METAVERSE

Transitioning (to) Future Cities

Transdisciplinary platforms as instruments to democratise technology for participatory use in building back neglected urban voids of Riga

2022

TABLE OF CONTENT

Digital platforms catalyze community, bringing people together to co create and fix their city. But what if we had more tools, digital tools to act on the city around us? What if the same mechanisms of smart urban optimization allowed people to take ownership of their city and make improvements that only residents could dream up?

Carlo Ratti, 2016

INTRODUCTION

Neal Stephenson has established a strong sci-fi foundation for what today we understand as the Metaverse. In Snow Crash [Fig. 1] in 1992, Stephensons describes the story as told through the eyes of Hiro, the protagonist, who navigates the Streets of a utopian digital universe. In the novel, the Street is imagined as a space where developers can build their own streets that feed off the main artery. Players (avatars) can build their cities, buildings, parks, and even things that do not exist in Reality, such as three-dimensional objects that ignore the universal laws of gravitation (spacetime).

The most significant difference between Stephensons and modern Metaverse is the possibility of a different governance models. Stephensons Metaverse is operated by a centralized-governing body, Global Multimedia Protocol Group (GMPG). Developers, in this instance, software corporations, create pieces of the puzzle - the user interfaces, buy virtual frontage of the Street and obtain zoning permits. The financial resources go back into the GPMG fund to further develop and expand the hardware that keeps the virtual Street alive (Stephensons, 1992, p.26). When the book was written, blockchain, smart contracts and consensus algorithms were not termed. Hiro collected funds with friends to buy the virtual development licensing, hoping that they would be able to build something on it one day. City ownership by residents reflects the potential of contemporary metaverse technologies built on top of user-generated assets, new finance models (DeFi), and decentralized autonomous organizations (DAO). The Snow Crash pictured the natural world as a dystopia we all pulled to the ground and the Metaverse as the romantic escape. Today's Metaverse has the potential to create a utopian synergy between virtual and physical reality. A mixed reality experience where virtual elements compliment physical world and vice-versa. Metaverse is not a place or a single thing, its rather a state consisting of technologies and ecosystem of usres. Fundamental system of metaverse (is) will be blockchain, which can be accessed through API platforms. Metaverse platforms involves citizens (general public) in decision making, funding and execution of ideas for their neighbourhoods, without a third party involvement.

This document tries to understand how the metaverse systems help improve the physical world and let the two, physical reality and virtual reality, coexist. The document focuses on key technologies of the metaverse which enable the virtual universe to exist. However, based on the speed Metaverse is evolving, this document will fall short and might be outdated prior to completion.

Nevertheless, research will look at Riga as a physical case study to highlight social and urban situations where the Metaverse creates value and to establish a framework and define attention areas, i.e. urban void abundance, NGO activism, and city governance struggles. Secondly, the term metaverse will be summarised and understood via enabling technologies that make the metaverse ecosystem possible. The paper looks at how some of these enablers, like virtual reality and gaming, are helping spatial designers. To conclude, the document aims to deepen our understanding of the role of blockchain and decentralised autonomous organisations (DAO) in city restructuring through physical applications.

Enjoy.

01. METAVERSE SYSTEMS

What is Metaverse?

The Metaverse, as popular as this buzzword is nowadays, it still lacks a clear definition. Metaverse is a concept that is evolving, enriching and shaping itself, especially since Facebook's re-branding. On a fundamental level, the Metaverse provides three-dimensional immersive experiences based on virtual and augmented reality technology. In media, it appears to be an entirely fictional 3D space, but researchers believe MV creates mirrored images based on the natural world, like Digital Twin technology. MV is built as an economic system utilizing blockchain technology and seamlessly merges the virtual and real worlds, making it a Mixed Reality experience. On top of that, MV blends the economic, social, and identity systems, allowing each user to produce content and edit the world. Be it Virtual or Real.
(Ning et al., 2021; Lee et al., 2021) I thiMetaverserse is gaining so much popularity due to its possibility to create direct monetary value for its creators instead of monopolistic control of a large firm.

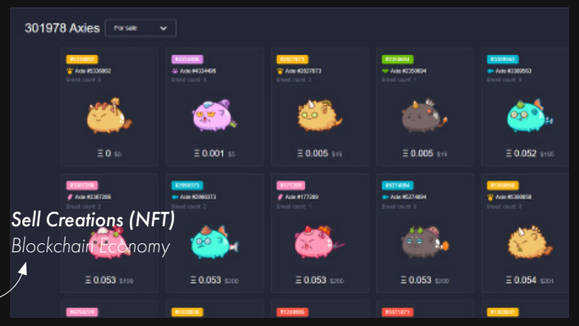
Interaction
Access VR/AR/PC/Tablet

Identity Systems
Fortnite

User Generated Environments
Sandbox

Own Land
Sandbox Virtual Property

Create
Unity Platform



Sell Creations (NFT)
Blockchain Economy

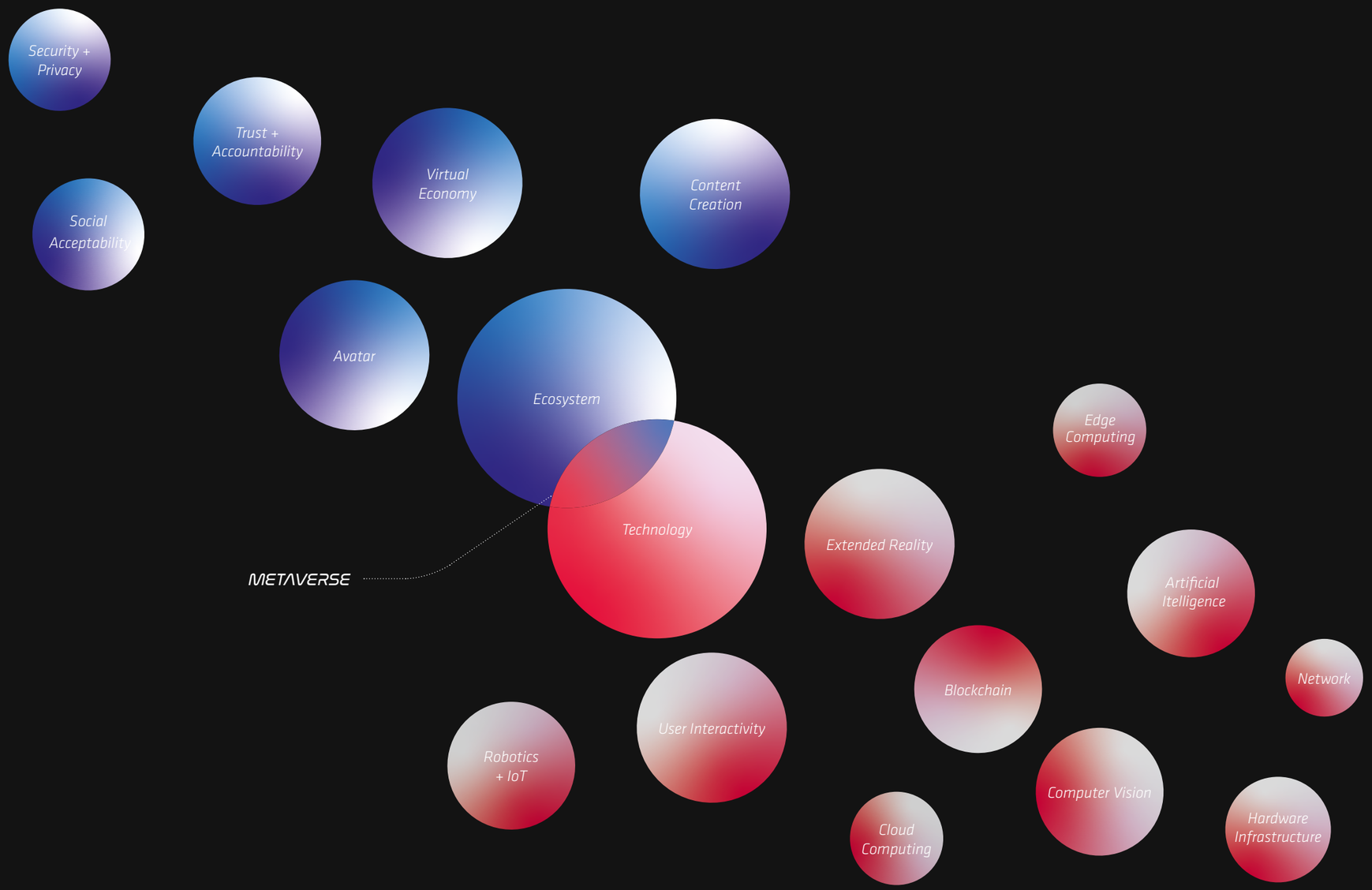
Source: *Ning et Al., (2021). A Survey on Metaverse: the State-of-the-art, Technologies, Applications, and Challenges. p1 Accessed: 21st December 2021*

Experience / Socialize
Fortnite Travis Scott Concert

Metaverse Industry

The Digital Big Bang

Metaverse industry fourteen focus areas fall under two key aspects, ecosystem and technology. The key technologies enable the Digital Big Bang, which in return feeds and supports the ecosystem. Source: Lee et al., 2021

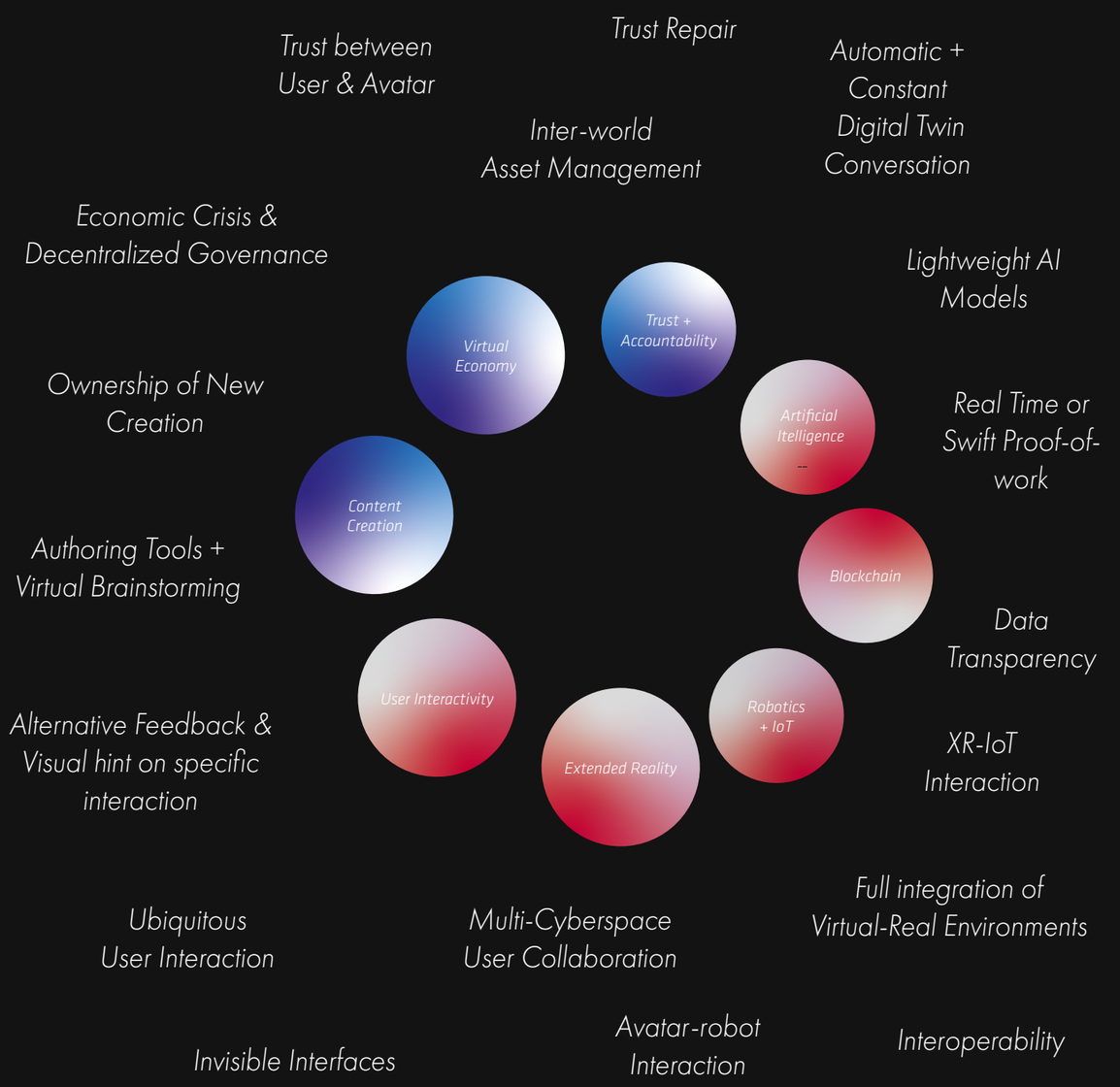


Source: *Lee et Al., (2021). All One Needs to Know about Metaverse: A Complete Survey on Technological Singularity, Virtual Ecosystem, and Research Agenda. 10.13140/RG.2.2.11200.05124/8. p45 Accessed: 20th December 2021*

Metaverse Enablers

Note: Under each focus area has an underlying enabler that will feed into and drive the development of the metaverse. Underlined can be directly linked to architecture.

On Granular Level



Source: Lee et Al., (2021). All One Needs to Know about Metaverse: A Complete Survey on Technological Singularity, Virtual Ecosystem, and Research Agenda. 10.13140/RG.2.2.11200.05124/8. p45 Accessed: 20th December 2021

Enablers In Architecture

Enablers in architecture can be enhanced versions of our day to day tools and design processes. Digital Twins (DT) technologies are the most obvious elements. Architects replicate physical worlds into 3D models to interact and adapt to their desired outcome. Digital Twins are smart models infused with city and building data to allow a smarter data driven decision making. Data is digitally mapping the real world, such as people movements, vehicles, objects, climate and spaces. Trained BIM/DT professionals are able to add, interact and manipulate such complex models. But with metaverse development, we these models will become more accessible , due to block-chain, edge and cloud computing, and code-less content creation applications.

Where Can Enablers Help AEC

Ubiquitous User Interaction

- Workshops
- Stakeholder governance
- Long distance collaboration.
- Citizent involvment
- In-house localized processes

Alternative Feedback & Visual hint on specific interaction

- Site visits + Annotations
- Client / User Interaction
- Faster + Inclusive design process
- Presentations + project pitching

Multi-Cyberspace User Collaboration

- 3D Modelling Interoperability
- Creation syncronized regardless of software
- Localized data sharing
- Inclusive idea sharing due to Avatar Privacy
- Asset sharing
- Architectural Material and asset marketplace(?)

Avatar-robot Interaction

- Construction process supervision
- 3D Printing
- Construction worker support
- No need to travel to site
- Heavy lifting

Data Transparency

- Budgeting + Expendature
- Materials database for tracking and safety
- Climate consequences of the building
- Decision making coordination
- Localized building and city data

Trust between User & Avatar

- Building in sensitive communities
- Openess to decision making
- Stakeholder involvment
- Stakeholder idea sharing
- Info. Access
-

Authoring Tools + Virtual Brainstorming

- 3D Modeling softwares
- Open BIM Models
- Real-Time rendering + Annotation
- Localized communication
- Decision making tracebility + storage
- Stakeholder involvment

Automatic + Constant Digital Twin Conversation

- Smart CAD models
- On the spot CAD model access and interaction
- Citizent access to design process
- CAD responds to realtime situations
- City/Building Data/ Performance sharing and adaptation real time
-

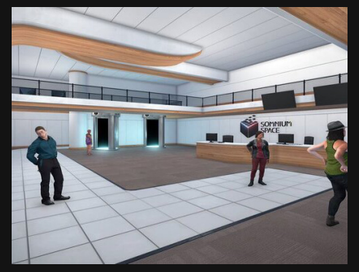
Metaverse Environments

As the metaverse is not a location or destiny but an ecosystem and state, companies are creating tech infrastructure to host 3D worlds (Metaverse Environments, if you will). Decentraland is a first of its kind and operates on a decentralized blockchain with a consensus algorithm. Below is a summary of the most popular worlds as of February 2022. Each can be further investigated; by blockchain, which it operates on, what's the scale of the ecosystem, is it open-source, centralized or decentralized, whitepaper, and where is the company going.

Decentraland

Parcel = A 16 meter by 16 meter piece of

SOMNIUM SPACE



CRYPTOVOXELS

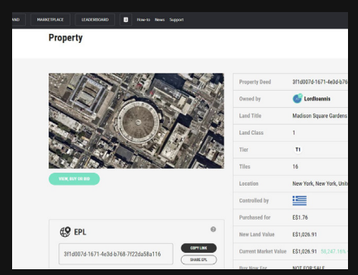
THE SANDBOX

ILLUSORR

hubs moz://a

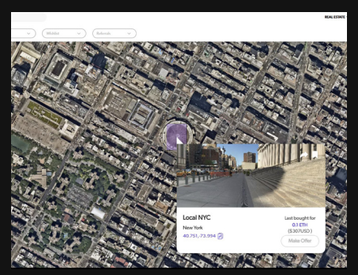
Virtual Meeting Rooms (No Land needed)

superworldapp.com



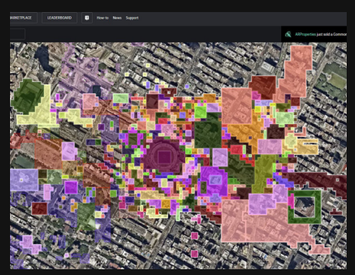
Parcels placed in cartesian coordinates (x,y)

superworldapp.com

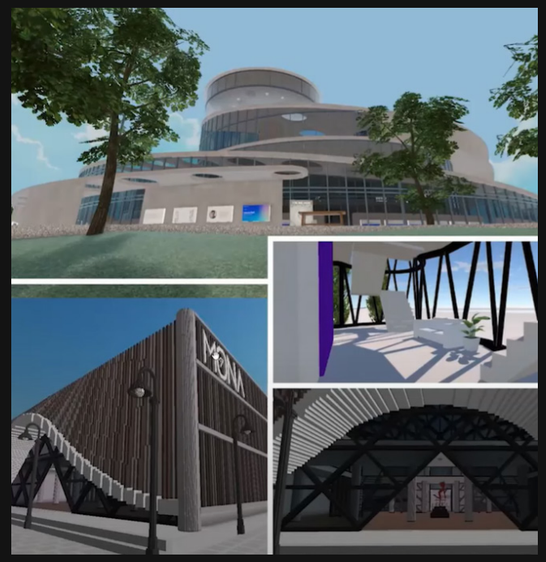


Buy Virtual/Real Land (?)

Earth 2



The same land available on multiple platforms



VoxelArchitects.com, build on the platforms below:

Decentraland

SOMNIUM SPACE

CRYPTOVOXELS

hubs moz://a

Commercial

Culture

* NFT Exhibition Halls
* Event Spaces
* Product Showrooms
* Office Meeting Rooms

MetaverseWorldBuilders.com, build on the platforms below:

Decentraland

THE SANDBOX

Metaverse Architects

Currently, several design studios claim to be metaverse architects; At the same time, such a title does not officially exist; anyone with the ability and desire to create 3D environments on top of the existing platforms can call themselves a metaverse architects. Despite the title, the exciting part of the metaverse is the power to give access to younger creatives to make a name for themselves. Voxelarchitects.com describe a three step process to access the metaverse.

1. Parcel Scouting:
First you buy virtual land on the metaverse worlds, Decentraland, Sandbox etc. This is the biggest challenge when working with brands as everyone wants to get the best locaiton for a good price. Voxel Architects apperantly have connections to allow aquire land. Land is sold as NFTs. Unique pieces of tokens. You can buy or rent parcels.

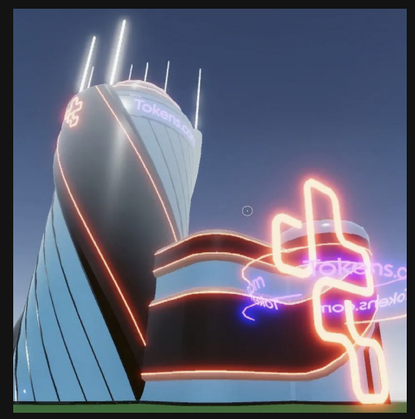
2. Architecture + Design:
Architecture in the metaverse has endless possibilities. It ignores the physics of real world, where imagination is the only limit... and parcel size. Each building has a unique style also depending on the metaverse platform itself. Crypto Voxel and Sandbox works with blocks. They are inspired by Minectaft. Decentraland is a metaverse that relies on heavier 3d softwares, like blender, maya etc. Somnium Spaces is more similar to SimCity, re probably the most realistic in appearance to real-world.

3. In-Game Coding:
Interactive features, like opening doors or pop-up art work requires additional in-game coding. Metaverse is shifting towards becoming, or already is an ecomerce space, and in game shopping is becoming normal. Potentially this is where the digital twin information is integrated. How much scripting is needed ? how heavy are the models ? Can they be live synced?

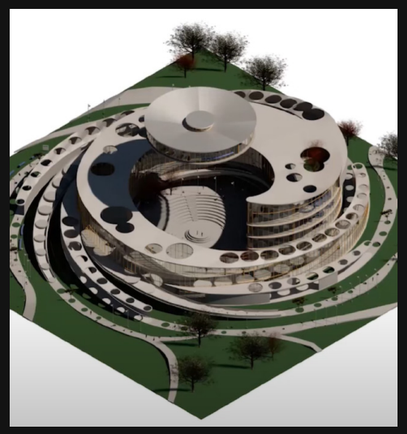
Architecture in the metaverse is purely based on form and aesthetics. Structural, nor physical constraints exist. At the end of the day, current platforms are focused on gaming / entertainment environments. This can be exciting for architecture in instances where clients do want a more social duality experience, when creating their new project. Although, as these worlds are not built for the complexity of architecture, a different approach will need to be develop.

Source: https://voxelarchitects.com/

Metaverse Architects



Architecture in the metaverse is purely based on form and aesthetics. Structural and physical constraints do no exist.



Existing Metaverse Platform
(Decentraland etc)

↓

Parcel Scouting
Decentraland etc → *16 x 16 m standard parcel size*

↓

Space Design
(Solo or hire designers) → *Independent process to maximize experience and create exploration*

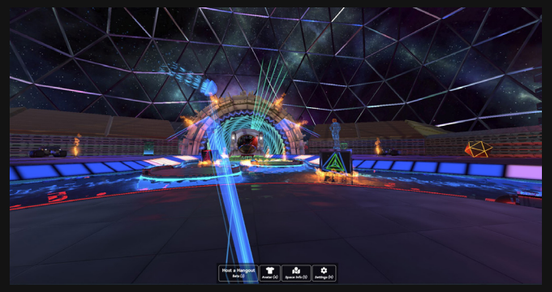
↓

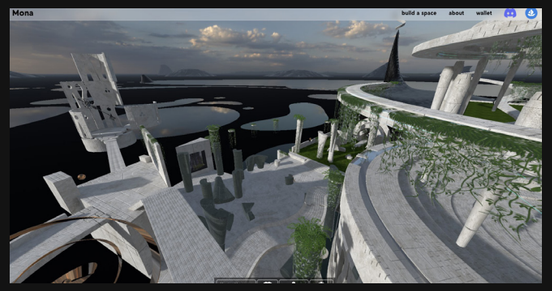
In-Game Code
(Solo or hire designers) → ** Moving parts*
**Laser shows*
**Data Set Overlay*
**Web Links*

↓

Uploading to Platform
(Typically 5Mb .OBJ files Max)

Unique Metaverse Worlds



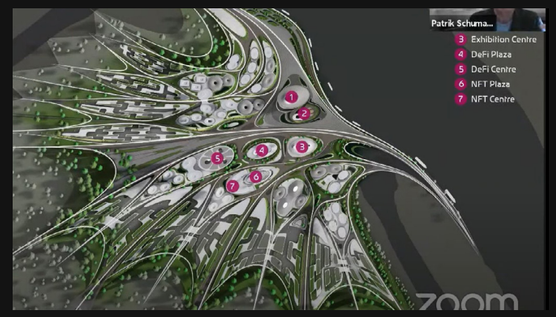


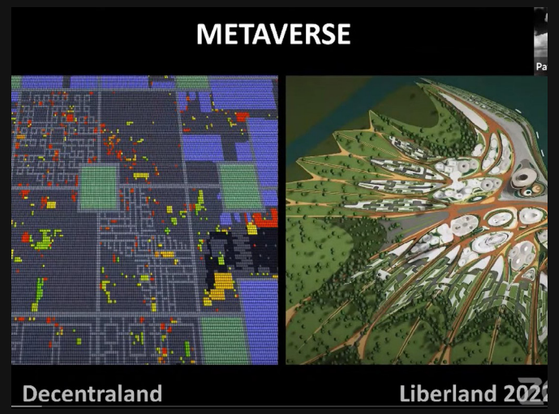
Unique metaverse worlds, or as the industry calls them, first-generation metaverse worlds, are unique high-polygon, hyperrealistic environments. Monaverse is an open platform focusing on individuals' private artwork through experiences while hosting open and token-gated social events. One of the most prominent players is mona.gallery, which allows creators to use their presets in Unity to build a virtual space up to 2GB in file size, compared to 5Mb on Decentraland. Like all other metaverse companies, Mona is also developing user-generated content (UGC) toolkit. Currently, the most significant advantage of mona.gallery is the large file size stored on a decentralized blockchain storage network, filecoin.com, and easy to access browser-based platform. While it is relatively accessible, the weak point is the slow and often flickering experience. This proves that the available technologies are not ready for VR/AR or live 3d experiences. Metaverse popularity will accelerate the R&D. Mona.gallery is only accessible through a browser, and VR/AR is in development.

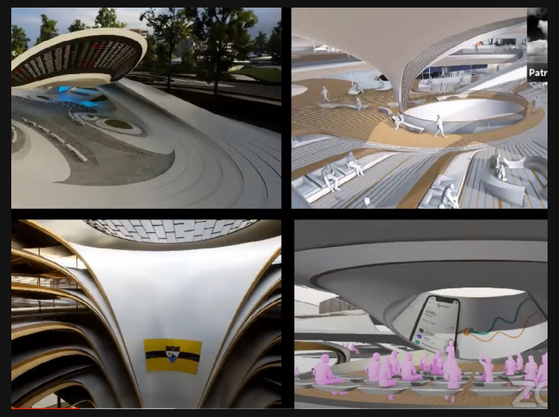
Source: https://www.mona.gallery/

BIg Guns in the Mv

Large architecture studios have also entered the metaverse conversation. Companies like BIG and Snohetta are building on platforms like Decentraland, while ZHA is collaborating with gaming companies to work towards independent metaverse universes. Below is an example where ZHA Principal presents a tabula rasa city built as a cyber world first to let potential residents 'live' in the town. LIBERLAND METAVERSE: A lot of focus goes on the openness and activated outdoors spaces. The distinction between spaces is very loose; the outside and inside the boundary are almost invisible. It has more to do with inter-visibility and creating intimacy, not much to do with the elements—co-Working / Co-Location.







Digital Twins

Future metaverses will be high integrity and conscious models which will be able to execute tasks on their own. In architecture, building information models (BIM) are becoming more accurate thanks to IoT sensors which can be implemented across cities in a size of a fiat coin. Metaverse can help make Digital twins more accessible and open to everyday humans. With 3D models living on cloud and edge servers, virtual models can become 'breathing' walkthrough environments with existing and proposed architecture and urban planning futures. Digital simulations facilitate transparency and more straightforward dissemination of private sector and government decisions to the public prior to physical implementation (and negative consequences). (White et al., 2021). Many semantic 3D models available today are a top-down view of the city focusing on smart city tech development and general 'progress', ignoring the social concerns. (Cureton and Dunn, 2021, p. 267/8)

DTs are created to fundamentally understand and explore the relationship between a place through digital technologies. Several governments around the globe are exploring DT in city governance; Virtual Singapore25 and Wellington Digital Twin26 (Cureton and Dunn, 2021). Investing in Smart city policies can be linked to a robust economic growth (Caragliu and Del Bo, 2019)

Smart City replicas benefit us by monitoring and predicting wider systems-of-systems (SoS) actions. Metaverse cities can create living testbeds for future cities, test proposed scenarios, and allow digital twins to learn from the environmental data, city data, and resident inputs. (Fuller et al., 2020). Deep Learning-enhanced digital twins analyse and synchronise metaverse and physical systems to predict and improve physical reality. If the changes are proposed to meet the scripted requirements, changes will be deployed, peer-reviewed, or autonomously. DTs are sensing systems accessed via a centralised control room, or more recently, through our mobile devices and open-data cloud platforms, accompanied by virtual models. (Cureton and Dunn, 2021). With semi-autonomous and autonomous organisations, Metaverse can make digital twins more accessible.

DTs are a fusion of geospatial information systems (GIS and building information modelling (BIM) (Laat and van Berlo, 2010), but the usefulness of such models depends on how comprehensive (White et al., 2021) and comprehensible the data is. Digitalisation for cities can be seen in three ways; 1) digital model, 2) digital shadow, and 3) digital twin [Fig. 8]. Digital model is a simple 3D model with no interaction from IoT, metaverse or the physical world. CAD environment could be a Sketchup/Rhino/Maya building model, which does not impact the physical world if the change is applied. The digital shadow is the digital representation of the physical entity, which adapts once a change is made in the physical realm. Digital twins are the next iteration of digital shadows. Once the physical changes, digital changes, and if the digital changes, the physical adapts too. The metaverse and the physical world can influence one another. (Fuller et al., 2020)

Besides architecture and planning, DT is entering the mainstream period for application in healthcare, transportation, energy & utility, and electronics & manufacturing27. Post pandemic normal is making virtual worlds more desired as the market is expected to grow from USD 3.1bn in 2020 to USD 48.2bn by 2026 at a compound growth rate (CAGR) of 58.0%28.

With available technology, large scale DTs are questionable in terms of the usefulness and possibility, as an intentional focus of these virtual worlds is required for near-future urban design and placemaking. Metaverse's focus on users, gaming engines and virtual experiences can redefine digital twins. Interactive game-like digital twins need to be tested; Riga's urban voids can operate as an innocent test-bed of new organisations, digital twins and digital toolkits for participatory placemaking.

25
Virtual Singapore.
https://www.nrf.gov.sg/programmes/virtual-singapore

26
Wellington Digital Twin built on Unreal Engine.
https://buildmedia.com/work/wellington-digital-twin

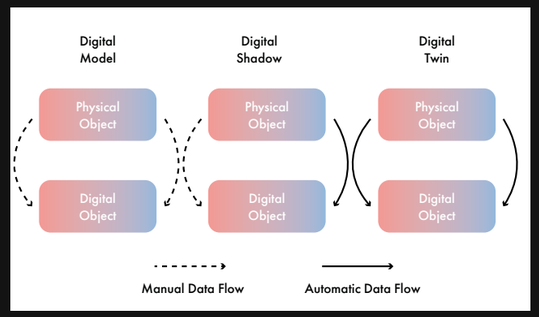
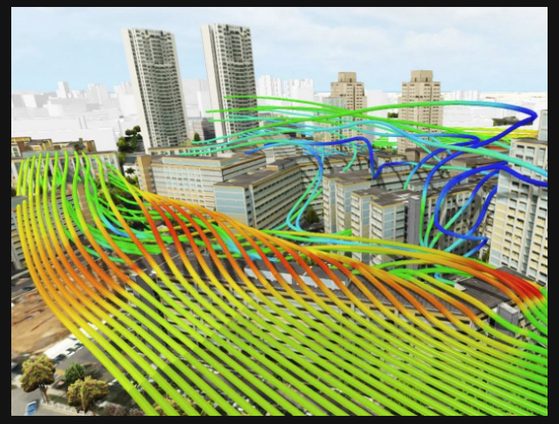


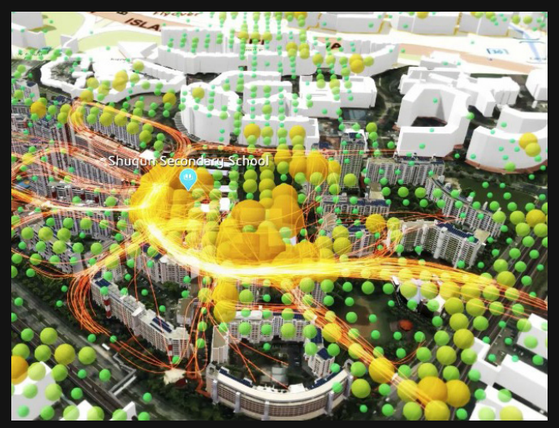
Fig. 8
Digital Twin Continuum.
https://ieeexplore.ieee.org/ielx7/6287639/8948470/9103025/graphical_abstract/access-gagraphic-2998358.jpg

27
Digital Twins becoming mainstream.
https://www.gartner.com/en/newsroom/press-releases/2019-02-20-gartner-survey-reveals-digital-twins-are-entering-mai

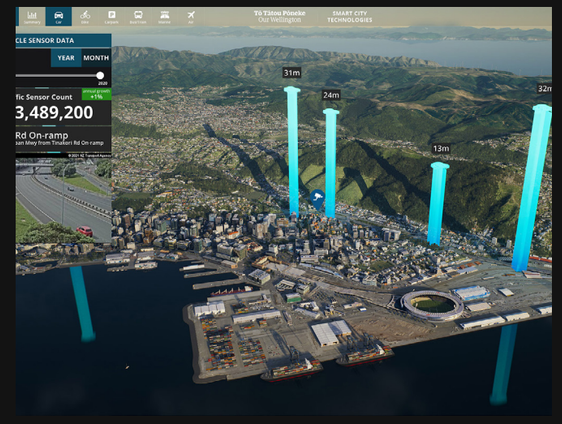
28
Digital Twins market size.
https://www.marketsandmarkets.com/Market-Reports/digital-twin-market-225269522.html

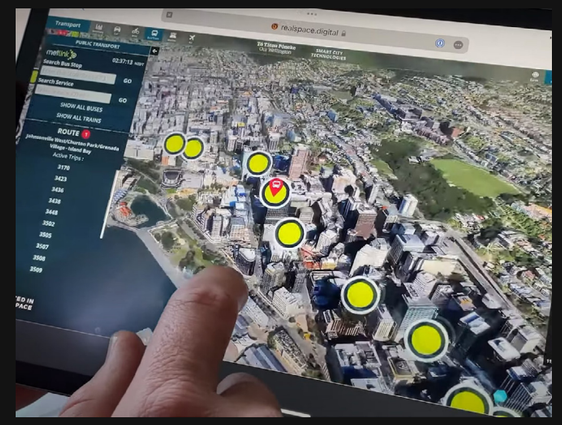
Virtual Singapore





Wellington Digital Twin





MULTIVERSE KEY TAKE AWAYS

No real life rules or restrictions such as gravity, structural stability, climatic issues, or physical laws will be at play in the metaverse.

Architectural education will have to expand and combine fields; digital media and 3d technology .digital twins. and data science, and programming.

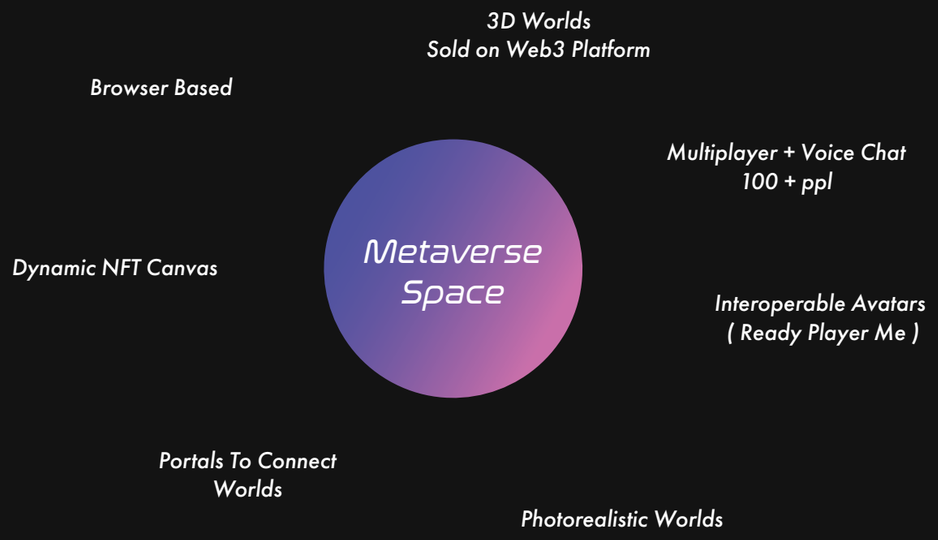
No distinct design process, web3 designers are focusing to create immersive experiences and to exhibit digital art, nfts and social events.

Meta architects will be working purely on the form, geometry, and visuals. Eventually learning how to integrate real word data. City flows etc

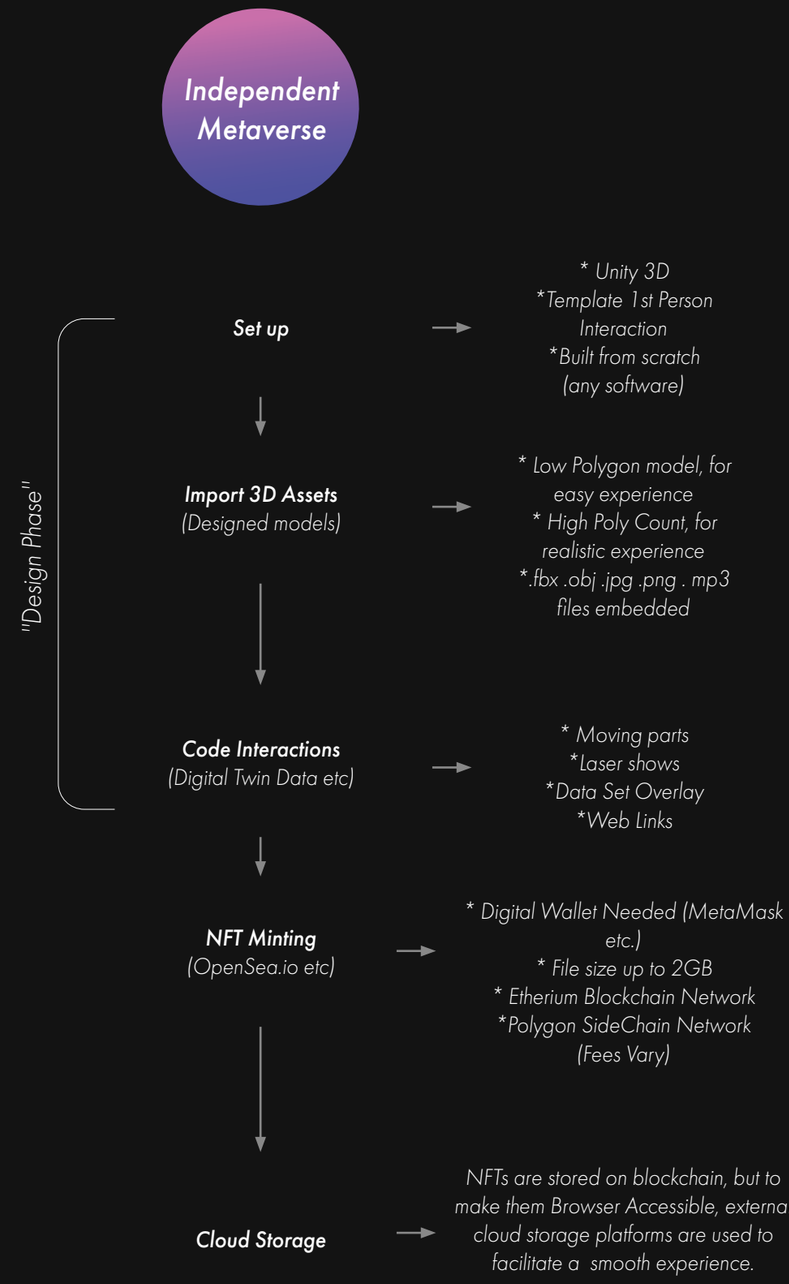
No distance rules but still some metaverses have prime locations based on zoning.

Game designers and programmers may become architectural designers.

WHAT MAKES A MV SPACE



BUILD ON MV



USER GENERATED CONTENT

'Metaverse' Platforms

Many apps, platforms and software are circulating the metaverse ecosystem and tech scene. What makes metaverse so exciting is pushing towards making all of these interoperable with a focus on user-generated toolkits. These specific apps might not be MV-ready platforms, but the metaverse has opened a new category of applications of its own (dApps). As seen previously, many platforms used in architecture have the fundamental features to transition to a more interoperable, open and inclusive, and collaborative MV.

Gaming Platforms
(Closest Metaverse Companies)

MINECRAFT

EPIC GAMES

THE SANDBOX

SIMCITY BUILDIT

ROBLOX

SECOND LIFE

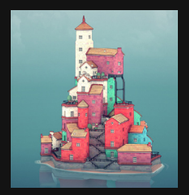
Decentraland

SuperBARRIO

plethora-project

Block'n'Hood
Education Tool of cities

unity



Townscape

BLOCK BY BLOCK

Tech Platforms
(New + Existing Companies Transitioning)

NVIDIA OMNIVERSE

NIANTIC

aerometrex

Microsoft Mesh

ARCore

AR

Ar

VIRTUAL SINGAPORE
Our Island Nation's Digital Twin

Twinmotion

ENSCAPE

SpaceForm

Urbanbase

unity

Arkio

Architecture Platforms
(Shows AI/Digital Twin/ Content Creation Traits)

ARUP

Arup Neuron

ArcGIS CityEngine

BLOCK BY BLOCK

SuperBARRIO

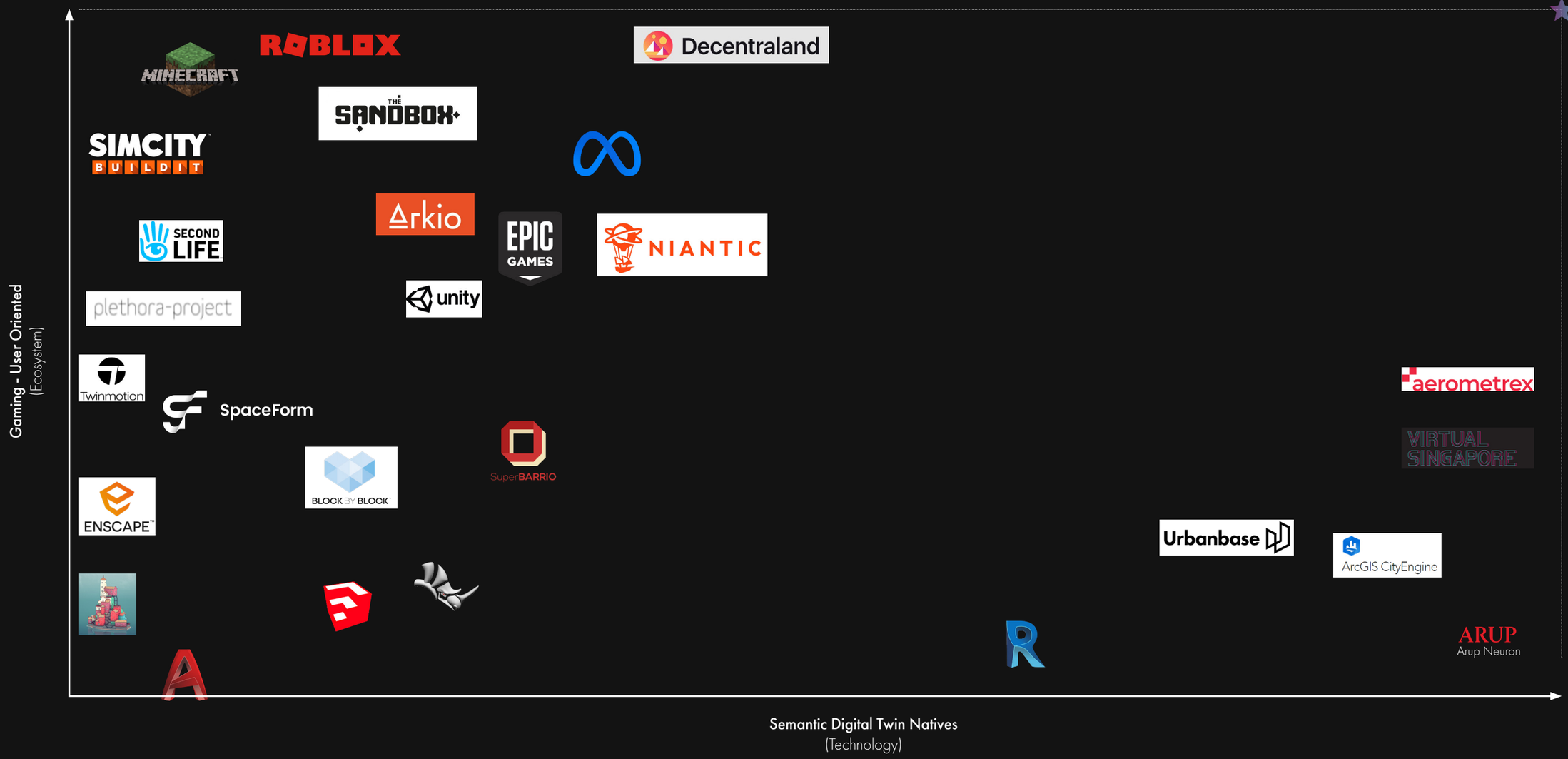
plethora-project

Block'n'Hood
Education Tool of cities

PLATFORM GRAPH

How Metaversy Are Current Platforms?

Gaming platforms are heavily built around users, content creation and interaction. Tech is needed to make them more interoperable and augmented. Decentraland is the closest we have to the metaverse, as it's the first iteration of the tech+ecosystem merged. At the same time, architectural models are dumb or intelligent. Dumb models are outstanding in creating content but lack data overlay; however, some are highly data-driven but lack user-friendly interaction. Each software could be placed against each criterion.



Chapter 03 | 3.1 Virtual, Augmented and Mixed Reality

Today's metaverse experiences represent a small subset of the larger Metaverse spectrum. Currently, Metaverse is viewed as a cartoonish fictional world that facilitates socialising and utilises cryptography to lay the foundation of an open creator economy with new ownership models. These creations are digital files, from simple photos (jpg) to 3d worlds and gifs/video assets (digital art, fashion pieces)[14]. The metaverse, however, in combination with virtual reality (VR), augmented reality (AR) and mixed reality, can be also seen as media technology whose core idea is to present content engagingly and as realistically as possible (Rosenberg, 2021). Moreover, the chapter looks at early mixed-reality adapters in the architecture field.

The metaverse will be possible to access not only through browsers (i.e. Chrome, Mozilla) or VR but rather with AR headsets with overlays, hand-held devices with touch screens, projectors, touchscreen tabletops and even wearable projections (Braud, Lee, Zhou, 2021) such as Google's Glass launched in 2013. In 1965, Ivan Sutherland, in an essay, coined 'The Ultimate Display' as a head-mounted three-dimensional display that was built for training purposes for NASA Ames Research Centre. This can be viewed as the first iteration of VR goggles, and since then, aerospace has utilised VR and AR as tools to reduce costs and failures prior to departure. Such intervention has only yet to be fully adopted for architectural projects in architecture but to help spatial designers communicate, engage, and design.

With cheaper hardware and powerful software VR and AR, technologies have the potential to immerse design teams and clients, manage expectations and reduce time on the design process, especially if the target audience is not trained architects. In the context of the metaverse, virtual environments accompanied by headsets and online browsers will further allow Multiple User Collaboration (real-time interaction) on an unprecedented scale.

The most significant difference between MR and AR is that MR technologies are embedded with the knowledge of the physical reality, while AR systems overlay graphics onto our physical world (Skarbez et al., 2021). When looking at the Reality-Virtuality Continuum by Milgrim and Kishino [Fig. 7], VR is on the complete opposite spectrum to physical reality. Currently, the metaverse is on this spectrum, Virtual Environments. John Hanke (2021) called the current metaverse direction a walled garden. Also, the rising fear of isolation caused by VR can be sensed among different generations.

Metaverse has a danger of pulling us away from our information bubbles (targeted ads) to our custom realities, further separating us from others, even when we are standing face-to-face in a public space. VR is a powerful tool to enhance our social interactions and even permit new social interactions. (Alvarez and Duarte, 2020)

Second Life creator Philip Rosedale emphasised that even with all the software and hardware available, most people; "do not want to be a cartoon avatar while wearing a VR headset"[15]. Creators of PokemonGo shares a similar opinion; ''The [virtual] Metaverse is a Dystopian Nightmare. Let's Build a Better Reality.''(Hanke, 2021)[16]. Neal Stephenson, in 1992, with Snow Crash, imagined the metaverse as a utopian place where we went to escape the dystopian reality we have created. Niantic uses such an argument to remind us that the virtual reality world is not to look forward to but rather let us build an augmented reality that fosters interaction with the natural world and real people.

03 | 3.2 MR Early Adaptors

Despite the criticism, in 2016 CGArchitects surveyed around 400 architectural professionals, asking if they use VR/AR/MR in their practice. 69% replied they are using, but only 22% were architecture firms themselves[17]. Surely, this number has increased, especially among large design firms like Gensler [18], SHOP Architects[19] and BIG / UNStudio[20]. Gaming and VR will be a key player in driving the development of metaverse platforms, but only a tiny part of it.

14
Digital world marketplace.
https://opensea.io/collection/virtual-worlds

15
Second Life creator metaverse advice.
https://techcrunch.com/2022/01/13/second-life-philip-rosedale-returns-linden-lab-high-fidelity/

16
Pokemon Go creators metaverse advice.
https://nianticlabs.com/blog/real-world-metaverse/

17
VR Usage in Architecture.
https://www.cgarchitect.com/features/articles/919b2174-survey-results-vr-usage-in-arch-viz

18
Gensler VR lead project.
https://www.archpaper.com/2017/04/gensler-nvidia-new-headquarters/

19
SHOP Architects use AR on-site.
https://unity.com/case-study/shop-architects

Chapter 04 | 4.1 User Generated Content Platforms

What makes metaverse so exciting is pushing towards making all of these interoperable towards user-generated environments. The previous chapter highlighted vital concepts as to why and how accessible digital twins will be part of the Metaverse; this chapter will focus on how architects use gaming and virtual environments to shape ideas and engage citizens.
Blockchain and metaverse have created a new category of software applications (apps + dAapps) built for the Web3 wave. Decentraland is the closest we have to metaverse state, as it is the first iteration of the user-generated, managed, and ecosystem accessible through VR or Web2 browsers. Architects are slowly transitioning towards the Decentraland metaverse to exhibit and create a multi-platform (physical + virtual) presence for other companies[21]. First iteration of the metaverse world will be built on other platforms, but spatial designers will utilise gaming engines to create new architecture in the long run.

Spaceform.io, above is one of a kind architecture paltform that has a potential to go Metaverse. It is an interactiove VR collaboration plarform. It is designed for architecture an interior design meetings, with real time archviz features.

20
BIG / UNStudio Virtual Reality Startup
https://www.dezeen.com/2019/06/21/hyperform-squint-opera-big-unstudio-virtual-reality-design/

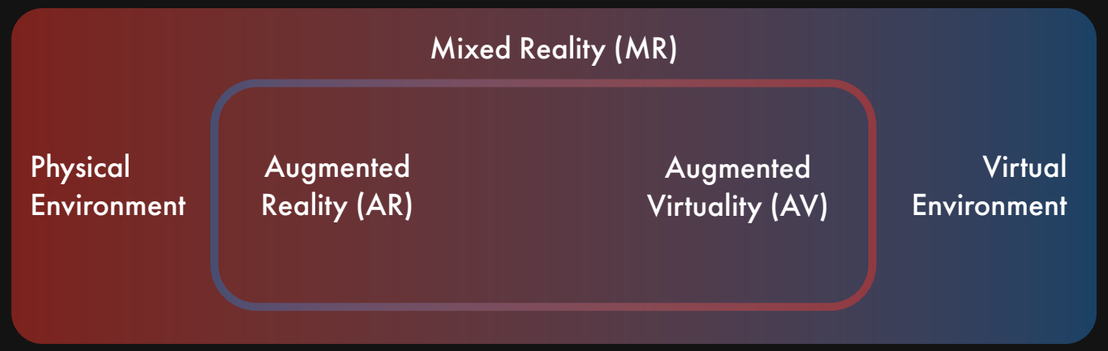
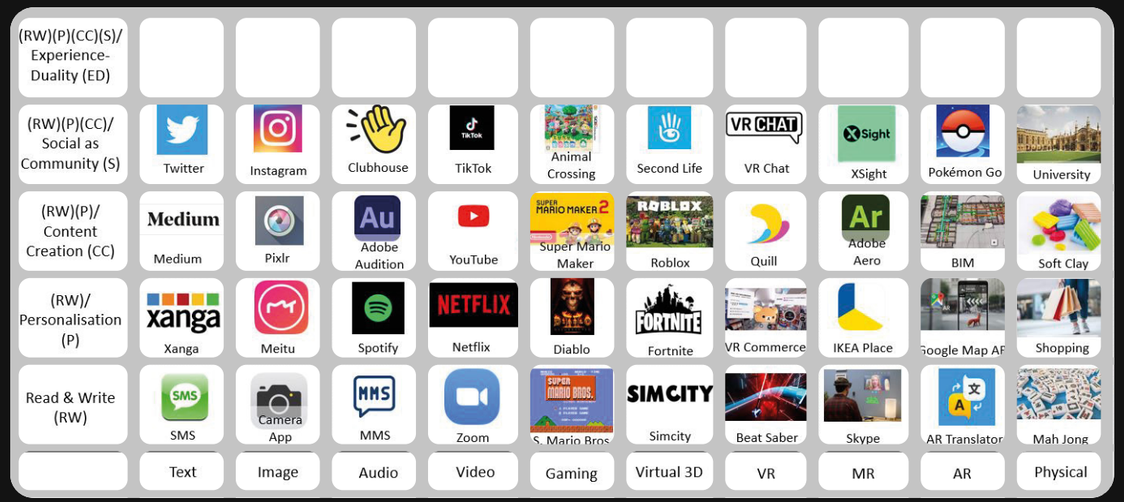
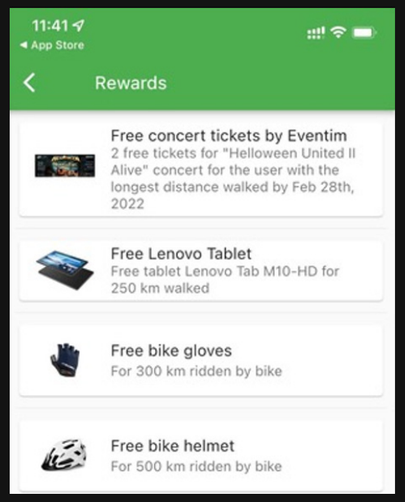


Fig. 7
Milgram and Kishino's (1994) Reality-Virtuality (RV) Continuum. The continuum also can be viewed as a metaverse spectrum, from pure virtual environments to hyperrealistic holograms overlayed onto the real world.

Many apps, platforms and software are circulating the metaverse ecosystem and tech scene. What makes metaverse so exciting is pushing towards making all of these interoperable. These specific apps might not be the MV platforms, but the metaverse has opened a new category of applications of its own. There is not much architectural software or almost no platforms that facilitate experiences in duality. Based on the research done by Lee et al., in 2021, even Pokemon Go, an 'augmented reality game, does not meet the Reality–Virtuality (RV) Continuum criteria to be considered a metaverse platform.



Source: *Lee et al., (2021)*



Sofia Coin, on the left, is an app that encourages walking, cycling and outdoor time in return for real rewards. This is a great way how to engage locals to interacts with our cities. Spaceform and Sofia Coin are two features missing from the matrix above, but equally important.

04 | 4.2 Gaming in Architecture

The current market focuses on game-ish virtual spaces because video games test technologies and cultural and social features of contemporary society. Video games and Metaverse will transform spatial design, placemaking methodology, and city governance. Gaming in architecture is used as a robust design tool, offering alternate perspectives to designers. (Alvarez and Duarte, 2021, p. 192) As argued by Malgorzata Hanzl (2007), Role-Player (video) Games (PRG) can be a valuable tool in consensus building programs. (Alvarez and Duarte, 2021)

Architects have a lot to learn from video games, as video games are creating serendipitous and non-linear storytelling to shape environments. Most city-like video games mimic the real world to capitalise on our mental associations. (Alvarez and Duarte, 2021, p. 187) The most common engagement happens from a third-person perspective, as almost a drone or a bird hovering above one's head. A similar manner is used by urban planners, where cities and neighbourhoods are designed from a top-down plan view for a three-dimensional city. This way, the planner or player operates as a strategist afar, disconnected from the life and activities of a vibrant city. Daniel Golding (2003) advocates for a first-person perspective which acts as a tactician; ''individuals encounter the city not as a concept, but rather as an immediate experience''. (Alvarez and Duarte, 2020; Golding, 2003) Employing a first-person approach to physical reality and city-type games can force us to consider the spatial characteristics, ludic moments and narratives as part of the design process. These elements facilitate a more immersive sense of place, curated by the players and designers. Metaverse infrastructure is not ready for digital twins as its hosting massively multiplayer-online (MMOG) experience with custom toolkits is challenging.

04 | 4.3 Block by Block (BbB)

Block by Block (BbB) is an initiative launched in 2012 to integrate the computer game Minecraft into public space planning with local community participation. Minecraft is their primary methodology to engage people from all backgrounds and age groups because of its simple interface, easy to learn and ability to visualise ideas three-dimensionally. BbB operates as a platform and mediator for governments and public space advocates to open up the city to all. BbB has completed 135 public space interventions using Minecraft, which community leaders phrase to be cost-effective and engaging[22].

In 2015, UN-Habitat selected Pristina, Kosovo, to test the BbB methodology in rejuvenating neglected urban spaces. More than 70 individuals participated in the workshop to redesign an abundant marketplace. Facebook pages were used to inform and mobilise locals. Based on the initial brainstormed ideas, the participants co-created the final design on a multiplayer Minecraft server. The final proposal included inclusive public spaces, a palace for resting, Kosovo's first skatepark, and a playground. The project transforms an urban void into an attractive and multifunctional public space in one of Europe's poorest countries.

After the project, the Mayor of Pristina noted; '' "We live in a municipality, in a community. We should establish a mindset that we should jointly make decisions about how a certain part of the neighbourhood we live should look". Game developers of Minecraft (Lydia Winters from Mojang) have praised BbB for using their game in a manner that was not intended to shape our physical world; "Block by Block democratised the development process and gave people ownership over the space. There are a lot of new residents in the area, and Block by Block gave them a path to come together positively." Block by Block, and the institutional initiative[24] proves that inclusive and open design processes can be a success, especially in politically tricky areas.

The initiative came from the UN, a powerful entity that supervised and managed the whole process. So the question is, can we use DAO and Metaverse worlds as mediators and tools of governance in areas where *live players*[23] like powerful governments are not present?

21
BIG designs for Metaverse
https://www.dezeen.com/2022/03/02/big-viceverse-metaverse-virtual-office-vice-media/

22
Block by Block / Minecraft used for regeneration in Kosovo.
https://www.blockbyblock.org/projects/kosovo

23
Meaning of Live Players.
https://medium.com/@samo.burja/live-versus-dead-players-2b24f6e9eae2

24 Similar Projects

Block'hood
https://www.plethora-project.com/blockhood

Public Play Space
https://www.publicplayspace.eu/

SpaceForm
https://www.spaceform.io/

Programmable City
http://progcity.maynoothuniversity.ie/about

Dublin Dashboard
https://dashboards.maynoothuniversity.ie/exhibition/

Fellenopoly
https://urbansync.nl/2018/12/12/urban-sync-in-de-krant/

Riga Minecraft
https://urbcultural.eu/news/gamification/minecraft-as-a-tool-to-think-out-of-the-box/

SuperBarrio
http://superbarrio.iaac.net/

24
Riga in Minecraft.
https://geoboxers.s3-eu-west-1.amazonaws.com/riga_ov/index.html#Riga/0/7/597/-1744/64

Decentralized Autonomous Organization

6.1 Blockchain

Blockchain refers to a general-purpose technology describing information exchange and digital asset transactions. A distributed ledger, consensus algorithm, and smart contracts are critical ingredients of the metaverse. It is not the virtual world space alone but the system that enables connectivity to Web3
While blockchain processes and techniques are evolving rapidly, distributed ledgers are built for big data. Cities generate a vast amount of data each day, making centralised cloud servers unable to carry the load due to limited network resources (Braud, Lee, Zhou, 2021; Xu. et al., 2018). Users (or nodes identified in the blockchain) keep a complete list of the data (cryptographic hash) locally and synchronously stored on a specific blockchain. Distributed Ledgers (DLT) is a database that is geographically shared or stored among multiple participants, making each node a legible and responsible source of verification or trustless trust, as, by default, ledgers are immutable unless designed otherwise.

Blockchain and city governance are essential elements when thinking about future cities, as in many cities around the world, especially in Eastern Europe, centralised entities symbolise corruption. Most companies, governments, and banking are examples of a centralised database and single point of distribution, making this the most prone single node of failure when it comes to corruption, privacy breach, and fraudulent activities.

As an example of Riga, new governance models can be seen as digital activism by removing third parties and handing over the power to the citizens. Also, one of the most significant metaverse concerns is the monopolistic platforms that will provide the metaverse infrastructure (Rosenberg, 2021).

06 | 6.2 Decentralised Autonomous Organisation (DAO)

DAO can be seen as a decentralised funding administration, where individuals can determine where all the money gets allocated in a peer-to-peer (P2P) manner. Investors convert fiat currency (USD, EUR, GBP) for a token (cryptocurrency). Decisions are recorded on the blockchain, immutable and executed through smart contracts. The set of rules on which DAO can operate - consensus algorithms are a set of agreed-upon criteria to allow transactions, voting or data sharing to be committed and executed through smart contract codes. Algromitization creates frictionless and more honest bureaucracy/microtransactions, as the operation will become invalid if the agreed criteria are not met. Like traditional job or agreement contracts, smart contracts are rules in a business or government. However, the scripted code and ability to execute an action on themselves create a smart contract that facilitates frictionless peer-to-peer (P2P) operations.

DuPont (2018) compared The DAO to the crowdfunding website Kickstarter29. Kickstarter promotes commercial good 'product ideas' or start-ups for which many individuals, the general public, can donate funds through its centralised platform. Typically, backers receive ''rewards'' as a pre-sales mechanism. In DAO, anyone with a refundable token (post gas fees and volatility) is eligible to vote. ''Voting'' for a project is conceptually the same as funding a Kickstarter project, but voting members have significant control over each transaction and project (DuPont, 2018).

Decentraland, run on DAO30, is the largest metaverse platform claiming to offer the first fully autonomous virtual world - the user community can propose and vote on events, features, land, and NFTs policies. The metaverse governance can be accessed through Decentraland DAO's governance interface, powered by Aragon31. Decentraland has created a simple application programming interface (API) dashboard through which all governance can be filtered.

06 | 6.3 DAO as a City

The critical challenge of both blockchains, smart contracts and Cryptourbanomics are that they cannot be sustained and grow as solely bottom-up projects. Moore's law indicates that the rate of change is accelerating exponentially; the public and private sector, governmental bodies and individuals will have to collaborate to forge a new shared understanding of the use and governance of blockchains (Tapscott, 2018, p.392). In this case, both ends (bottom and top) must invest and operate together to mature and solidify Metaverse (Marsal-Llacuna. 2021). The CityCoins32 is a blockchain that enables smart contracts on the Bitcoin network, connecting the bottom (citizens) with the top (governance). The main objective of the CityCoins is to give communities the power to improve their cities while providing rewards to participating individuals and municipalities. Each city can create a coin to raise funds for specific city development. MiamiCoin33 is one of the first CityCoins to test the use case on an actual location.

Through MiamiCoin, the city and its constituents can shape the surroundings with (or without) governmental institution involvement, depending on the scale of the project. The investment is split between 30% going into the cryptocurrency wallet of the city, and 70% being returned to holders of MiamiCoin to earn money by participating in the stacks blockchain consensus process (Proof of Transfer or PoX34).

To better explain how an individual can become part of a DAO, we can look at MiamiCoin's four-step process:

1) Digital wallet set up - an anonymous crypto wallet through which most blockchain activities are facilitated.
2) Buy City's coin - purchasing crypto does not have to be a significant investment; some blockchains ask for it to verify the credibility of a digital wallet.
3) Visit the cities DAO Dashboard with a wallet.
4) Engage, propose, review and vote for projects and proposals. This can include new public space rejuvenation, improvements to local bike lanes or general infrastructure, reporting an accident or proposing an event.

06 | 6.4 DAO as a City by Law

Wyoming becomes the first U.S. state to recognise DAO35 as a separate entity, which will help lay the foundation for DAO and its members. (Dill, 2021) CityDAO.io is one of the first networks to create decentralised asset ownership for physical reality, the first land-based in Wyoming, U.S.

CityDAO36 claims to pursue what Bitcoin and Ethereum have done for the digital ecosystem. They aim to create the same impact for physical locations. The platform is still under development and will be launched in Spring 2022 with actual Wyoming Land as NFTs37.

Wyoming's DAO Law recognises DAO governance as an LLC Limited Liability Company (LLC), creating legal opportunities for citizens to become in charge of their city. LCCs can own physical land, which creates opportunities for people to decide what the land is used for. With plenty of untouched and futureless physical voids, Riga has an opportunity to become NFTs. Creating a digital urban design toolkit based on successful city interventions can foster creativity and provide a framework for citizens to engage with their city on a granular level.

Miera street in Riga becomes a satellite neighbourhood to test for proof-of-concept of DAO and urban voids as self-contained city regeneration incubators shaped by residents. Besides being a fully bottom-up proposal, platformization can enable new and sustainable economic growth while partnering with local communities.

A popular trend is appearing in the cryptocurrency world, where many cities around the globe are planning to launch their coins, e.g. Korean S-Coin38, + Reno Coin; Reno DAO. Everything digitised will have an opportunity to be connected, from digital twins of physical objects and systems, digital identities (participant avatars) to small and large scale business and city governance (Braud, Lee, Zhou, 2021). There are many opportunities within cities to take advantage of digitalisation. Metaverse or virtual worlds dashboards can operate as an Application Programming Interface (API) [Fig. 9] for new innovative governance models.

29
Kickstater Homepage. https://www.kickstarter.com/

30
Decentraland "Decentalised Autonomous Organisation" DAO
https://dao.decentraland.org/en/

31
Decentraland built DAO by using a third-party company, Aragon. Build your own DAO infrastructure. https://aragon.org/

32
CityCoins
https://docs.citycoins.co/about-citycoins/what-are-citycoins

33
MiamiCoin, an app that allows you to propose and fund new projects in Miami.
https://miamivoice.org/

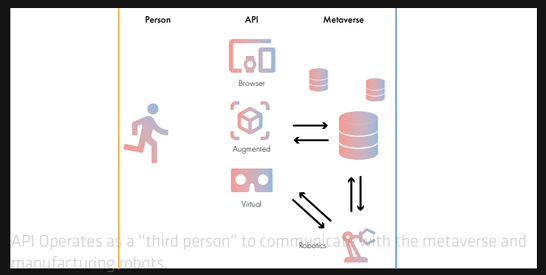
34
Participation on Bitcoin network can be refeered to as Stacking.
https://www.hiro.so/wallet-faq/how-does-stacking-work

35
Wyoming Law introduces DAO as a legal entity for the U.S State.
https://finance.yahoo.com/news/daos-taking-over-wyoming-law-194516224.html

36
Guide on how to set up a Crypto Wallet by coinbase.com.
https://www.coinbase.com/learn/tips-and-tutorials/how-to-set-up-a-crypto-wallet

37
CityDAO for decentralized physical asset ownership.
https://www.citydao.io/

38
South Korea launches S-Coin. Its own cryptocurrency.
https://www.coindesk.com/markets/2018/04/02/south-koreas-capital-is-planning-to-launch-its-own-cryptocurrency/



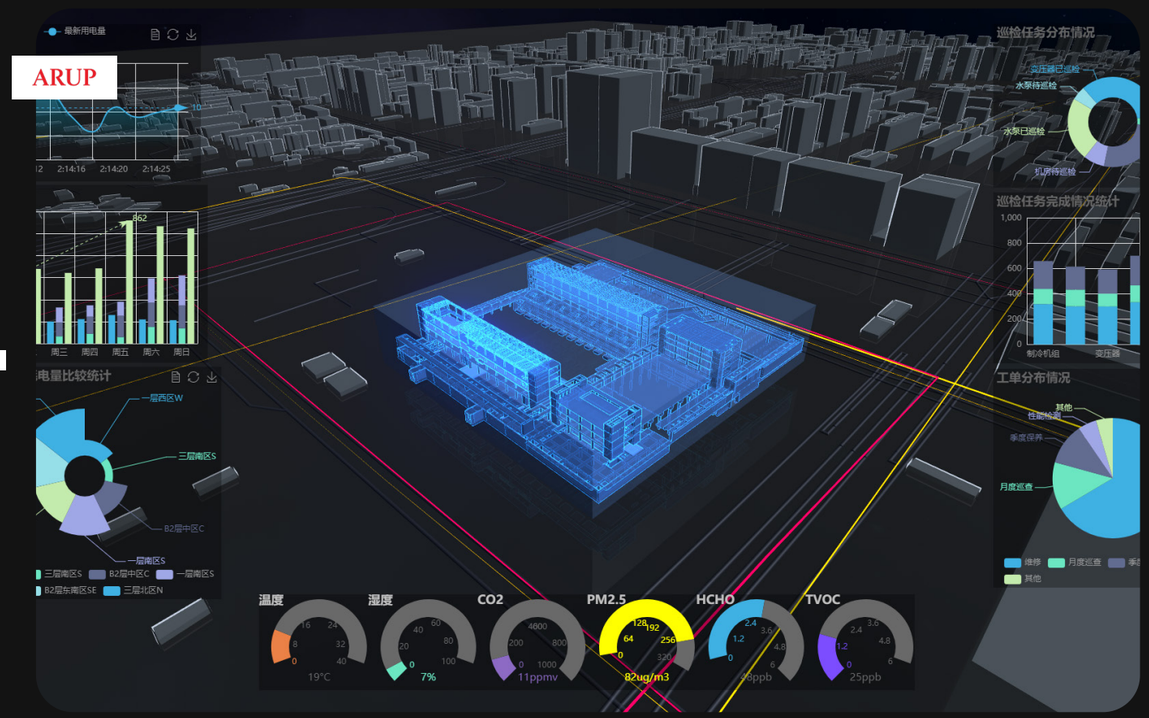
API Operates as a "third person" to communicate with the metaverse and manufacturing robots

PROBLEM STATEMENT A

Driver For Further Investigation

Architecture industry has potential to dive into metaverse, as the software and tool-set that we utilize are the foundation that the metaverse will be built on. The problem holding this back from happening is that all the software are segmented, exclusive (only for designers, not public) and its compartmentalized. Today's video games are still fictional environments with no real-world information. The most powerful asset games entail are their ability to engage stakeholders, make the software user-friendly and adapt quickly to new technologies. Real world metaverse can be a digital twin that we all can play with, real-time.

+



Gaming Metaverse

- *Disconnected from real world data (AR will change this)*
- *Fictional Worlds*
- *Easy to use*
- *Fun and AR can encourage leaving the house*
- *New Economic Models*
- *User Focused*

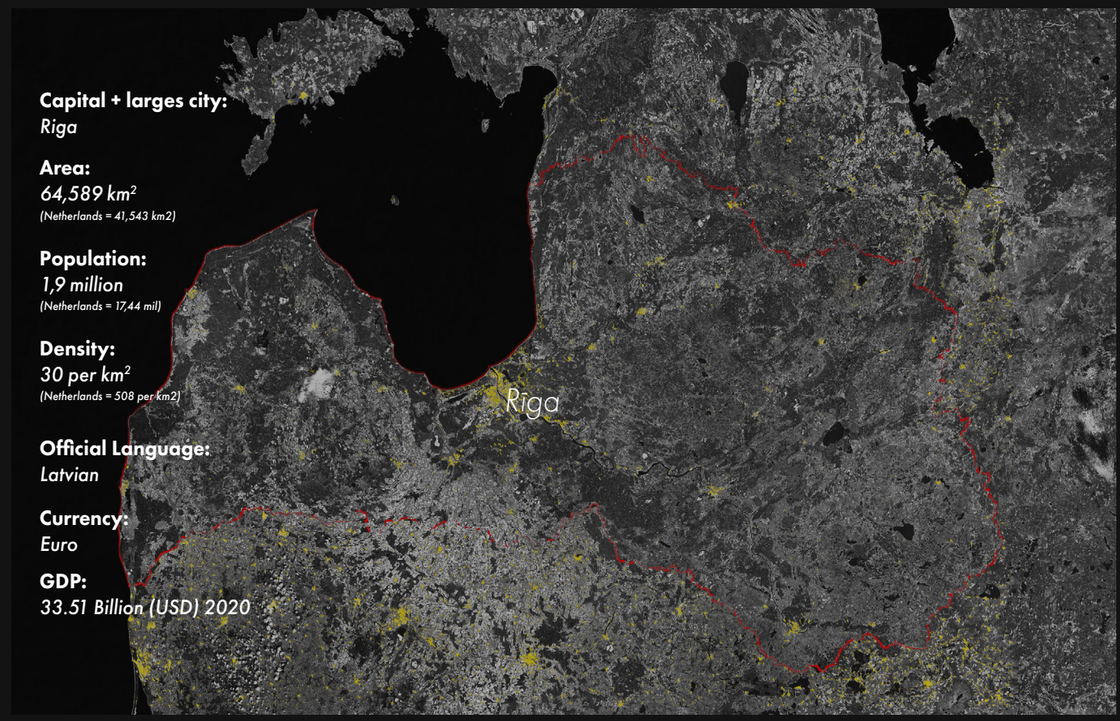
Architecture

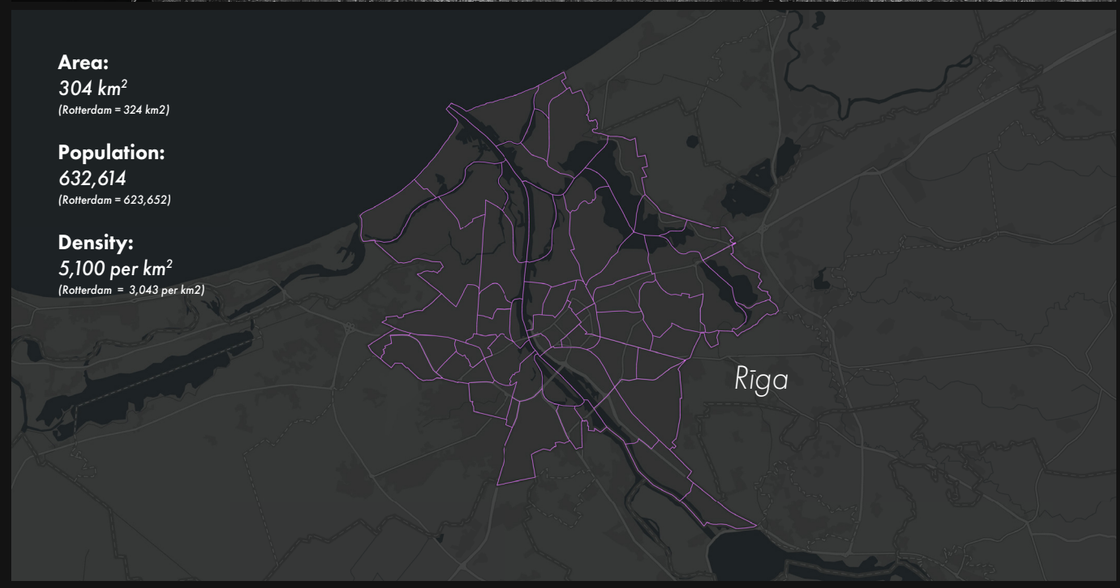
- *Hard to interact with*
- *Segmented*
- *Closed Access and expensive*
- *Not for stakeholder governance*
- *Real World Data infused*
- *Responsive*
- *Real world implications*
- *Real World Situations*

02. CASE STUDY OPPORTUNITIES

LATVIA

Key Facts

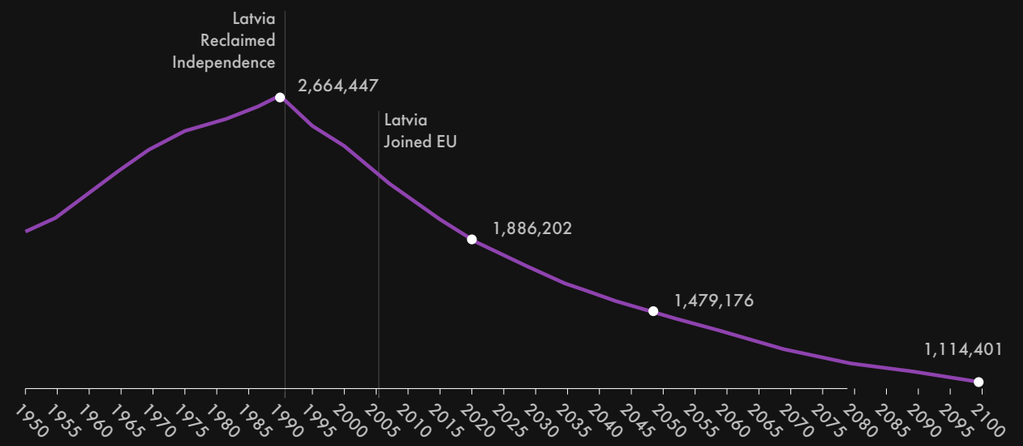


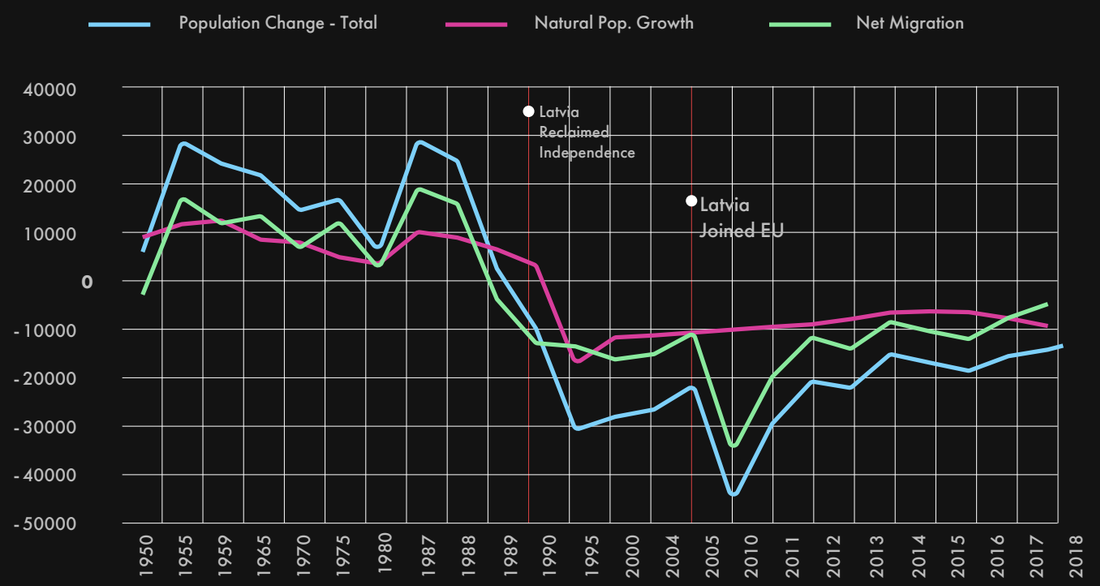


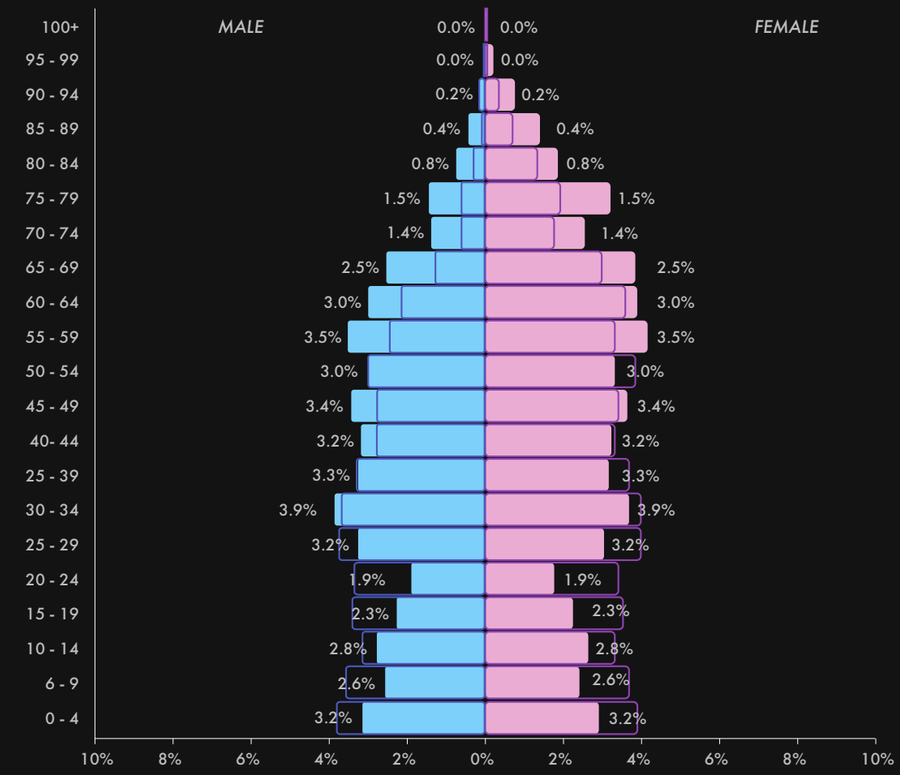
Riga

Riga Disapora

Historically, Latvia had a stable economy due to solid agriculture, which has experienced irregular periods of economic growth due to occupation. The country has been in economic decline for the last 110 years. (Borgen, 2017) This has negatively impacted Latvia's population, which is predicted to collapse by 2050. The working population (15-35), the most vital economic contributors, continue migrating to other countries worldwide. Latvia has a scarcity of natural resources, but the most significant shortage comes from economic opportunities. The second-largest is the working population which is strongly correlated. (Williams, 2021) The country is going through a health system crisis which does not encourage young families to have babies. The government is opening dual citizenship schemes and increasing language and integration classes to foster migrant return. However, this has not proven efficient, as the focus has not been on a sustainable job market that would incentivize displaced Latvians to return and even attract other nations. One-third of the Latvian population lives in Riga.







Source: *Latvian Statistical Database. https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__POP__IR__IRS/IRS010/table/tableViewLayout1/* **Accessed**: *15.12.2021*

Source: *Borgen Magazine. Poverty in Latvia. January, 2017. https://www.borgenmagazine.com/poverty-in-latvia/* **Accessed**: *15.12.2021*

Source: *Williams, 2021. Latvia: Population Decline Since the Fall of the USSR. https://storymaps.arcgis.com/stories/2748577726df3467888f38803cdb4dc6f* **Accessed**: *15.12.2021*

The population decline has had an enourmous impact on local economy and ability to thrive. Urban fabric of Riga almost symbolizes the fact. Nearly every fifth building and voids is neglected dawning on citizents. And these buildings are not somewhere outskits of the city, but rather facing major highways and residential areas. Some of the voids have been empty for decades, while minimal number face demolition as they have become too unsafe.

By definition public space, is a public domain, yet there is nothing public or inclusive about excessive urban voids. This potential is stolen from citizens of Riga, due to political dysfunction. "Inbetween space, the public space is the single most important site for the convergence of people of all ages" [and backgrounds].

Source: Latvian Statistical Database. https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__POP__IR__IRS/IRS010/table/tableViewLayout1/ **Accessed**: 15.12.2021

Source: Borgen Magazine. Poverty in Latvia. January, 2017. https://www.borgenmagazine.com/poverty-in-latvia/ **Accessed**: 15.12.2021 **Source:** Williams, 2021. Latvia: Population Decline Since the Fall of the USSR. https://storymaps.arcgis.com/stories/274857726df34678888f38803cdb4dc6f **Accessed**: 15.12.2021

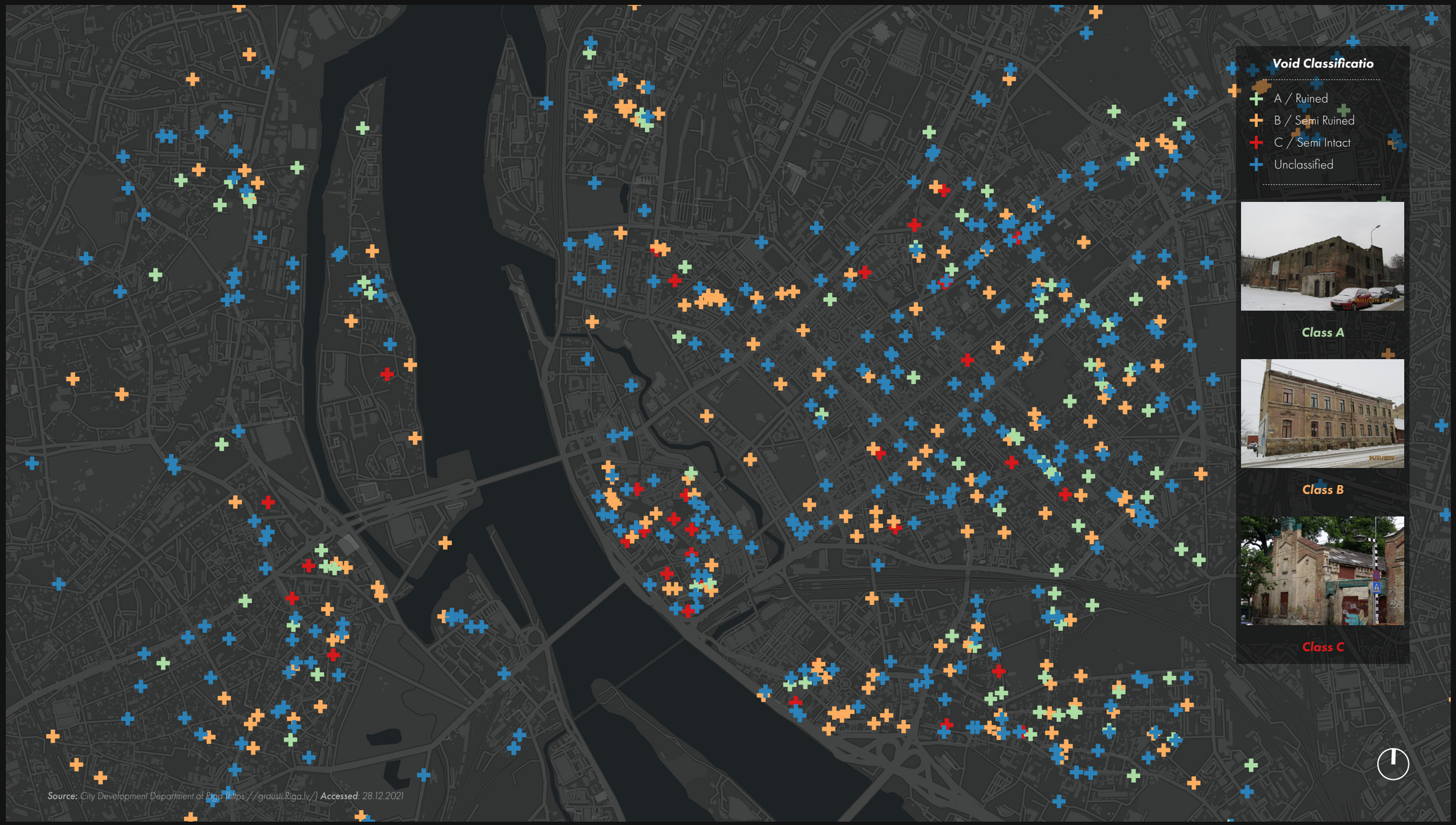
CITY OF RIGA

Core City Structure

00 500 1000m

URBAN VOIDS

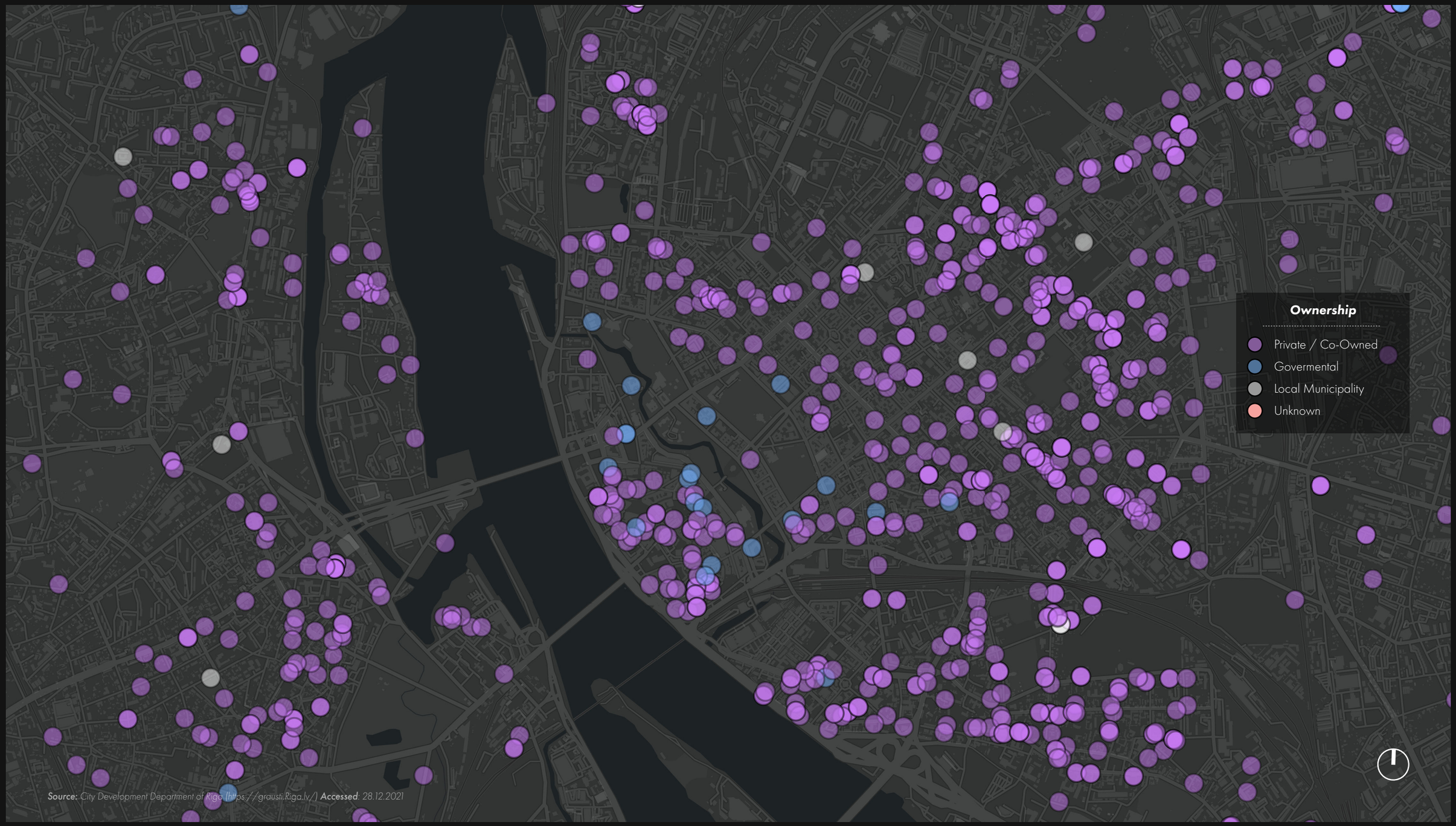
Property Destruction Level Classification



Source: *City Development Department of Riga (https://grausti.Riga.lv/)* **Accessed**: *28.12.2021*

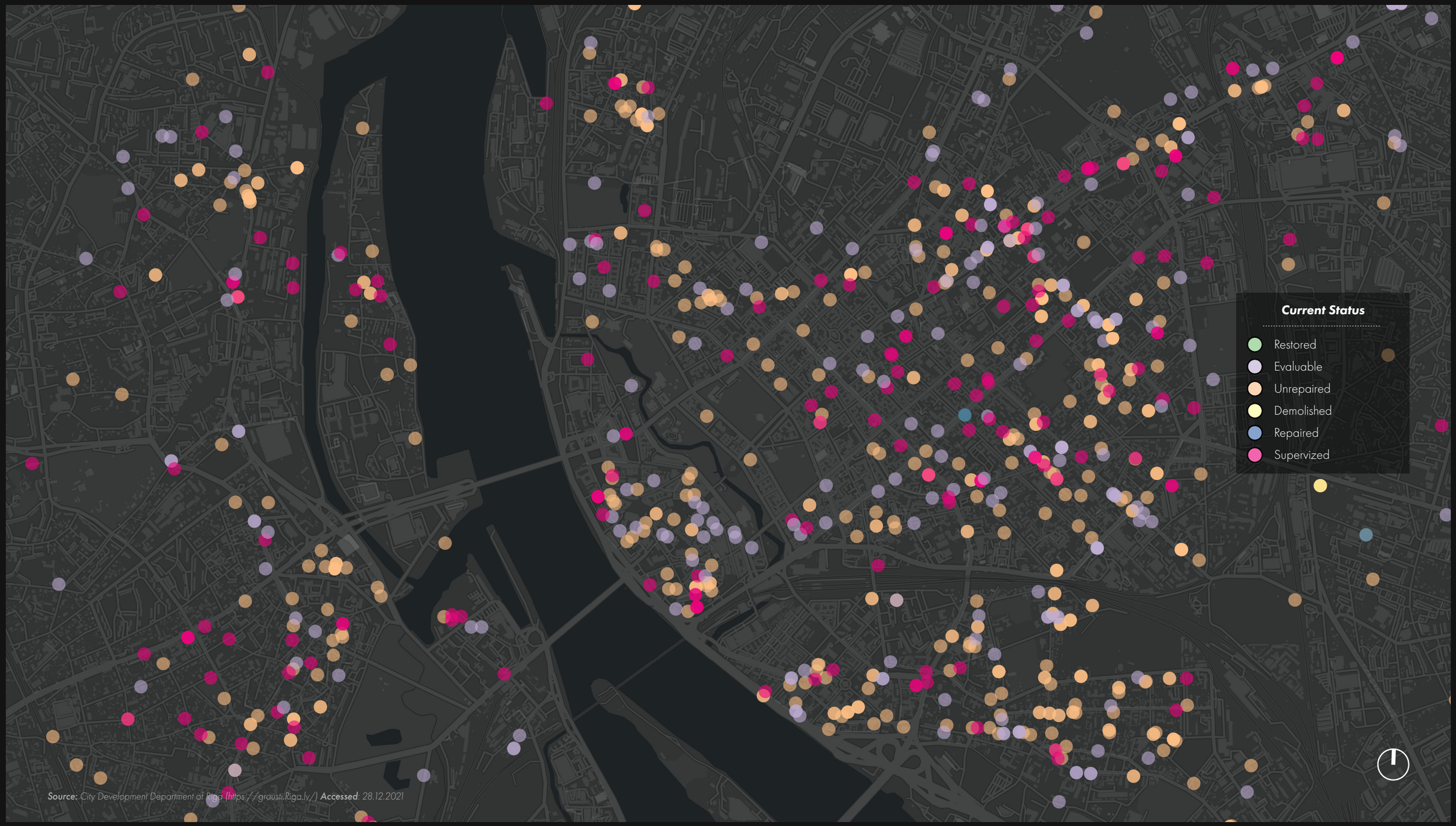
URBAN VOIDS

Property Ownership



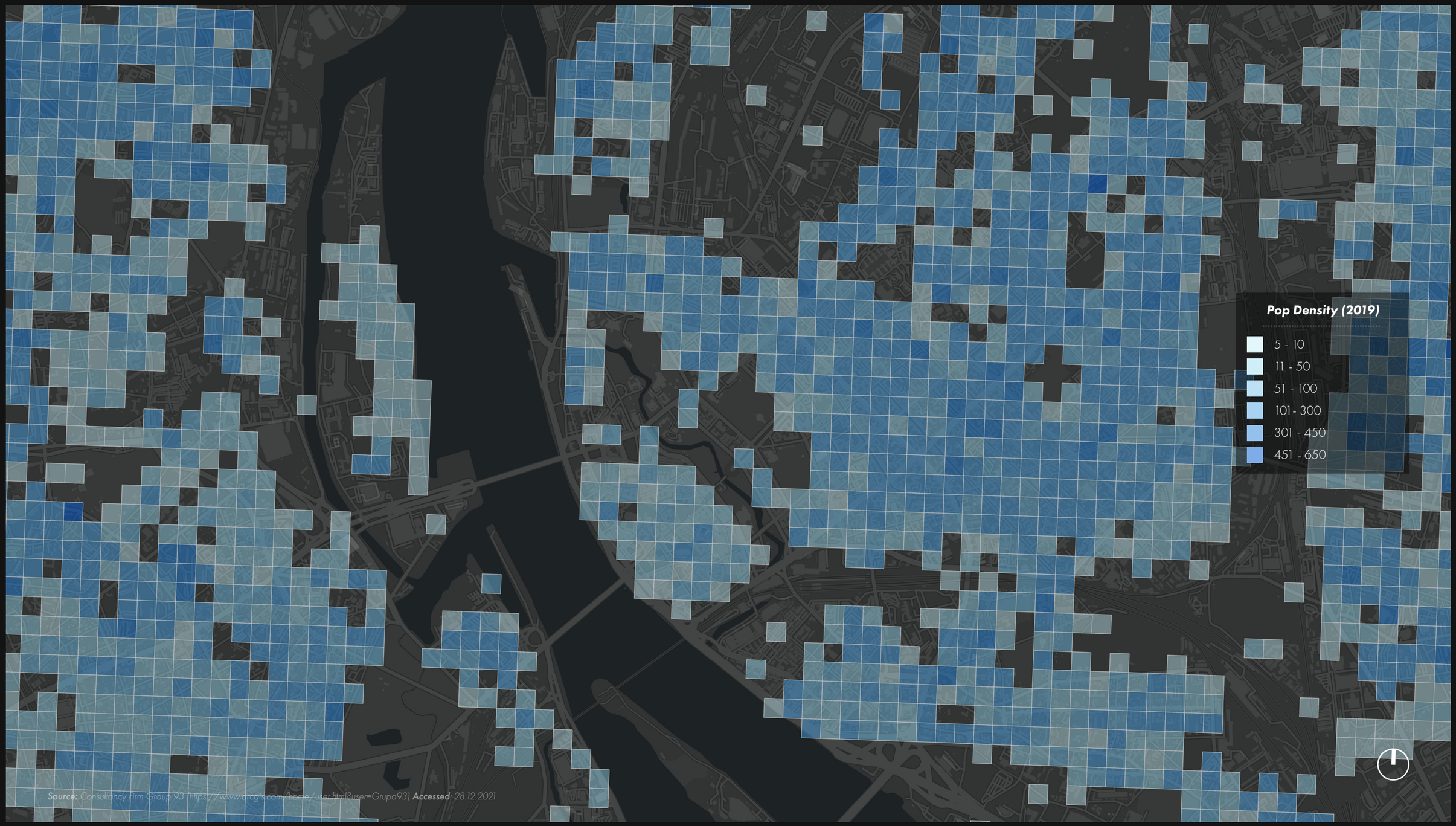
URBAN VOIDS

Property Status



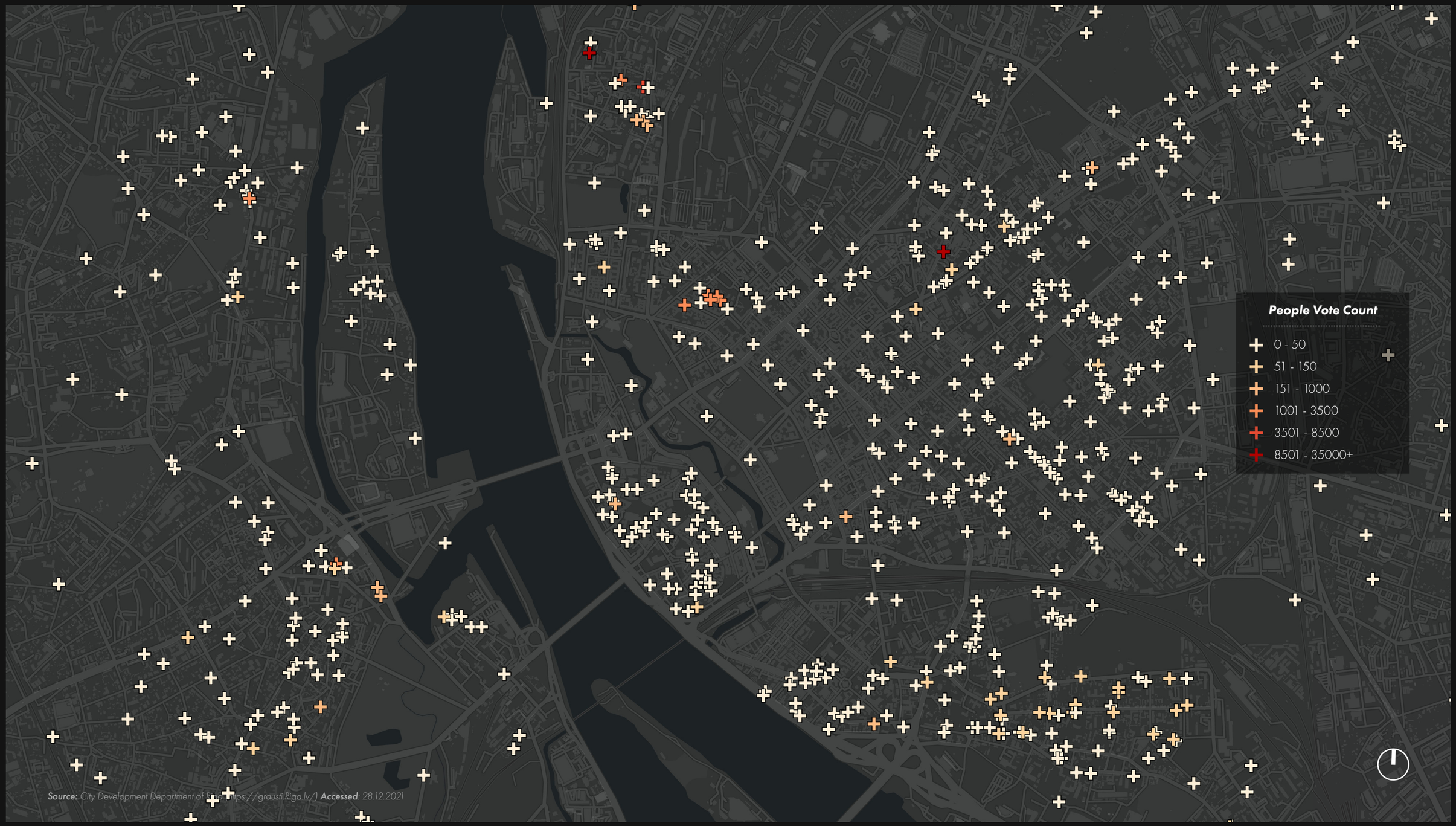
URBAN FABRIC

Population Density



URBAN VOIDS

Local Desireded Regeneration Points

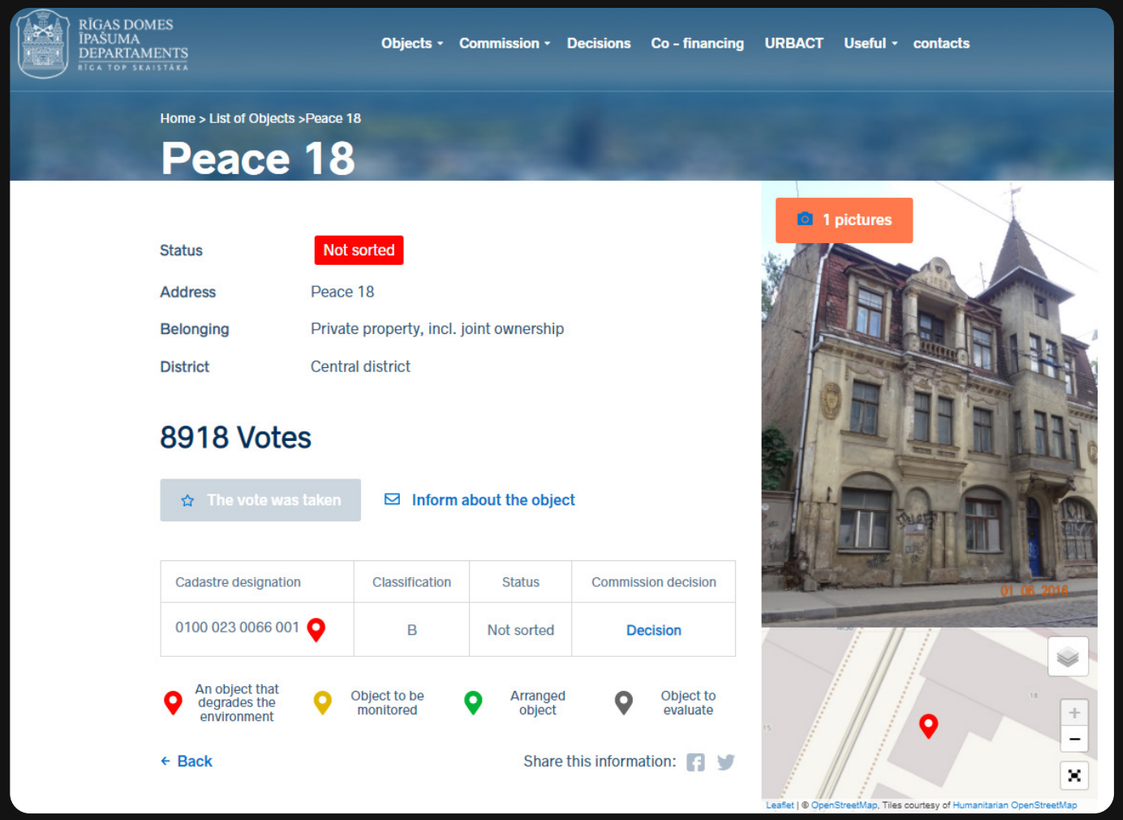


Governmental Initiative

Vote Vote Vote

Riga City Council Property Department has started mapping all the voids to understand the severity. This great initiative is the first step in the right direction. Currently, people can vote on which site needs further discussion. The voting system does not ask or interact with citizens any further. What they think needs to be done, what the area will benefit from, and what's required to foster jobs. Decision-making happens behind closed doors and can take months or years before anything starts taking shape. Diving deeper into the documents of some units, I realised that the Municipality is deciding not what to do with each team but classifying and identifying their status. This is important, but why nothing is being done to renovate these scars?

Sample:
Building on the right has been empty for over 10 years. In 2015 and 2016 municiplity carried out the assesment on the quality of the building. It was decided that it is partially ruined and no furhter actions are being taken.



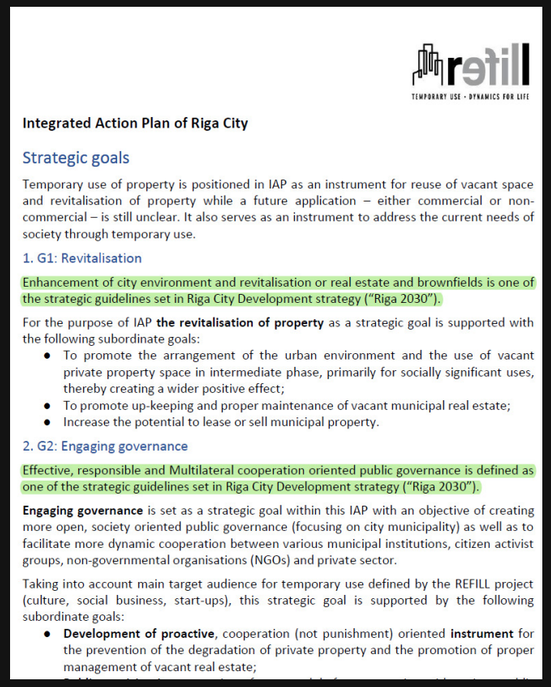
Source: *https://grausti.Riga.lv/objekti/miera-18/* **Accessed**: *28.12.2021*

NGO Initiatives

Temporary Solution For Permament Void

A Non-profit organization, Free Riga has become the primary mediator between the property owners and space searchers. They facilitate collaboration by connecting artists to vacant spaces. This is a form of tactical urbanism, bottom-up initiation.

Free Riga is tackling this temporarily on a small scale. This issue is common in many cities across Europe. Around 11 million plots and buildings are empty across Europe. (Visegrad Funds, 2014) Many private and EU-funded NGOs are experimenting with urban voids to rejuvenate their localities. Funding sometimes can be an issue, but peoples from NGOs state the biggest problem is stakeholder governance, property rights and top-down support.



refill
TEMPORARY USE - DYNAMICS FOR LIFE

Integrated Action Plan of Riga City

Strategic goals

Temporary use of property is positioned in IAP as an instrument for reuse of vacant space and revitalisation of property while a future application – either commercial or non-commercial – is still unclear. It also serves as an instrument to address the current needs of society through temporary use.

1. G1: Revitalisation

Enhancement of city environment and revitalisation or real estate and brownfields is one of the strategic guidelines set in Riga City Development strategy ("Riga 2030").

For the purpose of IAP **the revitalisation of property** as a strategic goal is supported with the following subordinate goals:

- To promote the arrangement of the urban environment and the use of vacant private property space in intermediate phase, primarily for socially significant uses, thereby creating a wider positive effect;
- To promote up-keeping and proper maintenance of vacant municipal real estate;
- Increase the potential to lease or sell municipal property.

2. G2: Engaging governance

Effective, responsible and Multilateral cooperation oriented public governance is defined as one of the strategic guidelines set in Riga City Development strategy ("Riga 2030").

Engaging governance is set as a strategic goal within this IAP with an objective of creating more open, society oriented public governance (focusing on city municipality) as well as to facilitate more dynamic cooperation between various municipal institutions, citizen activist groups, non-governmental organisations (NGOs) and private sector.

Taking into account main target audience for temporary use defined by the REFILL project (culture, social business, start-ups), this strategic goal is supported by the following subordinate goals:

- **Development of proactive**, cooperation (not punishment) oriented **instrument** for the prevention of the degradation of private property and the promotion of proper management of vacant real estate;

Key Challenges:

+ Stakeholder Governance
+ Brokering (Mediators)
+ Legal Framework
+ Funding
+ Governmental Engagement
+ Slow Adaptation
+ In some cases, 3rd party is better than a municipality due to trust issues and competition.

Source: *Visegrad Funds, 2014. https://issuu.com/kekfoundation/docs/vacant_central_europe* **Accessed**: *16.10.2021*
Source: *Refill, 2017. A Journey Through etmporary Use. https://refillthecity.wordpress.com/* **Accessed**: *16.10.2021*

Metaverse as an NGO

Metaverse As A New Methodology

Tactical urbanism is a great way to create attention and change your local area. It engages locals, is solution-driven, usually low cost and is initiated by bottom-up groups. This is great, although locations like Riga do not have time to spend 5+ years on one void at a time. In places like this, multiple parties need to be triggered simultaneously. Politically it can be challenging as officials change every few years; even when they are around, they can be barely trusted. High-profile initiatives will need a simple governance system. Metaverse can be seen as the next-generation tactical urbanism methodology. An interactive location and site-specific content creation platform automatically builds and securely stores datasets on the edge or cloud.

As an example can be seen in Amersfoort, The Netherlands.
Most of the empty spaces in Amersfoort are privately owned. Events are organised where parties can network and find their match. Local initiatives and businesses had a hard time finding each other. Amersfoort has engaged the networking organisation Matchpoint to create a platform for the two parties to find one another. Matchpoint has set up a website and is building a solid database.

Some estate brokers see the matchmaking service as a competitive action and don't want to collaborate with Matchpoint. As a neutral partner outside of the municipality, Matchpoint is in a better position to make matches than a department within the administration.

#1. LEGAL FRAMEWORK
Temporary use should be recognised as a practice by the municipal administration and included in the legal frame of building regulations.

#2. BROKERING
Temporary use requires accurate, dedicated mediation between stakeholders and support in the field for the entire duration of the temporary use, and beyond.

#3. SUPPORT
To benefit from temporary use and fully use its potential, initiatives need support.

#4. TEMPORARY USE BECOMES NORMAL
Temporary use is the new normal. Vacant urban spaces are no longer considered anomalies. As a result, temporary use is likely to develop further into a public service.

#5. URBAN LABS AND STRATEGIC TEMPORARY USE
Temporary use is a tool for bottom-up urban planning and a laboratory to experiment with the city of tomorrow.

SMALL SCALE LOCAL INITIATIVE
(Bottom-Up)

+

Blockchain

User Interactivity

Artificial Itelligence

Trust + Accountability

Extended Reality

Virtual Economy

Content Creation

Artificial Itelligence

Virtual Economy

Extended Reality

Artificial Itelligence

BIG SCALE INTERNATIONAL SUPPORT
(Bottom-Up+Top-Down)

Source: *Refill, 2017. A Journey Through etmporary Use. https://refillthecity.wordpress.com/* ***Accessed****: 16.10.2021*

A. How can Metaverse be used to rejuvenate decaying urban voids of locations similar to Riga?

Research Questions

B. How can we use the platformisation of metaverse to give voice to all neighbourhood residents and property stakeholders?

03. CASE STUDY

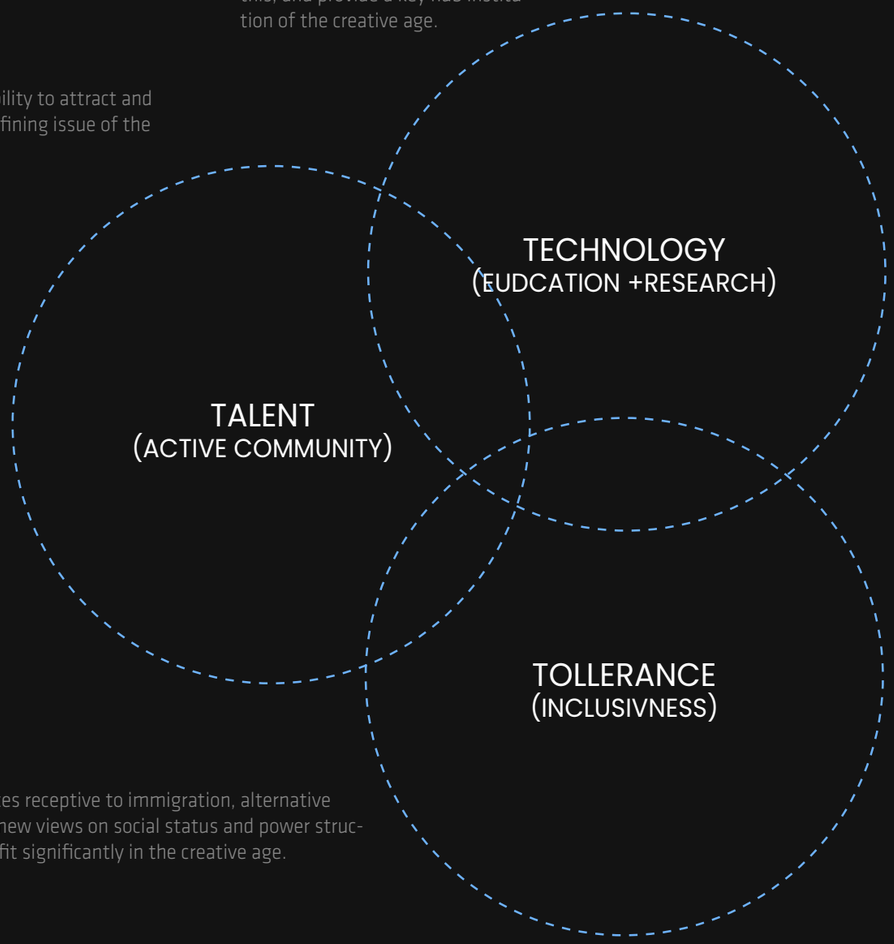
Site Drivers

Two Way Strategy

For the site, I am looking at two strategies to initiate an architectural project and help foster the research in the metaverse. Richard Florida is a known researcher with a formula to promote neighbourhood growth. This has been criticized for triggering gentrification, but with metaverse as a tool for governance and 'city access ', we can avoid further community displacement. Digital blockchain systems can facilitate new governance models to shape their respective environments—an opposite approach to traditional city rejuvenation.

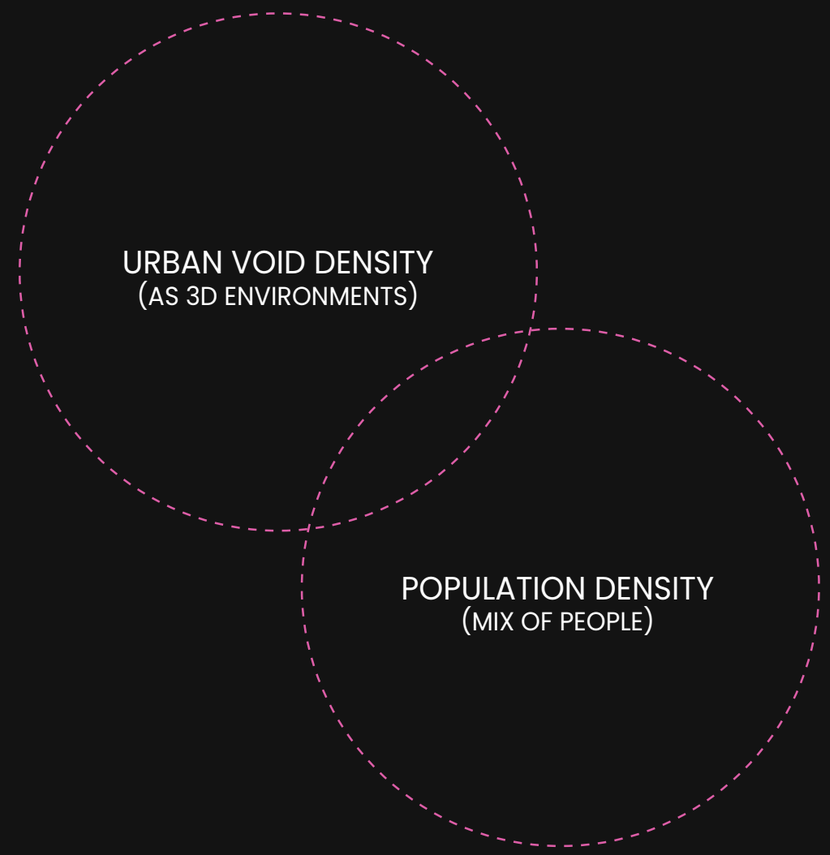
Tech: Universities are paramount to this, and provide a key hub institution of the creative age.

Talent: A community's ability to attract and retain top talent is the defining issue of the creative age.



Tolerance: Places receptive to immigration, alternative lifestyles, and new views on social status and power structures will benefit significantly in the creative age.

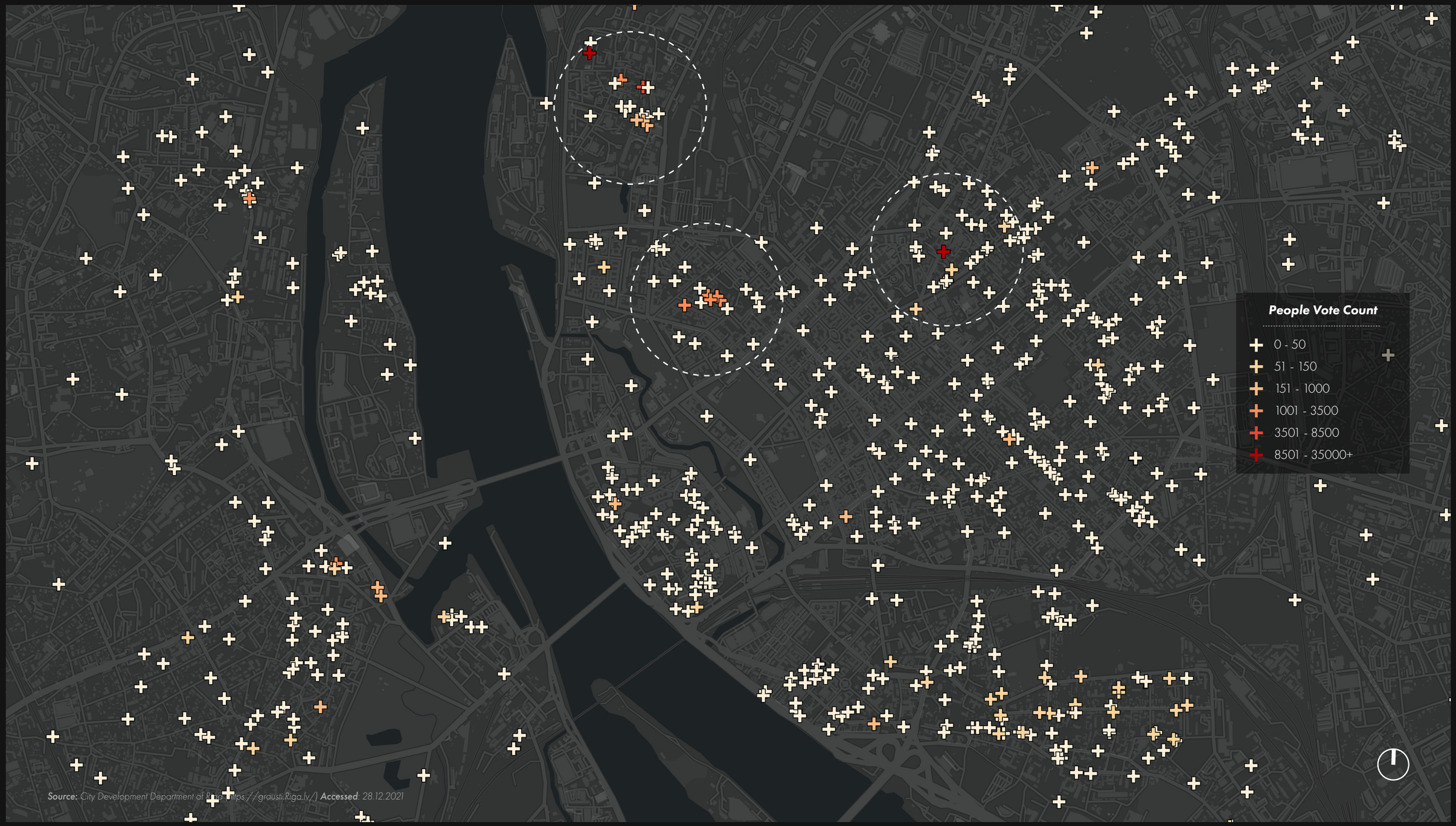
RICHARD FLORIDA
(Formula For Urban Rejuvination)



METAVERSE
(Key Principles)

URBAN VOIDS

Local Desireded Regeneration Points



Location Comparison

Identifying Neighbourhood Potentials

Three locations were compared based on Richard Florida and Metaverse criteria. Based on void density, resident density and land use, and accessibility. Setting out criteria is essential as it helps define a case study site that will positively impact the city—a catalyst location for total urban void regeneration. As a resident and programmatic, diversity and accessibility are critical; in this instance, Peace Street has the most needed ingredients for change.

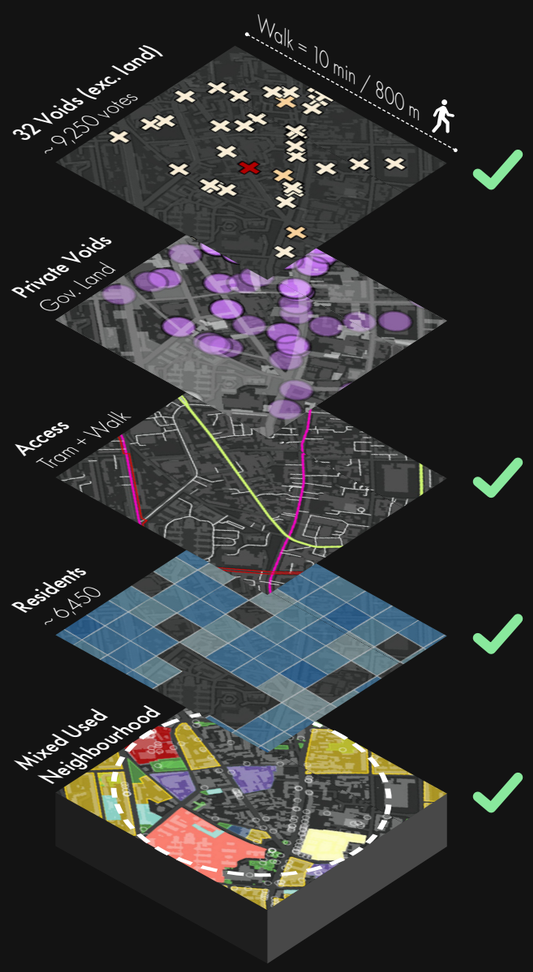
People Vote

Land Ownership

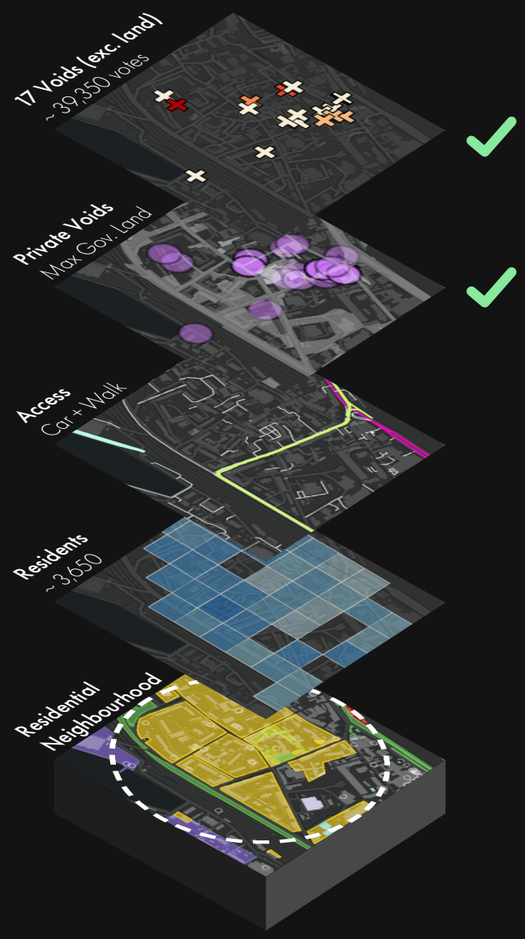
Infrastructure

Population

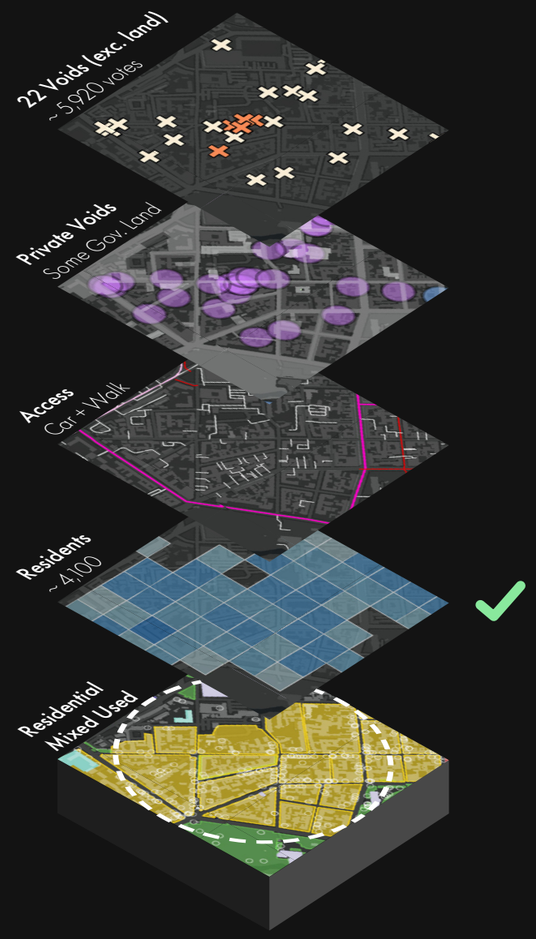
Land use



Peace Street



Outter Center



Silent Center

Source: *City Development Department of Riga (https://grausti.Riga.lv/)* **Accessed**: *28.12.2021*

Location Comparison

Identifying Neighbourhood Potentials

When comparing three urban voids closer, two are near the demolition state. Peace street has an urban void as a plot and a building in the centre of Riga.

Peace Street 18

+ Class B + 8900 Votes ● Private Property / For Sale

Vēžu Street 7

+ Class A + 33120 Votes / Up for demolition ● Private Property

Dzirnavu Street 27

+ Class B + 1190 Votes ● Private Property / Under Renovation

Peace Street 14

+ Class B + Unlisted ■ Goverment Owned Land

Piena Street 14

+ Class B + 3600 Votes ● Private Property

Dzirnavu Street 26

+ Class B + 1170 Votes ● Private Property

Peace Street

Neighbourhood Overview

Peace Street indeed appears to have an active community but to be frank quite a sterile environment where the National Theatre is submerged in the sea of cars.

Locals

Mutigeneration Families / Artists / Young Professionals

The Republic of Peace Street is a community-driven initiative to unite residents. Typically events and gatherings occur in car-filled courtyards—among multigenerational neighbours with many artists and young families residing in the area. Despite the vast amount of negligence in the area, locals desire to live and raise families in this central location.

A local family has recently moved from a noisy main street with the tram passing by to an apartment facing the courtyard.

Anchor and Land Use

Is it Worth The Walk

Youth attractiveness is evident when looking at land use. Programmatically, the neighbourhood is diverse and appears walkable in terms of distance: several schools, lots of shops and even a chocolate museum and factory. Anchors are defined as site generators and receivers of pedestrian activity. At the bottom is a detailed list of potential points of interest that locals would use daily or occasionally.
While Frontage Quality explains where people are likely to want to walk, Anchors tell us where people are likely to need to walk—or at least to find the walk most useful (Speck, 2018).

Total of 174 attributes (POI):

Art Center - 1
Art Pieces - 4
ATM - 7
Bakery - 1
Bank - 1
Bar - 7
Beuty Shop - 2
Bench - 1
Beverage Shop - 4
Bike Rental - 5
Bike Shop - 1
Bookshop - 2
Cafe - 9
Camera Surveilance - 9
Chemist - 1
Clothe Store - 8
Community Center - 1
Computer Shop - 1
Convenience Store - 5
Dentist - 5
Doctor - 1
DIY Store - 1
Embassy - 1 (Rom)
Fast Food - 8
Florits - 3
Fountain - 1
Furniture Store - 1
Gift Shop - 1
Guesthouse - 1
Hairdressers - 9
Hotel - 1
Jeweller - 2
Kindergarten - 1
Kiosk - 1
Laundry - 1
Memorial - 2
Phone Shop - 1
Museum - 2
Nightclub - 4
Optician - 3
Outdoor Shop - 2
Pharmacy - 5
Playground - 4
Police - 2
Post Box - 1
Pub - 6
Recycling - 4
Restaraunt - 9
School - 5
Shoe Shop - 3
Sports Shop - 4
Supermarket - 2
Theatre - 1
Toilet - 2
Toy Shop - 2
Travel Agent - 3
University - 1
Vending Any + Parking - 2

Source: *Open Street Map (https://www.openstreetmap.org/node/1982654013#map=14/56.9567/24.1152)* ***Accessed****: 30.12.2021*

Street Quality

Frontage Quality Assesment

Frontage Quality Assessment. Determining where people are likely to walk in a study area. While Frontage Quality explains where people are likely to want to walk, Anchors tell us where people are likely to need to walk—or at least to find the walk most useful. Despite the vast programmatic diversity, walkability is not encouraging as street quality is poor, and there are no buildings inviting footfall, reducing interaction or serendipity.

Frontage Criteria:
cities, a street with friendly buildings on both sides is an A. When one side becomes a blank wall, it drops to a B. A blank wall across from a parking structure is perhaps a D. Two trash-strewn lots and F. What matters is that the the system is internally consistent so that pockets of good or alarming can be identified.

Frontage Criteria

- A - Street Friendly Buildings
- B - Blank Facade On One Side
- C -Two Blank Facades Facing
- D - Parking Lot + Blank Wall
- E -Parking Lots
- F - Trash-Strewn Lots

Source: *Frontage Criteria from: Speck, J. (2018). Walkable City Rules: 101 Steps to making better places. Island Press.* ***Accessed****: 09.01.2022*

Infrastrucutre System

Access Points

It is difficult to imagine people walking if there is not an appropriate infrastructure in place, and secondly, they will walk if their walk serves some purpose. Life is much more efficient when your neighbourhood encourages walking or biking to school instead of driving since time is not wasted in transit or traffic. (Speck, 2018, p 33)

Infrastructure

- Primary r.o.w
- Secondary r.o.w
- Tertiary / Service
- Cycle Path
- Bus
- Tram
- Highest Voted Void
- Bus Stop
- Tram Stop

Source: *Open Street Map (https://www.openstreetmap.org/node/1982654013#map=14/56.9567/24.1152)* **Accessed**: *30.12.2021*

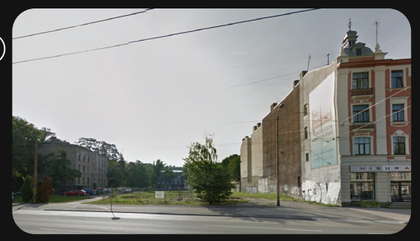
Futureless Voids

Overall Neglect

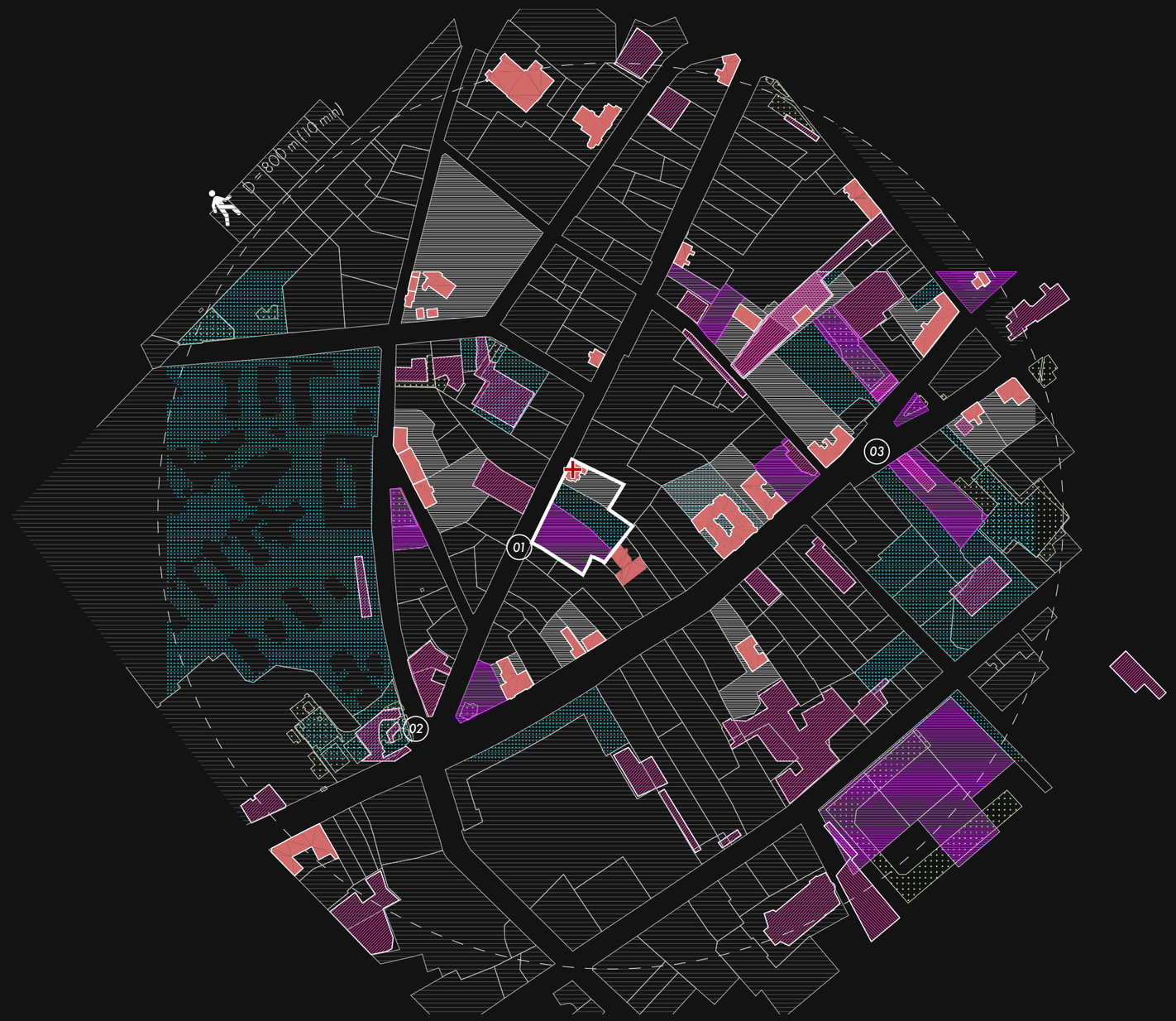
Like in the virtual world, the natural world metaverse can consist of real places, locations and qualities. Urban Voids are perfect playgrounds as it combines real-world issues and allows people to interact with emptiness via digital dashboards.

01 **Plot Number** 01000230064

02 **Plot Number** 01000230099



03 **Plot Number** 01000280009



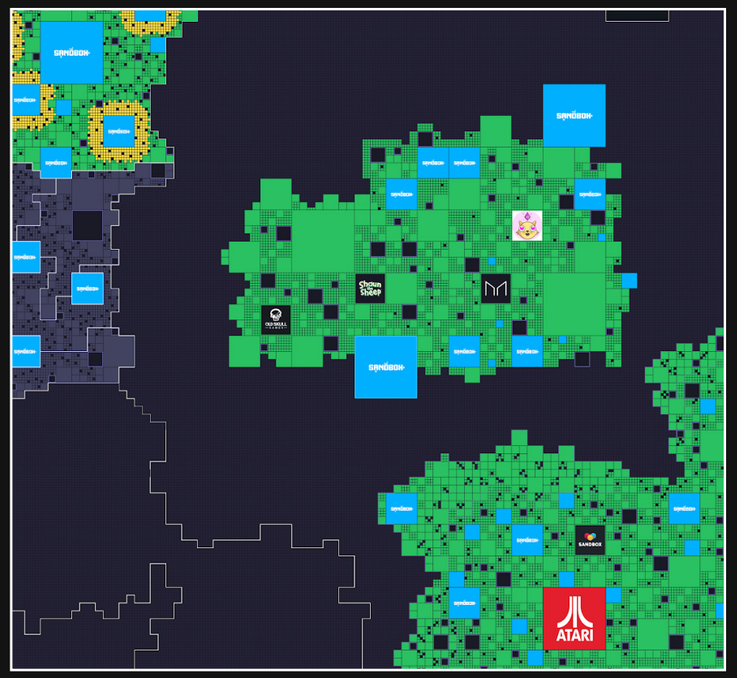
Neglected Buildings
Building Plot
Open Parking Plots
Gov. Owned Land
Empty Plots
Potential Site/ Highest Voted

Source: *Open Street Map (https://www.openstreetmap.org/node/1982654013#map=14/56.9567/24.1152)* ***Accessed****: 30.12.2021*

Digital Plot

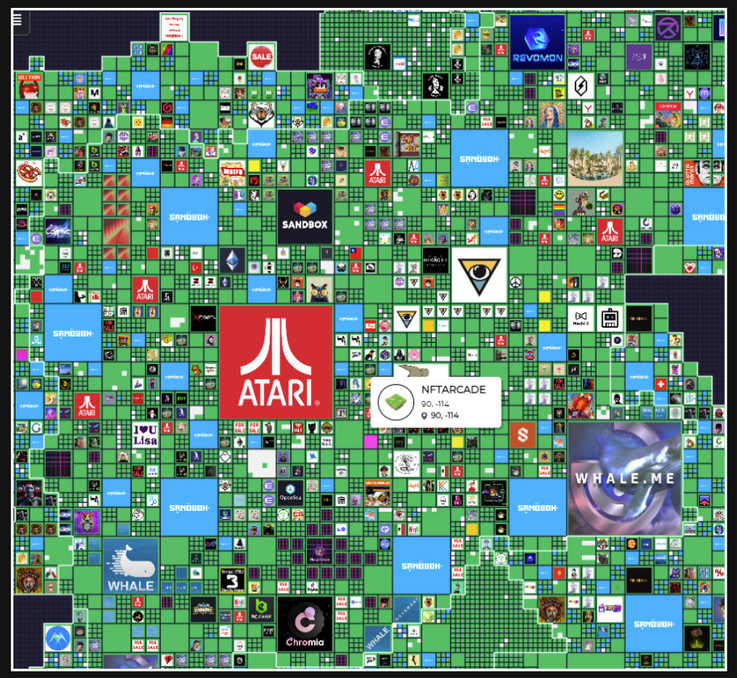
Virtual Real Estate Is The Future (?)

'Metaverse is' widely explored in the gaming industry, as it creates a clean canvas for exploration and technology testing. As Lee et Al. suggest, the Metaverse eventually will consist of real-world digital twins. The technology needs time to advance, although we can learn the critical principles of gaming land distribution. We need to think of real-world cities as licences and codes to proceed.



Digital Islands

Metaverse will take many different forms, from a small meeting room experience to a city-wide first-person exploration. Currently, a decentralized Metaverse run by The Sandbox and Decentraland (key players) lets individuals buy virtual land using Crypto. The land has an NFT and a verification code. Similar to when we purchase physical real estate.



Neighbourhoods

Quite often, digital cities also have traditional zoning. Some districts are famous for retail, entertainment and even official embassies. Barbados announced its commitment to Metaverse with a diplomatic embassy in Decentraland.

Bardbados Decentraland Source: https://www.bloomberg.com/news/articles/2021-12-14/barbados-tries-digital-diplomacy-with-planned-metaverse-embassy

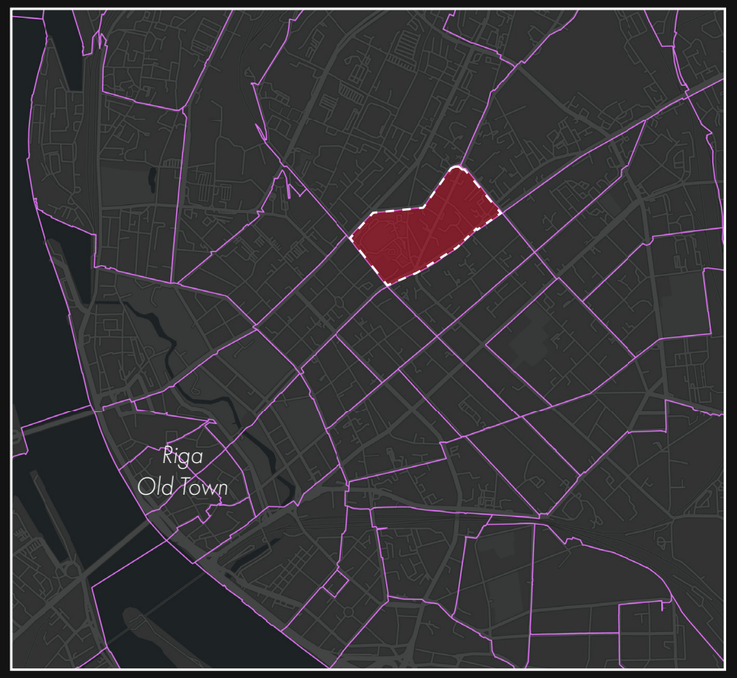
Plots

Businesses and private individuals can buy pieces of land required to build a virtual architecture on their platform. Each building can be populated per individuals' desires, with no planning permits and so on; maybe this could be the future of architecture? If the land purchasing, surveying and planning application process could be synchronized and automatically generated. Blockchain and Smart Contract application needs further exploration and research in architectural governance.

Physical Plot

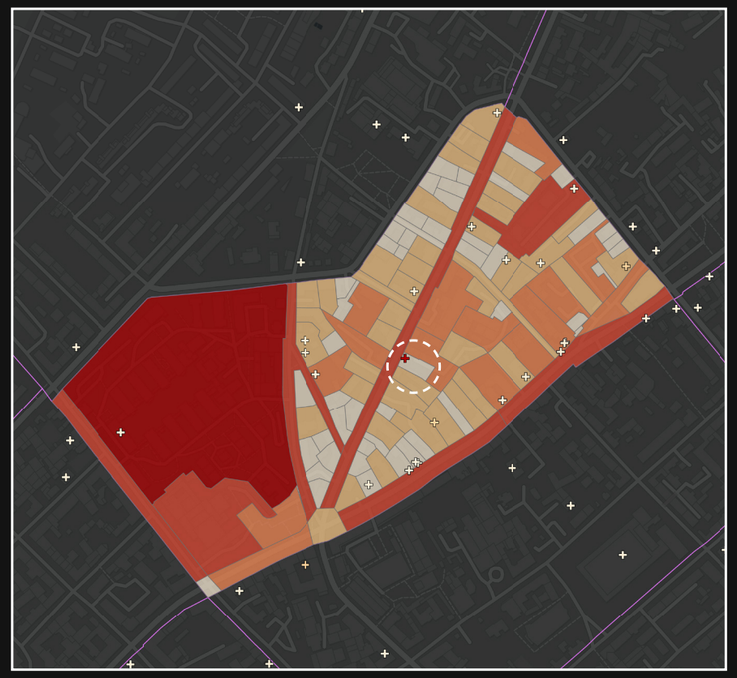
Real World Metaverse

The new chapter can be highly beneficial for the real-world AEC industry. Like the Metaverse lands, Cadestral Codes are used to identify, sell and upgrade (or downgrade) our cities. I had to search for many hours, maybe days, to find such information, but the Metaverse could help localize this information in a three-dimensional manner; a digital breathing twin. Similar to Virtual Singapore, but with an ability to experience cities from street level and interact with them on the spot or remotely using augmentation devices.



Neighbourhood Cadestral Code - 0100023

Red Area.
I am focusing on neighbourhood 0100023, as multiple urban voids are screaming for attention, while this gives me a base to have a referenced real-world Metaverse.



Plot Cadestral Code - 01000230066

As the Metaverse will consist of worlds, Riga .23 can be a world on its own. Cadastral codes can be divided according to land ownership and use within the more extensive area. 20+ urban voids can be found within this area, allowing me to create each as a separate entity which residents can interact with.

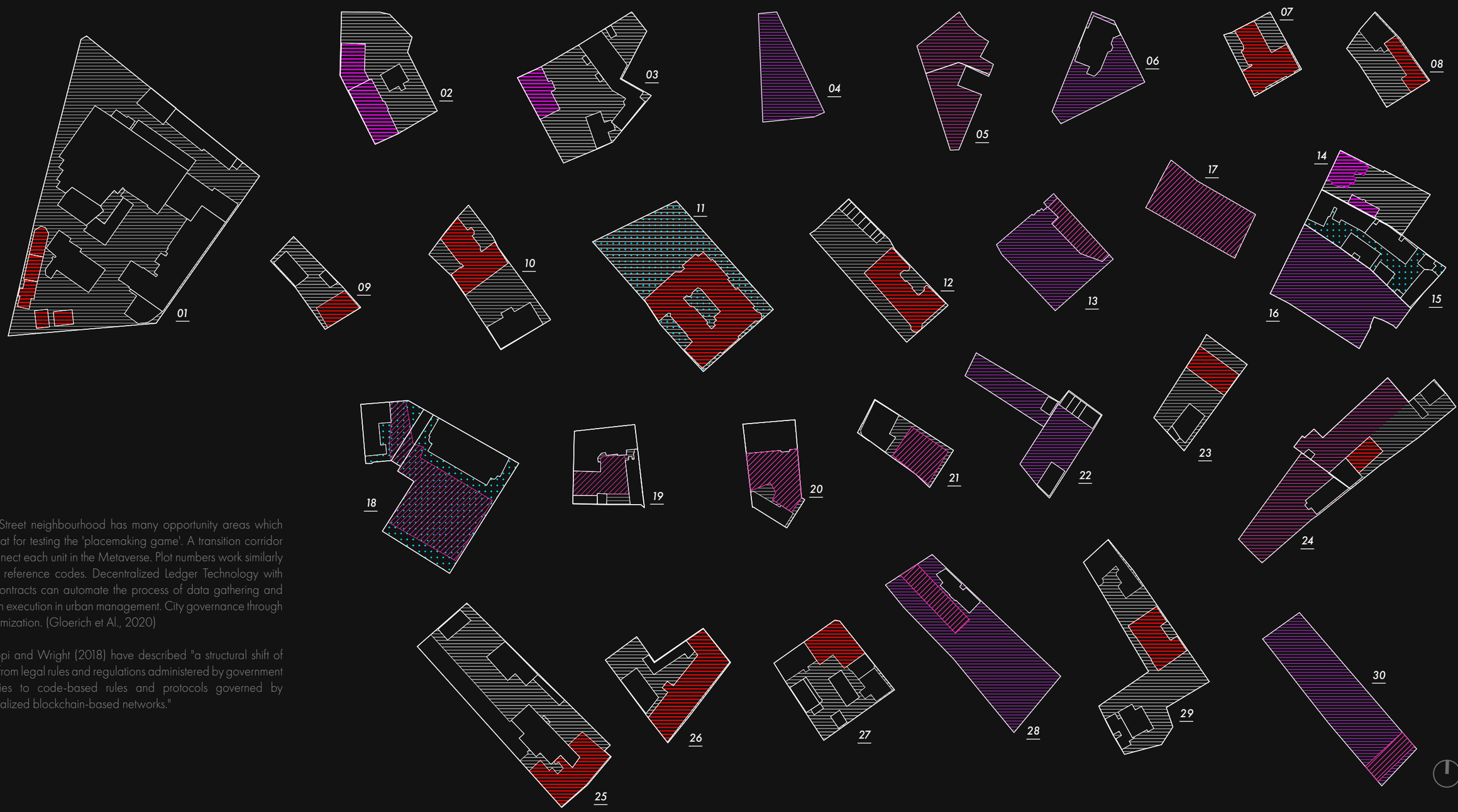
Building Cadestral Code - 01000230066001

Each plot has several buildings that need attention. As a starting site, I will focus on the site ...66001, which has nine smaller facilities. This will be the 'home' point for the Metaverse placemaking game. Other plots nearby will be connected with a proposed master plan as several empty plots are government-owned.

Urban Voids As MV Worlds

City As A Rights Management System

Neglected Buildings · Building Plot · Gov. Owned Land · Empty Plots · Open Parking Plots



Peace Street neighbourhood has many opportunity areas which are great for testing the 'placemaking game'. A transition corridor will connect each unit in the Metaverse. Plot numbers work similarly to NFT reference codes. Decentralized Ledger Technology with smart contracts can automate the process of data gathering and decision execution in urban management. City governance through algorithmization. (Gloerich et Al., 2020)

De Filippi and Wright (2018) have described "a structural shift of power from legal rules and regulations administered by government authorities to code-based rules and protocols governed by decentralized blockchain-based networks."

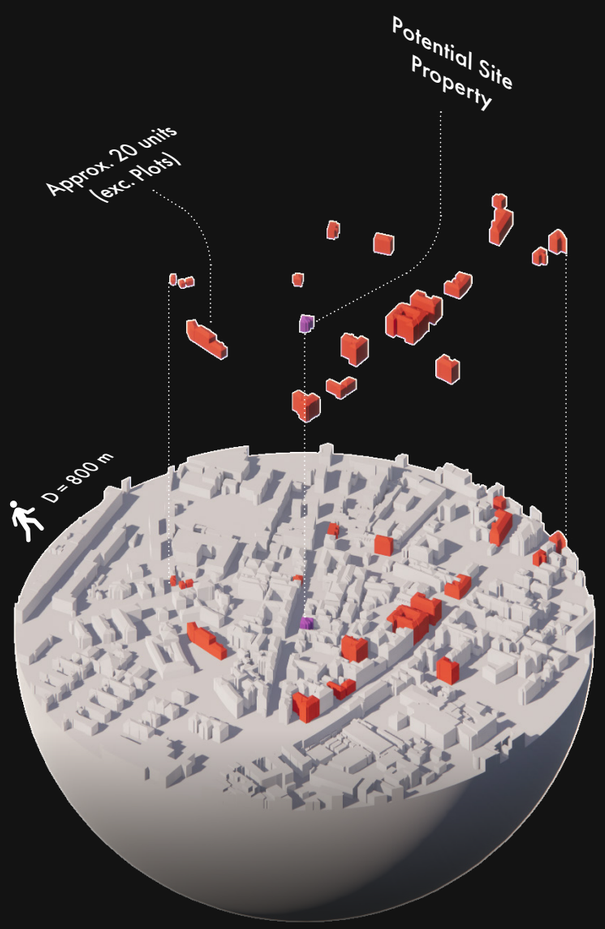
00 50 100m

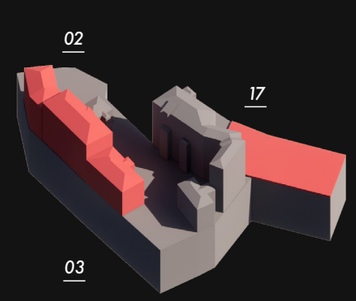
Urban Voids As MV Worlds

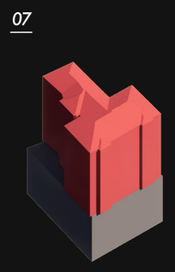
Potential Metvaverse 'Playgrounds'

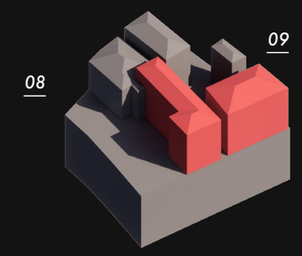
Urban voids count:
There are 20+ neglected buildings within a 400m radius from the site (purple building). Each structure and plot (shown following slides) can become part of the Metaverse world where locals can interact with the city, proposing alternative neighbourhoods.

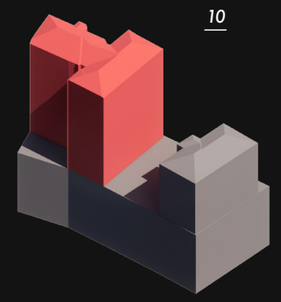
Blockchained Digital Twins:
Each axo highlights an opportunity unit which can be 'played' within the Metaverse. It can be experienced via augmented reality when close to a specific location or remotely through a virtual reality headset. Each void stores a digital twin on a decentralized blockchain. Latvia experiences vast corruption, typically through the built environment and urban design projects. How we make and collaborate has an opportunity to change due to web3 and Metaverse technologies.

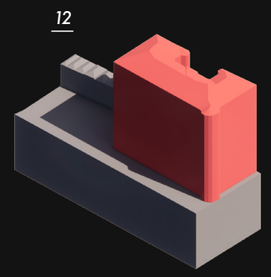


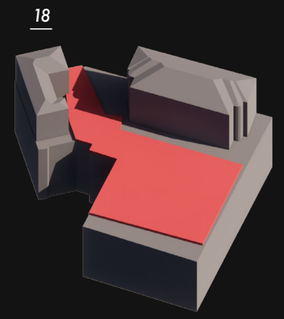


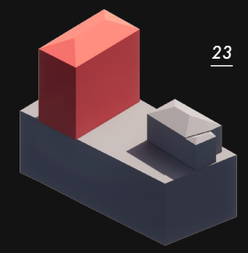


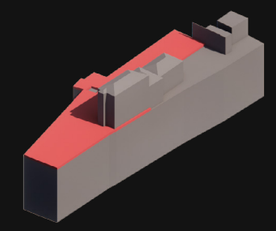


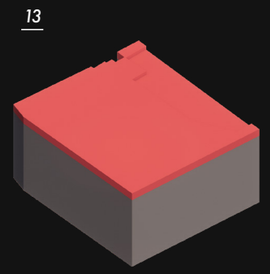


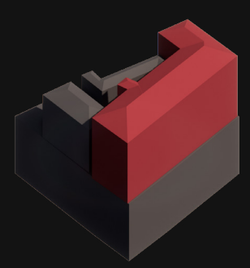


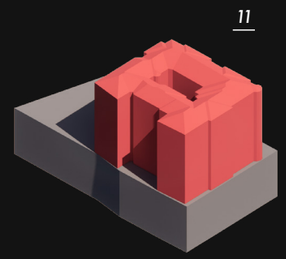


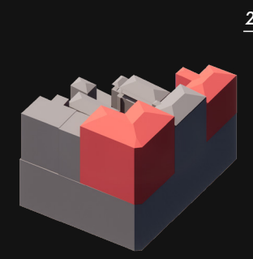










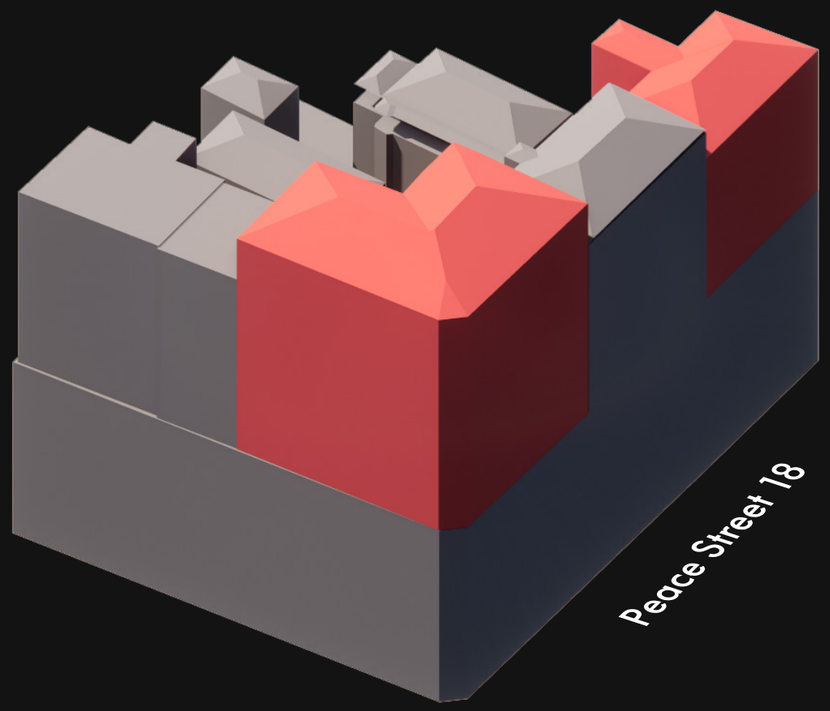


Non Fungible Token. NFT

Urban Void As An NFT

Each urban void can become an asset (an NFT) or social crypto coin that individuals can purchase or 'invest' in, exchange money for equity. By buying into the urban void metaverse, individuals establish a digital identity and can become active citizents of the duality. With a token one can participate in decision making, propose and vote for alternative solutions to urban void of Riga.

Each void, through Smart Contracts, can have coded policies or building regulations. Such as Form-Based Code. Form-based codes address the relationship between building facades and the public realm, the form and mass of buildings with one another, and the scale and types of streets and blocks. This becomes a bottom-up approach to city planning, as each urban void regeneration must consider the contextual implication. This can be tested in the metaverse, simulating the real-world situations and opening up the digital twins for interaction can create people-centred neighbourhoods.



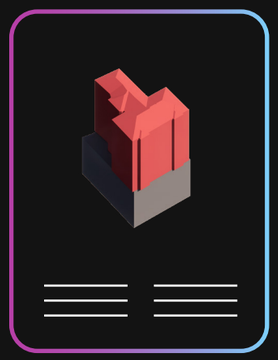
Data Set

Plot Number: *01000280009*
Year Built: *1924*
Planning: *No Reported Future Plans*
Status: *Recently was for Sale*
Use: *Historically commercial use*

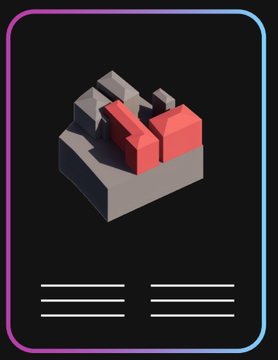
Proposed Use: *Library*
Block Score: *67 points*

- Private / Co-Owned
- 8900+ Votes
- B / Semi Ruined
- Evaluable

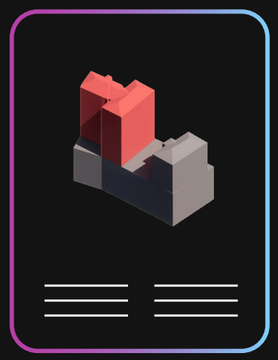
NFT 1



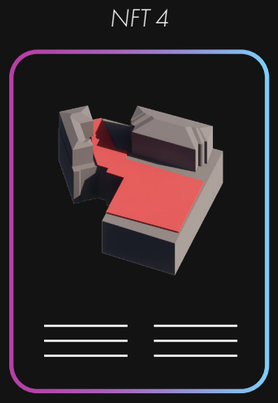
NFT 2



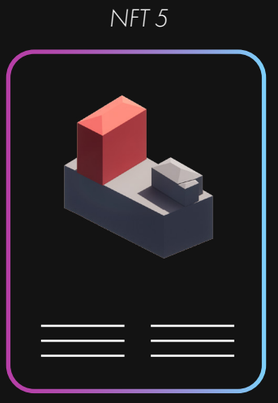
NFT 3



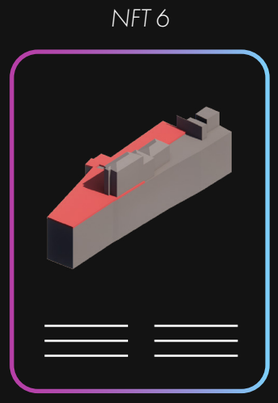
NFT 4



NFT 5

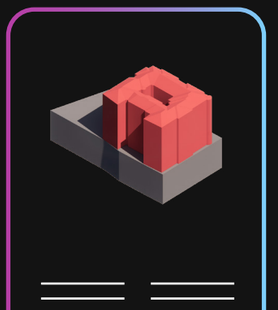


NFT 6

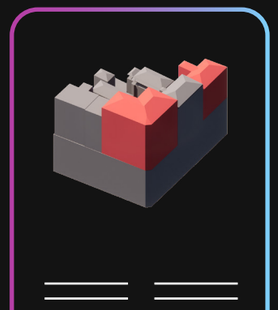


NFT 7

NFT 8



NFT 9



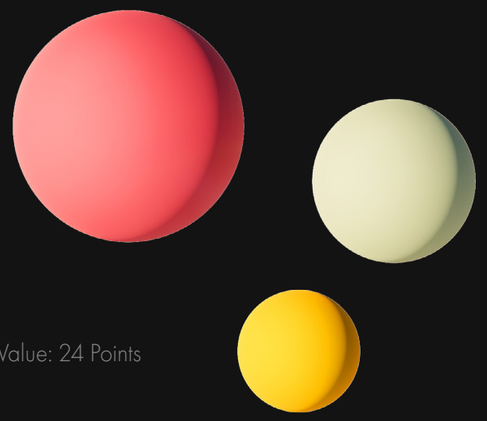
Social Infrastructure Tool Kit

Urban Void SDK

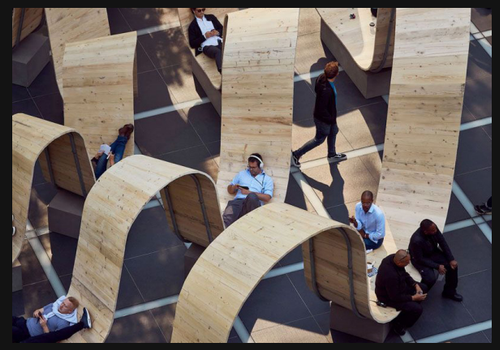
Because the metaverse is not a single location but a state of multiple cyberworlds and systems working together, companies in the metaverse are building toolkits and software-development kits (SDKs) to gather community input in problem-solving and ecosystem creation. This is an excellent initiative from developers as it indicates that the next generation of the internet will be decentralized or created by the users.
Architecture Metaverse can significantly benefit from such initiatives. Create an open-source and accessible toolkits inspired by real-world public spaces, architecture and gaming elements. Overlaying gaming and the physical world can foster a fun and playful approach to city design and governance, removing the seriousness of policies.

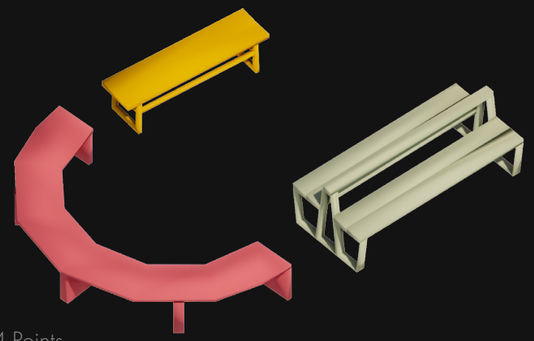
These urban voids can significantly impact the city and economy if rejuvenated with social infrastructure. Social infrastructure is a series of physical spaces where people can assemble.
The project does not desire to build a community forcefully but rather a foster contact by letting individuals pass by, engage with their surroundings, and decide for themselves what is needed in their neighbourhood. It's not so much about a particular shop but is when a program acts as a place of congregation. (Klinenberg, 2018).

Social infrastructure, emphasizing the role of social spaces that promote belonging and civic engagement, should be treated with the same right and seriousness as the complex infrastructure of our cities, especially in the post-pandemic world, where our physical infrastructure has proven insufficient and fragile to handle extreme situations, where tightly-knit communities are celebrated and less isolating. Each component could have a value score attached, so neighbourhood quality increases or decreases each time an object is placed on site.



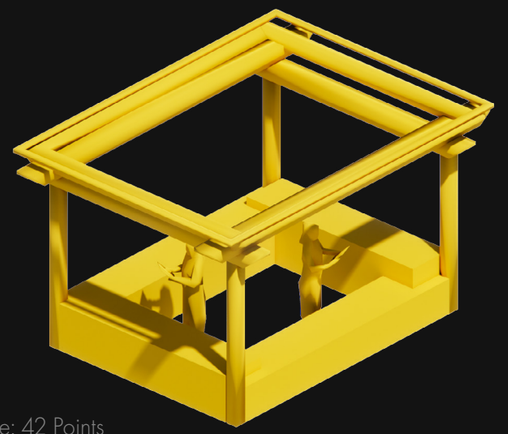
Value: 24 Points





Value: 34 Points

Value: 81 Points



Value: 42 Points

Components

Active Components

Schools
Athletic Fields
Food Markets
Art + Consumer goods
Hairdressers
Playgrounds

Passive Components

Public institutions
Libraries
Bookstores
Cafes
Parks

Toolkit Mock Up

AR DAO Dashboard - Mobile Device or Browser

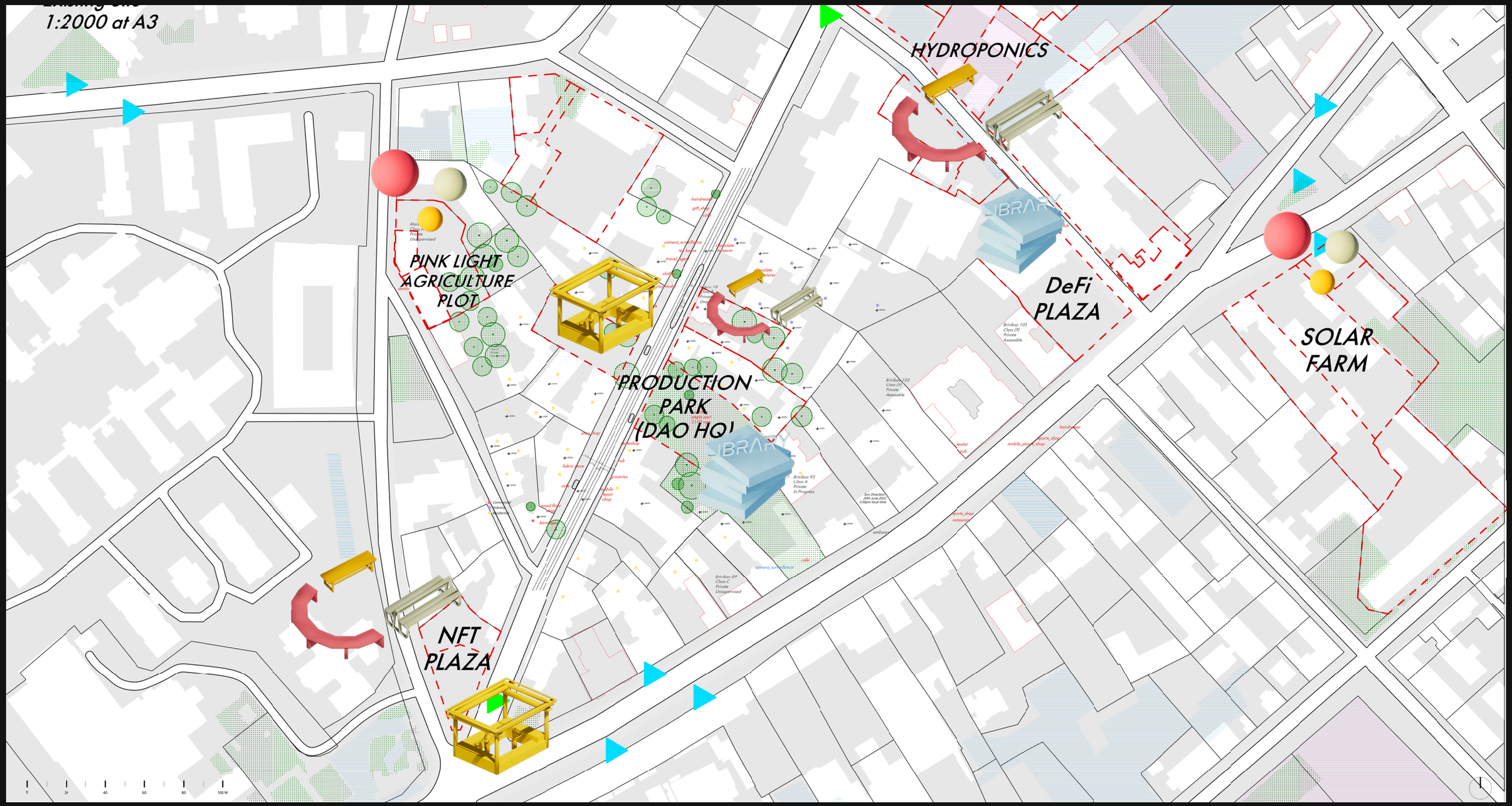
Metaverse can be accessed through a physical hand-held device with built-in features to help re-imagine urban voids. Such a toolkit could be used in community workshops, on a browser such as Chrome remotely or by passing by gaps.

Toolkit Mock Up

AR DAO Dashboard

City As A Game

But With Real Utility



04. CONTEXT STUDY

The Missing Puzzle

Site Potentials

The most exciting projects start by understanding the missing puzzle in the neighbourhood while paying close attention to what's already on site.
It is essential to have the new intervention built on top of the existing facilities within the neighbourhood. The site is surrounded by schools and businesses, which the project can empower and utilize. Taking all the above into account, I propose designing a metaverse research academy. It is going to be a challenge-based learning academy (CLB) which encourages students to leverage technology to collaborate and solve real-world problems. Metaverse can contribute to education in the following ways:
- Immersive, simulating realistic scenes to promote the understanding of learning content;
- Test and learn about digitalization for kids and the elderly.
- If Augmented, foster outdoor time and encourage physical engagement.
(Ning et al., 2021)

The Center of Creative Learning (CCL)

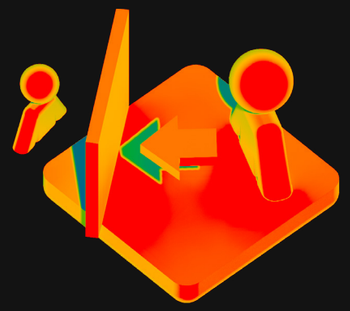
CCL in Riga is a place where young people aged 5 to 25 can spend their free time. The "Annas 2" Centre offers technical, scientific and artistic workshops, development of practical skills and help in choosing possible future professions as well as interesting holiday camps for children and young people in Riga and elsewhere. Non-formal education is the essential part of the Centre's operational philosophy and working methods.

Local Needs

On-Site Existing Program, Local User Needs.

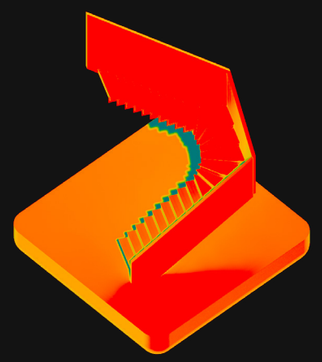
I discussed the current situation with the Creative Learning Center to determine what the neighbourhood needs. Inhabitants of the school (also regular users of the neighbourhood) highlighted six key downfalls and potentials. The school organises occasional events, yet the only way to accommodate interaction is by closing down tertiary roads for the day and spilling them onto the streets.

Source: *Email communication extracts and summaries* / **Date of Event**: *01.04.2022*



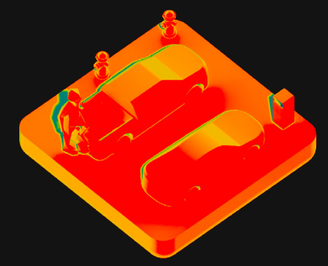
VISUAL CONNECTION

In general, rooms lack a well-thought-out and visually stimulating storage system that would make the environment easier to perceive and make it easier to navigate the materials and space itself.



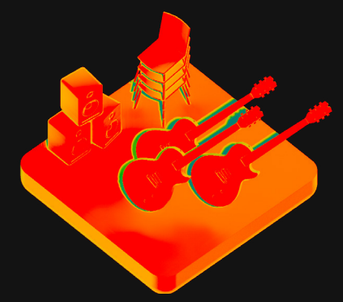
STAIRS

The physical environment is not inclusive; there is no elevator and many stairs. The building should be assessable to all mobility needs.



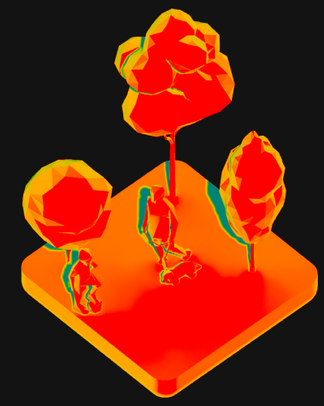
POOR BACK-YARDS

We sometimes decorate the street in front of the building. We have a yard, but it is in a poor state for people to come together.



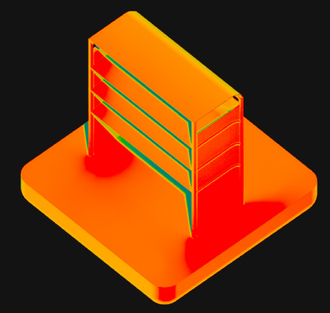
EQUIPMENT

We try to remodel the existing spaces with appropriate equipment and sound insulation where needed for the workshops.



MULTIFUNCTIONAL YARD NEEDED

I think it would be essential to use the outdoor area efficiently and create a multifunctional space where various competitions, competitions and other events can be organized.



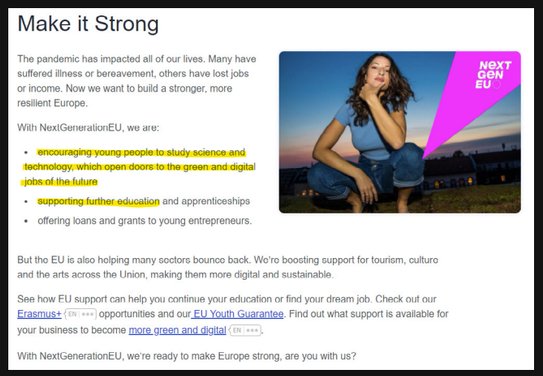
STORAGE

The electronics classroom is adapted so that it is more convenient to store all the components needed for classes, student work, and teaching materials.

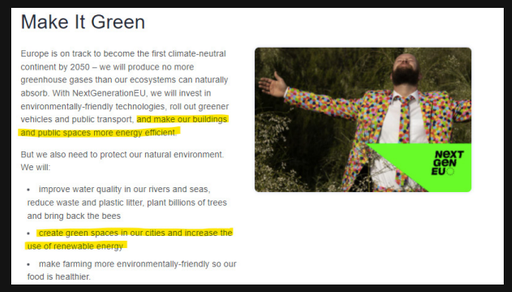
Next Gen EU

Digital Decade

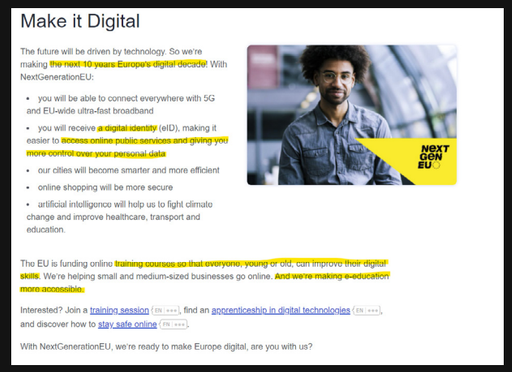
Next-Gen EU is an 800+ Billion euro fund provided to European countries. There are two key reasons why I am highlighting Next Generation Eu. The first is research-related and the second program related. With this initiative, the EU defines the next ten years as the digital age for Europe. This initiative encourages more research in making digital services accessible and our public space greener. The aim is to provide workshops and educate youth and seniors about science and digital systems, to open doors for a more digital and green future. This is an exciting period for all of us in this room and the EU. But most significantly, for Riga, because there is funding to marry urban voids and metaverse into an exciting future of Latvia.



** ... encouraging young people to study science and technology, which open doors to the green and digital jobs of the future.*
** supporting further education and apprenticeships.*



** ... make our buildings and public spaces more energy efficient.*
** Create green spaces in our cities and increase the use of renewable energy.*



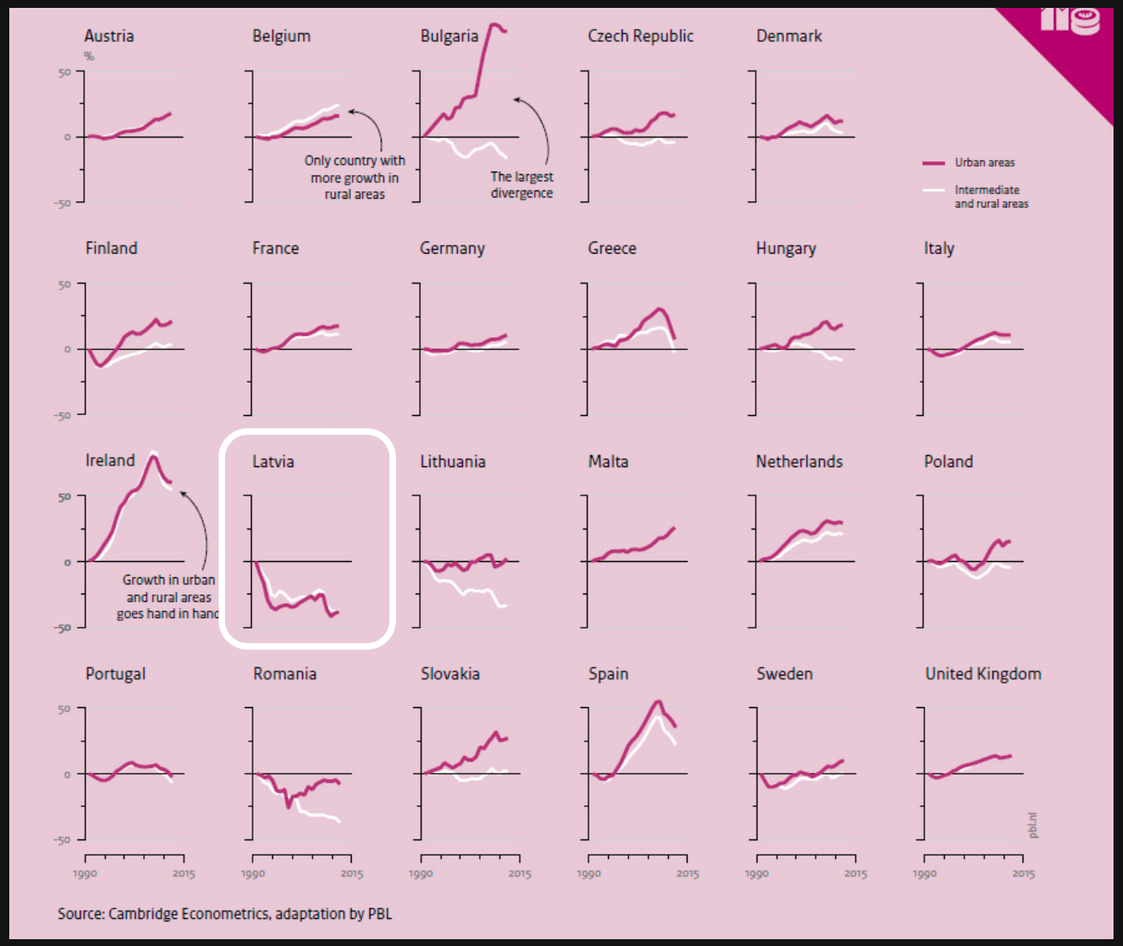
** ... the next 10 years Europe's digital decade!*
** making it easier to access online public services and giving you more control over your personal data.*
** training courses so that everyone, young or old, can improve their digital skills.*

Source: *https://europa.EU/next-generation-eu/index_en#ecl-inpage-30*

Creating Opportunities

Departing Yough Departs For A Reason

Many Latvians have left Riga to go to the suburbs or leave the country together. Latvia has one of the worst economies in the whole of the EU. To change the trajectory, we must create jobs and increase opportunities for women, young people and older and low-skilled workers, modernise the labour market and invest in education and skill training.



Source: *www.pbl.nl/en. Parts of this publication may be reproduced, providing the source is stated, in the form: Nabielek K. et Al. (2016), Cities in Europe. PBL Netherlands Environmental Assessment Agency, The Hague.* **Accessed**: *30.09.2021*

Developer Academy

Small Intervention - Big Change

Apple had started a developer academy. The academy primarily collaborates with existing educational institutions, like universities, to extend their tech training. Apple is almost following the Richard Florida's Ven diagram highlighting the 3T's for neighbourhood rejuvenation. Apple is a third party in lifting the community and creating new entrepreneurial opportunities. Riga and Metaverse need this sort of initiative. I am focusing on a Metaverse Research Academy.

Source: *whttps://www.apple.com/newsroom/2021/01/apple-launches-major-new-racial-equity-and-justice-initiative-projects-to-challenge-systemic-racism-advance-racial-equity-nationwide/*

05. PROGRAM

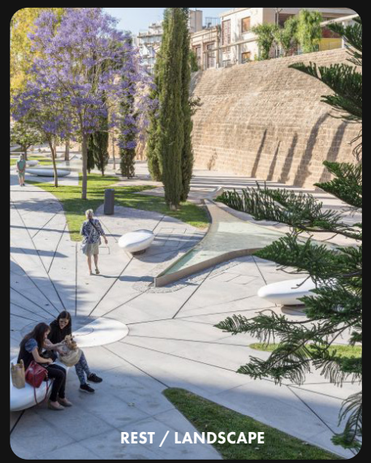
Program Objectives

Six Key Drivers

Local Engagement means connecting and inviting locals to interact with the proposal, the program, and further research. **Global Engagement** can be linked to R&D within digitalisation, architecture and the Metaverse. So I want to create a Metaverse research academy as a catalyst that intertwines.


ENGAGING ALL BACKGROUNDS


SPACE FOR PLAY


REST / LANDSCAPE


EXPLORATION


OPEN PUBLIC SPACE

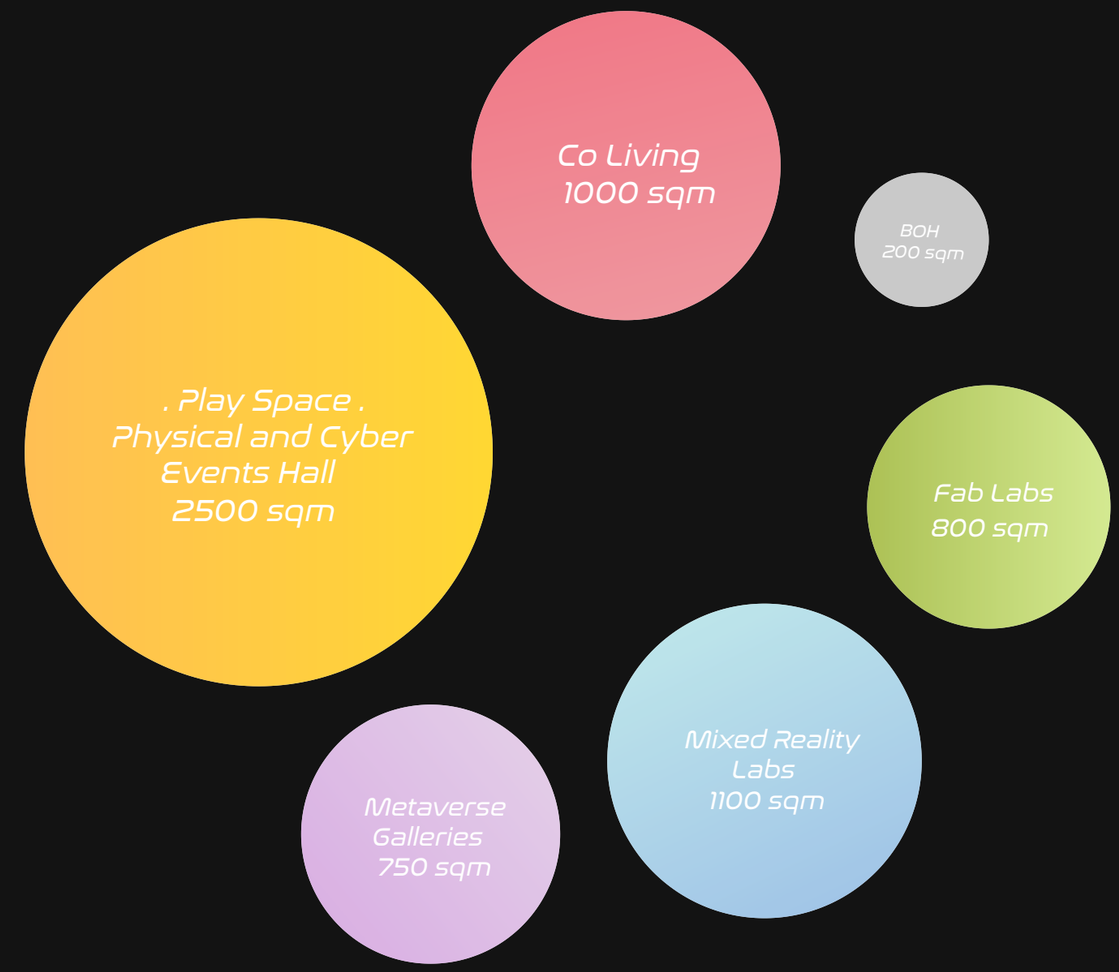

INNOVATION / LEARNING

LOCAL ENGAGEMENT ⟷ GLOBAL ENGAGEMENT

Programmatic Strategy

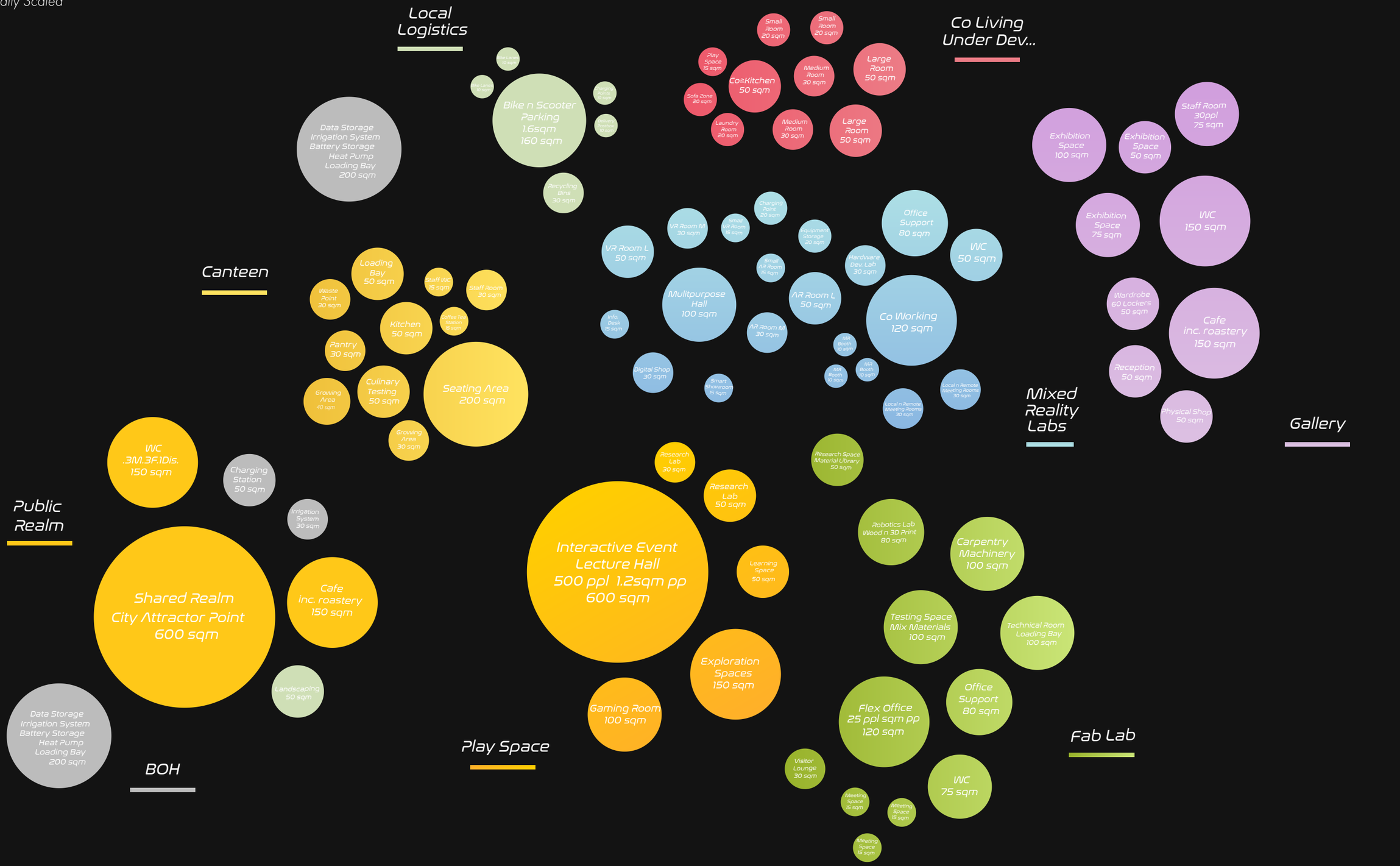
Serendipitous Learning

Based on the artsy and active community of Peace street, I am trying to create an environment where any age group can learn through passive participation or observation. Afar, once the observer is enticed and becomes the research academy participant, the real power of the metaverse is revealed into the digital and physical world.



Program Overview

Proportionally Scaled



Program Breakdown

List Per Program

Play Space

* Exploration Spaces (Open Air)
* Test / Experiment
* Interactive Event Hall
* Lecture Hall
* Gaming Auditorium
* Research Labs (Open Access)
* Learning Spaces

Public Realm

* Shared Realm (City Attractor Point)
* WC
* Cafe
* Open Event Space
* Landscaping
* Irrigation System
* Charging Station

Gallery

* Exhibition Space (Temp. Rooms)
* WC / Restroom
* Cafe (150sqm inc. Roastery)
* Shop / Commerce Corner
* Info Desk / Ticket Office
* Wardrobe / Cloakroom
* Elevator Access Points
* Observation Deck (?)
* Public / Private Parking
* Office / Meeting Rooms
* Storage / Technical Plant

Fab Lab

* Robotics Lab (Wood + 3D Printing)
* Explore / Testing Area
* Carpentry Workshop / Machinery
* Office + Staff Room
* WC + Cafeteria
* Storage + Technical Plant
* Material Loading Bay / Logistics
* Visitors Lounge
* Mixed Material Workshop
* Showrooms
* Learning Space

Canteen

* Kitchen
* Culinary Space
* Cafe / Tea Shop
* Food Growing Area
* Loading Bay / Logistics
* Staff Room / Private WC
* Waste / Recycling Point
* Storage / Pantry

Mixed Reality Labs

* VR Room (S/M/L)
* AR Room (S/M/L)
* Technical Plant
* Co-Working Desks
* Rentable Work Booths
* Open Work Area
* *Local Worker*
* *Remote Worker*
* Administration Desk
* Cafe
* WC / Cloakroom
* VR/AR/RoboticEquipment Storage
* Multipurpose Hall
* Charging Station
* Robot Workshop (3D Printing)
* Smart Hardware Showroom
* Hardware Dev. Lab
* Interactive Event/Game Room (MR Booth)
* Control Hub
* E-Commerce Shop
* Archive / Library

Co Living

* S/M/L Short Stay Residency
* WC / Showers
* Kitchen / Coffee Bar
* Laundry Room
* Storage / Goods Zone
* Work Tables / Print Station
* Cinema / Entertainment
* Sofa Zone / Play Space

Local Logistics

* Bike Lanes
* Tram Stop Improvement
* Recycling Bins
* Parking (Bike/Scooter/Car)
* Delivery Pod (Amazon Like)
* Charging Station (Device/Vehicle)

BOH

* Data Storage
* Irrigation System
* Battery Storage
* Heat Pump
* Waste Recycling Point
* Loading Bay

06. SITE

Site Outline

Agglomerate Of Voids

Existing Site
1:500 at A3

04

existing
parking
1250 sqm

existing
empty plot
2100 sqm

tea house
travel_agent
clothes
clay studio
chocolate
museum
chocolate
manufacturer
fabric store
pub
grocerie
cafe
mobile
repair
shop
wood floor
shop
beverages

Miera 18
Class B
Private
Unsupervised

Mārzciņas 10
Class B
Private
Unsupervised

Brīvības 93
Class A
Private
In Progress

Commercial
Industry
Residential

0 5 10 15 20

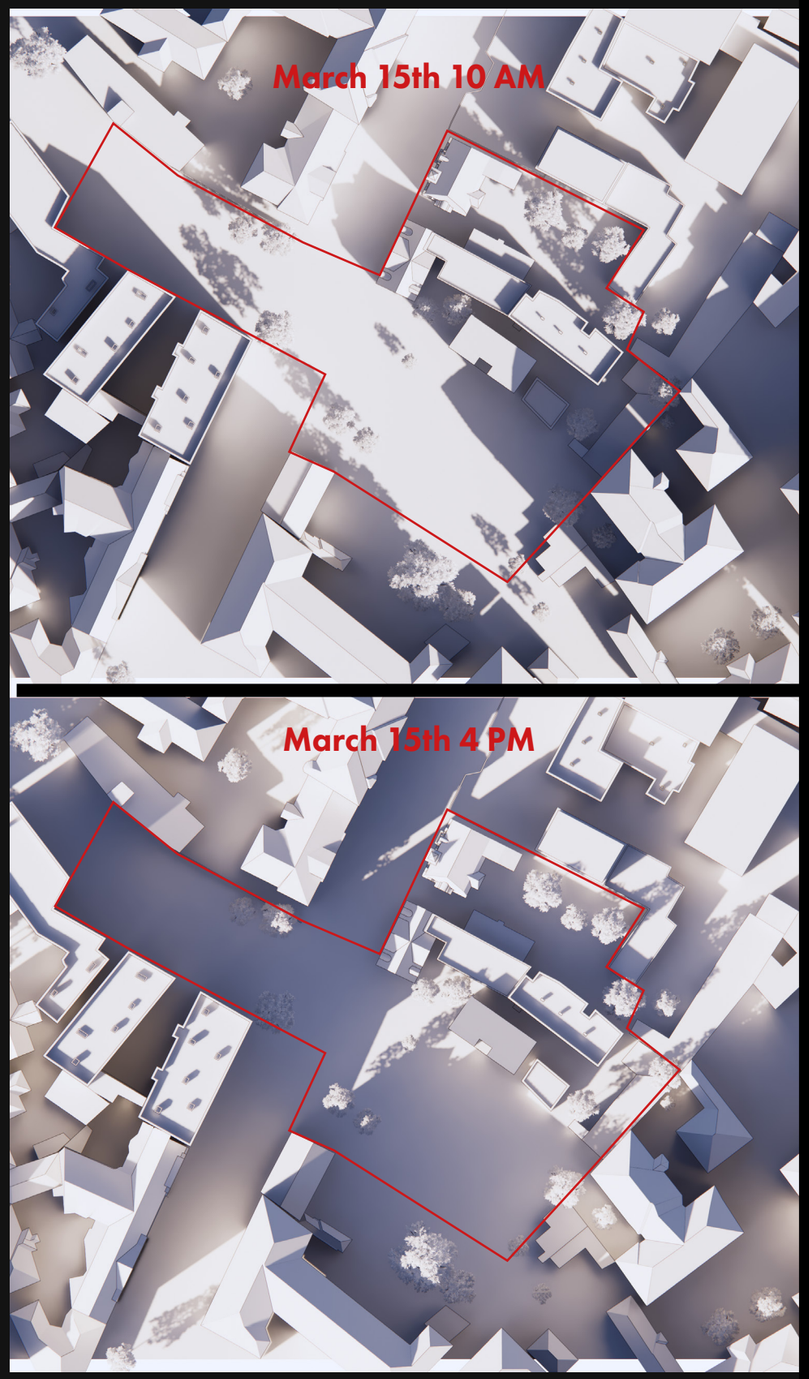
Sun Direction:
15th June 2022
4:00pm local time

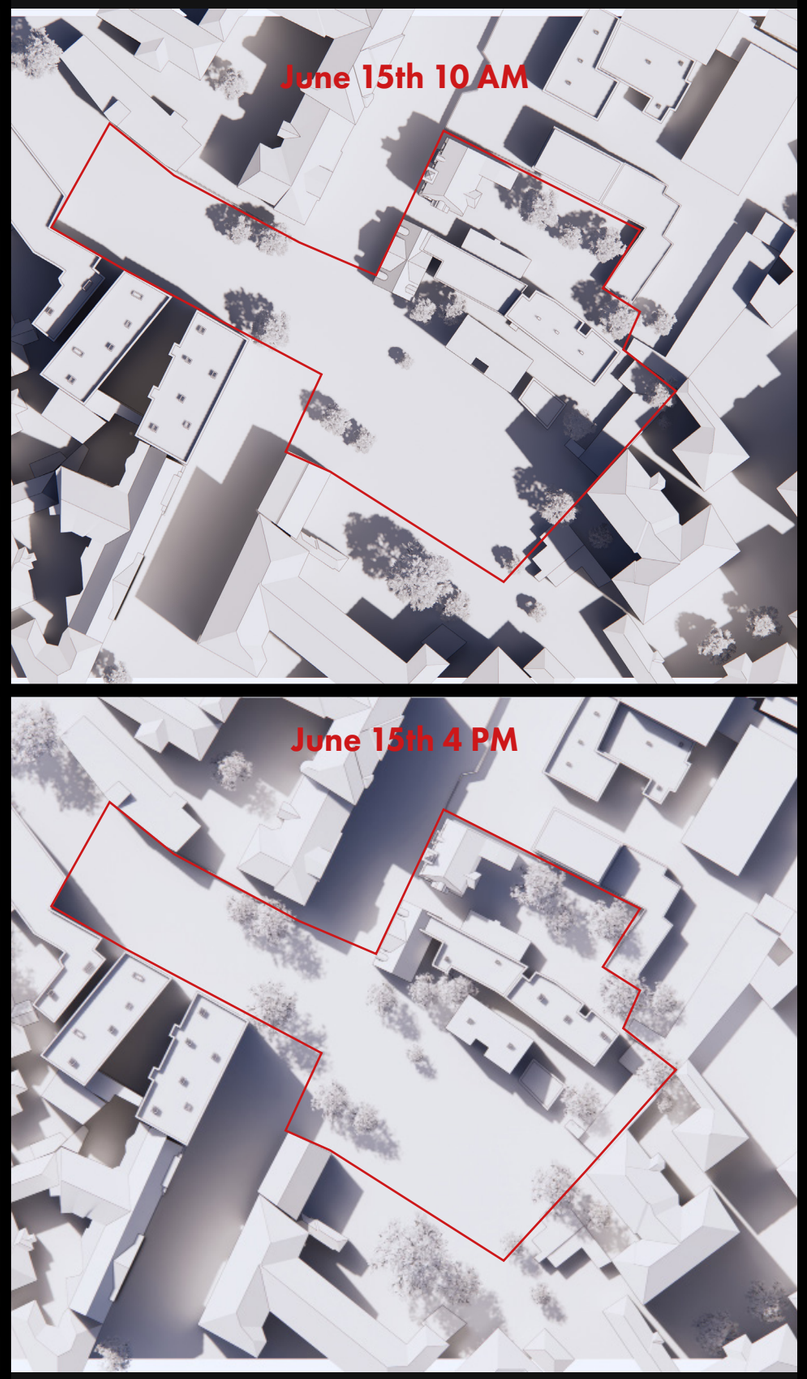
Existing Site

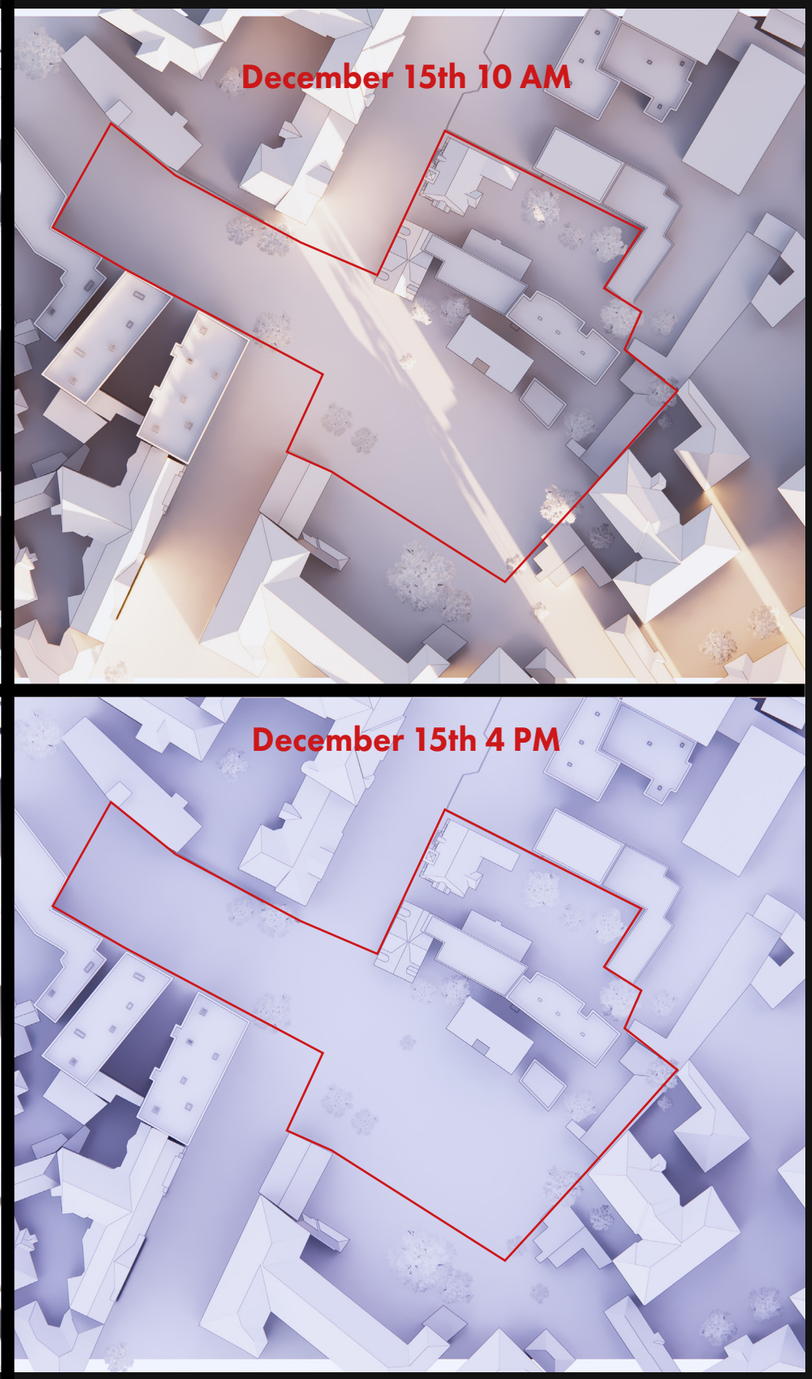
Void Agglomerate

Yearly Sun Exposure

Sun Path



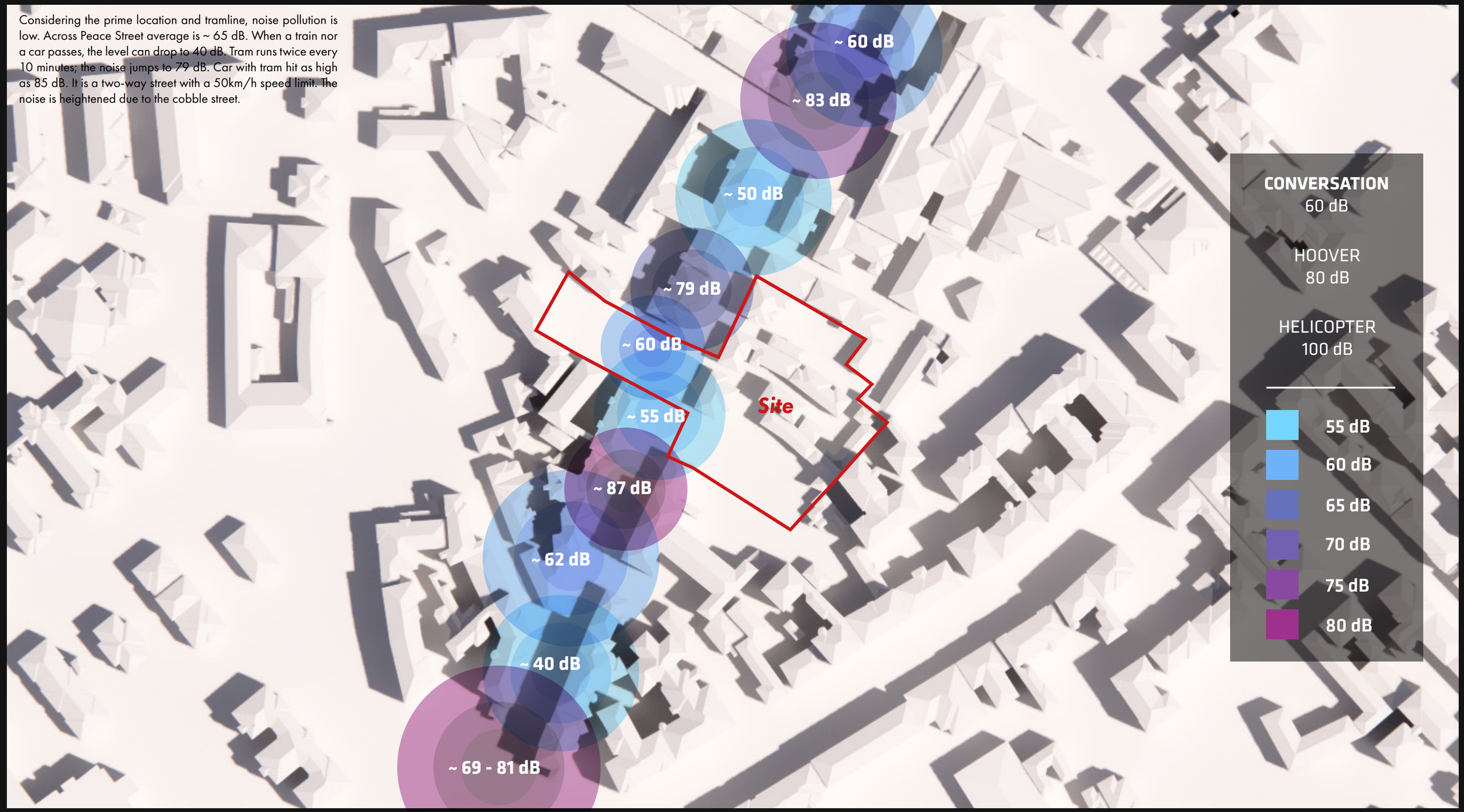




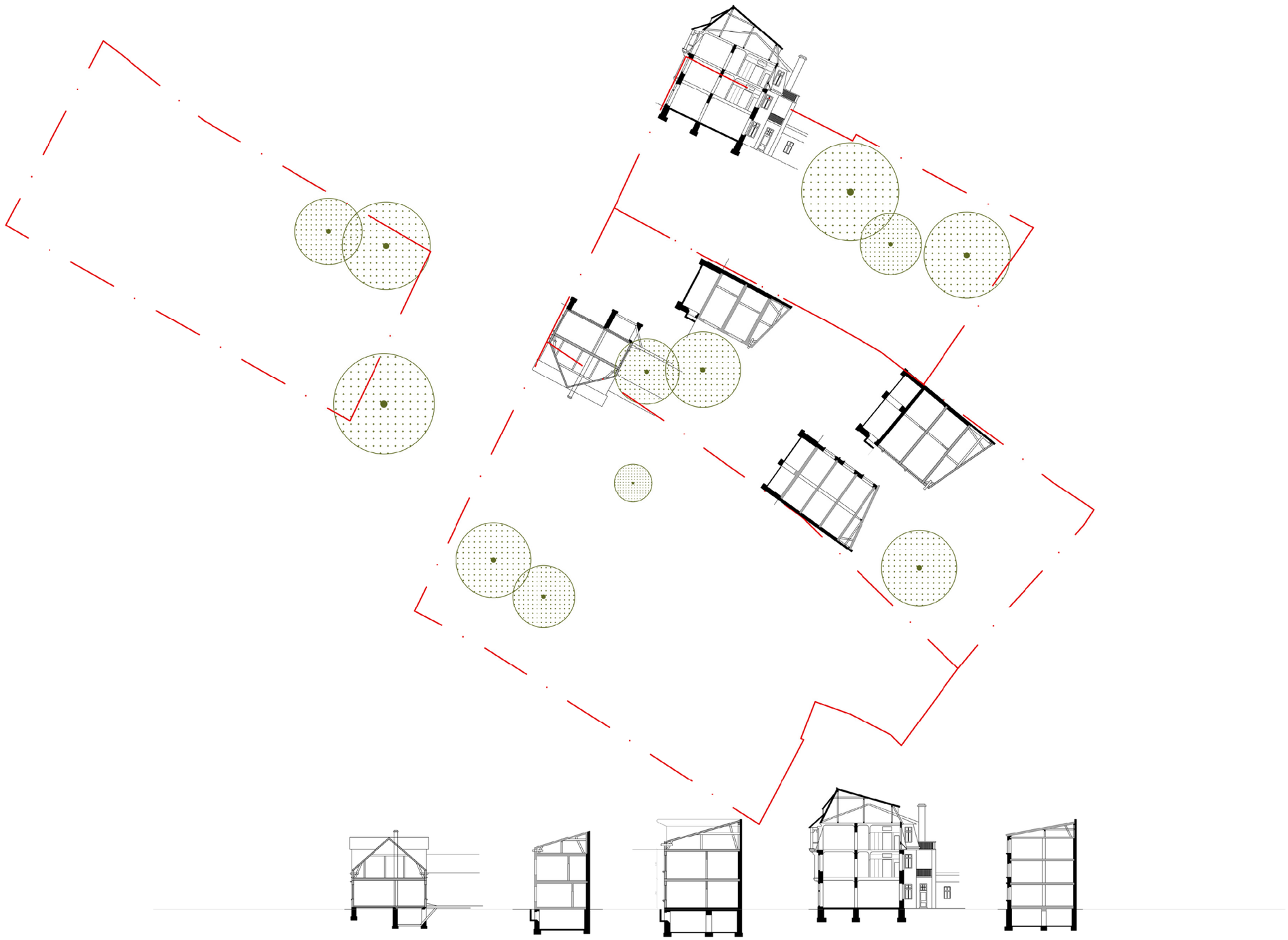
Noise Levels

Prime Location + Tramline

Considering the prime location and tramline, noise pollution is low. Across Peace Street average is ~ 65 dB. When a train nor a car passes, the level can drop to 40 dB. Tram runs twice every 10 minutes; the noise jumps to 79 dB. Car with tram hit as high as 85 dB. It is a two-way street with a 50km/h speed limit. The noise is heightened due to the cobble street.

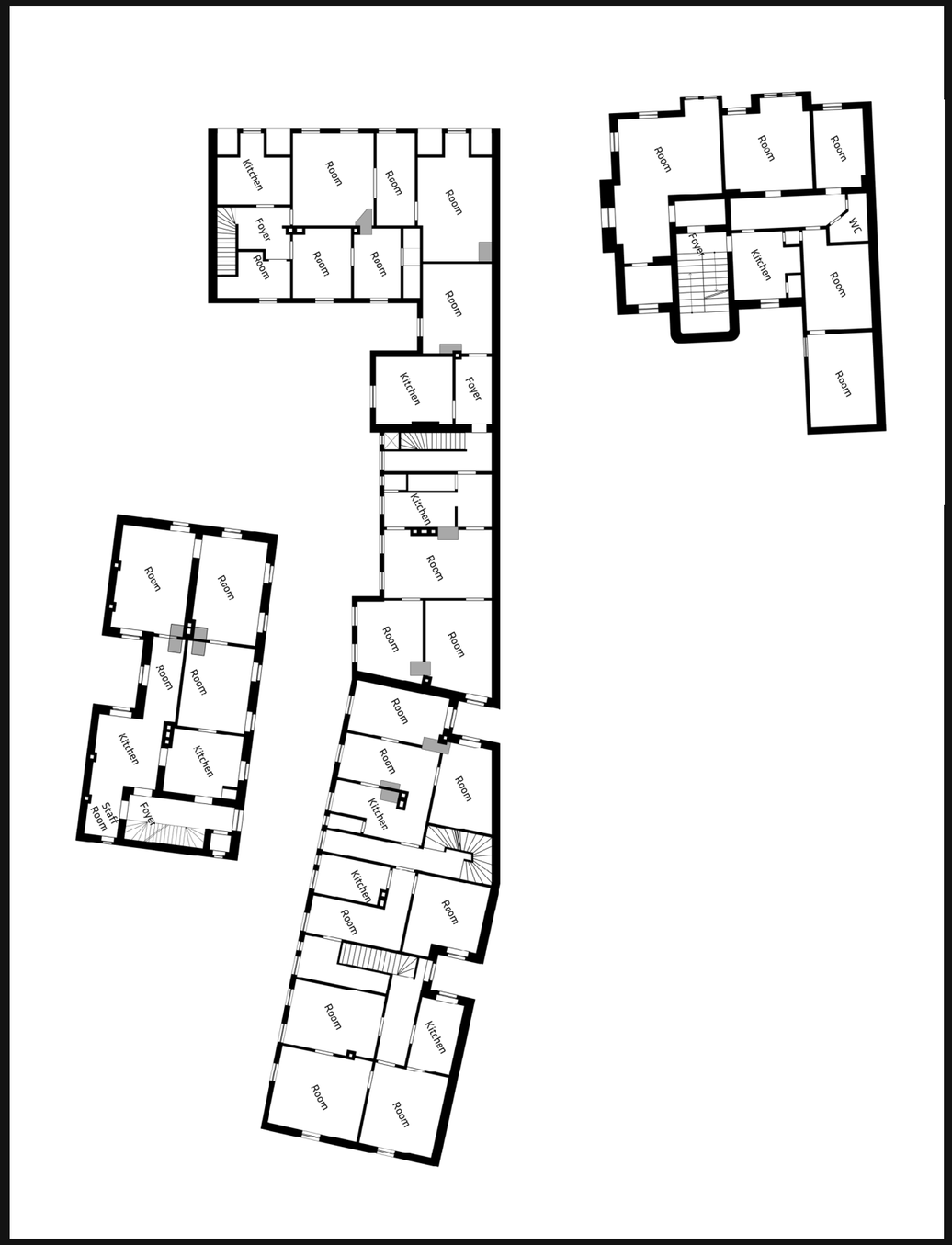


Existing Sections
1:500 at A3



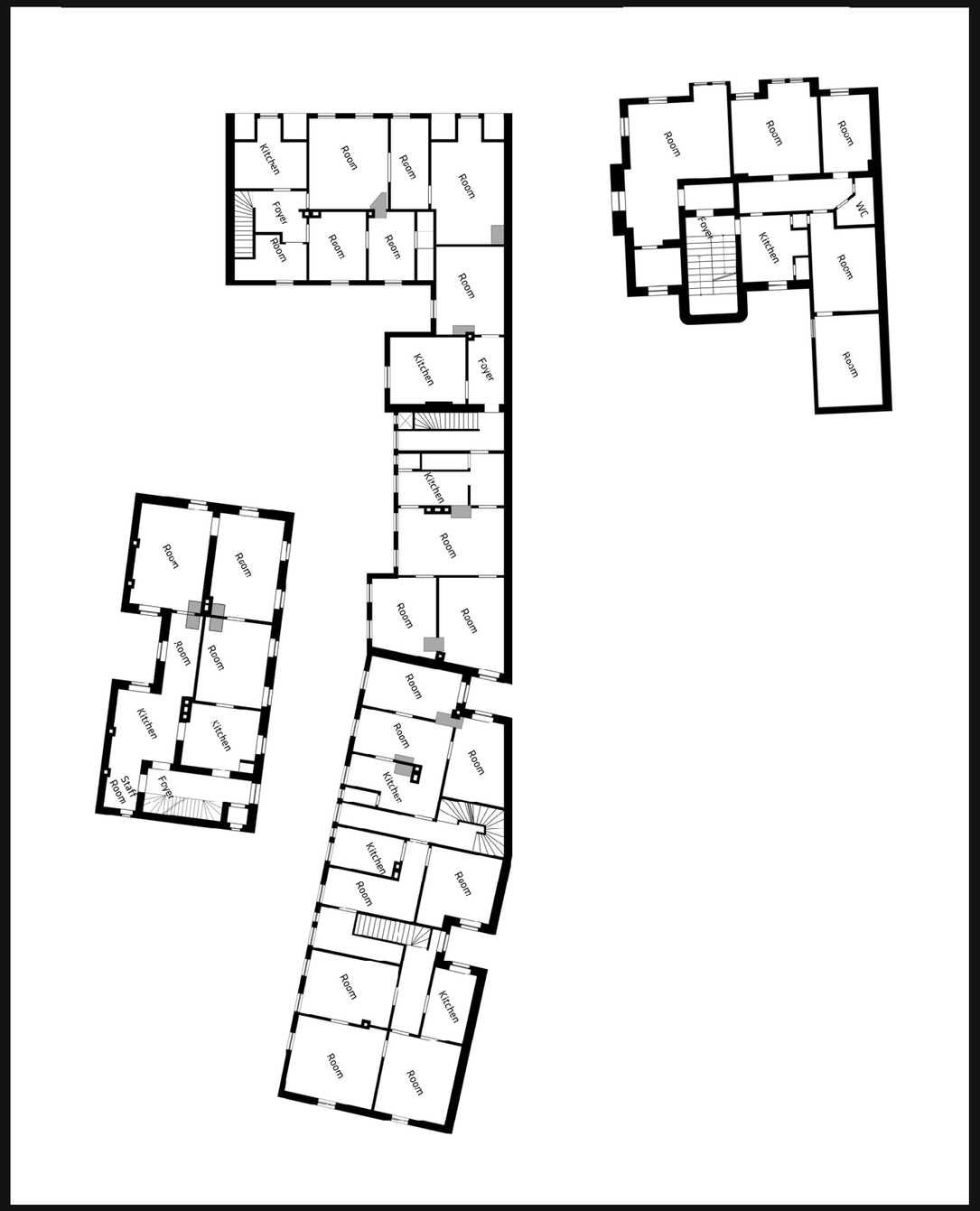
Existing Plans

Ground Floor - Upper Levels



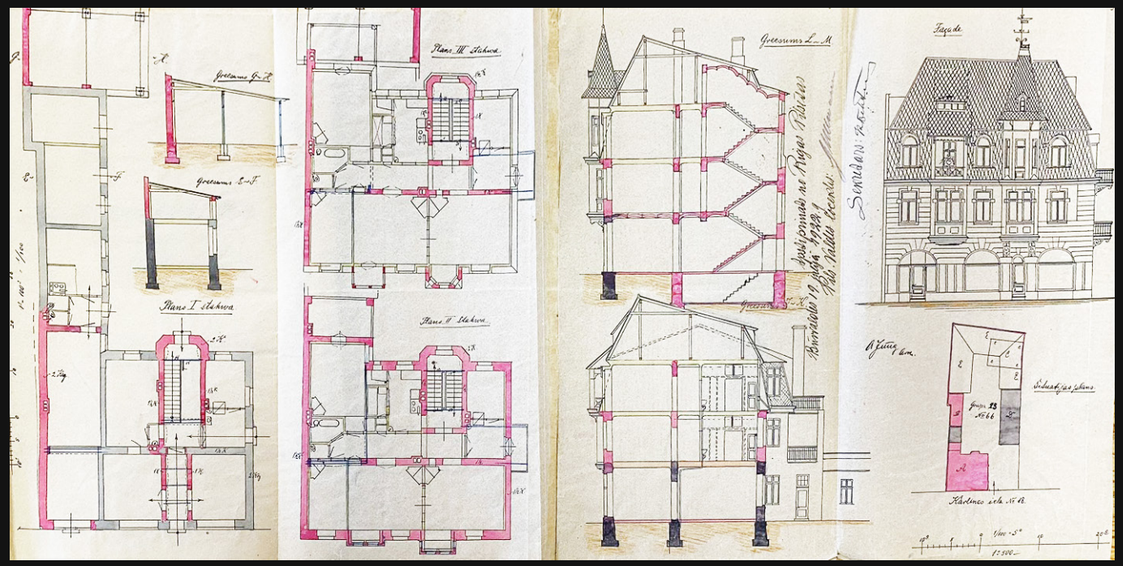
See Appendix

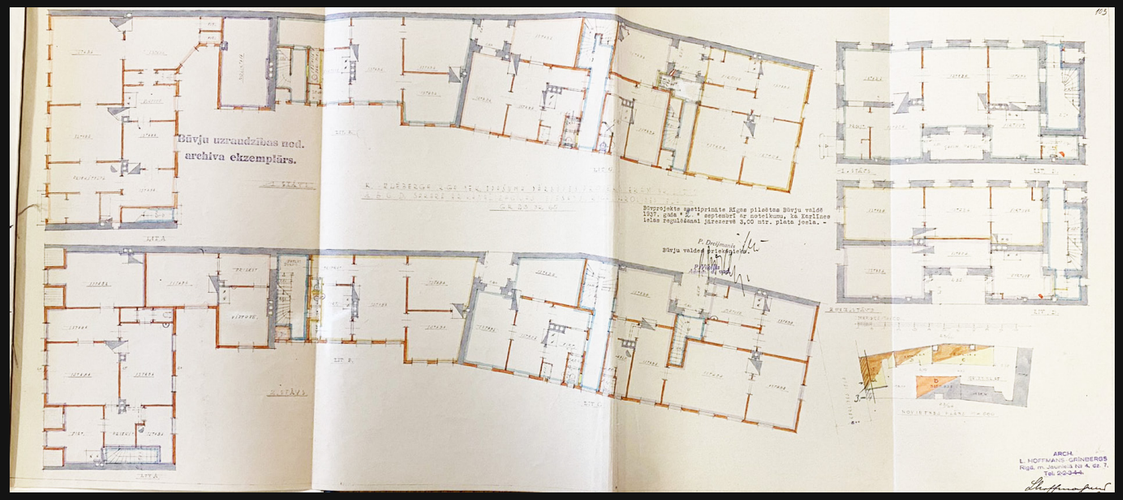
For Full Drawing List

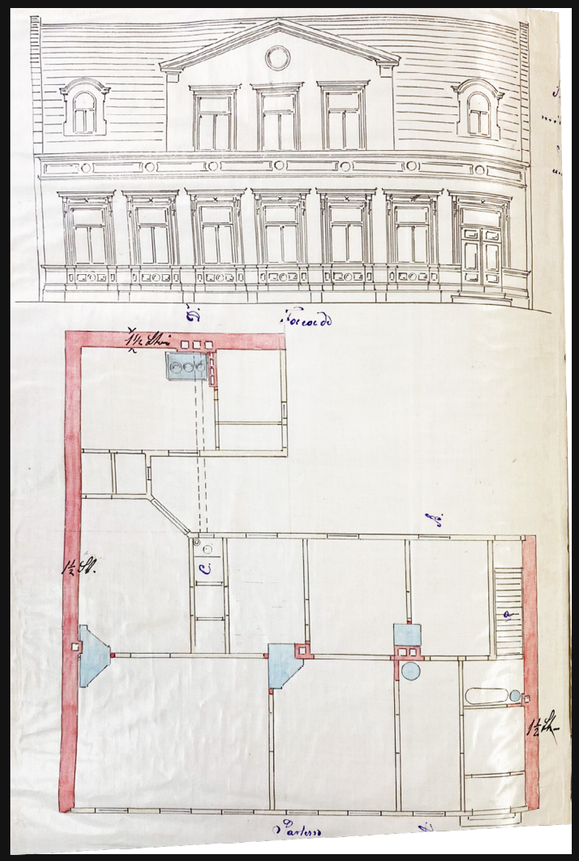


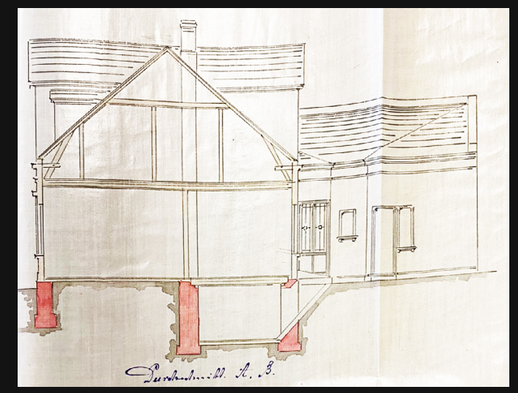
Historical Drawings

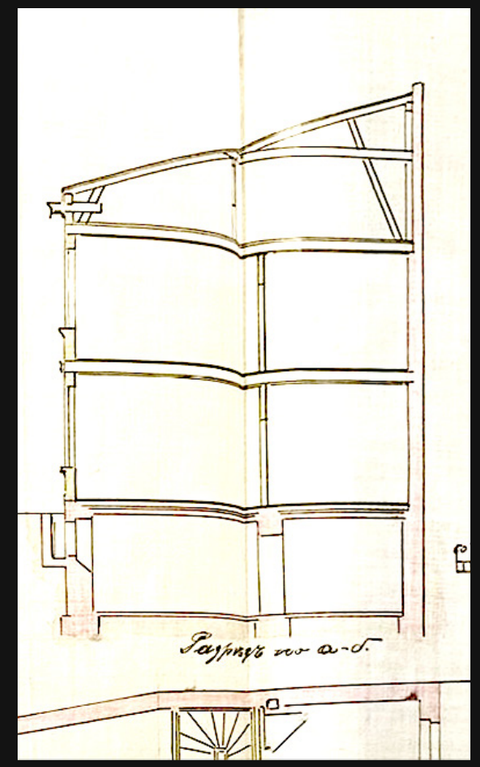
1890s - 1920s



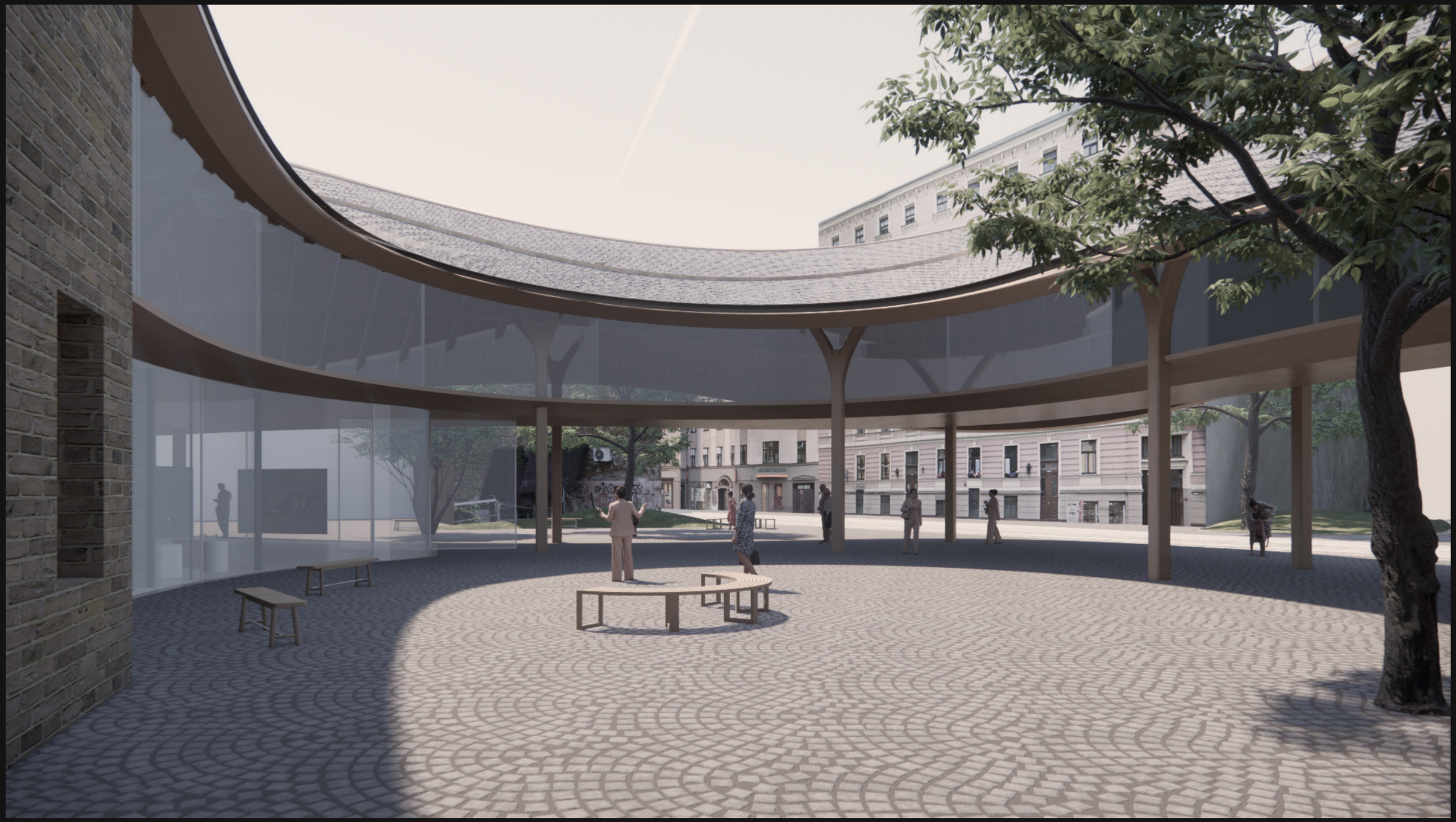






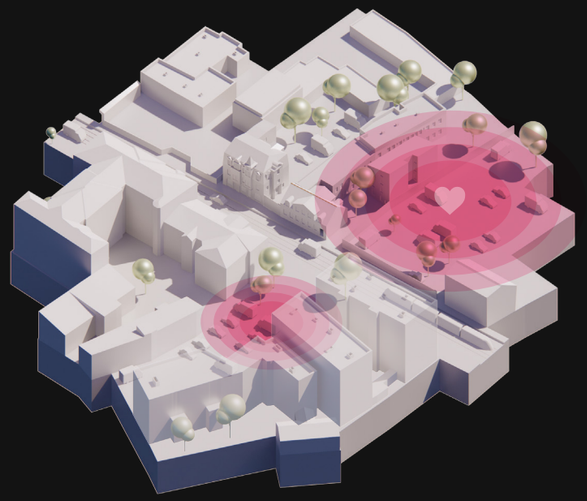


7. CONCEPT APPROACH



Concept Approach

Drivers

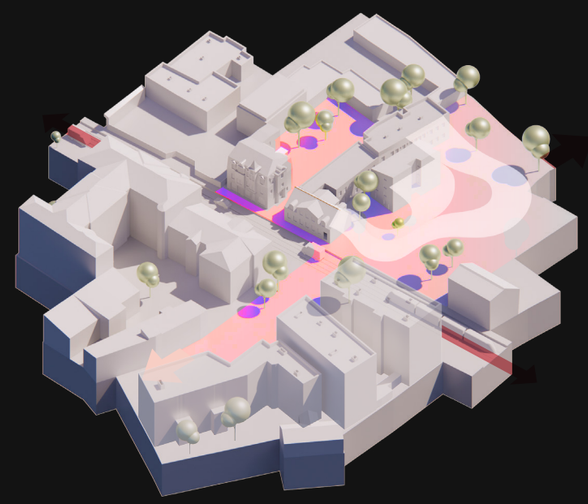


The Heart
The building is trying to avoid a hierarchy of programs with a decentralized layout while proposing an attraction point to draw passersby to the heart of the campus.

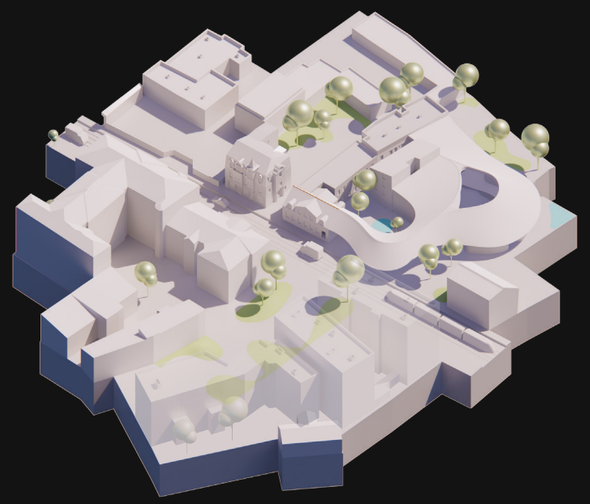
Heirloom
The existing, late 1800s gabled roof building is almost stretched outwards to meet the city and connect with its sibling while respecting the current landscaping.

Sun Shaped Canopy
Canopy shaped by the sun path to create a comfortable microclimate through the site yet harvests solar energy.

Iconic Yet Grounded
The average building height is +11 m; a new proposal is playing these heights to create a grounded street-level presence.



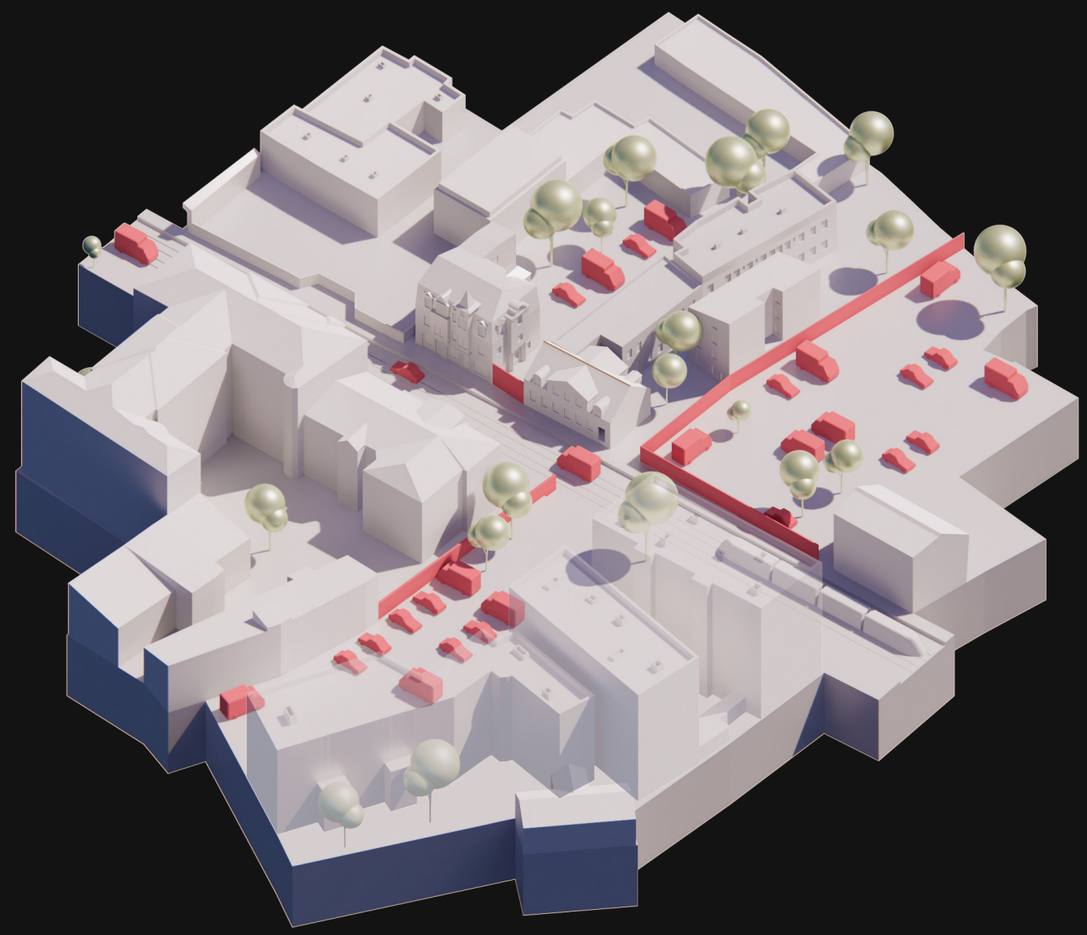
Public Realm
Fostering contact where contact is almost impossible. I am trying to treat the building and project almost as a public space for all age groups and backgrounds.

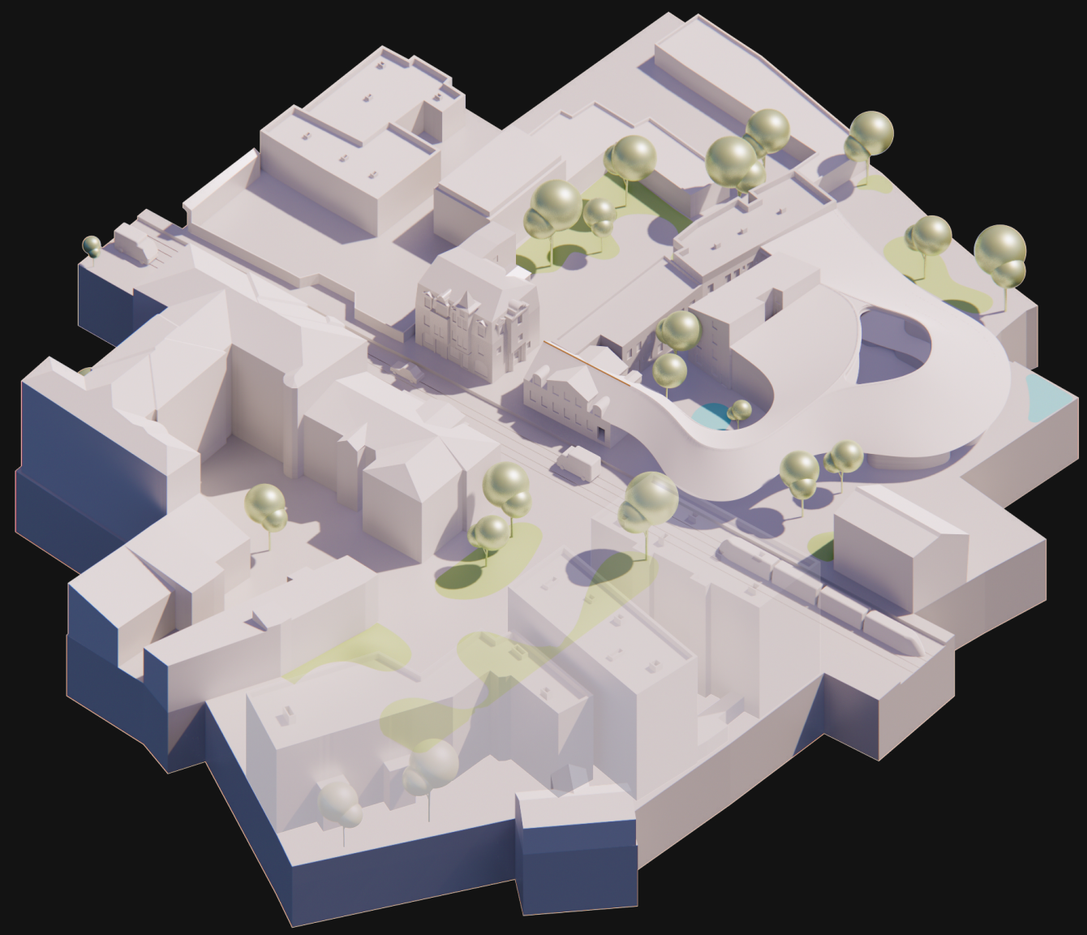


Civic Engagement
The campus is scattered with social spaces to promote belonging and civic engagement. Sometimes Latvians can be cold, yet they open up once gradually introduced with change.

Existing vs Proposed

Opportunity





Living Duality

From a forgotten urban pocket to a functioning public campus for citizens of Riga and the people who have left Latvia.

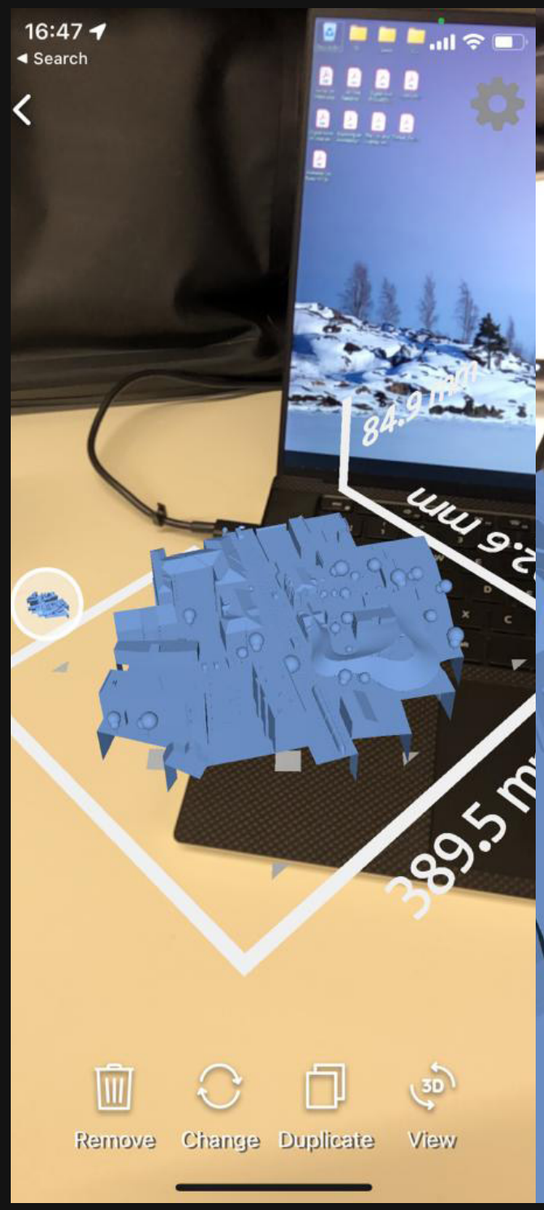
8. DESIGN STRATEGY

VR AR Design Methodology

Design Through Experiences

Throughout the design phase, as part of the metaverse nature to design for experience, Research Academy was also designed using a Virtual Reality headset to experience design options and test how 'real' it 'feels'. VR creates a sense of presence, but research revealed that VR headsets could be less reliable when shared with others throughout the exploration. Primarily due to hardware size, cables and network issues (at least at the TU Delft BK faculty). Also, motion sickness is a side effect many experiences when using VR for a prolonged period. With current and further technology development, VR headsets can drastically influence our design and communication process and final delivery.

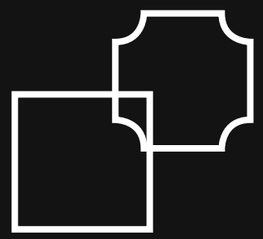
Augmented Reality apps on a mobile device were used to grasp the concept better. A physical model was also used with an AR overlay, which proved inaccurate due to hardware limitations. With newer devices, overlay design exploration would become dual physical/ virtual. AR here functioned as a new methodology to study and communicate ideas. As more and more individuals own a smartphone, AR can become a fun and fruitful participatory tool.



An Expression

Europe's Capital Of Jugendstil

Take the heirloom and history of Riga and give it a second breath. Jugendstil inspires the project, perhaps not the ornamental but the fluidity and smoothness of architecture. Riga Art Nouveau can be predictable at the base or linear and explode into fluid and contradicting elements and statements at the top. It's an artistic expression that Riga carries very proudly. Metaverse architecture, by nature, is quite expressionistic, calling for attention. To catalyze profound change in urban voids, the research academy has to be an icon, an expression of local struggles, art and history. The whole project plays with duality, old vs new, virtual vs physical.



Contradicting / Asymmetrical shapes

Inspiration from both organic and geometric forms

Fluid

Curved glass

Decoratively undulating lines

Floral ornamentation which stylises nature

Independent elements are merged to form a three-dimensional expression.

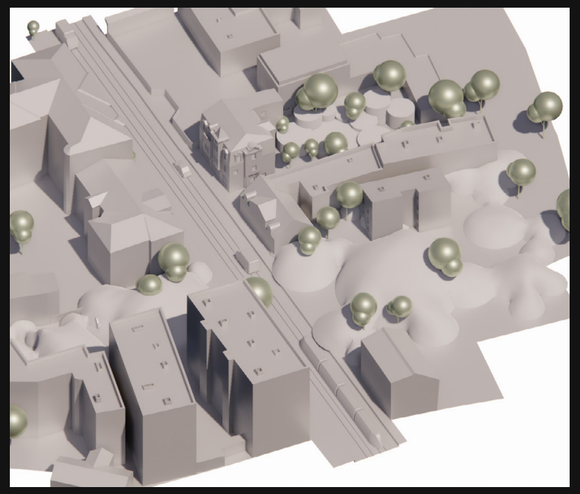
Focused on the aesthetic composition

Sculptural and expressionistic

Extensive use of arches and curved forms

Design Study

Volume Exploration



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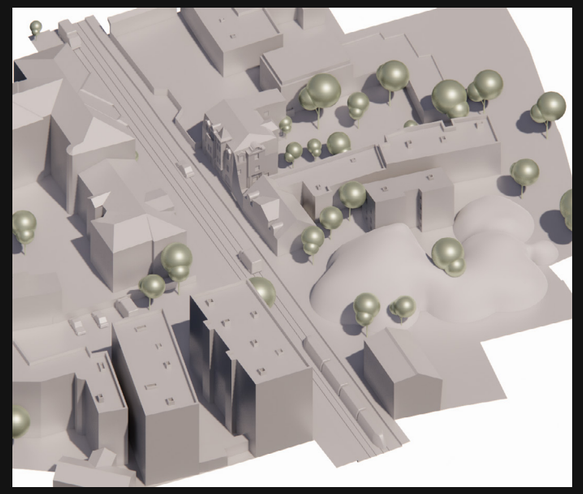

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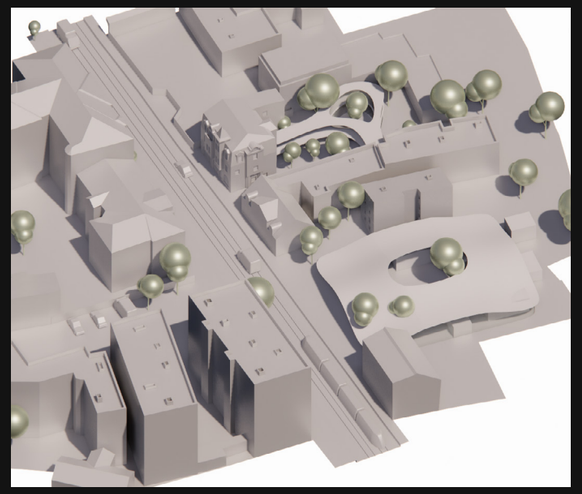

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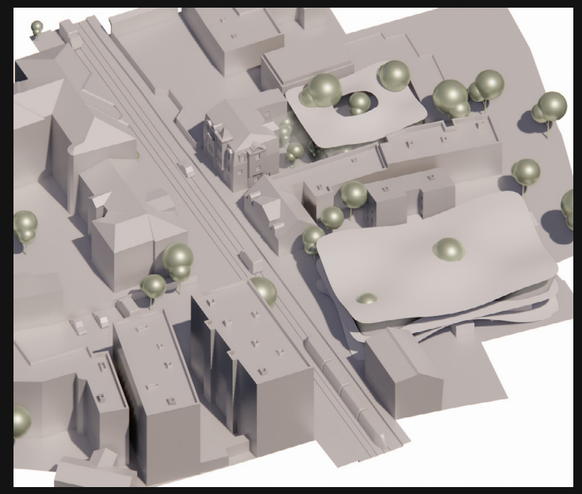

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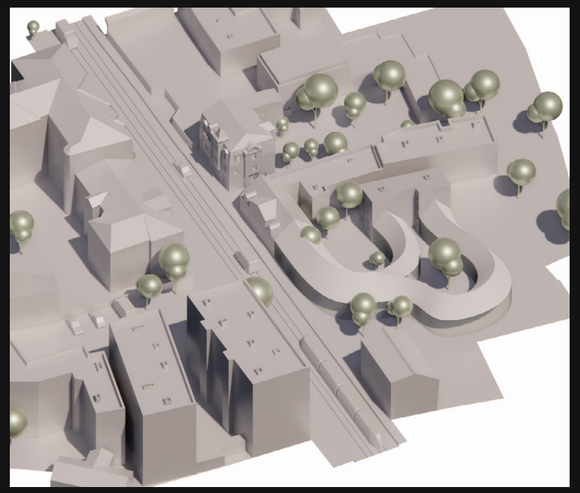

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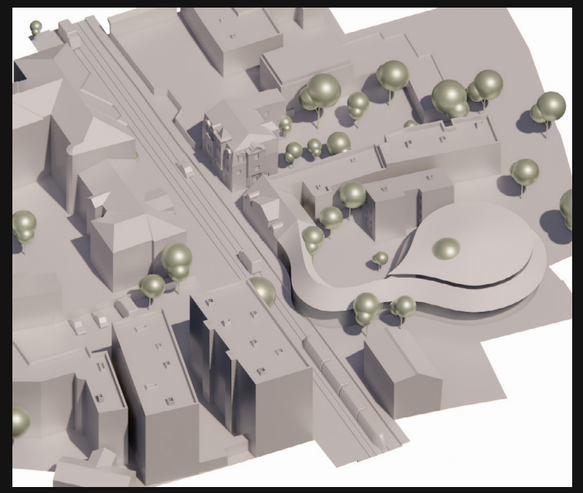

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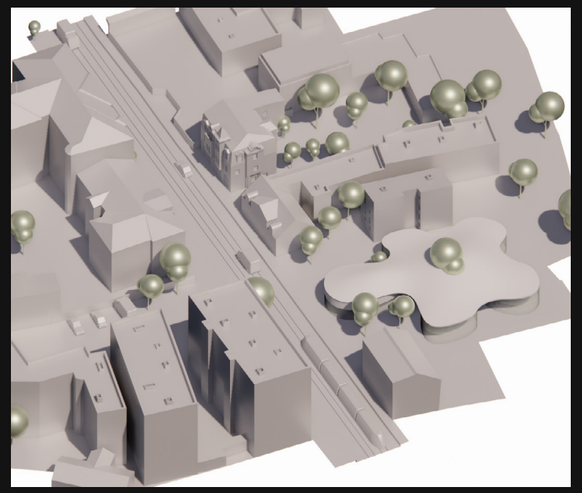

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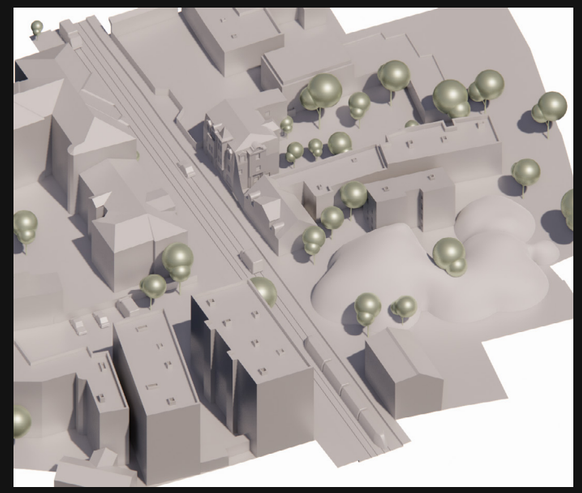
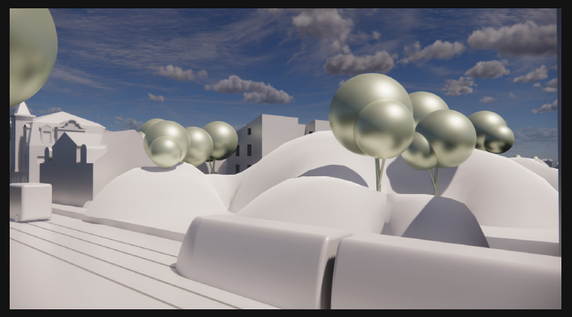
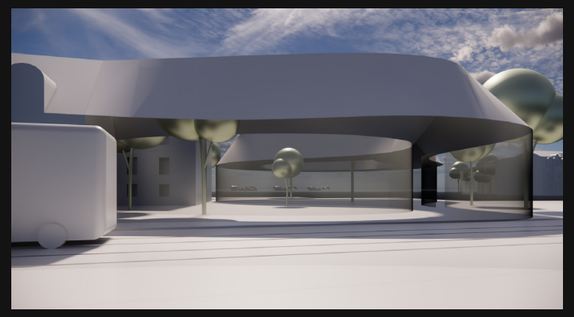


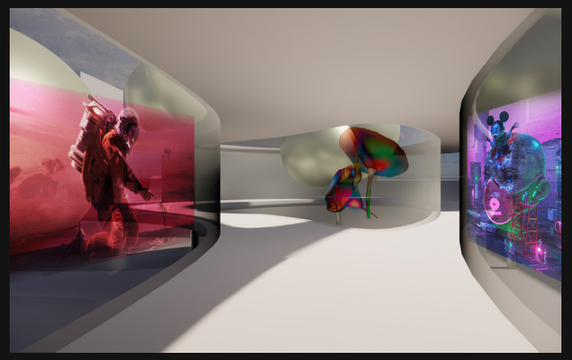
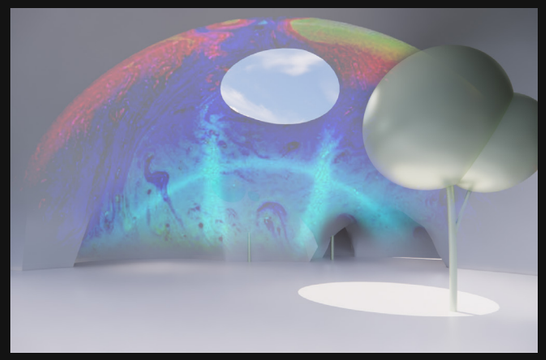
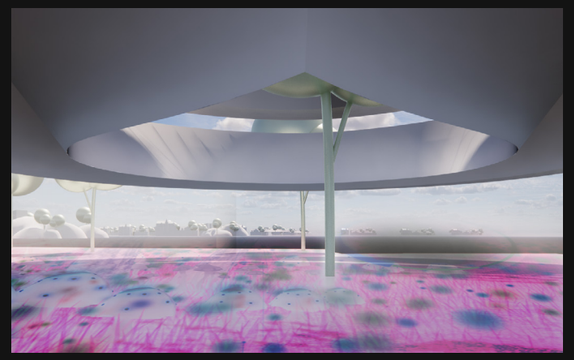
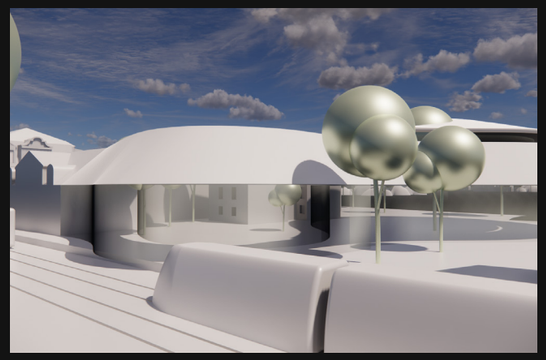
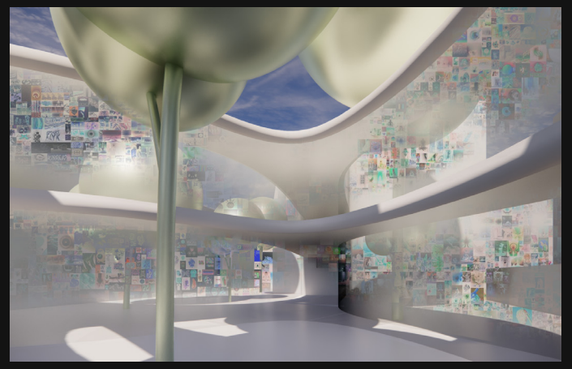
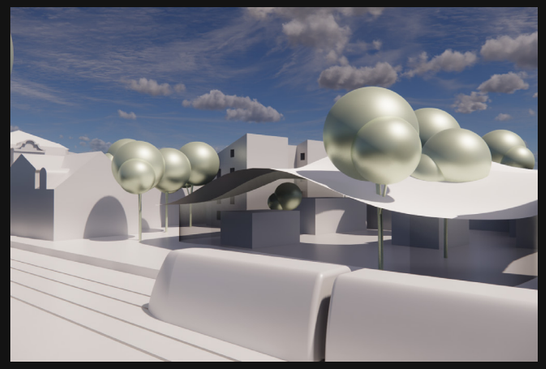
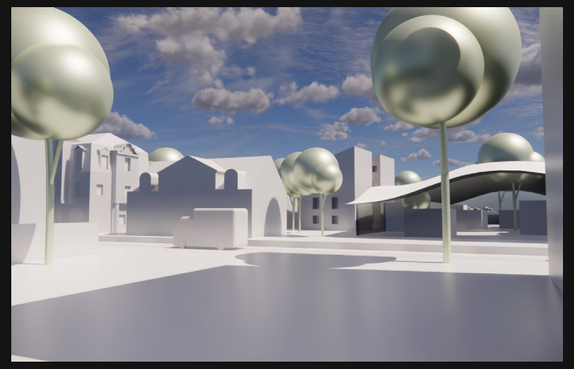
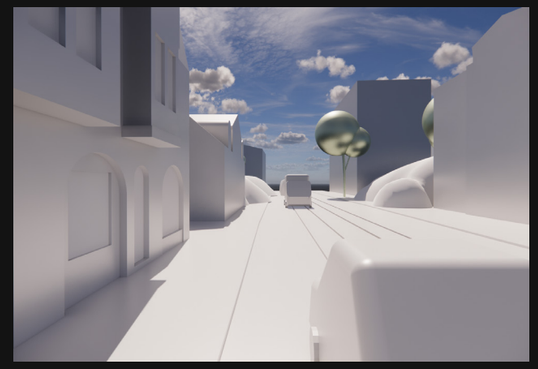
OPTION 00

Design Via Experience

VR Experiences





Existing Site Elements

Tactile + Visual

Rounded roof shingles

Rounded penetrations

Excessive use of brick

Open glassfields

Large and mature trees

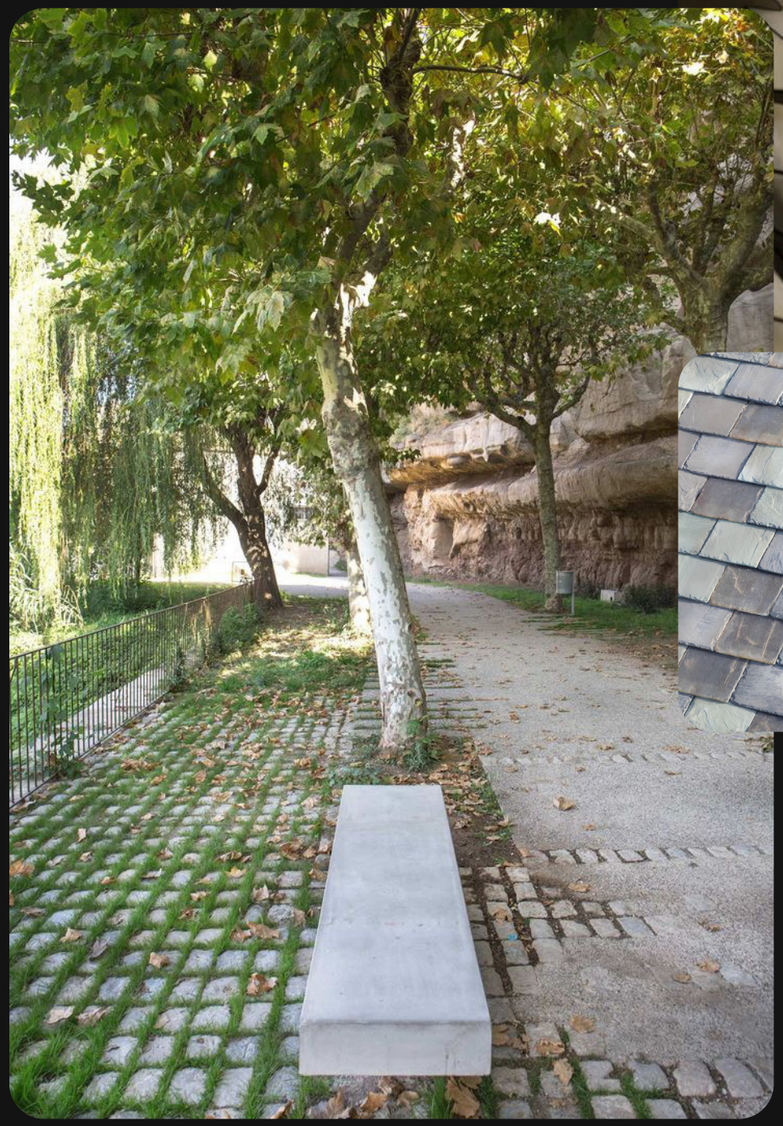
Cobblestone with tram line

Timber structure and facade with rough brick additions

Proposed Elements

Tactile + Visual

Rough and soft extension of the cobblestone and landscape

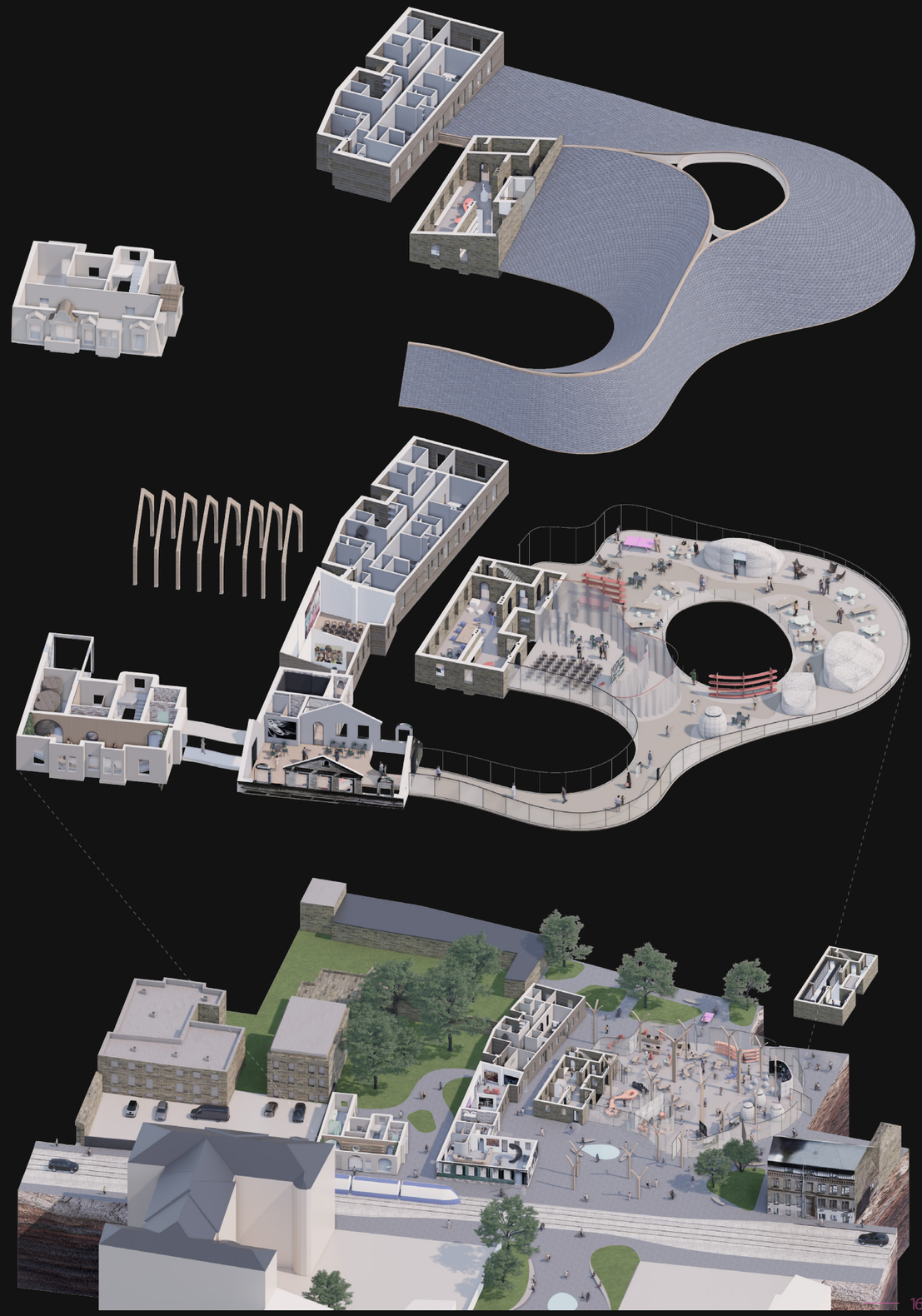


Extension and modernization o f the shingle roof

Collision of existing brick / timber and shingles and arches

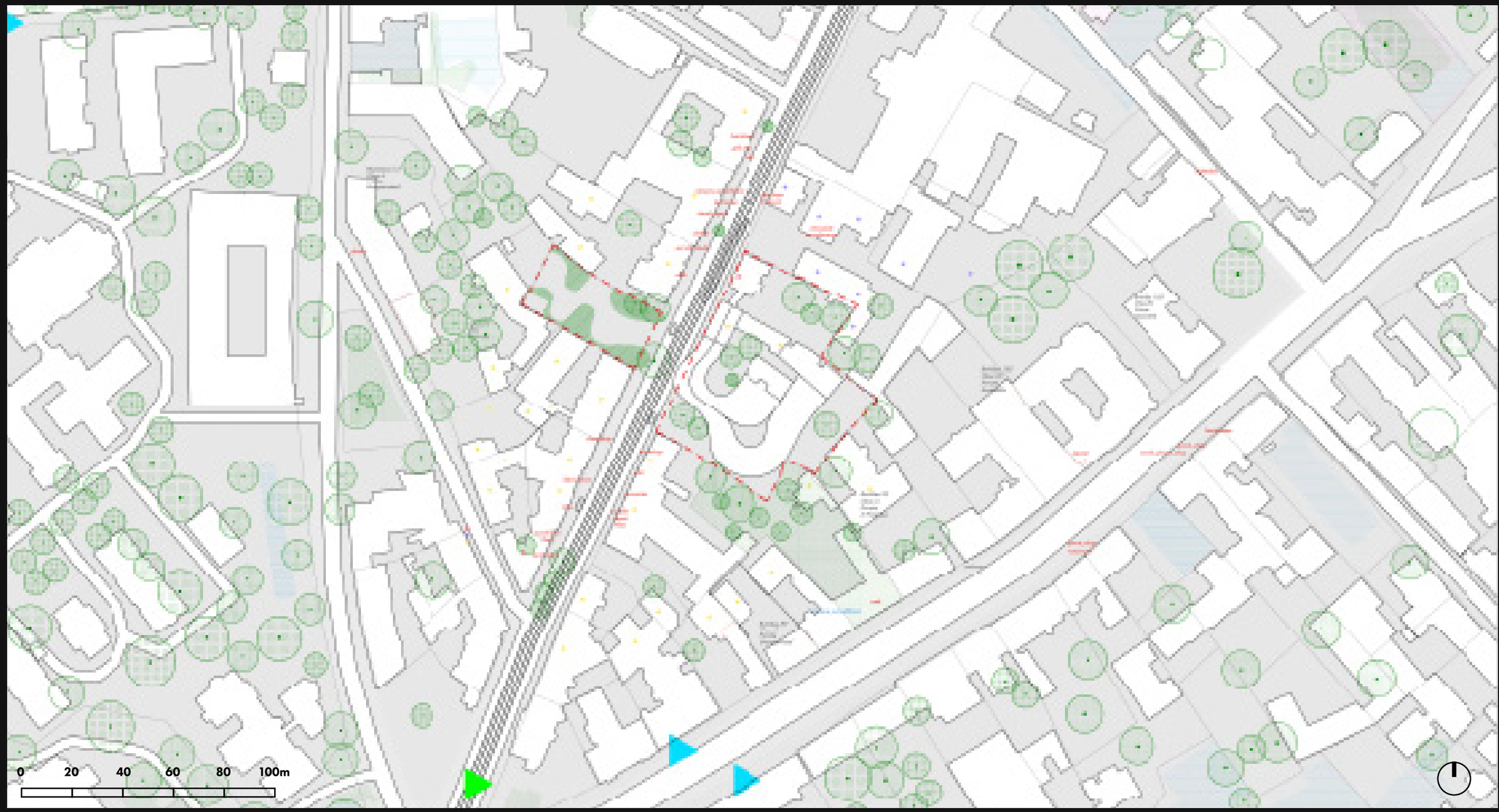
Timber as primary strucutral element

09. METAVERSE RESEARCH ACADEMY



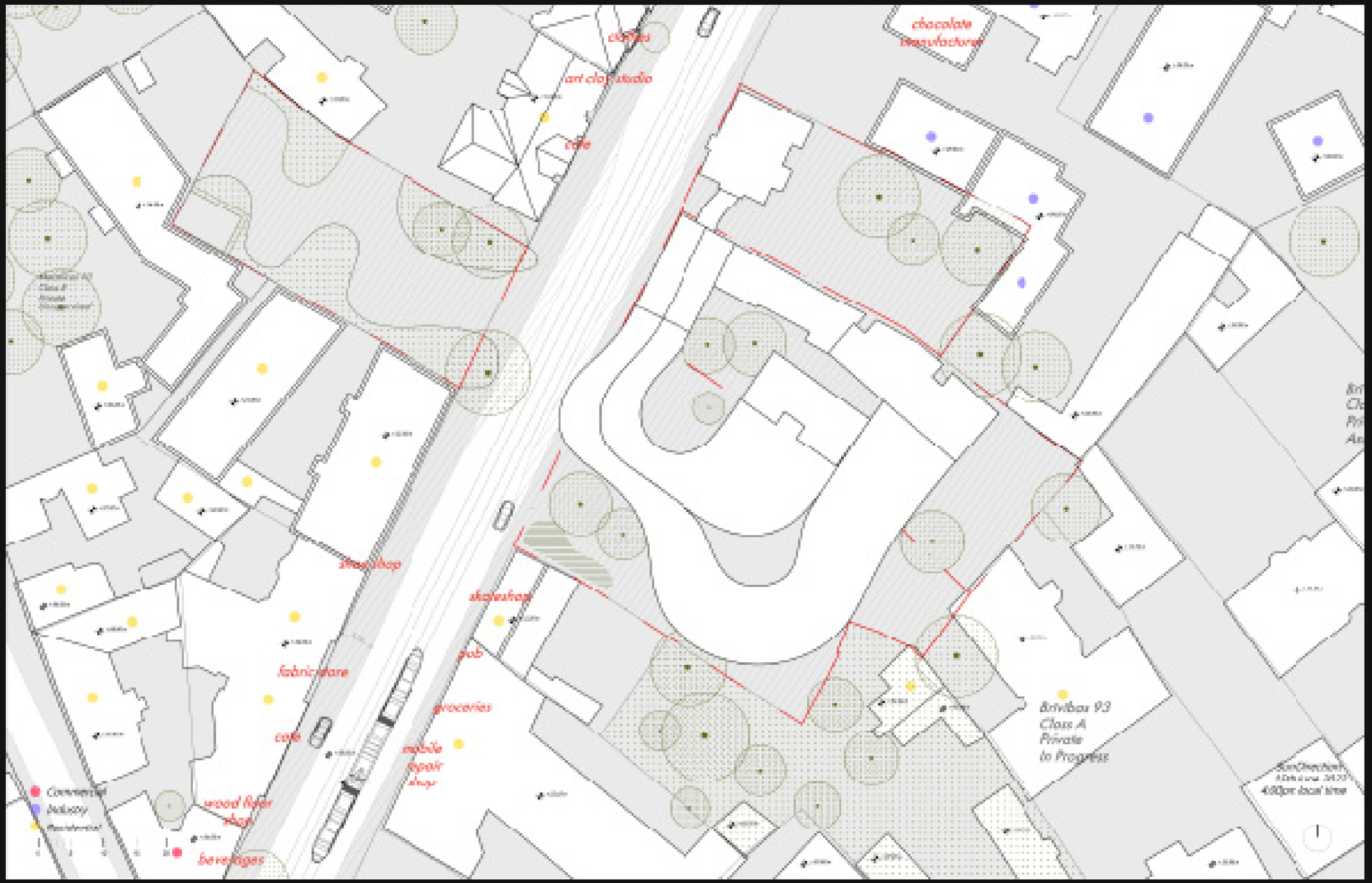
Proposed Roof Plan

1:1500 at A3



Proposed Roof Plan

1:500 at A3



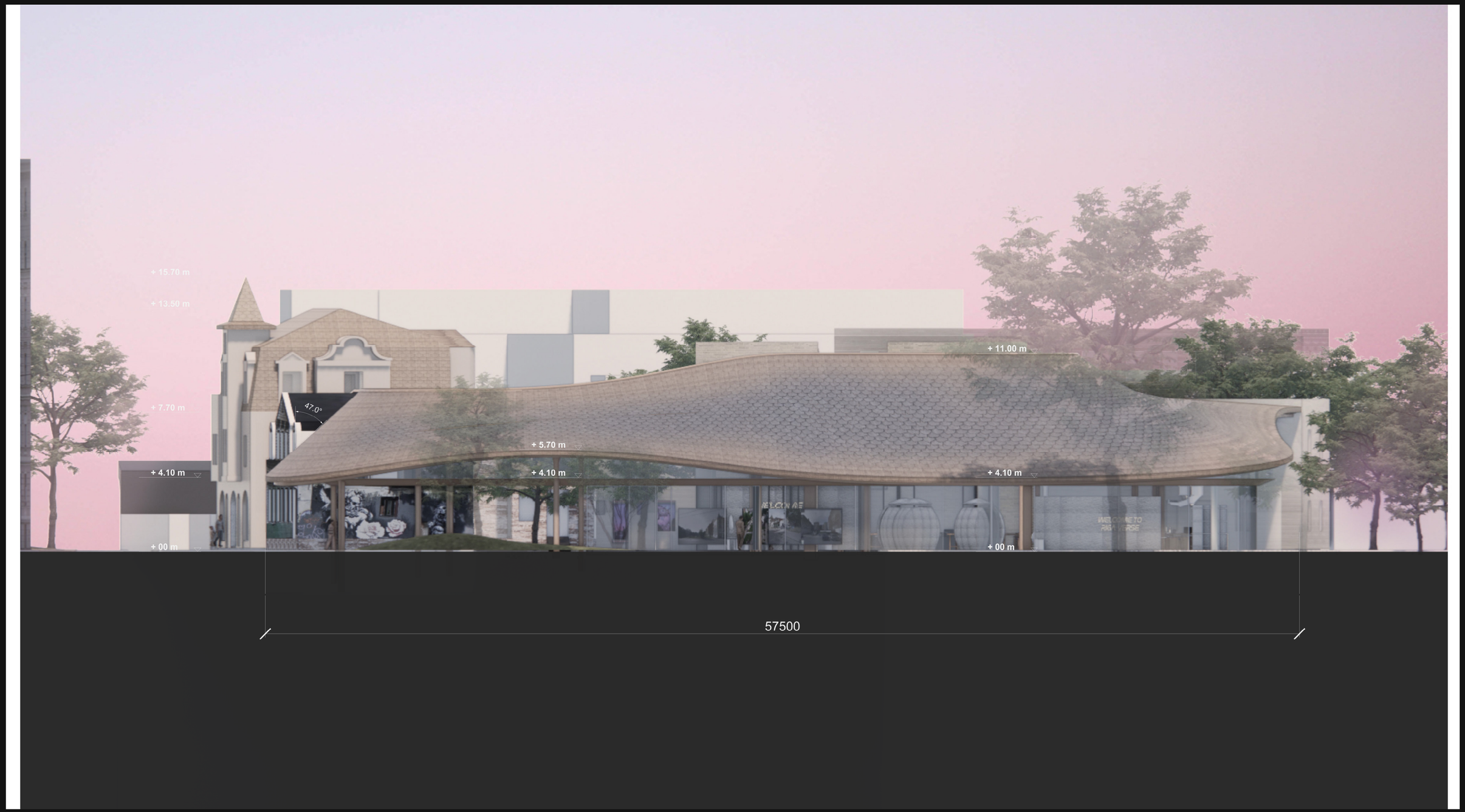
West Elevation

...

0 10m

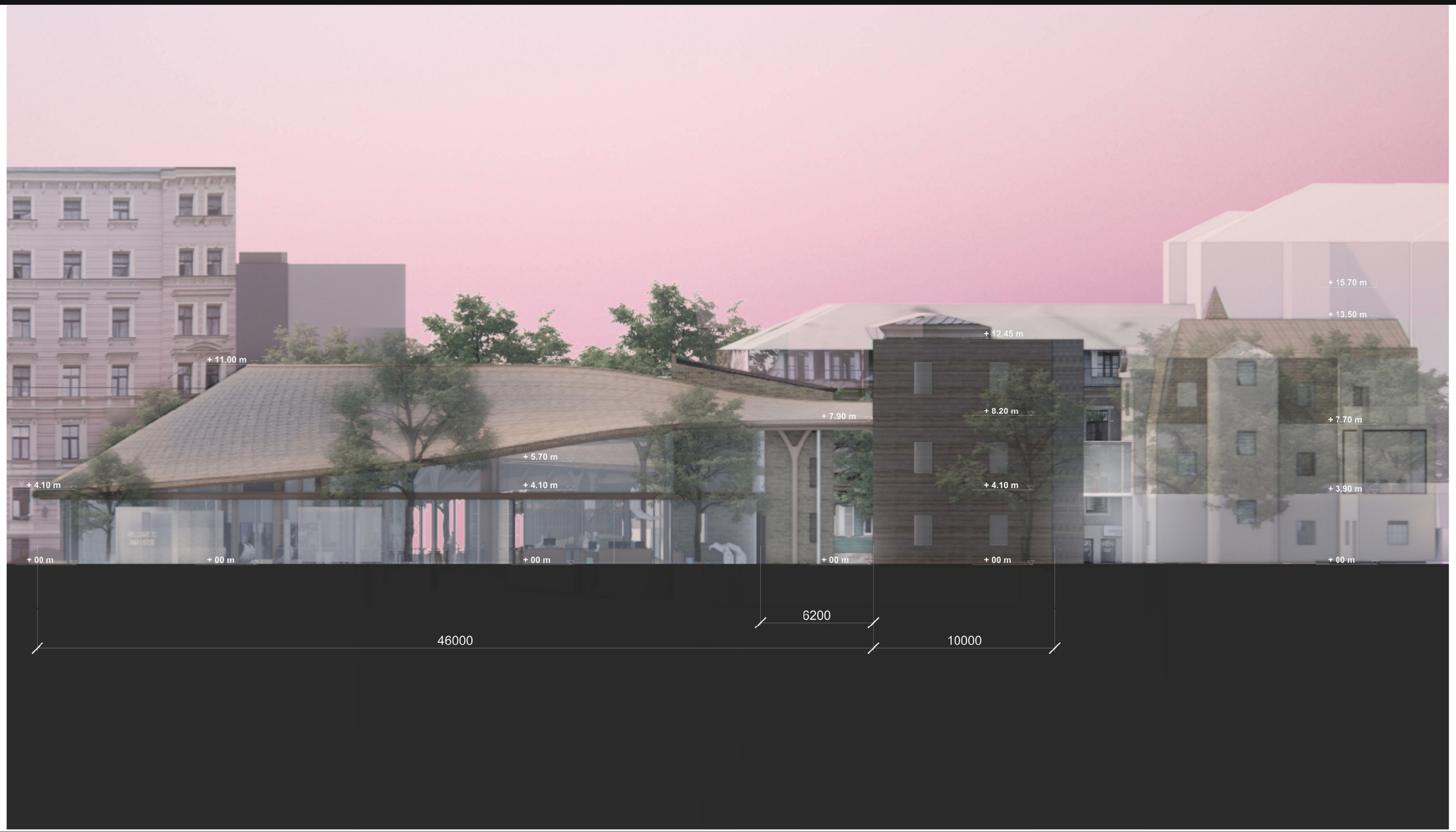
South Elevation

...



East Elevation

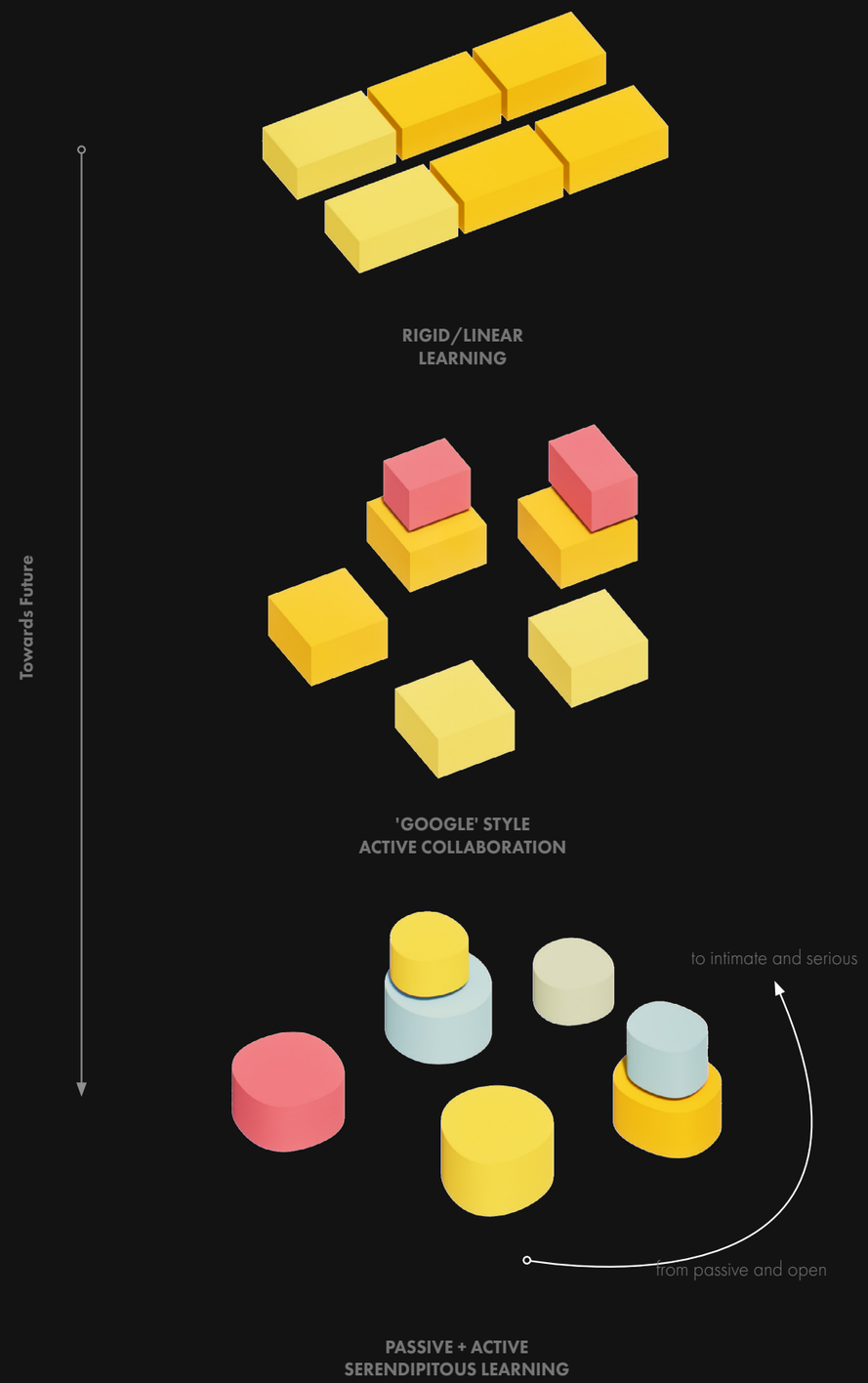
...



0 10m

Organizational Approach

Flexibility Catalogue = Future Proof



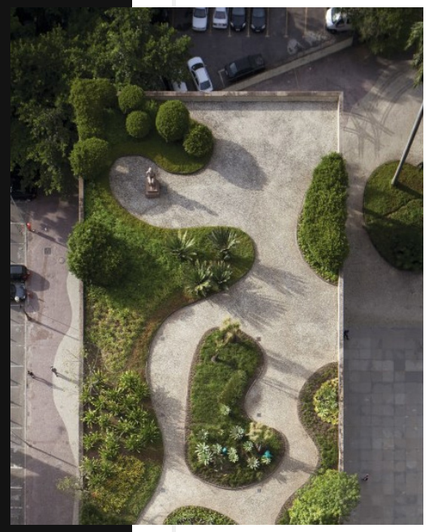
Social Landscape

Flexibility Catalogue = Future Proof

See Appendix

For Full Drawing List

"Inbetween space, the public space is the single most important site for the convergence of people of all ages" [and backgrounds]. (Hauderowicz and Serena, 2020)



Roberto Burle Marx /
New York Botanical Garden

Buga 5 Playground, Munich.

Children's Bicentennial Park, Elemental

Ground Level Plan

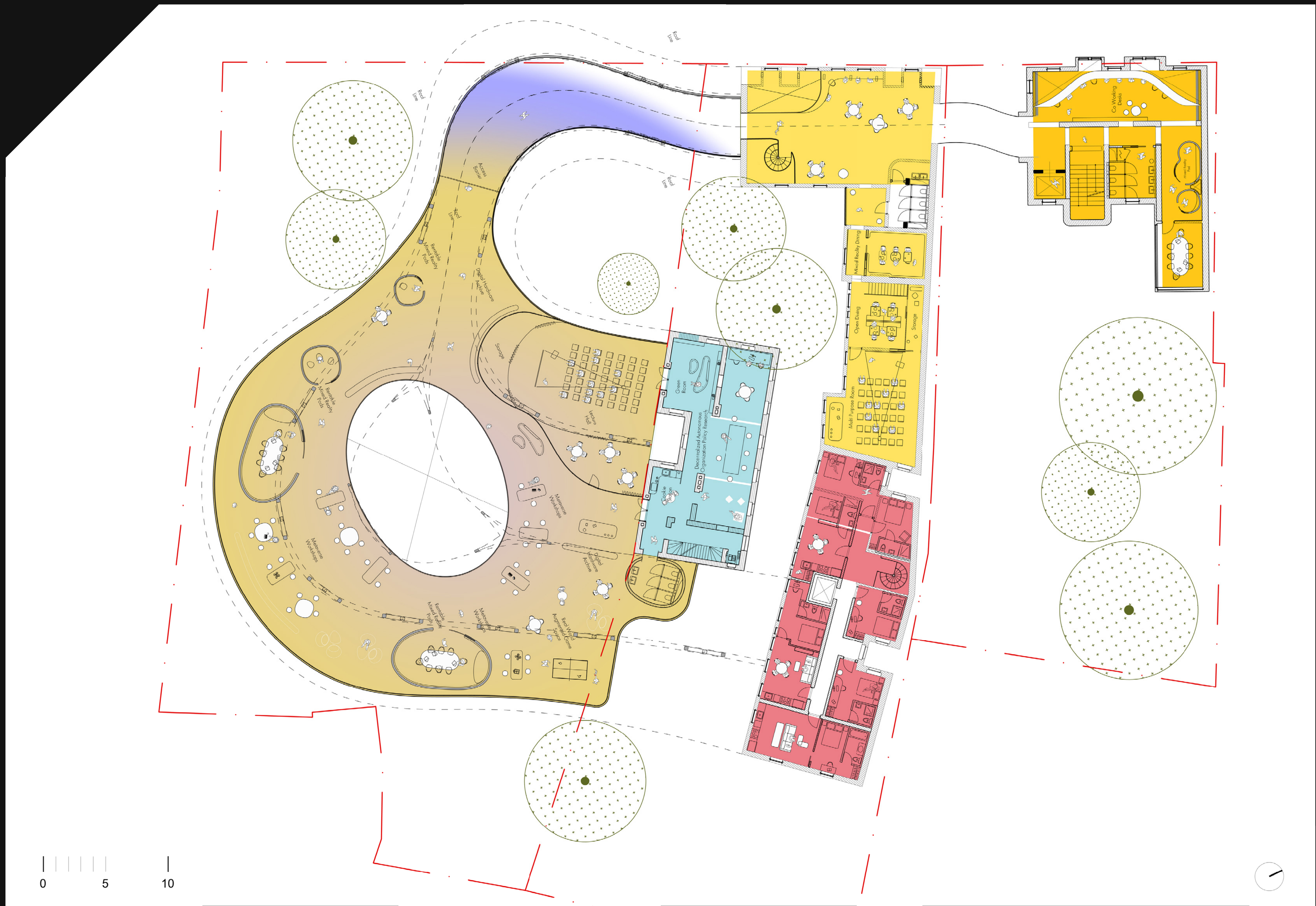
1:250 at A3

- Administration
- Co Living
- Fabrication Labs
- Mixed Reality Lqbs
- Shared 'Play' Space

First Level Plan

1:250 at A3

- Administration
- Co Living
- Fabrication Labs
- Mixed Reality Lqbs
- Shared 'Play' Space



First Level Plan

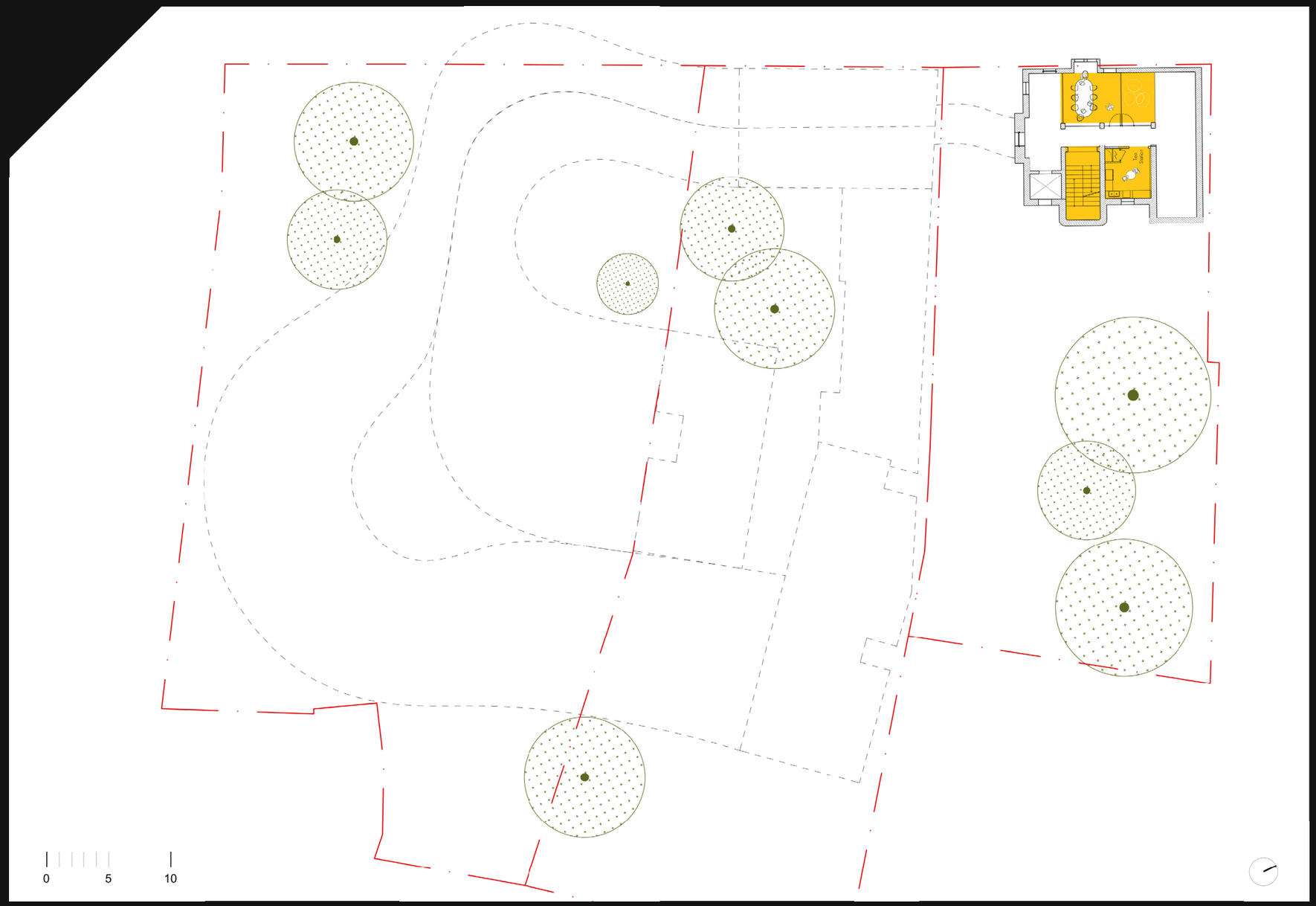
1:250 at A3

- Administration
- Co Living
- Fabrication Labs
- Mixed Reality Lqbs
- Shared 'Play' Space

First Level Plan

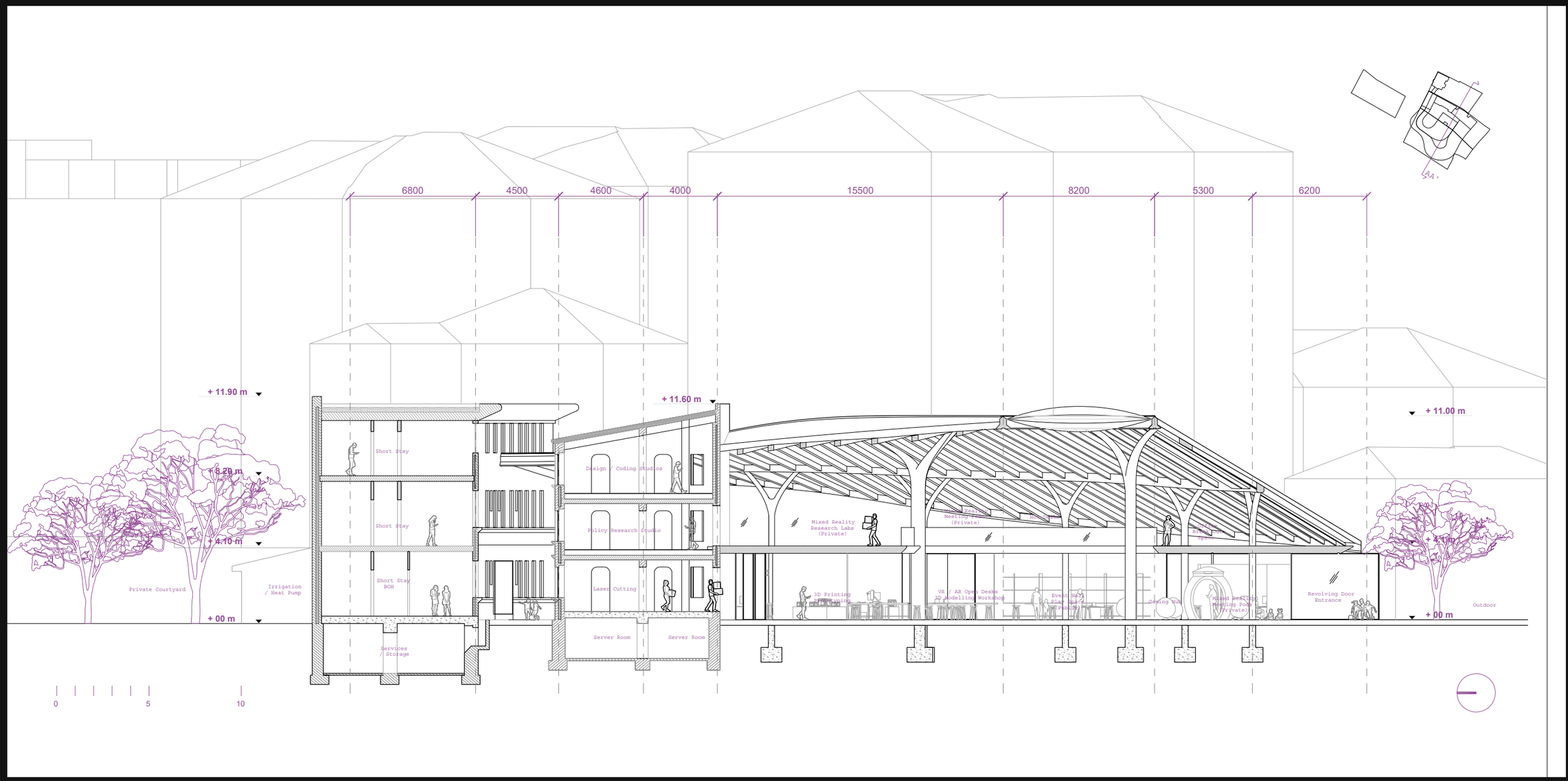
1:250 at A3

- Administration
- Co Living
- Fabrication Labs
- Mixed Reality Lqbs
- Shared 'Play' Space



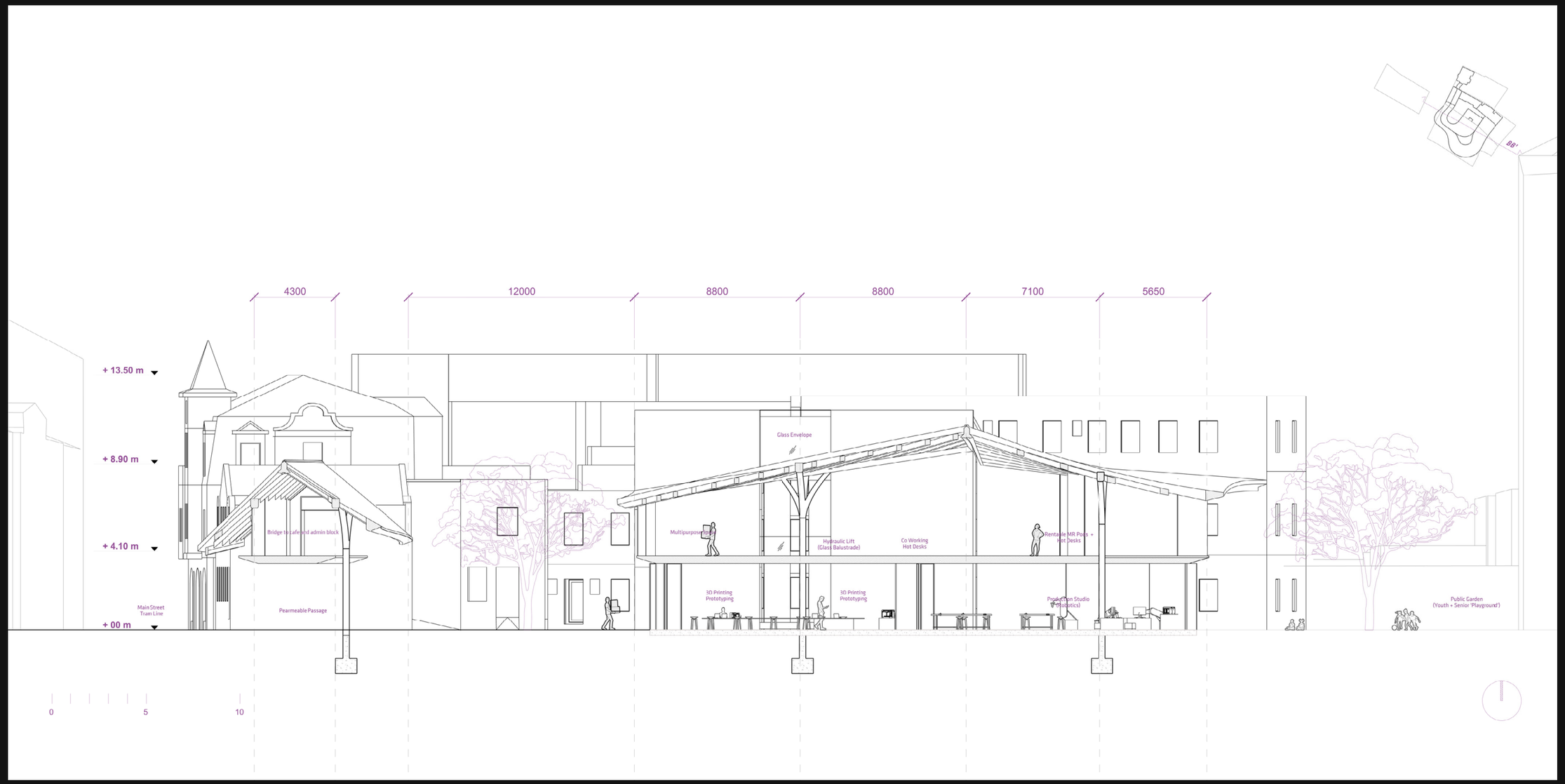
Short Section AA

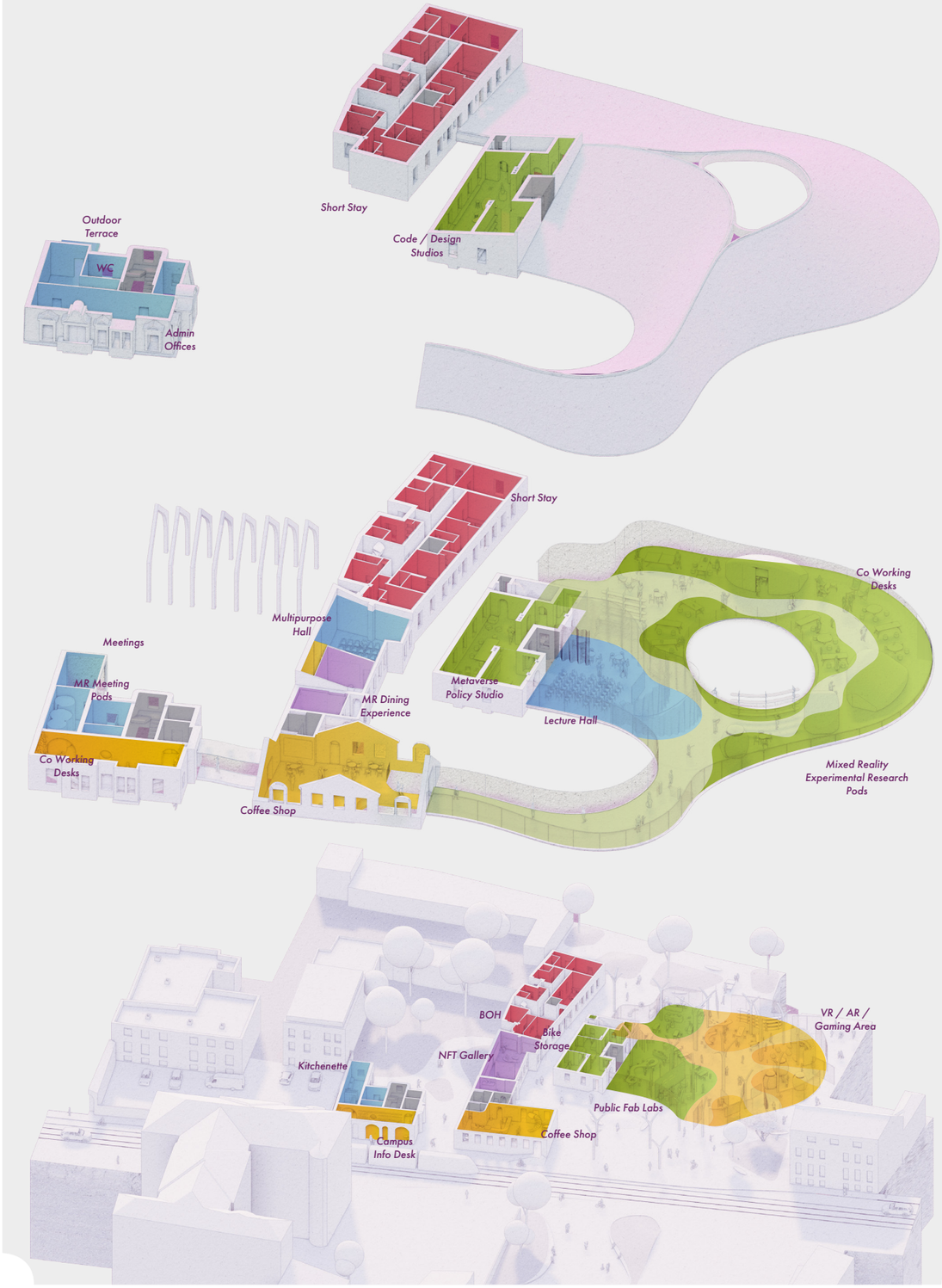
1:200 at A3



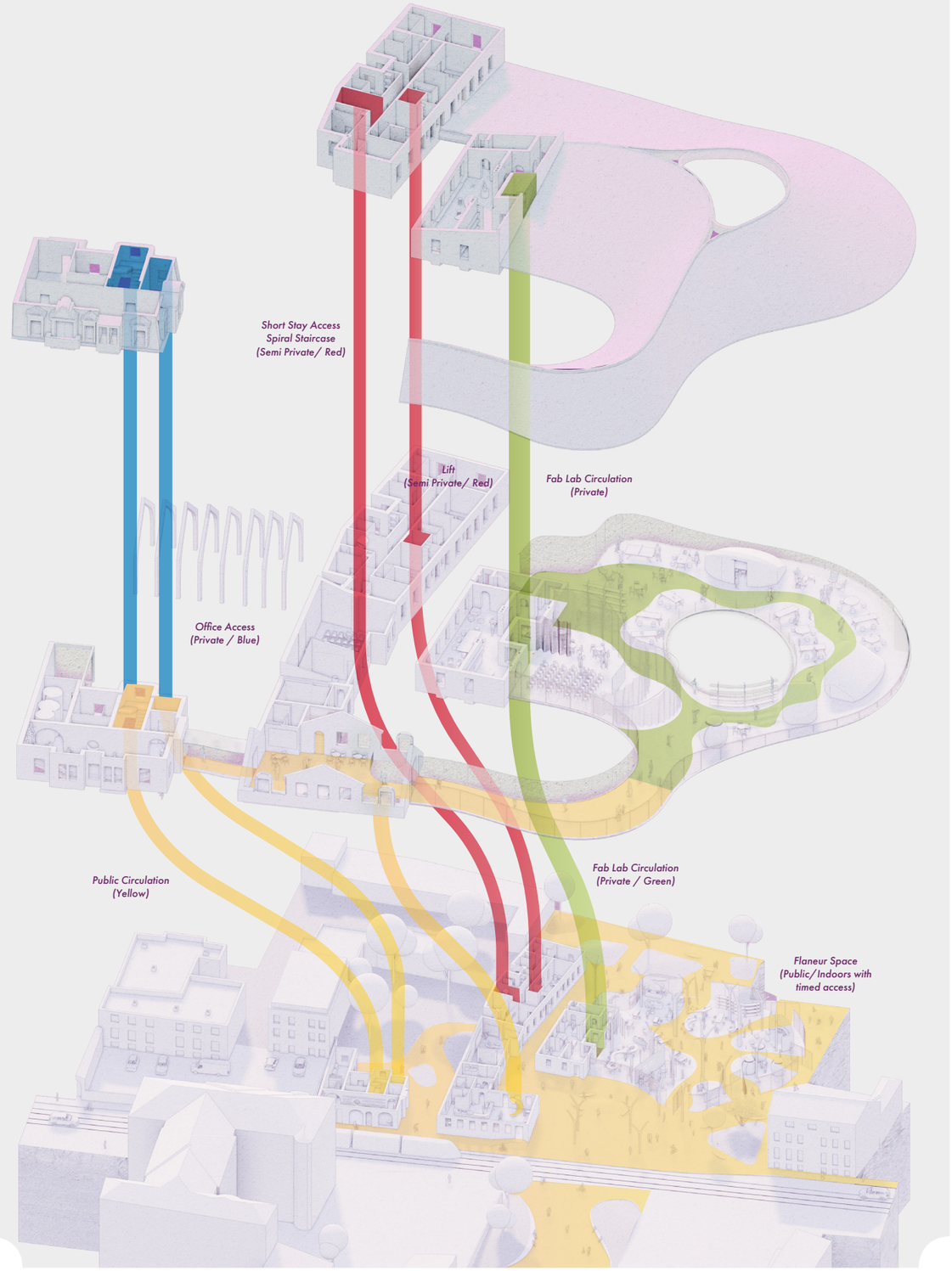
Long Section BB

1:200 at A3

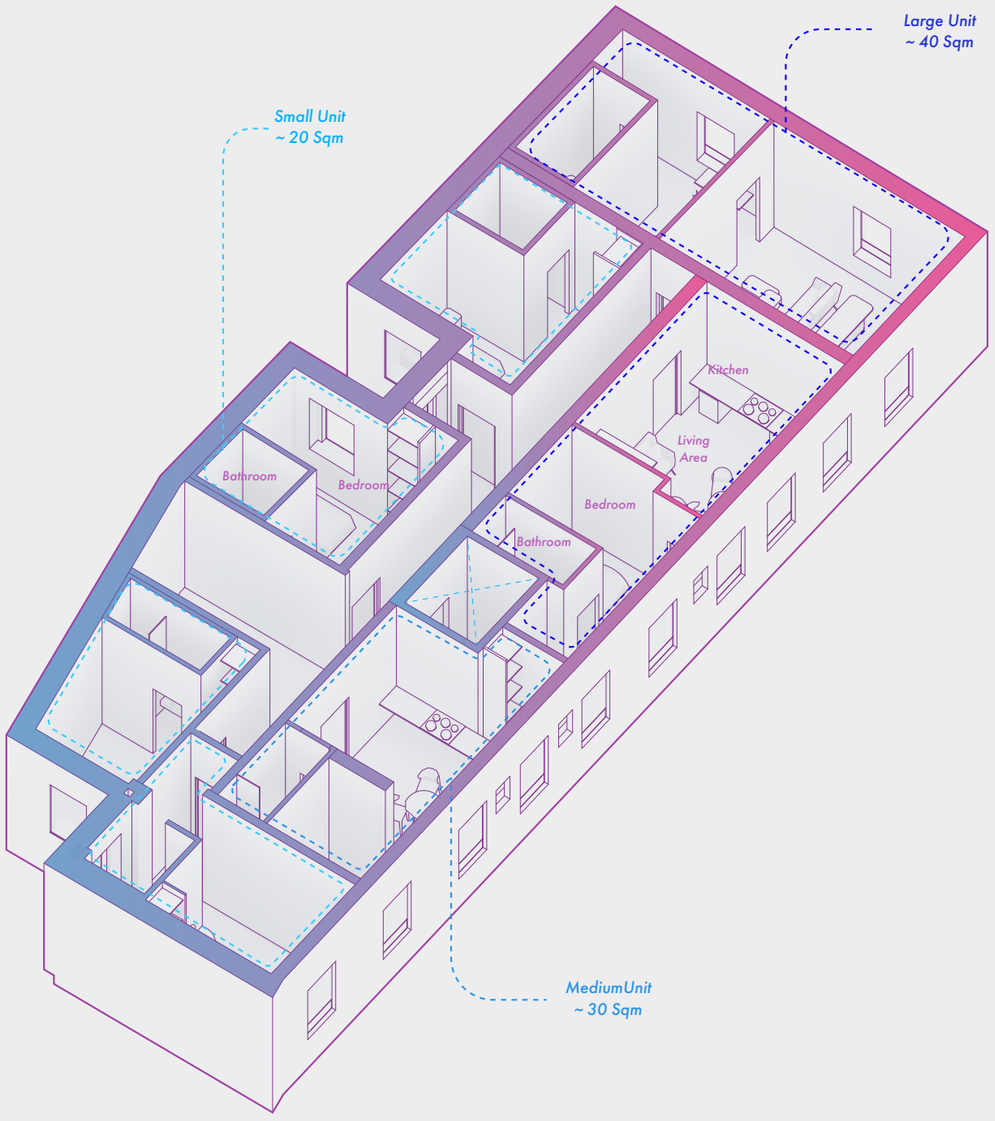




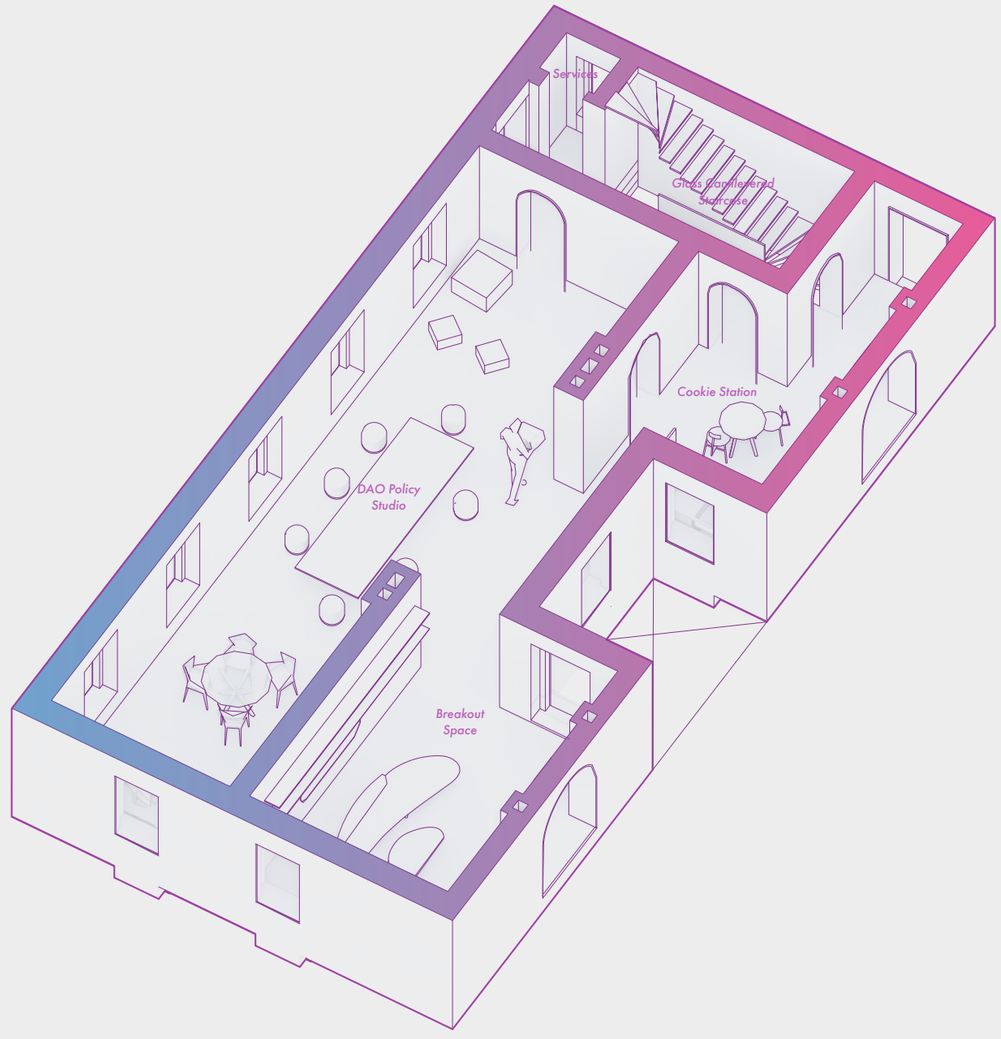
Program Distribution



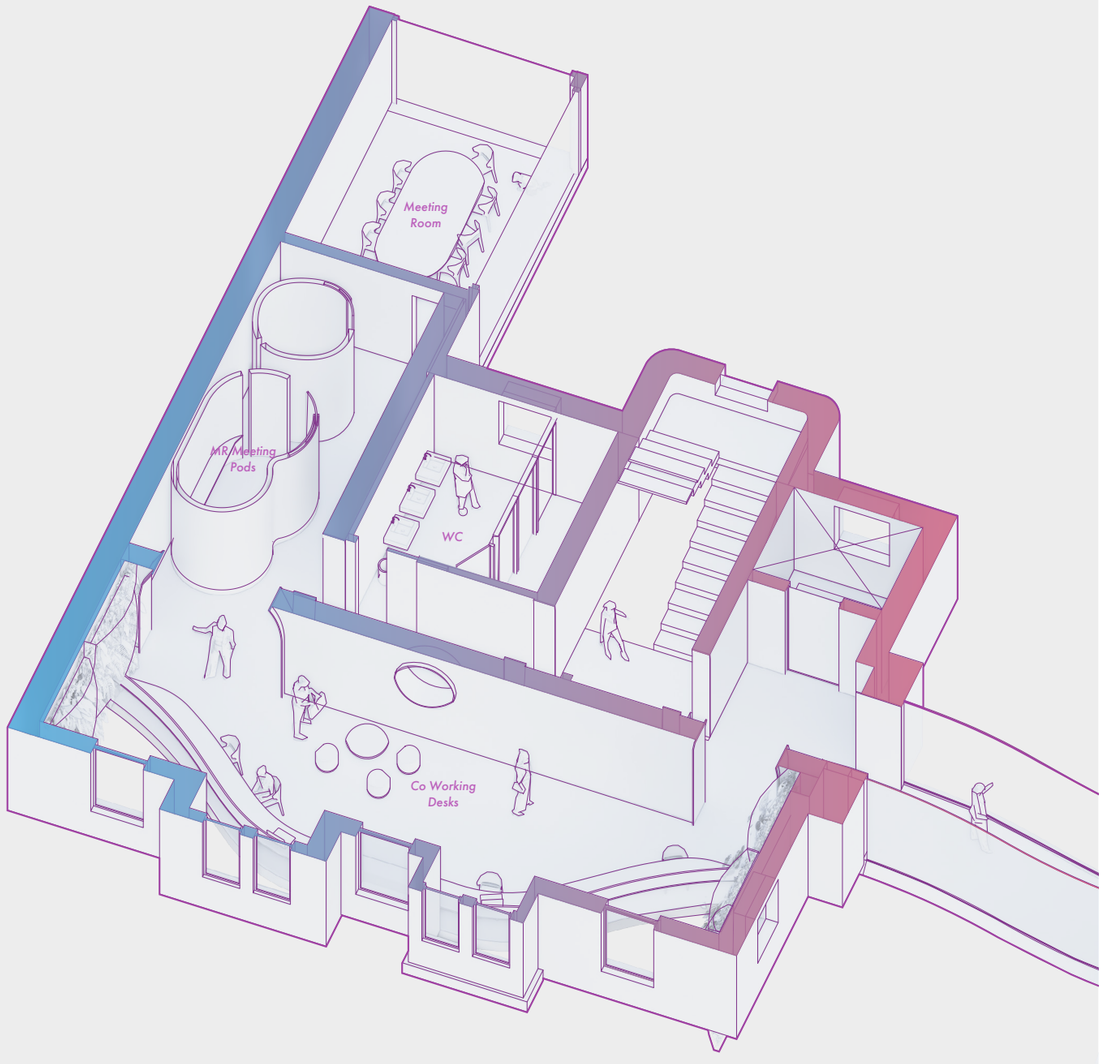
Circulation



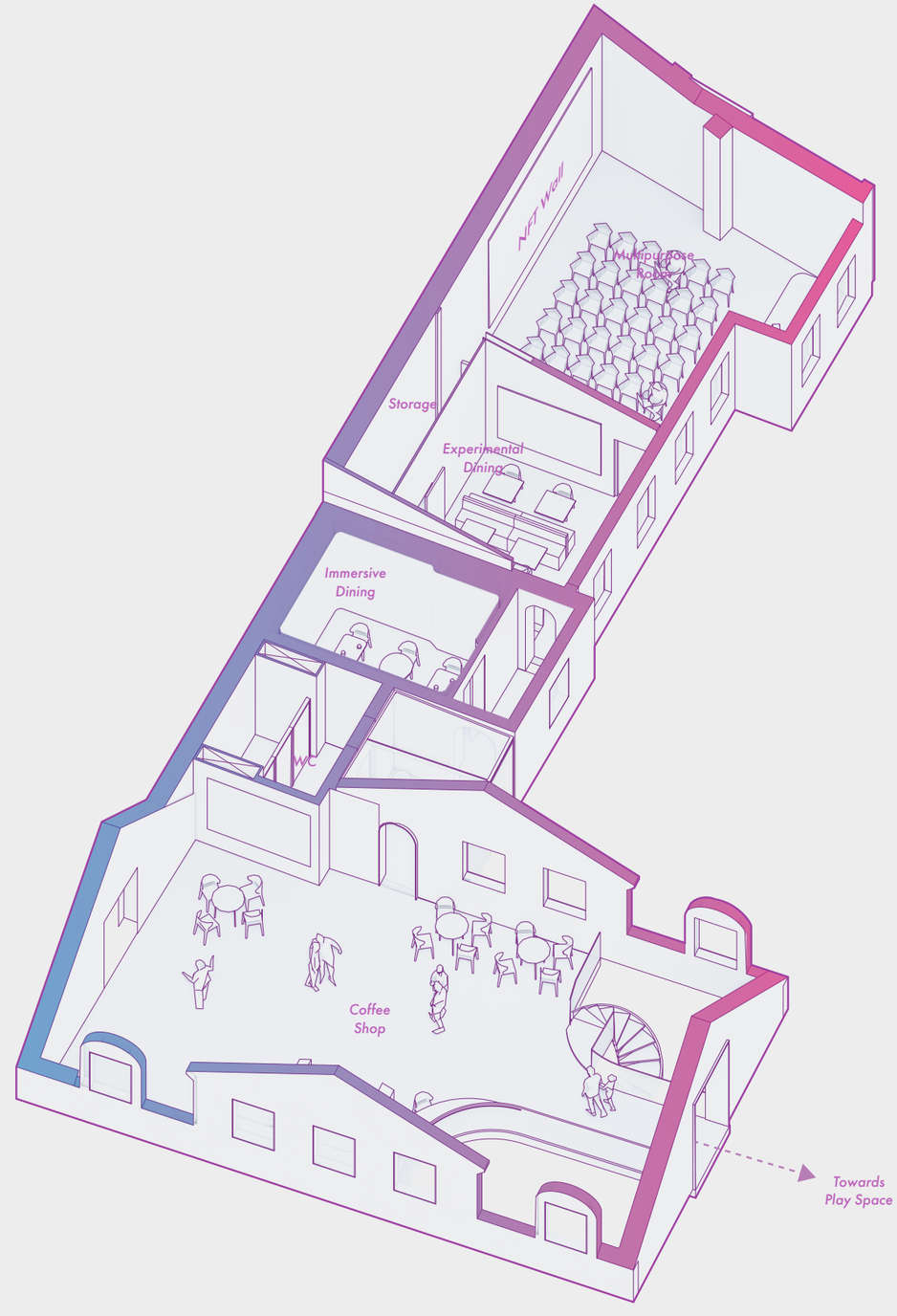
Typical Short Stay Level



Typical Research Studio Level

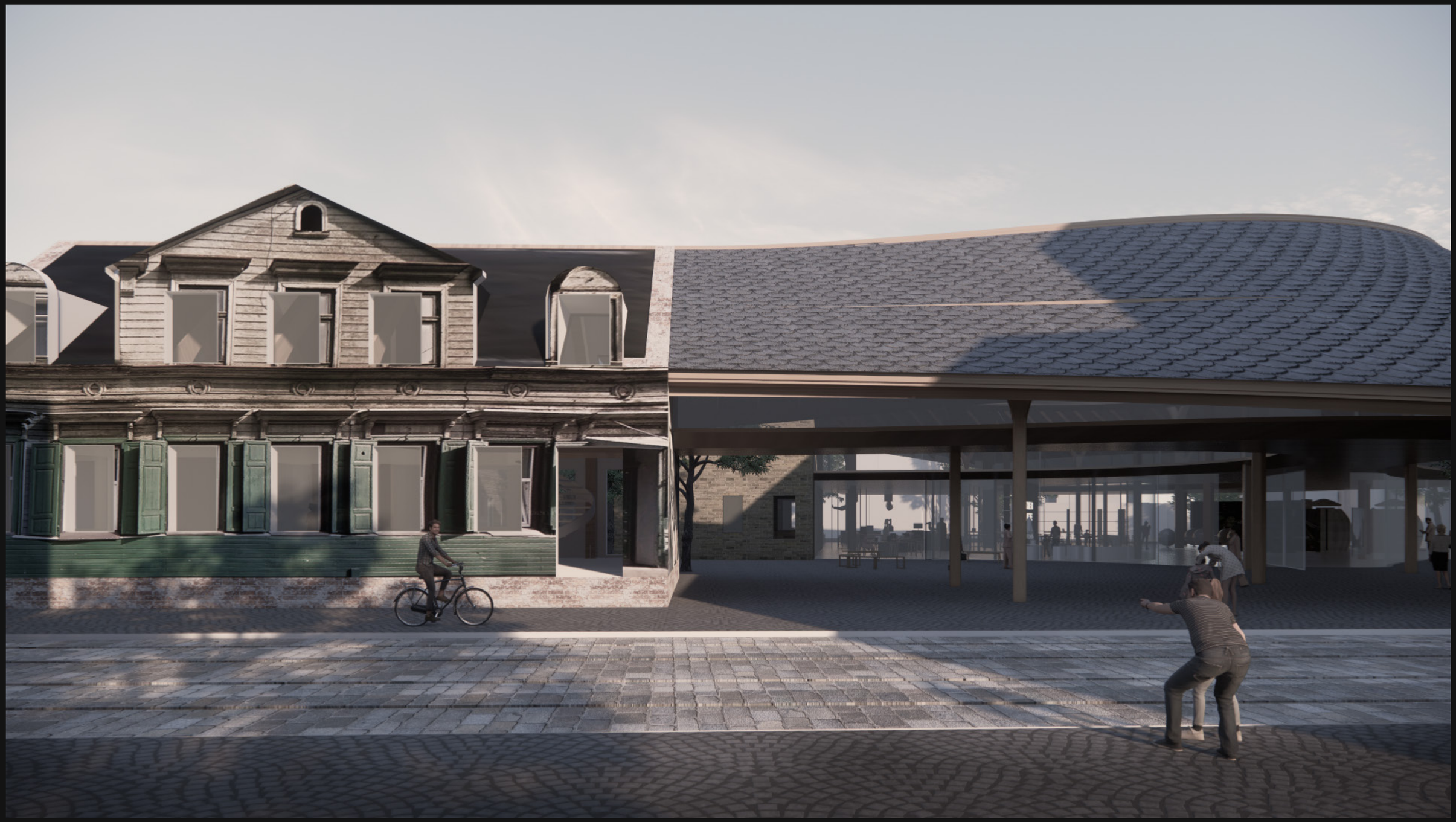


Typical Admin Level



Typical Dining Level

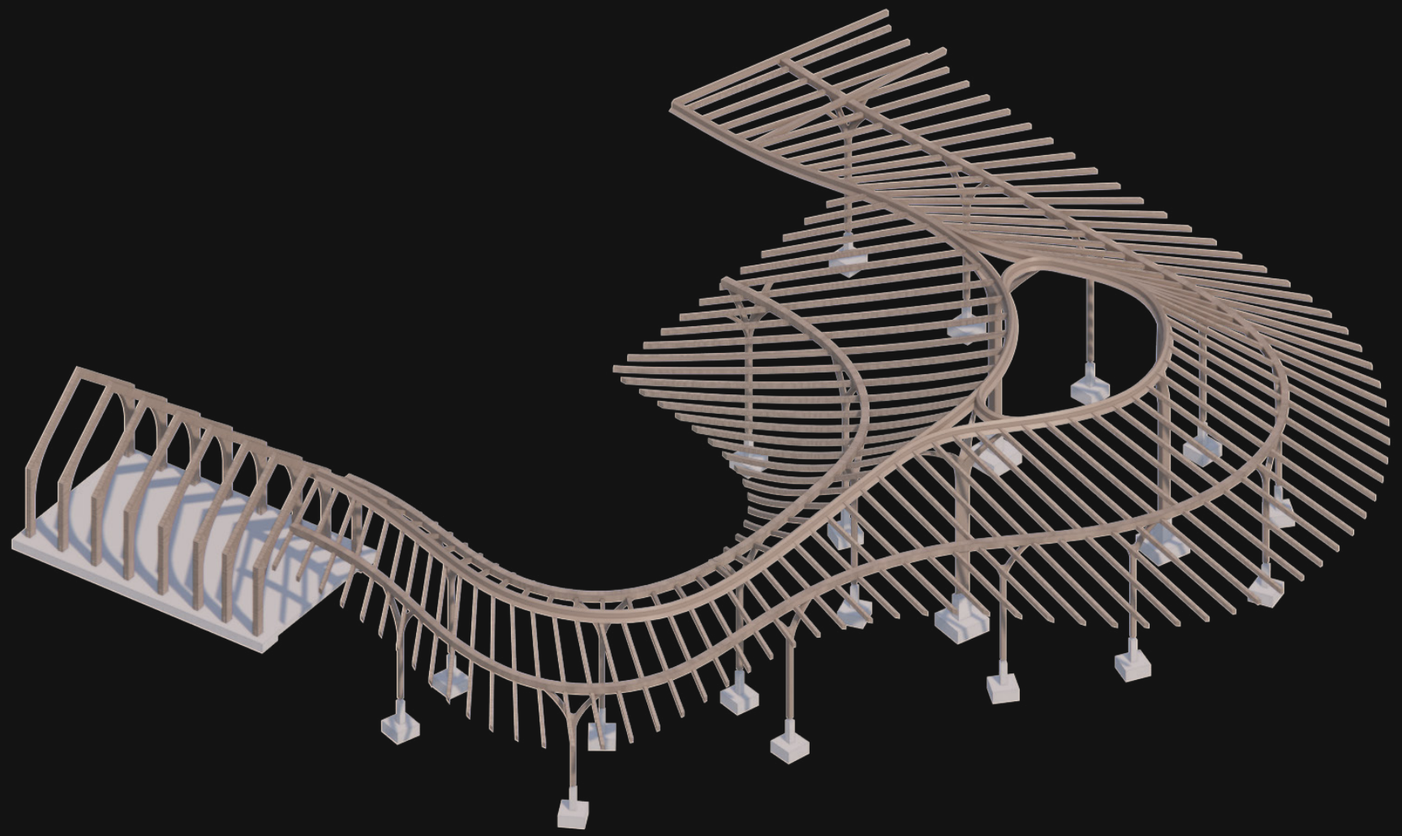
10. STRUCTURE AND CLIMATE STRATEGY



Load Bearing Structure

Primary + Secondary Elements

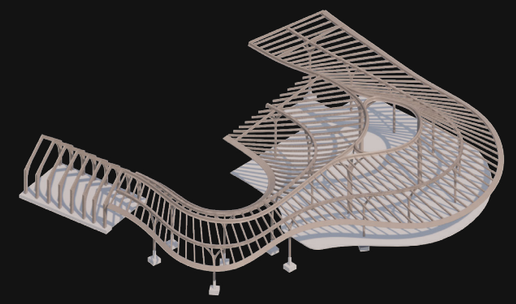
In Latvia timber is the most popular export product. From raw materials to engineered timber, straight or curved glulam (up to 36m) can be manufactured locally.



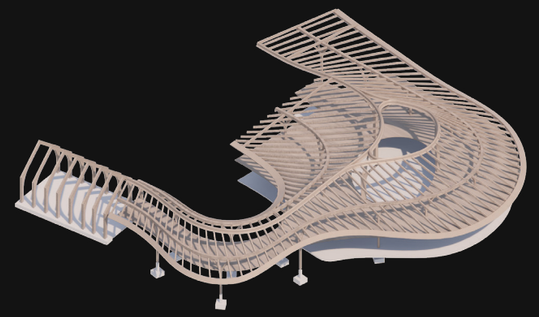
Local Capacity
(On left, Zaza Timber is one of the largest timber product manufacturers, located around 100km from the site)

Primary Structure
(Singular system of Glulam Columns + Glulam Structural Ring)

Secondary Structure
(Glulam ribs operate as catenary beams, reducing stresses and increasing tension to stabilize the building from all sides. Reduces wind load)



CLT Slabs
(Freestanding columns allow clt slab placement with concealed steel hooks)



Structural Plywood Skin
(In-situ applied 35mm plywood acts as a lateral restraint, creating a continous strucutrral support for timber ribs.)

Assemblage Of A Segment

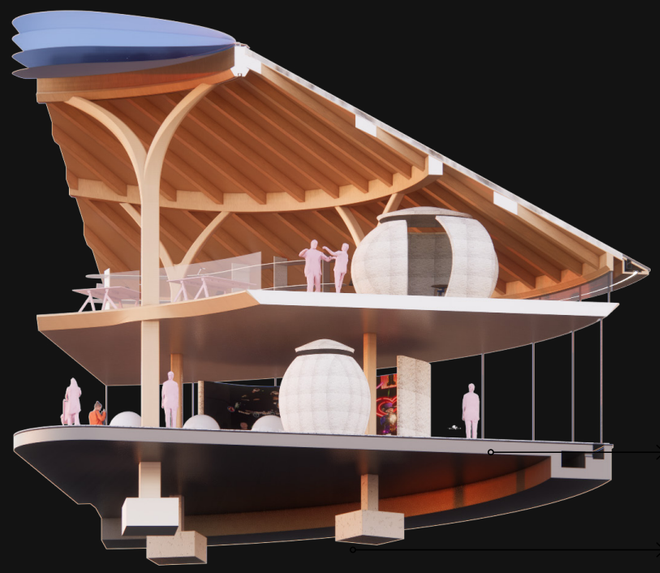
Material + Structural Composition

Glass Fins

Locally Sourced
Wood Ribs

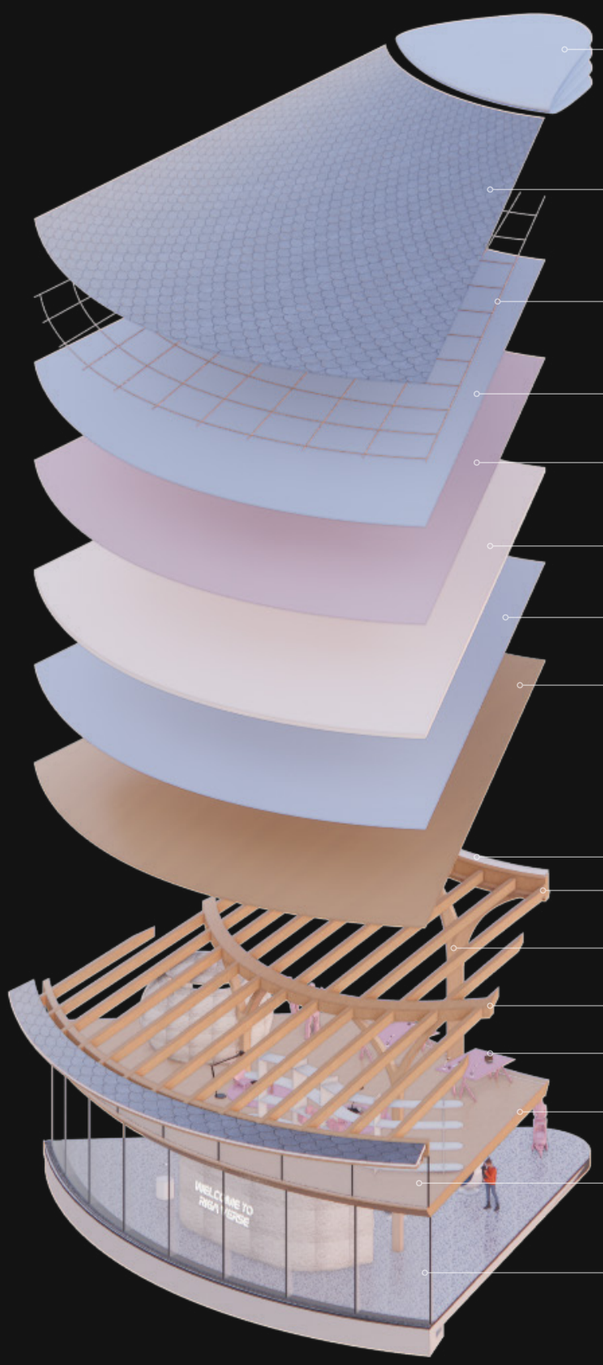
Shingle Composition

Roof Shingles



Concrete Slab

Pad Foundation



4 Layer ETFE Foil Cushion
U Value = 1.4 w/m²K

Spruce Timber / PV Shingles

Tile + Counter Battons

Breathable Waterproof
Membrane (10 mm drainage)

Two-Ply Bituminous Seal

Thermal Insulation (150 mm)

Air Tight Vapour Membrane

Plywood Panels

Total Roof Structure
U Value = 0.144 w/m²K

Steel ETFE Cushion Bracket

Glulam Structural 'Ring'

Glulam Column

Glulam Beam

Glulam Rafters (Ribs)

CLT Slab

Curved Tripple Glazed Glass

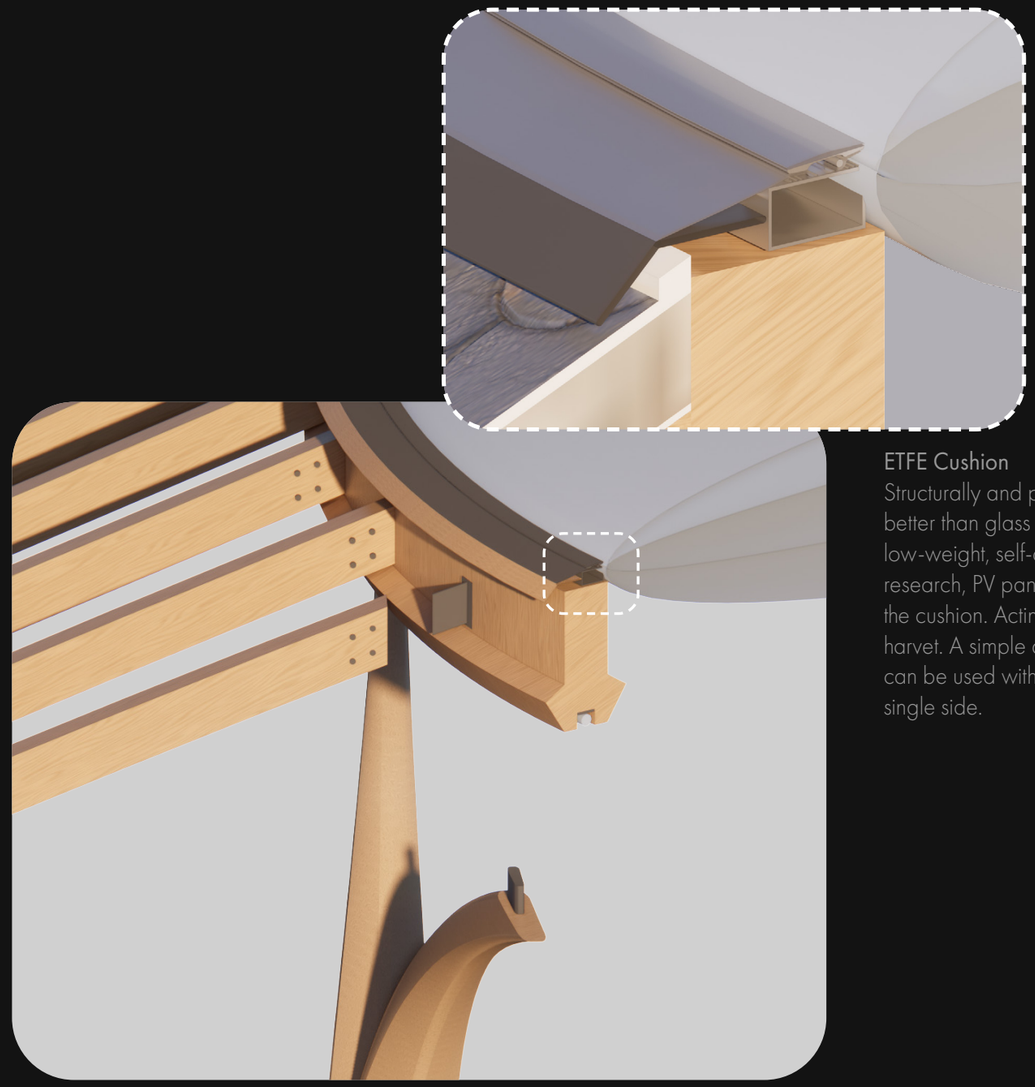
Glass Fin
(Thoughened Tripple Glazing 36mm)

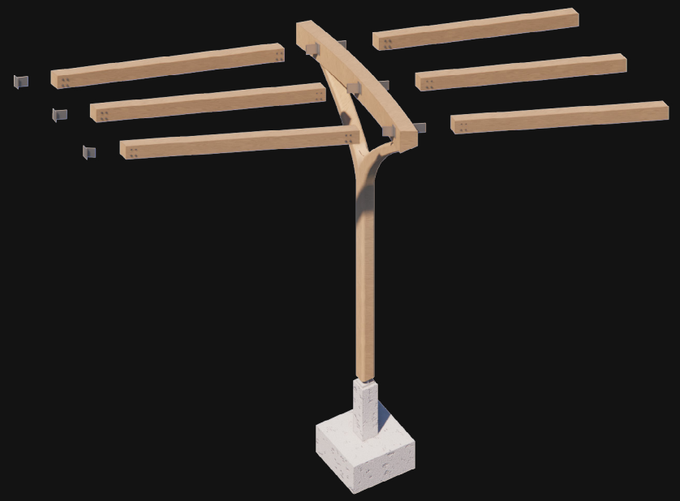
Structural Ring Fragment

Segment Principle + ETFE Foil Lid

Strucutral Principle
Columens are positioned 6m apart, and sits on top of Pad foundation, due to natural curvature of the structure, the structure acts as a 'table', that does not require a core stabilizer.

Connection Principle
As part of the projects concept, I am using a concealed bracket (Alumidi bracket). For sedondary structure, a Self-drilling dowels are used to allow in-situ assembly.



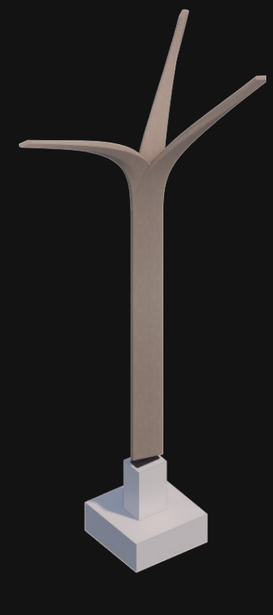


Column + Raft Assembly
(Glulam ribs are positioned roughly 1.2 m apart, allowing for a traditional plywood sheet installation in-situ.

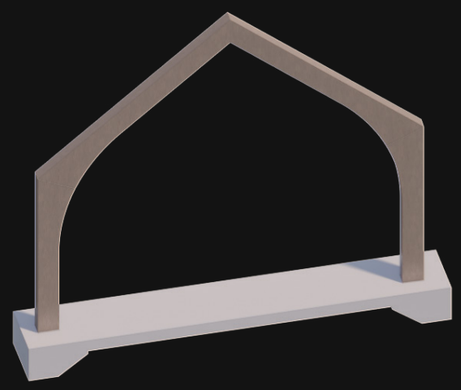
ETFE Cushion
Structurally and practially ETFE cushions are better than glass in this instance. It is relatively low-weight, self-cleaning and with further research, PV panels can be incorperated into the cushion. Acting as a shader and energy harvet. A simple and universal clamping system can be used with as it is attached from a single side.

Primary Columns
3 Primary collumns are supporting the central space, due to the unique shape of the roof, collumns branch out at the top, referencing Jugenstil.

Secondary Columns
Two fold column carries the the ribs



Secondary Columns +
Towards the end os the new built, columns branch out into four, to reduce dependancy on existing brick cavity walls.



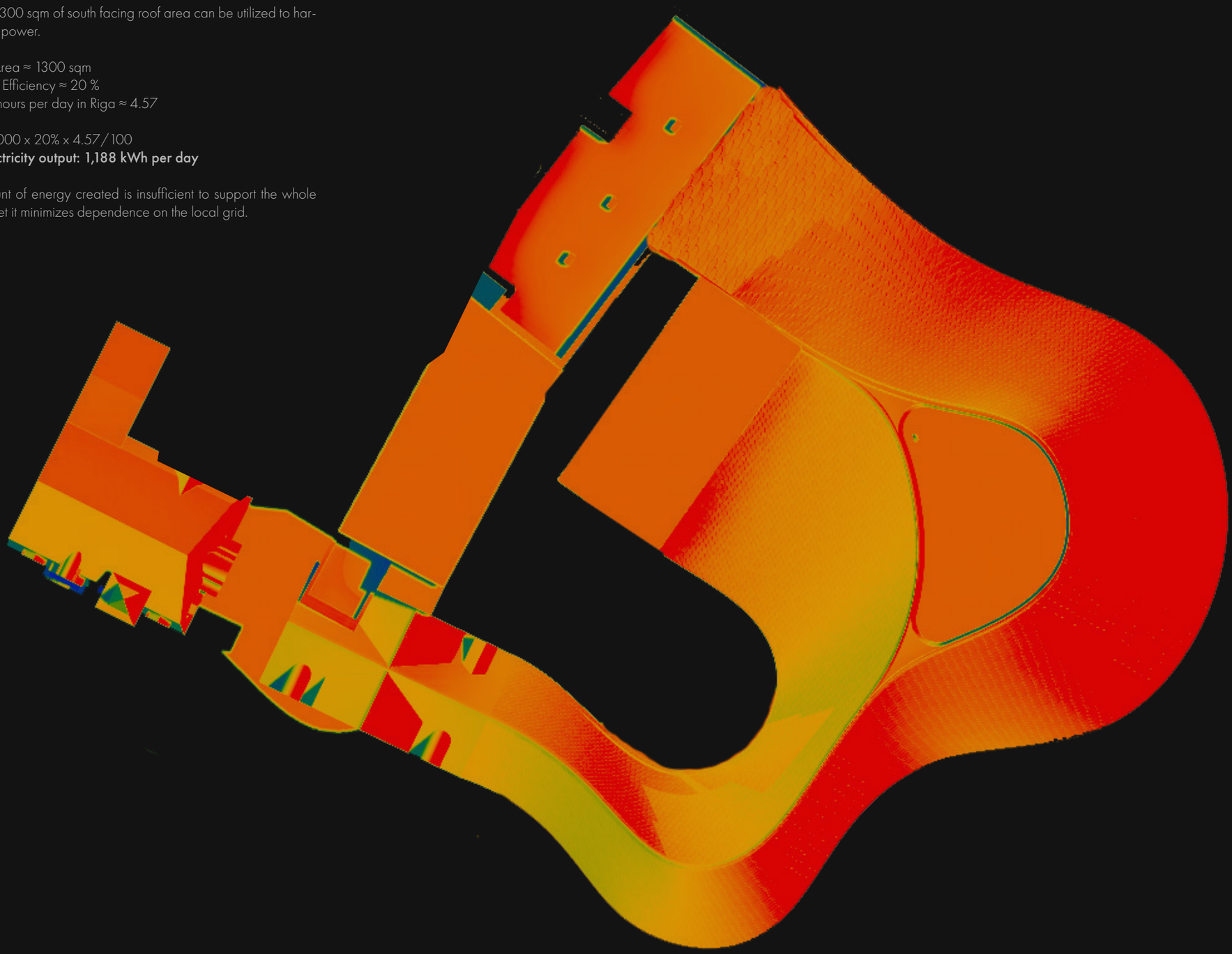
Solar Catchment Roof

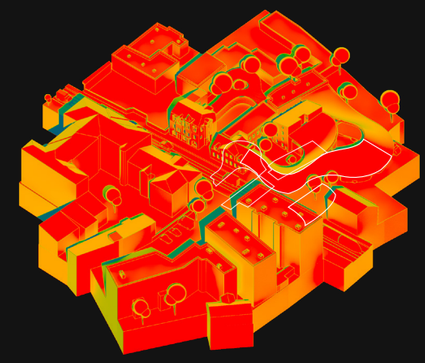
Photovoltaic Gains

Roughly 1300 sqm of south facing roof area can be utilized to harvest solar power.

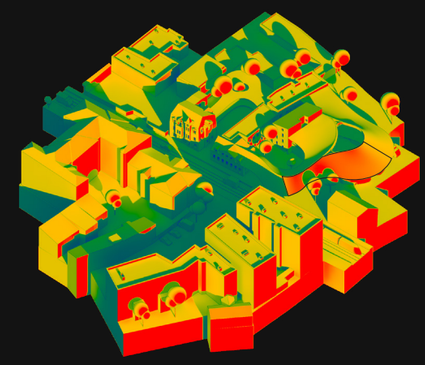
PV Roof Area ≈ 1300 sqm
Estimated Efficiency ≈ 20 %
Avg. sun hours per day in Riga ≈ 4.57
Formula:
1300 x 1000 x 20% x 4.57/100
Total electricity output: 1,188 kWh per day

The amount of energy created is insufficient to support the whole project, yet it minimizes dependence on the local grid.

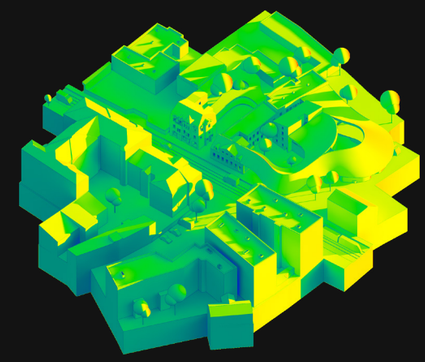




15th June 4 PM



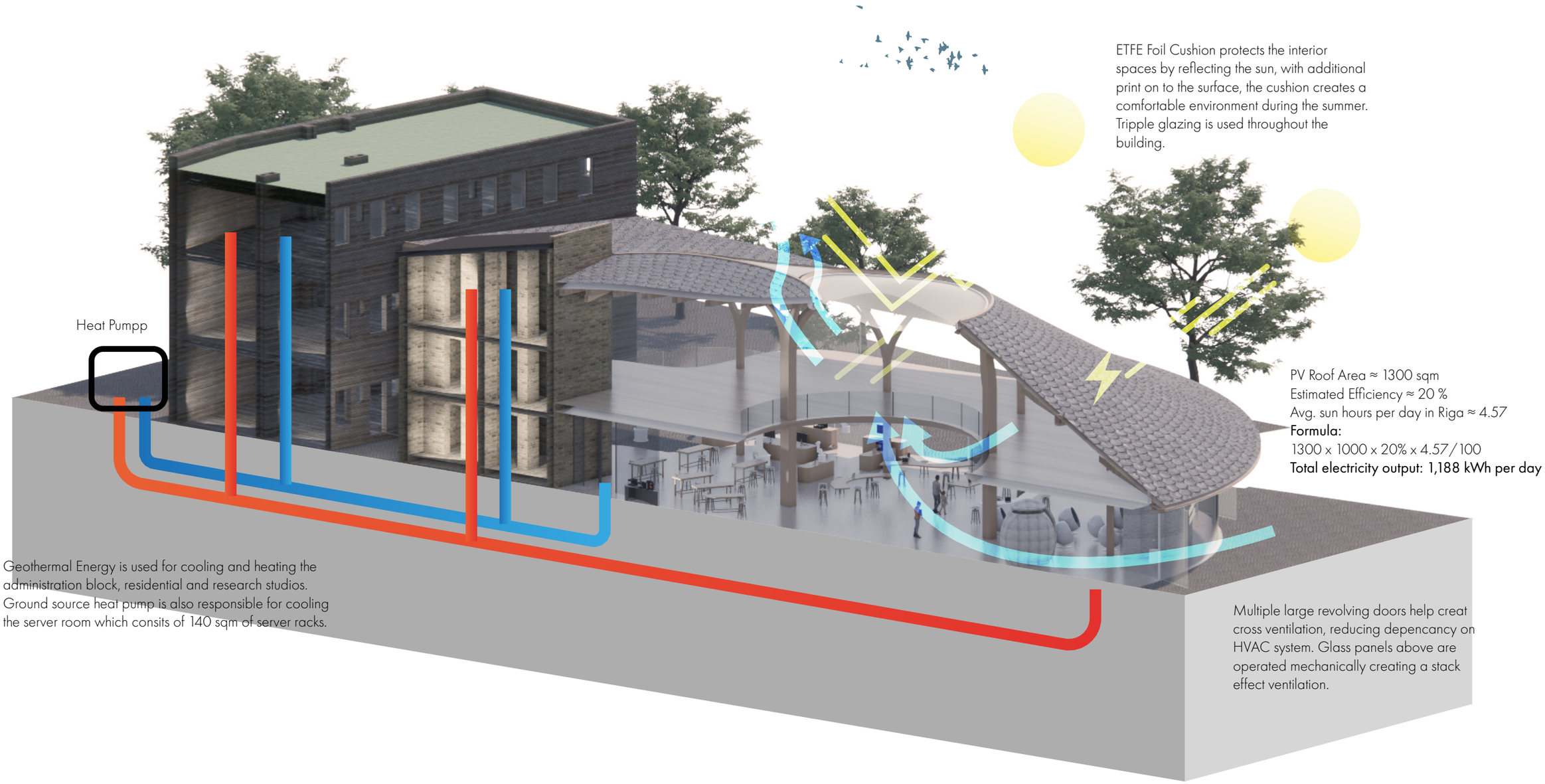
15th March 4 PM



15th December 10 AM

Climate Strategy

Ground Level Cooling / Heating



ETFE Foil Cushion protects the interior spaces by reflecting the sun, with additional print on to the surface, the cushion creates a comfortable environment during the summer. Tripple glazing is used throughout the building.

PV Roof Area ≈ 1300 sqm
Estimated Efficiency ≈ 20 %
Avg. sun hours per day in Riga ≈ 4.57
Formula:
1300 x 1000 x 20% x 4.57/100
Total electricity output: 1,188 kWh per day

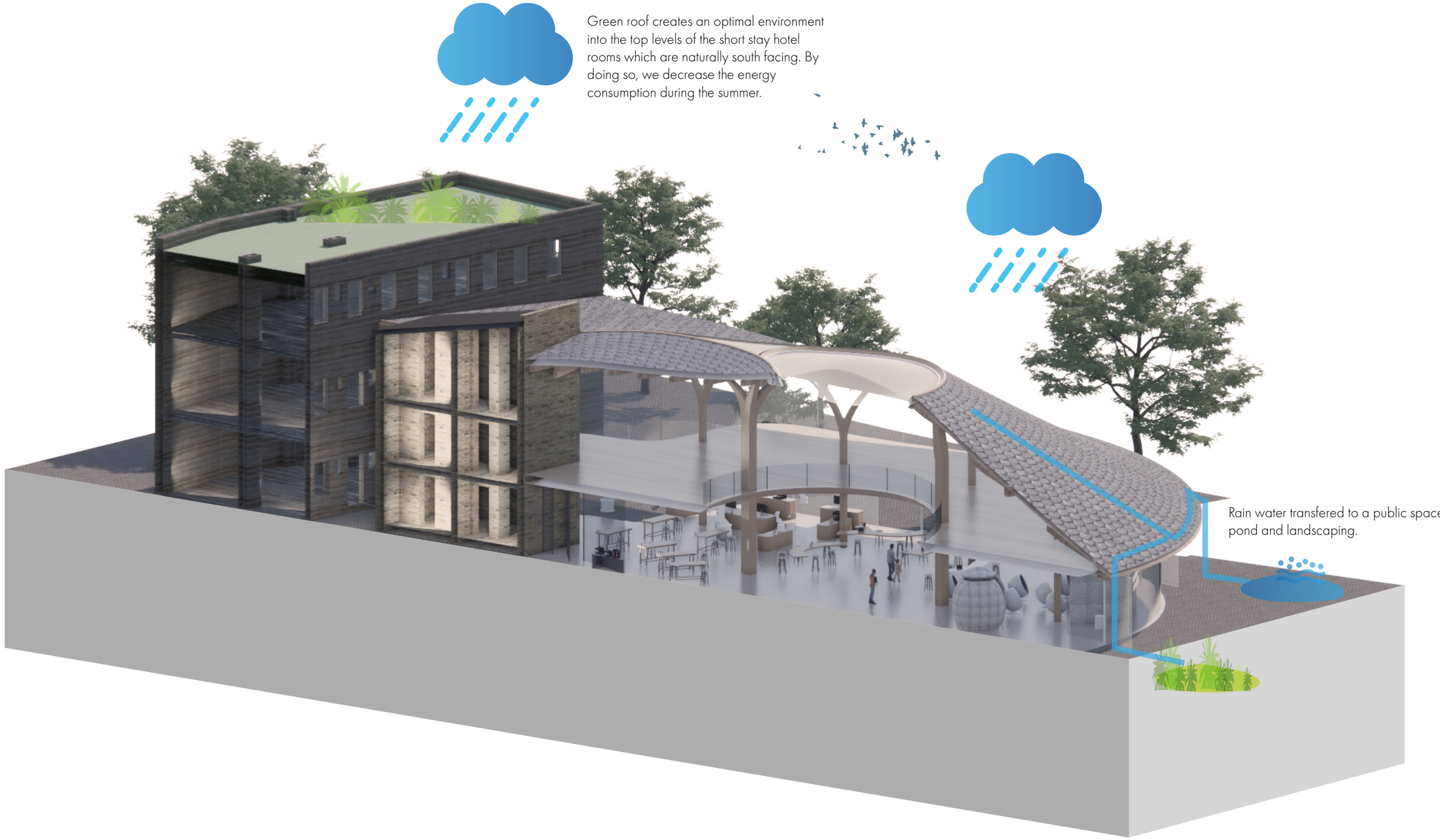
Geothermal Energy is used for cooling and heating the administration block, residential and research studios. Ground source heat pump is also responsible for cooling the server room which consits of 140 sqm of server racks.

Multiple large revolving doors help creat cross ventilation, reducing depencancy on HVAC system. Glass panels above are operated mechanically creating a stack effect ventilation.

Climate Strategy

Drainage + Water Transfer

Green roof creates an optimal environment into the top levels of the short stay hotel rooms which are naturally south facing. By doing so, we decrease the energy consumption during the summer.



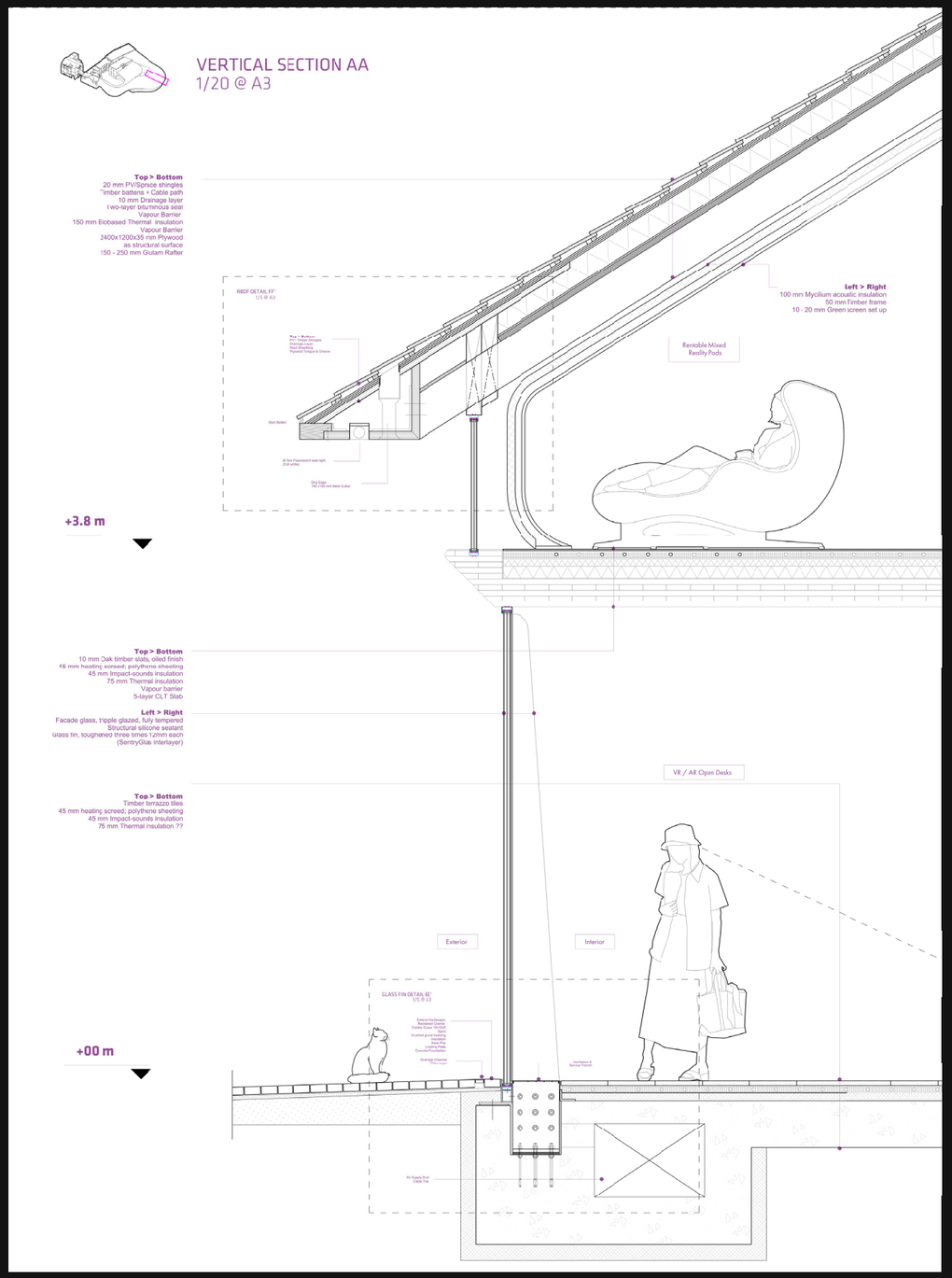
Rain water transfered to a public space pond and landscaping.

11. TECHNICAL DRAWINGS

11.1 APPENDIX

Section

Section + Facade Element



METAVERSE

Transitioning (to) Future Cities

2022