UrbanSim User Meeting, 18.05.2010

Collaborative Modeling Platform for Future Cities

Gerhard Schmitt, Jan Halatsch, Anastasia Koltsova, Antje Kunze

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Collaborative Modeling Platform for Future Cities

The planning of future cities is one of the most challenging tasks

- built structures: up to 80% of CO2 emissions
- occupants: 60% of world population lives in cities
- globalization: identity of regional cities becomes obsolete
- cities are becoming ‘generic’ (Rem Koolhaas)

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Goals

- significantly reduced CO2 emissions
- maintaining quality of life
- establishing urban ecosystem services

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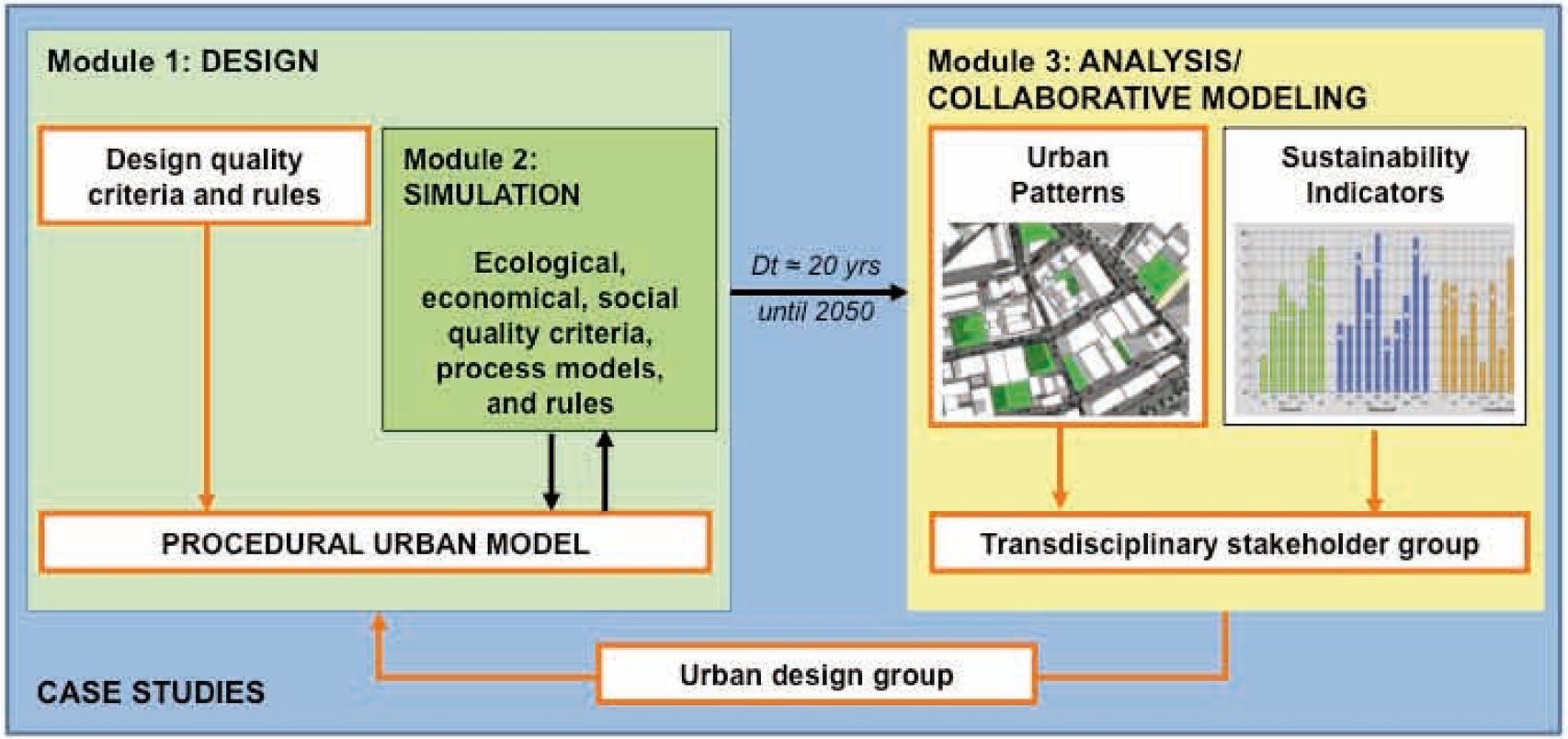
submitted NRP 65 New Urban Qualities proposal:

“Sustainable Urban Patterns”



Overview of the collaboration platform.

Collaborative procedural urban modeling and evaluation concept.

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The following research questions will be studied:

- Urban design guidelines are rather abstract. How can we translate existing design guidelines into specific, formal shape grammars?
- How can quality criteria be made (inter-)operable?
- There is a lack of application of transportation, economical, ecological, and social knowledge by urban designers.
- How can the underlying rules be defined in order to be relevant for design?

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The following research questions will be studied:

- A procedural urban model allows the integration of a set of rules for generating and visualizing urban development scenarios.
- Which urban patterns are possible in 2030 and 2050 based on the application of a set of rules including ecological, economical, social, and urban quality criteria?
- What is their visual quality on the regional and local scale?

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The following research questions will be studied:

- An analysis of the resulting urban patterns with a set of sustainability indicators allows for an evaluation at local and regional scale under different urban development scenarios.
- Feedback from stakeholders can validate this assessment of the innovative urban patterns.
- Which of these urban patterns are the most sustainable?

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The following research questions will be studied:

- Integrated concepts for sustainable development of agglomerations and city centers at the local and at the regional level have to account for coordinating strategies at the upper level (top-down).
- At the same time they should be based on collaborative decision-making processes to meet the needs of the local and regional actors (bottom-up).
- In practice, there is a lack of approaches and tools that support a combined bottom-up/top-down dialogue in the urban planning processes.
- Does a collaboration platform with supporting procedural methods allow an effective cooperation between the different planning levels?

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Workshop “Architectural programming”: Defining urban patterns

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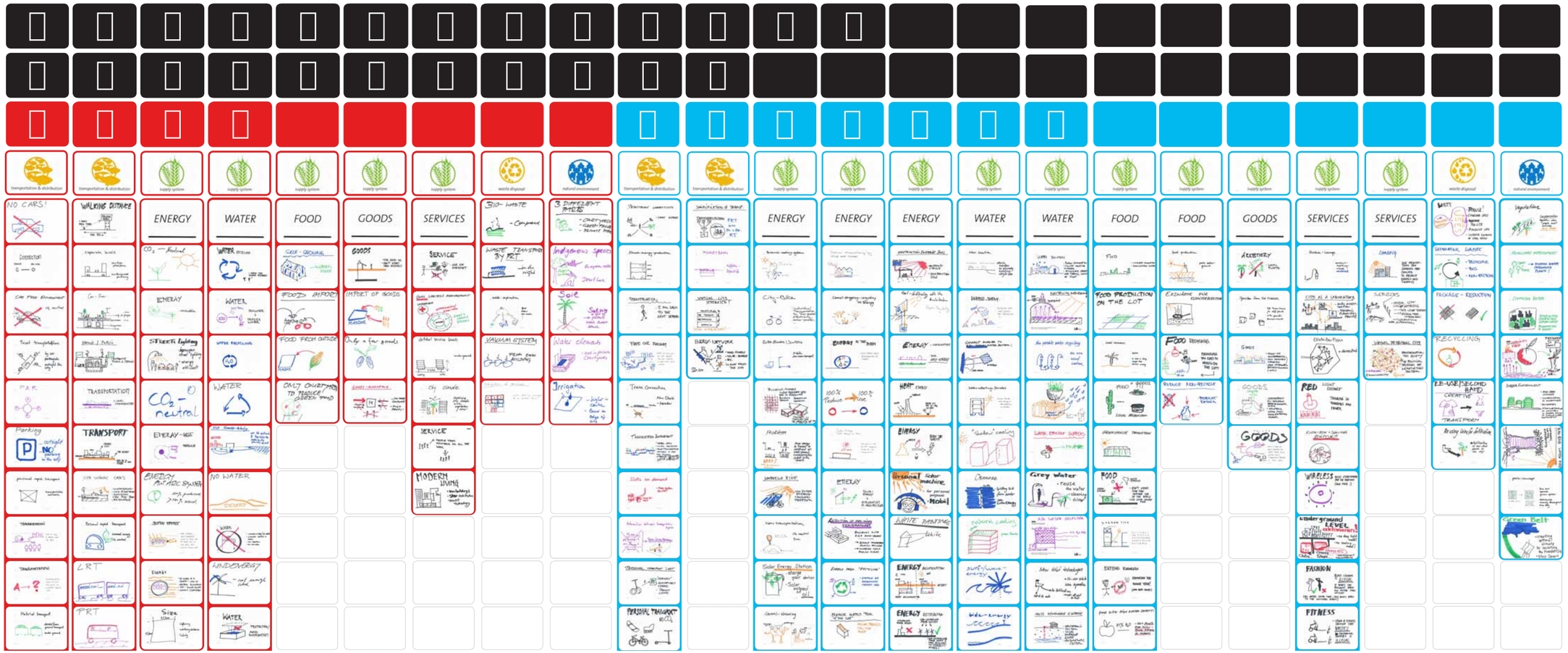
Workshop “Architectural programming”: Defining urban patterns



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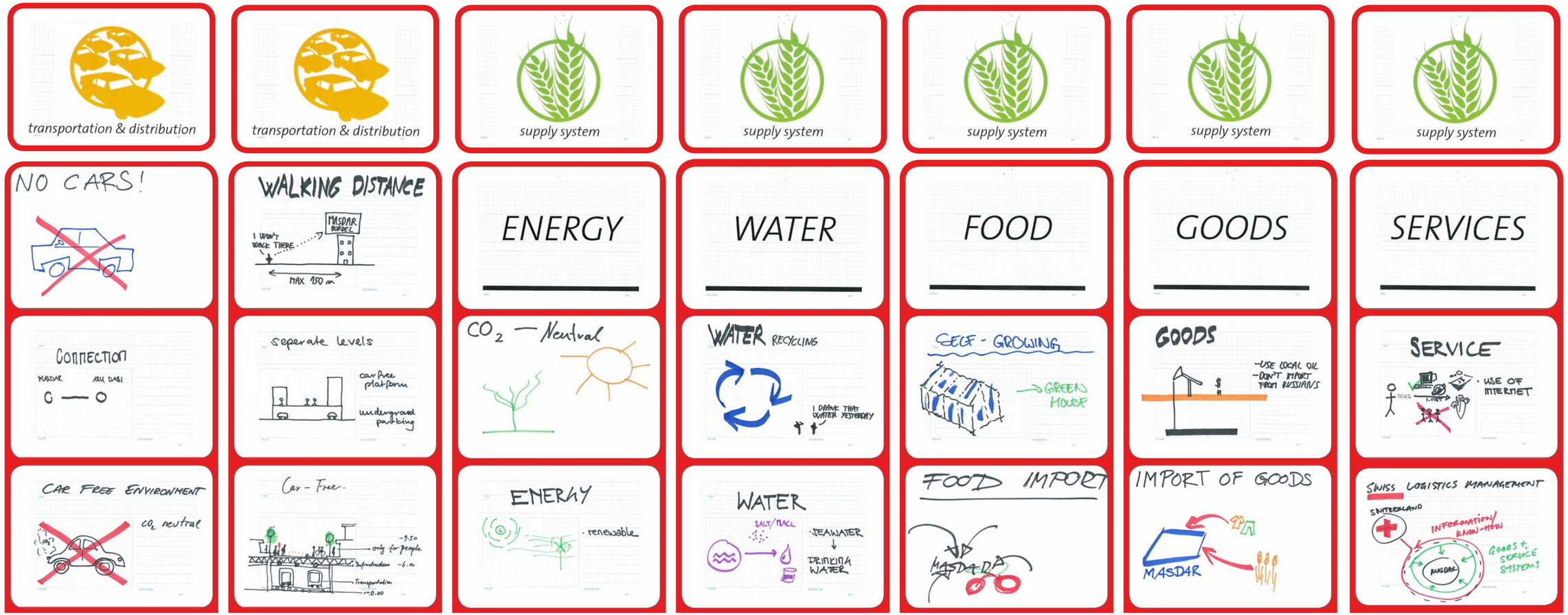

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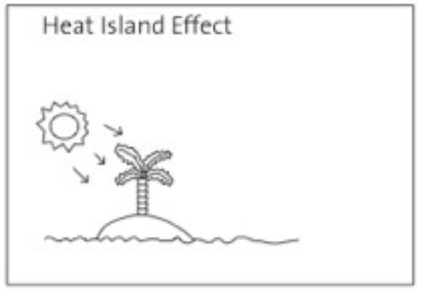

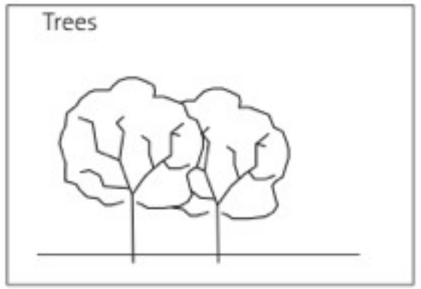

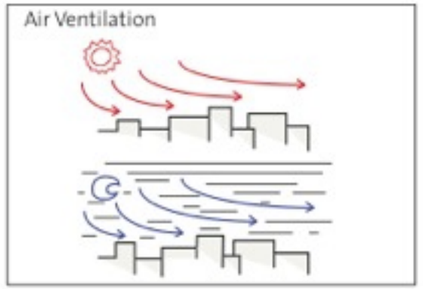

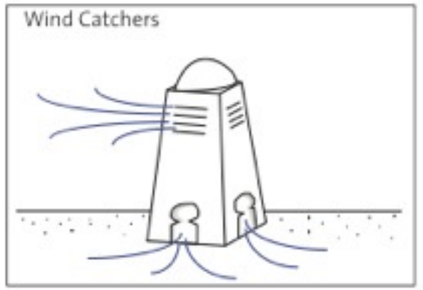

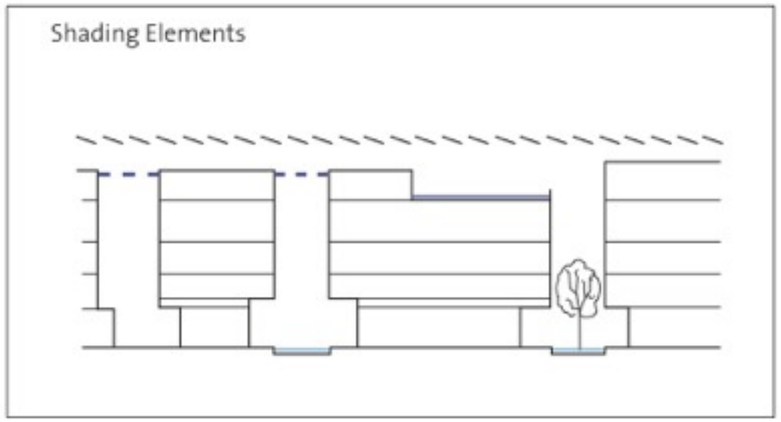

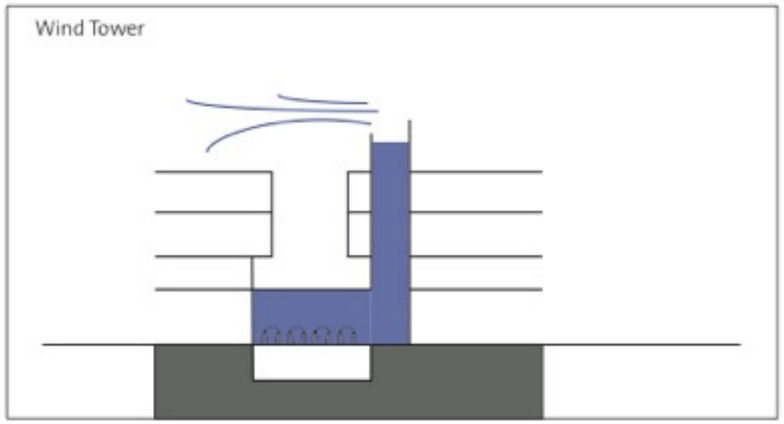

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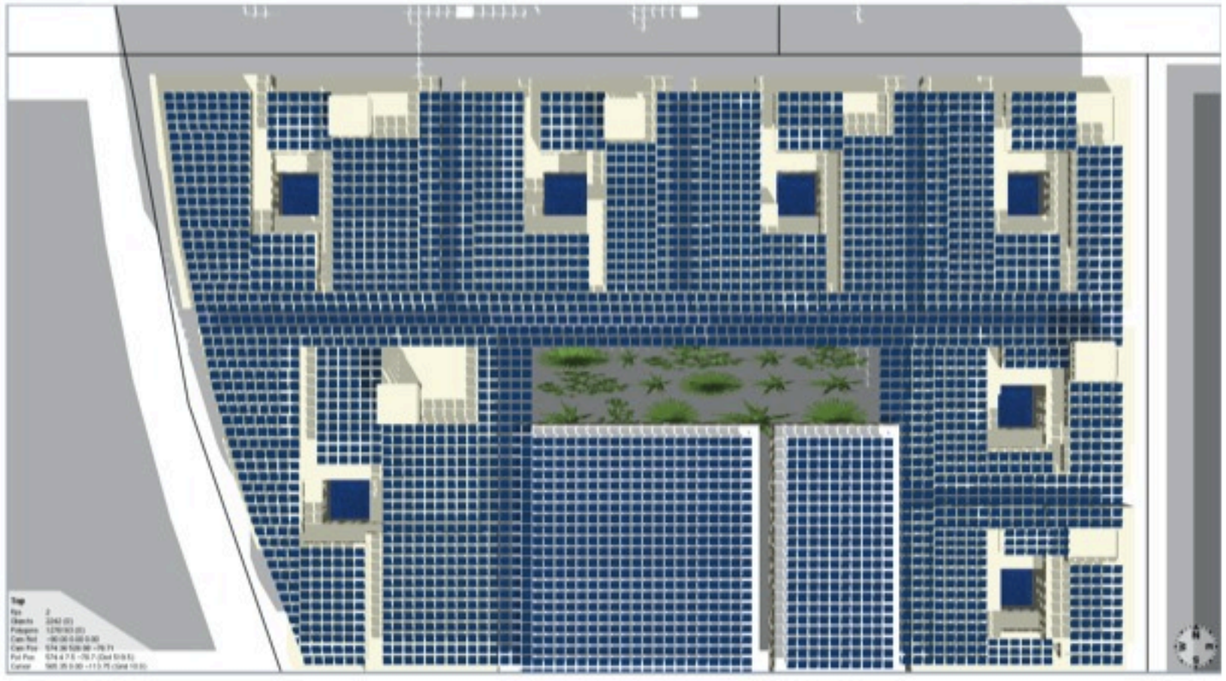

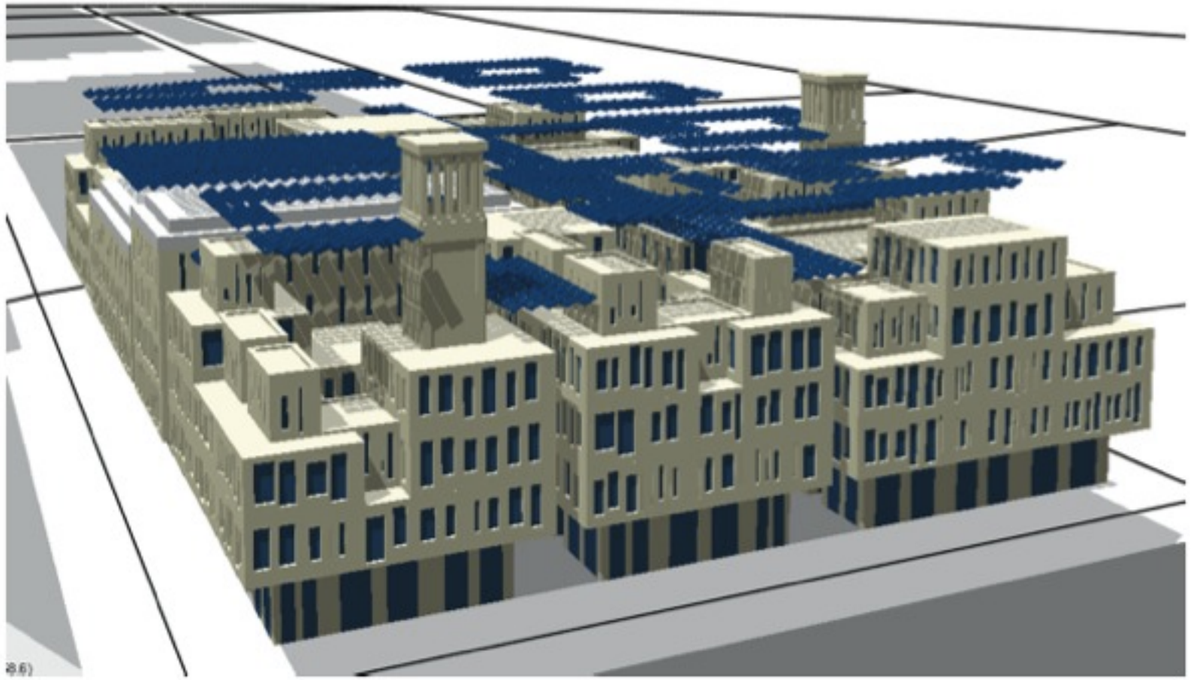

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Collaborative Modeling Platform for Future Cities

(1) Building classification and generation: Procedural modeling

- fast & semi-automatic creation of urban layouts
- rule-based semantic description of parametric 3D geometry with associated meta data
- grammar-based automatic generation of 3D buildings
- results: interactive and interchangeable qualitative 3D models and quantitive analysis for reporting (e.g. building CO2 emissions on urban scale)

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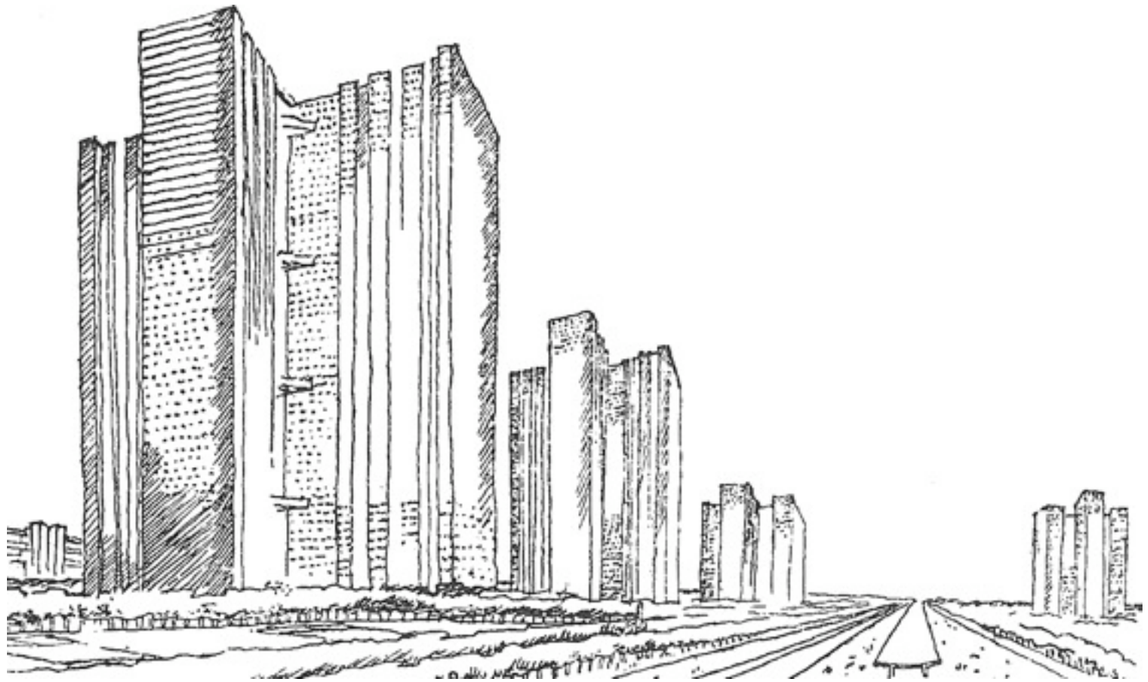

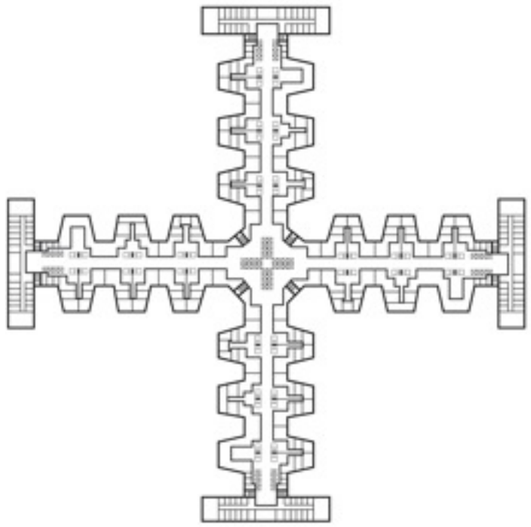

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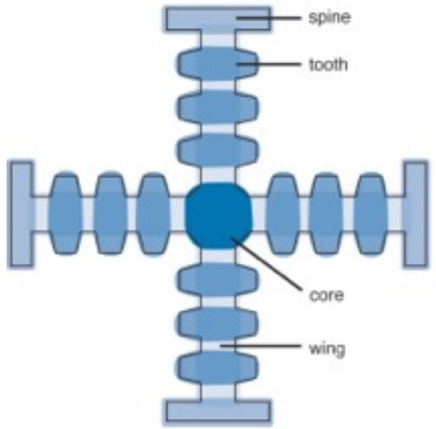
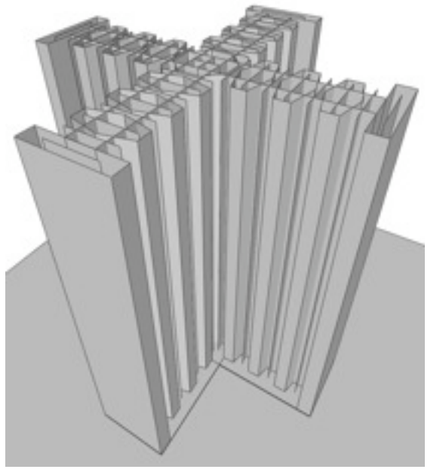
BUILDING_H = 220
BUILDING_W = 100
GROUNDFLOOR_H = 6
WING_W = 16
SPINE_W = 50
TEETH_PROJ = 10
TEETH_DIST = 12





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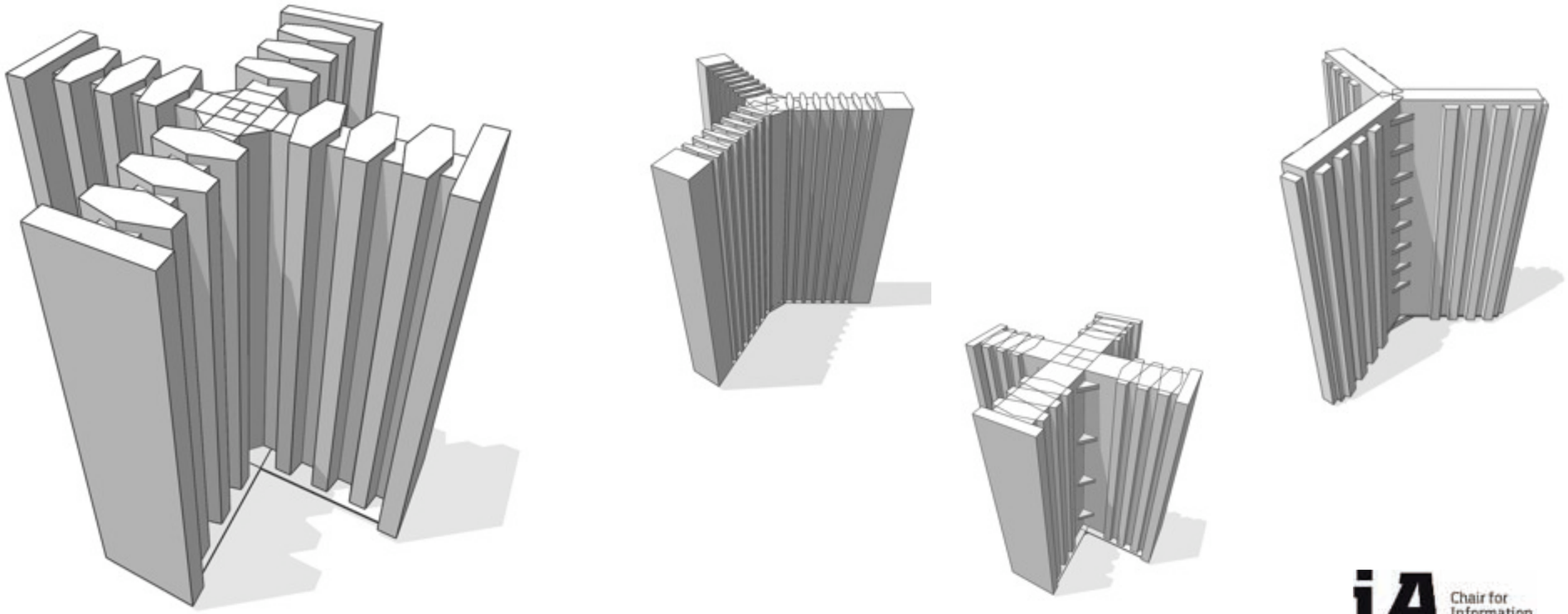

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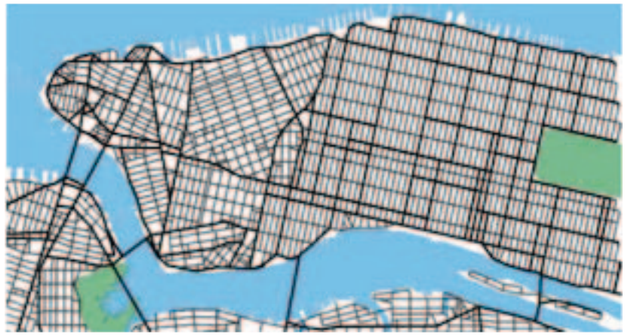
(2) Semi-automatic generation of networks: Synthetic street network of Manhattan

- here: generation of transport networks
- technique can be easily extended to generate networks for white, grey, black water etc. or telecommunication infrastructure
- networks are generated based on constraints (obstacles, shortest path)
- technique will link urban plan by architect with city engineer



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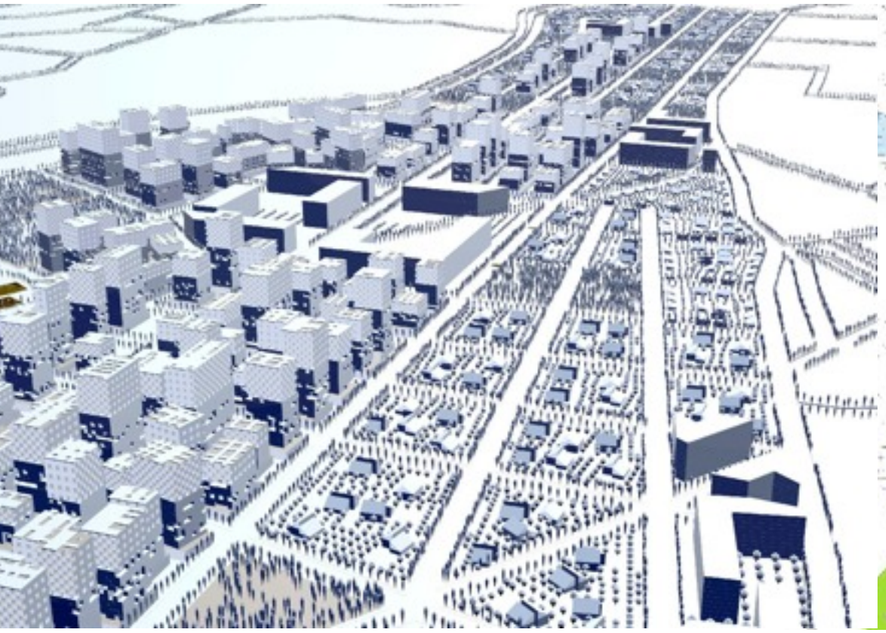
(3) Evaluation of urban patterns: Dubiocity



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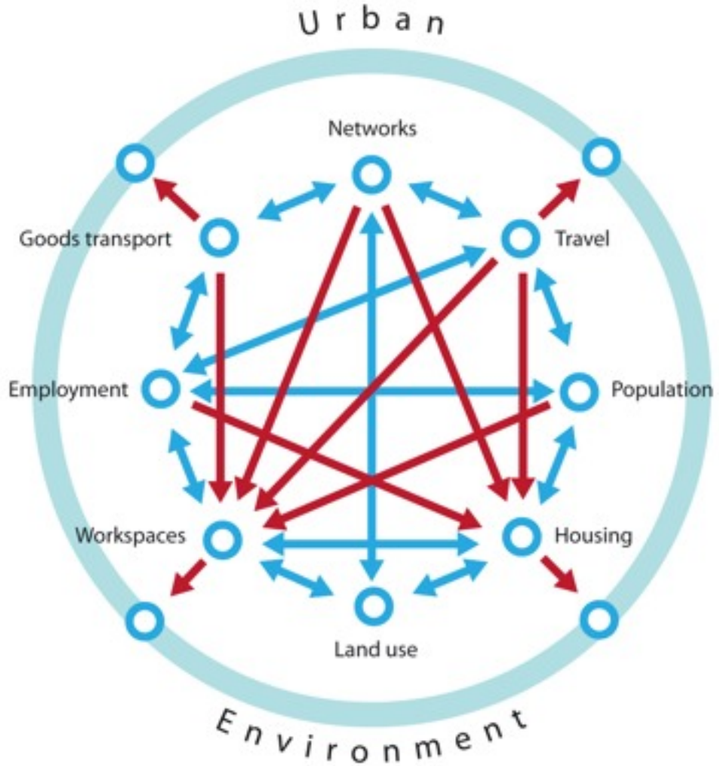
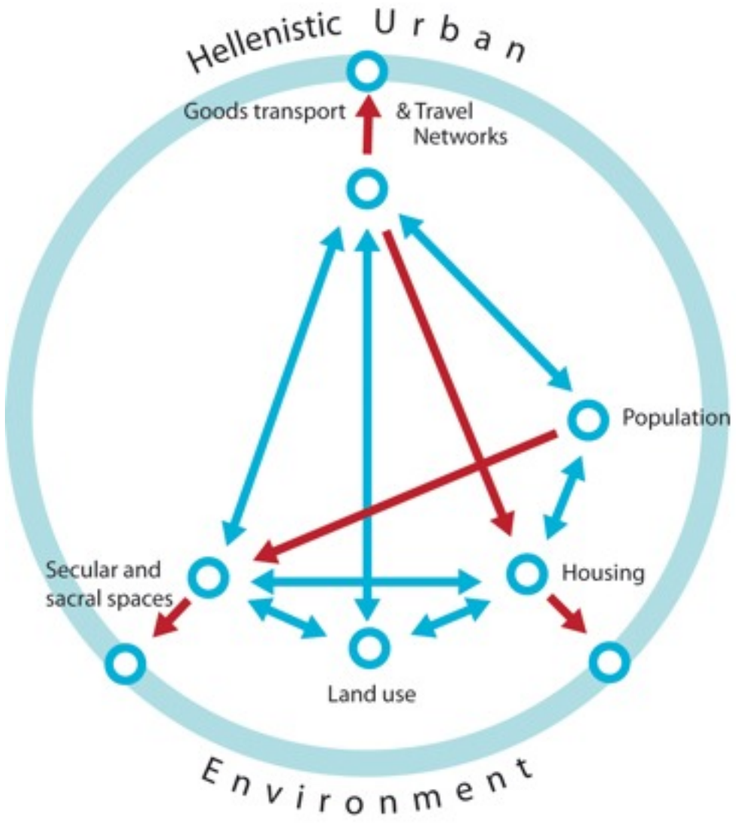
(4) Evaluation of urban patterns: Procedural transport and land-use model



Simplification

for simulation of 3D environment



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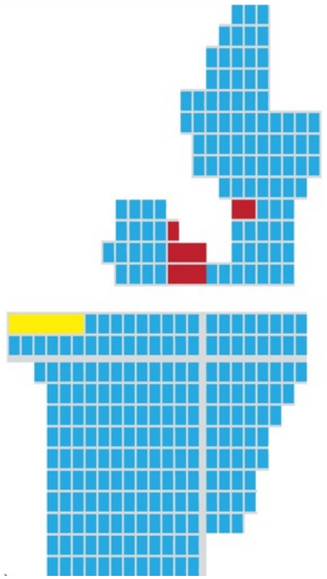
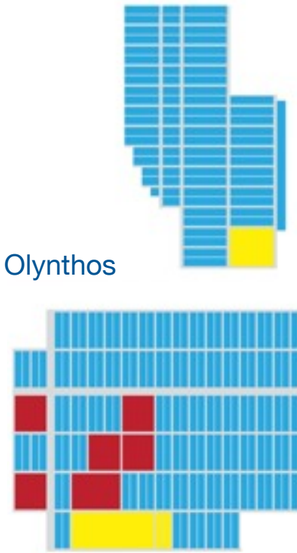
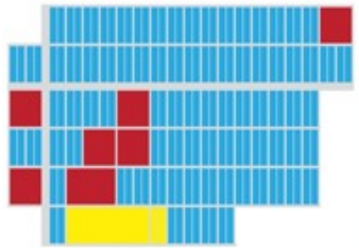


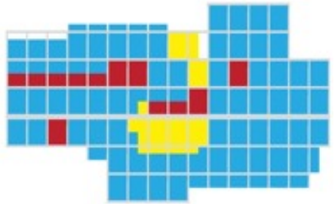
Miletos



Olynthos



Knidos



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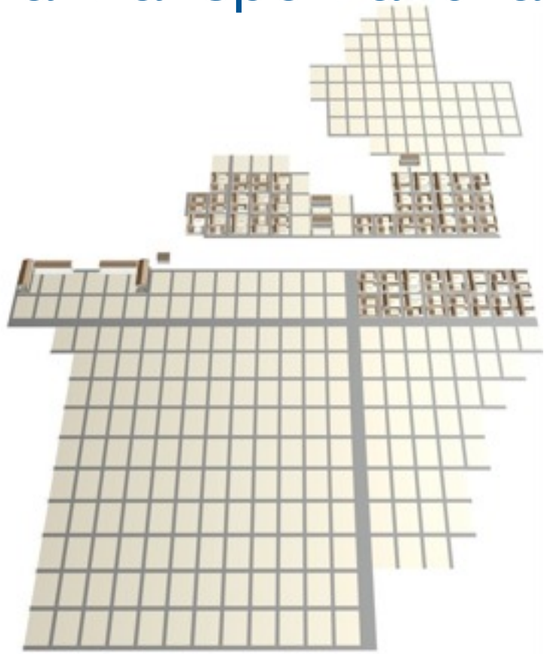

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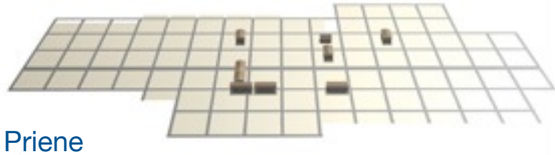

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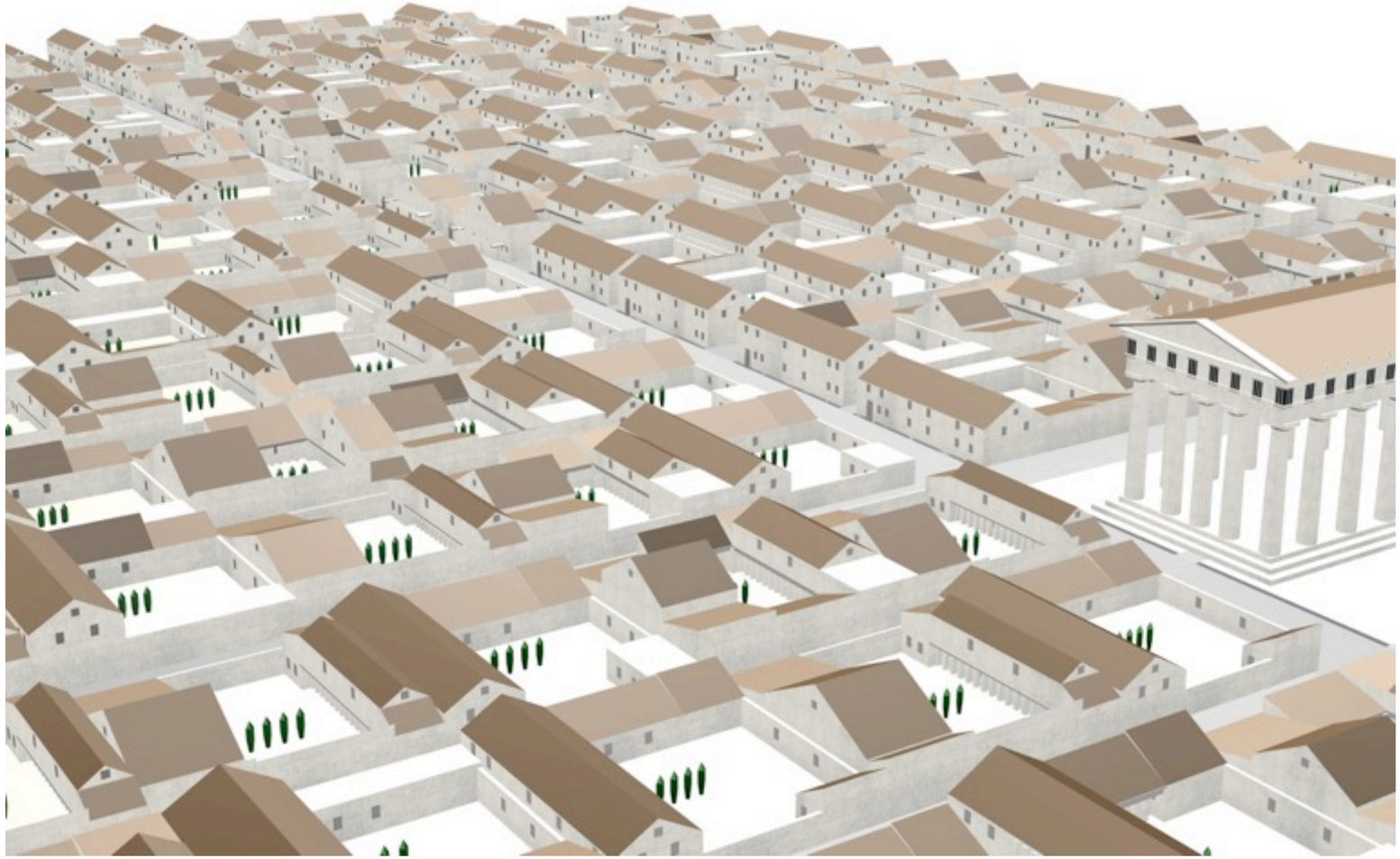

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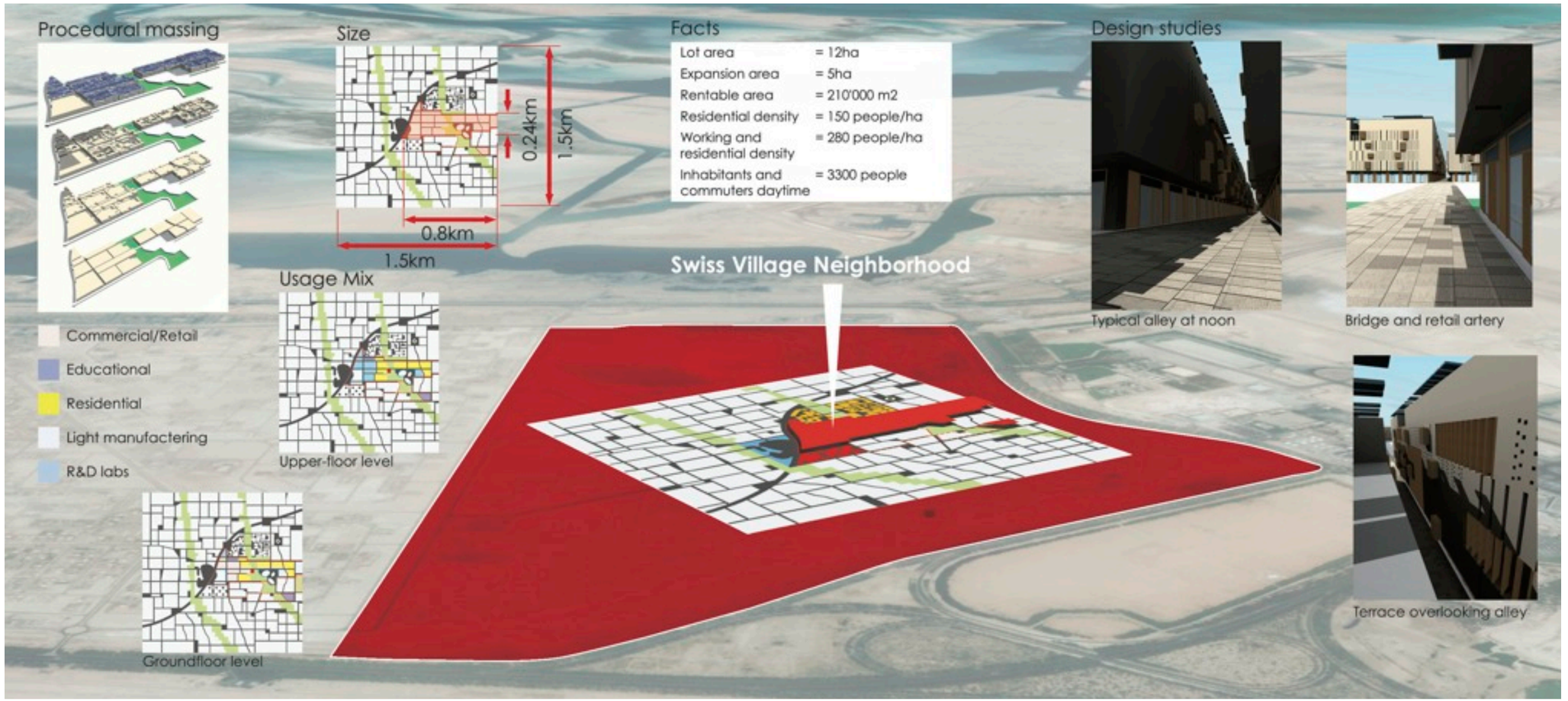
(4) Visualization of urban planning guidelines: Swiss Village Abu Dhabi, Masdar



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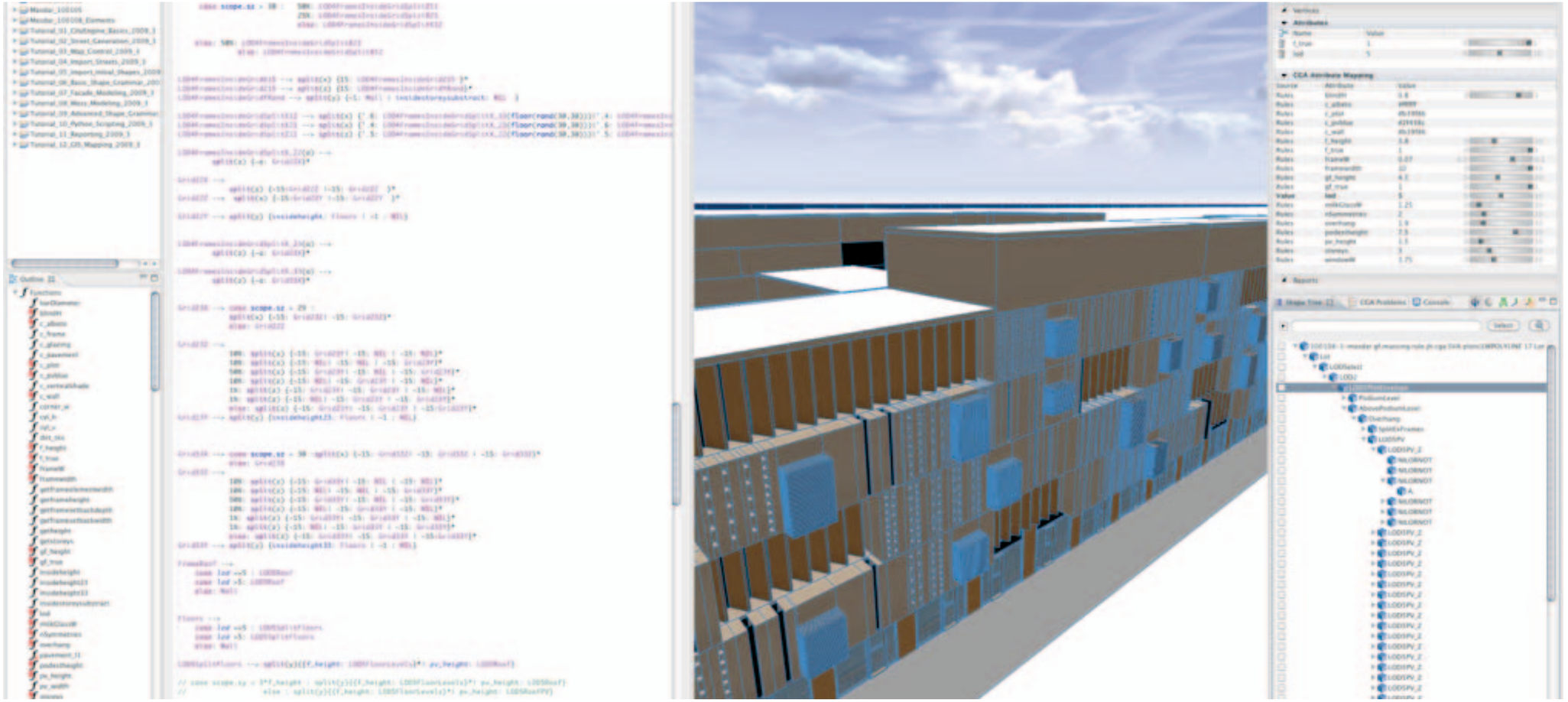

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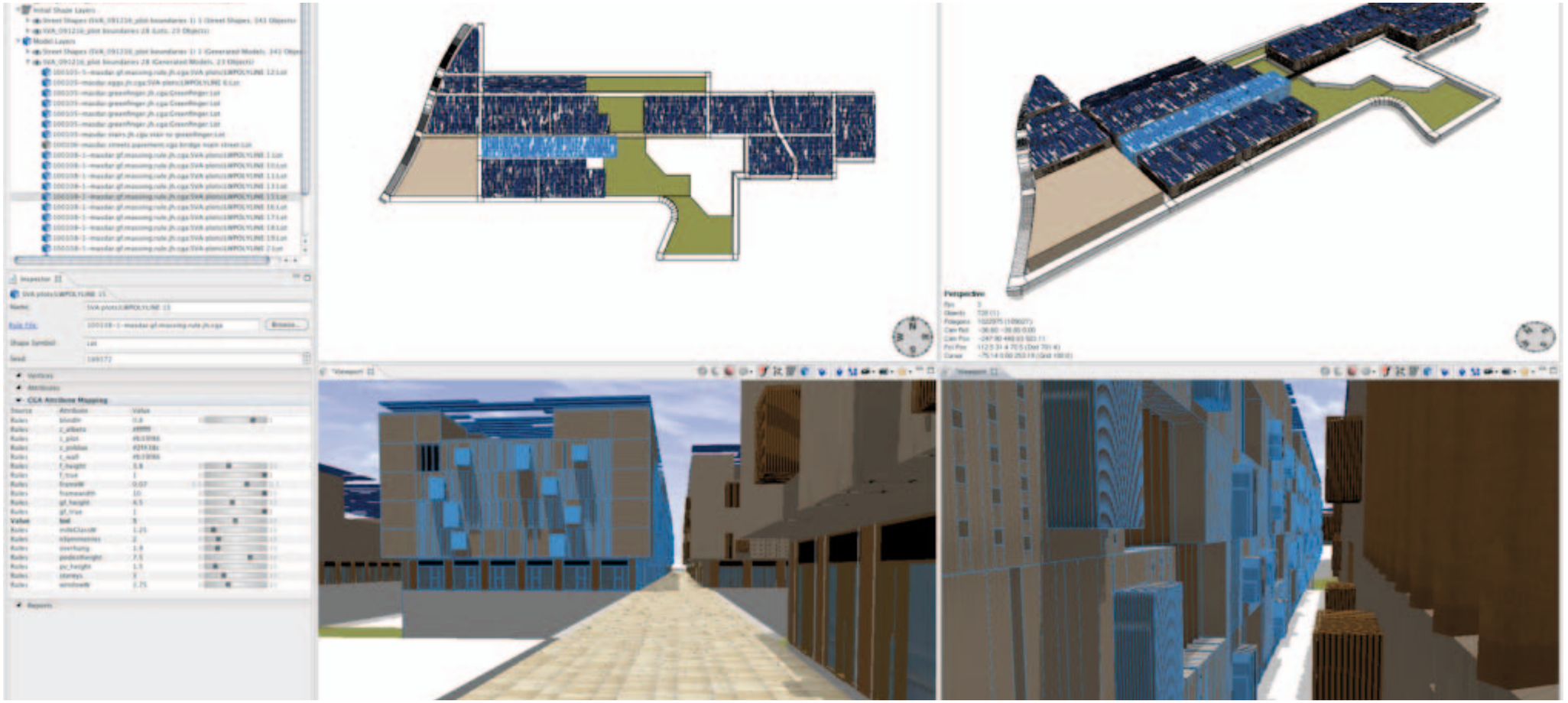

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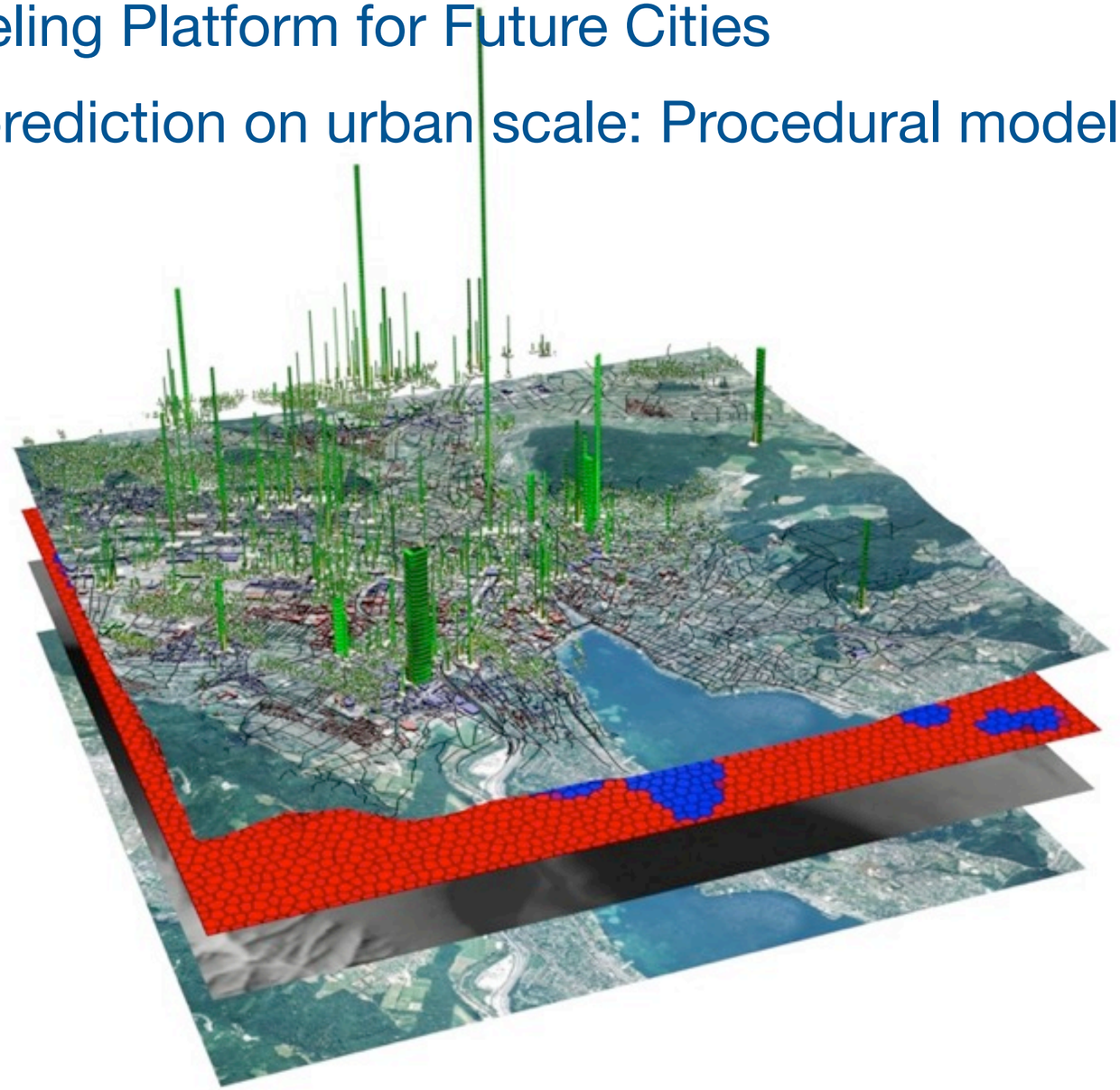
(5) CO2 emission prediction on urban scale: Procedural model of Zurich



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(6) Scenario of a fossil fuel free Zurich

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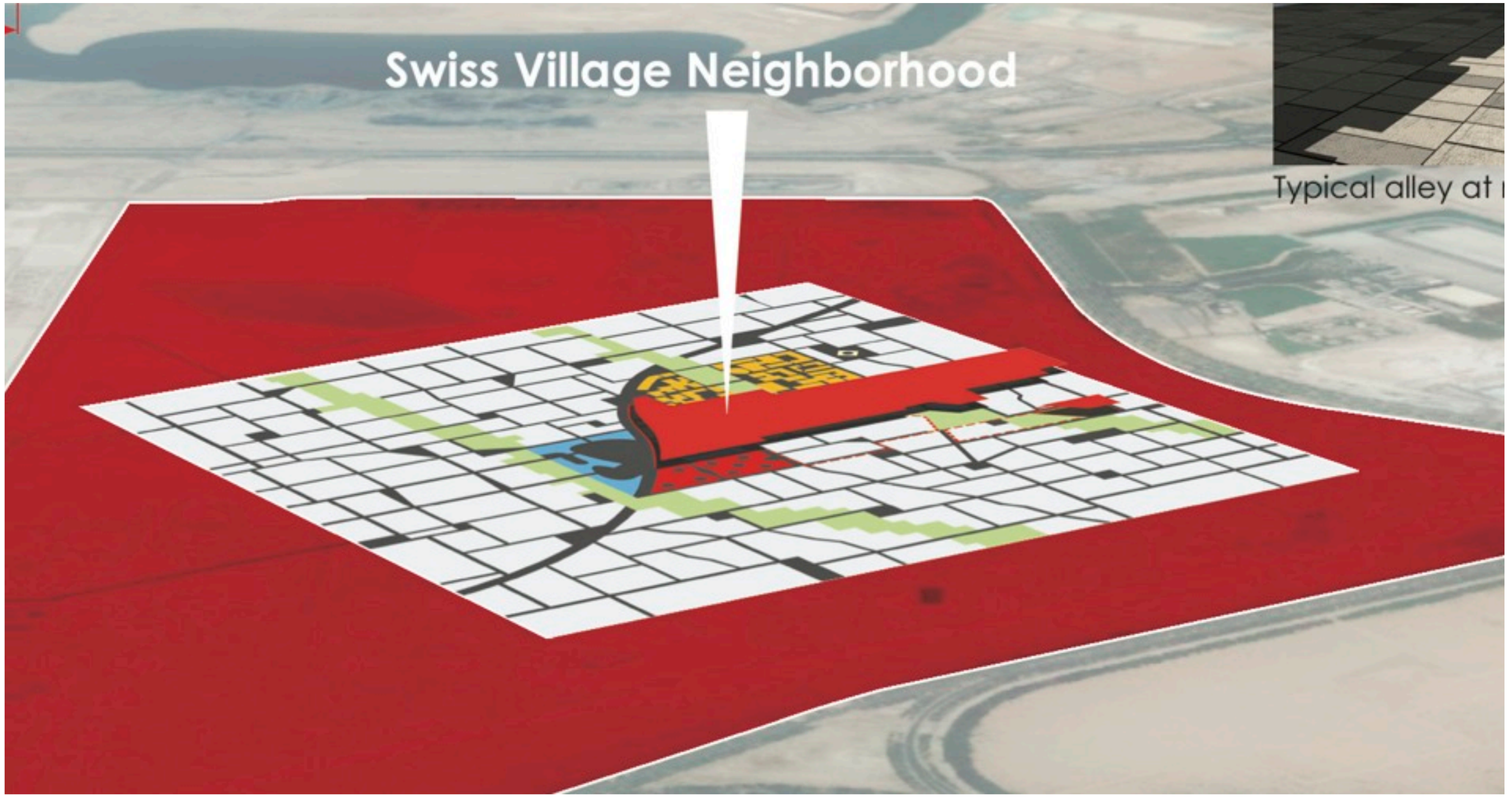
Scenarios for the Swiss Village Abu Dhabi



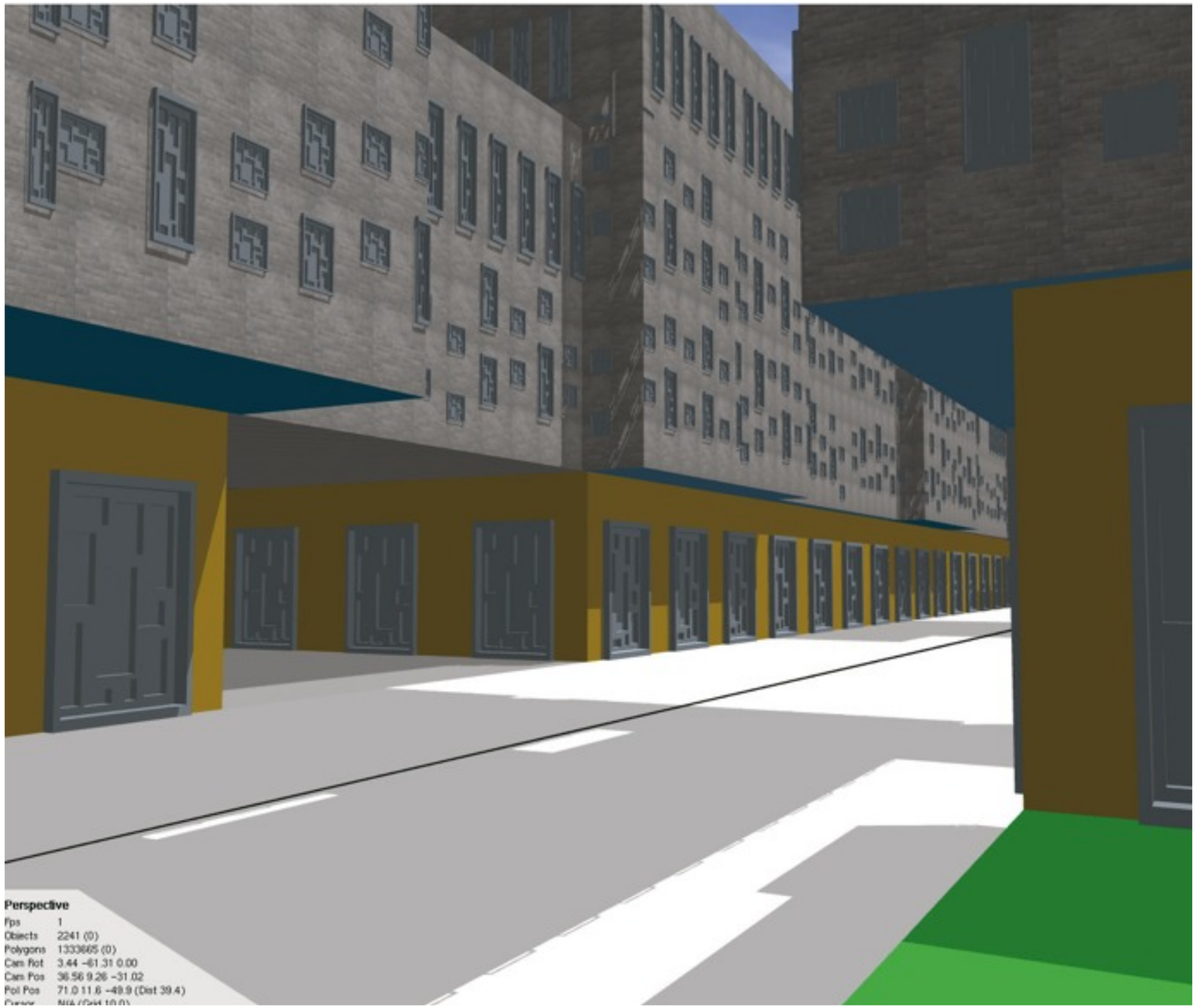
Final presentation FS2010 –Marc Warrington, Rujun Jia, Wei Hou, Ming Shan Ng, Santiago Espitia

Scenario: residential block - bird's eye view

G.C.: 68%
(65%)
G.F.A: 13850 m2
(16950 m2)

Residential: 91%
Office: 4%
CMY: 3%
Retail: 1%

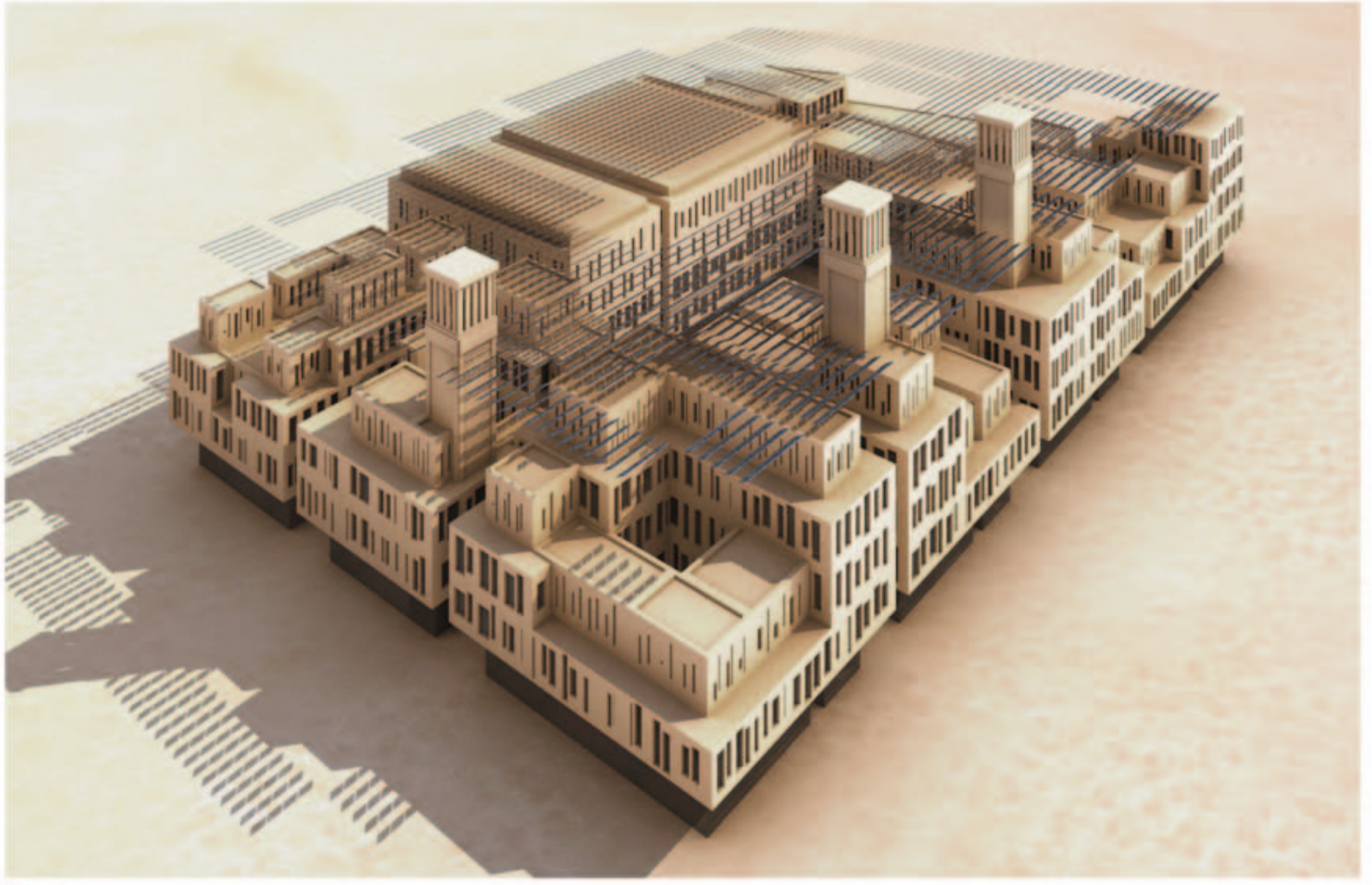
Scenario for Lot I-08



Scenario for Lot I-09

Scenario for Lot I-11

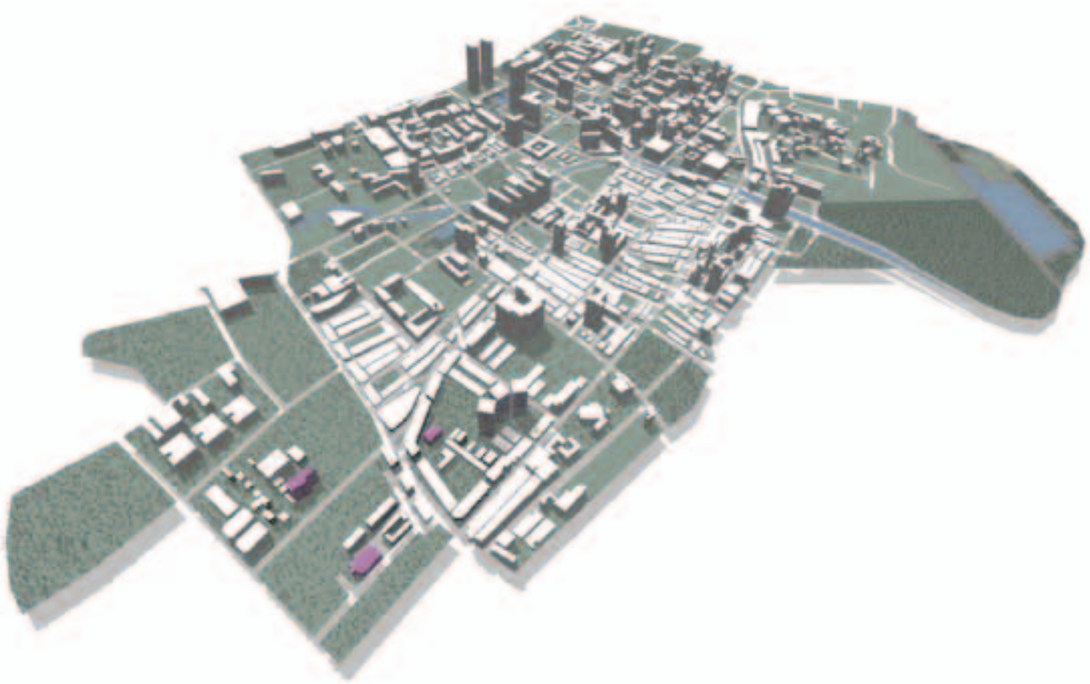
Scenario for Lot I-13



Design Proposal

- visualization of information
- translating the data in architectural design
- parameterized model

Scenario for Rochor, Singapore



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