



# Yufan Xie Portfolio

2017-2020



## Yufan Xie

**Computational Designer**

uvnlab.com

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## EDUCATION

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**2014 - 2019 Bachelor of Architecture**

*China Central Academy of Fine Arts(CAFA), SoA*

**2018.2 - 2018.4 Exchange Program**

*University of Westminster, SoA*

**2019.9 - 2021.5 Master of Architecture**

*University of Southern California, School of Architecture*

## WORK

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**2017.9 - 2019.7 Research Member of Parametric Group Team CAFA**

*Algorithm researches and digital fabrication*

**2017.8 - 2017.11 Internship at Tuning-Synesthesia Studio, Beijing**

*3D printing research and pre-design*

## EXHIBITION

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**2019.12 Shenzhen Bi-City Biennale of Architecture and Urbanism (UABB)**

*"The Unknown City" in "Ascending City" section*

# CATALOGUE

## RESIDENTIAL

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**FOLDS/HOLEs**

**Sharing the Wall**

**Bit-Erosion**

## DIGITAL

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**Self-Organizing**

**Method Researches**

## Experimental

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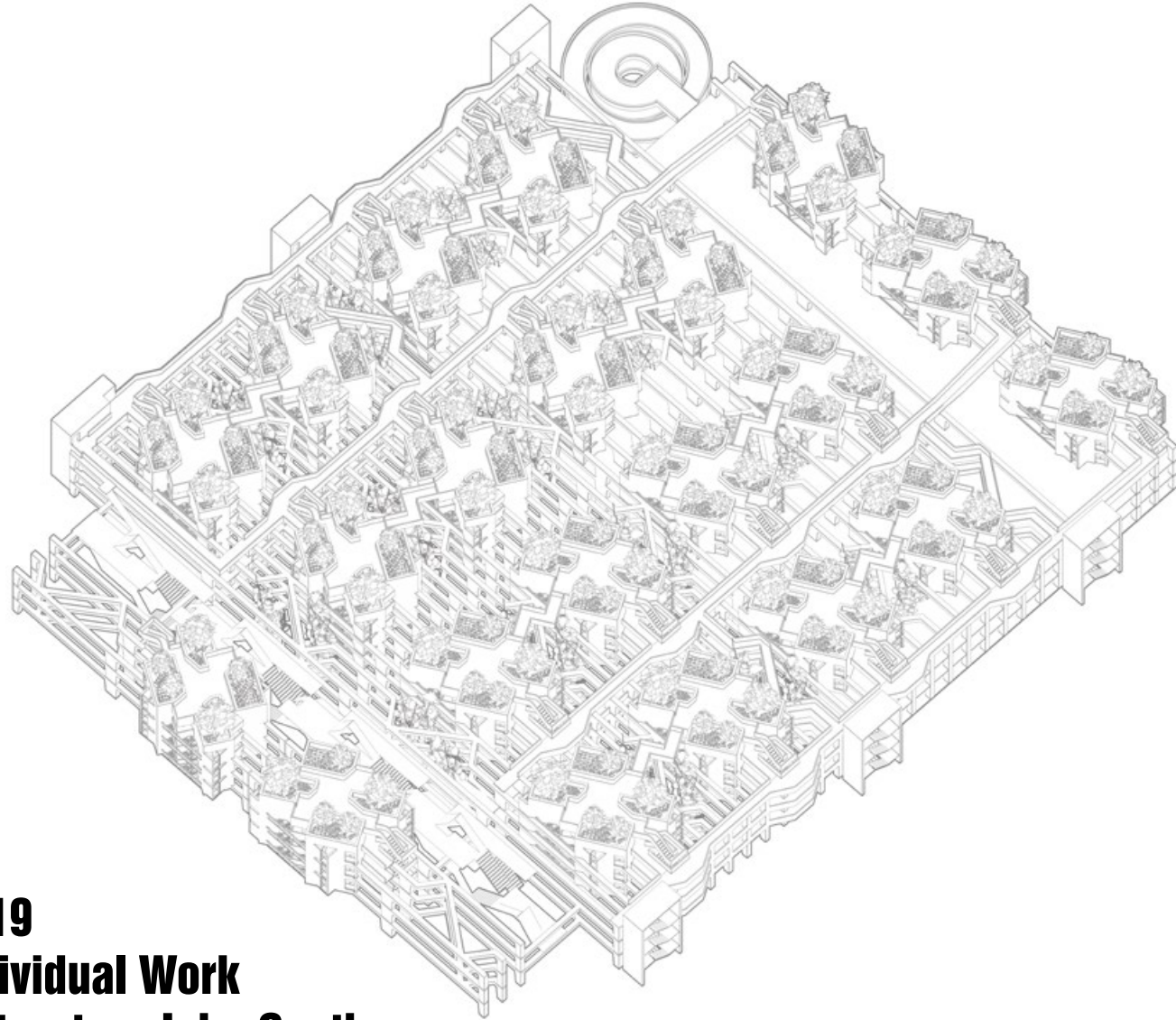
**GAP+**

**The Unknown City**



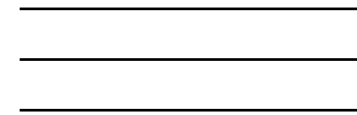
R E S I D E N T I A L

# FOLDS/HOLEs

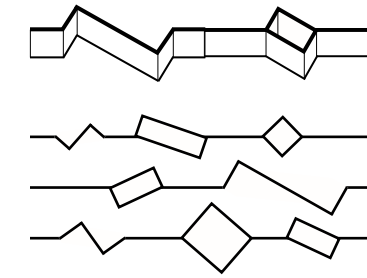


**2019**  
**Individual Work**  
**Instructor: John Southern**  
**Tech: Grasshopper**

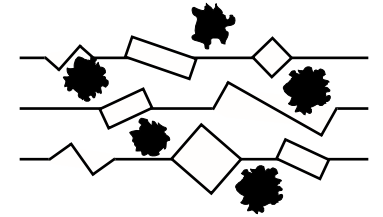
## A Transition of Grid



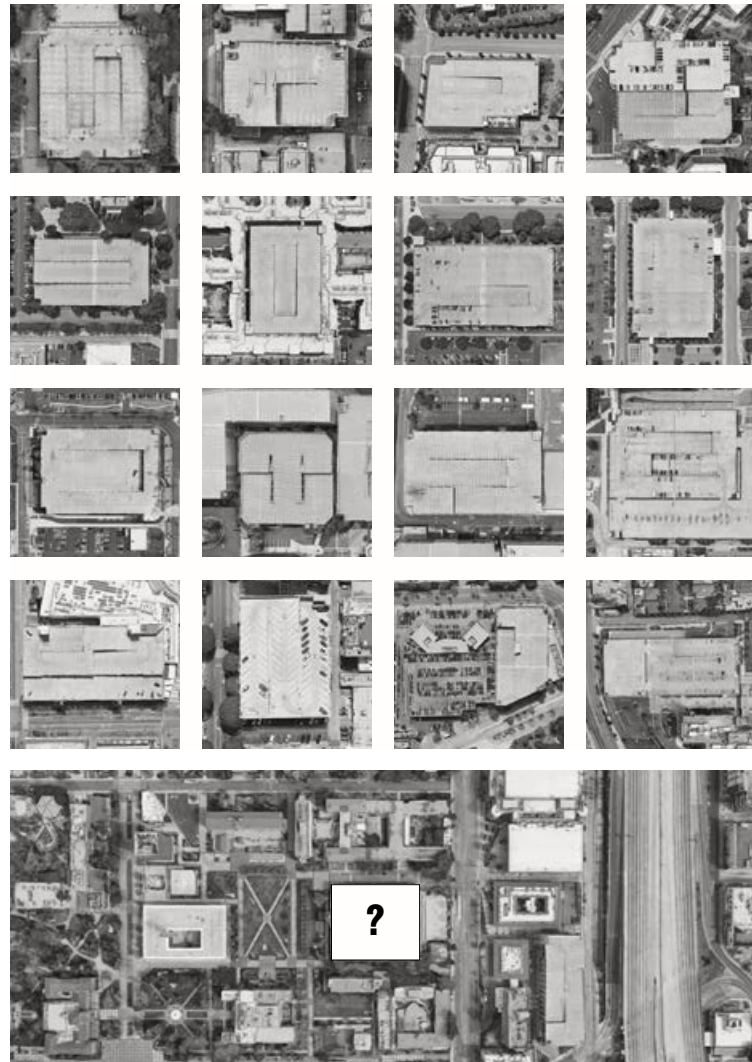
*Industrial culture brought us a landscape of GRIDs, dominating the urban space we are living in - and by that, it shaped human and nature.*



*This project explores FOLDS and HOLEs - the typology of boundaries - through which a new community can be placed. The mixture of rigid and soft boundaries that results, produces a spatial pressure release for the students housed in the project, resulting in an architecture of "slow space" in the campus grid.*

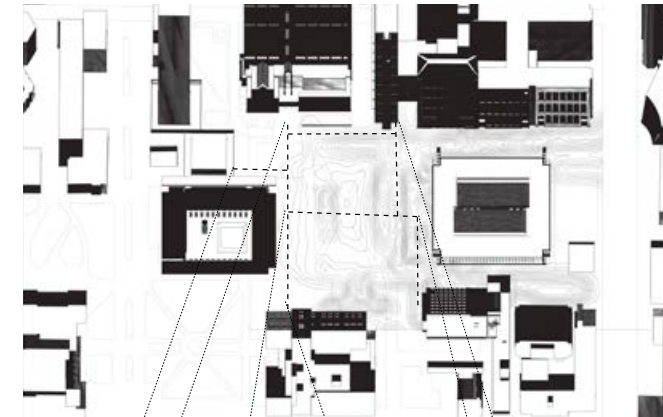


*Upon the mixed grid and structure of old and new, trees and are introduced as a potential variable, softly shaping the space in turn - gradually transforming it, into a new symbiotic system for plants and human. By that, the ruin of industrial culture can be re-shaped.*

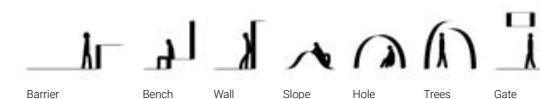
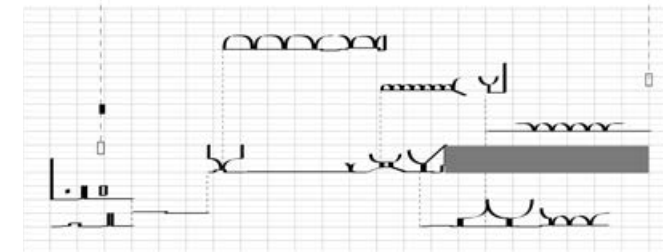
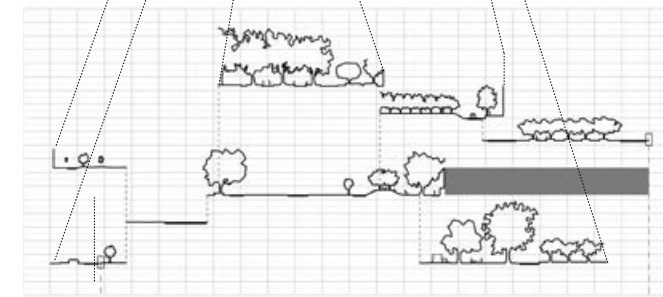


McCarthy is a typical type of parking structure that blocked urban life with its dense structural grid and noises of cars. In a foreseeable future, the car usage will decline, leaving thousands of toxic ruin behind.

### What is FOLD/HOLE?



### FOLDS & HOLES - Space Types



Plan Fold Hole  
 Pass Gather Stay

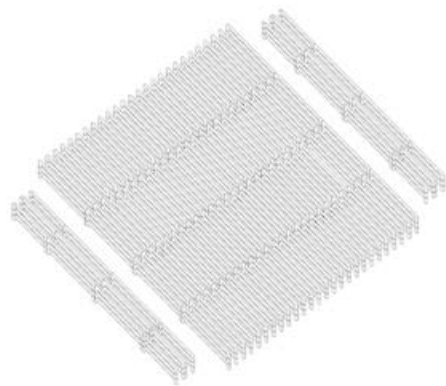
FOLD/HOLE refers to space typology of different boundaries.

The campus, and urban space are all dominated by artificially planned grid. Human and nature are reshaped by this culture.

But the fact is that, comparing to those planar grid, those folded and holed space are the most comfortable area in the campus.

# FOLDS/HOLEs - Beam Based Typology

FOLDS/HOLEs are series of typologies operating on single beam and create rhythm of space. Structurally, the load of reshaped beam is shared by nearing beams. Among several variations, the 30-degree type is the most efficient type which balanced between area and comfort. The module of single is larger than the original interval.



## Frame

Dimension (l\*w\*h) 2\*67.5\*9.5

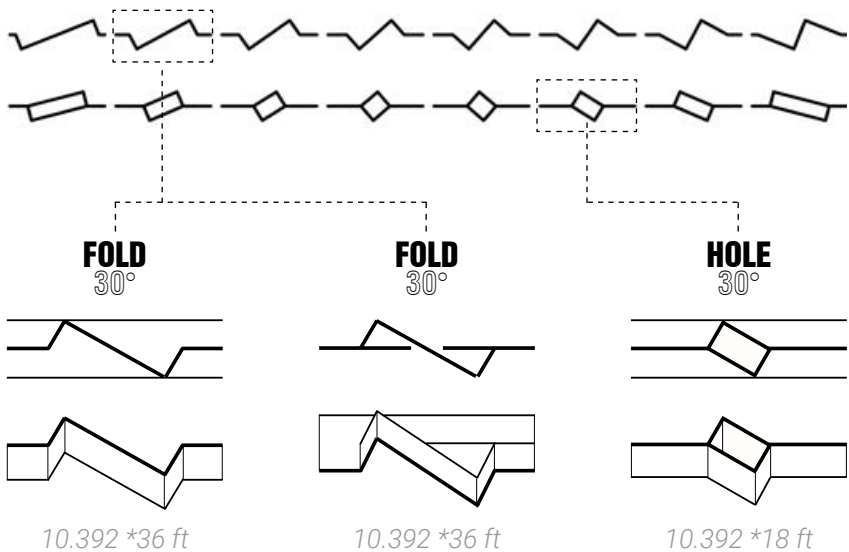
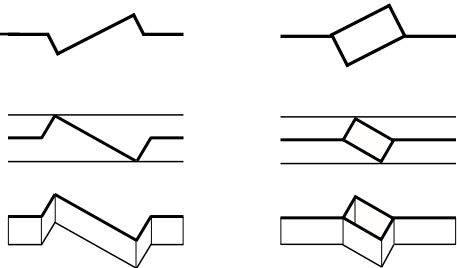
What McCarthy Parking Structure brought us in USC Campus – a blank area that means nothing to human and nature. Is it possible to transform it into a comfortable space? Is there a solution that can be widely used in similar conditions?

How do we slow down this structure to a comfortable space?

The challenge is the density - the beams of McCarthy are 67.5 ft wide, 9.5 high with an interval of only 9 ft.

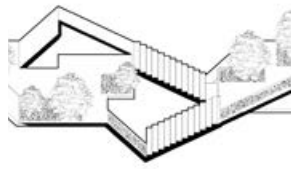
## Folds

## Holes



## Horizontal FOLD Bamboo Element

Pressure releasing element between units



## Vertical FOLD Landscape Element

Uplifted landscape in larger scale

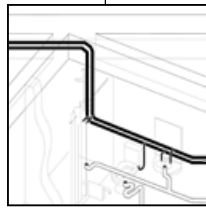
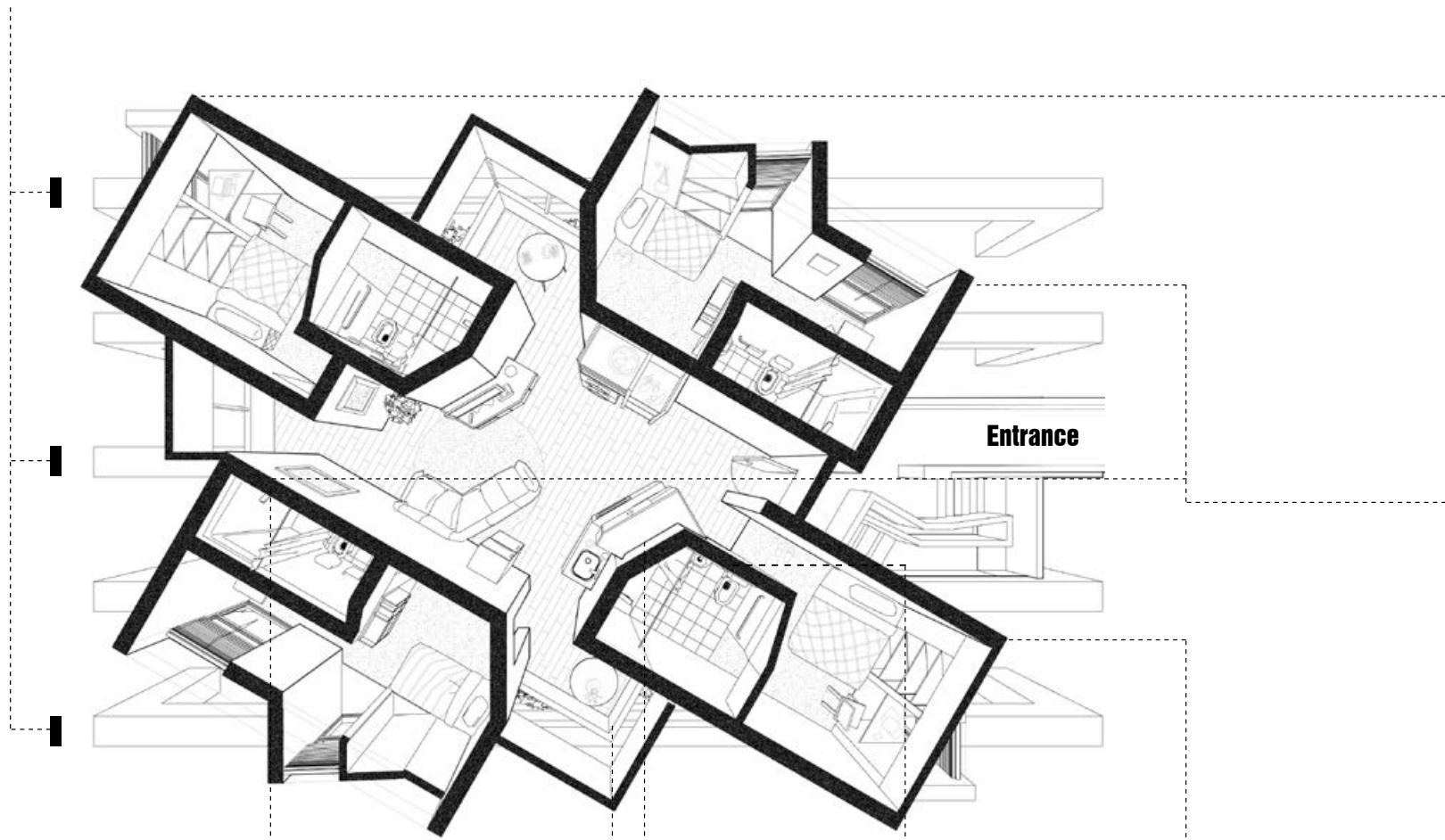


## HOLEs Housing Element

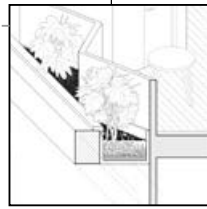
Folds and holes are created in a micro level,

## Structure/Power Supporting Beam

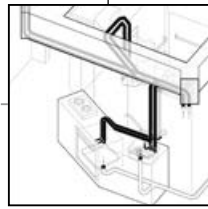
Supportive beam that provide water/electricity/air condition cycle to grouped units.



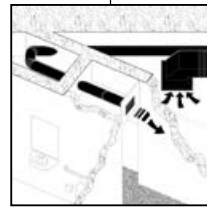
Water



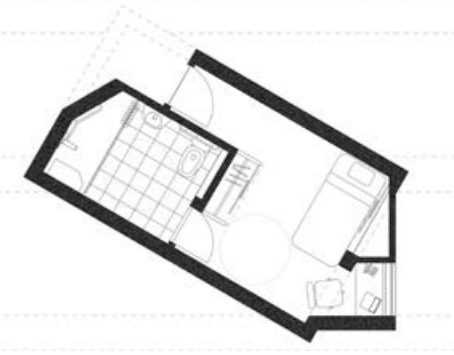
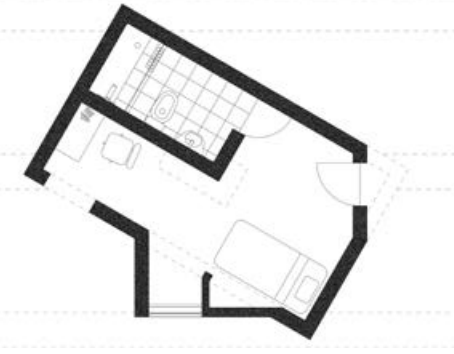
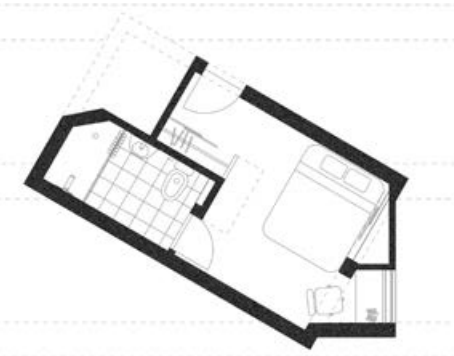
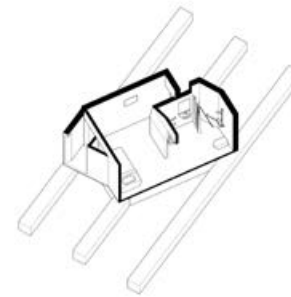
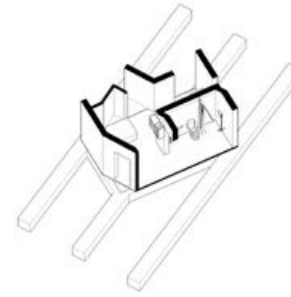
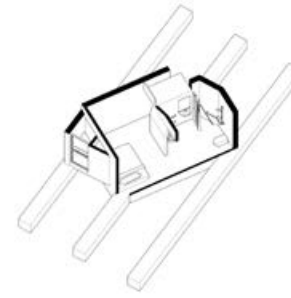
Planting Pot



Sink



HVAC



### Double Unit

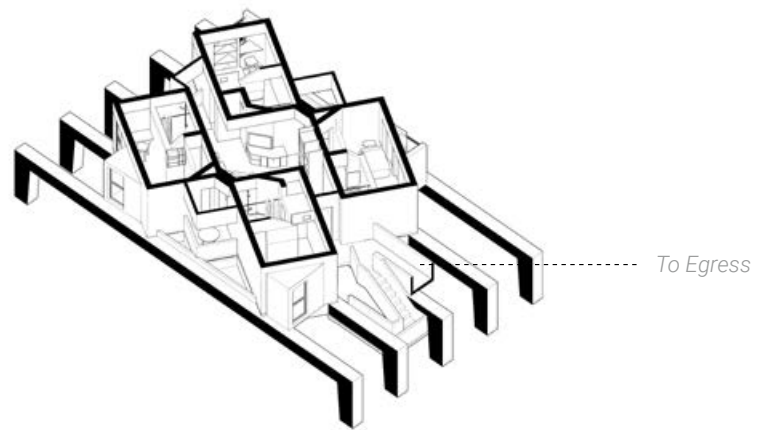
25%  
205 Sq.Ft

### Single Unit

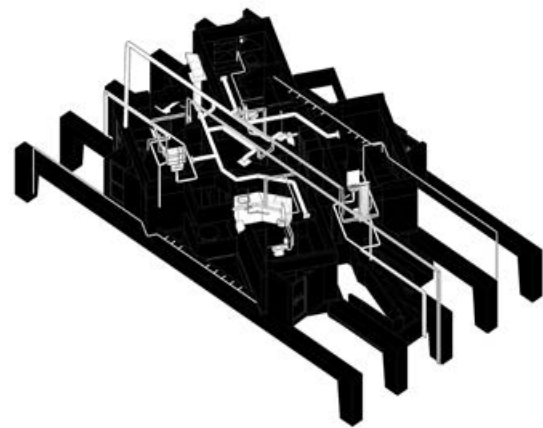
50%  
177 Sq.Ft

### ADA Unit

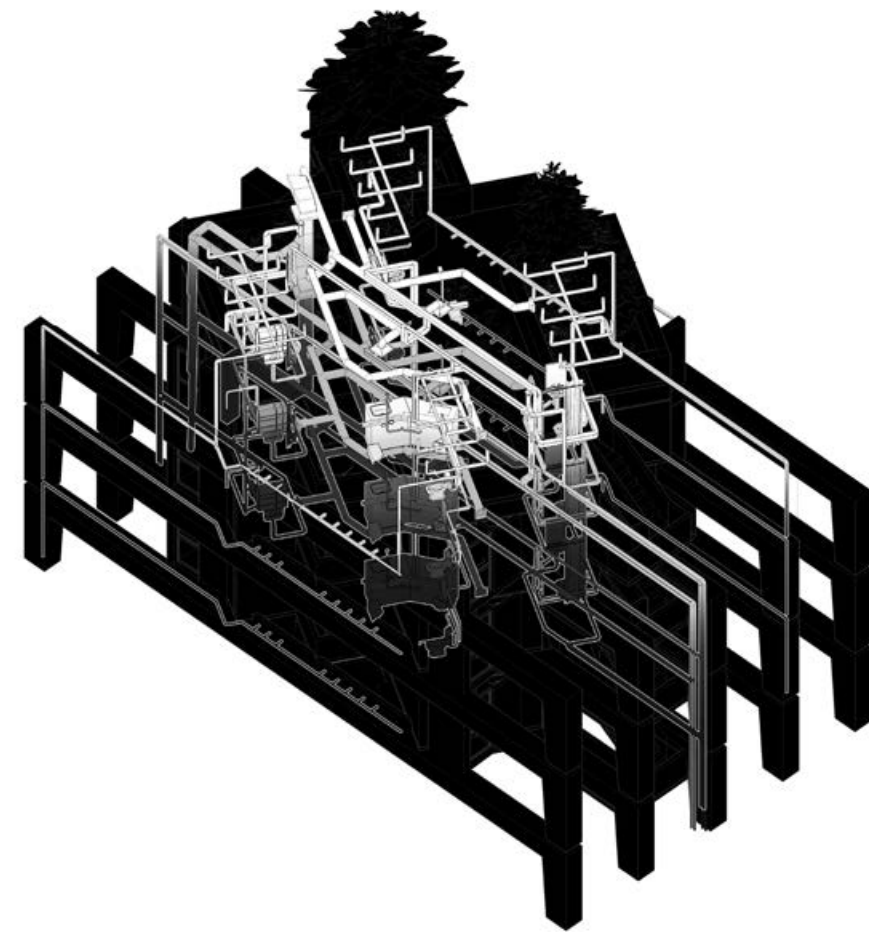
25%  
190 Sq.Ft



**Single Floor**

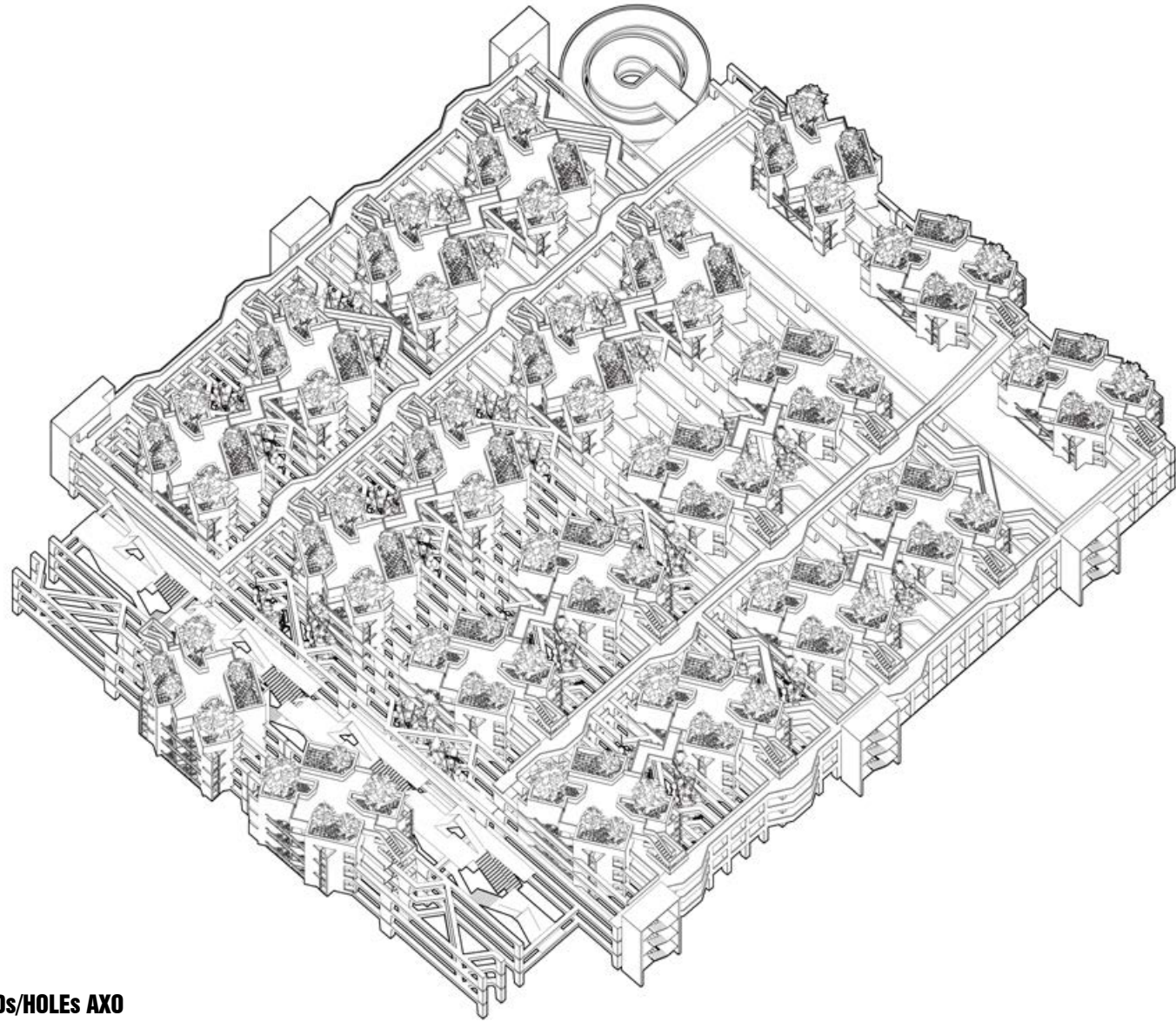


**Single Floor**

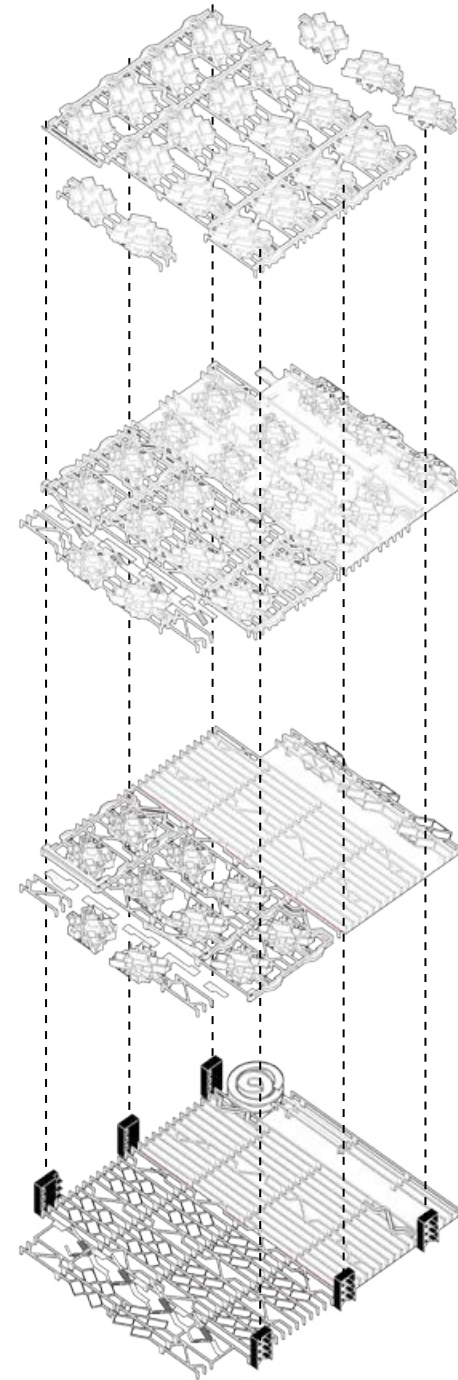


**Tower System**





FOLDS/HOLEs AXO

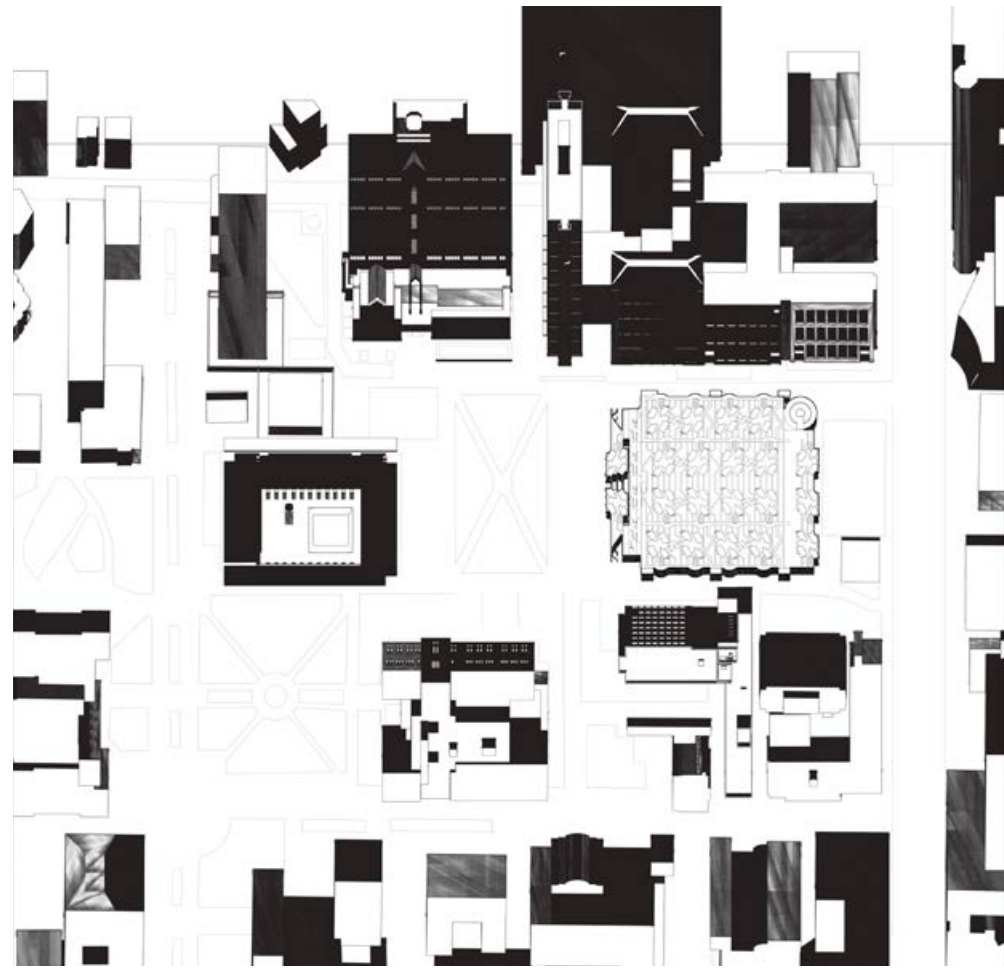


**4th Floor**  
80 Units  
0 Bay

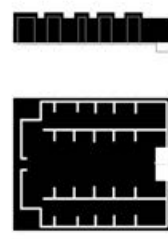
**3rd Floor**  
80 Units  
0 Bay

**2nd Floor**  
40 Units  
96 Bay

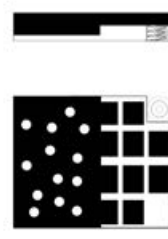
**Ground Floor**  
0 Units  
128 Bay



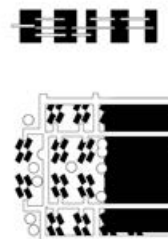
**Housing/Landscape  
Parking**



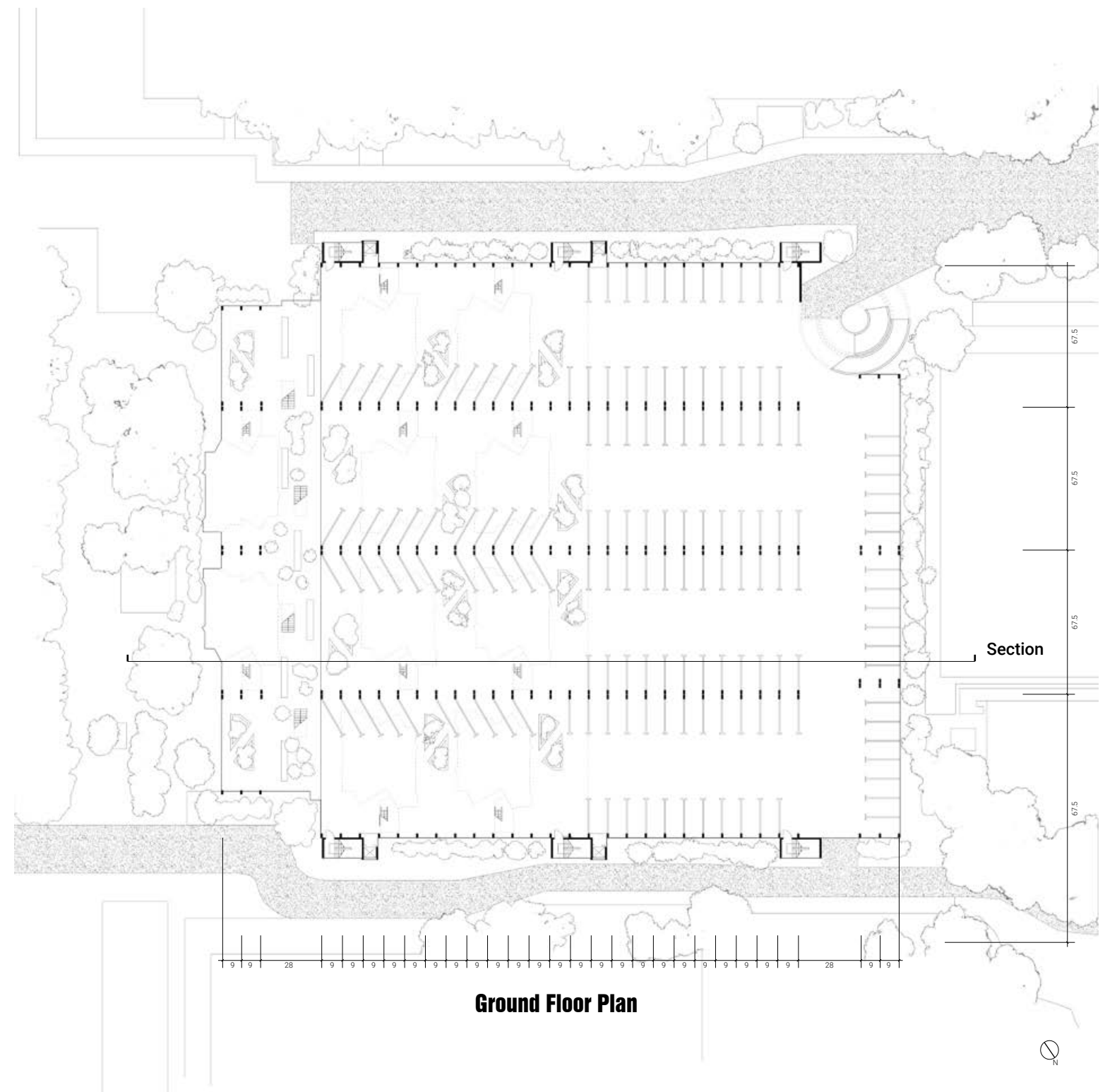
**Housing/Rogue/  
Parking  
Mechanical**



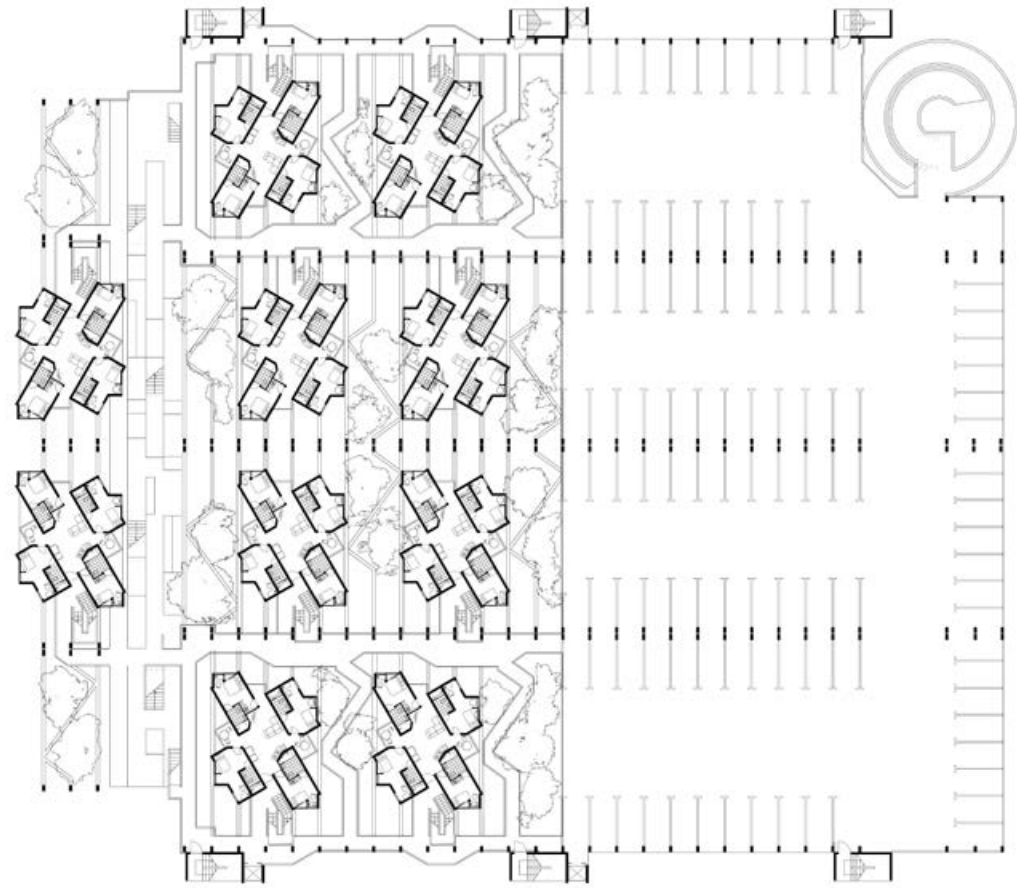
**Housing/Parking  
Landscape**



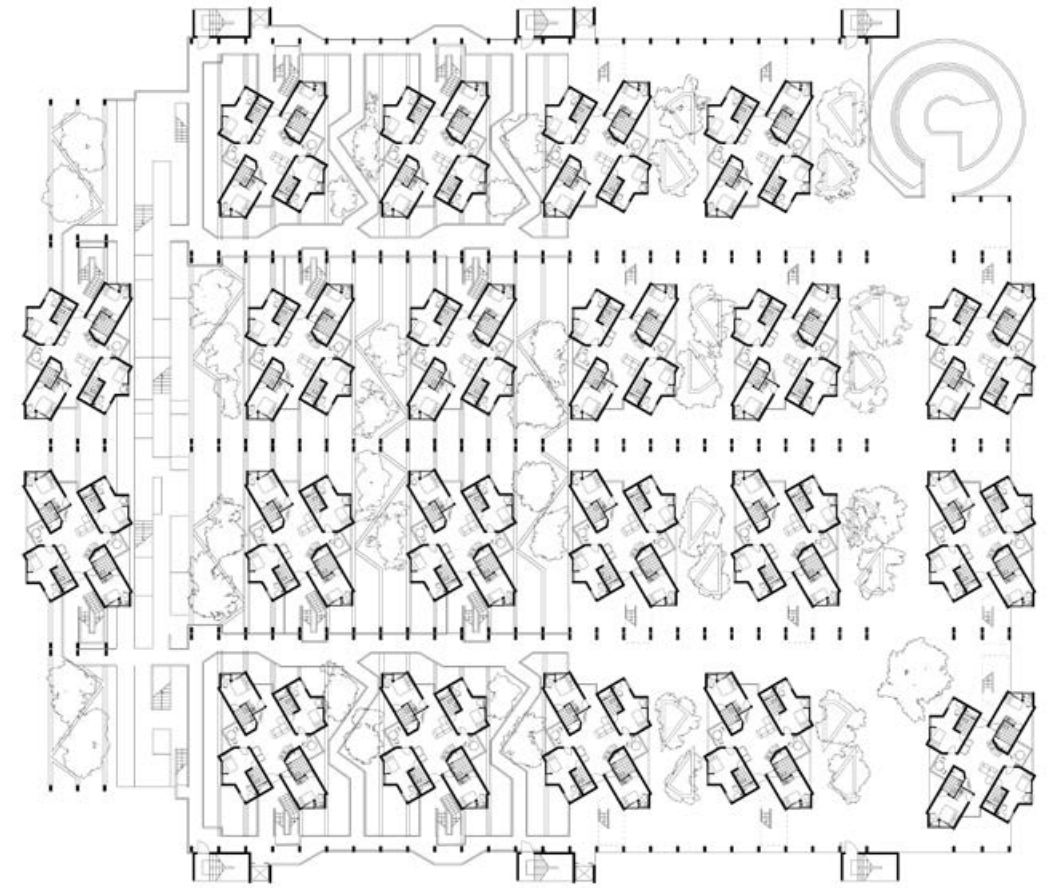
**Space  
Circulation**



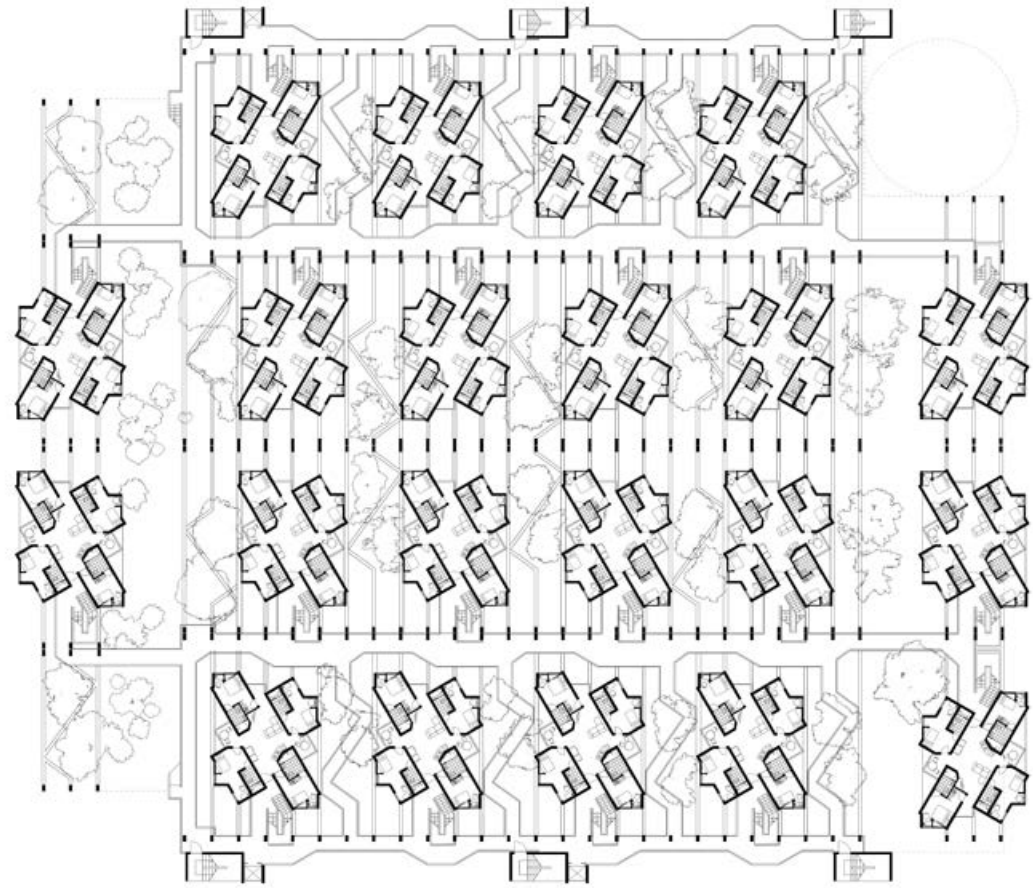
**Ground Floor Plan**



**1st Floor Plan**



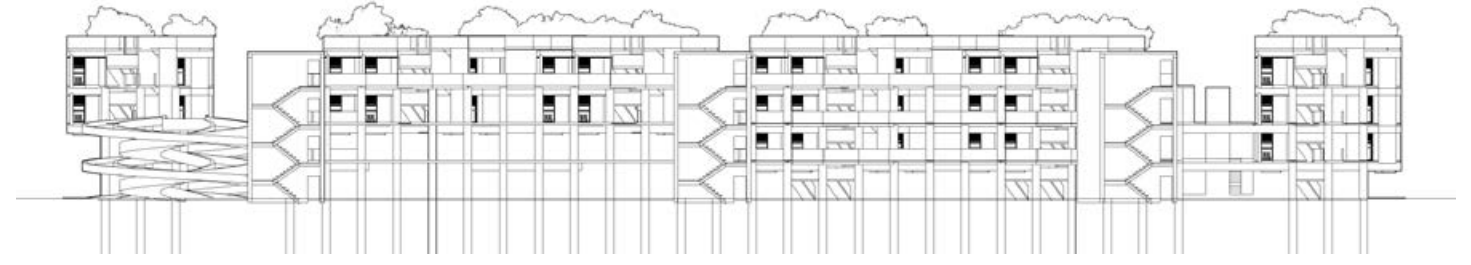
**2nd Floor Plan**



**3rd Floor Plan**



**South Elevation**

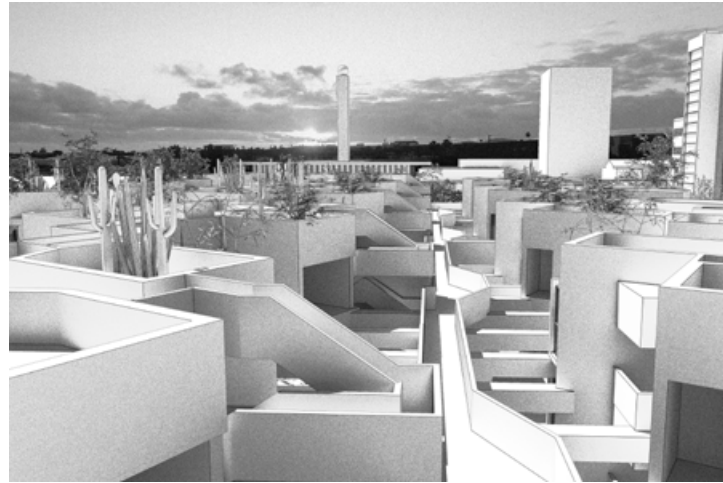


**North Elevation**



**West Side**  
Lawn, Ground Landscape

*East side is the entrance in campus, the original vegetation clusters connects new landscape, generate a slow space for pressure-releasing.*



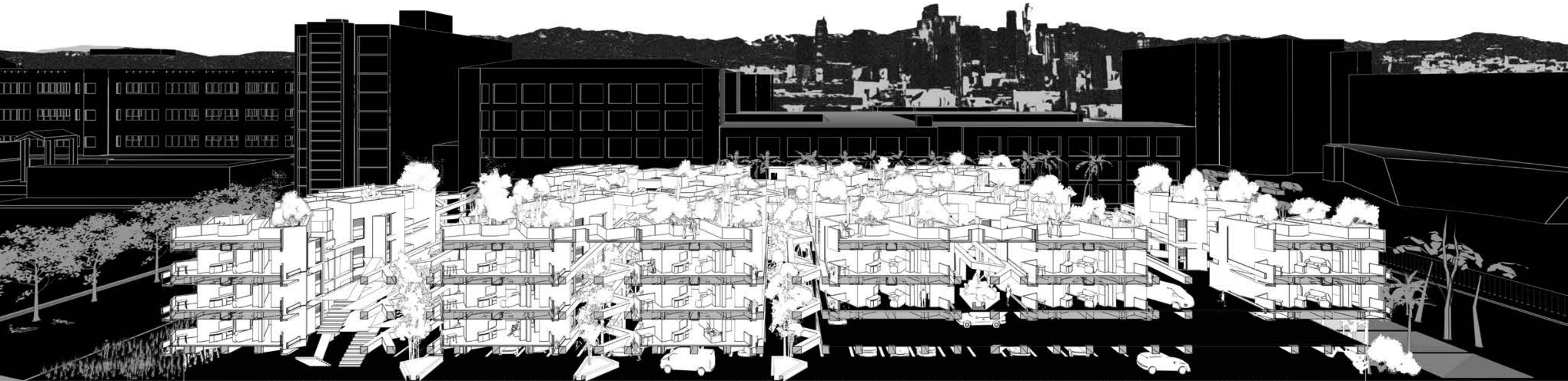
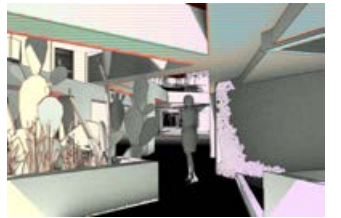
**Center**  
Rooftop, Landscape Elements

*Landscape is scattered into pieces, mixed with living spaces. Corridors at rooftop connected unit groups, making the whole building a vertical sharing community.*



**East Side**  
Parking, Open Space

*East side was the main entrance for cars, the original wide ramp is replaced with spiral speed ramp at corner.*



# Sharing the Wall

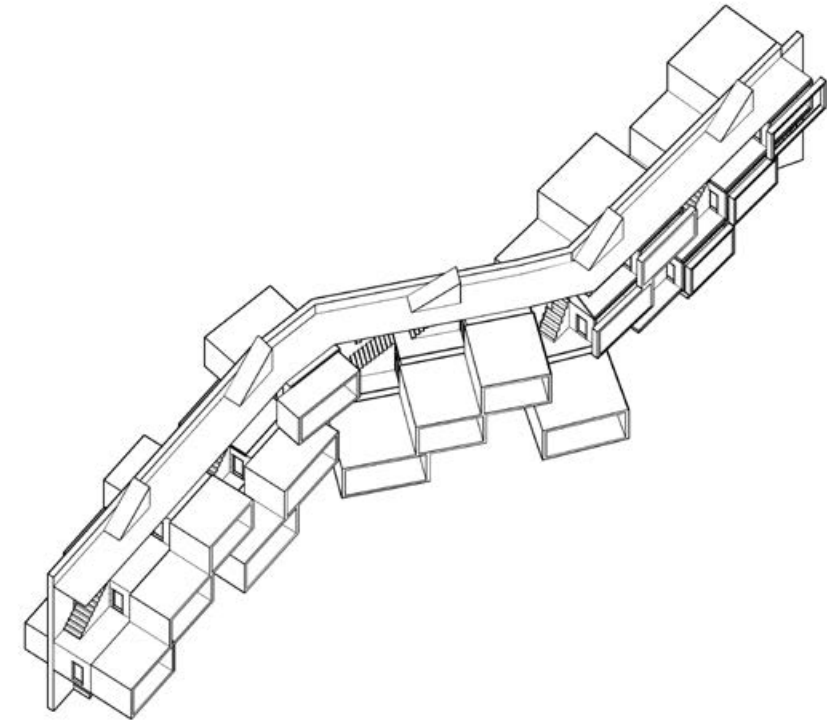
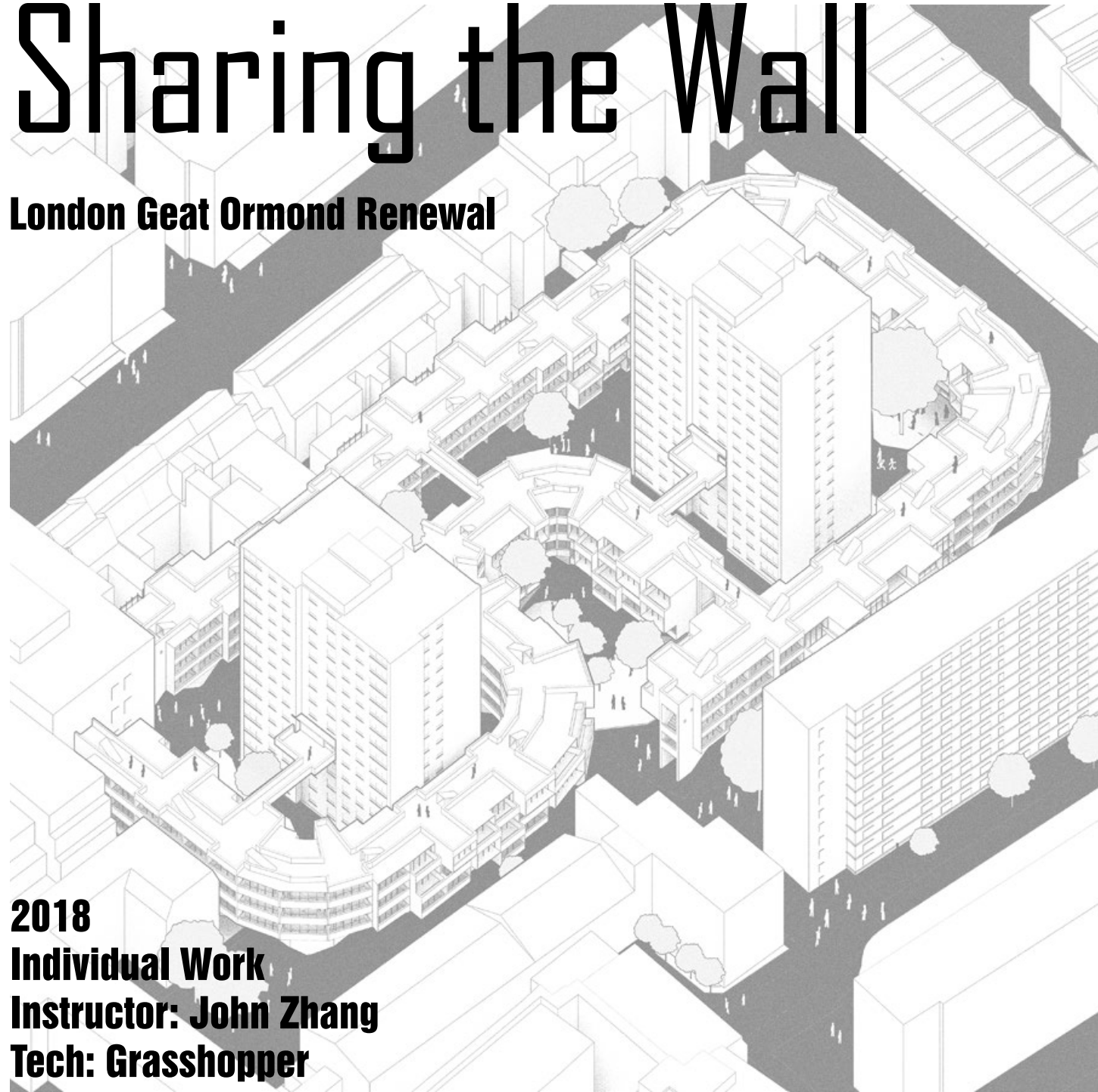
**London Geat Ormond Renewal**

**2018**

**Individual Work**

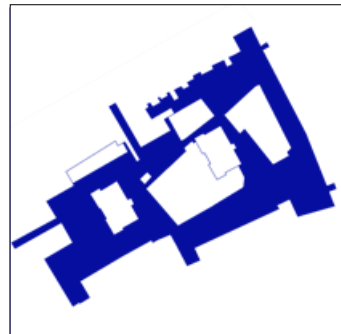
**Instructor: John Zhang**

**Tech: Grasshopper**

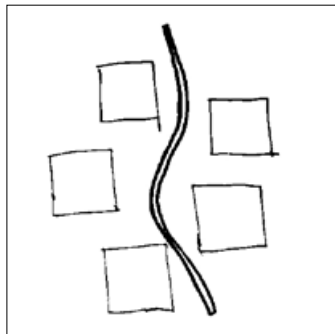


*This project explores a high-adaptive linear housing model in high-density metropolis like London, New York. It was insert as a mediator between different groups in Great Ormond Community, without interfering existing context.*

# WALL - in a limited community



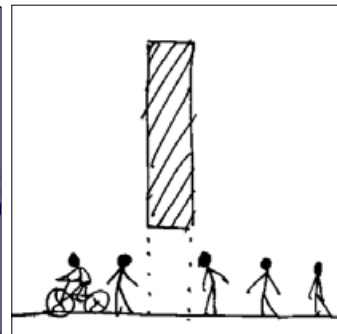
Limited Space



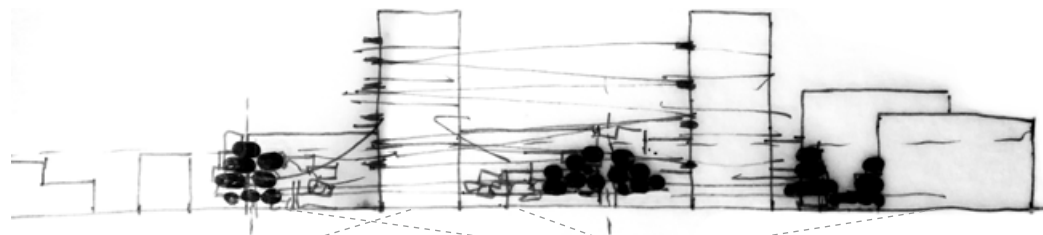
Snake Wall



Ground for Walking



Lift Up



**New Immigrants**

Mid-East immigrant families, mostly with children.



**Lonely Seniors**

Old people with leg issues, who live alone in their flats.



**Poor Students**

Young workers and students in London



**Sick Kids**

Sick Kids and their families/nursing staffs  
Additionally for patients from other

# BRIDGE - between mixed groups

## Finding the WALL

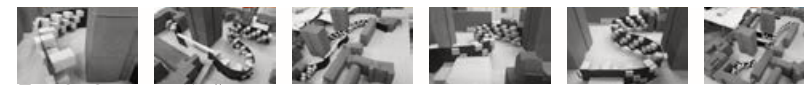


Wall space prototype

Units plugged into the wall, extended to face inside



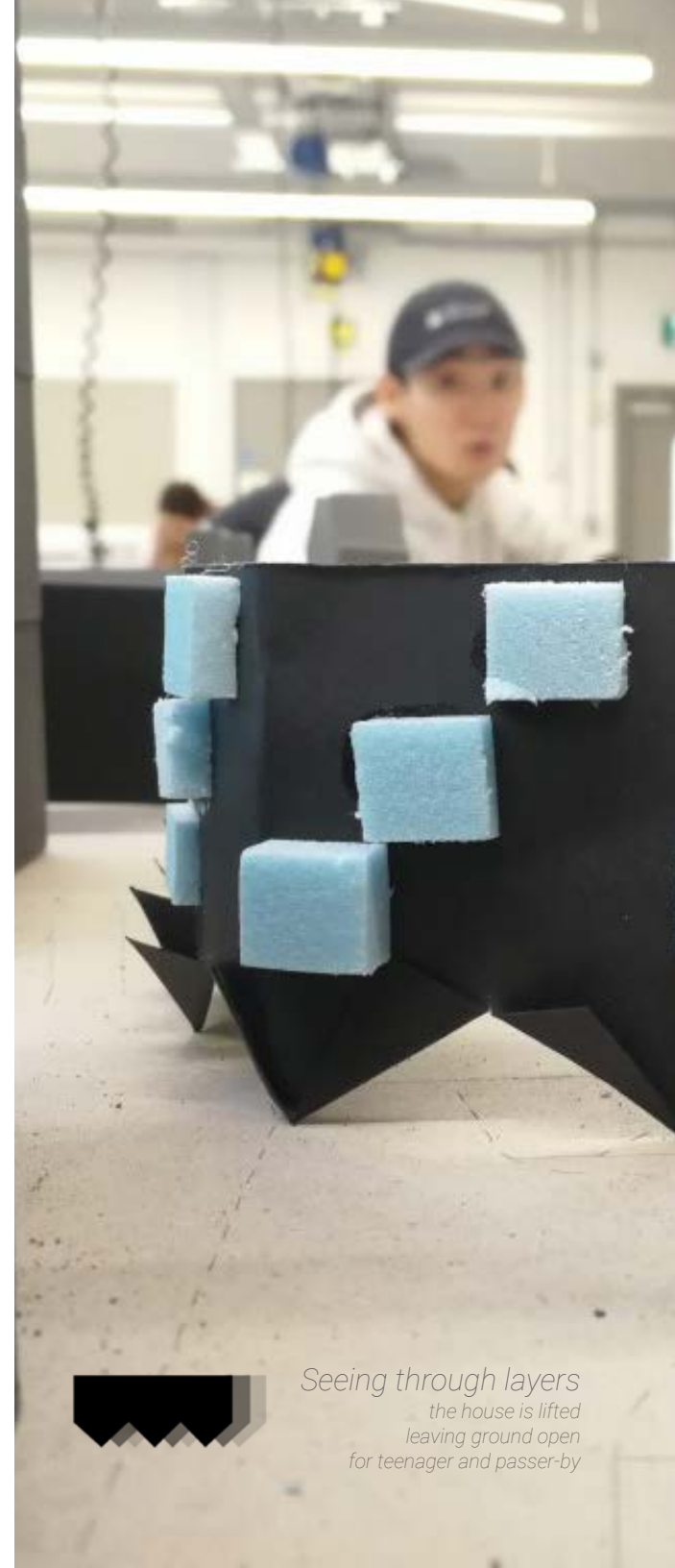
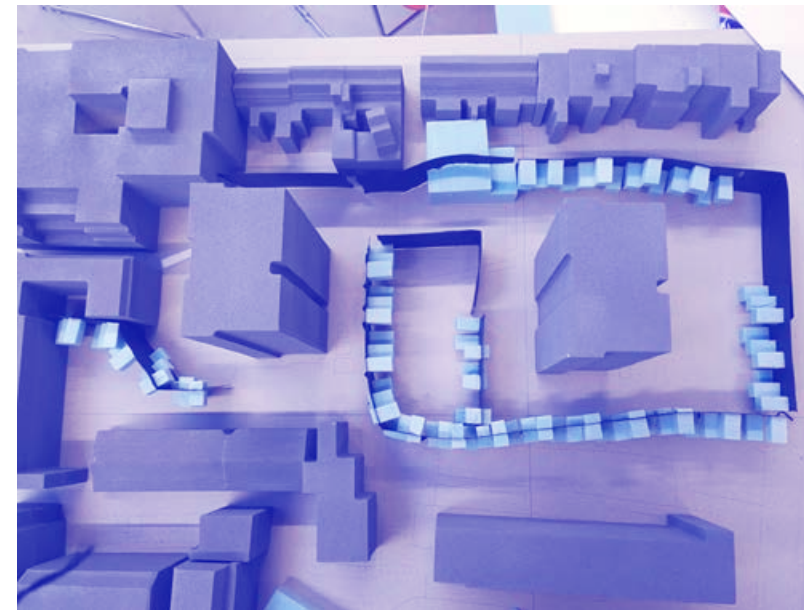
Test 1 - Separate Walls



Test 2 - Curvature Walls

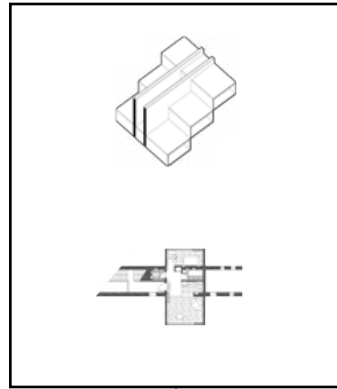


Test 3 - Walls Framing the Space

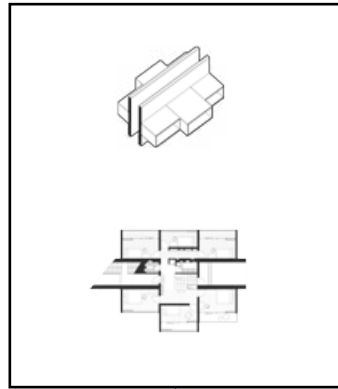


Seeing through layers  
the house is lifted  
leaving ground open  
for teenager and passer-by

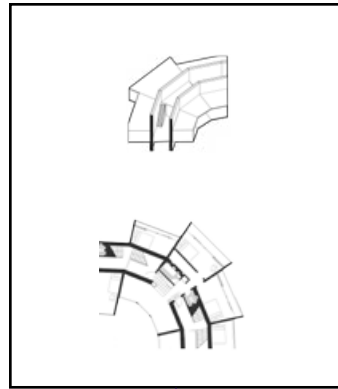
### Single Type



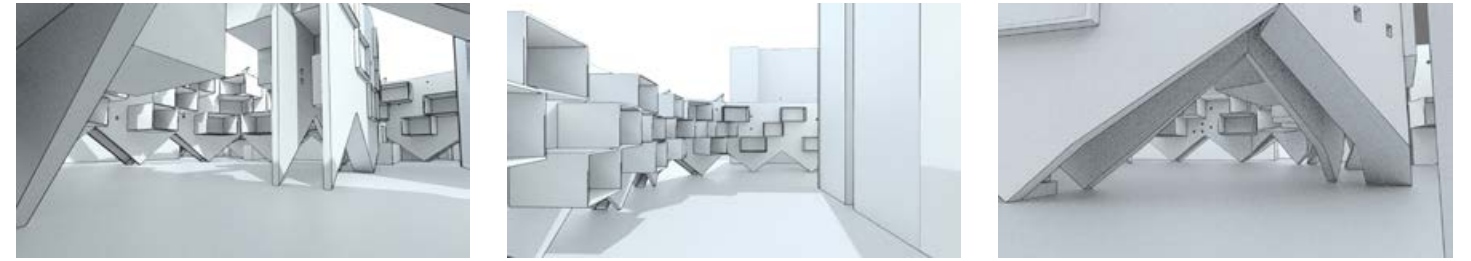
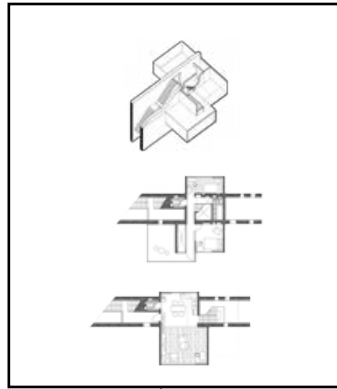
### Joined Type



### Corner Type



### Complex Lofter



### Minimize the shade & Maximize the area



Shade on Existing Buildings (noon)  
Total Area

Ratio

A  
X  
B

Length

- S Joined Type
- M Lofter Type
- L Single Type

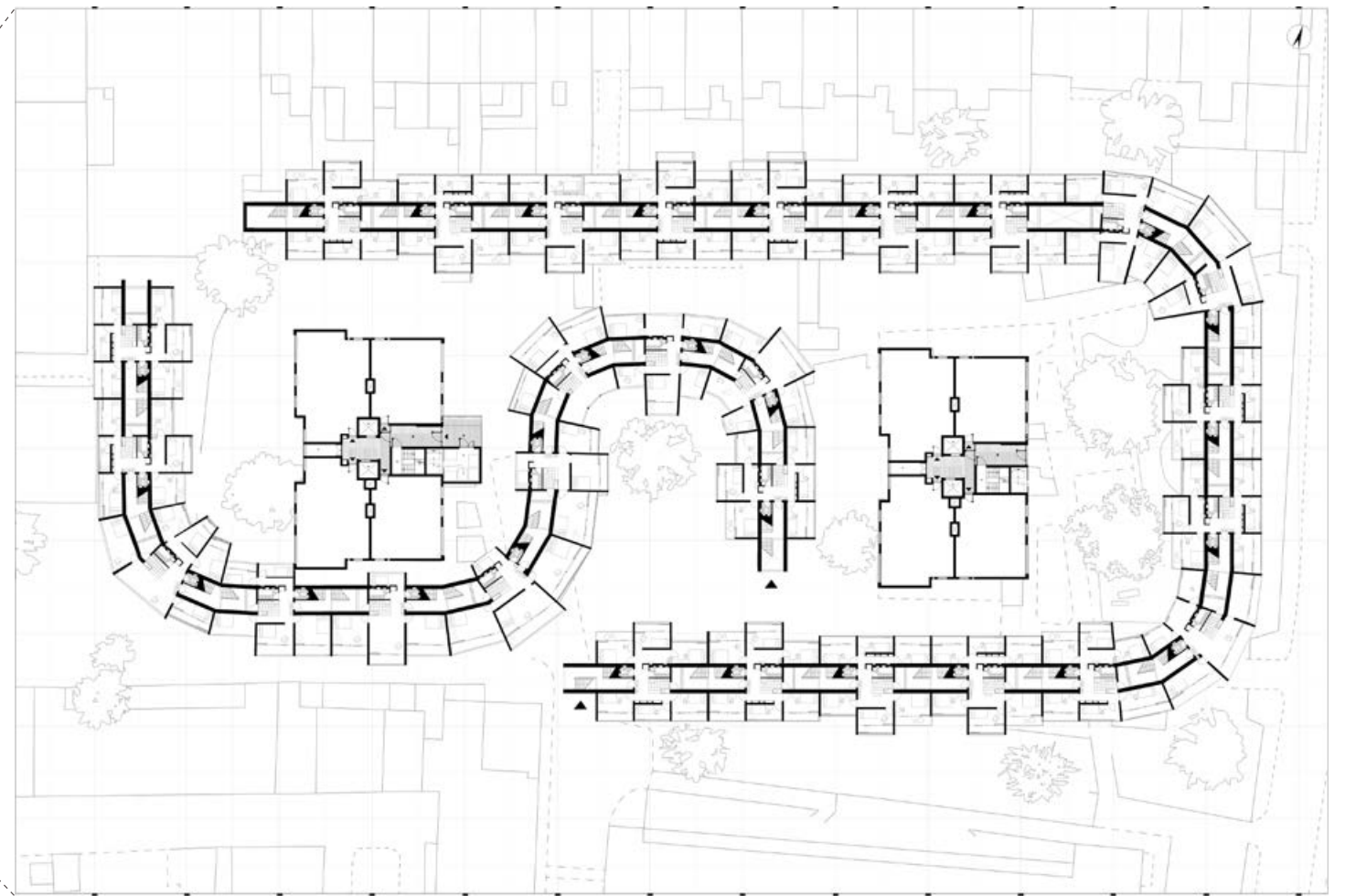
Layout

Weight

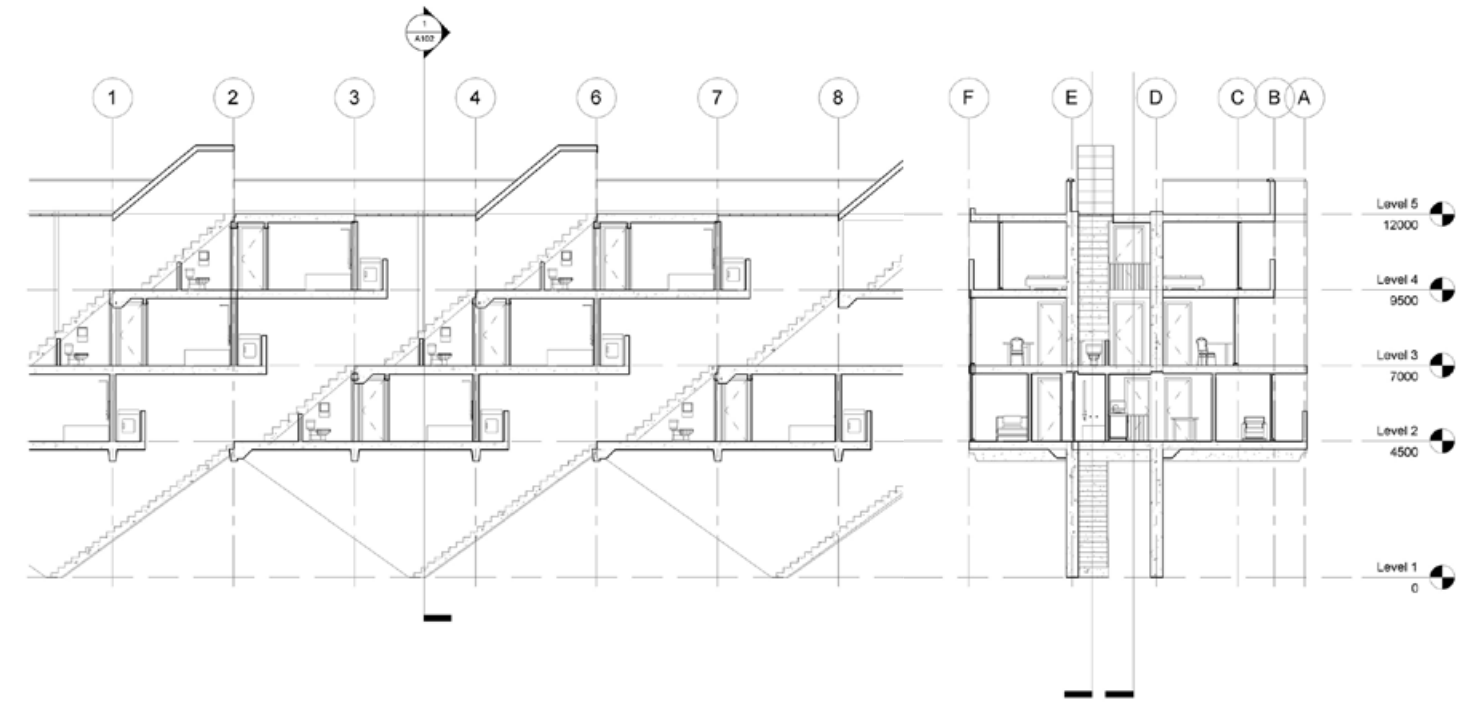
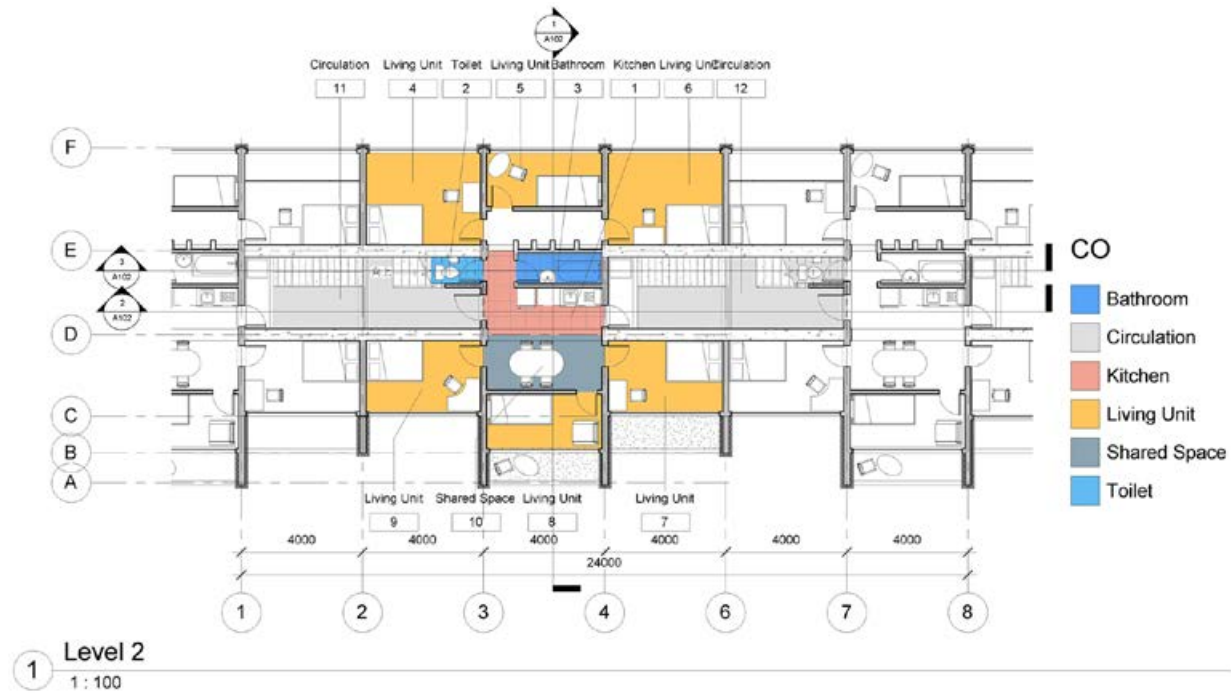
Radiation (0,1) +0.5  
Public (0,1) +1  
-1

*I wrote a length-computation method based on an environmental variable, which is a weighted mean of factors of radiation, public and wall curvature. I hope to keep units always facing inside, producing contact between public area and balconies.*

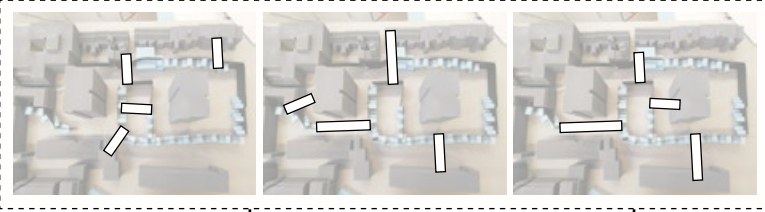
*Depending on distributed area, several types can be selected from library. Small units are combined to be a larger shared type, middle-sized units are combined vertically to produce higher space quality, large units are designed to be individual single type for higher efficiency.*







## Finding the BRIDGE



*It's not an isolated wall, life within the wall is integrated to the community, by bridges on the roof and lifted arches of the wall. The roofs of lower spaces could be an extended balcony of upper ones, and top roof could be expanded then. A thin wall turned to be an open space in the air.*

*The ground level is totally free for existing residents, such as childrens and elder ones. Patients from hospitals nearby can play down there, too.*

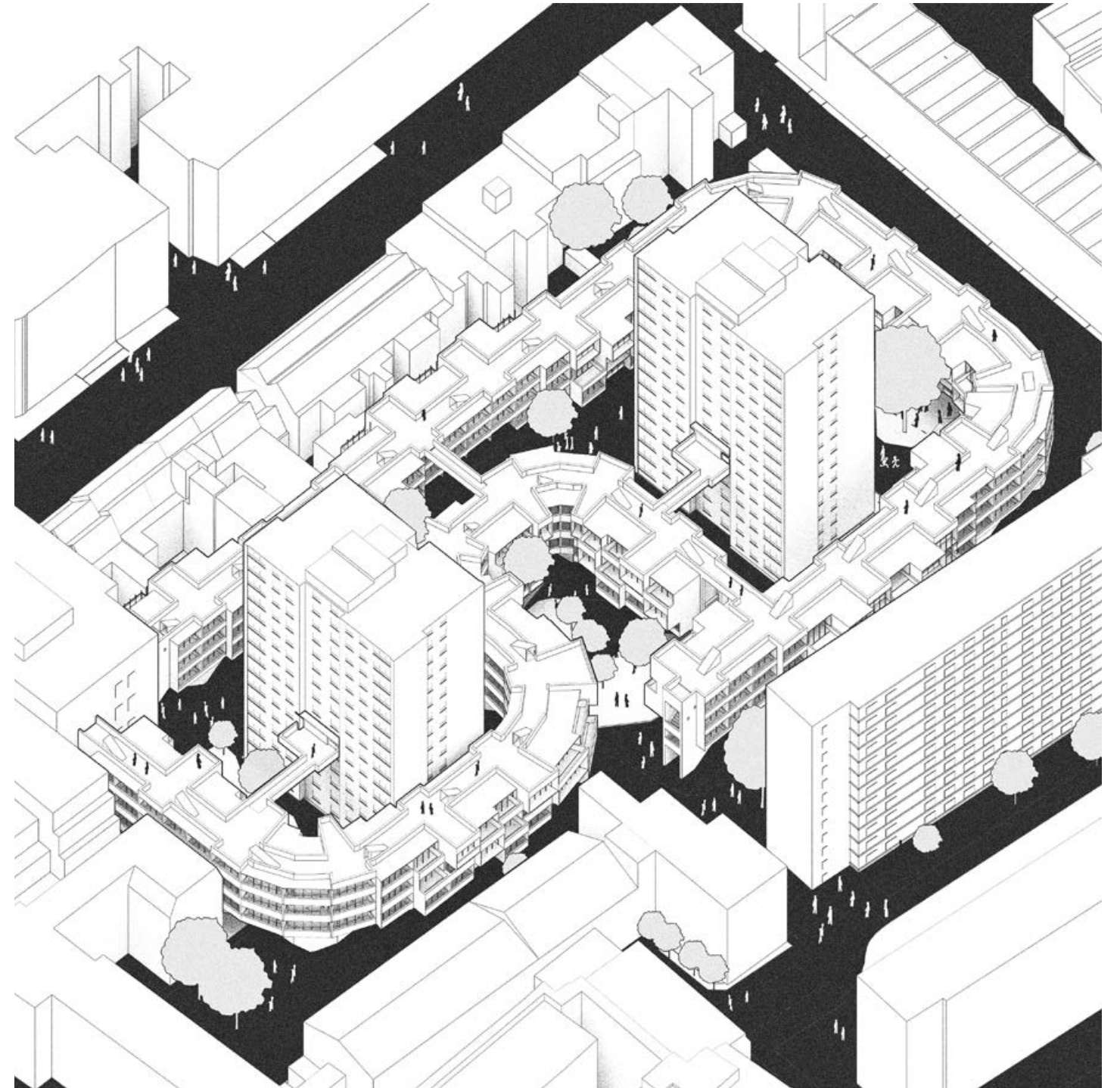


*Apartment(linked)*

*Flat(linked)*

*Playground*

*Hospitals*



**LIVE WITHIN THE WALL**



**Above the Roof**

*Old roof and new roof, turns to be a whole. Seniors with leg issues can hang out directly from the floor they live in.*

**L I V E   W I T H   T H E   W A L L**

*The ground level would be a free space for walking and cycling under arches - patients from hospitals nearby could also hang out around.*

**Down on the Ground**



*When I walk inside the wall  
The shimmering light runs  
through holes on the wall  
producing a cosy atmosphere*

# Bit-Erosion

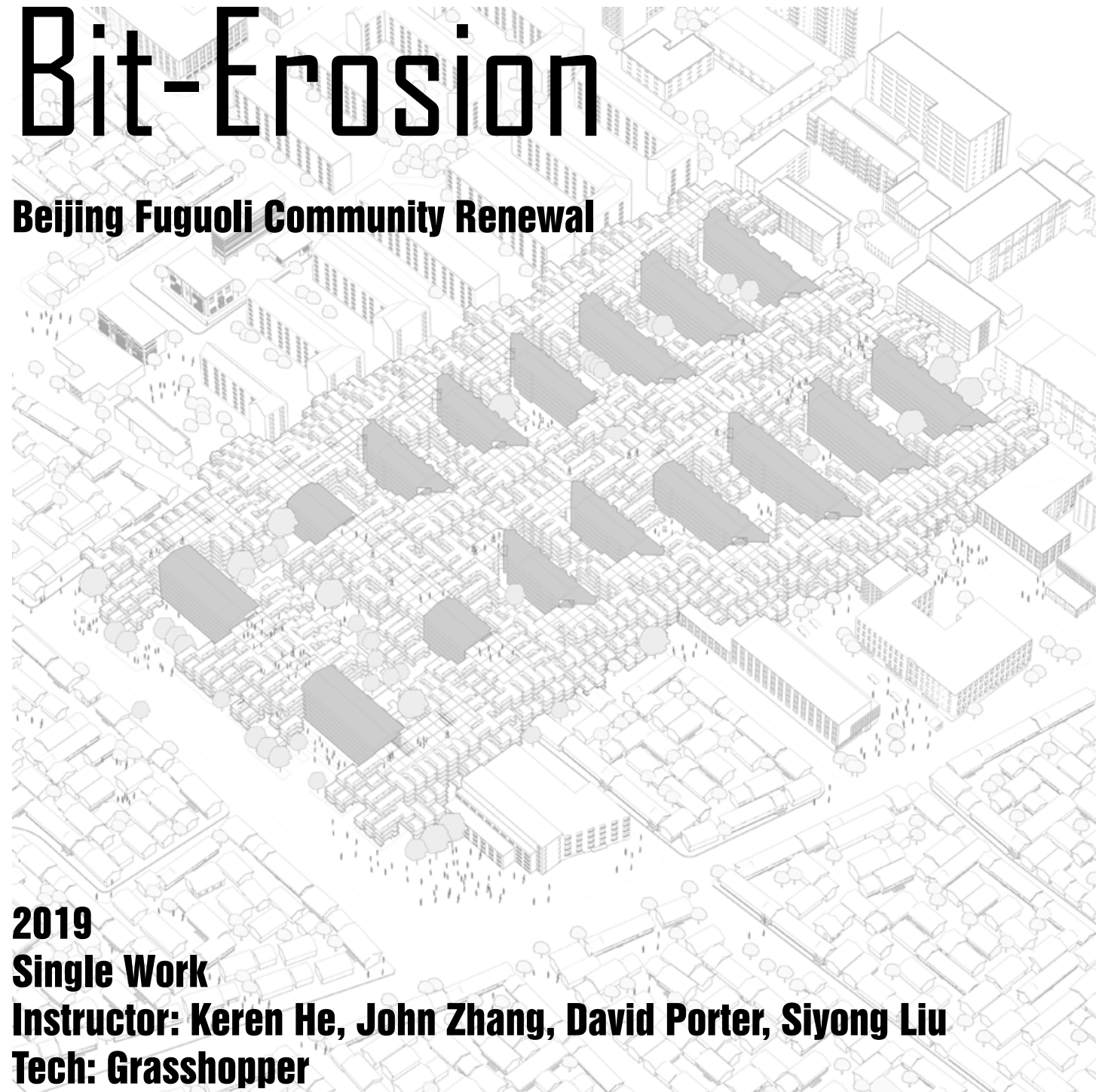
Beijing Fuguoli Community Renewal

2019

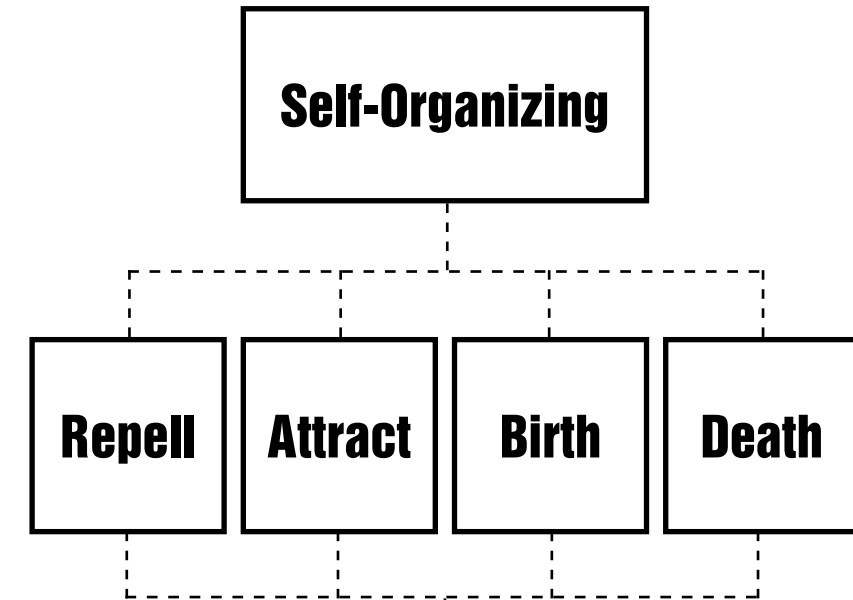
Single Work

Instructor: Keren He, John Zhang, David Porter, Siyong Liu

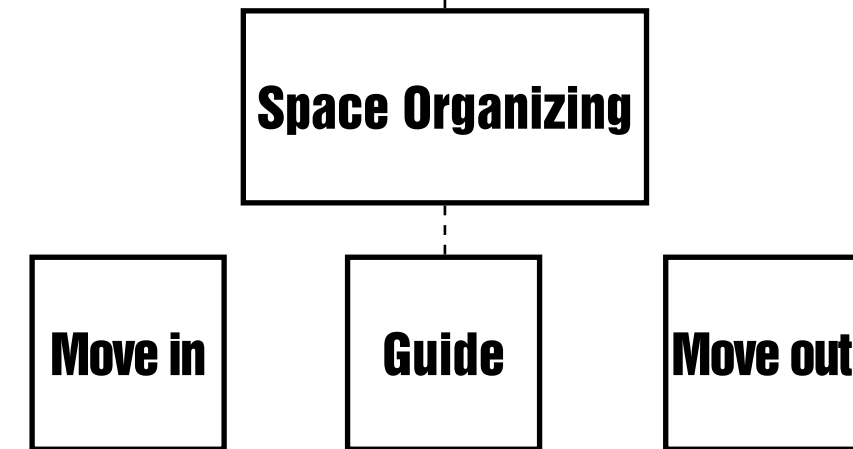
Tech: Grasshopper



Basic Behaviors



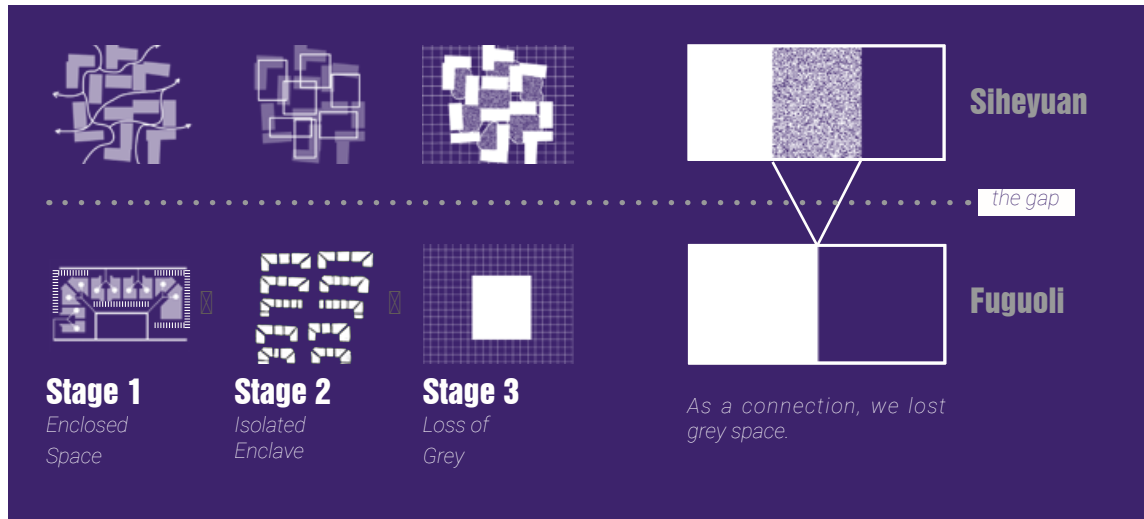
New Residents



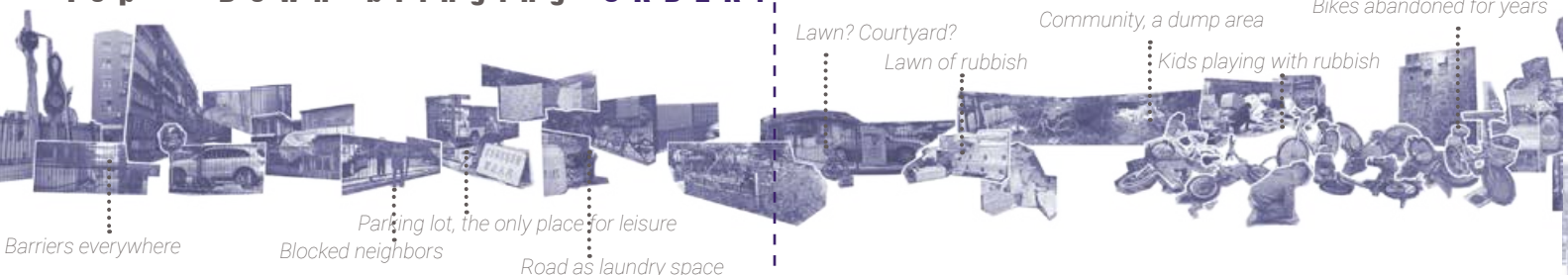
Old Residents

*This project proposed a bottom-up solution of Self-Organizing to guide community renewal and development.*

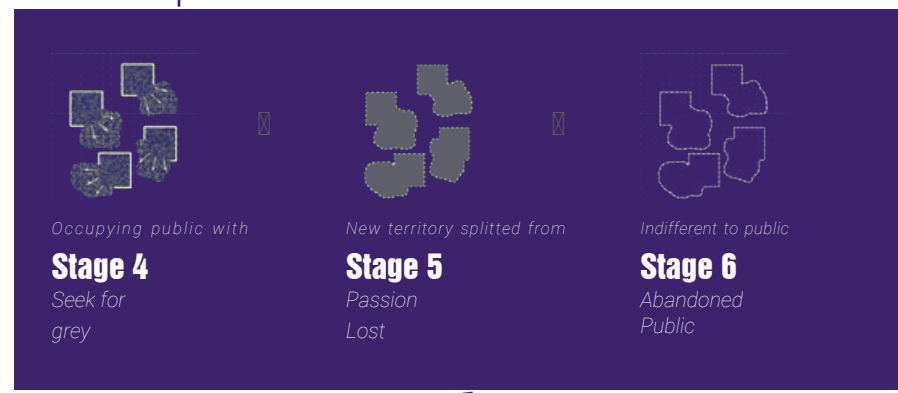
*Under a self-adaptive mechanism, we can balance between personal need, density, price and privacy, to provide low-rent housing for young generations.*



**Top - Down bringing ORDER?**



**Bottom - Up causing MESS?**



**Top-down planning deviated from habit weakened vitality of community**

We both lost passion for PUBLIC SPACE



**Leaving Residents**

Many aged residents wish to move away to suburb, living in high apartments is a trouble for them.  
As for middle-aged residents, whose families have children, will stay longer in this community, they are expecting changes to this

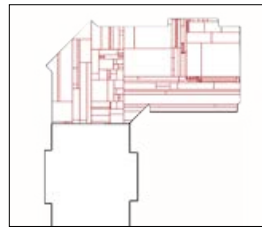
**Alert**  
Who are you?  
What are you doing to my house?  
Don't remove my house anymore!

**Missing**  
I do miss my life in Hutongs...  
Miss my neighbors...  
Those apartments are so tedious.

**Leaving**  
I have leg issues...  
I'd rather living in suburb...  
It's a trouble to go downstairs everyday...  
We old peoples hope to leave there...  
**Wish**  
Our community is so messy....  
Everybody wanna make a change.  
But what could we do?  
I'd like a courtyard rather than car

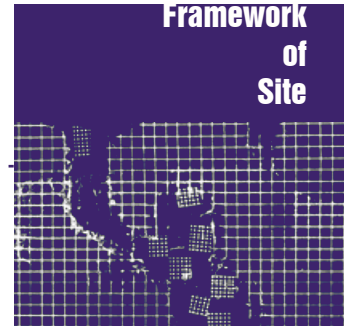
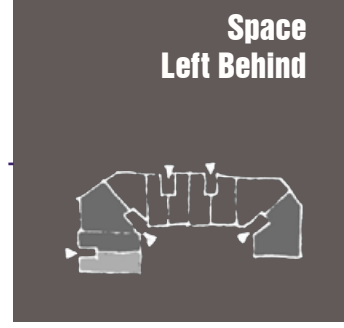
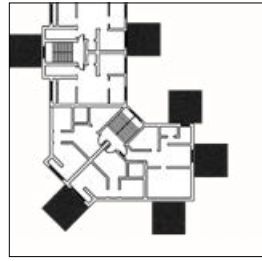
**Inward Space**

Most part of shady rooms (mainly on east and west side of building) are divided into tiny units by aged owners for rent. Frames are kept, walls are changed for space.

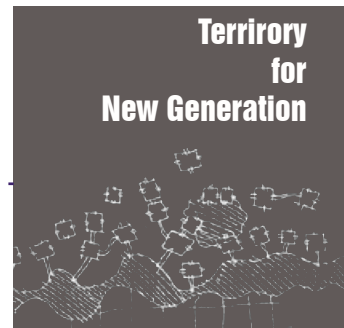
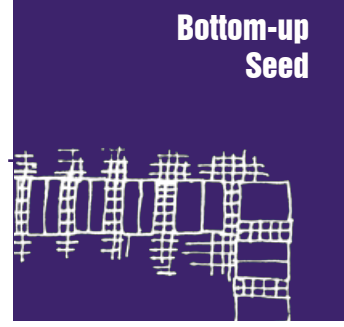


**Outward Space**

Self-built structures of ground floor residents to expand their balcony and basement. It inspired me where the new structure

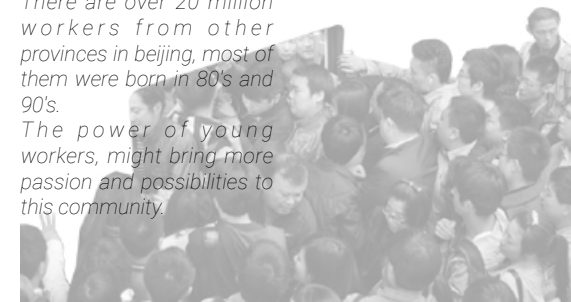


**the Break**



**BIT - Workers**

There are over 20 million workers from other provinces in Beijing, most of them were born in 80's and 90's.  
The power of young workers, might bring more passion and possibilities to this community.



**Transportation**  
I rent a house in suburb  
I spend 4 hours on the road everyday  
Totally exhausted.....

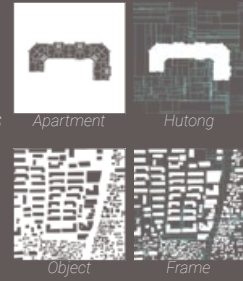
**Environment**  
Now I'm living in basement  
If possible  
I'd like a small cabin on the ground

**Fees**  
Downtown room cost over \$5,000 per month  
It's still rising.....  
That would take a big part of my salary.....

**A place to stay**  
The government is removing old houses  
"Low-ends" are forced to move out  
Now we got no where to go.....

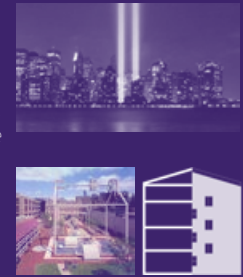
### Private to Grey

Transforming idle spaces back to shared grey space



### Keep Framework

By keeping the framework, the context can be preserved.



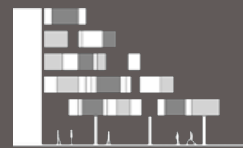
### Self-Organized Territory

Accumulative territory above the ground grows from transformed space.



### Dense Units

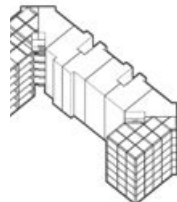
Low rent, simple, shared public space - space for mixed high-density community.



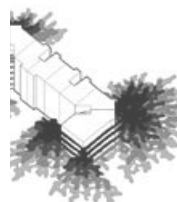
#### Stage 1



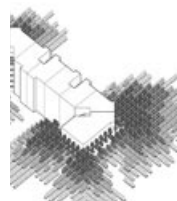
2 Block Replaced



Framework on Sides

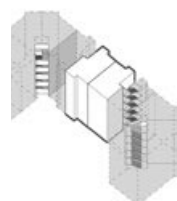


Grown Territory

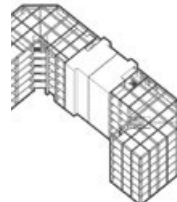


Generation 1

#### Stage 2



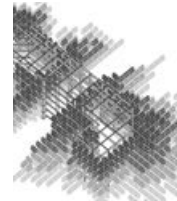
4 Block Replaced



Developed Framework

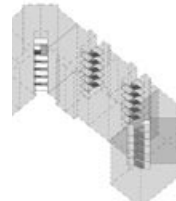


Expanded

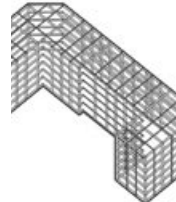


Generation 2

#### Stage 3



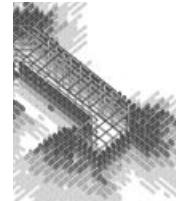
Totally Replaced



Framework of Fuguoli

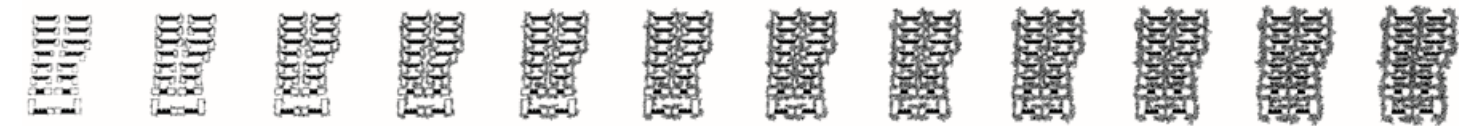
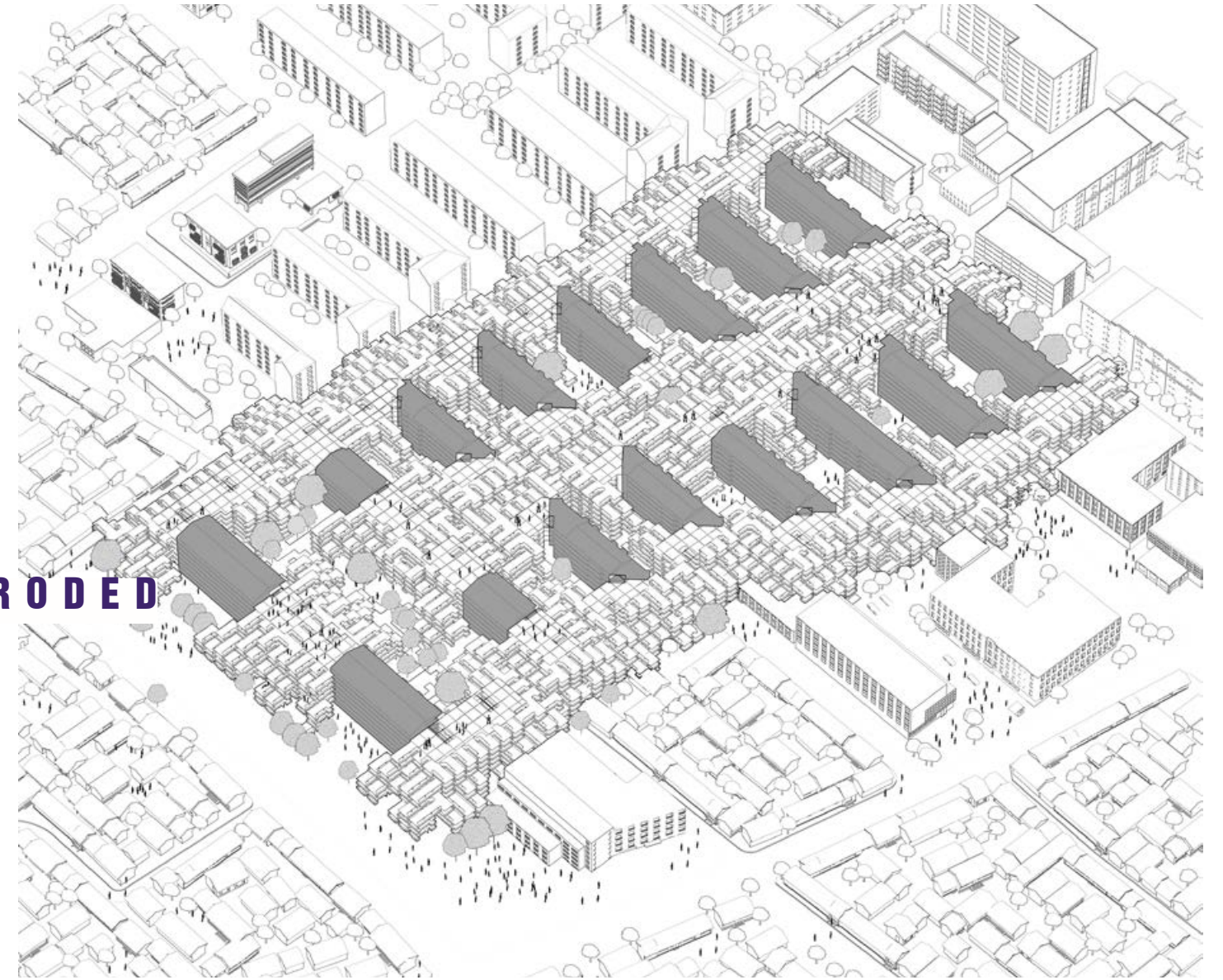


Occupation



Generation 3

As interation goes, old space would be **ERODED**



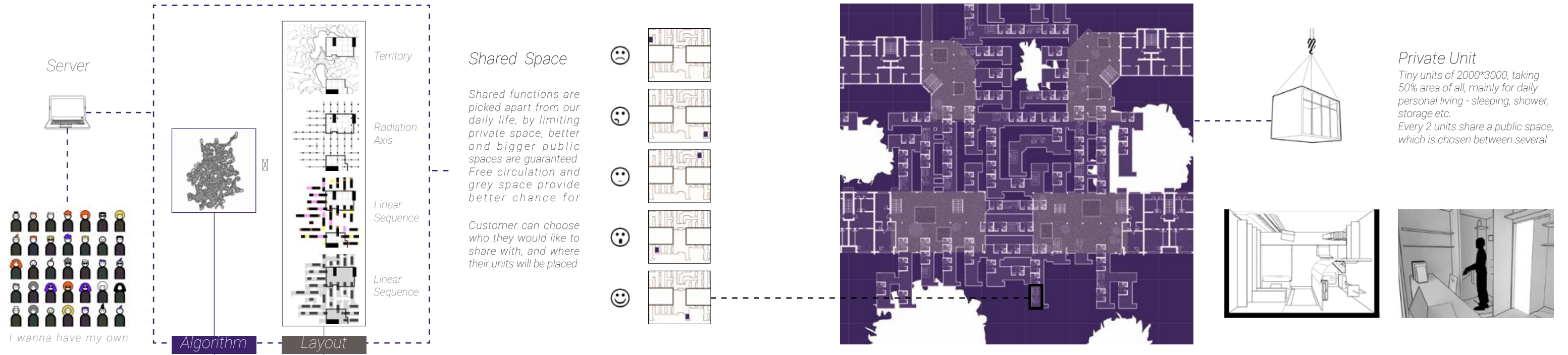
t h r o u g h

# Customer

# Territory Optimization

# Options

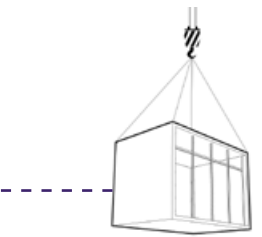
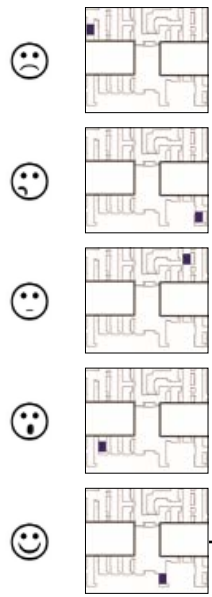
# Construction



## Shared Space

Shared functions are picked apart from our daily life, by limiting private space, better and bigger public spaces are guaranteed. Free circulation and grey space provide better chance for

Customer can choose who they would like to share with, and where their units will be placed.



## Private Unit

Tiny units of 2000\*3000, taking 50% area of all, mainly for daily personal living - sleeping, shower, storage etc. Every 2 units share a public space, which is chosen between several



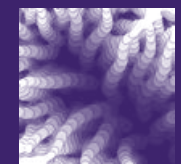
# Power-driven Algorithm

The SELF-ORGANIZING SYSTEM is implemented to be the tool for generating space.

On existing structure, the new territory grows. Architecture itself is a hierarchy of power and behavior, the "growth" is a process driven by political and spatial behaviors, will keep growing dynamically, finally reach a balanced space form.

The explicit form is a result of implicit balanced power.

## Spatial Behavior



### Birth

Outer units  
low utilization  
fulfilling idle spaces

### Death

Inner units  
removing overcrowded space  
maintaining density

## Social Behavior



### Attracting

Higher density  
Higher profit  
Higher utilization

### Repelling

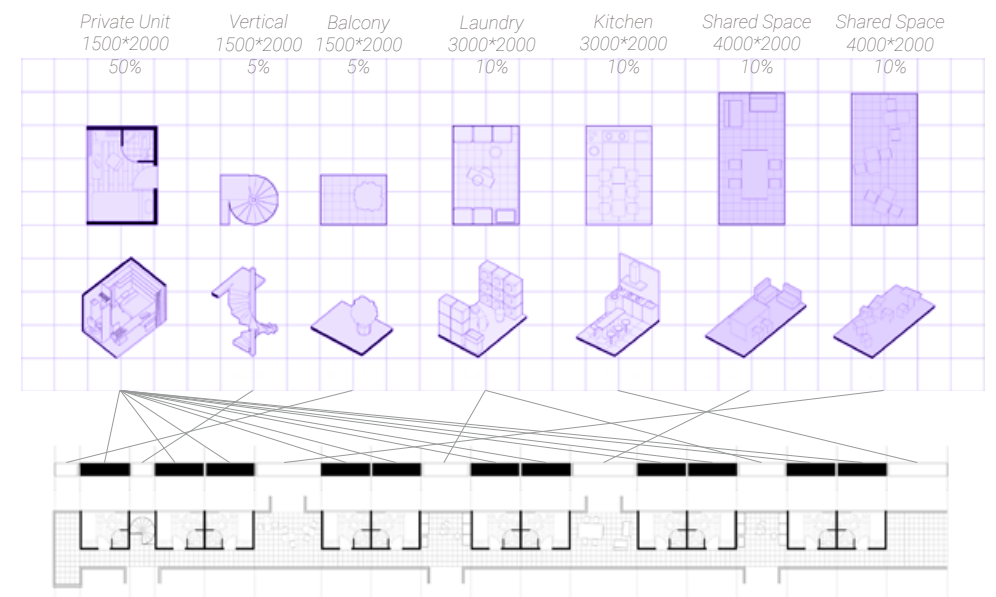
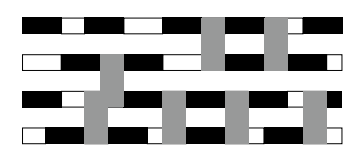
Lower density  
Larger personal space  
Better sunshine

## Linear Sequence

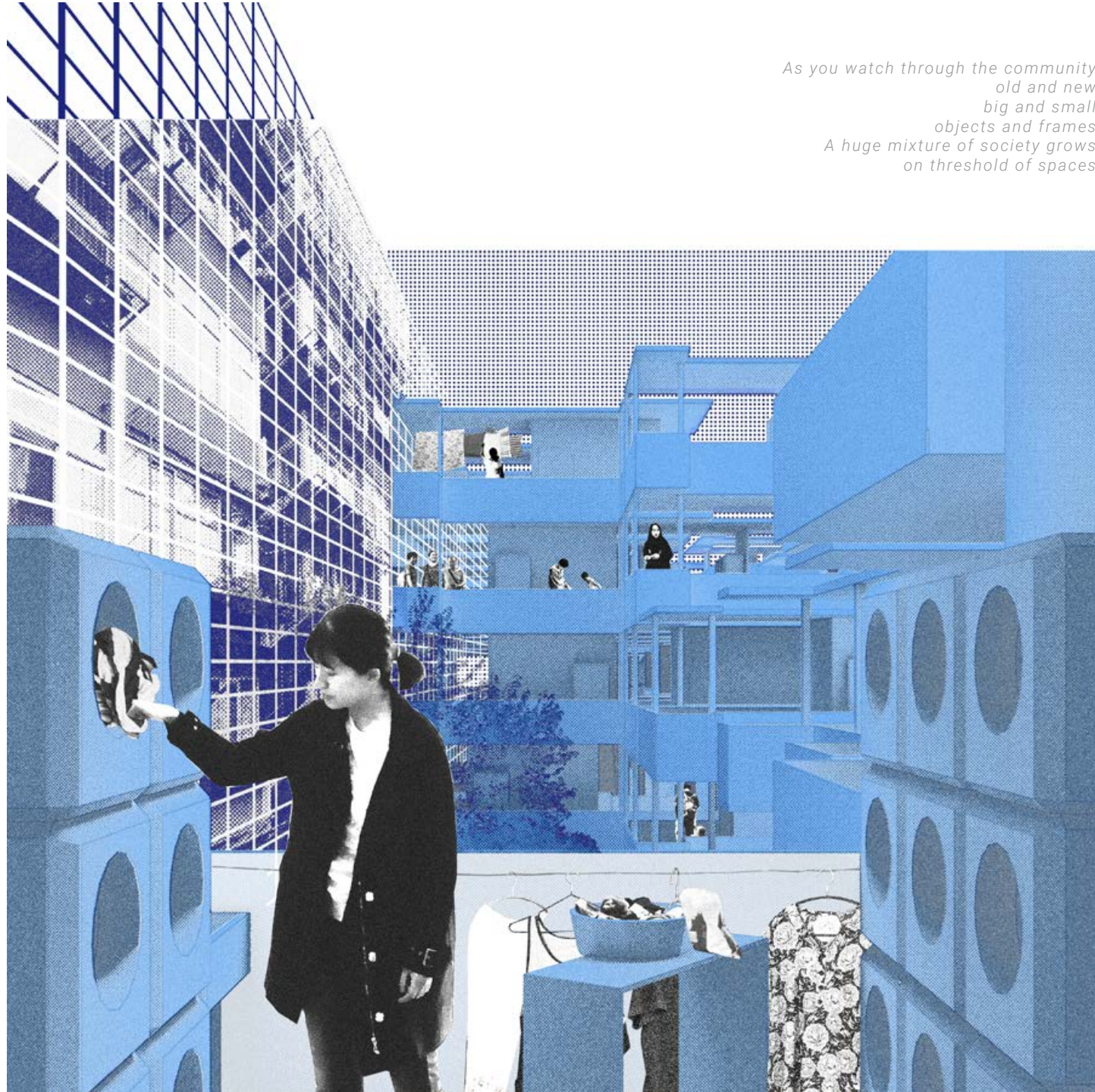
A repeated pattern is applied to linear space, every 2 private space share a public space chosen from



For neighboring shared space, paths will connect them across lines, to increase communication.



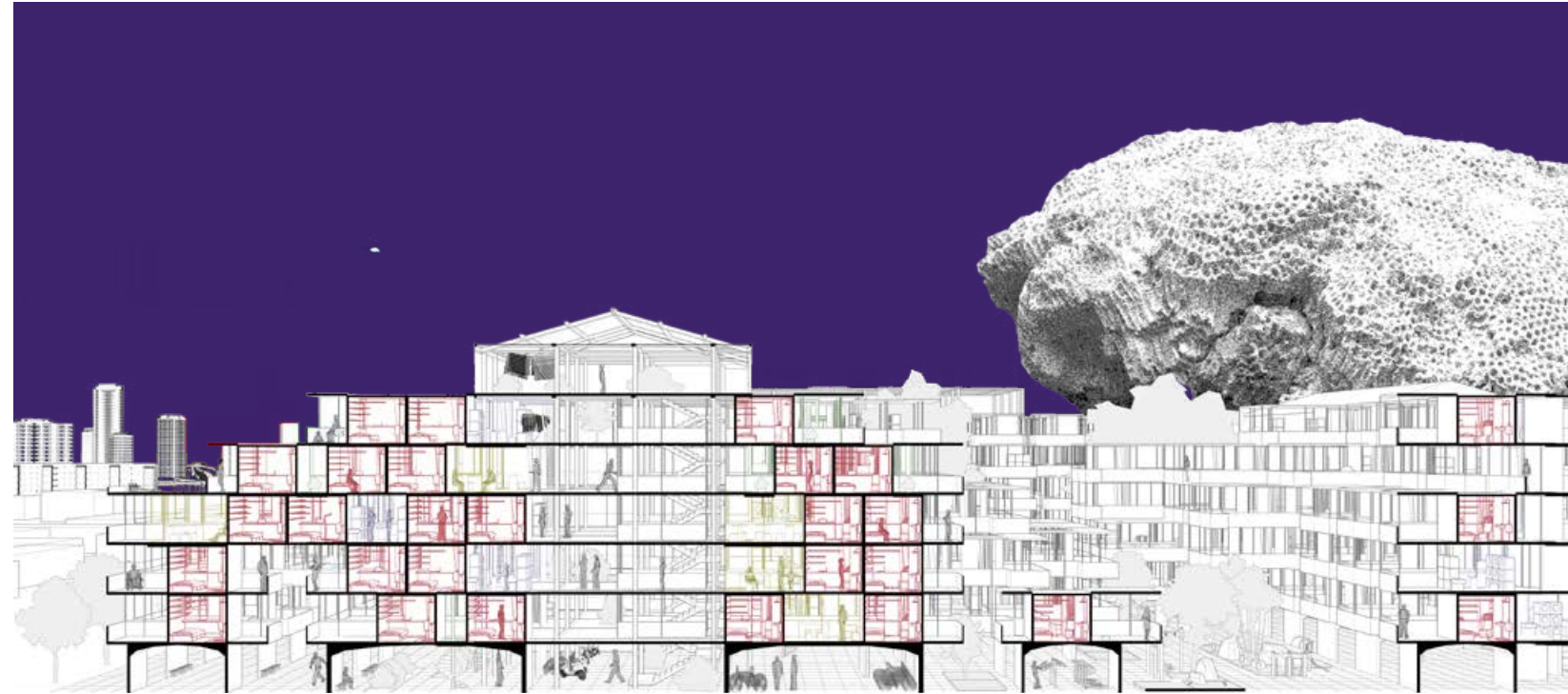
*As you watch through the community  
old and new  
big and small  
objects and frames  
A huge mixture of society grows  
on threshold of spaces*



*On rocks live the corals  
they reproduce  
aggregate  
die  
and calcify*

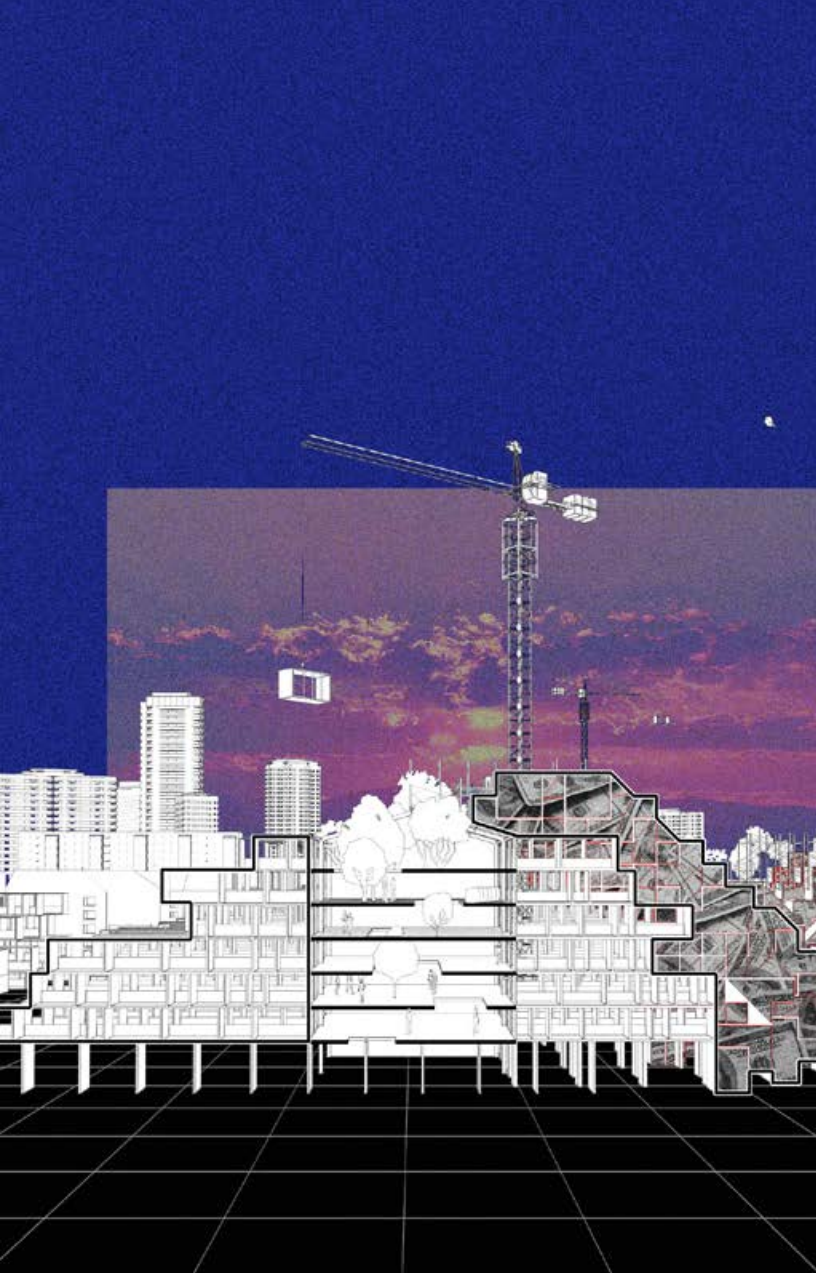
*lives turns to rock  
on which new ones rise*

*Have we ever return the space we  
borrowed?*



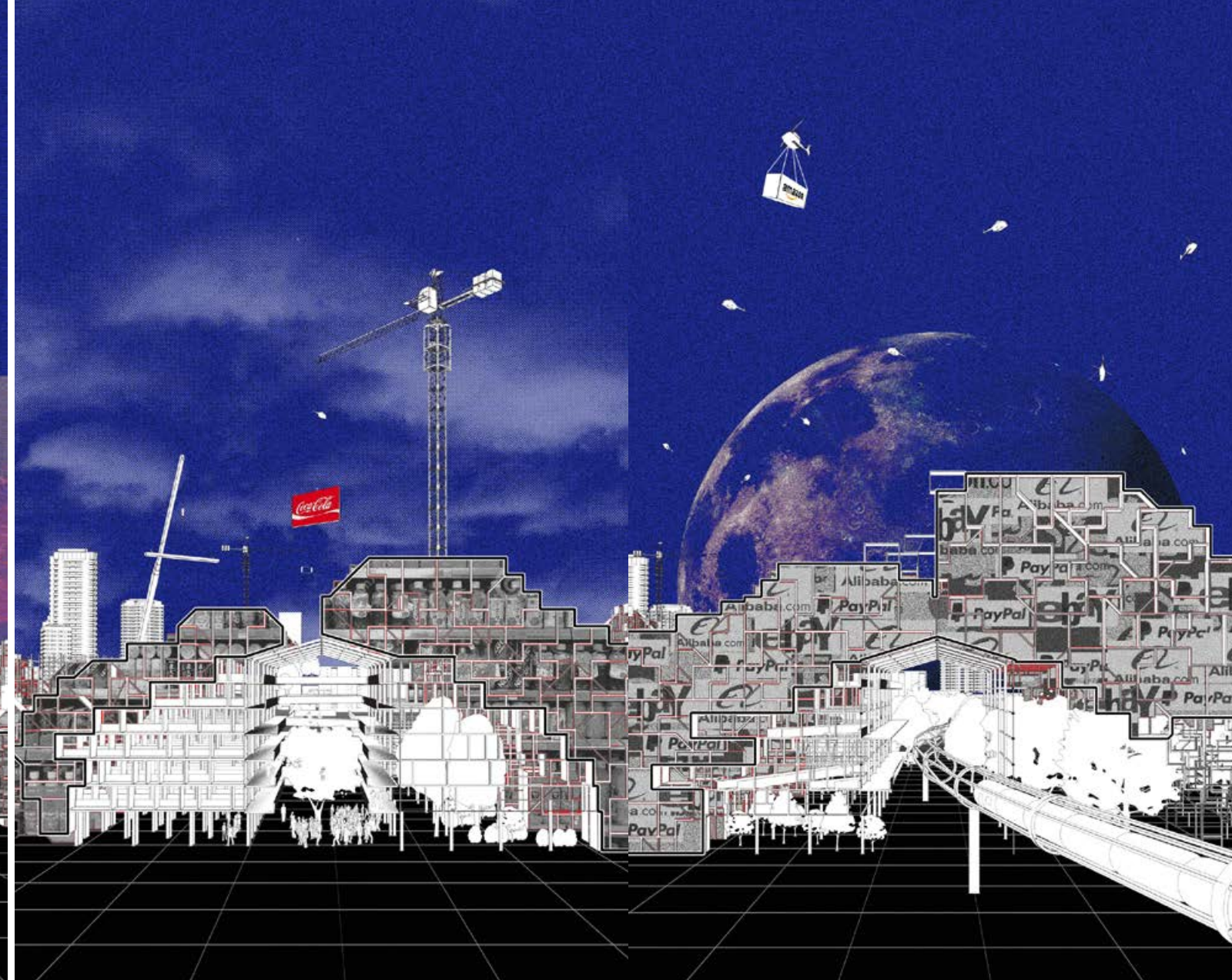
**Run! Run! Fuguoli! Run into the sky!**





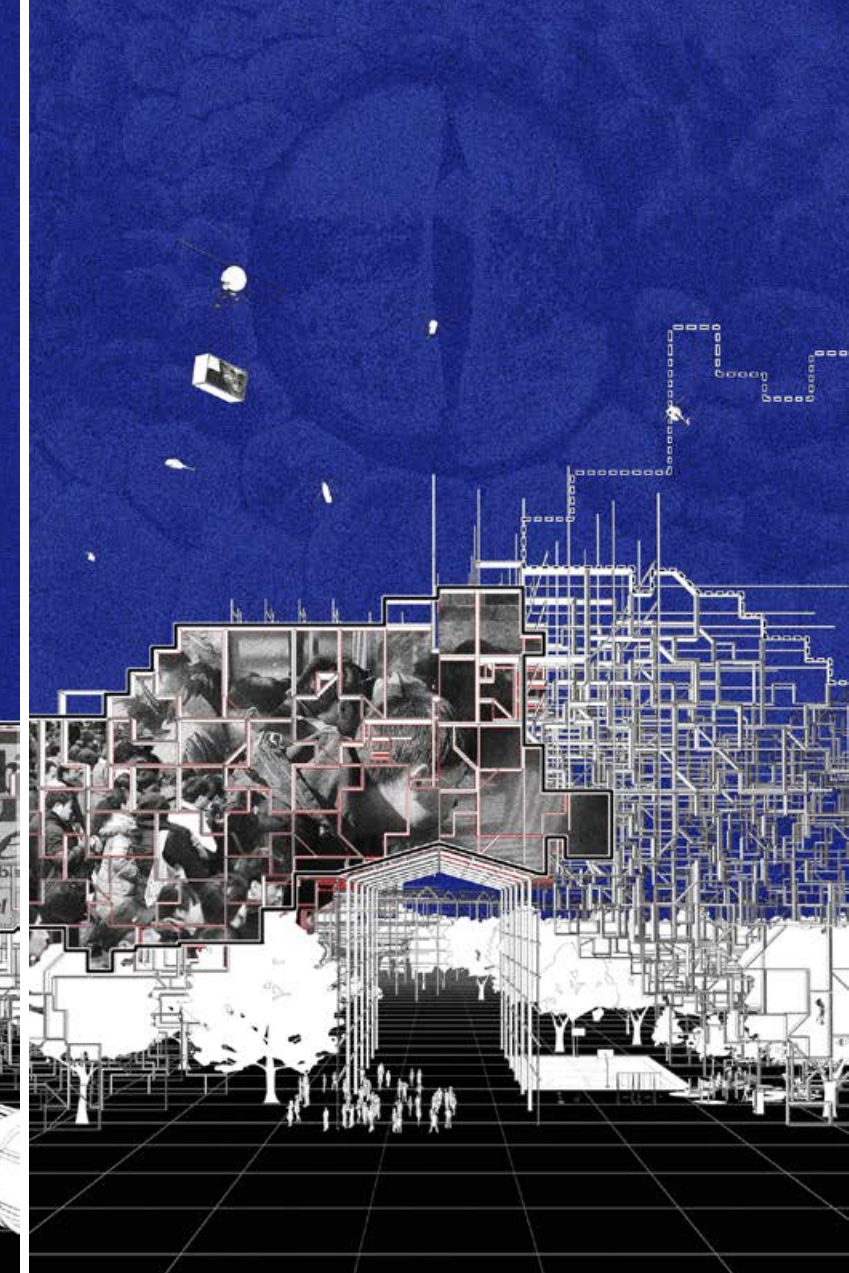
**Run through the section of time!**

*Power of capital will automatically drive it as a self-organization.*



*As generation changes, "new" community turns to be a history, eroded by newer generations. And itself becomes a framework like Fuguoli, supporting our future life.*

*One day, newer generation would pass, eroded by units with higher density. Our community, our city turns to be hollow shell, the ground would be free, returned to the earth.*



*Human city would be a illusion. Only from frameworks they left we can see our past, above which our new city could be built. It's a stratum, we left our trace behind, why not return something we borrowed from the earth?*



D

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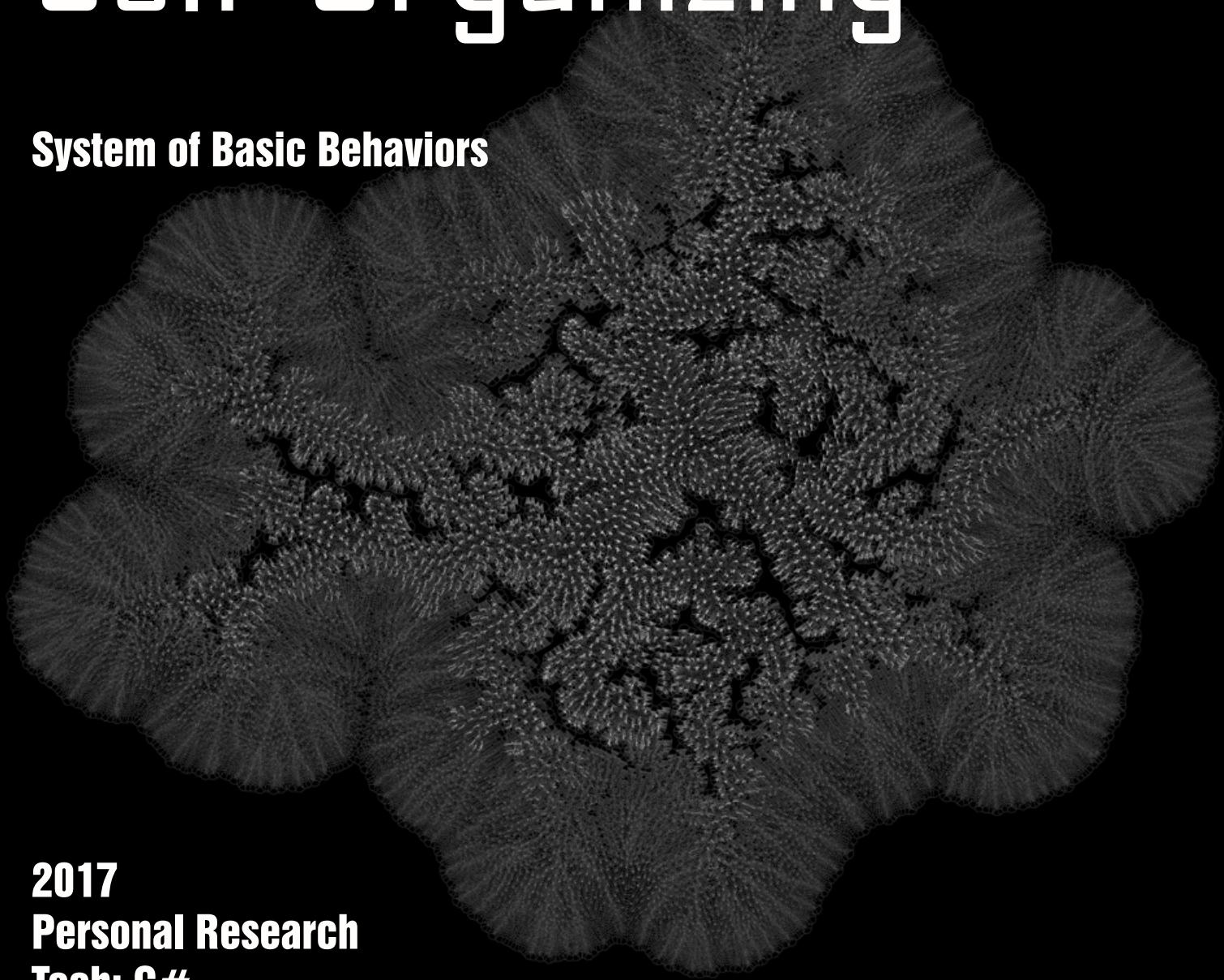
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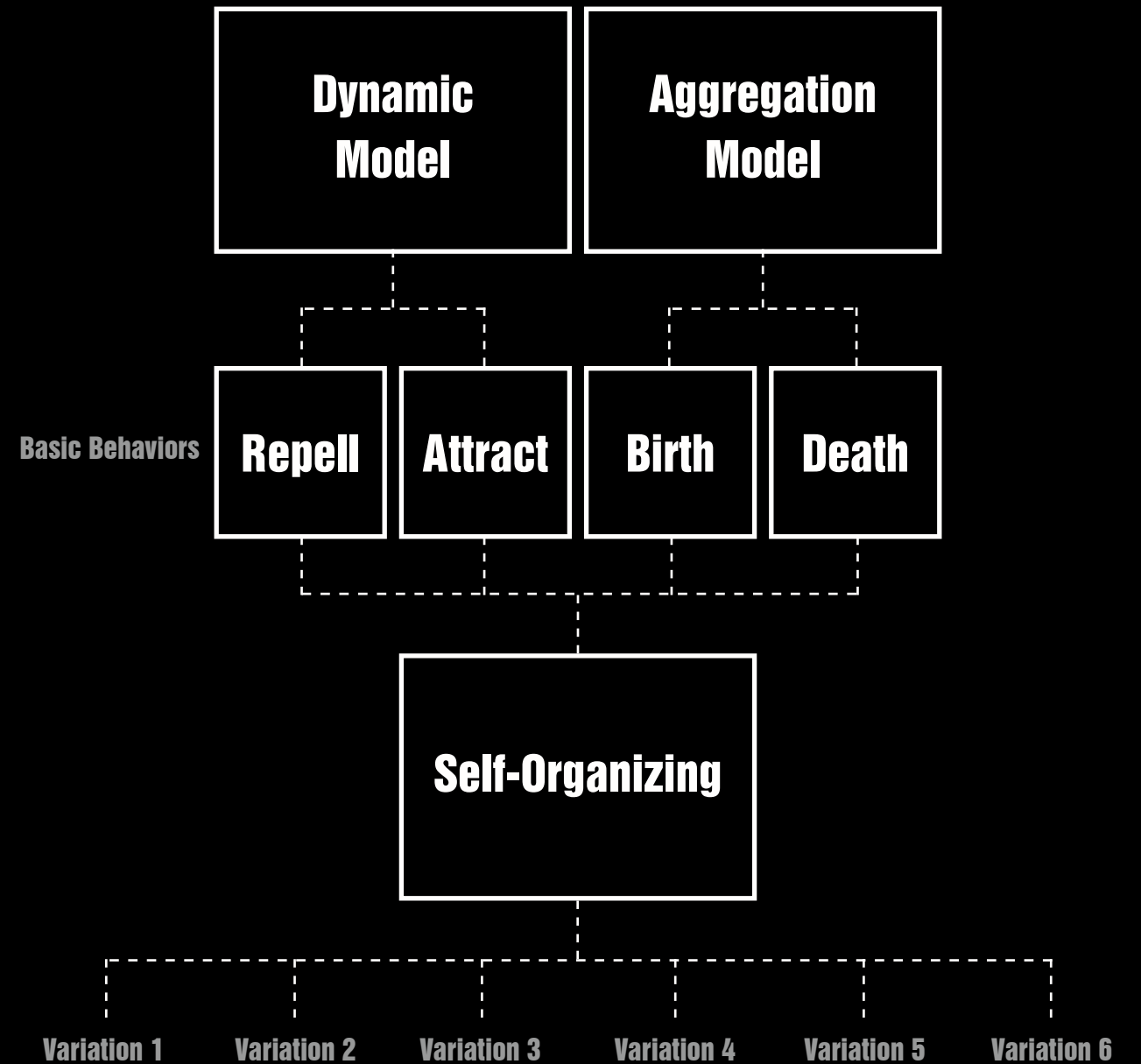
L

# Self-Organizing

System of Basic Behaviors

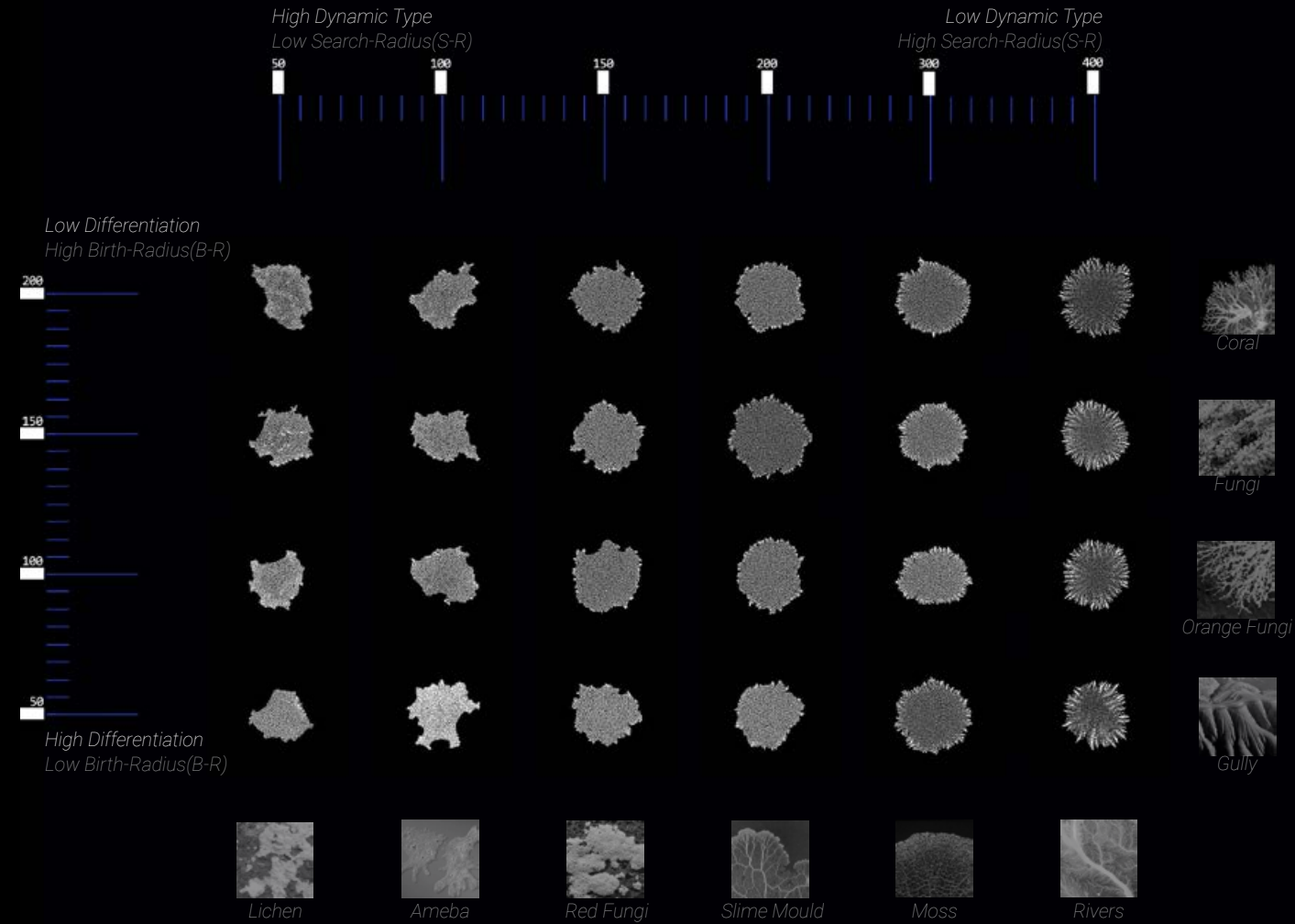


2017  
Personal Research  
Tech: C#



*This research extract basic behaviors of several prototypes, to construct a comprehensive model - Self-Organizing. By changing variables - portion of behavior, environment information and colony distributions, various form is produced. In results we can see different feature of original models, and adapt them to different context.*

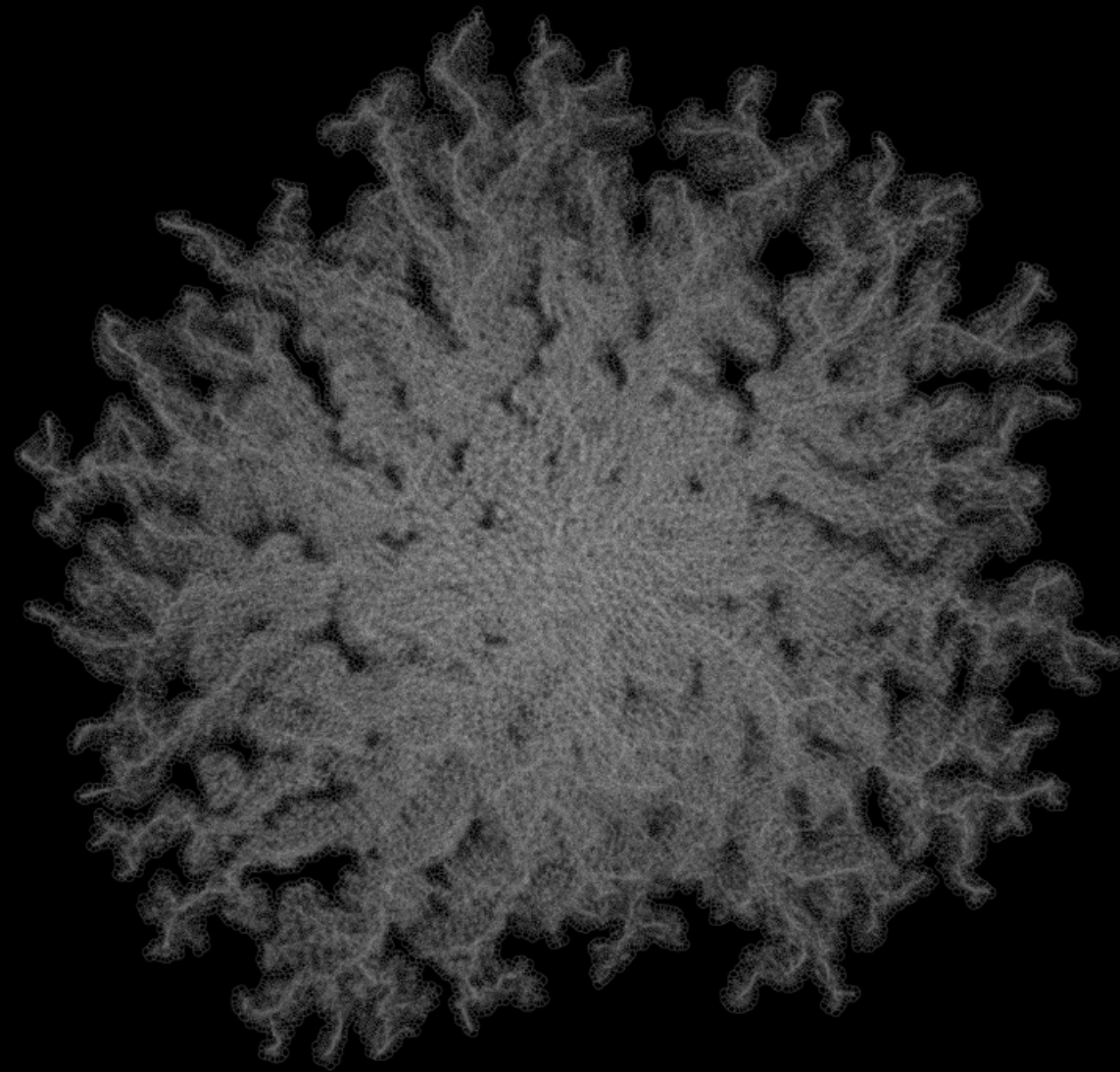
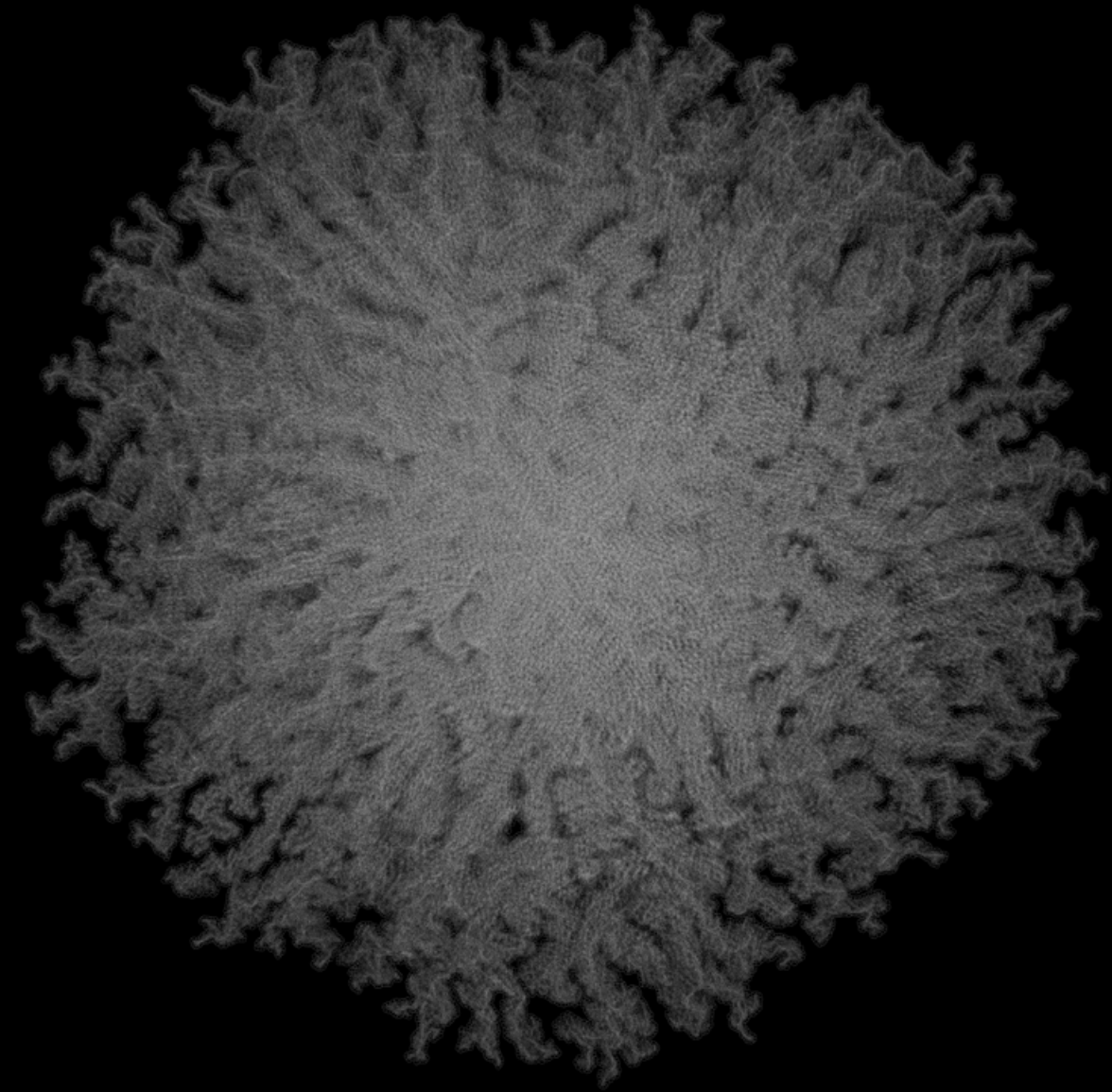
# ENVIRONMENT as a variable



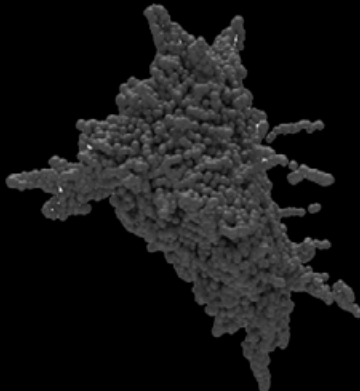
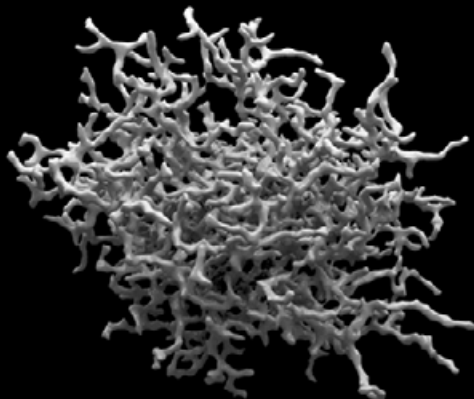
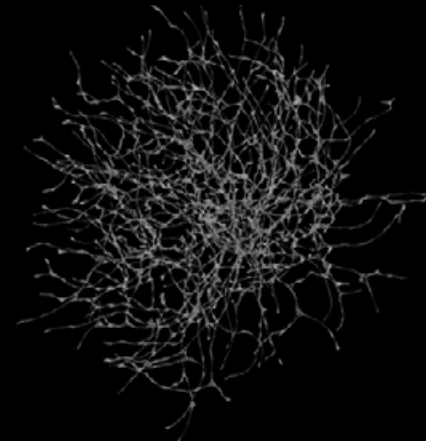
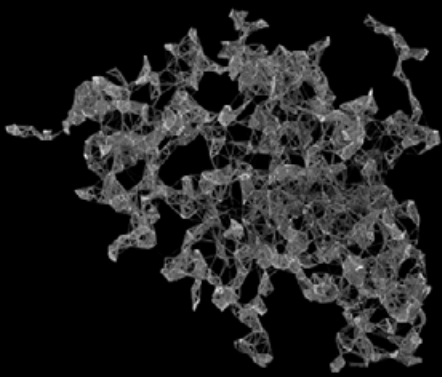
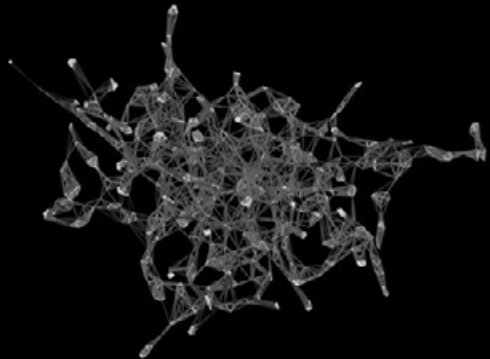
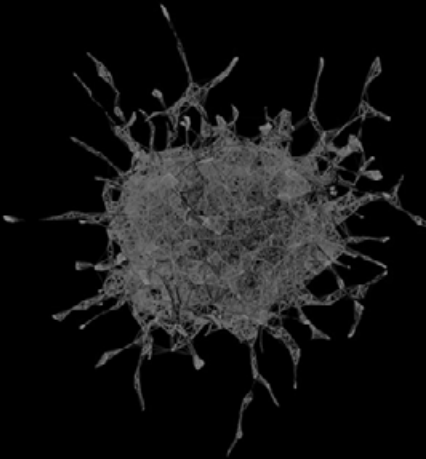
According to portion of behavior, the system will show more feature of a specific prototype.

# Behavior Portion Control

By changing variables of environment, the system shows intelligence and responds to surrounding, adapting themselves to field and environment.

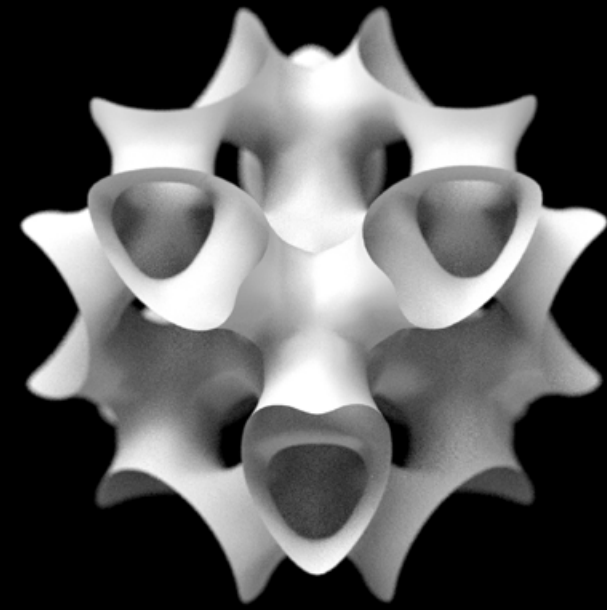


**Self-Organizing 3D - Variations of System**

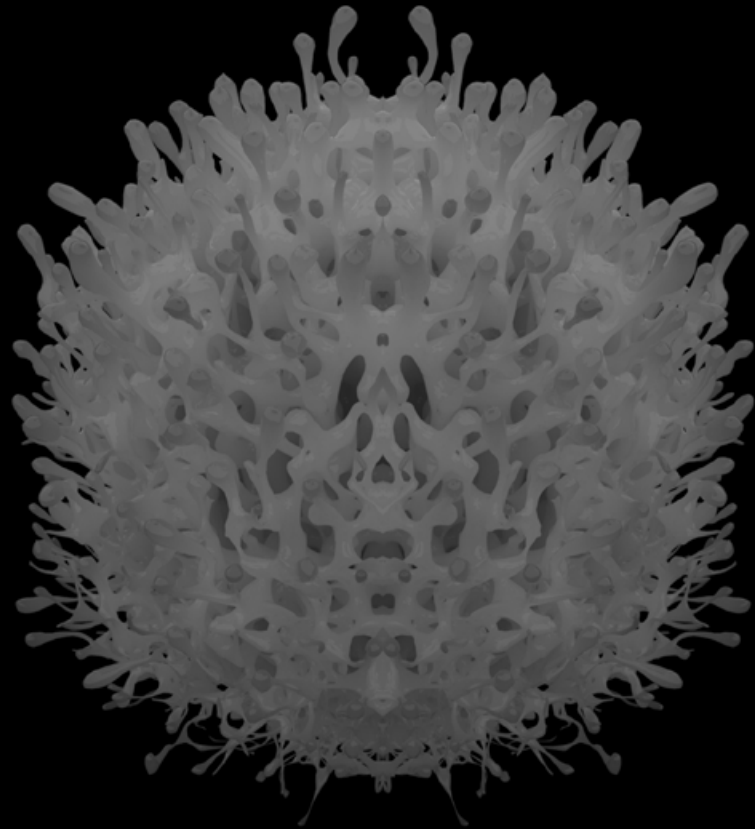


# Method Researches

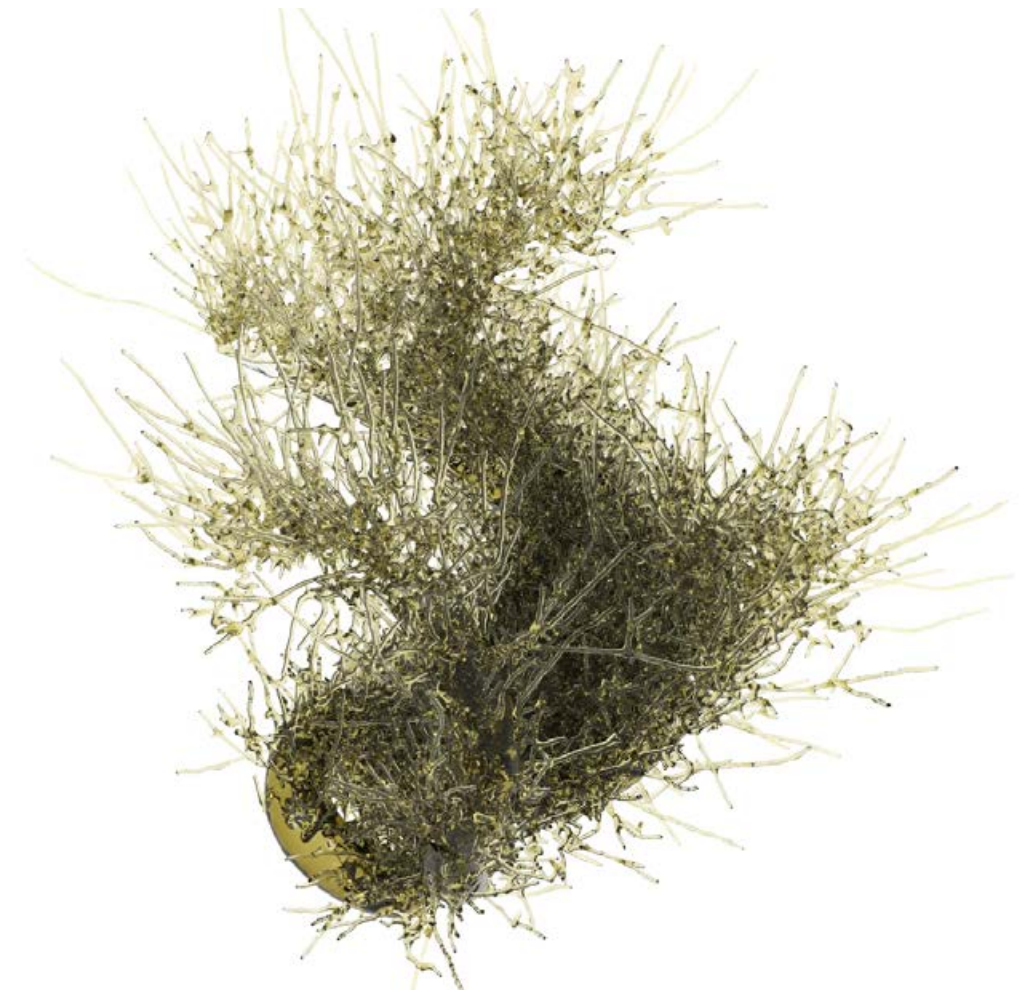
**2015-2020**  
**Personal Research**  
**Tech: Varies**



**2015 / Mininal Surface Study**

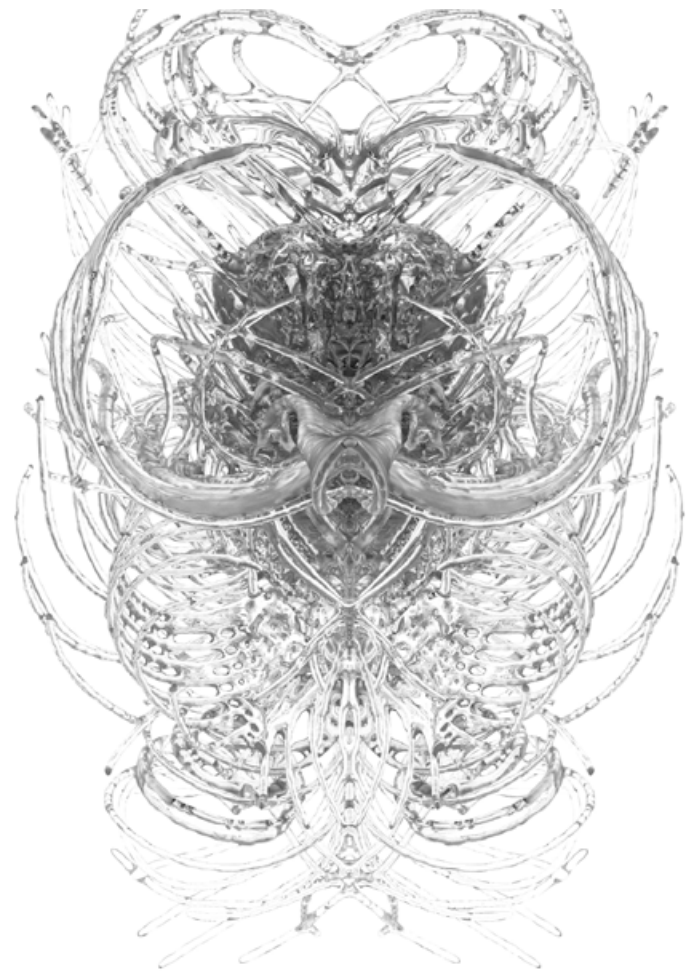


**2017 / Particle Aggregation System**

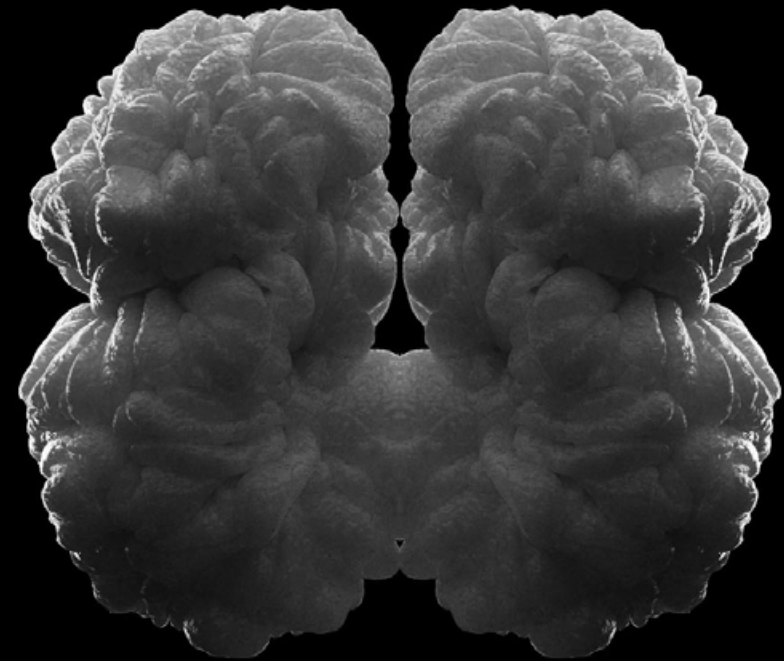


**2018 / Diffusion Limited Aggregation**

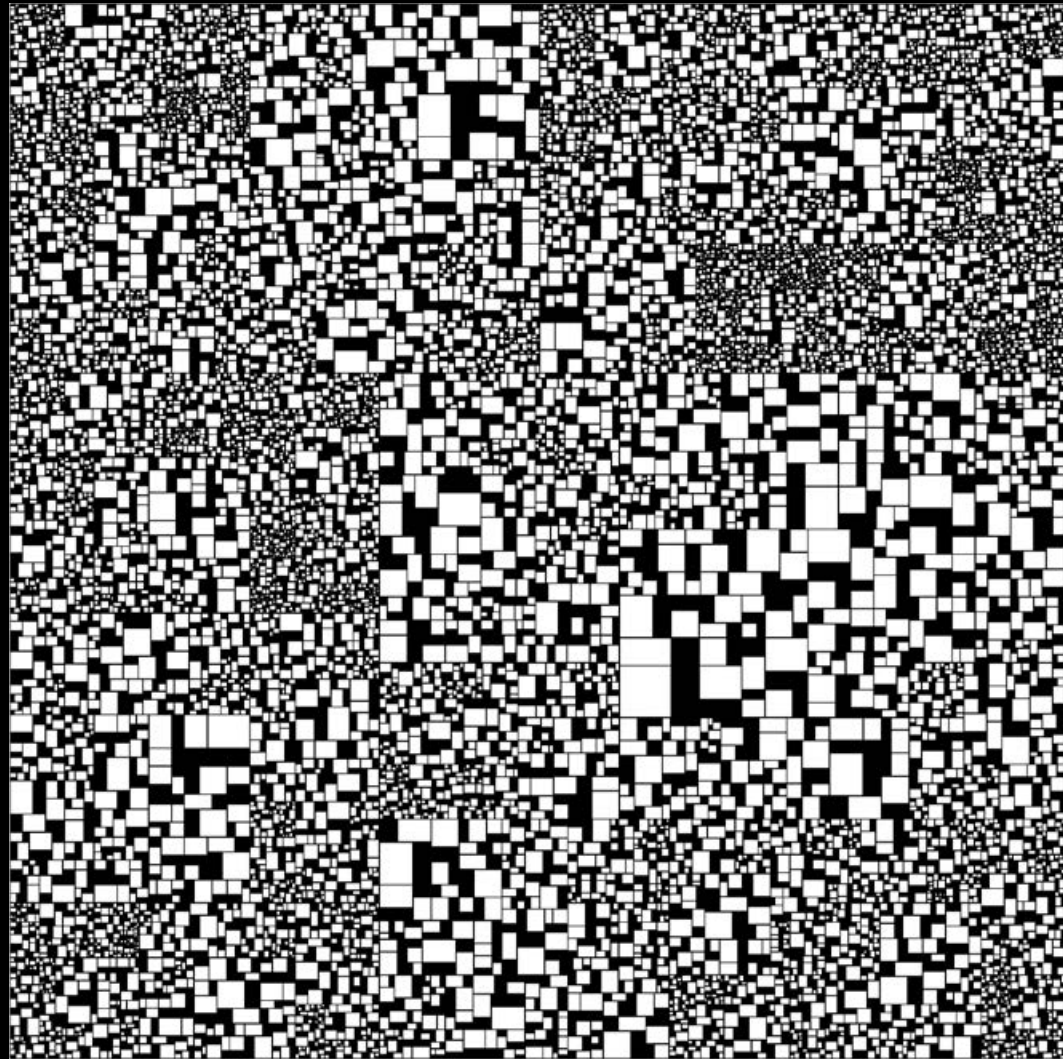




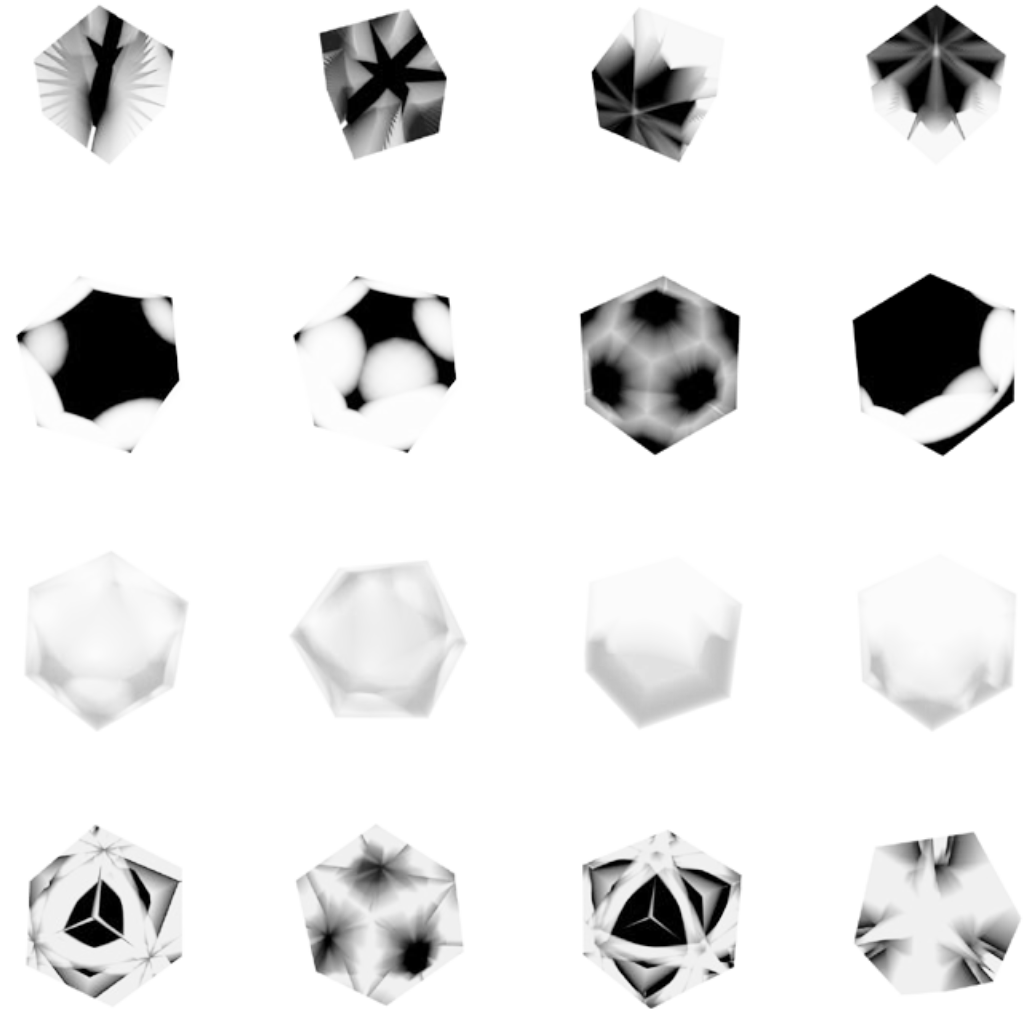
**2018 / Field Curve**



**2018 / Differential Growth**



2019 / KD Tree



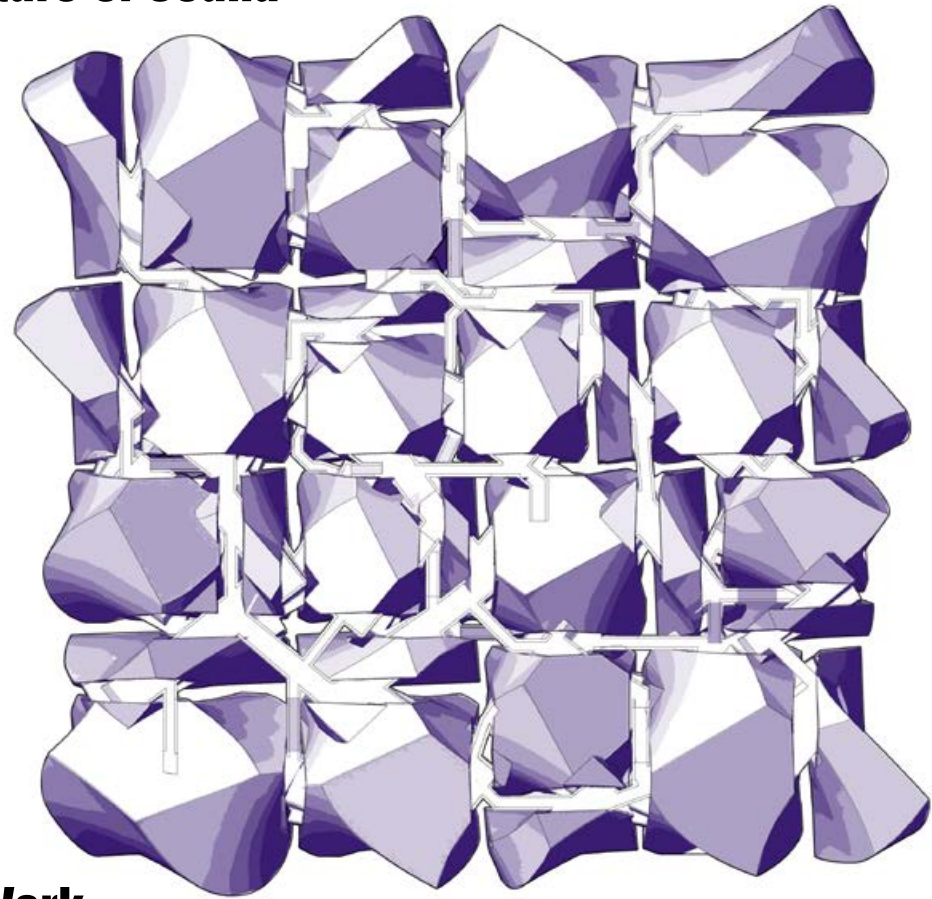
2019 / Volume Depth Fog



E X P E R I M E N T A L

# GAP+

## an Architecture of Sound



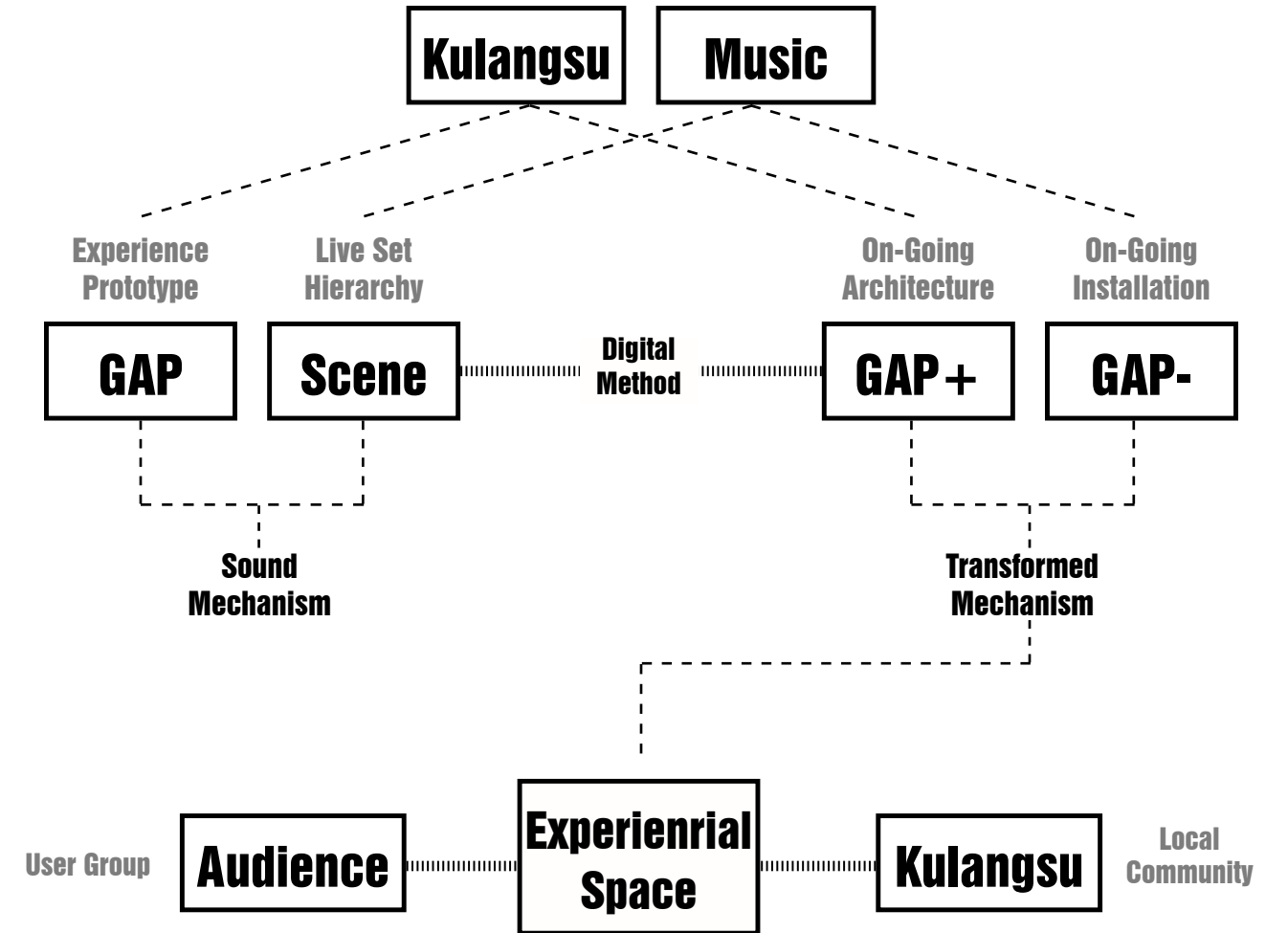
2019

Individual Work

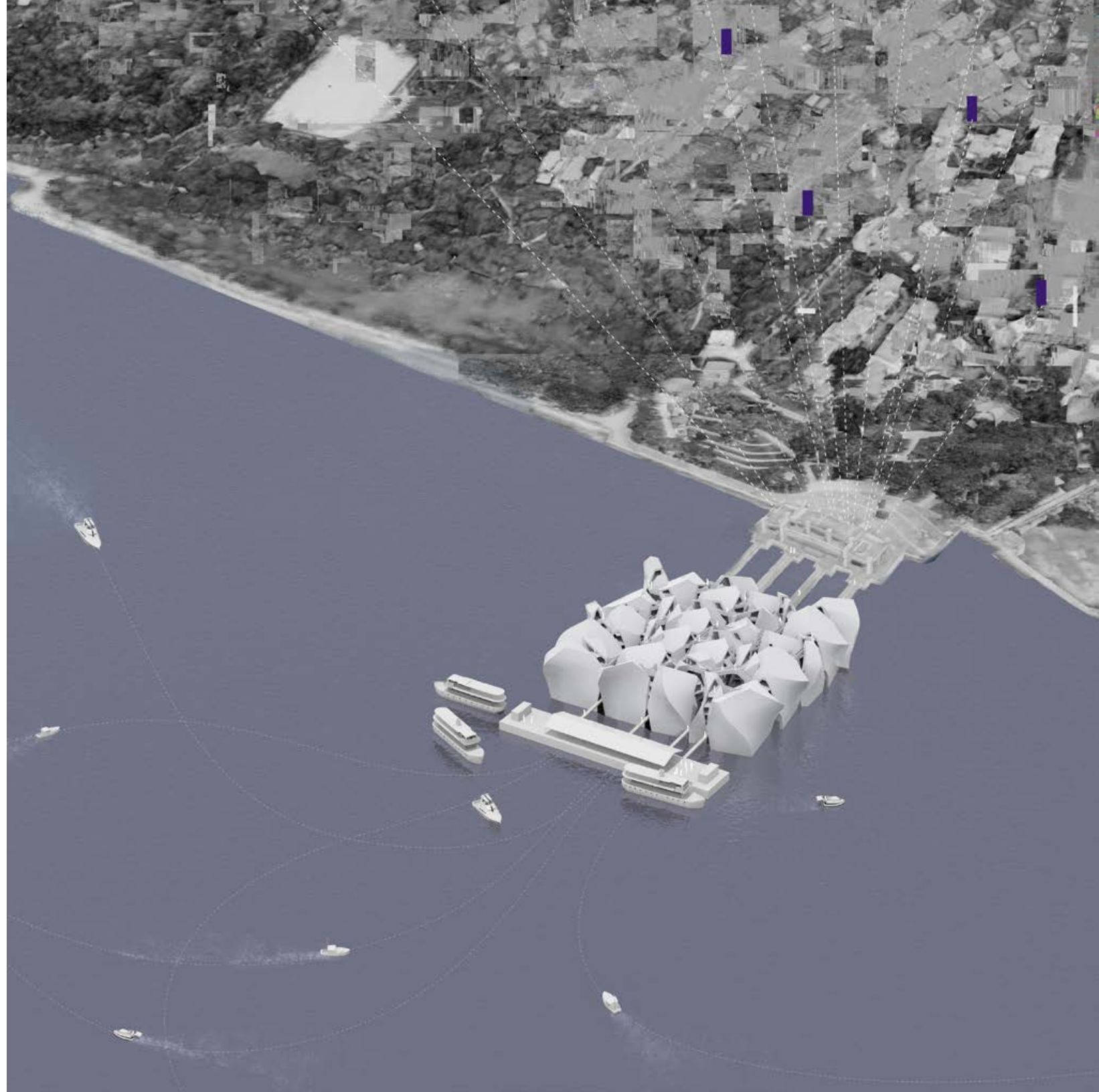
Instructor: Yufang Zhou, Wendong Wang, Zigeng Wang, Huanyu Wang

Wang

Tech: Varies



*This project explores the mixing mechanism of soundscape.  
By abstracting personal experience in GAPs on Kulangsu as a prototype  
the hierarchy and mechanism of soundscape on Kulangsu is deconstructed and re-composed  
with the structure of "Scene" in Live Set (Electronic Music) and digital method  
I transformed it into an architecture of sound  
to generate two parts - GAP+ and GAP-  
They both are, wandering projection out of Kulangsu  
Thus, a transformed experience is produced to link "here" and "there".*

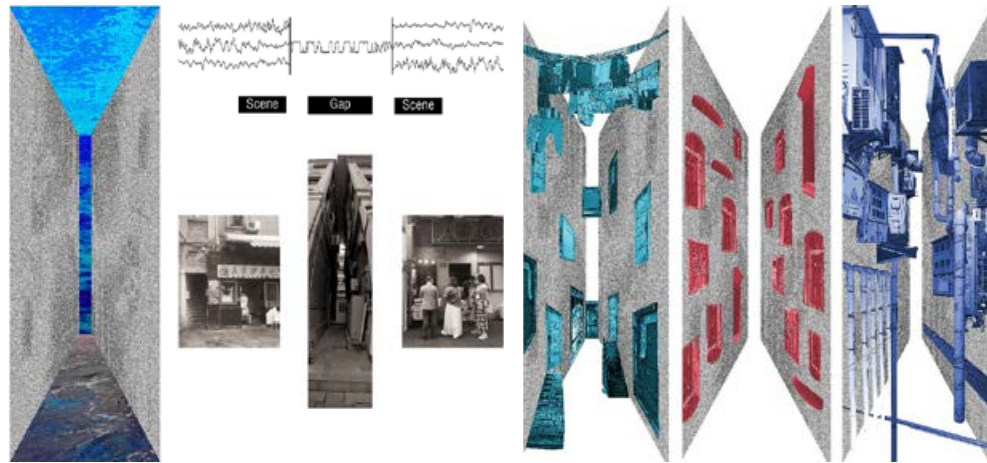


# #1 GAP - The prototype



## Kulangsu, an island of GAPS.

As you walk through the GAP, sounds fade in, and out. Spaces are connected ambiguously.

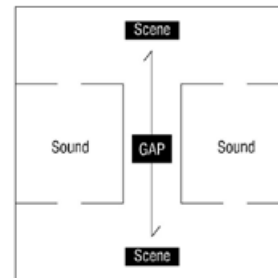


### GAP - outside

The GAP is a filter, compressor and mixer of soundscape. It is the intersection of different scenes, a devisualized aural structure.

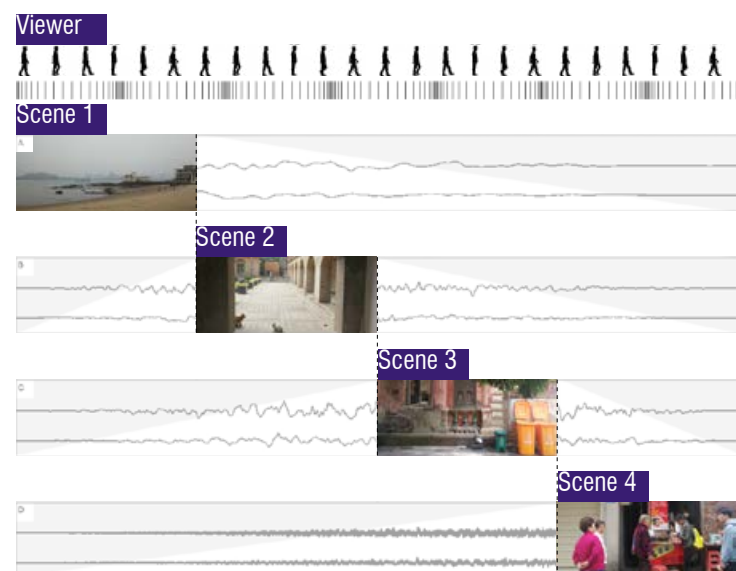
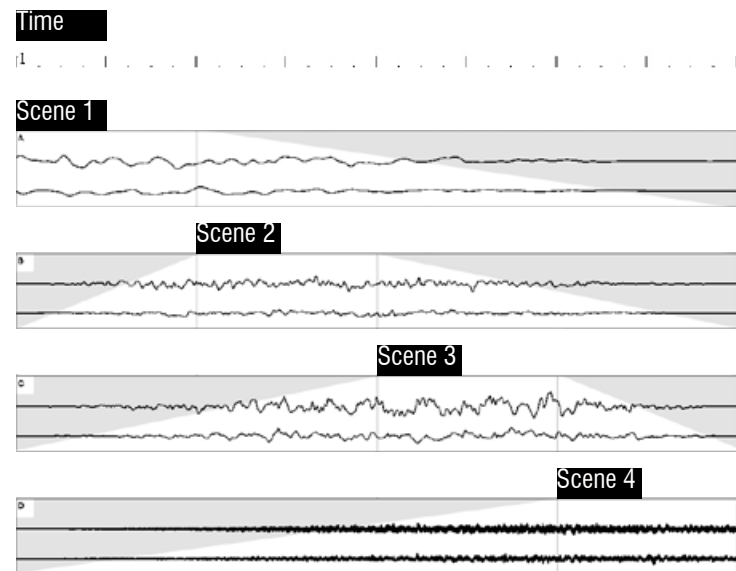
### GAP - inside

The space inside GAP, which holds piles of infrastructures, machines and data streams, is the most sophisticated element inside the gigantic sound machine of commercial Kulangsu.



**As a medium of sound mixing  
can GAP generate new aural space?  
What is connected and divided by GAPS?**

# #2 Scene - Hierarchy



## Scene - Live Set

*Real-time and cyclical - by going through looping scenes of clips, the ambient of live-set is rendered to move forward.*

## Scene - Kulangsu Set

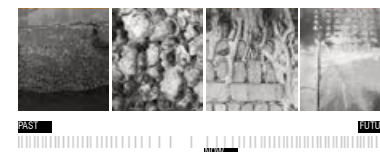
*When we walk through GAPs, we walk through on-going scenes and ambiances.*

*The GAP is the key part of mixing.*

*Our experience replaced time, becoming the live set storyline of Kulangsu*

**As a structure of Live Set, can SCENE produce an "on-going" space?**

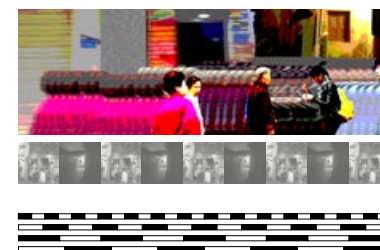
## Kulangsu of Past



*Whatever the past or future is, whatever lived and died on this island. History has past, the space just goes on, as a non-*

## Kulangsu of Happening

*It is the enormous "now" composed Kulangsu.*



**Museum of Past?**

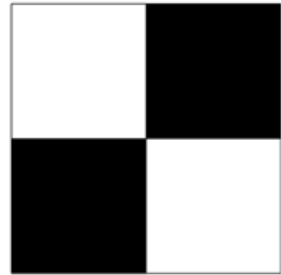
**Exhibited Piano that nobody plays**

## Museum of Happening?

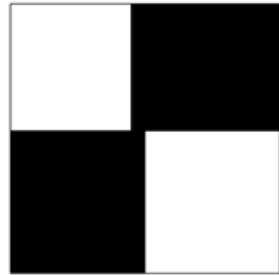


**Performed Kulangsu that everybody plays!**

# #3 GAP + Architecture of Sound



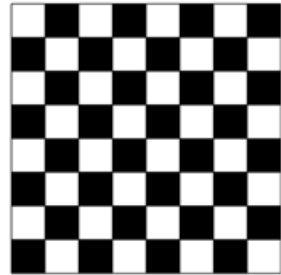
Iteration:2  
Deviation:0.01



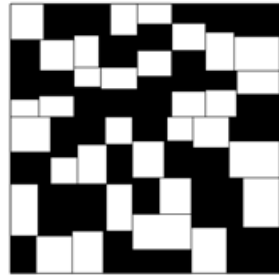
Iteration:2  
Deviation:0.2



Iteration:2  
Deviation:0.5



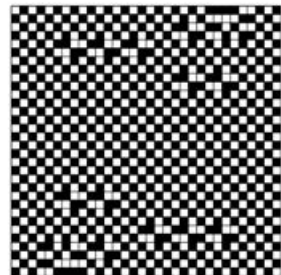
Iteration:6  
Deviation:0.01



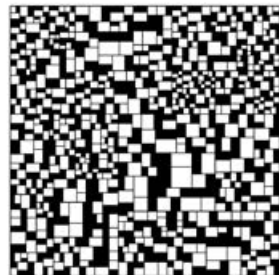
Iteration:6  
Deviation:0.2



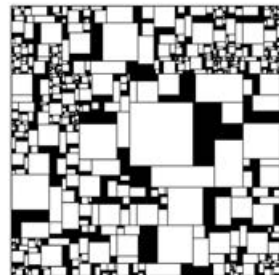
Iteration:6  
Deviation:0.5



Iteration:10  
Deviation:0.01

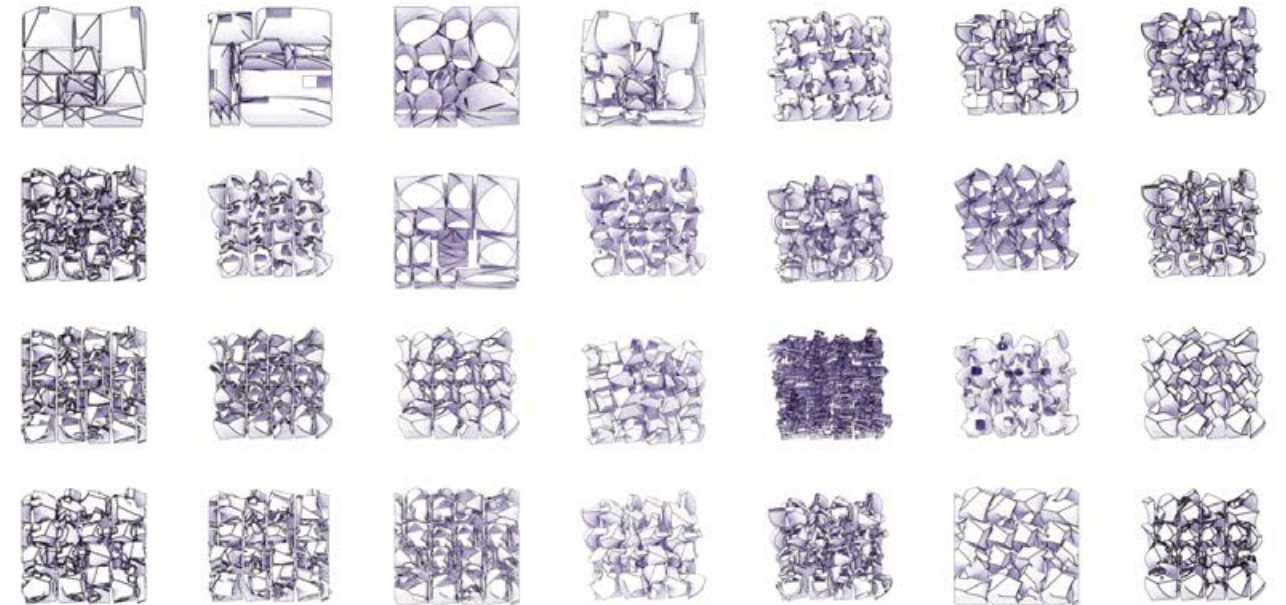


Iteration:10  
Deviation:0.2



Iteration:10  
Deviation:0.5

## Urban space - Binary Pattern - Algorithm

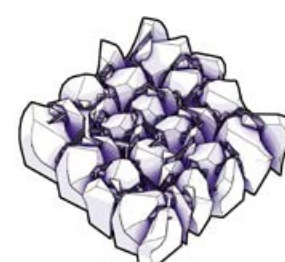
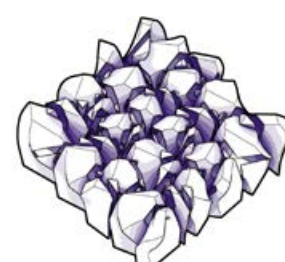
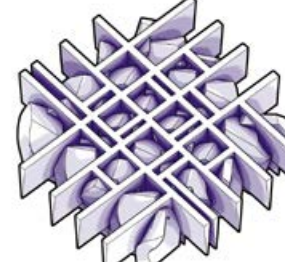
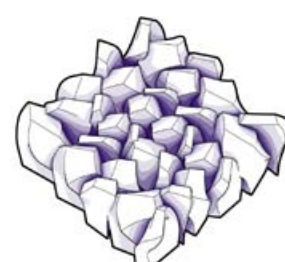
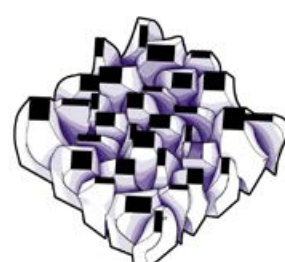
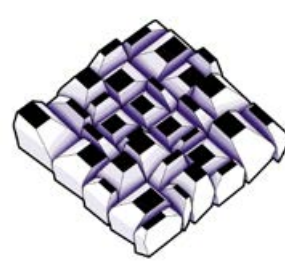
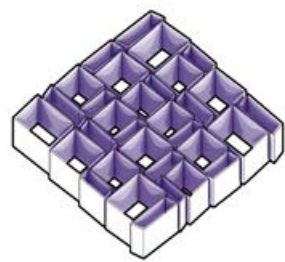
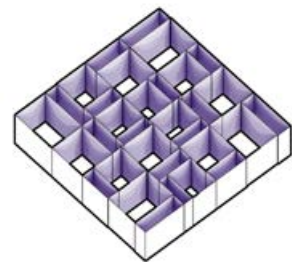
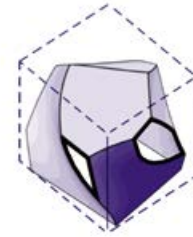
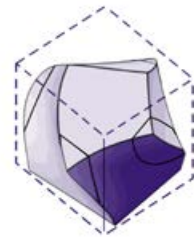
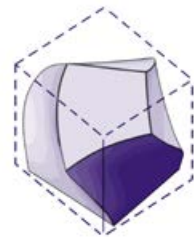
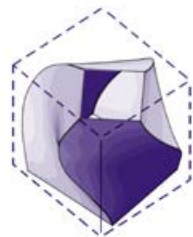
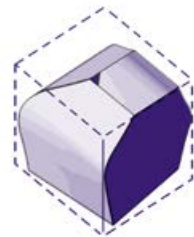
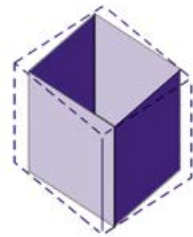


The K-D Tree, a type of Binary system is used for generating binary space system of diversified and controlled hierarchy a space consists of GAPS - a microcosm of Kulangsu.



## Generative Binary Space

*By overlapping the twisted grid with the original grid, a complex system of holes and tunnels is generated. From bottom to the top, single spaces are gradually open and mixed together.*



*KD  
Original Grid*

*DisPlace  
Form the GAP*

*Shape  
Vision Details*

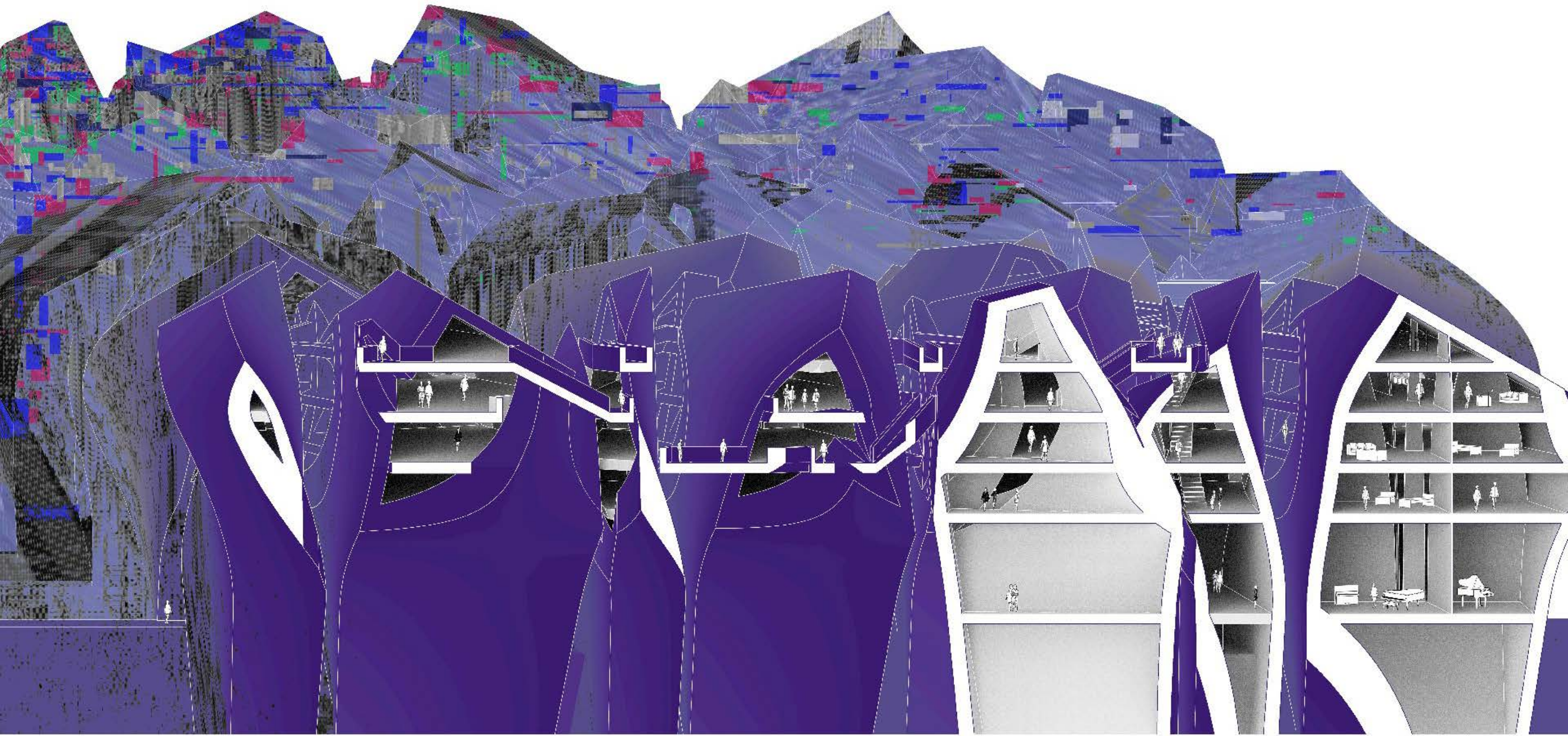
*Rotate  
Negative Intersection*

*Tilt  
Roof Space*

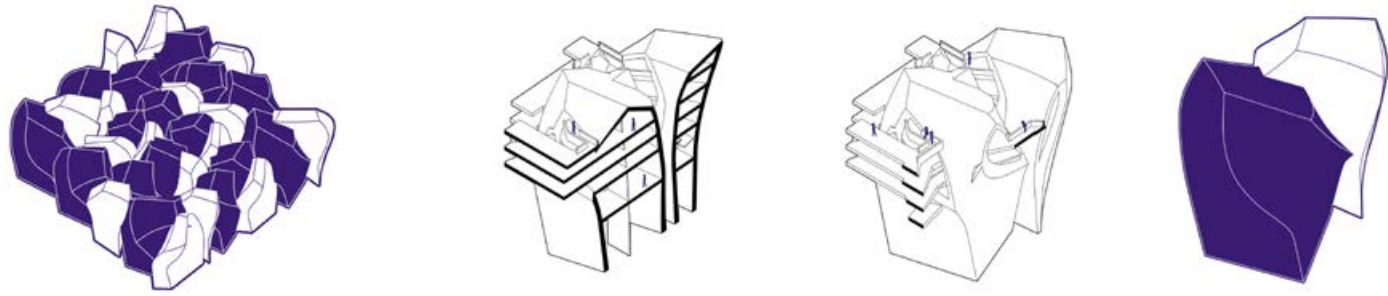
*Overlap  
with Original*

*Cut  
by Original*

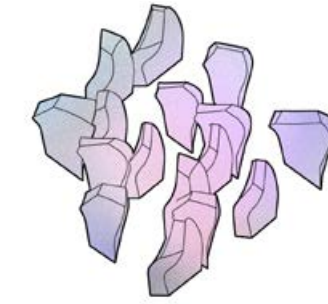
*Cut  
by Original*



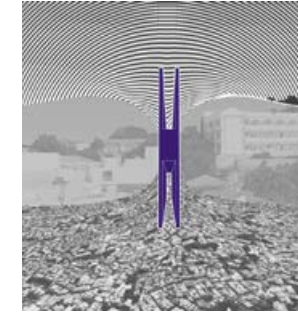
# 16 Instrument + 16 Sampler



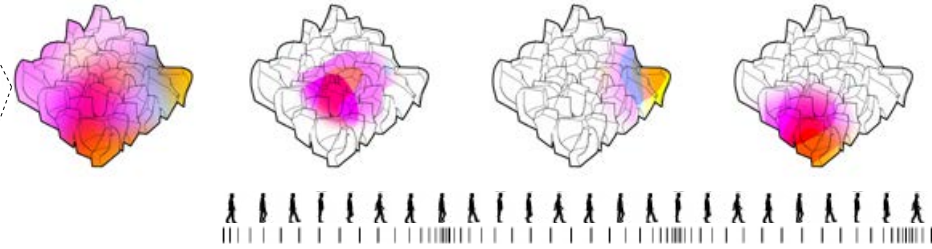
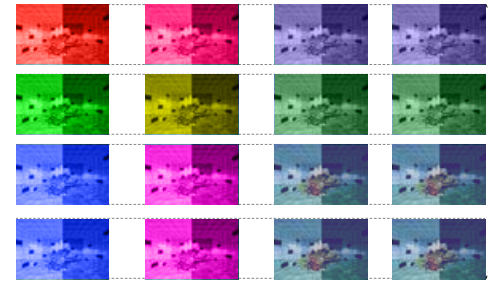
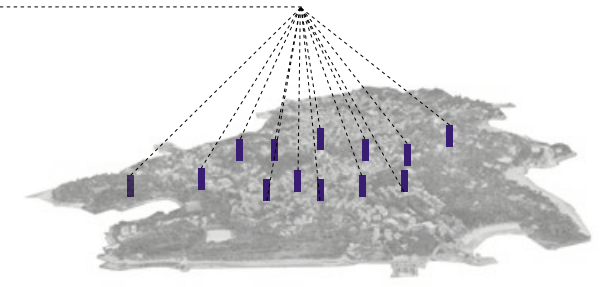
**Sound Unit** ..... **Sampler**



Staircase



Sample from GAPs



# Group of Scene

Walk through GAP+  
We walk through a Live Set!



Texture - aural attributes

**Instrument Unit** ..... **Sequencer**

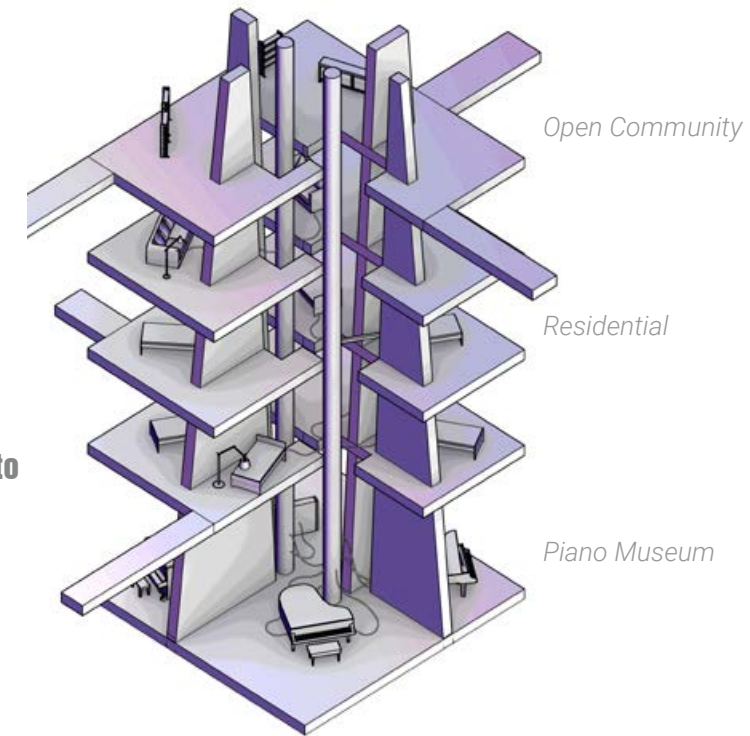


Community Space



Tempo

Residents Trigger Auto Notes



# Residents Triggered the Space, and Nver Stop!

## Inside GAP

Attracting  
Crossing the GAP



Bottom-Plan Mix: Low



## Enter

Through holes on GAP  
user step into interior



Mid-Plan Mix: Mid

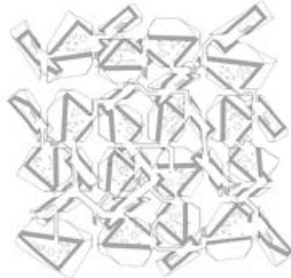


## Rise

As you rise, up to rooftop  
The space opens gradually  
Sound becomes

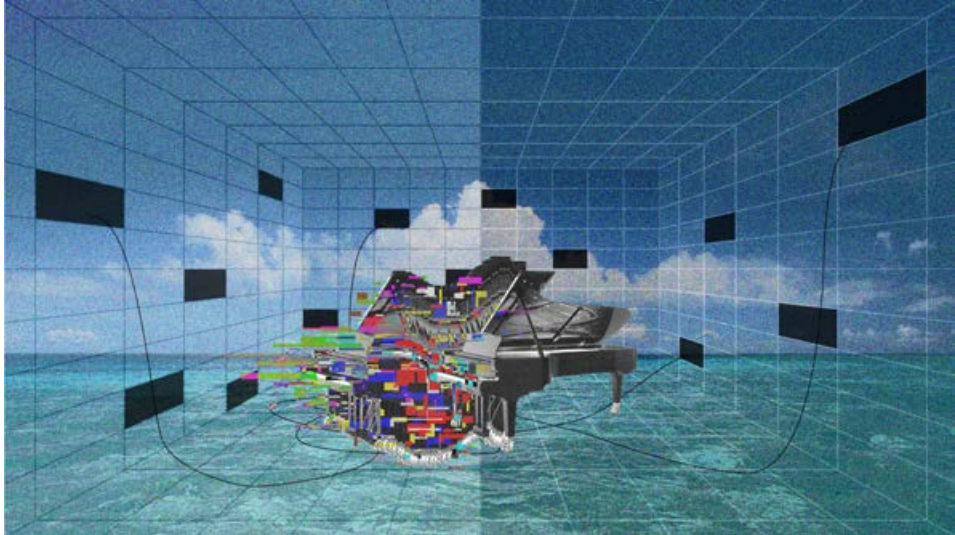


Top-Plan Mix: High

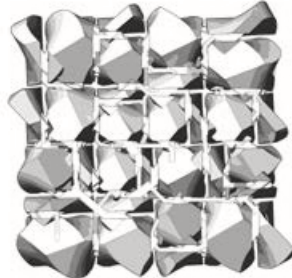


## Join

Unit Space is awaiting



Top - Open Roof

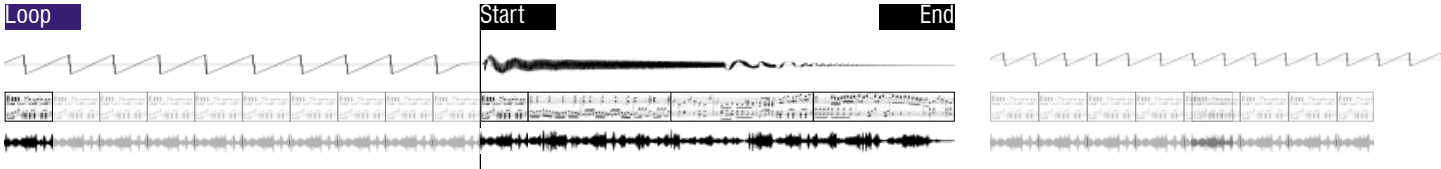


## Trigger

New residents can automatically take  
part in the performance.

## Back to Loop

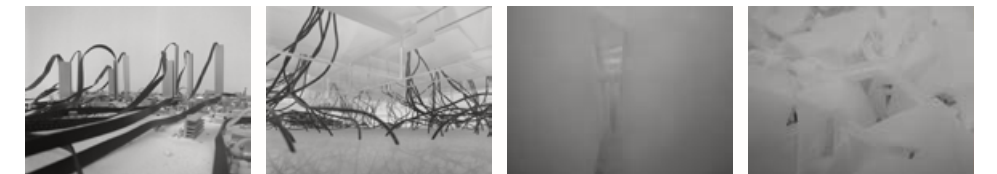
The museum is a live space triggered  
by people. The live set of Kulangsu never  
stop, as there is still tourist.



## #4 GAP- Installation of Sound



another derivative wandering out of Kulangsu  
an interface between audiences and Kulangsu



With sensors, it transforms space information to generate visual and sound. By collecting sound in Kulangsu, what we play on GAP- HERE, is connected to THEREs on Kulangsu.

By waving our palm, gigantic mixed sound from Kulangsu evolves from the gap behind. People experience Kulangsu from distant.



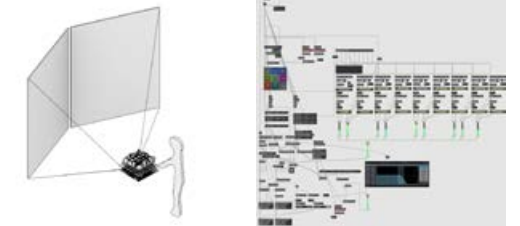
**Wave  
to start LiveSet!**



**Horizontal swipe  
to switch sound**



**Vertical move  
to compress/reverb/fx**



*In the coordinate of "GAP-", areas are distributed with specific ambience. As user moves, the composition is uniformed.*

**Music - midi controllers**



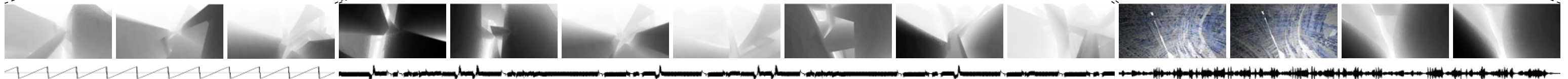
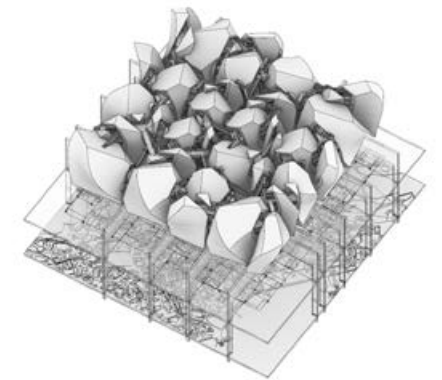
**SOUND** **Generate** **SPACE**

**Sound installation - GAP-**



**SPACE** **Generate** **SOUND**

*The GAP- controls the sound in an explicit-implicit way, rather than the implicit-explicit way of sound art/live set.*



# The Unknown City

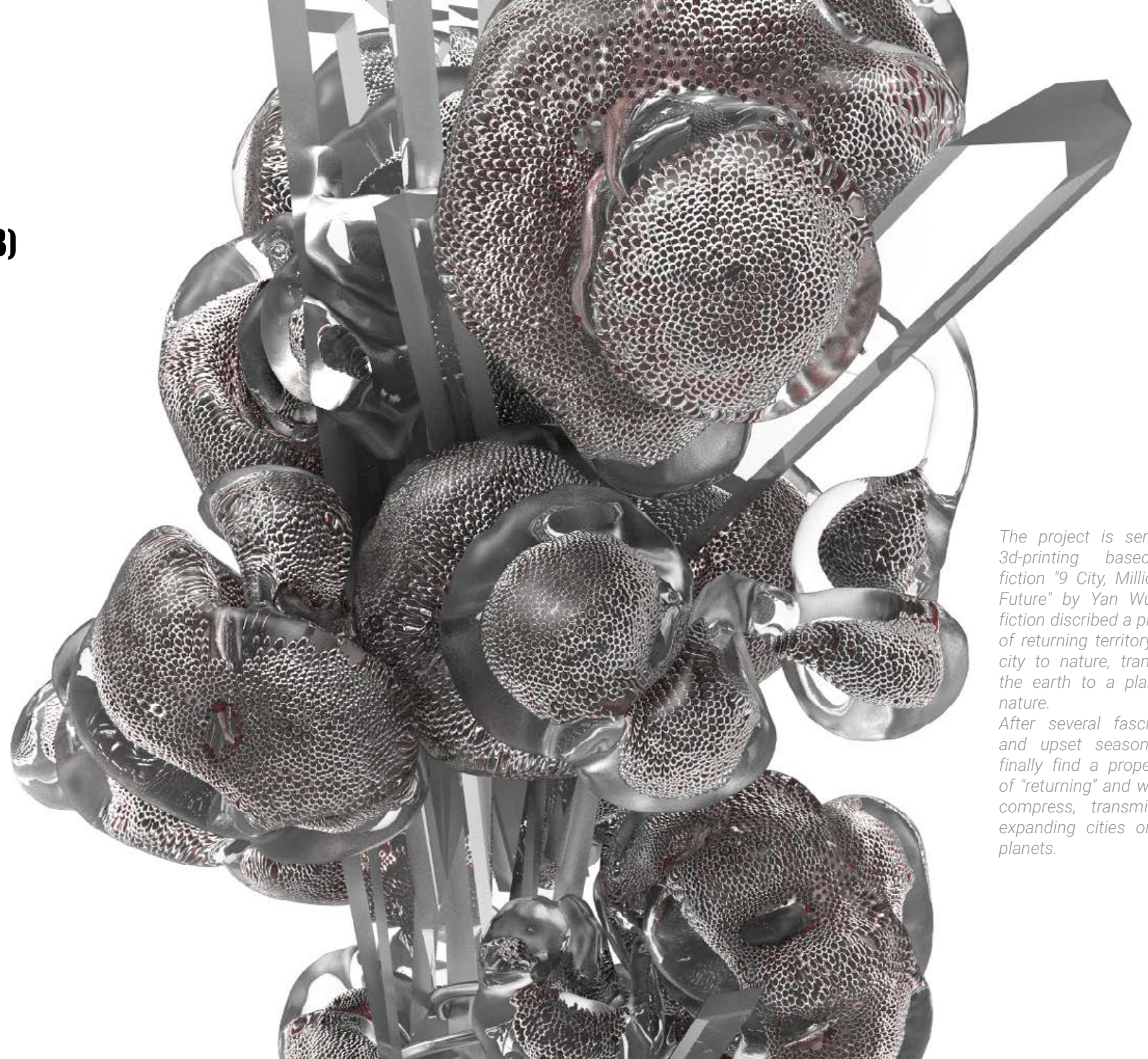
**2019 Shenzhen-Hongkong Urbanism Bi-City Binnale(UABB)**

**2019**

**Yufan Xie, Yan Wu, Yu Chen**

**Tech: C#, Grasshopper**

**Material: 3D Printing**



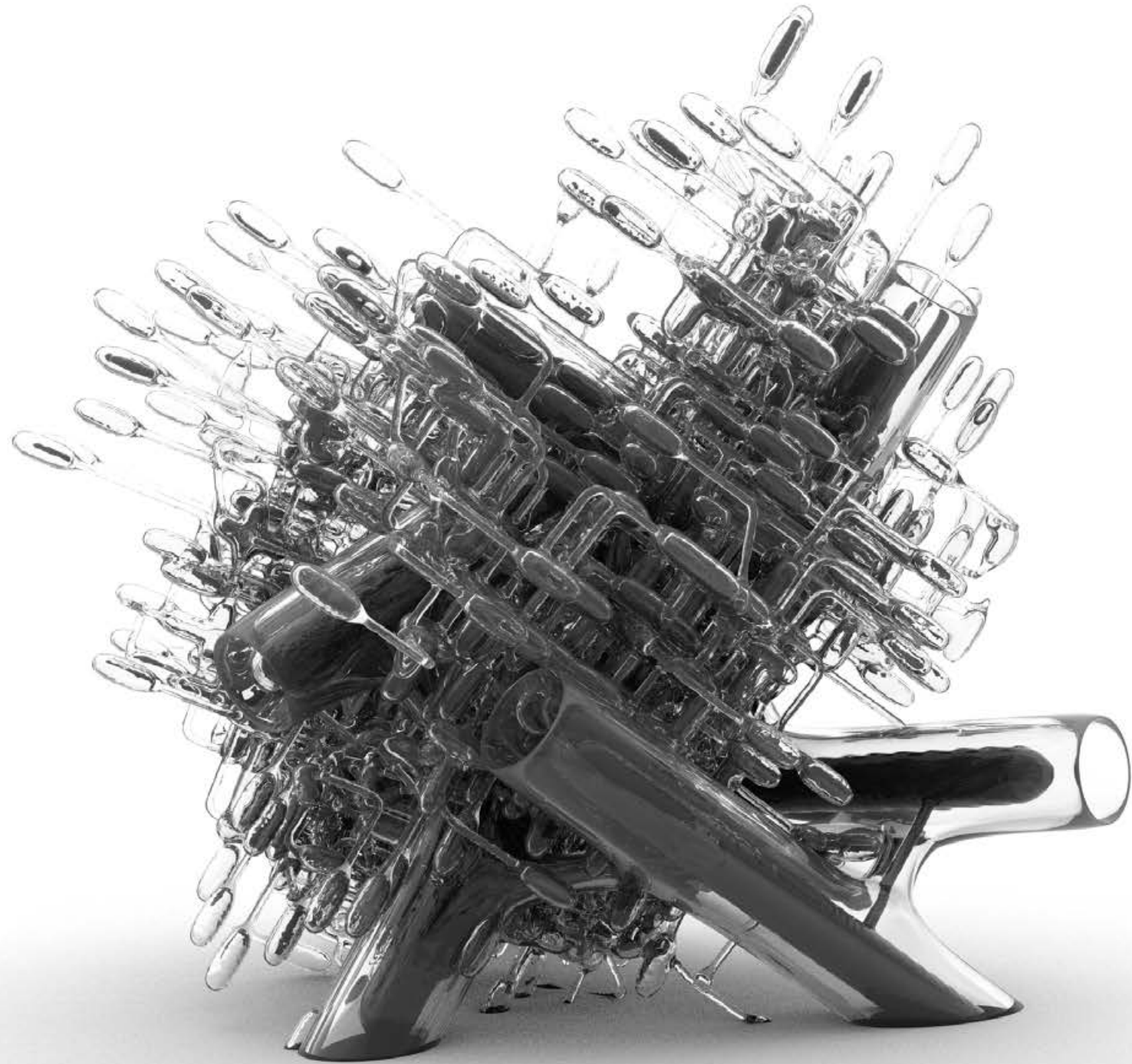
*The project is series of 3d-printing based on fiction "9 City, Millions of Future" by Yan Wu. The fiction discribed a process of returning territory from city to nature, transitting the earth to a planet of nature.*

*After several fascinating and upset seasons, we finally find a proper way of "returning" and ways to compress, transmit and expanding cities on new planets.*



## City of Tree

*In the future people find a method to build city with pipes and tunnels. Living space are arranged along tunnels, and expanded as green house. Pipes dive into underground to gain nutrition for the whole city.*

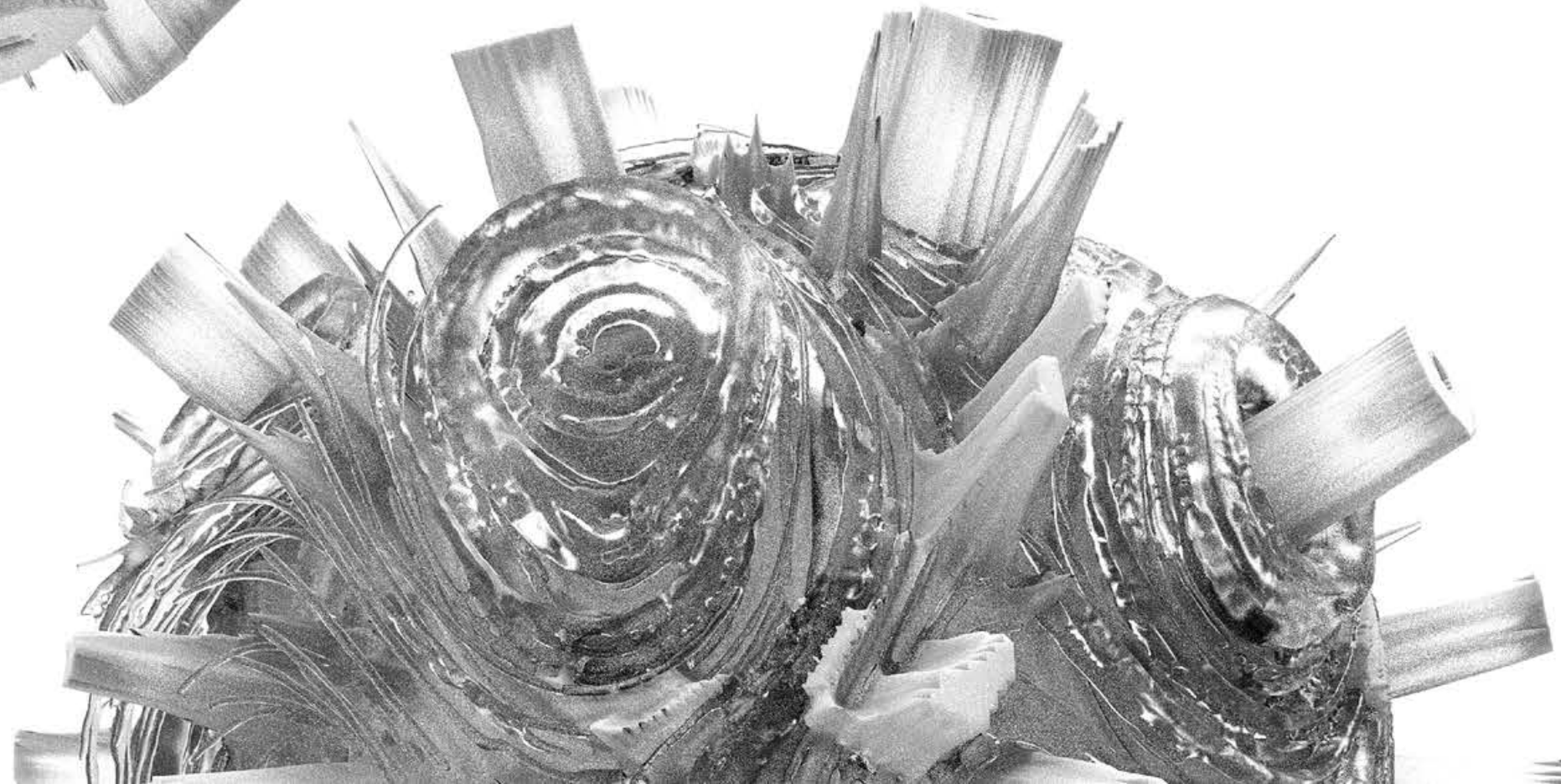
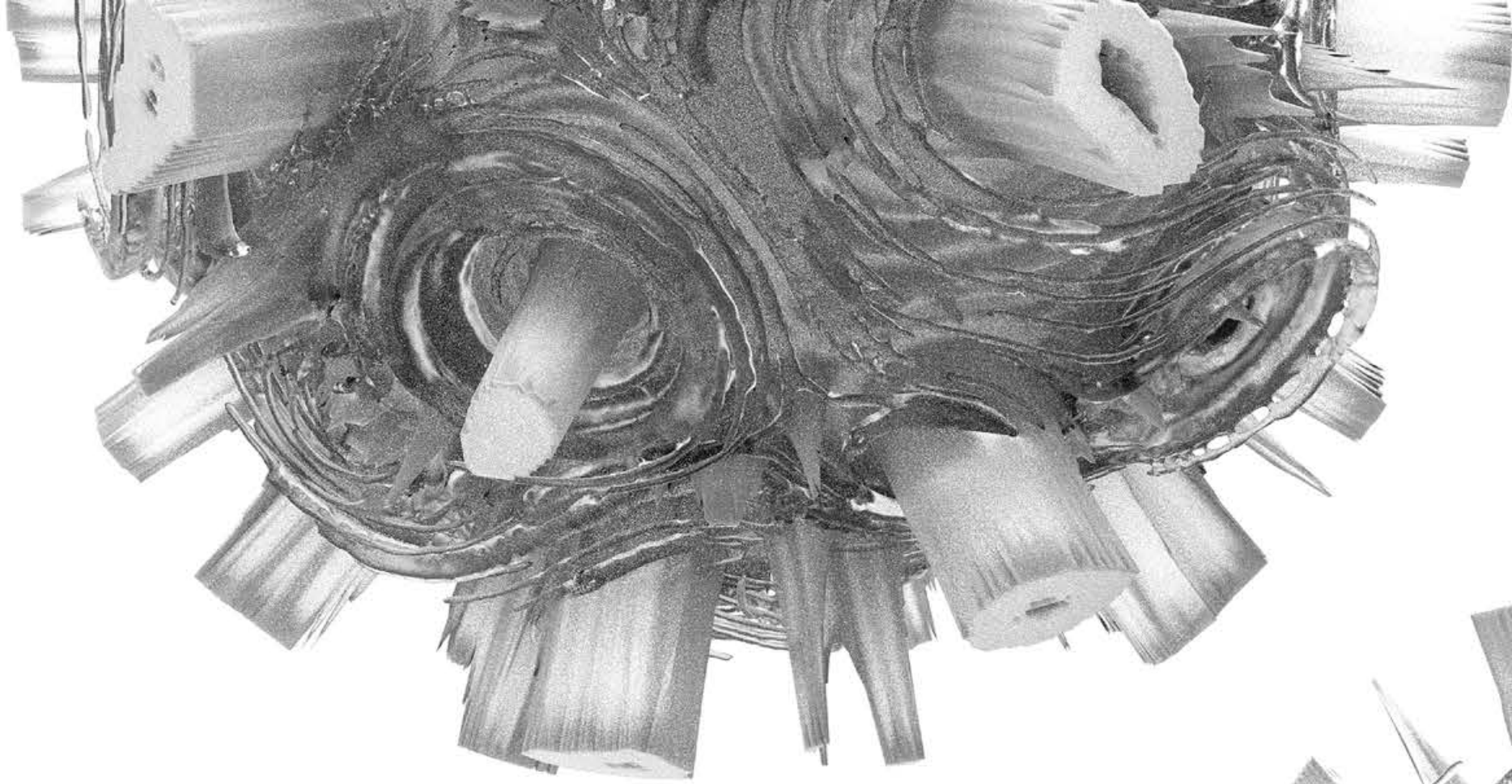




## Floating City



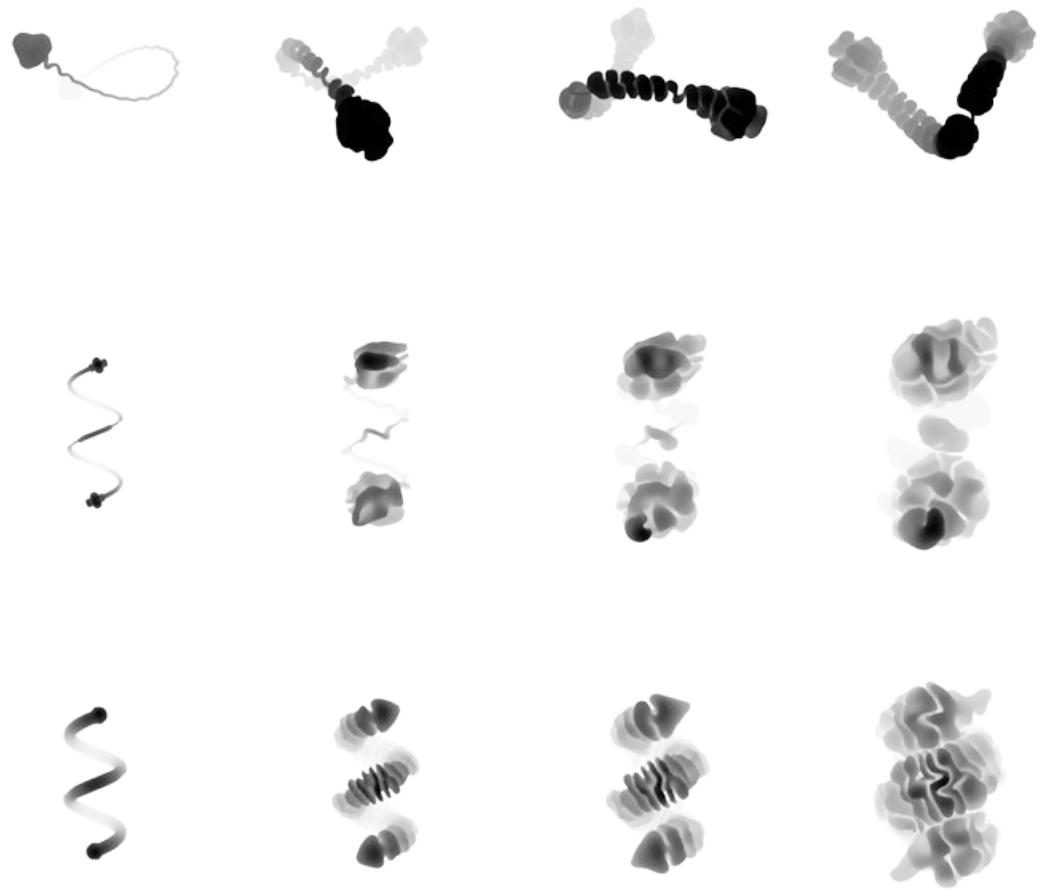
*City that runs like bird system around space elevators, with high mobility.*





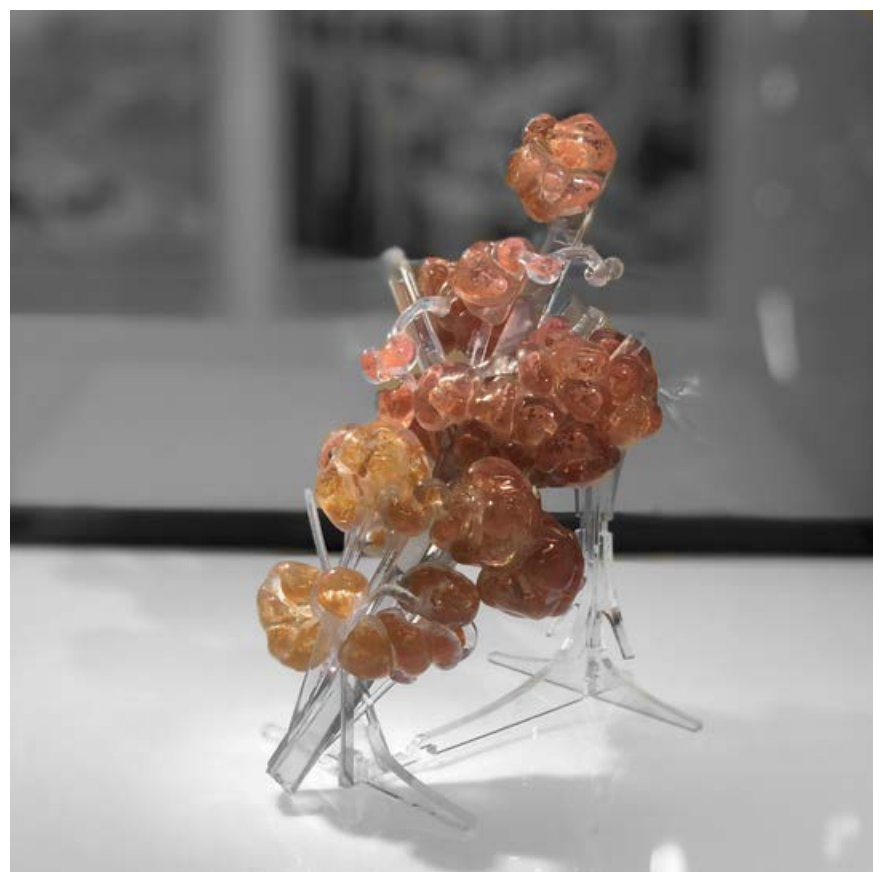
## **Symbiotic City**

*City built under the sea. In future, human find a way of co-living with deep-sea creatures. By sharing nutrition, the city runs as a symbiotic system.*



## Vertical City

*Self-organized high-density city along artificial spines. This method can achieve highest-utility in limited space, to solve residential problems.*





**Thank you for reading !**



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