

## "SYNAPSES"

Erwin Schroedinger once stated that every living organism is moving towards maximum entropy through reaction-diffusion process and the organism can hold the line only control this process, and this is a physical constraint which governs all life phenomena. Alan Turing' s two-component reaction-diffusion equation is known to govern the two dimensional patterns created by living organisms. We have constructed a new principle of space construction (SYNAPSES) by extending this idea to three-dimensional space. This synapse structures function as the terminals on the knowledge-information network, and also work as the boundary between active/passive materials to maintain the whole structure.

## Cityscape

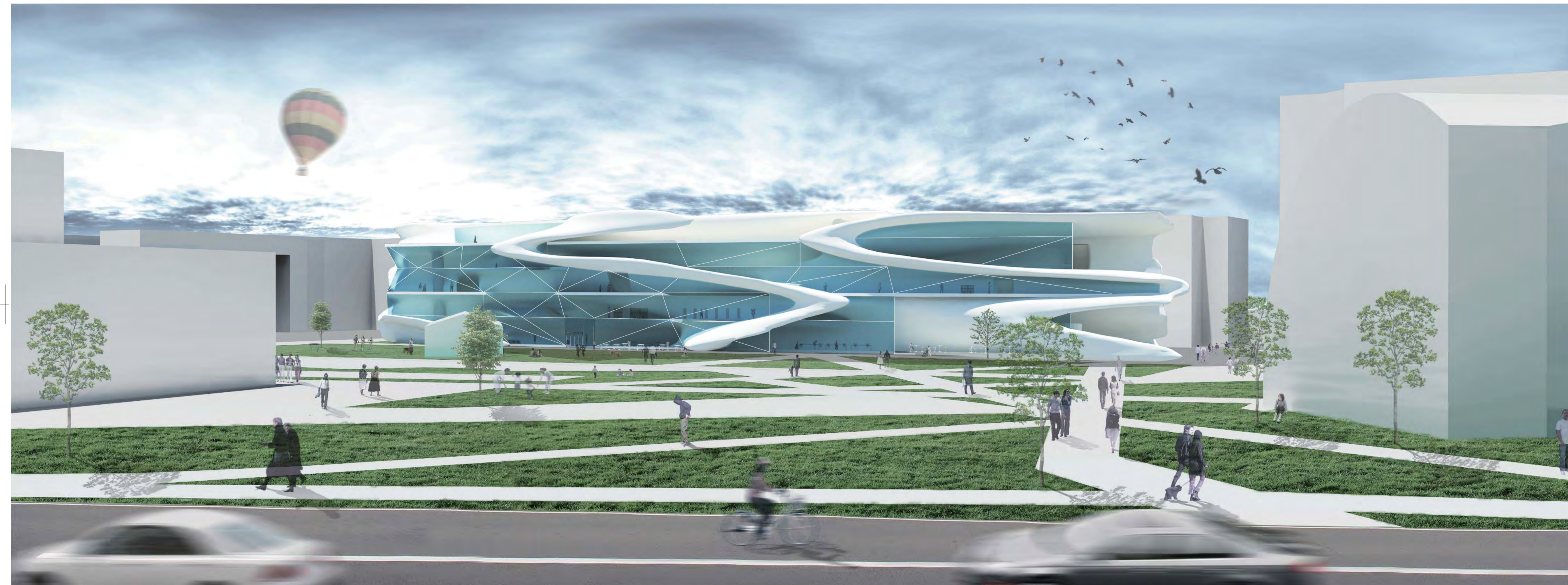
Helsinki is located at the far end of Baltic Sea in Scandinavia Peninsula. About 80 % of the land is occupied for forests and there are over 180,000 lakes and fiords. Helsinki is blessed with rich natural environments and acts as the central city for politics, economics and culture in Finland. The planning area is adjacent to 'Finlandia Hall' designed by Alvar Aalto on the northwest and 'Finland Central Station' designed by Eliel Saarinen on the southeast, which can be seen as the connecting point for geometric lines of the Helsinki City. Furthermore, this site is ideally located as a meeting point for the people arriving from difference places. Combining these site-specific characteristics and presenting one of the memorial projects for 100 years of Independence of Finland, we aim to generate an architectural form which offers communication exchange.

## Architecture

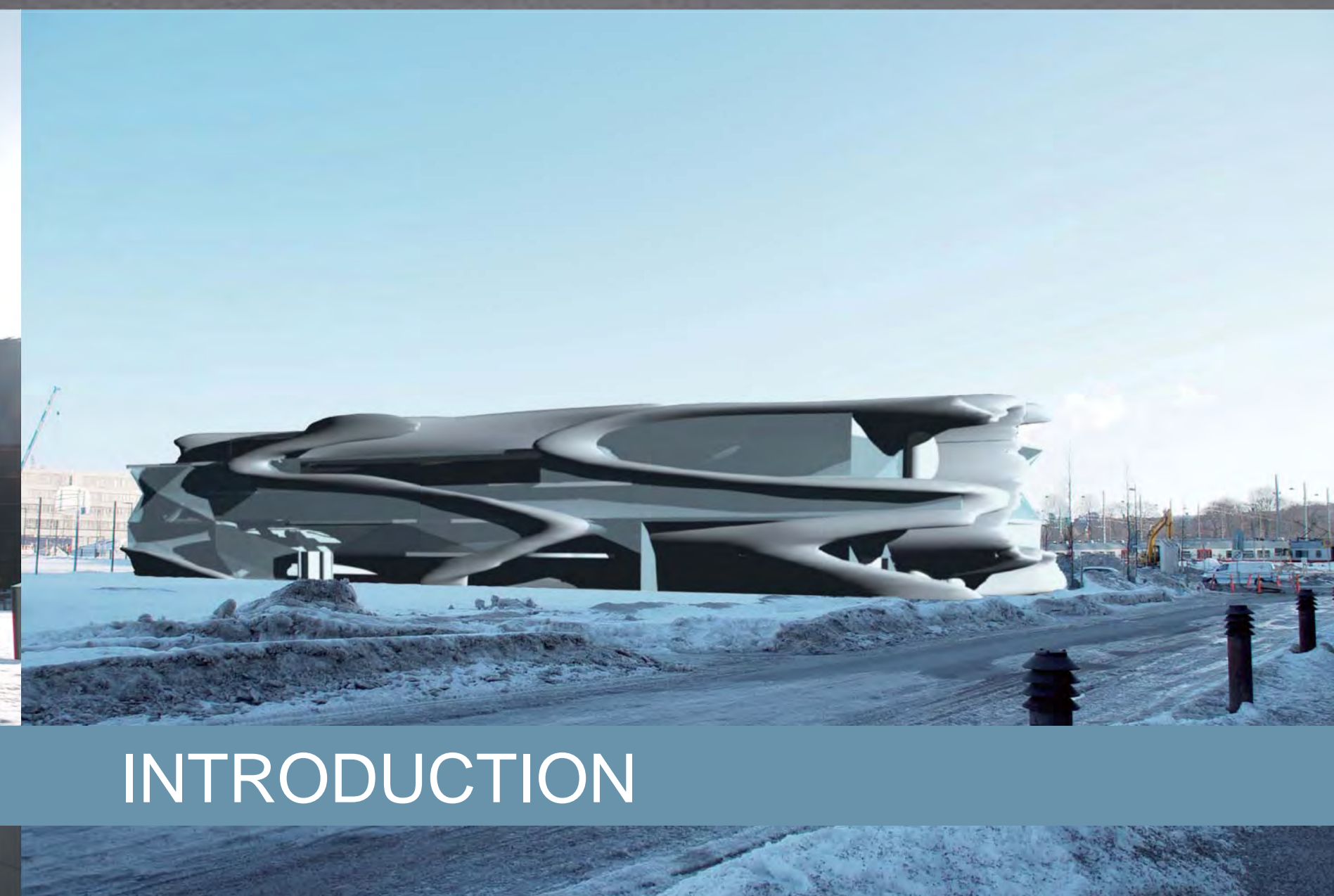
When you step into the building of the Finland Central Library from the Finlandia Park, you will find an internal space with full of excitement. This internal space provides various places for library functions and dramatic background . Natural light penetrated from the side, which is characteristics in the northern high latitude regions, reaches every space of the building and people using different places and this will reinforce the richness of the internal space.

The organic form of the architecture, in which city, landscape and architecture intertwined each other, is derived from Alan Turing' s concept of reaction-diffusion equations which explains biological formation. We call this structural form 'synapse' . 'Synapse' is a form of HP Shell by high density configuration of the space frame. It is a skeleton supporting all the rooms as well as membranes. 'Synapse' structure exists as a membrane-boundary of space and divides between 'quiet area' that stores knowledge such as the library zone and 'active area' that spreads knowledge to outside such as the entrance and children spaces. Energy, information and knowledge going through the structure of 'synapse' can be reachable to everywhere in the entire building and it can be obtained in every spaces of the library.

This is similar to the 10s of billions of nerve cells in human brain which by building up a network through juncture device called synapse build up a network and provides means of information propagation which is the ground base for our memory and knowledge creation.



HELSINKI CENTRAL LIBRARY



INTRODUCTION



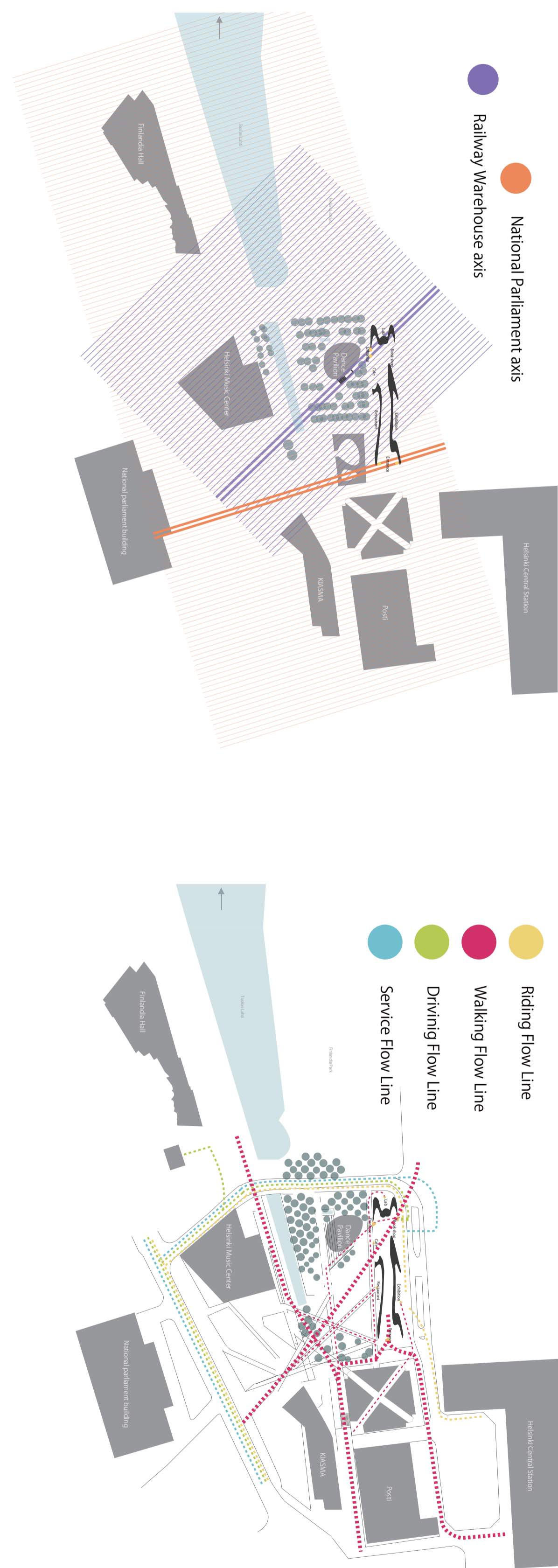


This site is located at a pivotal place in Helsinki. In the surroundings, the Helsinki Central Station leading to many other Finnish cities and towns, the Parliament, "Töölönlahti" which is the focal point of the Töölön area, are located. Also there is a trace of former railway trucks indicating demolished old railway warehouses, determining the environmental characteristics of the site. Among these elements, slanted shape of the planned dance pavilion has the same direction as the rail truck, and the footpath from the parliament has the same direction as the main entrance of the parliament. We have decided to take these two directions as the main axes for the future of this site, and the library will have two entrances in these directions.

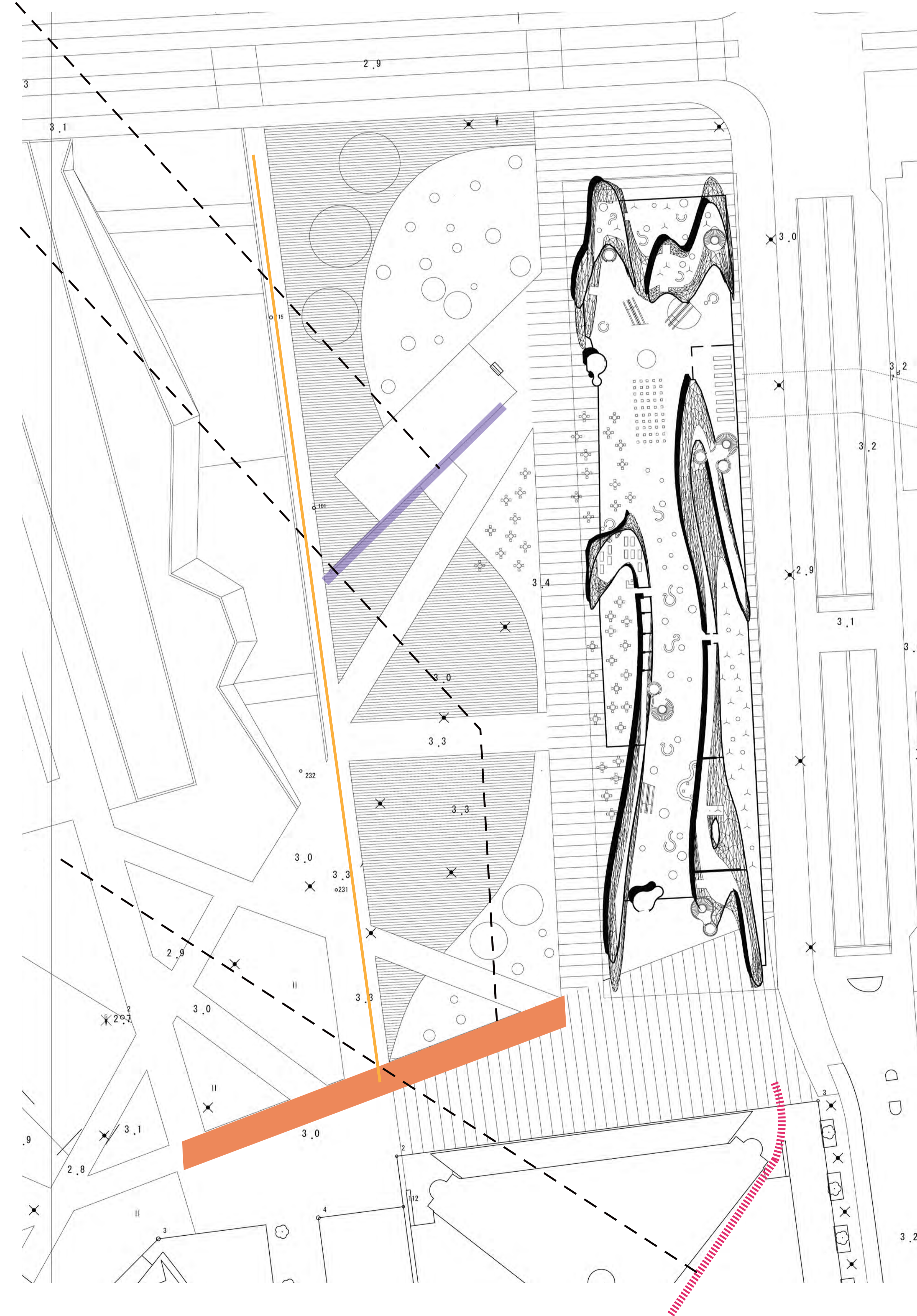
Moreover, on the north side of the site the Helsinki Central Station is located and the Palma is found on the east side, the Finlandia Hall and 'Töölönlahti' on the west side as well as the 'Kiasma', museum of contemporary art and the Helsinki Music Centre on the south side. Concerning these locational relationships, we expect a large flow of pedestrians and cyclists from these four directions. For car users, an entrance to the underground parking space is planned on the north side.

Correspondingly, we are planning a bookshop on the north side, the pedestrian entrance from the Central Station on the east, a Lab on the west and the south entrance for people arriving from the adjacent park which will be open over the weekend for the users returning books. On the four perimeter blocks, the two main entrances for the general public and a service entrance to the library are planned.

Considering the visual continuity with the park and the flow of the people from this direction, the entire environment is designed with the principle of biomimicry to embrace nature and greens. Also, the library user can enjoy the delightful scenery of 'Töölönlahti' from every floor of the library.



■ Diagram







### Ecological sustainability

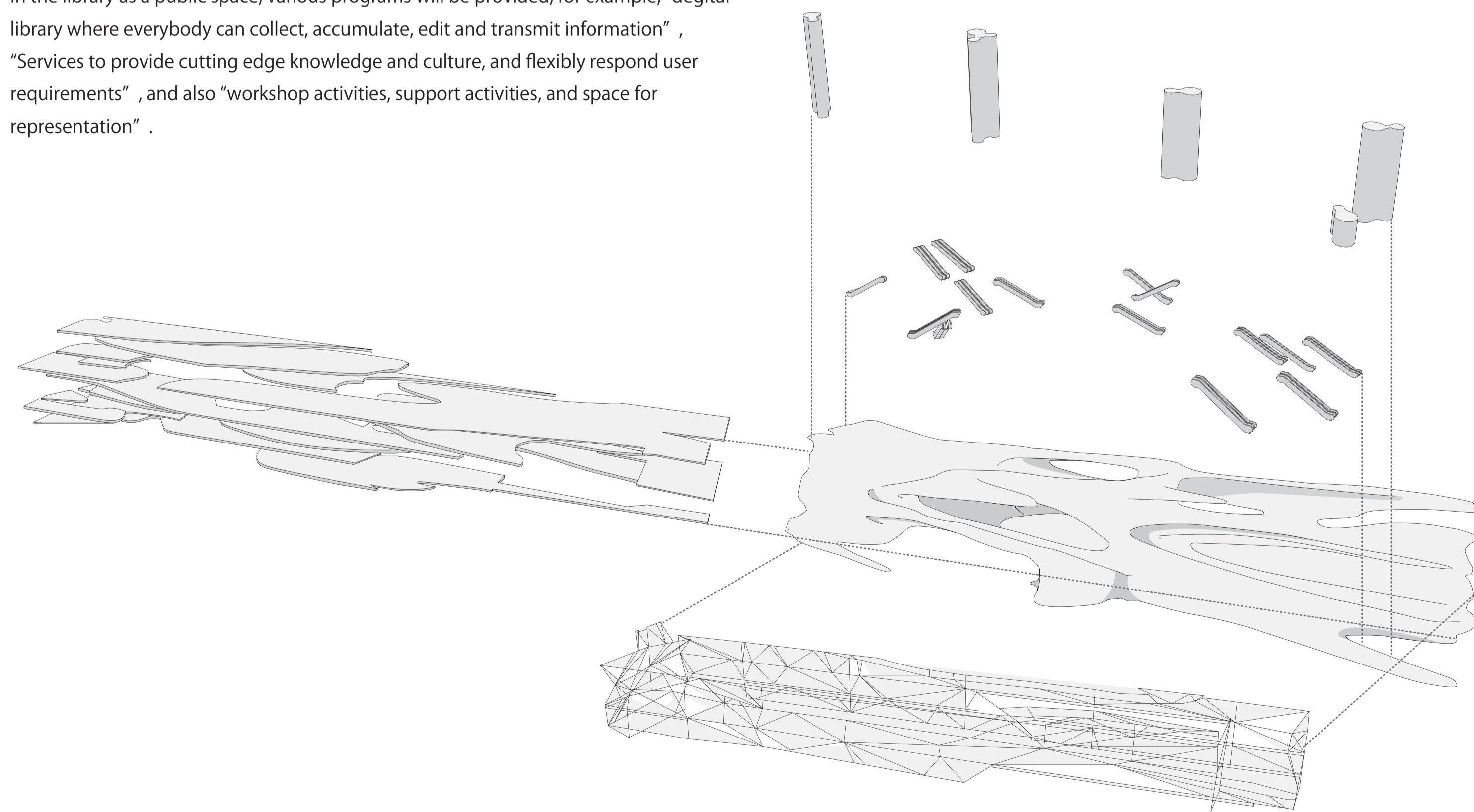
The architecture is based on the principle of biomimicry, which is the key technology for sustainable development through coexistence of living objects and the nature. It is also along with the 'zero emission' principle which might be the solution for urgent issues in water, food, housing, health, energy, education, employment. The library combines natural resources such as wind energy and solar energy to maintain interior comfort.

Air-conditioning system will be designed to allow localized air-conditioning. As a energy efficiency measure, geothermal heat and free-cooling will be used to reduce energy of localised air-conditioning. Lighting system is based on in-direct lighting through LED devices, with extensive use of natural light. Dimming control with luminometer is also planned. The surfaces of the unit structures, which represents the characteristic 'SYNAPSE' of this plan, will be used as the reflective board of the lighting, and represent a dynamic space going together with friendly visual space.

### Usability

The library is not the space only for reading, but also a platform for sharing information. Everywhere in the library, the library helps every user to exchange information through various digital media and utilize it.

In the library as a public space, various programs will be provided, for example, "digital library where everybody can collect, accumulate, edit and transmit information", "Services to provide cutting edge knowledge and culture, and flexibly respond user requirements", and also "workshop activities, support activities, and space for representation".



#### Main lobby and central public service spaces

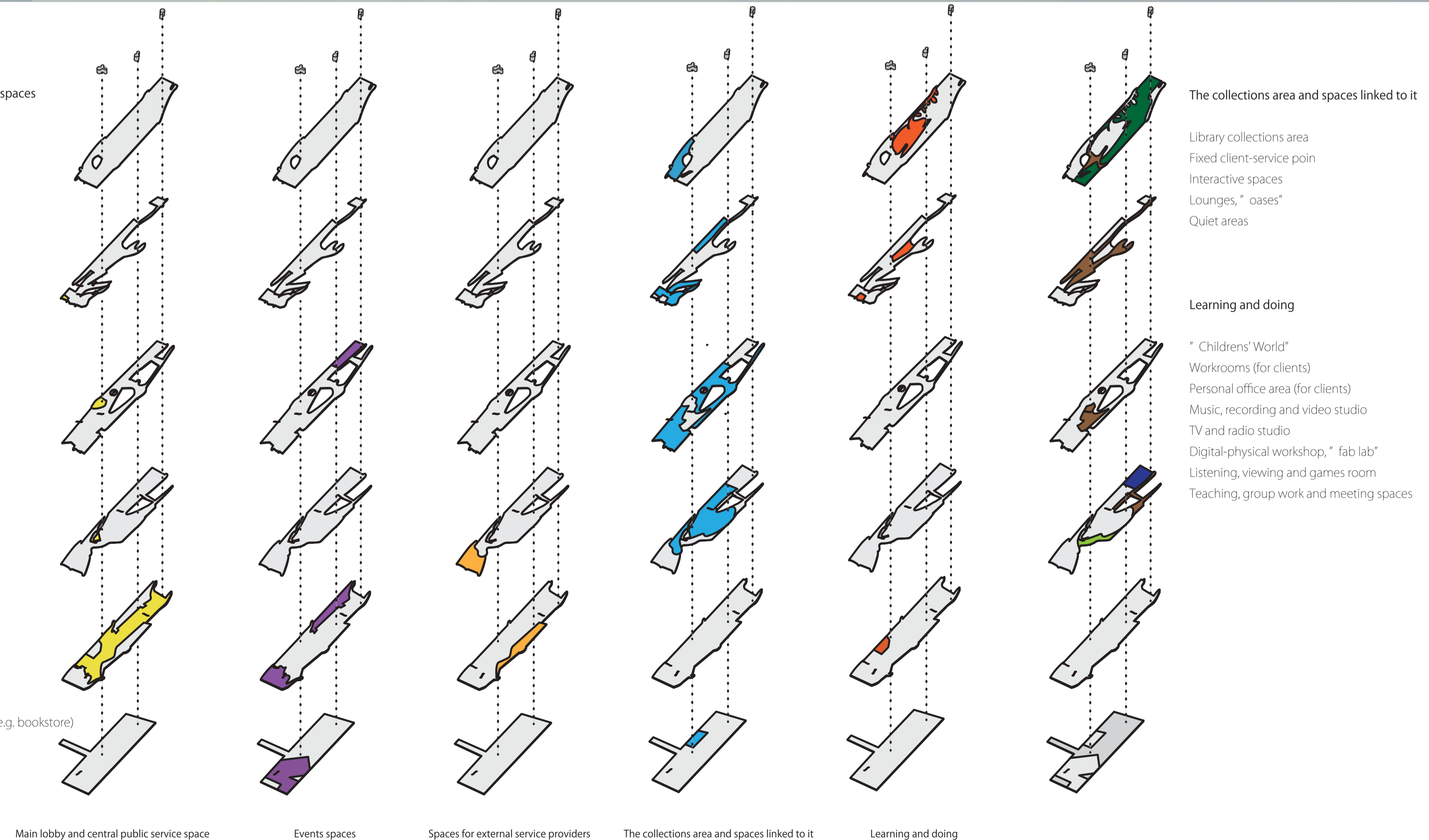
- Lobby functions
- Public toilets
- Public services
- Meeting and lounge area
- Stage
- Pop-up info spots (space reservation)

#### Events spaces

- Cinema
- Multi-purpose hall
- Furniture and stage prop storage
- Lobby areas
- Back stage
- Living lab
- Library exhibition space
- Rentable exhibition space
- Exhibition spaces, local storage points

#### Spaces for external service providers

- Café
- Restaurant
- Public sauna
- Reservation for commercial premises (e.g. bookstore)



Main lobby and central public service space

Events spaces

Spaces for external service providers

The collections area and spaces linked to it

Learning and doing

#### The collections area and spaces linked to it

- Library collections area
- Fixed client-service point
- Interactive spaces
- Lounges, "oases"
- Quiet areas

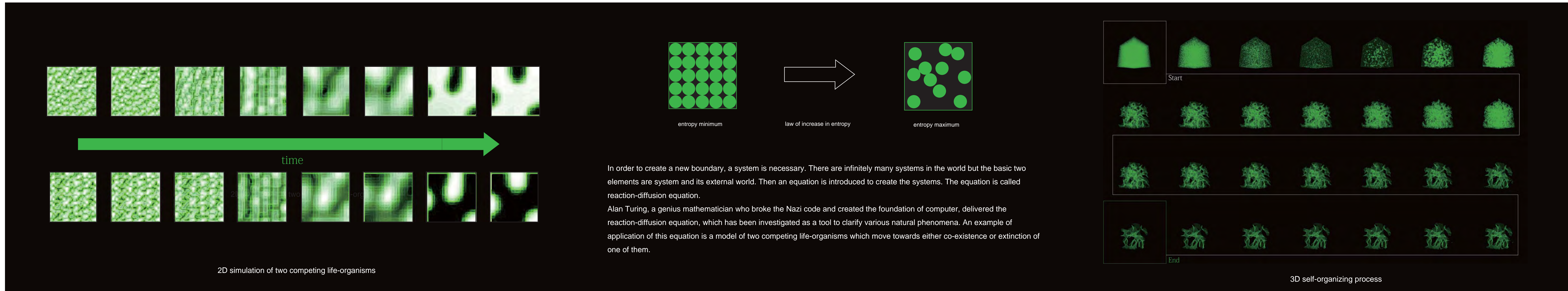
#### Learning and doing

- "Childrens' World"
- Workrooms (for clients)
- Personal office area (for clients)
- Music, recording and video studio
- TV and radio studio
- Digital-physical workshop, "fab lab"
- Listening, viewing and games room
- Teaching, group work and meeting spaces



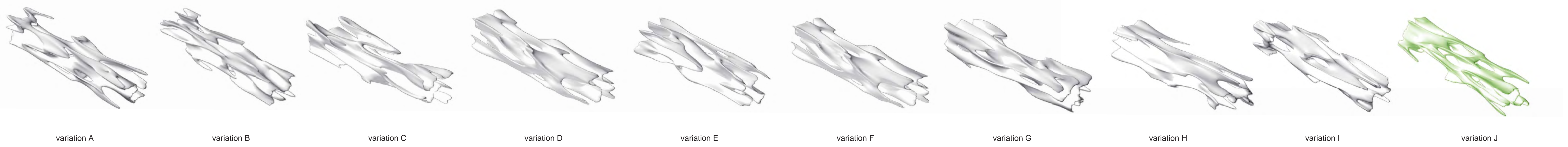
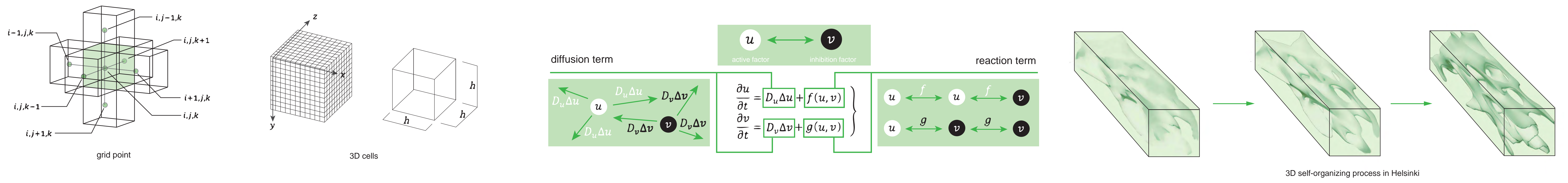
### Erwin Schrodinger, a co-founder of quantum mechanics, asks, from the physical point of view, 'What is life' ?

Since life phenomena are all governed by physical law, atoms constructing a living organism are never free from random thermal motion (Brownian motion and diffusion). In short, inside of a biological cell is always moving. Despite this, living organism is able to maintain internal order. Any well-ordered system becomes possible only when huge number of atoms (or molecules) behave coherently, as their 'averaged' activity. Ordered states could arise from random movement as an average probability of atoms with specific tendencies. That is, a small ordered state which is accidentally emerged in random motion, start affecting surrounding atoms. A state created by a small well-ordered part could work towards further ordering. This is the mechanism of self-organization. The self-organization, also known as spontaneous ordering, is the phenomena where an order is created spontaneously, and then the order itself starts creating a structural pattern with its own order. In life phenomenon, "a part affects the whole and the whole affects the part". It keeps the entropy at a constant level. All physical processes governed by "law of increase in entropy" move towards homogeneous distribution of matters and end up with random chaotic state (steady state). This state with maximum entropy is the death of the system. However, life organisms seem to be able to intentionally avoid the steady state, i.e. death. Of course any life organism will eventually reach to the end where entropy is in its maximum. Open system maintain its entropy by exchanging energy between inside and outside of the system. This is called as dynamic equilibrium.

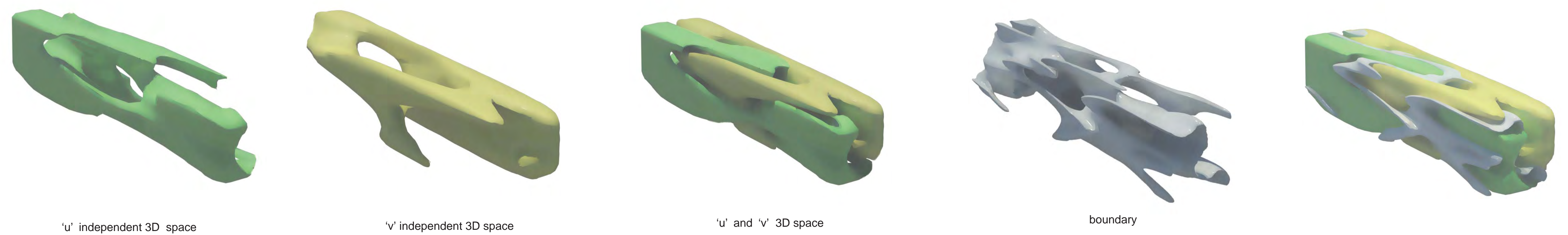


In order to create a new boundary, a system is necessary. There are infinitely many systems in the world but the basic two elements are system and its external world. Then an equation is introduced to create the systems. The equation is called reaction-diffusion equation.

Alan Turing, a genius mathematician who broke the Nazi code and created the foundation of computer, delivered the reaction-diffusion equation, which has been investigated as a tool to clarify various natural phenomena. An example of application of this equation is a model of two competing life-organisms which move towards either co-existence or extinction of one of them.



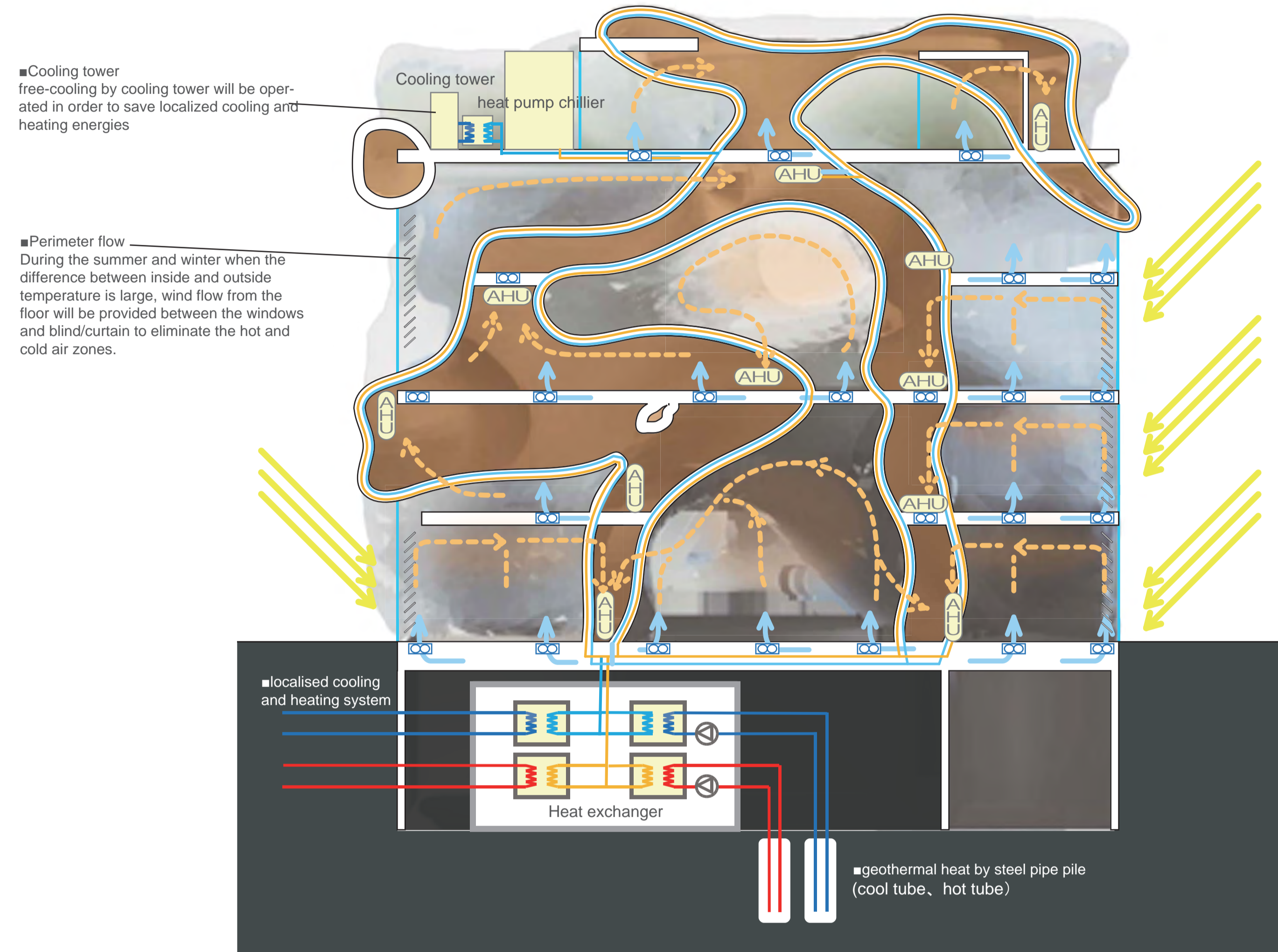
We are trying to create boundaries between gaps of the visualised world. According to the equation, for each of 'u' and 'v' independent three dimensional space will be created and in the gap of the two spaces a boundary is created. A small order creates the whole. The ordered state is unique and there is no state which is the same as this one. It will be a configuration like the earth which exists only here. The complexity of the configuration is determined by the number of cells in the system. The vague concept of "complexity" become realised by quantification. A part affects the whole and the whole affects the parts.





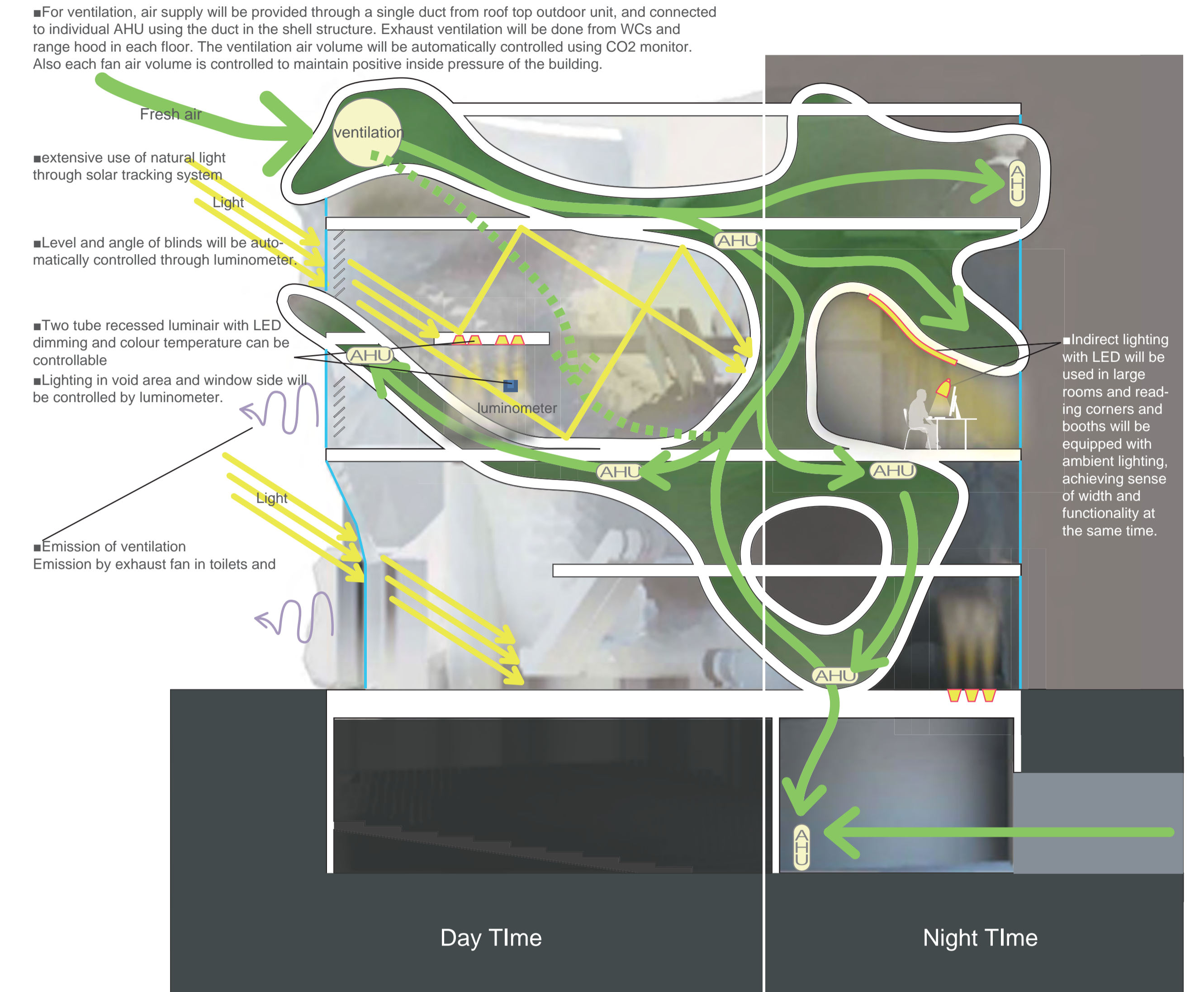
### Outline of ventilation system and air conditioning system

The air conditioning system uses the water cooling central heating system according to prerequisite, which enables individual and localized cooling and heating. The AHU of individual rooms are fitted with four sets of plumbing which enables selection of cooling and heating. Towards energy saving, geothermal heat by steel pipe pile and free-cooling by cooling tower will be operated in order to save localized cooling and heating energies. To take the measure to the situation in which localised cooling and heating system is not available, heat recovery type heat pump chiller will be set on the roof top, to ensure the backup function. In large rooms, public spaces, and rooms with many windows where operation hour of the heating system might be long, transfer grille will be set under the floor, and in small rooms where heating systems will be on and off frequently, transfer grille will be in the ceiling, to manage energy saving and comfort at the same time. In the window side perimeter, air flow from between window and the blind will be provided from below the floor to cope with record breaking heat wave. For ventilation, air supply will be provided through a single duct from roof top outdoor unit, and connected to individual AHU using the duct in the shell structure. Exhaust ventilation will be done from WCs and range hood in each floor. The ventilation air volume will be automatically controlled using CO2 monitor. Also each fan air volume is controlled to maintain positive inside pressure of the building.



### Outline of lighting system

The lighting system for large rooms and public spaces is based on indirect lighting using LED which has longer operating life, high efficiency and offers the variability of light quantity and colour temperature. In any rooms where possible, natural light through a void will be brought in. Illumination light is equipped with dimming control using lighting sensor. The surfaces of the unit structures, which represents the characteristic 'SYNAPSE' of this plan, will be used as the reflective board of the lighting, and represent a dynamic space going together with friendly visual space. Task-ambient lighting device is equipped for private booth seats in the library, which enables individual lighting controls. In group workrooms projector mode by only daylight is provided. Small rooms are in principal planned by direct lighting system by LED lighting device (open-bottom lighting devices and downlight). On/Off of the individual lighting can be remotely controlled by BM's (central monitoring system). BM's have time-schedule function to enable automatic on/off of the lighting to save energy from the large architecture and provide fail-safe function.



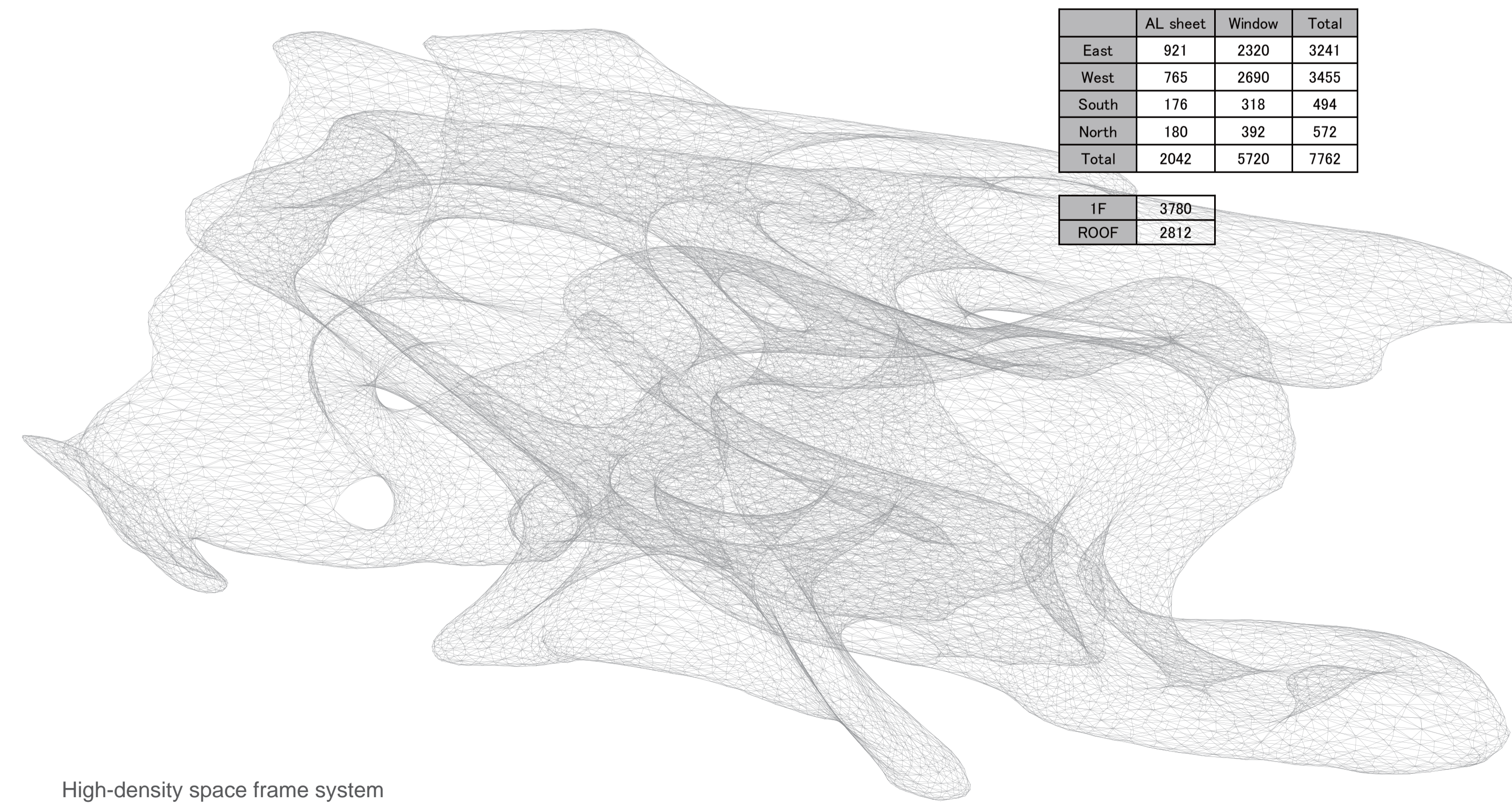
### STRUCTURES

Structure types, U values  
A pillar and a beam: Structure (HP shell by high-density arrangement of a space frame).  
Floor: The void slab using the deck  
Outer wall: Aluminum With a fluoro-resin glow Heat insulation sandwich panel  
U value: U= 1.5  
Utilization of passive means available light, solar heat, the rain water of the natural style, snow, ice, and heat of the earth etc. - it uses.

### WINDOWS

Window types, U and g values, window frame types and U values  
Double sash 24 mm thickness Window of argon filling: 1.1 W/m2K  
Solar shading: description of solutions and control principle  
About shading of a windowpane, the electric blind which manual operation and automatic mode can change in principle is adopted.  
Moreover, suppose that it is the same also about shading of the top glass of Void part.  
Let opening and closing of a blind, and an angle be the systems which control automatically in automatic mode according to the information on an illumination sensor by the window, and temperature and a moisture sensor. They are five steps which specifically took down the blind when the illumination and heat load of the room by solar radiation were large, and were set up beforehand. It shall choose out of the angle about a story.  
Moreover, in preparation for the case where there is fault of the time of a power failure or a system, it is considered as the blind system which can be operated also manually.

	Total	1F	2F	3F	4F	5F
Roof	2812	0	0	0	0	0
1F	3780	3780	0	0	0	0
2F	3780	0	3780	0	0	0
3F	3780	0	0	3780	0	0
4F	3780	0	0	0	3780	0
5F	3780	0	0	0	0	3780
Total	18120	3780	3780	3780	3780	3780

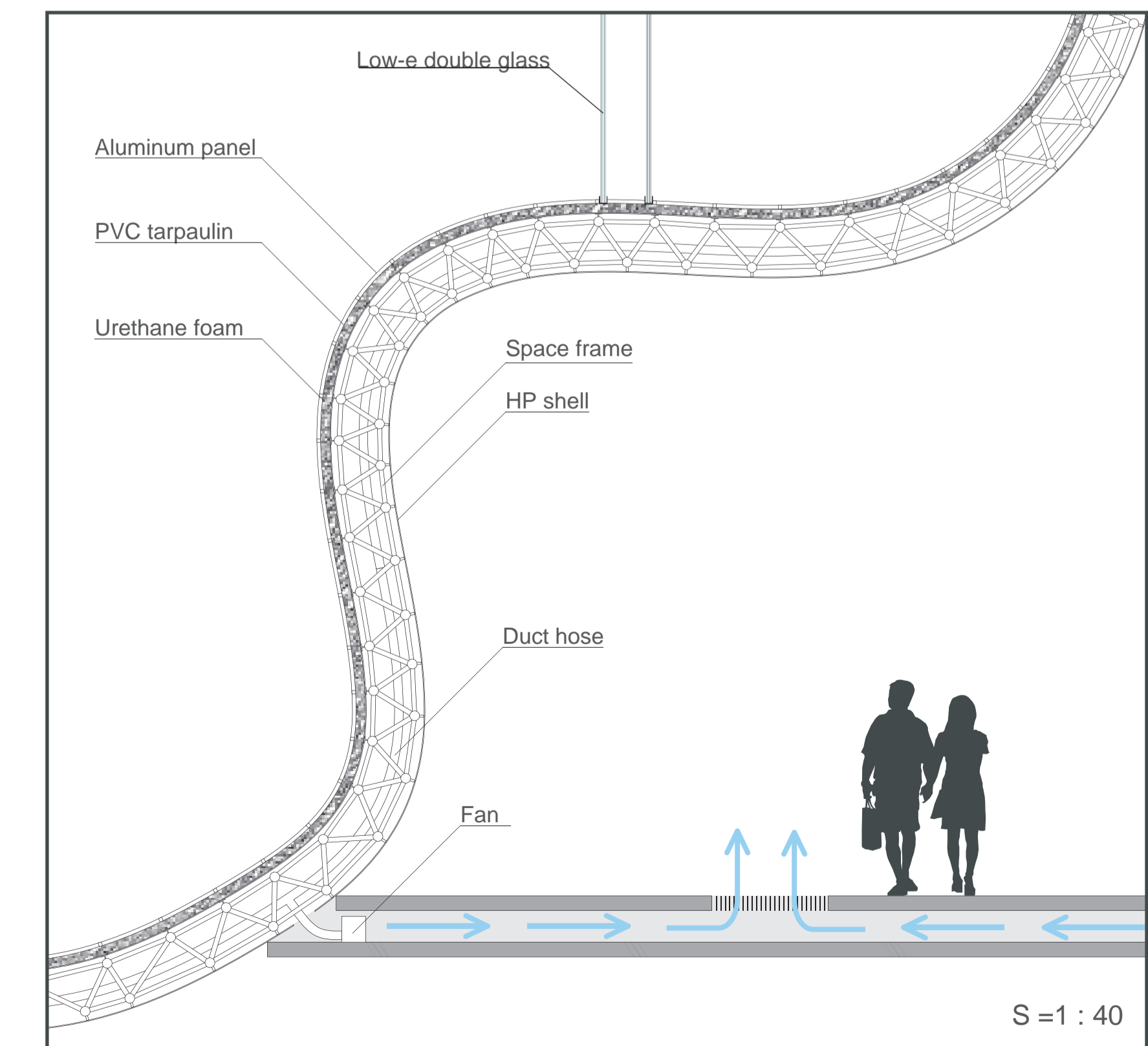


### The surface area data

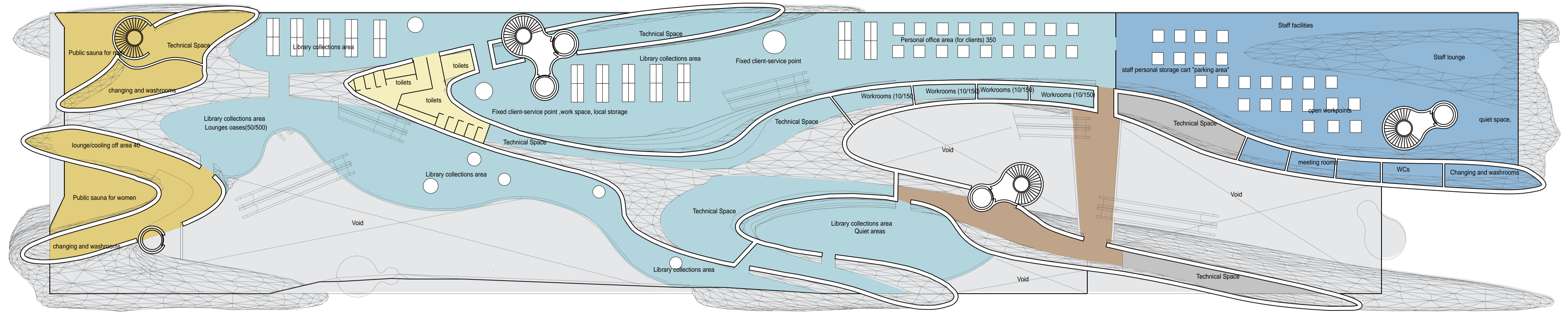
	AL sheet	Window	Total
East	921	2320	3241
West	765	2690	3455
South	176	318	494
North	180	392	572
Total	2042	5720	7762

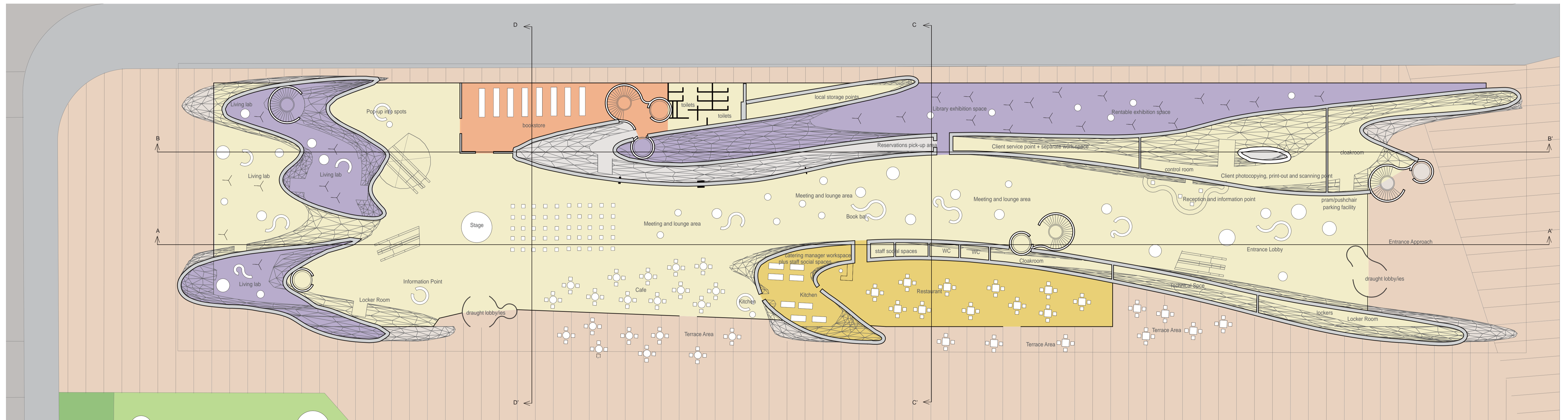
1F	3780
ROOF	2812



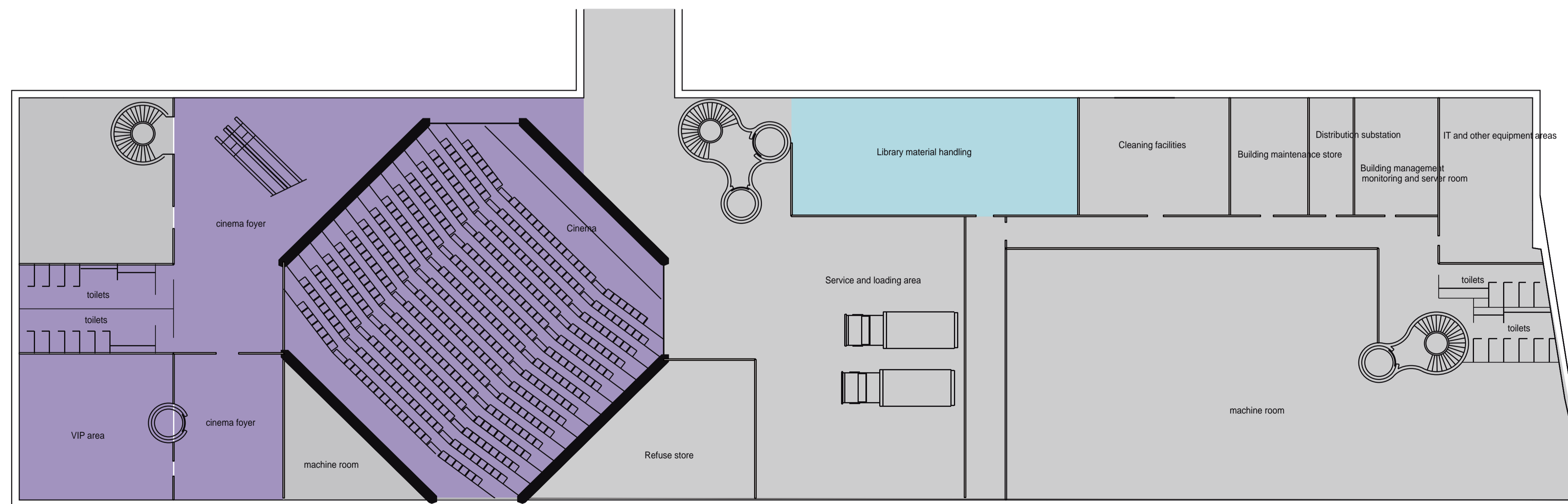




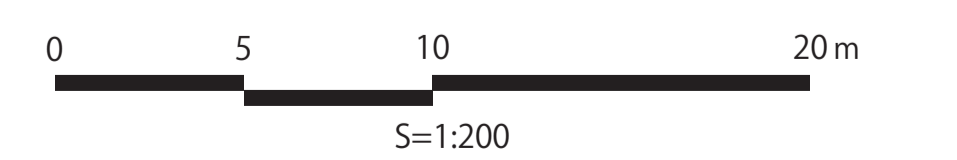
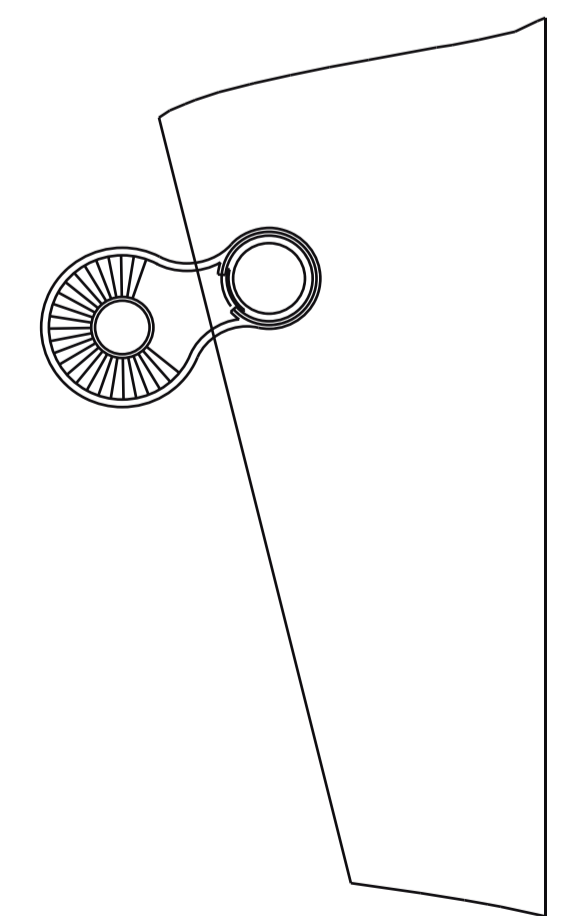
2F Plan



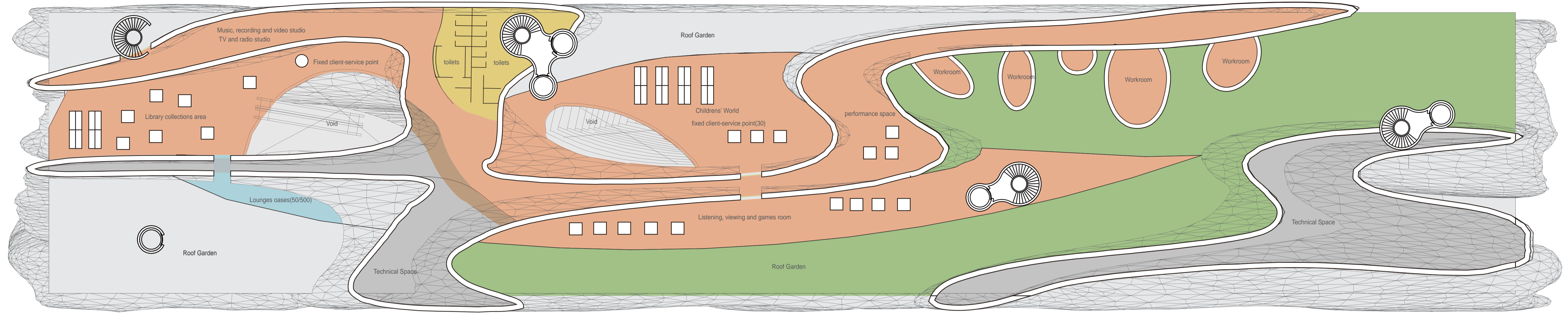
1F Plan



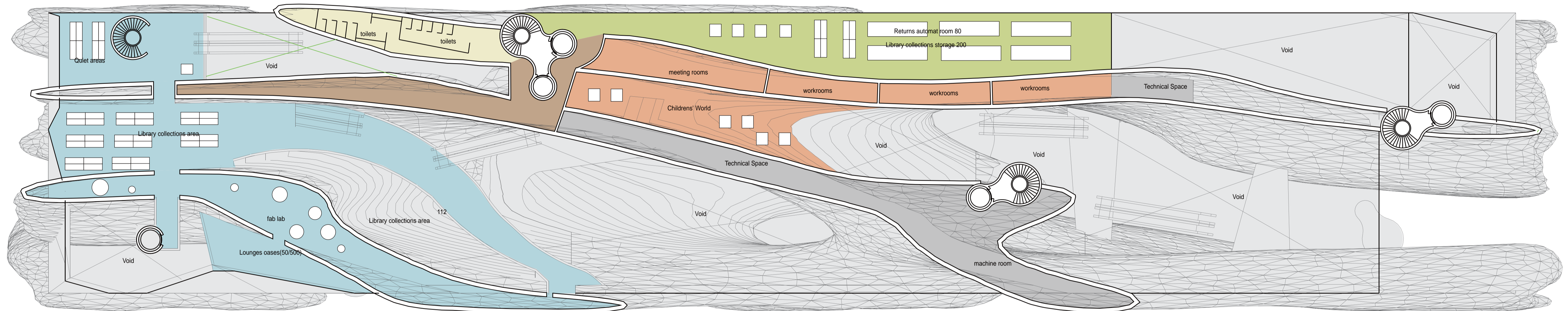
B1 Plan



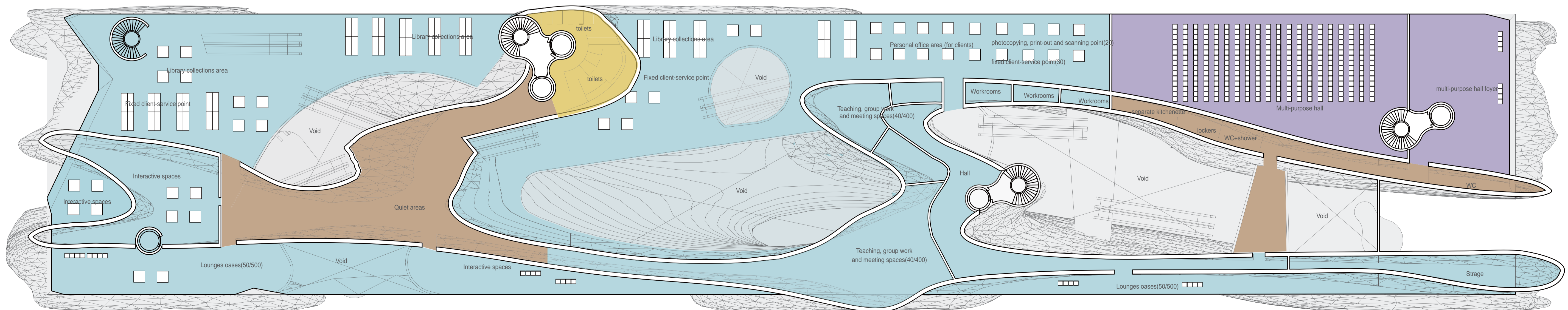




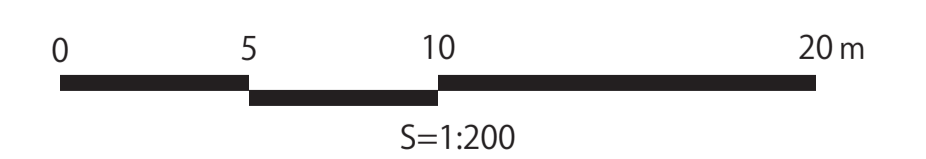
5F Plan



4F Plan



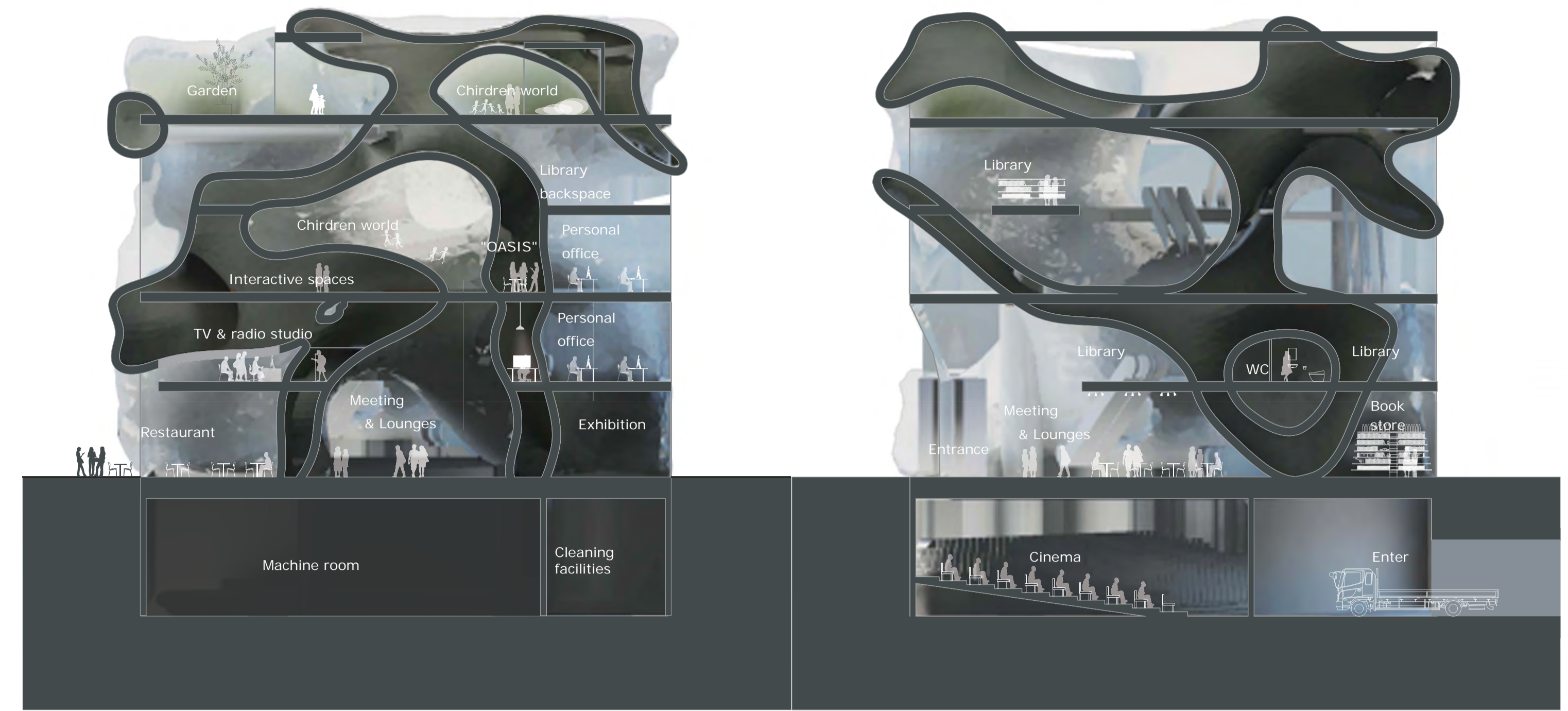
3F Plan





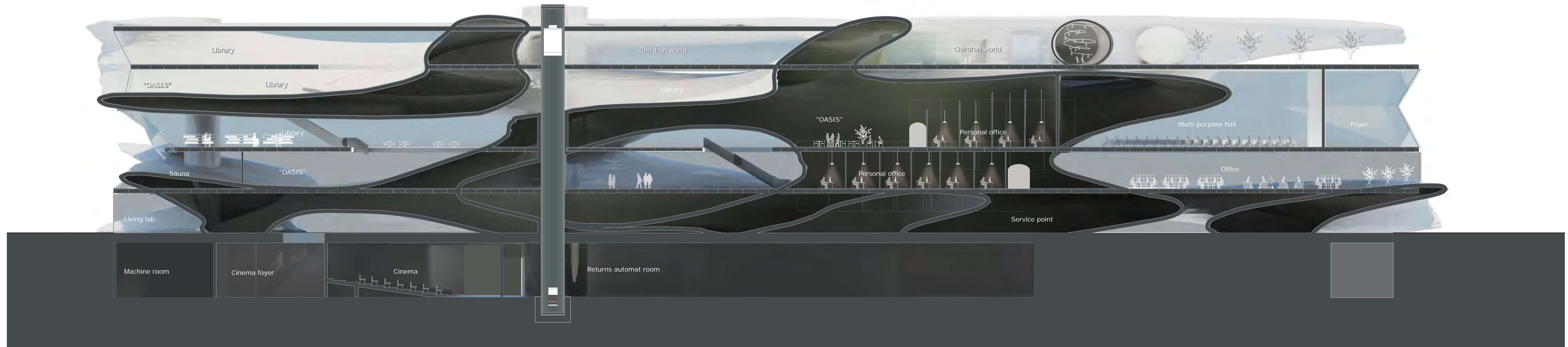
With civilizing from ancient times, various copy materials were tried all over the world. The wooden bark which among these most many races used easily was skinned, and the act copied there became a 祖 form of the book. The word "book" is coming in Western Europe from the word which points out a beech tree, and the word "wooden inner bark (liber)." In the East, it is said that it changes from the meaning of "hitting the foundations of things", and came to point out a book. Many books are printed with technical evolution and it is everything but books, a magazine, audiovisual data, and Braille-points data. It became media, such as recording data, and a data, it was collected and kept, and the library which performs offer to a user, etc. was born. The greatest feature of a present-day public library makes lifelong learning an idea, and there is in performing activity for securing fair access to community residents' information. Therefore, the network between libraries was improved, and even if the accommodation space was where, equal library service could be received. By the way, for a public library, exploitation of a new domain is an important issue and it is required to grope for the new role of a library by strengthening a learning function again paying attention to the function as a lifelong learning center, and to aim at a new user's acquisition.

In a main library, it becomes a place which can be relaxed as the user is relaxing completely in the sitting room of my home. All places are modeled by human size and the beautiful natural material is put together well there. There, there it asks for slight sunlight and people gather. Moreover, this library is also not only the place that reads a book calmly but the "platform" which shares information actively. It helps so that all the people may exchange information freely and can master through various digital media at all the places of a library. For example, as a "digital library, although it also becomes bored, information is collected, Environment which accumulates and edits and whose dispatch is possible." "Culture is offered with the latest Satoru, service which satisfies users' demand flexibly. "-- the space of various expressions sake besides the newest knowledge and information, support service, and workshop activity. "-- etc. -- the service and the program as a public facility are prepared. All the library services of the main library are based on the idea "equal access to information" of residents, and serve as an important point of the library network of various parts of Helsinki.



C-C' Section

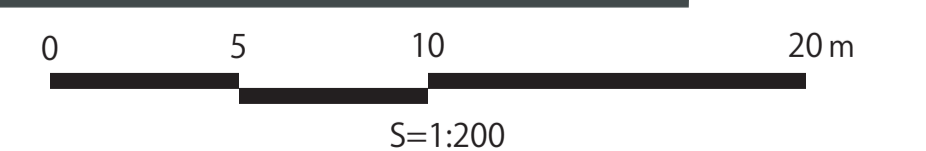
D-D' Section



B-B' Section



A-A' Section





**Calm irritation**

The subject which forms a synapse is a structure. The bidirectional medium which is not 2 clause confrontation is a synapse. It is the construction of a penetrable soft and biological form.

The natural material of which it is complaining to the senses of the human being of consciousness, such as a tree, a stone, cloth, and paper, vision, hearing, a tactile sense, and the taste is used for interior. The synapse (Helsinki main library) provides people who visit with experience of various space, and gives a stimulus to a brain.

Although it has intention of the interior of a room being quiet, irregular form expression distinguishes between each space. By a variation with the form of the room produced from the field of the synapse curved gently, and a delicate size, available light shines in in the course from which many differed. Thereby, the flow of space is born to the whole design. The dynamic internal flow line which consisted of space which a curved surface builds induces the space of a pause, meditation, and discovery to a user with the opened view which acts mutually and suits it. Moreover, the place as a "forum" which can respond to events, such as an event and performance, flexibly is offered. The cafe open to both the park of the first floor and the lobby also becomes a place which opens an informal event. The view in which it was the inside which is visible from the outdoors open will pull the interest of those who walk along a park, and will join a stimulus of space.

The integrated object of a synapse and scenery is born into this place and environment.



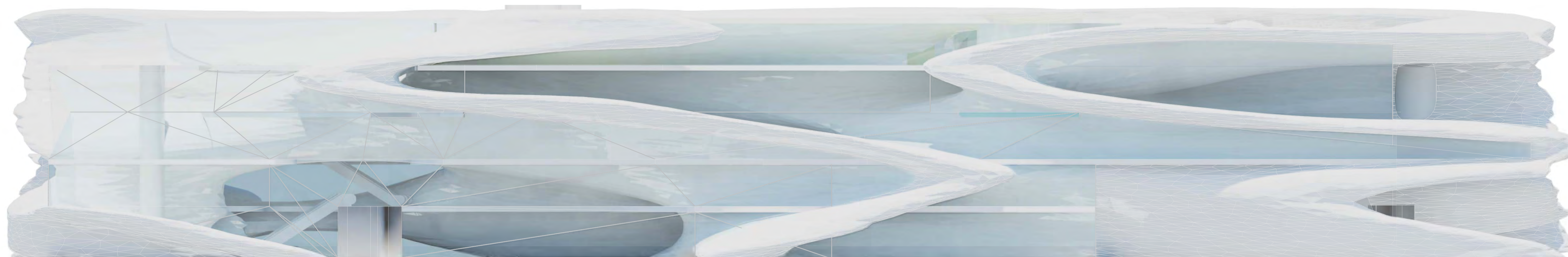
North Elevation



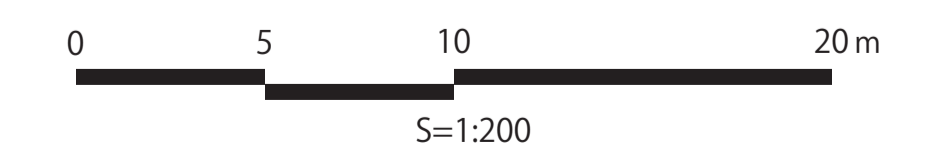
South Elevation



West Elevation



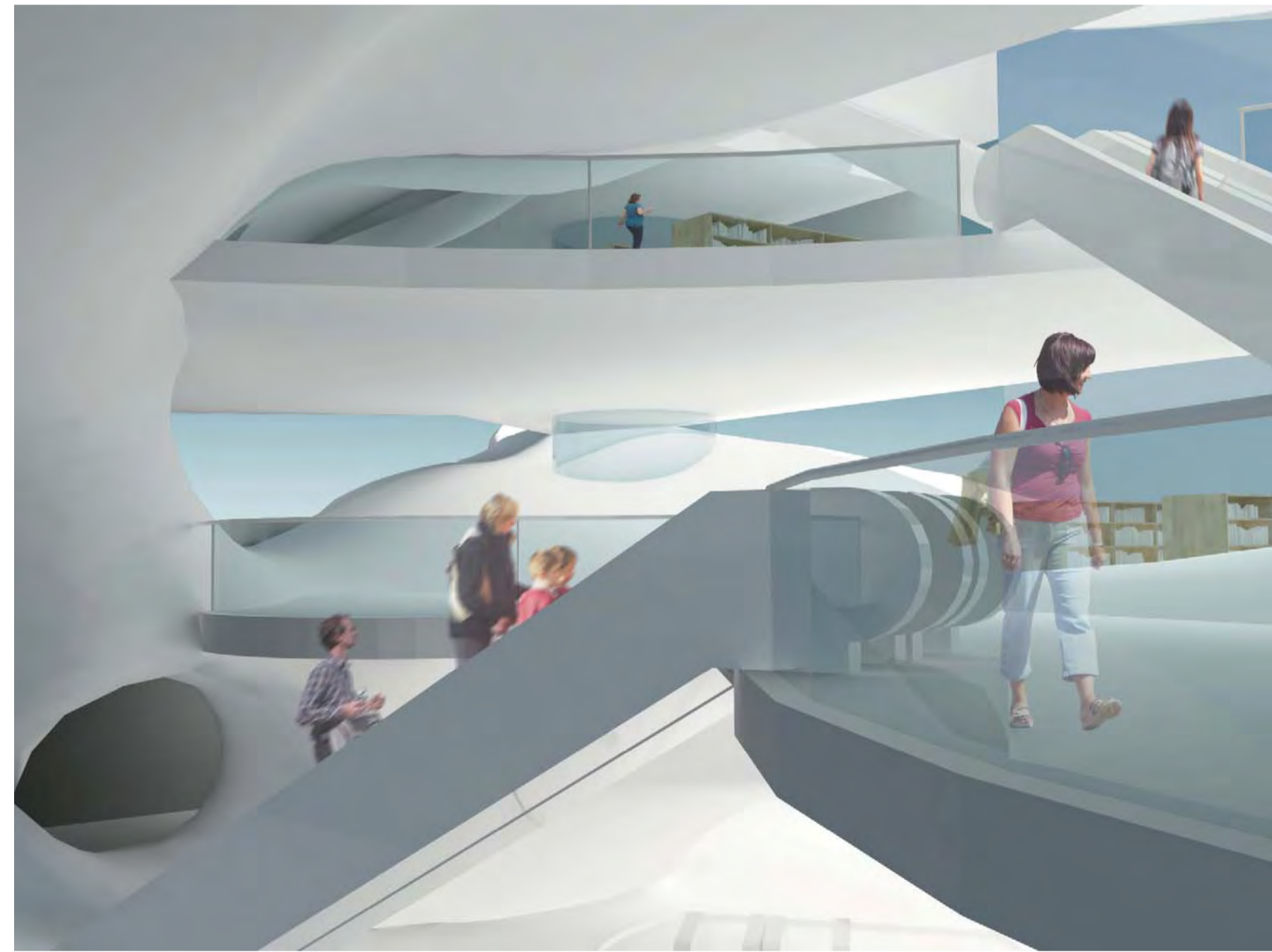
East Elevation













Technical engineering report template

This or corresponding (equal in contents) document is used to summarize (in 2-4 A4 sheets) the technical solutions of the project.

## **EXTENT INFORMATION**

- **Calculation extent information of the building**
- **Areas of building envelope parts (external walls, base floor, roof)**
- **Window areas to different orientations**

Six face pieces which constitute the building which heat exchange with the external worlds, such as the open air and the ground, produces, i.e., an outer wall, and an earthen floor -- the fundamental view over composition component selection of - roof, I think that a highly efficient material is utilized for the right man in the right place by thermally insulated as much as possible so that people and property may be protected from the severe nature of cold district Helsinki and business of a comfortable library can be secured, without using energies, such as electricity and gas, as much as possible.

Specifically, it is compatible in the design nature and functionality which symbolize the concept "SYNAPSES" of this proposal using <the heat insulation sandwich panel of paint with a fluoro-resin glow> with high insulation properties in most outer walls.

Moreover, the flooring material of the first floor or underground insulates the cold from underground as <concrete +FP board + polyethylene foam>, and secures insulation properties and 侯性-proof to roof material using <concrete + urethane denaturation iso cyanurate form + vinyl chloride system sheet waterproofing>.

As window material, from the difference in temperature of the interior of a room and the external world being about a maximum of 50 °C from the past meteorological data in winter, Regardless of the direction, <+Low-e double-glazed glass containing aluminum sash + argon gas> was adopted, and it was compatible in insulation properties and a light transmittance state, and aimed at the library which has a feeling of opening brightly with energy saving.

## **ENERGY SUPPLY SOLUTION**

- **Deviations from the basic solution (district heating, district cooling, grid electricity)**

The district heating and cooling (DHC as below) should be utilized as a main heat source of air-conditioning. The heat from DHC can be exchanged individually and conveyed effectively to some rooms to be air-conditioned and to other rooms to be heated in the building.

The grid electricity will be utilized as an economic electric energy source on demand in cooperation with electric power company.

- **Renewable energy produced on site**

Sunlight and heat of the earth shall be utilized as renewable power source energy and geothermal heat source on site.

- **Description of system implementation**

The air-conditioning system is a water-cooled central type. The main heat source is the heat exchangers from DHC in the underground air-conditioning room. The sub heat source for back-up of DHC consists of the heat pump chillers on the roof which can make hot water and cold water simultaneously.

Piping for air-conditioning consists of 4-pipes system (supply and return pipes for hot and cold) to the air-handling-units (AHU as below) in each room and areas to be cold or hot in the building. The amount



of cold and hot supply water will be usefully and automatically controlled by Building Management System (BMS as below) on reference with real-time temperature and humidity of each room's sensors.

The several percentage reduction of energy for air-conditioning will be done by free-cooling operation for cooling tower on roof which will shorten the period of heat exchange over DHC.

Besides, the several percentage reduction of energy for air-conditioning will be also done by heat exchange over underground geo-thermal tube as an almost constant heat source in a year.

The economical operation for electrical energy will be realized by the forecast system for power consumption and generation which will contribute to economical generation plan of the power company.

The forecast system will have functions which can predict the better condition for operation by analyzing past data of electricity consumption and generation from solar panel system.

## **HEATING**

### **• The basic heating solution of the project, heat distribution, controllability**

(The preceding chapter described) a heat source is used as DHC, and the central air-conditioning system is adopted because the water has a high thermal conductivity as a coolant.

The pipings which bring the warm water passes to each floor along the inside of each mechanical shaft from an underground machinery room and passes to each AHU in each floor along the inside of the double floor h150 which consists of free access panels.

The under floor blow-off type of AHU is adopted as a best solution for this "SYNAPSES" plan which has features of non-territorial zoning with agility and comfortability in the future.

In the floor fine distribution of blow-off from AHU to persons and objects can be realized by arrangement of position and amount of blow-off mouths. The blow-off mouth has the size of a free-access panel and a shutter and a fan which can be remotely controlled for open-close and rotation through BMS. Fine arrangement of heat distribution can be realized timely and economically by selection for number and position and control of shutter and rotation of blow-off mouths according to the information from temperature and humidity sensors(T-H sensor as below) through BMS.

## **STRUCTURES**

### **• Structure types, U values**

A pillar and a beam: Structure (HP shell by high-density arrangement of a space frame).

Floor: The void slab using the deck

Outer wall: Aluminum With a fluoro-resin glow Heat insulation sandwich panel

U value:  $U=1.5$

### **• Utilization of passive means**

available light, solar heat, the rain water of the natural style, snow, ice, and heat of the earth etc. -- it uses.

## **WINDOWS**

### **• Window types, U and g values, window frame types and U values**

Double sash 24 mm thickness Window of argon filling: 1.1 W/m<sup>2</sup>K

### **• Solar shading: description of solutions and control principle**

For solar shading the electric blind-shading system with two operation functions of manual mode and automatic mode in principle is adopted to windows and the top glass of Void part.

In the automatic mode the opening and closing of a blind certain and an angle of blind fins will be controlled automatically according to algorithm pre-calculated with the information from illumination sensors and T-H sensors.

Moreover, it is considered that the blind-shading system can be operated manually in preparation for the case of power failure or some trouble in system.



## **LIGHTING**

- **Lighting solution for the main spaces (main library area, lobbies, rooms for group work),  
modifiability of lighting**

As a lighting plan of main rooms, indirect illumination system by the LED light is adopted in principle as a viewpoint of a long life and efficiency and valuation of light volume and temperature(frequency) .

Moreover, the natural light by Void space and reduction control of energy for electrical lighting by an illumination sensor is introduced in some rooms.

The dynamic and eye-cared gentle lighting space will be realized by utilizing the surface of the void and shell structure surface consists of this "SYNAPSES" plan as a light reflector of indirect illumination.

A task-ambient light is arranged in private booth seats and LED downlights are also adopted as a projector mode for hall and lab space.

- **Small spaces, as a general description**

As a lighting plan of small spaces, direct illumination system by the LED light is adopted in principle (for example ceiling light, downlight) .

- **Lighting powers and lighting controls for calculation**

It shall be considered as the power consumption of 10W/m<sup>2</sup> as a LED lighting for working on desk(500lx). Reduction of the lighting electric power by available natural light shall be expected about 5% by the whole inside of a building.

In addition, power on/off operation of lighting can be controlled automatically on the programming schedule by remote control on BMS.This lighting system will contribute to saving for personnel expenses on building management and to saving energy by forget of shut-off.

## **VENTILATION**

- **Plant rooms for ventilation, and general principles for zoning and ducting**

The ventilation system adopts a single duct system. Pre-conditioned outer air in the machinery room on the roof distributes to AHU in each rooms on each floor passing inside the space of shell and void structure.

Pre-conditioned outer air mixed with return-air from the room is blown-up from the blow-off mouse on the free access panel without ducting. type of AHU is adopted as a best solution for this "SYNAPSES" plan which has features of non-territorial zoning with agility and comfortability in the future.

The air volume of ventilation is controlled automatically under the CO<sub>2</sub> concentration level in law by CO<sub>2</sub> monitor and in order to maintain positive pressure in this building.

The excessive air is almost exhausted from WC in each story and from range-food in a cafe.

- **Heat recovery**

By carrying out heat recovery of the exhaust air of the part in ventilation by a total enthalpy heat exchanger, a several percentage of reduction in energy for air processing will be performed.

- **Solutions for demand controlled ventilation**

The air volume of ventilation is controlled automatically under the CO<sub>2</sub> concentration level in law by CO<sub>2</sub> monitor.

- **Electrical efficiency, SFP value**

The main machine of ventilation are total enthalpy heat exchangers and supply fans and exhaust fans. So the average of SFP values is about 1.8kW/m<sup>3</sup>/s (0.5W/m<sup>3</sup>/h).



- **Cooling generation, unless district cooling is used**

Unless district cooling (DHC) is used, Cooling generation is supplied by heat pump chillers with heat recovery on the roof which can make hot water and cold water simultaneously. .

- **Other solutions with influence on the cooling energy need, e.g. free cooling**

To save the energy for cooling by DHC, free cooling by cooling tower on the roof and geothermal heat exchange by cooling tube will be adopted.

- **Networks and room cooling solutions**

The saving of cooling in each room will be achieved timely and automatically by control of air volume and temperature and humidity by BMS with information from T-H sensors arranged in each room and space. Air volume will be controlled by remote operation for AHU and blow-off fan on free access panel and temperature and humidity will be controlled by remote operation for a total enthalpy heat exchanger and AHU. And a part of BMS (for example a temperature in private booth) accessed on web by user can realize comfortable and energy-saving circumstances.

## **DOMESTIC HOT WATER**

- **Solutions for generation and heat distribution**

The rooms necessary to hot-water supply are a kitchen for cafes, toilet washstands, backyard for the personnel etc. Since each amount of hot-water supply is relatively few, it will be based on individual installation of an electric water heater.



## NAME ENVELOPE

Masakazu IWAI (Design team leader and Design Teams' Contact Person)

E mail Address : im.a-0821@ae.auone-net.jp

Postal Address : 5-20-6-208,,Onohara-higashi, Minoh City, Osaka, Japan

Postal Cord. 562-0031

Hirokazu ABE (Sub-Design Teams' Contact Person)

Masahiko MIYAMOTO

Ryuta MASAI

Noriko OTSUKA

Akira TAKAHASHI

Akio ISSHIKI

Shintaro MAKI

Jung Woo YE

Fumika NARITOMI

Yuika NAKAGAWA

Seri CHIKUNI

Yuriko SHIMOMURA

Mari IKEDA

Tomoko HASHITERA



## USER ID ENVELOPE

User ID : g5epr5ad

Masakazu IWAI (Design team leader and Design Teams' Contact Person)

E mail Address : im.a-0821@ae.auone-net.jp

Postal Address : 5-20-6-208,,Onohara-higashi, Minoh City, Osaka, Japan

Postal Cord. 562-0031