Introduction

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This book includes reflections about some seminal research activities carried out by the Spatial cognition and planning group in Bari Polytechnic University in recent times.
Over the last decades, challenges to traditional planning and decision-making approaches have developed significantly, reflecting a growing disconnect between formal theories/methodologies and operational realities (Batty, 2022). Spatial planning, originally conceived as a rational and linear process, is increasingly suffering from inadequacy in managing the complexity and dynamism of real-world contexts, leading to plans that are often abstract - if not unrealistic. Its limitations are often evident, especially in the difficulty of defining and then achieving shared objectives in environments typically characterized by diverse and changing interests and needs (Arentze, Timmermans, 2006). The advent of emerging technologies seems to offer new perspectives for planning, providing advanced tools for analysis, interpretation, data management, and decision support. The challenge, therefore, is how to use emerging technologies to build collective and dynamic knowledge, capable of adapting to change and promoting more equitable and sustainable decisions (Cui, Yasseri, 2024). The difficult answer depends on the ability to combine the use of advanced tools with the meaningful inclusion of communities, ensuring that decisions are informed, shared, and actionable. This may require a significant rethinking of

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planning practices, shifting the emphasis from top-down models to more collaborative and adaptive modeling frameworks, capable of integrating diverse perspectives and responding to the evolving needs of communities (Amedeo et al., 2008; Batty, 2013).

In this framework, the present book highlights the critical role of spatial knowledge acquisition, representation, and management in supporting effective spatial planning and decision-making.

Focusing on the complexity of urban systems, Borri, Camarda and Stufano underscore the significance of spatial cognition in decision-making. The paper explores the critical role of understanding spatial forms, relations, and memories to enable effective urban design. Through experiments with students and professionals, the study analyzes how creativity manifests in urban design, influenced by cognitive processes and associative abilities. The discussion pivots to the value of ontologies in preserving spatial sense through IT platforms, demonstrating the potential for knowledge-based decision-support models.

Mastrodonato and Camarda further underscore the importance of cognitive factors in the complex organization of urban space. The study on orientation in wayfinding shows how the physical characteristics of urban environments can significantly impact (and are enriched by) human behavior and experience. This research highlights the need for planners to consider the cognitive dimensions of urban spaces, particularly spatial representation and orientation, to create more user-friendly and accessible environments.

Stufano Melone delves into the significance of spatial cognition in urban planning, by investigating how to enhance the resilience of the city of Taranto. By analyzing spatial primitives and cognitive maps, planners can gain valuable insights into how individuals perceive, represent

and interact with their urban environments. The use of ontologies to represent and organize spatial knowledge provides a framework for understanding complex urban systems and developing more resilient decision-support models.

Berriola and Santoro introduce a multiagent knowledge-exchanging approach integrating online surveys and text analysis tools to support urban regeneration. The paper highlights the application of this methodology to the former asbestos industrial site in Bari (Fibronit), showing how citizen engagement can build public initiatives basing on community knowledge. The approach emphasizes the replicability of combining participatory frameworks and IT-based approaches for sustainable urban planning.

Finally, Patano showcases the potential of data-driven modeling approaches in improving public health and urban planning. The DARE project, with its focus on the "One Health" approach, shows how leveraging big data, AI, and interdisciplinary collaboration can lead to more informed and effective health policies. This has significant implications for urban planning, as it can inform the development of healthier and more sustainable urban environments.

In conclusion, this issue of Plurimondi underscores the critical role of spatial knowledge in supporting effective urban planning and decision-making. By integrating citizen engagement, spatial cognition, data-driven approaches, and historical analysis, planners can develop more informed, inclusive, and resilient urban futures. This requires a shift towards more knowledge-intensive planning processes that prioritize the acquisition, representation, and utilization of relevant knowledge from various sources, including citizens, experts, and historical data.

References

Amedeo D., Golledge R.G., Stimson R.J. (2008), *Person-Environment-Behavior Research: Investigating Activities and Experiences in Spaces and Environments*, New York, Guilford Press.

Arentze T., Timmermans H. (2006), Multi-agent models of spatial cognition, Learning and complex choice behavior in urban environments, in Portugali J. (ed), *Complex Artificial Environments*. Berlin, Springer.

Batty M. (2013), *The New Science of Cities*: Cambridge, MIT Press.

Batty M. (2022), The conundrum of 'form follows function'. *Environment and Planning B: Urban Analytics and City Science*, 49(7), pp. 1815-1819

Cui H., Yasseri T. (2024), AI-enhanced collective intelligence, *Patterns*, 5(11), 101074