SYMBIOSIS IN URBAN VILLAGE

Hyperbody

P5 Presentation

Chong du

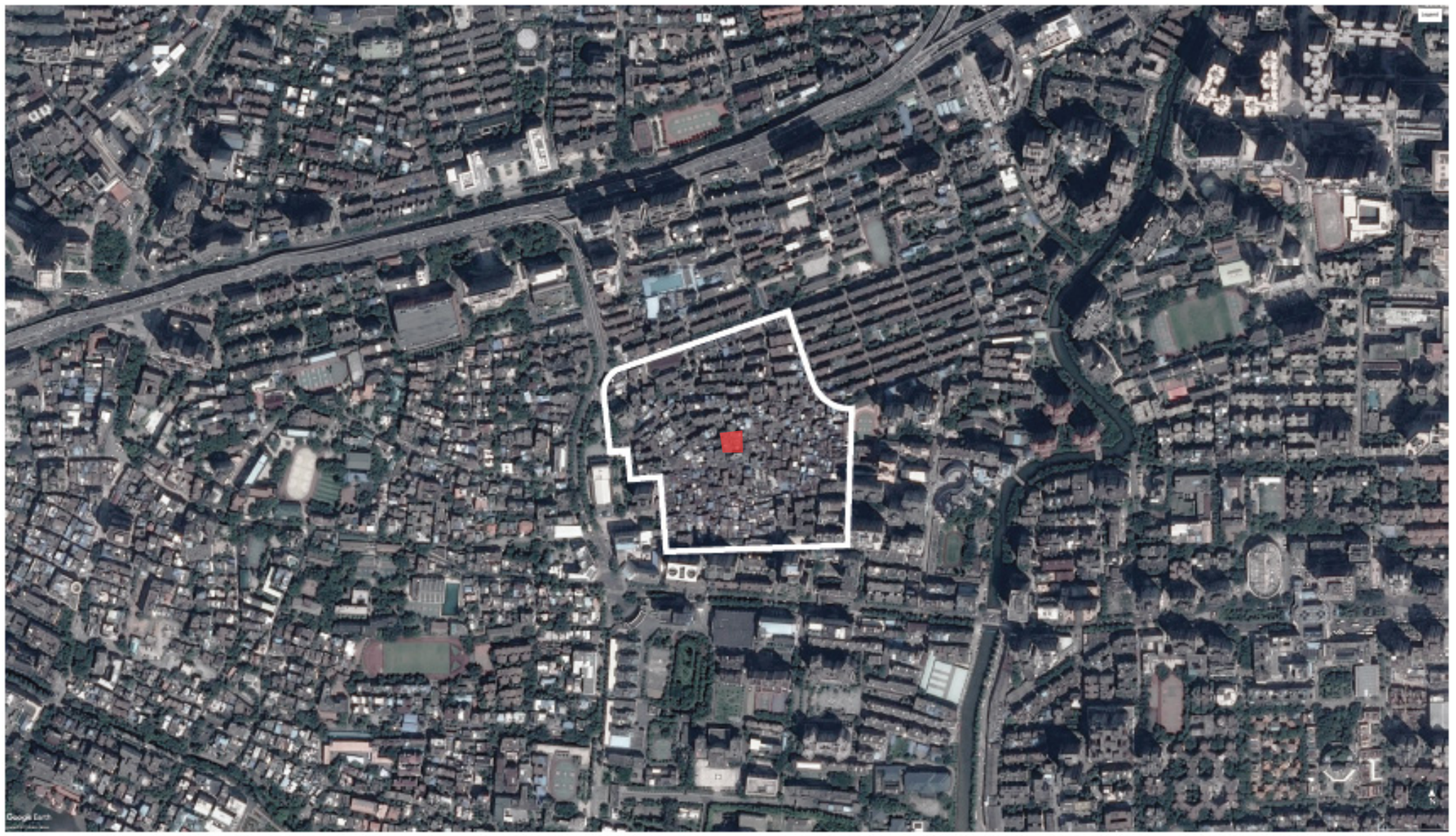
"Symbiosis comes from the Greek term for :living together"—referring to a relationship 'between two or more organisms that is not only advantageous but necessary to both. It does not only encompasses **harmony or peace**, but also **opposition and competition**."

<Each one a hero> ------ Kisho Kurokawa

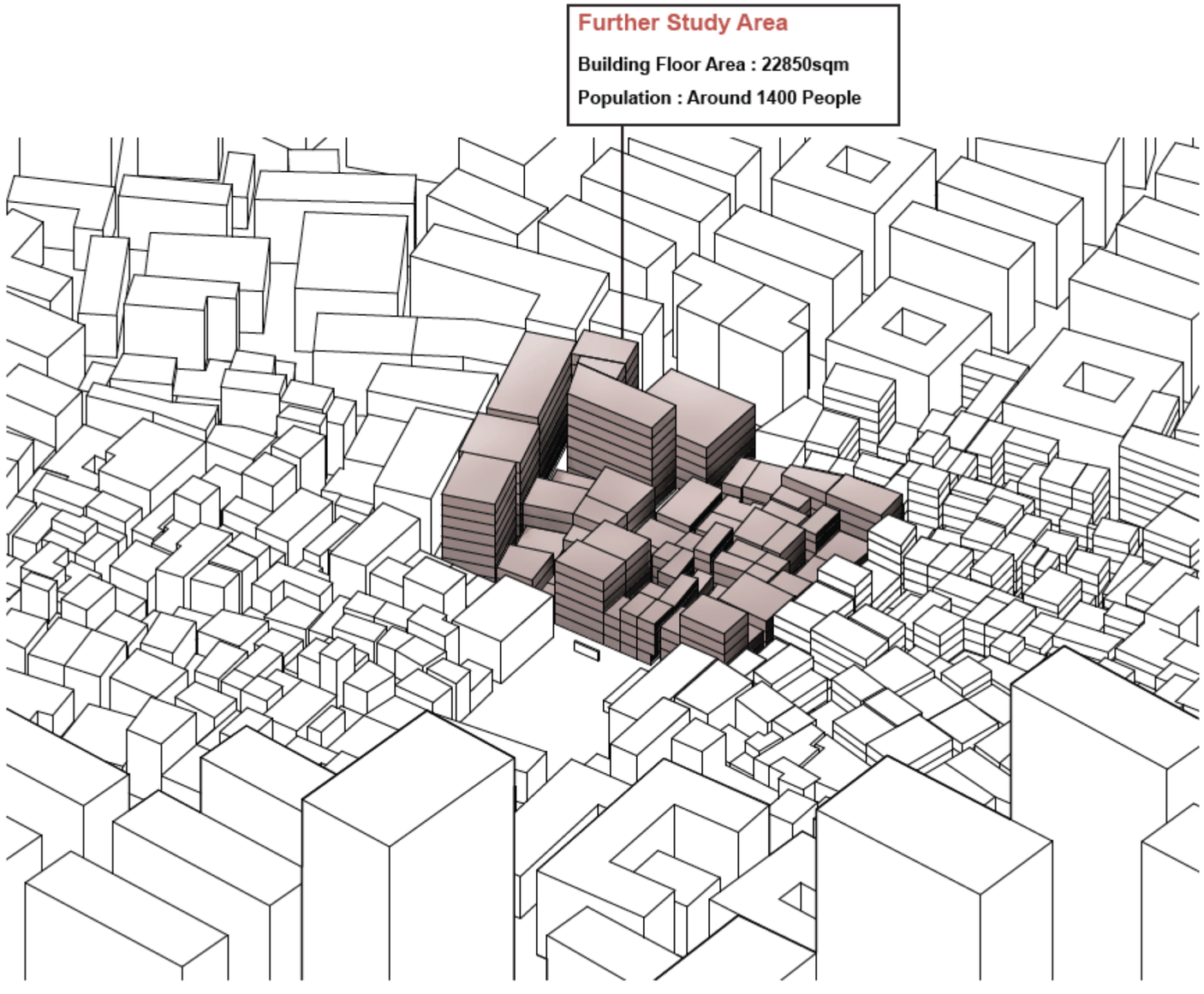
PART 1 : RESEARCH AND PROGRAM GENERATION

PART 2 : ARCHITECTURE DESIGN AND MATERIALIZATION

PROJECT LOCATION

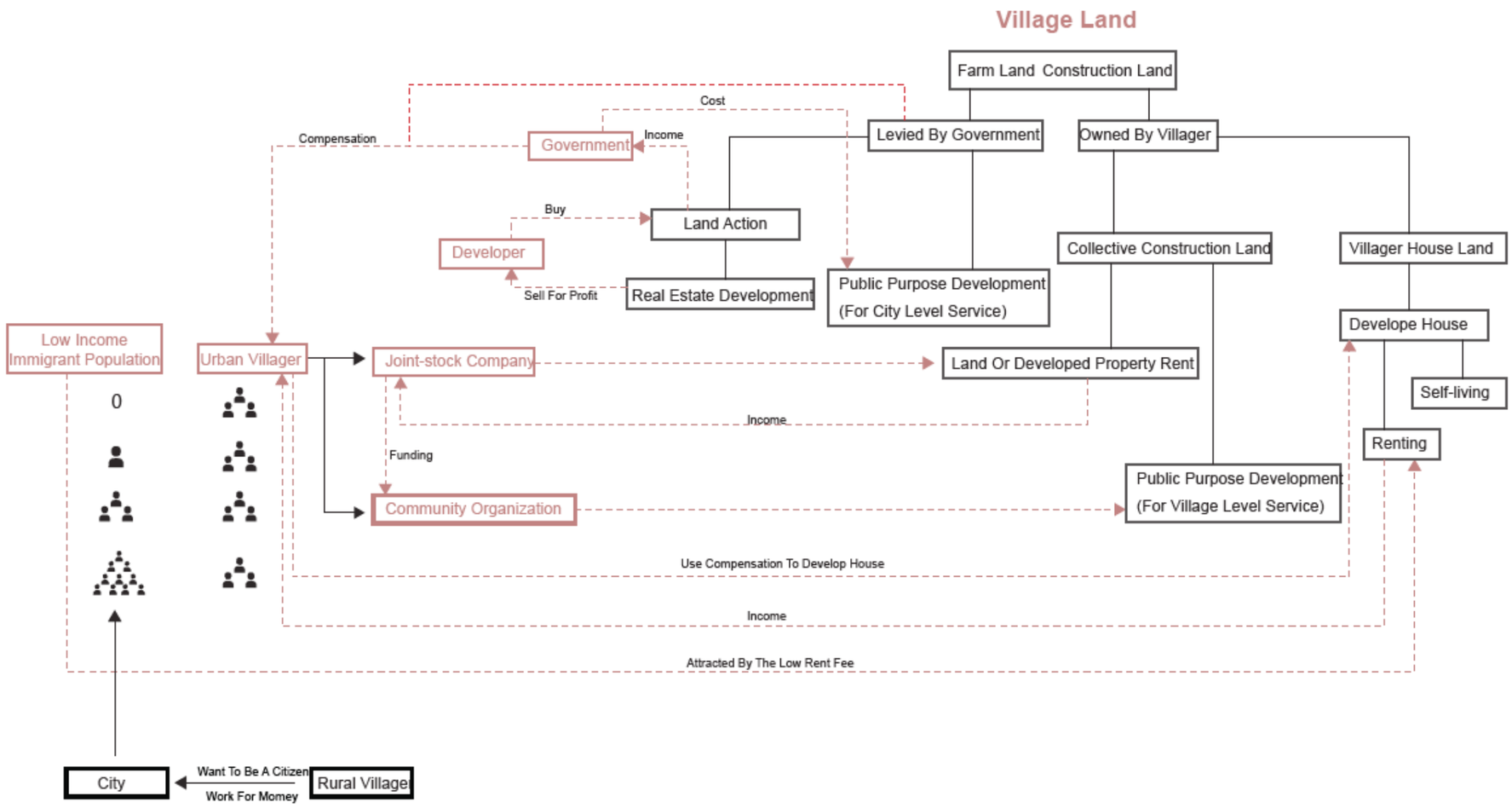


PROJECT LOCATION



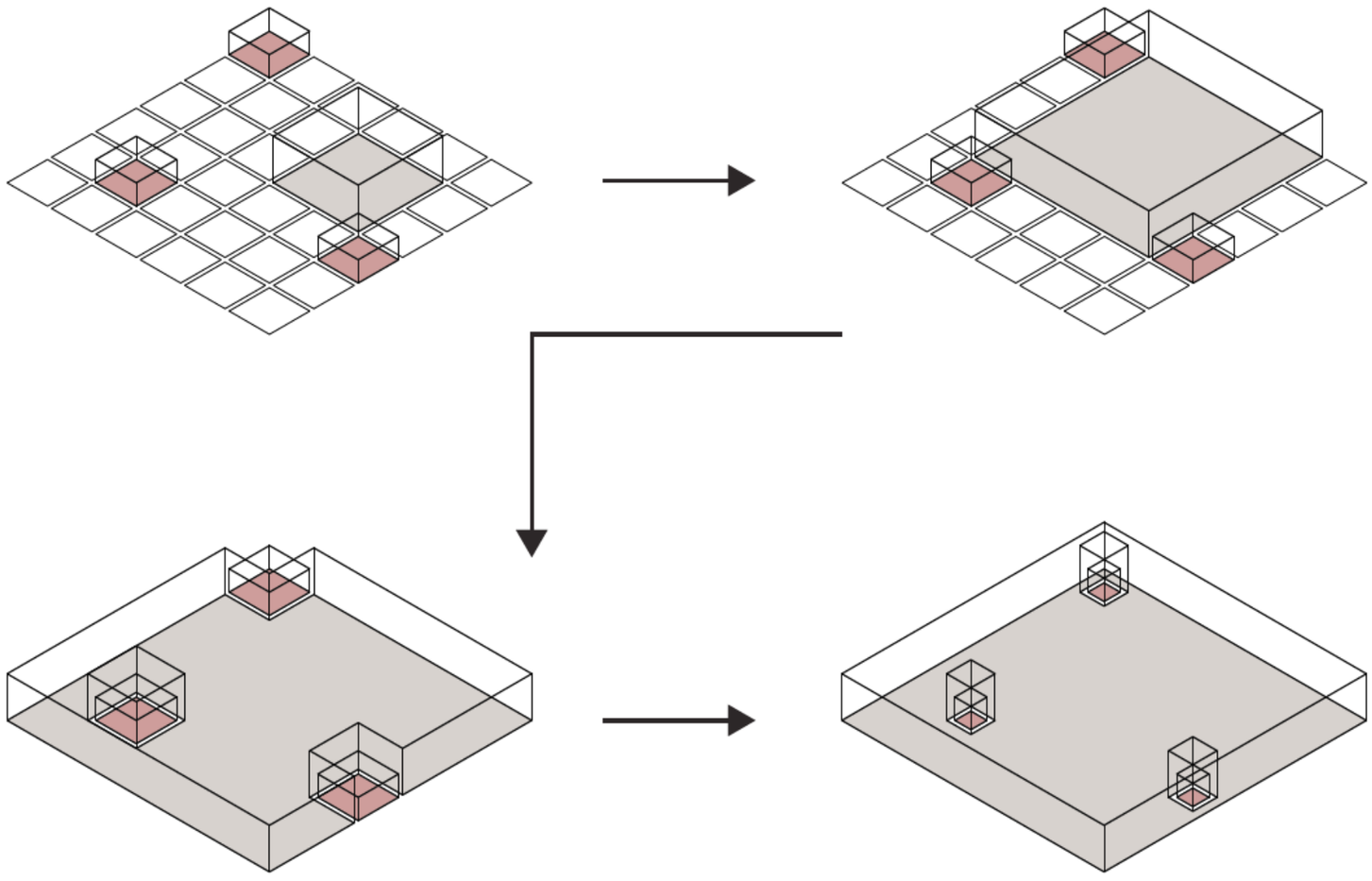
TOP-DOWN ANALYSIS OF URBAN VILLAGE

The Political And Economical Reason



TOP-DOWN ANALYSIS OF URBAN VILLAGE

Urban Village Generation



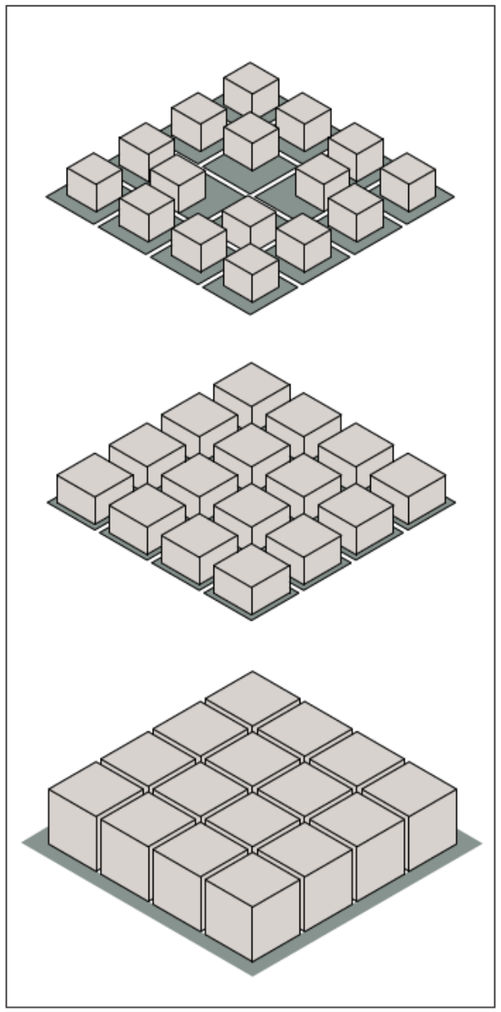
TOP-DOWN ANALYSIS OF URBAN VILLAGE

The Current Result Of Tension Among The Symbiotic System

Village land is not included in urban planning land

Apartment leasing supply increase

Apartment renting demand increase



Out of control developing

PROBLEM

1, Extremely high density,
2, Bad ventilation, bad lighting, bad security
3, High risk of fire disaster,
4, Almost no public space
5, Poor spacial quality

OPPORTUNITY

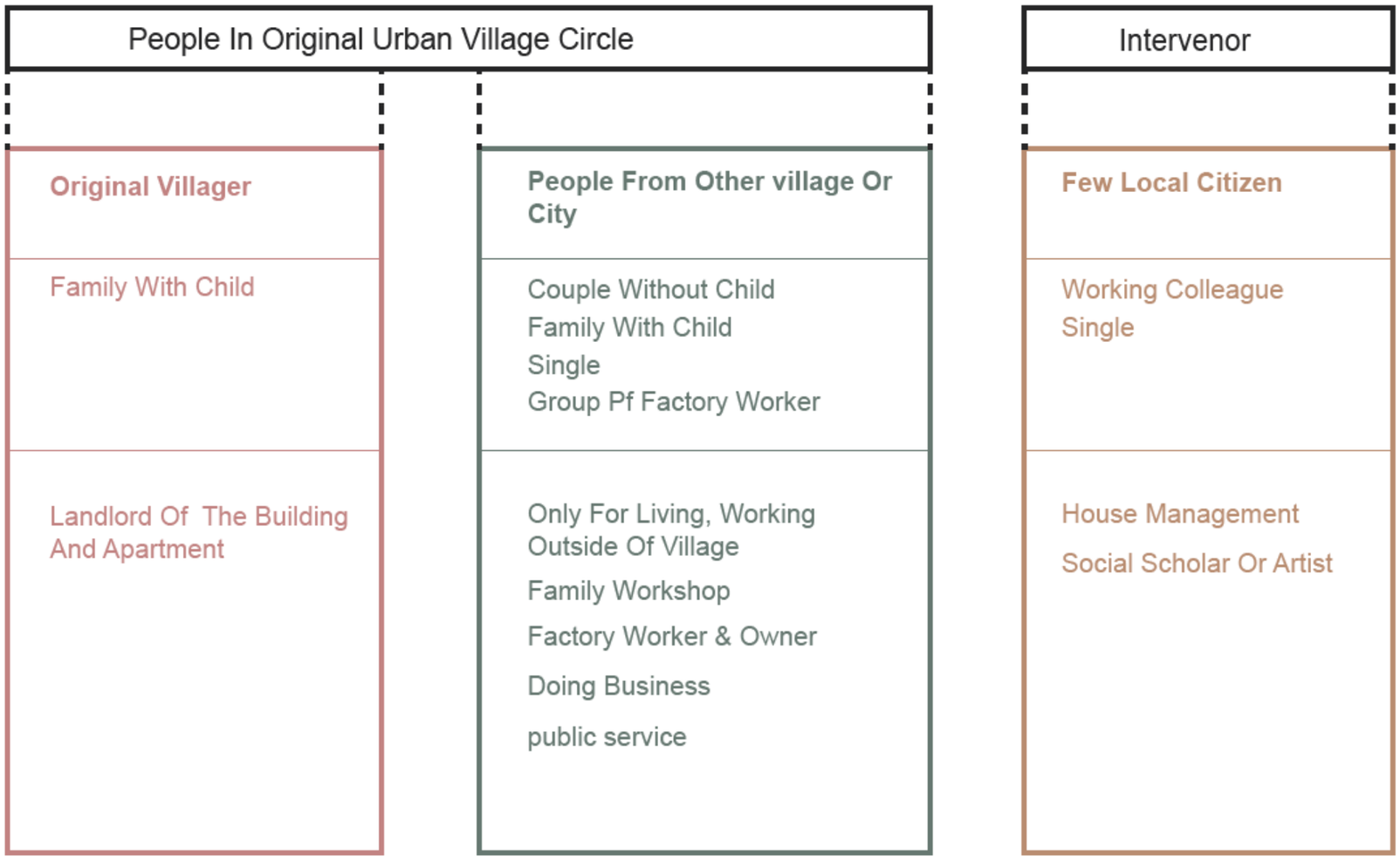
1, Income for the villager,
2, Low price apartment for immigrant,
3, Multi-function community,
4, Multi-commercial activities,
5, Plenty jobs supply
6, ...

COMPARING TO SLUMDOG

1, Urban village is different from the slumdog
2, the urban village has its own order
3, Its self-generated social economic system
4, its self-government institution,

BOTTOM-UP ANALYSIS OF URBAN VILLAGE

Different Groups Of People

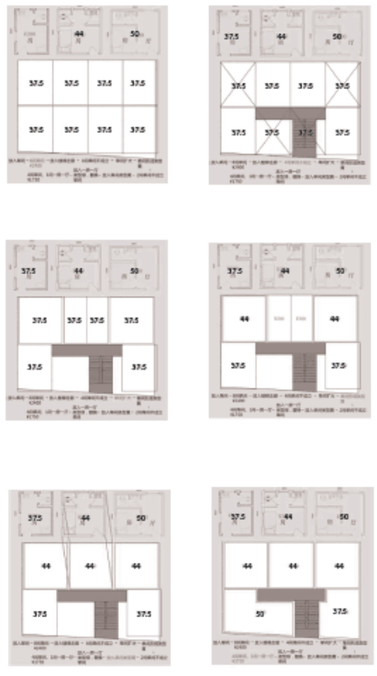


BOTTOM-UP ANALYSIS OF URBAN VILLAGE

Landlord Of The Building And Apartment

Design

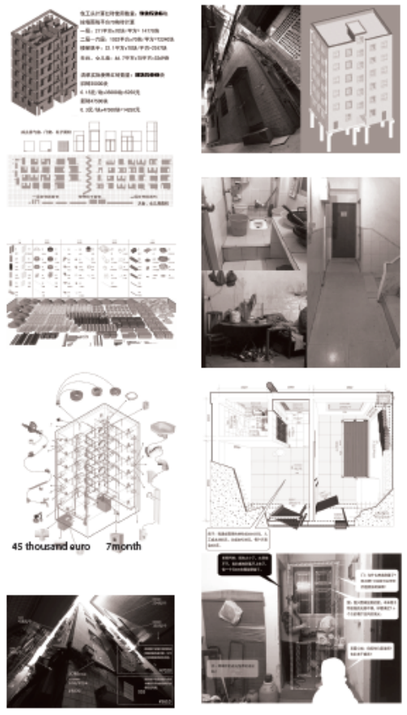
Combination Of Different Price Units



220 thousands euro.

Consctruction

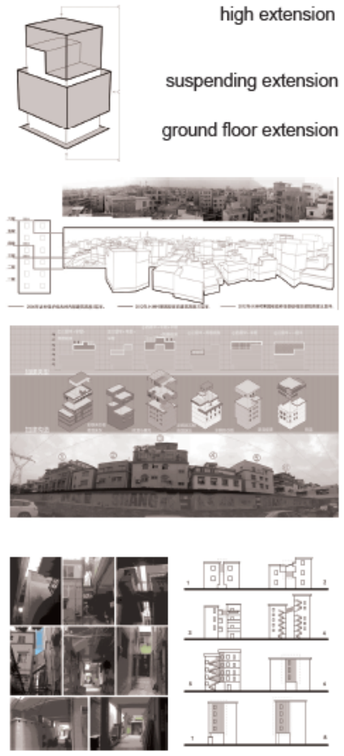
Cost & Result



600sqm. 7month, 45 thousands euro.

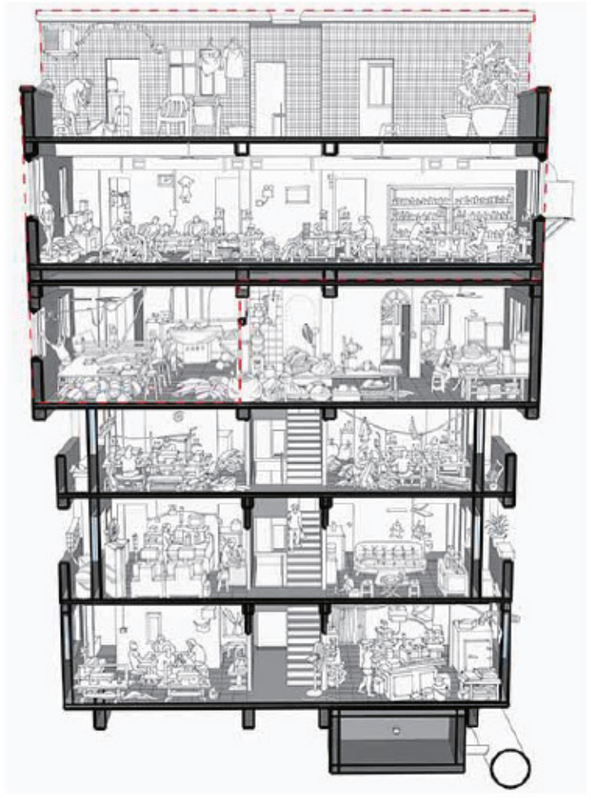
Extension

Three Types

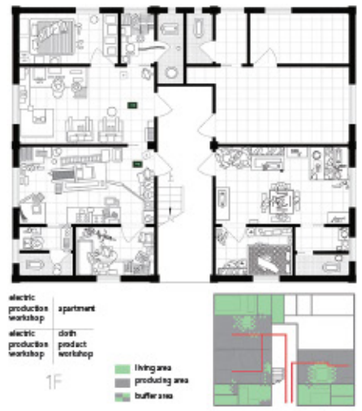


BOTTOM-UP ANALYSIS OF URBAN VILLAGE

Family Workshop

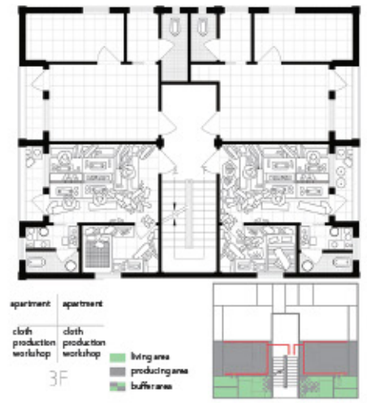


section

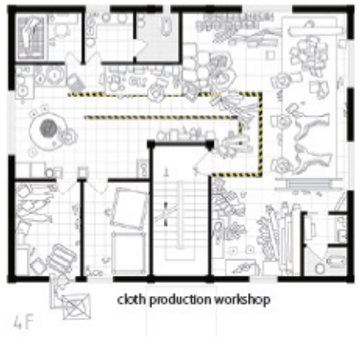


Ground Floor

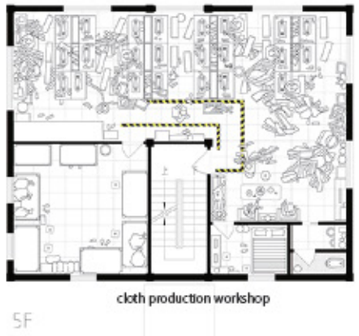
First Floor



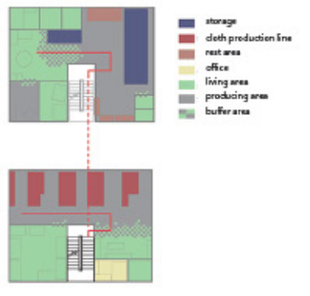
Second Floor



Third Floor



Fourth Floor



BOTTOM-UP ANALYSIS OF URBAN VILLAGE

House Management

A group of people who rent several buildings from the landlord , they will update the building condition and try to organize these buildings as a more tied connected community. and then rent it out a bit higher than the

Renovated building

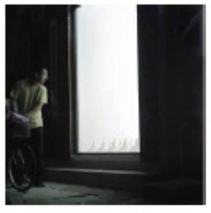
Social Scholar Or Artist

The artist, who see the vitality, the richness, the complexity, the contradictoriness and the possibilitiy in urban village, want to do something inside.

1, there is more freedom in urban village comparing to the city.

2, lower cost, so they can do something they want, without considering the money.

3, want to do some survey or experiments in urban village.



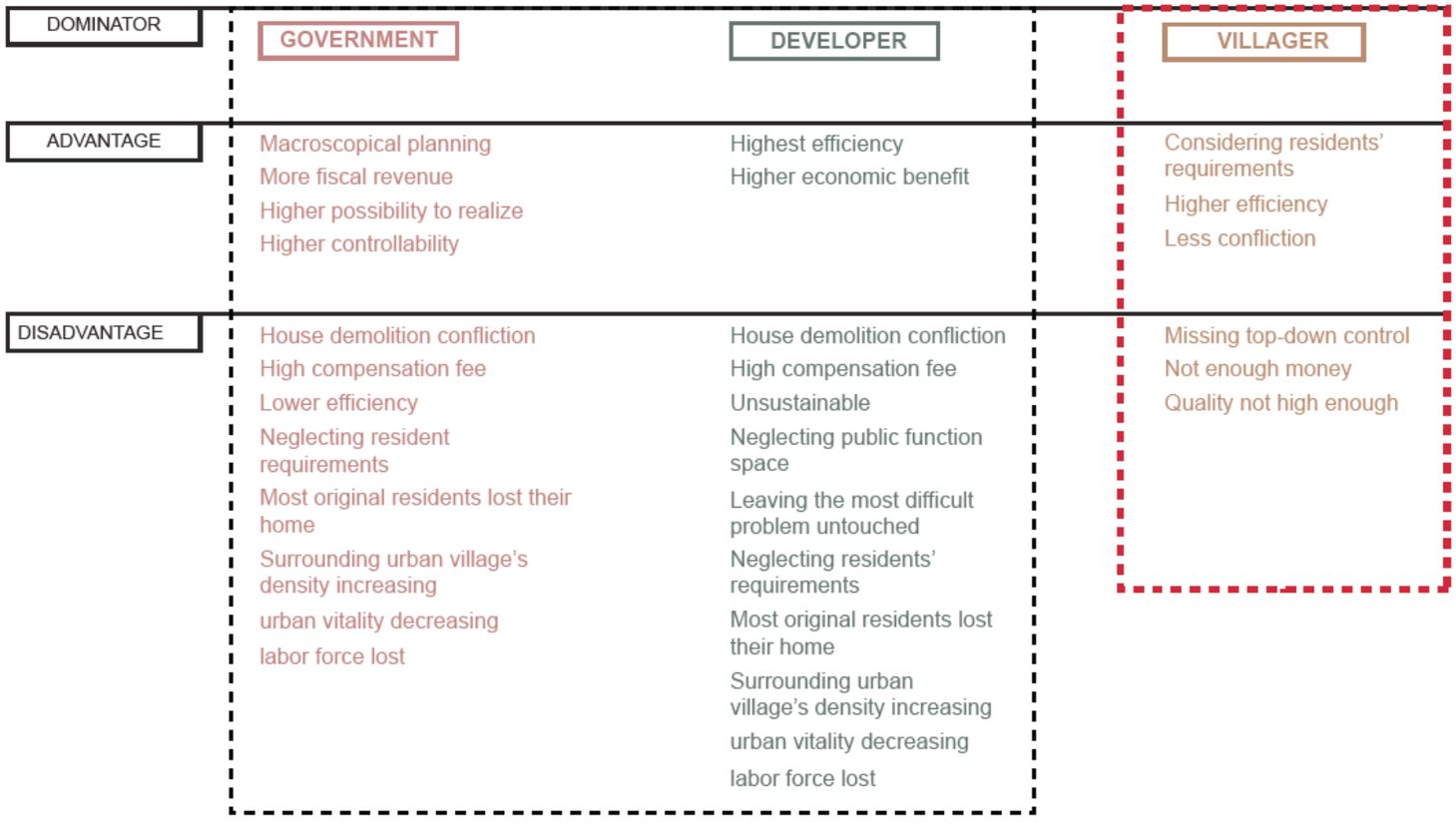
Art Gallery

Social Activity

Media show

CURRENT SITUATION OF URBAN VILLAGE

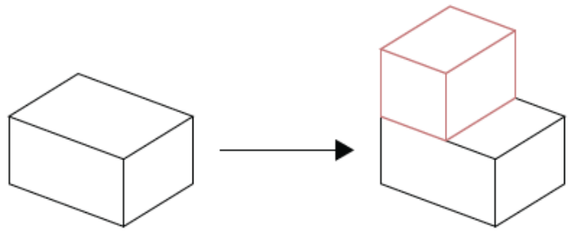
Different Attitudes Towards The Symbiosis System



TOP-DOWN VIEW INTERVENTION

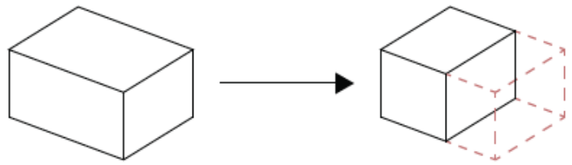
Intervention Types

ADDITION



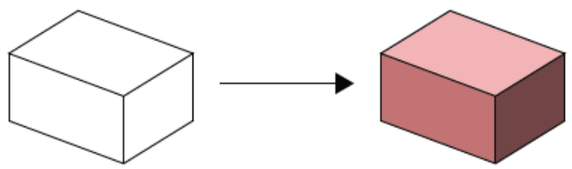
The addition volume should be placed on the top of the existed high building in order not to block or be blocked the daylight and radiation.And the additional parts can't be to close to each other.

REMOVING



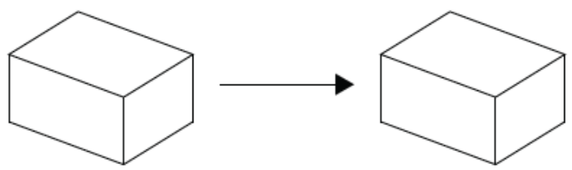
Demolishing starts from the brick structure building with lower storeys, to the concrete structure with lower storeys. And then it comes to the afterwards added structure, and finally the high concrete structure. Non't Demolish historical building.

TRANSFORMING



The area of transforming parts should not exceed the area of additional parts minus the area of demolishing parts. And this area will mainly prepare for the new injected functions.

REMAINING



The remain part will keep its original structure and envelop. The function wil mainly apartment, which exclude the domestic worshop.

TOP-DOWN VIEW INTERVENTION

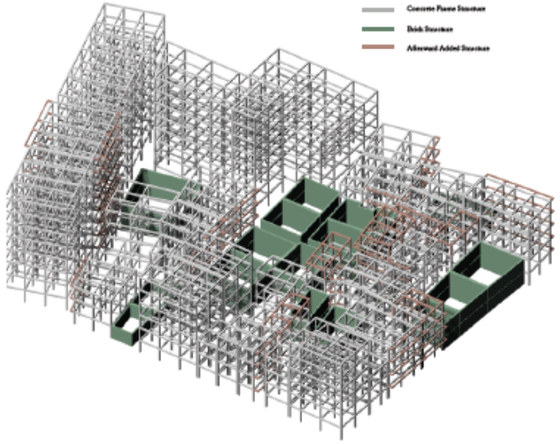
Intervention Criterion

From easy to hard

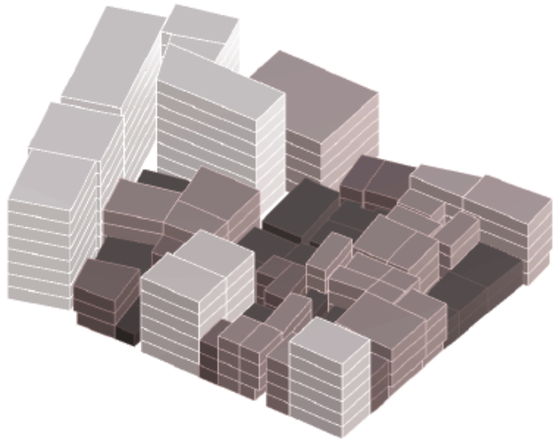
From low value to high value

Keep similar number of araprtments for renting

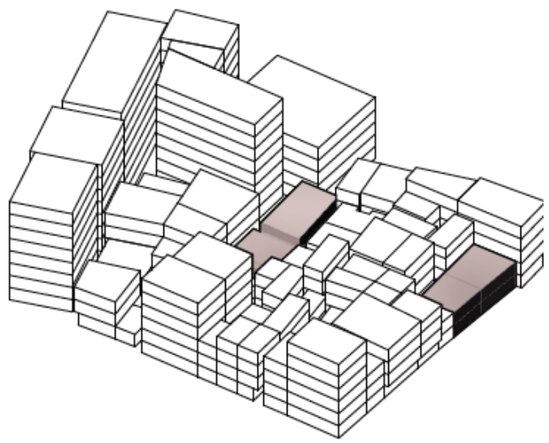
Buildings' Structure Types



Buildings' Storey Numbers

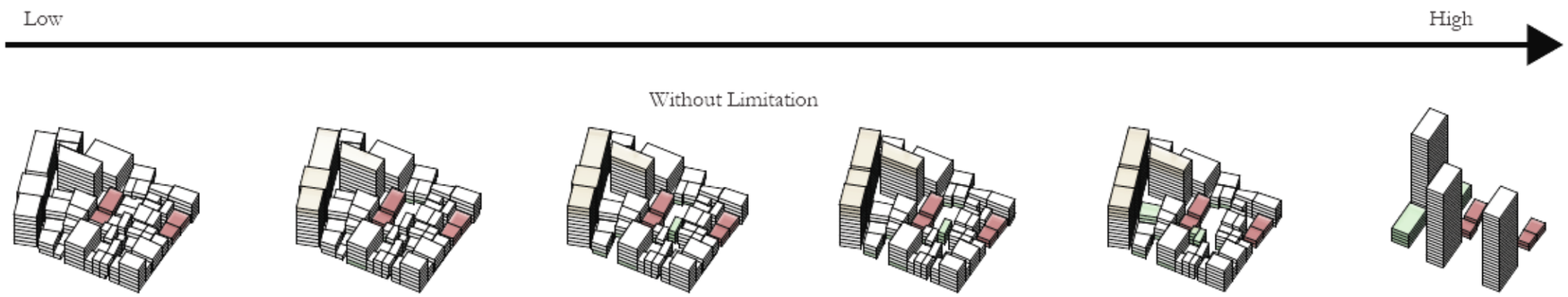


Buildings' Values



TOP-DOWN VIEW INTERVENTION

Different Intervention Intensity



Original
Plot Density: 0.77
Floor Area Ratio:3.5

Strength Level 1
Demolishing: 600sqm
Transforming: 700sqm
Additon:1300sqm
Plot Density: 0.72
Floor Area Ratio:3.5

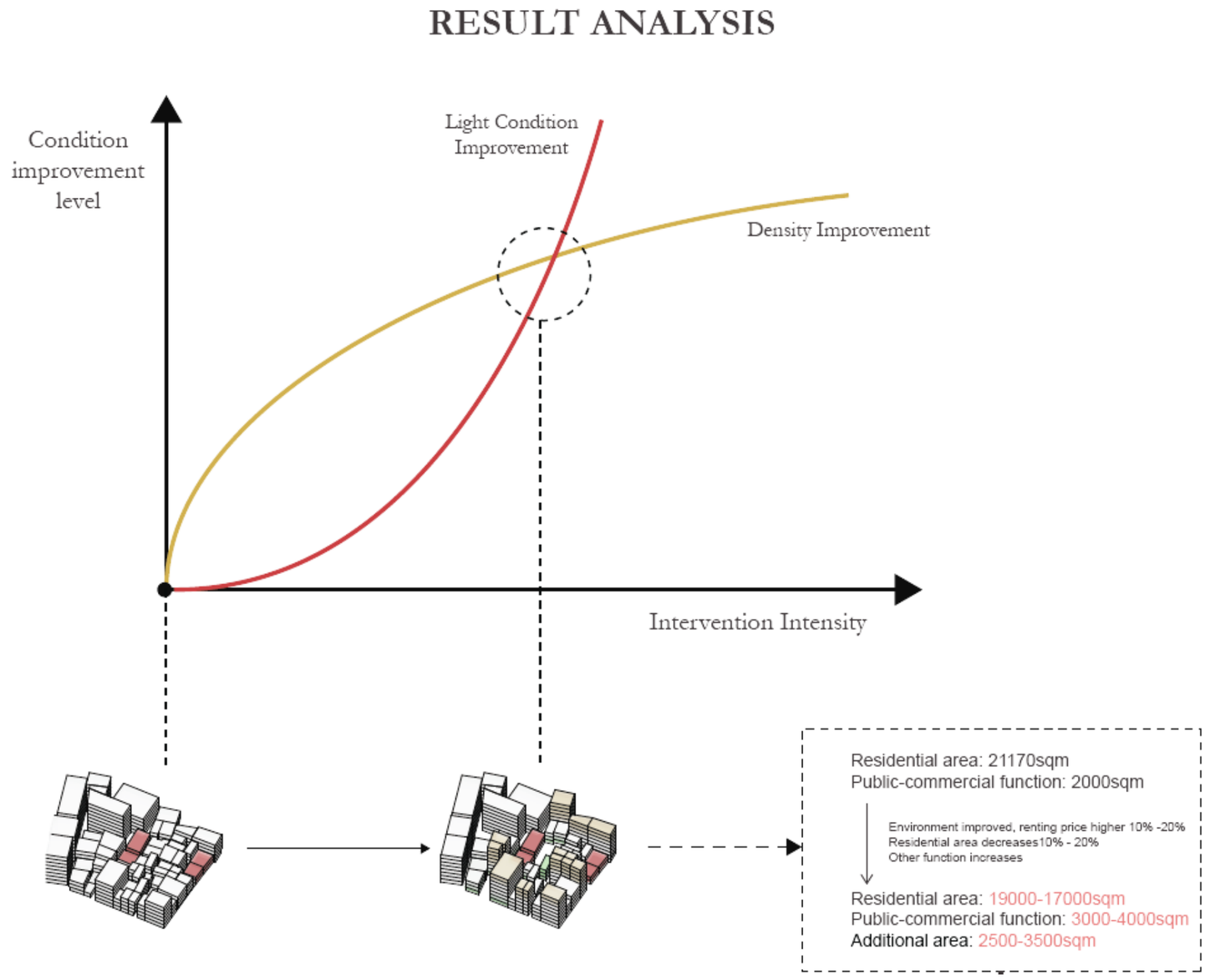
Strength Level 2
Demolishing: 1200sqm
Transforming: 1200sqm
Additon:2400sqm
Plot Density: 0.68
Floor Area Ratio:3.68

Strength Level 3
Demolishing: 1900sqm
Transforming: 1200sqm
Additon:3100sqm
Plot Density: 0.66
Floor Area Ratio:3.68

Strength Level 4
Demolishing: 2200sqm
Transforming: 1600sqm
Additon:3800sqm
Plot Density: 0.62
Floor Area Ratio:3.82

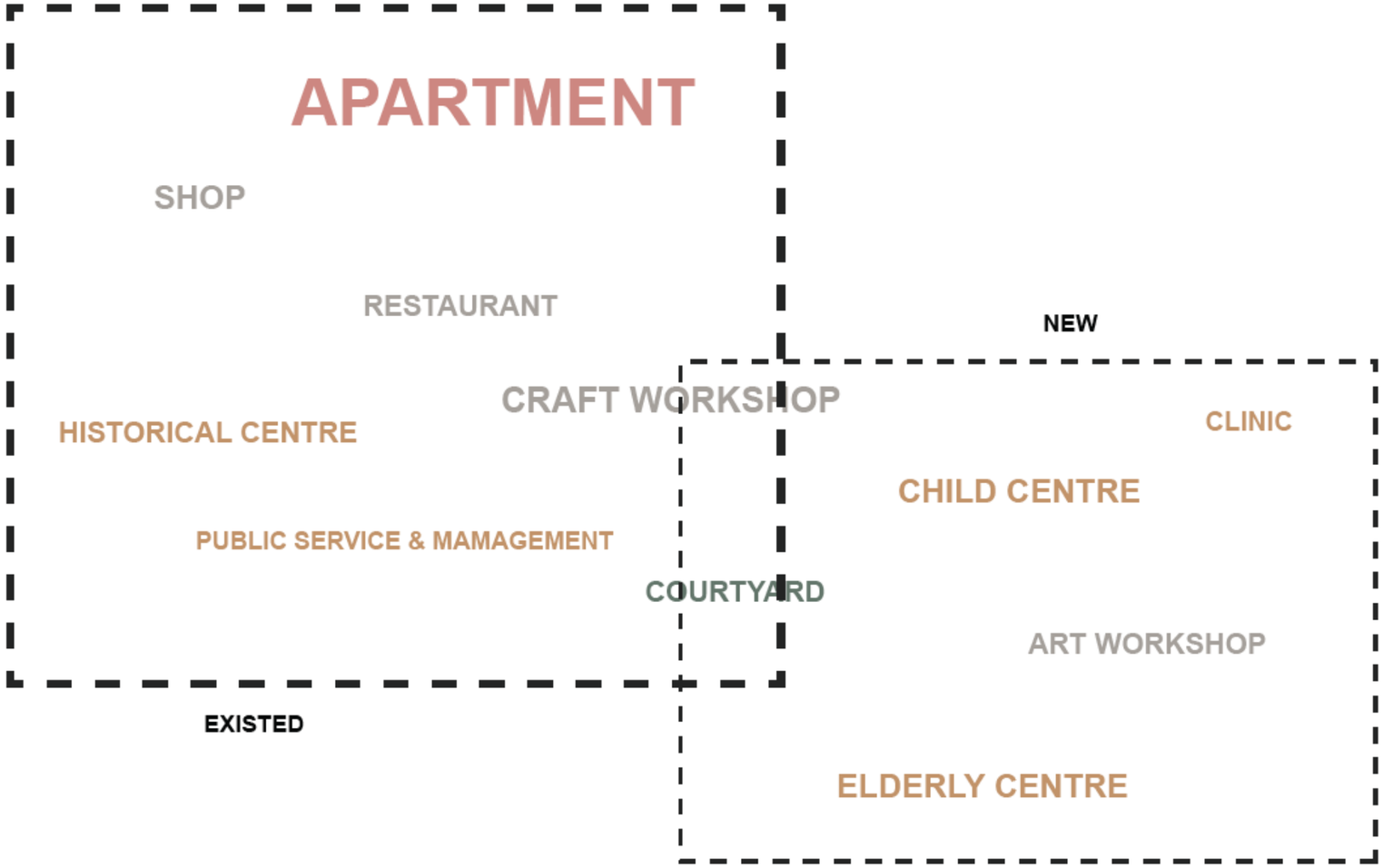
Extreme Condition
Residential Community
Plot Density: 0.28
Floor Area Ratio:3.5

TOP-DOWN VIEW INTERVENTION



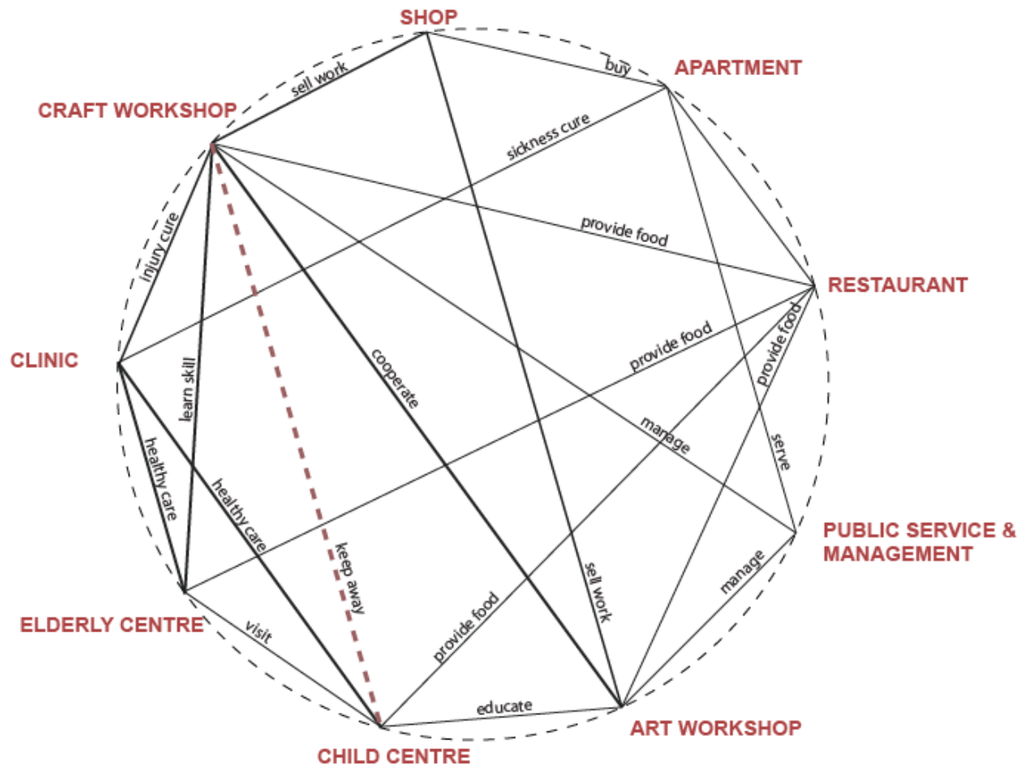
BOTTOM-UP VIEW INTERVENTION

Program Functions Proposal



BOTTOM-UP VIEW INTERVENTION

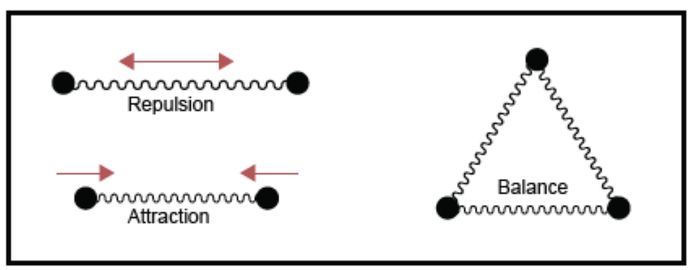
Functions' Inter-relationship



However, this is only a 1 to 1 relationship, when it comes to a three-members inter-relationship or even more, there will be unreasonable relationship

BOTTOM-UP VIEW INTERVENTION

Particle, Force Based Systems

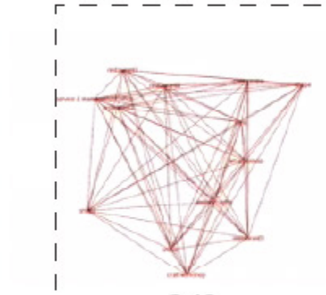


Inter-forces Between Functions

	art workshop	craft workshop	restaurant1	restaurant2	restaurant3	restaurant4	shop1	shop2	shop4	clinic	service& mamagement	elderly centre	child centre
art workshop	-												
craft workshop	2	-											
restaurant1	1	-	-										
restaurant2	-	1	-1	-									
restaurant3	-	2	-	-	-								
restaurant4	2	-	-	-	–1	-							
shop1	-	2	1	1	-	1	-						
shop2	0	2	1	-	1	1	1	-					
shop3	2	-	1	1	1	-	-1	-1	-				
clinic	-	2	-	-	-	-	-	-	-	-			
service& mamagementoffice	1	1	-	-	-	-	-	-	-	-	-		
elderly centre	0	5	-	2	-	1	2	-	2	3	-	-	
child centre	3	-3	1	-	1	-	-	-	-	3	-	4	-

BOTTOM-UP VIEW INTERVENTION

Optimization Result



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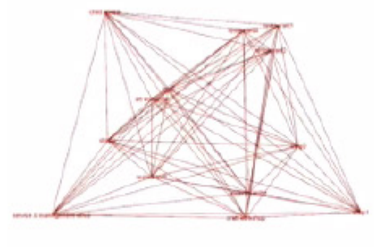

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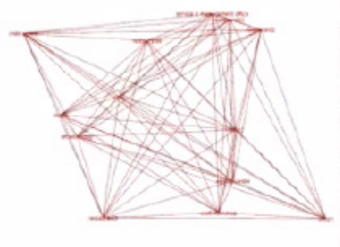

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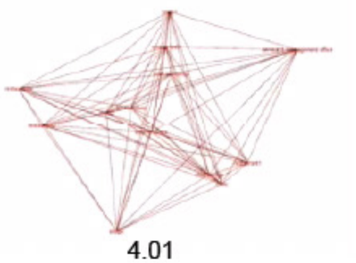

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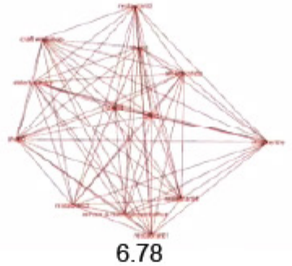

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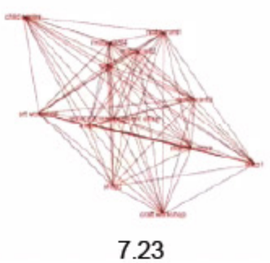

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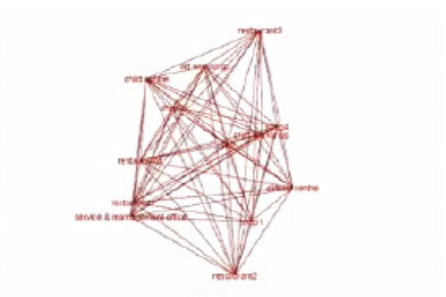

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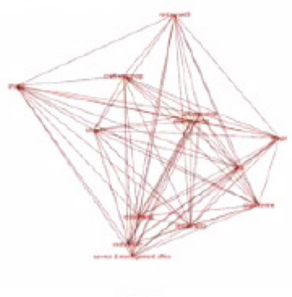

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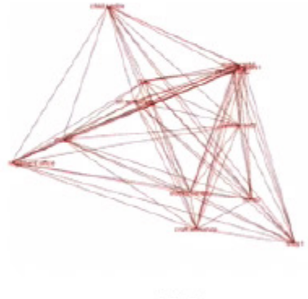


42.6

BOTTOM-UP VIEW INTERVENTION

Functions' Properties Requirements

	daylight	radiation	publicness - privacy	accessibility from urban village	accessibility from outer city
art workshop	2	3	0	0	2
craft workshop	2	3	3	4	5
restaurant1	-	-	3	5	2
restaurant2	-	-	3	3	4
restaurant3	-	-	3	3	4
restaurant4	-	-	3	5	4
shop1	1	-	5	5	1
shop2	1	-	5	5	1
shop3	1	-	5	5	3
clinic	3	0	3	5	-
service & mamagement	2	3	5	5	-
elderly centre	5	5	0	5	-
child centre	5	5	- 3	3	- 1

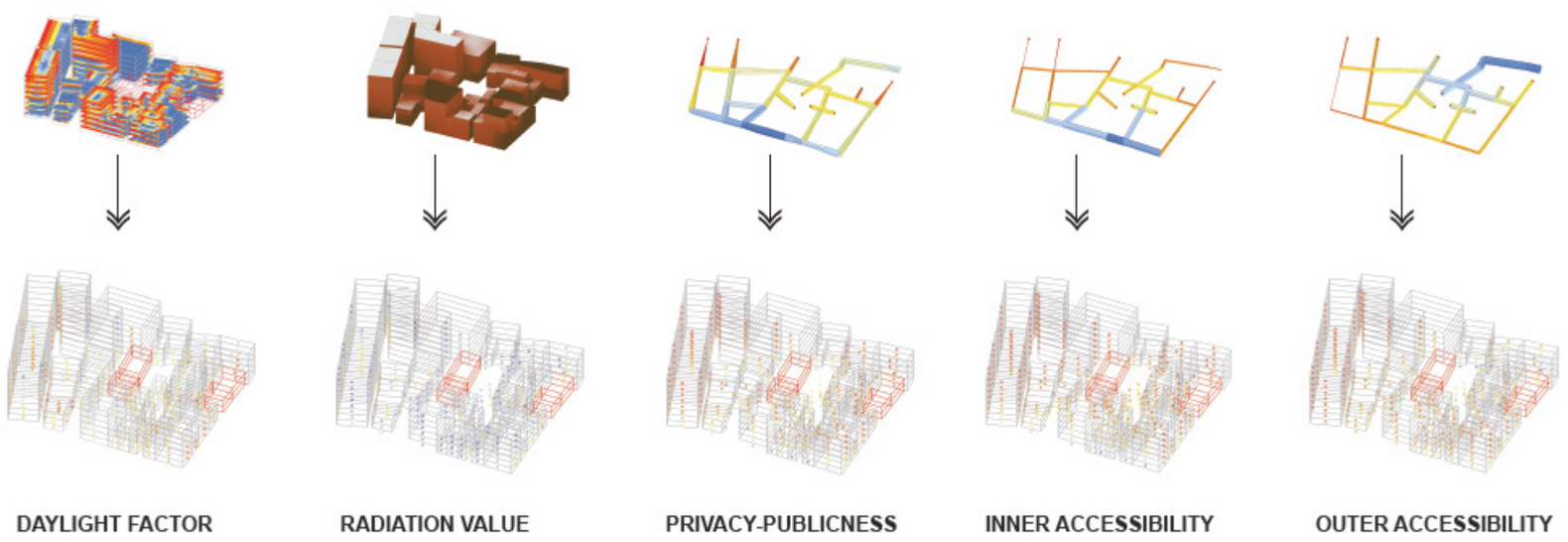
Quantitative Properties

Qualitative Properties

BOTTOM-UP VIEW INTERVENTION

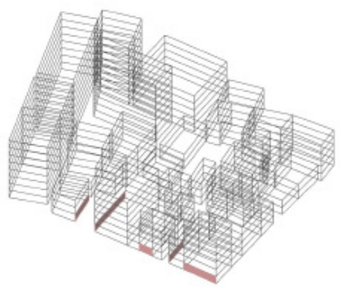
Space Syntax Evaluation

Evaluation Result

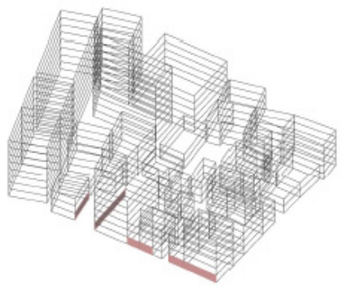


BOTTOM-UP VIEW INTERVENTION

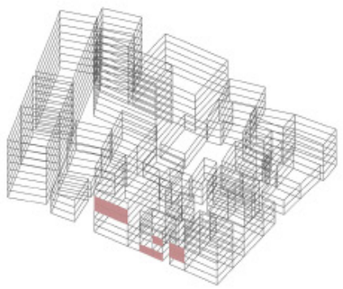
Available Locations for Each Function



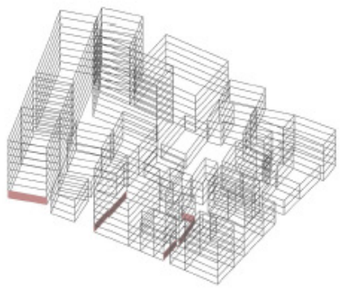
SHOP



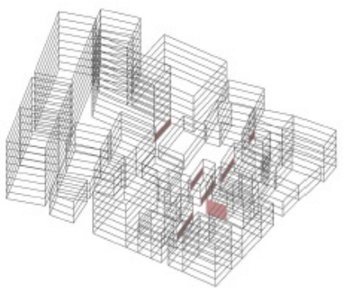
SERVICE & MANAGEMENT



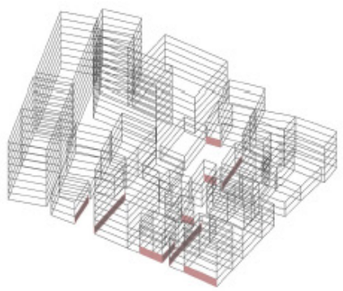
ELDERLY CENTRE



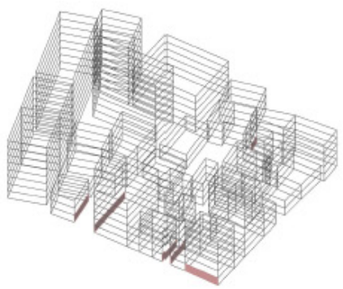
CLINIC



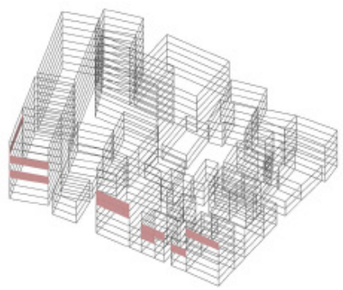
ART WORKSHOP



RESTAURANT



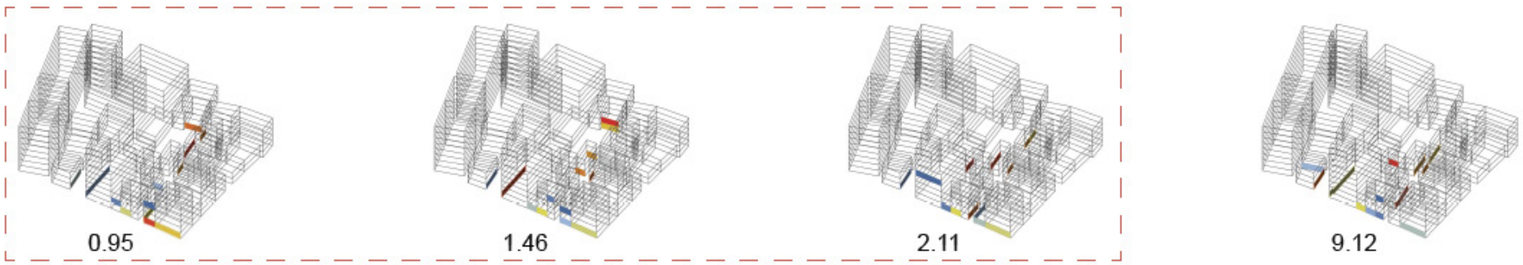
CRAFT WORKSHOP



CHILD CENTRE

BOTTOM-UP VIEW INTERVENTION

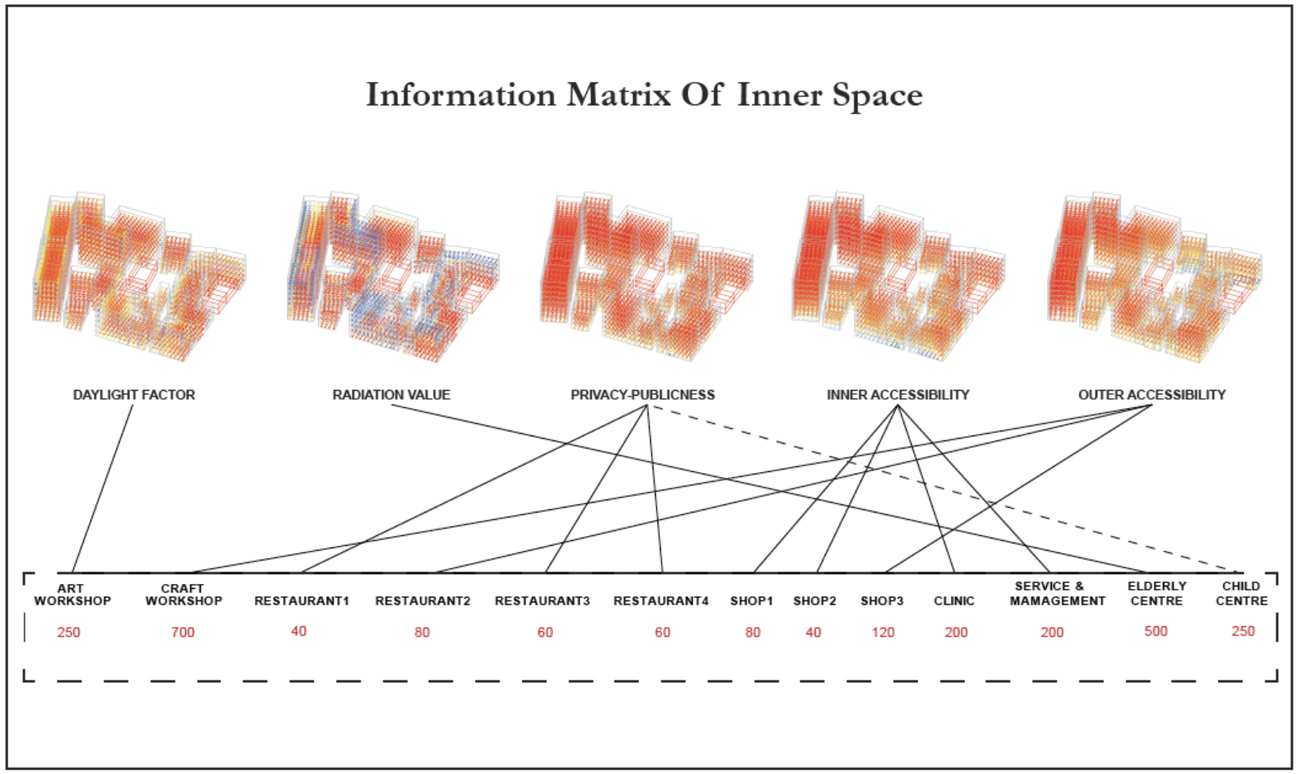
Combination Re-evaluation



COMBINED INTERVENTION

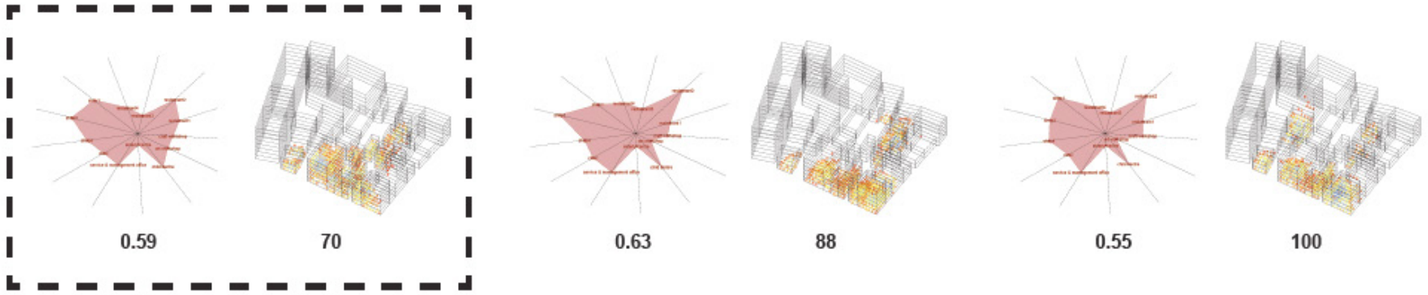
Information-drive Method For Functions' Growing

Data-field, Recursion Method

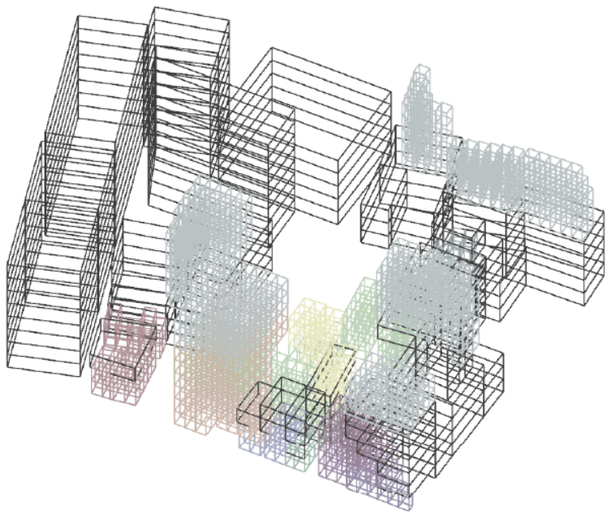


COMBINED INTERVENTION

Result Re-evaluation

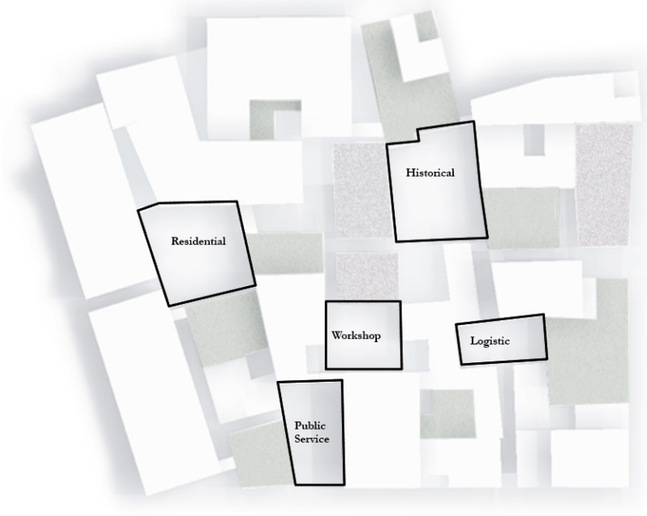


PROGRAM RESULT



Result of growing scrip

Function distribution



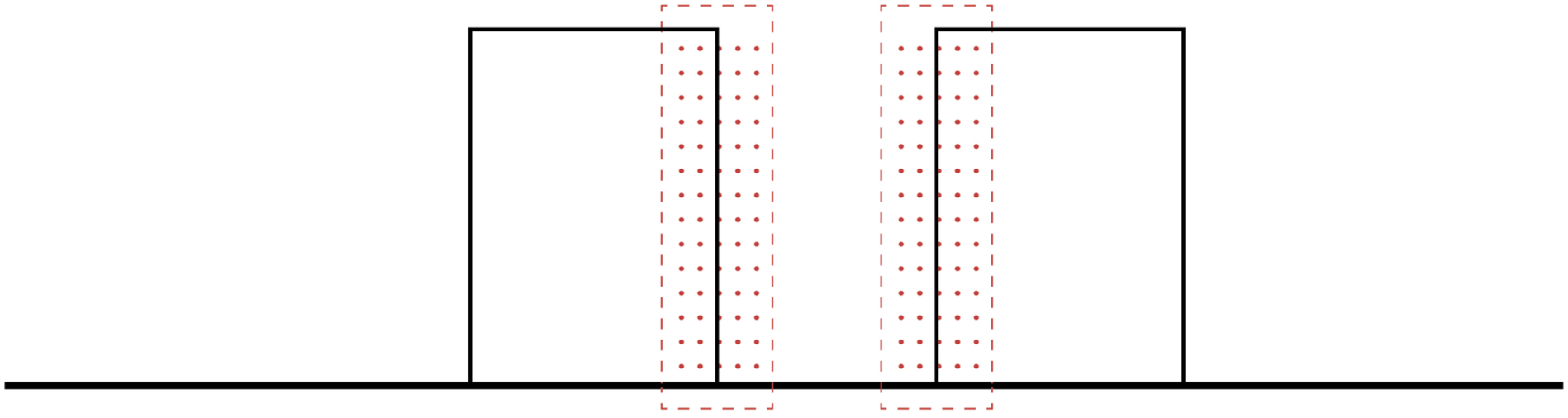
Public space property

INTERVENTION IN URBAN VILLAGE

INTERFACE STRATAGE

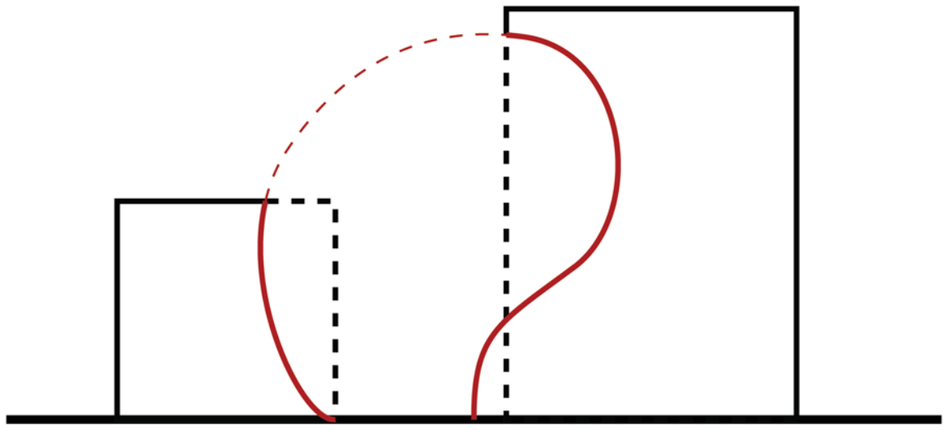
The interface doesn't work as a boundary like a wall or normal facade, but as an extension of the function or the space. As the mutual penetration and mutual understanding of two defferent elements proceeds, the interface of the intermediary reveals the life in the smybiotic system.

SHARED INTERFACE SPACE



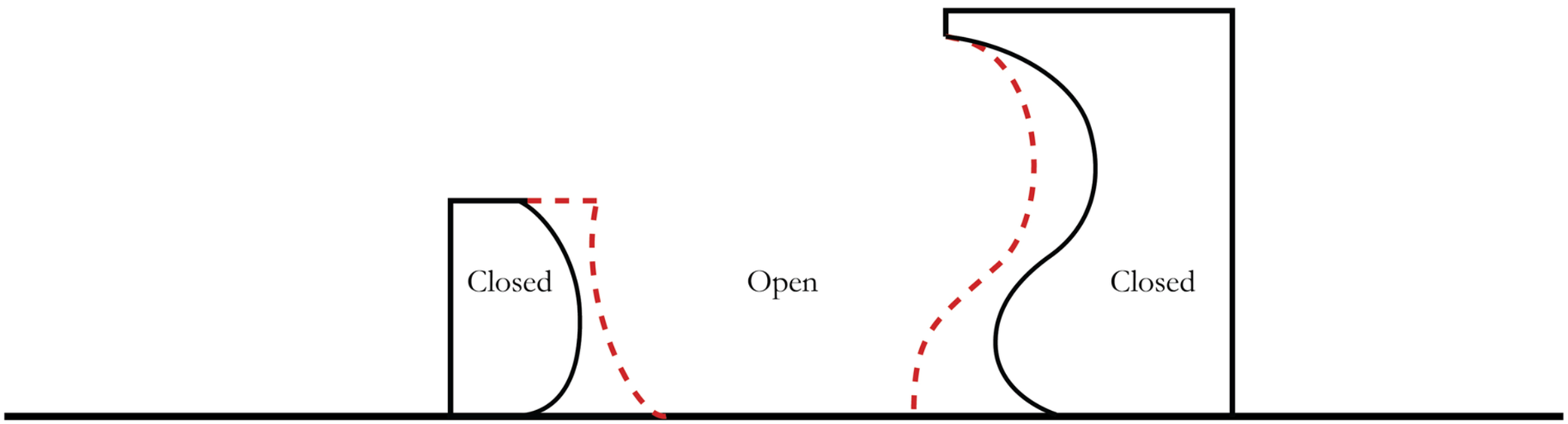
Semi-open shared interface space

INTERVENTION STRATAGE

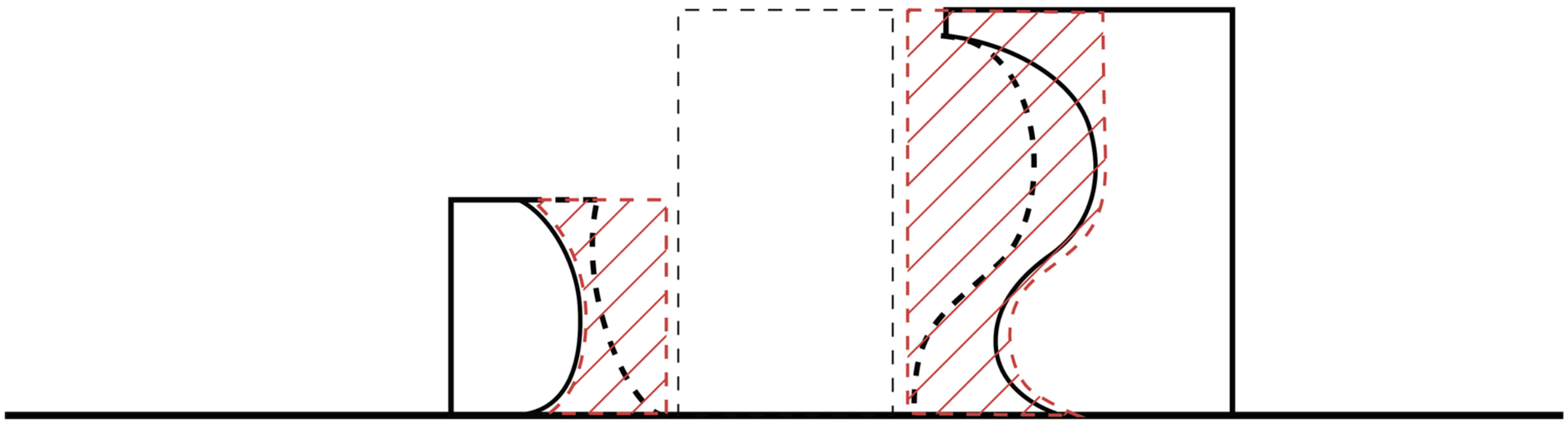


Manipulate the Public Space

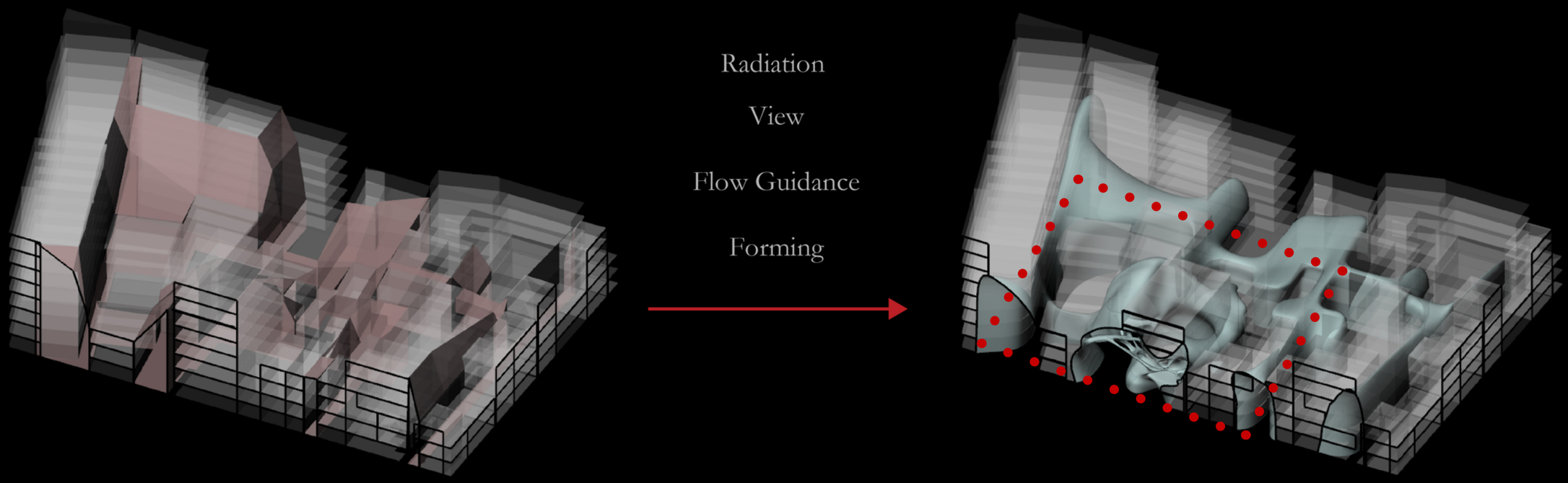
SPACE TYPE



SPACE TYPE

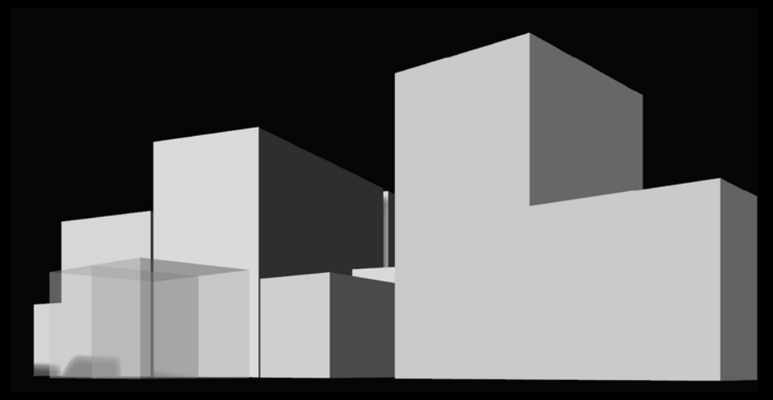


PUBLIC SPACE DEFORMATION AND SUBSTRACTION

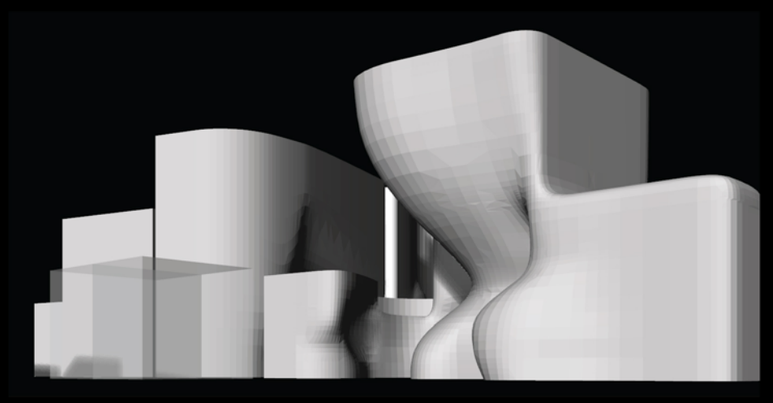


PUBLIC SPACE DEFORMATION AND SUBSTRACTION

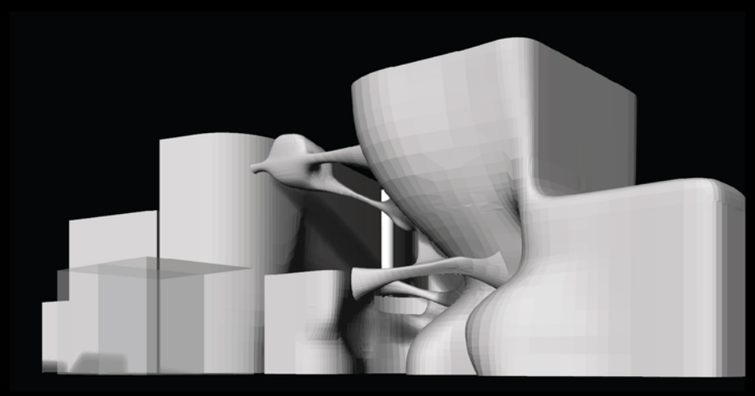
Origional building volumn
and public space



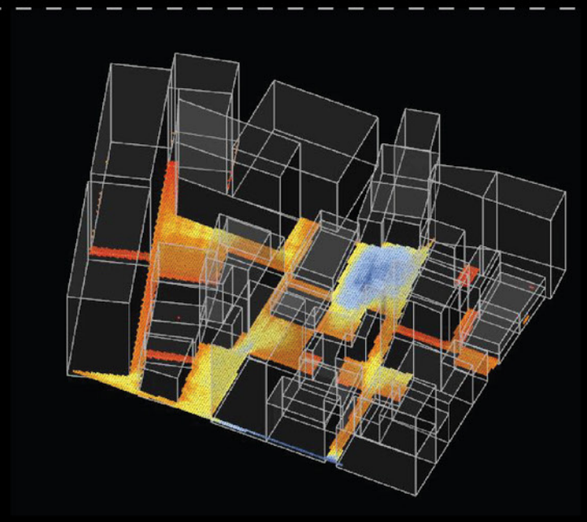
Building volumn substracted
by the deformed public space



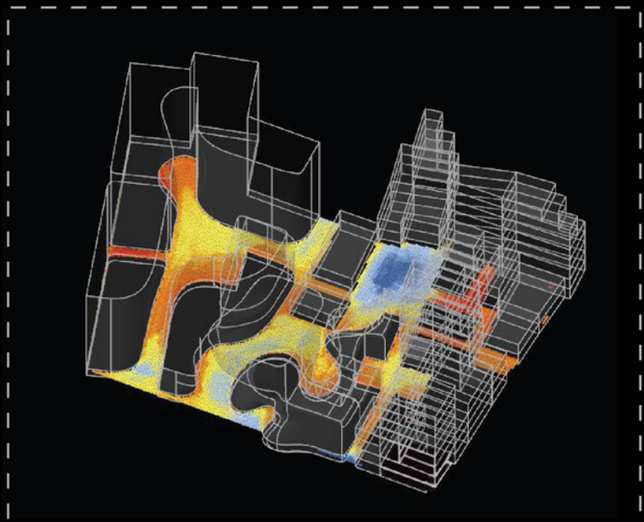
Connection bridge
and small pavillion

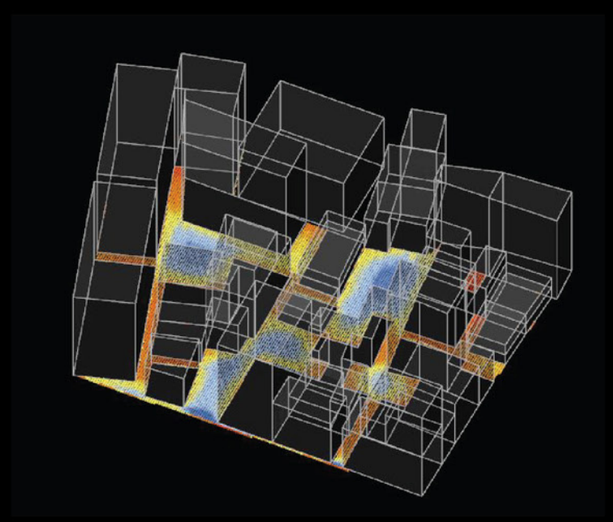


PUBLIC SPACE RESULT COMPARATION

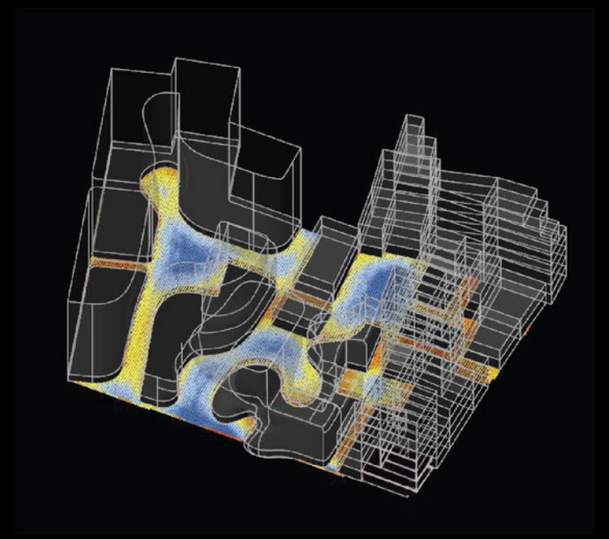


RADIATION





VIEW



Before

After

ARCHITECTURE GENERATION METHOD

Parametric and **computational** method in order to achieve iterative optimization operation.

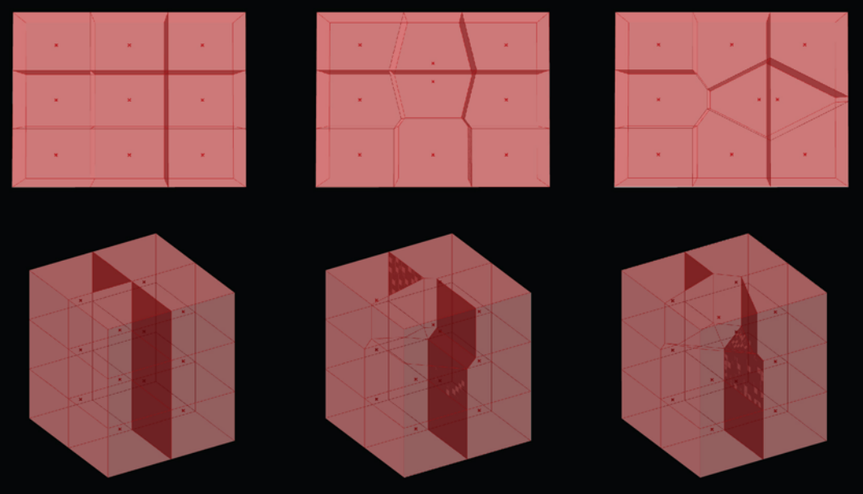
A **smooth transition** between old and new; open and closed; private and public.

Both **continuity and diversity** between the structure and space of new and old part.

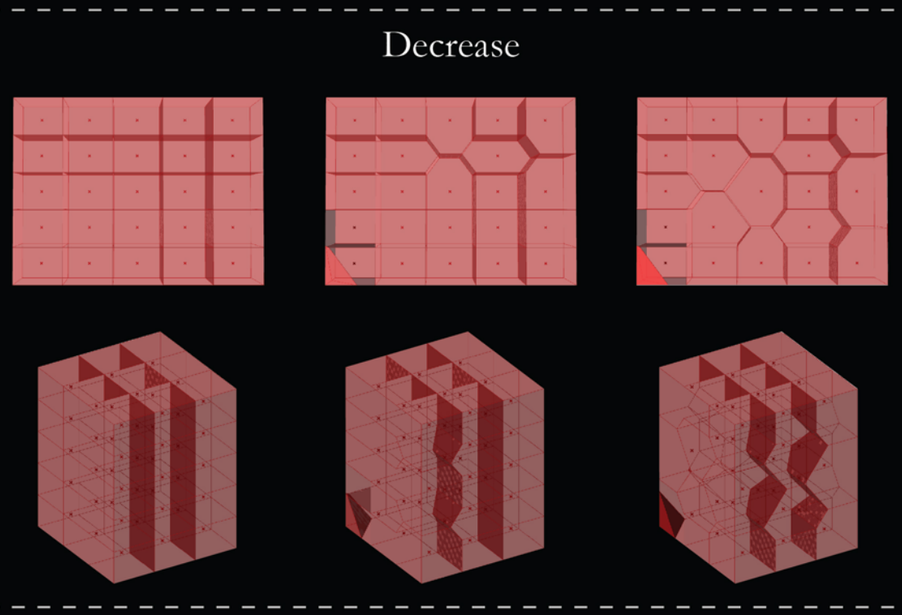
BUILDING SCALE GENERATION STRATAGE

3D Voronoi Study

Movement

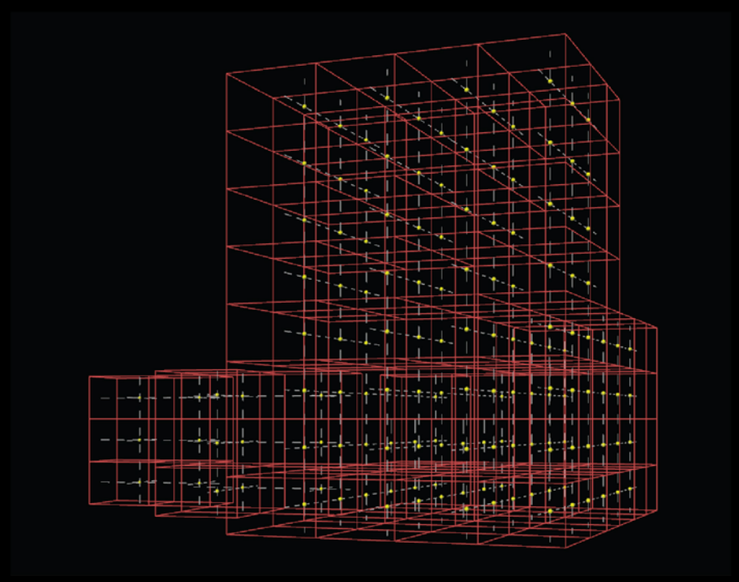


Decrease

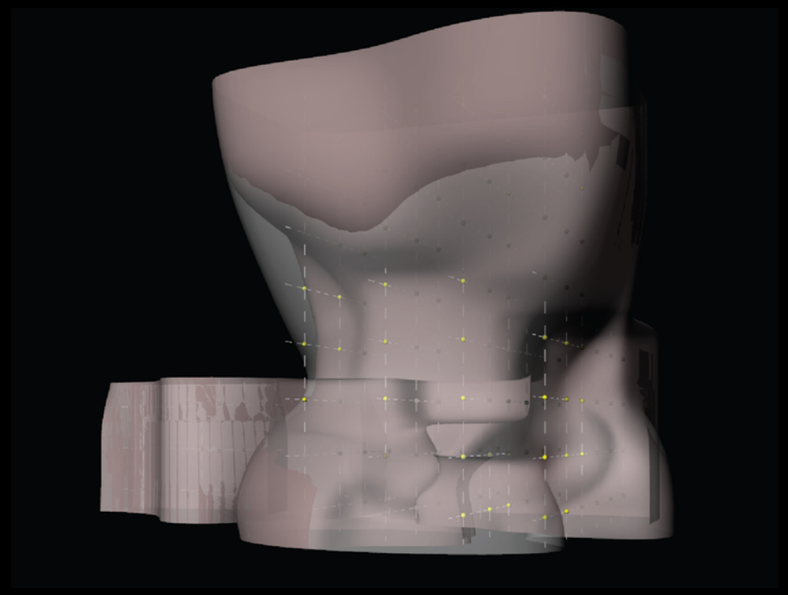


GENERATION PROCESS

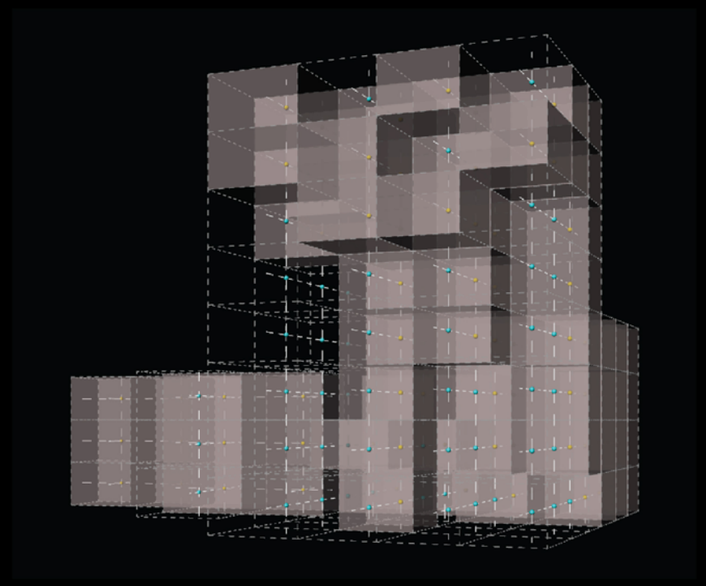
Origional Volumn and Points



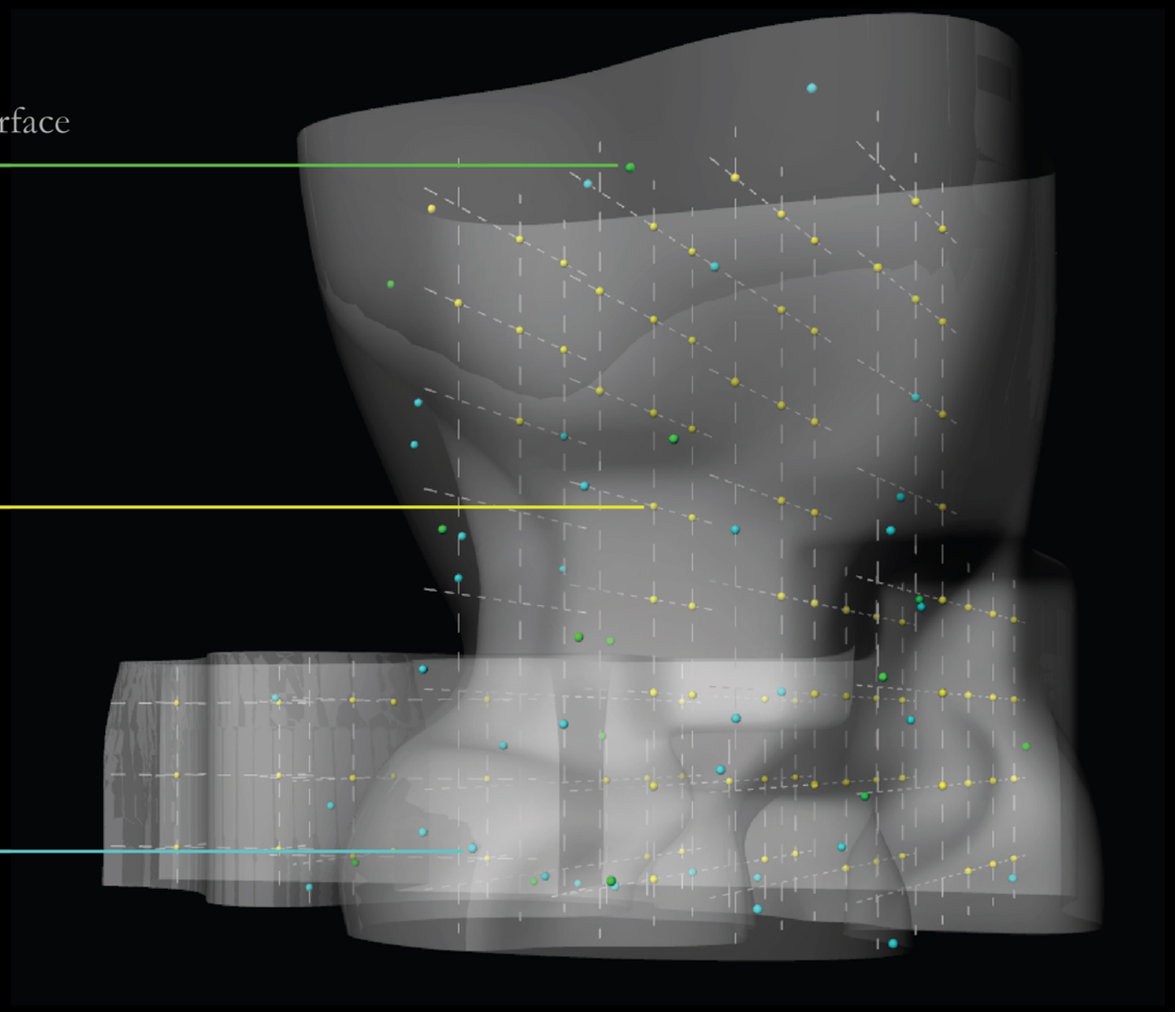
Inner and Outer Layer



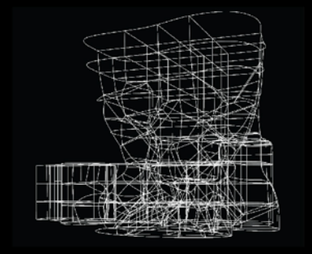
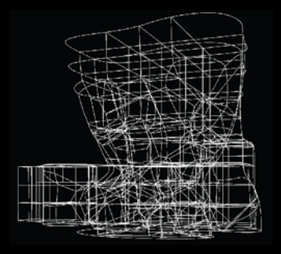
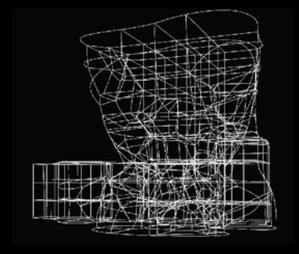
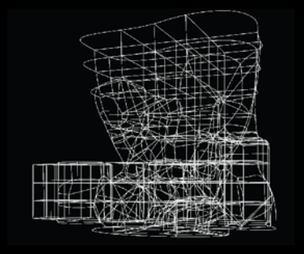
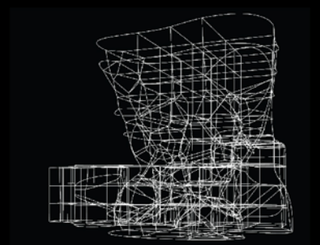
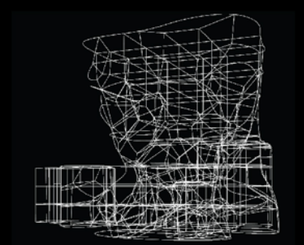
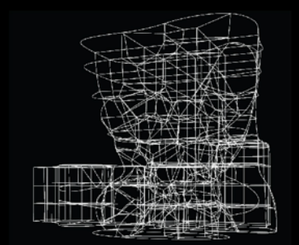
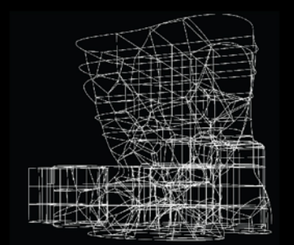
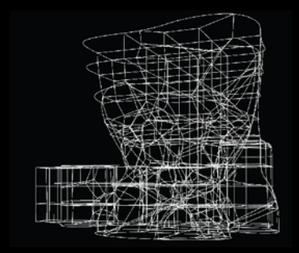
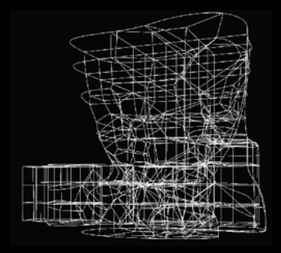
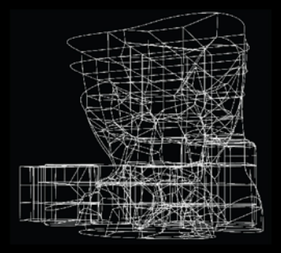
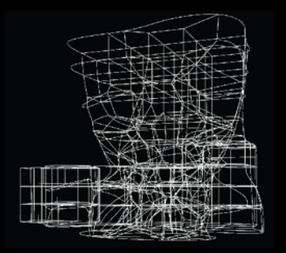
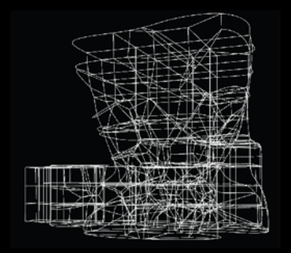
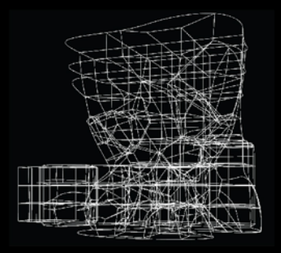
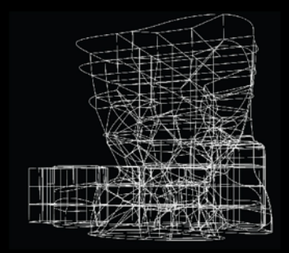
Fixed Area and Points



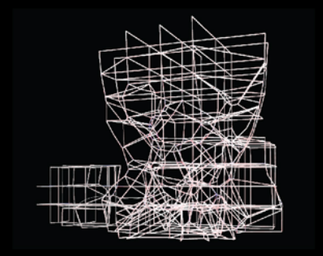
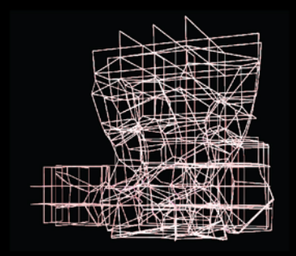
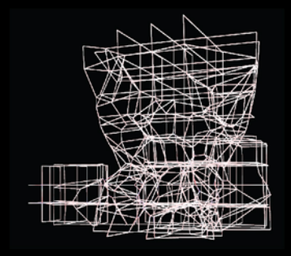
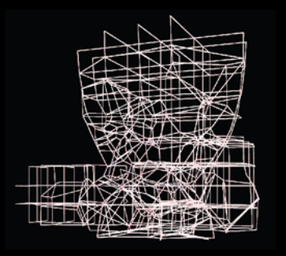
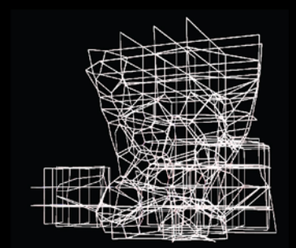
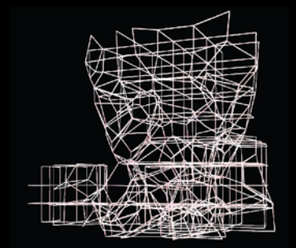
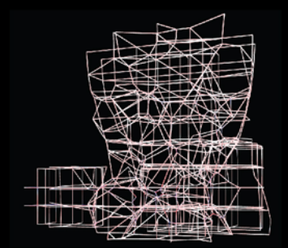
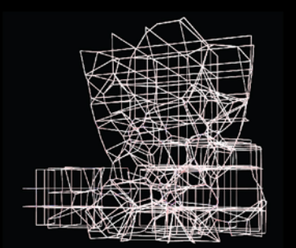
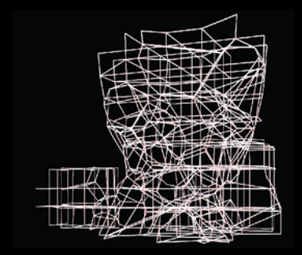
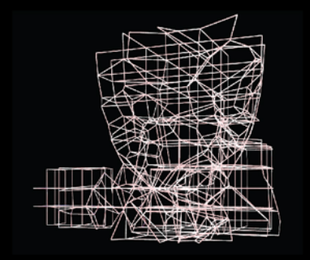
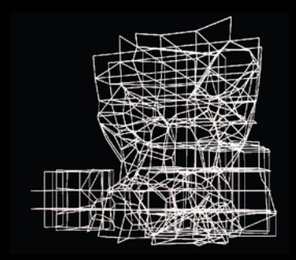
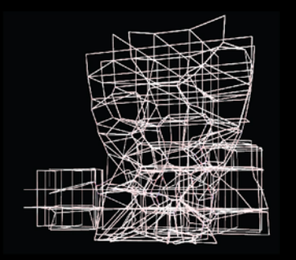
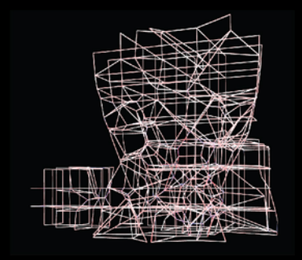
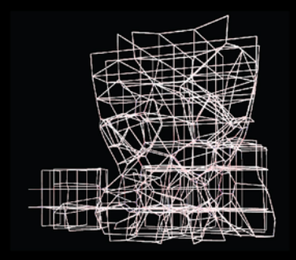
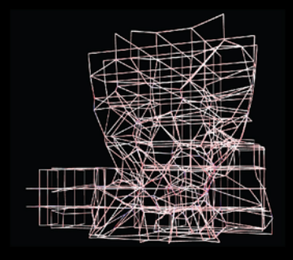
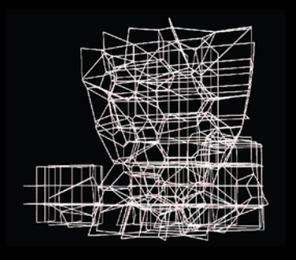
GENERATION PROCESS



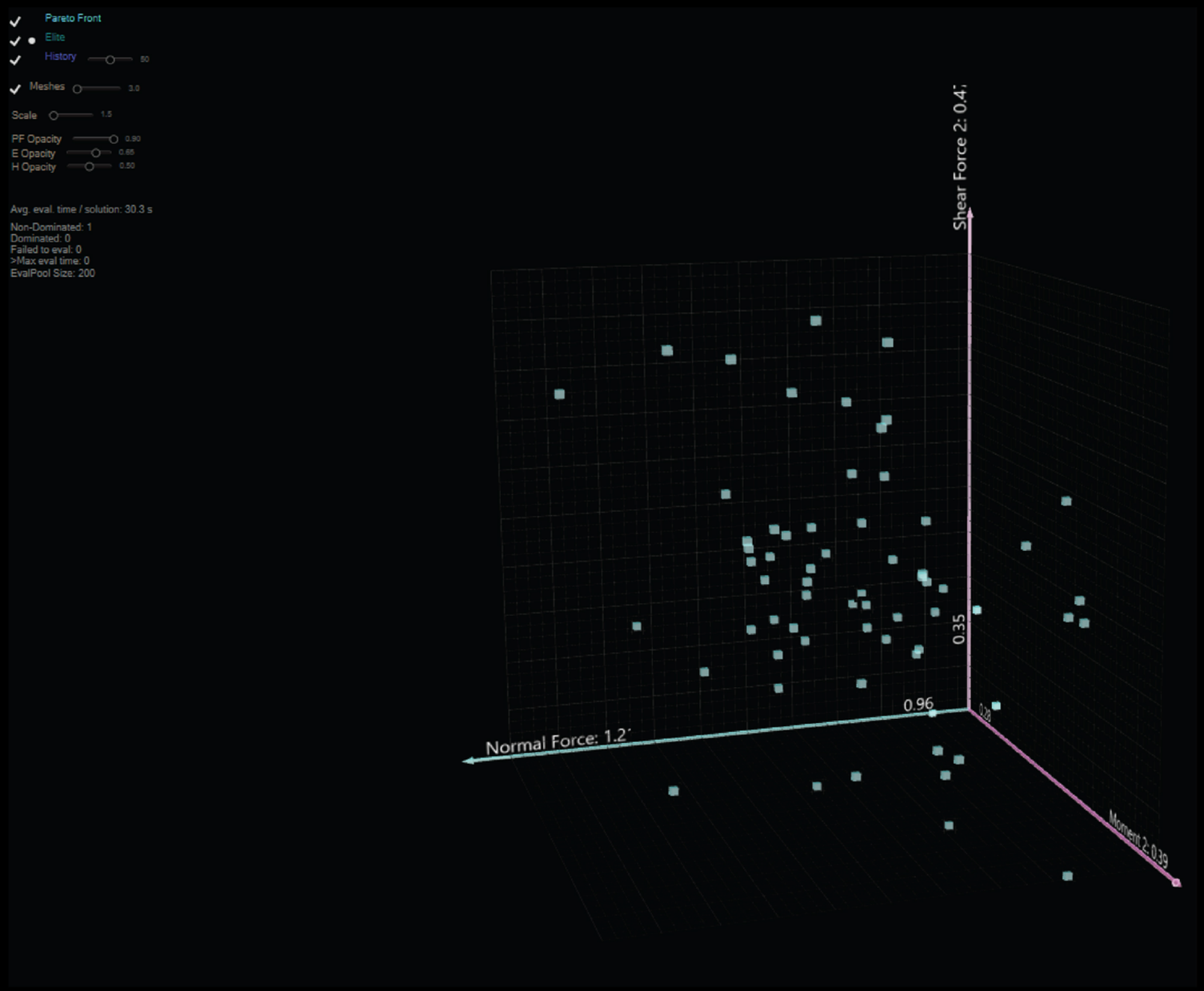
ITERATION RESULT

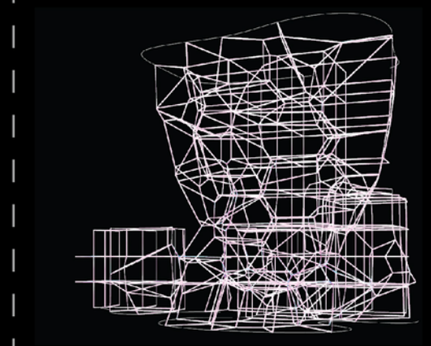

















ITERATION RESULT

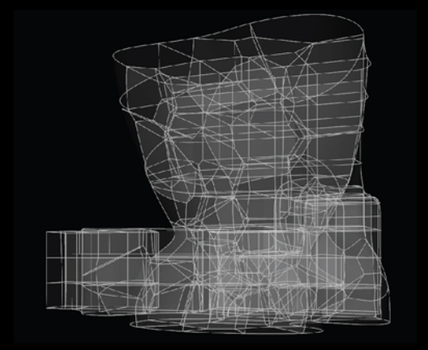

















MULTI-OBJECTS OPTIMIZATION ANALYSIS



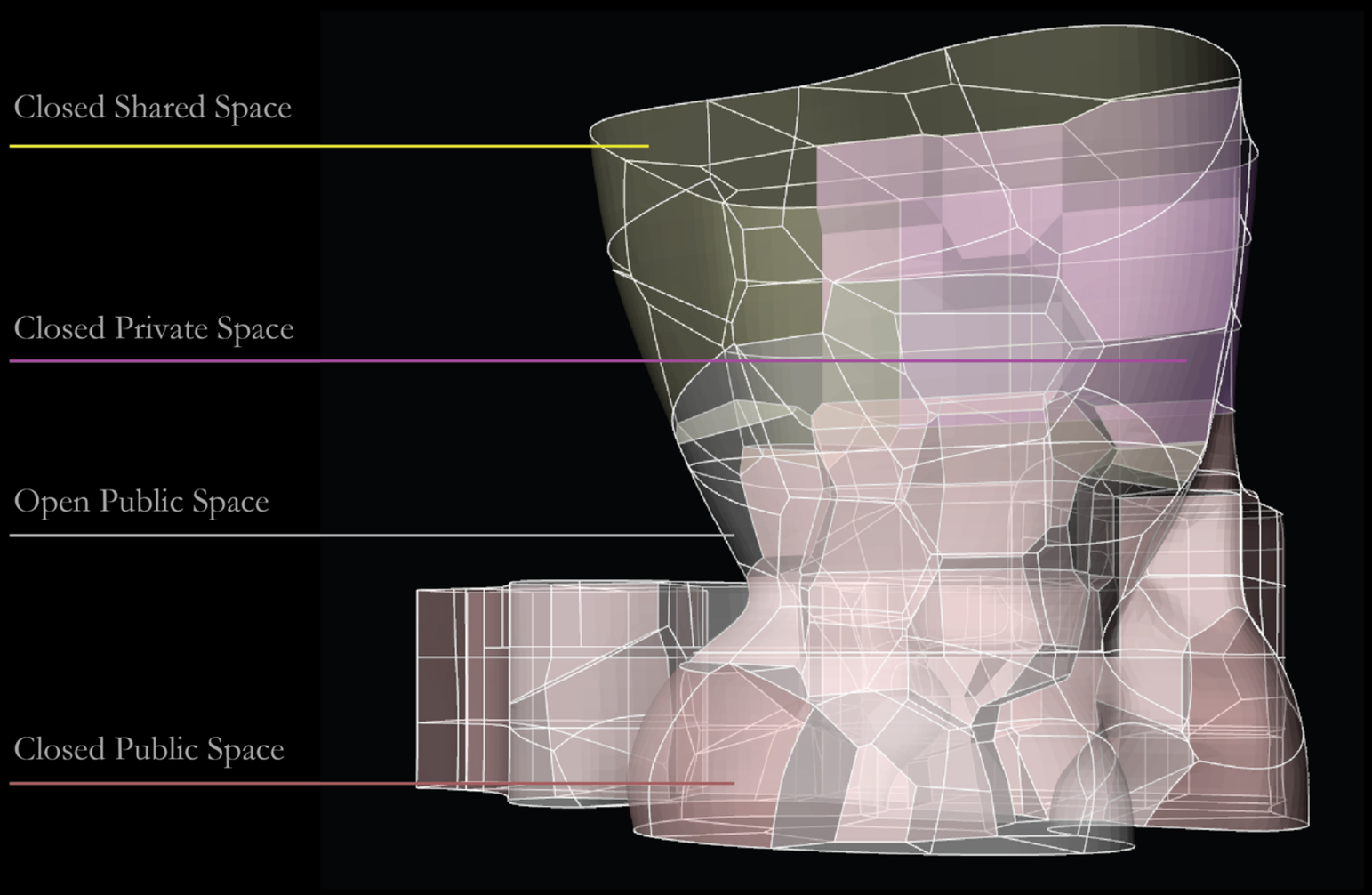


Better Structure Performance

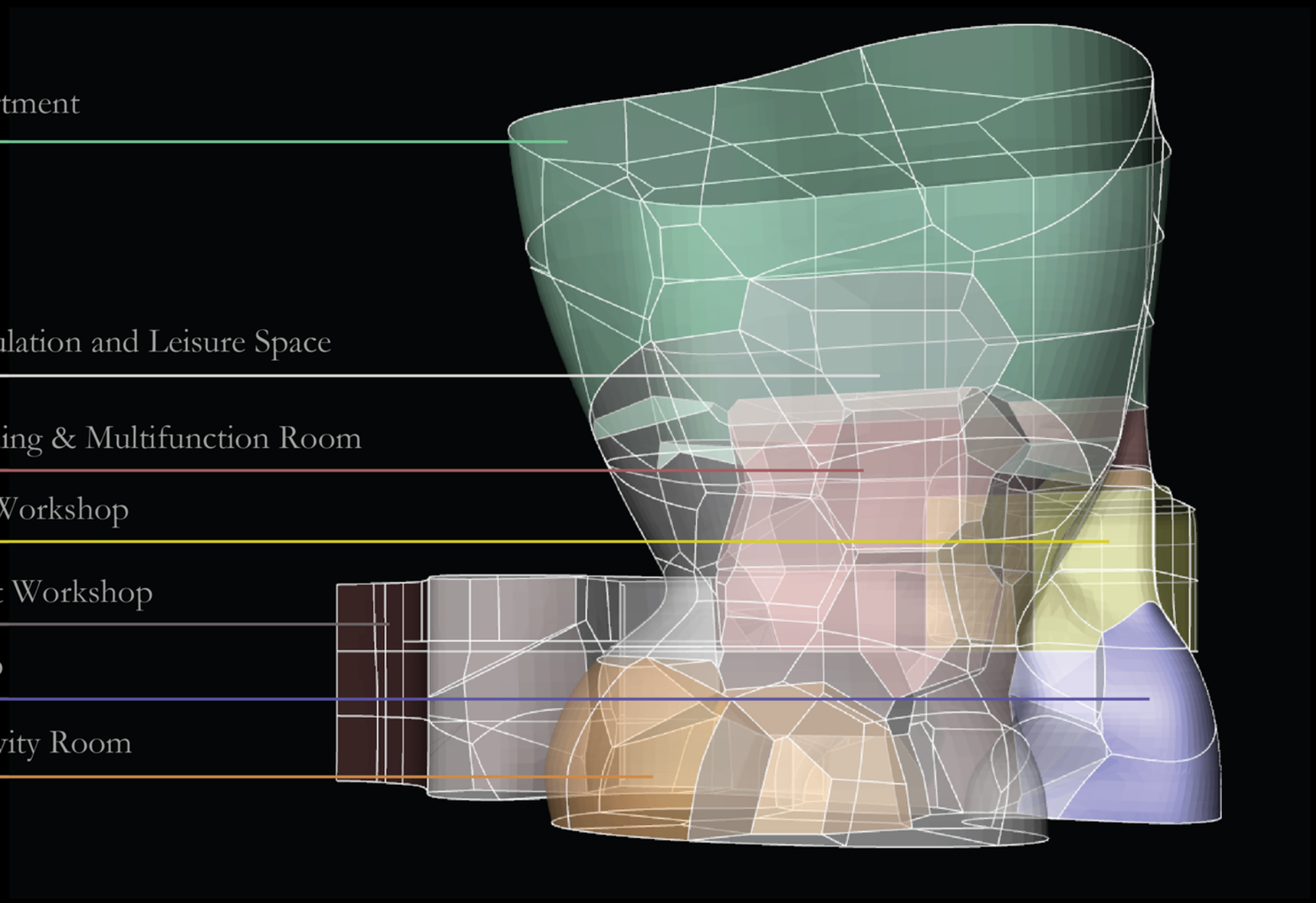


Better Spatial Quality

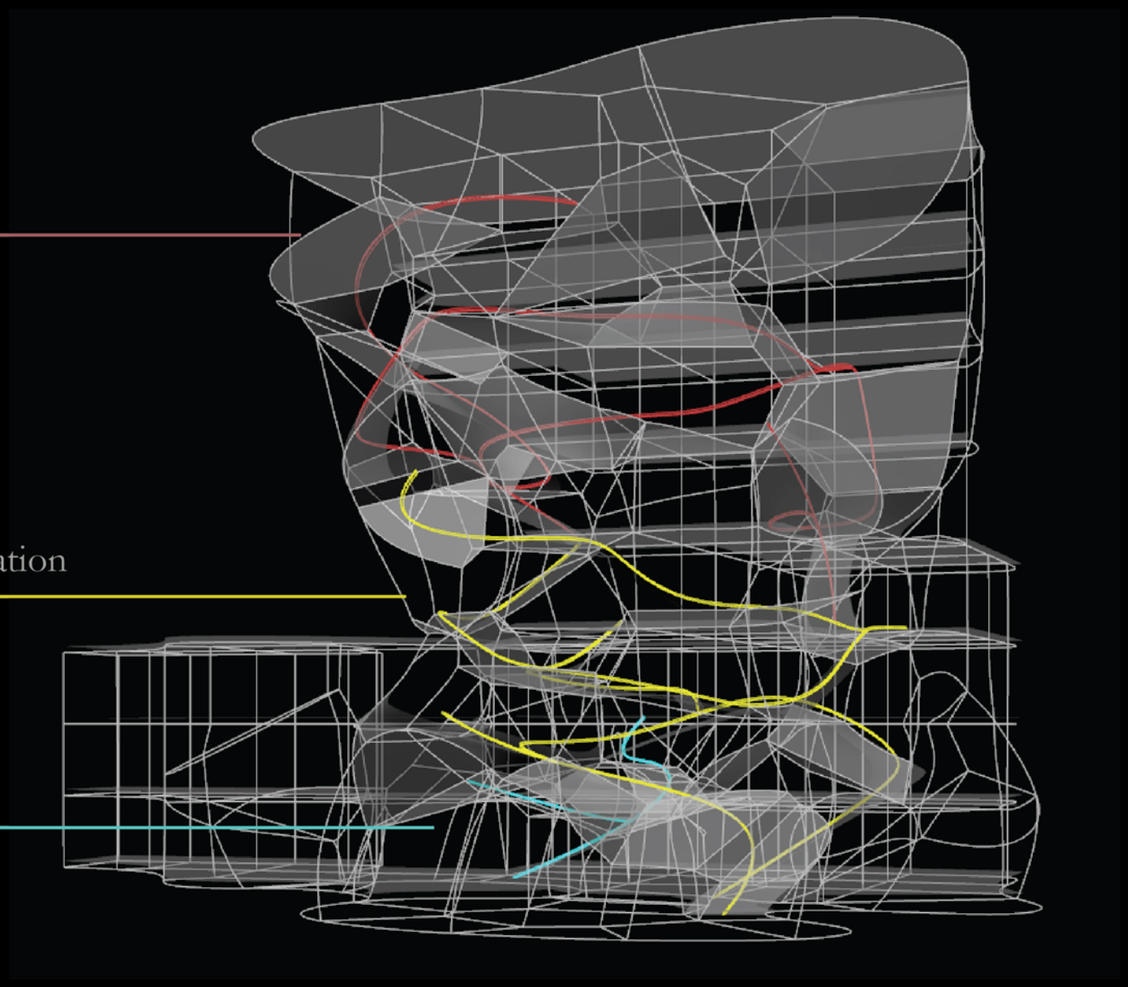
SPACE TYPES


Closed Shared Space
Closed Private Space
Open Public Space
Closed Public Space

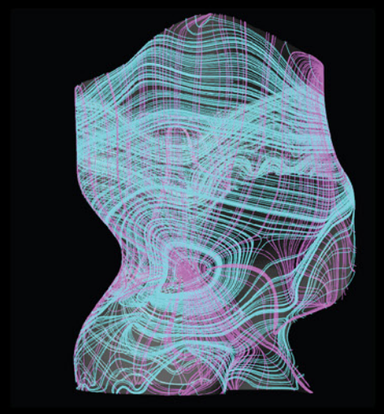
FUNCTION DISTRIBUTION

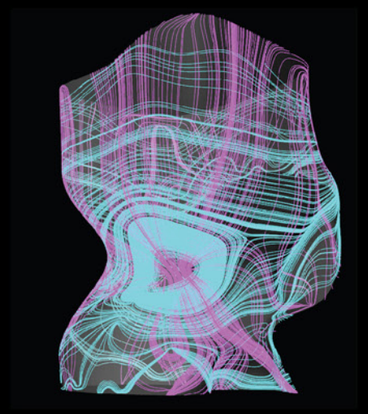


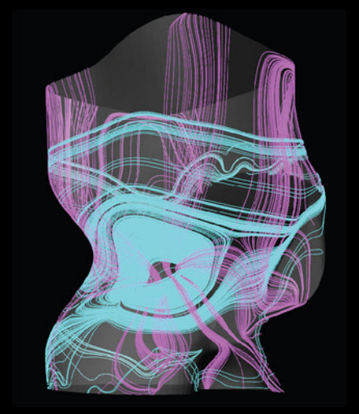
CIRCULATION TYPES

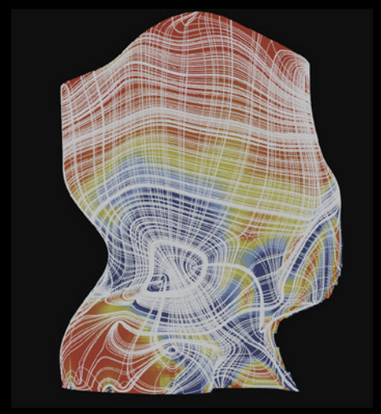


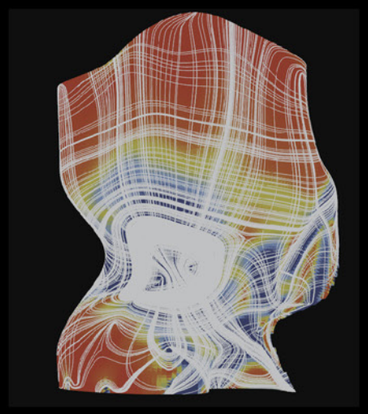
ENVELOPE STRUCTURE ANALYSIS

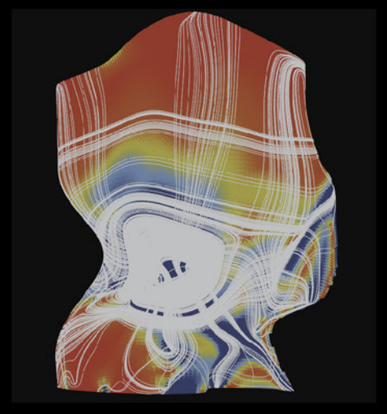










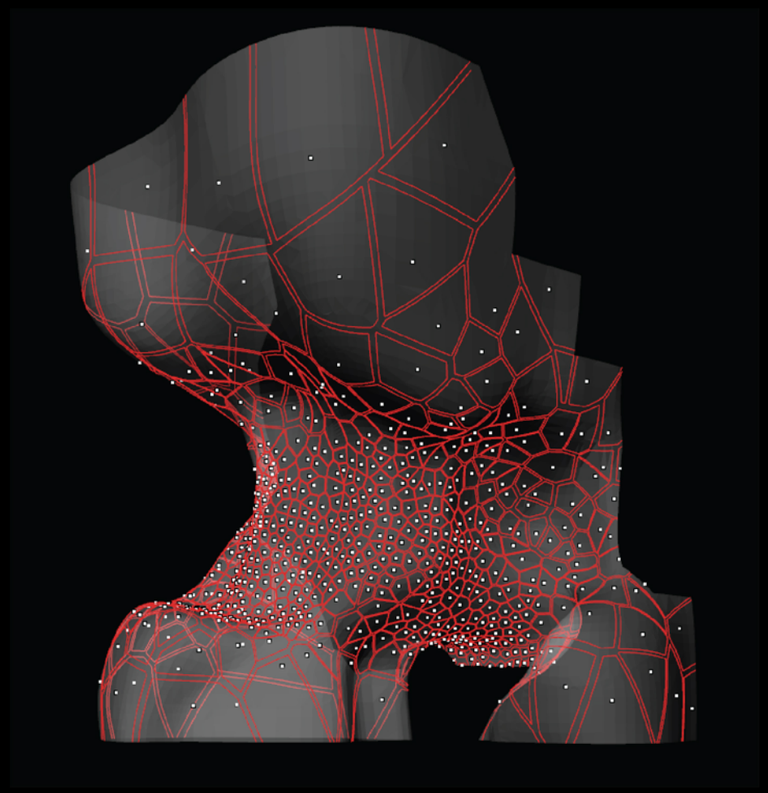


Iteration 1

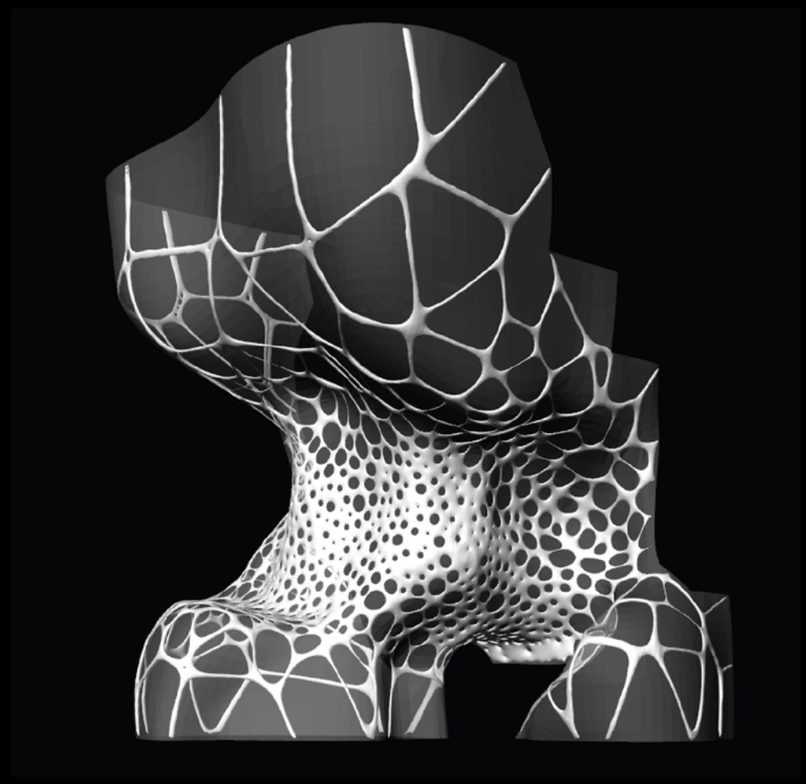
Iteration 2

Iteration 3

ENVELOPE PATTERN GENERATION



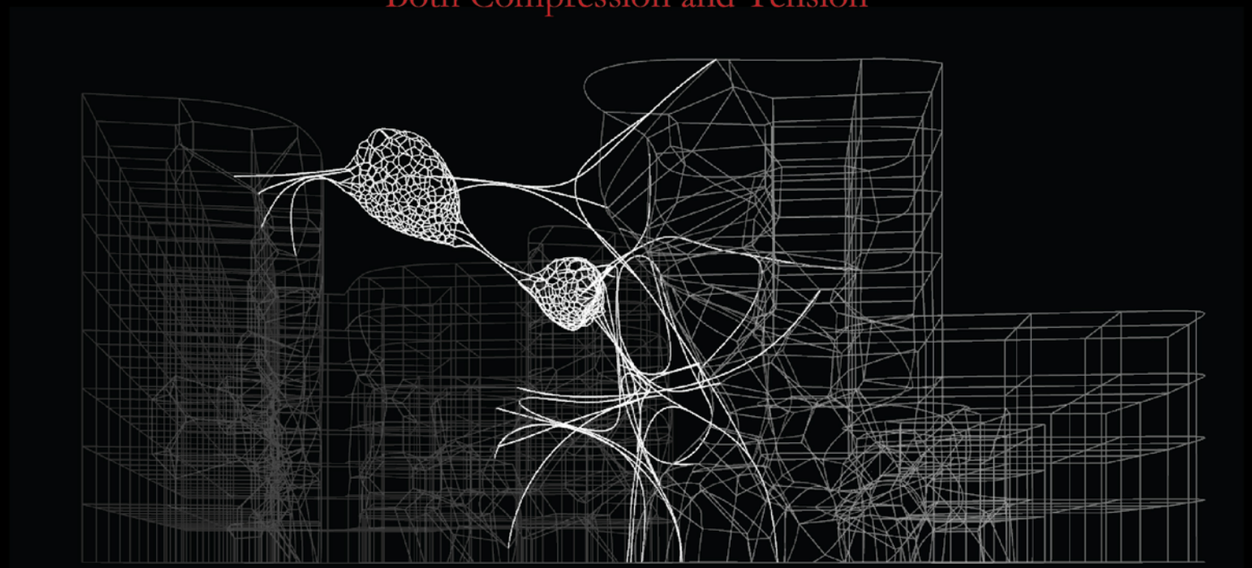
Voronoi Pattern



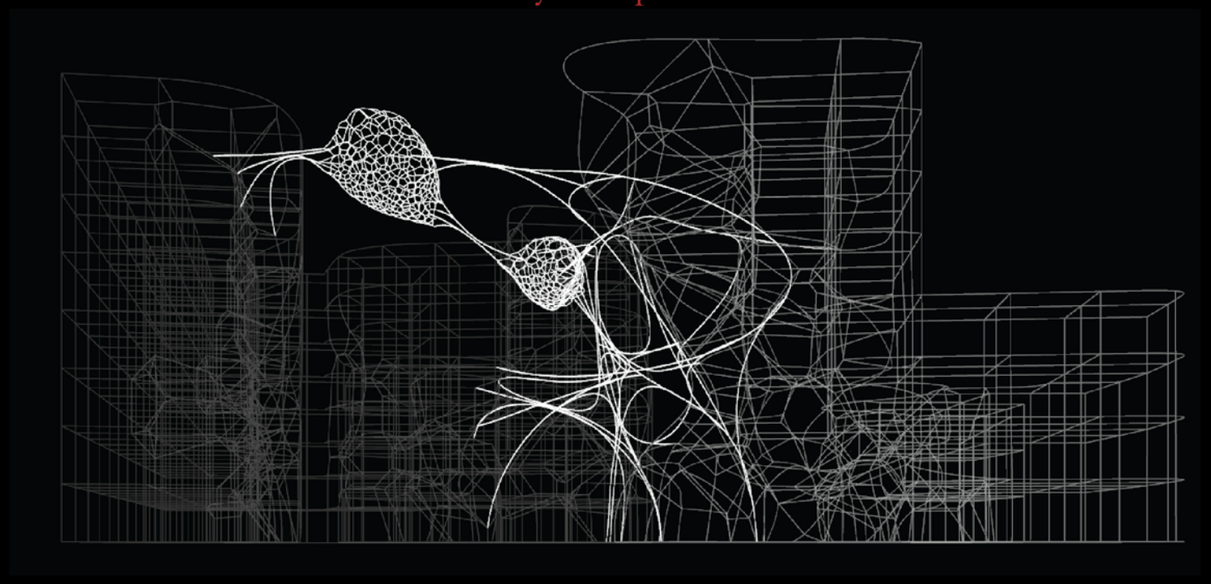
Merge into Volume

BRIDGE STRUCTURE INTEGRATION

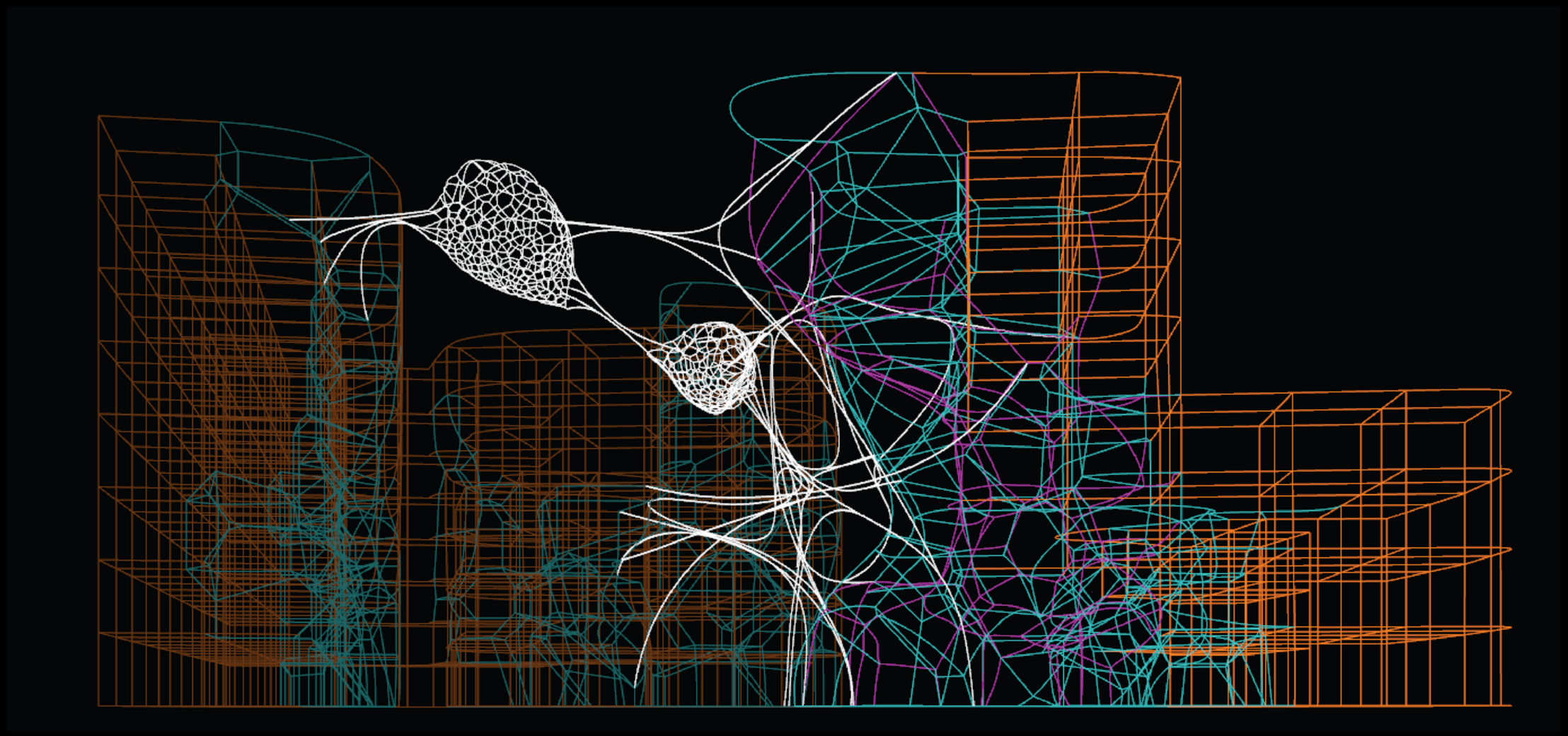
Both Compression and Tension



Mainly Compression



ARCHITECTURE LAYERS



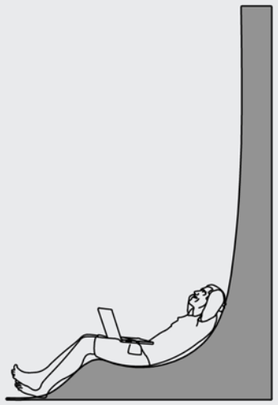
DIVERSITY OF POROSITY

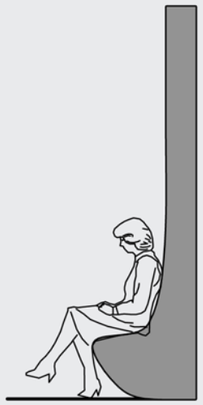
Large Scale:
Large Structure and Public Space

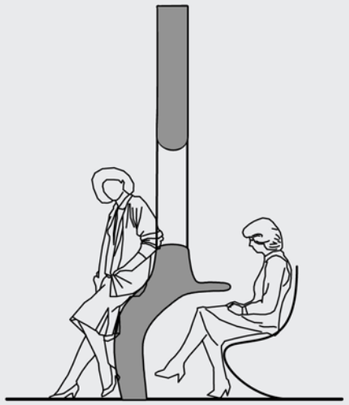
Small Scale:
Openings on the Envelope

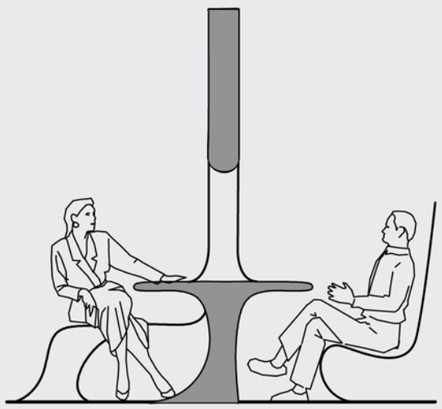
Middle Scale:
Transitional Structure and Interface Space

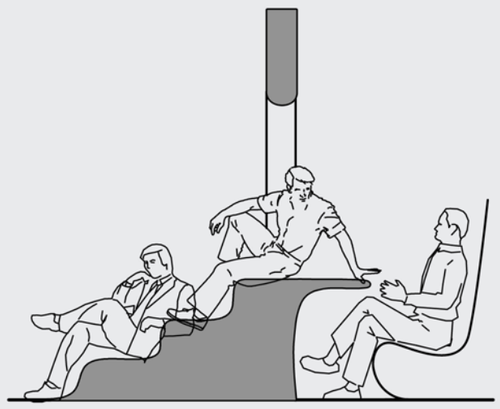
INTERFACE STUDY BETWEEN HUMAN BEHAVIOR AND POROSITY OF WALL

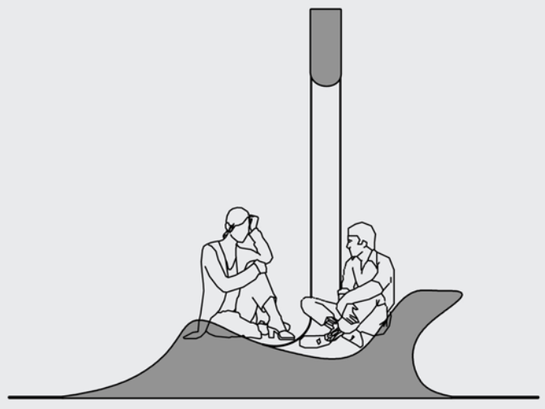






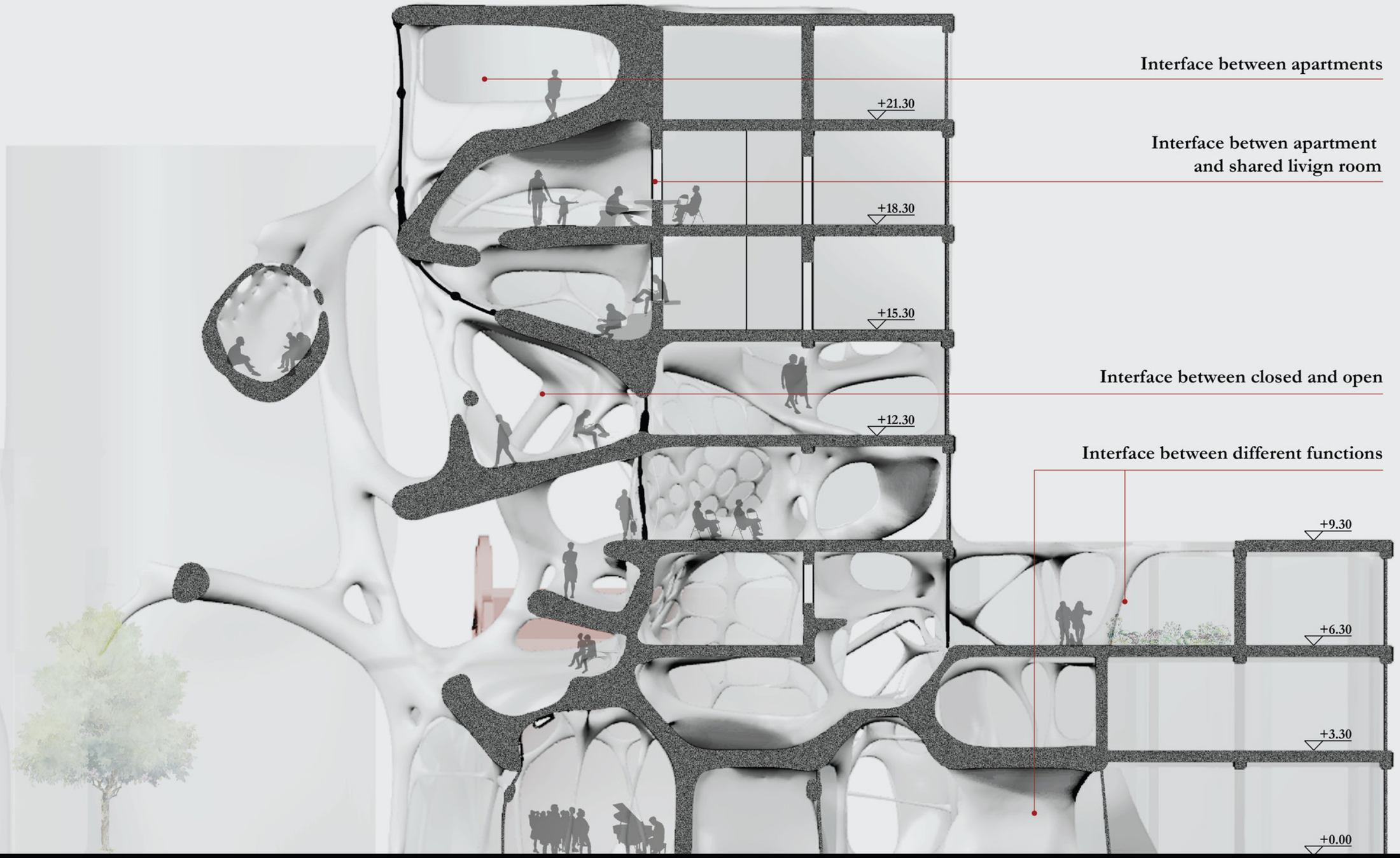






INTERFACE IN DIFFERENT RELATIONSHIP

A-A SECTION



INTERFACE IN DIFFERENT RELATIONSHIP

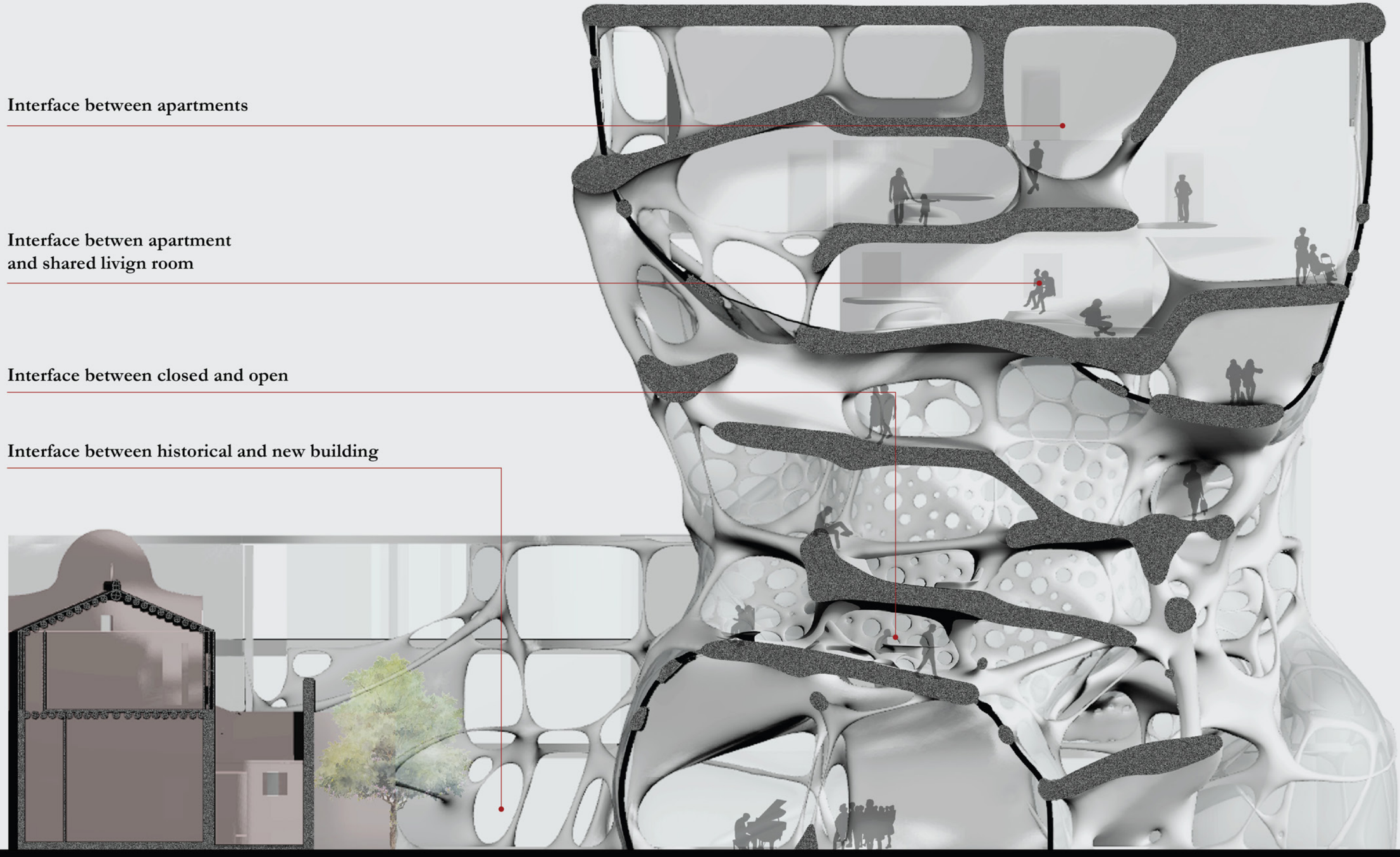
B-B SECTION

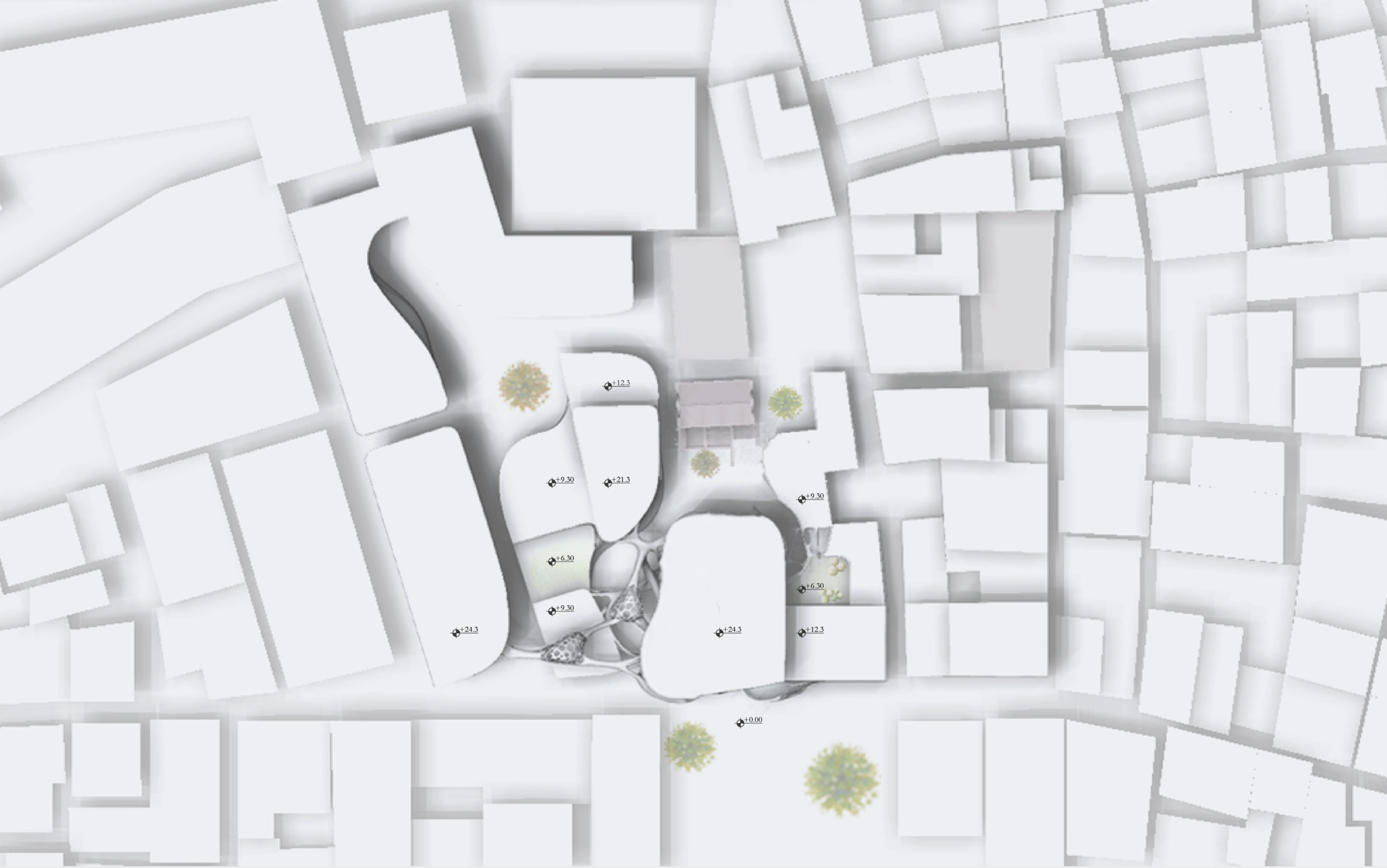
Interface between apartments

Interface betwen apartment
and shared livign room

Interface between closed and open

Interface between historical and new building

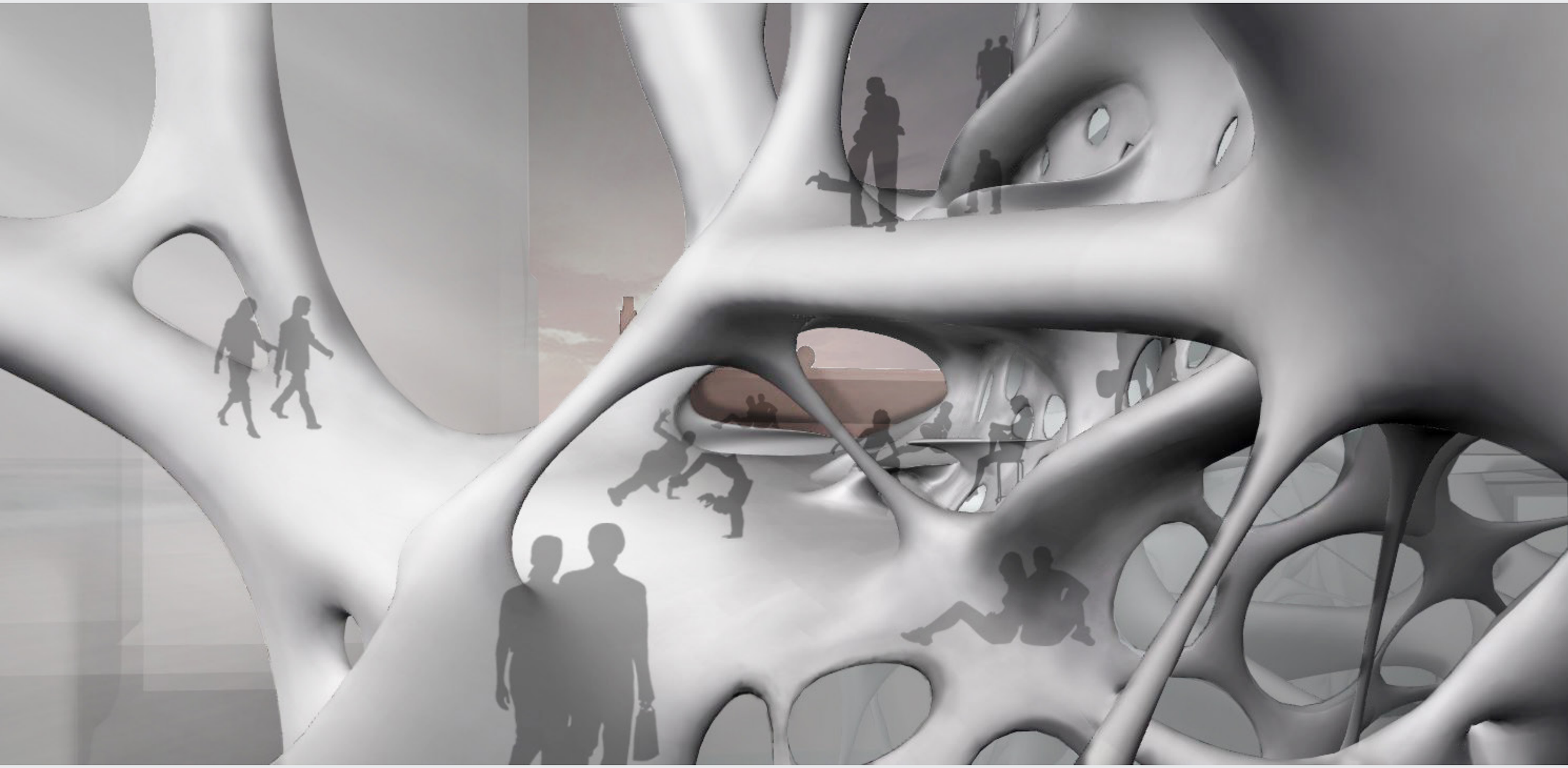


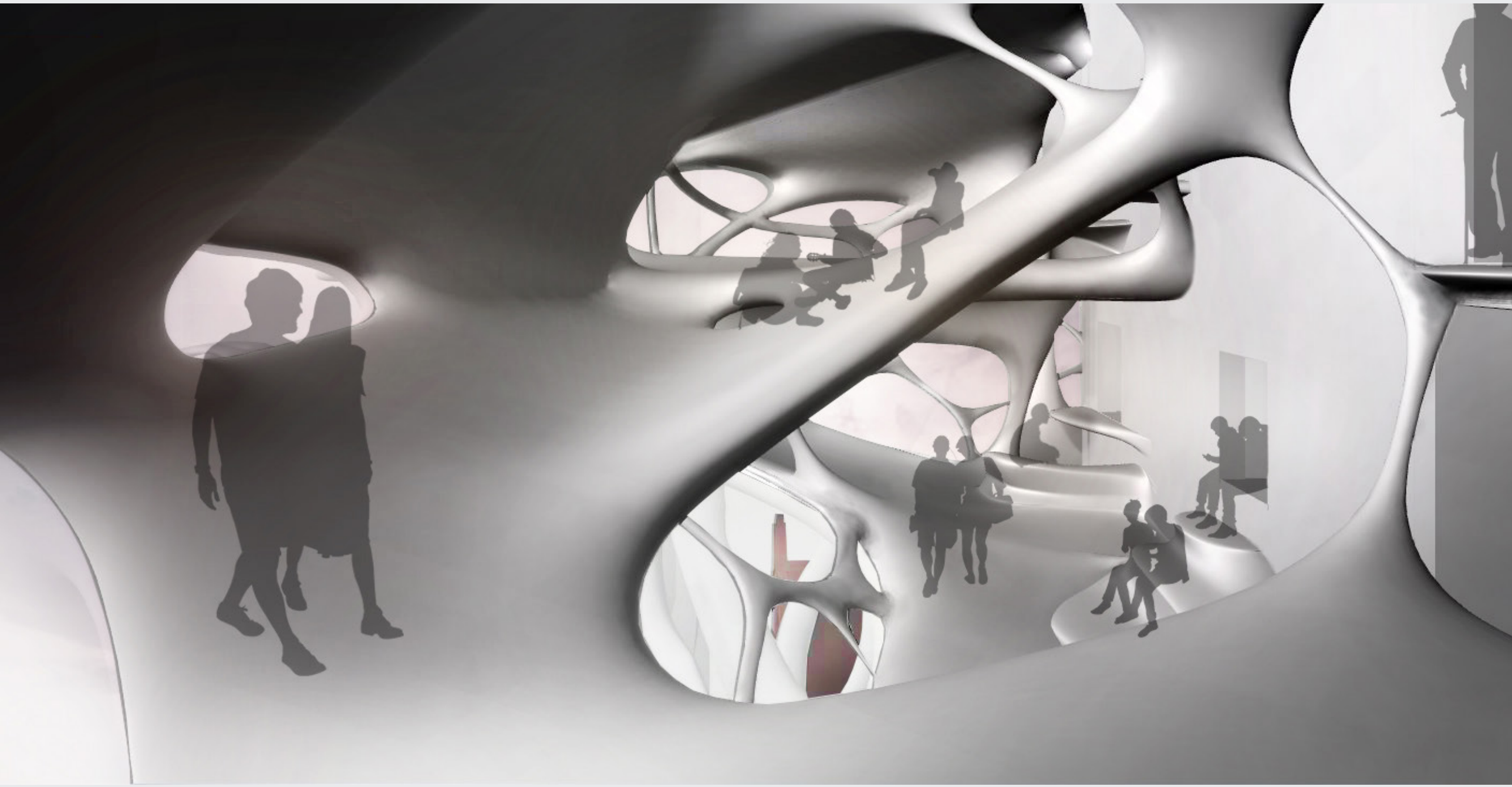


N

MASTERPLAN

0m 5m 10m 20m





CLIMATE ANALYSIS

SUMMER

In summer time, the architecture profile and the semi-public space can perform as the shading system for the architecture.
For the cooling system, I am trying to get rid of using air condition in order to preventing the creasing temperature in public space.
So I try to maximize the natural ventilation by creat cross ventilation and chimney effect.

CLIMATE ANALYSIS

WINTER

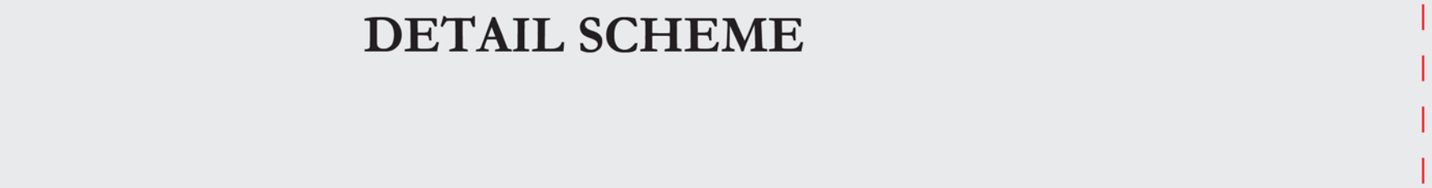
In winter, as the sun light direction becomes more tilted, the sun light can shine into the building.
The shared living room of the residential part can work as a green house to store the heat during the day.
The ventilation is controled by the heating wall vent to prevent the heat lost but still guarantee the fresh air.

DETAIL SCHEME

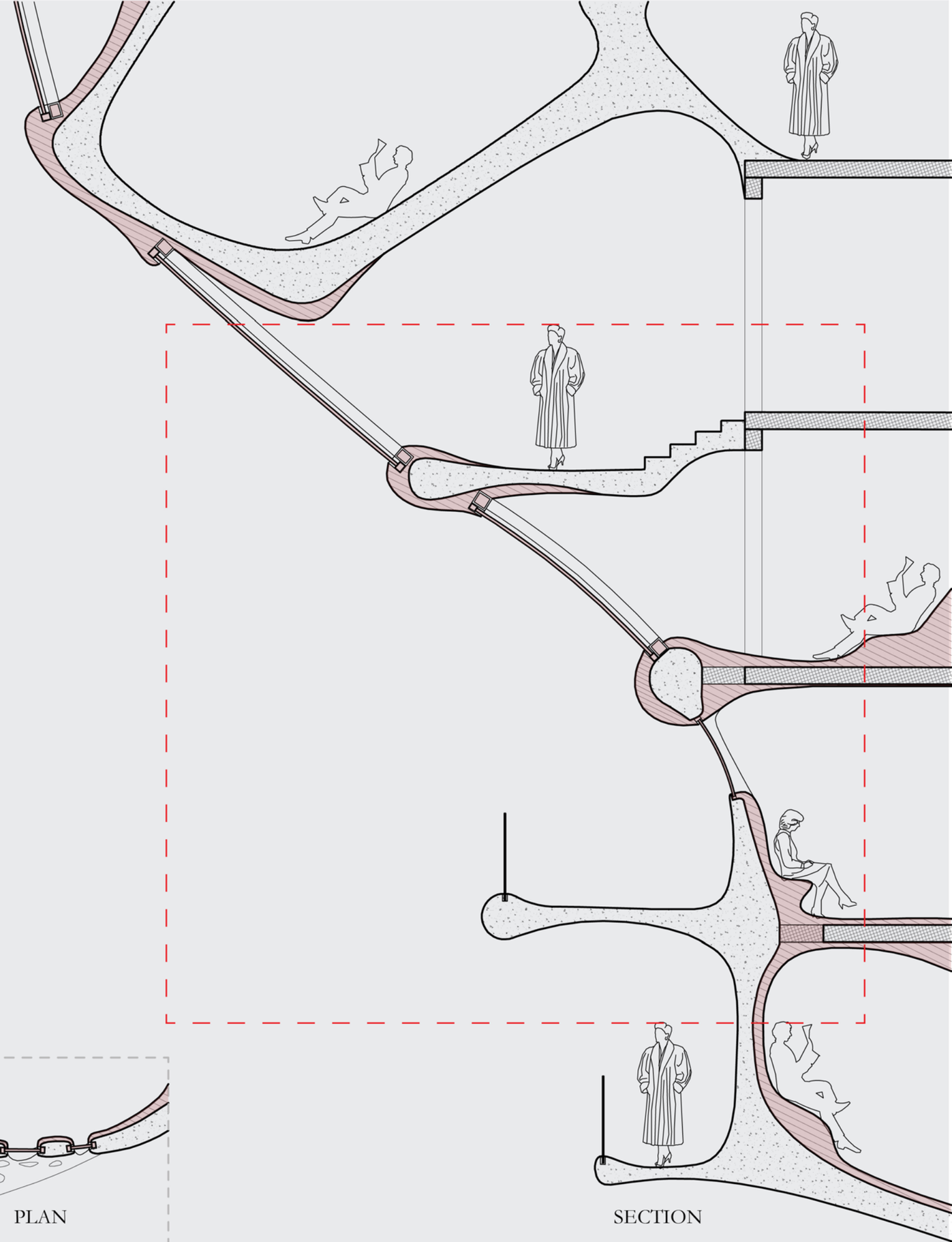
The insulation EPS distribution

The Connection between new and old

0m 0.5m 1.5m 3.5m



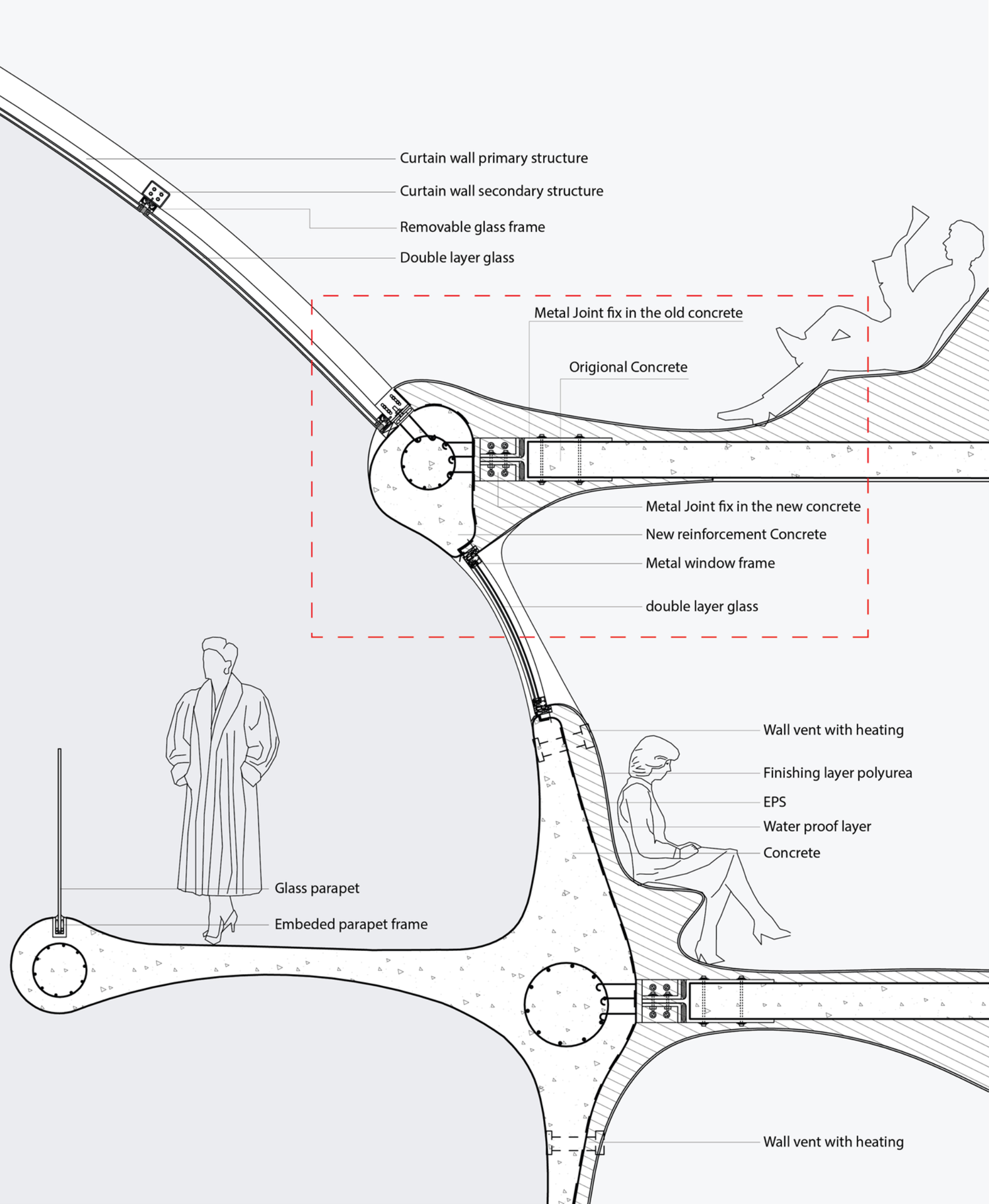
PLAN



SECTION

DETAIL DRAWING

0m 0.5m 1.5m



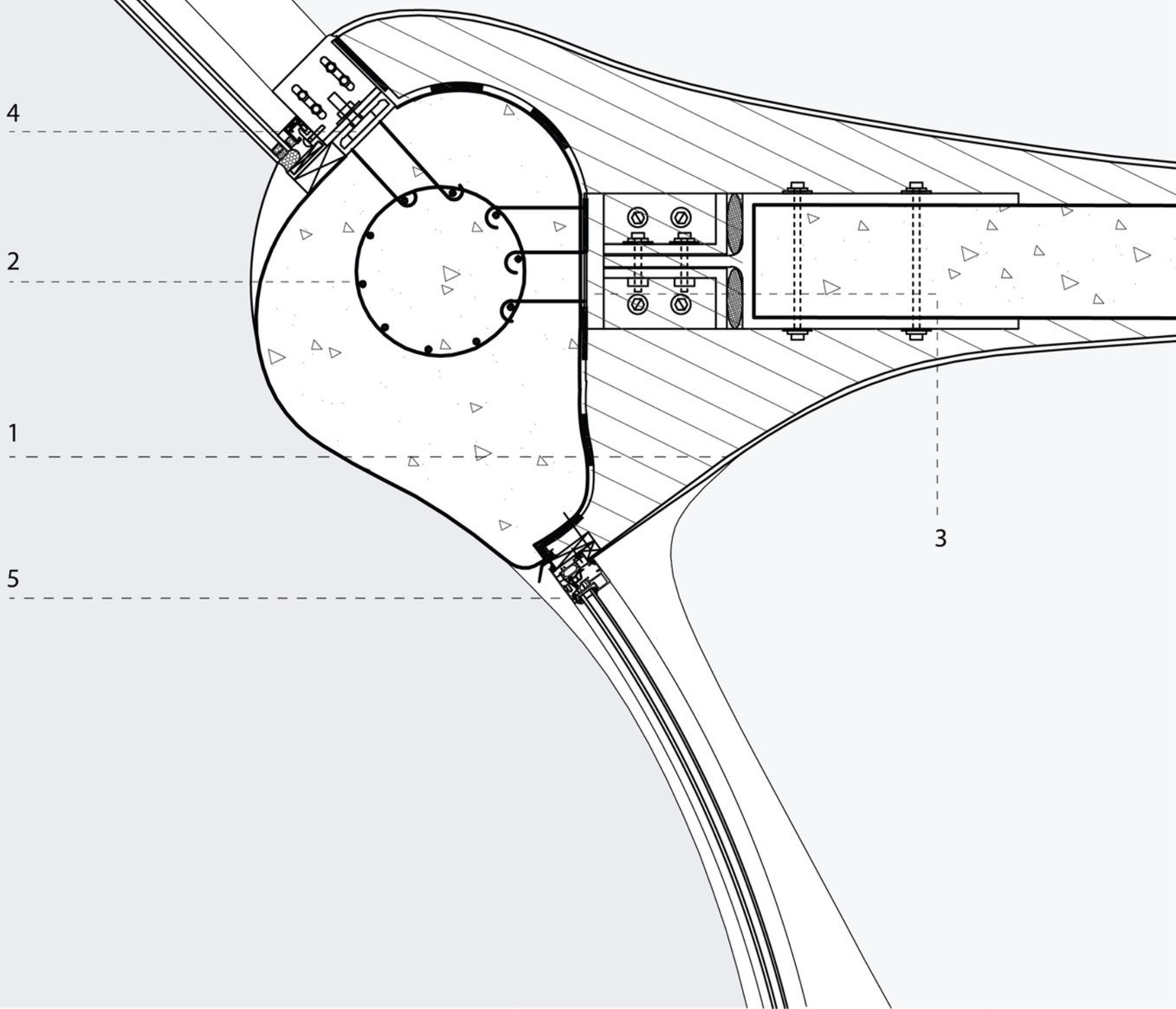
1 Inernal finishing polyurea
EPS insulation
Wterproof layer
Reinforced concrete

2 Reinforced bar

3 Embeded metal component
Metal joint between new and old part
Metal component fixed on the old part

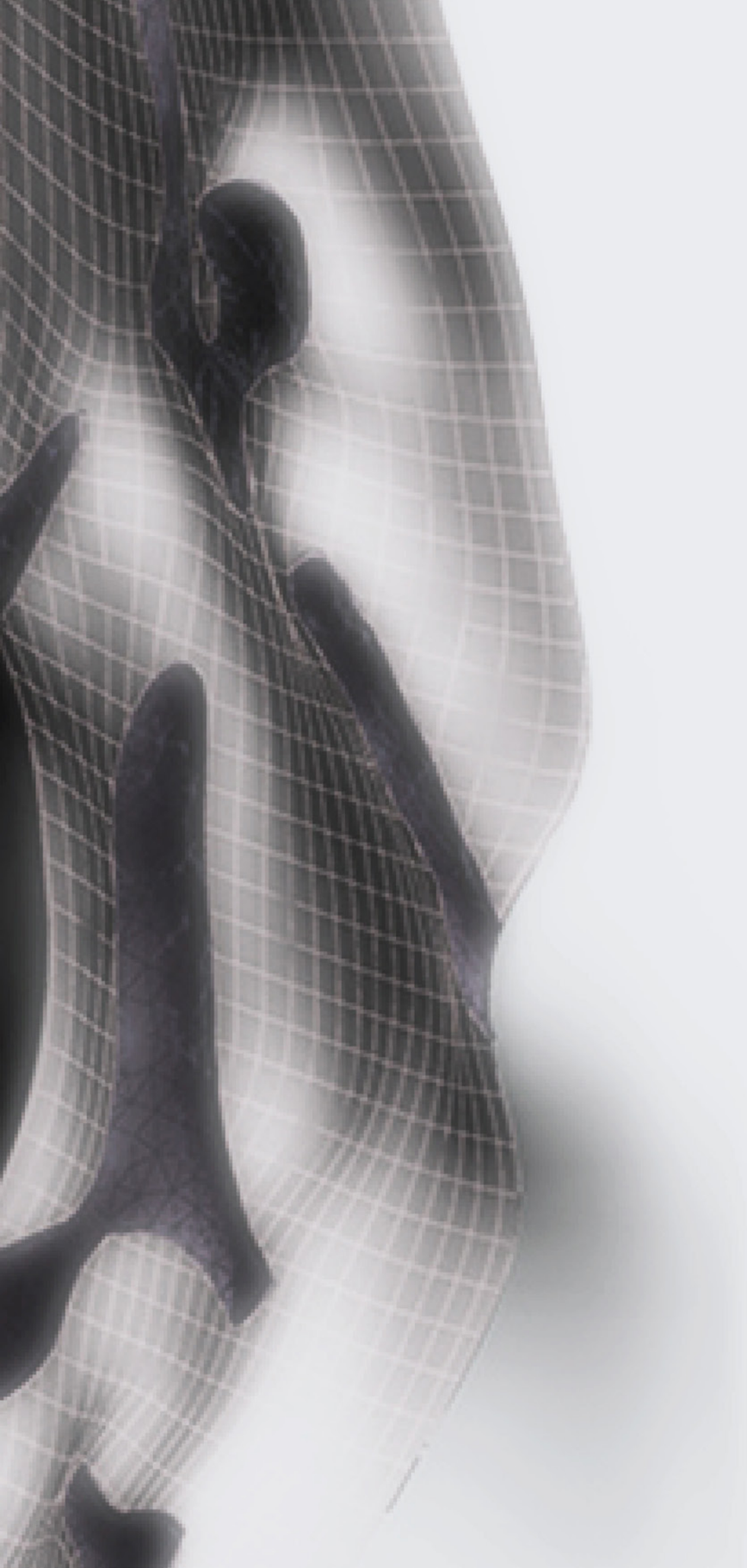
4 Embeded metal component
Sub-structure of curtain wall
Removable glass frame

5 Wingdow frame can be opened



DETAIL DRAWING

0m 0.2m 0.5m 1m

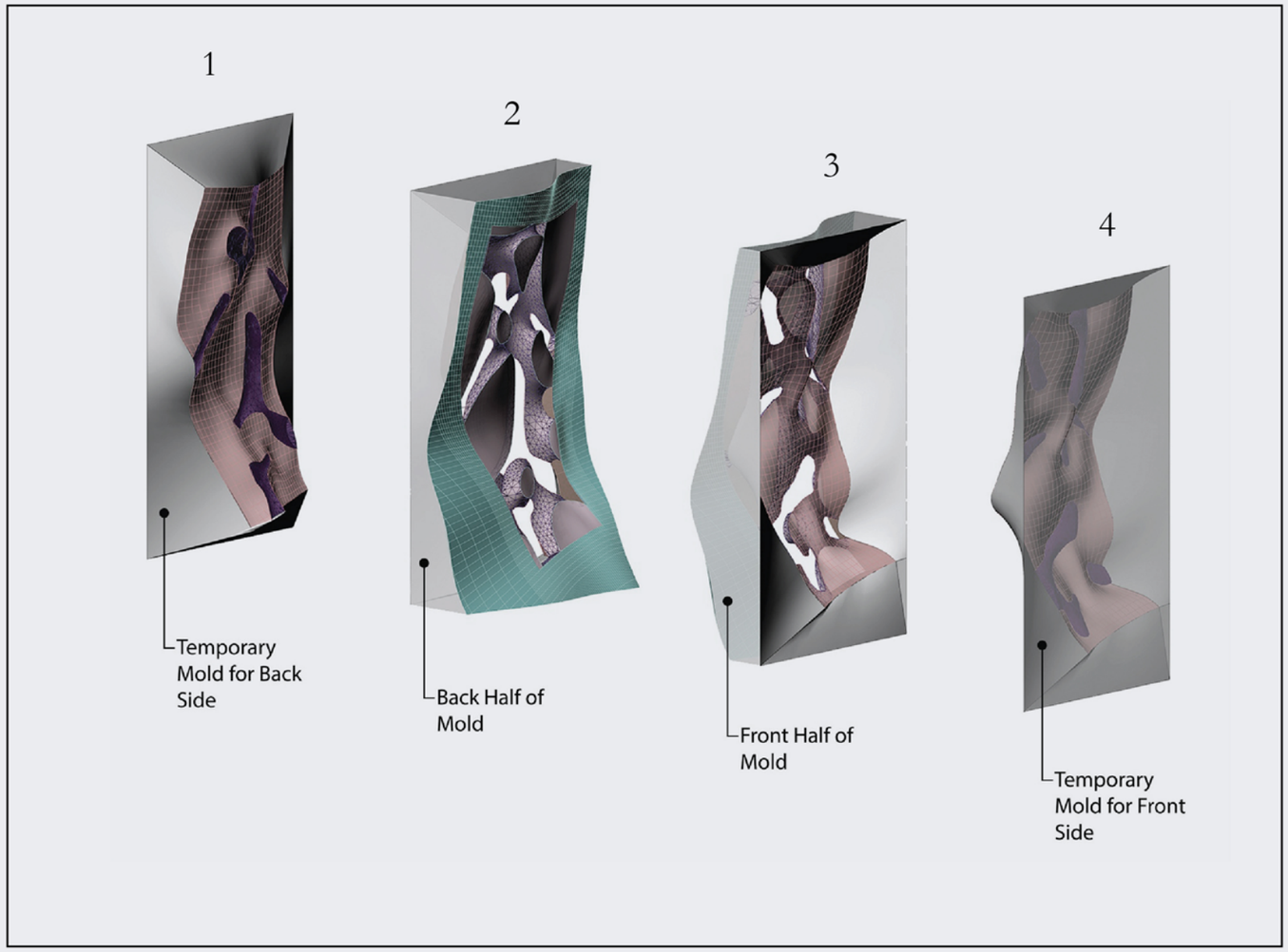


ROBOTIC PRODUCTION
HYBRIDITY

Eps Milling & Concrete Pouring

HYBRIDITY PROTOTYPE

EPS mould for concrete pouring

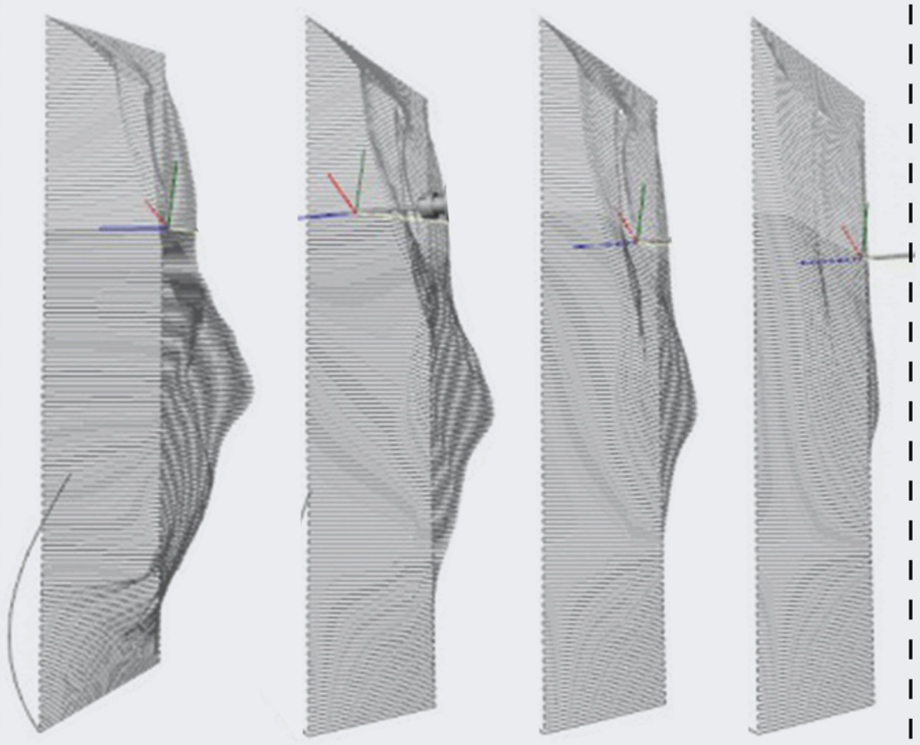


Prototype outcome

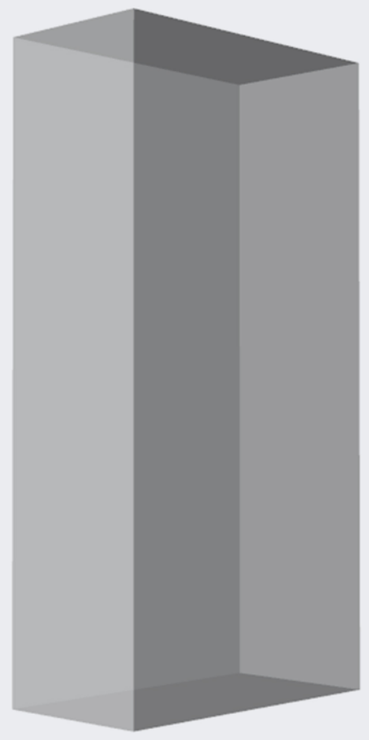
PROTOTYPE MANUFACTURE

Outcome mould

4 layers of milling toolpath



EPS block



THANKING LIST

Special Thanking

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Erik Zanetti, Jill Duan, Floris van Buren, Vera Laszlo, Arwin Hidding, Sui, Zhiqiang Xu,
Mahmoud Meligy, Dessau Waseem

N

GROUND FLOOR PLAN

0m 2m 5m 10m

N

SECOND FLOOR PLAN

0m 2m 5m 10m

N

FIFTH FLOOR PLAN

0m 2m 5m 10m