
Responsive Atmospheric Patios

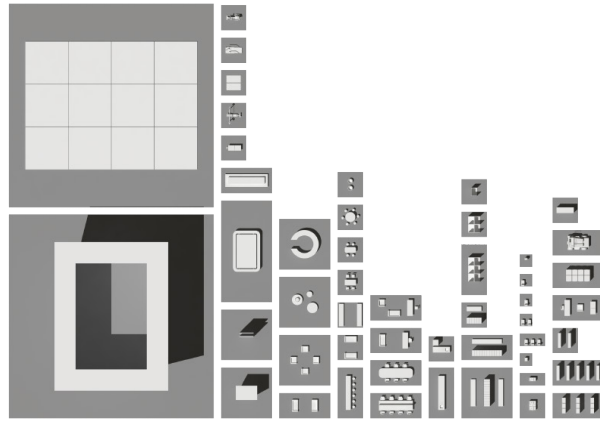
2016

Project by fabric | ch

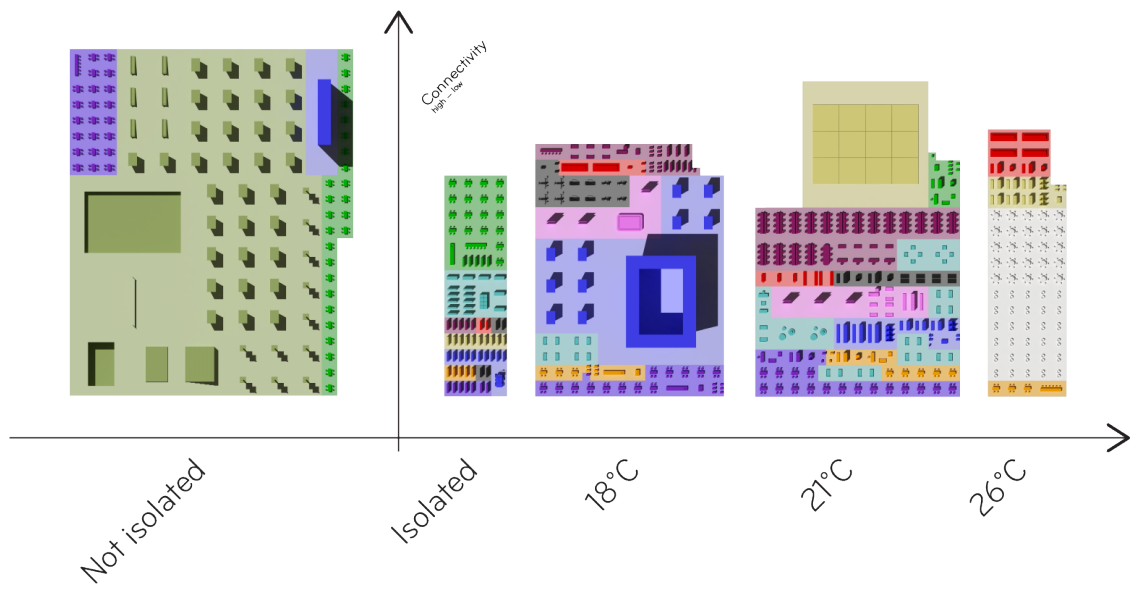
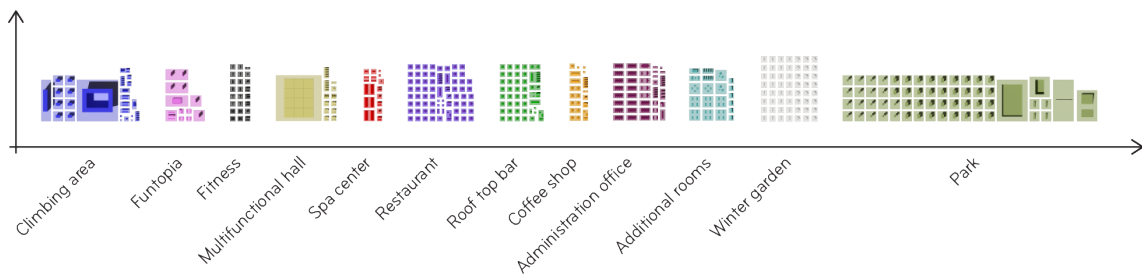
Architecture competition: Collider Activity Center, Walltopia (2013). Later turned into an experimentation program (2016).

Location: Sofia (BL)

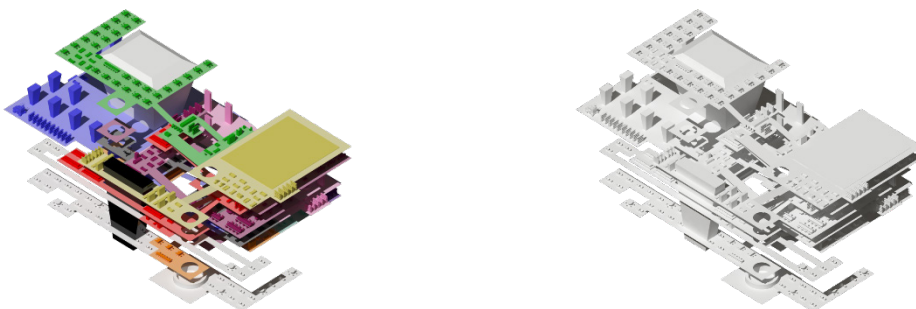
- Living environment, organized around three climatically conditioned, and one unconditioned patio spaces
- Atmospheric variations (physical & digital) as base for programmatic rules
- Programmatic algorithms to retrofit architectural functions
- Atomized functions conditional re-aggregation
- A “Large Functions Collider” (LFC)



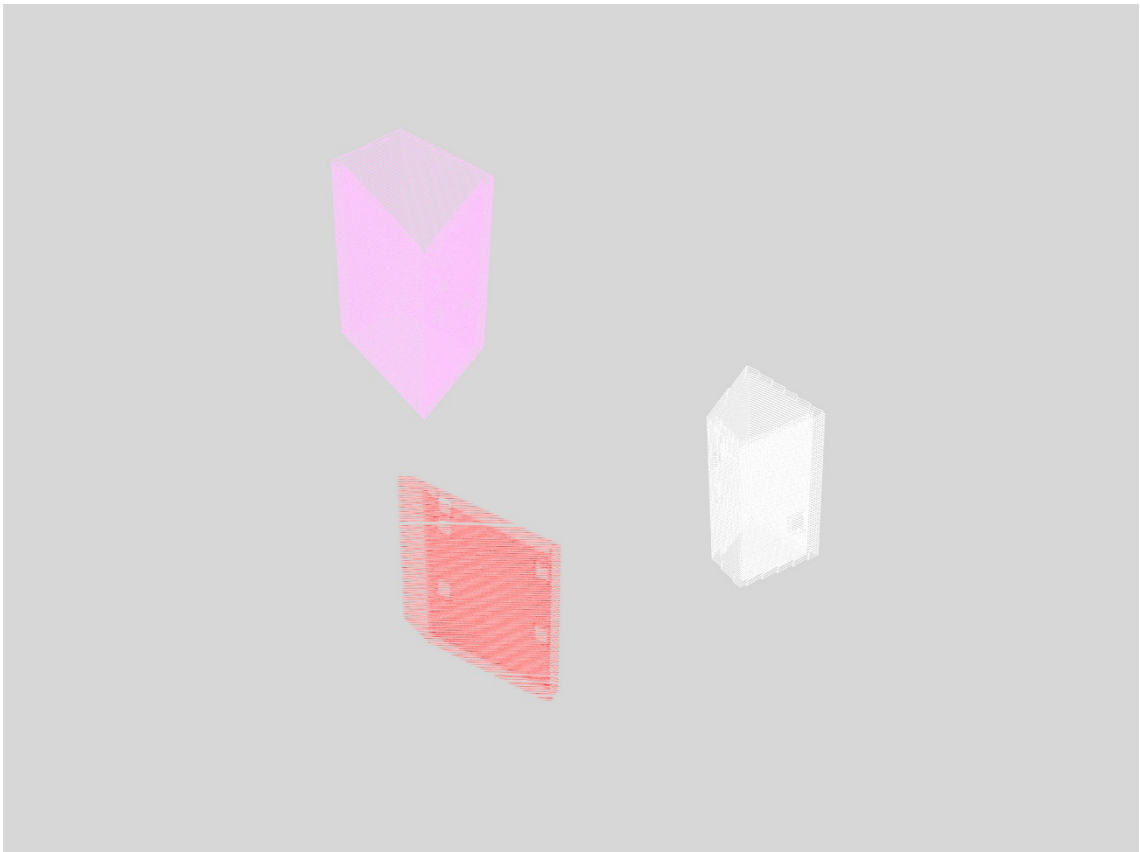
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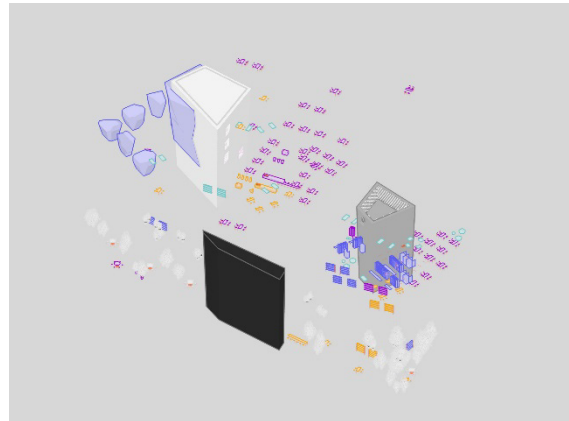
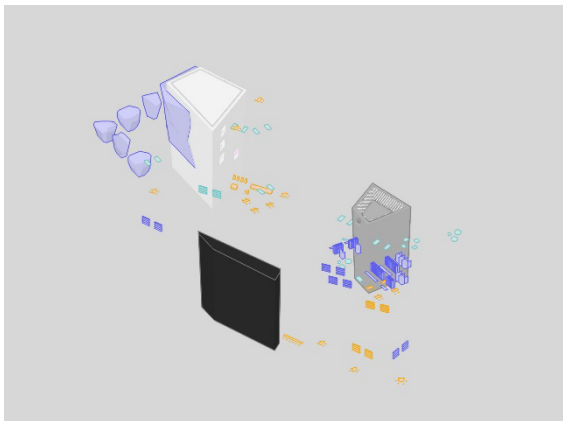
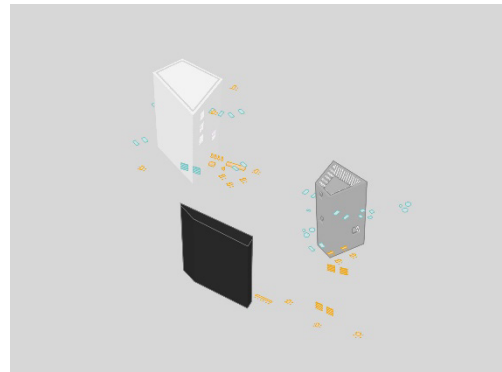
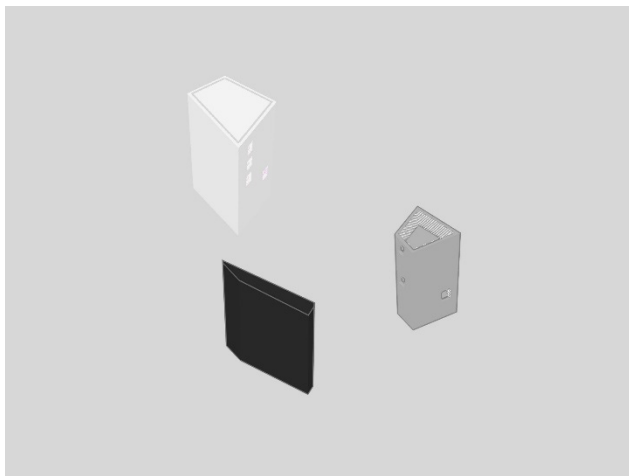
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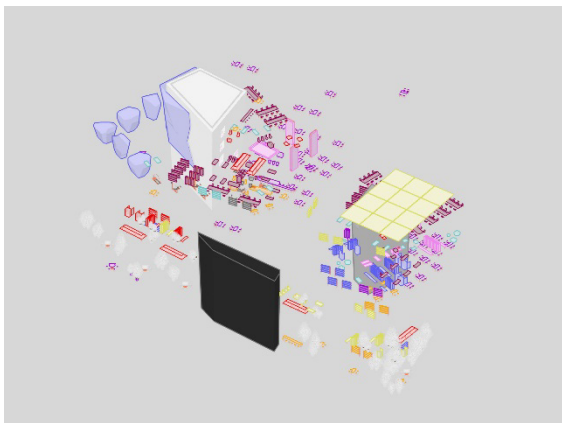
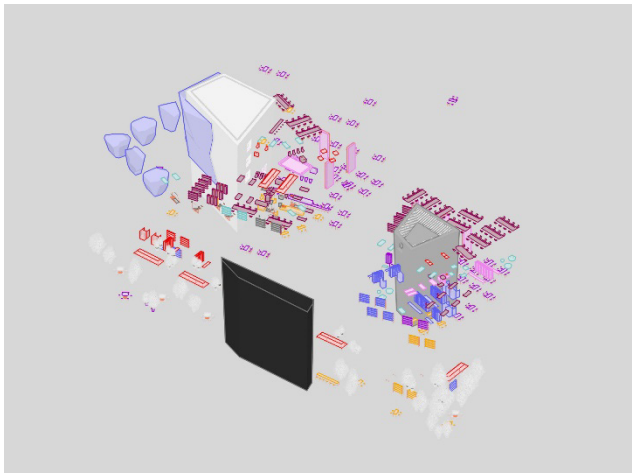
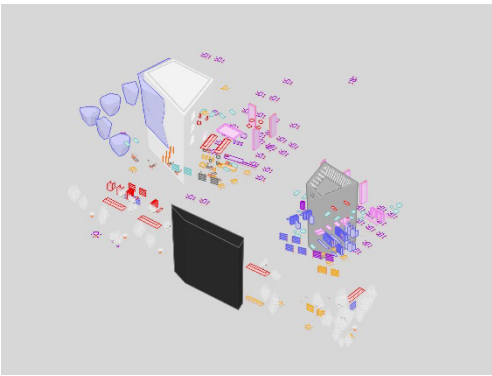
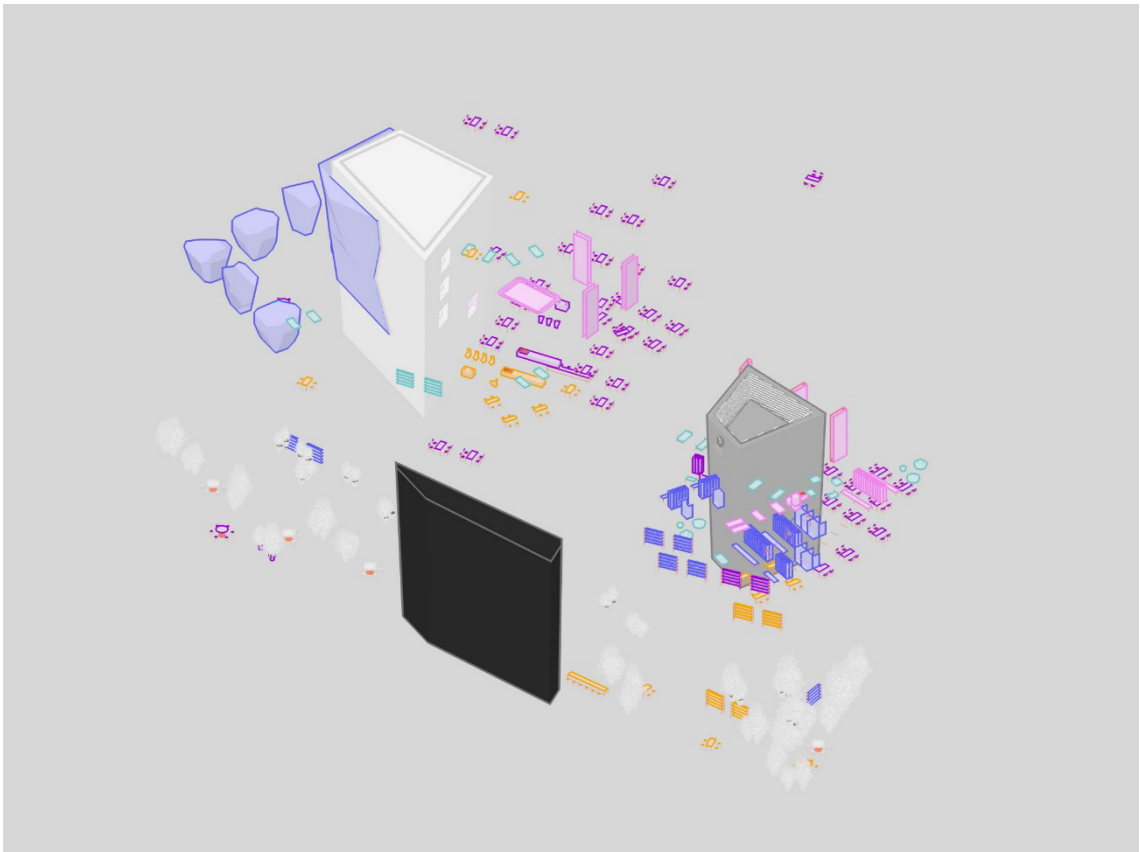
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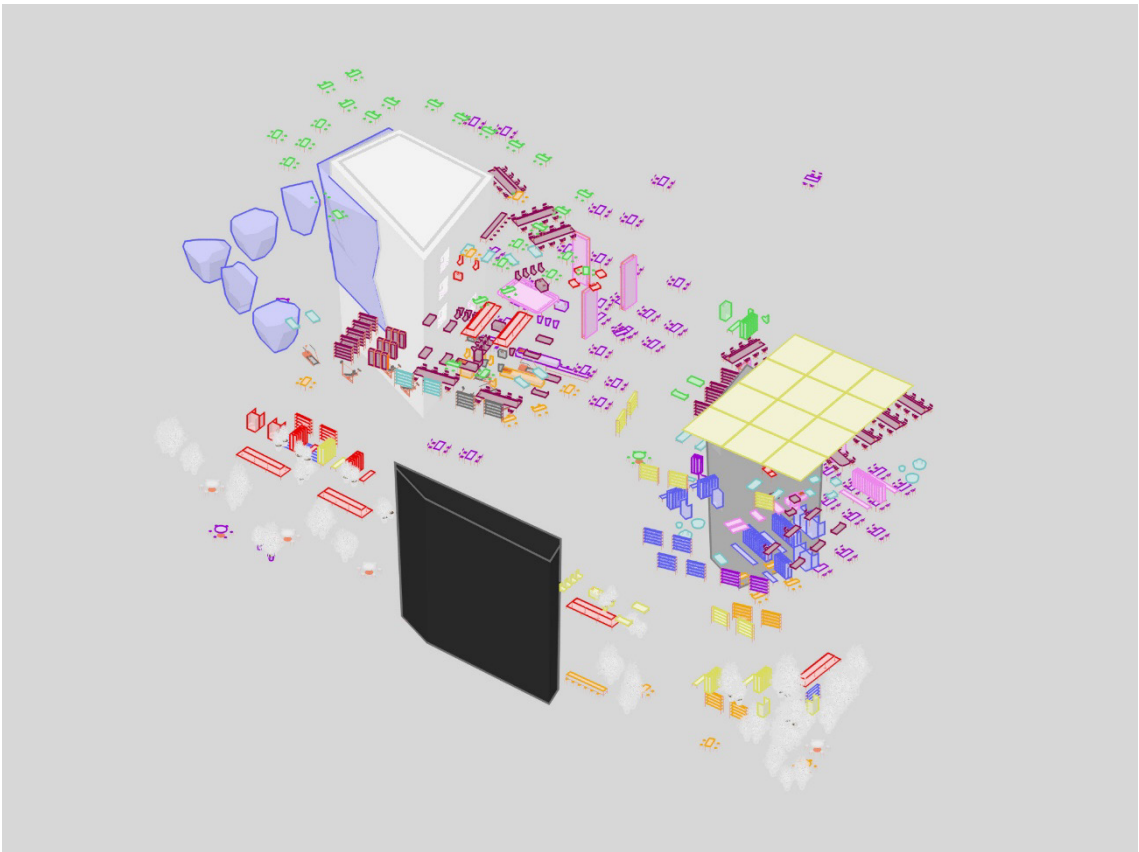
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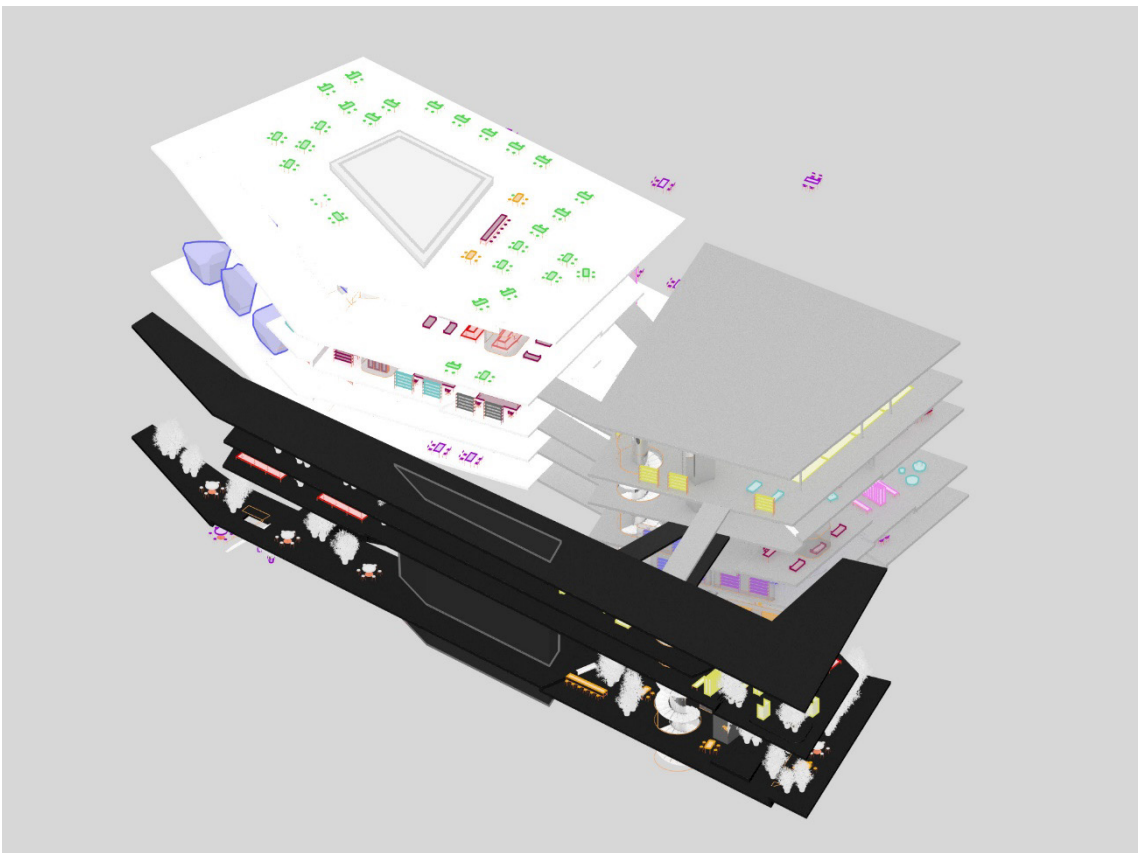
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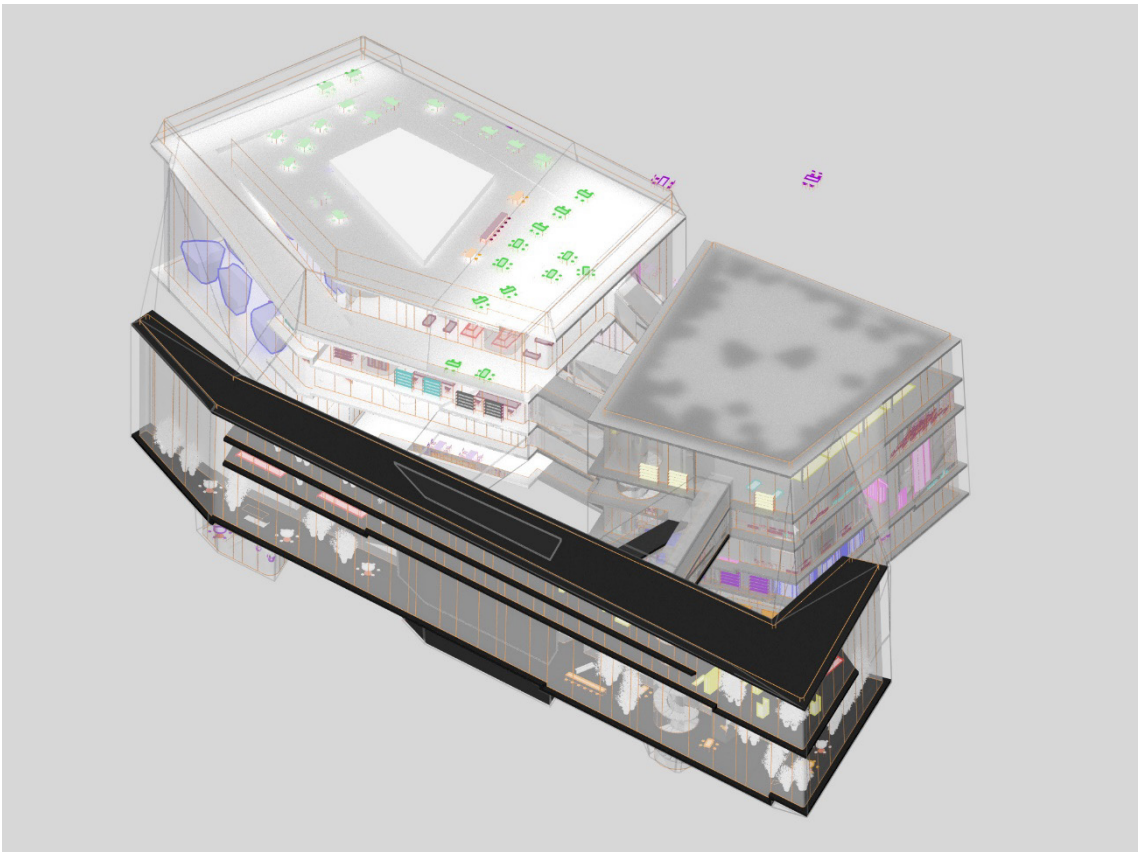
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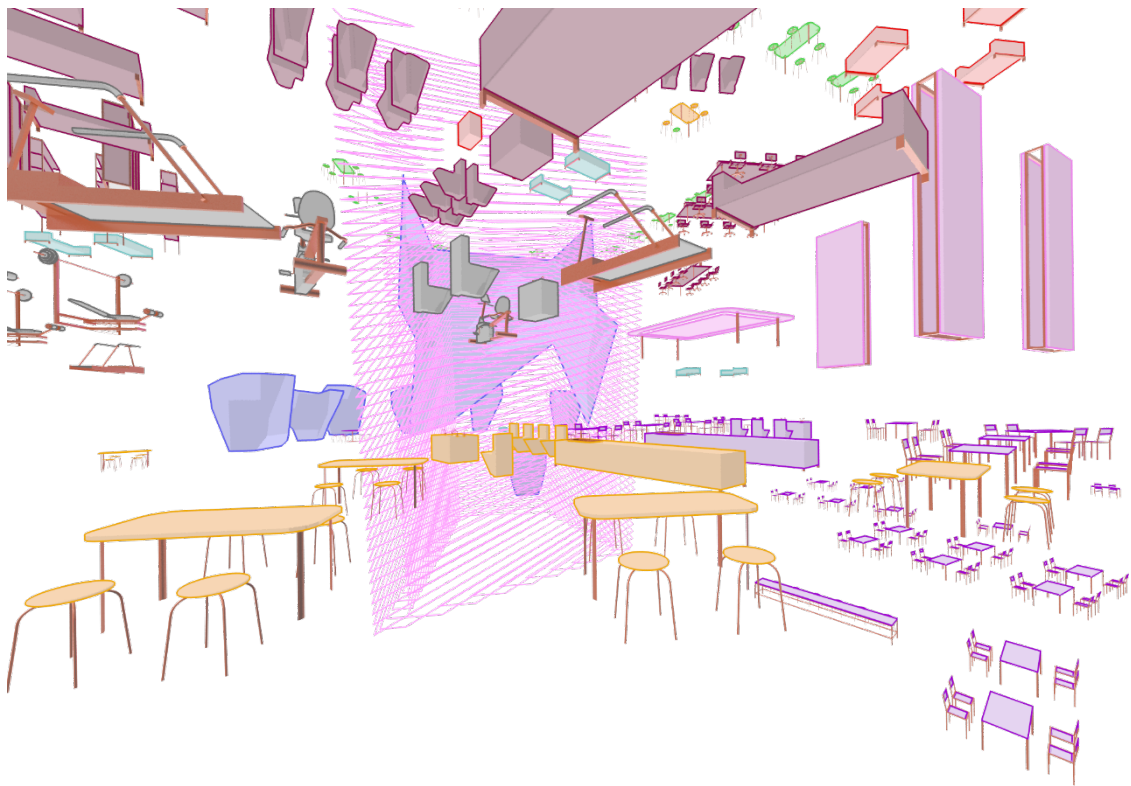
[Img. 8]



[Img. 9]



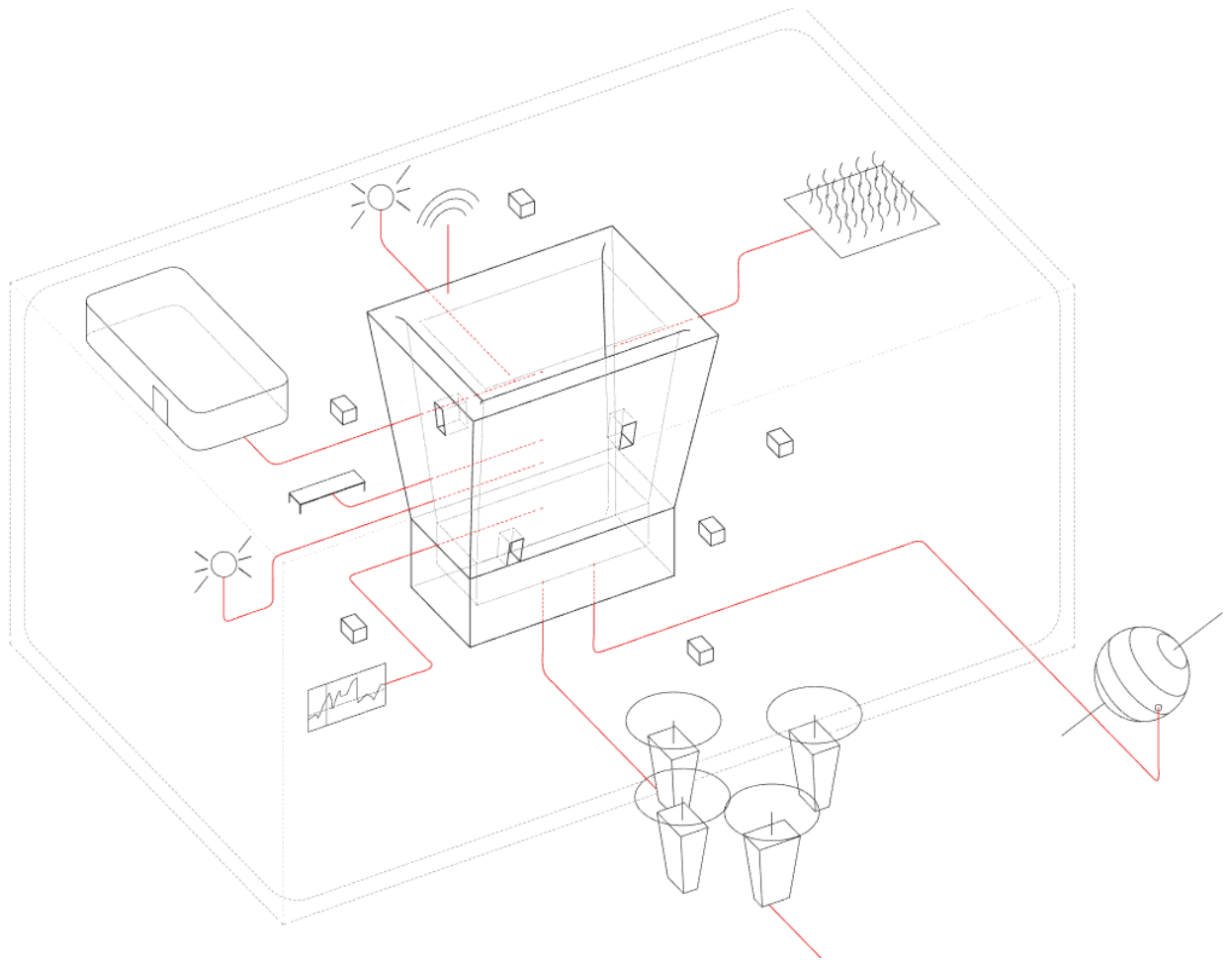
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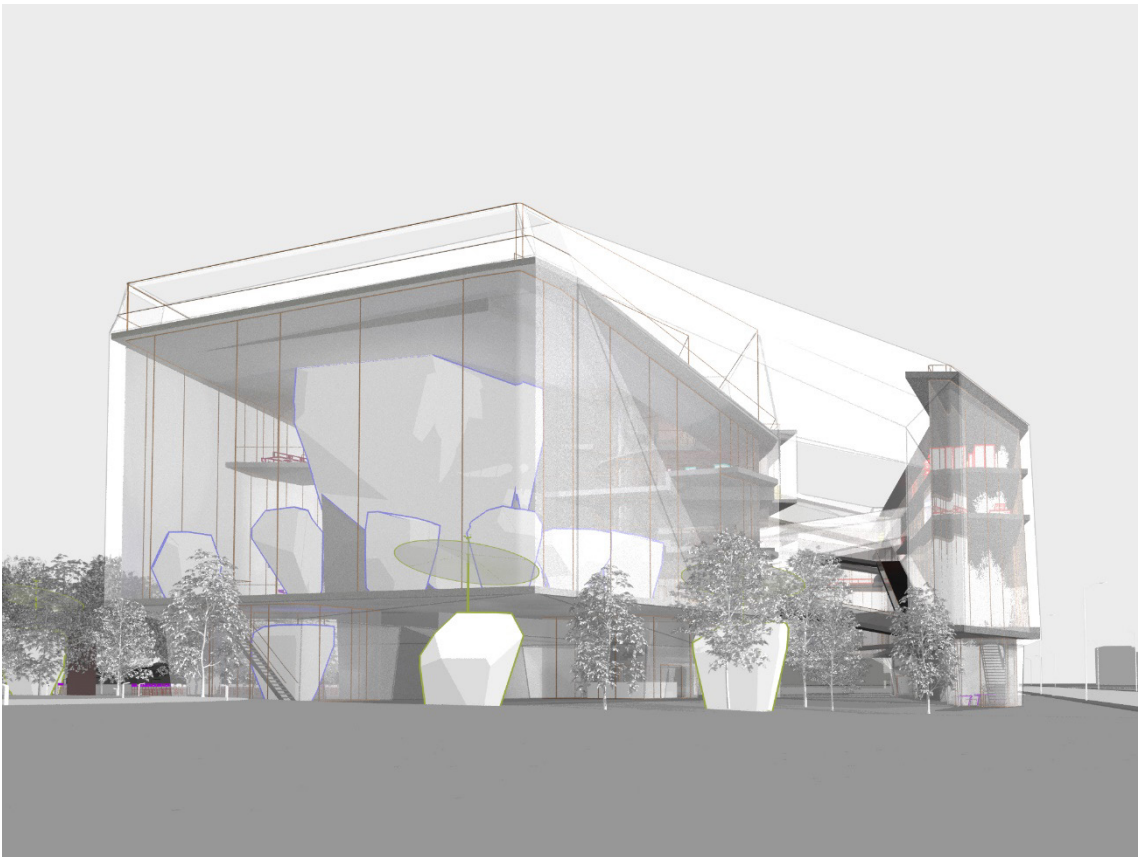
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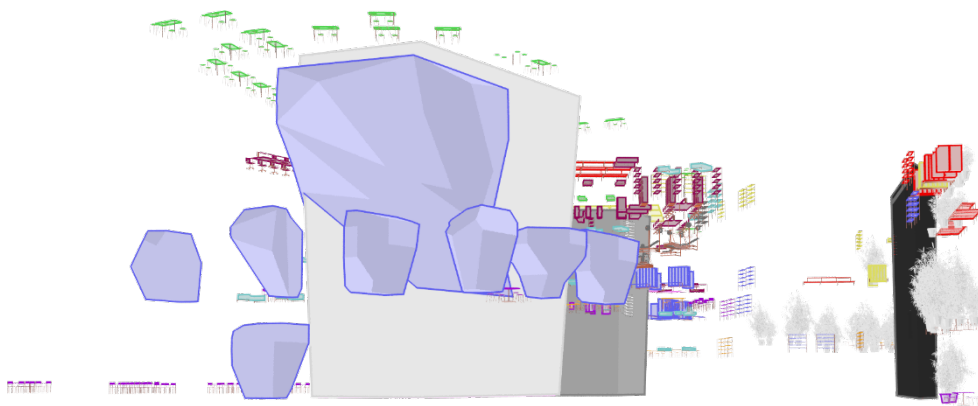
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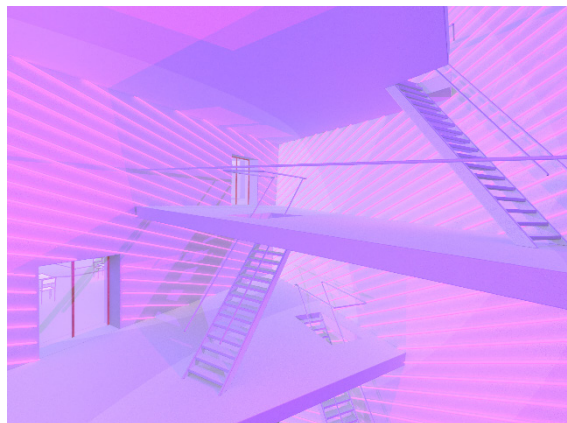
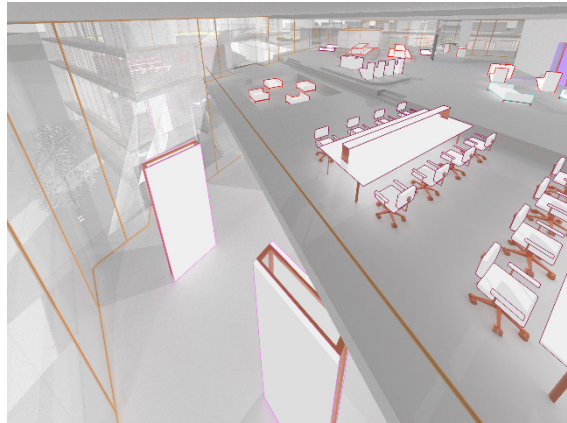
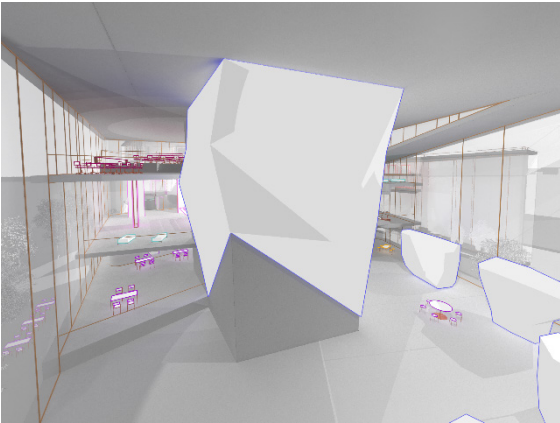
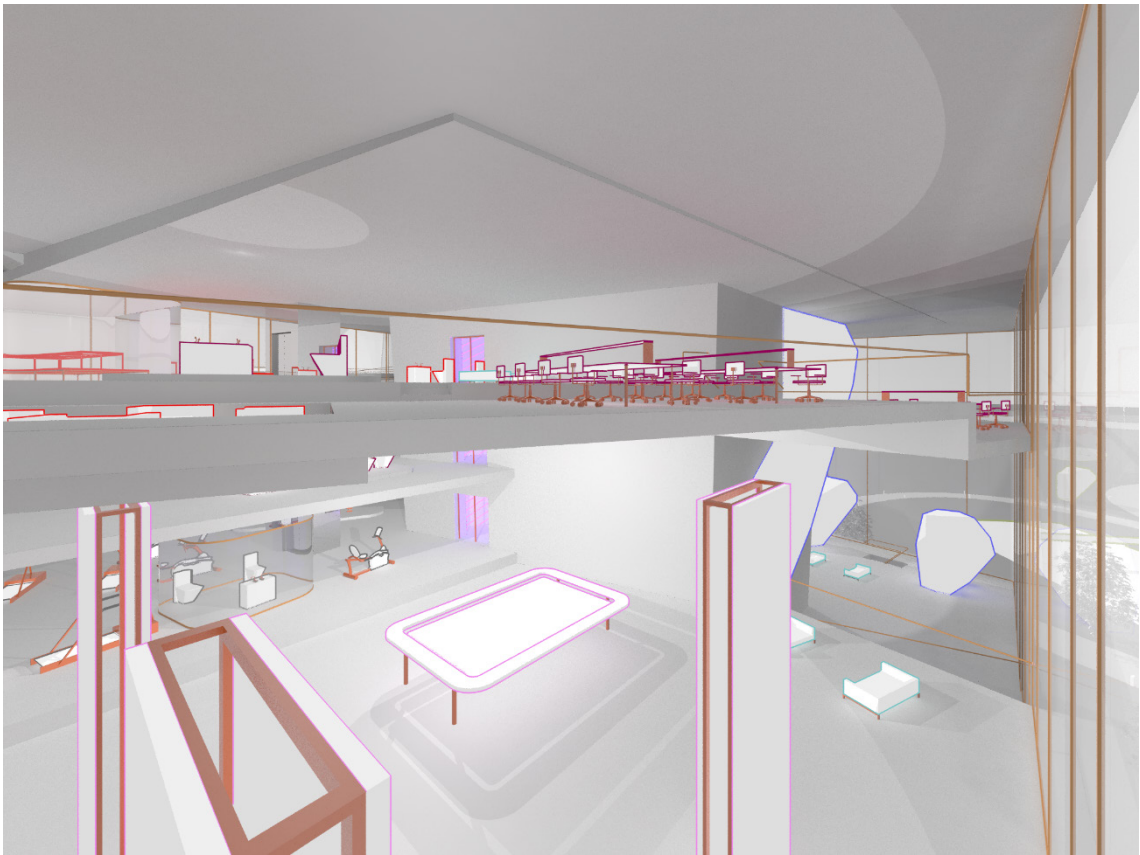
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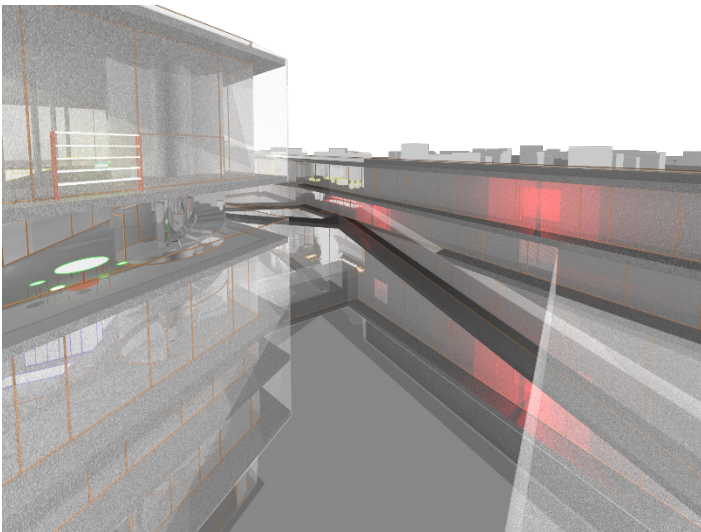
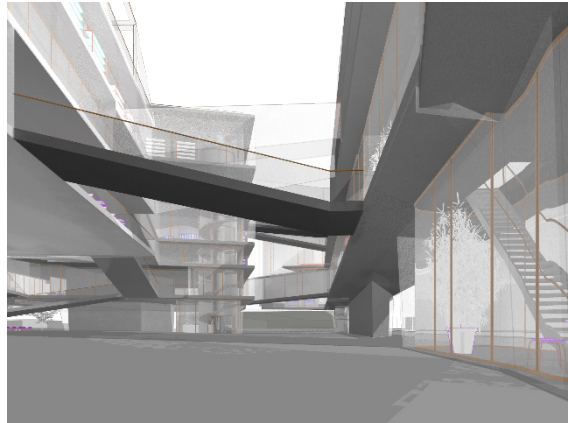
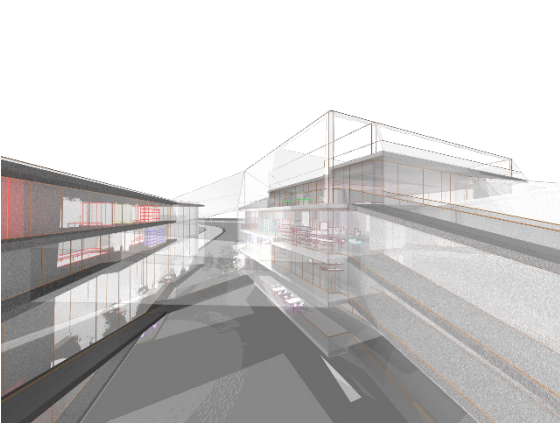
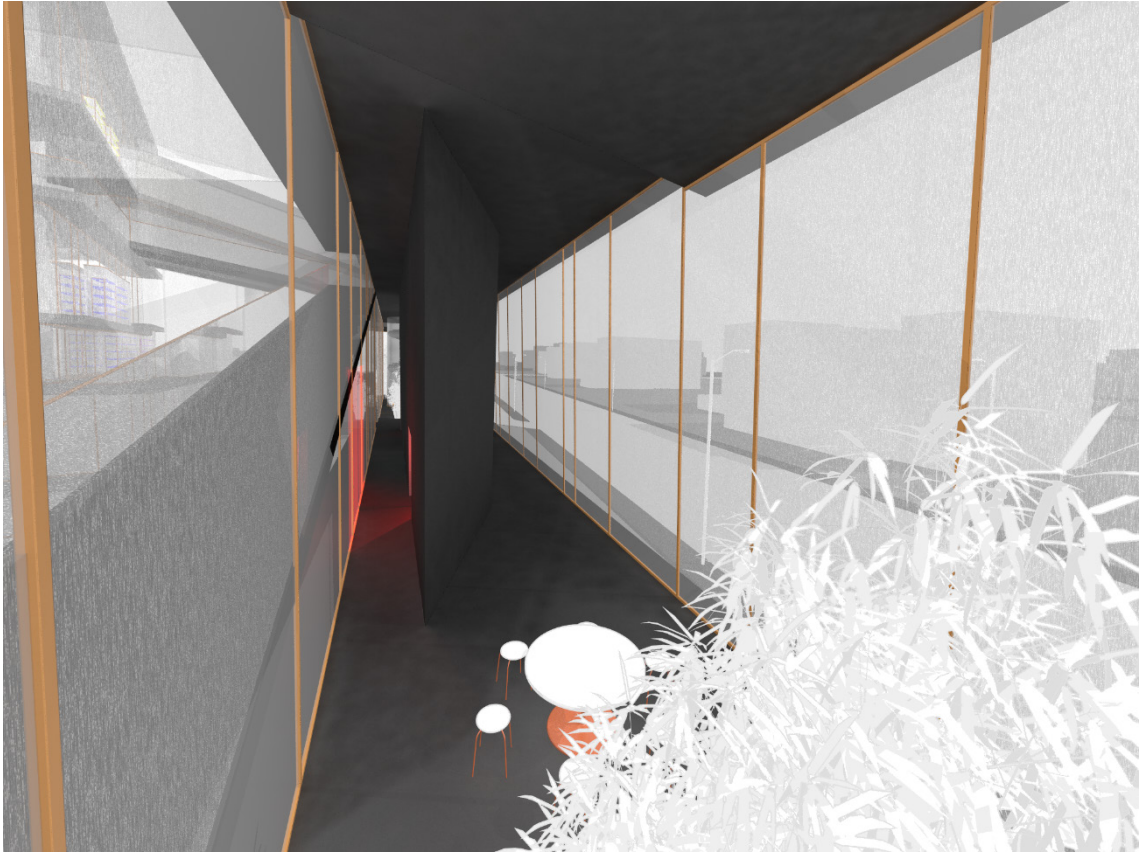
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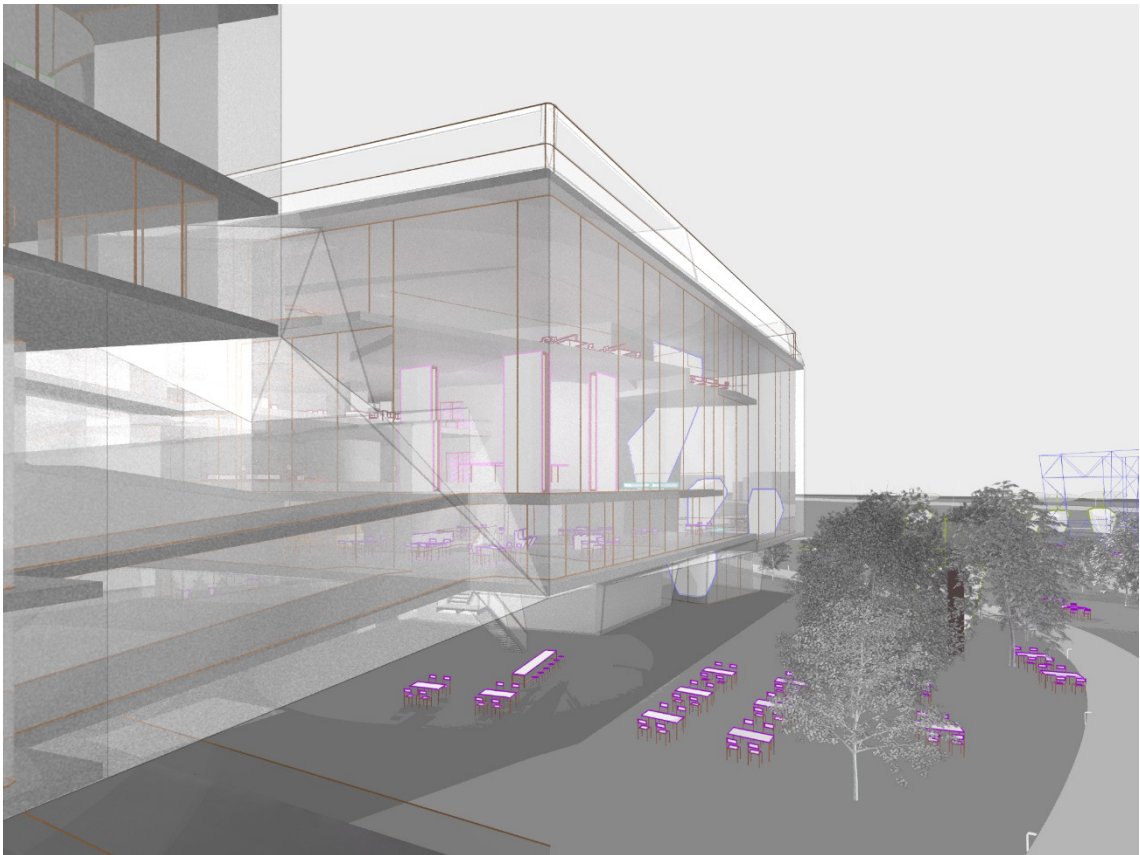
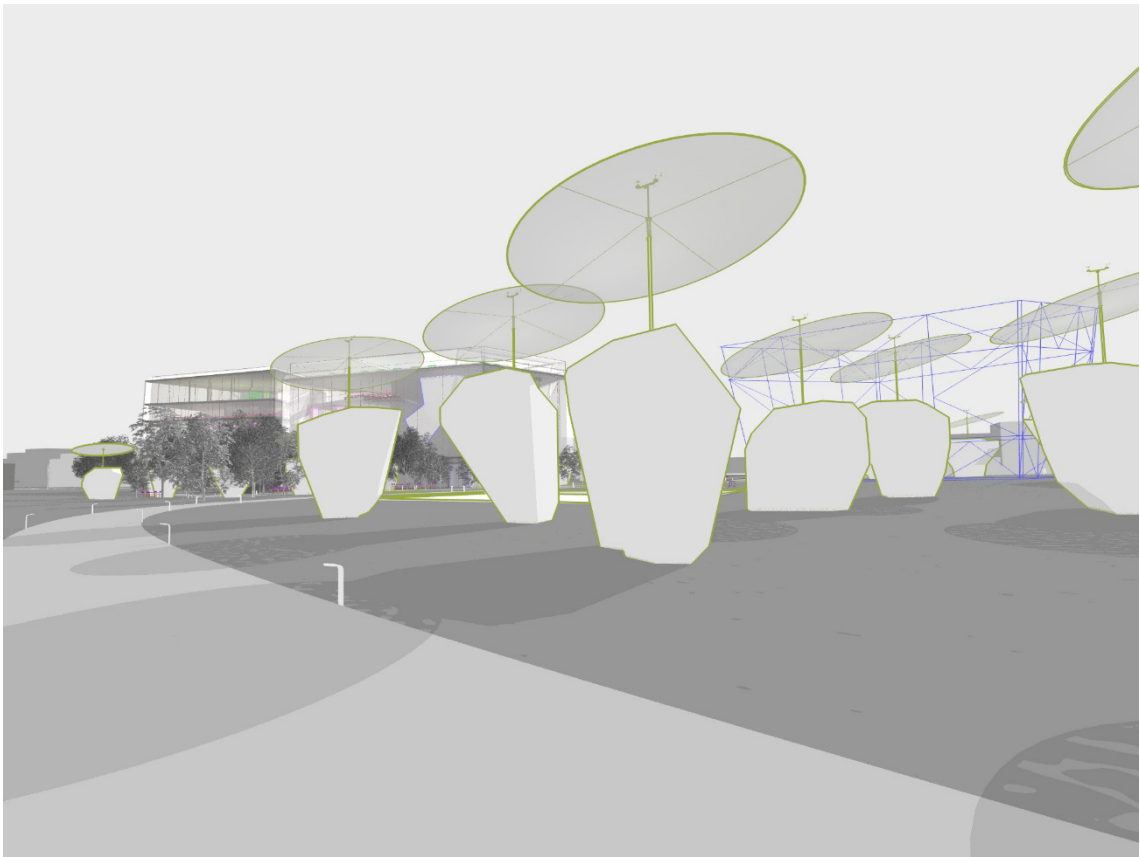
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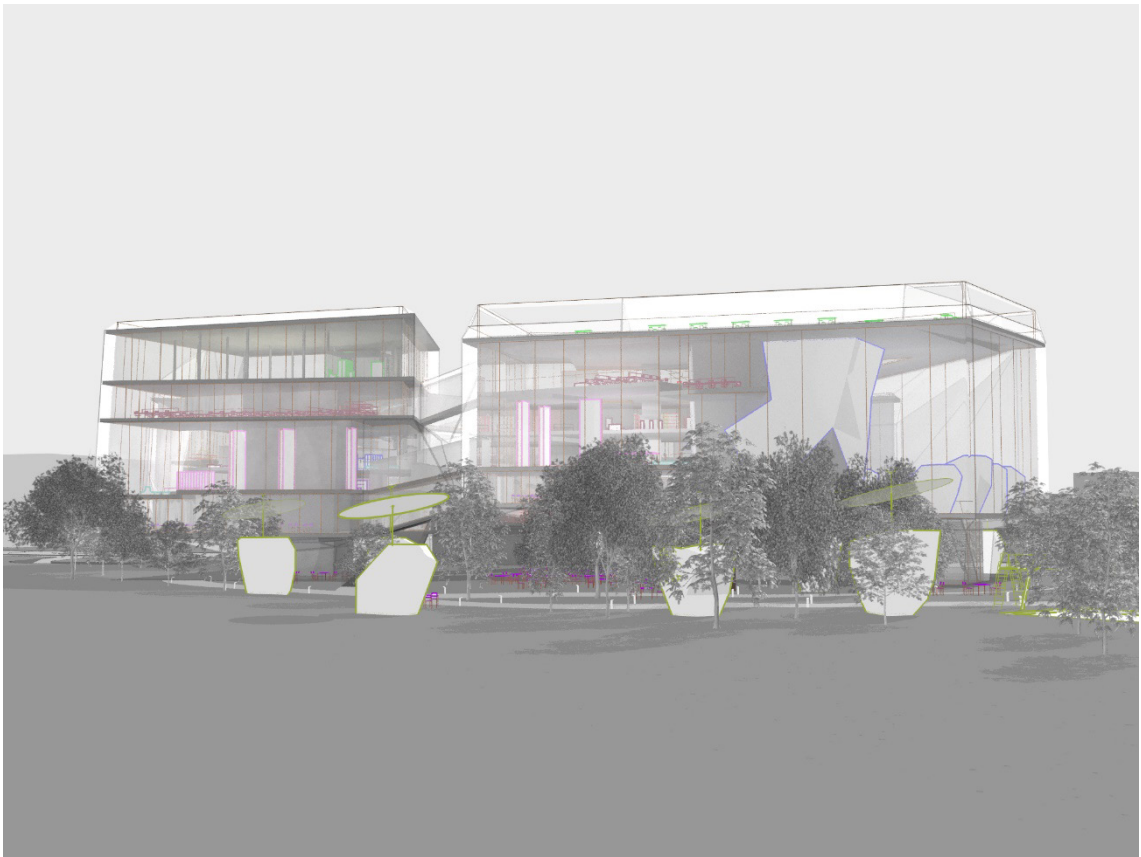
[Img. 16, 17, 18, 19, 20]



[Img. 21, 22, 23, 24]



[Img. 25, 26]



[Img. 27]

Image captions:

- [Img. 1] The program of the center is fractioned into functional & spatial elements.
- [Img. 2-4] The program of the competition, as given, was organized around the functional entities described by the program (a fitness center, a café, offices, a spa, a winter garden, and so on) [img. 2].
The bottom image shows a reorganization of this program along different rules: the suitability of each function for specific atmospheric conditions (Not isolated, Isolated, 18°C, 21°C, 26°C – the three latest being incarnated by artificially tempered patios). The y-axis is used to display a need in connectivity, but a dependency on an ideal condition. The bigger the y value, the more the function can move away from the ideal case. There is volumetric aggregation and redistribution of the functional elements around three artificial patios (18°C, 21°C, 26°C).
- [Img. 5-7] The three patios (18°C – ultraviolet light, 21°C – white light, 26°C – infrared light) and the distribution of the functions in space.
- [Img. 8, 9] All the functions [img. 8] and the slabs of the building being materialized around them [img. 9]. Albedo colors.
- [Img. 10] The complete building is made of three sub-structures. Two layers of skin: one for each sub-structure (glass) and one for the entire program (lattice).
- [Img. 11] "Atomized functions" aggregating in empty space (process). Generating building(s).
- [Img. 12] Full site and main program organized along one long, circling boardwalk.
- [Img. 12] A "Responsive Patio" both adapts to environmental sensing to maintain its equilibrium, provides connectivity, and drives the behavior of networked "environmental devices".
- [Img. 14, 15] View with all the envelopes [img. 13], and the same view with atomized functions in empty space [img. 14].
- [Img. 16-20] Views into the 18°C sub-structure and patio. Each artificial patio mitigates the climate thanks to the large thermal inertia in each sub-structure.
- [Img. 21-24] Inside and outside of the sub-structure at 26°C.
- [Img. 25-27] Outside views of the building and site made of four substructures (the building itself is made of three) and five layers.

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Responsive Atmospheric Patios

Four abstract but responsive patios aggregate around themselves the whole center's program according to a defined set of rules linked to atmospheric conditions and spatial meta-data. Broken down into its most elementary functional "particles", the "atomization" or "atmospherization" of the program and its almost generative reorganization leads toward the retrofitting of functional relationships, increasing their interaction, breaking down their zoning and trying to diminish their energy needs, yet fully and generously landscaping the site. The process triggers emergent spatial patterns: landscapes of non-hierarchical "functional moirés".

To retrofit functioning (at its "particulate" level)

We live today mostly in spatial organizations, architectures, structures, and ways of functioning inherited from the second half of the 20th century, if not inherited from the 19th and sometimes earlier. Said in a somewhat simplistic way, 20th century spatial organization could be considered as made of structured entities - like houses, offices, subways, highways, hotels, airports, parks, etc. -, themselves made out hierarchical sub-entities of frozen group of functions - like kitchens, working room, living rooms, waiting rooms, etc. -, that came with consequent energetic costs.

Since the 1950-90ies period, the context has fully changed, as we all know now: recently "upgraded" by the means of new infrastructures and computational spaces - communication, search engines, databases, sensors and networks -, mediated by "clouds" of all sorts, quantified into data, organized into new social collectivities, hopefully soon supplied by "smart grids" of clean energy, possibly built of meta-materials, our relations to the environment and the others has changed.

This contemporary life that takes place in this new "atmospheric" context seems to combine in all sorts of new manners and durations the material and the immaterial, the local and the distant, the mediated and the actual. It aggregates distributed services at their "particulate" levels from heterogeneous sources or locations and therefore takes place in an environment that we could define as "variable", of a "spatial moiré" condition: the overlap of two - or more - spatial conditions or patterns over certain duration in time triggers a third and new one, that is different than the accumulation of the two others, the "moiré" condition. This condition, we call it "atmospheric" because it is felt as ambient, borderless. It is built upon the ephemeral aggregation and interferences of different sources and has no precise limits both in time and space. It is in this sense like haze, vapor or gazes and also sometimes landscapes.

The Collider Activity Center with its mixed "collided" program is the occasion to revisit and potentially fully retrofit this past way of functioning according to a selective

set of rules inscribed within a contemporary, "atmospheric" context. It is the occasion to invent or discover new functional patterns and aggregations of increased interaction. It is a chance to find updated and less hierarchical spatial configurations in direct connection with issues like responsiveness, connectedness, openness, sustainability, horizontality, "haziness" and mainly, "moirés" contemporary landscapes.

How to retrofit: five atmospheric conditions as programmatic rules.

A process and a set of rules has been adopted to distribute the program in a de-hierarchized manner and fully reorganize it:

- 1) Break down the program and each programmatic entity into its fundamental elements (the "functional particles") that are the furniture elements (furniture of different sorts – offices, fitness, gardens, climbing, etc. –, lighting, heating, plants, vehicles, technical equipment) or basic spatial elements (floors, ceilings, (walls, pillars), voids, rooms) with their proper metrics needs.
- 2) Attribute each of the "functional particles" with meta-data: ideal temperature of functioning, connectivity, level of mediation, exposure to natural light, exposure to artificial light, exposure to conditioning (passive and/or active).
- 3) Main reorganization of the whole program and "functional particles" around five specific and static atmospheric conditions (mainly for energy saving), according to meta-data:
 - 18°C, exposed to light, exposed to conditioning, isolated, regular connectivity: ideal for sport activities, cold rooms, etc.
 - 21°C, exposed to light, exposed to conditioning, isolated, high connectivity: ideal for offices, café, living, locker rooms, etc.
 - 26°C, exposed to light, exposed to conditioning, isolated, low connectivity: ideal for winter garden, sauna, etc.
 - Variable °C, variable exposure to light, isolated: ideal for storage of all sorts (cars, furniture, etc.) and protected areas of café and restaurant, etc.
 - Variable °C, variable exposure to light, not isolated: outdoor activities and park.

How to retrofit: four conditioned patios, three connected volumes of "atmospherized functions", one landscape.

The five atmospheric conditions serve as the base for a generative approach toward functioning. The "functional particles" are rearranged into the matching conditions according to their meta-data, giving birth to three functional volumes of "atmospherized functions" (18°C, 21°C, 26°C), an overall insulation volume surrounding them (Variable °C, isolated) and a landscape (Variable °C, not isolated).

"Atmospherization" and "moirés" are not only considered as nice words, but as design strategies. The break-up of the program into its most elementary parts (functional particles) allows for its distribution and reorganization in plan and section into a networked configuration of single elements. From this point, like vapor around nuclei (dust, salt, etc.) in clouds, functions aggregate in new, somewhat unpredictable but meaningful and coherent configurations.

The three volumes and the landscape are organized around four conditioned patios (responsive) that materialize and maintain the four main specific atmospheric conditions and their idealistic climatic condition.

Four responsive-abstract patios, thermal inertia.

The four patios consist of three interior volumes, closed and conditioned and an outdoor one in the park, fully open (wireframe).

- _ Patio 1: 18°C, hermetic, inside, conditioned, networked, artificial UV lighting.
- _ Patio 2: 21°C, hermetic, inside, conditioned, networked, artificial white lighting.
- _ Patio 3: 26°C, hermetic, inside, conditioned, networked, artificial IR lighting.
- _ Patio 4: variable °C, open, outside, natural lighting and artificial lighting.

The patios are considered abstract in the sense that they are fully artificial and function in a reverse manner compared to traditional patios. The three internal patios are therefore totally hermetic to the outside, conditioned (abstract climate), artificially lit and networked (channeled) to distant locations from which they get information, while the outside one is on the contrary fully open (wireframe), bare the rooftop as well as the outside climbing wall but serve as the central point to artificially light up the landscape of the park at night.

The patios are considered "ideal" as well, in the sense that they try to artificially materialize the specific atmospheric conditions (18°C, 21°C, 26°C, Variable °C) and keep them stable, static.

The patios are networked and responsive. They act like large thermal inertia spaces and masses (for the three interior patios) in the "center" of each of the three volumes of "atmospherized functions", trying to moderate their atmosphere and keep it as close as possible to its ideal temperature. Informed by a mesh of atmospheric sensors, the patios "know" the temperature and conditions in their vicinity, particularly in the volumes surrounding each of them. They get a bit hotter or colder if needed and triggers variations (light, heat) in their connected peripheral (9).

The purpose of keeping these static climatic conditions and the distribution of functions according to their best fit is first sensual and conceptual, but it is also for energy savings and sustainability reasons: fewer variations in climatic conditions and the use of climatic inertia will trigger a diminution in energy consumption. A skin/insulation layer (Variable °C, variable exposure to light, isolated. Containing storage of all sorts) surrounding the three internal volumes will increase their insulation.

fabric | ch, May 2013

Note: the competition project later further served as research into "atomized" generative functionalities associated with specific conditions. In 2016, we finished a new version of the same project. It then in its turn served for the research project Atomized () Functioning.*

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