8 Summary of the Webinar Presentation

Meta Berghauser Pont

10 Februrary, 2025
Hosted by: Spatial Analysis and Simulation Lab/Community (SASL)
Title: **Analytical Tools for Better City Design: Advancing Urban Planning through Evidence-Based Decisions**

Introduction

The Spatial Analysis and Simulation Lab (SASL) recently hosted Professor Meta Berghauser Pont from Chalmers University of Technology in Gothenburg for an engaging webinar. The session drew participants from around the world to explore how spatial morphology—the study of urban forms and patterns—can be integrated into urban design to address pressing environmental and social challenges. Dr. Nabil Mohareb, Associate Professor and session host, highlighted SASL's commitment to combining cutting-edge spatial analysis with innovative approaches to urban planning.

Speaker Profile

Professor Meta Berghauser Pont leads the Spatial Morphology Group (SMoG) at Chalmers University, pioneering advanced methodologies to quantify urban form and its socio-ecological impacts. Her research integrates spatial metrics, automated typological mapping, and tool development, including the Place Syntax Tool (PST) and Urban Calculator. Berghauser Pont's seminal work, Spacematrix: Space, Density, and Urban Form (2023), critically examines density's dual role in fostering sustainable transport and exacerbating ecological degradation.

Presentation Insights: Theoretical Framework and Research Approach

Professor Berghauser Pont structured her presentation around three interconnected themes: modeling, evidence, and tools. She emphasized the need to broaden the field of urban planning and design to address conflicting impacts and responsibilities. Her research framework integrates both social and ecological perspectives, examining not only human movement patterns but also those of other species with the common denominator of how spatial form impacts these processes.

Global Challenges and Urban Density

The presentation began by addressing global challenges through the lens of Rockström and Raworth's work, emphasizing the dual responsibility of creating environments where people can

thrive while respecting planetary boundaries. Professor Berghauser Pont highlighted the crucial role of cities in addressing these challenges, particularly given the accelerating trend of global urbanization.

The discussion of density revealed complex trade-offs. While higher density can promote sustainable transport and walkability, it often has negative implications for ecology, social impacts, and health. This complexity necessitates a more nuanced approach to densification, focusing not on whether to densify but on how to do so effectively.

Modeling Approaches and Methodological Innovations: Professor Berghauser Pont introduced several innovative modeling approaches:

- **Spacematrix Framework**: This multidimensional density framework combines variables such as floor space index (FSI), ground space index (GSI), and building height to provide a more comprehensive understanding of urban typologies. The framework moves beyond simple population density measures to better capture the qualitative aspects of urban form that are meaningful for architects and urban designers.
- **Accessible Density Analysis**: Rather than relying on traditional area-based density measurements, this approach analyzes density within walkable catchment areas (5, 10, 15-minute walking distances). This method, developed before the popular "15-minute city" concept, provides a more nuanced understanding of how density affects urban life and movement patterns.
- **Automated Typological Mapping:** The research team developed methods to analyze entire cities, regions, and countries through automated processes based on the Spacematrix framework. This approach enables comparative studies across different urban contexts and cultures and has been extended to also include street and plot types.

Evidence and Implementation: Advanced Modeling Outcomes

Professor Berghauser Pont presented compelling evidence from extensive studies across Stockholm, Amsterdam, and London, where her team analyzed pedestrian movement patterns in relation to urban density and street configuration. The research involved 20 neighborhoods per city, with multiple street measurements in each area, using Wi-Fi signals to track movement patterns. The results demonstrated that denser, more compact urban areas consistently showed higher pedestrian flows, while streets with high centrality attracted more movement.

A key finding was that the combination of density and centrality measures explained approximately 65% of pedestrian movement patterns in Stockholm. When this trained model was applied to predict pedestrian movement in Gothenburg, it maintained a strong predictive power of 55%, demonstrating the robustness of the approach across different urban contexts.

Tools for Research and Practice

a. Place Syntax Tool (PST): The PST, developed as a QGIS plugin, represents a significant advancement in spatial analysis tools. Unlike traditional space syntax tools, PST integrates both configurational measures and attractions, providing a more comprehensive understanding of urban dynamics. Key features include:

- Integration of attraction data with spatial configuration
- Capability to analyze both motorized and non-motorized movement networks
- Multiple distance measures (walking distance, turns, angle deviation)
- Automated segment map creation from road centerlines

Professor Berghauser Pont emphasized that PST's strength lies in its ability to bridge theoretical frameworks with practical applications. Besides in urban planning and design project, PST is also capable in analyzing informal settlements and has proven valuable in cultural heritage areas.

b. Habitat Network Tool: This innovative tool extends urban analysis into ecological dimensions by:

- Integrating urban and ecological data layers
- Analyzing habitat quality and connectivity
- Assessing species movement patterns alongside human mobility

c. Urban Calculator: Developed to make complex spatial analysis accessible to practitioners, the Urban Calculator offers:

- Simplified interface for early-stage design evaluation
- Scenario-based analysis capabilities
- Before-and-after impact assessments
- Integration with both motorized and non-motorized transport networks
- Quality-checked datasets for reliable results

Integration of Social and Ecological Perspectives: Professor Berghauser Pont emphasized the importance of considering both social and ecological dimensions in urban planning. The research group's approach uniquely combines:

- Traditional urban analysis focusing on human movement and social interaction
- Ecological assessment considering species mobility and habitat quality
- Integration of both perspectives to understand urban-nature interactions

This integrated approach helps address the fundamental question: "Can we build denser cities without jeopardizing biodiversity and human well-being?"

Future Directions and Educational Implications

Research Development: Professor Berghauser Pont outlined three key areas for future development:

- Standardization of built environment description methods
- Enhancement of longitudinal and post-occupancy studies
- Development of systematic reviews to strengthen evidence-based practice

Educational Needs: The presentation highlighted crucial skills needed for future urban professionals:

- Critical evaluation abilities for evidence quality assessment
- Proficiency in spatial analysis tools (GIS, Python)
- Understanding of both quantitative and qualitative urban analysis methods

Interactive Session (Q & A): The interactive session featured several insightful questions from the audience:

1. Density Thresholds and Their Cultural Variation

Question: "Is there an optimal density threshold that cities should not exceed?"
Meta's Response: Studies suggest that density has positive impacts only up to certain thresholds, beyond which negative ecological and social effects arise. However, these thresholds are context-dependent and vary by culture and geography. She emphasized the importance of achieving diversity in densities and centralities to foster resilience.

2. Global North vs. Global South Contexts

Question: "How do density and centrality strategies differ for Global South cities?"
Meta's Response: Urban typologies differ between the Global North and South, often shaped by historical and colonial contexts. For example, informal settlements pose unique challenges due to data scarcity. Localized tools and targeted data collection are necessary to analyze these areas effectively.

3. Application in Informal Settlements

Question: "Can Place Syntax Tools be applied to informal urban settlements?"
Meta's Response: PST and similar tools are effective in informal settlements, but data availability remains a challenge. Alternative data-light methods are under development to address these gaps.

4. Real-Time Data for Dynamic Cities

Question: "How can tools adapt to dynamic urban changes?"

Meta's Response: While her models currently use mainly static data, the team has worked on daily and weekly fluctuations in pedestrian flows as well as seasonal variations in biodiversity. However, longitudinal studies and real-time integrations could expand their applicability, particularly for rapidly urbanizing regions.

5. Ecological Benchmarks

Question: "How can ecological needs like biodiversity be quantified?"
Meta's Response: Ecological needs vary by region and species. Her team aims to generalize urban biotopes for key species to establish benchmarks and support biodiversity-inclusive urban design.

6. Educational Reforms

Question: What skills should future planners prioritize?
Meta's Response: Blend GIS proficiency (Python, AI) with critical evaluation of evidence quality. Systematic reviews and meta-analyses that summarize key findings are a must to inform urban planning and design studios and practice.

Key Takeaways

1. Evidence-Based Urbanism: Tools like PST enable planners to integrate socio-ecological metrics during design iterations, reducing reliance on anecdotal precedents.
2. Global South Relevance: SMoG's automated typological mapping offers actionable insights for post-colonial cities, balancing heritage preservation with informal settlement upgrades.
3. Dynamic Urban Challenges: Urban planning must account for rapid urbanization, especially in the Global South, using flexible and context-sensitive approaches.
4. Interdisciplinary Collaboration: Bridging urban morphology and ecology necessitates standardized data protocols and partnerships with ecological institutes.
5. Future Research Directions: Integrating climate resilience into urban morphology models. Expanding tools for informal settlements and data-scarce regions. Establishing density and centrality benchmarks for diverse urban contexts.

Conclusion

Professor Meta Berghauser Pont's presentation highlighted the transformative potential of advanced spatial modeling and tools to address urban challenges. The session ended with an engaging discussion on cultural, ecological, and contextual variations in urban morphology. The SASL team extended their gratitude and emphasized the importance of interdisciplinary collaboration for sustainable urban design.

How to cite:
Berghauser Pont, M. (2025, February 10). Analytical Tools for Better City Design: Advancing

Urban Planning through Evidence-Based Decisions [Webinar]. Summary provided by N. Mohareb, Spatial Analysis and Simulation Lab (SASL). Prepared with the assistance of AI.