SmartHubs Accessibility Tool

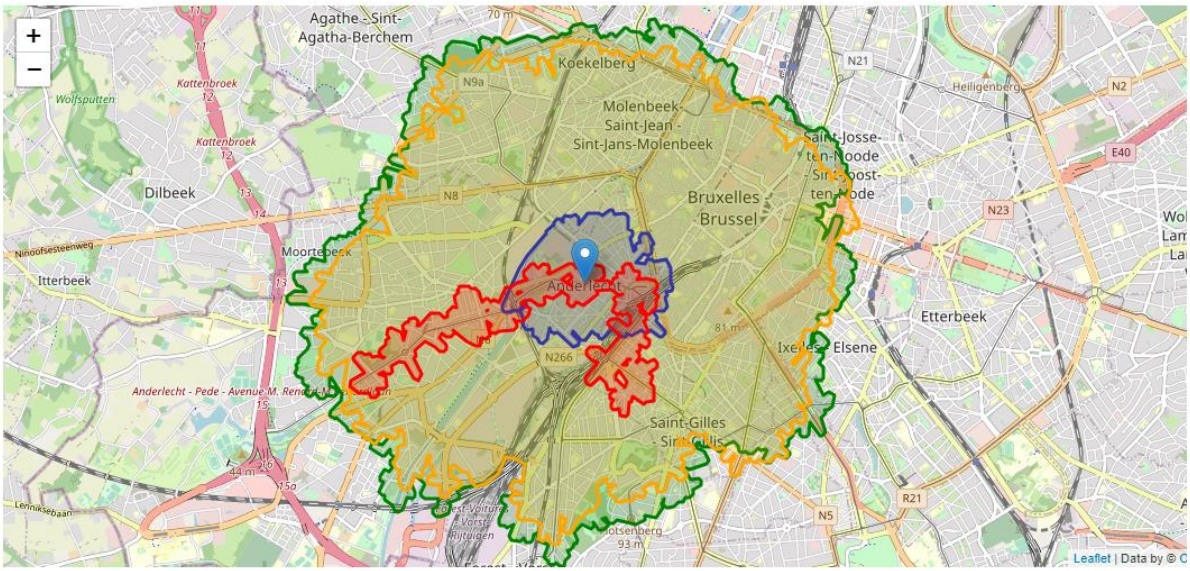
SUMMARY OF IMPACT ASSESSMENT AND TOOL DEVELOPMENT

SmartHubs Accessibility Tool

INTRODUCTION

The SmartHubs Accessibility Tool is designed as a user-friendly planning tool designed to assist planners and practitioners in developing and testing mobility hub scenarios. The tool aims to measure amenity accessibility using various modes of transportation (walking, cycling, e-scooters, public transport) to and from mobility hubs. Although the analysis that the tool performs is relatively simple, the tool stands out for its automation and user-friendliness, eliminating the need for GIS software expertise. The approachable interface and automated processes cater to users of all skill levels, while advanced users can download outputs for further analysis in external GIS software. The SmartHubs Accessibility Tool was also used for the impact assessment part of the SmartHubs project. The impact assessment examines the accessibility implications of mobility hubs in each of the living lab cities.

Analysis Results



	id	mode	Restaurant/Cafe/Bar	Education	Service	Healthcare	Supermarket	Entertainment
0	hub1	Walk	74	5	20	19	6	1
1	hub1	Bike	1731	64	213	228	71	10
2	hub1	E-Scooter	1638	58	202	201	65	9
3	hub1	Public Transport	83	1	24	21	6	1

Example of Analysis Output from the SmartHubs Accessibility Tool

METHODOLOGY

The SmartHubs Accessibility Tool underwent an iterative development process, starting with an initial version presented to academic and practitioner groups for feedback. The first version, a terminal application, required complex user input and lacked a visual interface, resulting in limited user engagement. A visual interface was later introduced, allowing users to input data directly without pre-prepared files, garnering increased interest and feature requests.

Workshops and demonstrations, involving academics and planning professionals, were conducted in each living lab city during tool development. Participants provided feedback, shaping future features. Observations influenced tool adjustments; for instance, preventing unintended hub additions to the map.

Accessibility is measured by counting reachable amenities within a specified time or cost budget using OpenStreetMap (OSM) data. The tool quality depends on OSM data quality, but it remains useful even with poor data. Its global applicability is maintained by allowing isochrone download and local dataset integration.

Implemented in Python using Streamlit, a Python package for fast web-tool development, the tool's simple interface masks complex background code. Unique functions address inaccuracies in existing isochrone-generating tools, ensuring accurate rural accessibility representation. The tool is capable of handling diverse GTFS data formats, including multiple datasets for a city, allowing for automated isochrone generation using public transport.

While the tool was developed within the SmartHubs project, it was also used to perform the impact assessment of mobility hubs within the living lab cities. The impact assessment was performed by developing scenarios, then analyzing these scenarios within each living lab city.

FINDINGS

This part of the SmartHubs project focuses on two main aspects: (1) developing a tool for assessing amenity accessibility near mobility hubs and (2) utilizing this tool for an impact assessment on living lab locations. The impact assessment involves scenario development for each living lab, with the SmartHubs Accessibility Tool used to analyze these scenarios, as summarized in the following table.

Living Lab	**Scenario**
Brussels	Before/after assessment of two potential mobility hub locations.
The Netherlands	Before/after assessment of eight potential hub locations (four in The Hauge, four in Rotterdam) and an accessibility analysis of each of these locations using shared electric scooters that are commonly found in the Netherlands with a cost budget of €5.
Munich	Before/after assessment of a parklet that was upgraded to a mobility hub.
Vienna	Comparison of four existing mobility hubs in Seestadt Aspern.
Istanbul	Before/after assessment of three train stations to assess to what extent they might benefit form being upgraded to a mobility hub.

The analyses performed in each living lab can be roughly grouped into two categories. The SmartHubs Accessibility Tool can be used for comparing scenarios, or the tool can be used for comparing different geographic locations. It is also possible to use the tool for an analysis that is a combination of these two possible analyses.

Brussels, the Netherlands, Munich, and Istanbul primarily fall into the scenario comparison category. For instance, Brussels examined potential mobility hub upgrades for public transport stops, while the Netherlands explored three scenarios in two cities—basic, all mobility options, and e-scooter budget. Munich studied before and after scenarios in a single location, and Istanbul compared walking accessibility to/from train stations with assumed shared mobility services.

The second category involves comparing multiple locations within a scenario, seen in Brussels, the Netherlands, Vienna, and Istanbul living labs. Comparisons help identify locations with the greatest accessibility improvements, such as Place du Conseil in Brussels. Vienna's comparison of existing locations aids local planners in establishing benchmarks for acceptable accessibility when planning new hubs, considering additional metrics like bicycle rentals.

Direct city comparisons are challenging due to varying accessibility standards and differences in OpenStreetMap (OSM) data quality. However, some basic comparisons can be made when looking at the relative improvements in accessibility. Metro Clemenceau in Brussels showed the smallest

improvement (an increase of 386%) when upgraded to a mobility hub with more shared modes available while Kralingse Zoom in Rotterdam showed the highest increase in relative accessibility (1941% increase) compared to other locations that were examined. It is important to keep in mind that these numbers do not tell the whole story and accessibility can be complex and involve many different factors. The relative increase in accessibility to amenities might have been small at Metro Clemenceau, but this can be misleading. When comparing this result to the other potential mobility hub in Brussels, it becomes clear that the percentages are different, but they both experience an increase of roughly 2000 accessible amenities after the installation of a mobility hub. The only difference is that Metro Clemenceau started out with a higher level of accessibility, thus making the relative increase seem smaller.

Furthermore, large or small increases in accessibility may have very little to do with the mobility hub or the modes made available. This is also dependent on the distribution and density of the amenities throughout the city. If a city has a relatively even distribution of amenities, any changes to a mobility hub will show significant increases in accessibility. However, if amenities are concentrated in key areas, then only improvements to mobility hubs that allow these key areas to be reached will show significant improvements. Planners and practitioners may need to combine their local knowledge and data with the output of the SmartHubs Accessibility Tool to make informed decisions.

CONCLUSIONS

It is important to assess not only the performance of the living labs, but also the performance and suitability of the SmartHubs Accessibility Tool for analyzing accessibility. This tool has both advantages and disadvantages. Its simplicity and ease of use, relying on freely available data, are key benefits. However, a major drawback is the potential for drawing conclusions from poor data, leading to missing crucial information. These aspects are interconnected, forming two sides of the same issue. While openly available data contributes to the tool's advantages, it also constitutes a significant drawback. Addressing these concerns by incorporating more reliable data and flexibility would complicate the tool, make it less user-friendly, and limit its applicability. Recognizing this relationship is crucial for shaping the tool's future development. Subsequent versions should maintain user-friendliness but could enhance results by incorporating local datasets.

RECOMMENDATIONS

There are two main recommendations that come from using the SmartHubs Accessibility Tool to perform an impact assessment. Planning practitioners who are looking to plan, expand, or assess mobility hubs might want to consider these recommendations.

Use the Accessibility Tool to make direct comparisons between multiple potential mobility hub locations within a city.

The SmartHubs Accessibility Tool can be used to make direct comparisons between multiple potential hub locations within a city. If a municipality is considering multiple locations and has finite resources to create new hubs, this type of analysis could be useful to identify which location might experience the greatest improvement in accessibility when a new mobility hub is added.

Use the Accessibility Tool to establish a baseline measurement for acceptable amenity accessibility.

Every city is different and there could be considerable variation in data quality and travel behaviour between cities. This means that it is not always clear what the acceptable amount of amenity accessibility should be. The SmartHubs Accessibility Tool can be used to assess all of the existing mobility hubs in a city and assess their levels of amenity accessibility. If this is combined with local knowledge (such as shared-mobility use), then a baseline level of acceptable accessibility can be established. This baseline can be used to compare planned mobility hubs to the existing hubs in the network.

COLOPHON

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VERSION
Version 1

WEBSITE
www.smartmobilityhubs.eu

FULL DELIVERABLE:
This text describes the development and application of the SmartHubs Accessibility Tool to perform an impact assessment on the accessibility implications of mobility hub implementation within the living labs. For the full deliverable (D5.2), please refer to:

Nichols, A., Duran, D., Büttner, B., 2023. SmartHubs Accessibility Tool. SmartHubs Deliverable D5.2. Available at:
https://www.smartmobilityhubs.eu/_files/ugd/c54b12_e489f6049f864e33b545af1780d8a6d6.pdf

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