

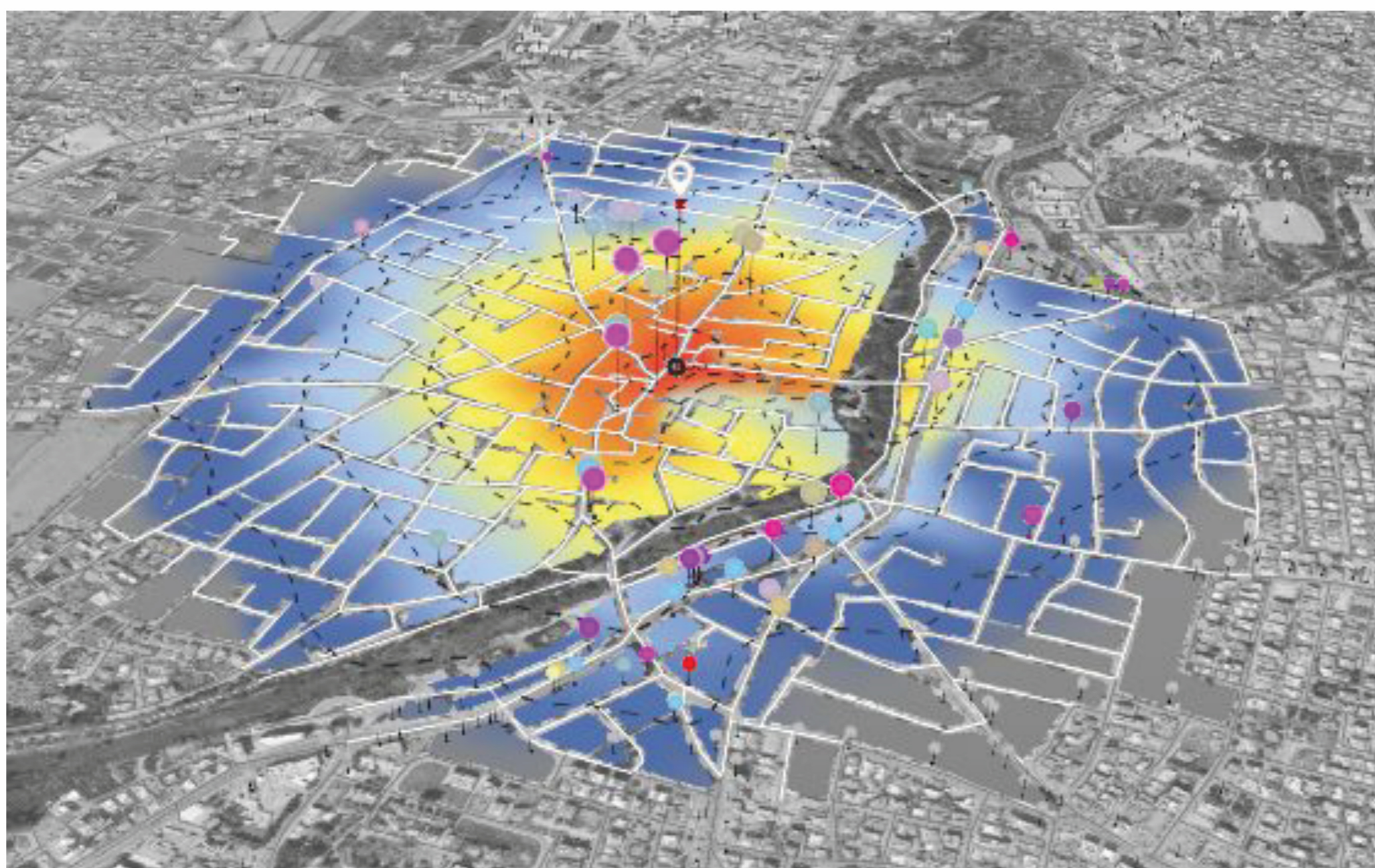
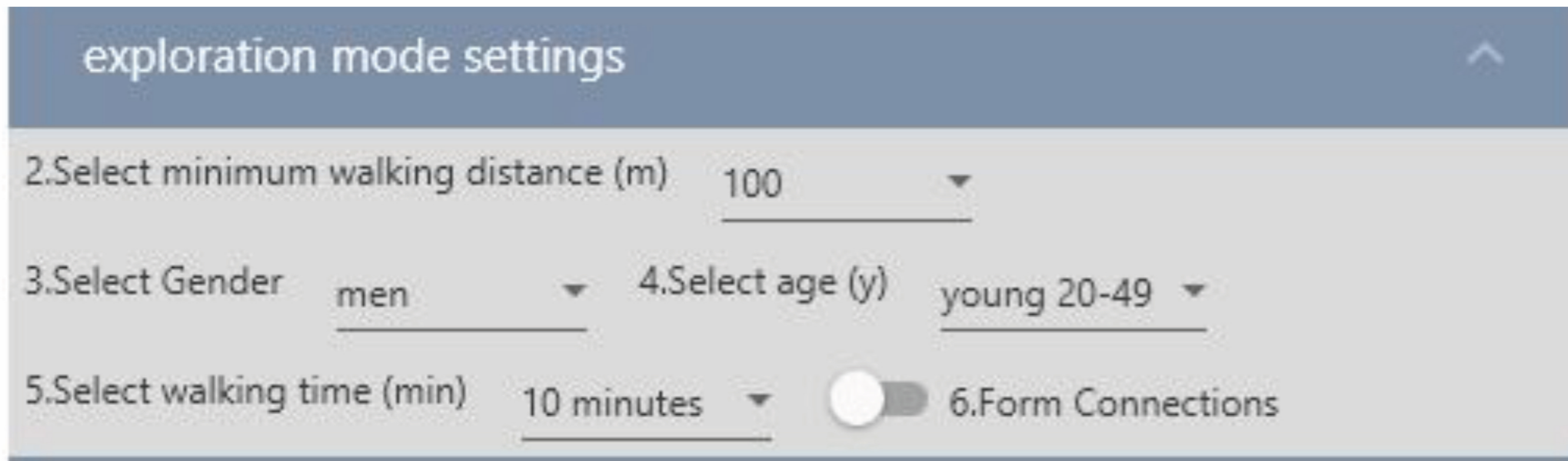
A Data-enabled Participatory Process for Enhancing Neighborhood Accessibility

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Abstract

This research presents a novel workflow for managing urban data and visualizing them with the use of a mixed reality interface for studying historic urban cores in participatory design scenarios, using as a case study the Strovolos historic core in Nicosia, Cyprus. The application provides a data-enabled interactive medium to measure key aspects of urban accessibility with real time data feedback, to test design hypothesis and record user input. The goal is the creation of a user driven urban database and facilitate decision making of urban scenarios in consideration of walkable cities



Tool Application

In the first version of the interface, using only screen-based input, participants were asked to map their walking routines while interacting in real-time with the previously presented data visualizations. The goal of this experiment was to introduce participants in participatory planning and citizen science and to evaluate preliminary engagement with e-participatory tools. The results showed that there is a need for a clear goal to be set in the participatory workshop setup, where the tools complement the participatory process, as engagement seems to require some sort of stake that the participant needs to bring along into the participatory setup.

Contribution of the Research

the contribution of the proposed methodology is in bridging the gap between scientific data visualizations for expert analysis and the use of simplified, static illustrations of urban conditions in participatory planning processes, facilitating the communication between residents and policy makers. Better communication for this research is related to a continuously growing database of locally aware urban data.

The tool developed to support this methodology provides an interactive medium to measure key aspects of urban performance, focusing on accessibility, in an easy-to-understand way. The intended environment of application is to be used along goal oriented participatory workshops as data feedback and recording tool to test design scenarios in relation to data-driven visualizations of local urban conditions. The tool can be enhanced with a mixed reality interface. By using a printed map and by projecting all accessibility data top-down, the tools strive to capitalize on the advantages in using a hybrid interface. That is physical interaction with a map, by using markers, post-it etc. and live update of projected accessibility data.

Conclusion

The goal to provide a data-enabled participatory medium to help with the creation of a user-driven database of citizen data to enhance user engagement and facilitate decision-making in neighborhood-scale design scenarios, specifically in the historic core of Chrysaleousa.

The strength of the methodology is that it relies in a hybrid setup where participation along with data collection is done on the same interface. However, as with most digital tools and participatory processes it requires initial training of participants to feel comfortable in using the interface presented, as well as the communication of clear goals and a facilitation methodology to be set prior to the participatory session. Also, during the participatory process, it requires very specific rules of conduct, for the tools to be used effectively, as participants need to engage with a clear goal in mind.

The methodology hopes to contribute towards a new approach to citizen- engagement in participatory urban management processes by helping non-experts to interpret urban analysis (scientific) data and the complexity of implementing alternative design scenarios in urban environments through visualization and knowledge elicitation – a method that helps the citizens to feel ownership of the dialectic process

Theoretical framework

Negri (2009) suggests that a new type of emerging urban centrality can be observed in cities due to rising population trends. These trends put great strain on cities and their neighborhoods due to the increased needs in infrastructure and governance, attributing to the neighborhood unit high importance, since it "is one of the most critical elements for the spatial and functional organization of the city" (Pozoukidou et al 2021, p.1).

The value of participatory planning in shaping the neighborhood from within, can be seen not only as an elicitation and decision-making tool for the authorities, but also a placemaking tool addressing the inhabitants, as with, "participatory planning, effectively engaged citizens can experience an increased sense of place" (Colantonio 2009, p. 2).

Methodology Overview

The projects suggests a novel workflow of managing urban data and visualizing them with the use of a mixed reality interface for studying urban accessibility aspects of historic urban cores in participatory design scenarios.

The two tools developed, "Accessibility Mapper" and "Neighborhood Mapper" offer the opportunity for users to highlight, using an interactive application, POI (places of interests), neighborhoods, local workshops, existing or future creative industries sites, routes, and areas of importance.

The primary goal of the tools is for local stakeholders, local community groups and municipal officials and researchers, to be able to capture local sentiment, track local businesses and highlight best potential areas for installing new businesses alongside local residential uses.

The core functionality of the tool relies in providing isochrone analysis and visualization for the given street network. Previous publications by Düring et al (2019) and Bielik et al (2018), provided valuable insight on the use of a graph-based model for accessibility and the relation between amenities and walking patterns in a street network.

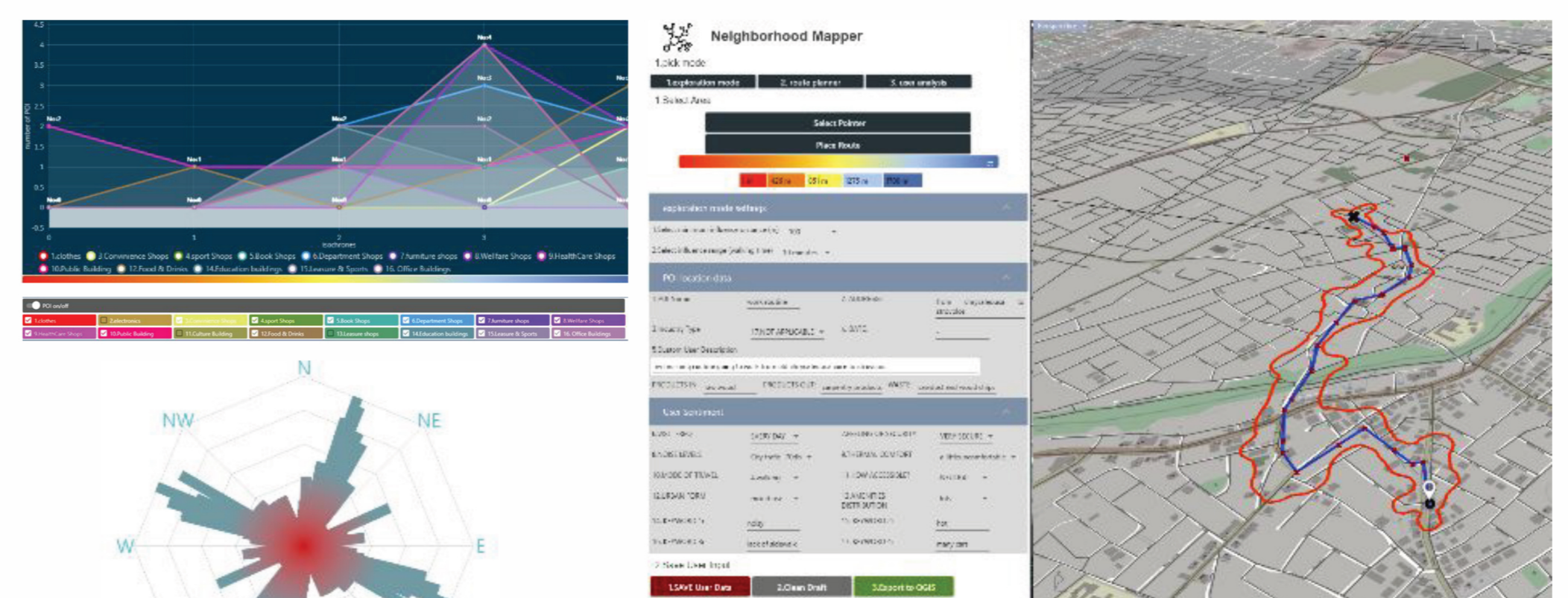
The proposed tools contribute to the area of digitally enhanced participatory processes by providing an interface for local stakeholders and inhabitants to engage in scenario testing and discussions that draw on expert data that typically are difficult to be integrated in city models and interpreted by non-experts.

User Interface

The proposed tools were developed to be used along with data-enabled planning practices (Lieven 2017), or participatory design methodologies (Our City Plans 2022).

All functionalities are being accessed through a custom user interface that has been developed in Rhino and Grasshopper. The combination of a custom interface that is easily operated by a non-expert user along with the ability for custom operations and functions to be easily programmed, makes the tool highly adaptable and reconfigurable to any given design scenario.

The visual interface is used to help users navigate in the map, change isochrone parameters and finally, provide feedback for any selected POI (point of interest). The provided feedback is then stored locally in Rhinoceros in the form of metadata along with the new user-generated POI and isochrones. Finally, all data collected are exported back into a shapefile, with the use of the BearGIS plugin.



POI location data			
1. POI Name:	Old Carpentry Workshop	2. ADDRESS:	Chrysaleousa
3. Industry Type:	wood workshop	4. DATE:	1929
5. Custom User Description			
this is an old wood workshop that was based in strovolos for many years			
PRODUCTS IN:		PRODUCTS OUT:	WASTE:
raw wood		carpentry products	sawdust and wood chips
User Sentiment			
6. VISIT FREQ:	OFTEN	7. FEELING OF SECURITY:	SLIGHTLY SECURE
8. NOISE LEVELS:	City traffic- 70db	9. THERMAL COMFORT:	Uncomfortable
10. MODE OF TRAVEL:	1. car	11. HOW ACCESSIBLE?:	GOOD
12. URBAN FORM:	Only housing	13. AMENITIES DISTRIBUTION:	a little
14. KEYWORD 1:	noisy	15. KEYWORD 2:	hot
16. KEYWORD 3:	neighborhood	17. KEYWORD 4:	lack of green

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