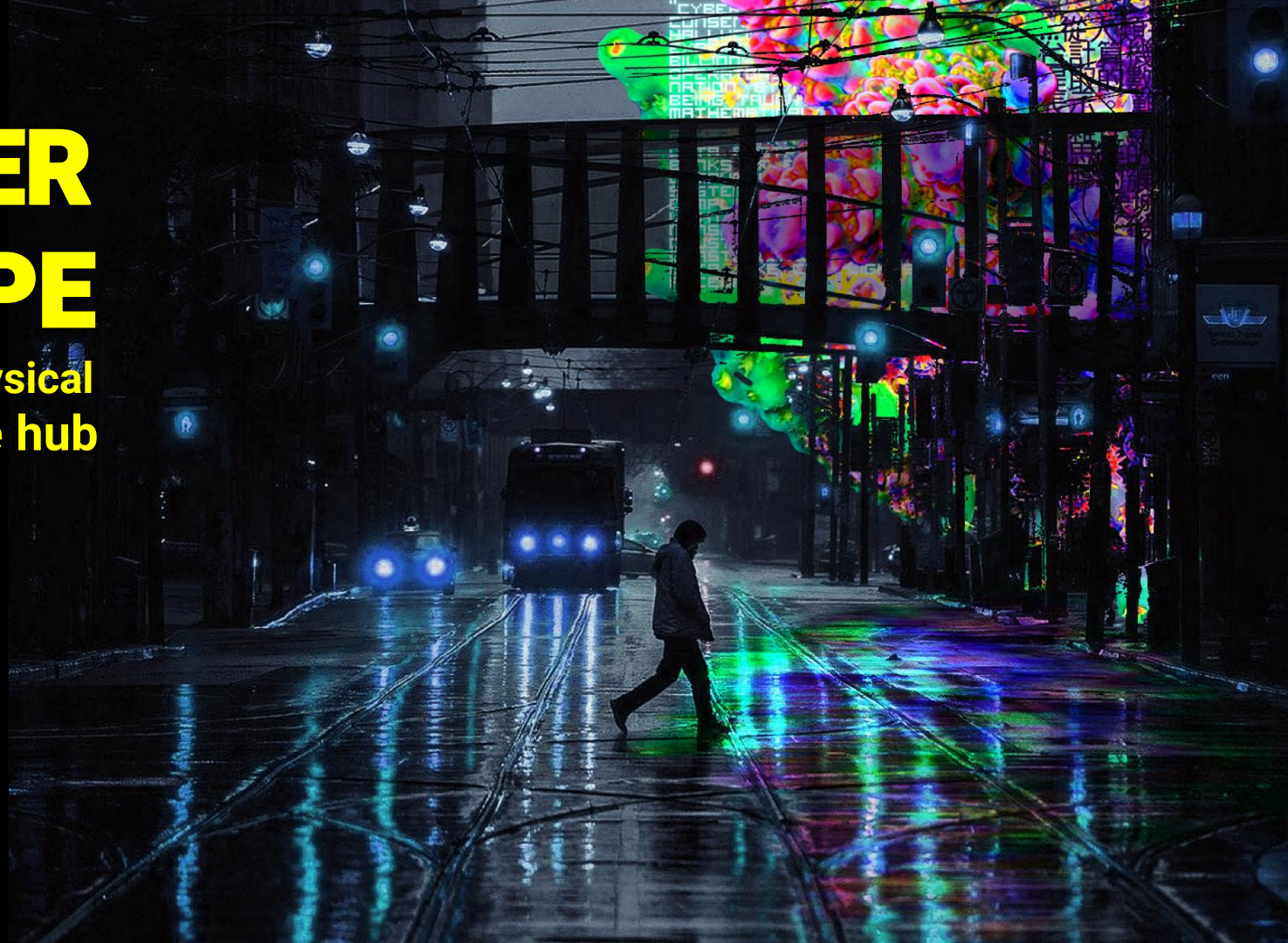


CYBER SCAPE

A cyber-physical
interactive hub

P5

Yongyi Wu
Robotic Building



1# Context: The Dual Identity of Contemporary Urban Life

2# Theory: Digital Media as Extensions of Human and Space

3# Experiment: A category of interaction

4# Program: The Postmodern Urbanite's Journey

5# Concept: Skin and organs

6# Design: An alien in the downtown

7# Materialization: Two fragments

Reflection

#1 Context: The Dual Identity of Contemporary Urban Life



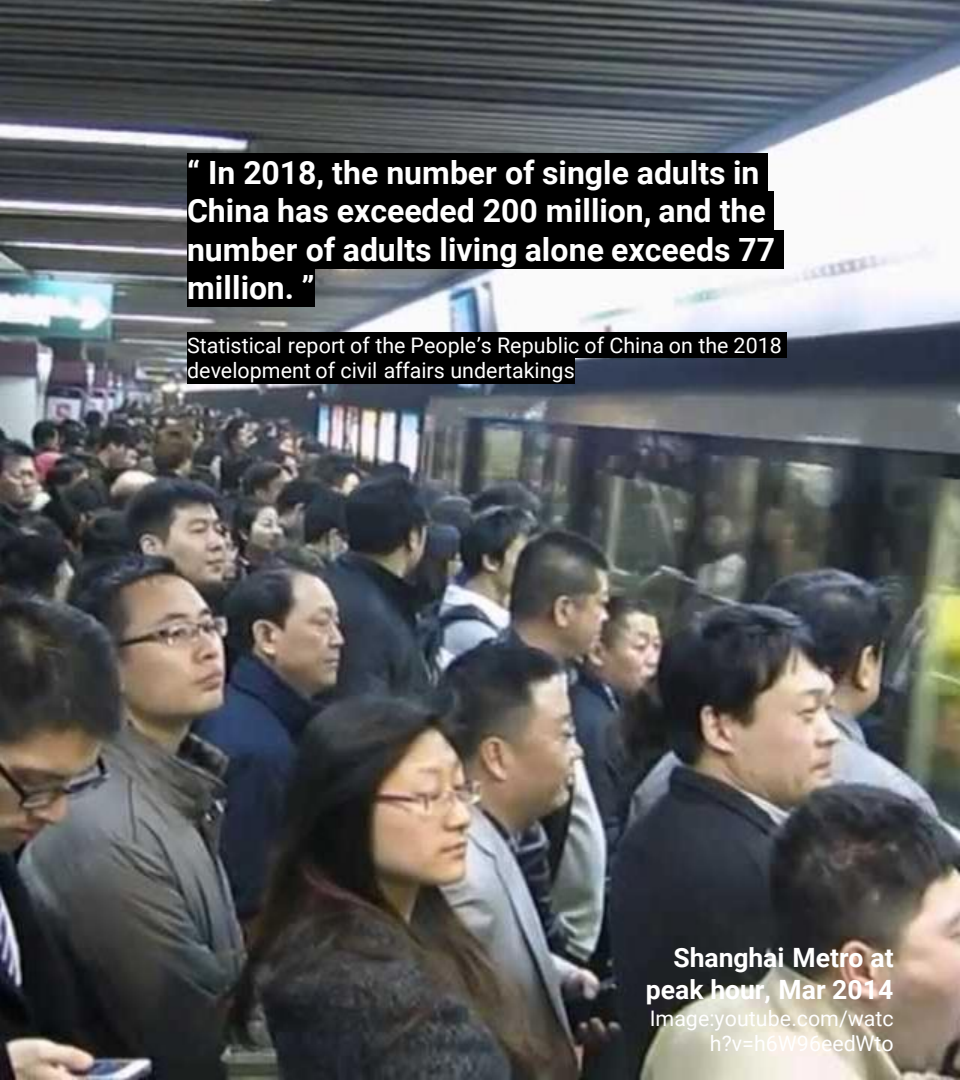
“Ouyang Shitong
in Shanghai”
Image: Ouyang Shitong



“Ouyang Shitong
in The Droughts”
Image: Ouyang Shitong/
Borderlands 3

“ In 2018, the number of single adults in China has exceeded 200 million, and the number of adults living alone exceeds 77 million. ”

Statistical report of the People’s Republic of China on the 2018 development of civil affairs undertakings



Shanghai Metro at peak hour, Mar 2014
Image: youtube.com/watch?v=h6W96eedWto

“ The 619.5 million players in China will spend \$37.9 billion in 2018, which makes it the biggest games market in the world. ”

China Games Market 2018, newzoo.com



Visitors play Xbox One during the 12th ChinaJoy
image: alamy.com

Daily Hours Spent with Digital Media per Adult User

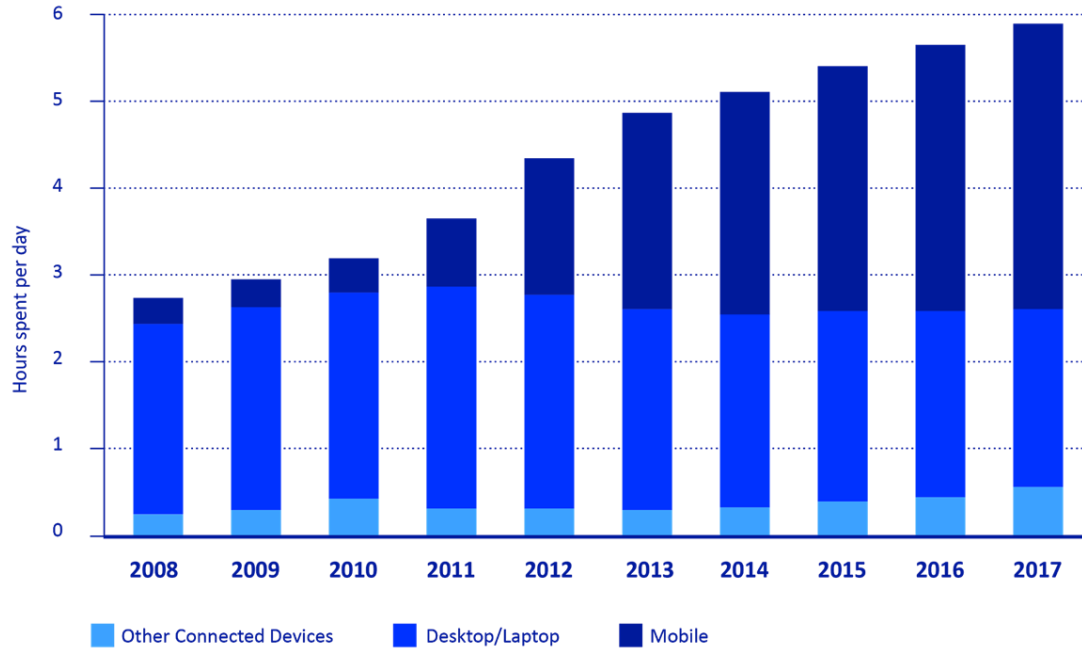


Chart2

Image:Yongyi Wu
Source: Internet Trends
2018, Kleiner Perkins



TECH

This Guy Spent an Entire Week in a VR Headset. Here's How It Went Down

F VICTOR TANGERMANN, FUTURISM
18 MAR 2019

Jak Wilmot, the co-founder of Atlanta-based VR content studio Disrupt VR, spent 168 consecutive hours in a VR headset - that's a full week - pent up in his apartment.

"This is quite possibly the dumbest thing I've ever done, but welcome to a week in the future," he said in a video about the experiment.

THE MEDIUM
IS THE
MESSAGE

THE MEDIUM
IS THE
MESSAGE

THE MEDIUM
IS THE
MESSAGE

THE MEDIUM
IS THE
MESSAGE

THE MEDIUM
IS THE
MESSAGE

#2 Theory:

Digital Media as Extensions of
Human and Space



THE MEDIUM
IS THE
MESSAGE

THE MEDIUM
IS THE
MESSAGE

THE MEDIUM
IS THE
MESSAGE

THE MEDIUM
IS THE
MESSAGE

"The media is the message"

Understanding Media: The Extensions of Man(1964),

Marshall McLuhan

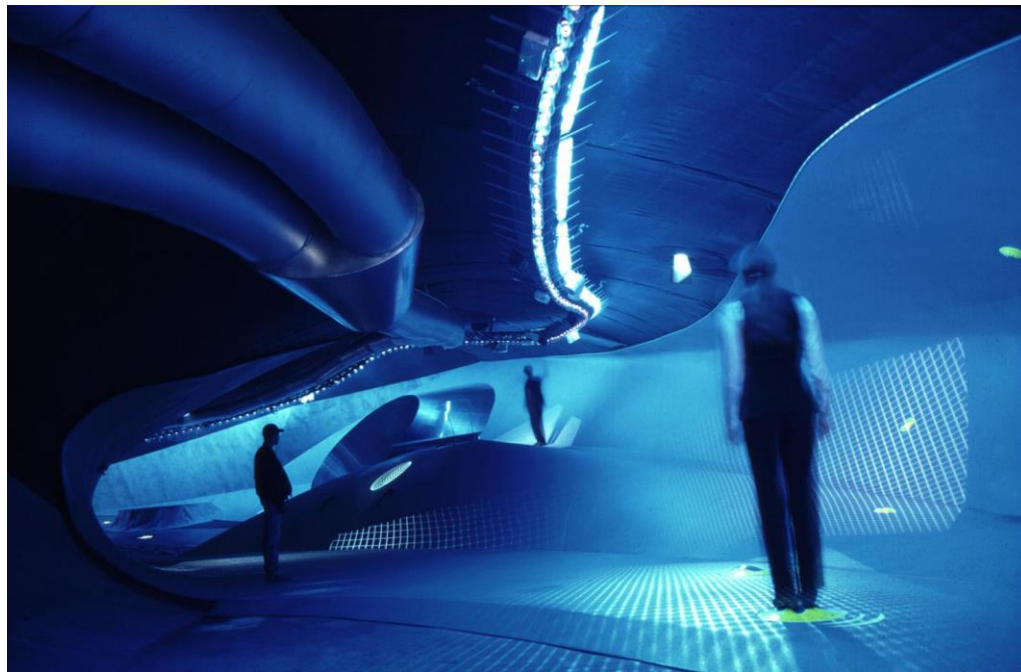
“Centuries ago, matter was defined by two dimensions: mass and energy.” “Today there comes a third one to it: information.... Today, information counts more than mass and energy. The third dimension of matter takes the place of the thing itself.” **“Any kind of matter is about to vanish in favor of information.”**

“Architecture is just about to loose everything that characterized it in the past. Step by step it looses all its elements. **In some way, you can read the importance given today to glass and transparency as a metaphor of the disappearance of matter.** It anticipates the media buildings in some Asian cities with facades entirely made of screens. In a certain sense, the screen becomes the last wall. No wall out of stone, but of screens showing images. The actual boundary is the screen.”

Architecture in the age of its virtual disappearance: an interview with Paul Virilio, Andreas Ruby, 1993



National Day light shows in Chinese cities, 2019
Images from internet



the Water Pavilion, Lars Spuybroek(NOX), 1997

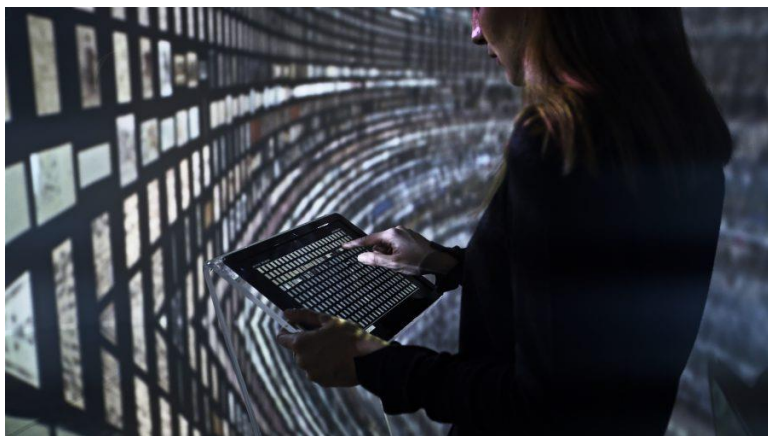


Hyposurface, dECOj, 2001





Blur building, Diller Scofidio + Renfro, 2002



Archive Dreaming, Refik Anadol Studio, 2017

<https://awards.mediaarchitecture.org/mab18/project/4>



"Forest of Light", Sou Fujimoto, 2016



'Thresholds' at National Science and Media Museum, Mat Collishaw, 2018

Recreate William Henry Fox Talbot's first photography exhibition in 1839

<https://www.scienceandmediamuseum.org.uk/what-was-on/thresholds>

#3 Experiment: A category of interaction



“Architects of the twenty-first century will shape, arrange, and connect spaces (both real and virtual) to satisfy human needs. They will still care about the qualities of visual and ambient environment.

They will still seek commodity, firmness, and delight. **But commodity will be as much a matter of software functions and interface design as it is of floor plans and construction materials. Firmness will entail not only the physical integrity of structural systems, but also the logical integrity of computer systems.** And delight? Delight will have unimagined new dimensions”

Mitchell, W. 1995, City of Bits: Space, Place, and the Infobahn, MIT Press, Massachusetts

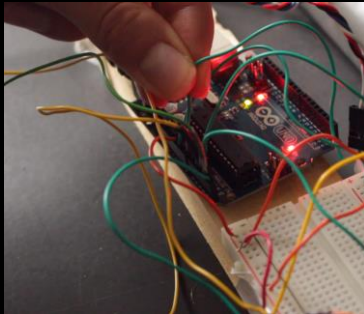
Workshop #1
Interactive shading



Workshop #1

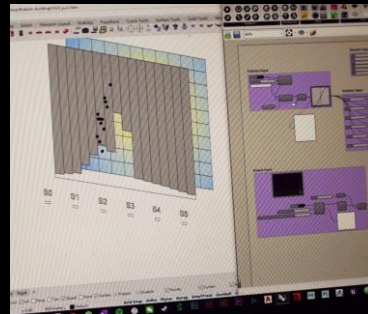
Interactive shading

1/What's input and how to capture it?



Light/Human movement;
Light sensor+Arduino/Kinect

2/What's the mechanism?



Transform sign to digital, produce a
response corresponding to the digital
signal in Rhino/Grasshopper

3/What's the result?



Responded animation;
projector

4/What's the social/architectural meaning of the result or the process itself?



Interactive shading; Interactive facade

Category

0-Public Interface



1-Cafe



3-Co-work/Startup



4-Event



5-Exhibition

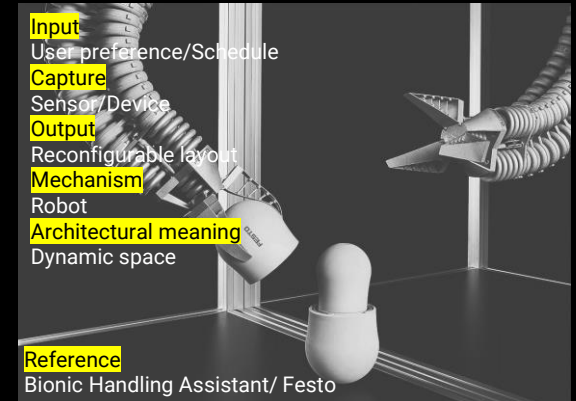
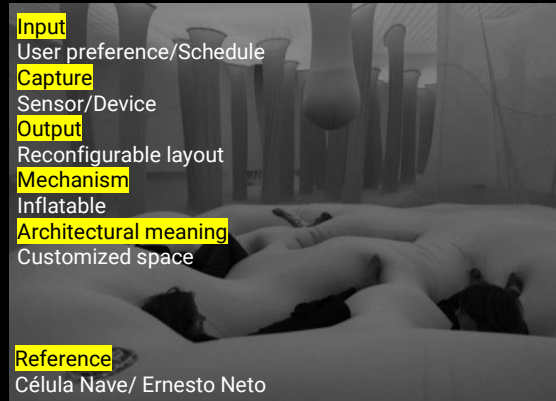
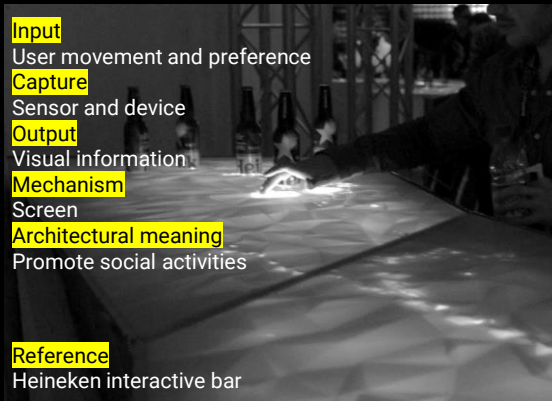
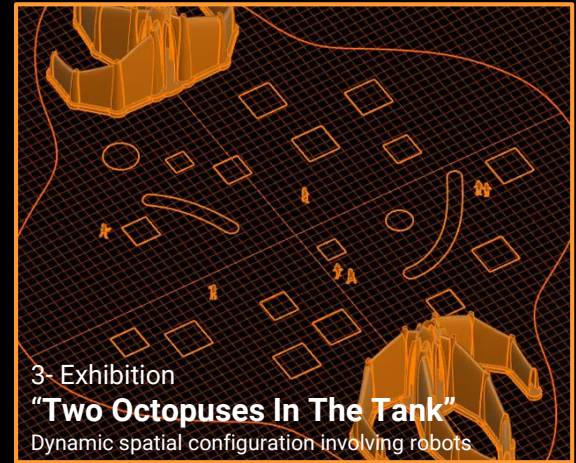
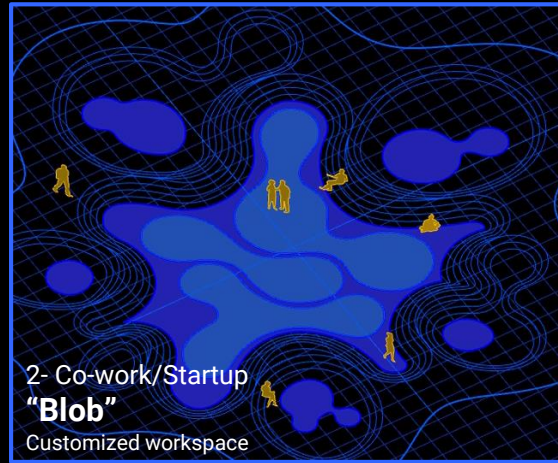


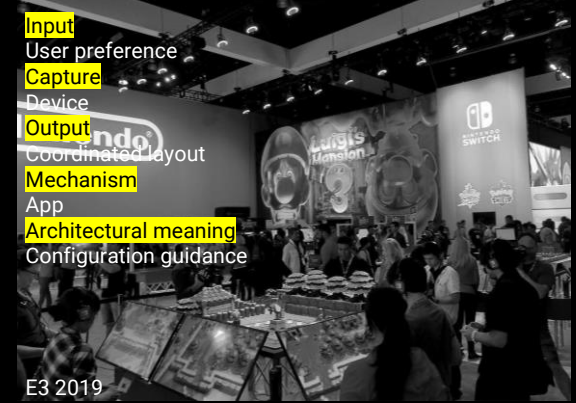
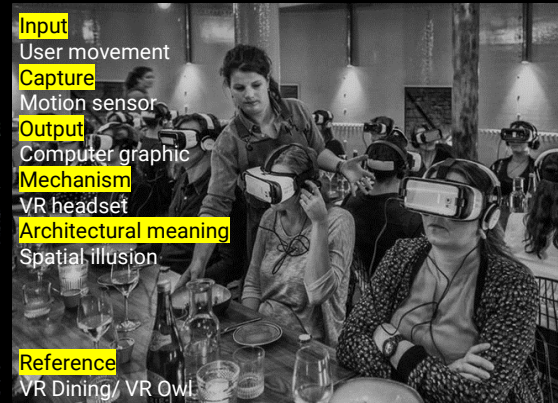
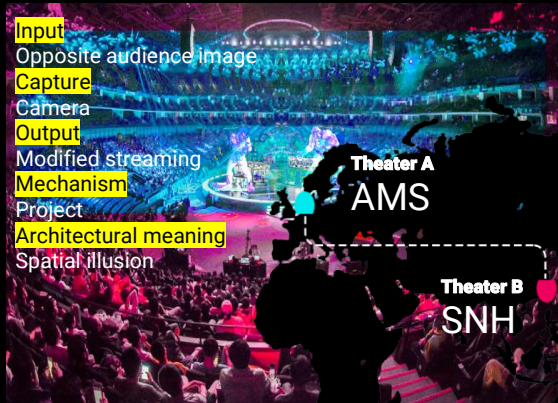
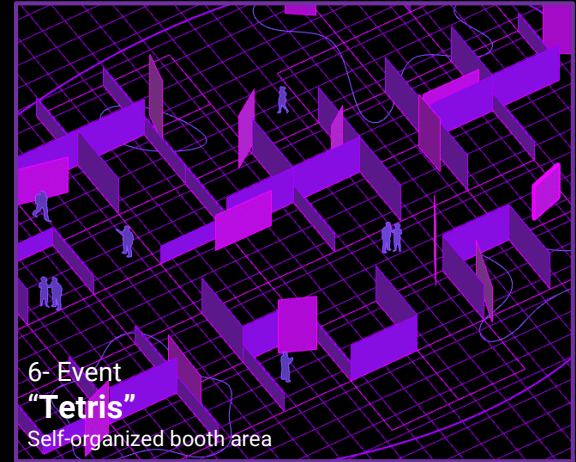
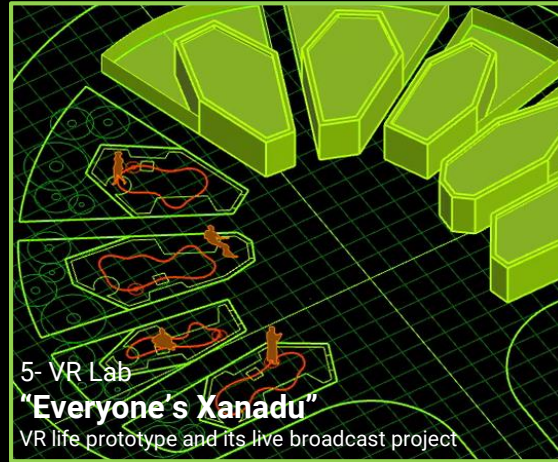
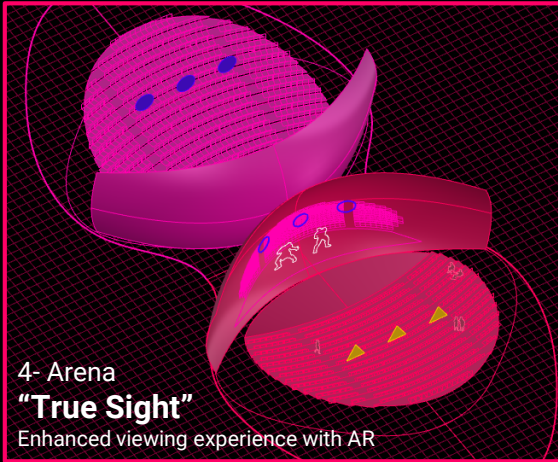
6-Aerna



7-VR Lab







Category

0-Public Interface



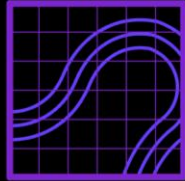
1-Cafe



2-Co-work/Startup



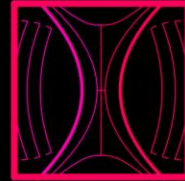
3-Event



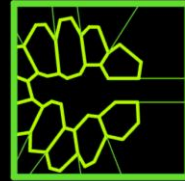
4-Exhibition



5-Aerna



6-VR Lab



Input	User movement and preference	User preference/Schedule	User preference	User preference/Schedule	Opposite audience image	User movement
Capture	Sensor and device	Sensor/Device	Device	Sensor/Device	Camera	Motion sensor
Output Reality	Visual information	Reconfigurable layout	Coordinated layout	Reconfigurable layout	Modified streaming	Computer graphic Virtuality
Mechanism	Screen	Inflatable	App	Robot	Project	VR headset
Meaning	Promote social activities	Customized space	Configuration guidance	Dynamic space	Spatial illusion	Spatial illusion

太平洋百货

#4 Program: The Postmodern Urbanite's Journey



1



Courier/Takeout guy

Manpower to compensate for the physical distance between cyberspace

2



Programmer

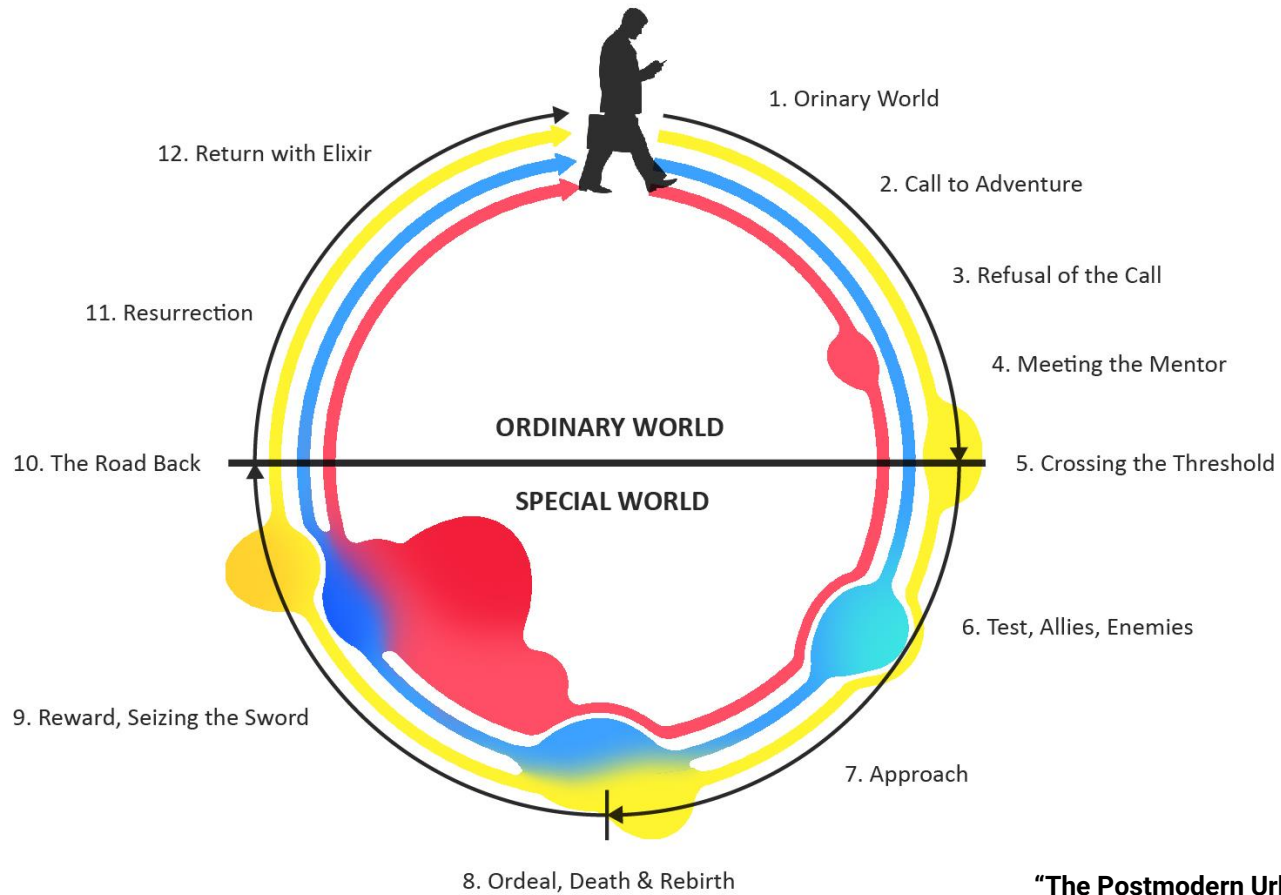
Builder of all virtual worlds

3



We media/Streamer

Amateur star in the Internet age



"The Postmodern Urbanite's Journey"

Joseph Campbell, 1949
Christopher Vogler, 2007
Image: Yongyi Wu

April 26th, 2024. There was a game in the arena of the new interactive hub in S city that night



Courier/Takeout guy

Manpower to compensate for the physical distance between cyberspace

Takeout guy

1. I got an order from a restaurant in the downtown called Interactive Hub. This was my first ride to that place. After arriving, I didn't know how to go at first ...

2. The custom was in a room like an office but not the same. A lot of people are chatting and working there ... **Co-work/Startup**

3. After my delivery, I was attracted by a mysterious room in the building ... **Exhibition**

Programmer Hello, Cyber Stranger

1. The metro was still crowded on Sunday. I bought a ticket for tonight's game in the new building downtown called Interactive Hub. What a strange name. I need to go there because I need to meet someone I just knew from a gaming forum ...

2. I found a safe in this building that talks about our jobs and it was a strange ...

3. The stranger introduced to me a place which is also in this building. He told me he is making his own indie game and asks if we want to join him. Sounds attractive to me but I already got a well-paid job. We discussed a lot and ordered some food at dinner time ... **Co-work/Startup**

4. Then we came to the arena. Great experience. I've had a great day. Maybe I should start to do something I really like ... **Arena**

Ep1

Ep2 Encounter

Ep3 Blob

Ep5

Ep4

Tetris

Ep6 Championship Night

Streamer

1. I had a show at the opening ceremony of the final in the new building downtown called Interactive Hub. My assistant drove me to the parking lot here ...

2. Before the final, there was an event I need to show up ... **Event**

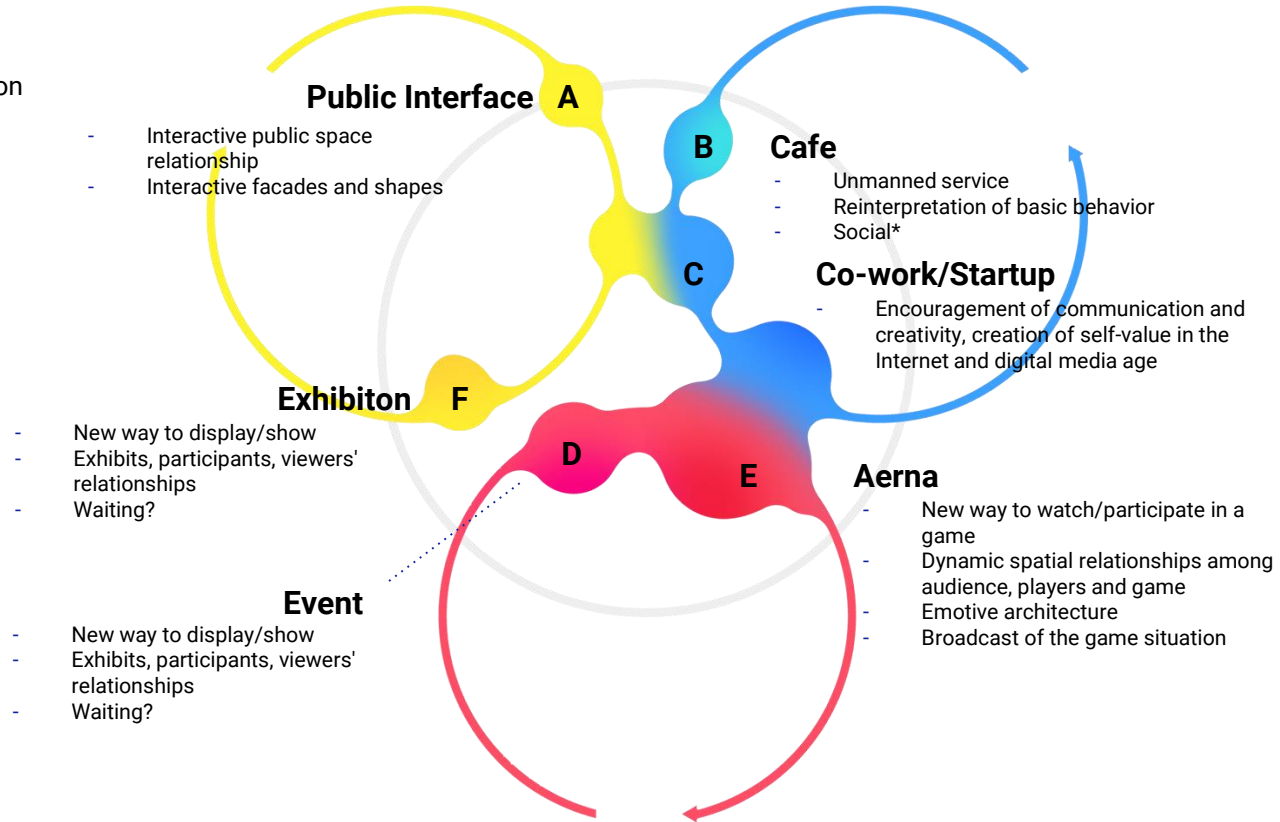
3. The arena here is very special, I think the audience like my show ... **Arena**

We media/Streamer

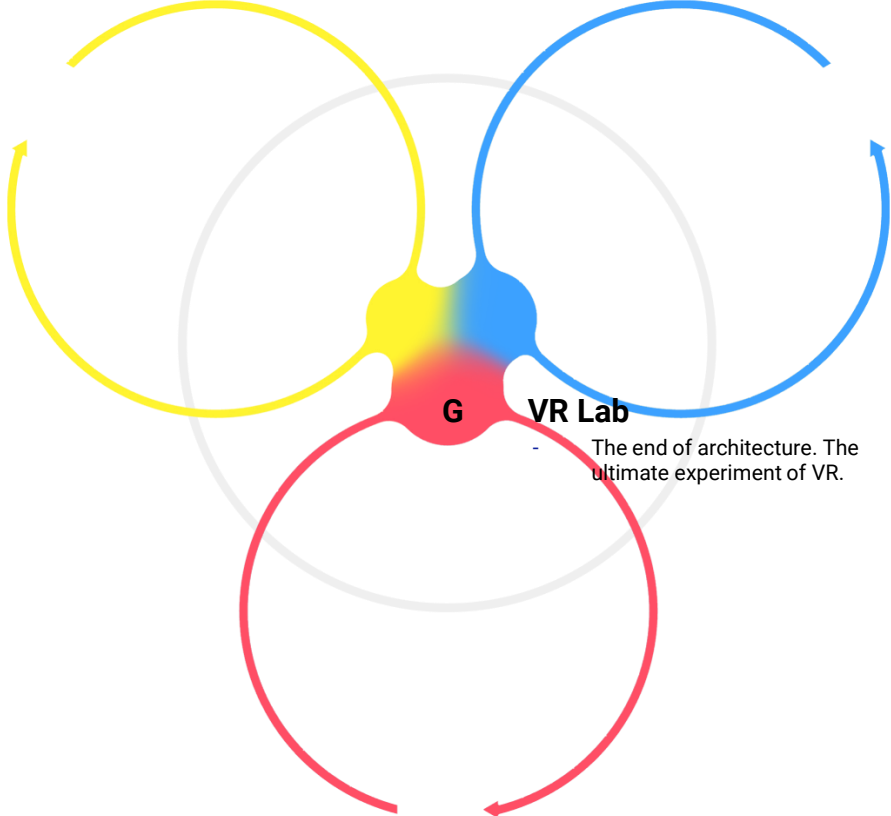
Amateur star in the Internet age



Narrative
-> Behavior
-> Interaction
-> Result ->
Narrative



Narrative
-> Behavior
-> Interaction
-> Result ->
Narrative



Cyberscape: a cyber-physical interactive hub

... is an urban cultural complex with the theme of interactive media, including functional spaces such as exhibitions, interactions, game events, esports, creative workshop, sales, and cafe, let visitors learn and create the knowledge, applications and trends of internet.

... its exterior and interior design embed cyber-physical system and show the characteristics and interactivity of the cyberspace to get the unity of theme and space experience.

... as a cyber dominant zone, it serve as a prototype to illustrate the possible impact of the Internet on society and lifestyle in the future.

1. Public Interface 1450 m²

- 1.1. Lobby 1000 m²
- 1.2. Elevator hall 300 m²
- 1.3. Entrance 150 m²

2. Cafe 600 m²

- 2.1. Dining area 500 m²
- 2.2. Kitchen 100 m²

3. Co-work/Startup 1350 m²

- 3.1. Work area 1000 m²
- 3.2. Meeting room 300 m²
- 3.4. Pantry room 50 m²

4. Event 2500 m²

- 4.1. Booth area 2300 m²
- 4.2. Retail area 200 m²

5. Exhibition 2000 m²

- 5.1. Showroom 1500 m²
- 5.2. Storage 500 m²

6. Arena 3200 m²

- 6.1. Auditorium 1600 m²
- 6.2. Circulation space 800 m²
- 6.3. Stage 400 m²
- 6.4. Backstage 400 m²

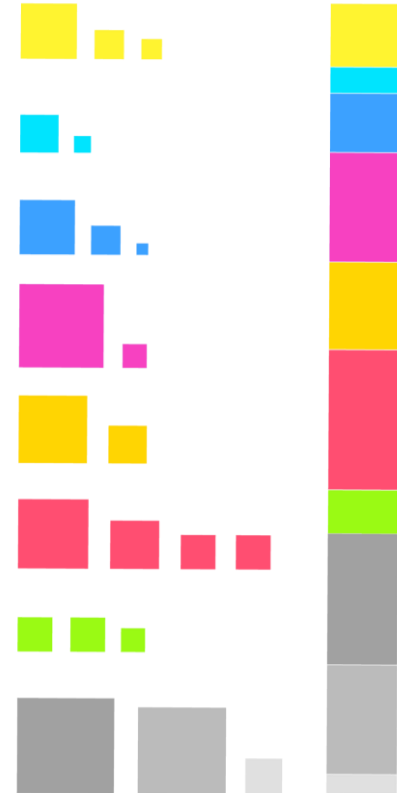
7. VR Lab 800 m²

- 7.1. Cell 400 m²
- 7.2. Studio 400 m²
- 7.3. Preparation room 200 m²

8. Other 5950 m²

- 8.1. Parking lot 3000 m²
- 8.2. Circulation space 2500 m²
- 8.3. Toilet 450 m²

Total: 17850 m²

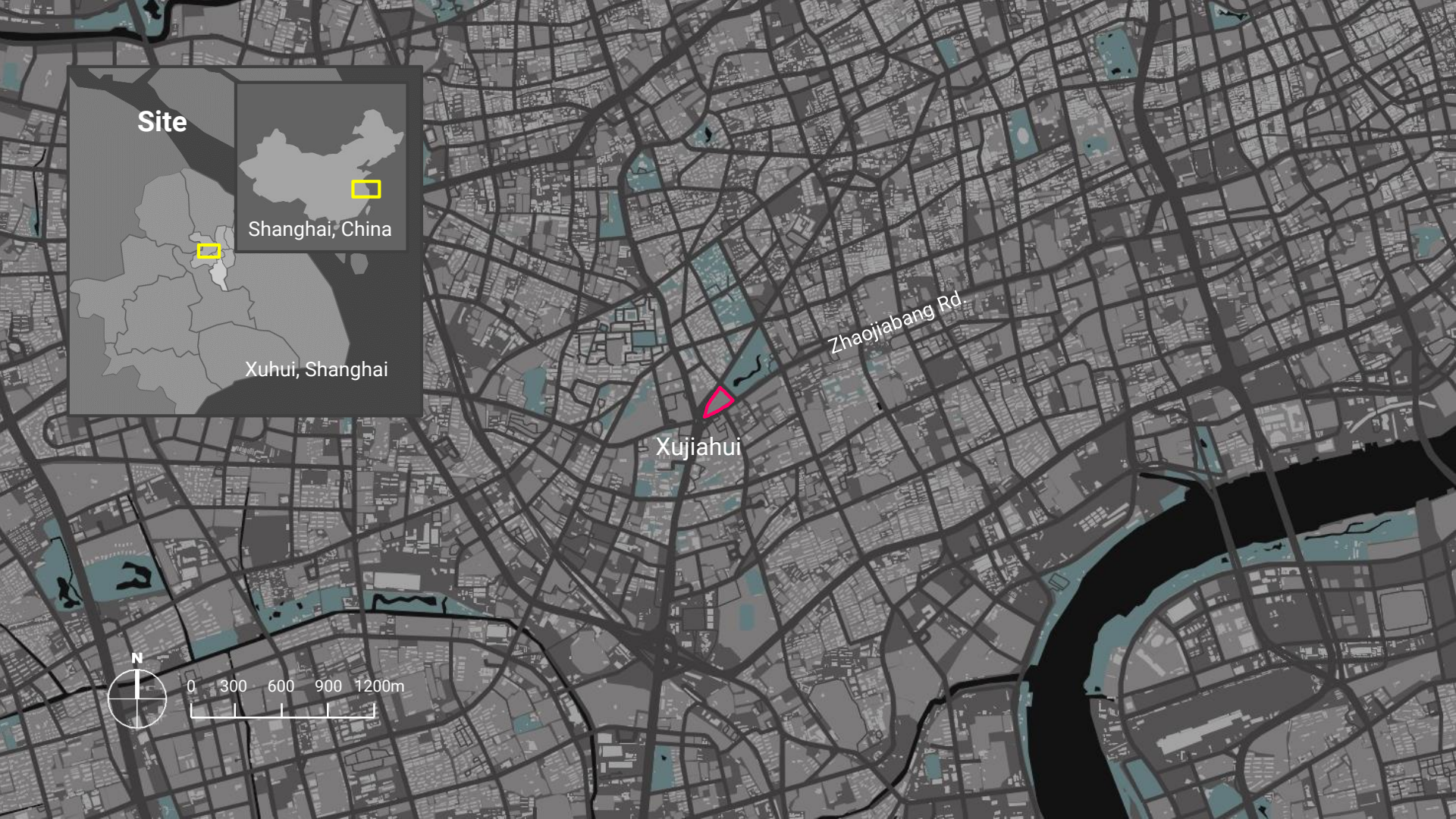




Nintendo®

E3 2019

Los Angeles Convention Center



Site

Shanghai, China

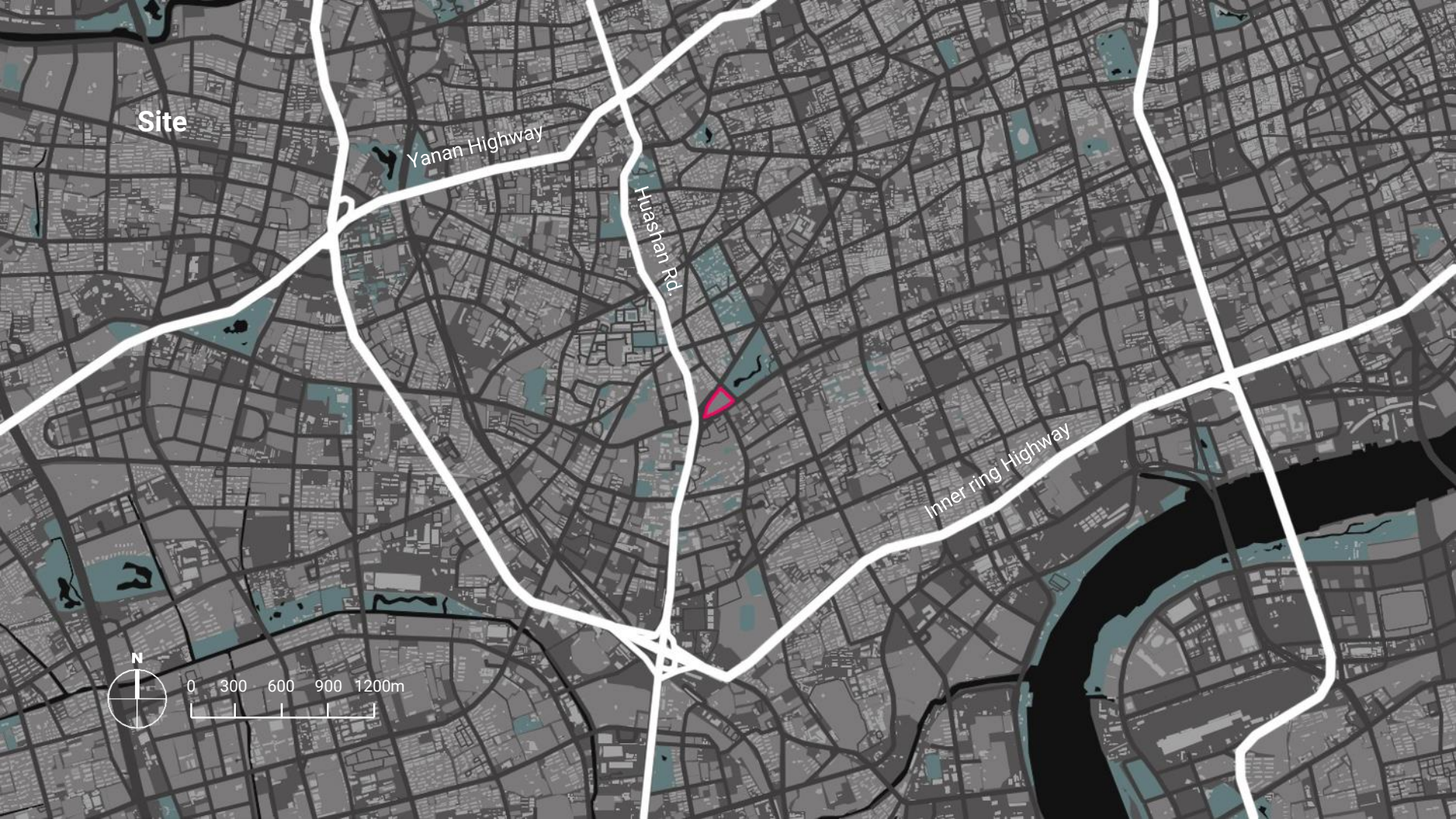
Xuhui, Shanghai

Zhaojiafang Rd

Xujiahui



0 300 600 900 1200m



Site

Yanan Highway

Huashen Rd.

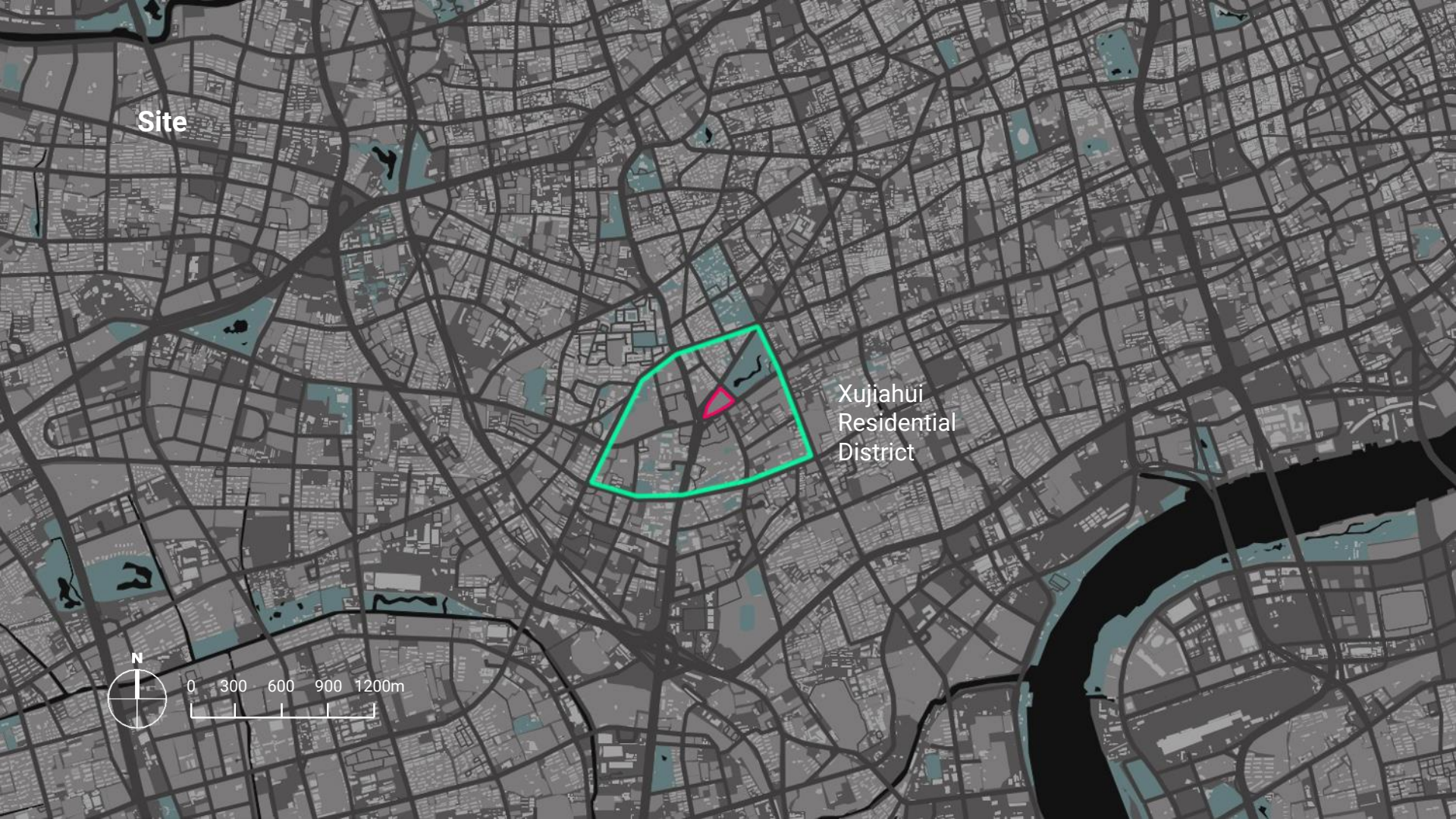
Inner ring Highway



0 300 600 900 1200m

Site

Xujiahui Residential District





Jiaotong University
School of Medicine

Site

Donghua University
Yanan Rd. Campus

Jiaotong University
Xuhui Campus

Chinese Academy of Sciences

Shanghai Medical College of Fudan University

Shanghai Civil Aviation Technology College



0 300 600 900 1200m



Site

Shanghai Library

Shanghai Sculpture Space

Shanghai Children's Museum

Shanghai Mass Art Center

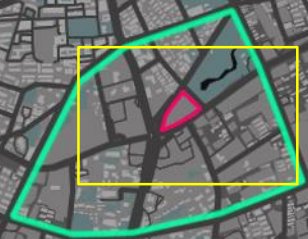
Shanghai Stadium

Long Museum



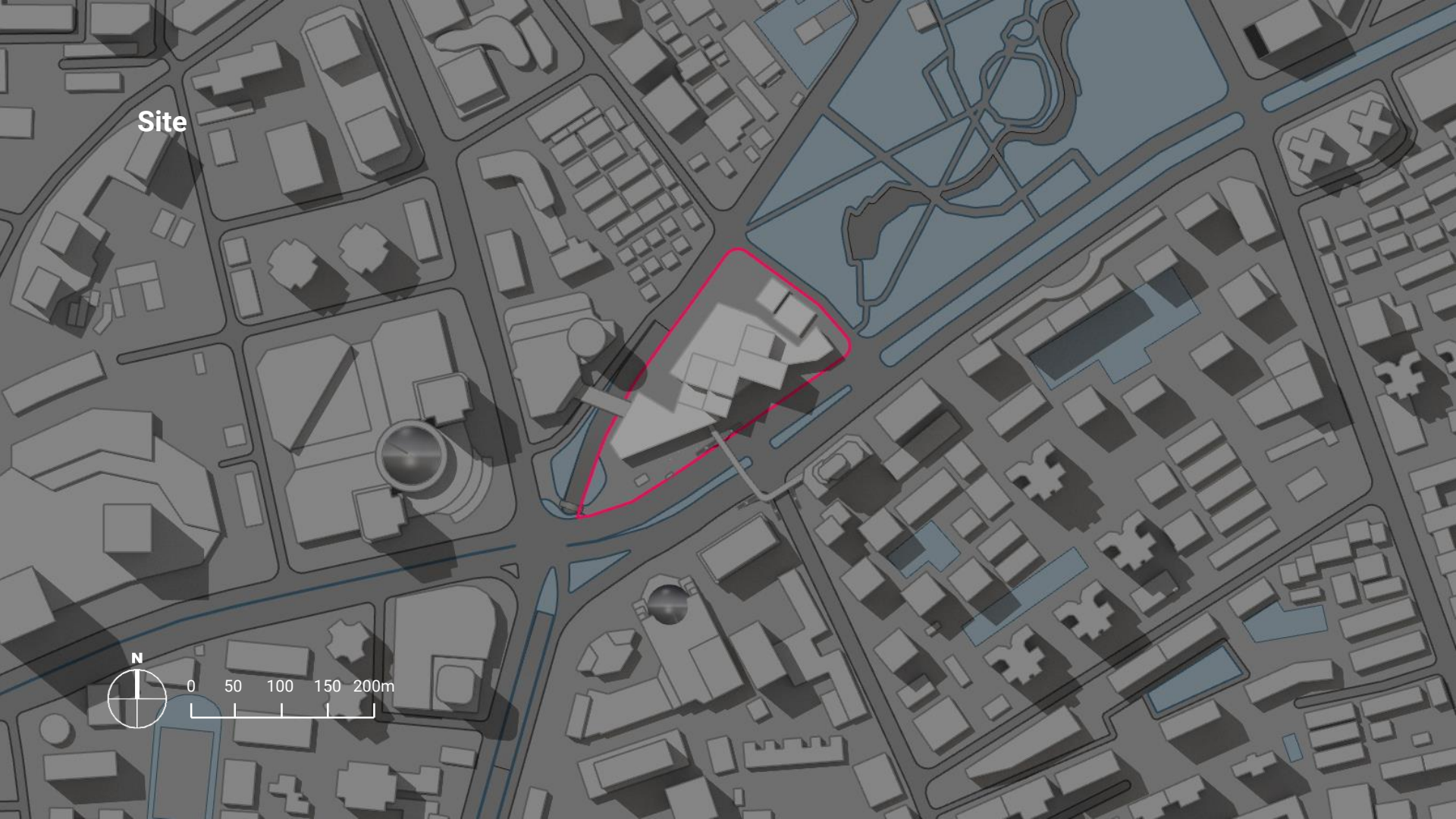
0 300 600 900 1200m

Site



0 300 600 900 1200m

Site



Site

Xujiahui Park



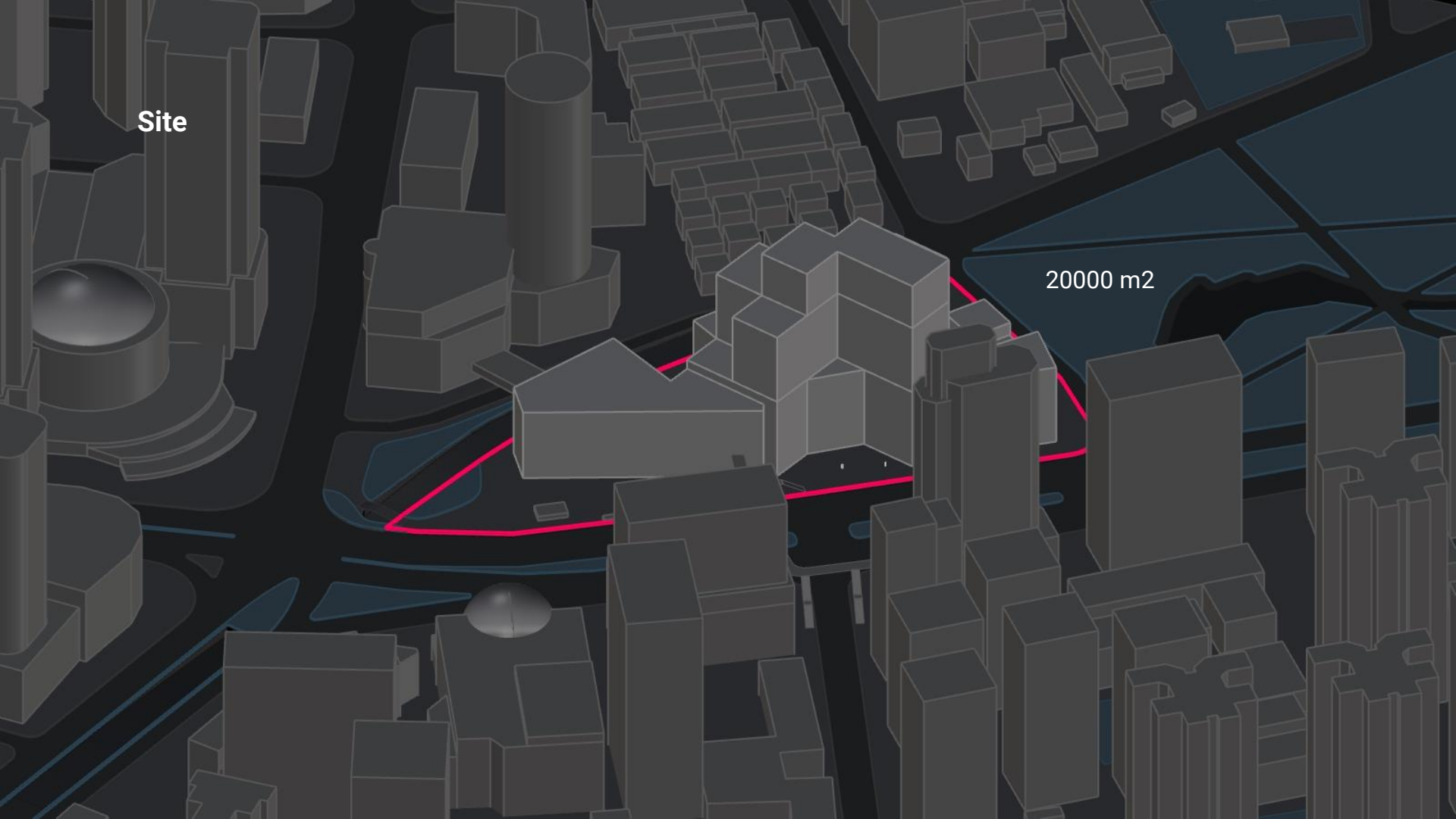
Site

Xujiahui
Commercial
Area

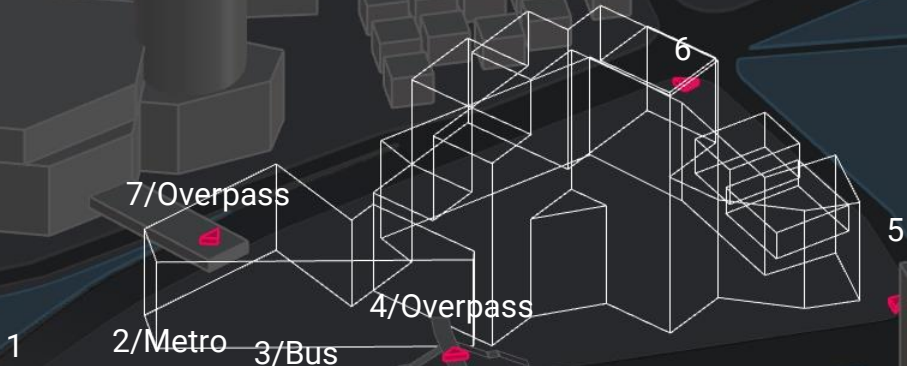


Site

20000 m²



Entrance



Landscape

Circulation core
Main

Circulation core
Auxiliary

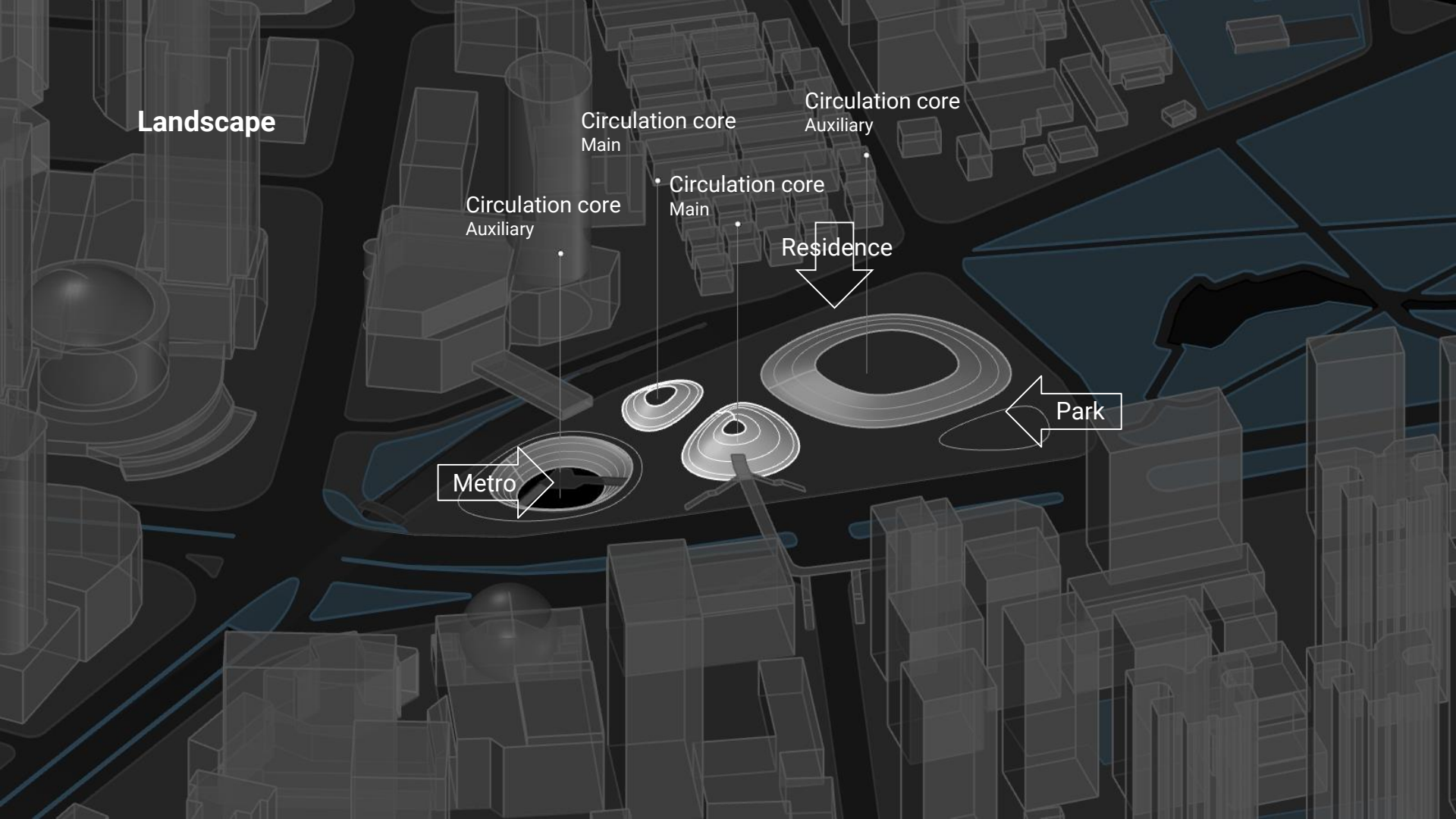
Circulation core
Auxiliary

Circulation core
Main

Residence

Metro

Park



Storyline

Streamer



1



2/Event
2000 m2

3/Arena
3300 m2

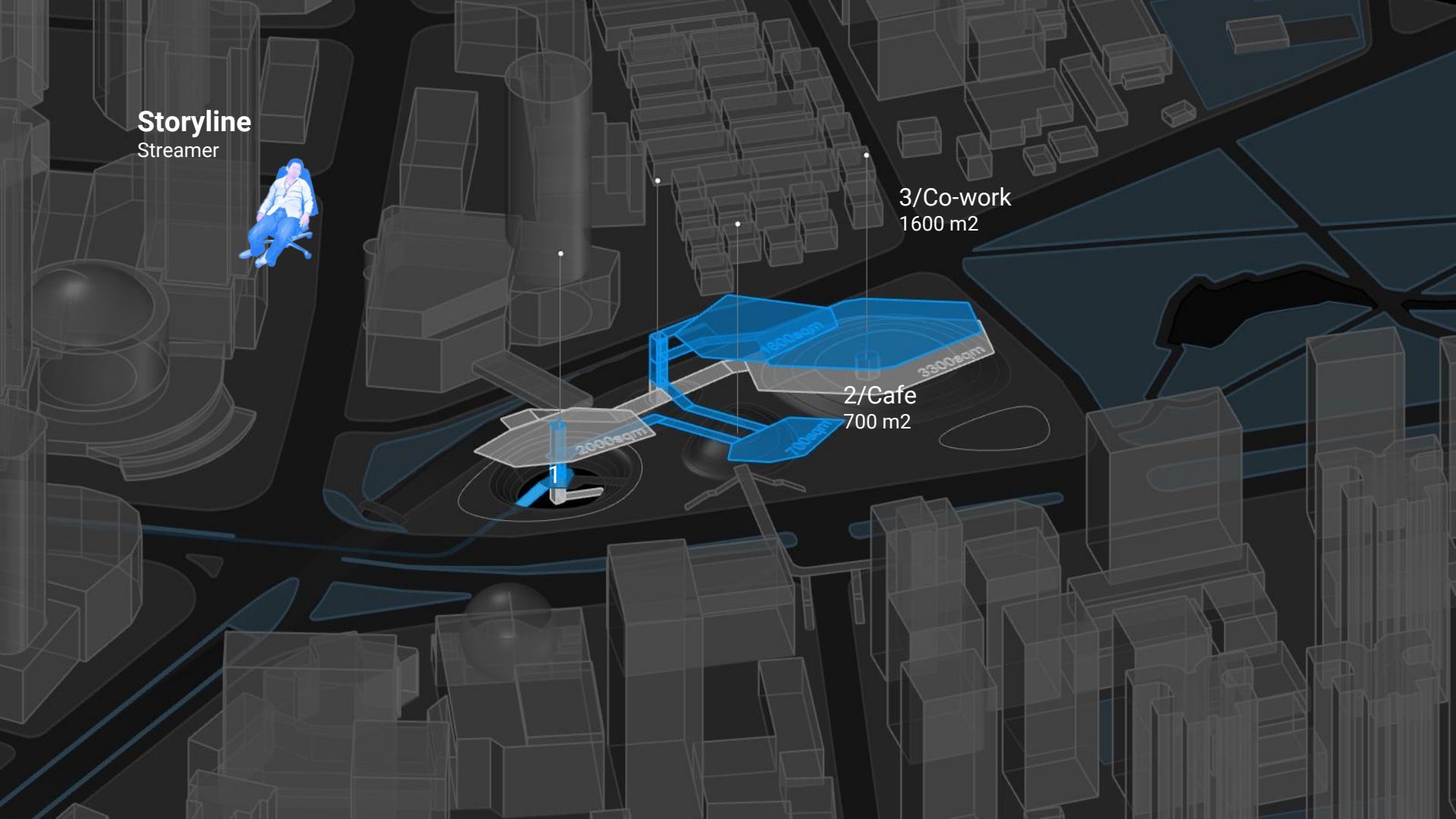


Storyline
Streamer



3/Co-work
1600 m²

2/Cafe
700 m²



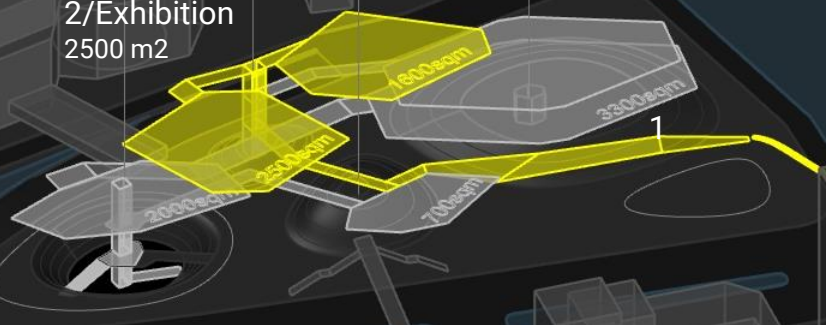
Storyline

Streamer



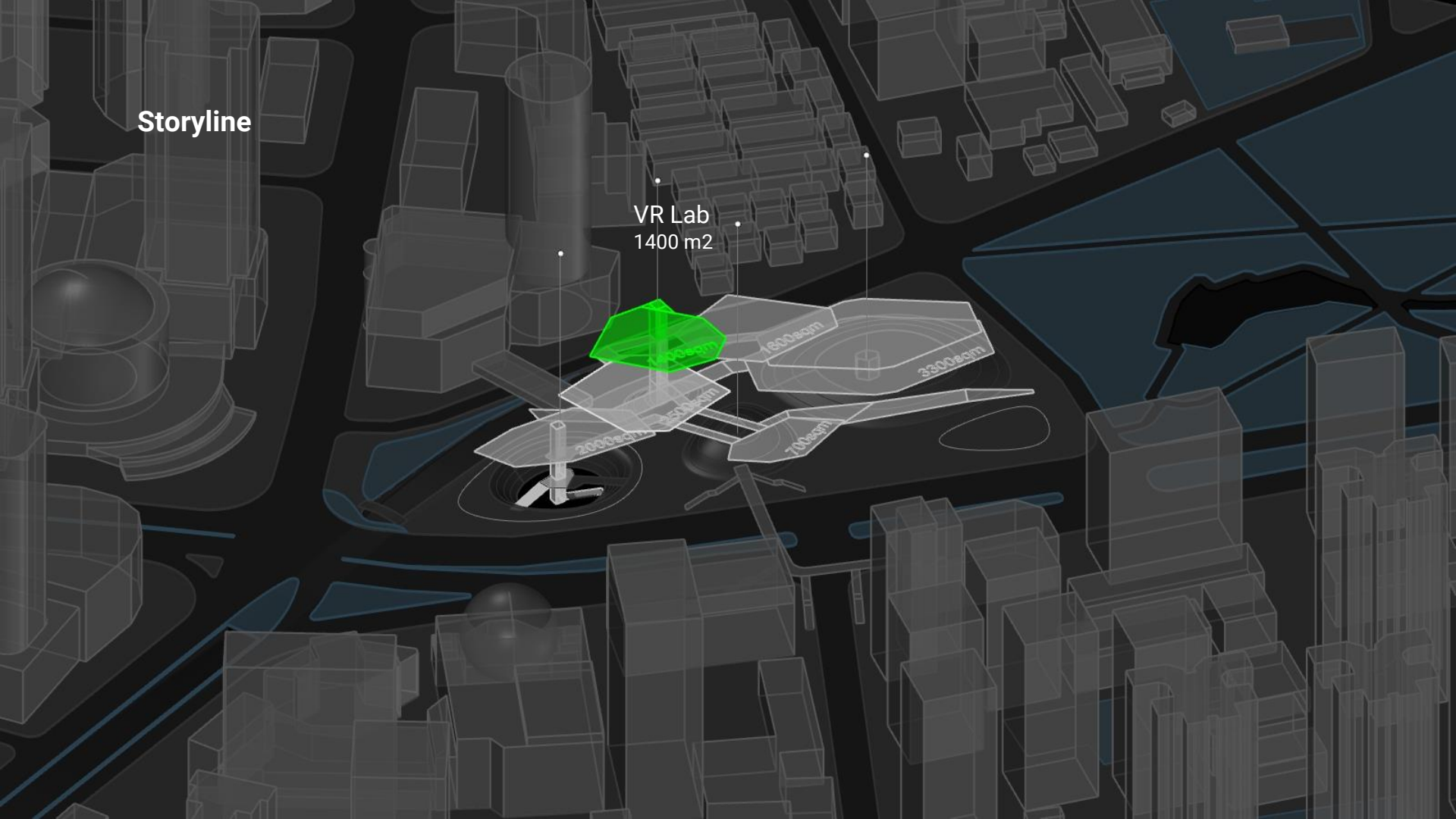
2/Exhibition
2500 m²

2/Co-work
1600 m²



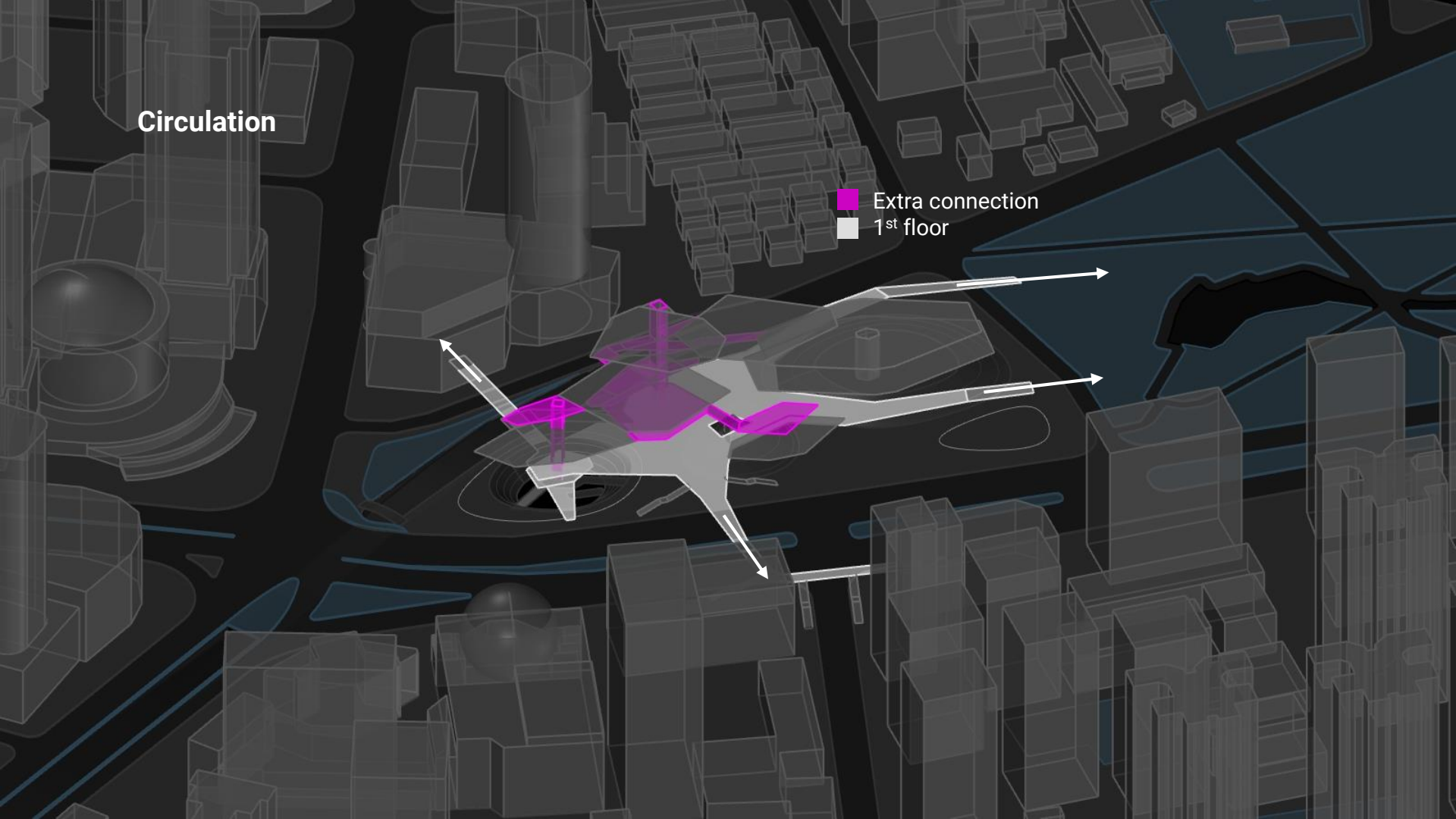
Storyline

VR Lab
1400 m²



Circulation

■ Extra connection
■ 1st floor



Program

5F VR Lab
1400 m²

4F Co-work/Startup
1500 m²
Exhibition
2000 m²

3F Arena
3300 m²

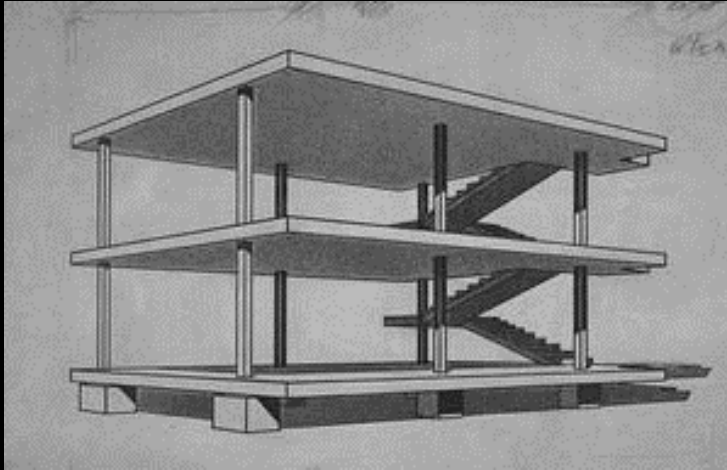
2F Event
2200 m²

1F Cafe
700 m²

0F Public Interface
1450 m²

-1F Parking lot
3000 m²

5# Concept: Skin and organs

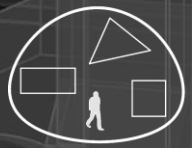


Dom-ino House, Le Corbusier, 1914–1915



the Water Pavilion, Lars Spuybroek(NOX), 1997

“Wrap”



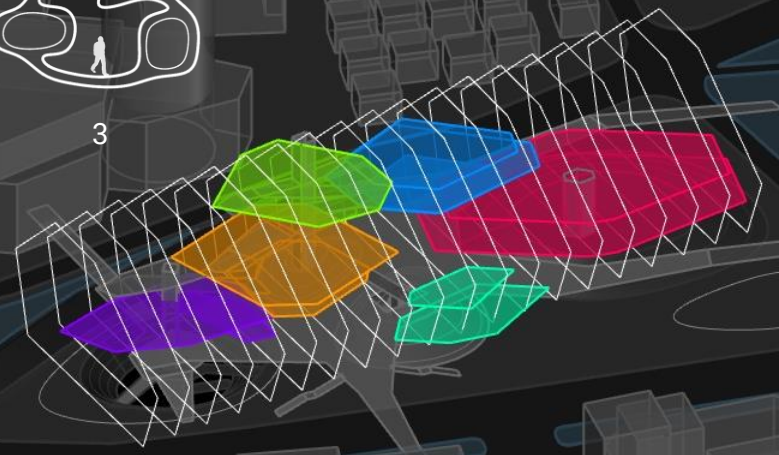
1

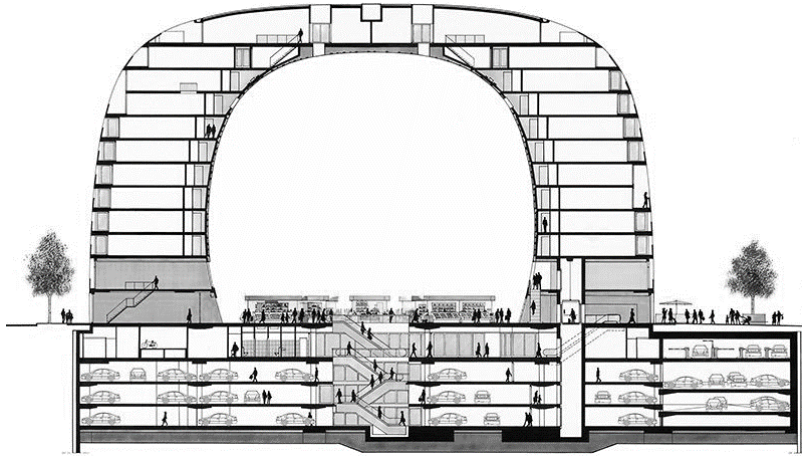


2

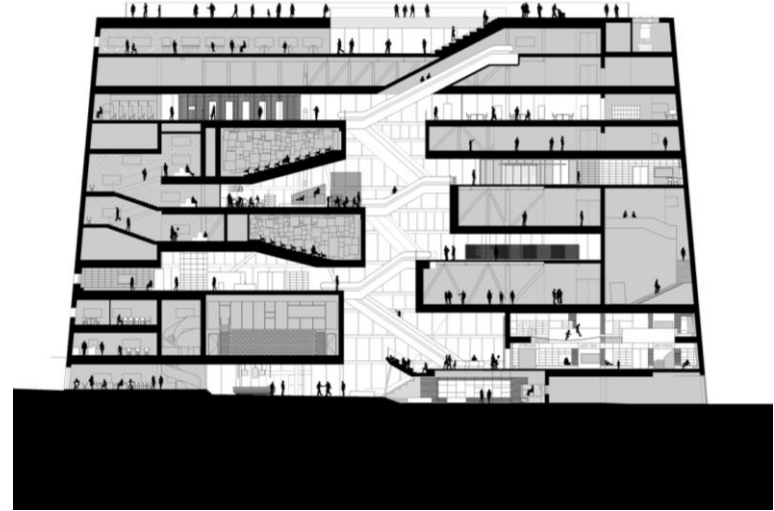


3





Markethal, MVRDV, 2014



Forum Groningen, NL Architects, 2019

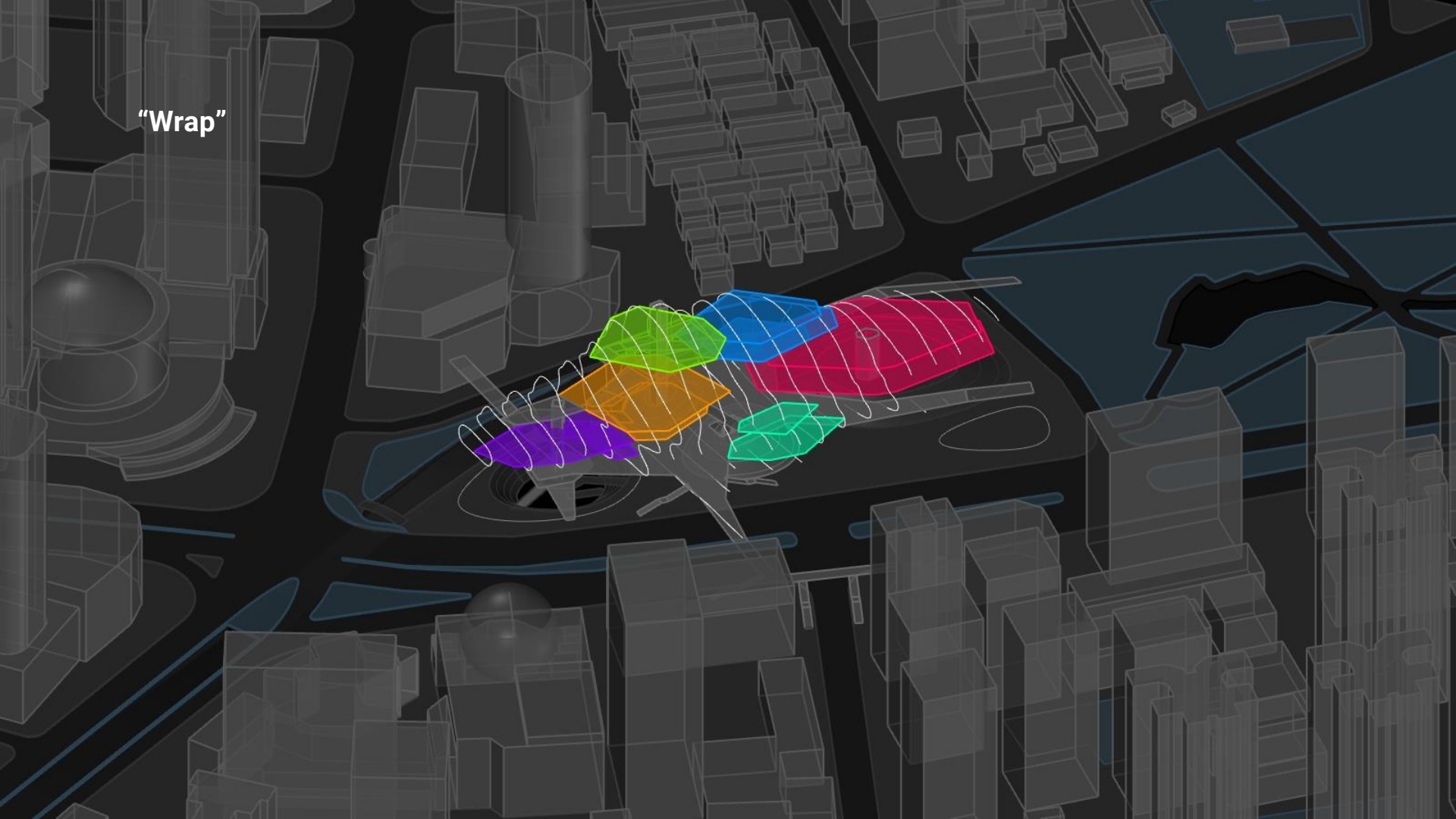


Museum of Contemporary Art & Planning Exhibition

Shenzhen, China

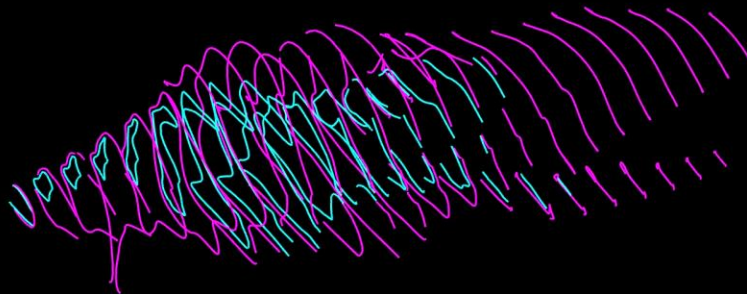
Coop-himmelb(h)au, 2016

“Wrap”



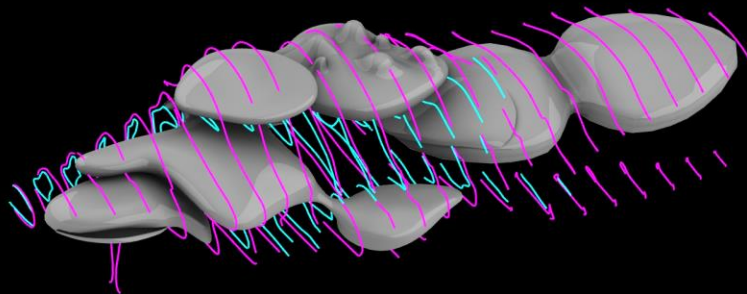
“Wrap”

■ Outer surface
■ Inner surface

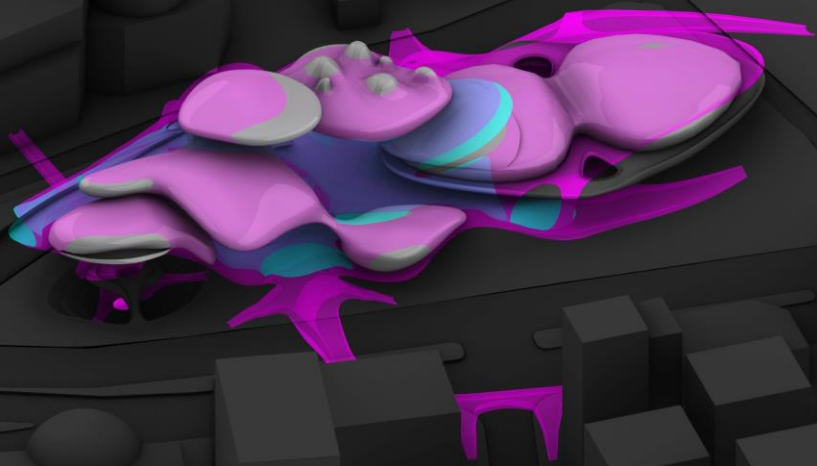


“Wrap”

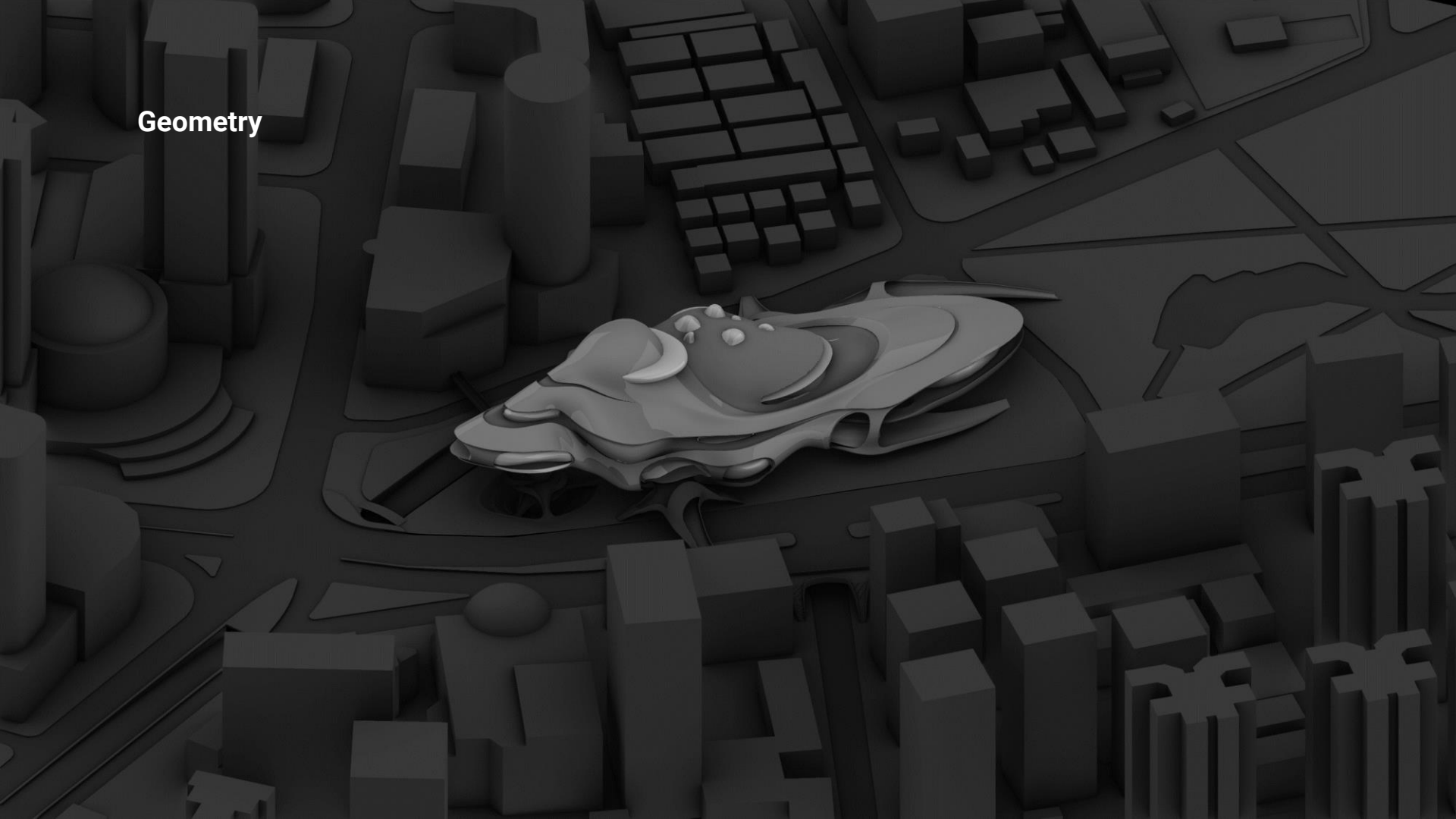
- Outer surface
- Inner surface
- Space (Category)

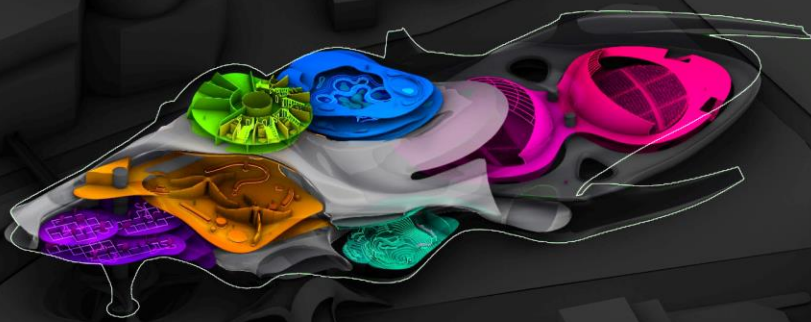
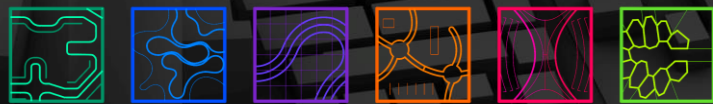


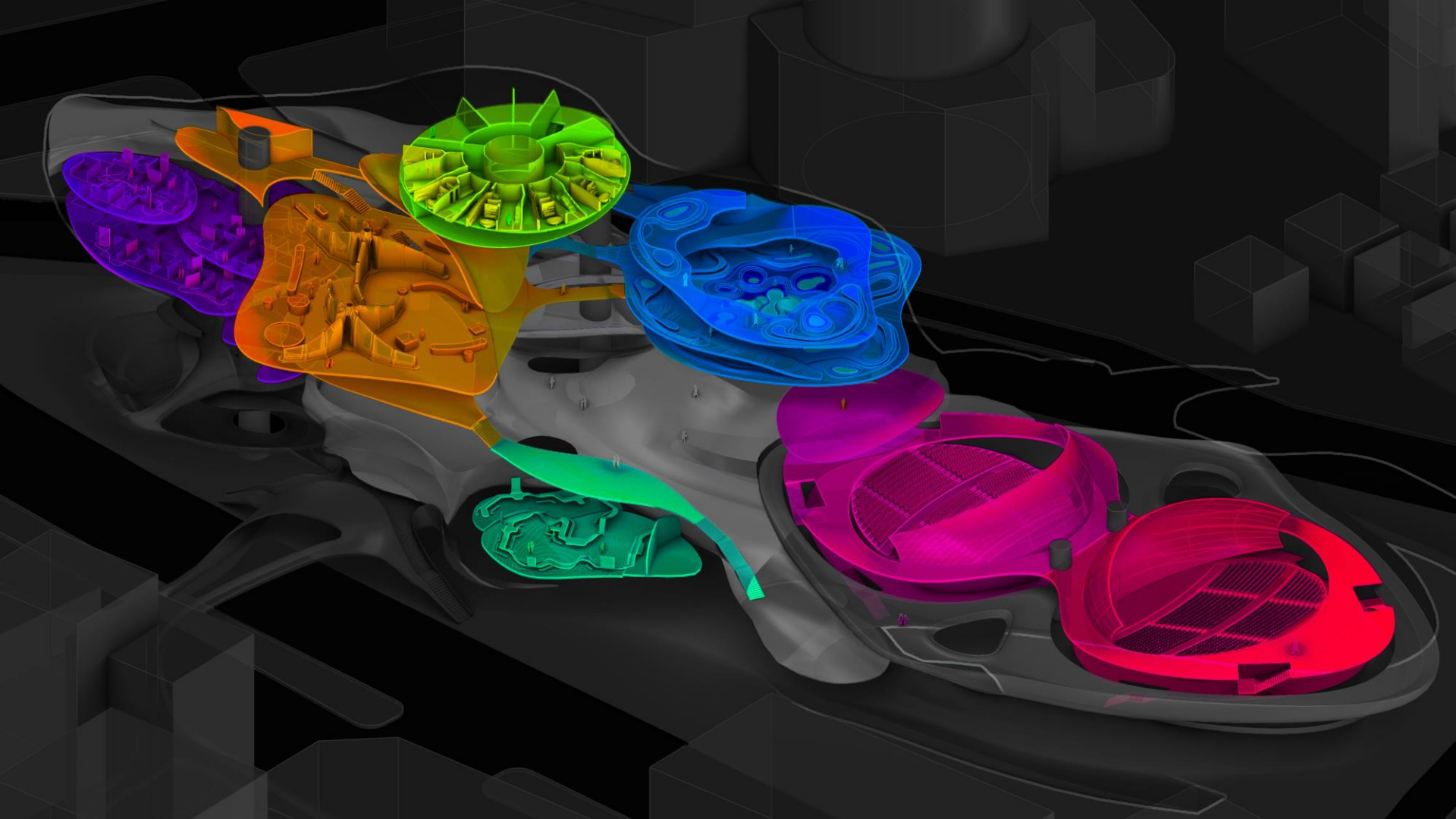
“Wrap”



Geometry



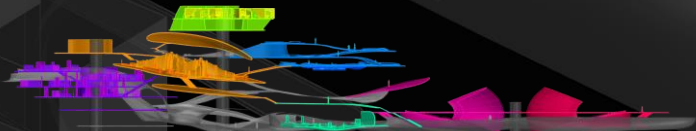
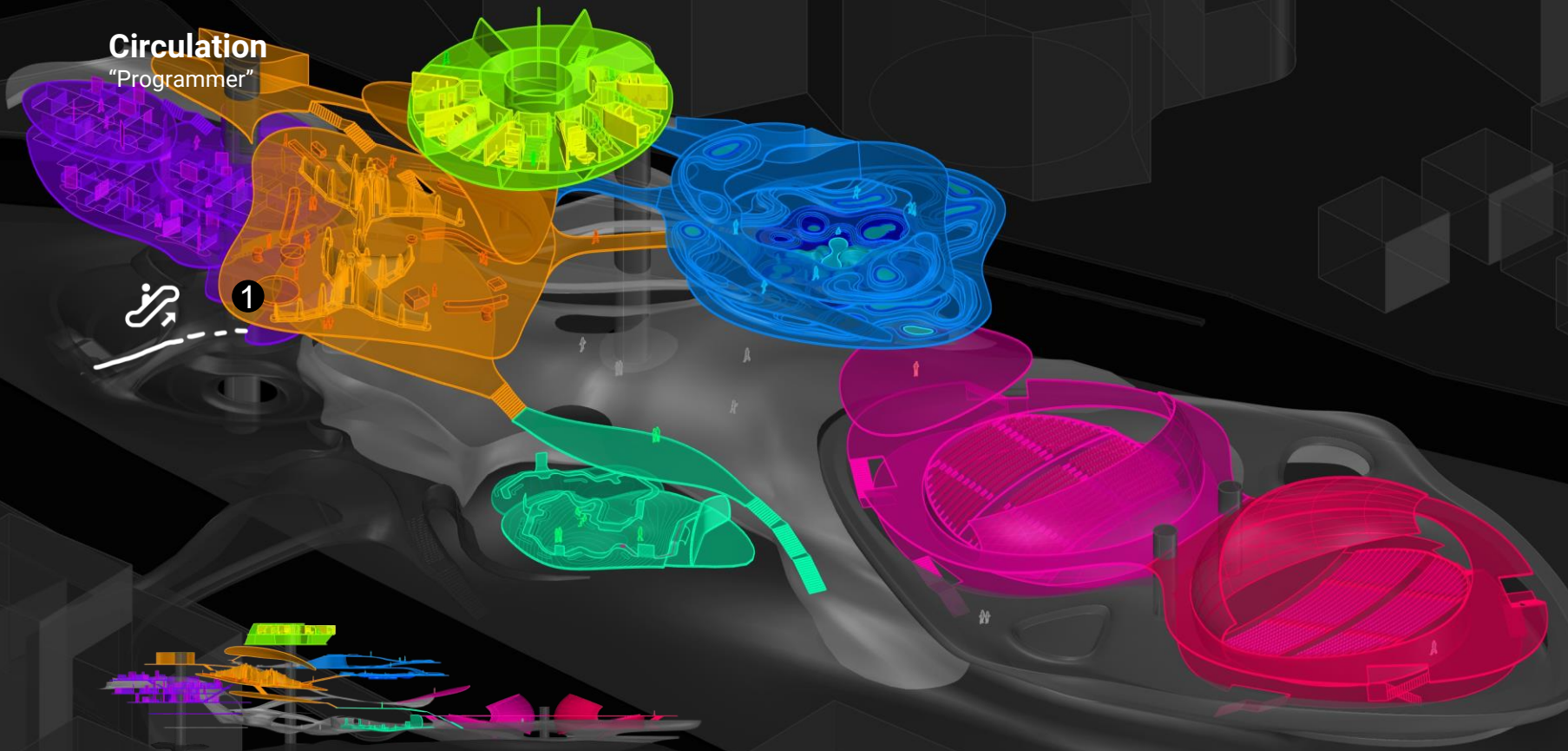




Circulation

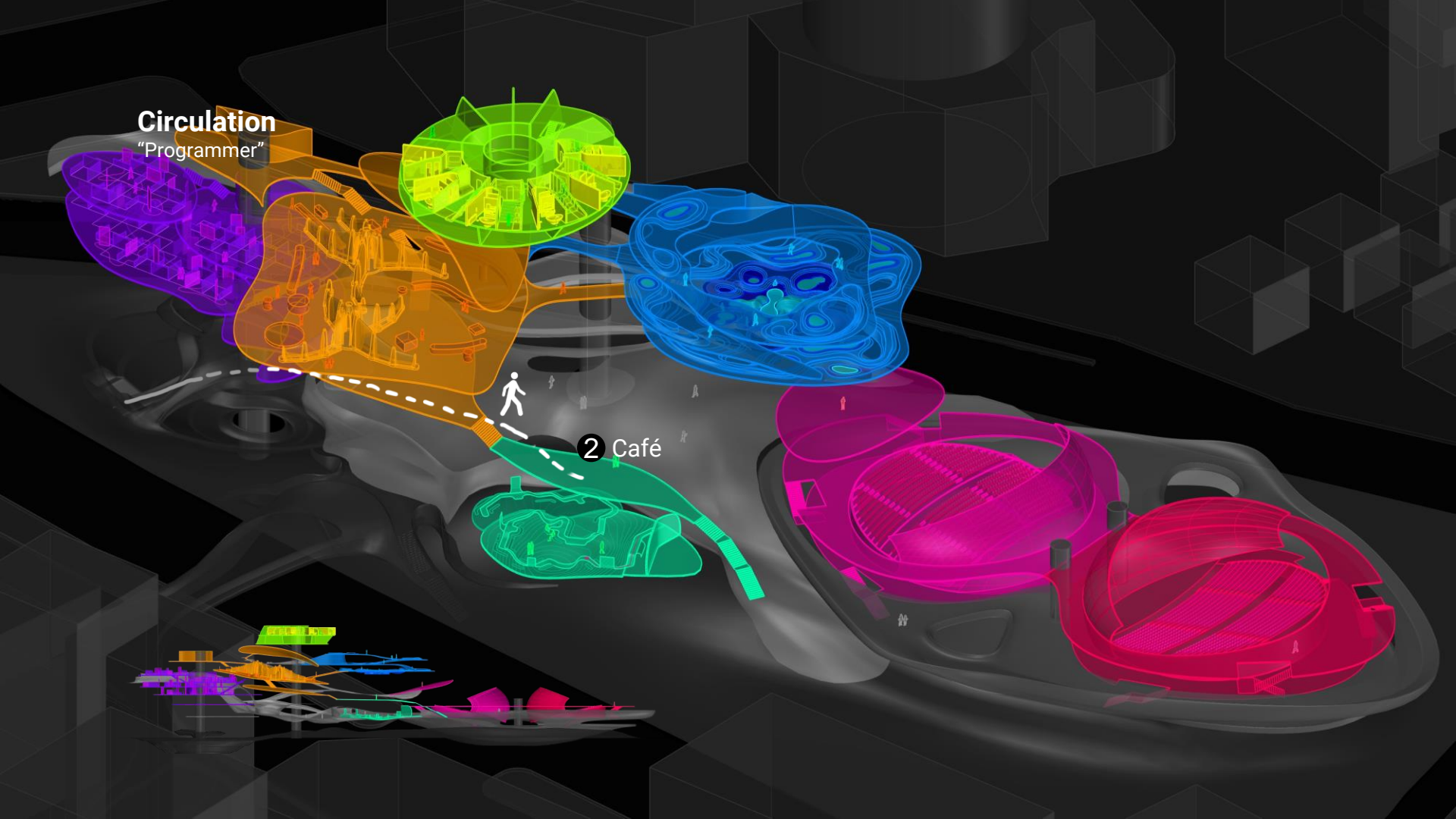
"Programmer"

1



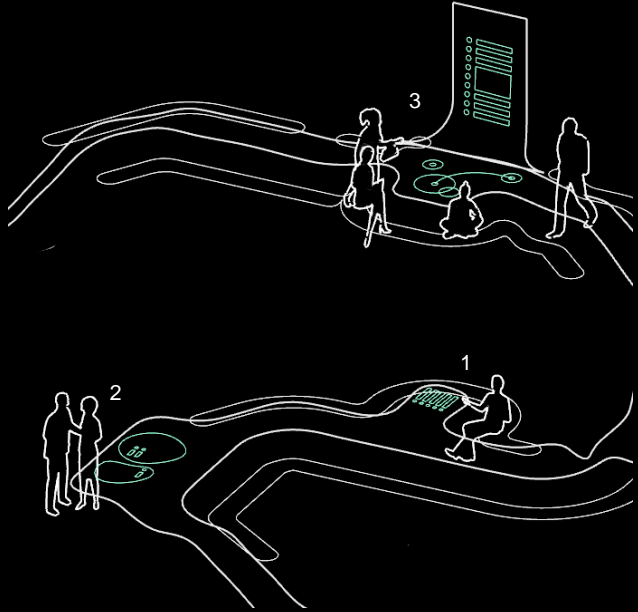
Circulation
"Programmer"

2 Café



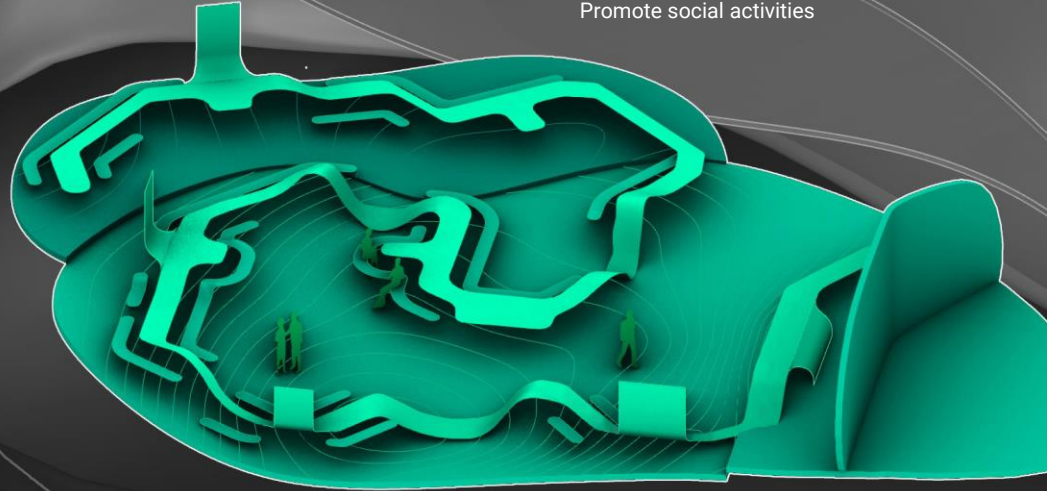
Café "Encounter"

Digital media enhanced social behavior



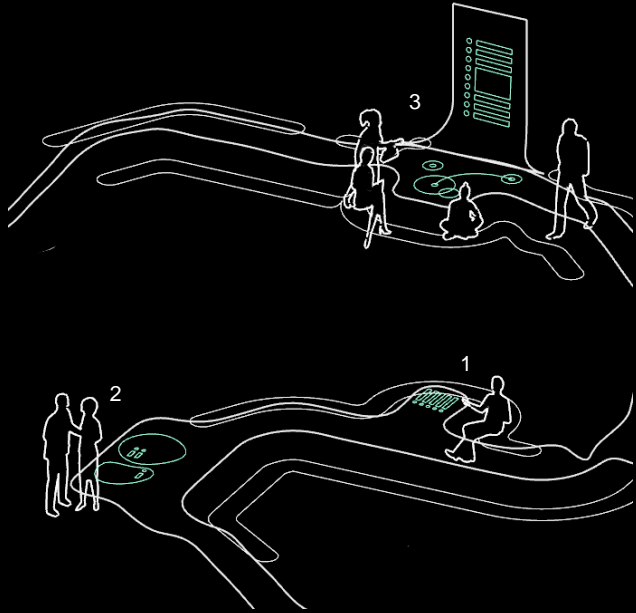
- 1 self-service
- 2 Offline meeting/dating
- 3 Party game

- Input**
User movement and preference
- Capture**
Sensor and device
- Output**
Visual information
- Mechanism**
Screen
- Architectural meaning**
Promote social activities



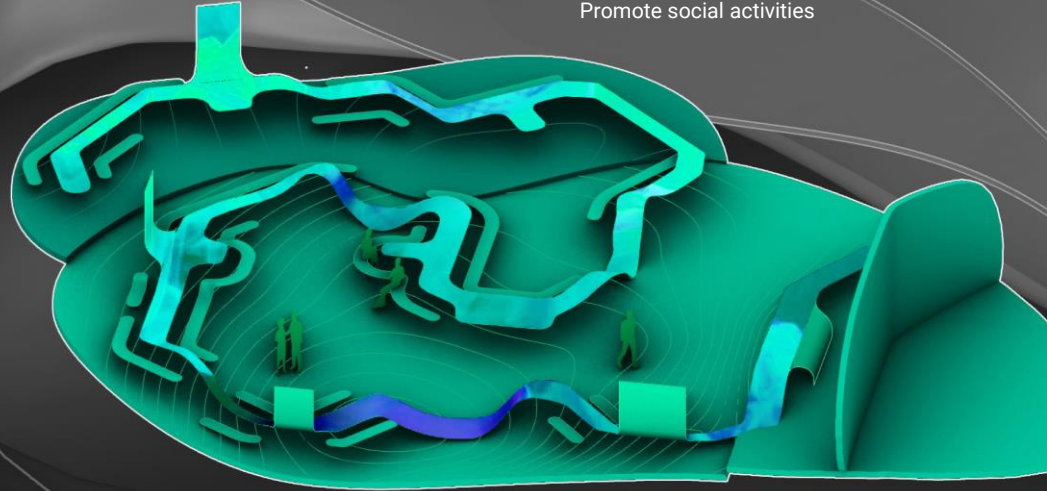
Café "Encounter"

Digital media enhanced social behavior



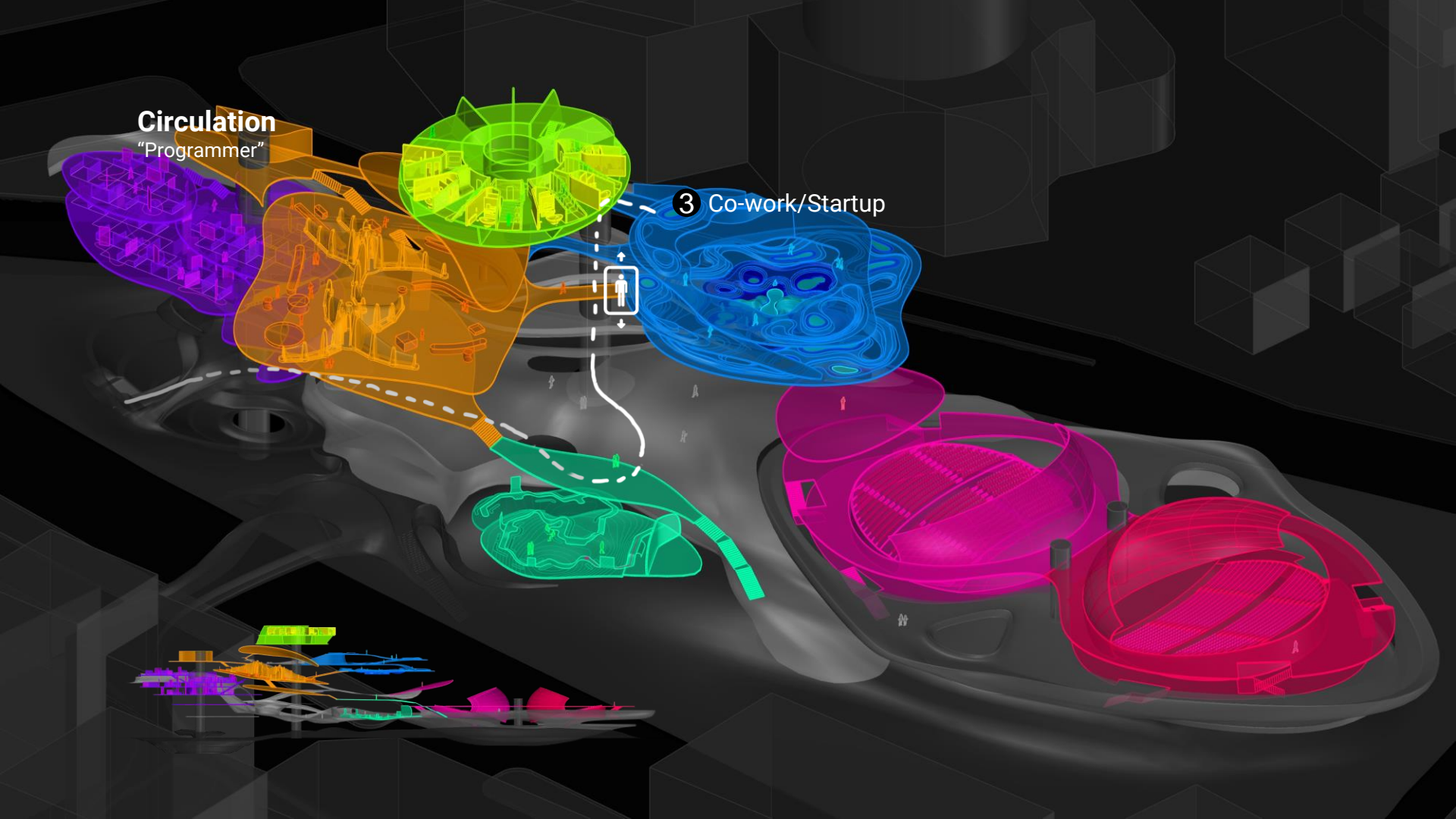
- 1 self-service
- 2 Offline meeting/dating
- 3 Party game

- Input**
User movement and preference
- Capture**
Sensor and device
- Output**
Visual information
- Mechanism**
Screen
- Architectural meaning**
Promote social activities



Circulation
"Programmer"

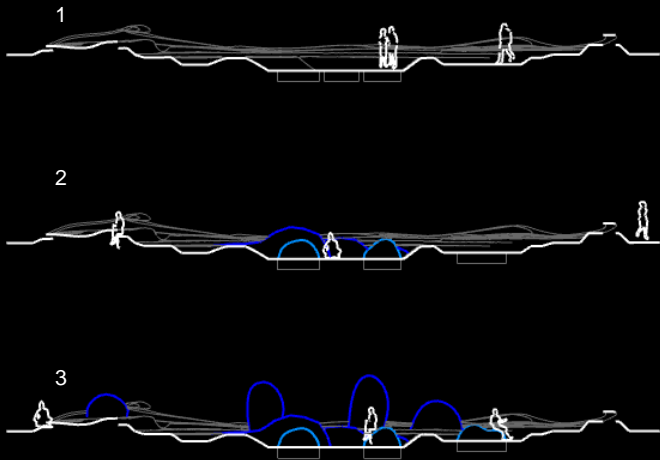
3 Co-work/Startup



Co-work/Startup

“Blob”

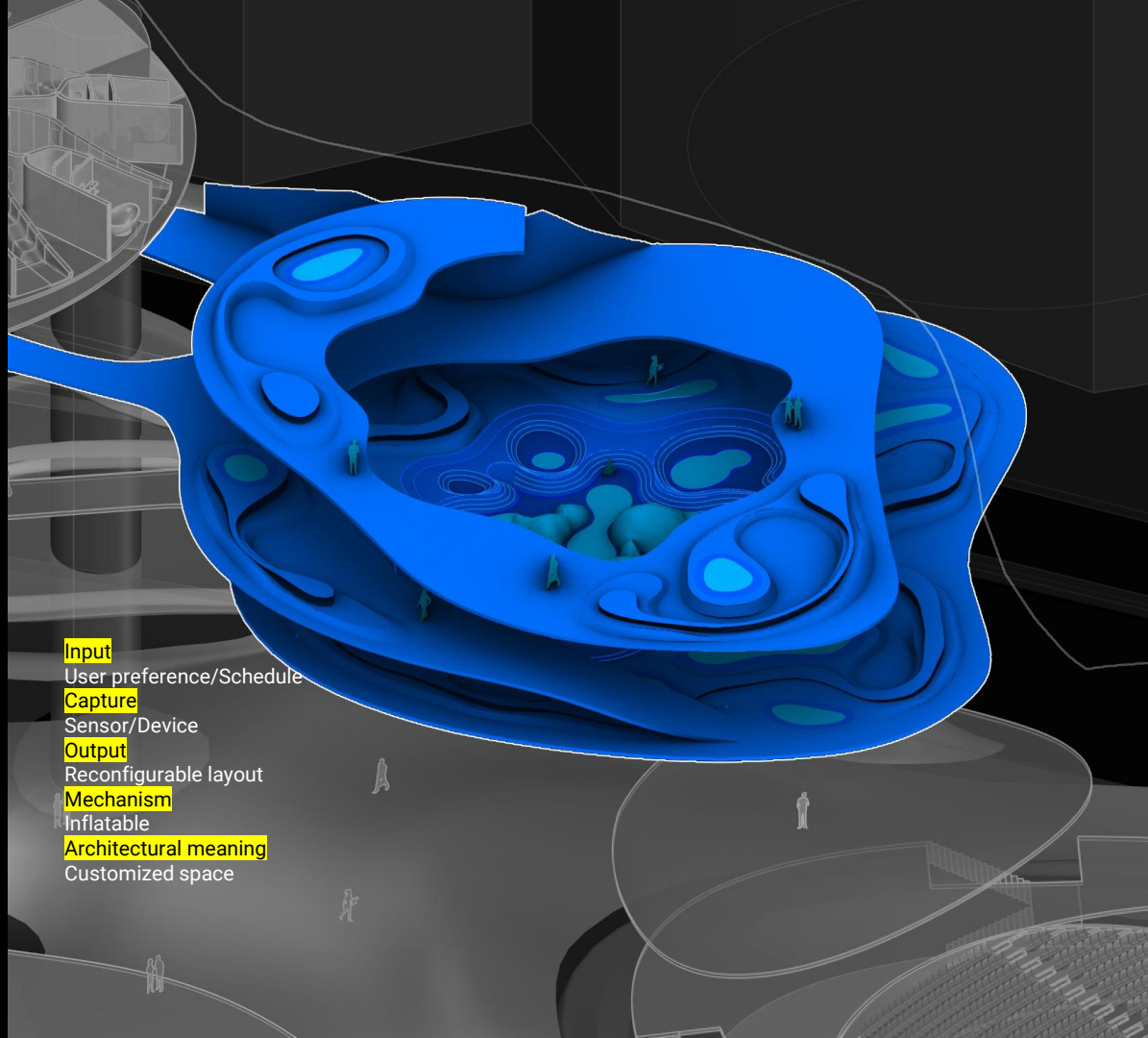
Customized workspace



1 inflated: 0%

2 inflated: 30%

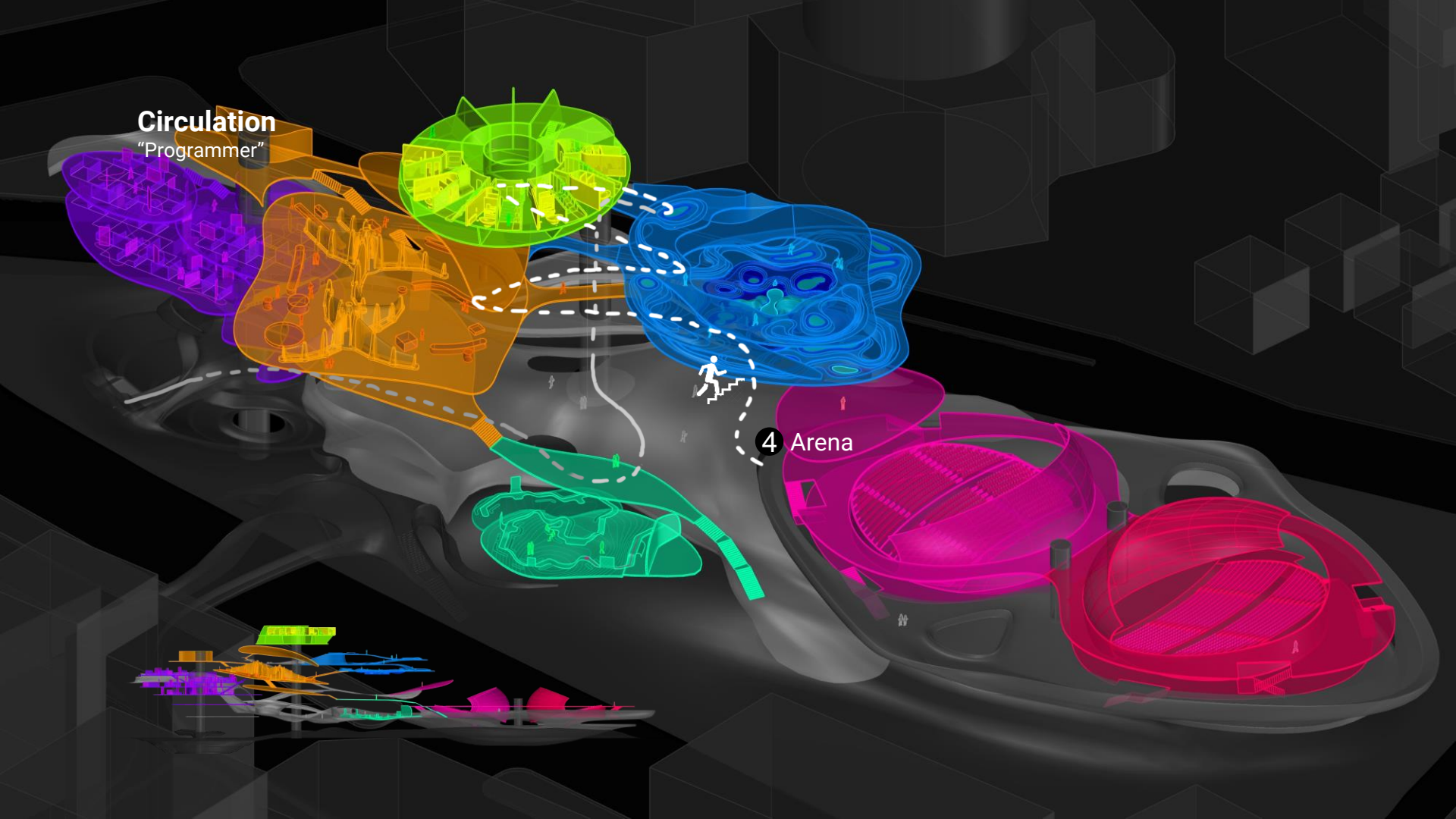
3 inflated: 70%



Circulation

"Programmer"

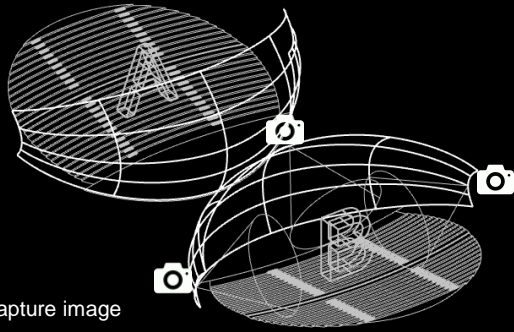
4 Arena



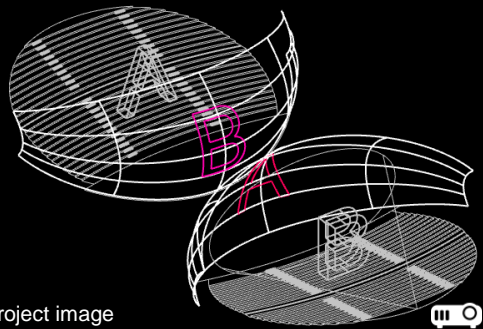
Arena

"True Sight"

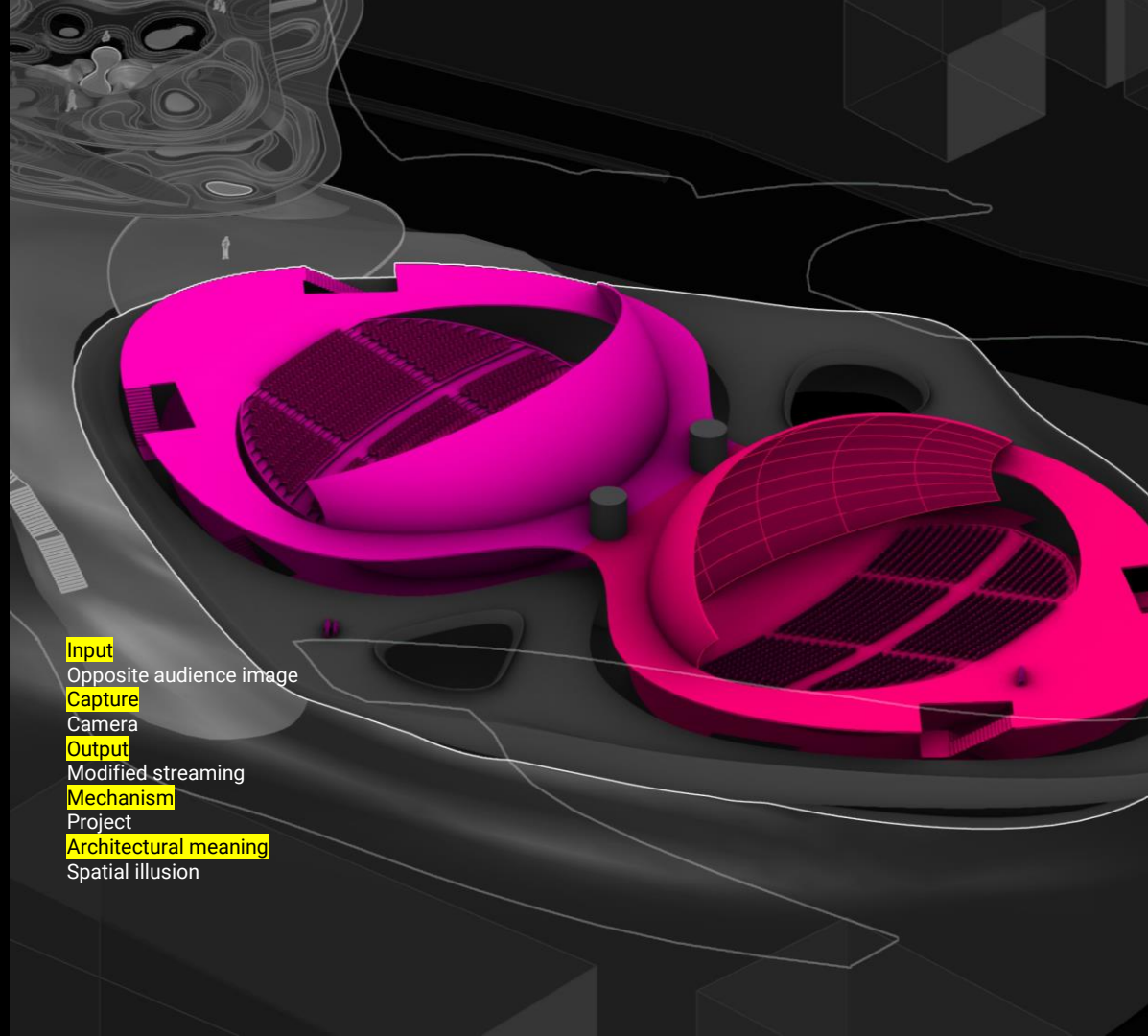
viewing experience with AR



1 capture image



2 project image



Input

Opposite audience image

Capture

Camera

Output

Modified streaming

Mechanism

Project

Architectural meaning

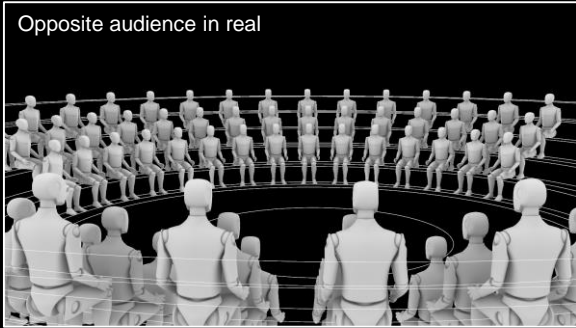
Spatial illusion

Arena

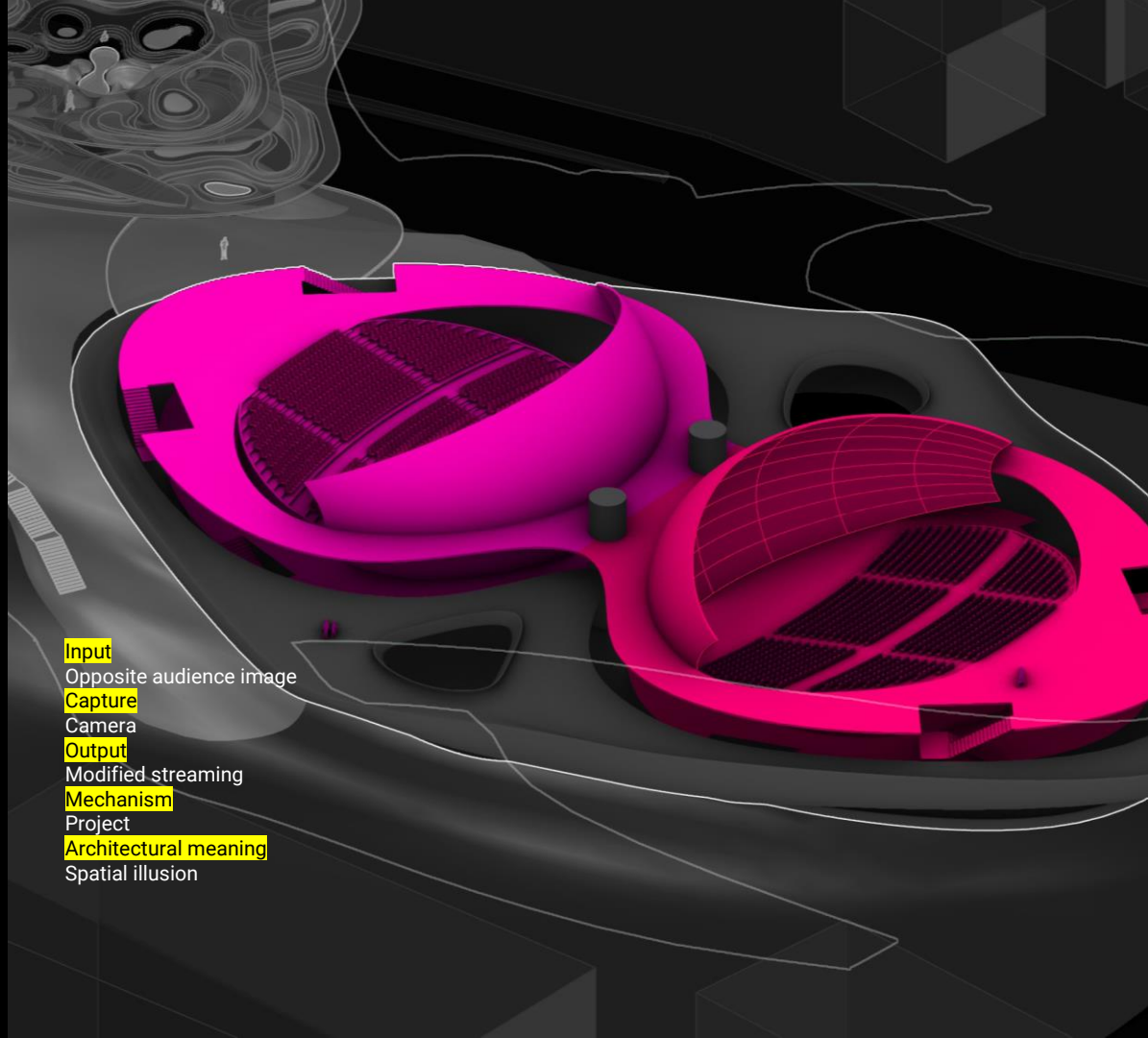
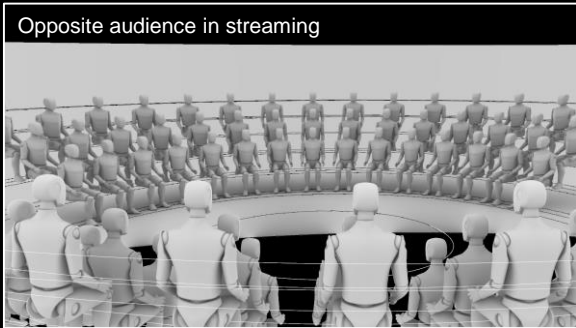
“True Sight”

viewing experience with AR

Opposite audience in real



Opposite audience in streaming



Input

Opposite audience image

Capture

Camera

Output

Modified streaming

Mechanism

Project

Architectural meaning

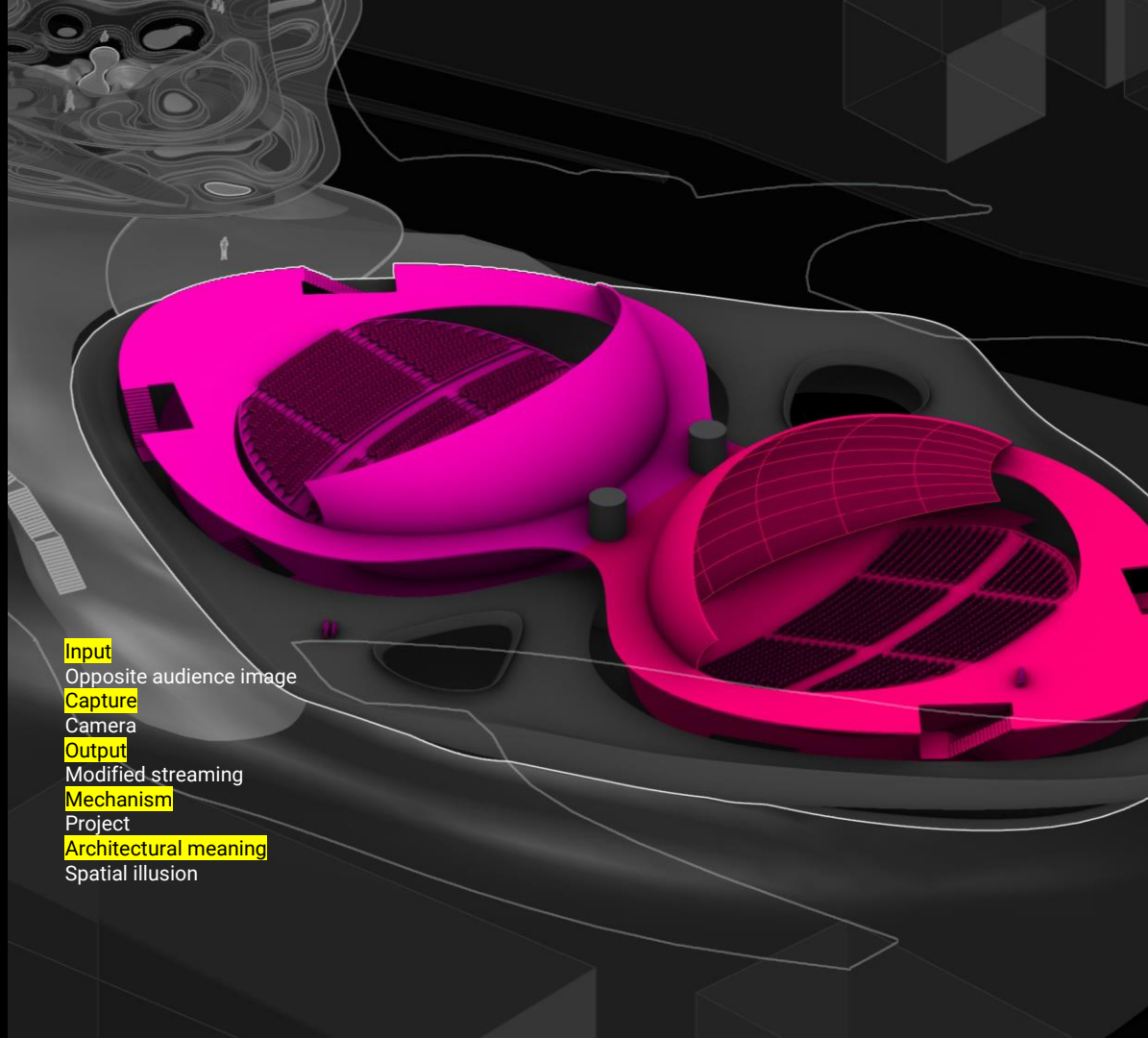
Spatial illusion

Arena

"True Sight"

viewing experience with AR

Overlaying different games



Input

Opposite audience image

Capture

Camera

Output

Modified streaming

Mechanism

Project

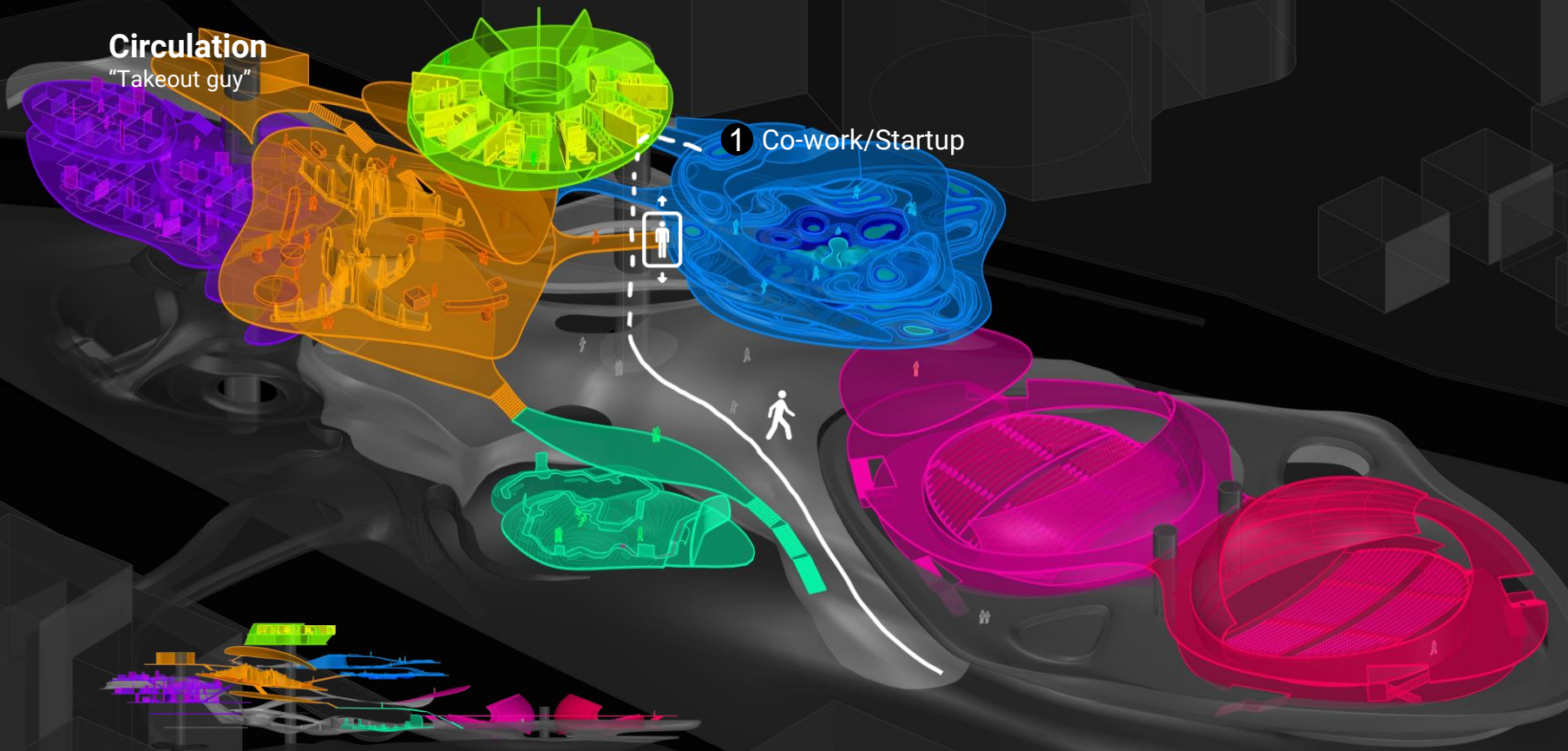
Architectural meaning

Spatial illusion

Circulation

"Takeout guy"

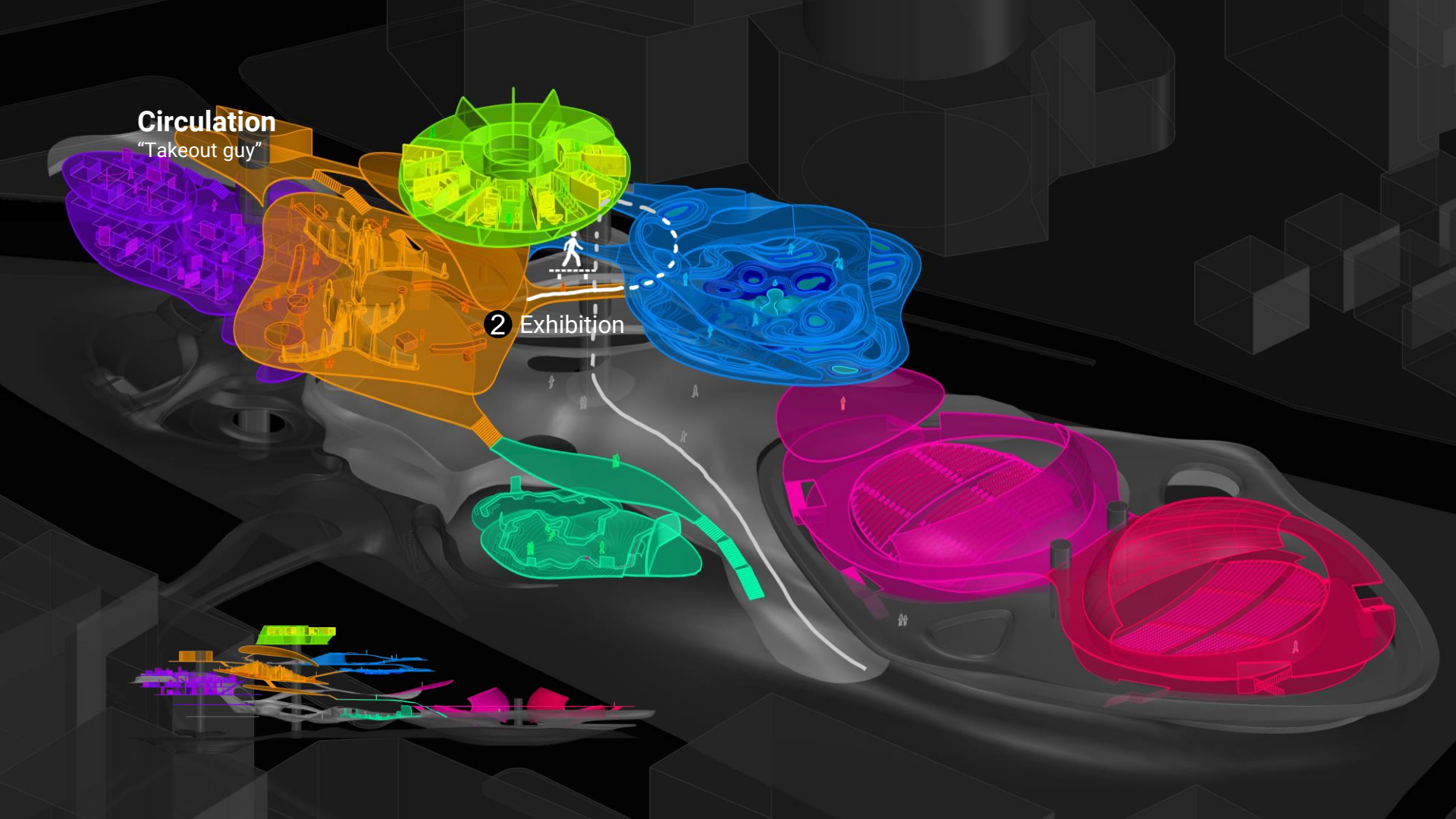
1 Co-work/Startup



Circulation

"Takeout guy"

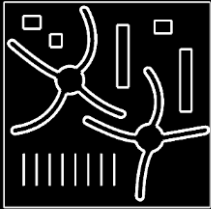
2 Exhibition



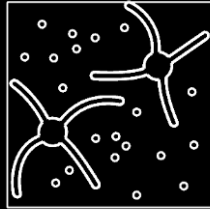
3- Exhibition

“Two Octopuses In The Tank”

Dynamic spatial configuration involving robots



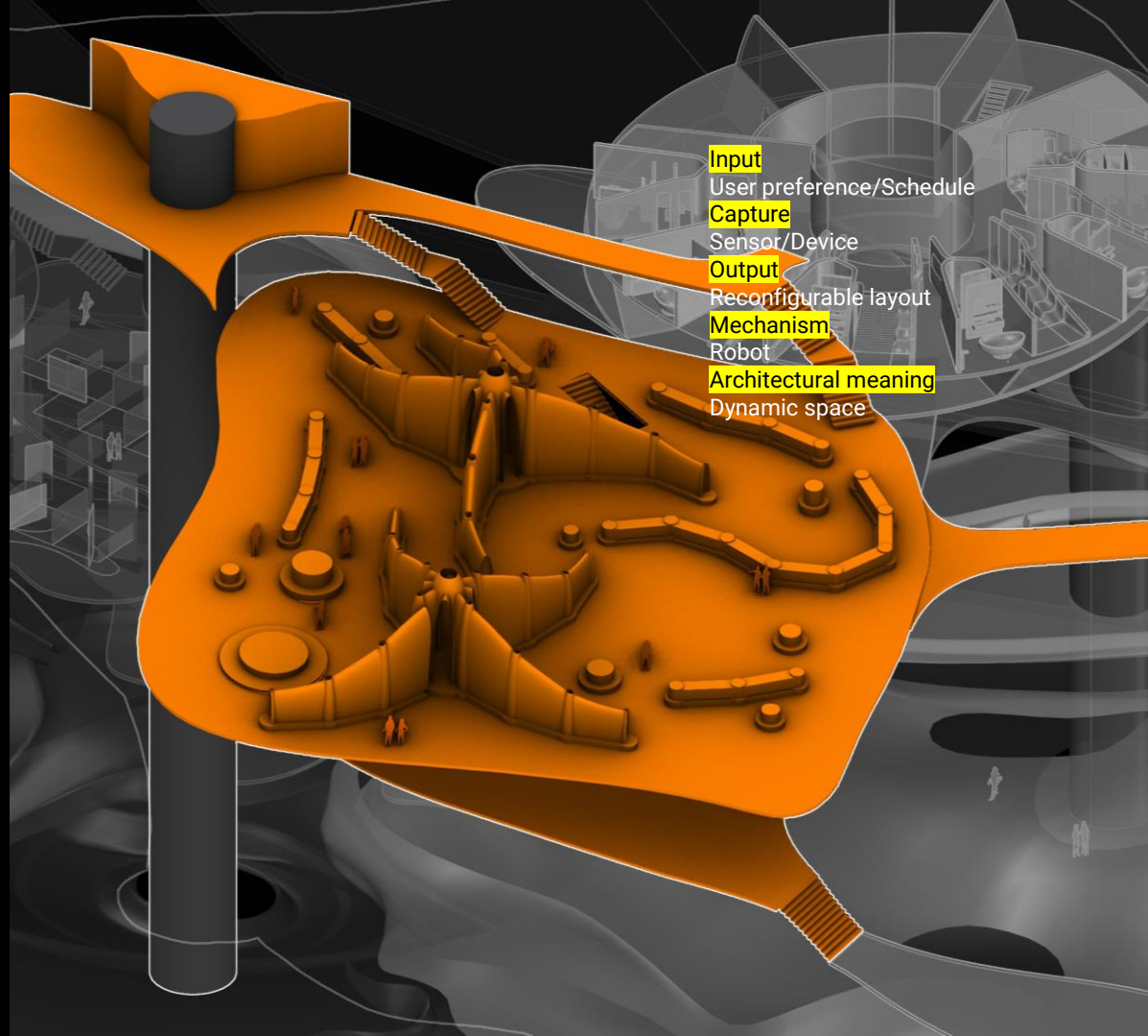
1



2

Activity:

1. Regular exhibition (static, pre-programmed)
2. "Octopus day off" (dynamic, real-time)



Input

User preference/Schedule

Capture

Sensor/Device

Output

Reconfigurable layout

Mechanism

Robot

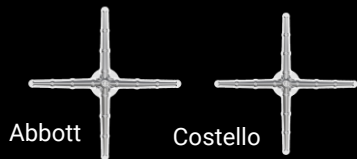
Architectural meaning

Dynamic space

3- Exhibition

“Two Octopuses In The Tank”

Dynamic spatial configuration involving robots



Abbott

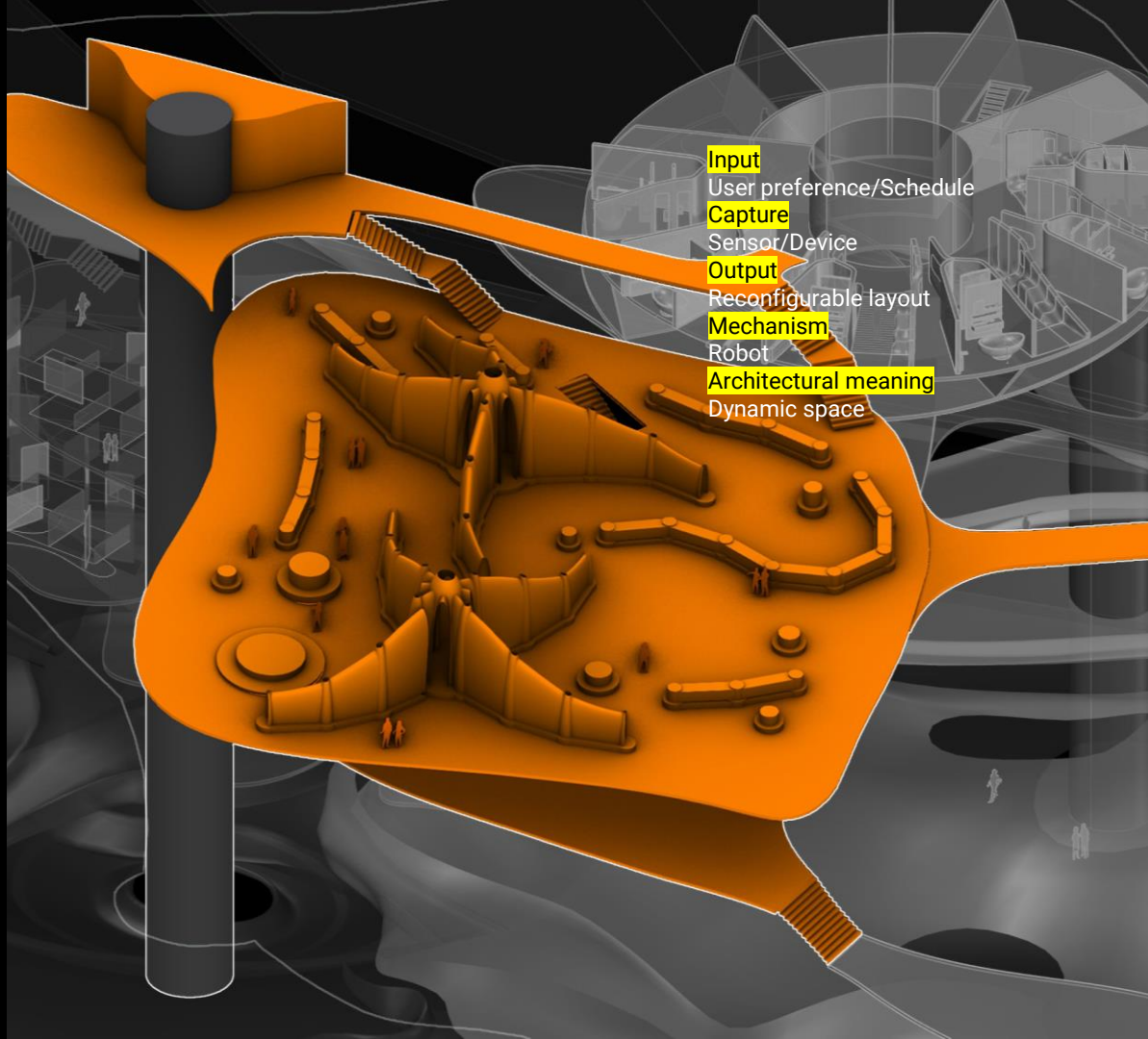
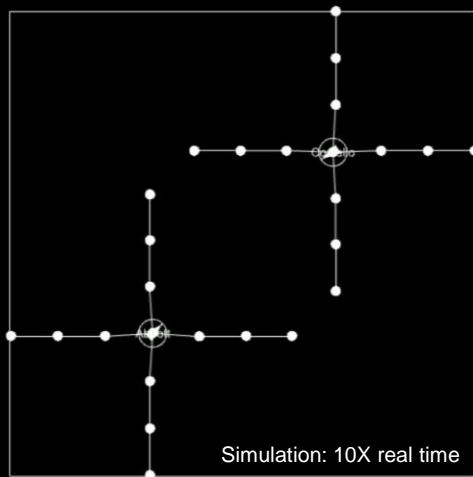
Costello

Feature:

Octopus Personality: Body/Activity/Relaxation

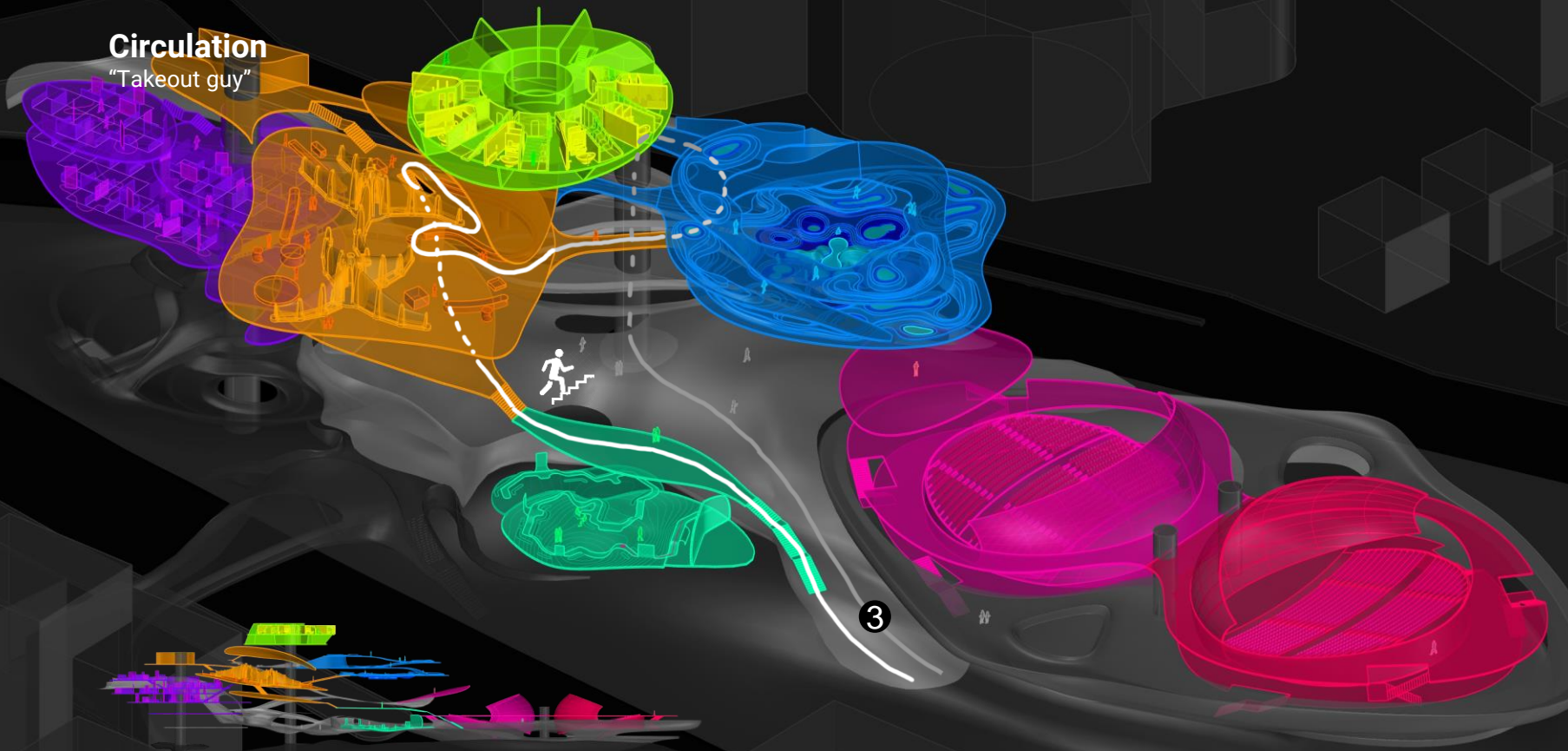
Octopus Behavior:

Cohesion/Separation/Obstacle avoidance



Circulation

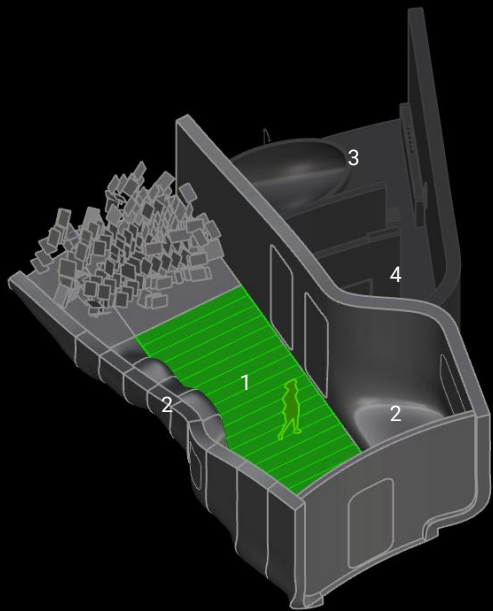
"Takeout guy"



VR Lab

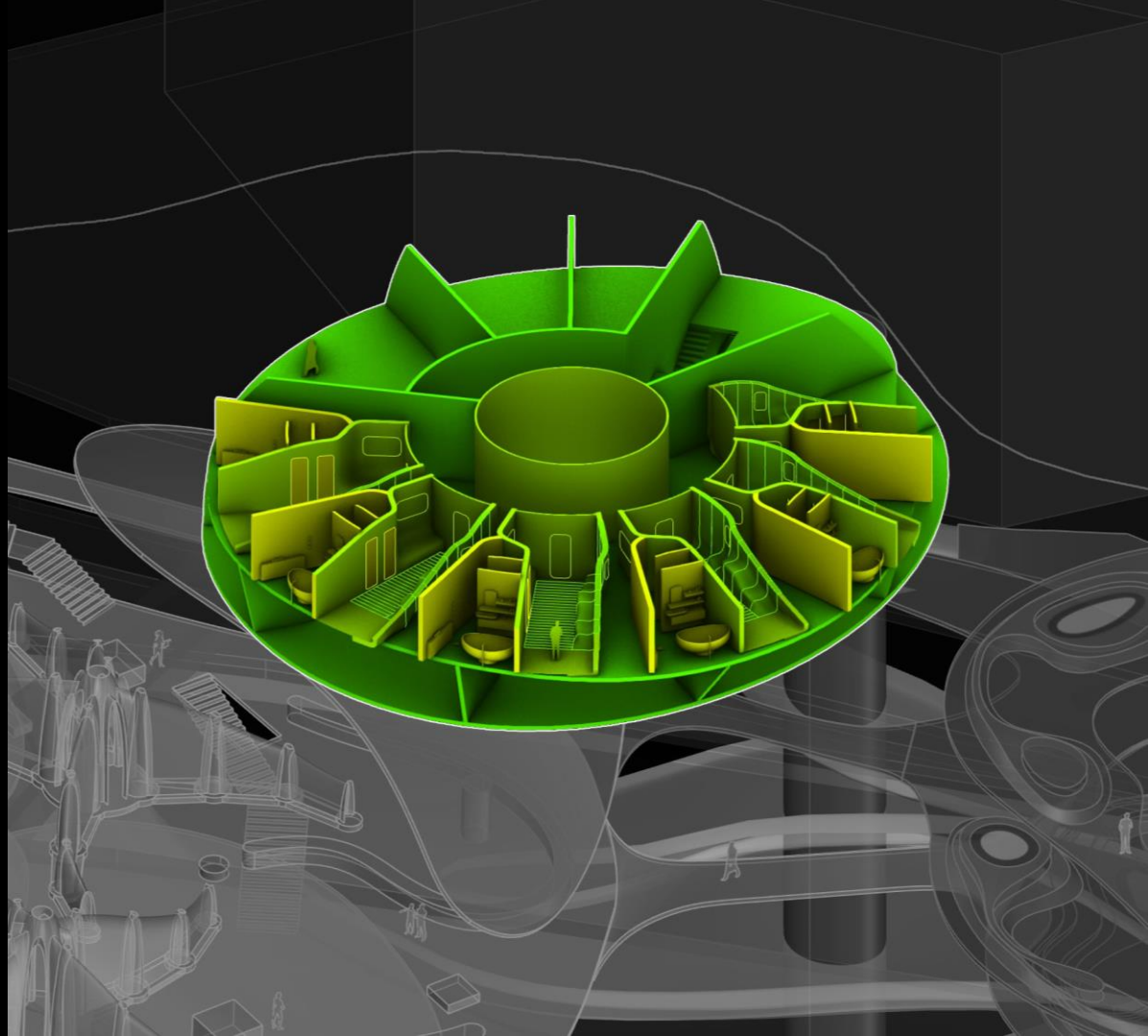
“Everyone’s Xanadu”

VR life prototype and its live broadcast project



VR life prototype

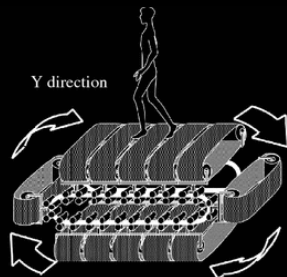
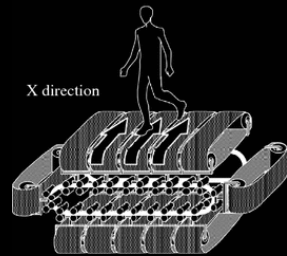
- 1 Omni treadmill
- 2 “Ambiguous furniture”
- 3 Bathroom
- 4 Changing room



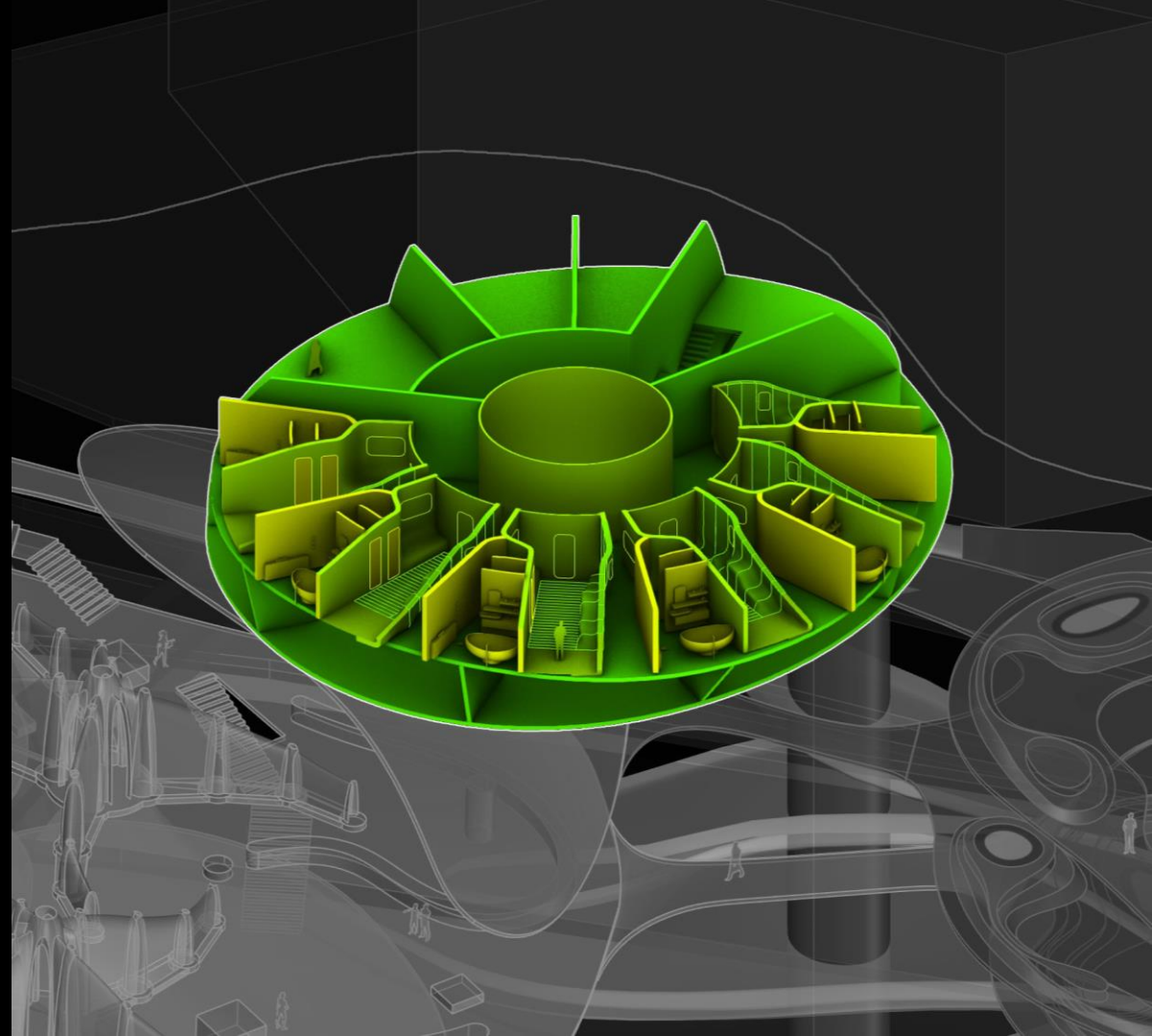
VR Lab

“Everyone’s Xanadu”

VR life prototype and its live broadcast project



“Omni treadmill”



VR Lab

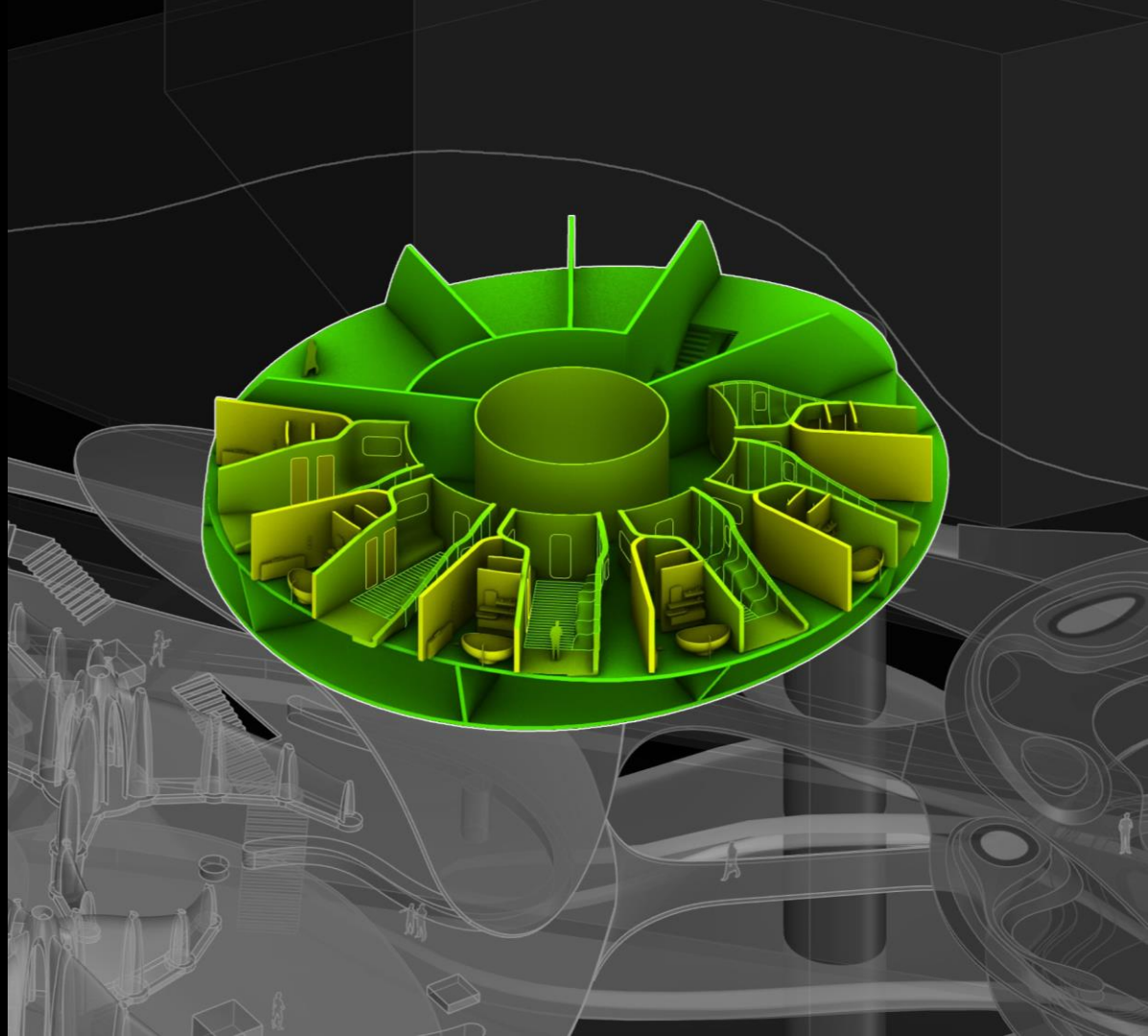
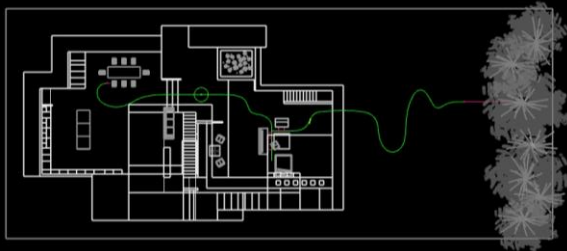
“Everyone’s Xanadu”

VR life prototype and its live broadcast project

In reality



In VR



Design

Prefab

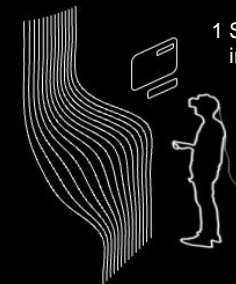
Assembly

VR Lab

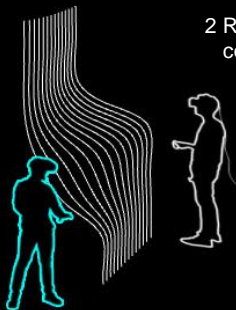
X

Robotic Production

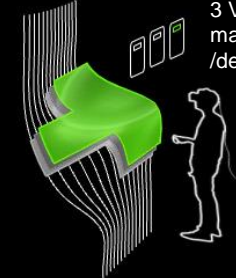
1 Sketch/modeling
in full-scale



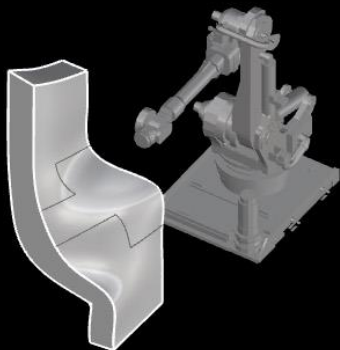
2 Remote
collaboration



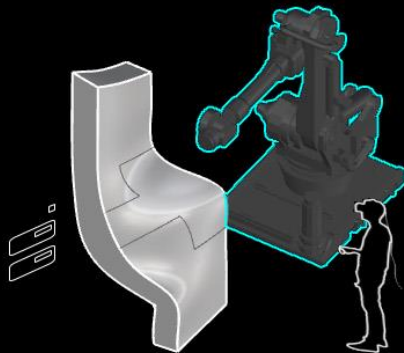
3 Verification of
material/structure
/detail



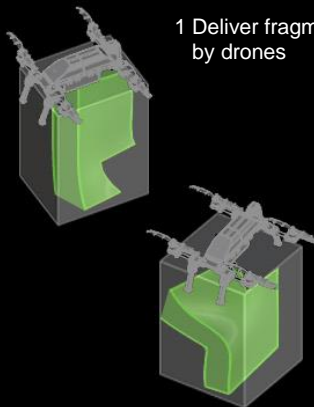
Robotic lab
Produce remotely



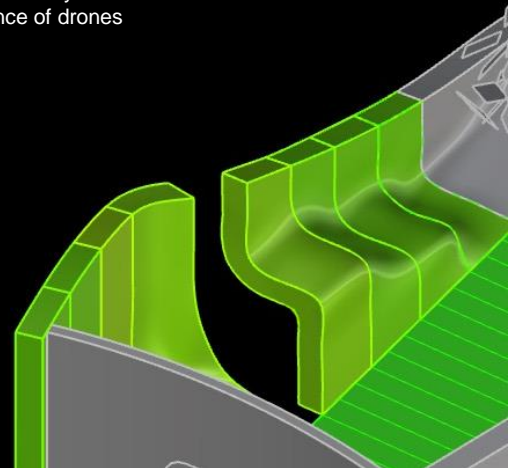
At home
Control robot in VR platform



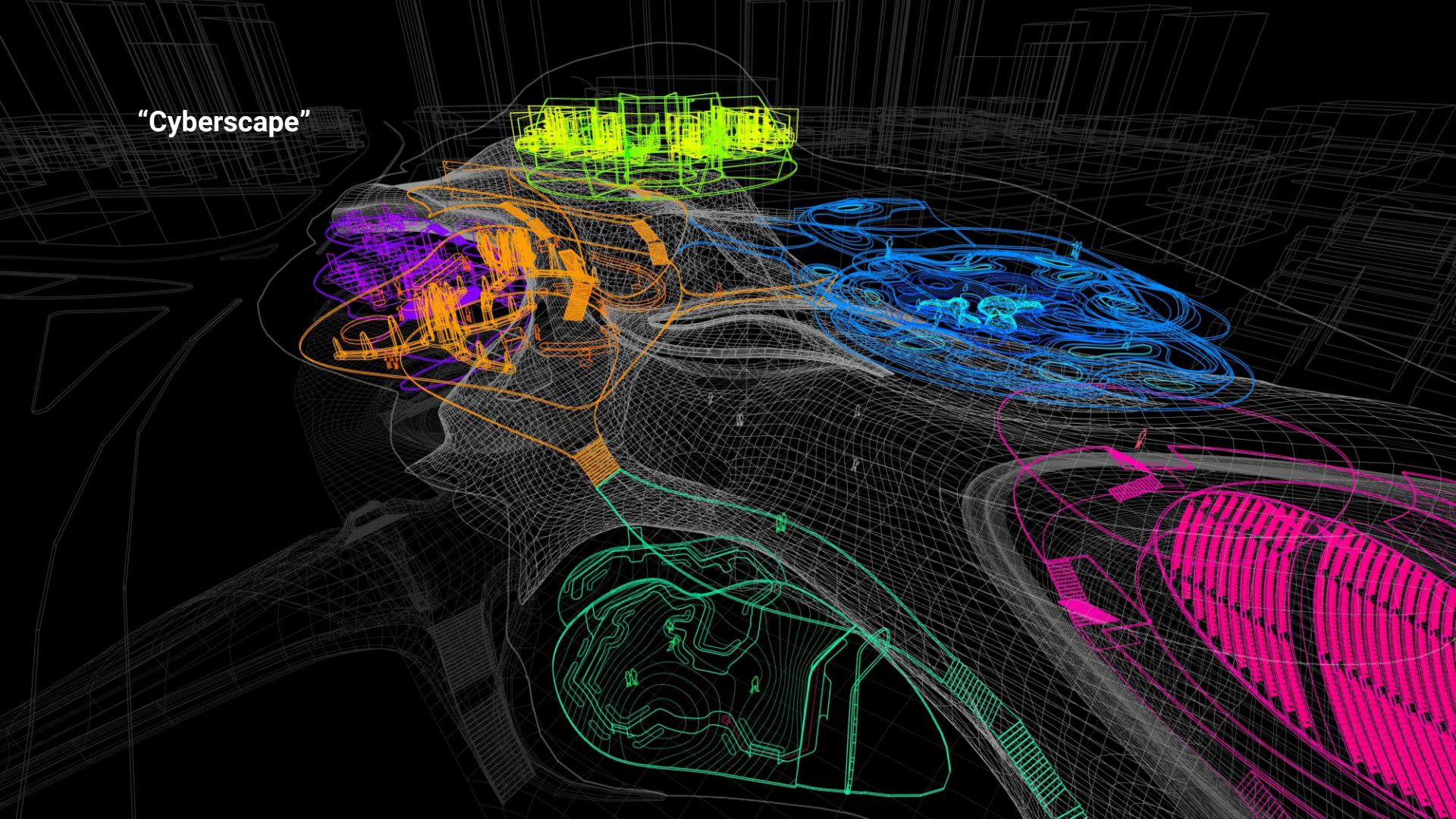
1 Deliver fragments
by drones



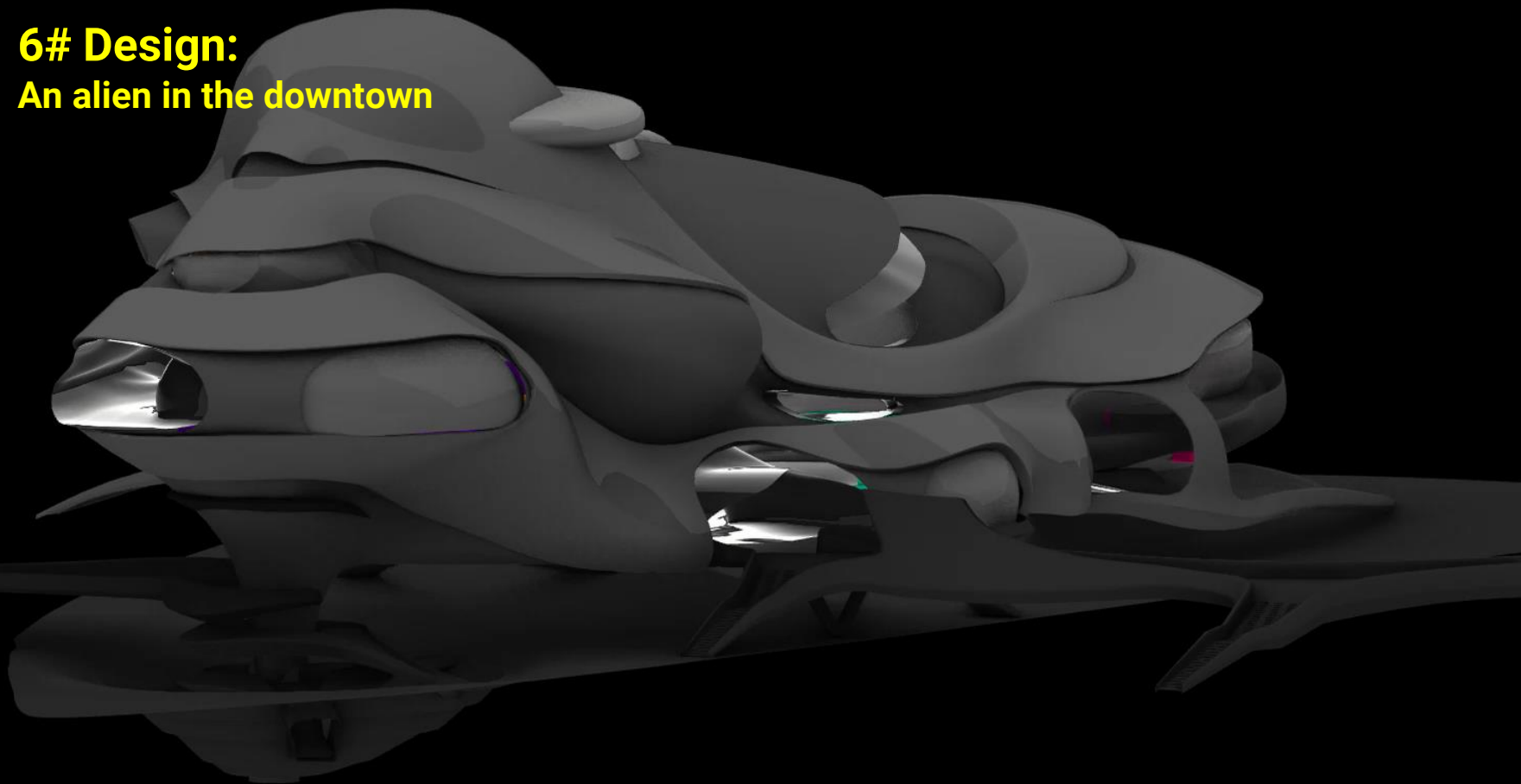
2 On-site assembly with
the assistance of drones



“Cyberscape”

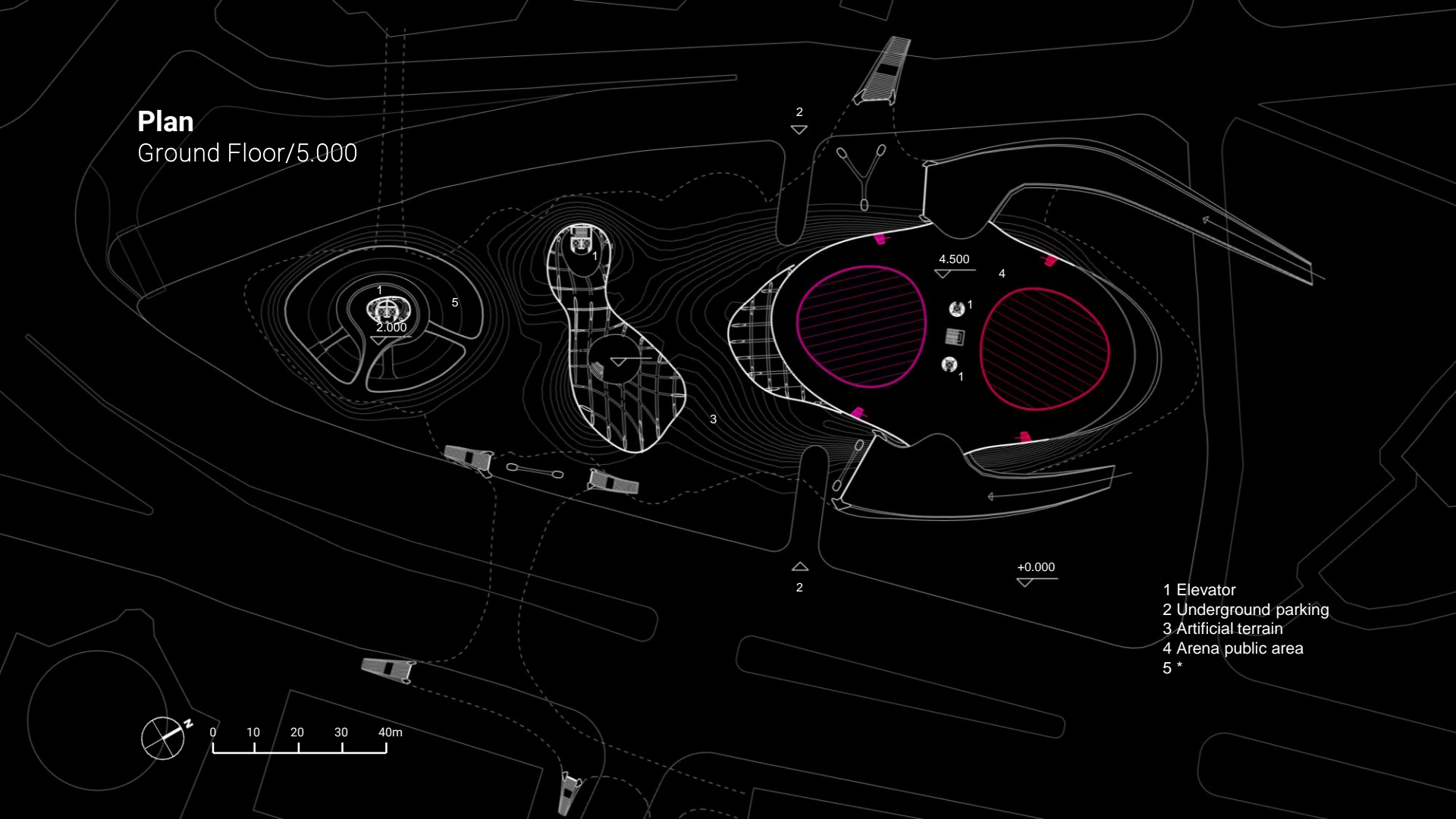


6# Design:
An alien in the downtown

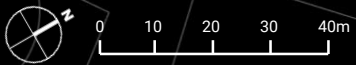


Plan

Ground Floor/5.000

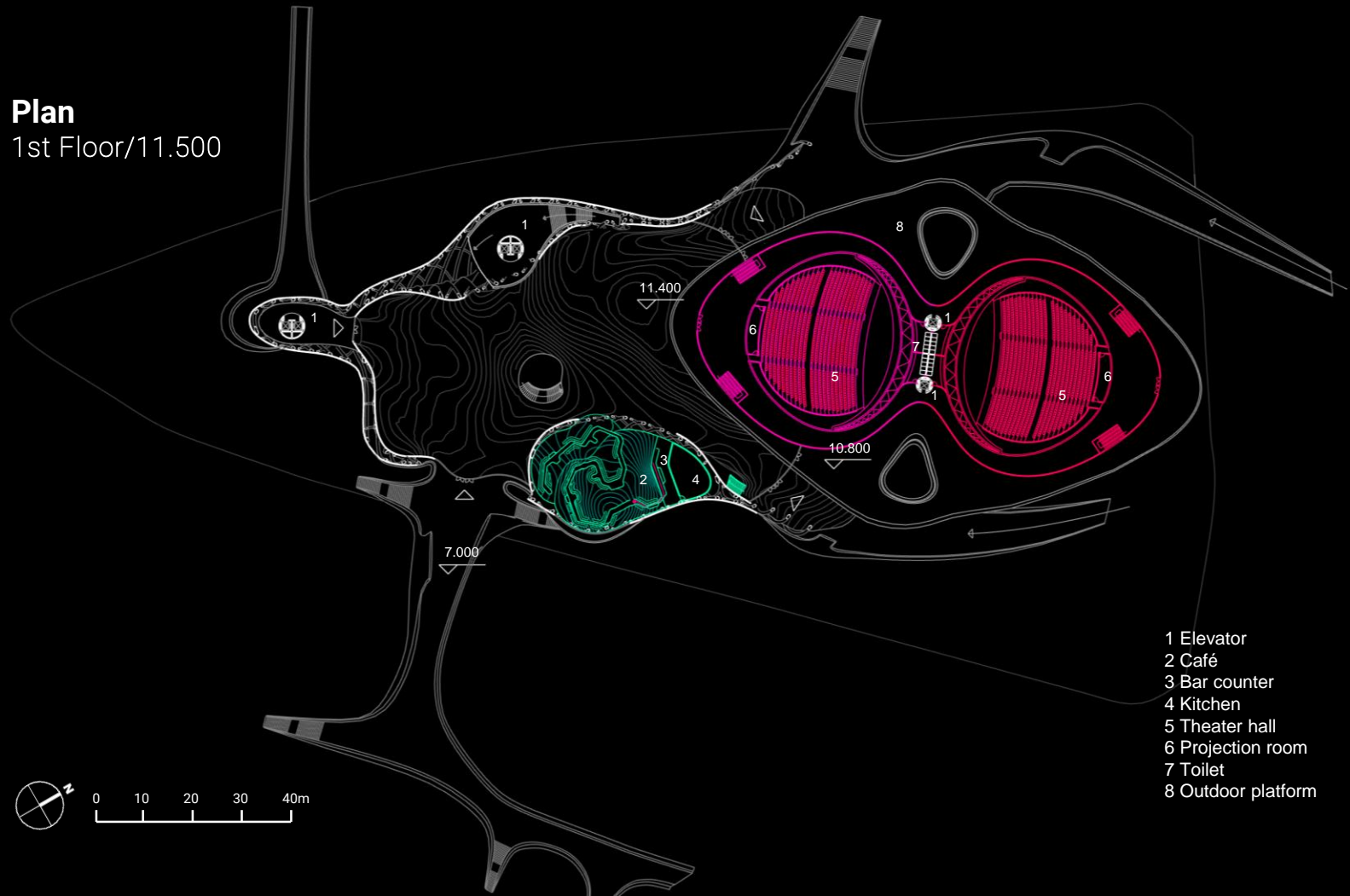


- 1 Elevator
- 2 Underground parking
- 3 Artificial terrain
- 4 Arena public area
- 5 *



Plan

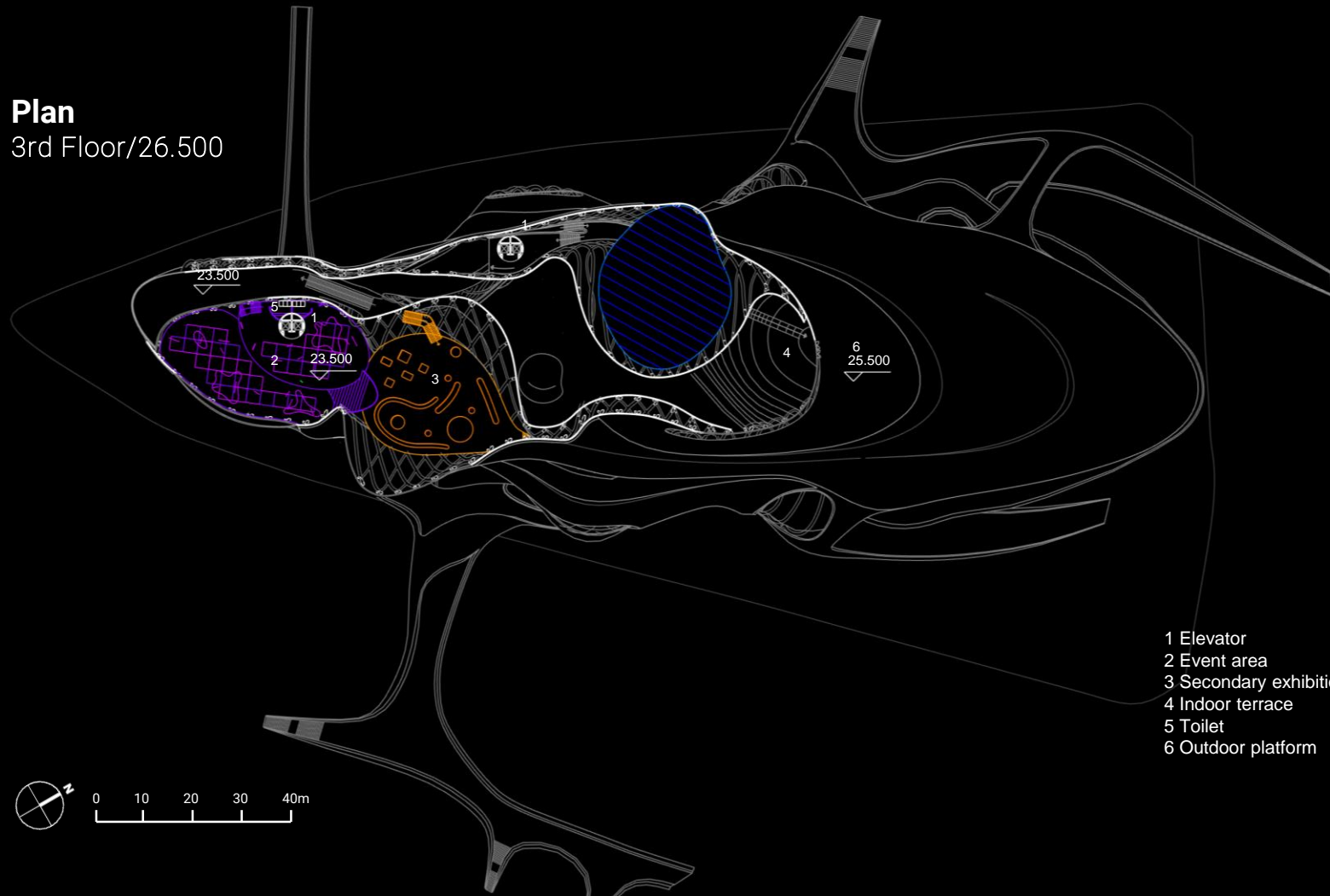
1st Floor/11.500



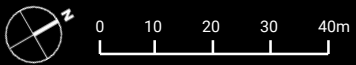
- 1 Elevator
- 2 Café
- 3 Bar counter
- 4 Kitchen
- 5 Theater hall
- 6 Projection room
- 7 Toilet
- 8 Outdoor platform

Plan

3rd Floor/26.500

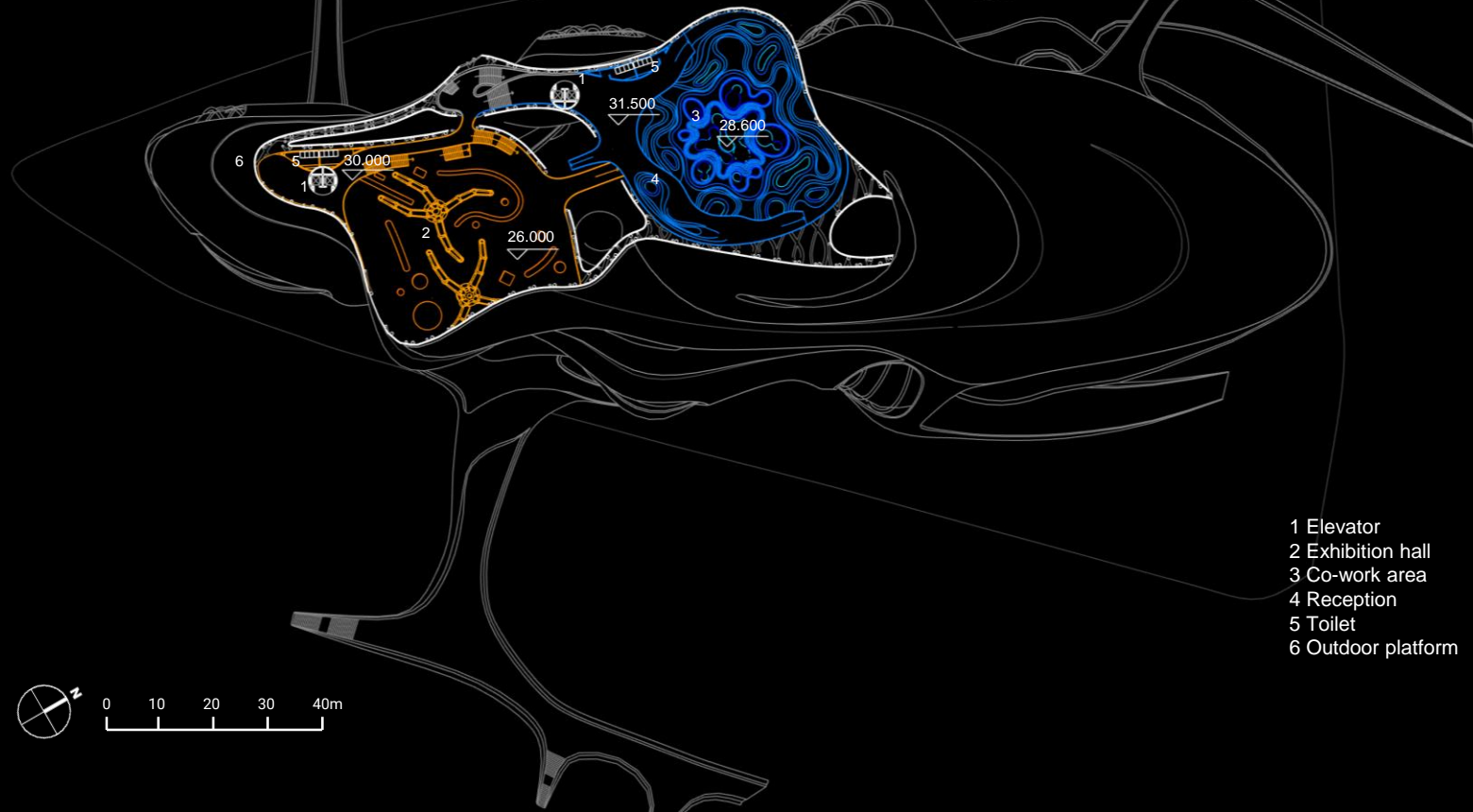


- 1 Elevator
- 2 Event area
- 3 Secondary exhibition hall
- 4 Indoor terrace
- 5 Toilet
- 6 Outdoor platform

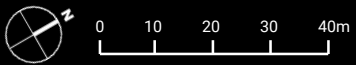


Plan

4th Floor/32.500



- 1 Elevator
- 2 Exhibition hall
- 3 Co-work area
- 4 Reception
- 5 Toilet
- 6 Outdoor platform

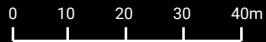


Plan

5th Floor/45.000

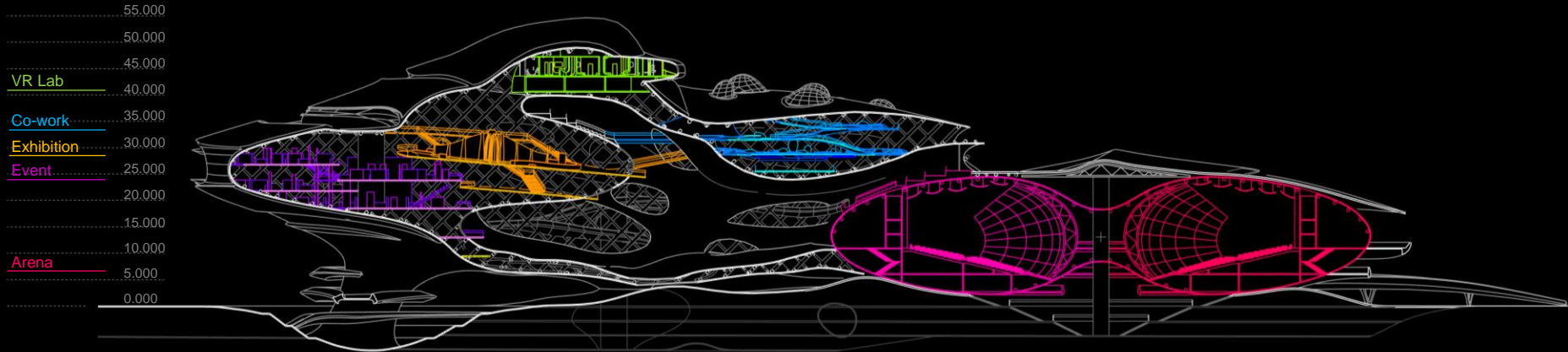
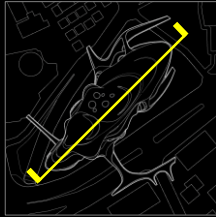


- 1 VR cells
- 2 VR studio
- 3 Office
- 4 Toilet



Section

Section A-A



VR Lab

Co-work

Exhibition

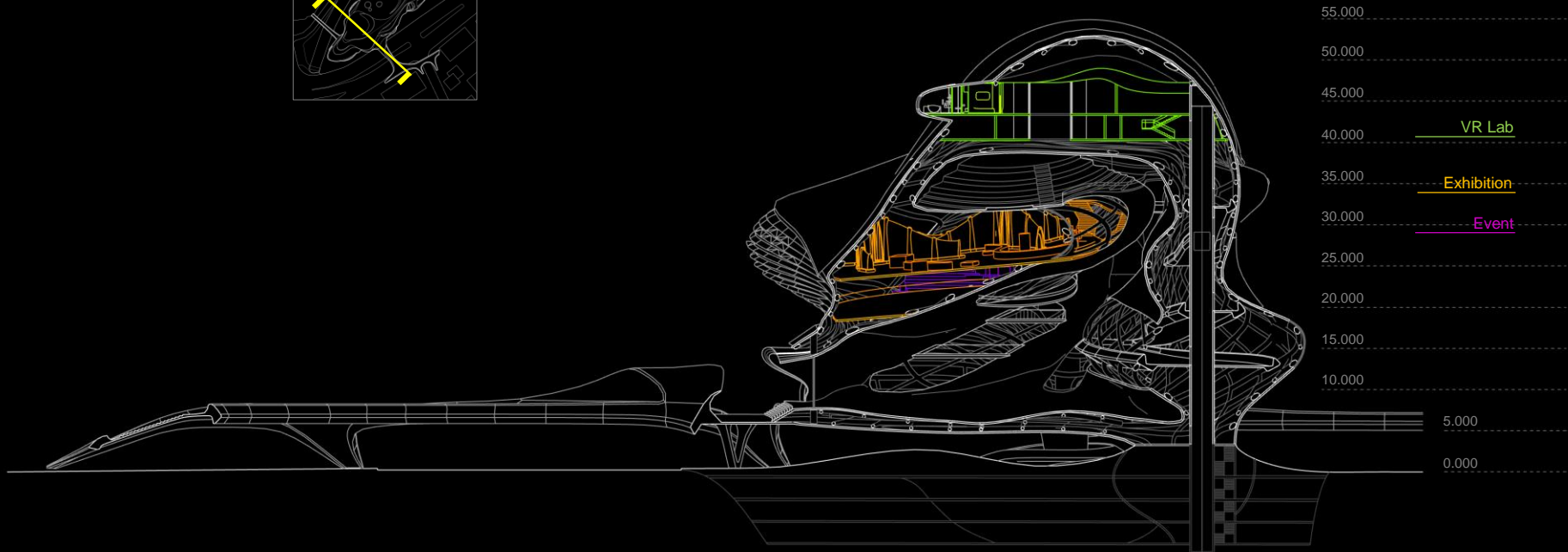
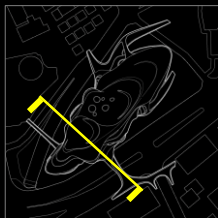
Event

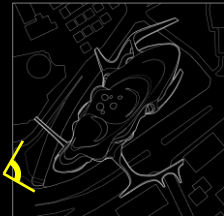
Arena

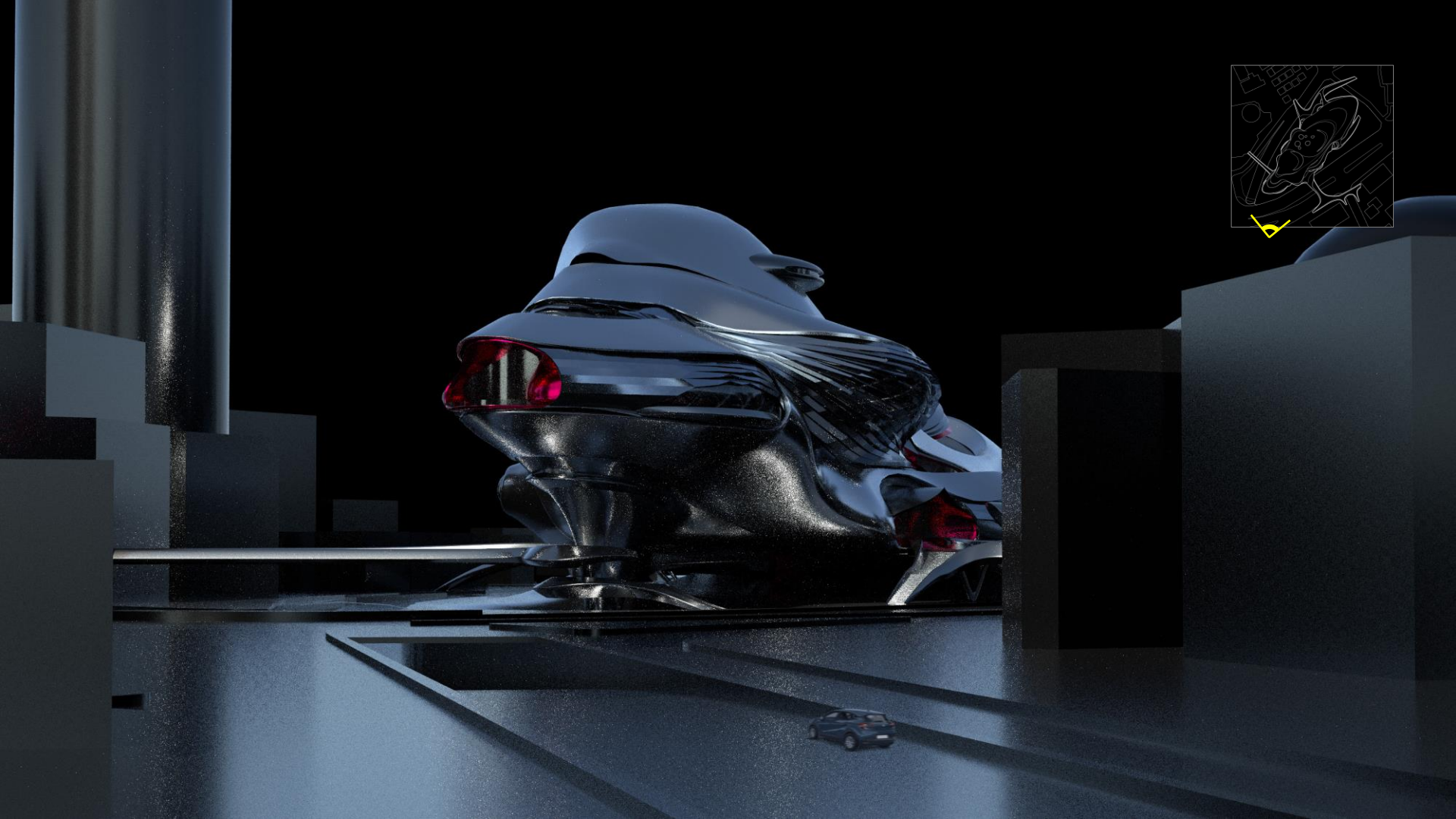


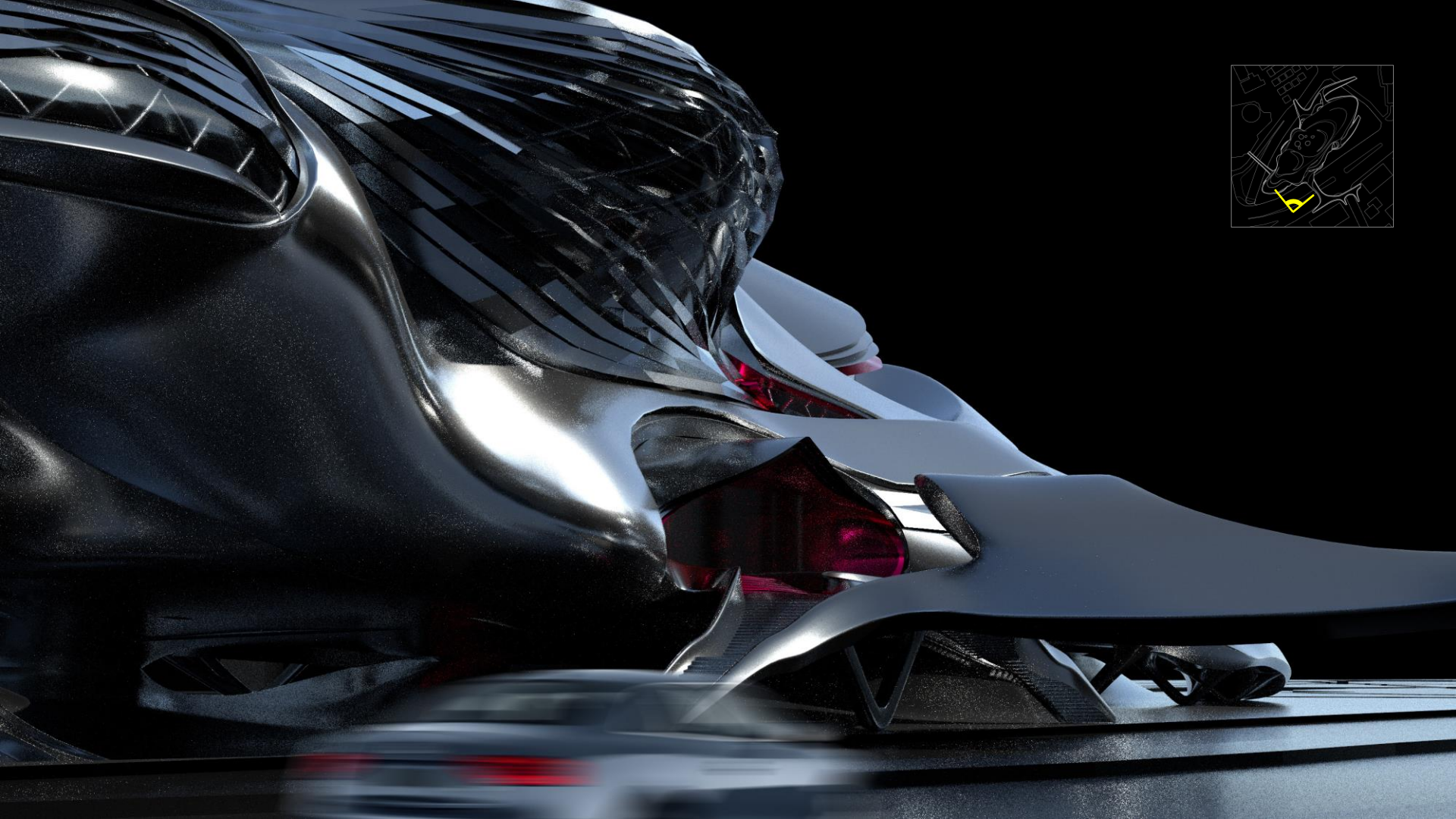
Section

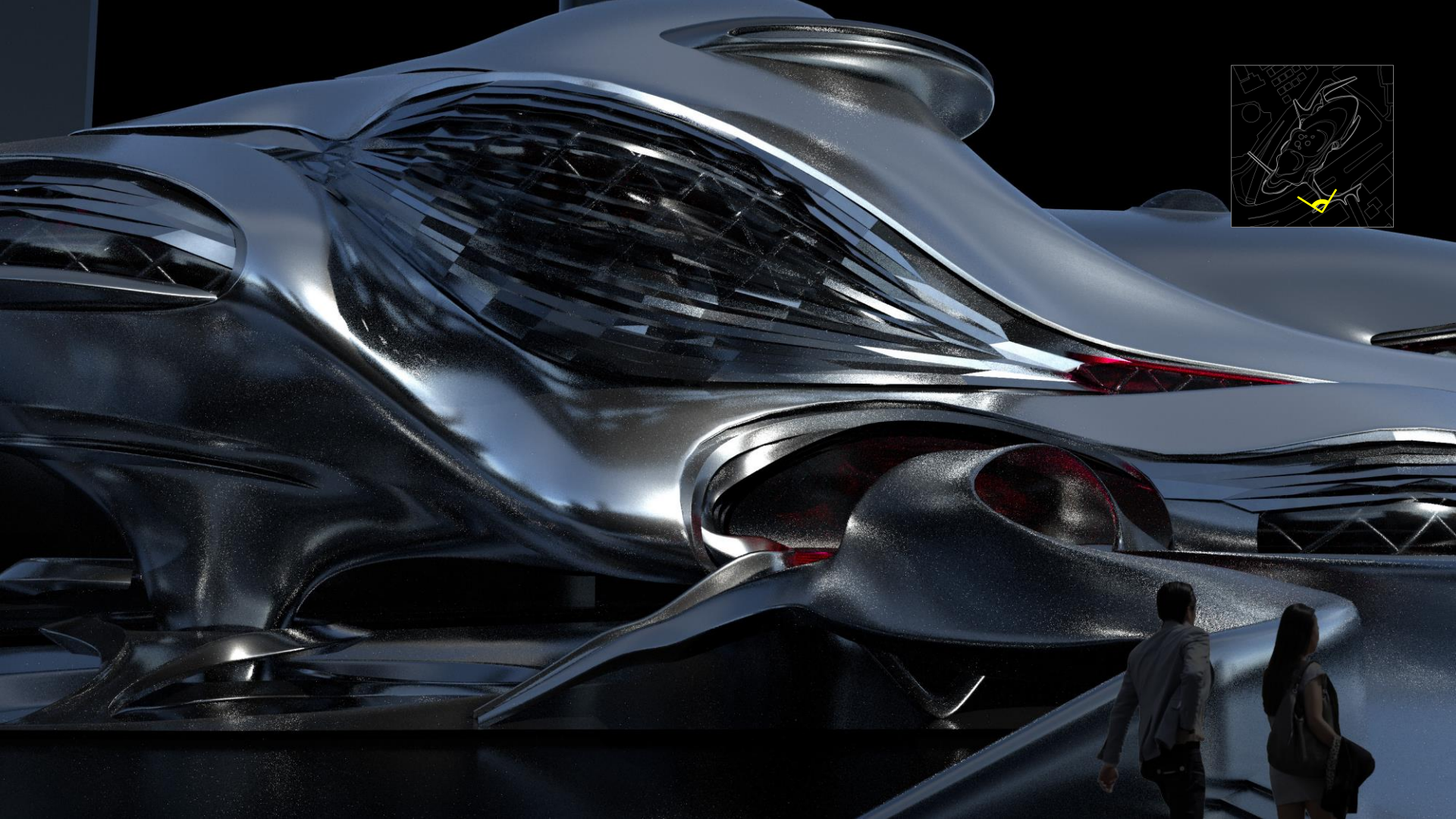
Section B-B



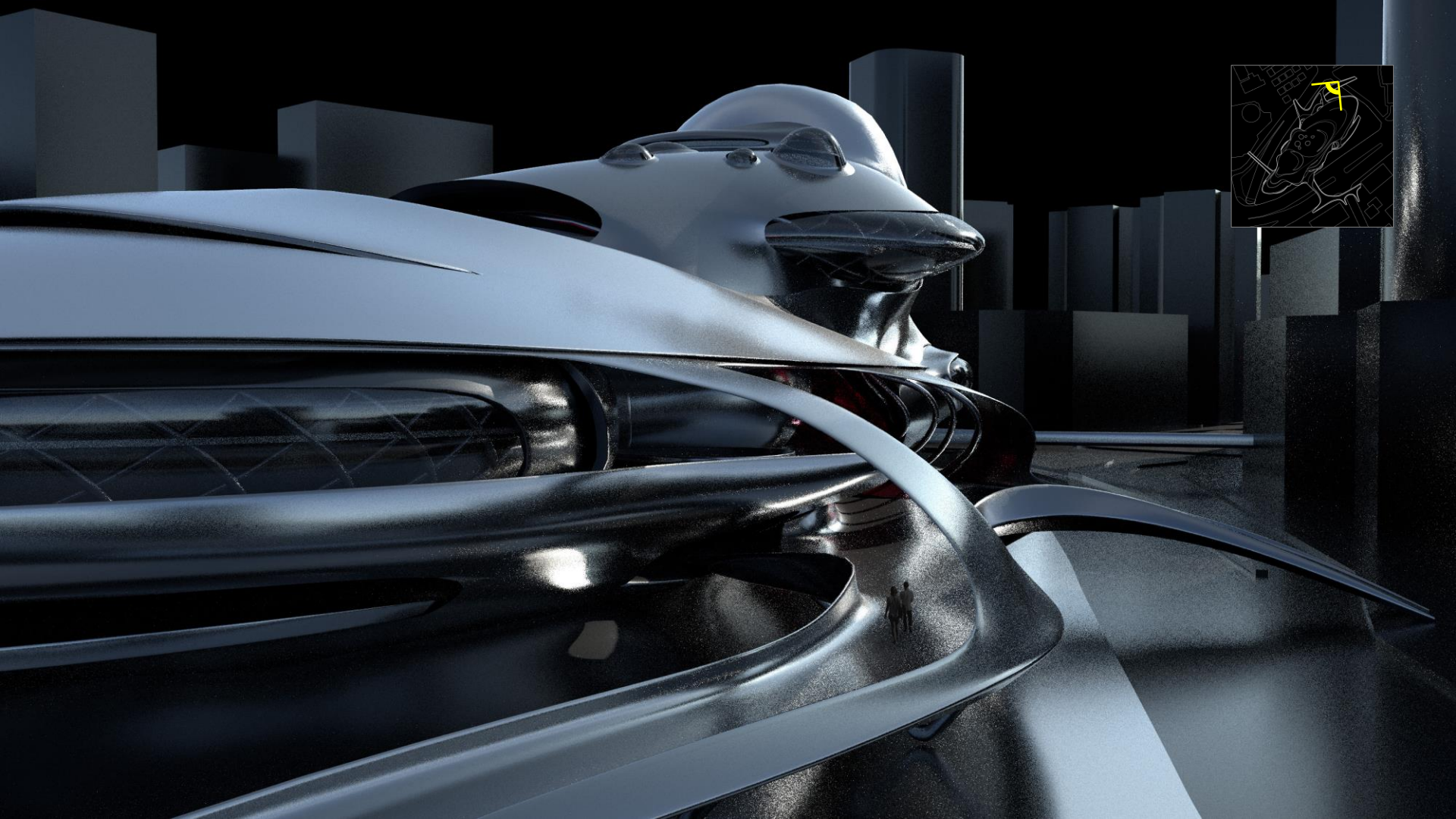


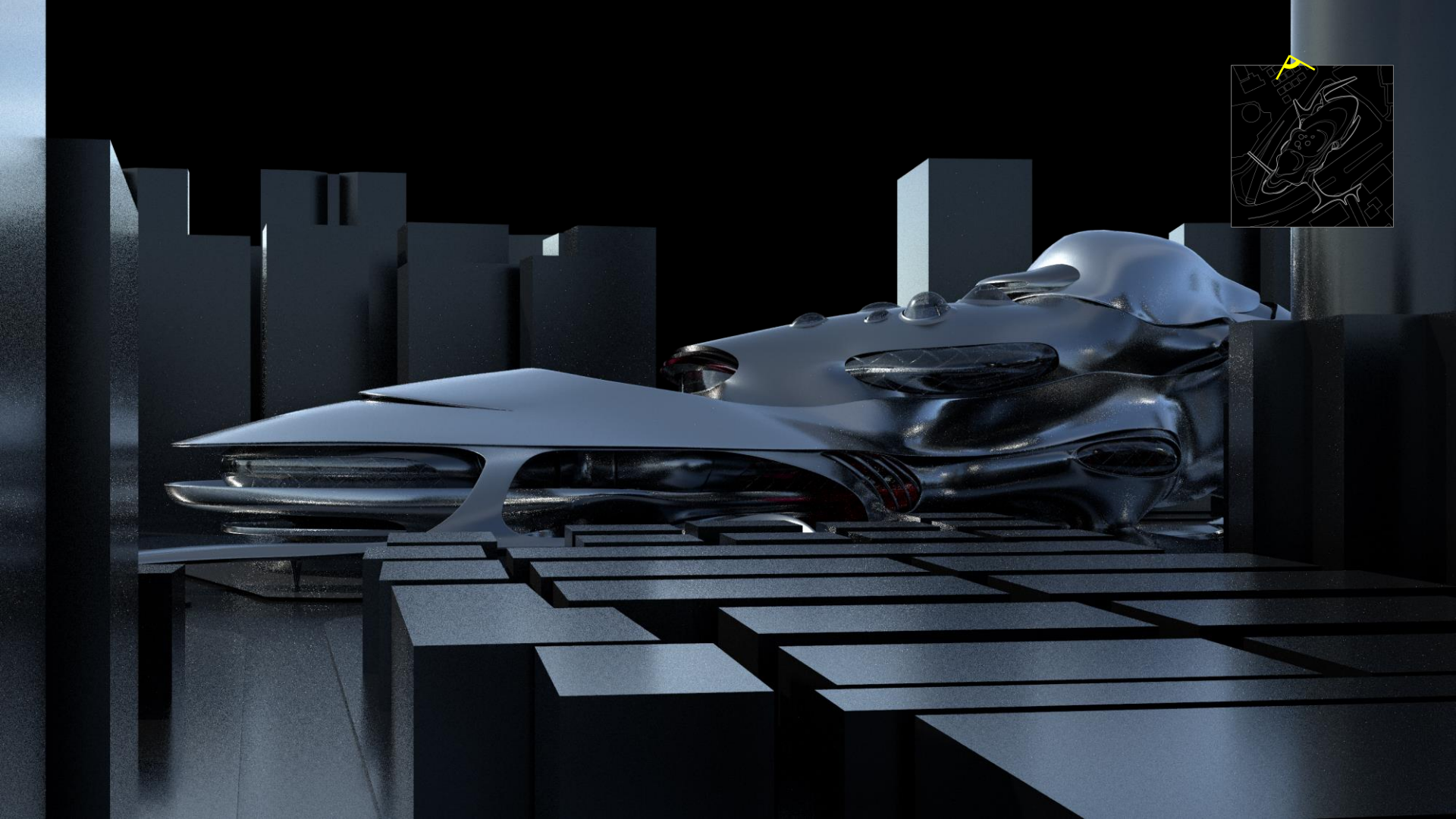






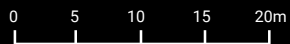




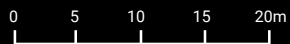
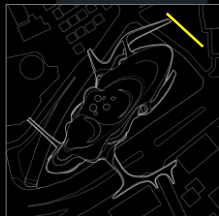


Elevation

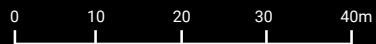
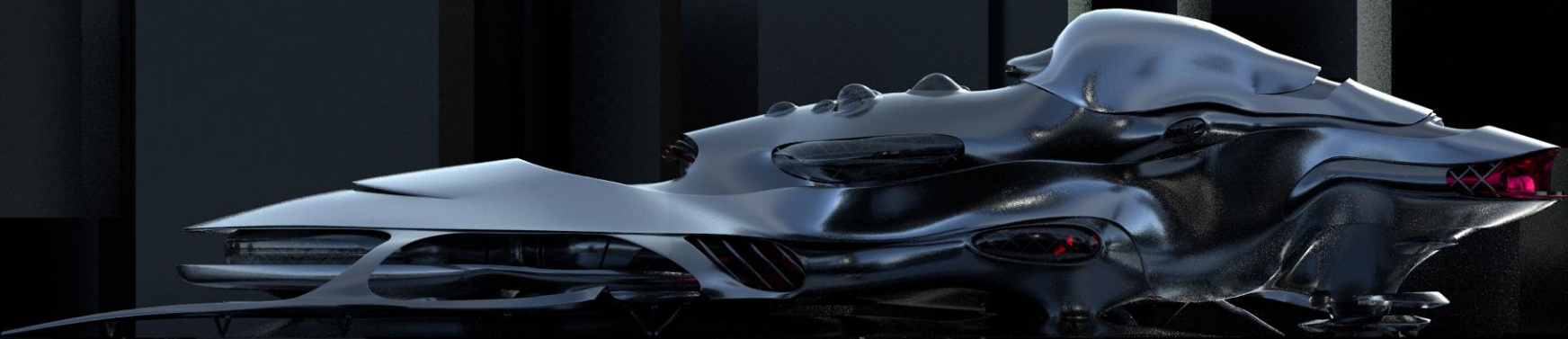
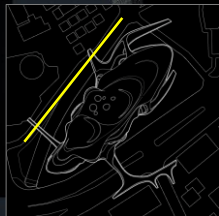
Southwest



Elevation
Northeast

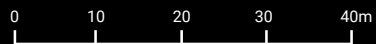
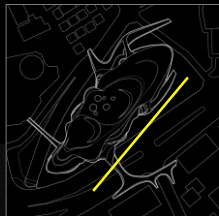


Elevation
Northwest



Elevation

Southeast



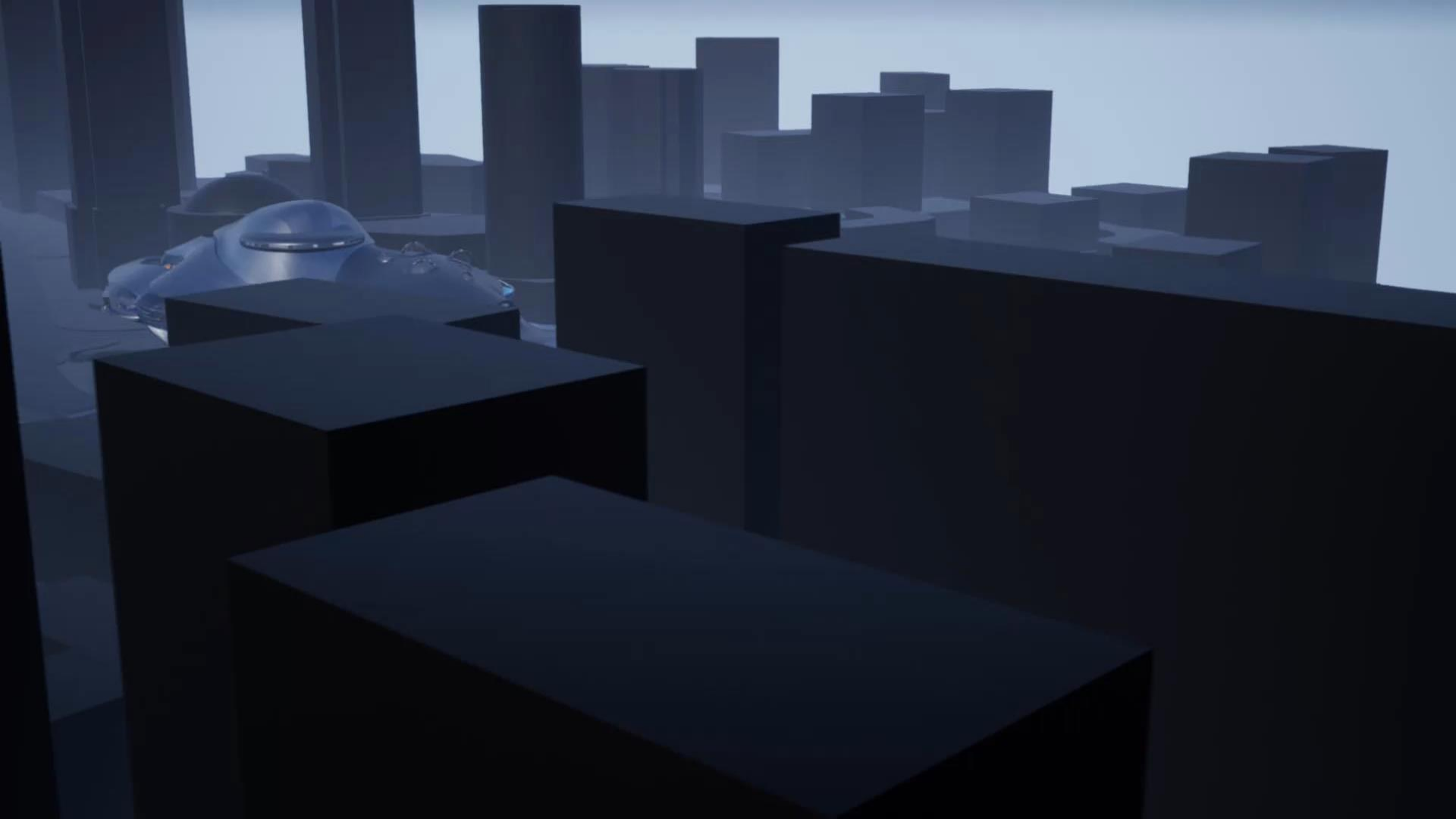


“A friendly alien”

Kunsthau Graz

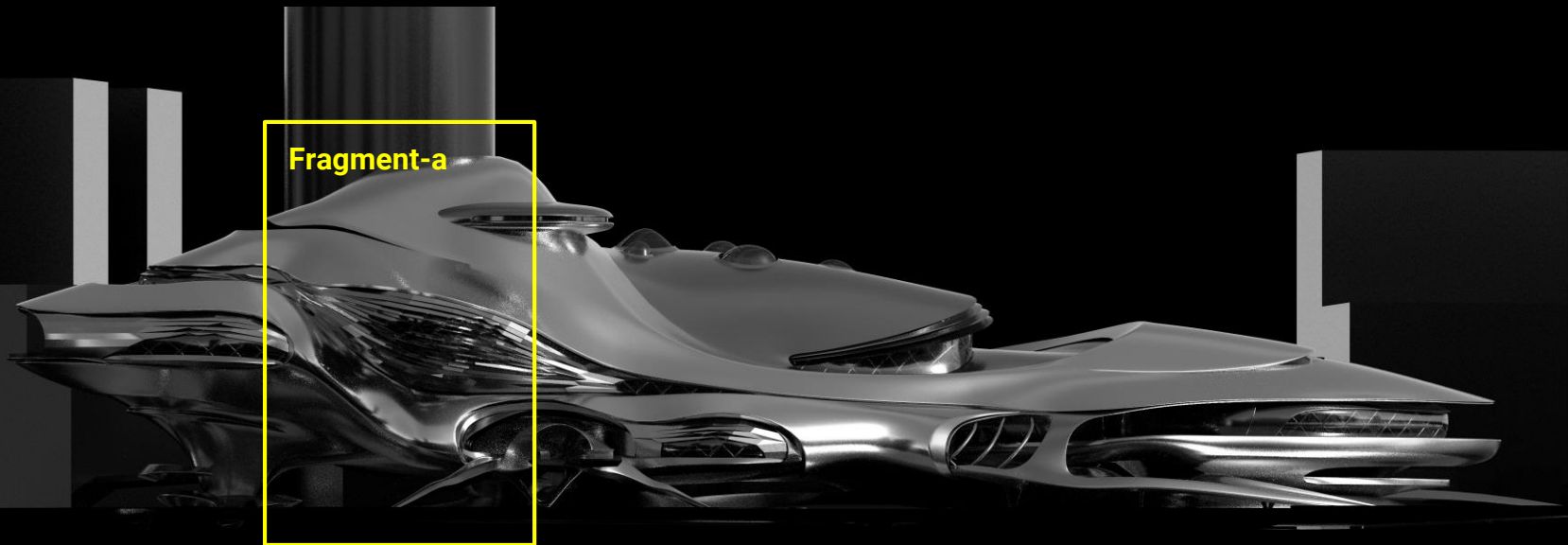
Graz, Austria

Peter Cook and Colin Fournier, 2003



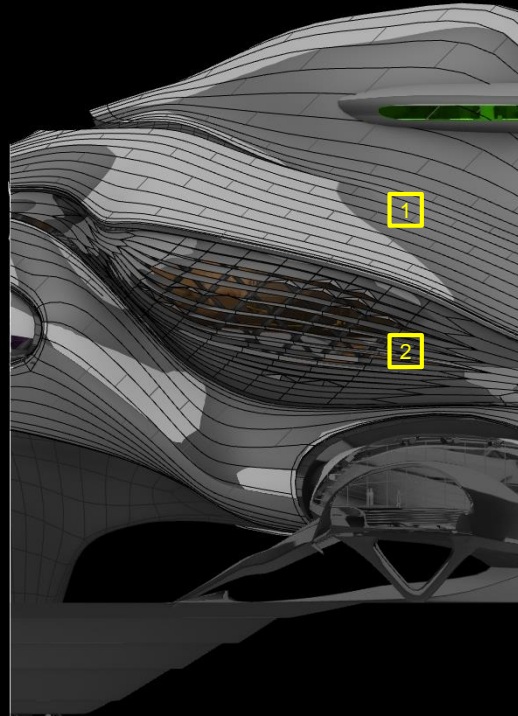
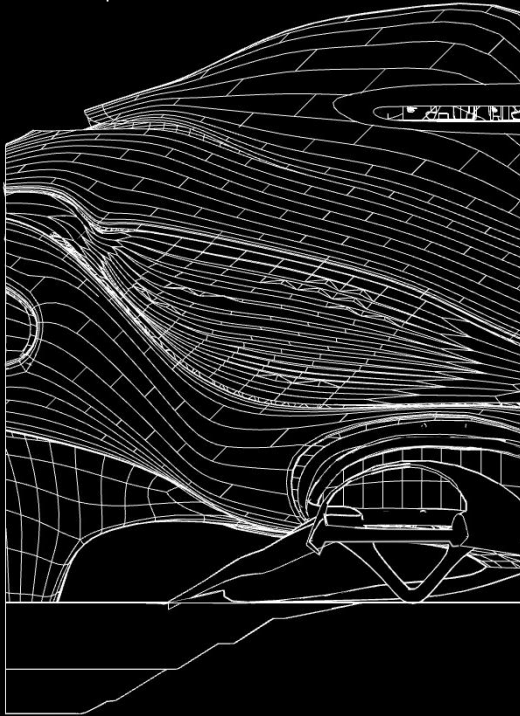
7# Materialization: Two fragments

Fragment-a



Fragment-a

Envelope

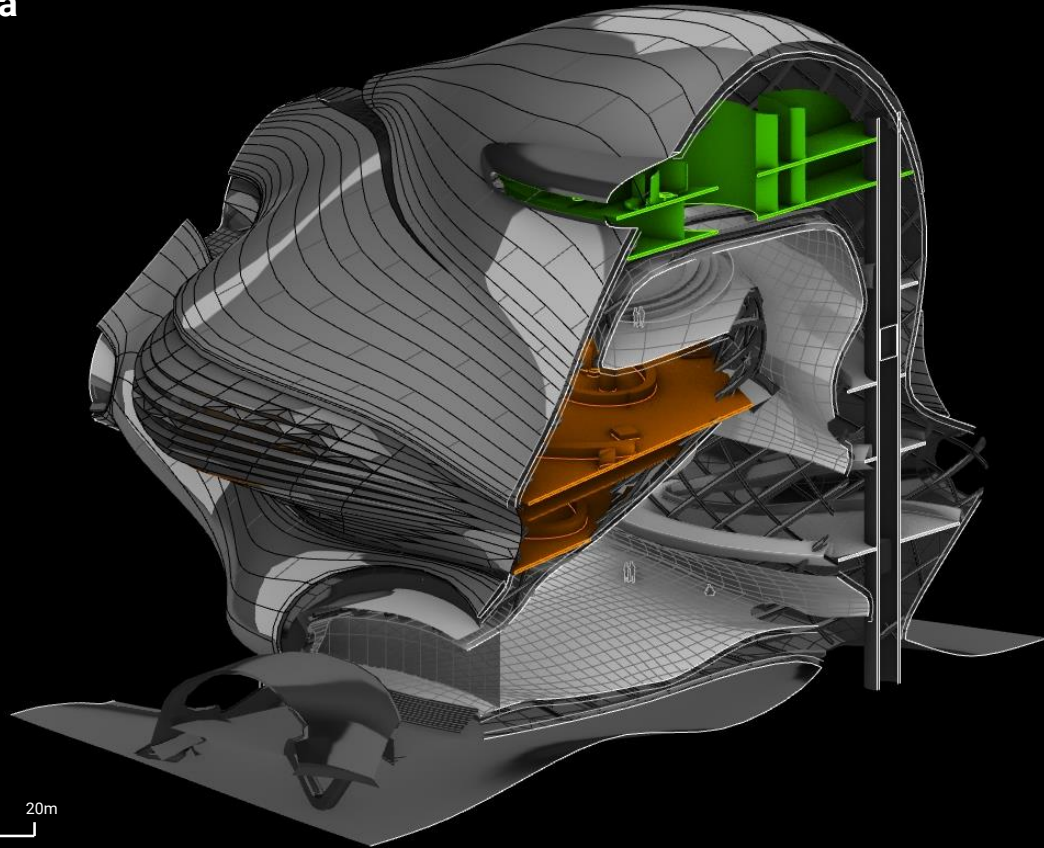


Stainless steel
PAHEUM/Coop Himmelb(l)au



Perforated aluminum sheet
Dalian International Conference
Center/Coop Himmelb(l)au

Fragment-a
Space

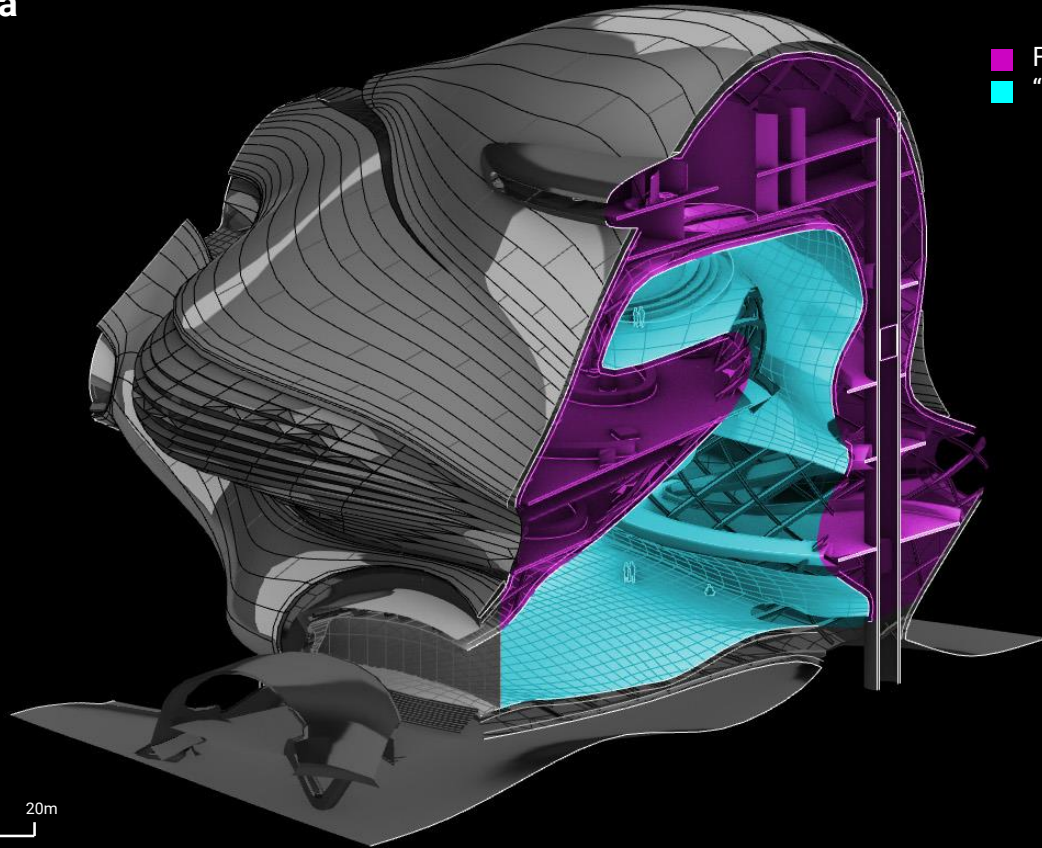


0 5 10 15 20m

Fragment-a

Space

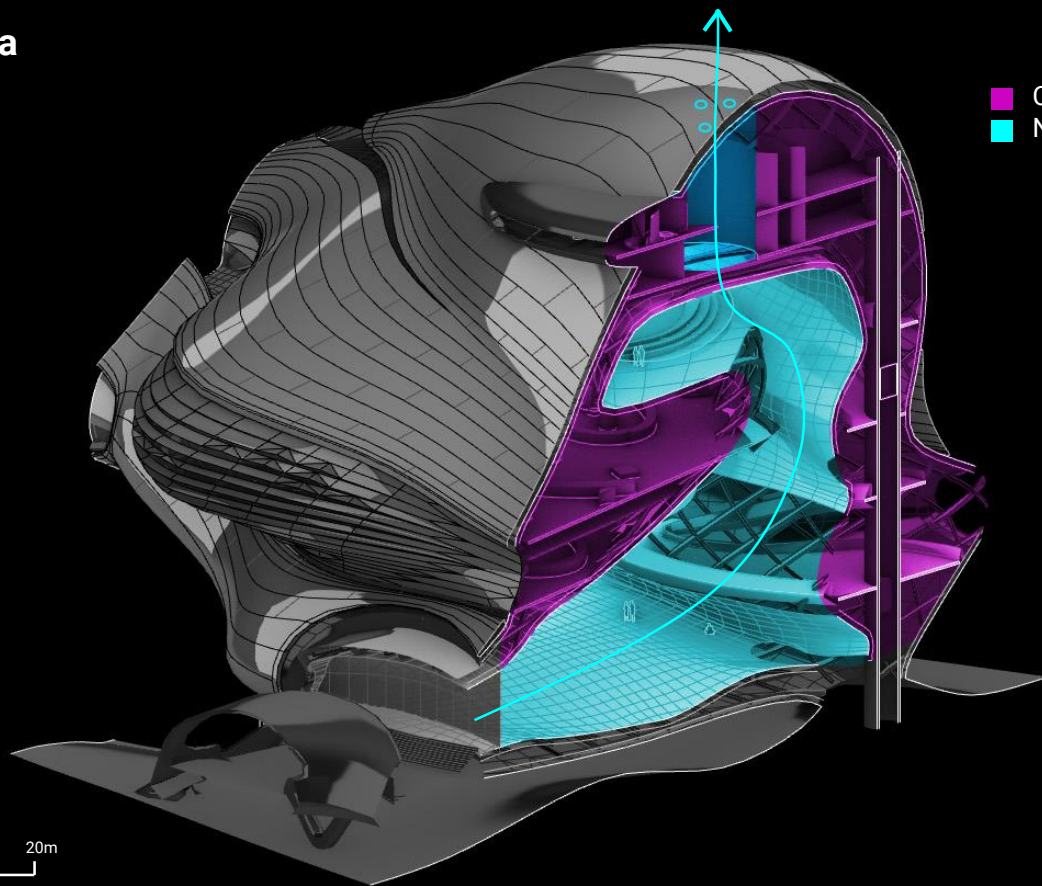
■ Functional space
■ "Cavity"



0 5 10 15 20m

Fragment-a

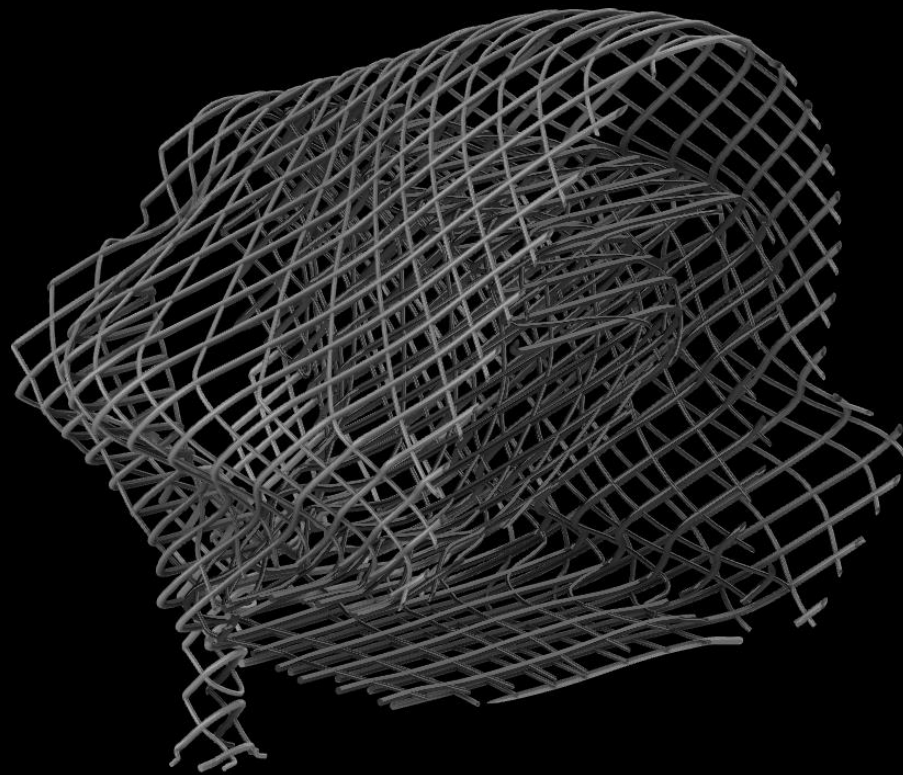
Climate



- Conditioned space
- Naturally ventilated

0 5 10 15 20m

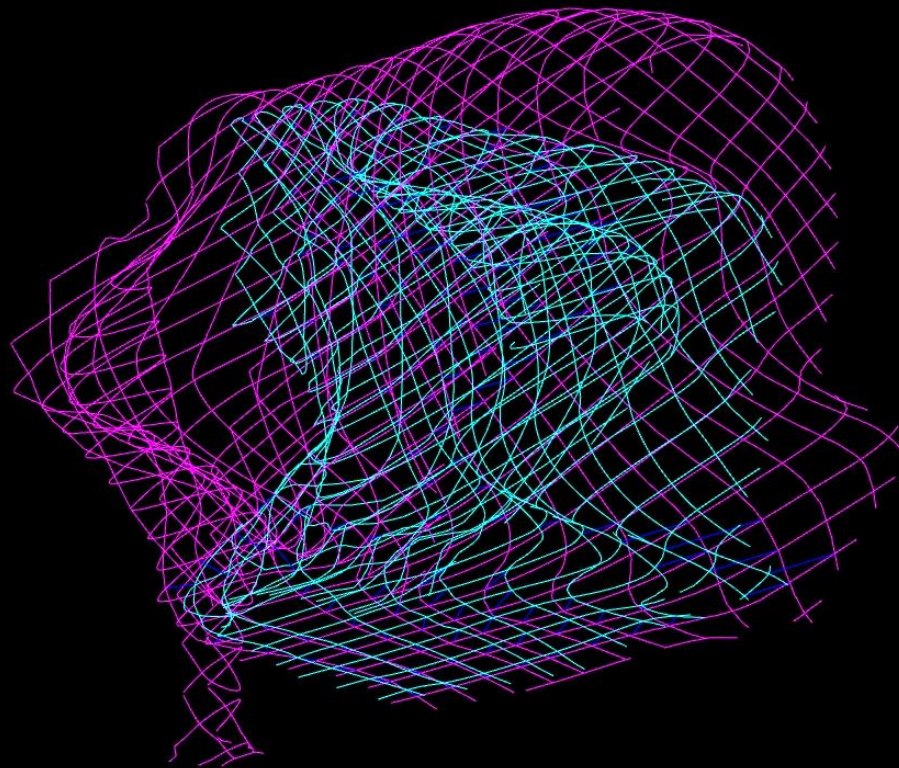
Fragment-a
Structure



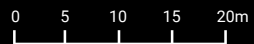
0 5 10 15 20m

Fragment-a

Structure



- Outer frame
- Inner frame
- Intermediate connection





Fragment-a
Structure

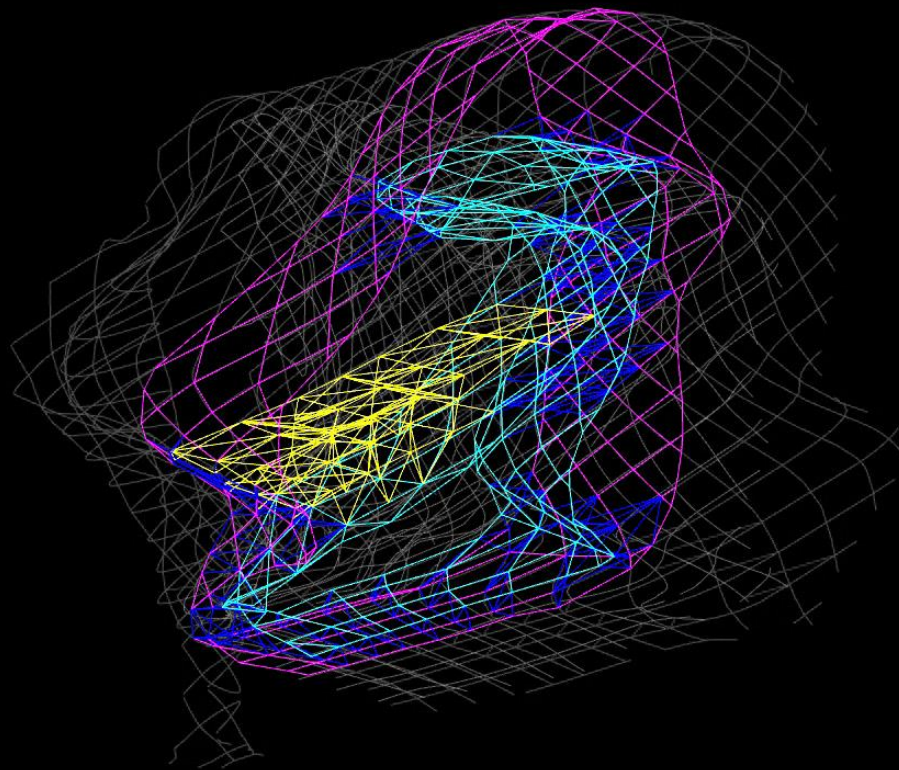
King's Cross Station renovation
John McAslan + Partners



Phoenix International Media Center
BIAD

Fragment-a

Structure

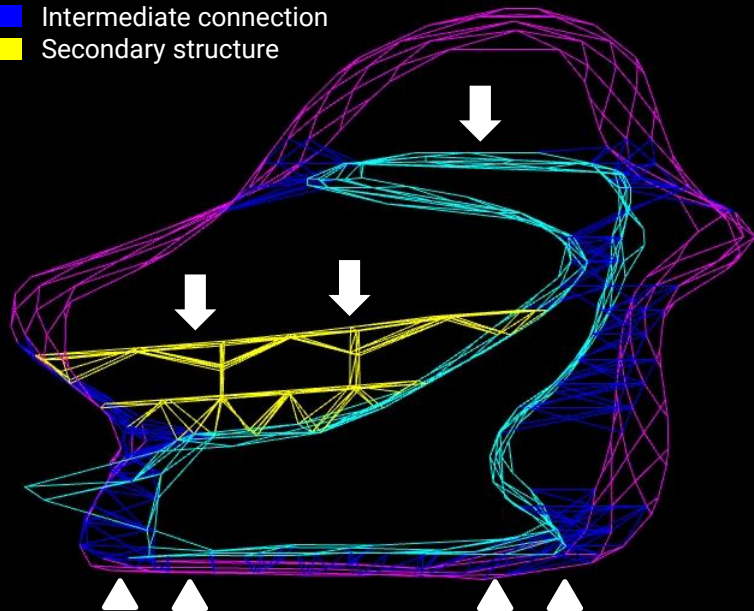


- Outer frame
- Inner frame
- Intermediate connection
- Secondary structure

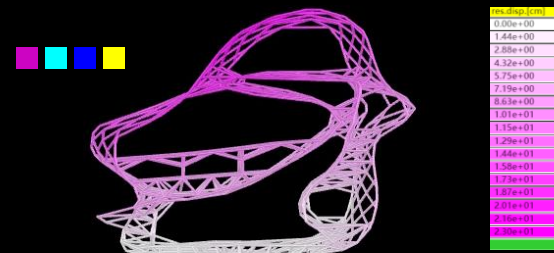
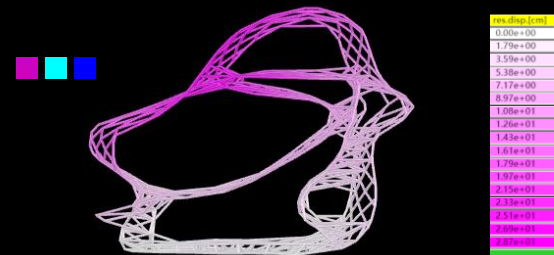
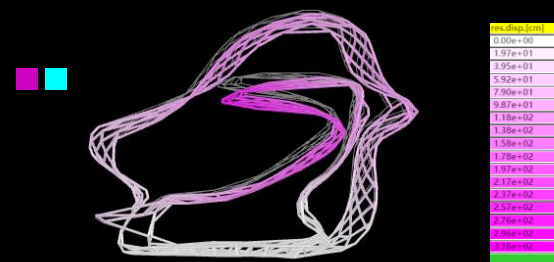
0 5 10 15 20m

Fragment-a Structure

- Outer frame
- Inner frame
- Intermediate connection
- Secondary structure

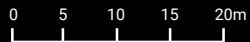
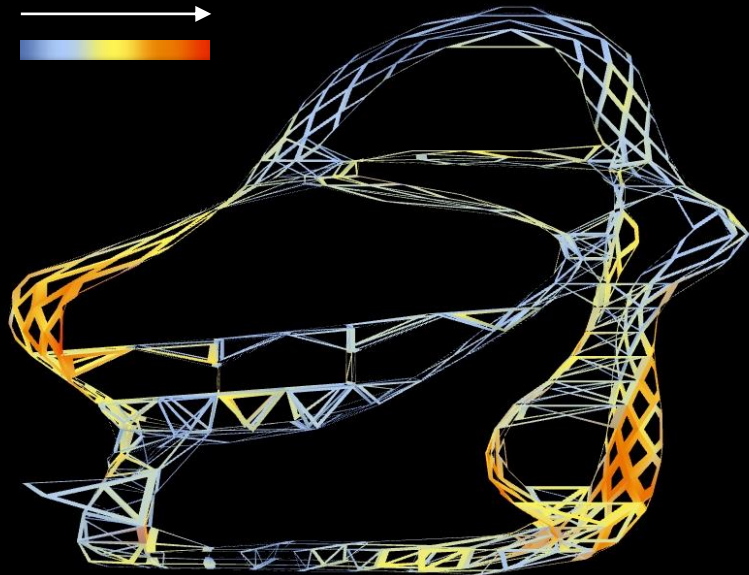


Displacement
*Simulate with
ø50cm, δ4cm, o-beam

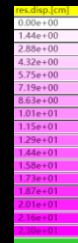
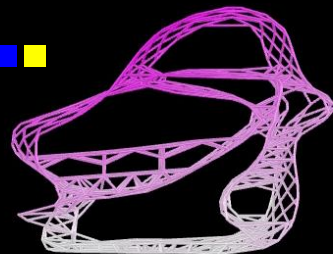
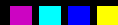
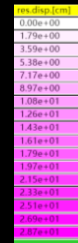
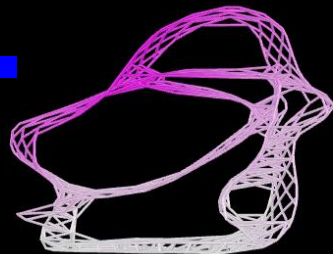
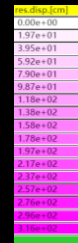
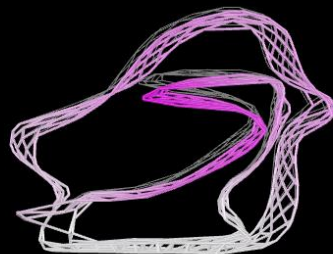


Fragment-a Structure

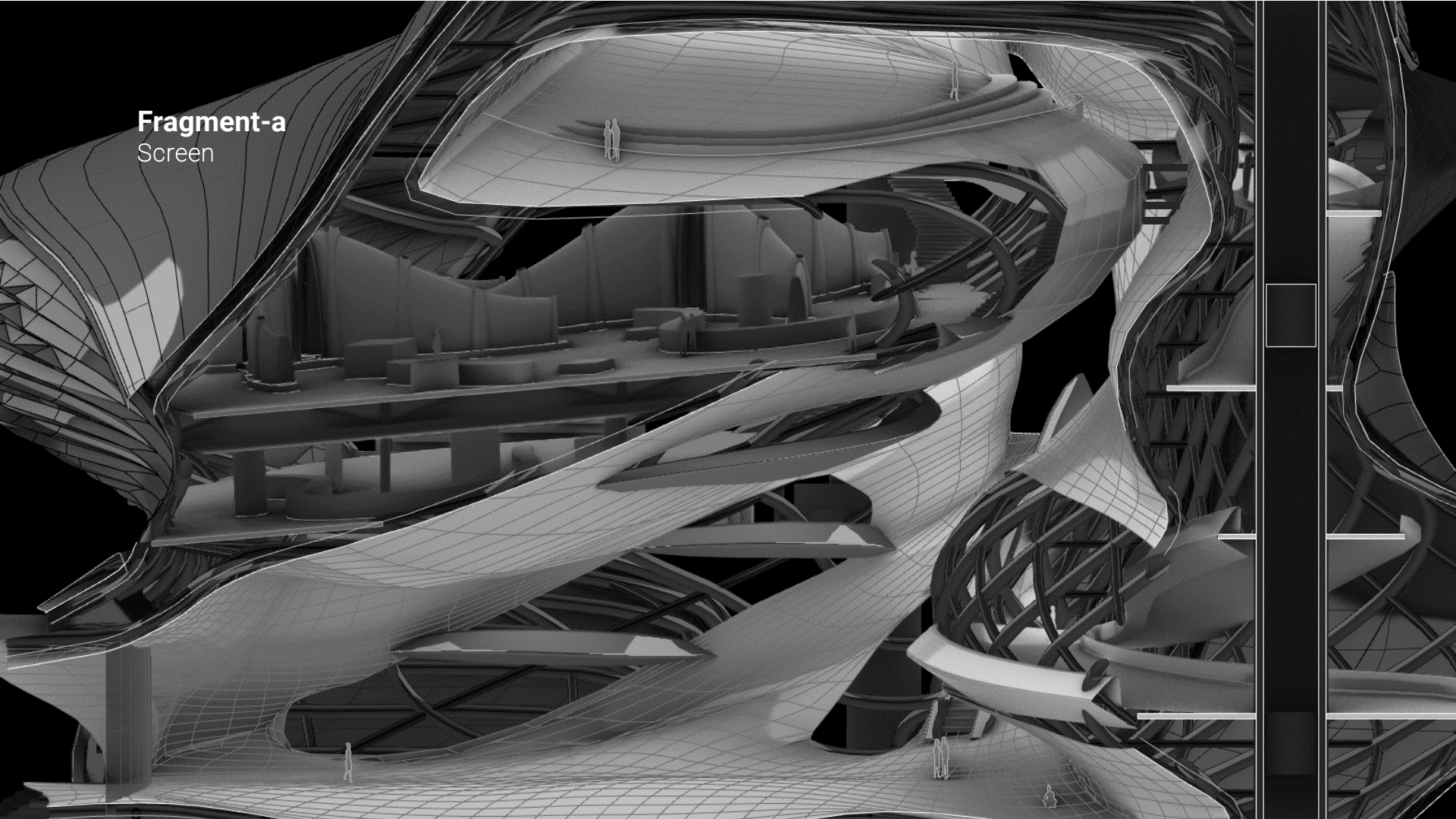
Resultant force



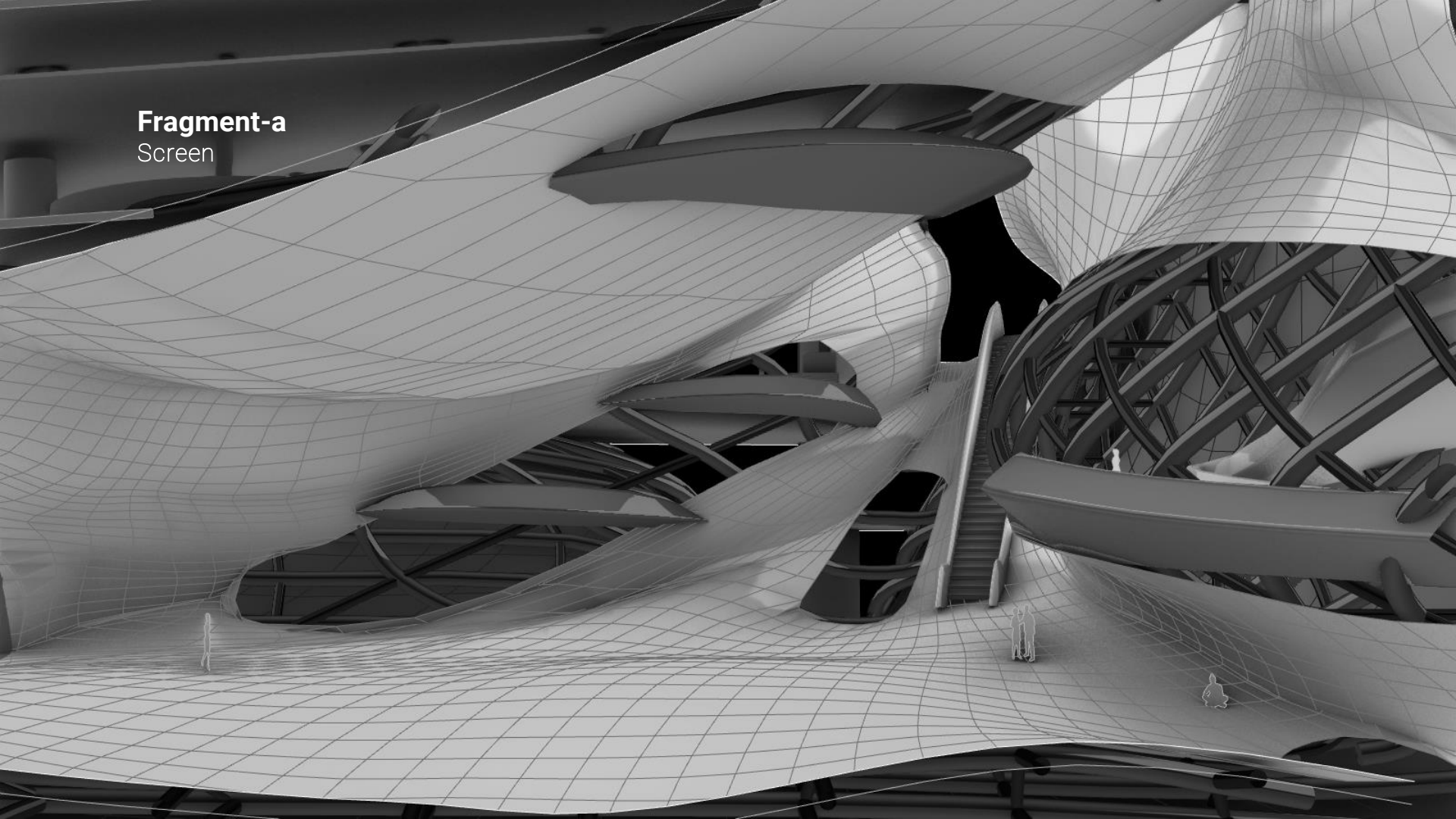
Displacement
*Simulate with
ø50cm, δ4cm, o-beam



Fragment-a
Screen



Fragment-a
Screen



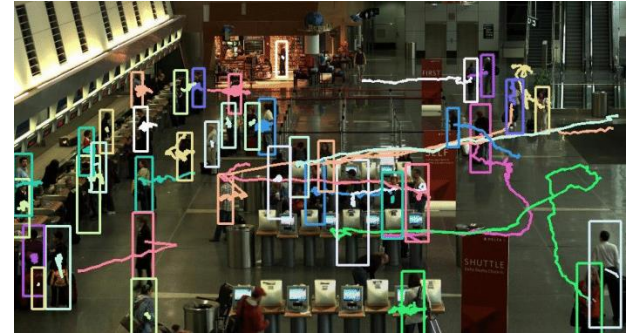
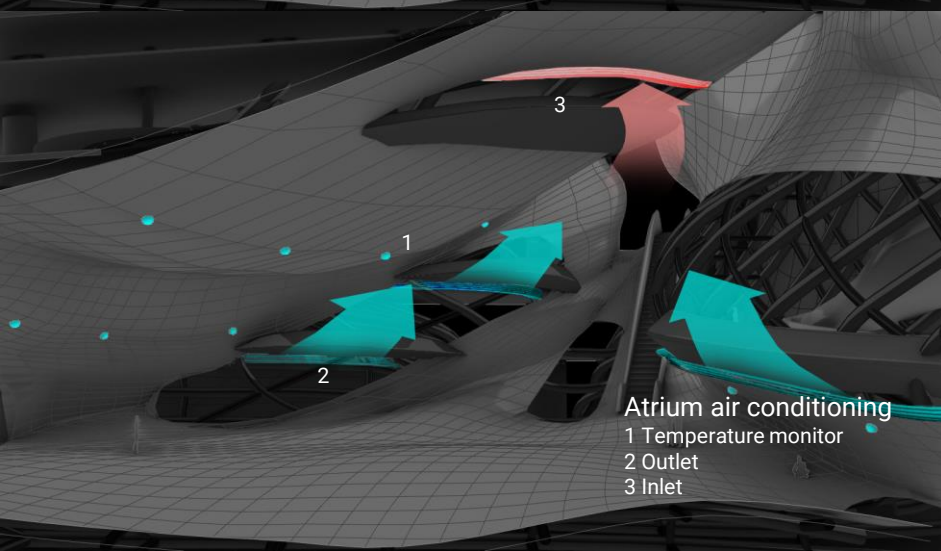
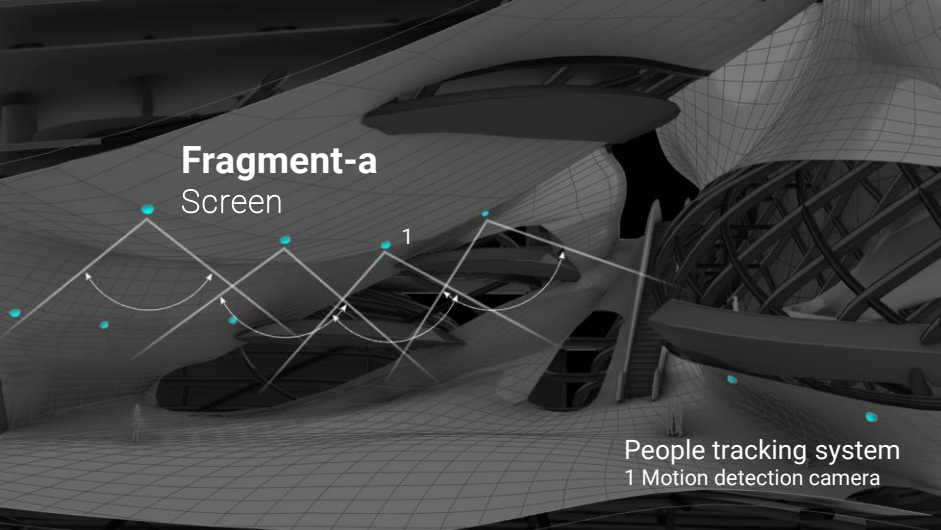


Fig. Multi-people tracking

<https://www.researchgate.net/publication/255568665> Part-based Multiple-Person Tracking with Partial Occlusion Handling

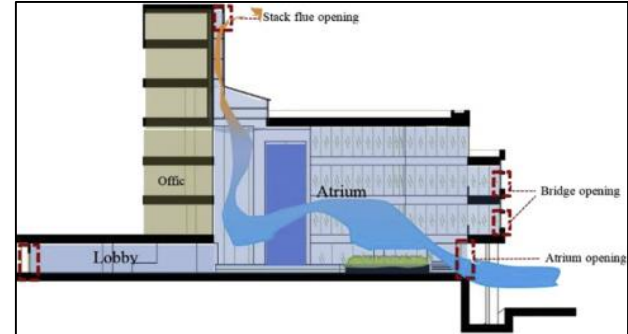
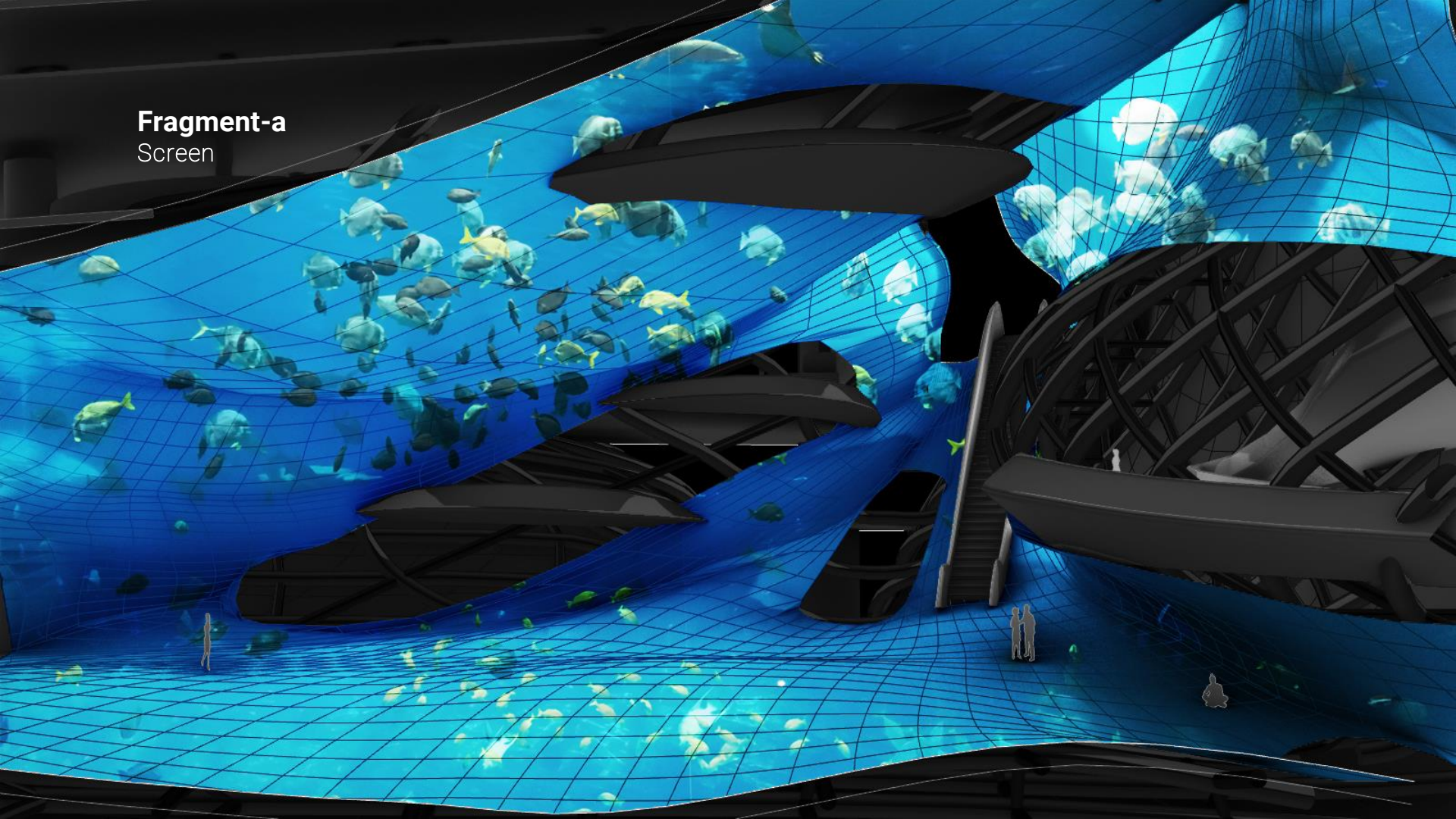


Fig. Atrium cooling performance

<https://www.sciencedirect.com/science/article/abs/pii/S0360132315300342>

Fragment-a
Screen

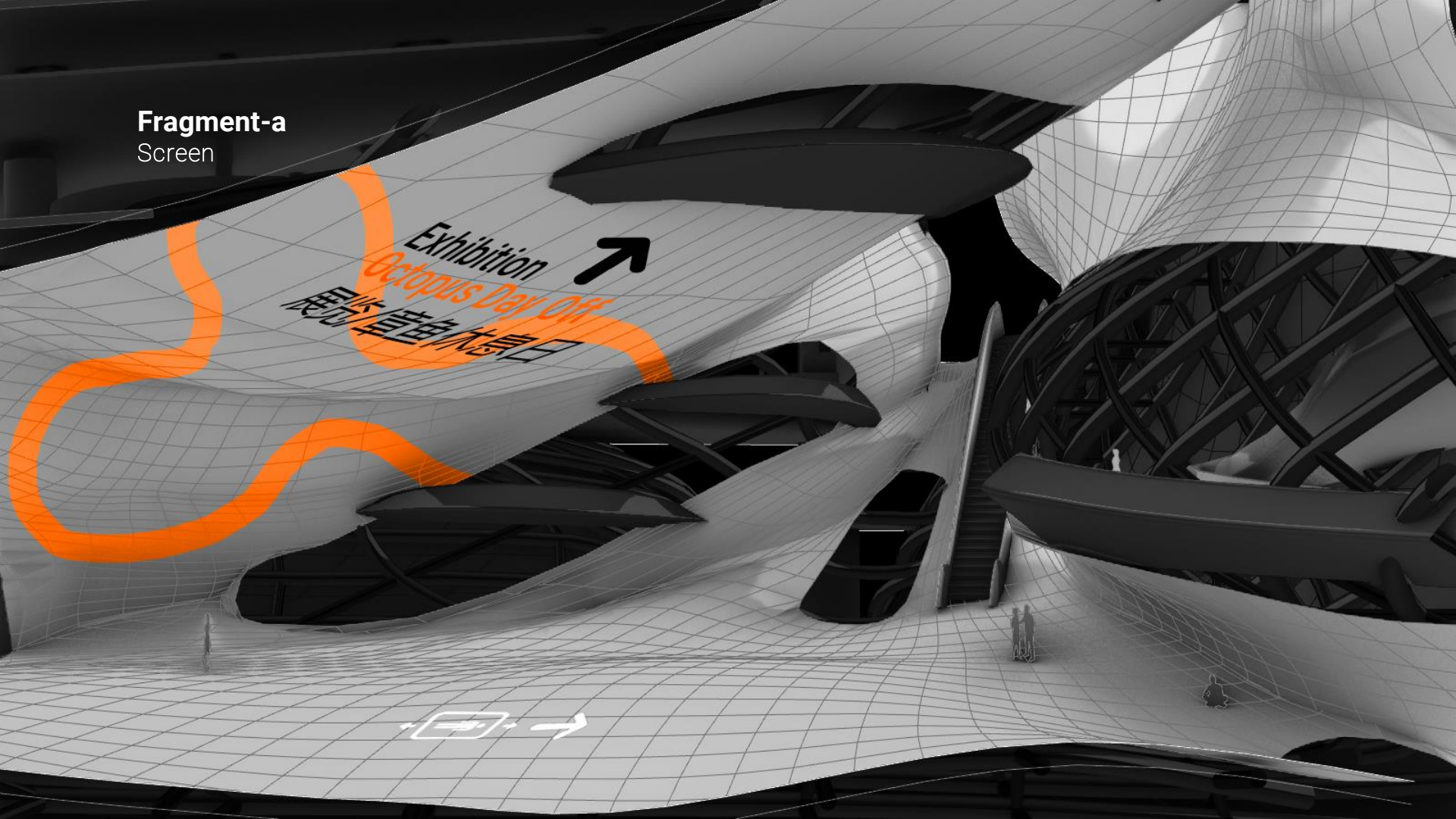


Fragment-a
Screen



Fragment-a
Screen

Exhibition
Octopus Day Off
展覽 章鱼休息日

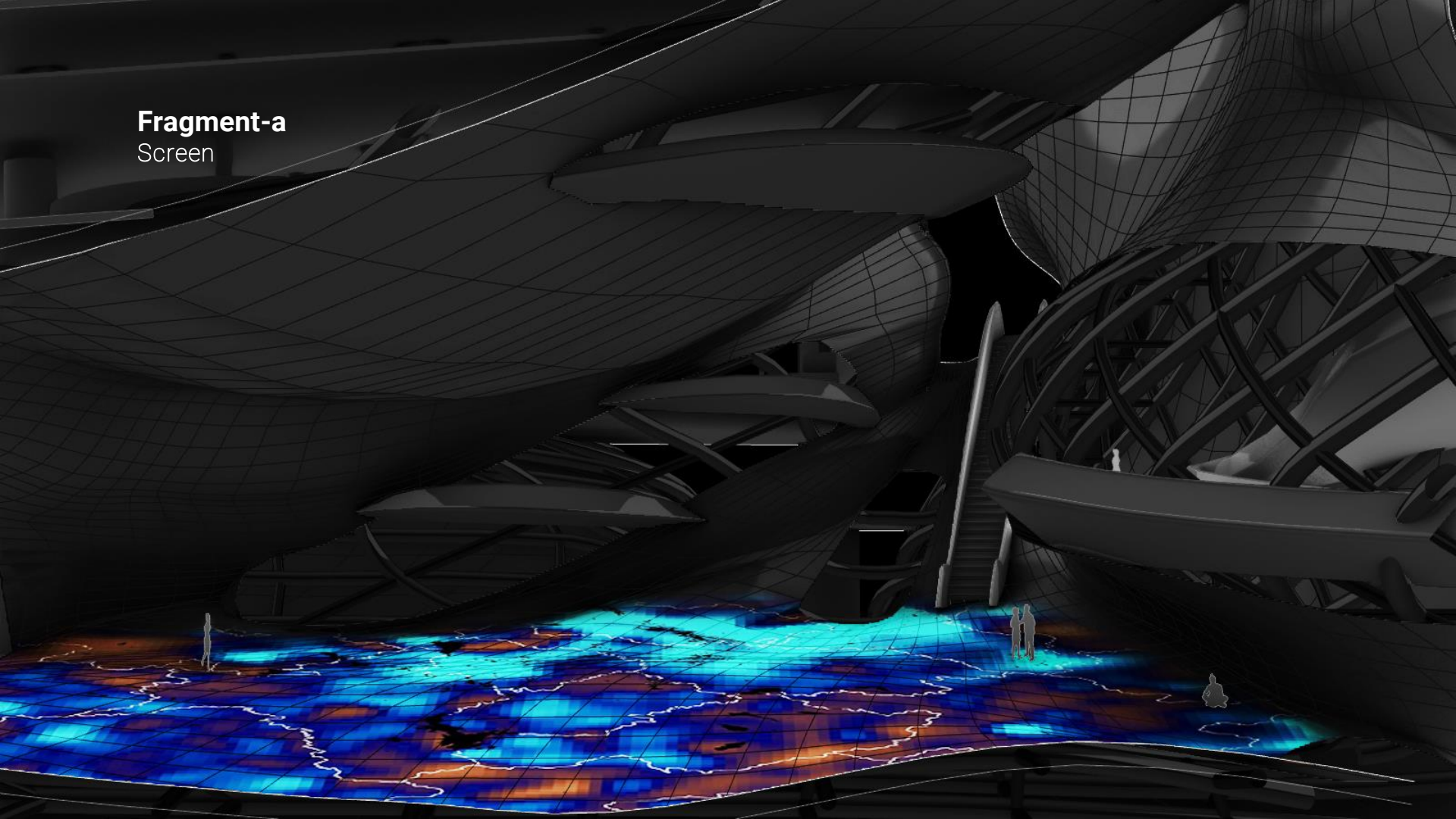


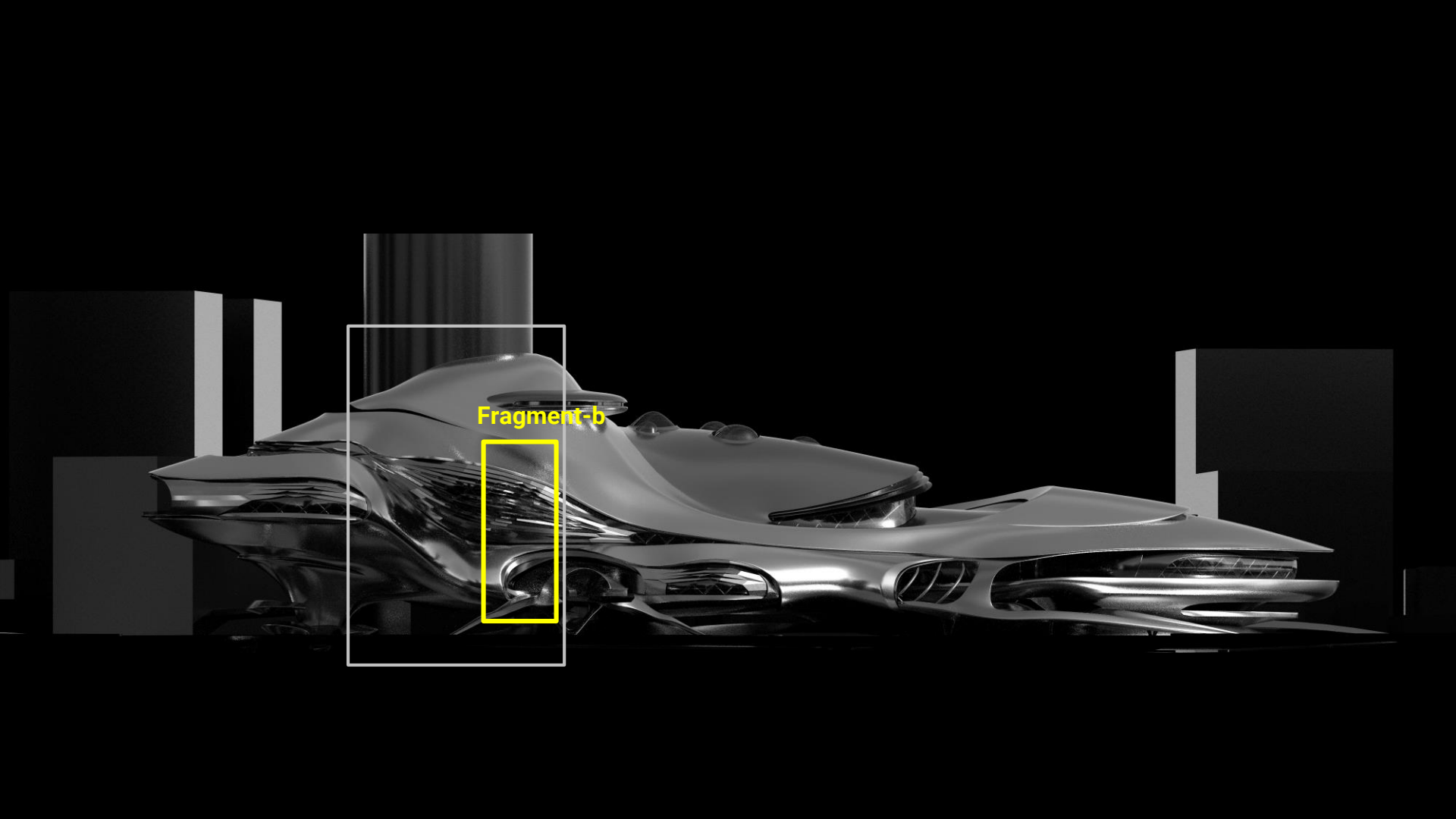
Fragment-a
Screen



Robotic Building 2019-2020 Workshop#1
INTERFACE

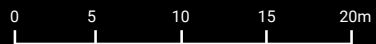
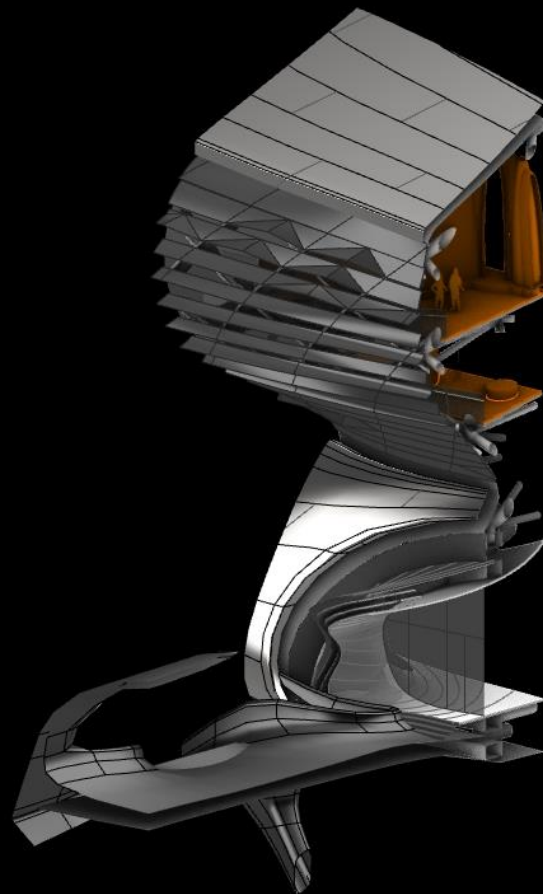
Fragment-a
Screen





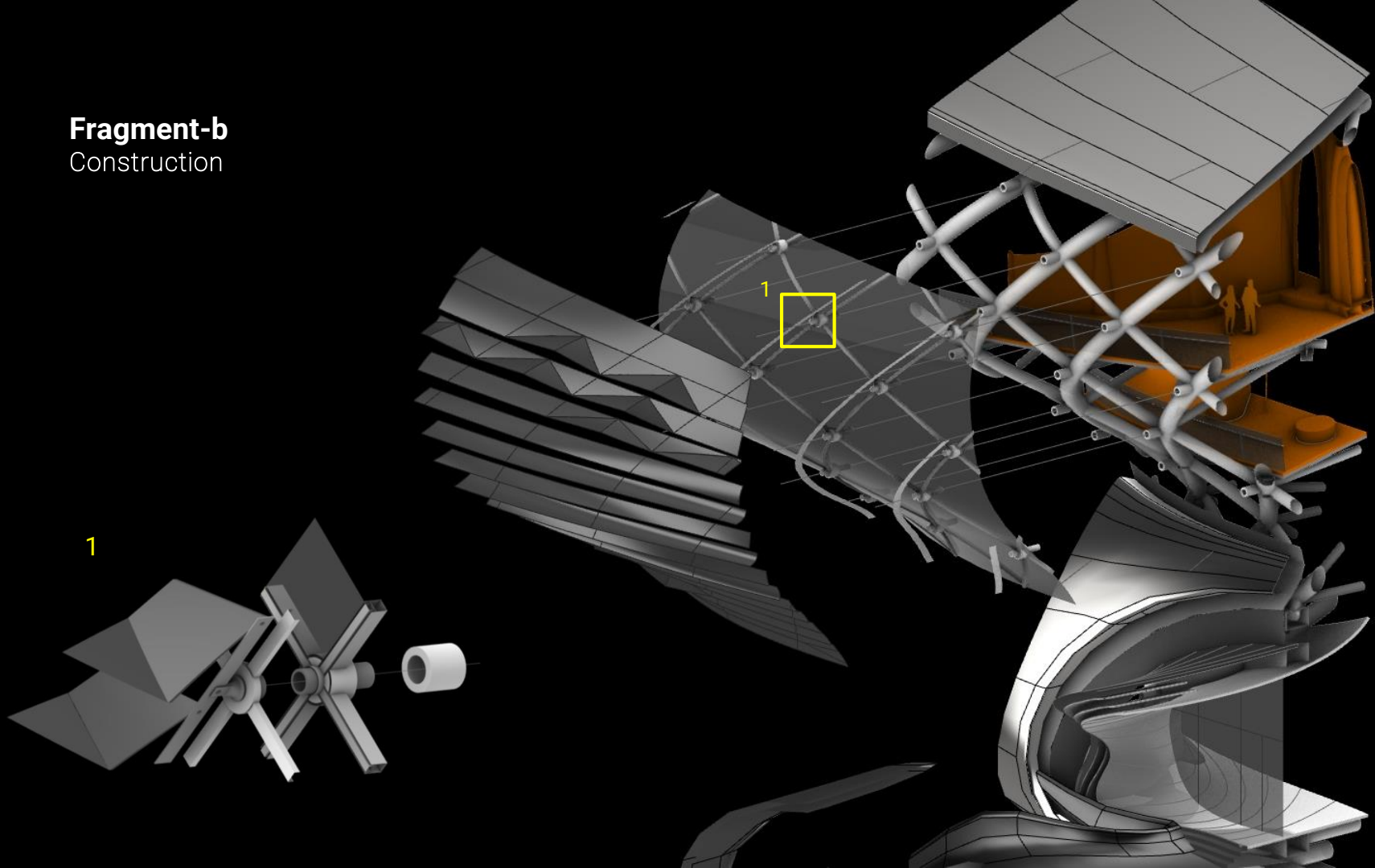
Fragment-b

Fragment-b



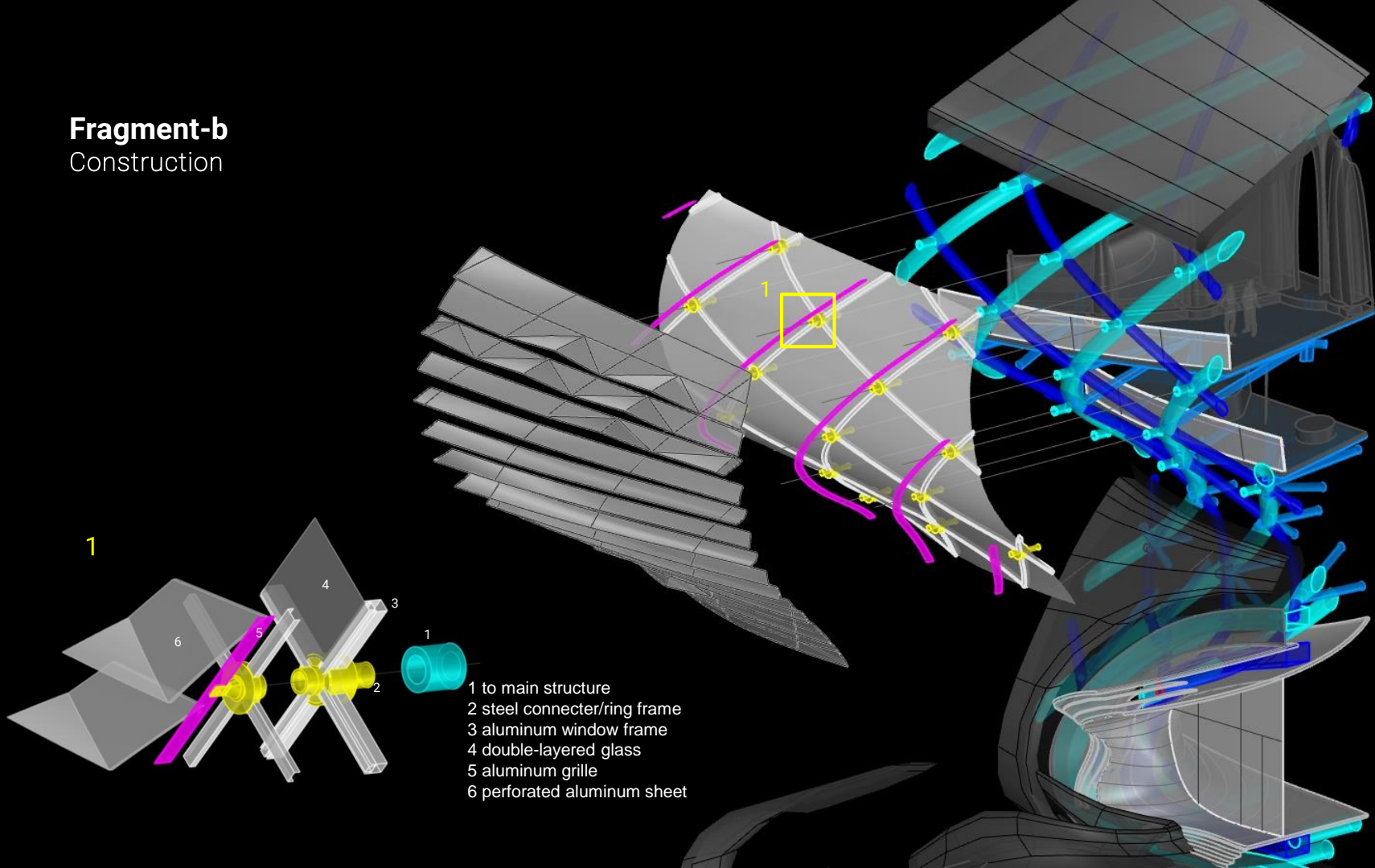
Fragment-b

Construction



Fragment-b

Construction



1

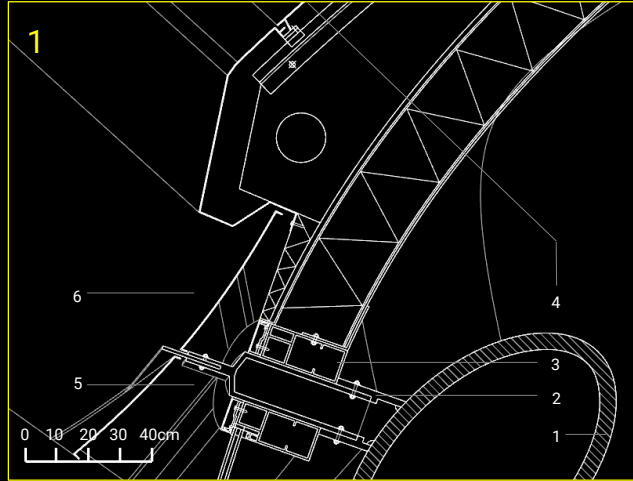
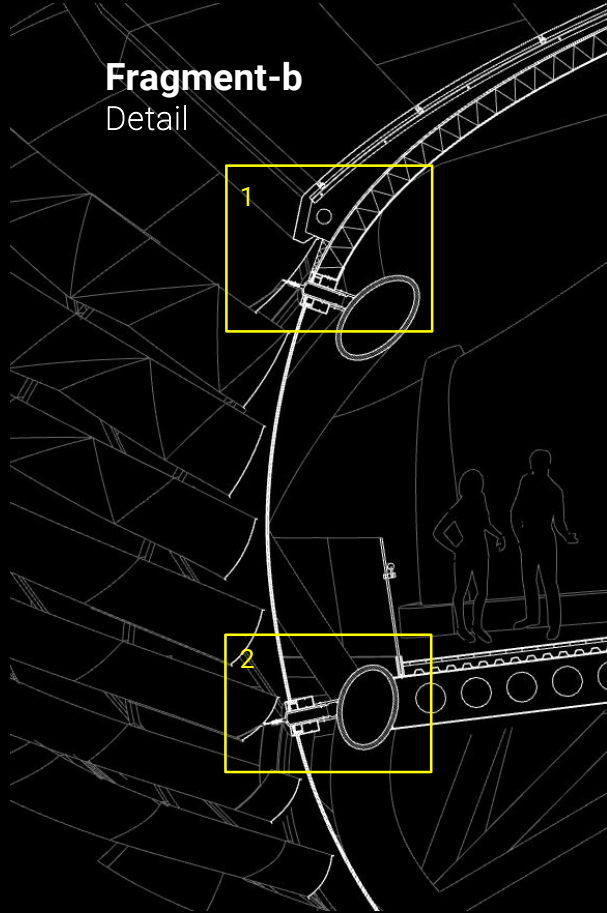
- 1 to main structure
- 2 steel connector/ring frame
- 3 aluminum window frame
- 4 double-layered glass
- 5 aluminum grille
- 6 perforated aluminum sheet



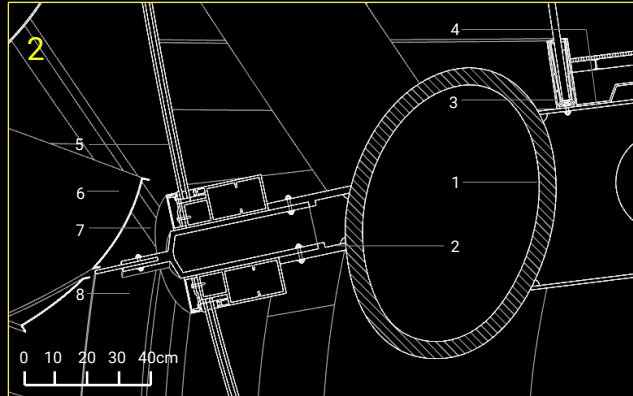
Fragment-b
Construction

King's Cross Station renovation
John McAslan + Partners

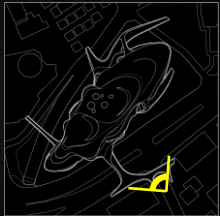
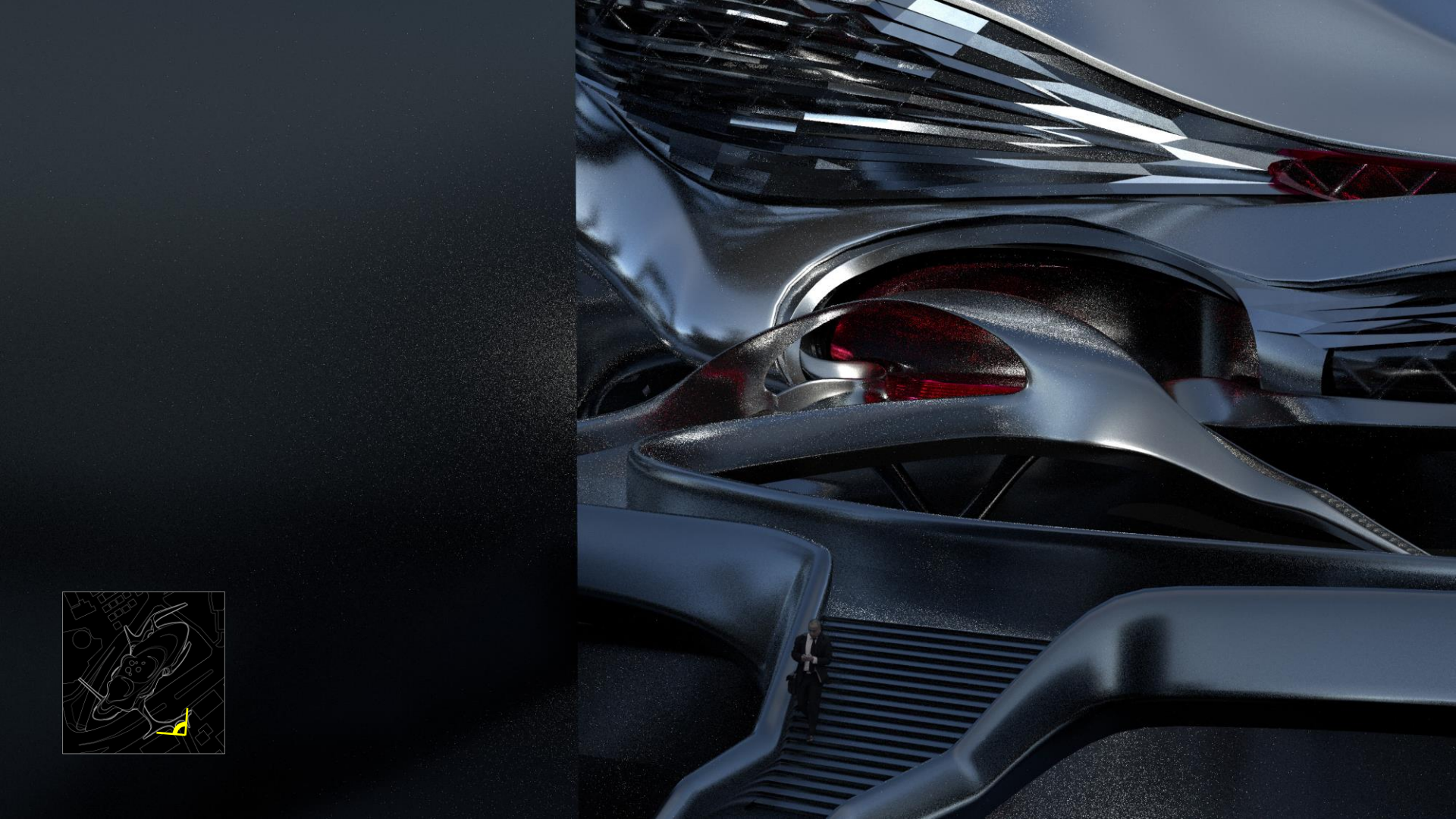
Fragment-b Detail

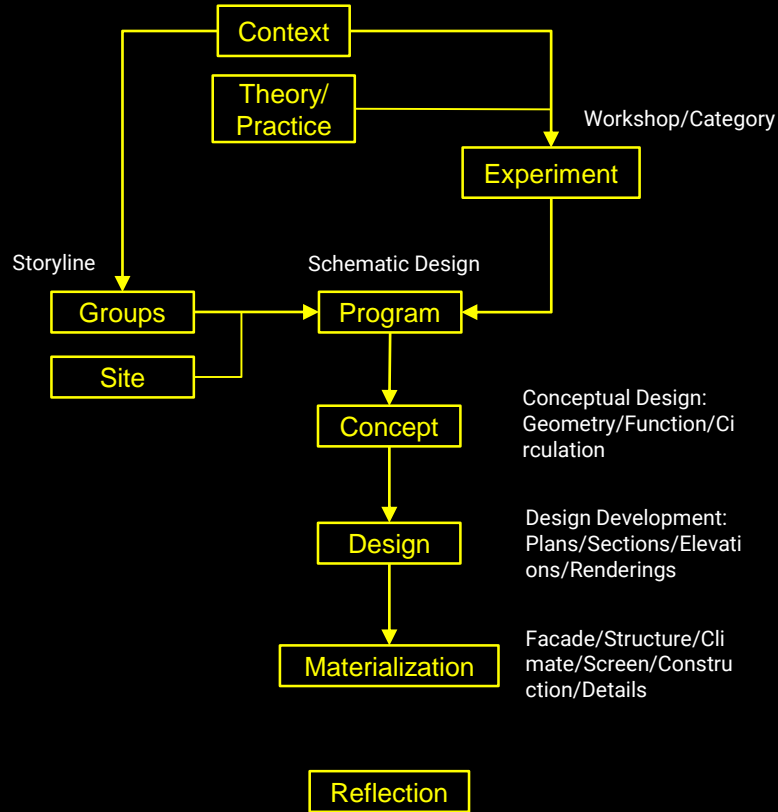


- 1 \varnothing 60cm, δ 4cm, steel beam
- 2 steel connector
- 3 steel ring frame
- 4 roof
 - stainless steel strip with rubber seal, factory applied finish, clipped on aluminum rails
 - 6 mm flexibly, plastered
 - vapor barrier
 - 120 mm mineral fiber insulation between supporting structure
 - breather membrane
 - 15 mm fiber-cement board
 - substructure plywood
- 5 aluminum grille
- 6 perforated aluminum sheet



- 1 \varnothing 60cm, δ 4cm, steel beam
- 2 steel connector
- 3 glass railing, aluminum bas shoe
- 4 floor
 - metal-encapsulated floor
 - 140 mm slim deck floor
 - steel structure
- 5 double-layered glass
- 6 perforated aluminum sheet
- 7 aluminum window frame
- 8 aluminum grille





Overall research question

- How to extend the physical and virtual meaning of architecture based on the influence of interactive media on people in contemporary urban context?

- And what kind of computational design and D2RP&O method can make it from speculation to practice?

COVID-19



P5

Yongyi Wu
Robotic Building

