

Fill the map: Integrating objective data and citizen knowledge for Participatory Urban Planning

A Superblock project in Vienna

Camila Narbaitz Sarsur

25th September 2023



Fill the map: Integrating objective data and citizen knowledge for Participatory Urban Planning

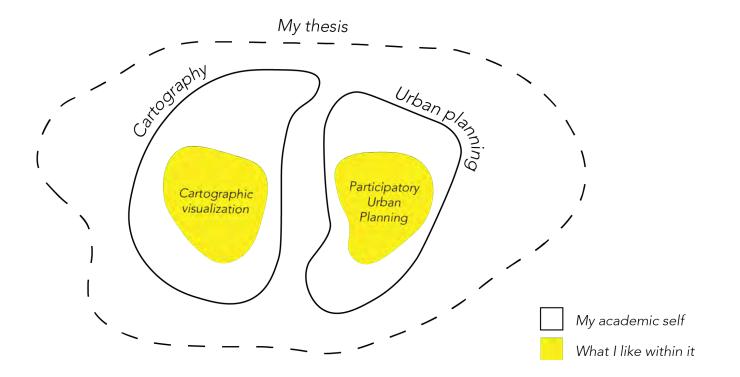




Fill the map: Integrating objective data and citizen knowledge for **Participatory Urban Planning**











Urban planning approach that started in 1950.

Involves the community in the planning process.

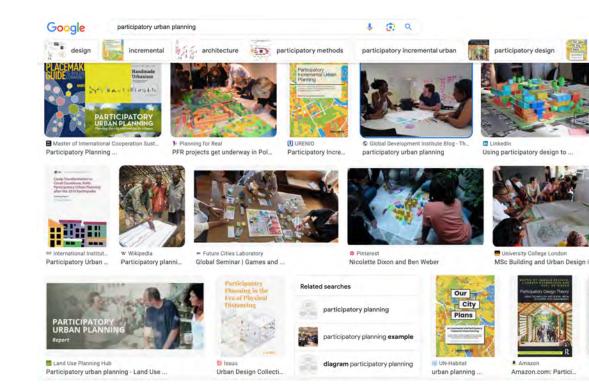
WHAT IS PARTICIPATORY URBAN PLANNING?







WHAT IS THE **ROLE OF CARTOGRAPHY** IN PARTICIPATORY URBAN PLANNING?





Maps incluiding citizen knowledge data in a spatial format.

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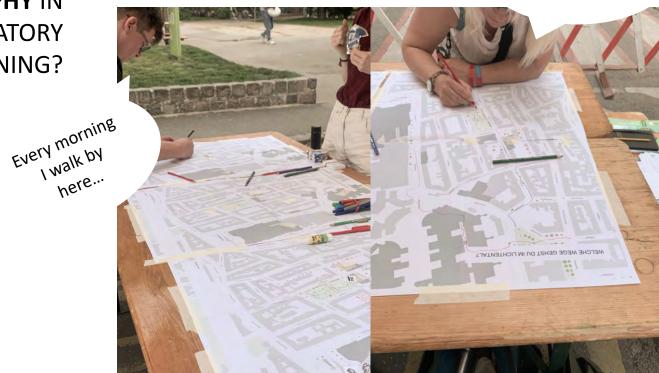
information and insights about a place or community based on personal experiences and perspectives.





Maps incluiding **citizen knowledge data** in a spatial format.

I take this street because it has no traffic



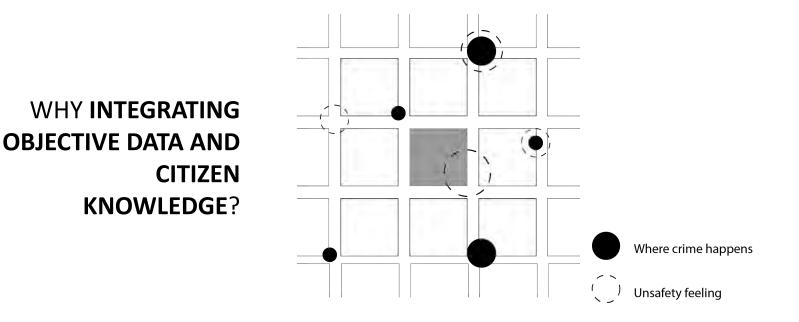
WHAT IS THE **ROLE OF CARTOGRAPHY** IN PARTICIPATORY URBAN PLANNING?



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Godwin, A. & Stasko, J.T. (2017)



So, if we already know that Cartography is part of Participatory Urban Planning and that is important to integrate objective data and citizen knowledge,

WHAT IS THE FOCUS OF MY RESEARCH?





Making visualizations effective for all stakeholders to understand the urban issues and engage them in the decision-making process

RESEARCH GAP





To identify optimal cartographic visualization strategies that combine objective data and citizen knowledge, thereby serving as decisionmaking tools within the framework of participatory urban planning.



RESEARCH OBJECTIVE



REFERENCES FOR DESIGNING

To analyze and create a catalog of urban data visualizations.

DESIGNING THE MAPS

To create suitable visualization
strategy to combine citizen
knowledge and objective data.

TESTING THE MAPS

To understand the effectiveness of the created cartographic visualizations, making diverse stakeholders interpret, make connections, and make sense of different data types.

RESEARCH SUB-OBJECTIVE





RQ1a

What elements and categorizations, such as visual variables and design elements stated by Jacques Bertin (1967), have been used and can be included as parameters for analyzing the visualizations?

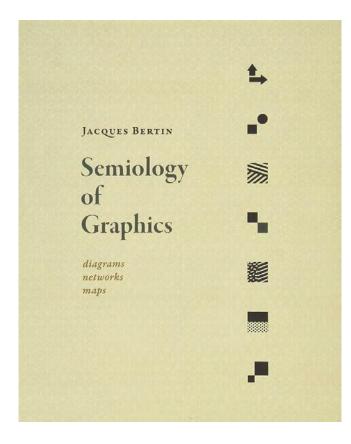
RQ1b

How are urban visualizations, those integrating objective data and citizen knowledge and those visualizing them separately, aligned with the selected analysis parameters?









Visual variables

Elements representing geographic features: POINTS, LINES, or AREAS.

Design elements

Attributes applied to the visual variables to make layers readable: COLOR, SHAPE, TEXTURE, etc.

Generalization

Spatial equivalent of simplification.

Complexity levels

Low, medium and high depending on the number of components and interactivity.

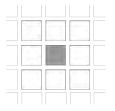


RQ1a – PARAMETERS SELECTION



Day o Night





Geographic spatial dimension of the data: location of parks.

categorical or qualitative data: land use.

Low complexity

2 components, no or low interactivity



Map no Ner



ainting / Drawing / Collag Bom in Ravensburg, Ger Studio in Berlin Open artist profil



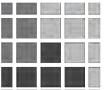
Qualitative

Medium complexity

3 components, no or low interactivity







Quantitative

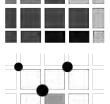
numerical data associated with geographic locations: population density.

Ordered

numerical data with an equal distance between categories: number of people crossing in each intersection.

High complexity

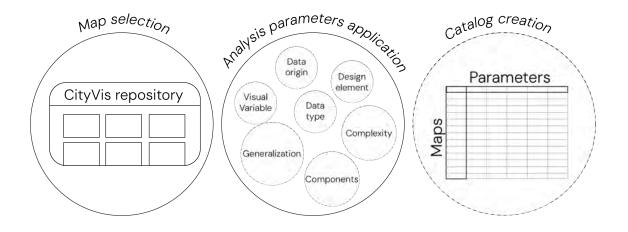
3 components, high interactivity





PARAMETERS SELECTION – Complexity levels







RQ1b - **VISUALIZATION ANALYSIS**



Collection



(ITU), 2022

PJ Oties







GLOCON Koç University, 2022

2022

Hamburg, Digital City Science, 2022

Domestic Tourism Planning via Mobility AUTO-NOM

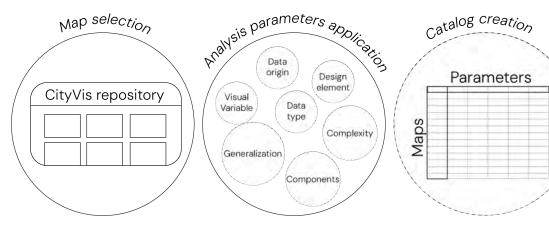
Visualising the impact of new mobility scenarios

How European States Decide on Asylum Data Rentlin Humen, 2022

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RQ1b - VISUALIZATION ANALYSIS



1st Outcome: The catalog

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RQ2a

Which visual variables and design elements are suitable to show the selected data? Should objective data and citizen knowledge be visually differentiated?

RQ2b

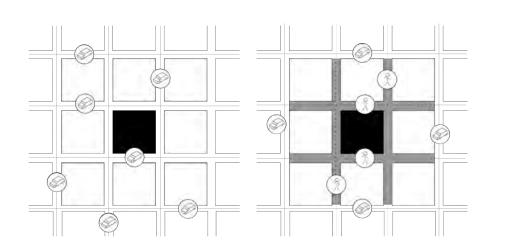
How can cartographic generalization techniques be employed to create a simplified visualization that still conveys the underlying data patterns?

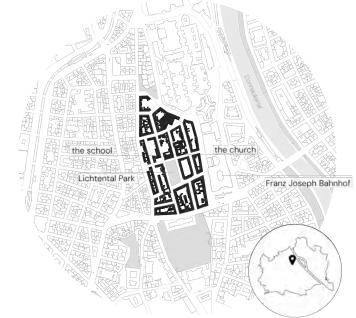
RO2 - RESEARCH QUESTIONS 2





Superblock project in Lichtental, Vienna.





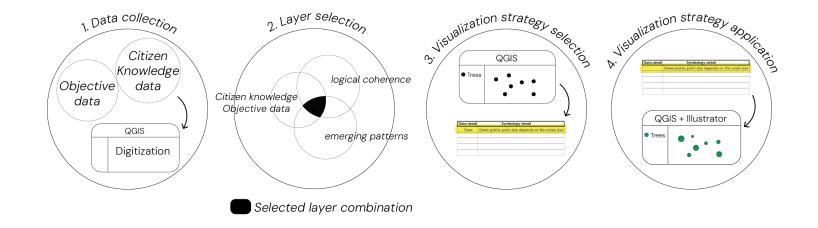
23 Fill the map

RQ2 - Selected case





Credits: Dongsheng Chen and Yuri

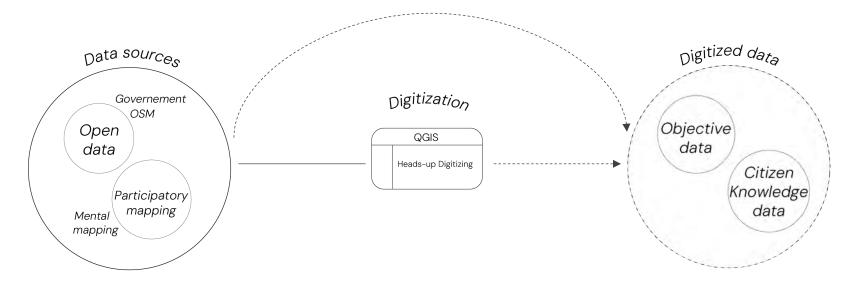




RQ2 - Methodology



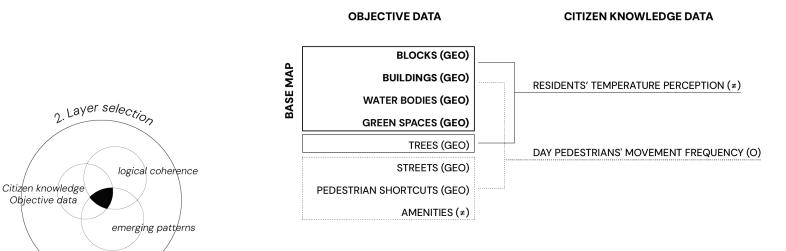






Methodology – Data collection





Combination 1: Residents temperature perception and green infrastructure.

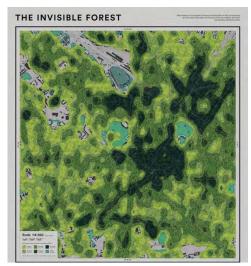
Combination 2: Day pedestrians' movement frequency and activity patterns



Selected layer combination

Methodology - Layer selection

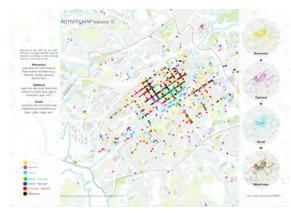




The invisible forest map (Density Design Research Lab, 2017).

Residents temperature perception and green infrastructure.

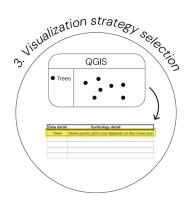
Visual heatmap style



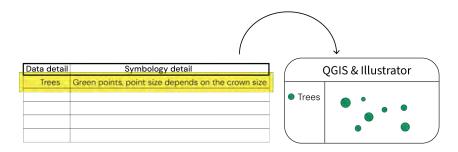
Activity map. A sense of place report (SPIN unit, 2015).

Day pedestrians' movement frequency and **activity patterns**

Activity analysis



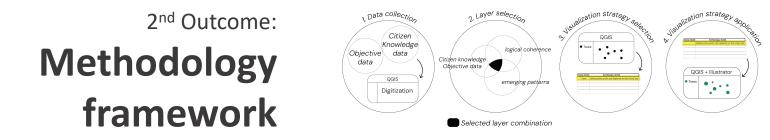
















Is there a difference in the assumptions made by stakeholders with and without expertise? Do stakeholders without expertise need other kinds of features more than map symbology (texts, pop-ups, graphs) to interpret and make sense of data?

Does modifying the symbology improve the intuitive interpretation of data patterns?

Are there distinct visualization preferences among stakeholders with and without expertise?



RQ3a

RQ3b

RQ3c

30 **Fill the map**



COMBINATION 1



MAP A MAP B with fine-granularity with generalization		i
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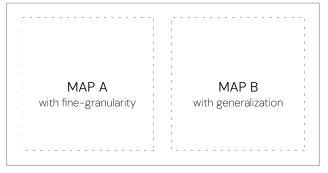
COMBINATION 1

Residents' temperature perception and green infrastructure



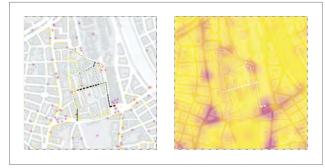
COMBINATION 2

Medium complexity



COMBINATION 2

Day pedestrians' movement frequency and activity patterns





RQ3 - Visualizations for testing



GENERAL INFORMATION

INTRODUCTION

INTERPRETATION AND PREFERENCES OF VISUALIZATIONS

	PATTERN 1 Low complexity	PATTERN 2 Medium complexity	
The research	MAP A with fine-granularity	MAP A with fine-granularity	Stakeholders' expertise
The Lichtental Superblock guide	Interpretation and connections	Interpretation and connections	
	MAP B with generalization	MAP B with generalization	
An example	Prefered map	Prefered map	General comments



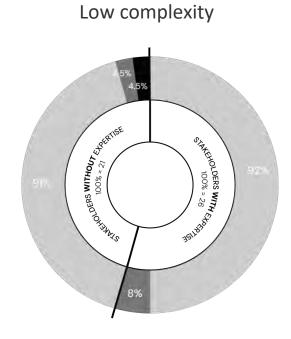
RQ3 – Survey design

PATTERN 1 Residents' temperature perception and green infrastructure PATTERN 2

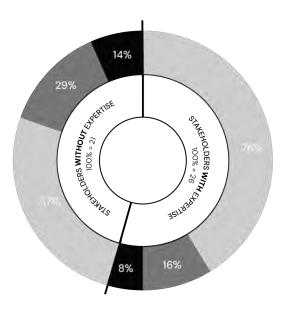




Can you find patterns in data?



Medium complexity



Yes, I do

l am not sure / l don't know

No, I don't

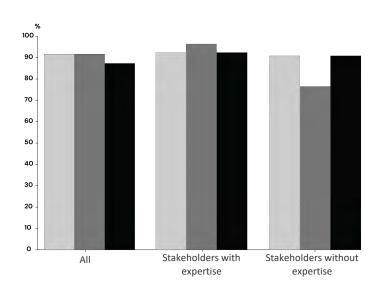
RQ3 - Results

PATTERN 1 Residents' temperature perception and green infrastructure PATTERN 2



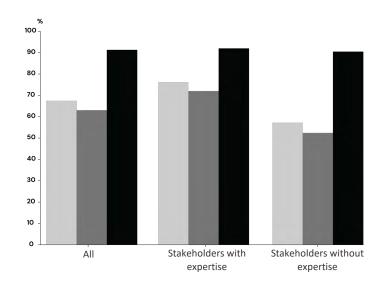


What about if I help you a bit...



Low complexity

Medium complexity



Participants finding patterns in Q1

Participants who could explain the found patterns (Q2)

Participants who could identify a pattern with the provided assumptions (Q3)

RQ3 - Results

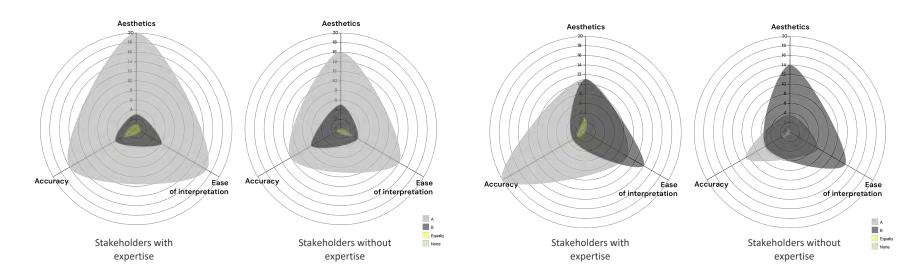


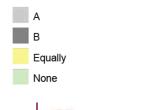


Which map do you prefer in terms of ...?

Low complexity

Medium complexity





Fill the map

35

RQ3 - Results



This study showed that **the complexity of the visualization influences the pattern interpretation and map preferences** among the two groups of stakeholders.

Low complexity maps showed that finegranularity representation was more effective for supporting decision-making.

Medium complexity maps emphasized the importance of considering users' needs to provide adaptable solutions to improve their understanding of visualizations. The finegranularity map was favoured regarding accuracy, and the generalized map was chosen regarding ease of interpretation. Balance between accuracy maximization and minimal effort (Kleinmuntz & Schkade 1993).

Use of heatmaps for hotspot identification but not for precise data interpretations (Netek et al., 2018).





Set 1: Tailoring visualizations considering their complexity levels.

^{3rd} Outcome: **Set of recommendations**

Set 2: Adapting to Workshop Objectives





^{3rd} Outcome: **Set of recommendations**

Set 1: Tailoring visualizations considering their complexity levels.

- Low-complexity visualizations → fine-granularity maps → accuracy maximization without overwhelming the user
- Medium complexity \rightarrow depending on map goal

Set 2: Adapting to Workshop Objectives

- Data Exploration Workshop
- Pattern Conveying Workshop



Survey

- Small participant numbers in the survey.

Data

- Scarcity of citizen knowledge data.
- Limited data was collected through the Mental Mapping workshop.

Map design

- Time limitations.

Results and conclusions

- The research is rooted in one specific study case.



LIMITATIONS



- Broader range of cases to increase the reliability and applicability of the results and recommendations.

- Practical implementation of the visualizations as dialogue tools in participatory urban processes.

- Developing interactive platforms that accommodate a variety of data layers and provide users with greater freedom to explore and interact with urban data.



FUTURE WORK

IT WAS NOT EASY TO COORDINATE THIS THESIS

-rane C

TUM

LICHTENTAL NEIGHBOURS

7th September

AIT

It has to be scientific

LICHTENTAL

AGENDA GROUP

WRITING CENTER

Make it nice looking

SOCIAL LIFE

BUT THE PEOPLE BEHIND MADE IT HAPPEN

