Introduction
Housing problem

Informal solution: huge social problems

formal solution: huge social problems
Housing problem

Informal solution: huge social problems

Reference

formal solution: huge social problems

Solution
Customized housing
diverse city environments
Diverse city environments
Habraken (1988): Type as result of three systems:
spatial / functional  |  structural / building  |  stylistic / decorative
Housing variation by combining different components
Levels of abstraction

Component
Room
Dwelling
Building
City block

Housing level
Urban level
Customized houses and diverse urban environment.
Basic conceptual model

requirements → design system → solution → production system → product

computer system
Siza’s Malagueira
Computer program for generating house designs online
Visualization: virtual reality and rapid prototyping
Customized houses and diverse urban environment
Urban variations
Buildings

Single-family housing

Multi-family housing
Spatial / functional system

- Bedrooms
- Kitchens
- Living room
- Dining room

Structural / construction system
Step 2: design system

4 Basic boxes

14 boxes with one or two partitions

500,000 different combinations
Step 3: computer system
Step 4: applying the systems in practice (Europan 7, Den Haag)
Real world application for Ove Arup, London
Design system
Building system
Computer system

Indicate the number of storeys between 1 and 6

What is the free height (comprehended between 2.4 and 3.5 meters)?

*Cancel*

: error: Function cancelled
Command: 'VLIDE
Command:
Command:
Output: 3D model, 2D Drawings, budget and list of parts
Design by programming

Ricardo Mesquita
High-rise Multi-family housing
Design system for multi-family housing
Design system for multi-family housing

Aggregation of dwellings into buildings

Tower

Left / right

Row

Neapo

José P. Duarte – TU Lisbon | MIT Design Lab
Flexible planning

diverse city environments
A Computational model for the Marrakech Medina
A Computational model for the Marrakech Medina
Rapid prototyped model of new solution
Urban Grammars

Patterns

General Grammars

Specific Grammar = \[ \bullet + \bullet + \bullet + \ldots + \bullet \]

Arrangement of Patterns and constraints on grammar rules
Basic geometry

Patterns:
- Activity nodes
- Eccentric nucleus
- Neighbourhood boundary
**Rules**

**Rules B1 and B2**

- TA: 42m x 30m
- TB: 54m x 30m

block dimensioning

**Rules B3 and B4**

block distance

**Rules C1 and C2**

aggregating blocks into quarters
aggregating quarters into neighborhoods
Urban plan: a solution
Expansion zone, Caldas da Rainha
rules

cell/neighbourhood

rule 1

plot division

rule 2

urban patio

rule 3

streets
main road structure

grid

Urban units (quarters)

Urban units (plots)
Trabalho do grupo @cto

construído - não construído

nº de pisos

usos
Conclusion
Summary

model for mass customization
  design, building, and computer systems
  type ↔ design system

two mass customization paradigms
  combination of standard components
  combination of non-standard components

rationalized construction
customized houses
diverse urban environments
affordable cost
avoid social problems