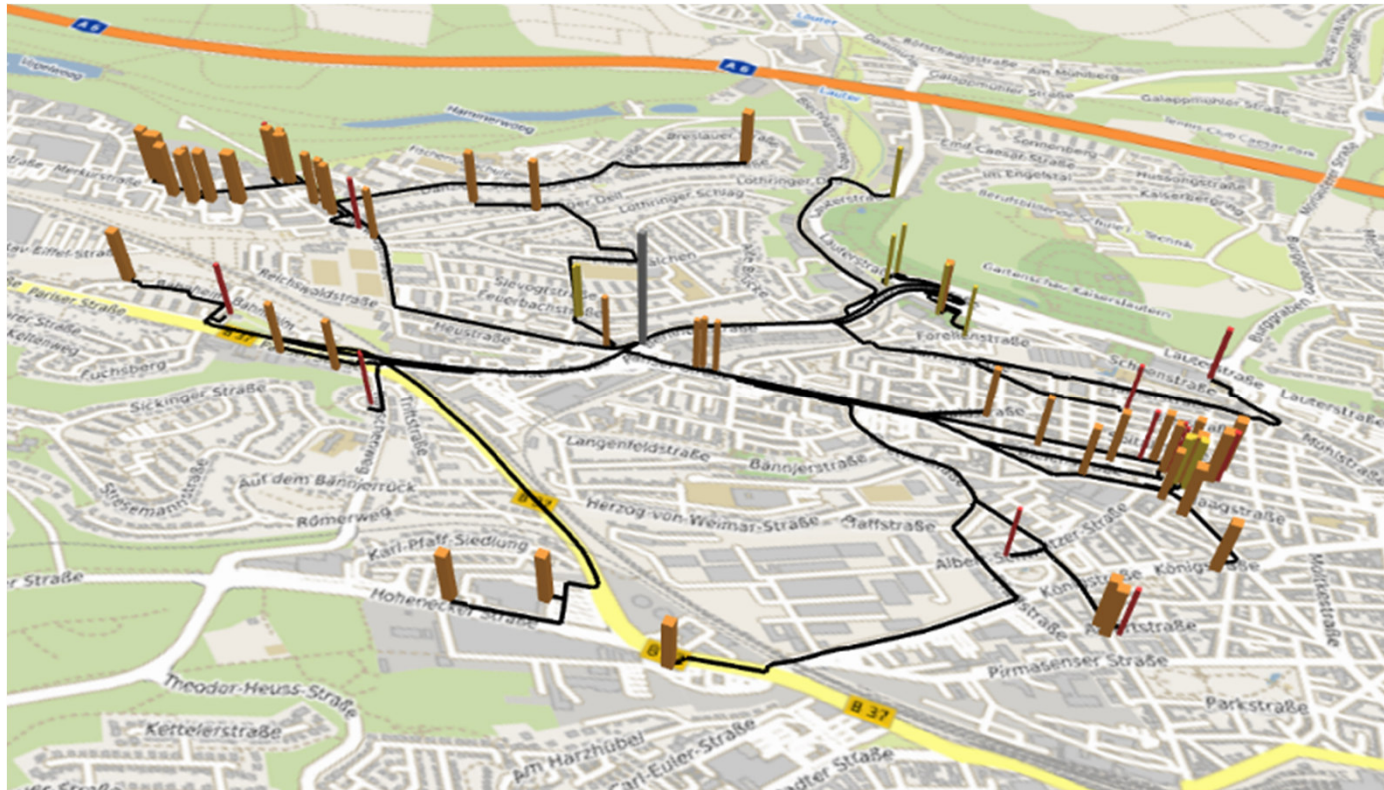
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## Visualisation – details on demand



The grey column in the middle represents the selected column

The colours reflect to which category each facility belongs to

The extrusion indicates which influence a facility has on Walk Score.

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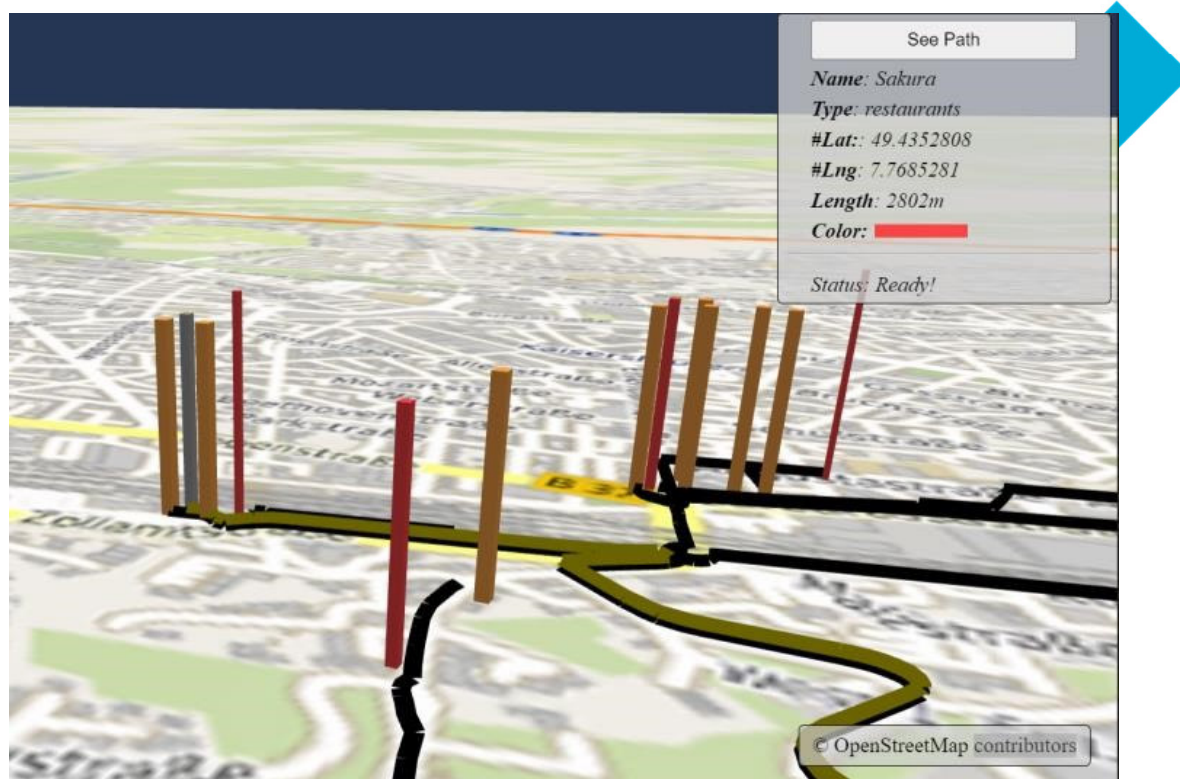


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## Visualisation – details on demand

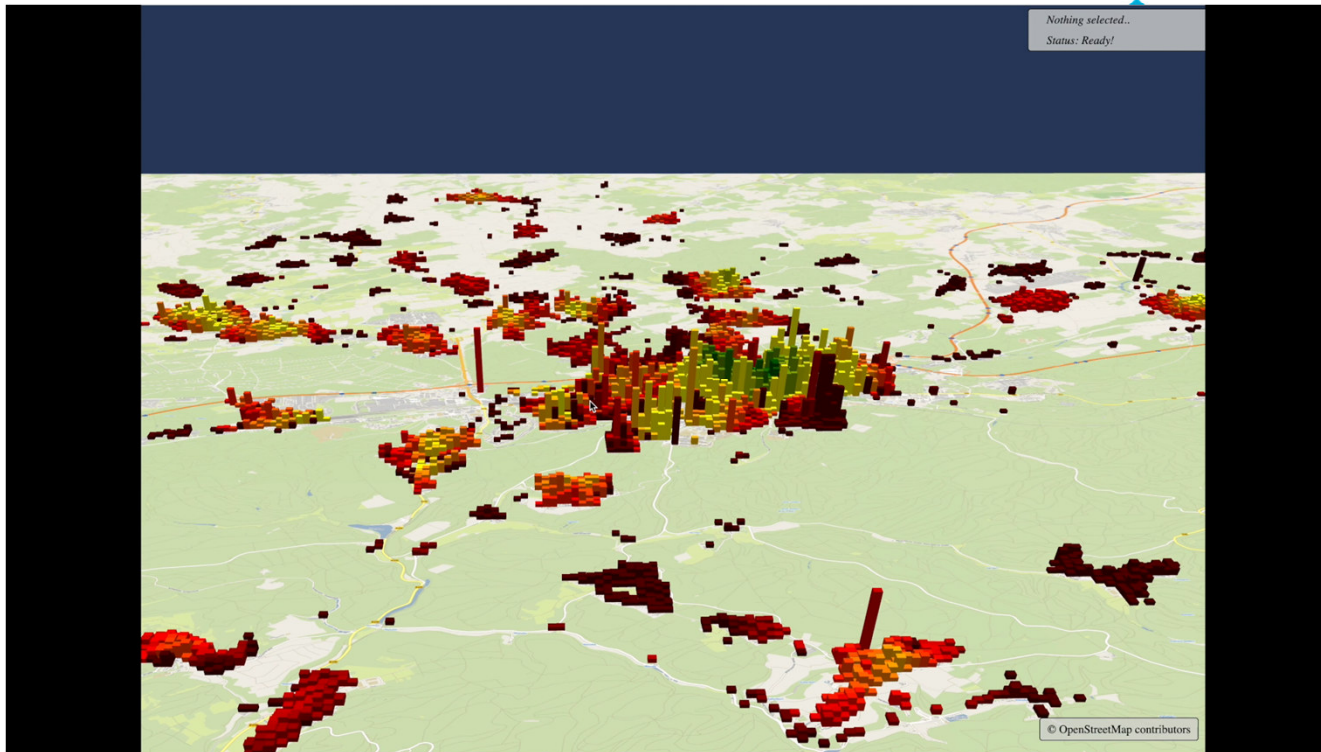


Information window for additional thematic information

Road network is displayed other than in original Walk Score, → locate barriers



## Conclusion



The 3D-Web-Application is so far only a prototype

Keeps the Walk Scores strength: easy to understand and compare (overview first)

3D adds a dimension, meaningful when planning for and with the elderly

Details on demand make the Walk Score more transparent, regarding amenities and routes

## Conclusion

- The 3D client, currently a prototype developed in an academic context, presents several usability issues that must be addressed before it can be adapted for practical use, e.g
- A notable limitation is the time-consuming loading time for route calculations, which must be addressed before practitioners can adopt the tool
- The gap between academic development and practical application remains significant. To close this gap, early collaboration with practitioners is essential. Only through concrete discussions can the prototype be further refined to meet actual needs and optimize it for specific local challenges.