



Real Estate Predictions 2022

Creating smarter urban environments

**How AI-powered Generative Design can
enhance urban and development planning**



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When considering the design of buildings and land use planning for urban development, traditional processes result in a number of constraints. First of all, data-driven design is challenging, since there are so many factors to consider, including economics, feasibility, social governance, land use and capital investment. Secondly, the planning output represents a fixed-state based on current problems, while development might take years. This makes it more vulnerable to shifts in the market or changes to the environmental and social context. Finally, it takes a lot of effort to make a plan, inhibiting our ability to quickly generate alternative scenarios or pivot our approach.

Urban and development planning is currently undergoing a massive upgrade, taking a data-centric approach to design that leverages the power of AI and analytics. In so doing, it introduces an agile approach to master-planning, creating a centralized digital twin to manage an urban ecosystem in operations.

Traditional processes for the design of buildings and land use planning for urban development render a number of constraints. A data-centric approach to design, based on the power of AI and data analytics, could enhance a massive upgrade of urban and development planning. Here's why and how.

How does AI play a part?

The rise of artificial intelligence (AI) and cloud-based processing has created a wealth of opportunities across all industries. It offers us the power to approach complex computing problems with incredible speed and accuracy that exceed our human capacity. What would have taken humans weeks to complete can now be resolved in hours. This is the basis for a revolution in the design process which can change our approach to planning buildings and cities.

A comparison to nature

To explain generative design best, let's have a look at nature. When we consider a flower, for example, we marvel at its perfection. Every nuance is perfectly calibrated to capture moisture, to survive in harsh conditions, and to reproduce in a living ecosystem. However, this flower did not come to be overnight. It took millions of years of evolution. Millions of design iterations one after the other, trial and error, update after update. This flower collected information from its existence to change its properties over time until it reached the peak of performance and efficiency. Generative design emulates this process of evolution.

Data-driven design

Generative design creates a virtual world to test versions of a design solution. Various data are entered, for example about building use, building height, construction area, loss rate, cost of construction, GHG emissions targets, number of residents, availability of green space, access to natural light, connectivity, and proximity to transport. A generative design process then renders this information into a series (hundreds) of typologies and spatial development options through computational design: the basic building blocks to inform detailed master planning. However, it doesn't stop there. Each

typology is tested and validated based on simulating various conditions, comparing one typology against the other to identify weaknesses and redundancies. This creates stronger and stronger design options the model achieves acceptable operational performance based on project success criteria. In essence, thousands of hours of design evolution are being condensed into a single afternoon—based on the power of the processor that is running the computations. It would be impossible to achieve the same output through traditional, human-powered processes.

Computational design as an enabler of better human design

This does not mean that we should replace designers. Instead, we should use computational design to provide a defensible and quantifiable spatial development framework to guide detailed human-led design. Instead of doing feasibility analysis and concept design, human designers are able to focus on creative decision-making associated to experience design, while relying on data-driven feasibility and project resilience.

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