

Construction productivity lagging behind

Why is there little to no improvement in the productivity of the construction industry in the past 50 years?



The climate cost of growth

Is our relentless pursuit of development

driving us toward an unsustainable carbon

future?



Urbanisation and social cohesion

Is rapid urbanisation deepening the divide

between thriving communities and those left

behind?

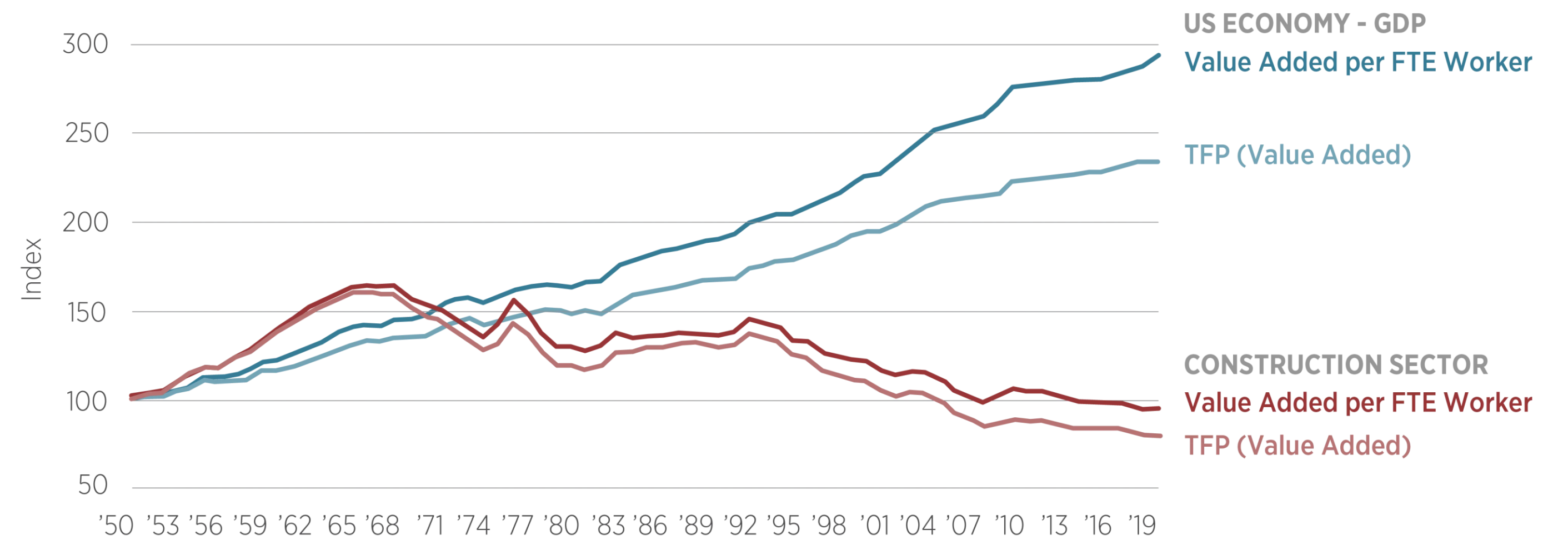
An aerial, isometric view of a city grid. The buildings are rendered in a light blue color, with one building in the center highlighted in a warm orange color. The perspective is from a high angle, looking down at the city blocks.

Form to FUTURE : Bringing Vision into Reality .

Part 1 : Innovation

Productivity in the construction industry has flatlined in the past 50 years

Indexes of Value Added Per Full-Time-Equivalent (FTE) Worker and Total Factor Productivity (TFP), Overall US Economy and Construction Sector (BEA Data)

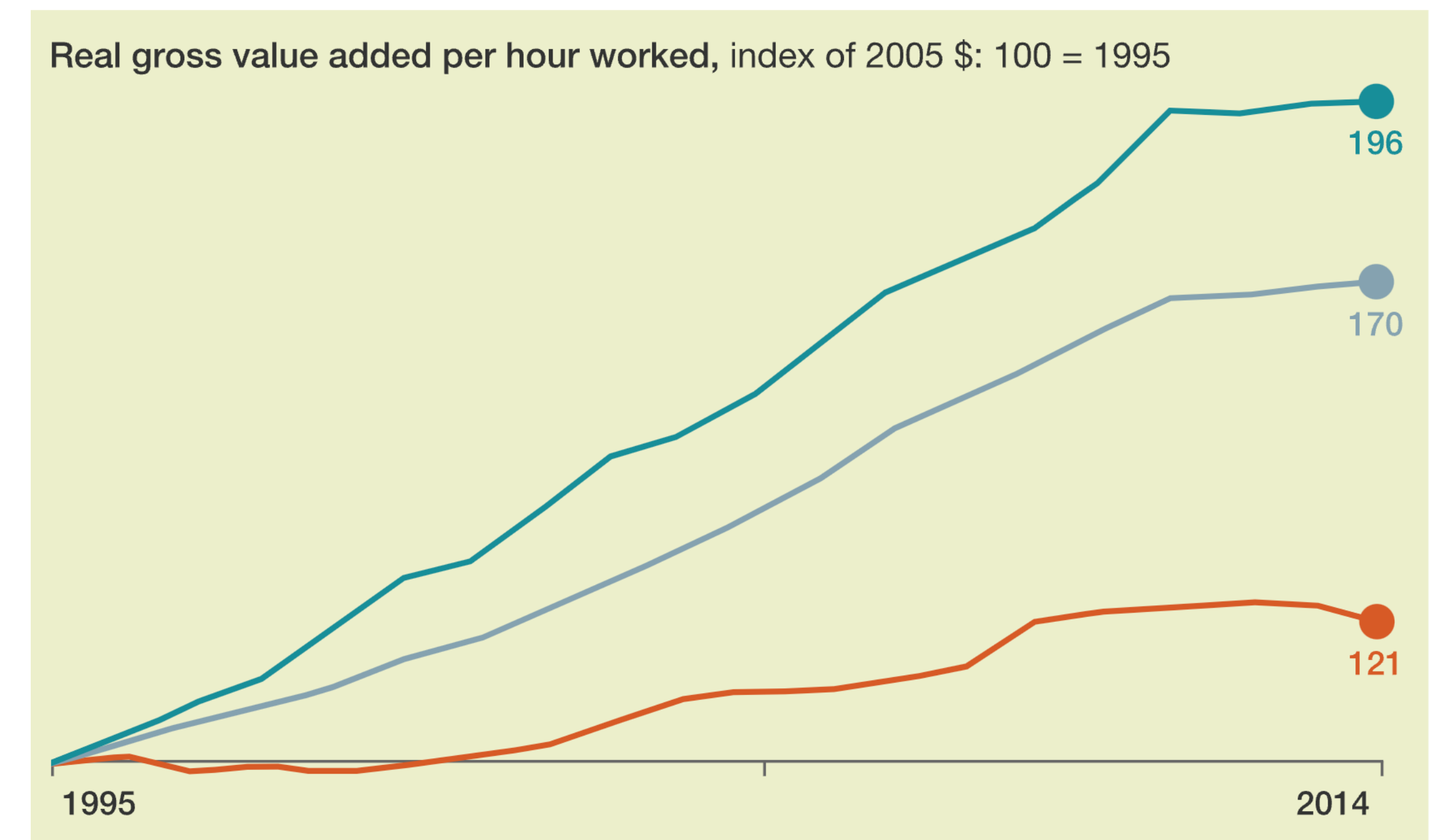


Note: This figure shows indexes of US construction sector labor productivity and total factor productivity (TFP) from 1950 to 2020. For comparison, it also plots the same indexes for the overall economy. Throughout the 1950s and well into the 1960s, both measures of construction sector productivity grew steadily. Indeed, they outpaced their whole-economy counterparts during that period. By 1970, however, the construction sector's labor productivity and TFP had both begun to fall. This downturn was not temporary; the decline has continued for the past half-century.



\$1.6 trillion of annual savings by bringing productivity in line with other sectors

Globally, labor-productivity growth in **construction** lags far behind that of **manufacturing** or the total economy.



Source: GGCD-10; national statistical agencies of Turkey, Malaysia, and Singapore; OECD, Rosstat; US Bureau of Economic Affairs; US Bureau of Labor Statistics; WIOD; World Bank; McKinsey Global Institute analysis

McKinsey&Company



Hyundai Motor Group Innovation Centre (HMGICS) Singapore

20 acre

87,000 m²

100 workers

30,000 vehicles annually





**Mesopotamian
brick, 3500 BC**



Mesopotamian brick



Colosseum, 70-80AD



Eladio Deste, 1984

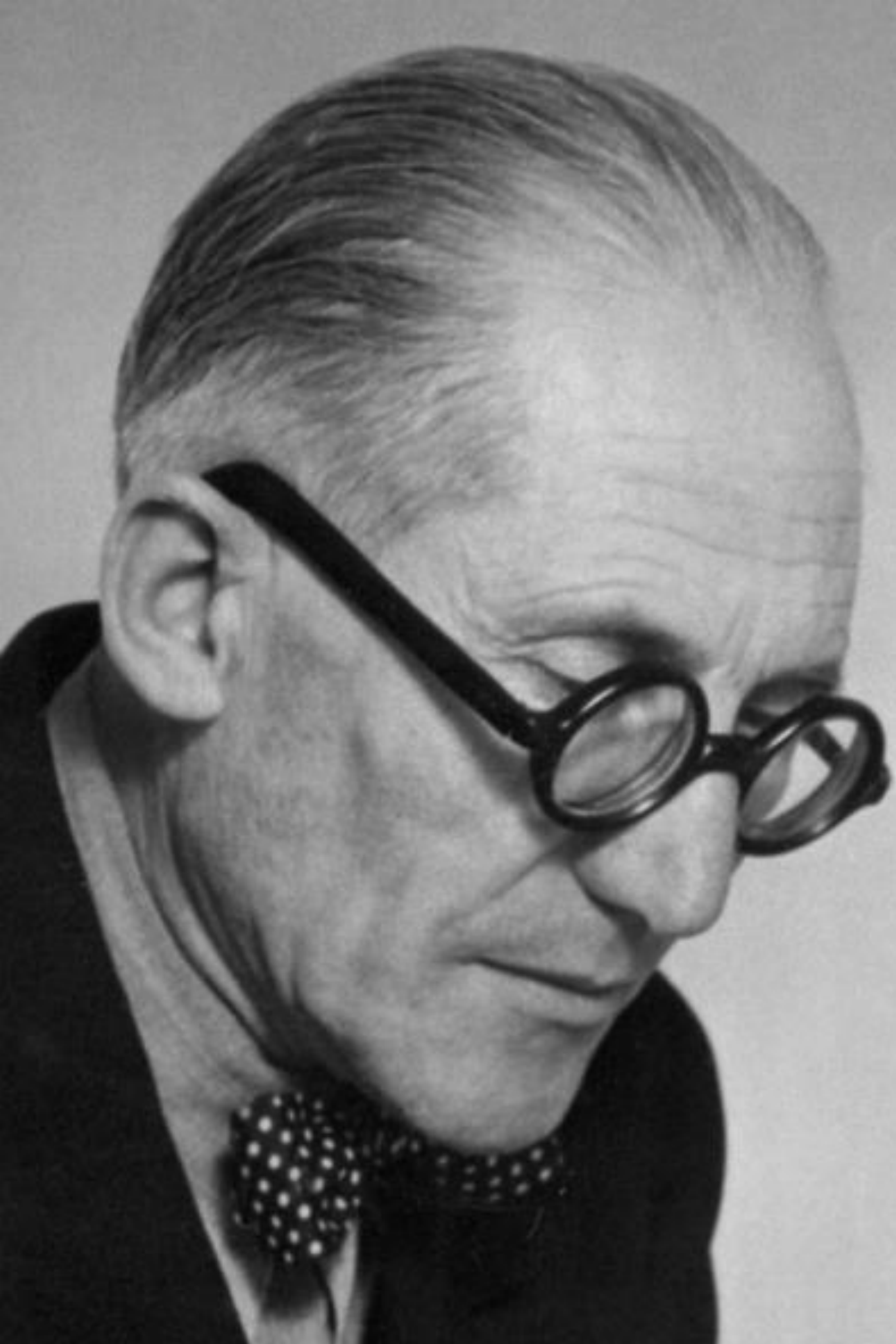
The brick: from structure to skin



Louis Kahn, 1962



NADAAA, 2019



**“Une maison est une
machine-à-habiter”**

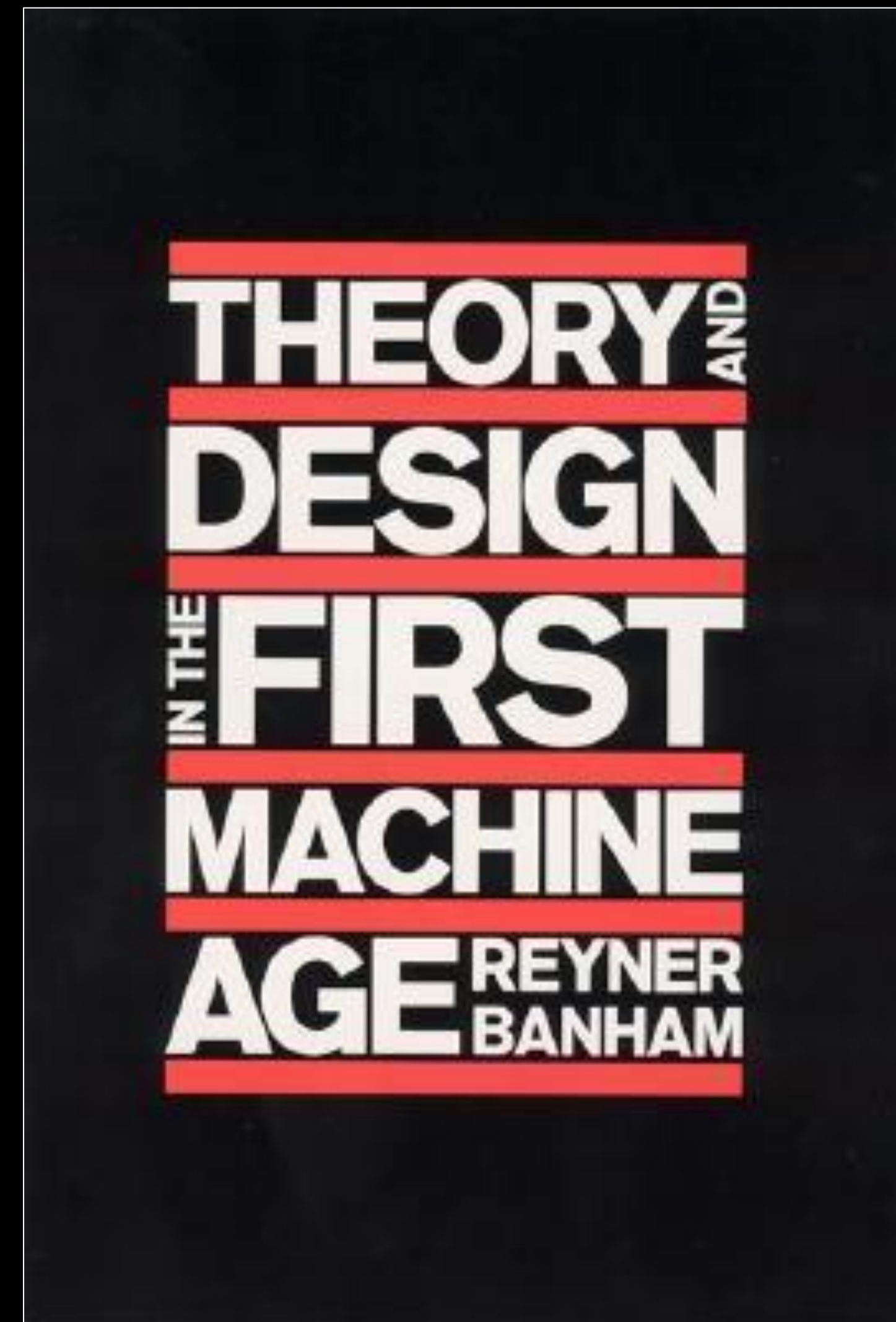
Le Corbusier, Vers Une Architecture, 1923

**“A house is a
machine
for living in”**

An architectural model of the Ville Radieuse urban plan, showing a central core of tall, cylindrical towers arranged in a grid, surrounded by a dense network of streets and smaller buildings. The model is set against a dark background, highlighting the geometric forms and the radial layout of the city.

Ville Radieuse, 1924

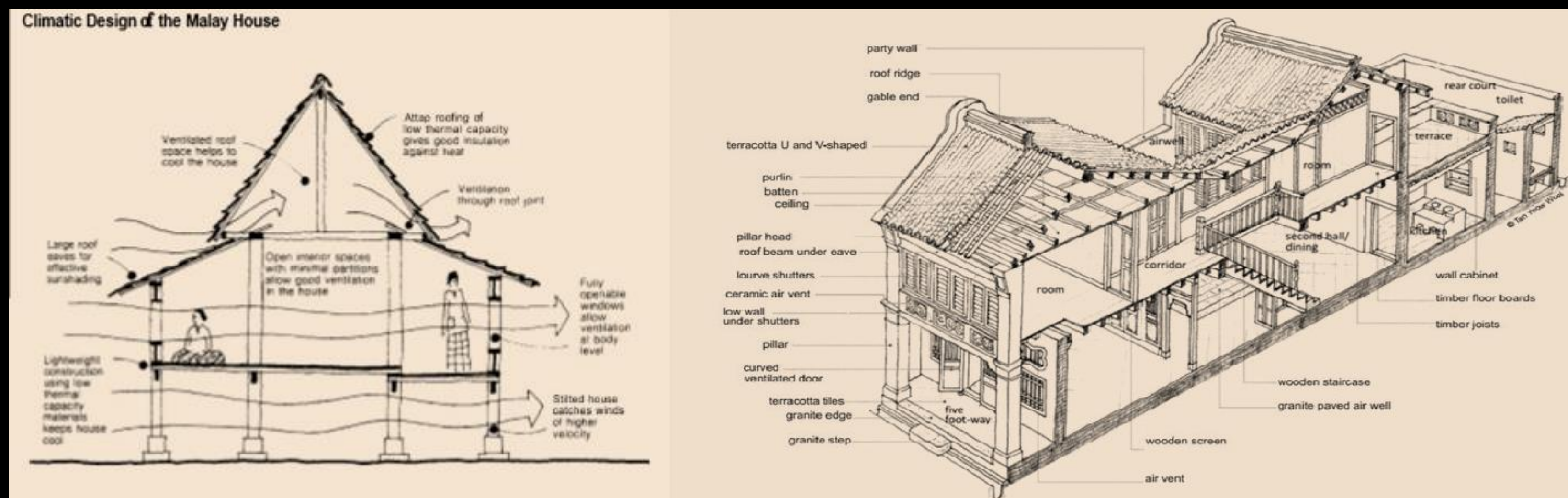
Architecture has attempted to respond to industrialisation since the first machine age



*Theory and Design in the First Machine Age,
Rayner Banham, 1960*

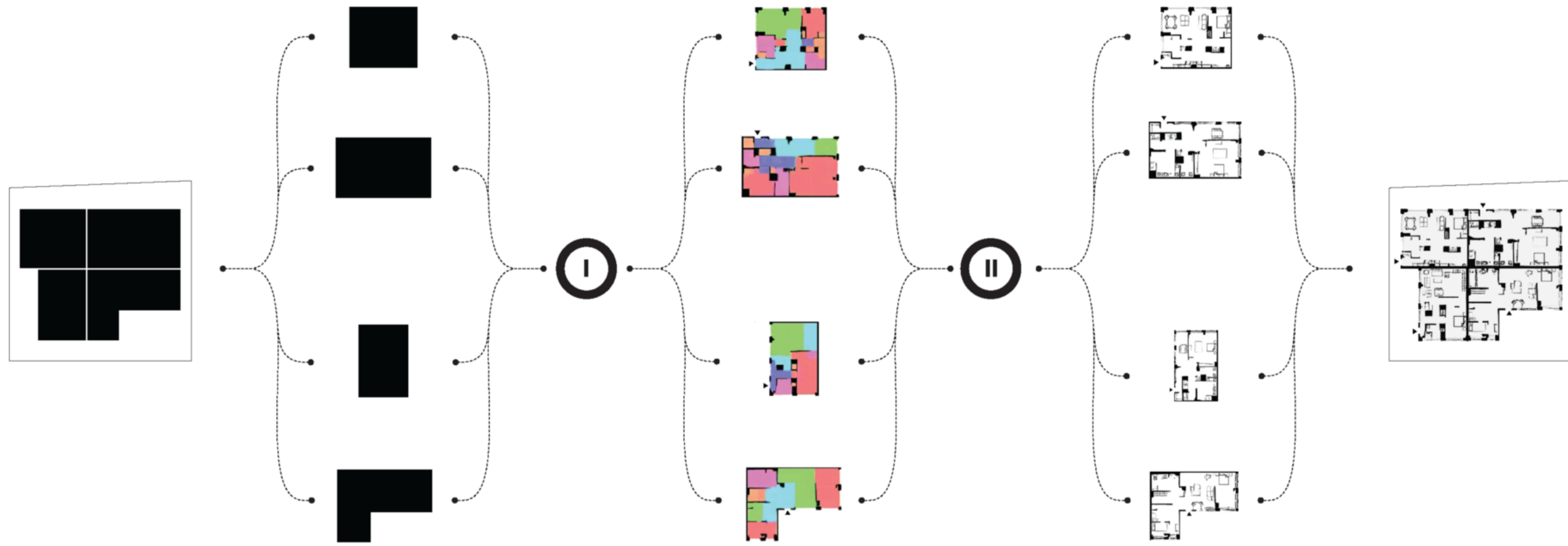
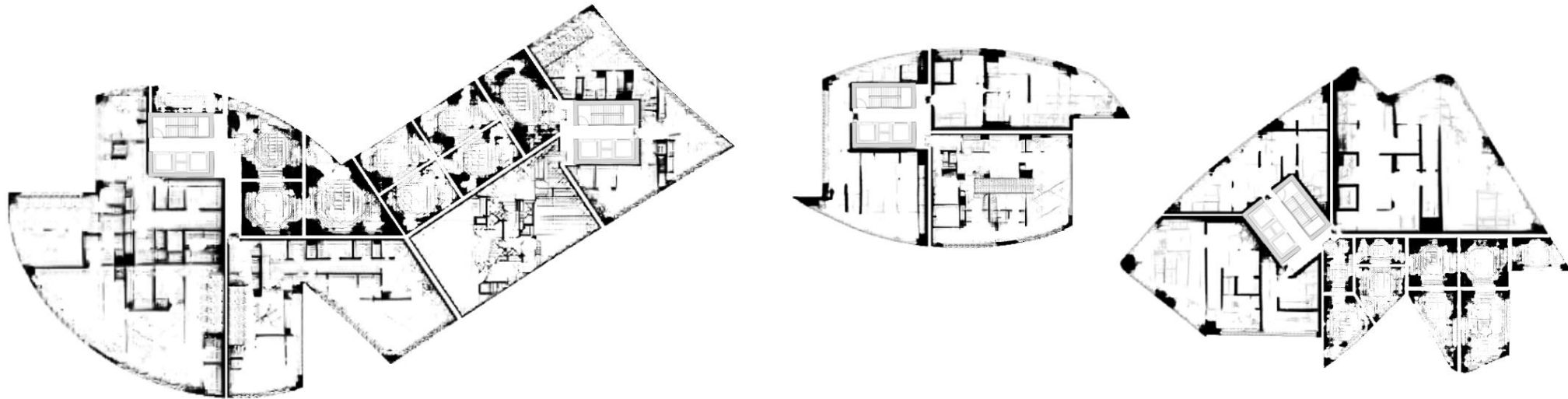
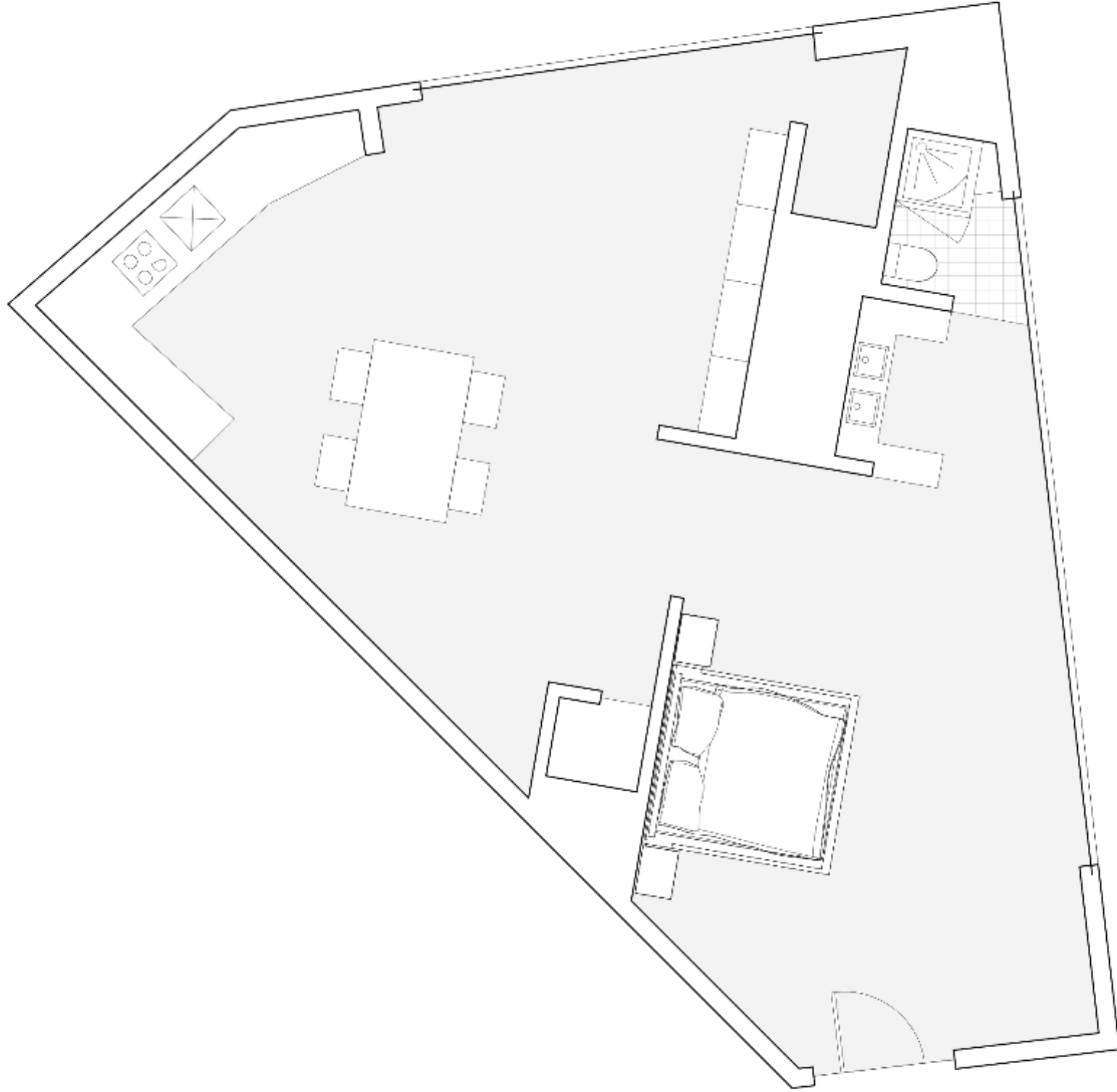
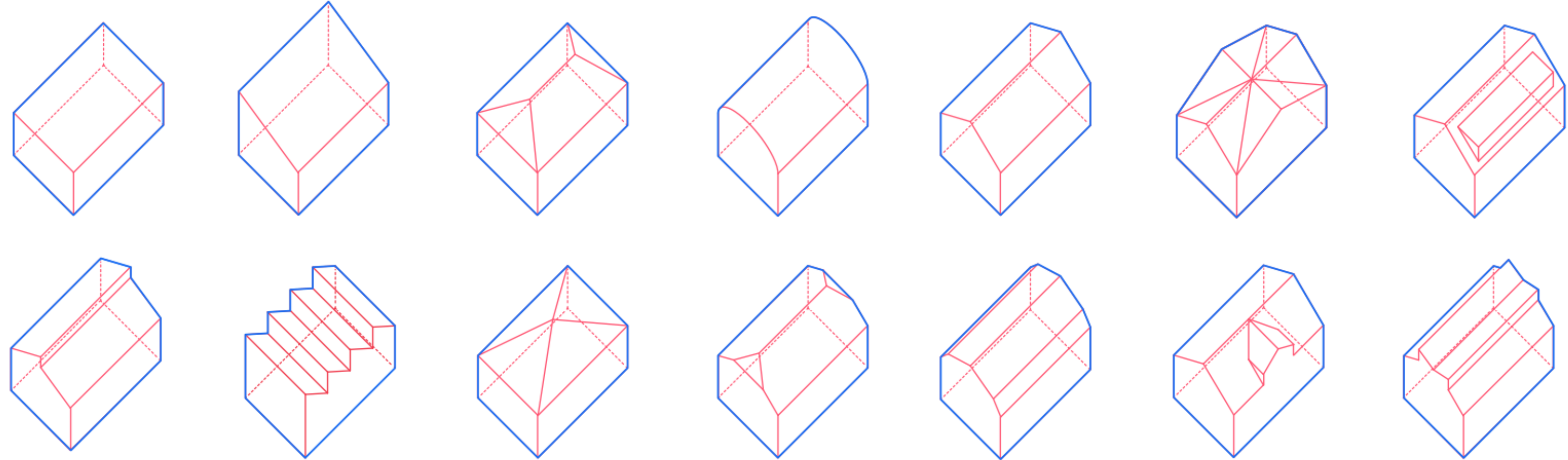
Where do we go from here?

Looking forward while at the same time learning from our past:



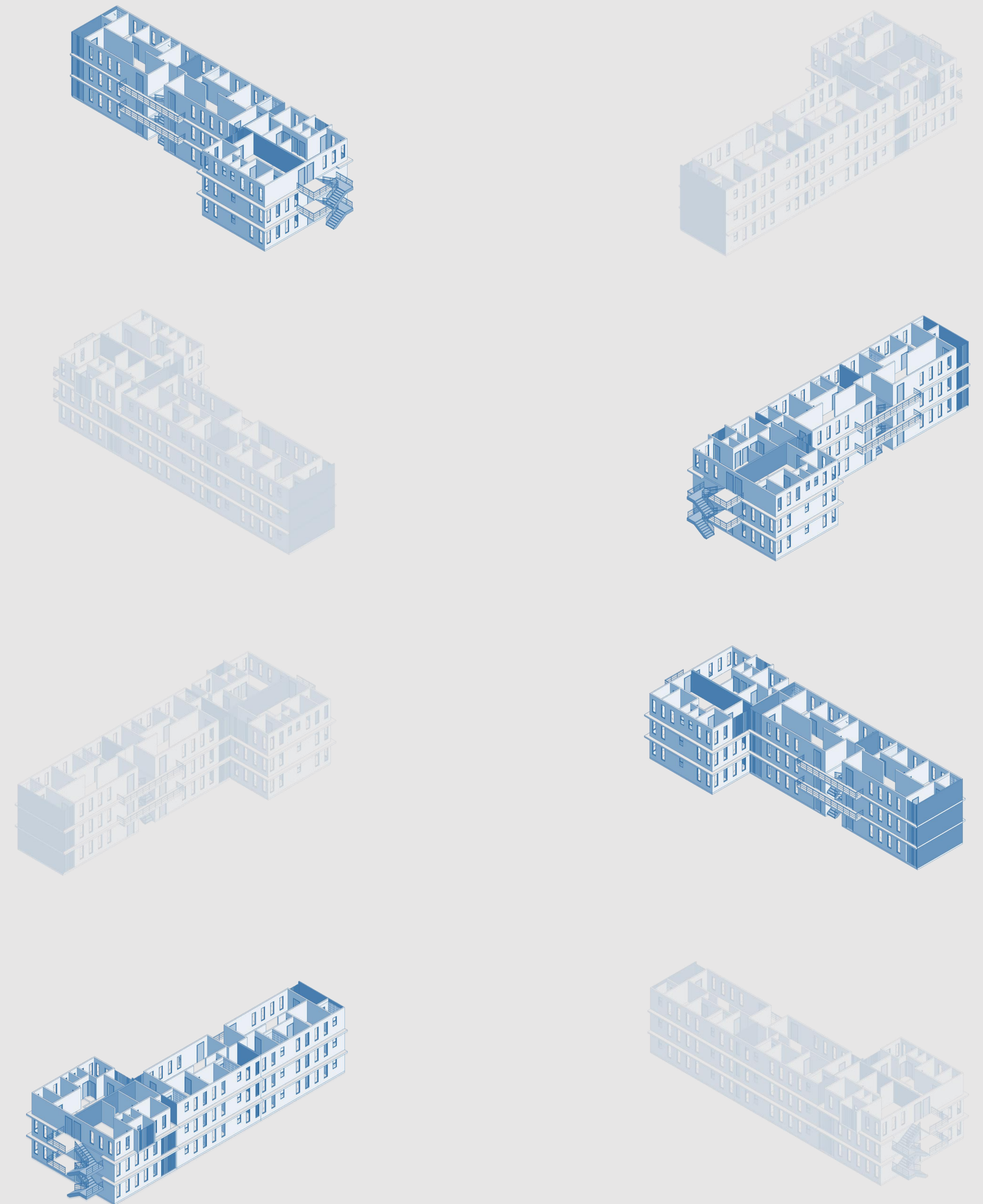
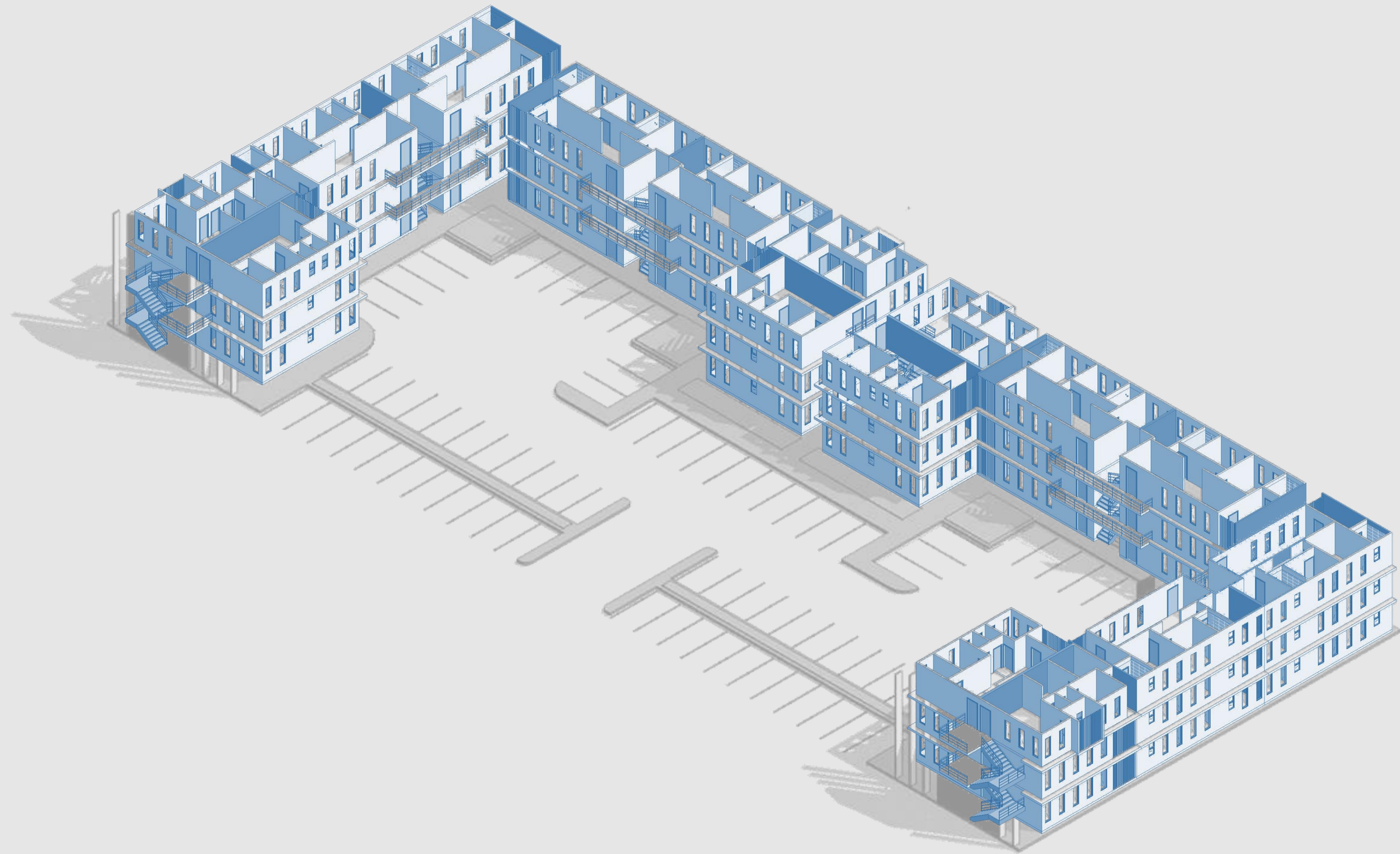
from the **kampung house**
to the **shophouse**

iterative prototyping

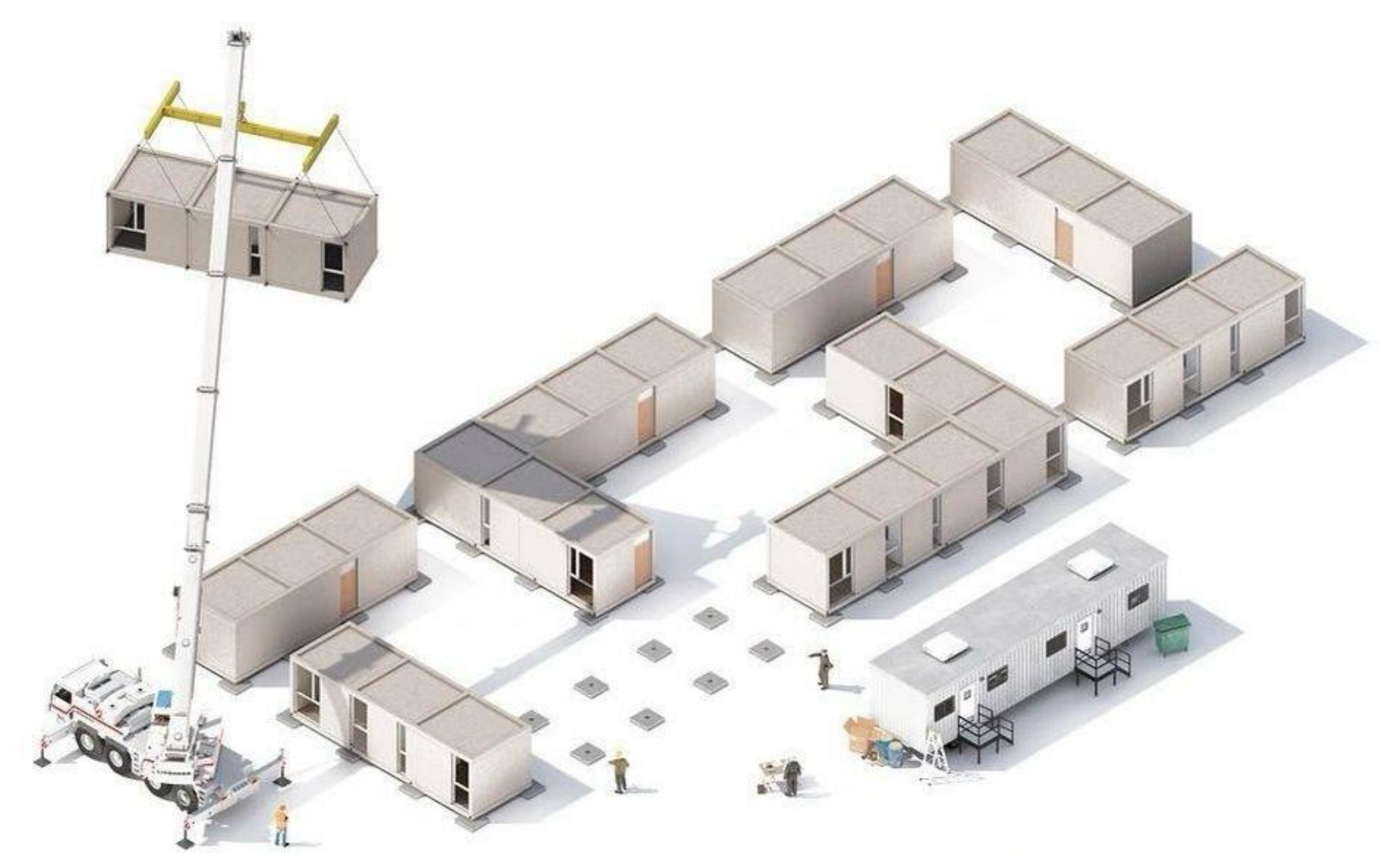


AI + Architecture : Towards a New Approach, Stanislas Chaillou

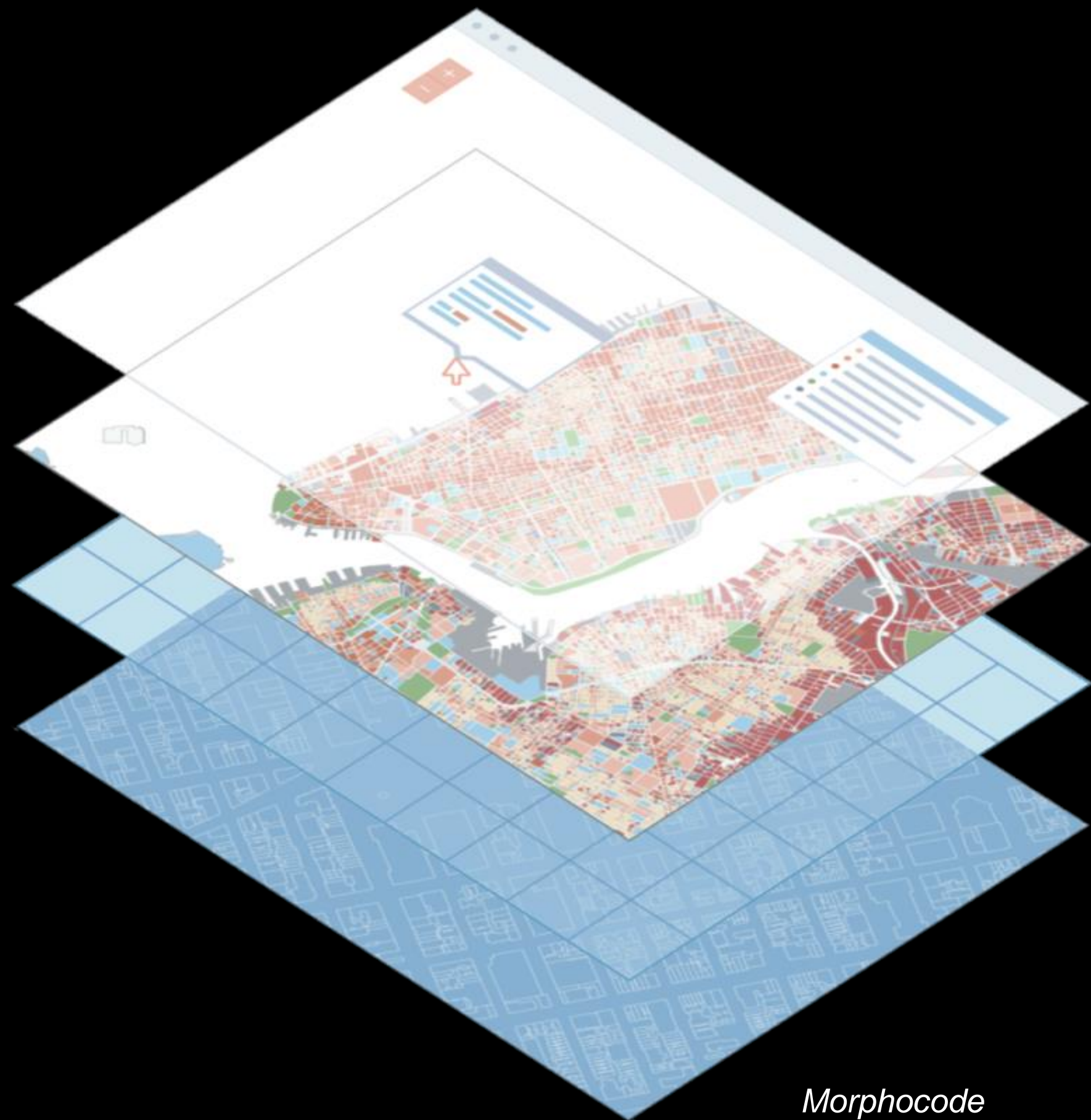
modularisation



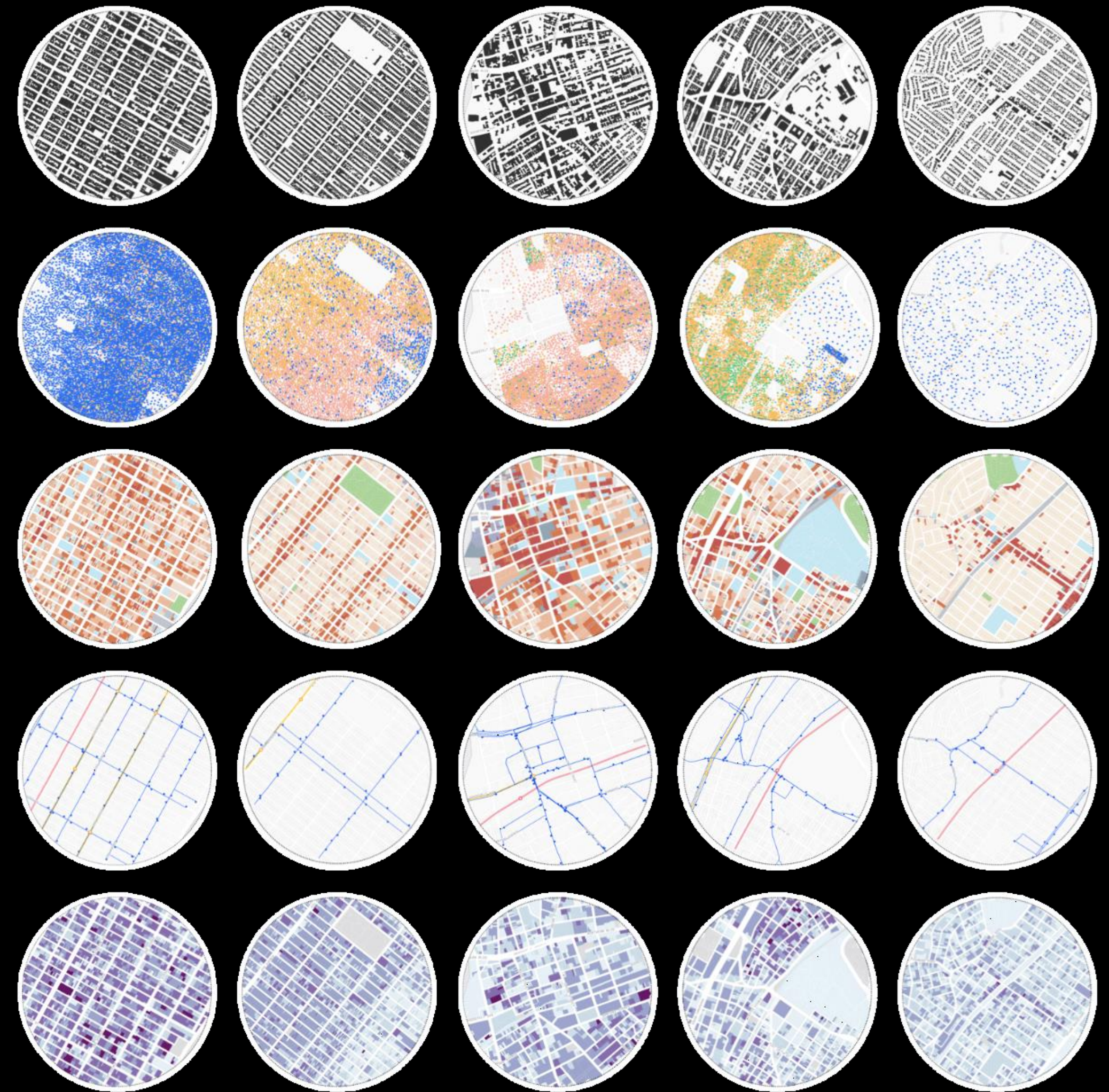
industrialisation



urban informatics & digital twin



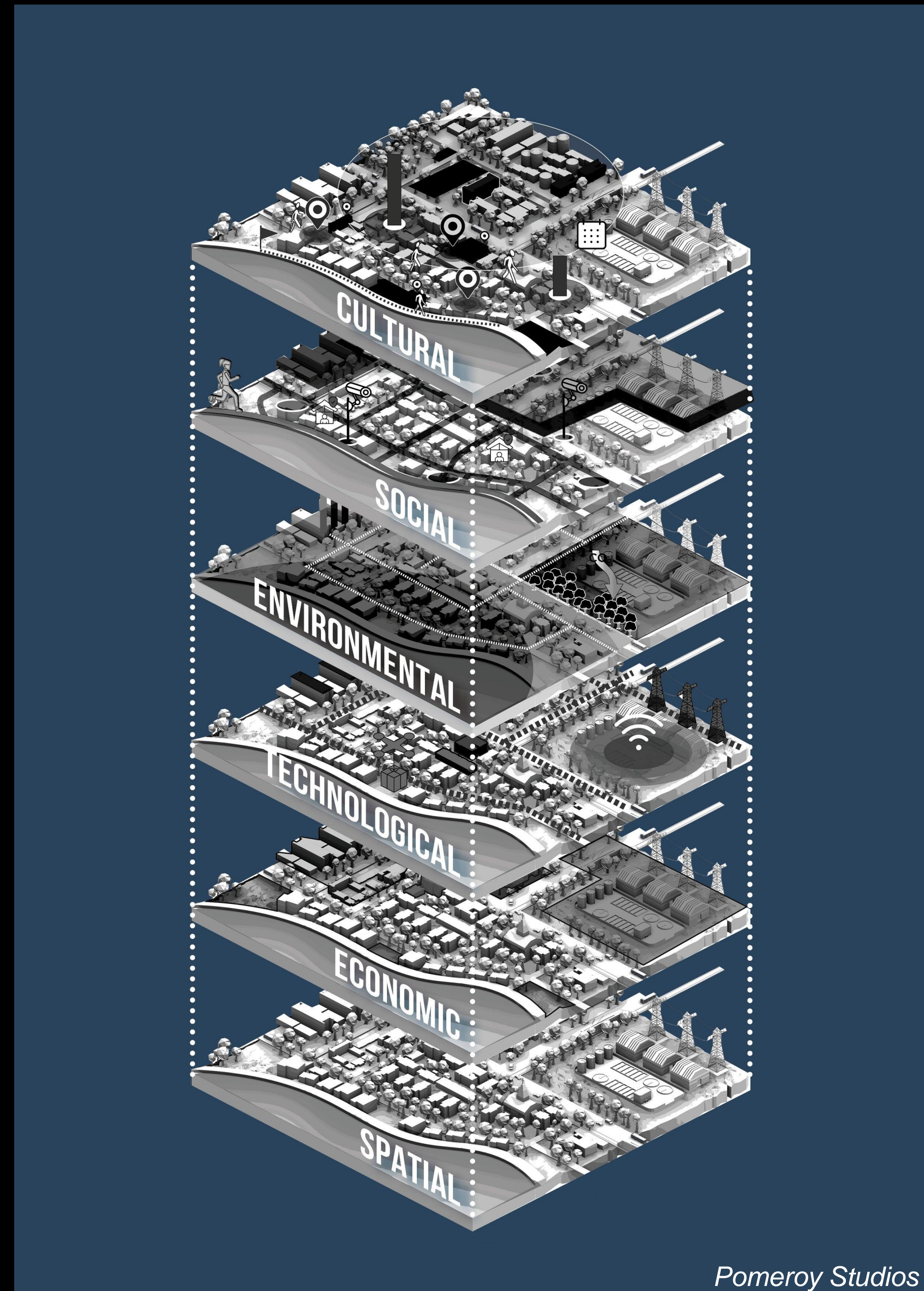
Morphocode



mapping key urban
indicators; physical,
environmental,
infrastructural & cultural

optimise city systems

simulate scenarios



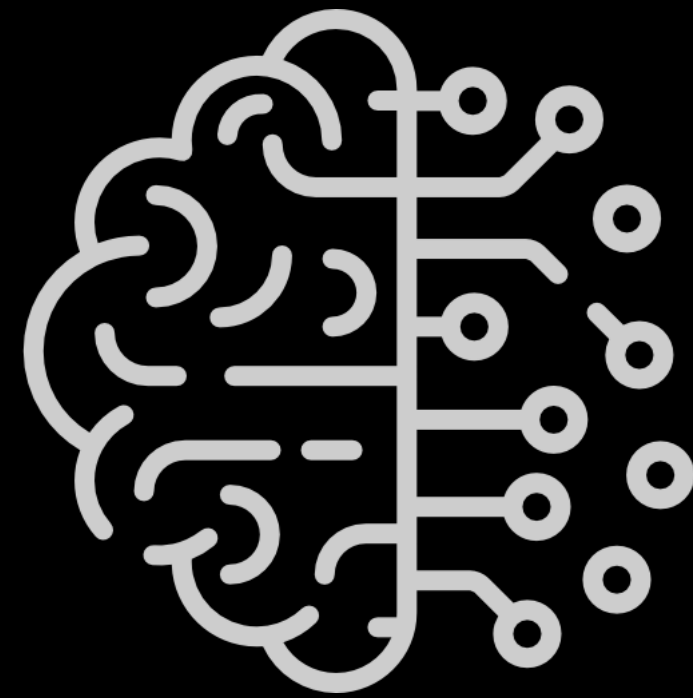
Part 2 : Resilience

A photograph of a server room with rows of server racks. The racks are illuminated from within, and the background shows a sunset or sunrise scene with trees and a bright orange sky. The text "AI's looming climate cost" is overlaid in white on the left side of the image.

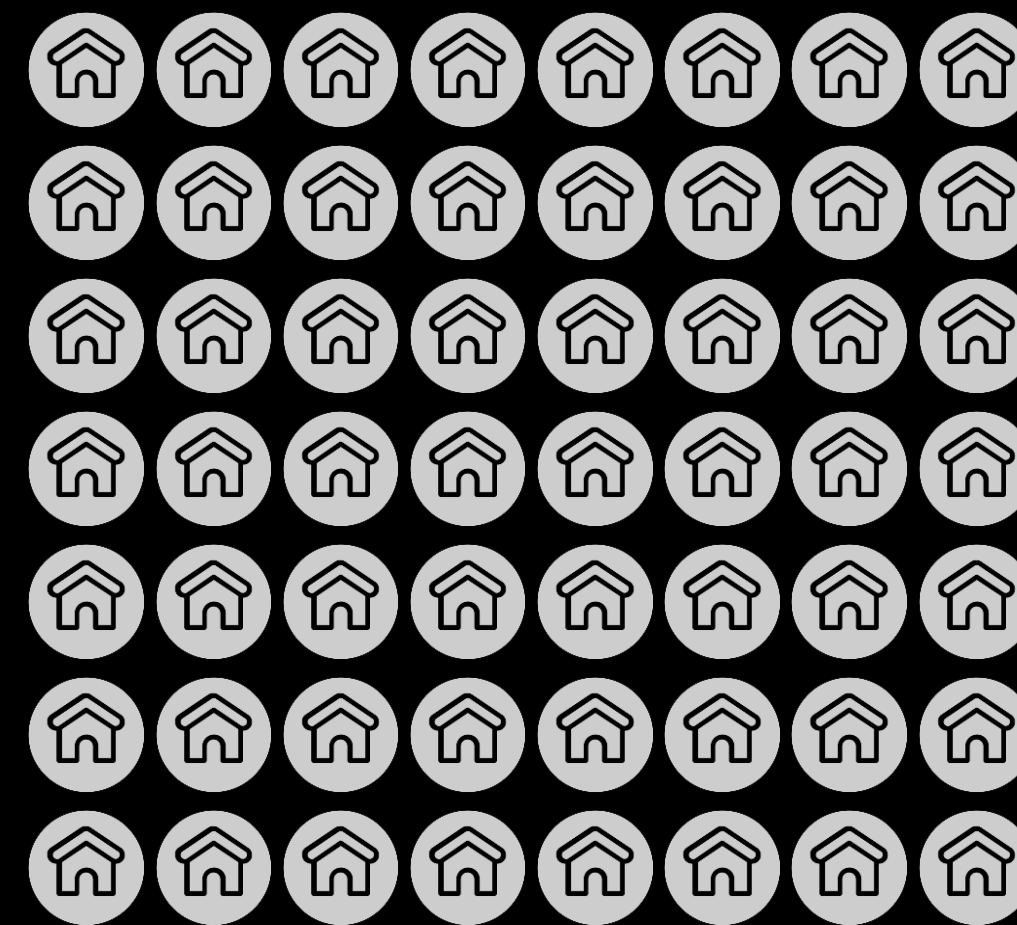
AI's looming climate cost

one 100MW data centre

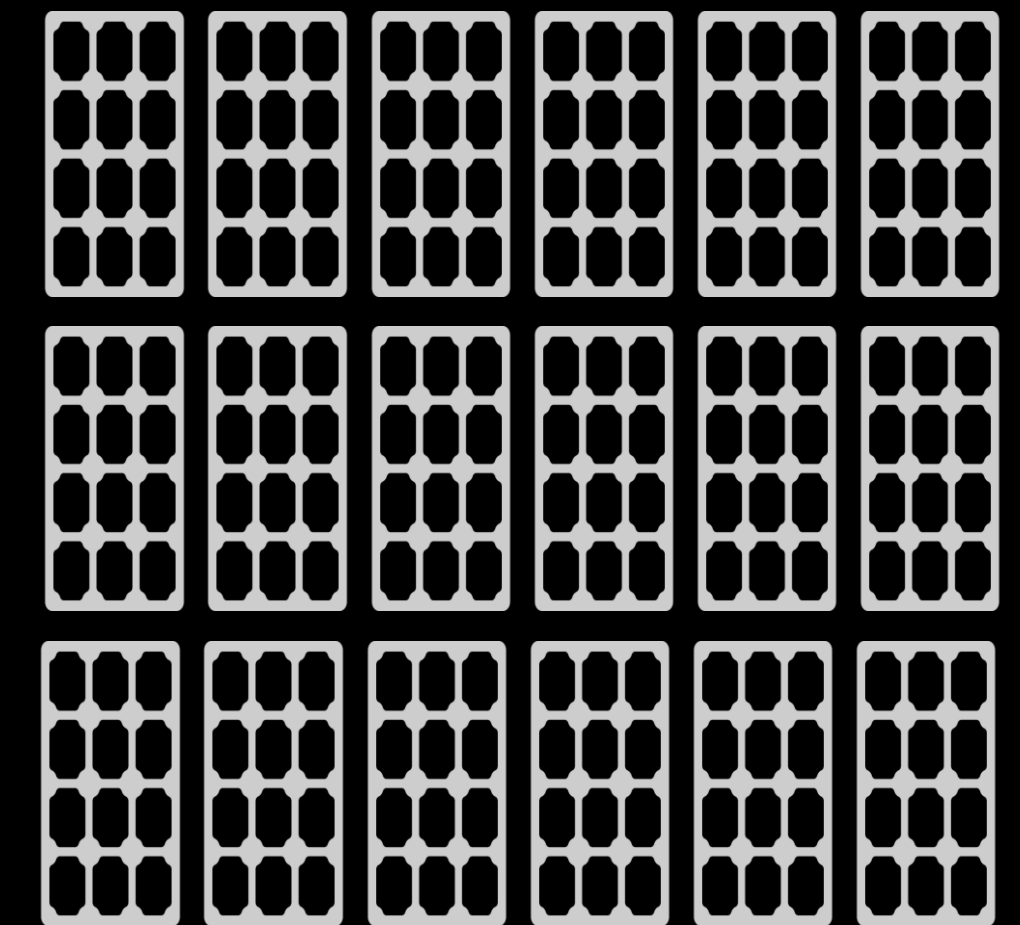
emits 650,000
tonne of CO²
annually



...which can
power
87500 homes



... equivalent to
1250 acre of solar
farm

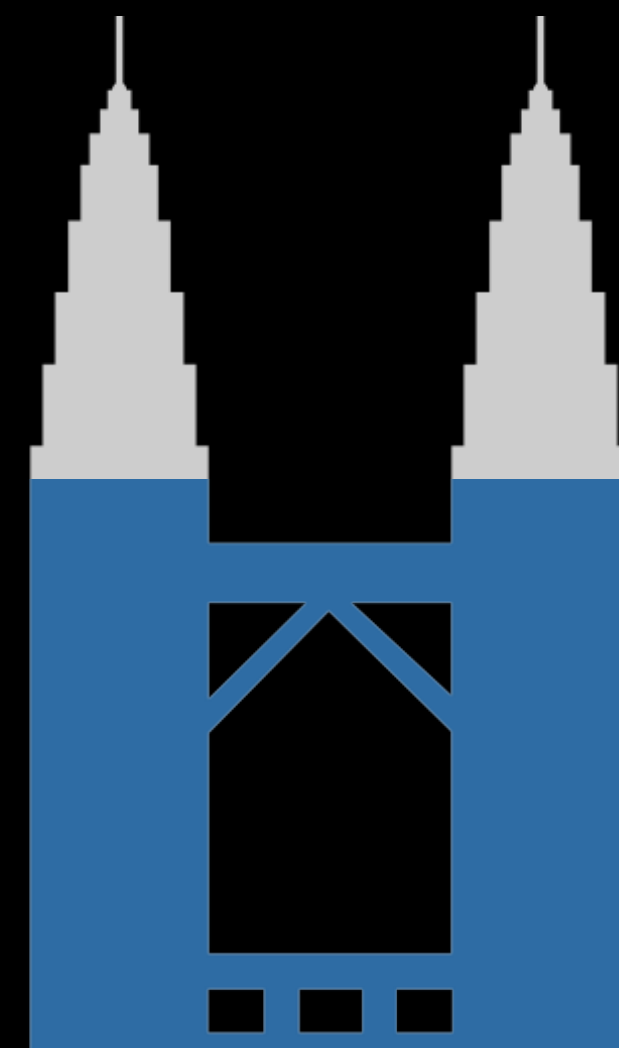


one 100MW data centre

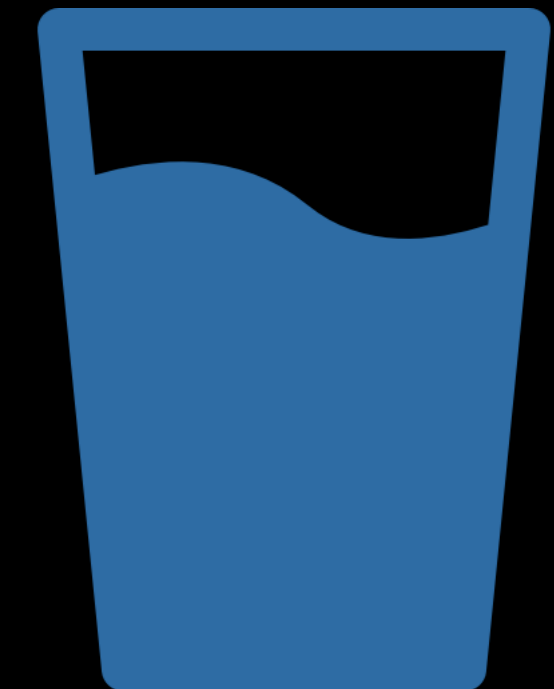
consumes 850 MI
water annually

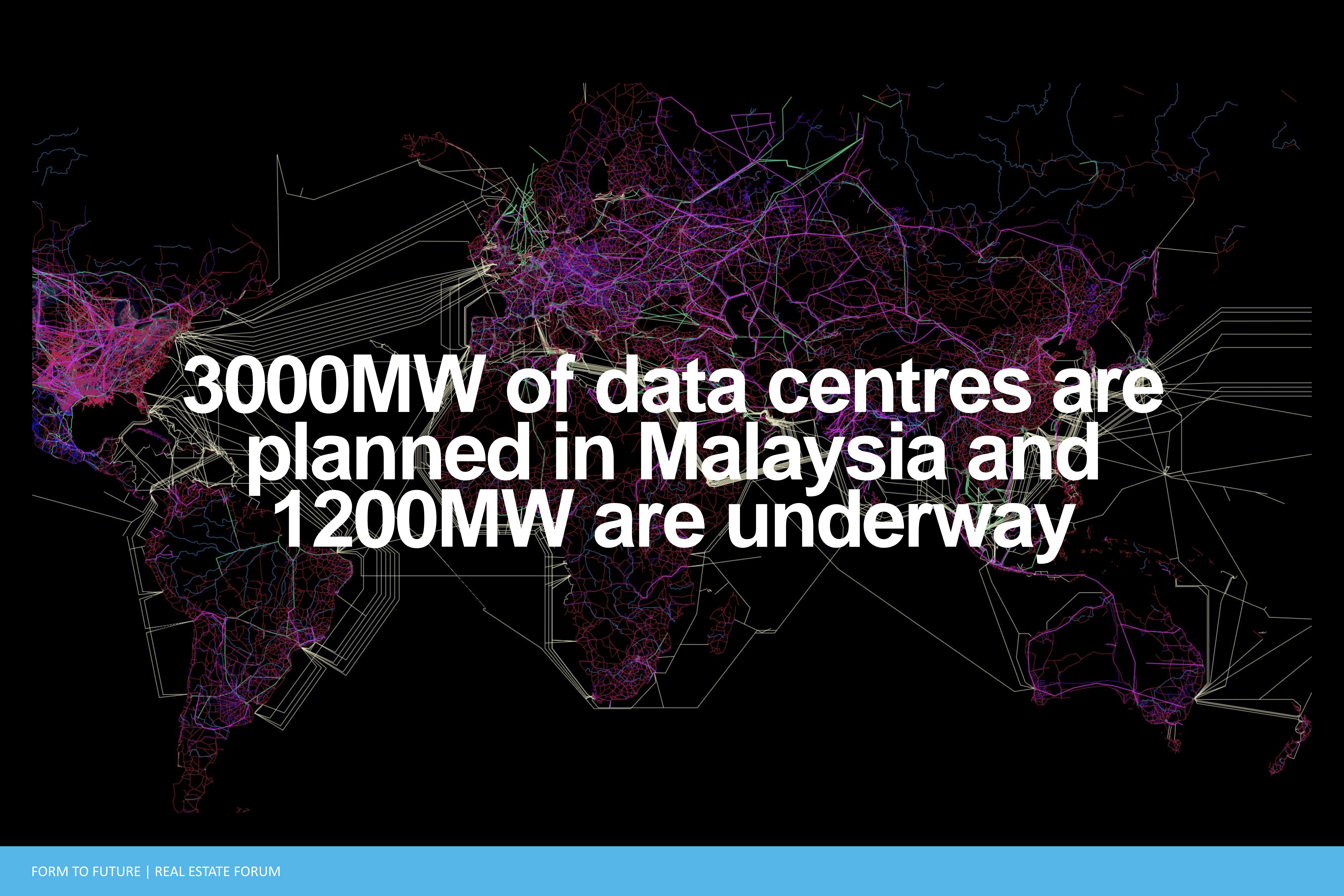


... can fill 60% of
Petronas Twin
Towers ...



... currently
sourced from
potable water





**3000MW of data centres are
planned in Malaysia and
1200MW are underway**

A photograph of a mangrove forest. The trees have thick, gnarled trunks and dense green foliage. The water in the foreground is calm, reflecting the trees and the sky. The overall scene is lush and green.

Opportunities in plain sight

embodied resources in a 18 km² township



**1 km²
ponds**



**2 km²
parks**



**6 km²
roof**



**125,000
population**

1,200,000 kWp

54,000 Mt

4,500,000 m³

36,000 MI

4,400 MI

515,000 GJ

2,000 t CO²

solar energy

solid waste

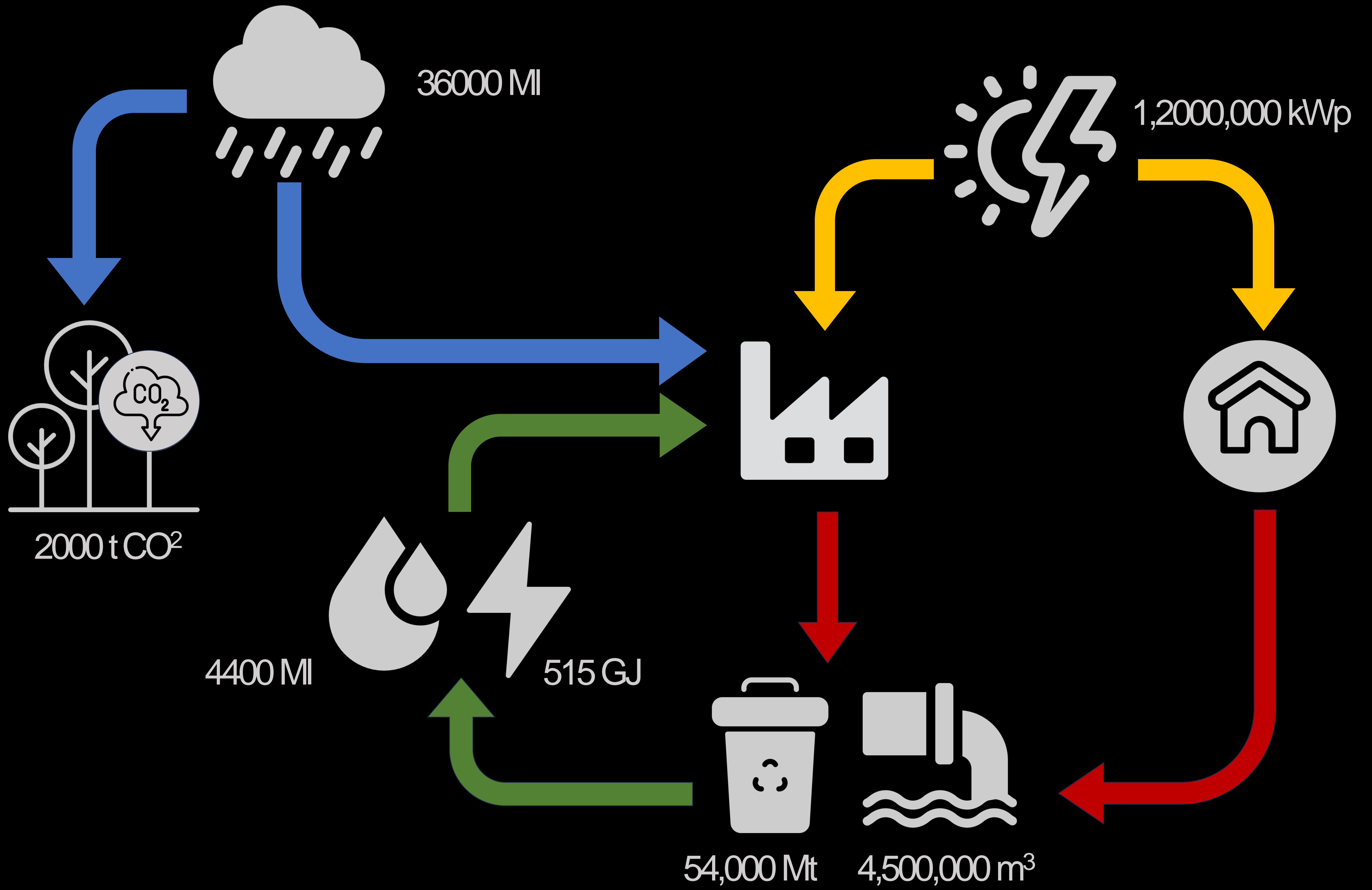
sewage

rainwater

recycled water

energy from waste

offset from parks



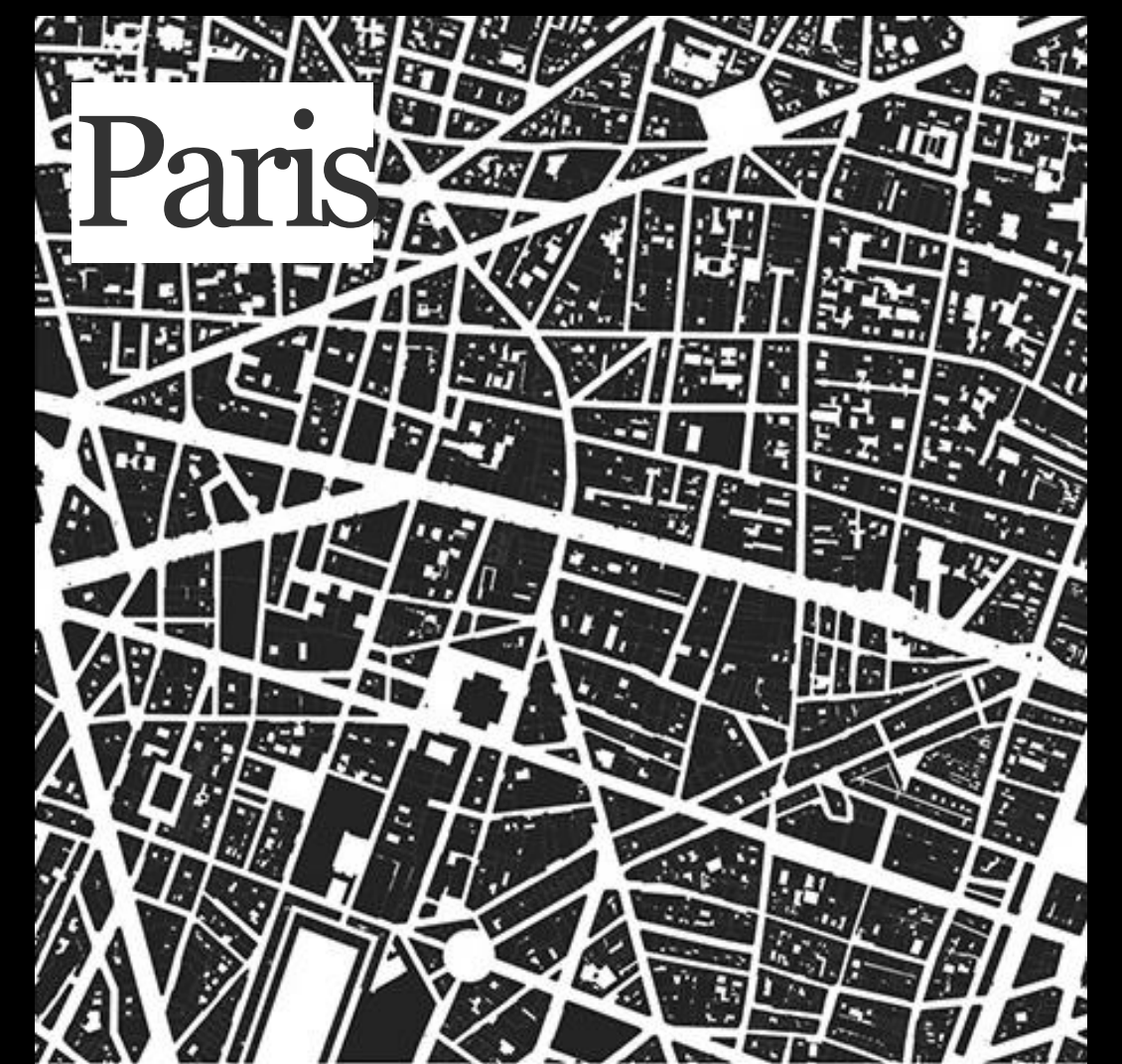
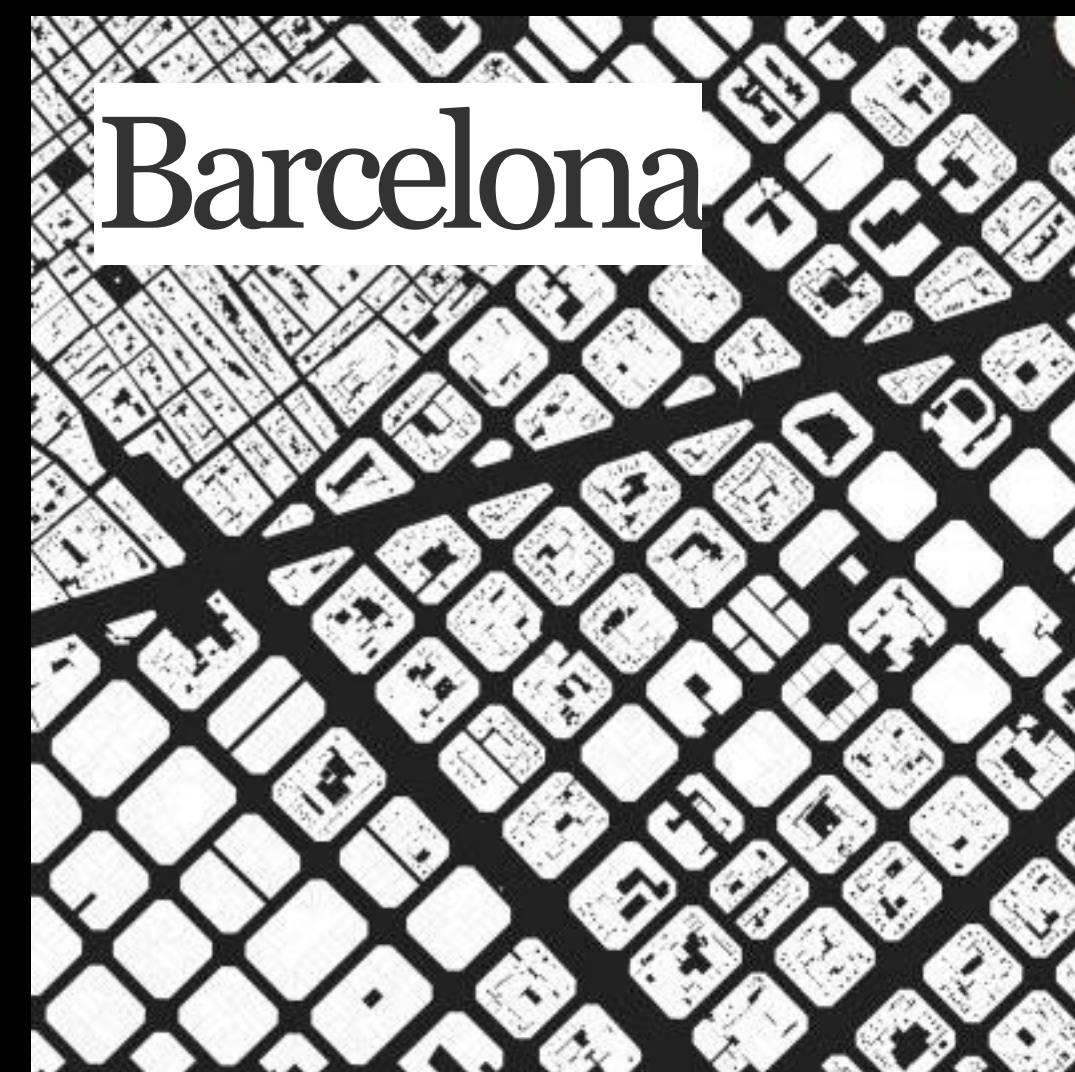
Part 3: Inclusivity

An aerial photograph of a suburban residential area. The image shows a dense grid of houses with various roof colors (red, blue, grey). A central feature is a large, irregularly shaped park or green space with a winding path and a small pond. To the right, a river flows through the area. The overall layout is typical of a planned suburban development.

The (sub)urban experience is becoming increasingly isolating



Noli Map of Rome, 1736

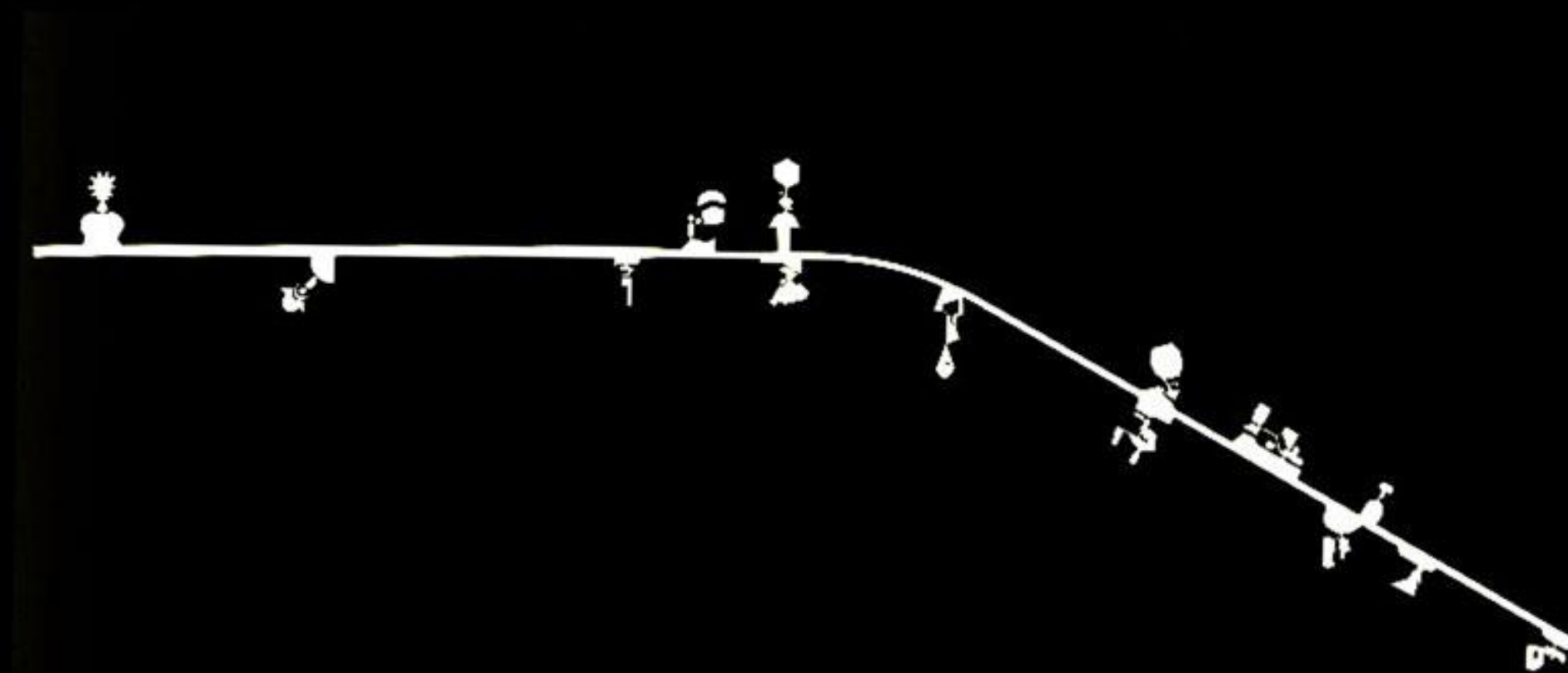


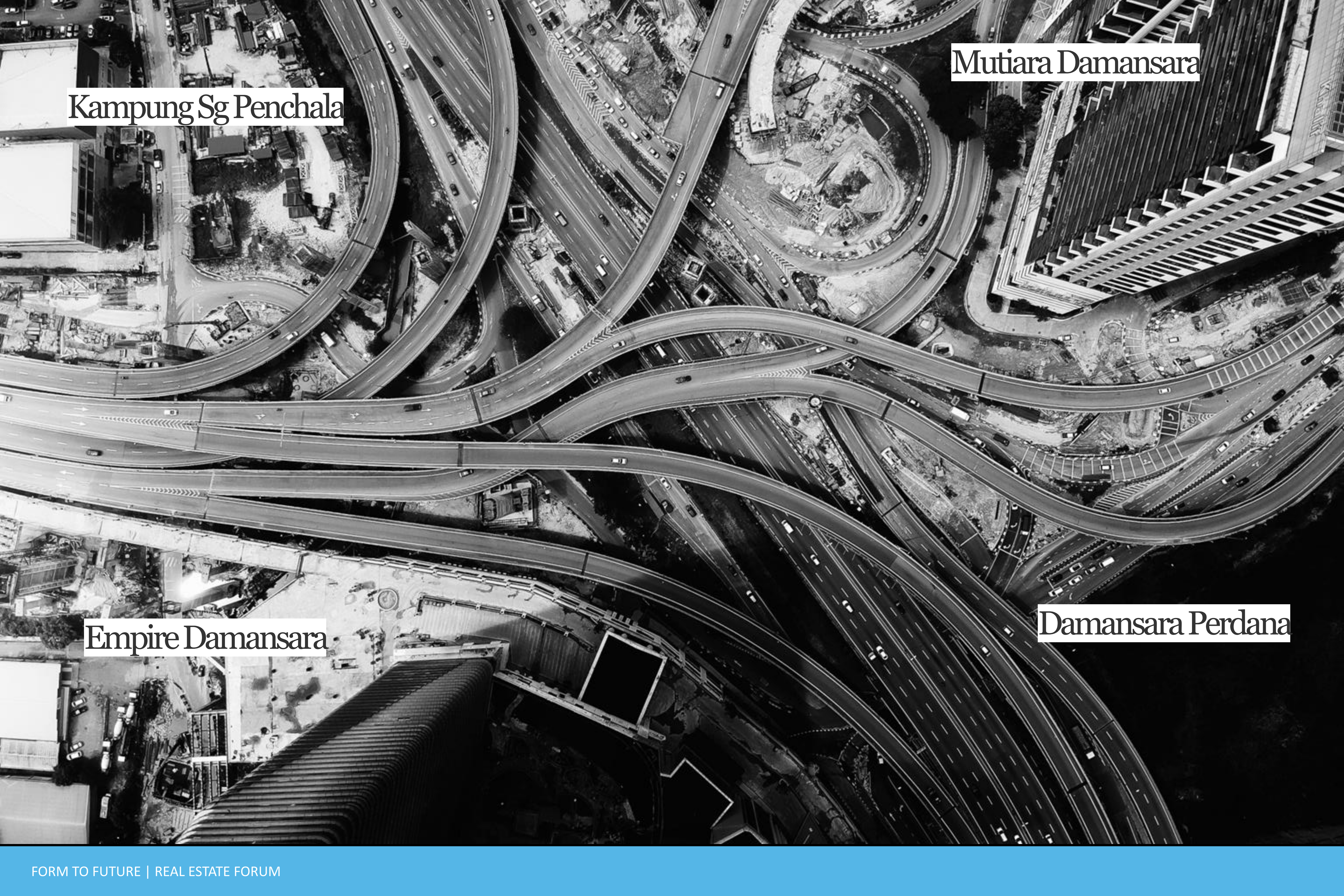
Who do we design our cities for?



“Las Vegas is to the Strip what Rome is to the Piazza.”

Venturi, Scott & Brown, Izenour, Learning From Las Vegas, 1972





Kampung Sg Penchala

Mutiara Damansara

Empire Damansara

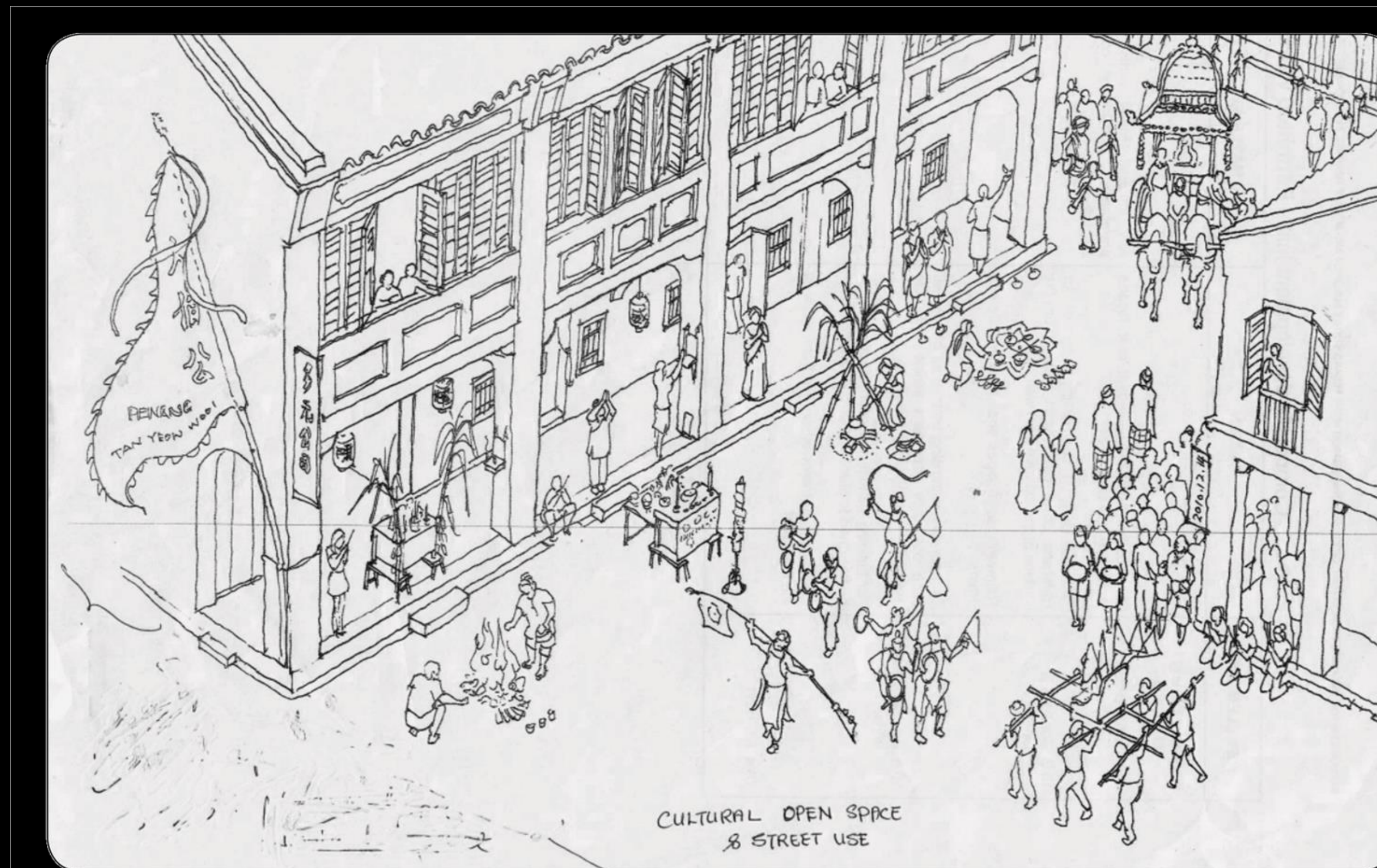
Damansara Perdana

A detailed historical map of George Town, Jamaica, from 1785. The map shows a dense urban grid with numerous streets and buildings. Key features include St. George's Church in the center, the Fort Cornwallis on the right, and various streets and landmarks labeled. The map is color-coded with various shades of green, brown, and purple. The text 'Learning from our past: George Town urban morphology' is overlaid in large, bold, black letters, and 'Kelly Map of George Town, 1785' is overlaid in a white box with black text.

Learning from our past: George Town urban morphology

Kelly Map of George Town, 1785

Learning from our past: George Town cultural open spaces

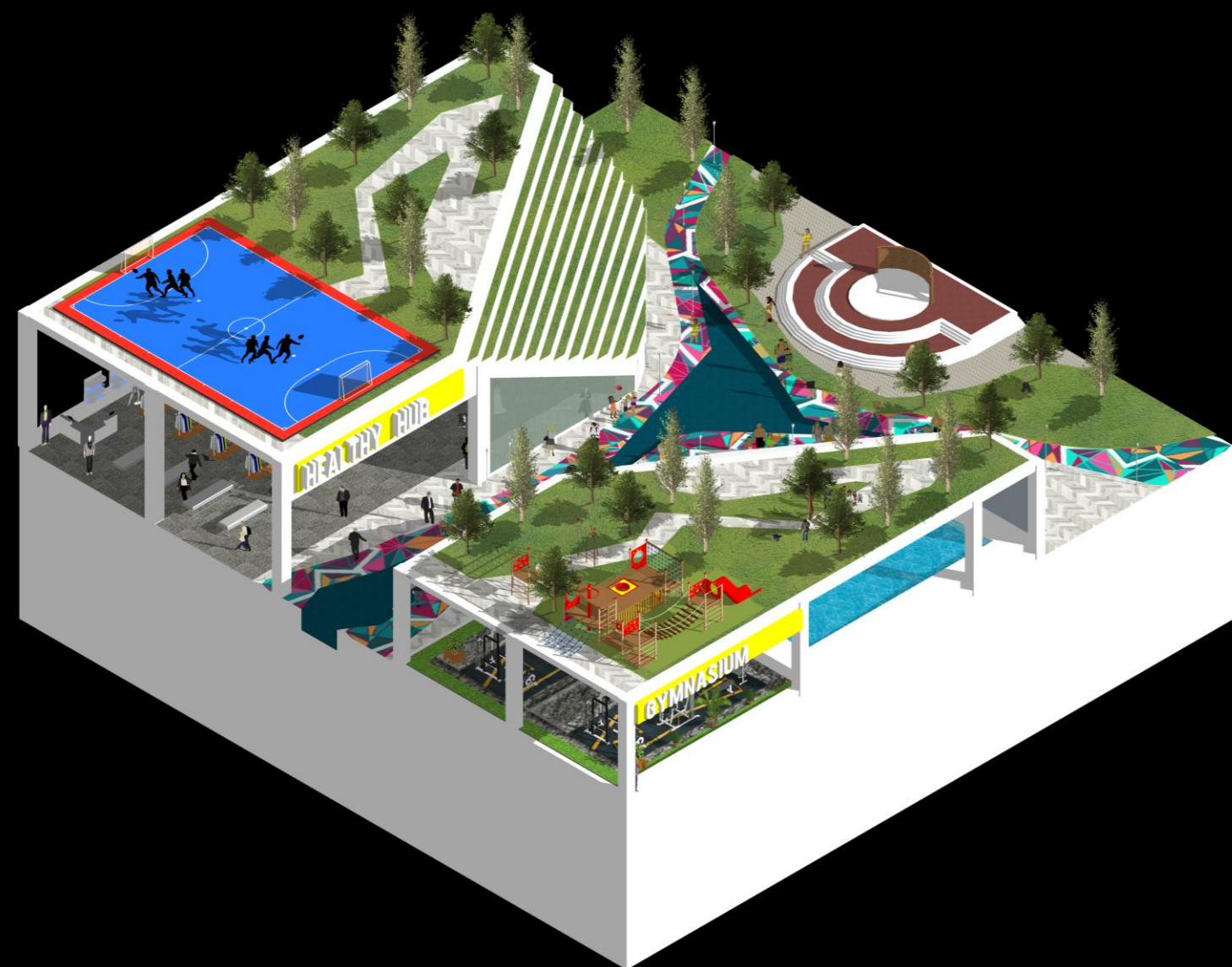


George Town cultural open space & street use, Tan Yeow Woon

designing equitable, inclusive public open space



**parks for
all ages**



**fitness for
wellness**



**green + blue
infrastructure**

indicators of livability:

The Kiara Bay hypothesis





**compact,
livable,
with
bountiful public
spaces**



But what about suburbia?



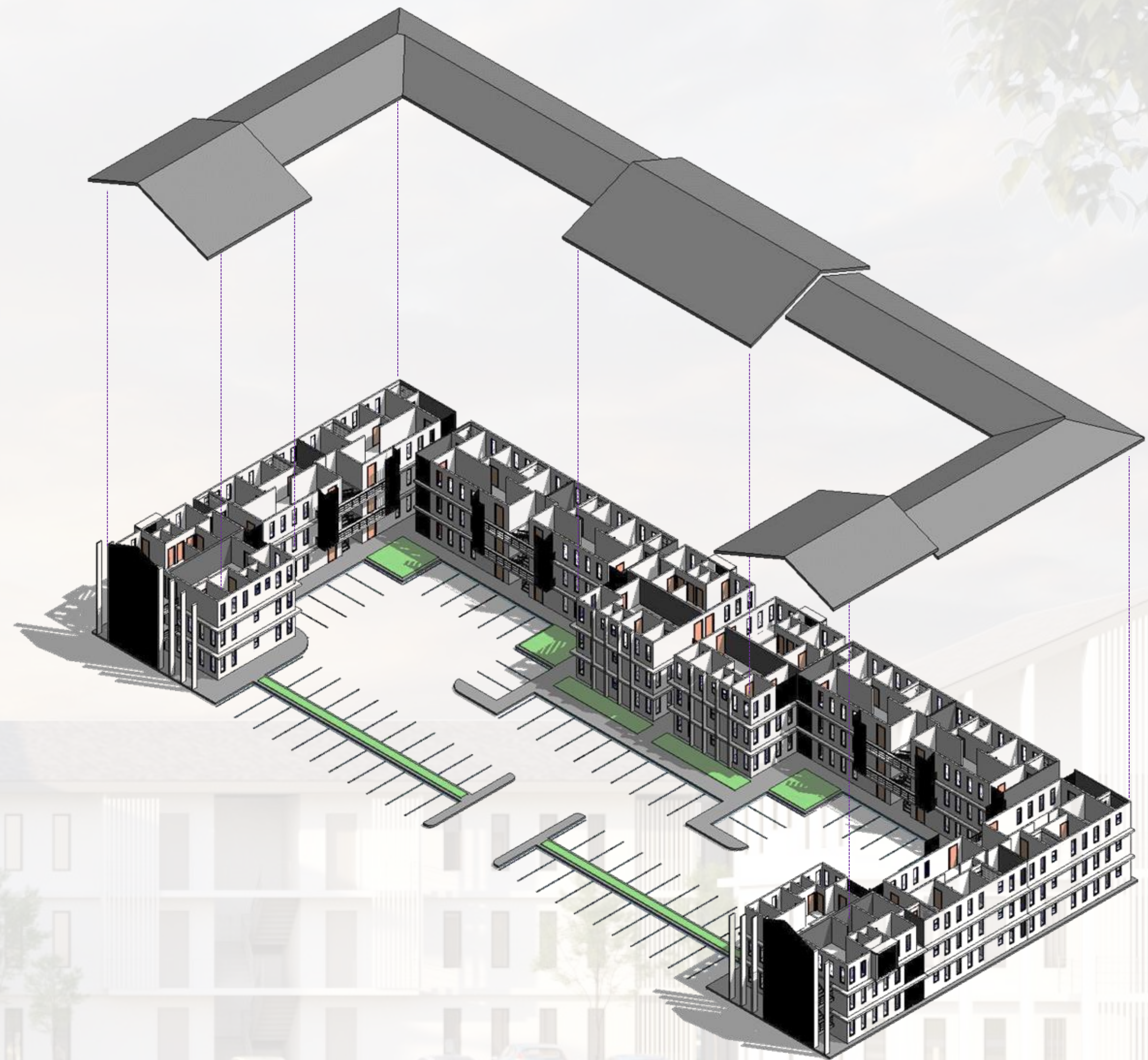
the case for missing middle housing?



per square km:
2,500 homes
10,000 population

per square km:
20,000 homes
80,000 population

thinking BIG and small to respond to today's housing challenges



How can we **manifest** the vision
of the future into the built form?
What roles do we play as:

developers
policymakers
entrepreneurs
investors
academicians



THANK

YOU