廣生馬

PARAMETRIC

+

MODELABLITY

PORTFOLIO

ZIYAN ZHUO
ARCHITECTURAL
SELECTED WORKS
2018 + 2023

Resume

ZIYAN ZHUO

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Tel: +39 3473617633

ZHUO ZIYAN

1996

2024

Personal Statement

I like talking to people, and do not afraid of the stage.
I Like to make friends and learn their virtues.

I am expert on BIM and parametric ability. Maybe it is due to my interest on softwares. During the master I learnt more on energy simulation and my thesis is based on that. I also learnt some coding skill and the txt2img (image generative ai based on text)AI, such as StableDiffusion.

I hope I can work with the advance tech.My dream mission would be to make Architectural animation via Grasshopper.

Experience

- **2022.7** In the LGC architetti, in Torino.
- **2020.9** Politecnico di Torino. Subject in Sustainability Architecture. Follow Giacomo Chiesa, researching the building EUI optimization.
- **2019.9** GD Architecture Design. In the team of drawings.
- **2015.9** College of architecture, Guangzhou University.

LANGUAGES

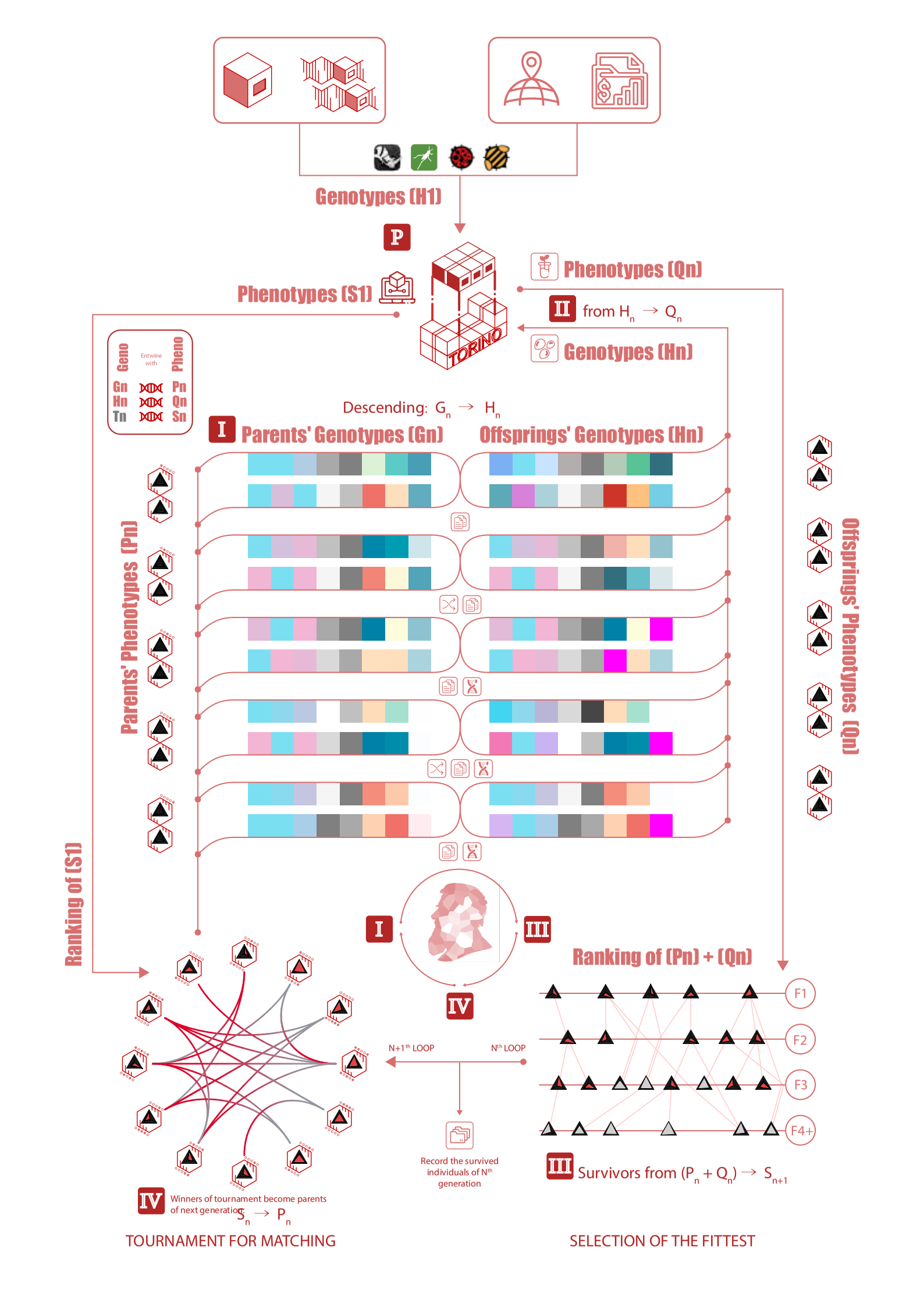
Italian	●●	Cantonese	●●●●●
English	●●●●	Mandarin	●●●●●
		Deutsch	●

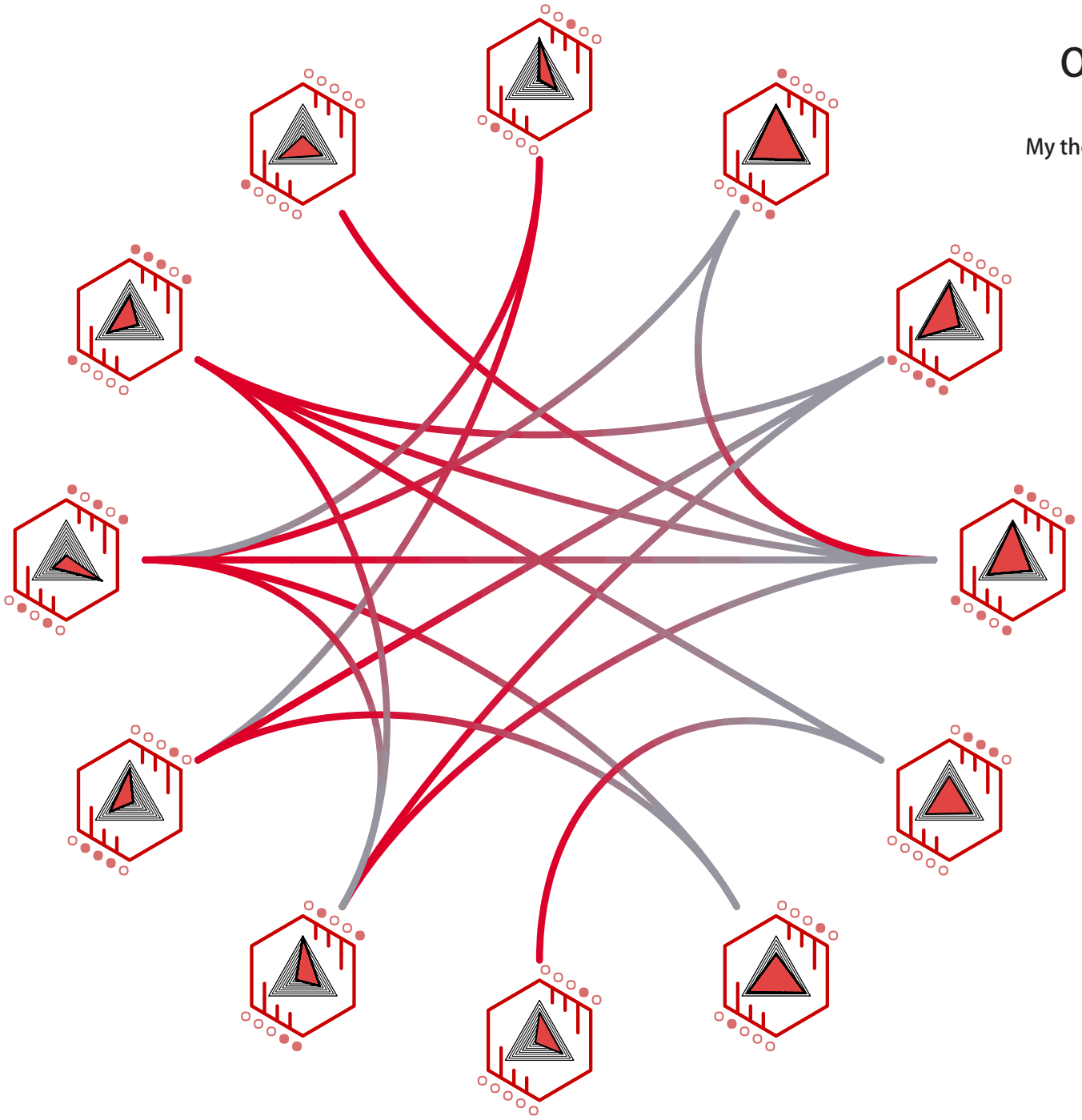
Id Ps Ai Pr Gh

CONTENT

Parametric selected works

BIM selected works


Genotypes (H1)
P
Phenotypes (S1)
Phenotypes (Qn)
II
from $H_n \rightarrow Q_n$
Genotypes (Hn)
TORINO
Geno
Entwine with
Pheno
Gn Pn
Hn Qn
Tn Sn
Descending: $G_n \rightarrow H_n$
I
Parents' Genotypes (Gn)
Offsprings' Genotypes (Hn)
Parents' Phenotypes (Pn)
Offsprings' Phenotypes (Qn)
Ranking of (S1)
I
III
IV
Ranking of (Pn) + (Qn)
F1
F2
F3
F4+
N+1th LOOP
Nth LOOP
Record the survived individuals of Nth generation
III
Survivors from $(P_n + Q_n) \rightarrow S_{n+1}$
IV
Winners of tournament become parents of next generation
$S_n \rightarrow P_n$
TOURNAMENT FOR MATCHING
SELECTION OF THE FITTEST



Scripting Architecture: Orienting Early Design Choices via Optimisation

My thesis on building energy simulation with paramatric method

Site:
Main study in Torino, Italy
5 European cities as comparison

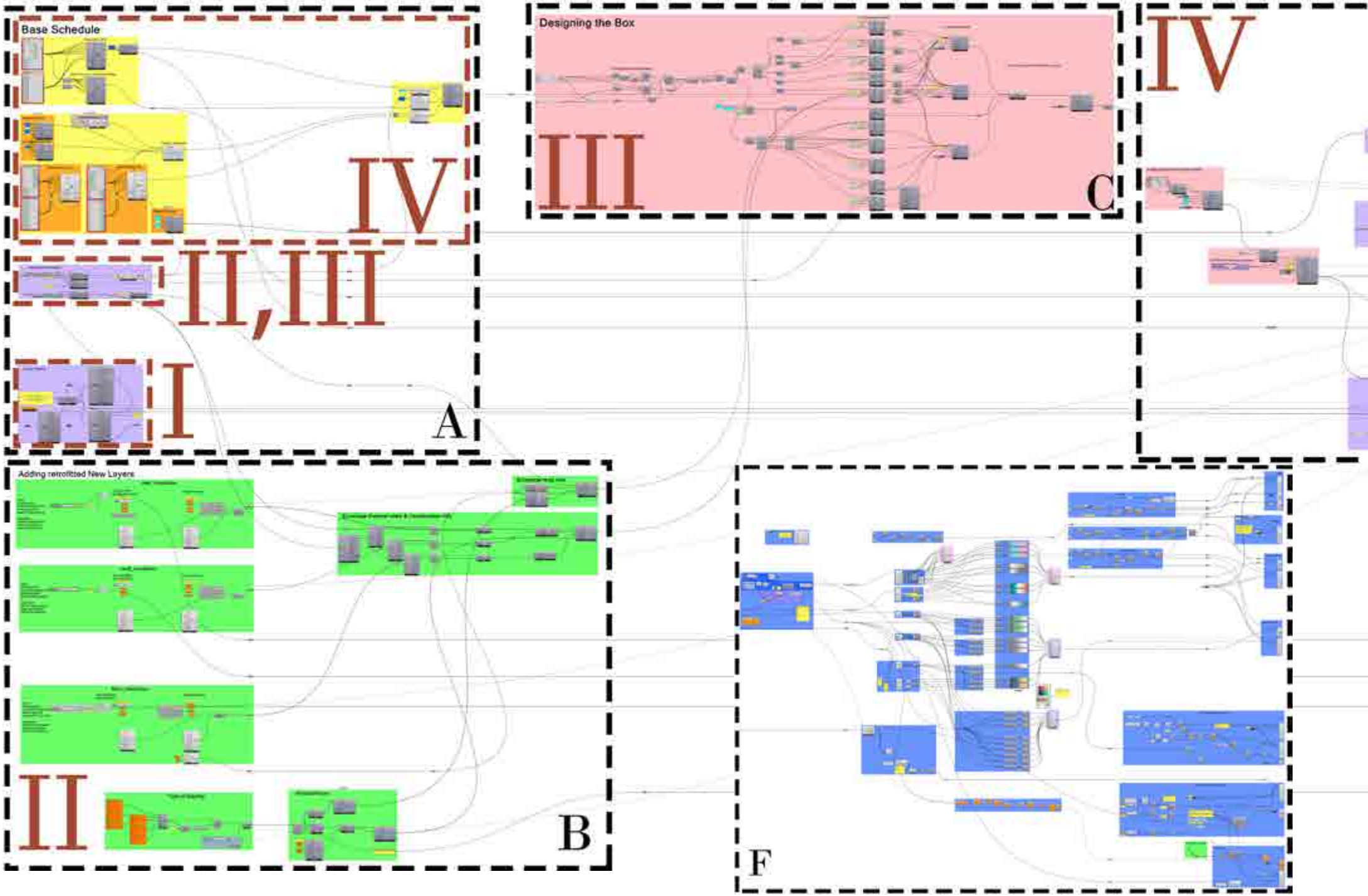
Individual research
Professore:
Giacomo Chiesa

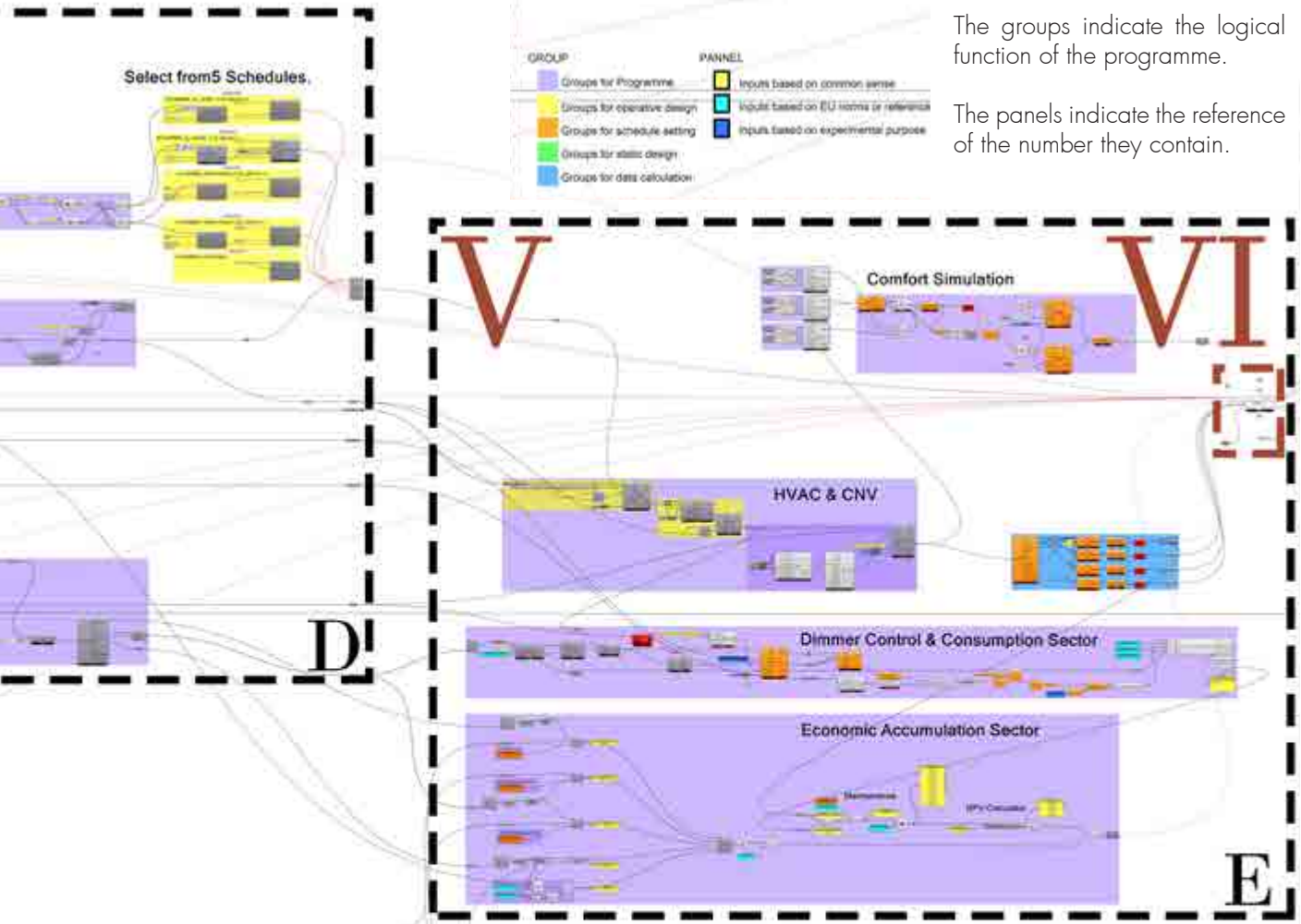
In these page, I present some analysis graphic from the Master thesis. These graphic are generated via grasshopper and modified by Illustrator.
The results of the simulation I uploaded on Github: github.com/ArchVittorio/GeneticfAlgorithm_HB_cities

This paper provides a comprehensive exploration of how parametric design, simulation, and optimization methodologies intertwine, showcasing their effectiveness in architectural design across various geographical contexts.

Specifically, firstly, We found a way to design an imagined box office with parametric skill, then build it within a 3D software environment. Secondly, we managed to evaluate it in 3 perspectives, which are economical assessment, energy usage intensity and comfort measurement. Thirdly, we applied a genetic algorithm on it to get the optimized results, and repeat the experiment under different climate conditions. Lastly, we collect the result, visualize it and analyse it.

We published the result and the workflow on Internet, in order to get feedback. Rethinking the defects in the experiment, I gained the experience and a polished idea on this philosophy while writing the thesis.


Base Schedule
IV
II,III
I
A
Designing the Box
III
C
IV
Adding retrofitted New Layers
II
B
F



The groups indicate the logical function of the programme.

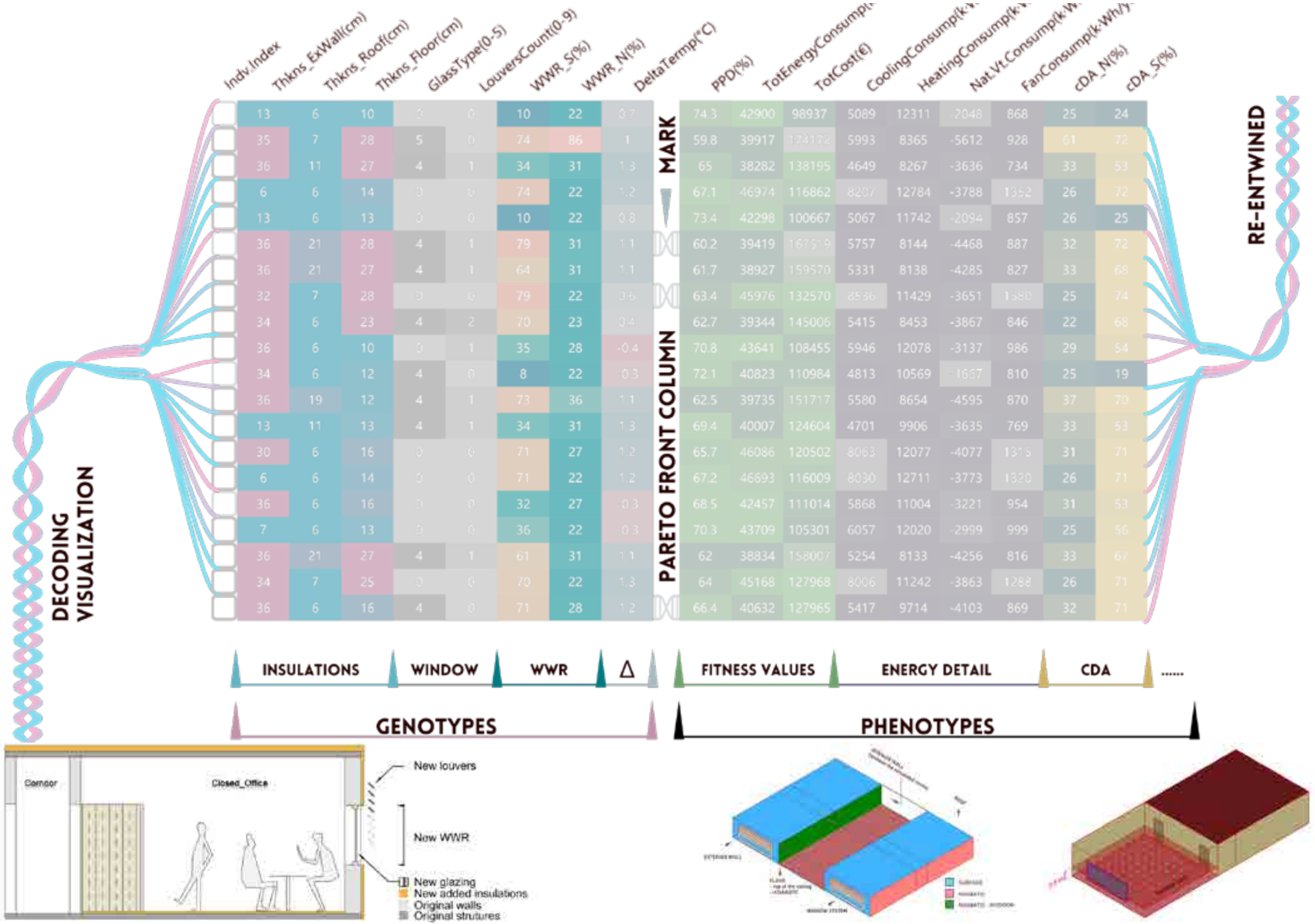
The panels indicate the reference of the number they contain.

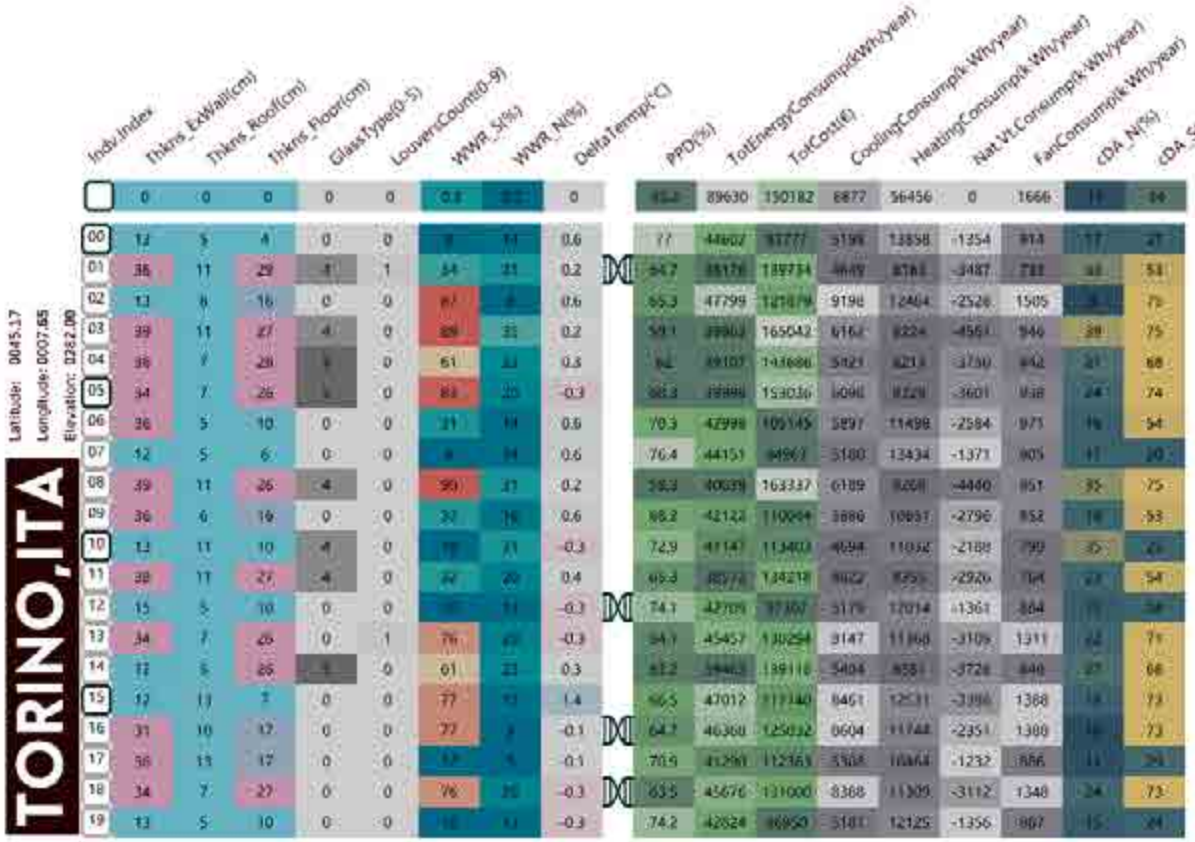
A - Preset of climate and regular.
B - Database of construction.
C - Building information defining.
D - Ventilation control.
E - Analysis and genetic algorithm.
F - Visualization.

I - Climate setting;
II - Window & structure profile;
III - Geometries defining;
IV - Schedule defining;
V - Analysing & calculating;
VI - Genetic Optimizing.

6 selected climates data are input in sector-I.
Also I used ISO 15686-5:2017 as reference, setting up the simulation inputs. The methodology is introduced in the paper, and realized on the GH canvas on right.

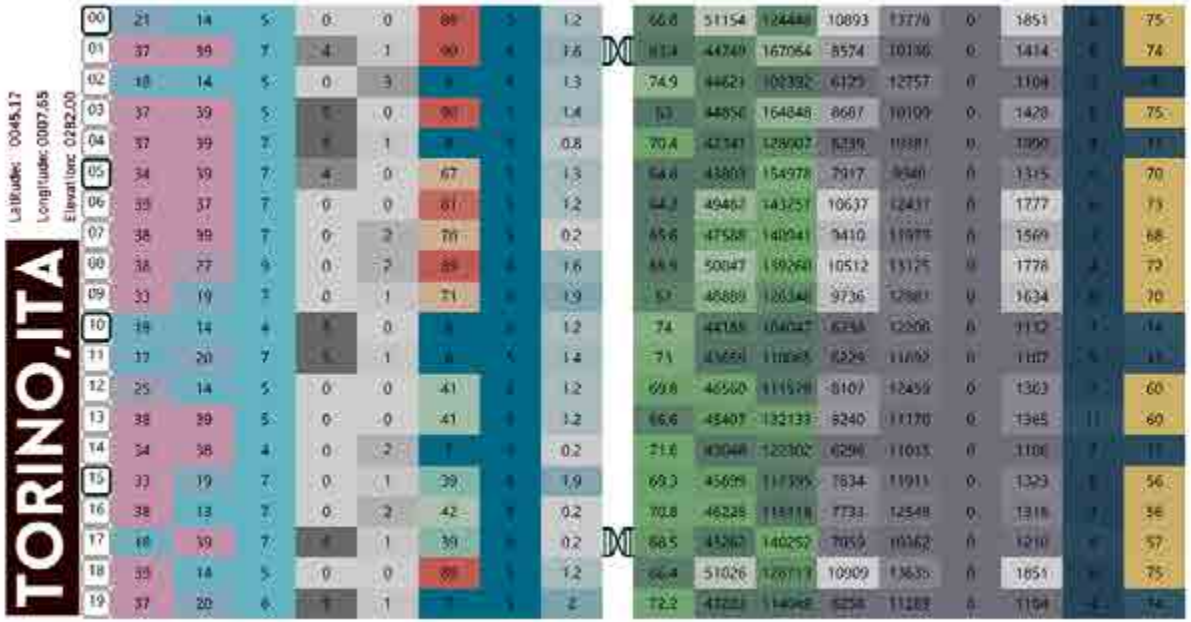
A sector - VI marked with F is not displayed here where the visualization function takes place with the help of Human GH plug-in.


Indv.Index
Thkns_ExWall(cm)
Thkns_Roof(cm)
Thkns_Floor(cm)
GlassType(0-5)
LouversCount(0-9)
WWR_S(%)
WWR_N(%)
DeltaTermp(°C)
PPD(%)
TotEnergyConsumpt
TotCost(€)
CoolingConsumpt(k
HeatingConsumpt(k
Nat.Vt.Consumpt(k
FanConsumpt(k·Wh/
cDA_N(%)
cDA_S(%)
MARK
PARETO FRONT COLUMN
DECODING VISUALIZATION
RE-ENTWINED
INSULATIONS
WINDOW
WWR
Δ
FITNESS VALUES
ENERGY DETAIL
CDA
.....
GENOTYPES
PHENOTYPES
Corridor
Closed_Office
New louvers
New WWR
New glazing
New added insulations
Original walls
Original strutures



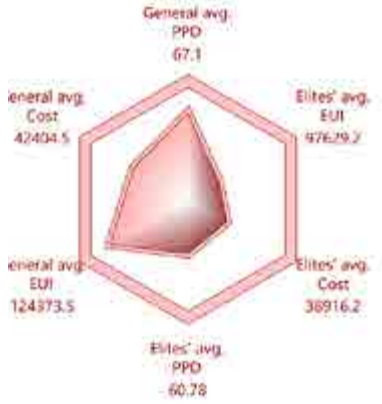
EquipConsump (kWh/year)
14789

ENERATION
99/99



EquipConsump (kWh/year)
14789

ENERATION
99/99



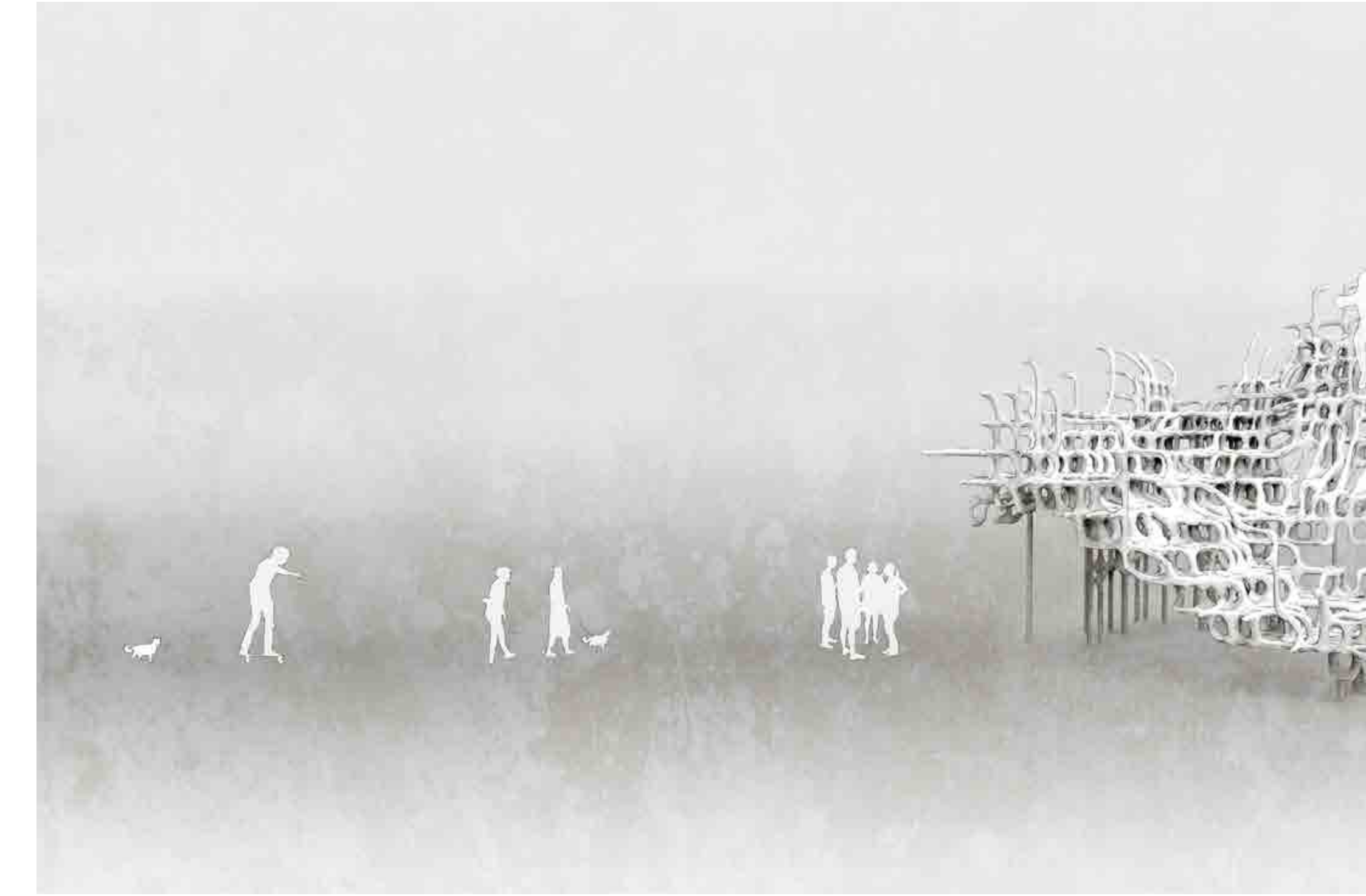
Mean value is selected as the key indicator as it represents the general performance of the final generation. On the other hand, in order to estimate the top elites' performance, the high ranking solutions need to be measured. Hence, in each fitness value, the top 5 solutions are extracted and summed up, which give the sense of the depth of the evolution trace.

The left bottom matrix, natural ventilation is 0, while on the left top it's considerable. It's because the smart controlled natural ventilation system is activated or not. These 2 simulations are conducted alone.

The difference is shown on the top hexagons. With the ventilation, all the KPIs decrease which are prooved effective.

The Mean value tendency above, shows along with the genetic algorithm, when the generation pass on, the fitness value converge in a better range.

This project show my parametric ability on composing a research. And I visualized the analysis graphic via Grasshopper.



Melody of School

A structure design with paramatric method

Site:
Inside Guangdong
Experimental Middle School

Teammate:
Stone Liang

Tutor:
Annie Li

When people manage a huge system, there are usually two ideas: the idea of capitalism, the invisible hand, and the idea of socialism, the visible hand.

The same is true when designers design a form, either from the bottom up, dominated by basic functions, or from top to bottom, with a core philosophy. Computers offer designers another option: the hand of data learning. The aim is to reveal the laws that the human eye cannot see, so that designers can see the evolution that was previously invisible. The results of machine learning are in the designer's case, just as the microscope is for microbiologists.

With this methodology, we can create a structure that totally related to the site. When it comes to middle school, we always think of the memory of our golden age. However, if we want to solidize a concreted sculpture representing what is exactly happening in the school. What it would like to be? The shape of the memory?
We want to design a accessible structure that have the exact feature of the shool. In this case we managed to get the statics that presents the feature of the site at first.

The melody of school day is made from three kinds of sounds,
boys, girls, teachers. So we analysed the density of thiese roles at first. Then we divided the school into 5*5m squares, and we used three colors to represent the roles. And further more, we used the density of color to symbolize th density of human.

As we filled in every square, we got a featured map. On this map every square has 5 statics those are positon, density of boys, density of girls, density of teachers, velocity of people.

We parameterized it and try to learn the principle inside it withthe help of computer.

Site Analysis

Site:Guangdong Experimental School
Area:0.02km2
Student Amount:1800
Teacher Amount:90

The end of the track is the place where many female students gather. They usually chat and play games here.

The male students always play football in the football field.

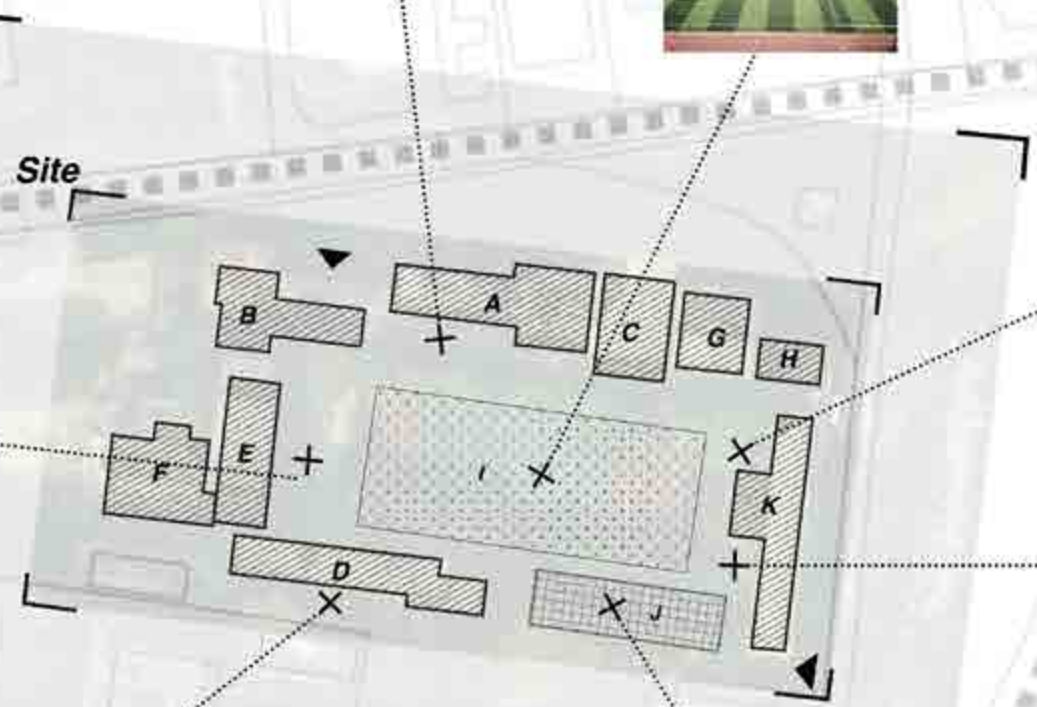
Many male students like to do some exercises in the this outdoor gym.

Many teachers will gather in the front of the comprehensive building.

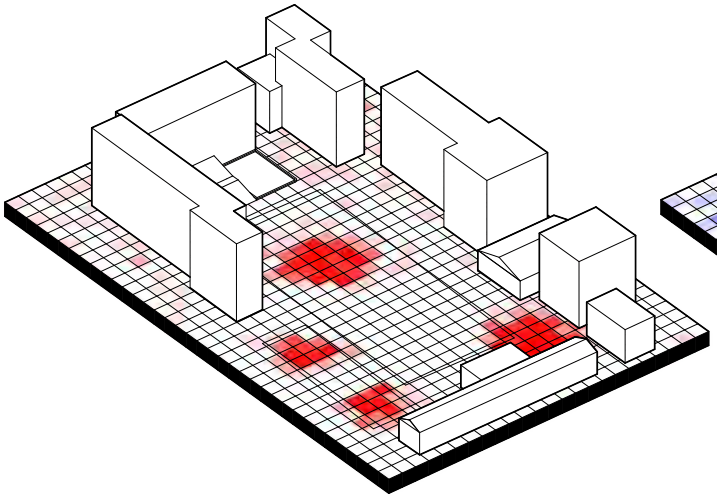
We found that many girls like to play some games in this area.

Many male students play basketball in this court.

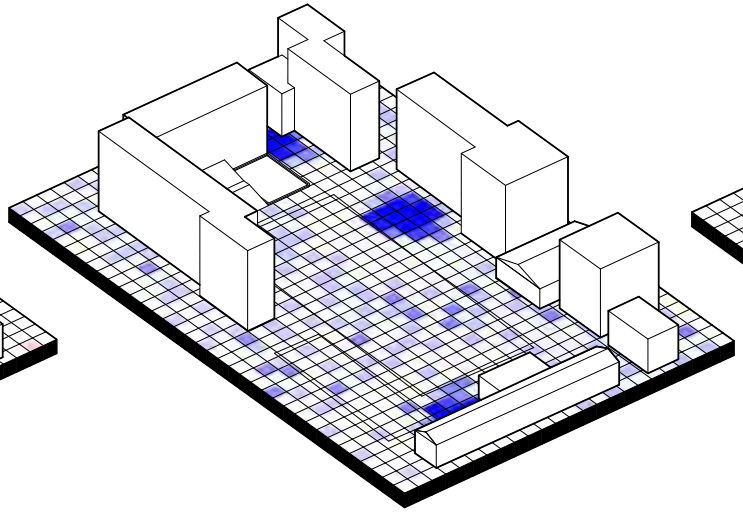
This place is near the teacher's office so that many teachers will chat with each others here.



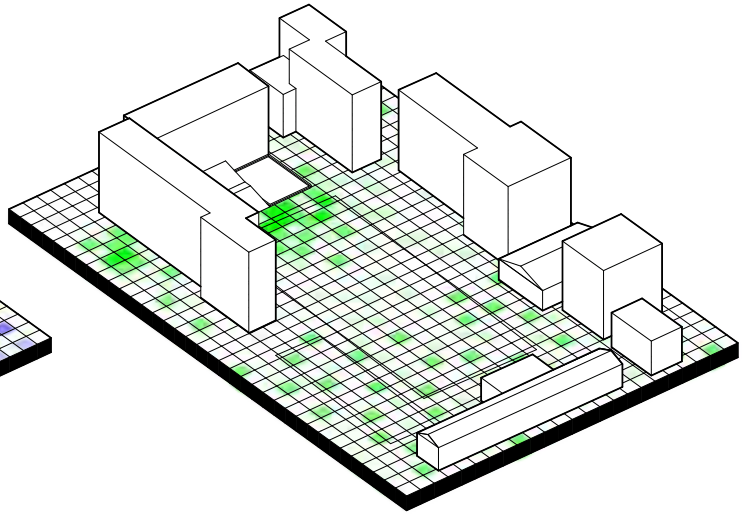
A-D:Teaching Building
E:Comprehensive Building
F:Canteen
G:Badminton Court
H:Dormitory
I:Football Court
J:Basketball Court
K:Gym
▼:Entrance
O:Important Station



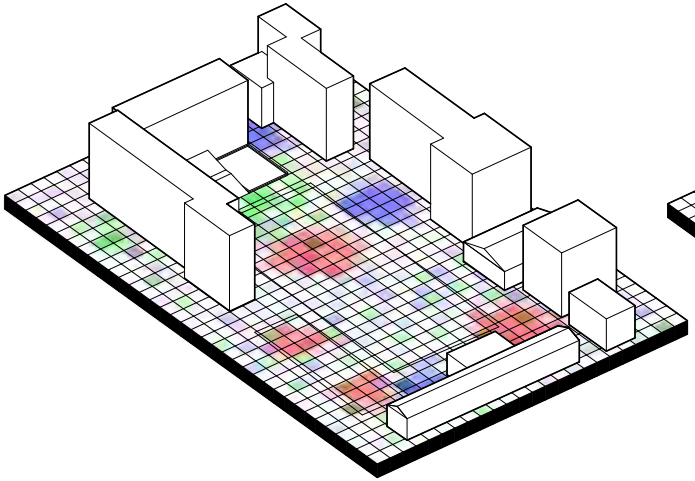
Density of Boys



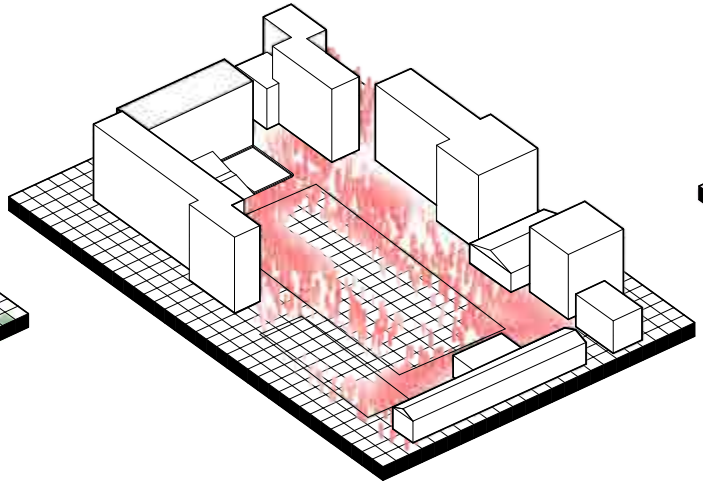
Density of Girls



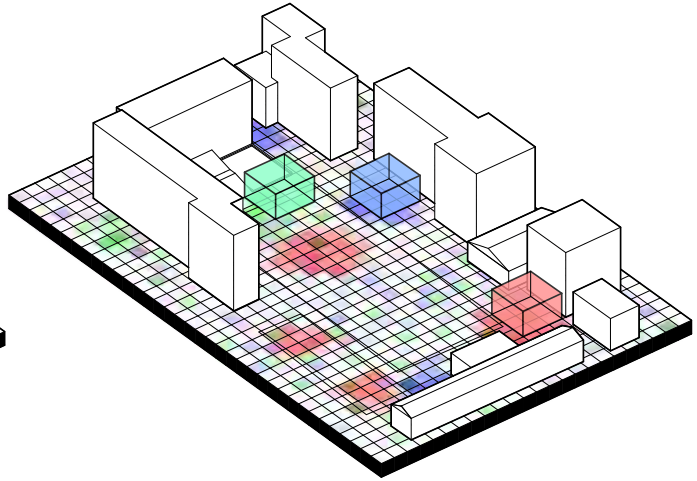
Density of Teachers



Density-feature map



Velocity-feature map



Site Selection

STEP 1- INPUT DATA

Data1: Horizontal coordinates of 10 base anchor points.

Data2: Heights of 4 upper anchors of pulling ropes.

Data3: Mesh color, which would be shown in step3.

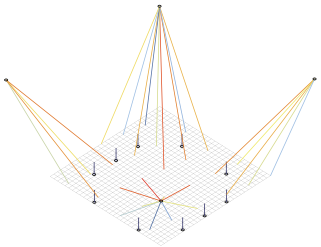
STEP 2- FLEXIBLE PHYSIC SIMULATION

1.Create linar forces and gravity.
2.The strength are proportional to lengths of rope and mesh lines.
3.Flexible simulation. The ropes pull the mesh into air while the anchors and gravity are restricting it. Finally, all the forces balance, and the shape of mesh is stablized.

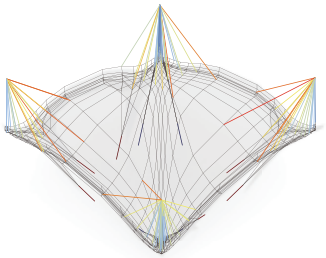
STEP 3- SMOOTHENING & SOLIDIFICATION

1.Transform the mesh to a solid.
2.Smoothening.
3.Corloring.

Define Boys as RED.
Define Teachers as GREEN.
Define Girls as BLUE.

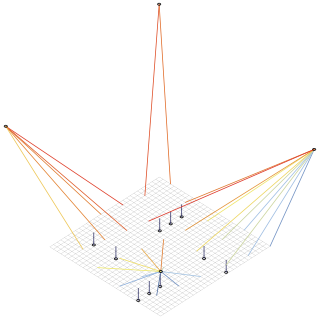


Teacher:100%
Boy:0%
Girl:0%

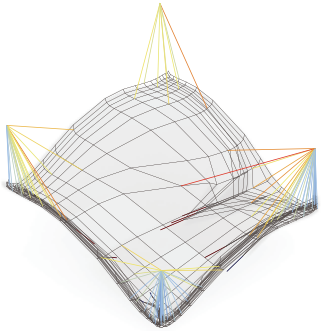


Accessiblity:100%
Competitivity:0%
Sensibility:0%

Green:255
Blue:0
Red:0

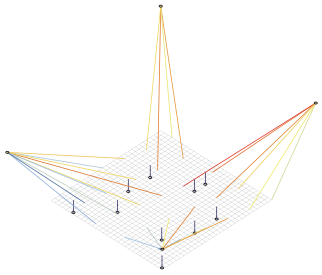


Teacher:0%
Boy:0%
Girl:100%

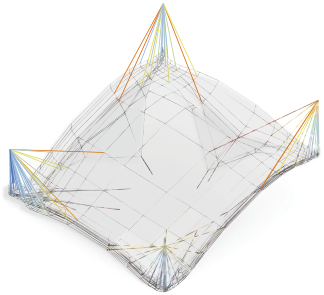


Accessiblity:0%
Competitivity:0%
Sensibility:100%

Green:0
Blue:255
Red:0

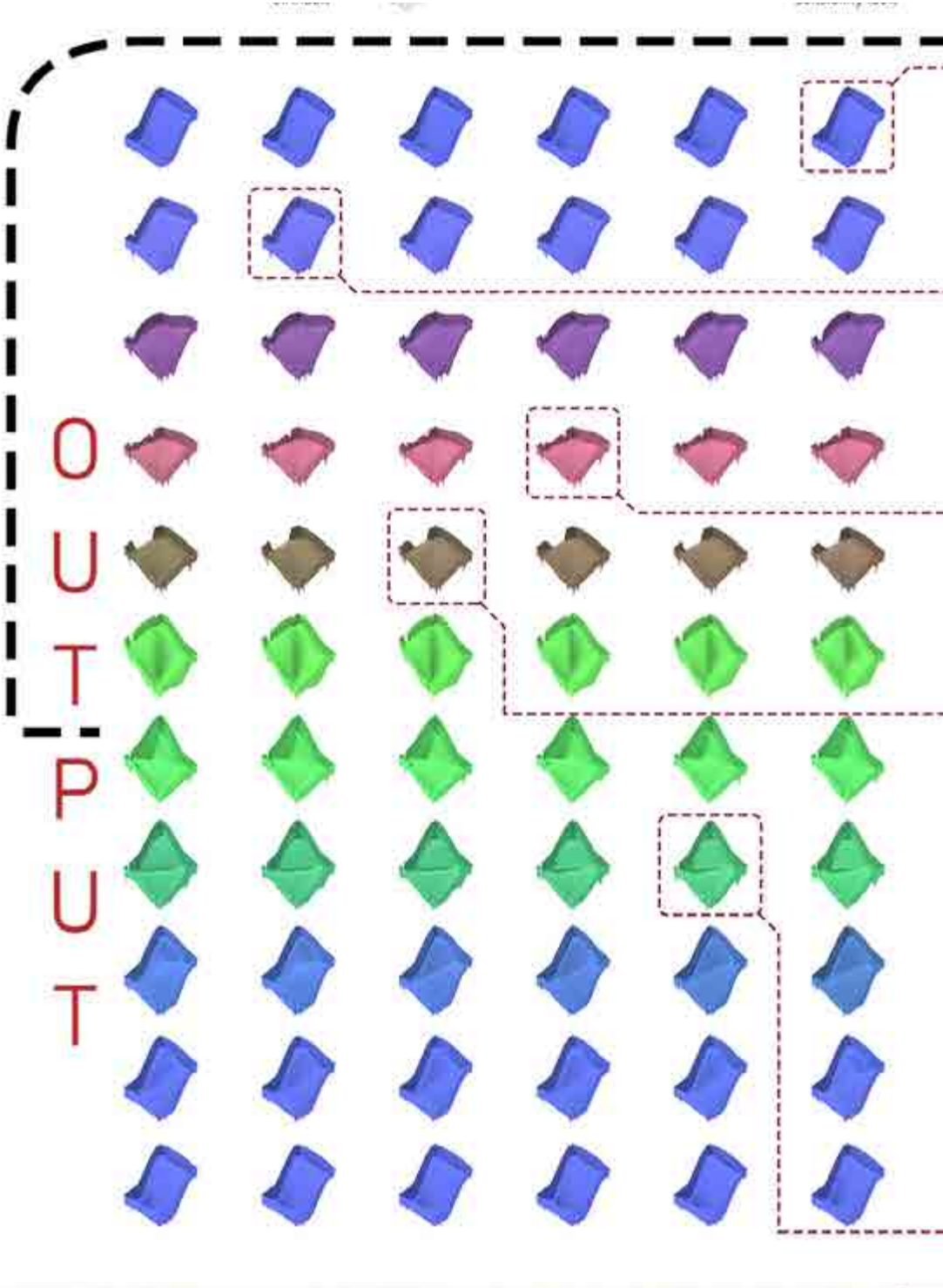


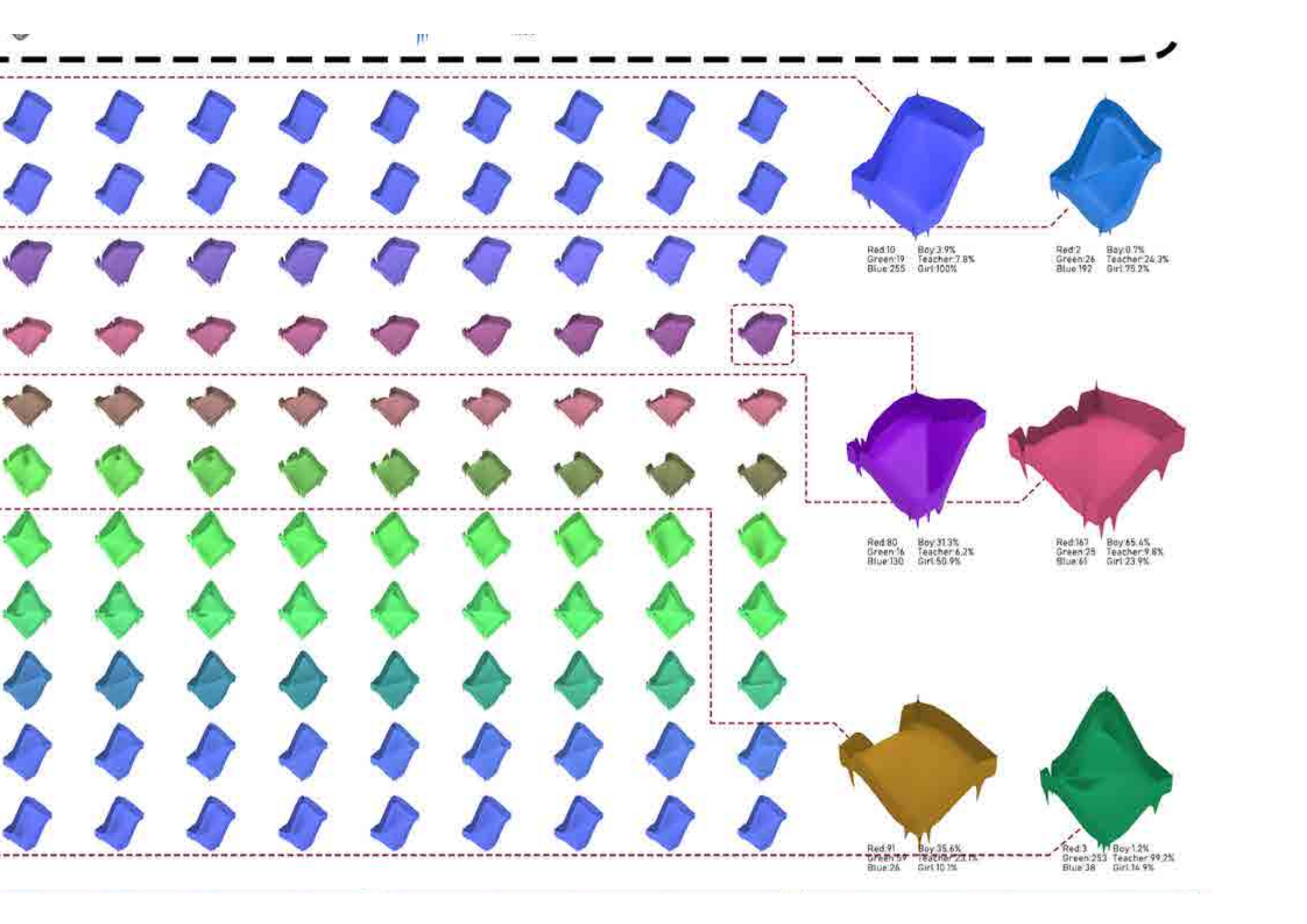
Teacher:0%
Boy:100%
Girl:0%



Accessiblity:0%
Competitivity:100%
Sensibility:0%

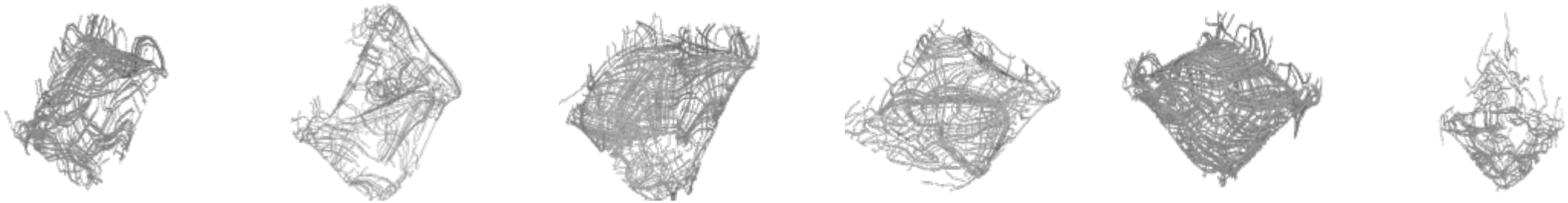
Green:0
Blue:0
Red:255



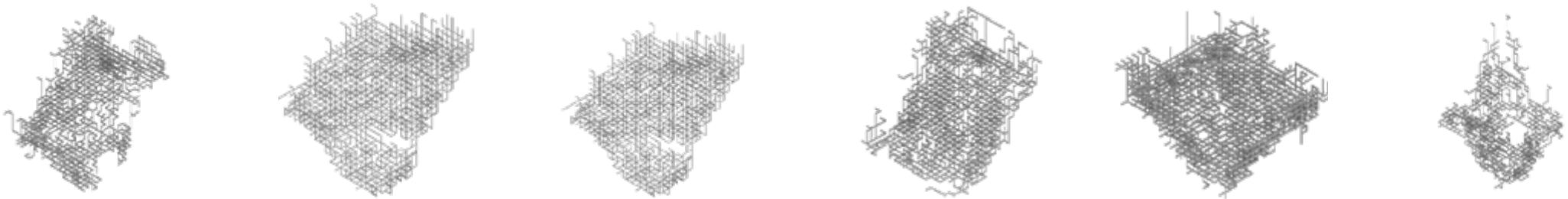

Red:10
Green:19
Blue:255
Boy:3.9%
Teacher:7.8%
Girl:100%
Red:2
Green:26
Blue:192
Boy:0.7%
Teacher:24.3%
Girl:75.2%
Red:80
Green:16
Blue:130
Boy:31.3%
Teacher:6.2%
Girl:50.9%
Red:167
Green:25
Blue:61
Boy:65.4%
Teacher:9.8%
Girl:23.9%
Red:91
Blue:26
Boy:35.6%
Girl:10.1%
Red:3
Green:253
Blue:38
Boy:1.2%
Teacher:99.2%
Girl:14.9%

Origin

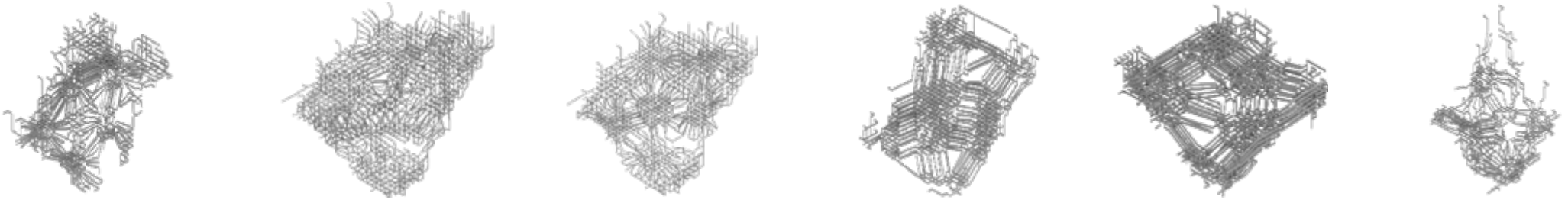
Structuralization



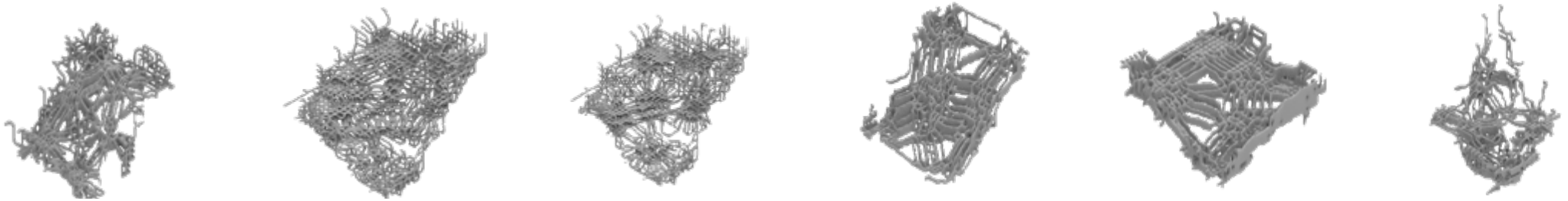
Framing



Optimization



Solidization



Modeling of Casa Trancura

A work from the course BIM
I present here to show my general Revit skill

Site:
Pucón, Chile

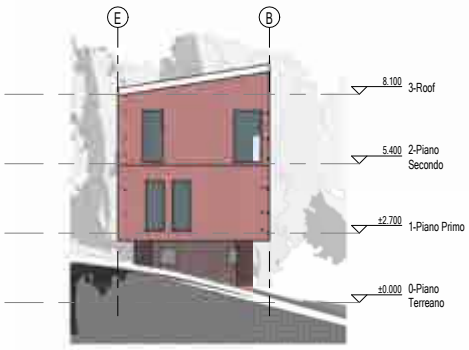
Individual work

Professore/ssa:
E.C.Giovannini
T.Andrea

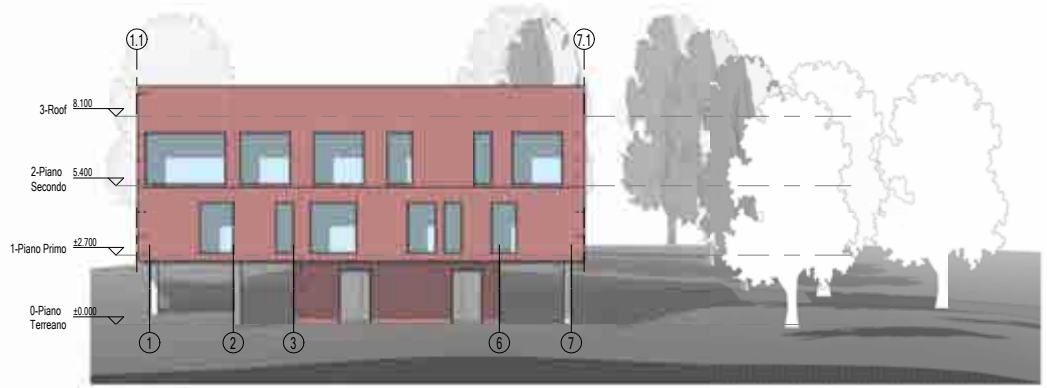
This project is a demostration of my Revit skill, rather than the designning skill. This work comes from the BIM course in Politenico di Torino.

The design is done by Labarca Martinez, and constructed in 2018. The course requirement is to choose a small building on architectural magazines and model it completely in Revit. I looked up the italian magazine *The Plan* vol.131 from 2021, selecting *Casa Trancura* as my reference since the professoressa said that's proper for an individual work.

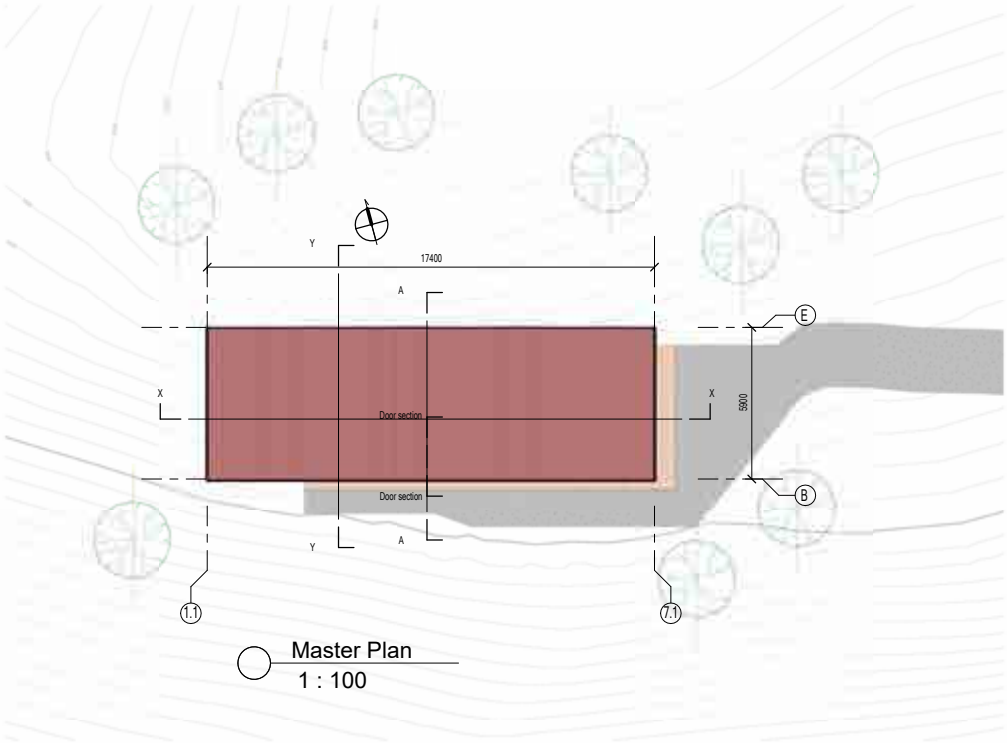
This project and the *PlayerOne* are all created inside Revit. While the *PlayerOne* highlights the skill of making irregular shape in Revit and advance envelope via Dynamo. This one focus on informativeness and expressiveness of the Revit drawings.



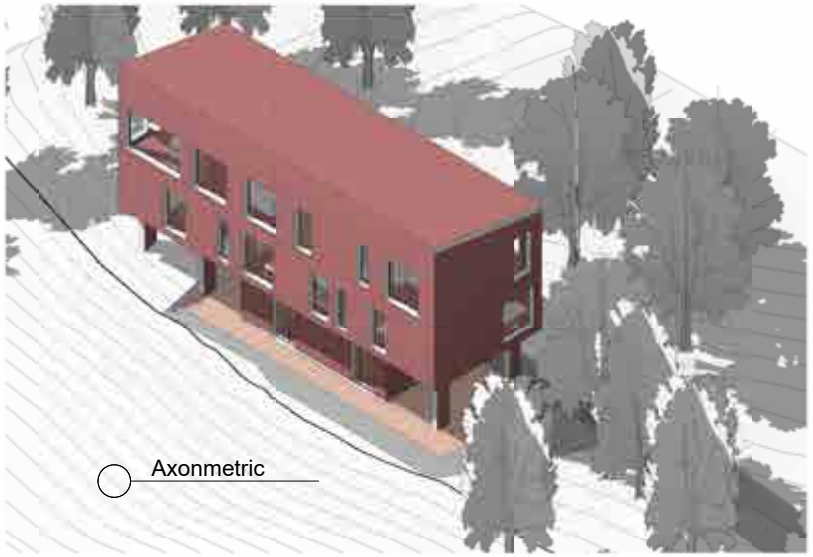
West Facade
1 : 100



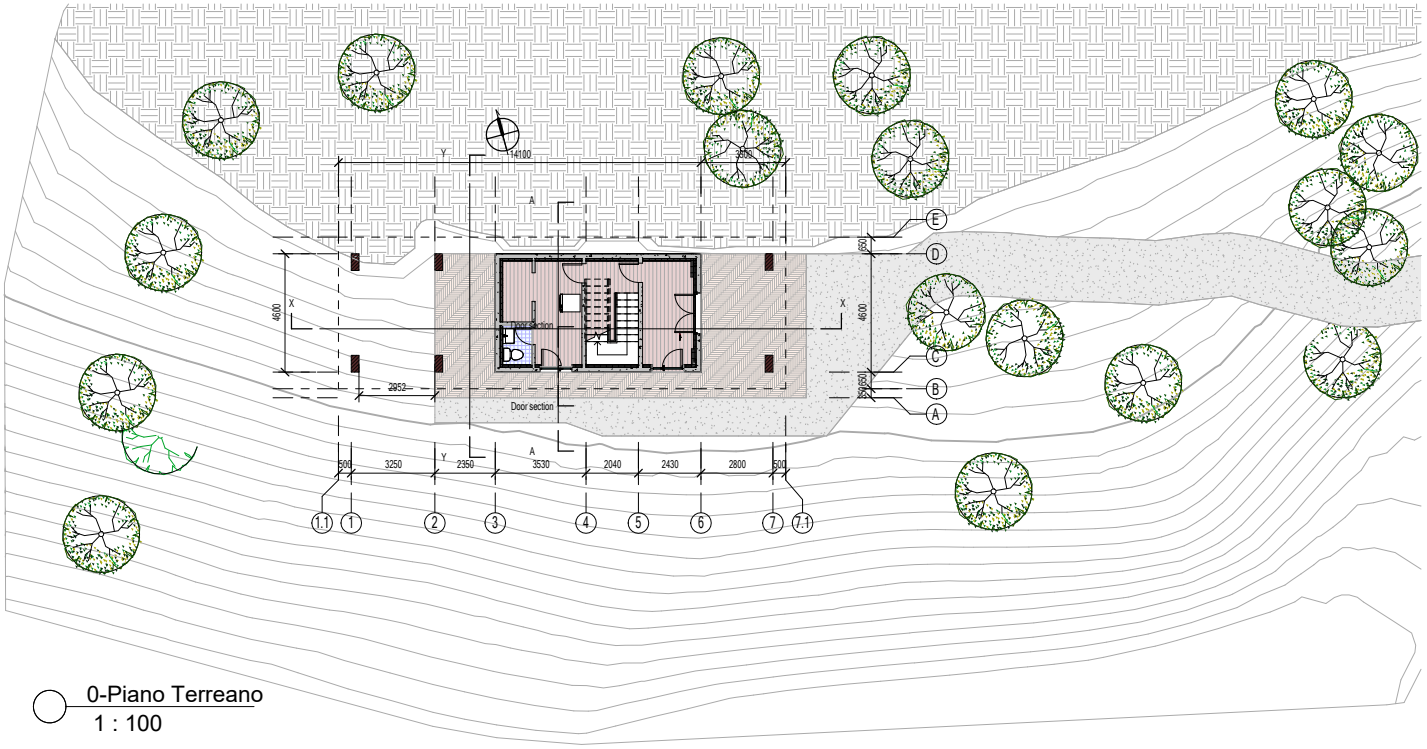
South Facade
1 : 100



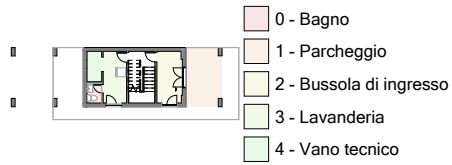
Master Plan
1 : 100



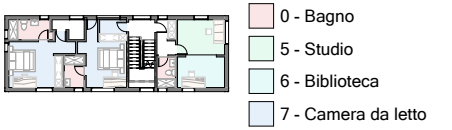
Axonmetric



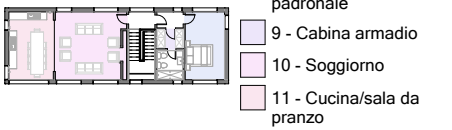
0-Piano Terreano
1 : 100



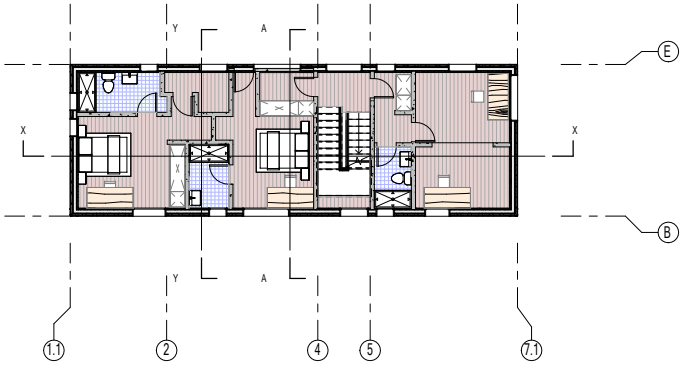
0-Piano Terreano Function
1 : 200



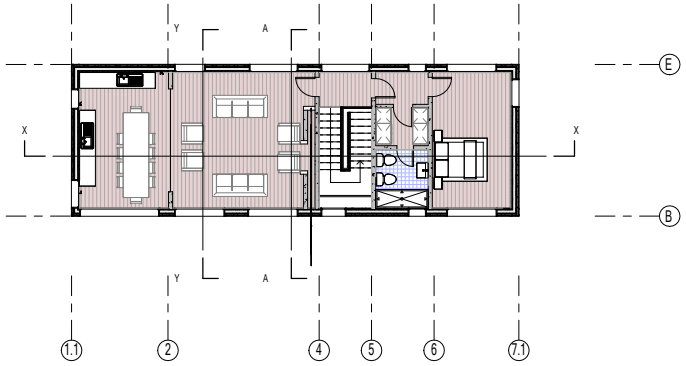
1-Piano Primo Function
1 : 200



2-Piano Secondo Function
1 : 200

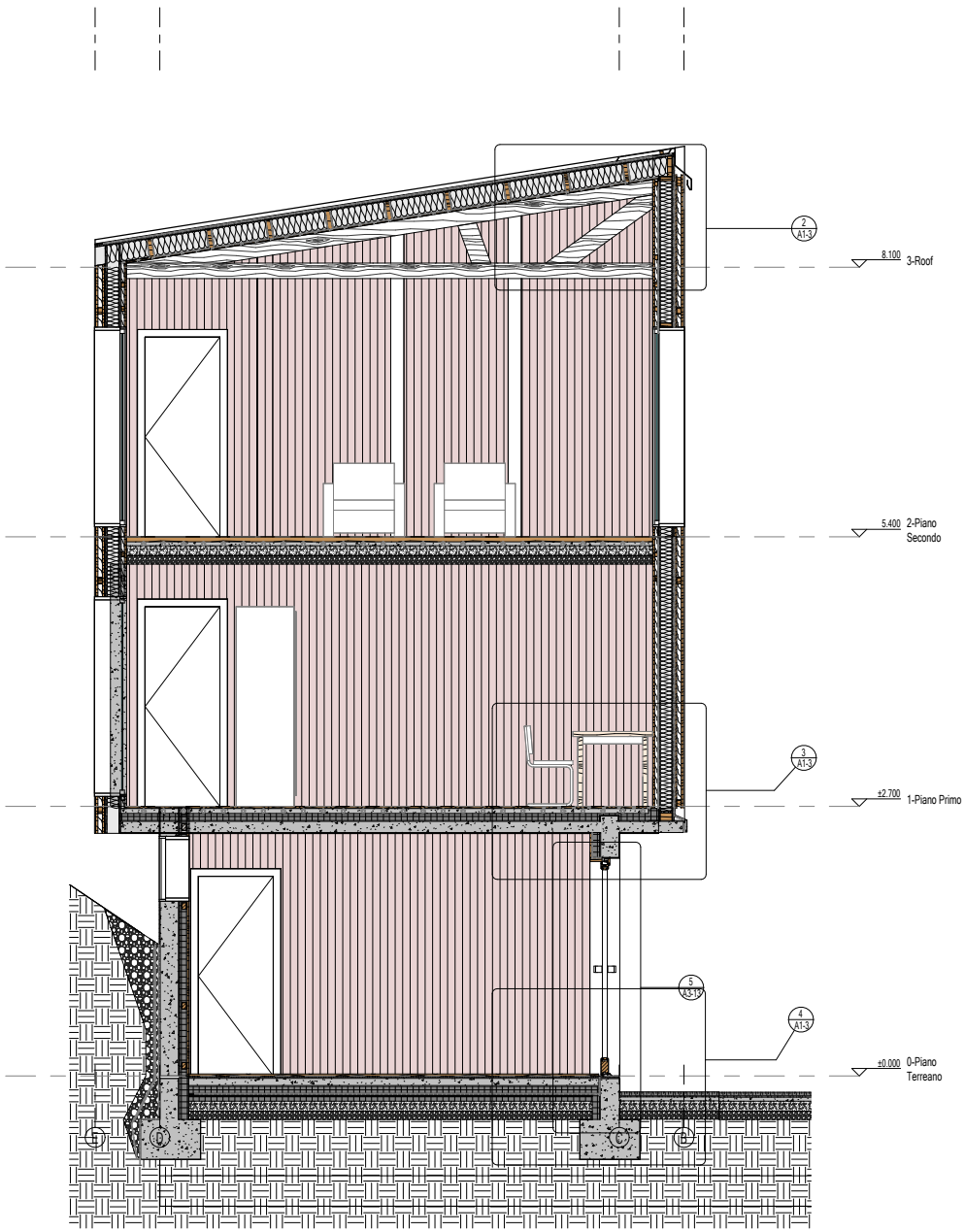


1-Piano Primo
1 : 100

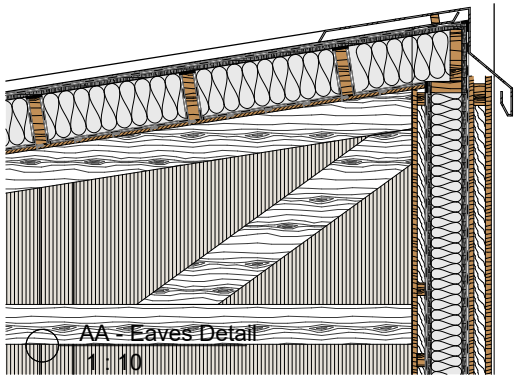


2-Piano Secondo
1 : 100

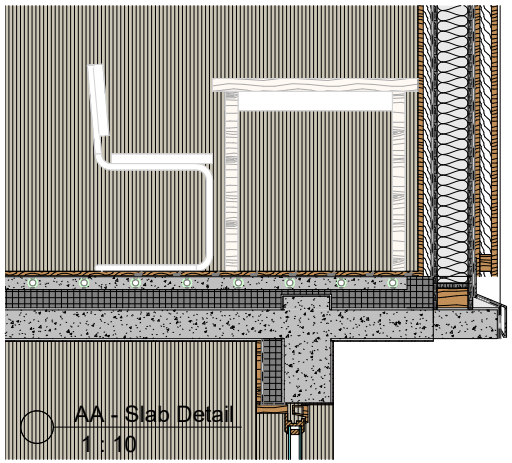
Room Area		
Name	Level	Area
0-Piano Terreano		
0 - Bagno	0-Piano Terreano	1.73
1 - Parcheggio	0-Piano Terreano	12.48
2 - Bussola di ingresso	0-Piano Terreano	7.82
3 - Lavanderia	0-Piano Terreano	7.36
4 - Vano tecnico	0-Piano Terreano	2.75
1-Piano Primo		
0 - Bagno	1-Piano Primo	3.42
0 - Bagno	1-Piano Primo	3.82
0 - Bagno	1-Piano Primo	5.09
5 - Studio	1-Piano Primo	9.98
6 - Biblioteca	1-Piano Primo	9.07
7 - Camera da letto	1-Piano Primo	16.30
7 - Camera da letto	1-Piano Primo	16.87
2-Piano Secondo		
0 - Bagno	2-Piano Secondo	4.62
8 - Camera da letto padronale	2-Piano Secondo	16.10
9 - Cabina armadio	2-Piano Secondo	3.03
10 - Soggiorno	2-Piano Secondo	28.97
11 - Cucina/sala da pranzo	2-Piano Secondo	18.54



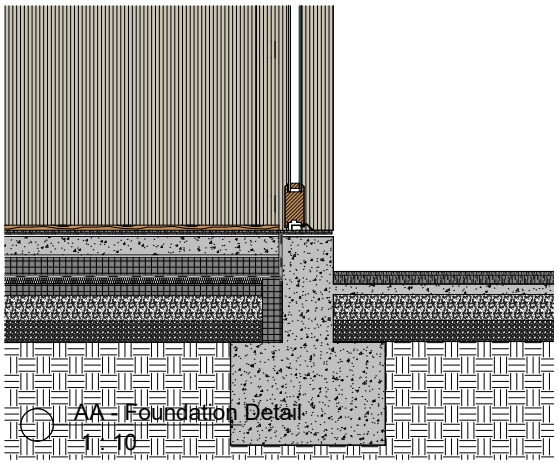
AA Section
1 : 25



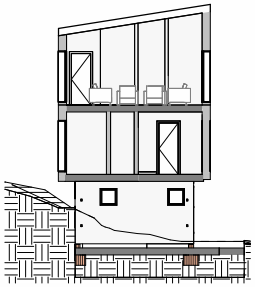
AA - Eaves Detail
1 : 10



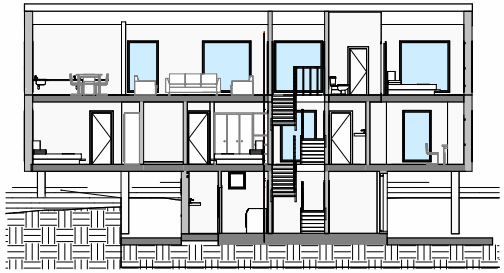
AA - Slab Detail
1 : 10



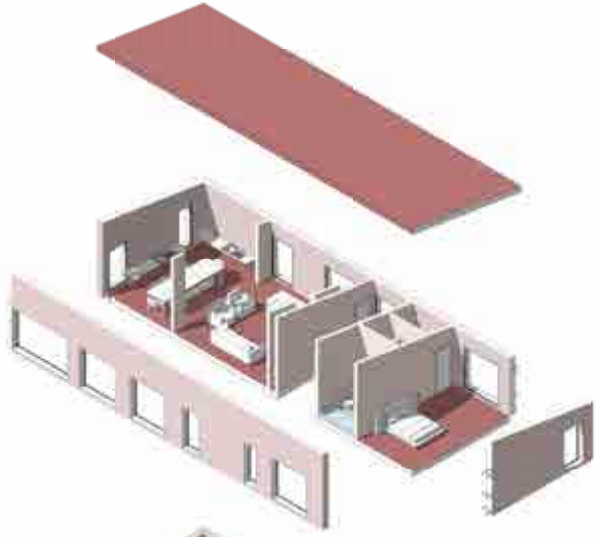
AA - Foundation Detail
1 : 10

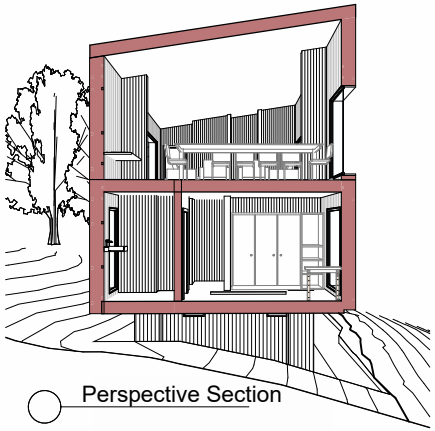


YY Section
1 : 100



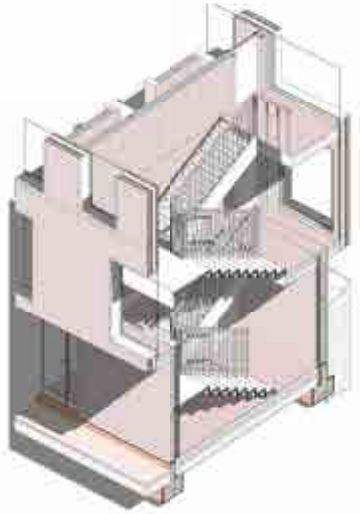
XX Section
1 : 100





Perspective Section

Bedroom



Staircase

Axonmetric Exploded

Player One

A gamers residential complex in digital era

Site:
Hign Education Mega Center,
Guangzhou

Independent Work

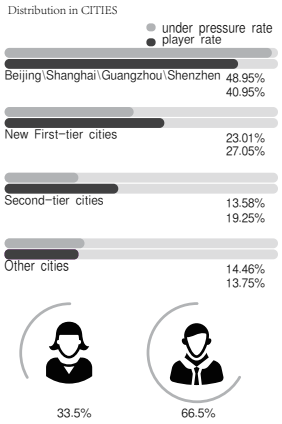
Tutor:
Luo Zhihua

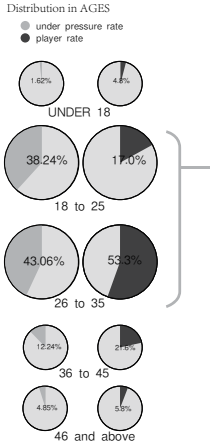
In the digital age, the social form changes dramatically, and the highly developed virtual technology also leads to the alienation of interpersonal communication in the real world. Information prosperity on the surface cannot cover the depression and loneliness in the heart... The traditional solidified and closed functional space further intensifies the isolation between people. What kind of space can promote lonely individuals to integrate into the community?

Greatest common divisor(GCD) is a mathematical concept. We borrow it into architecture, aiming to create an atmosphere to link all young people together.
We believe that this kind of space should make sense, just like *GCD* dose in maths operations, allowing individuals from different industries and interests to naturally enter the atmosphere of communication. So we choose
GAMIFICATION as the common divisor.
Gamification of survival is our concept of daily life. On the one hand, through games, it can relieve the tense of urban stressed life. Games, on the other hand, promote human interaction
Gamification is the most efficient means in the information age. It can trigger the activities of *sharing, collaboration, confrontation.* And communication behaviors make people feel that they are needed.

The special interpersonal relationship of the break time reconnects people. And we designed one individual residential complexes to materialize these ideas, bringing out a new kind of living building for the young generation.

PROPORTION of STRESSED PEOPLE & PLAYERS





STRESSES

DIGITALIZED GENERATION

PREFERING VIRTUAL ENTERTAINMENTS

PROS-REALISTIC

RELAX

CREATIVITY

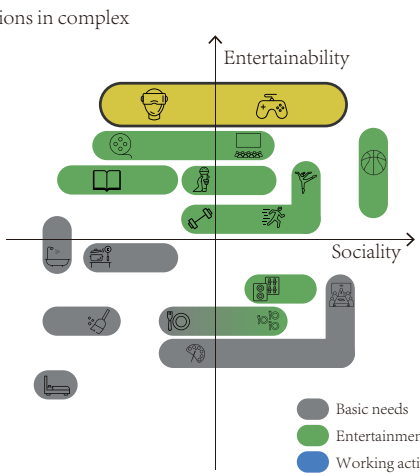
MOST SHARED INTEREST

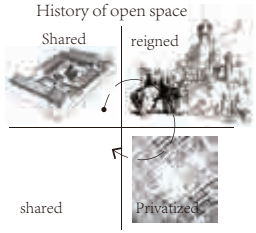
CONS-FUTURISM

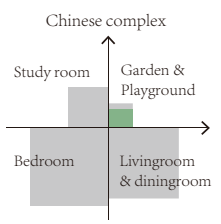
ISOLATION

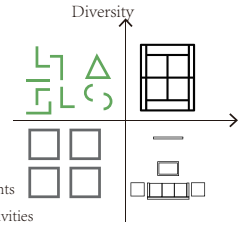
VIRTUALIZARION

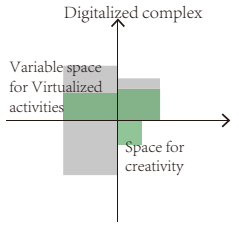
Young generation prefer the virtual entertainment while facing the stresses. But new fuctions of entertainment have not yet been taken into consideration in mainstream resident design. For example, the Nintendo fitness ring is extremely popular in today China. It will lead to a new life styles, and would perform better if it could interact with the living space.

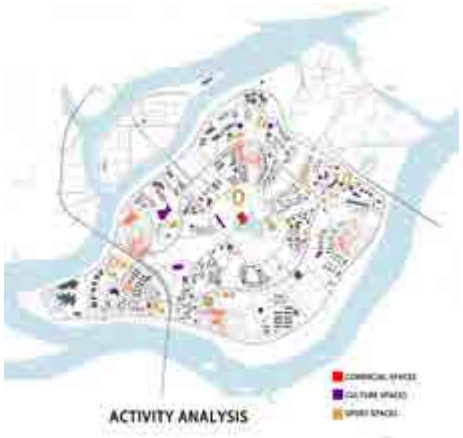




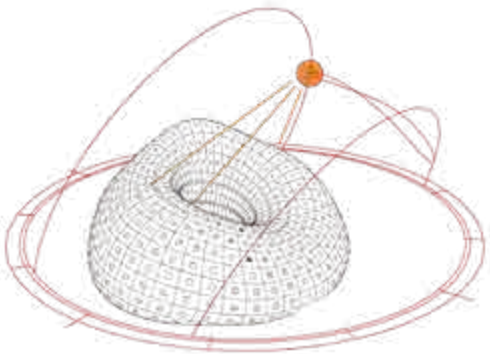




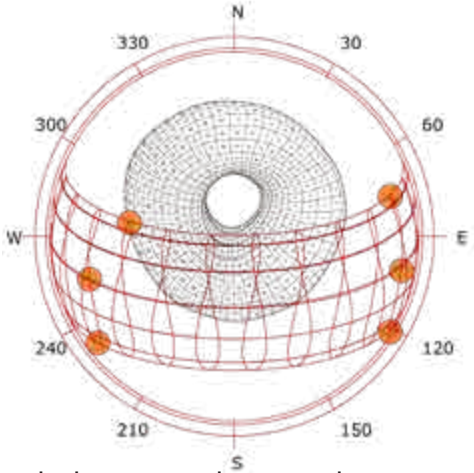




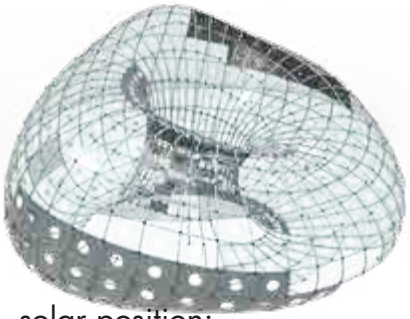
SKIN
=TRANSPARENT SURFACE + BROAD + FRAME



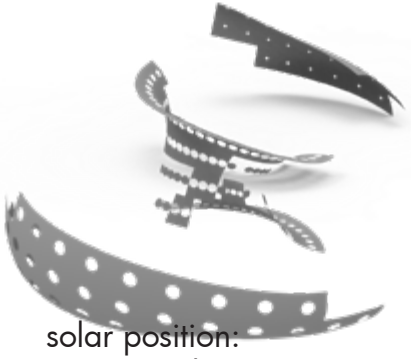
The direct solar radiation changes along time.
So our surface changes to adapt it.



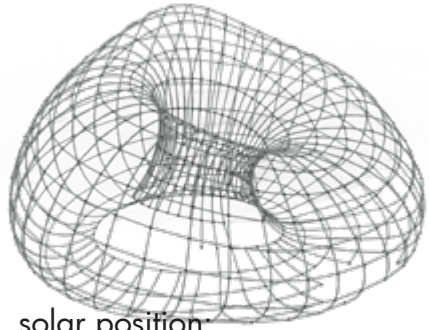
Whole year relative solar positions are all locate in this range.
And I pick the 6from them as the representative.



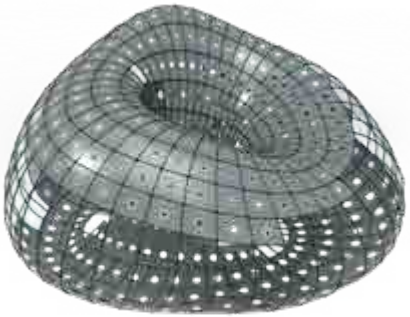
solar position:
summer solstice 08:00
transparent surface



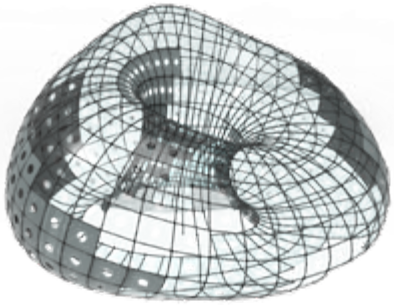
solar position:
summer solstice 08:00
broad



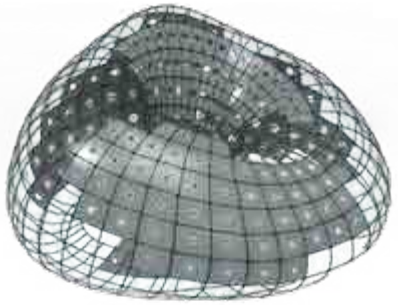
solar position:
summer solstice 08:00
frame



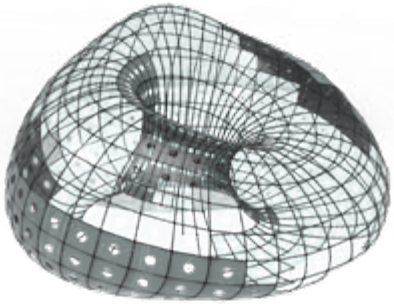
solar position:
summer solstice 15:00



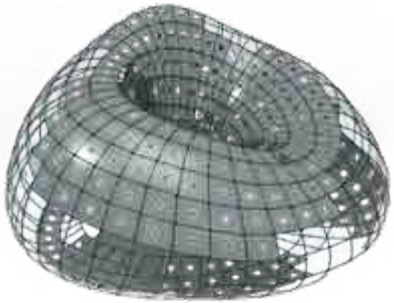
solar position:
winter solstice 08:00



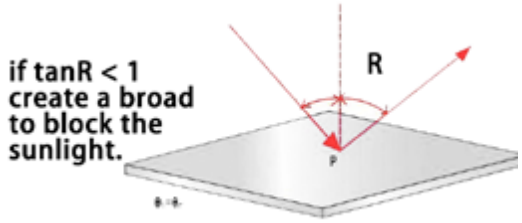
solar position:
winter solstice 15:00



solar position:
spring equinox 08:00

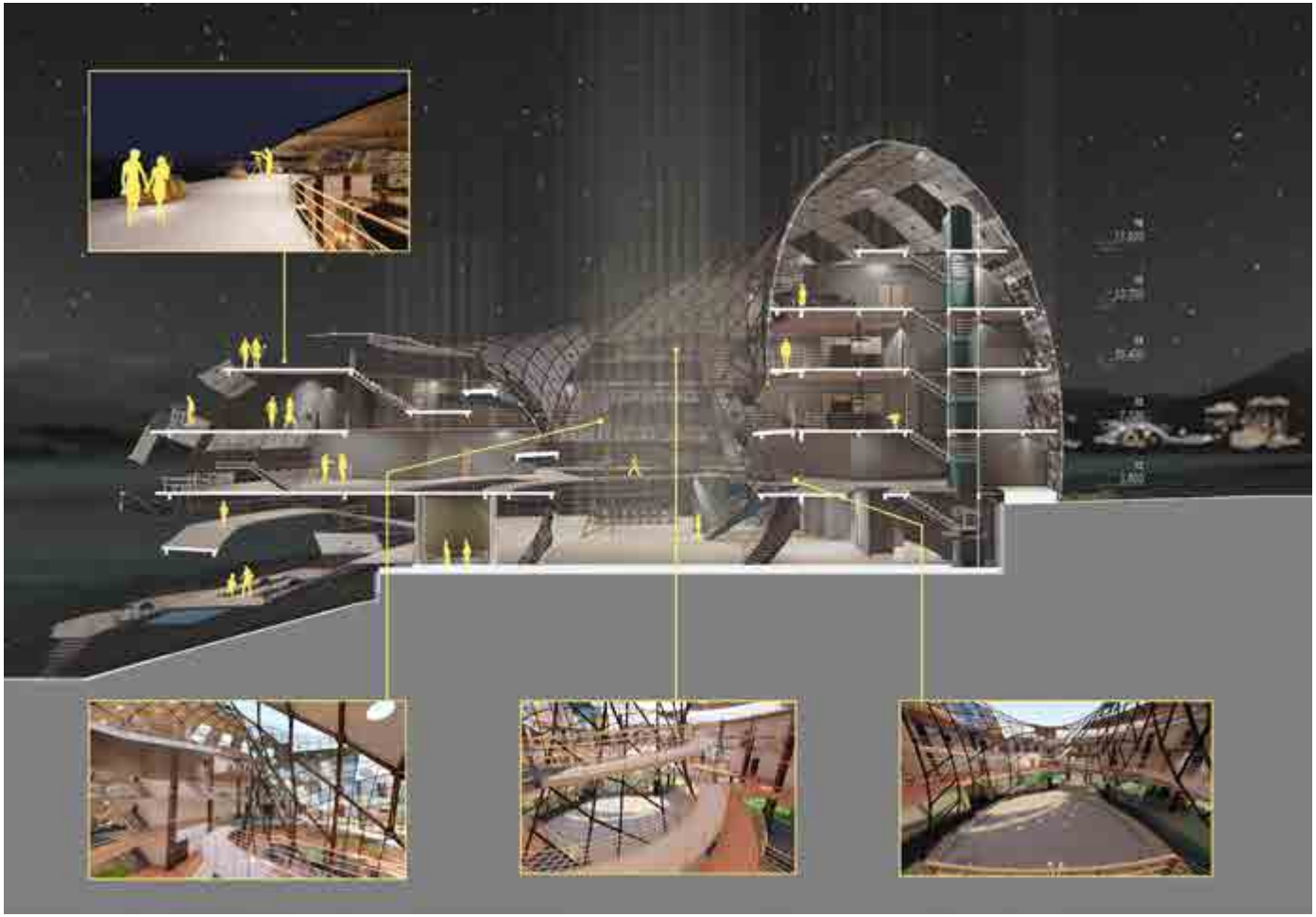


solar position:
spring equinox 15:00



The building is develop by the Mobius morph with the ellipse as the base type.
So, not only I got the dynamic parameterized shape of the building, I also got the pattern of the surface, which is like a weaven frame.

There is a elevation difference from south to north at the site.
The building conect the south and north by its transportation system.
The fastest way is to use the elevators on the north side.
However, the spiraling slope is the best choice to go up. Since it fit the shape of inner surface of the whole building. From every prespective, we could see the core court of the building. As the view broadened, the chance to set up binding is risen.



With the Mobius shape, all the indoor spaces are fluxion. Because most the activities area are stringed by the inner ring slope, we can see other active area via a sight corridor.