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Digital spatial models enhance urban estate planning and development

Real Estate Predictions 2025

Urban planning in the 21st century will face unprecedented challenges. As cities grow and evolve, the complexity of managing urban environments is already increasing, with issues such as land use allocation, grant of title, jointly owned property, decentralized market information, and entangled processes with multiple stakeholders. This article explores how platforms built around generative AI (GenAI), holistic processes, and a flexible data ecosystem can help address these challenges and enhance the planning of urban environments.

Challenges in modern urban planning

Modern urban planning is a multifaceted discipline that involves numerous stakeholders, including government agencies, private developers, community groups and environmental organizations. Stakeholders often operate with their own objectives and timelines, which can create conflicts of interest or timing and lead to inefficiencies. Significant challenges that impact development projects include:

- **Fragmented data sources**: urban planners must integrate data from various sources, which are often incompatible or incomplete.
- **Stakeholder misalignment**: differing priorities and lack of communication among stakeholders can lead to conflicting decisions and delays.
- **Complex regulatory environments**: navigating the myriad local, regional, and national regulations adds layers of complexity to urban planning projects.
- **Sustainability concerns**: balancing economic growth with environmental sustainability is a persistent challenge.

Integrated digital environment

To address the above challenges, a new concept is gaining traction – the integrated digital environment (IDE), built around a digital model of a city. The IDE creates a comprehensive and dynamic digital twin of the urban area, using key metrics such as real estate market trends, road traffic and social-infrastructure-related information – and powered by GenAI.

In itself, this digital model has limited value, until it's complemented by a robust set of processes and data flows. These can build stakeholder commitment to the IDE and make it an important tool for shared planning, data consolidation, and decision-making.

Case study

To demonstrate how effective the IDE approach could be, Deloitte built a GenAI-powered digital model for Riyadh – a vibrant city in Saudi Arabia that embraces its rich history while striving to become a modern hub for tourism and business.

Background: Riyadh is currently undergoing extensive development activity, as the city transforms into a global destination for tourism and business. With several mega-events on the horizon, including EXPO 2030 and FIFA World Cup 2034, the city must plan for housing needs, tourist inflows and the required infrastructure – a hugely complex process that can benefit from adopting an IDE approach powered by GenAI.

Scenario analysis: As part of the case study, a 905,000 sq m plot in the Ar Rahmaniyyah district of Riyadh was selected, to evaluate the potential options for developments on the site. These options were assessed against a range of parameters, including:

1. Livability metrics:

a. Population density (dwellings per hectare)
b. Infrastructure provision (educational, healthcare, retail, leisure)
c. Walkability index
d. Provision of green areas

2. Financial metrics

a. Sufficiency of demand
b. Financial feasibility for the commercial developer.

In the broader application of IDE, the parameters can be customized and benchmarked using local and global target values, including livability and overall sustainability metrics, as well as financial measures of profitability. The tool can incorporate assessments of dwellings per hectare for existing districts, and 'sandbox' different scenarios to balance financial performance with city-level integration. Using GenAI, the system conducts assessments based on input from a data lake that contains market transactions, infrastructure information, reviews, and other relevant data.

Outcome: The analysis of the single plot using multiple parameters led to more than 2,500 options being generated in just minutes, and which can easily be assessed against both strategic and financial objectives. The scenarios can be also tested for a broader city-level assessment of available land and/or redevelopment opportunities. The outputs and user interfaces can be customized to allow stakeholders the flexibility to gain unique insights that reflect their own specific requirements.

Conclusion

The integration of GenAI and holistic processes into urban planning represents a significant advance in managing the complexities of modern cities. By creating an integrated digital environment, planners and developers can overcome the challenges of fragmented data, stakeholder misalignment and regulatory complexity, gain rich and holistic insights, and ultimately make tomorrow's cities more sustainable and efficient.
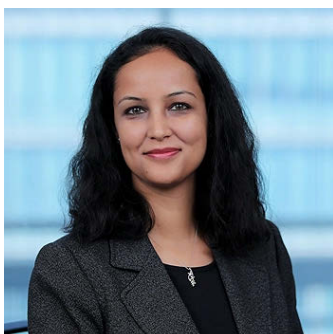
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