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The Sustainable Urban Planning Challenge

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Urban planning has always been an interdisciplinary process requiring the combination and synergy of various scientific disciplines and technical methods. In recent years, there has been an increasingly strong demand for respecting environmental standards on one hand and a trend towards creating cities that are more pedestrian-friendly and suitable for micromobility on the other. Internationally [6], urban and spatial planning is now moving in this direction, influencing local designs accordingly. In the case of the European Union, there has been a massive effort to shape and promote what we call sustainable design, and now in 2025, a significant database and repository of knowledge related to this field has been created [1]. In fact, the European Union considers the adoption of sustainable planning by member states not only an architectural or scientific choice but also a political approach to what we call 'European integration' [2]. Thus, it is evident that urban planning is, among other things, a matter of political and socio-political choices, sometimes imposed from top-down directives and other times developed as bottom-up demands.

In the formation of the new sustainable planning, the rapid technological advancements of recent decades have played and continue to play an essential role, as the process is ongoing. With the adoption of IoT technology even at the level of urban planning, we can now talk about an urban grid, not referring to the traditional grid of plans and blueprints of land uses, urban functions, zones, etc., but the grid co-created by all interconnected elements of the urban 'internet'. Scientists analyze the efficiency and practicality of gridable vehicles [7] while also assessing whether adopting such technology will positively impact the urban environment. Automation has penetrated even the micro-scale design of parking, with Potential Choices being meticulously examined through mathematical simulations and models to find optimal solutions [10]. Even the management and design of sidewalks [9] can be optimized with smart tools aiming to reduce congestion, improve urban air quality, and encourage the creation of communities with a high quality of life. Similarly, as electric mobility gains traction in citizens' daily lives, GIS systems are used to conduct geospatial analyses to determine optimal locations for electric vehicle charging stations [4]. Geographic statistical methods using GIS are widely employed to improve urban planning for a more sustainable future [3]. Another trend, increasingly feasible due to technological advancements, is shared mobility, which can be incorporated into urban social culture and future planning through automated vehicles and ITS, overcoming weaknesses in traditional public transport systems like fixed schedules [8]. At the scale of micromobility, such as bike sharing, extensive studies have been conducted on their overall efficiency, while specifically, it is interesting to observe how micromobility is influenced by social factors and human behaviors [5].

In general, it is clear that city planning increasingly relies on collecting data related to how cities function, how citizens choose to move, the modes of transport they use, the routes they follow, and utilizing this data for new proposals for future improved plans but also for real-time optimization of the urban situation as urban elements now interact and connect with one another more than ever before. It is evident that a decision-making framework has now emerged regarding sustainable urban planning, consisting of (a) planners and decision-makers, (b) new technological tools and mobility - transportation methods, (c) the public, and (d) the demand for sustainability and environmental improvement. The four sides of this framework have a reciprocal relationship of influence: for

example, many sustainable design proposals would be unfeasible or difficult to implement without technological progress. At the same time, citizens might simply not desire the proposed transition for various reasons. Within this equation, the spatial planning scientist and decision-makers often act as intermediaries, arbitrators, and, in many cases, proponents of often disruptive proposals. It will be fascinating—technologically, sociologically, and even philosophically—to see where this complex and multi-layered process will lead, as it will shape what cities and human societies will look like in the future and how we want them to be.

Keywords: Sustainable development; Sustainable Urban Planning; Urban Planning; Smart Planning; Micromobility

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