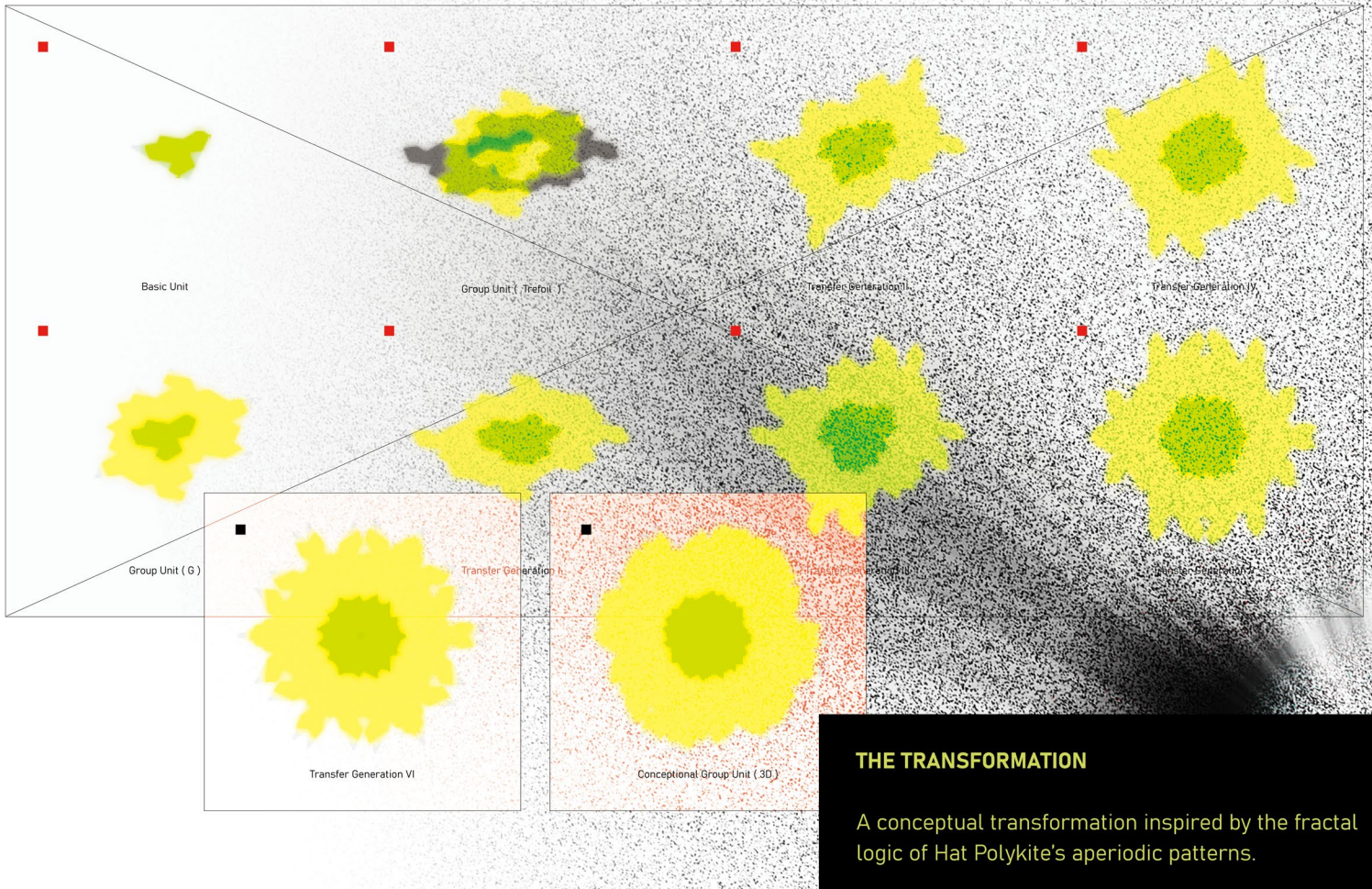




THE SPHERE
SERVICE MANUAL

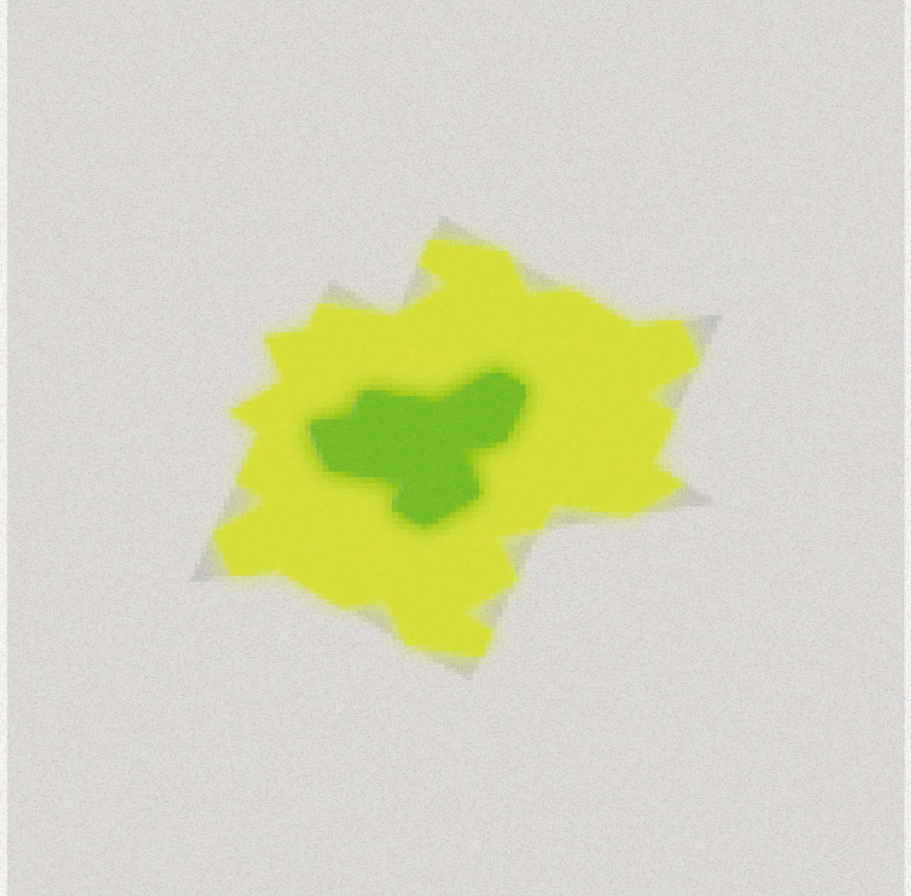
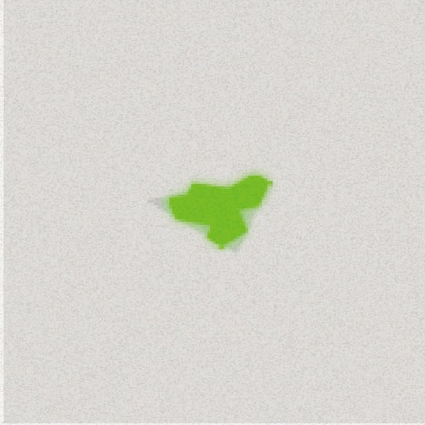


A conceptual transformation inspired by the fractal logic of Hat Polykite's aperiodic patterns.

It demonstrates how two-dimensional motifs transition into three-dimensional structures through a linear process of unit assembly, dual-surface deconstruction, and spatial formation.

The model serves as an exploration of the intrinsic logic behind Hat Polykite's composition.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	01
THE HAT POLIKITE TRANSFORMATION	GROUP UNIT (G)	

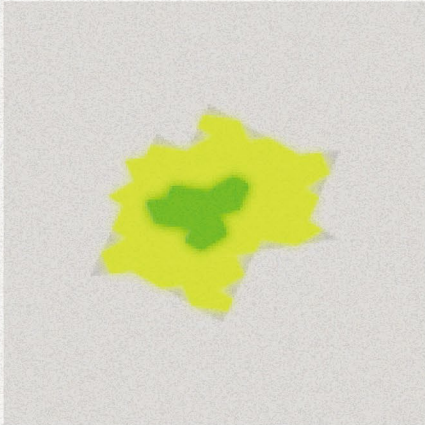


BASIC UNIT | LEFT

GROUP UNIT (G) | RIGHT

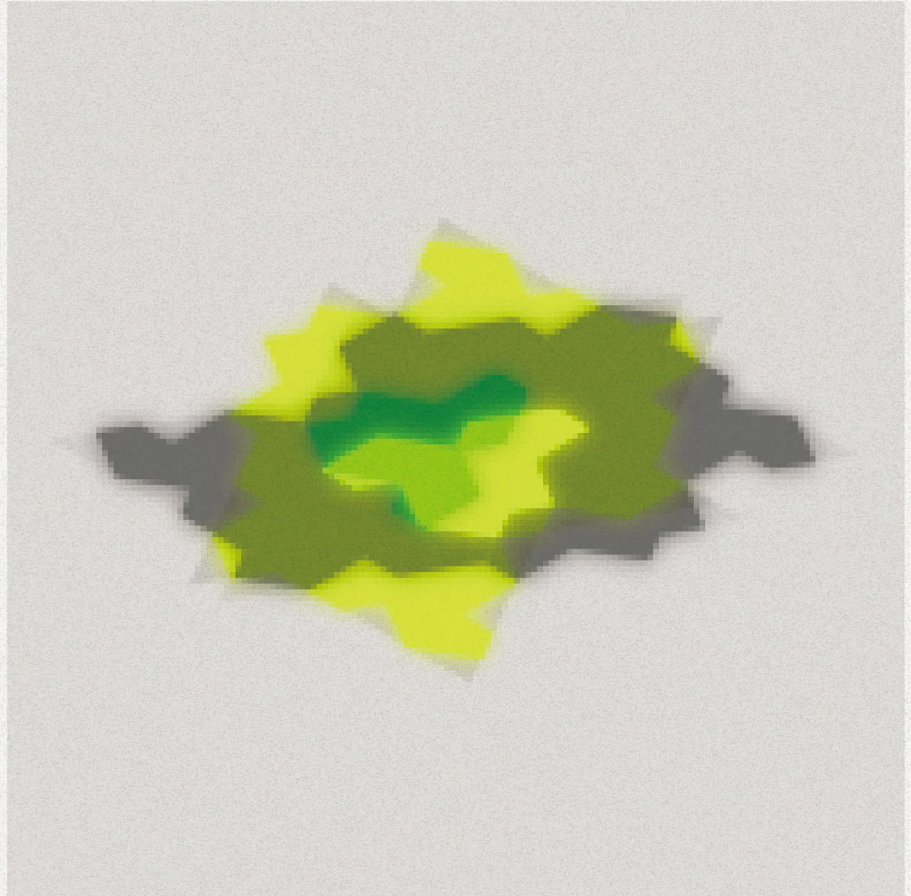
Transformation of the basic unit into a group unit.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	02
THE HAT POLIKITE TRANSFORMATION	GROUP UNIT (TREFOIL)	



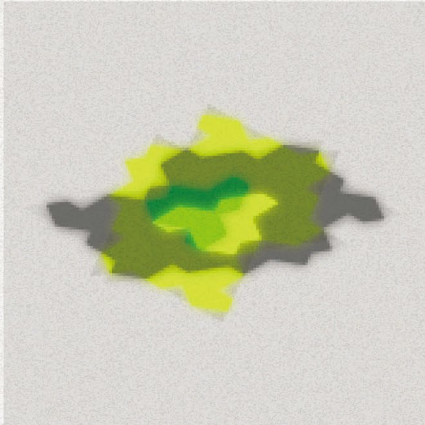
GROUP UNIT (G) | LEFT

GROUP UNIT (T) | RIGHT



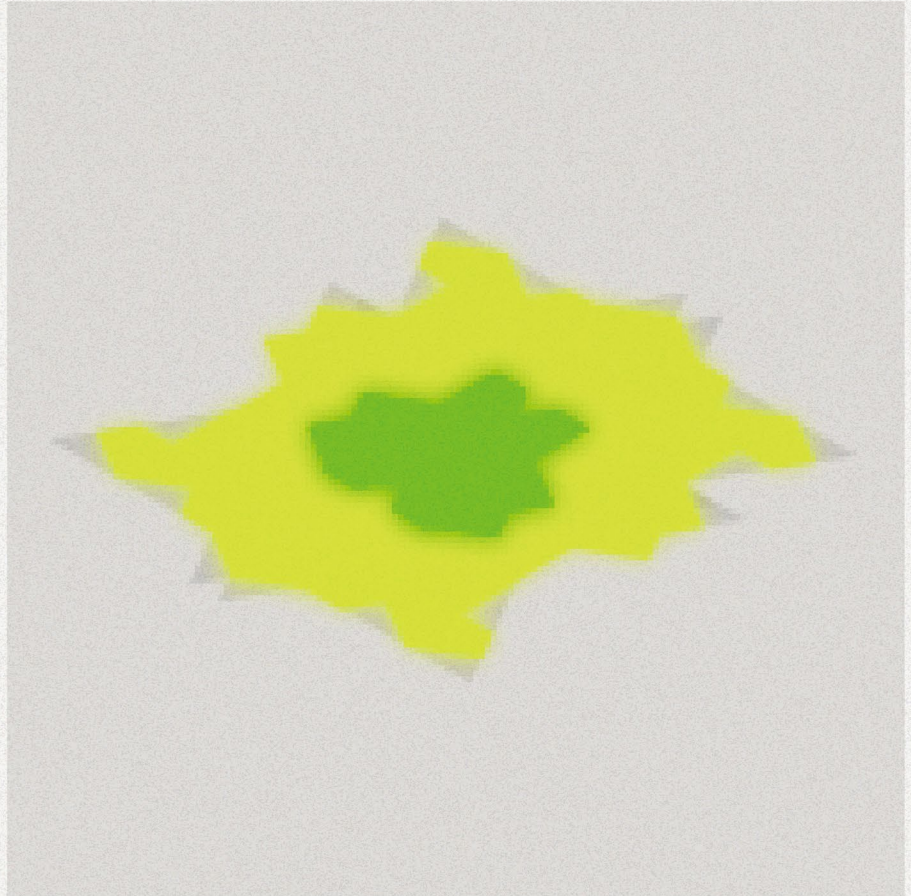
Addition of a mirrored group unit onto the original cluster.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	03
THE HAT POLIKITE TRANSFORMATION	GENERATION I	



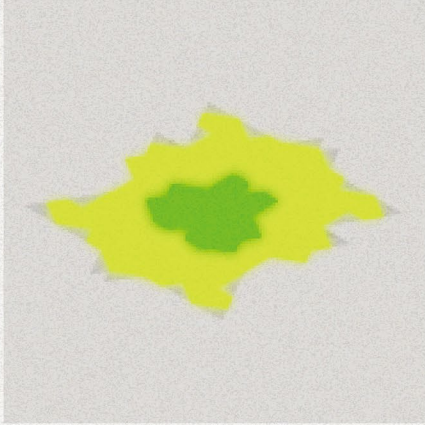
GROUP UNIT (T) | LEFT

GENERATION I | RIGHT

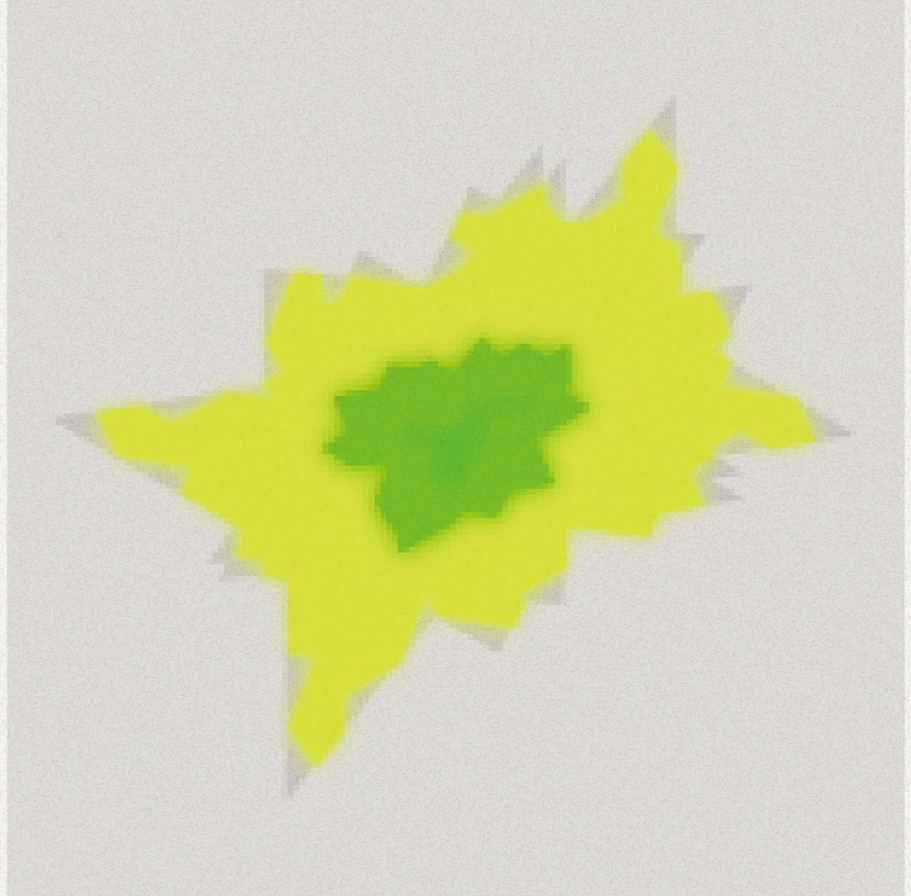


Formation of a planar unit with a dual-sided structure from two foundational group units.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	04
THE HAT POLIKITE TRANSFORMATION	GENERATION II	



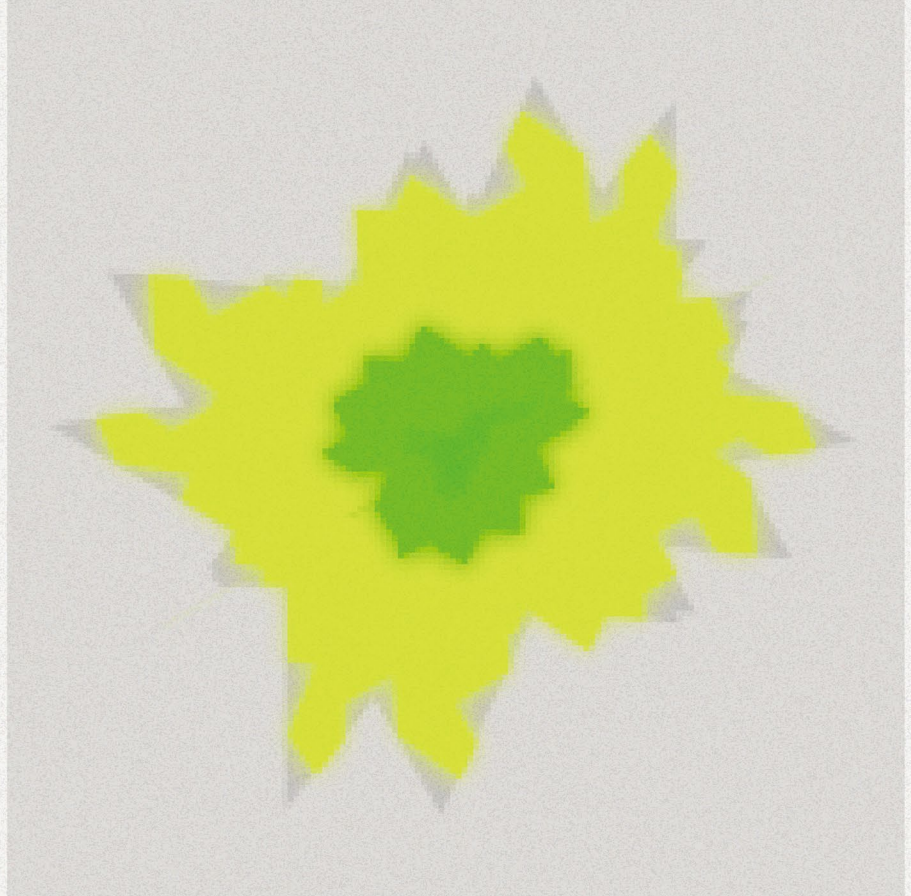
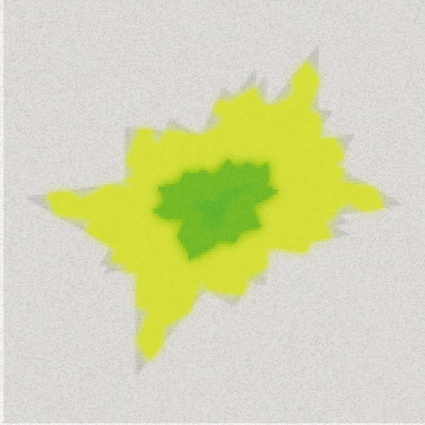
GENERATION I | LEFT



GENERATION II | RIGHT

Perform single-axis rotation on the planar unit to initiate three-dimensional formation.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	05
THE HAT POLIKITE TRANSFORMATION	GENERATION III	

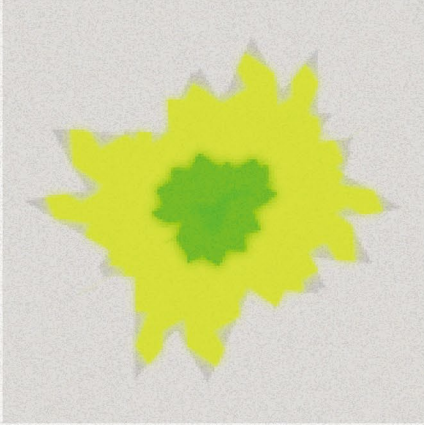


GENERATION II | LEFT

GENERATION III | RIGHT

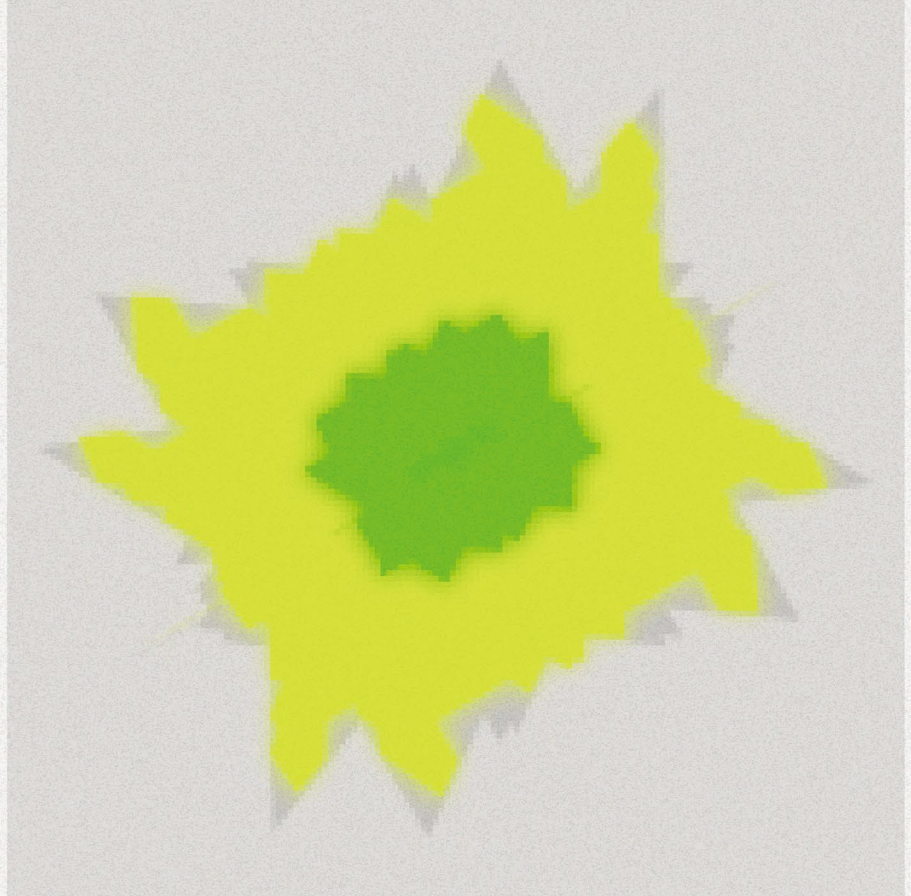
Observe that the three-dimensional form derived from single-axis rotation lacks symmetry.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	06
THE HAT POLIKITE TRANSFORMATION	GENERATION IV	



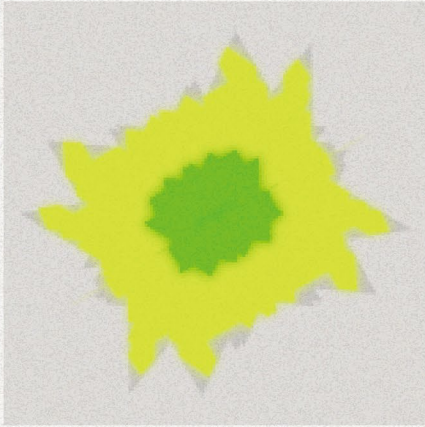
GENERATION III | LEFT

GENERATION IV | RIGHT

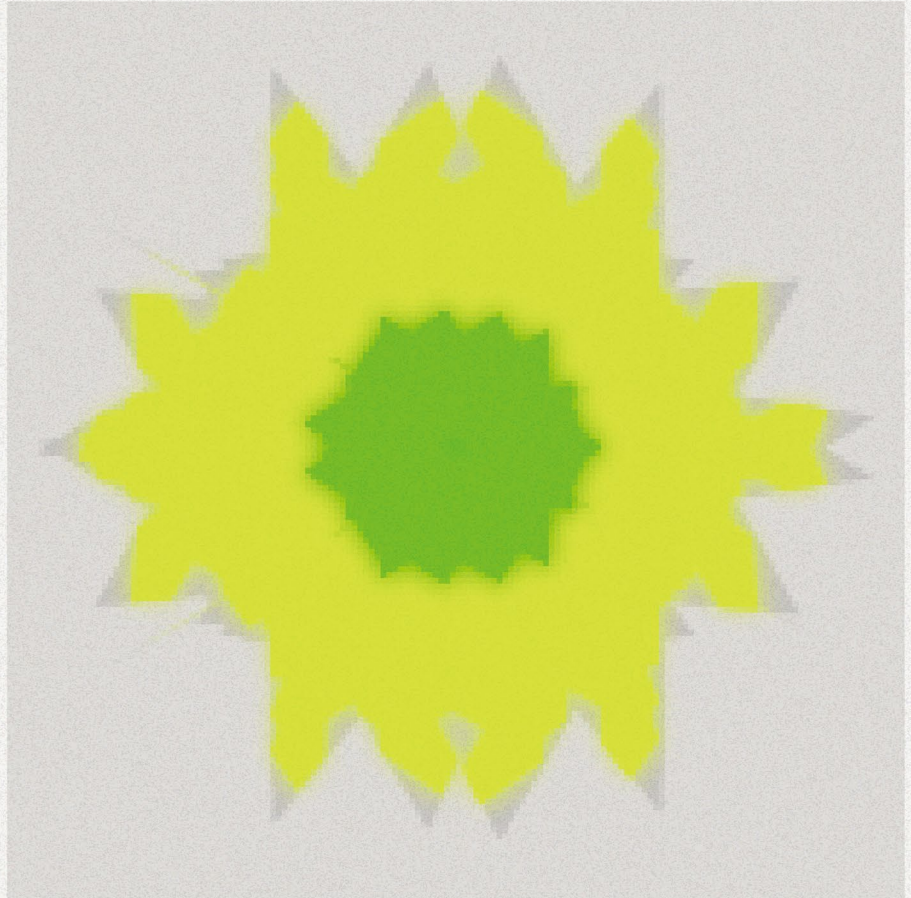


Mirror the rotated form around the midpoint of the rotational axis to achieve symmetry.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	07
THE HAT POLIKITE TRANSFORMATION	GENERATION V	



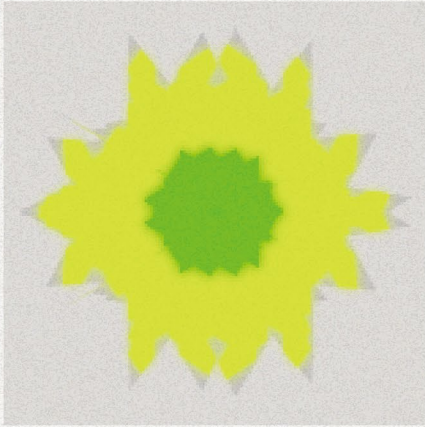
GENERATION IV | LEFT



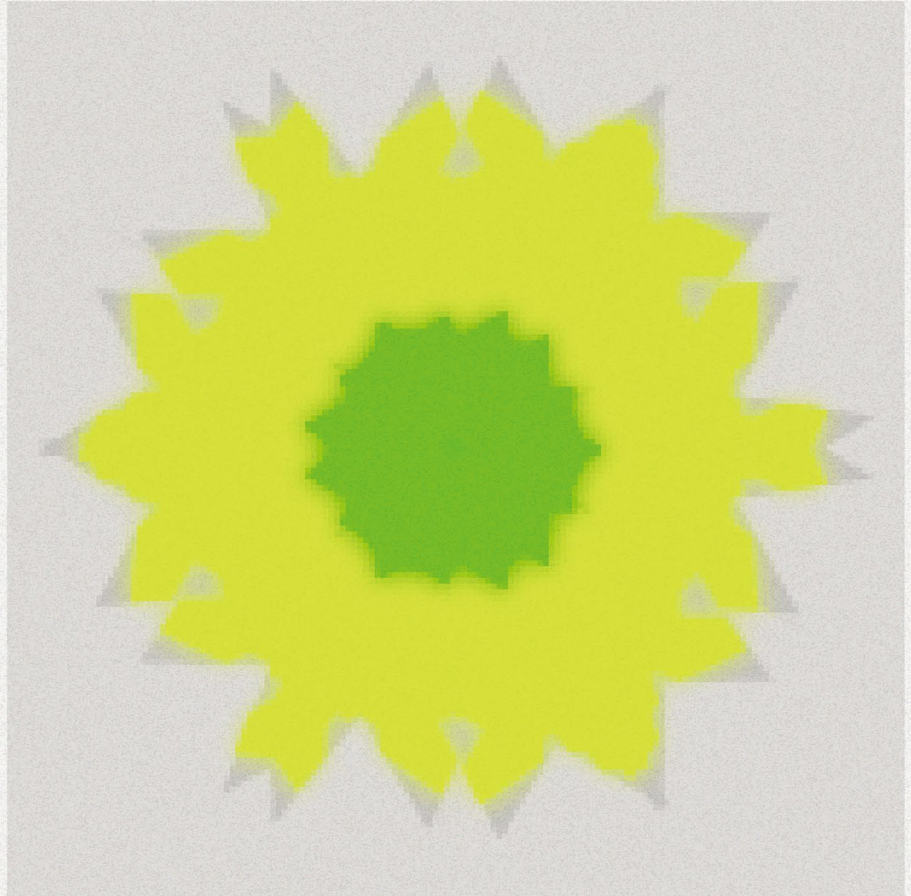
GENERATION V | RIGHT

Rotate the form 90° around the Z-axis to construct a three-dimensional structure on the XY plane.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	08
THE HAT POLIKITE TRANSFORMATION	GENERATION VI	



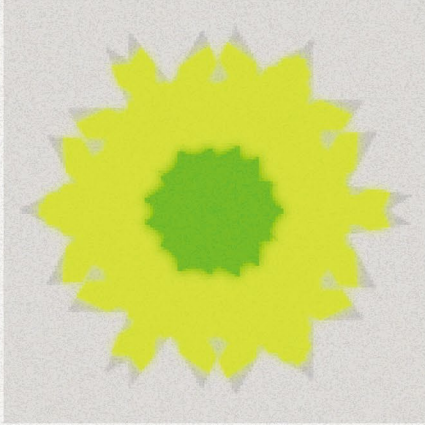
GENERATION V | LEFT



GENERATION VI | RIGHT

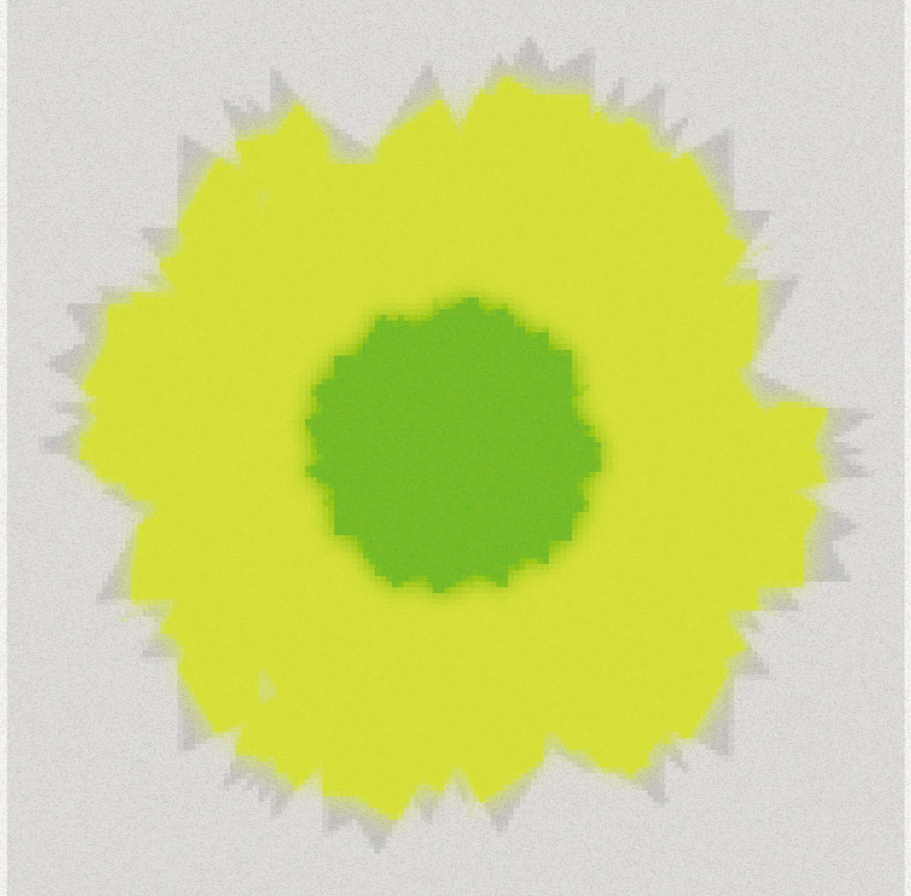
Rotate the form 90° around the Y-axis to construct a three-dimensional structure on the XZ plane.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	09
THE HAT POLIKITE TRANSFORMATION	CONCEPTIONAL UNIT	

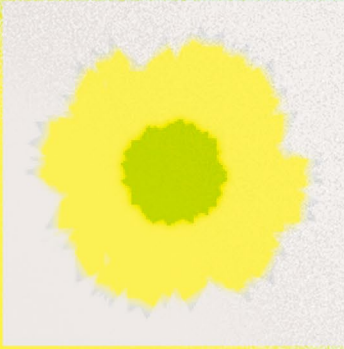


GENERATION VI | LEFT

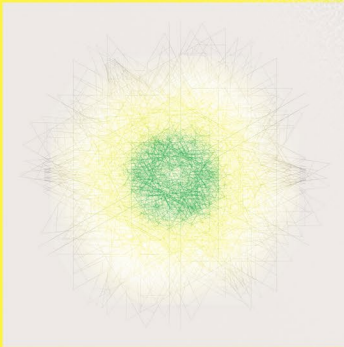
CONCEPTIONAL UNIT | RIGHT



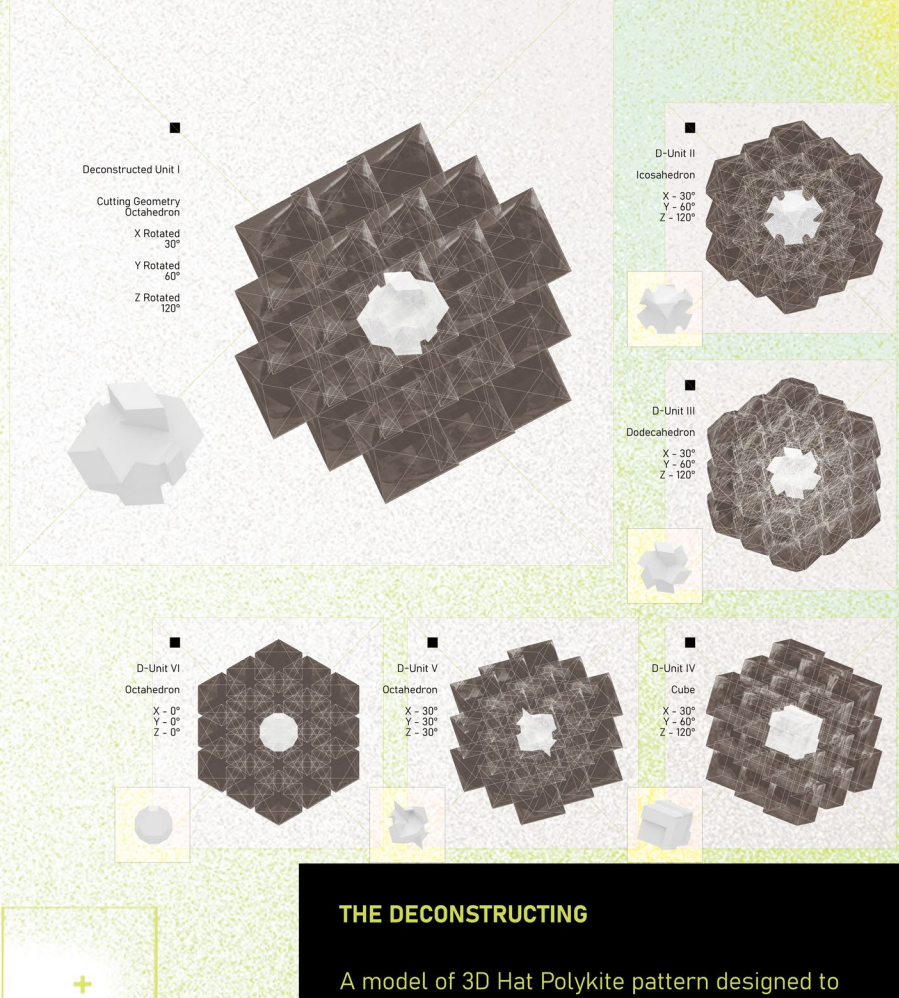
Rotate the form 90° around the X-axis to construct a three-dimensional structure on the YZ plane.



Conceptual Group Unit (3D)



Deconstructing Conceptual Group Unit (G)



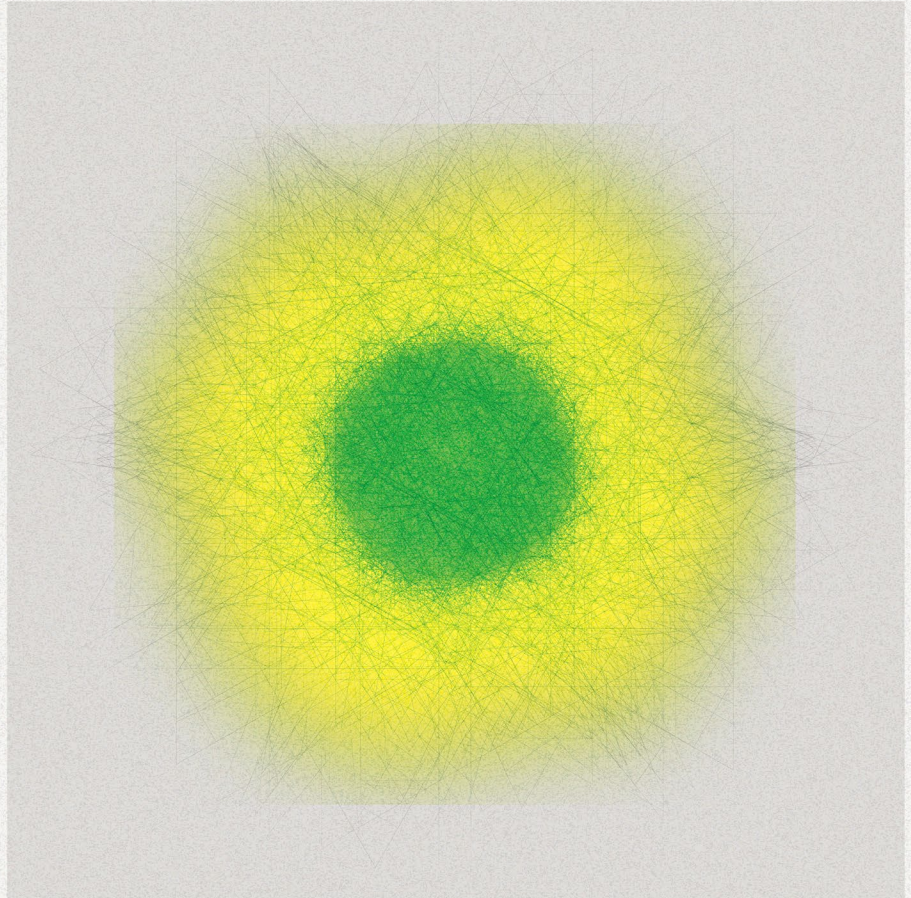
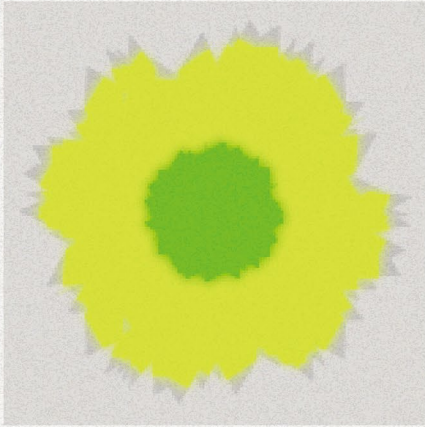
THE DECONSTRUCTING

A model of 3D Hat Polykite pattern designed to transform abstract ideas into tangible forms.

It illustrates the use of Boolean union operations with different patterns to translate abstract concepts into shapes, employing a deconstructive thinking approach.

The model serves as a structural foundation for functional mapping and system materialization.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	01
THE DECONSTRUCTED UNIT	DECONSTRUCTED UNIT	



CONCEPTUAL UNIT | LEFT

DECONSTRUCTED UNIT | RIGHT

The final conceptual model can be regarded as a 3×3×3 cluster with a central core.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	02
THE DECONSTRUCTED UNIT	OCTAHEDRON	

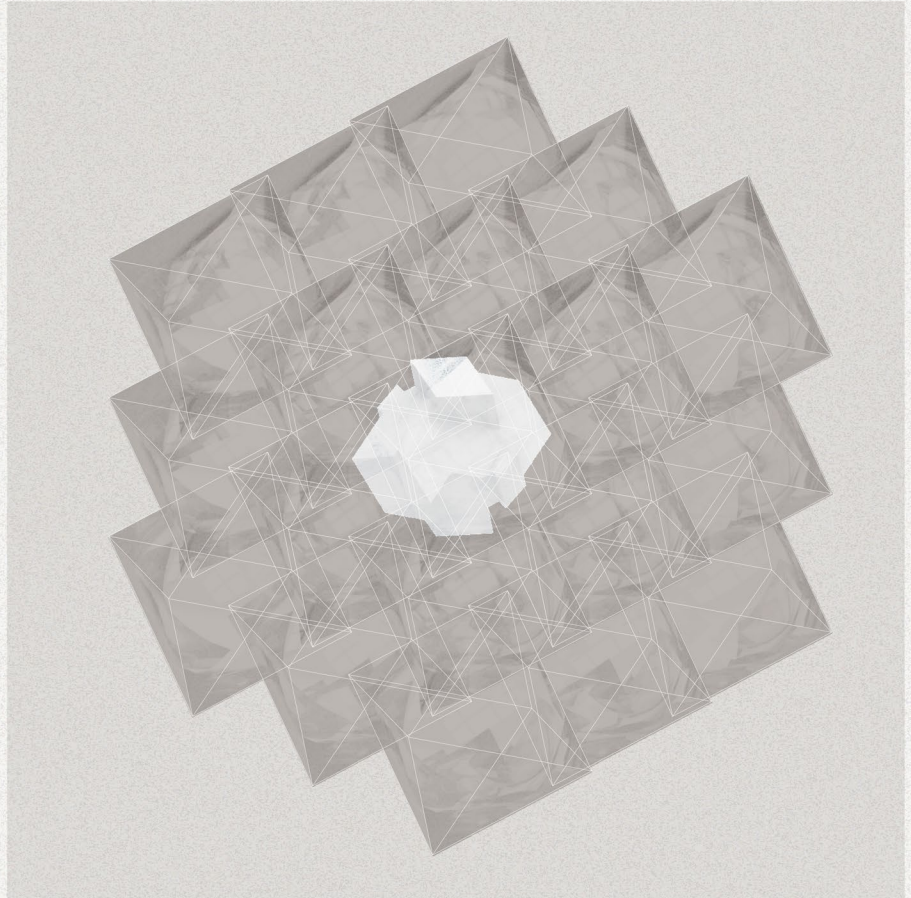


Cutting Geometry : Octahedron

X Rotated : 30°

Y Rotated : 60°

Z Rotated : 120°

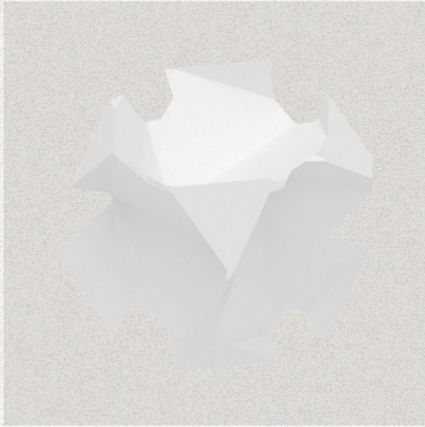


DECONSTRUCTED UNIT I | LEFT

DECONSTRUCTING | RIGHT

Using octahedron as the unit, with X/Y/Z rotation angles of 30°/60°/120°, forming a 3×3×3 cluster with a central core.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	03
THE DECONSTRUCTED UNIT	ICOSAHEDRON	



Cutting Geometry : Icosahedron

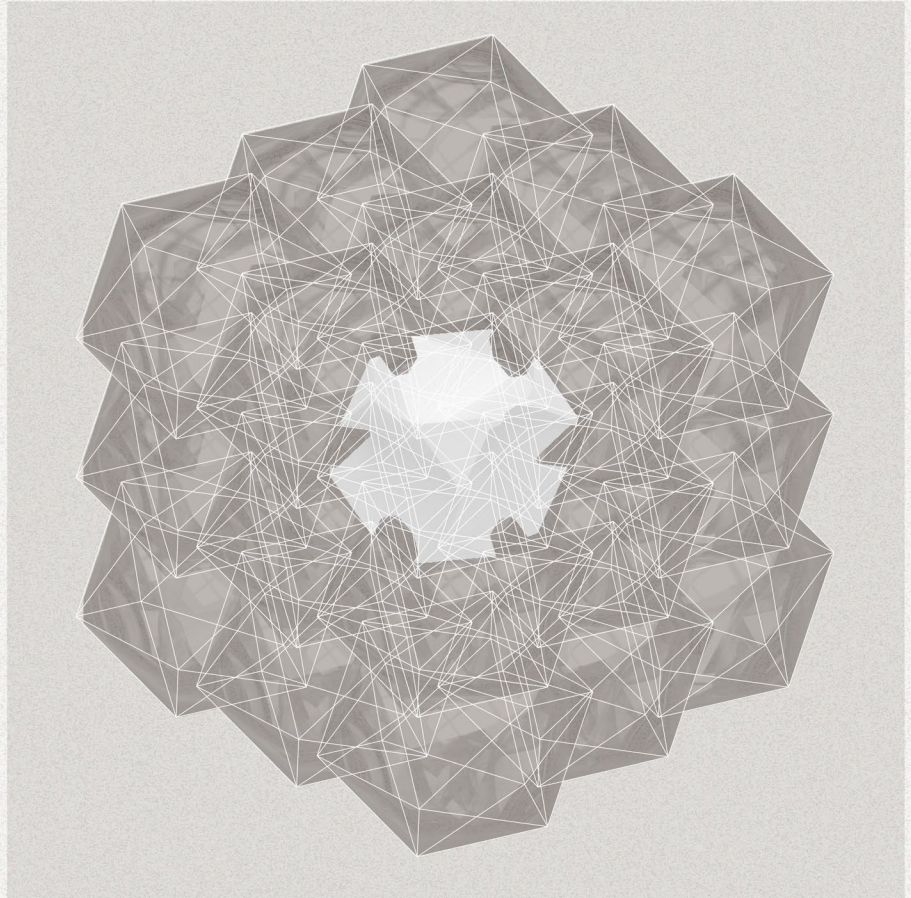
X Rotated : 30°

Y Rotated : 60°

Z Rotated : 120°

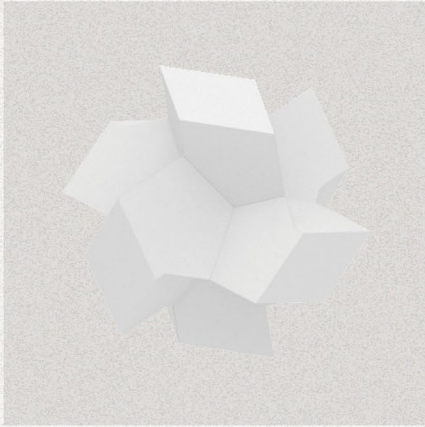
DECONSTRUCTED UNIT II | LEFT

DECONSTRUCTING | RIGHT



Using icosahedron as the unit, with X/Y/Z rotation angles of 30°/60°/120°, forming a 3×3×3 cluster with a central core.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	04
THE DECONSTRUCTED UNIT	DODECAHEDRON	



Cutting Geometry : Dodecahedron

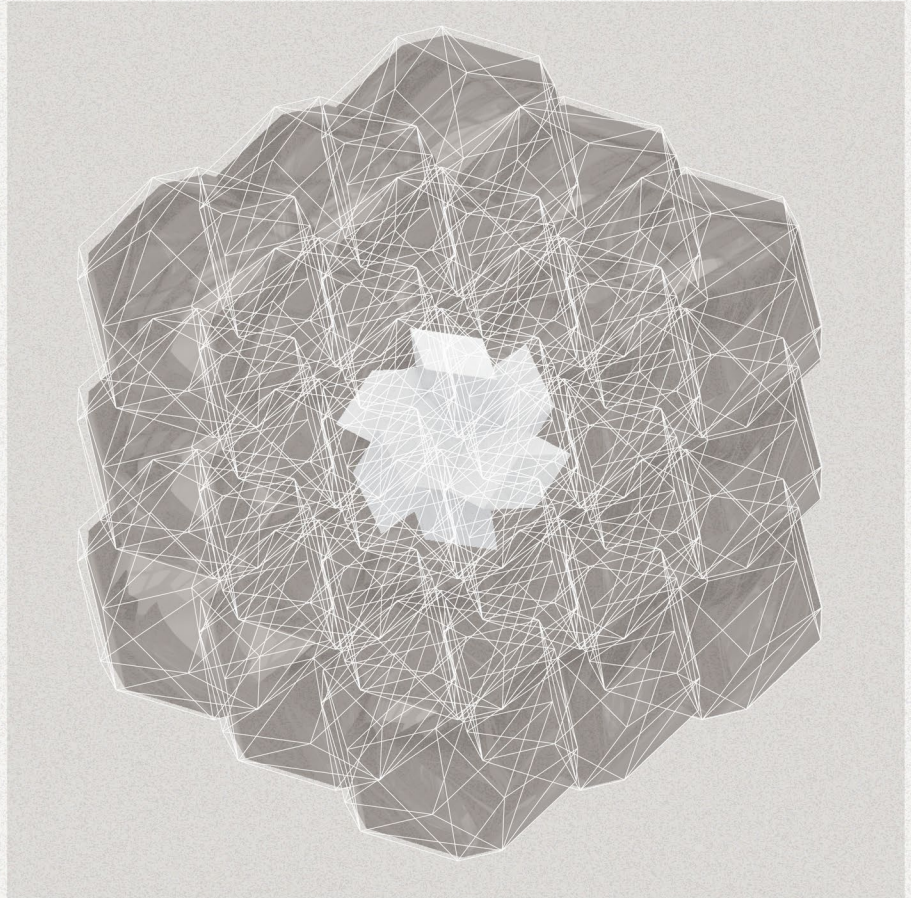
X Rotated : 30°

Y Rotated : 60°

Z Rotated : 120°

DECONSTRUCTED UNIT III | LEFT

DECONSTRUCTING | RIGHT



Using dodecahedron as the unit, with X/Y/Z rotation angles of 30°/60°/120°, forming a 3×3×3 cluster with a central core.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	05
THE DECONSTRUCTED UNIT	CUBE	



Cutting Geometry : Cube

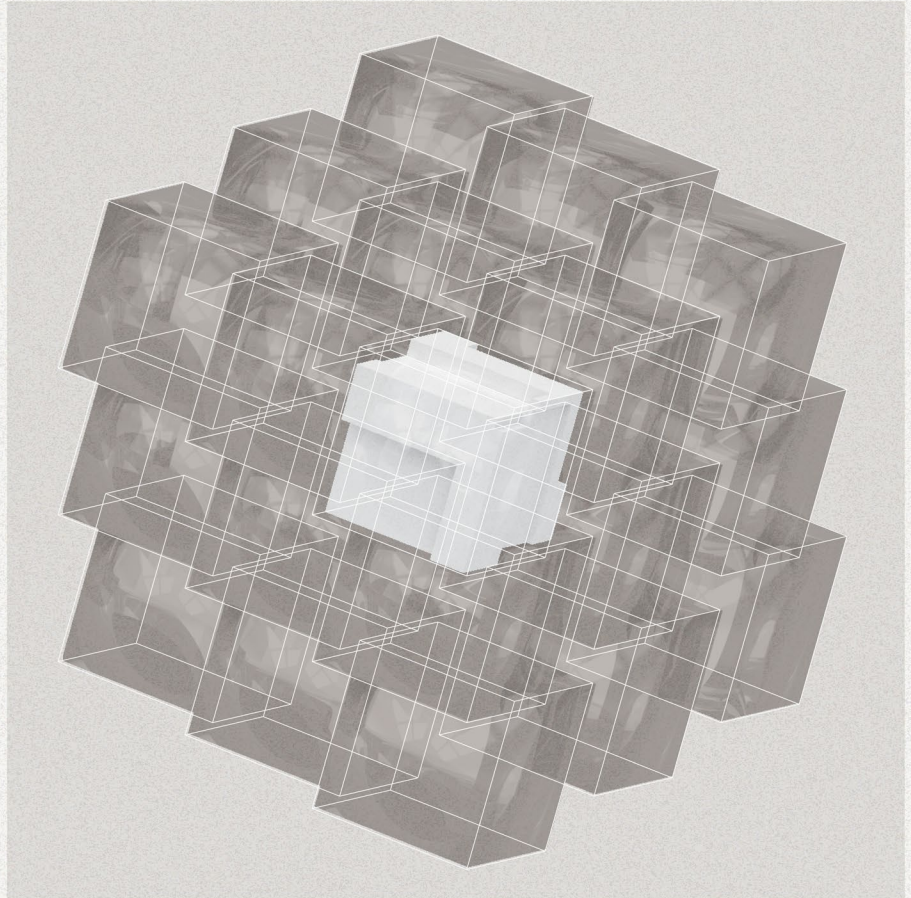
X Rotated : 30°

Y Rotated : 60°

Z Rotated : 120°

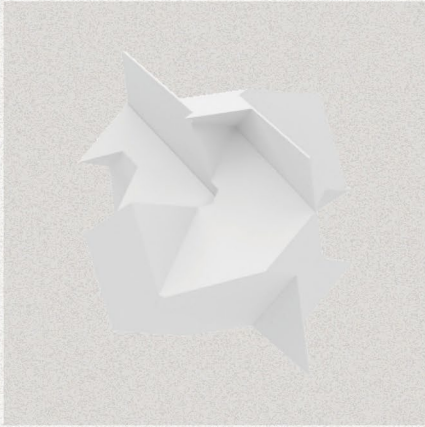
DECONSTRUCTED UNIT IV | LEFT

DECONSTRUCTING | RIGHT



Using cube as the unit, with X/Y/Z rotation angles of 30°/60°/120°, forming a 3×3×3 cluster with a central core.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	05
THE DECONSTRUCTED UNIT	OCTAHEDRON - II	



Cutting Geometry : Octahedron

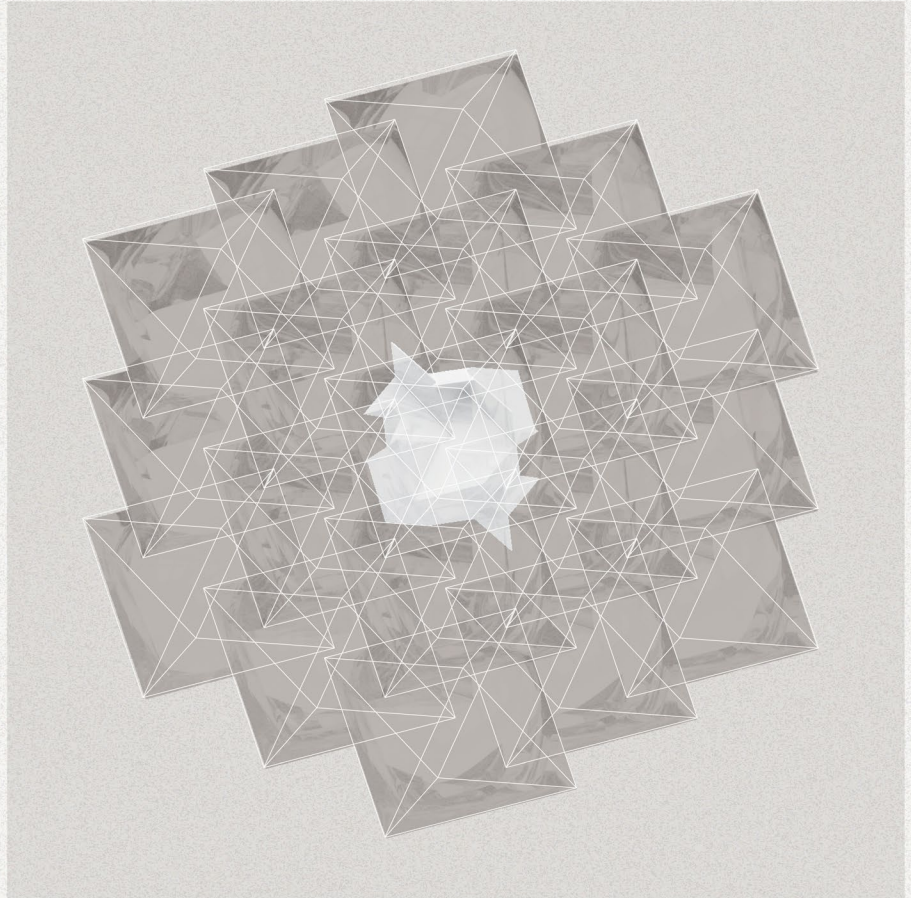
X Rotated : 30°

Y Rotated : 30°

Z Rotated : 30°

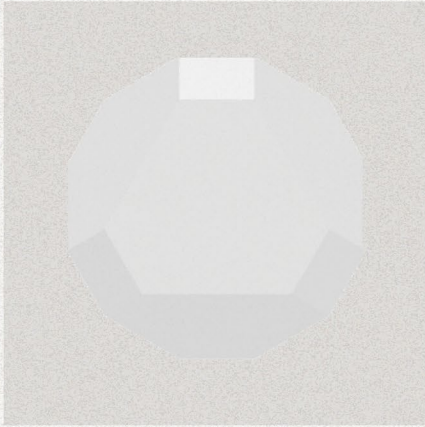
DECONSTRUCTED UNIT V | LEFT

DECONSTRUCTING | RIGHT



Using octahedron as the unit, with X/Y/Z rotation angles of 30°/30°/30°, forming a 3×3×3 cluster with a central core.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	05
THE DECONSTRUCTED UNIT	OCTAHEDRON - III	



Cutting Geometry : Octahedron

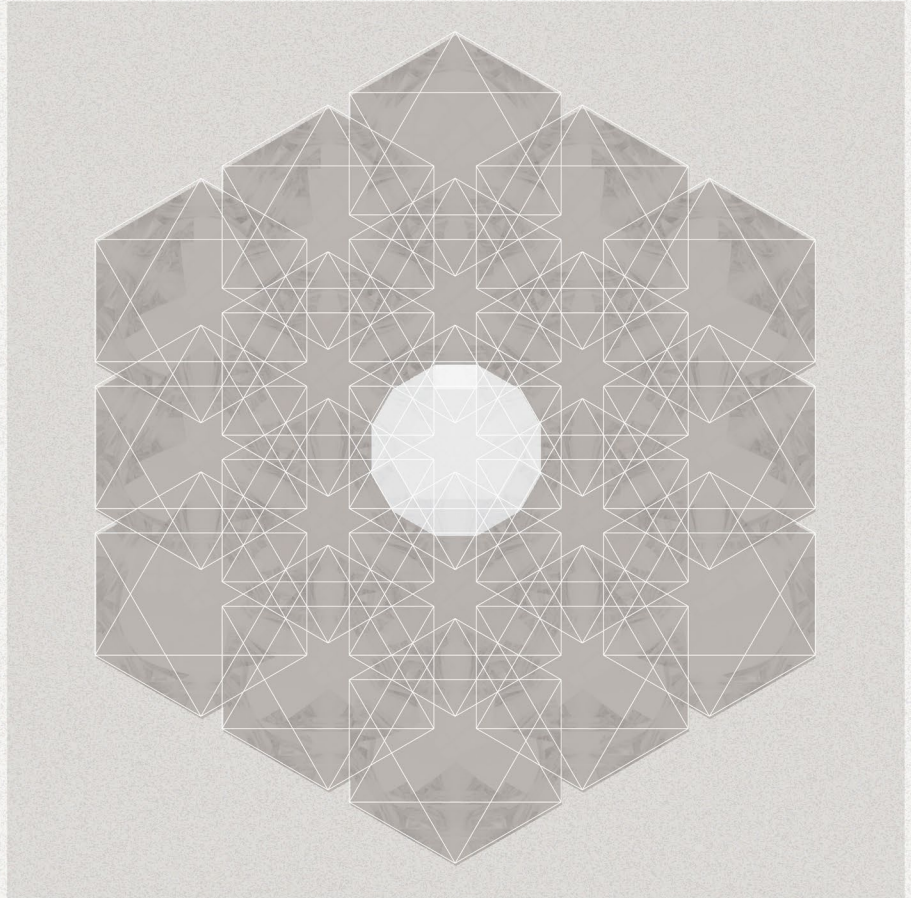
X Rotated : 0°

Y Rotated : 0°

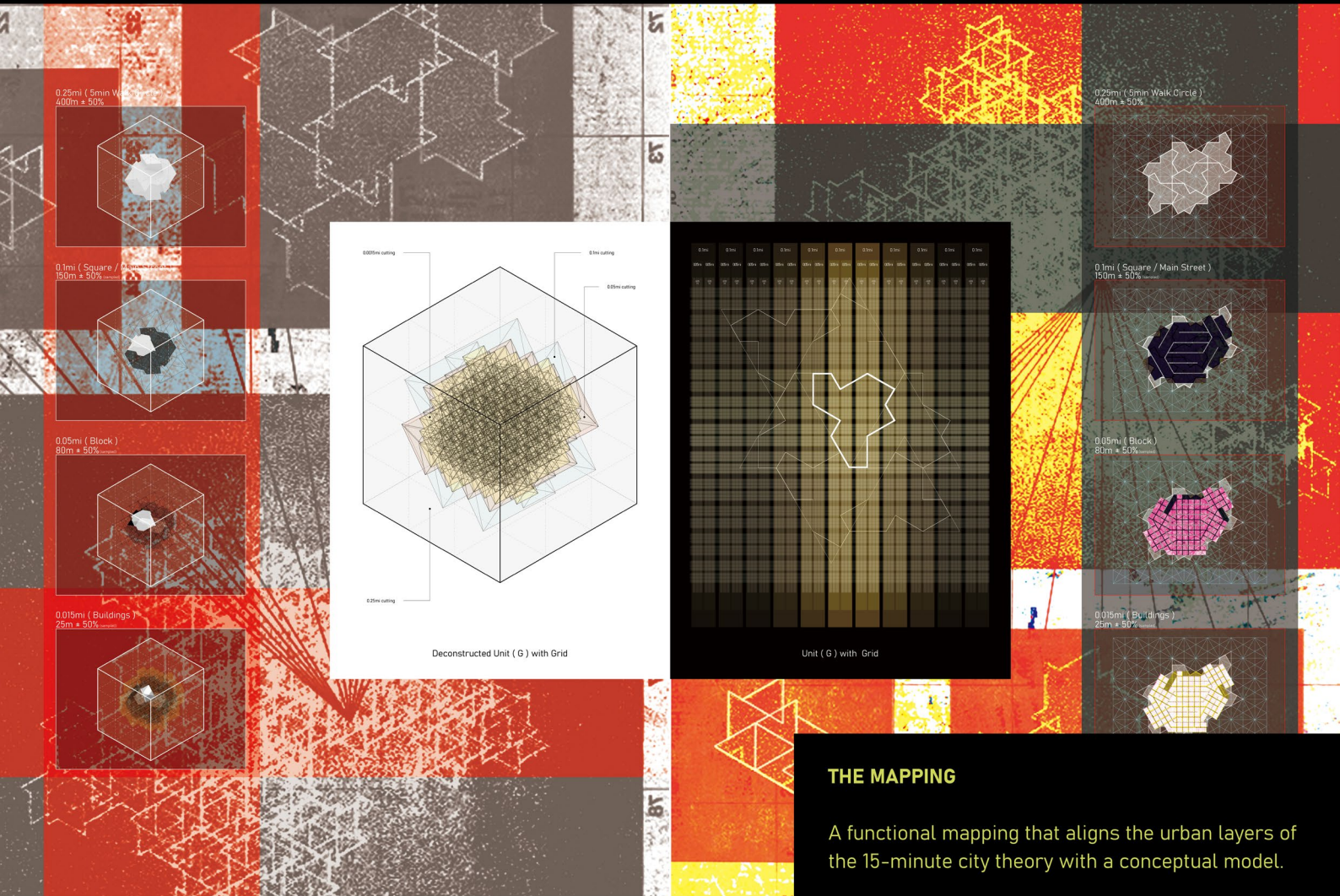
Z Rotated : 0°

DECONSTRUCTED UNIT VI | LEFT

DECONSTRUCTING | RIGHT



Using octahedron as the unit, with X/Y/Z rotation angles of 0°/0°/0°, forming a 3×3×3 cluster with a central core.



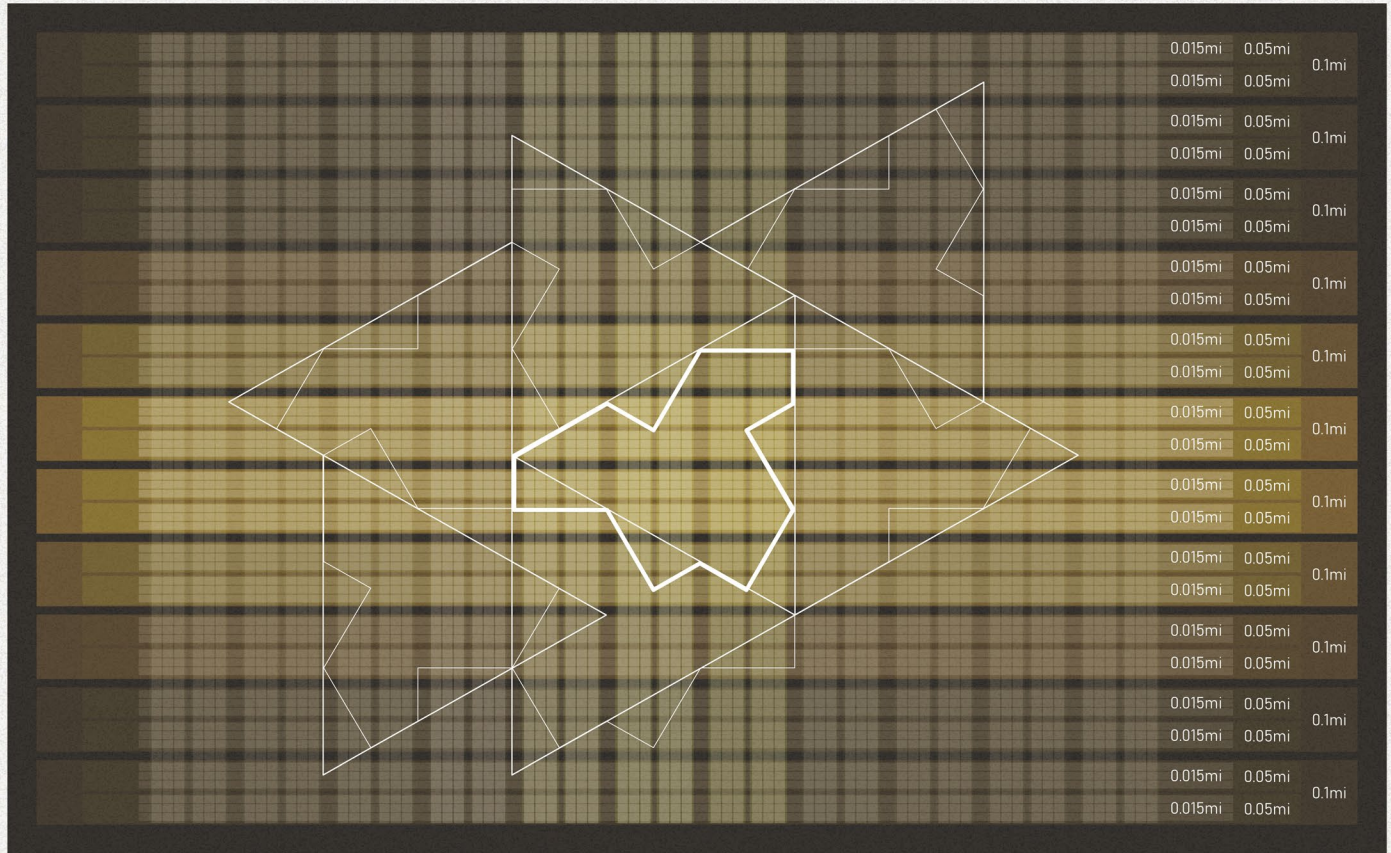
THE MAPPING

A functional mapping that aligns the urban layers of the 15-minute city theory with a conceptual model.

It assigns corresponding urban scales to the abstract conceptual model, transitioning from the circles to plazas or main streets, then to blocks, and finally refining to the scale of individual buildings.

This process explores the unresolved planning details within the 5-minute walk circle.

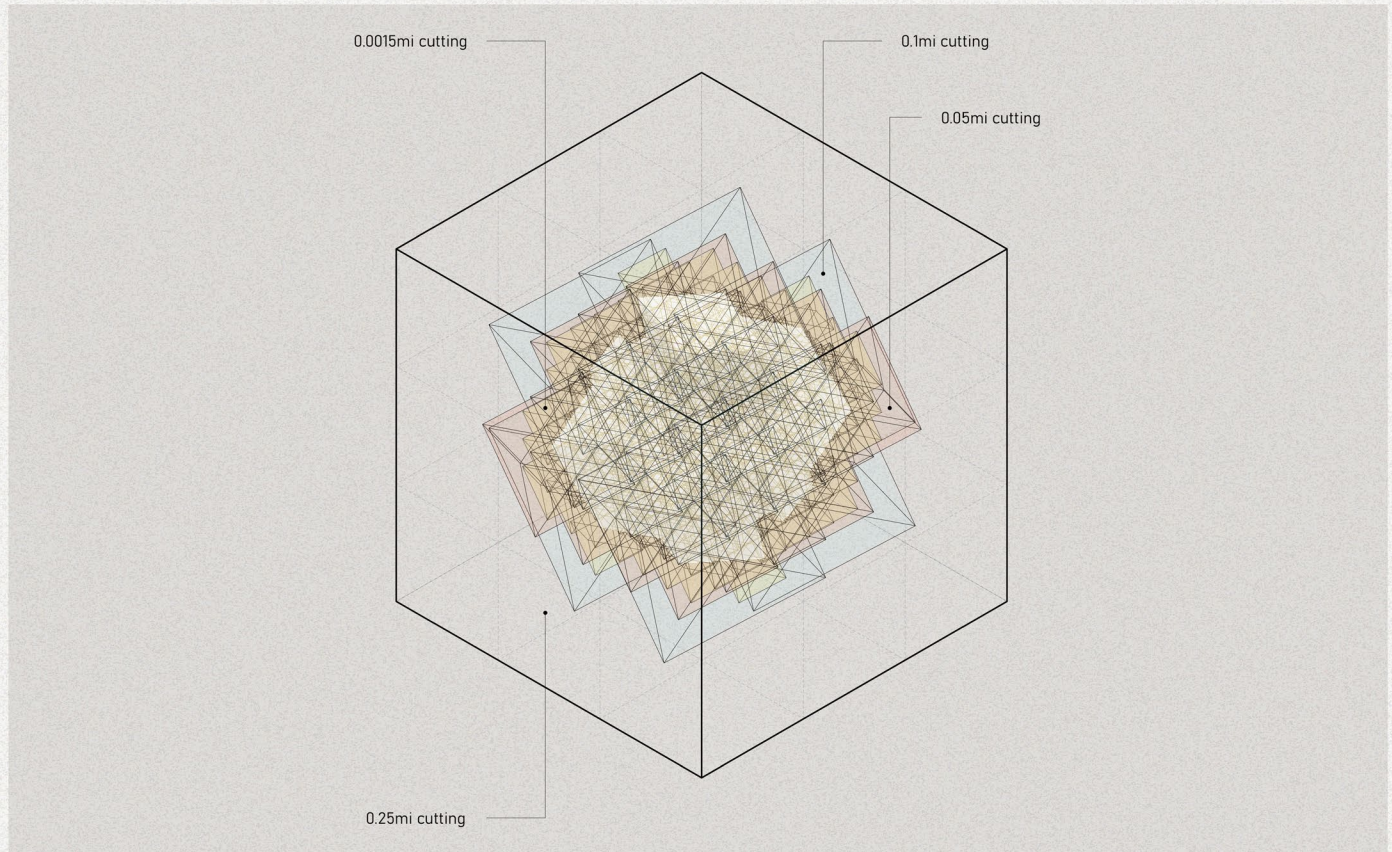
UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	01
THE MAPPING	UNIT (G) WITH GRID	



UNIT (G) WITH GRID

If a basic group unit is scaled to the size of a 5-minute walk circle, the fundamental dimensions for corresponding spatial scales can be derived.

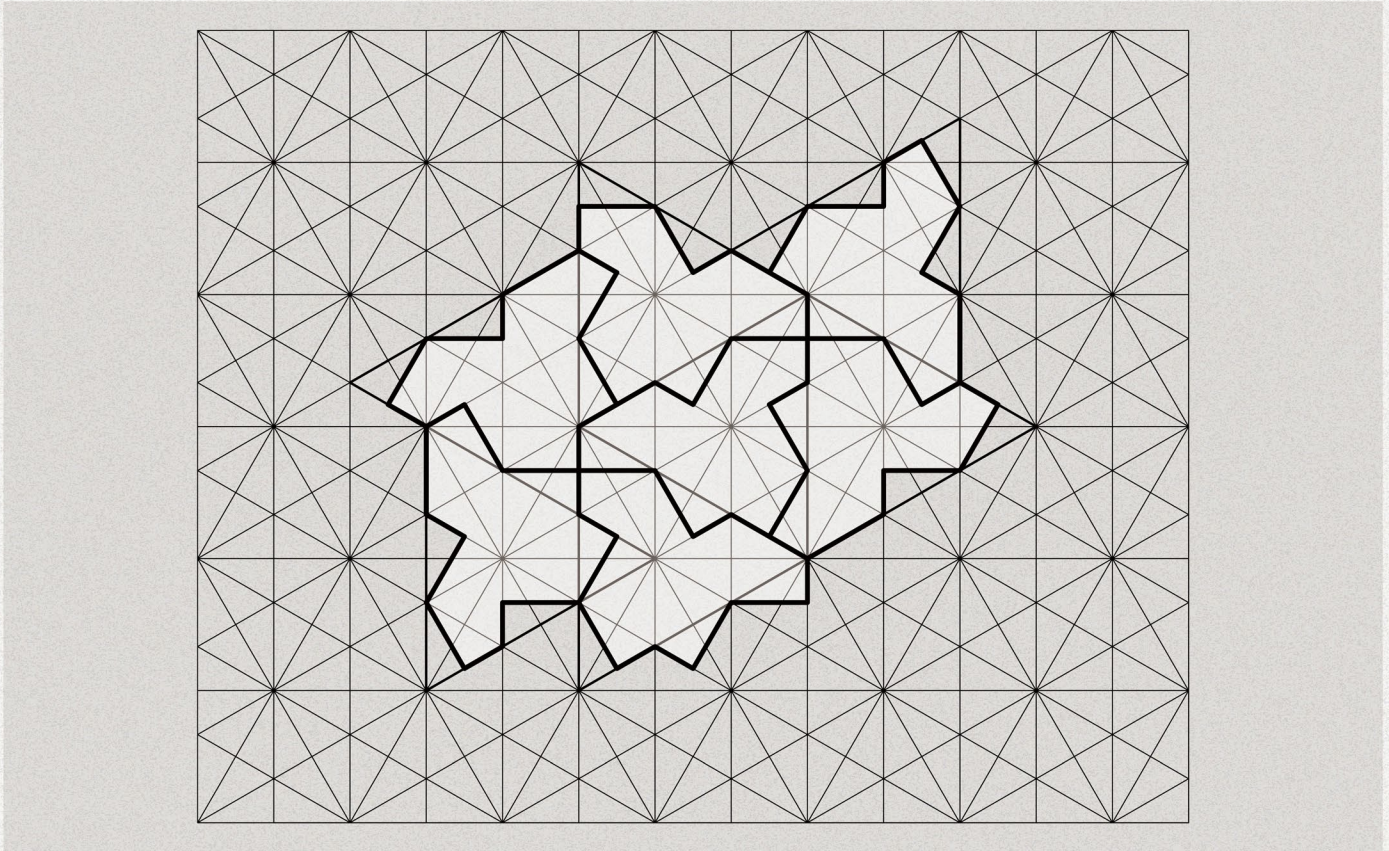
UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	02
THE MAPPING	DECONSTRUCTED UNIT (G) WITH GRID	



DECONSTRUCTED UNIT (G) WITH GRID

By aligning the sizes of different spatial scales, these dimensions can be mapped to the segmentation units used for deconstructing the conceptual model.

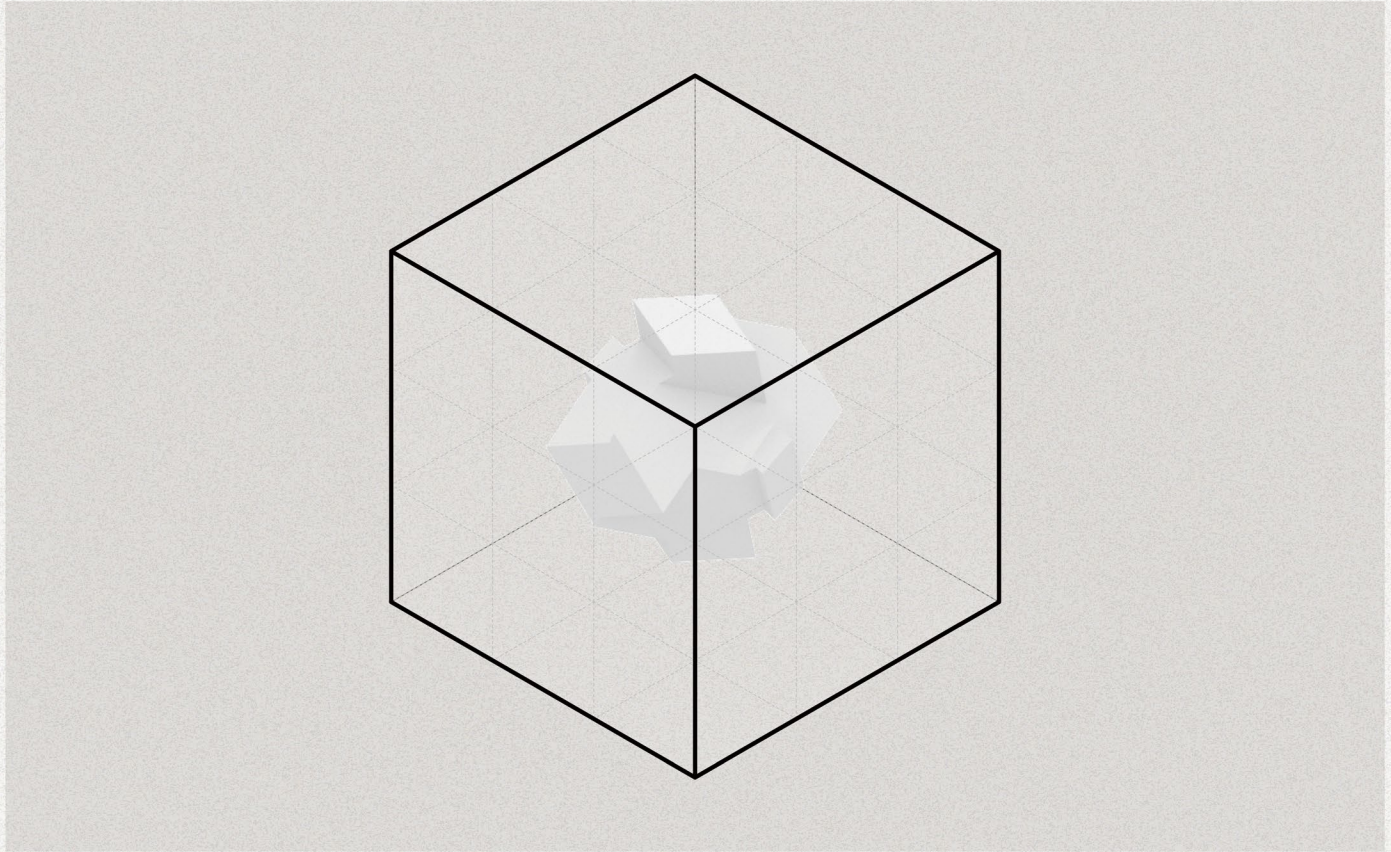
UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	03
THE MAPPING	5MIN WALK CIRCLE	



5MIN WALK CIRCLE (0.25mi / 400m ± 50%)

A 5-minute walk circle corresponds to a radius of approximately 0.25 miles, or about 400 meters.

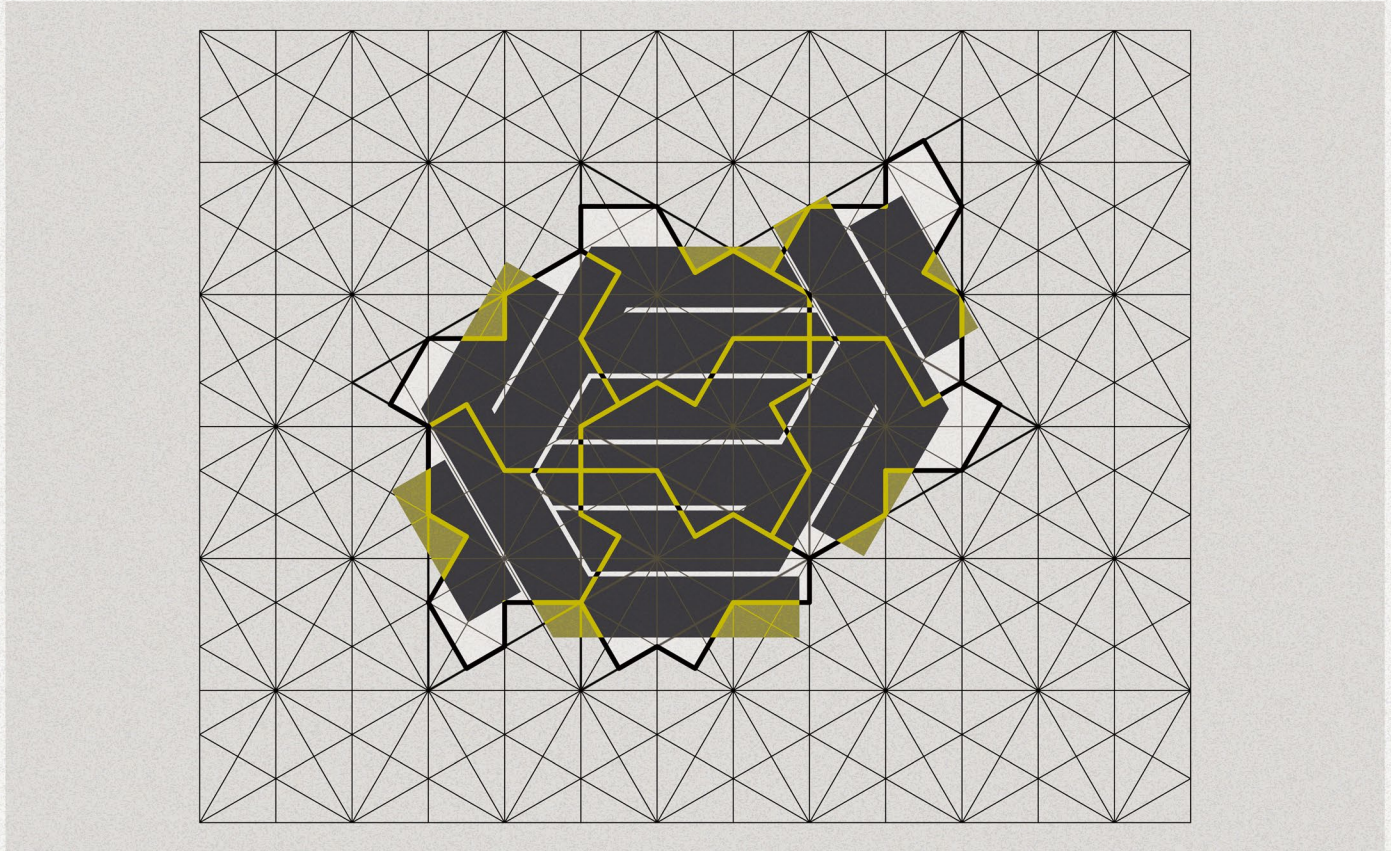
UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	04
THE MAPPING	5MIN WALK CIRCLE MAPPING	



5MIN WALK CIRCLE MAPPING (0.25mi / 400m ± 50%)

In the conceptual model, this translates to the size of a single unit within a 3×3×3 framework.

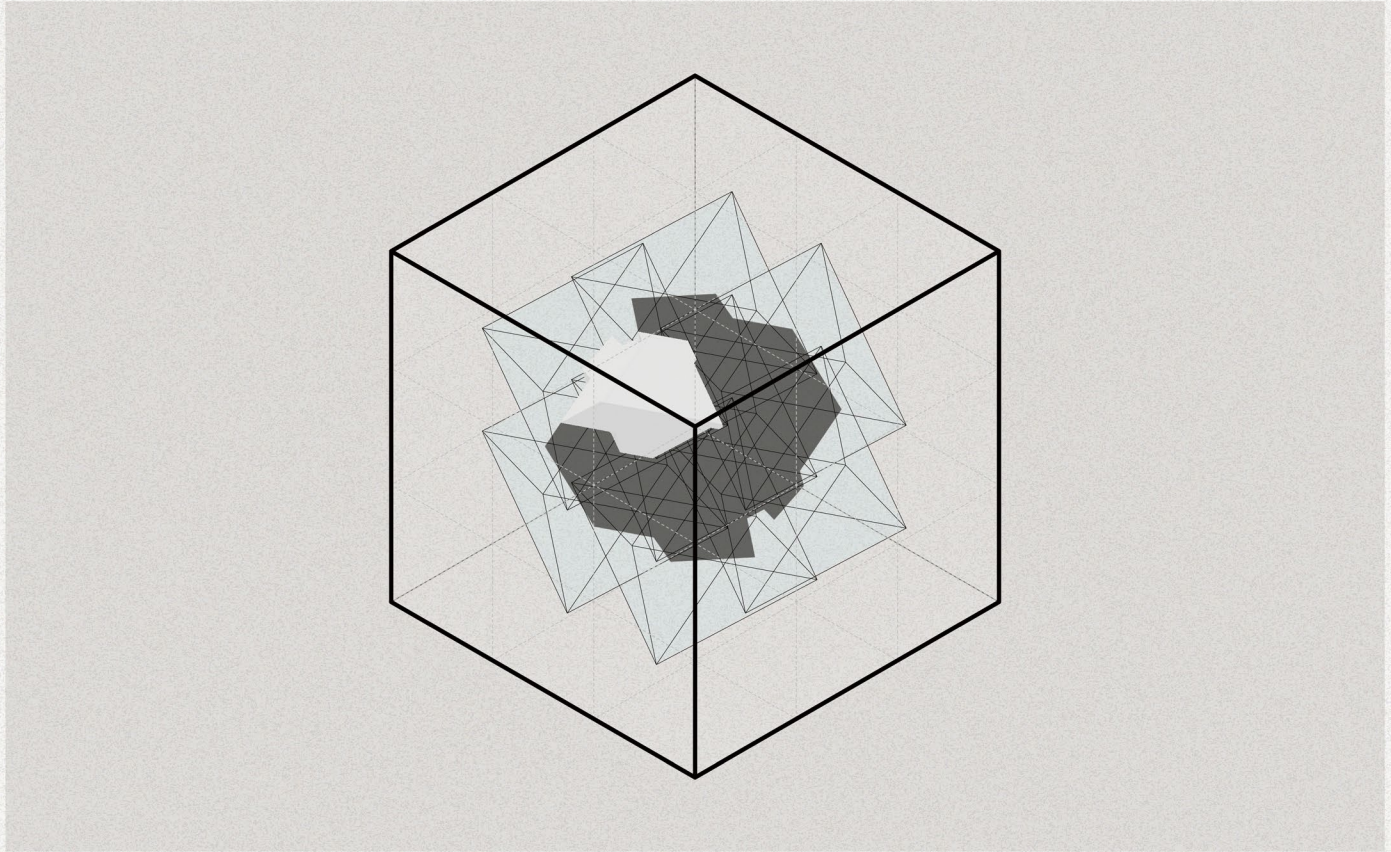
UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	05
THE MAPPING	SQUARE / MAIN STREET	



SQUARE / MAIN STREET (0.1mi / 150m ± 50%)

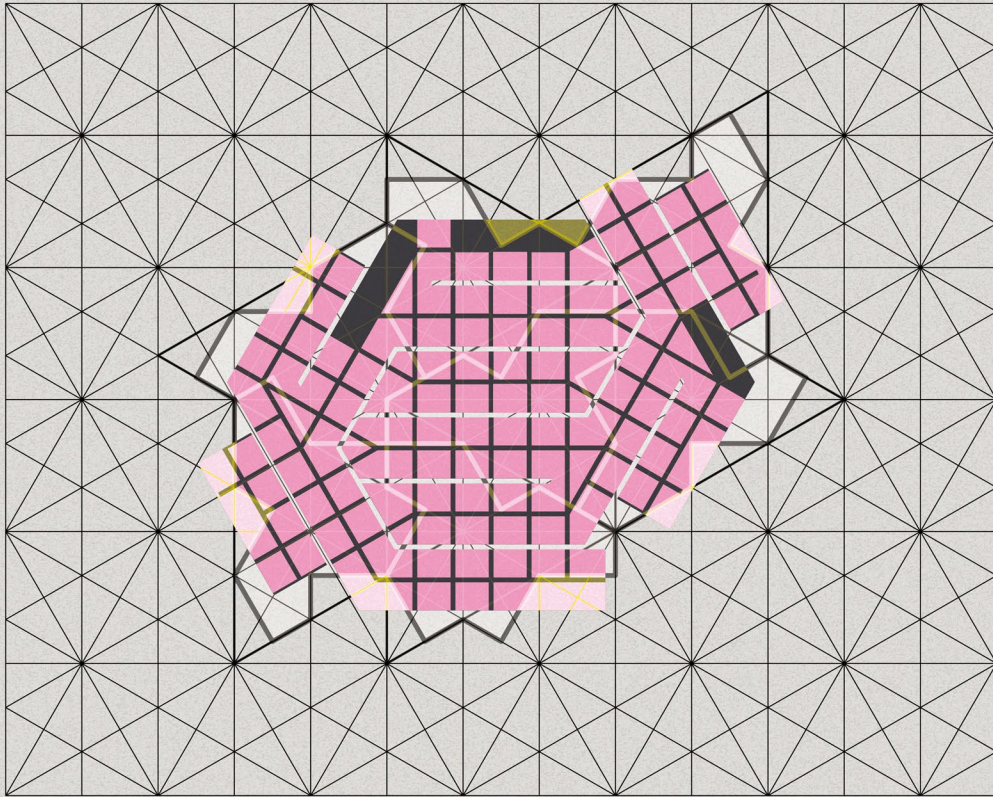
The secondary planning within the circle focuses on plazas and main roads, corresponding to a radius of approximately 0.1 miles, or about 150 meters.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	06
THE MAPPING	SQUARE / MAIN STREET MAPPING	



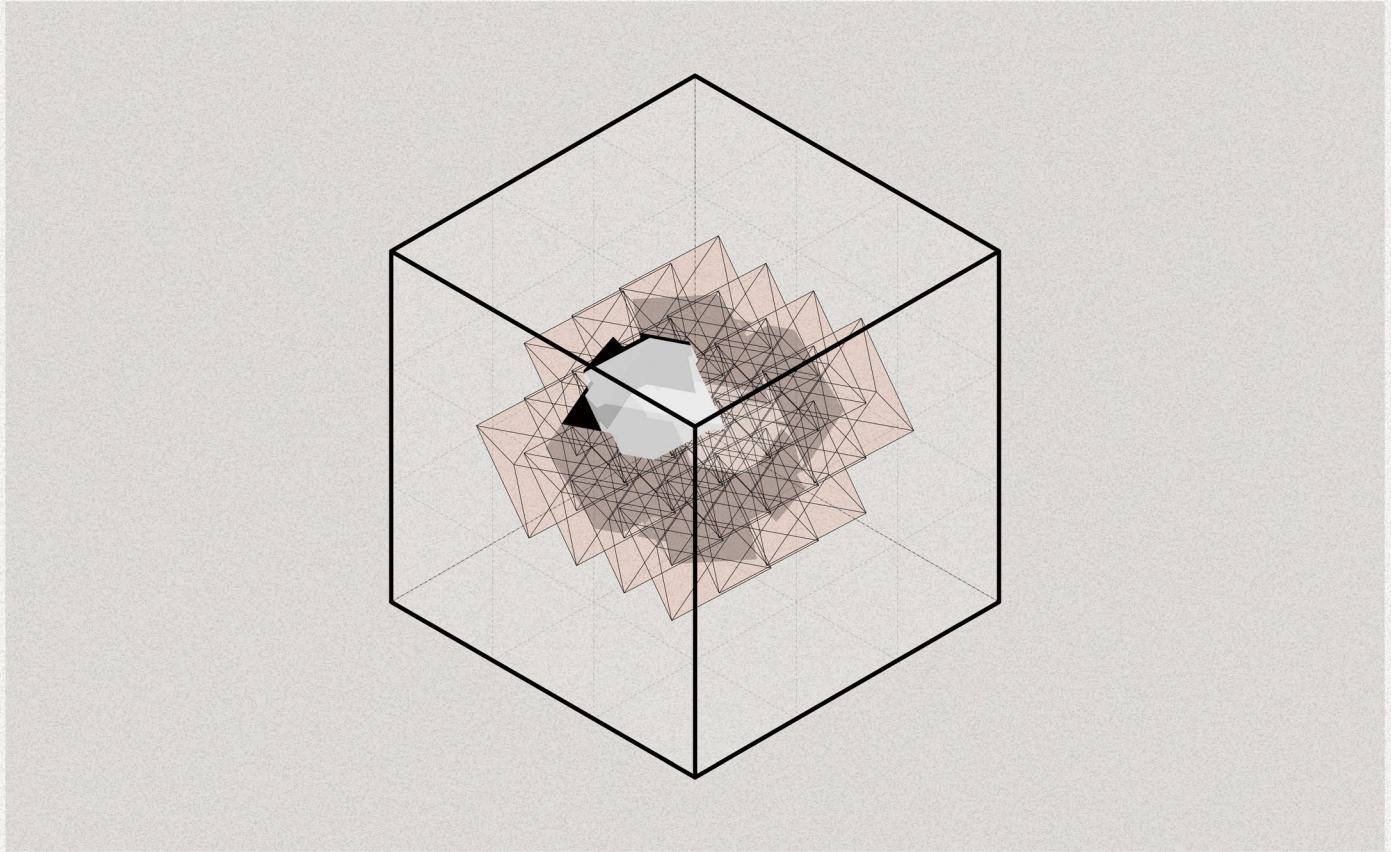
SQUARE / MAIN STREET MAPPING (0.1mi / 150m ± 50%)

In the conceptual model, this requires a second-level subdividing the size of a single unit within the 3×3×3 framework.

**BLOCK (0.05mi / 80m ± 50%)**

The tertiary planning within plazas and main roads focuses on blocks, corresponding to a radius of approximately 0.05 miles, or about 80 meters.

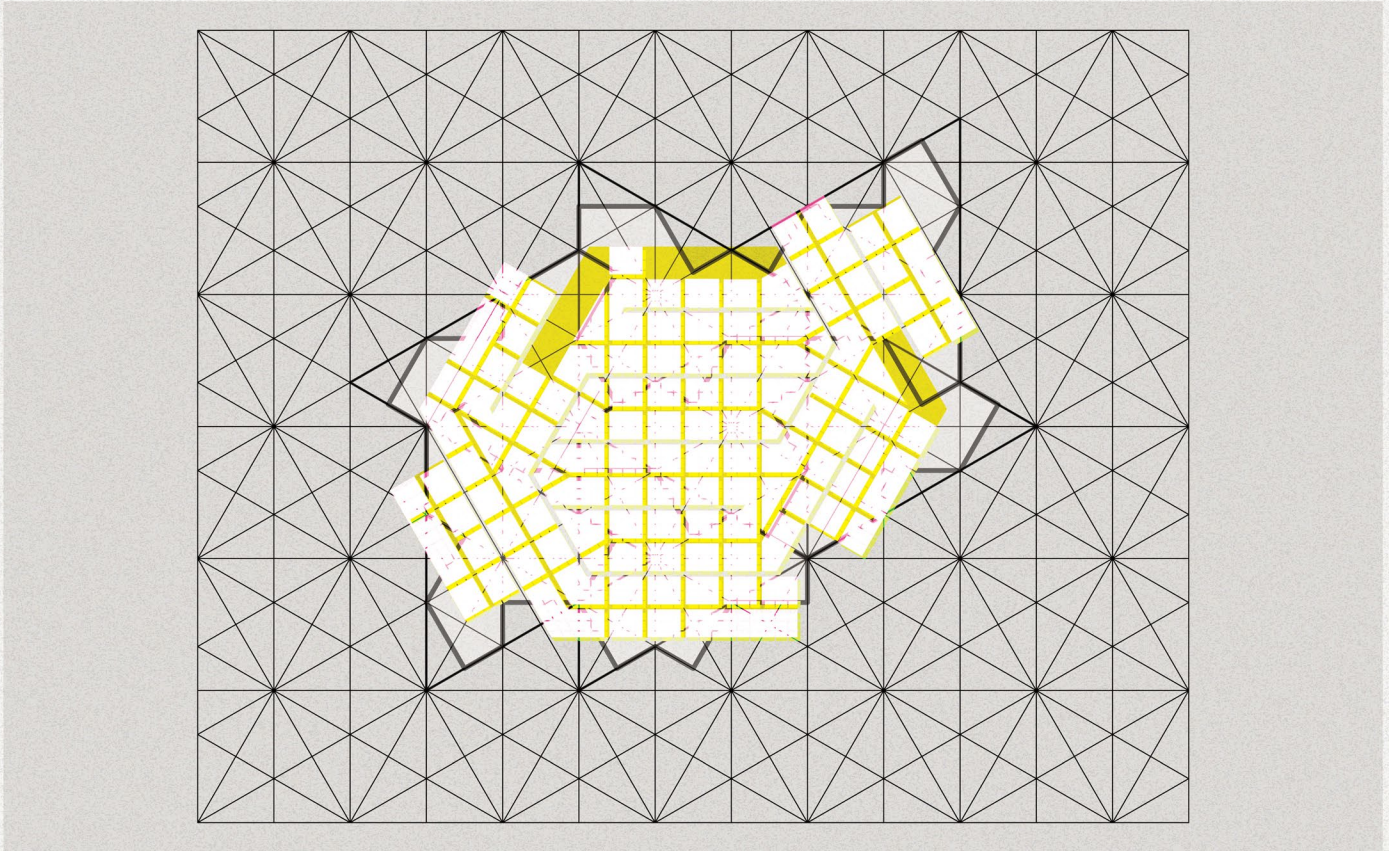
UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	08
THE MAPPING	BLOCK MAPPING	



BLOCK MAPPING (0.05mi / 80m ± 50%)

In the conceptual model, this requires a third-level subdivision of the size of a single unit within the 3×3×3 framework.

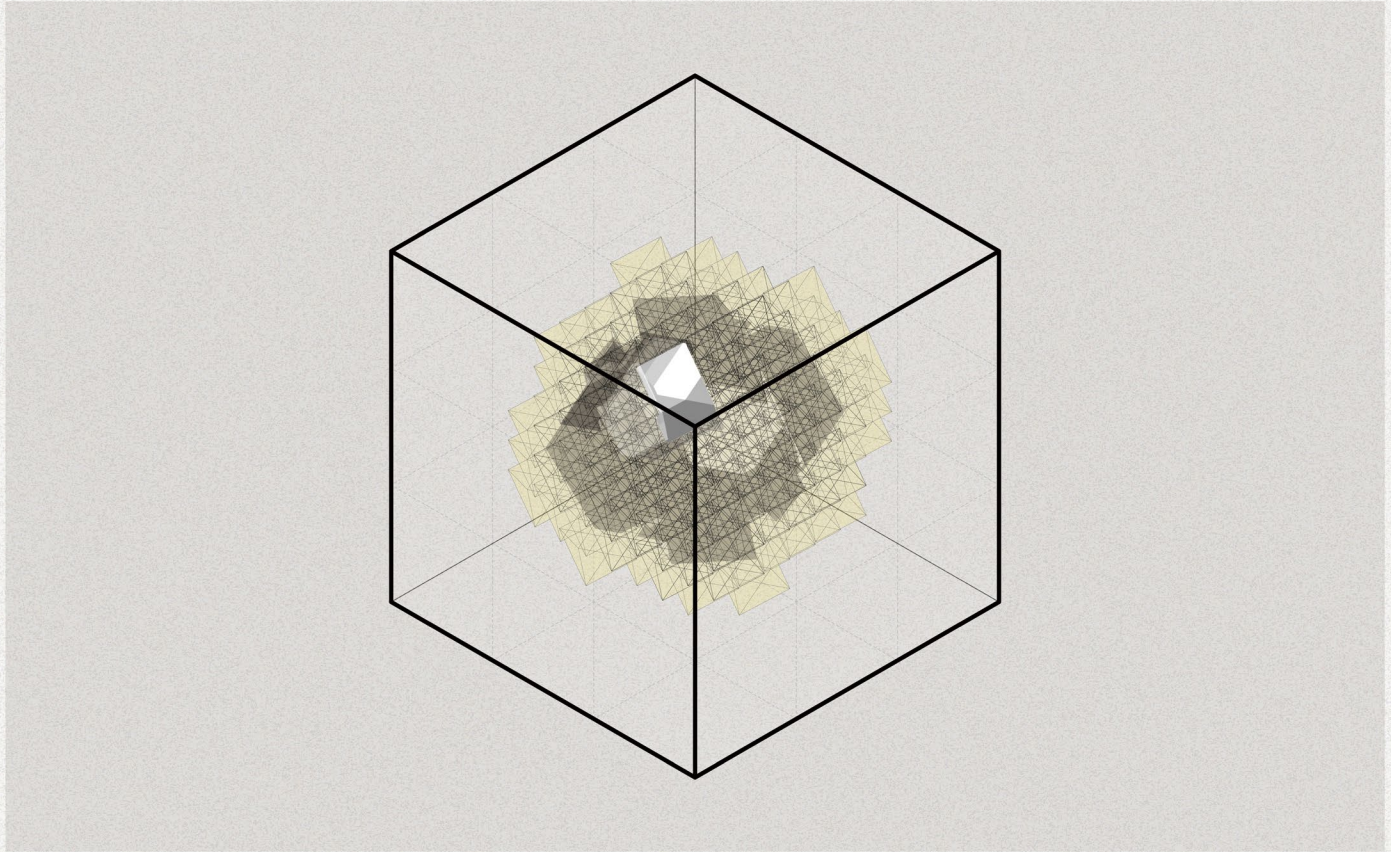
UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	09
THE MAPPING	BUILDING	



BUILDING (0.015mi / 25m ± 50%)

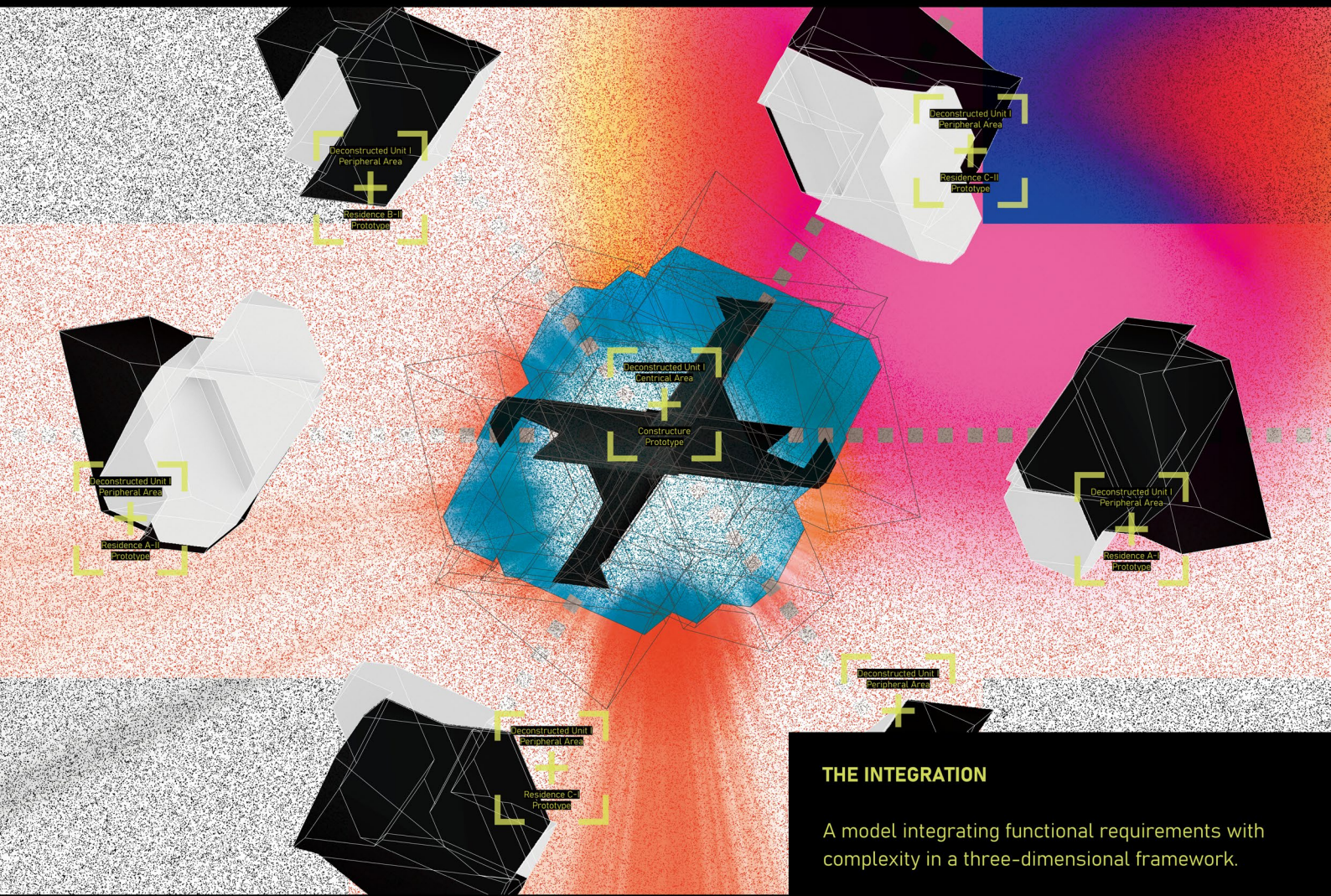
The quaternary planning within blocks focuses on buildings, corresponding to a radius of approximately 0.015 miles, or about 25 meters.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	10
THE MAPPING	BUILDING MAPPING	



BUILDINGS MAPPING (0.015mi / 25m ± 50%)

In the conceptual model, this requires a fourth-level subdivision of the size of a single unit within the 3×3×3 framework.



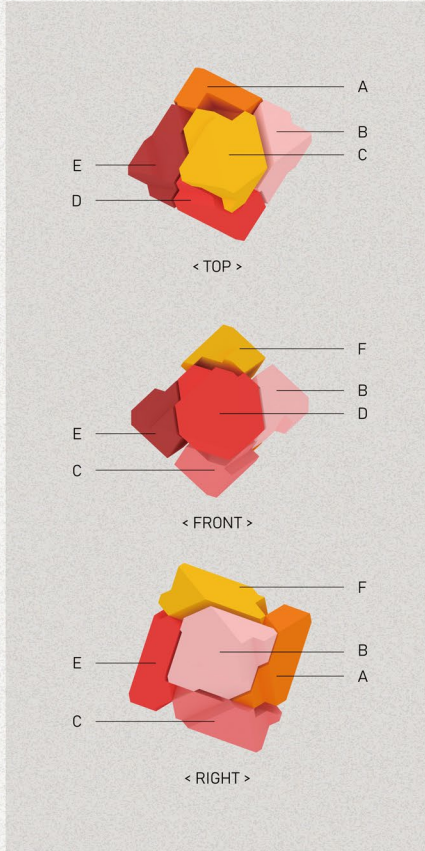
THE INTEGRATION

A model integrating functional requirements with complexity in a three-dimensional framework.

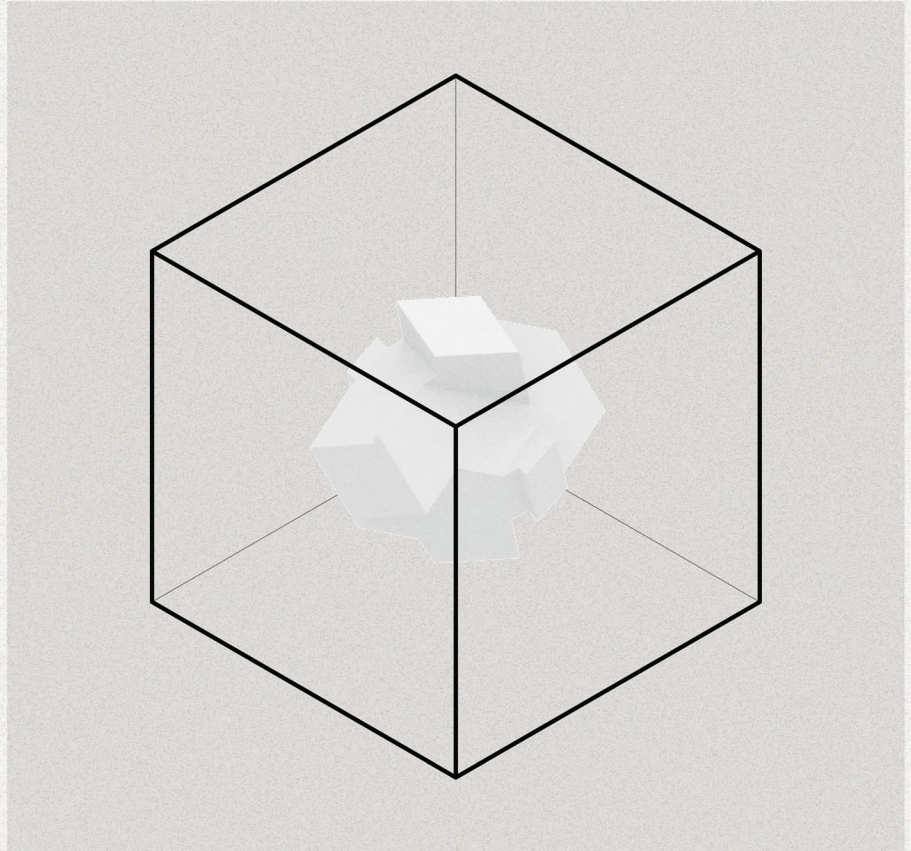
It integrates the 15-minute city theory and Hat Polykite's aperiodic patterns, provides specific scale references, and achieves unified integration in three-dimensional space.

The process serves as an experimental approach to explore preliminary methods for integration.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	01
THE INTEGRATION	GENERATION I	



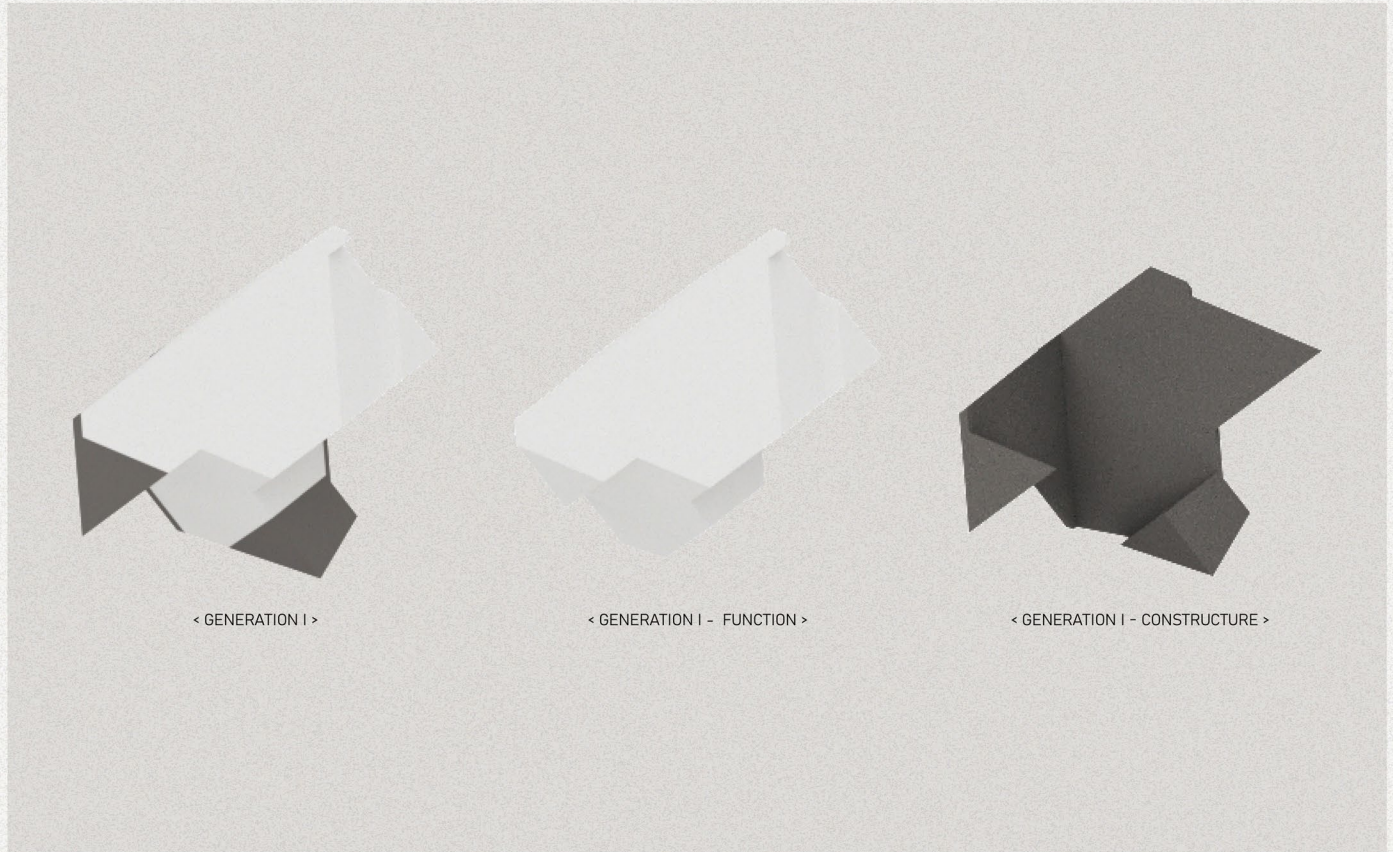
GI DECONSTRUCTING THREE VIEWS



GI DECONSTRUCTED UNIT POSITION

This involves a second-level subdivision of a single unit within the 3×3×3 framework.

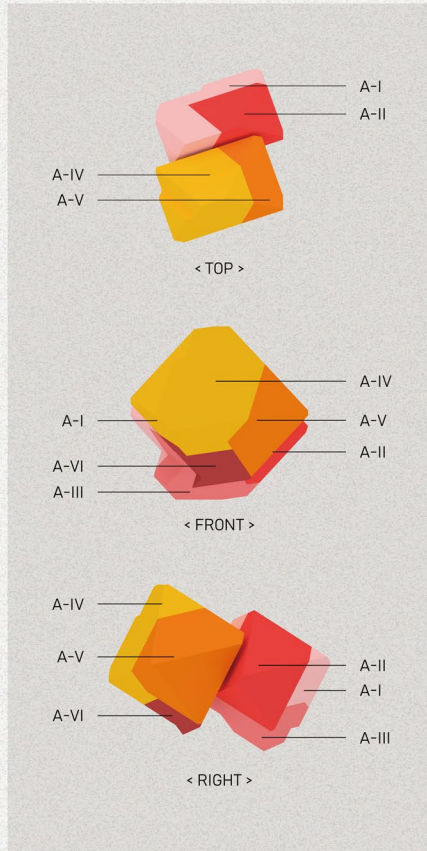
UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	02
THE INTEGRATION	GENERATION I	



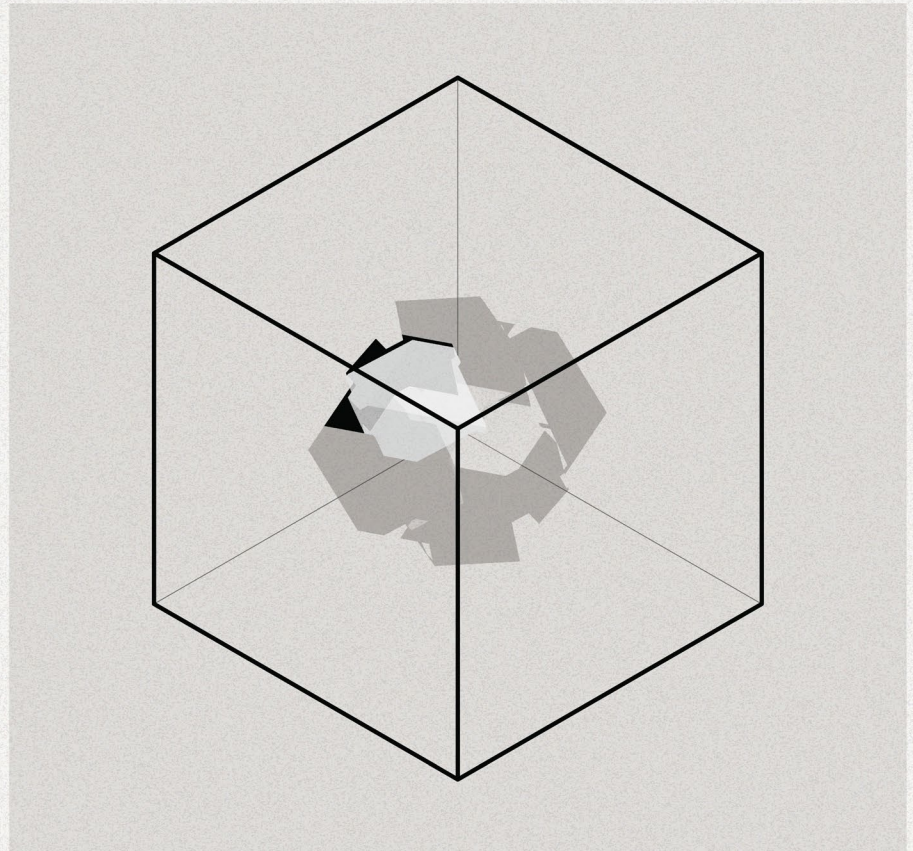
GENERATION I

The units resulting from the second-level subdivision form secondary functional zones along with an additional secondary framework.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	03
THE INTEGRATION	GENERATION II	



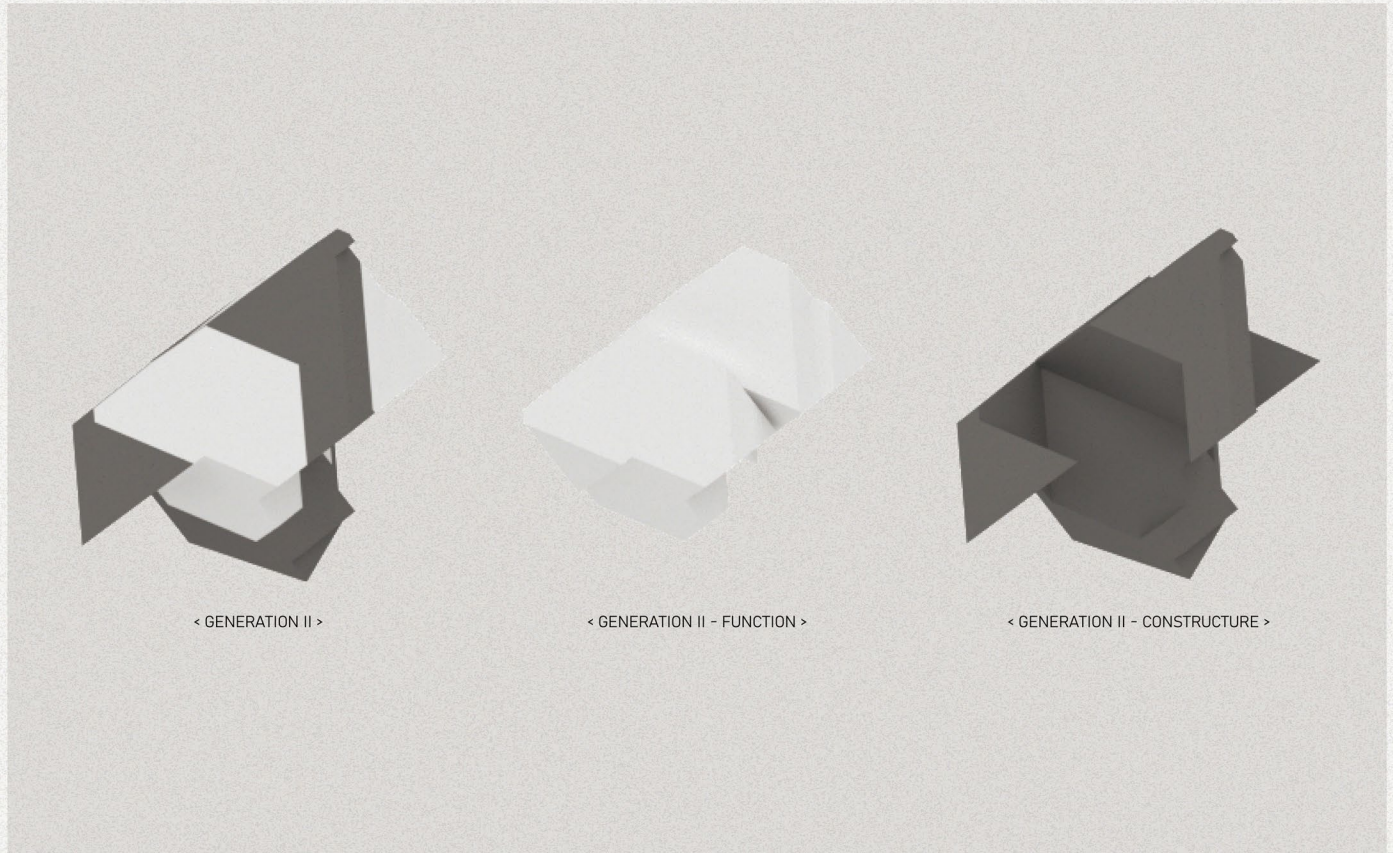
GII DECONSTRUCTING THREE VIEWS



GII DECONSTRUCTED POSITION

This involves a third-level subdivision of a single unit within a secondary functional zone.

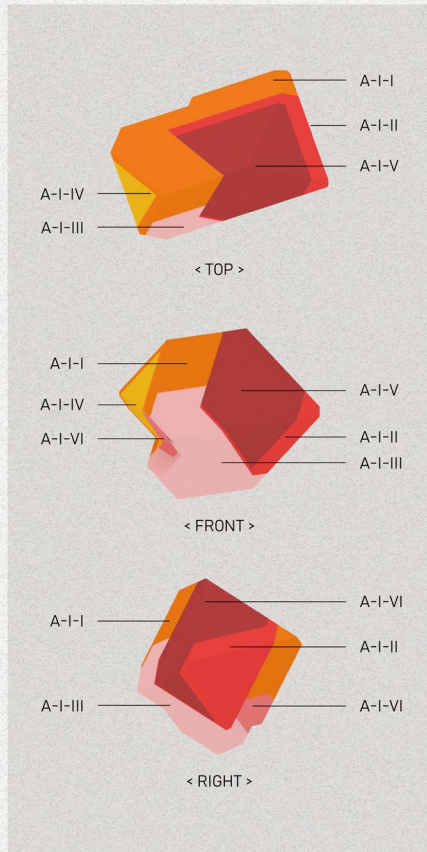
UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	04
THE INTEGRATION	GENERATION II	



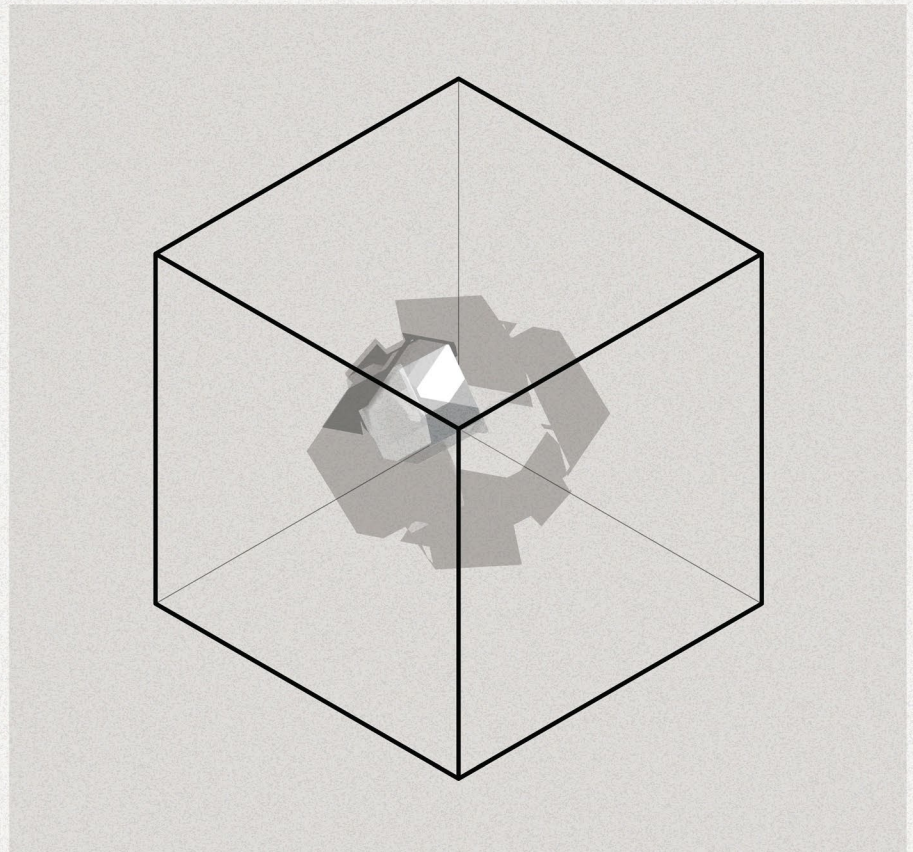
GENERATION II

The units resulting from the third-level subdivision form tertiary functional zones along with an additional tertiary framework.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	05
THE INTEGRATION	GENERATION III	



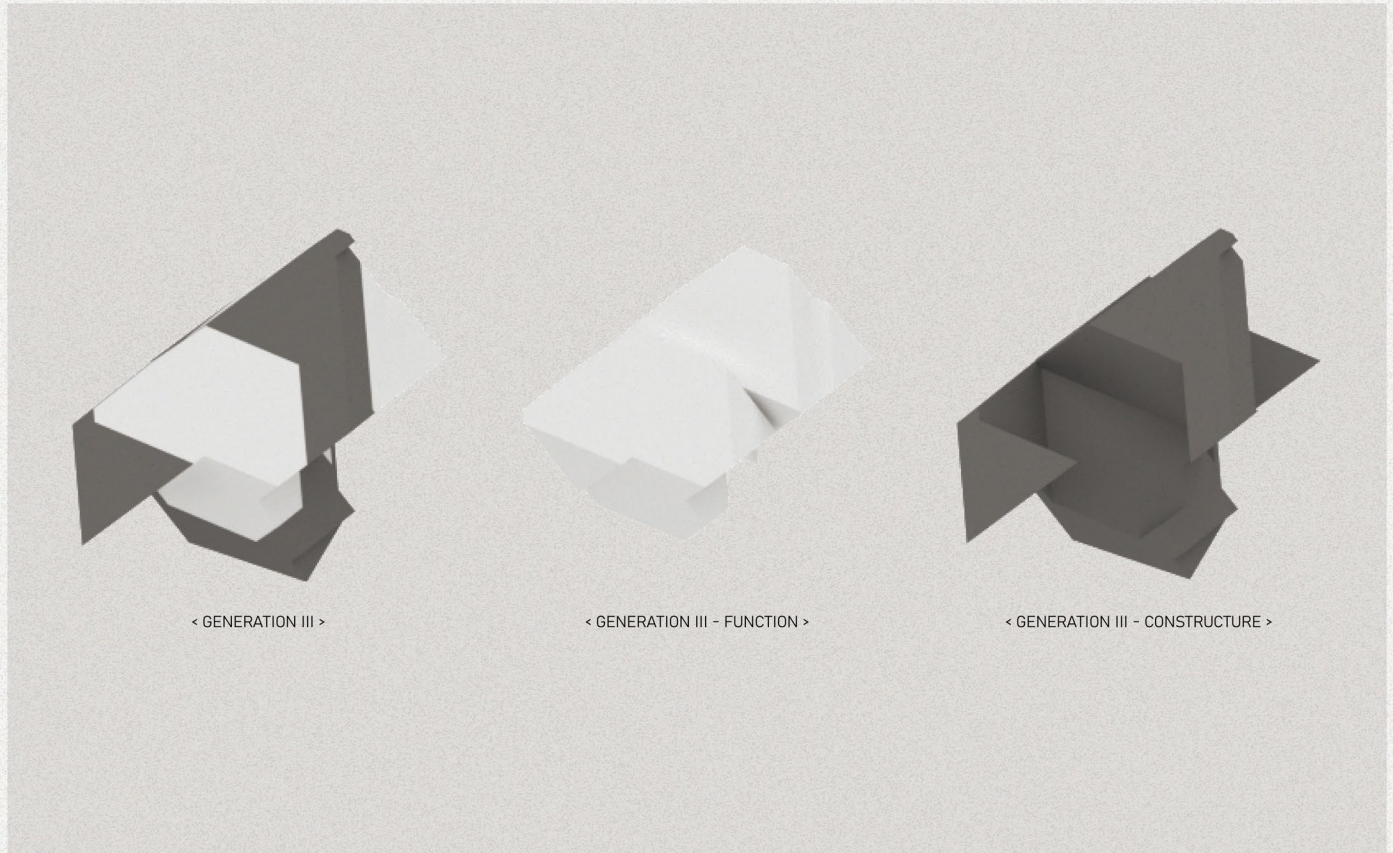
GENERATION III THREE VIEWS



GIII DECONSTRUCTED POSITION

This involves a fourth-level subdivision of a single unit within a tertiary functional zone.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	06
THE INTEGRATION	GENERATION III	



GENERATION III

The units resulting from the fourth-level subdivision form quaternary functional zones along with an additional quaternary framework.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	07
THE DECONSTRUCTED UNIT	GENERATION IV	



Reference Scale : Block

Imperial Unit : 0.03mi

Metric Unit : 50m

Tolerance : ± 50%

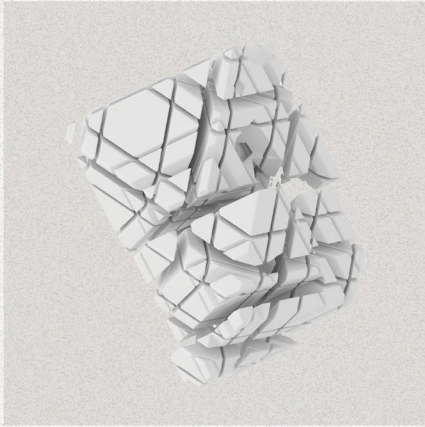
GENERATION III | LEFT

GENERATION IV - I | RIGHT



Once a cluster of sufficiently small units is achieved, it becomes necessary to consider richer urban textures.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	08
THE DECONSTRUCTED UNIT	GENERATION IV	



Scale Random : Off
Scale : 50m
Shape : Cube
Number : 15

Rotated Random : Off
X Rotated : 0°
Y Rotated : 0°
Z Rotated : 0°

GENERATION IV - I | LEFT

GENERATION IV - II | RIGHT



Using the block as a reference, the aim is to introduce more micro plazas within the space.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	09
THE DECONSTRUCTED UNIT	GENERATION IV	



Scale Random : Off
Scale : 50m
Shape : Cube
Number : 15

Rotated Random : Off
X Rotated : 30°
Y Rotated : 60°
Z Rotated : 120°

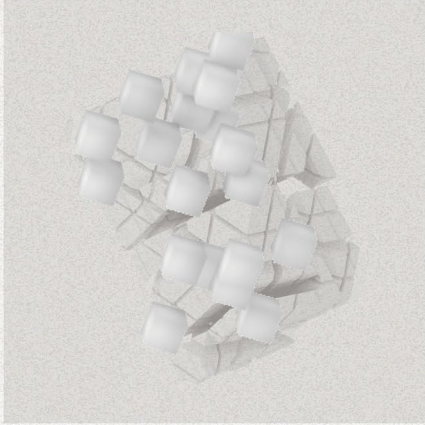
GENERATION IV - II | LEFT

GENERATION IV - III | RIGHT



Using the block as a reference, the aim is to introduce more micro plazas within the space.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	10
THE DECONSTRUCTED UNIT	GENERATION IV	



Scale Random : On
Scale : 50m ± 50%
Shape : Cube
Number : 15

Rotated Random : Off
X Rotated : 30°
Y Rotated : 60°
Z Rotated : 120°

GENERATION IV - III | LEFT

GENERATION IV - IV | RIGHT



Along with the fixed orientation, each micro plaza block is given a scale variation within a tolerance range.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	11
THE DECONSTRUCTED UNIT	GENERATION IV	



Scale Random : On
Scale : 50m ± 50%
Shape : Cube
Number : 15

Rotated Random : On
X Rotated : 30° ± 360°
Y Rotated : 60° ± 360°
Z Rotated : 120° ± 360°

GENERATION IV - IV | LEFT

GENERATION IV - V | RIGHT



As the micro plaza blocks are adjusted, additional orientations are introduced to each block for greater complexity.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	12
THE DECONSTRUCTED UNIT	GENERATION IV	

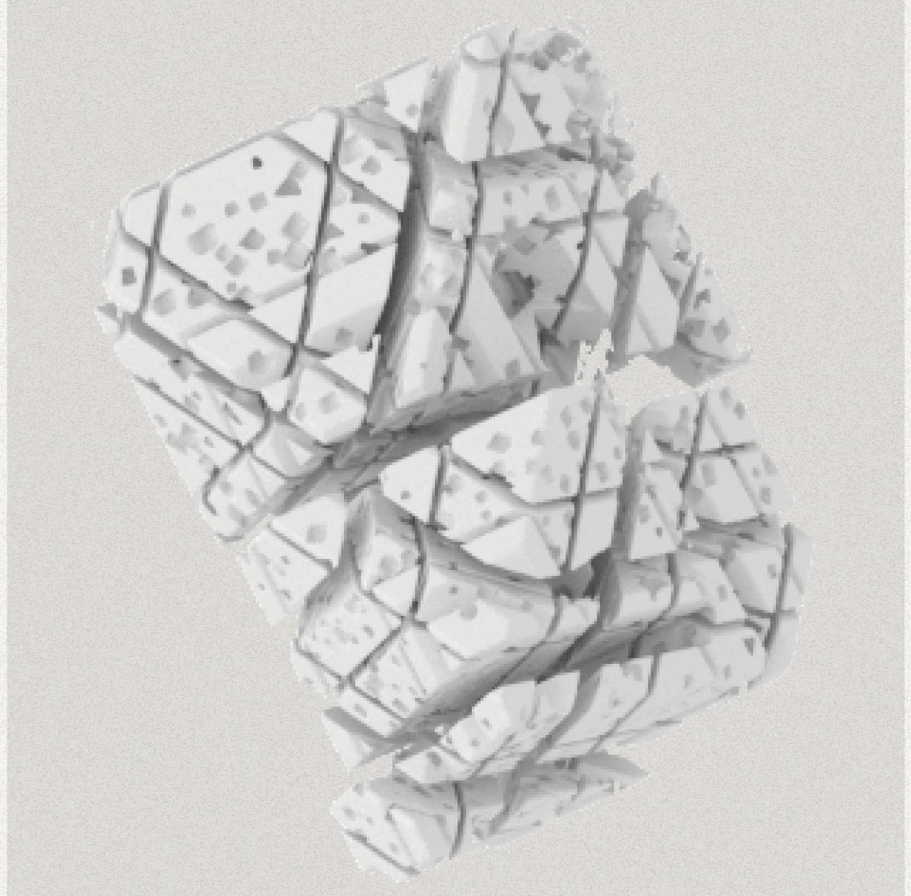


Scale Random : On
Scale : 50m ± 50%
Shape : Cube
Number : 15

Rotated Random : On
X Rotated : 30° ± 360°
Y Rotated : 60° ± 360°
Z Rotated : 120° ± 360°

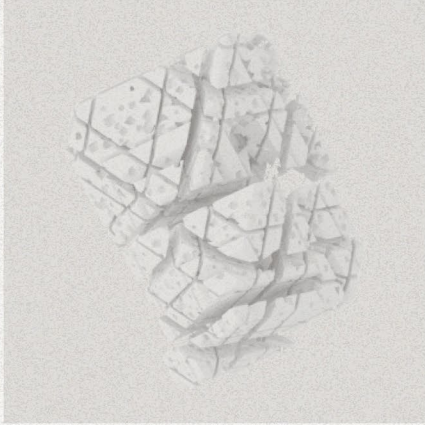
GENERATION IV - V | LEFT

GENERATION IV - VI | RIGHT



Perform Boolean subtraction between the framework and micro plazas, creating more negative spaces within the framework.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	13
THE DECONSTRUCTED UNIT	GENERATION V	



Reference Scale : Building
 Imperial Unit : 0.015mi
 Metric Unit : 25m
 Tolerance : ± 50%

Areas: 6

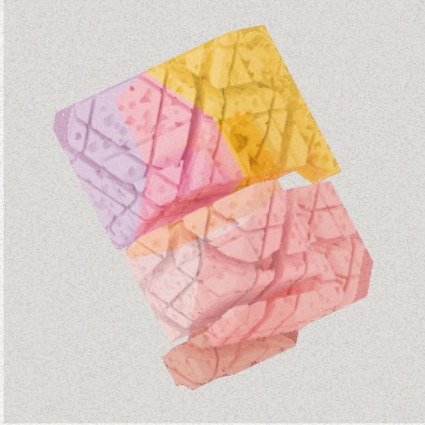
GENERATION IV - VI | LEFT

GENERATION V - I | RIGHT



Based on the cutting rules, the framework can be roughly divided into six distinct regions.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	14
THE DECONSTRUCTED UNIT	GENERATION V	

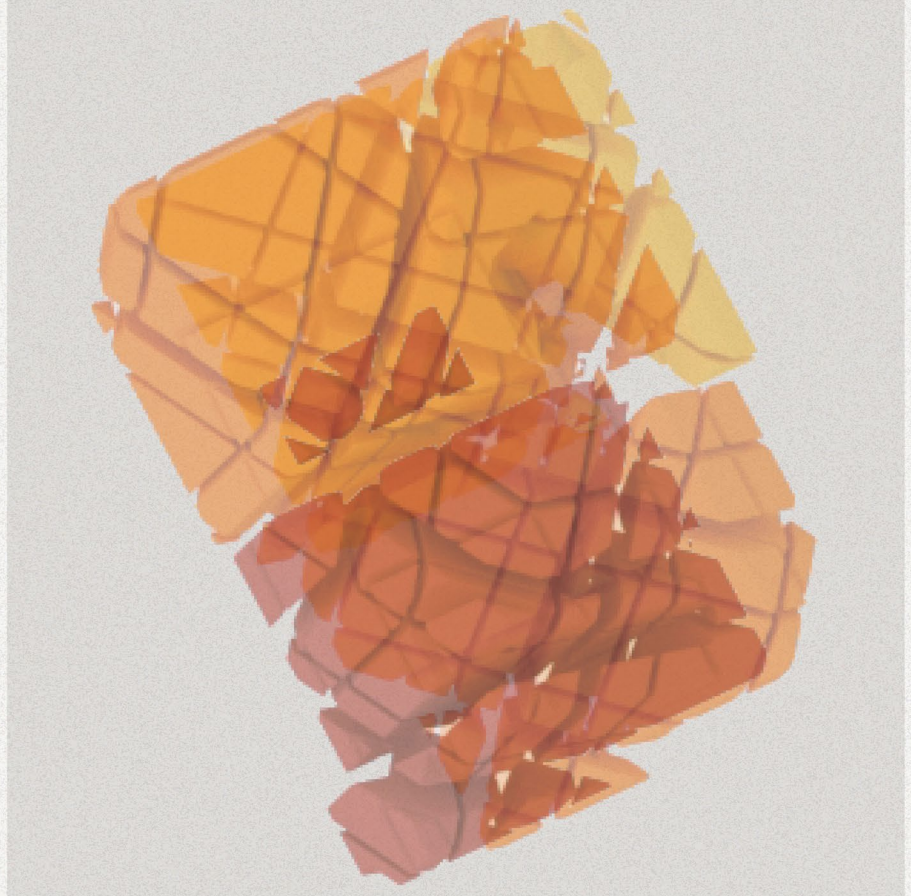


House Types: 3
Scale Random : Off
Scale1 : 15m
Scale1 : 20m
Scale1 : 25m

Rotated Random : Off
X Rotated : 30°
Y Rotated : 60°
Z Rotated : 120°

GENERATION V - I | LEFT

GENERATION V - II | RIGHT



According to the residential requirements of the 15-minute city theory, buildings need to have at least three types.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	15
THE DECONSTRUCTED UNIT	GENERATION V	

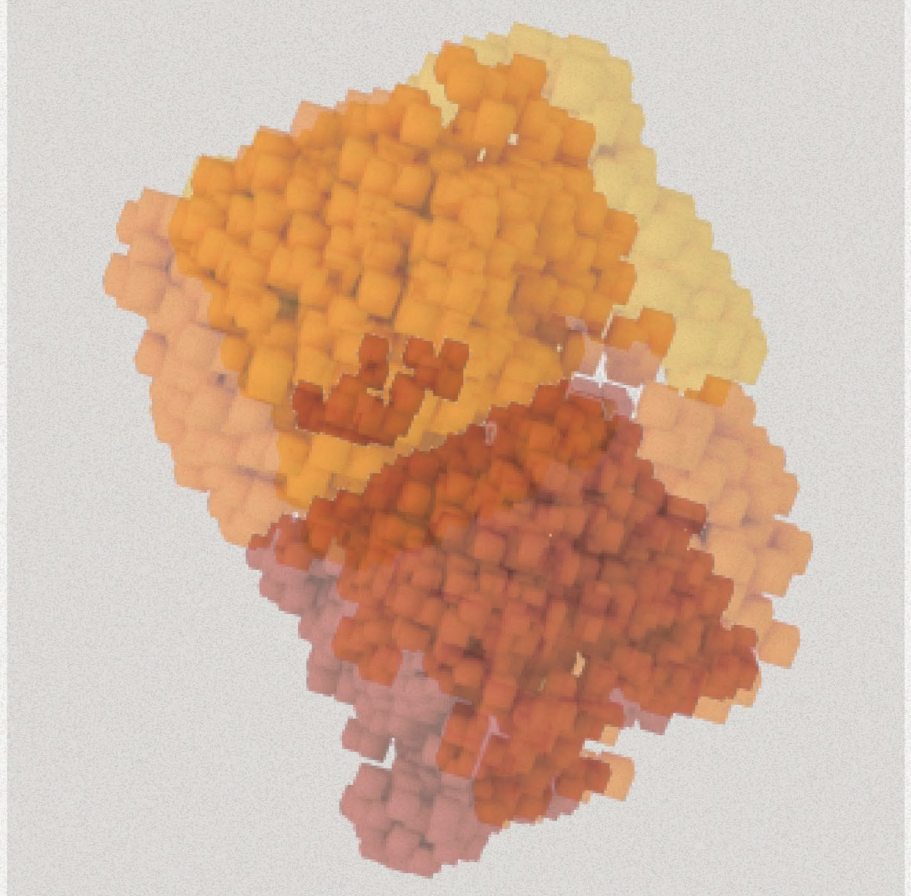


House Types: 3
Scale Random : Off
Scale1 : 15m
Scale1 : 20m
Scale1 : 25m

Rotated Random : Off
X Rotated : 30°
Y Rotated : 60°
Z Rotated : 120°

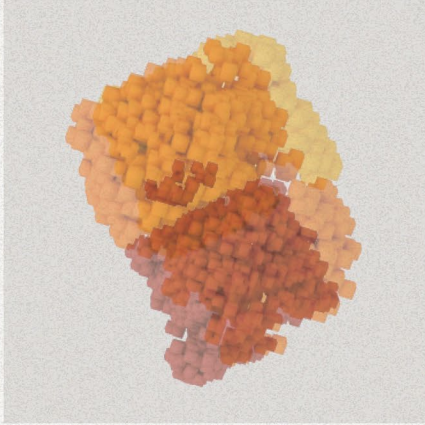
GENERATION V - II | LEFT

GENERATION V - III | RIGHT



Assign a fixed, uniform orientation to the three different types of buildings.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	16
THE DECONSTRUCTED UNIT	GENERATION V	

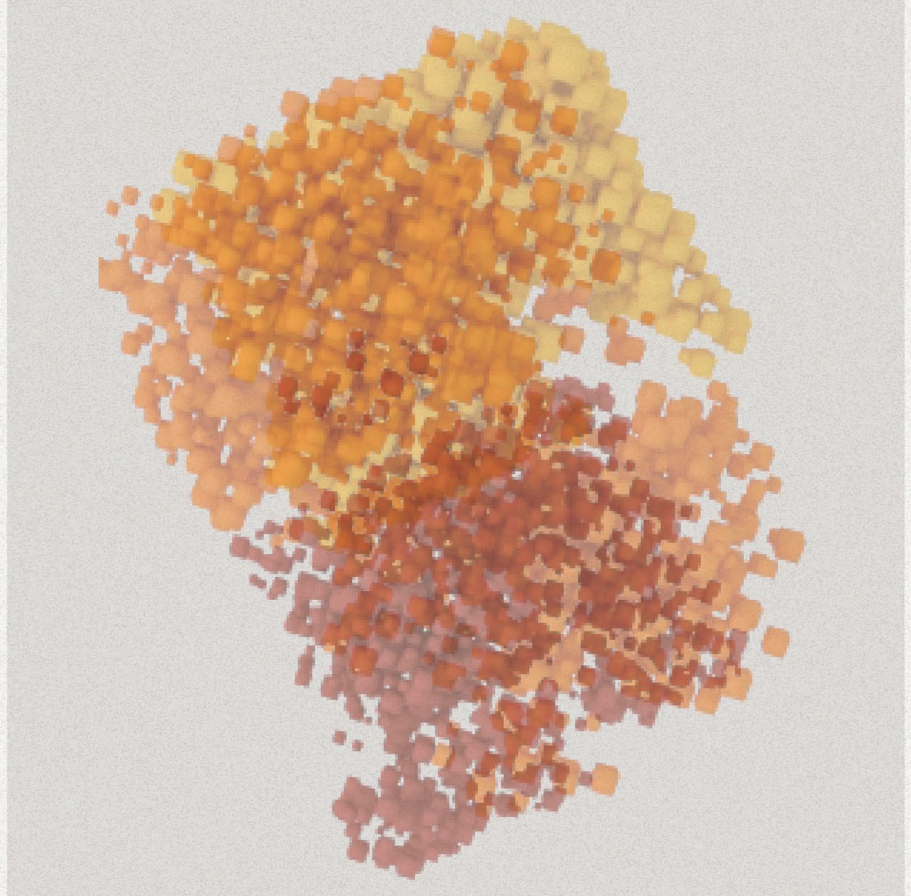


House Types: 3
Scale Random : On
Scale1 : 50m ± 50%
Scale1 : 50m ± 50%
Scale1 : 50m ± 50%

Rotated Random : Off
X Rotated : 30°
Y Rotated : 60°
Z Rotated : 120°

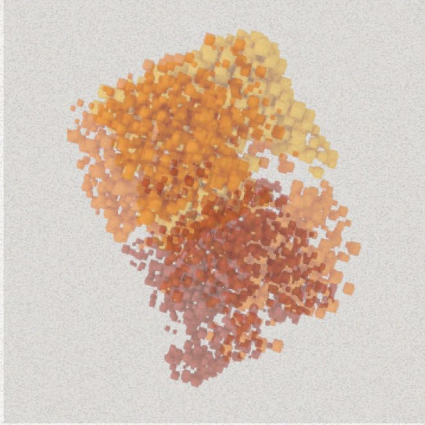
GENERATION V - III | LEFT

GENERATION V - IV | RIGHT



Along with the fixed orientation, each block of every building type is given scale variation within a tolerance range.

UAL ISD	GRIDCLAST	
CHAPTER III	THE SPHERE	17
THE DECONSTRUCTED UNIT	GENERATION V	

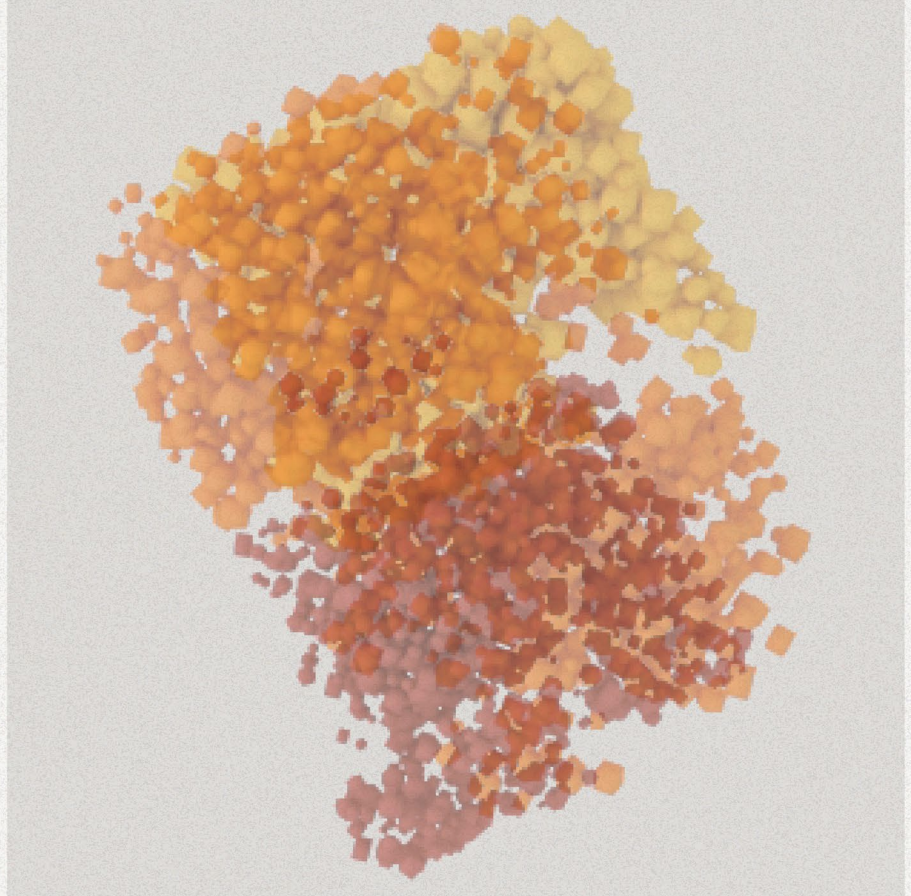


House Types: 3
Scale Random : On
Scale1 : 50m ± 50%
Scale1 : 50m ± 50%
Scale1 : 50m ± 50%

Rotated Random : On
X Rotated : 30° ± 360°
Y Rotated : 60° ± 360°
Z Rotated : 120° ± 360°

GENERATION V - IV | LEFT

GENERATION V - V | RIGHT



While adjusting each block of every building type, additional orientations are assigned to each block for greater complexity.

INTEGRATION SECTION

Section X.

Generation.

Generation V

X - Orient.

90°

Y - Orient.

0°

Z - Orient.

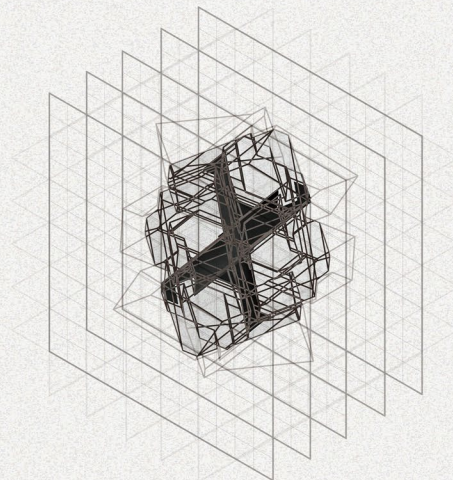
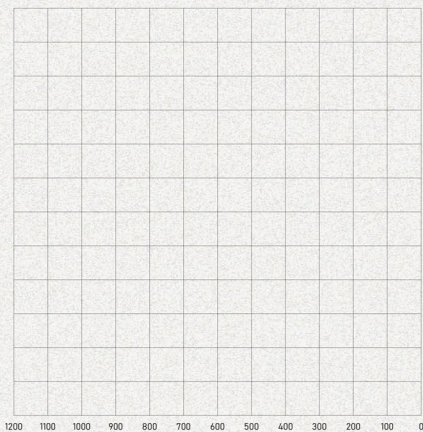
0°

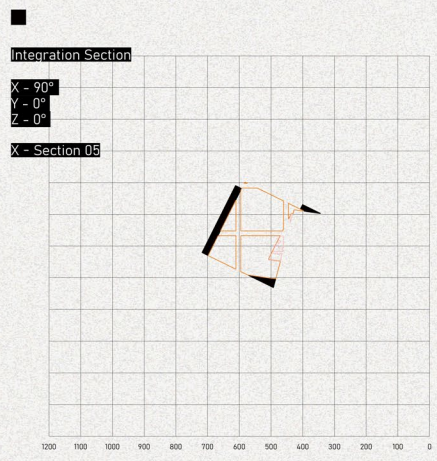
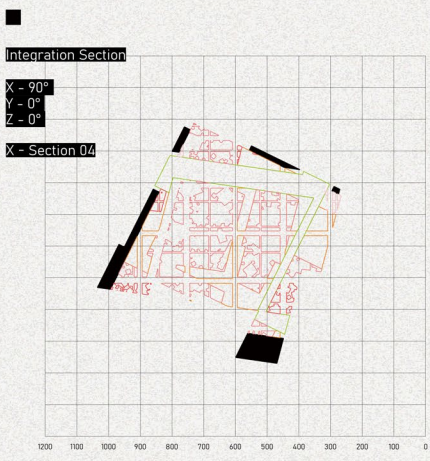
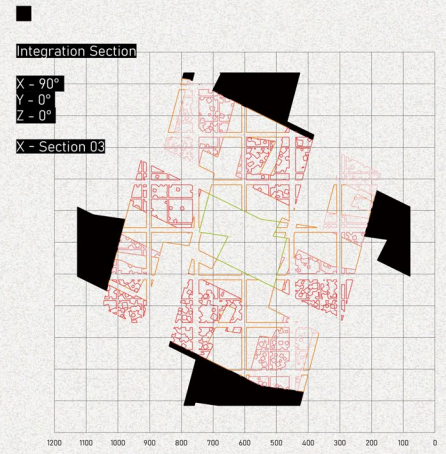
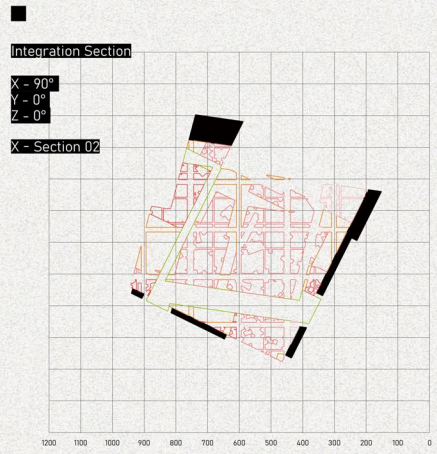
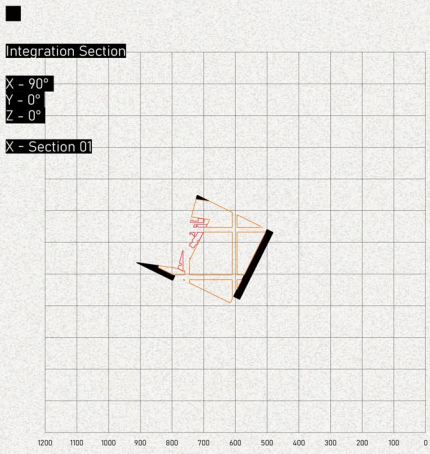
Scale.

1 : 40000

Operator.

Zifeng Tan





- Frame
- Central Park
- Grocery Store / Merchandise/ Public School
- Low-density Residential Area
- Medium-density Residential Area
- High-density Residential Area

INTEGRATION SECTION

Section Y.

Generation.

Generation VI

X - Orient.

0°

Y - Orient.

90°

Z - Orient.

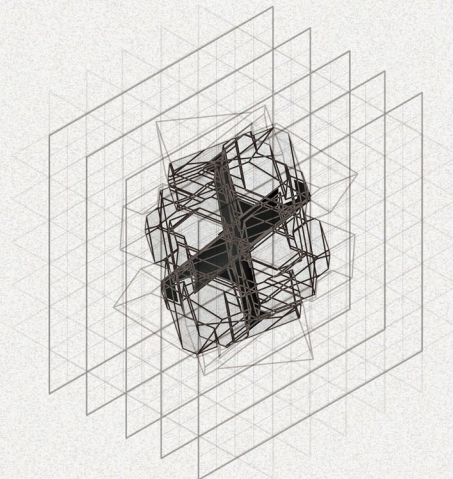
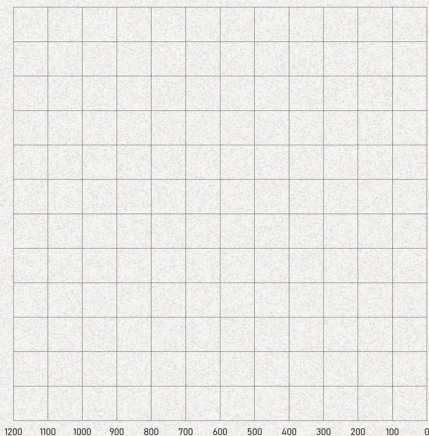
0°

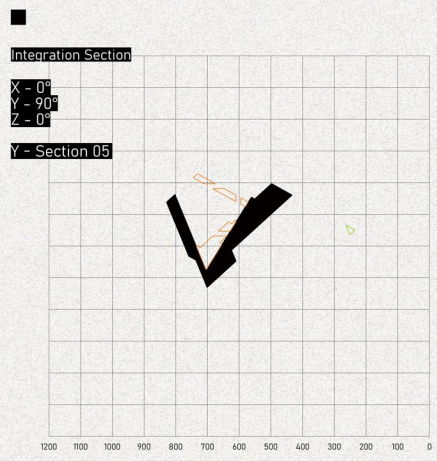
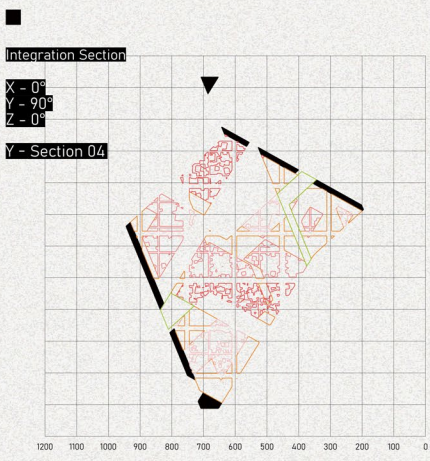
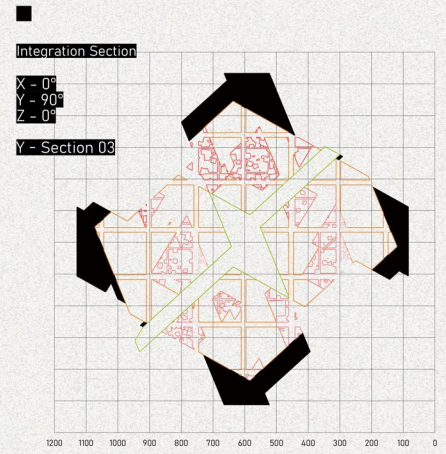
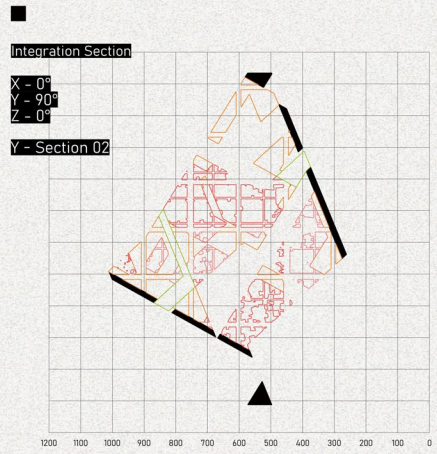
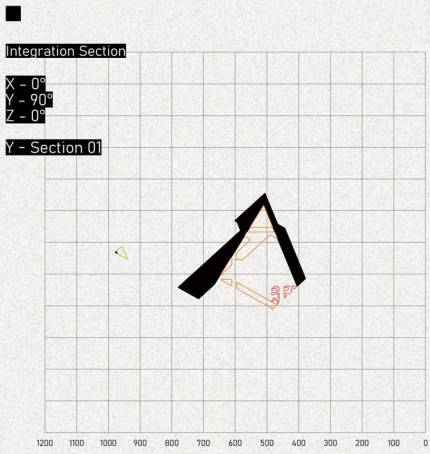
Scale.

1 : 40000

Operator.

Zifeng Tan





- Frame
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- Medium-density Residential Area
- High-density Residential Area

INTEGRATION SECTION

Section Z.

Generation.

Generation VI

X - Orient.

0°

Y - Orient.

0°

Z - Orient.

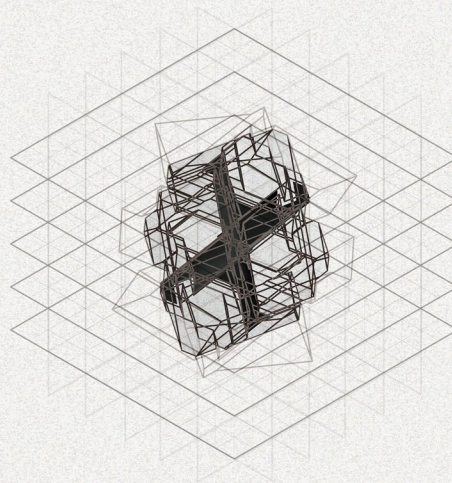
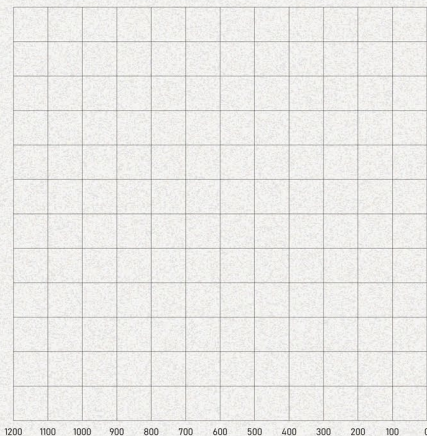
90°

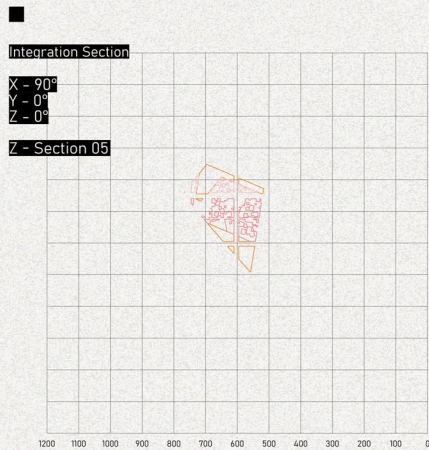
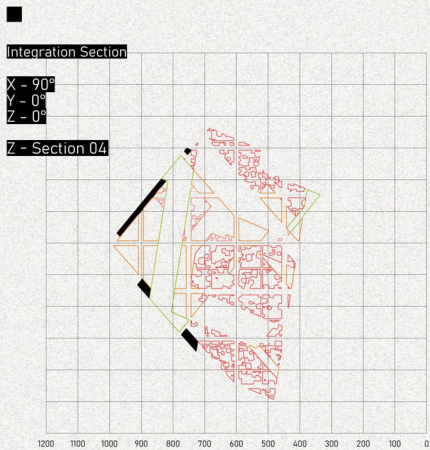
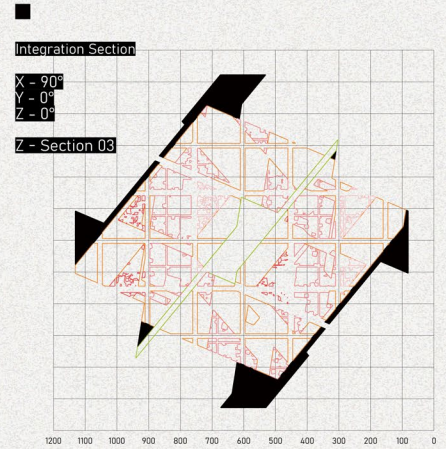
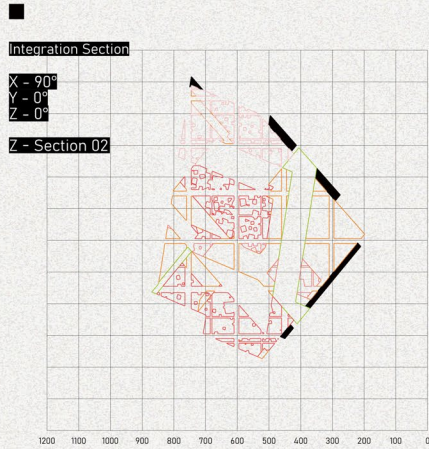
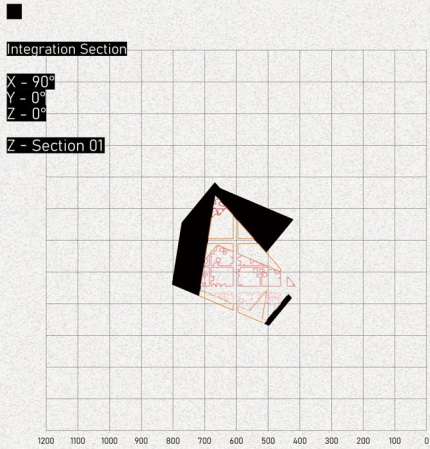
Scale.

1 : 40000

Operator.

Zifeng Tan





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