

HYDE PARK LIBRARY

ROBIN PETERSSON 2017



Tutor: David Andreen
Examiner: Christer Malmström

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1. INTRODUCTION

This project started with an architectural competition for the library of the future, located in Hyde Park in London. The idea of 'the library of the future' almost presupposes that the library of today is outdated and that its architecture no longer fulfills the necessary functions of the institution.

In many ways, the library is a typology and an institution in crisis. Its historical role to provide the public with information and knowledge has diminished greatly because of new technologies and media. The crisis is especially visible in the UK. Because of a lack of funding, 343 public libraries have closed since 2010, and many more stand near empty with visitors.

But the library is, even though fewer and fewer people use them, an almost sacred institution. Every time libraries close, the public outcry is enormous. The institution, it seems, embodies some of the finer qualities of a democratic society - universal access to knowledge, access to information, and access to a space, perhaps the last interior space in the city, without having to pay for it.

To reinvent the library, this project looks at the reasons for its decline. The main theoretical focus lies in the changing status of knowledge in our contemporary information society. The disruptive power of the internet is traced as one of the main sources for the decline of the public library. But, as Simon Jenkins writes, when discussing the library; "The internet stole the monopoly on knowledge but it can't recreate a sense of

place" (Jenkins, 2016). And it is in this spirit that this project reinvisions a new concept for the library - by looking at what the internet has failed to deliver.

The library is located on the border between the city, which has always been a space of confrontation, and the park, a space for escaping the noise and stress of the city, with parts of the building connected both conceptually and functionally to each context.

From the start of the project, my aim was to combine two of my main architectural interests. First, I wanted to make use of space syntax theory within the design process. This is often done in larger scaled urban projects, where design options are tested, using different space syntax analysis techniques, in order to predict their social performance when built. The main argument that space syntax puts forward is that the spatial configuration of cities and buildings affect peoples' movement patterns and their use of space. Spaces are used differently, not mainly because of their architectural or symbolic qualities, but rather because of their position relative to all the other spaces in the city (or building). By calculating the integration of a space within a larger network, it is possible to draw conclusions about its' social function and use.

Second, I wanted to explore new ways of designing architecture with the help of

digital tools, and generative processes. By using algorithms to design architecture, complexity and variation can be achieved, that without the help of the computer would be impossible. These parametric processes imply an almost endless variation in design options, as every parameter within the algorithmic process can be adjusted to change the end result globally. This means that choosing between lots of possible options becomes one of the main tasks of the designer.

It is here that these two fields, space syntax and generative design, could intersect, and provide a framework for making informed decisions within the design process.

1.1 Thesis Structure

The report is structured with a review of the theoretical readings in chapter two, where I describe the influences and theories that led to the concept of the library.

Chapter three is where I present the project, and go through the process and ideas behind each part of the building.

In chapter four I present the plans and sections of the building and the report is concluded with a brief chapter of reflections I have had around the project.

2. THEORY

This chapter outlines the theories and ideas on which the concept for my library is built. Throughout the chapter, I try to show how the architecture of libraries, and the built environment in general, responds to the social factors of their time.

Starting with an analysis of the traditional typology of the public library, I take Étienne-Louis Boullée's architecture from the enlightenment as example in order to show how it responded to new conditions in a democratic society. Boullée, I argue, used monumentality and uniformity as architectural qualities that mirror the importance, in a democracy, for social cohesion. With his library, knowledge presents itself to visitors as a unified whole - a condition that, in our contemporary information society, has changed drastically.

The changing status of knowledge in our society seems to be one of the main challenges to tackle when designing a new library. And it is through an analysis of knowledge, its social construction, and how it might be related to architecture, that the concept for my library takes shape.

One of my main sources of inspiration is Berger and Luckmann's sociology of knowledge, in which they show how common knowledge always comes out of social processes. They argue that it is through peoples interactions in everyday life that a shared understanding of what constitutes reality arises.

I go on to argue that the built environ-

ment plays a role in these processes because interaction and encounters between different people takes place in physical space. Working from the theories of Bill Hillier, I aim to show how the organisation of space creates different affordances for where and if social processes take place, and that the design of buildings and cities can either act to bring people together or keep them apart.

The internet, I argue, works in a similar way. It presents itself as a surprisingly strong framework that, through underlying algorithms, dictates what information people see and who they interact with. These algorithms divide people into 'echo chambers' on social networks, in which similar world views get perpetuated without confrontation or discussion amongst people of different opinions. On the internet, these strong frameworks seem to work squarely against the utopian visions that they were designed to realise.

The chapter is concluded with a discussion on new ways of designing architecture using 'big data' and generative processes, how these relate to the previous analysis of knowledge and unintended consequences, as well as presenting an outline for a vision of a future public library.

2.1 Étienne-Louis Boullée, the Book, and the Library-as-Archive

Before Étienne-Louis Boullée, the term monument referred exclusively to commemorative buildings. His work brought about a change in the definition to include also any public building, housing a public service, potentially accessible to all. His designs coincide with the French revolution and are conceptually indicative of the enlightenment ideas of his times. Instead of designing grand designs for dead rulers, his monuments celebrated the free individual, the conquest of science over religion, and liberal democracy over the monarchy.

A quality that is striking in all of Boullée's projects is the vastness and uniformity of their design. They appear almost devoid of context, as autonomous objects without external relations. Pier Vittorio Aureli has argued (2011) that this should not necessarily be seen as a radical architectural vision, but rather a post-revolutionary approach at consolidating the emerging ideas around the state, and the establishment of the democratic subject, in a new form of public space. The uniformity of his public monuments is mirrored in the need for cohesion in the new democratic society.

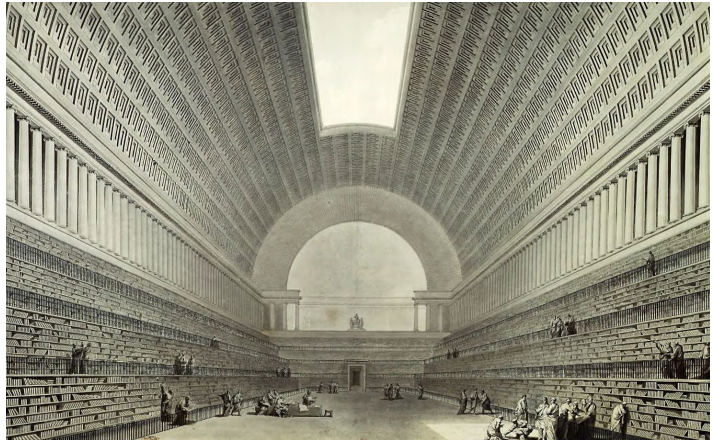


2.1
*Étienne-Louis Boullée; project
for an opera house (1781)*

Boullée's vision for the institution of the public library was that the state should have the responsibility for collecting, ordering and distributing all information to its' citizens. Knowledge, according to this vision, should be a public and free resource for all - as it was (and still is) considered a precondition for a democratic and free society.

At this time, the book was the main medium by which knowledge and information was distributed and consumed. The book had, and have had since, an enormous impact on the ways in which the architecture and function of the public library was conceived. Boullée's French National Library (1785) is designed as one large space with seemingly endless bookshelves, stacked in terraces along the walls. There are no desks or furniture for studying or research. Instead, the visitors are meant to browse through the rows of books, and not linger for other related activities, such as reading comfortably.

In Boullée's library, the book is the main inhabitant, whereas people are simply visitors.



2.2
*Étienne-Louis Boullée; design
for a library (1785)*

Boullée's French National Library is a good example of what Foucault (1986) has called a 'Heterotopia' - a repository of all time, enclosed in a kind of universal archive. Libraries and museums, Foucault explains, are spaces in which time never ceases to accumulate. Their purpose is to collect and display all of history, while still, paradoxically, being themselves outside time, "inaccessible to the wear and tear of the years". Up until the enlightenment these accumulations of time were always established by personal choice (people had private libraries and collections of artifacts). It is only during the modern era that they became institutions, and expressions of some collective effort.

But why was it necessary to compress and enclose all of time into one space, why was the library conceived as an archive? One reason, it could be argued, is the medium and the materiality of the book.

Stan Allen (Silver, 1996), when discussing the future of the library describes how the institution itself, not just the architecture, is called into question by a changing set of conditions, such as new technologies and media. He describes it as a traditional typology in crisis, as it has lost its' capacity to properly order and represent its spaces and their use.

"To design a library today is to contend with an entirely new set of expectations. Above all, it means to recognize an ever-increasing uncertainty of what constitutes knowledge, who has access to it and how it is distributed."

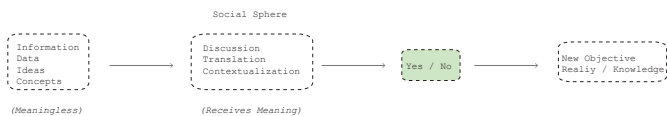
- Stan Allen (p.2)

2.2 Knowledge, Interaction, and the Generic City

In the broadest sense of the word, knowledge refers to a shared conception of what constitutes reality. It is the certainty that phenomena are real and that they possess certain characteristics. For example, everyone knows that the sun exists (that it is real), and that it has the characteristics of being warm and bright.

Berger and Luckmann argue, in their book 'The Social Construction of Reality' (1991), that all knowledge, including the most basic, common sense knowledge of everyday life, is a social product. It comes from, and is maintained by, social interactions - the most important being face-to-face interactions. When people interact, they do so with the underlying assumption that they share a similar conception of what constitutes reality, and through social interactions, this shared conception is both reinforced and perpetuated.

Additions into the social stock of knowledge arises from what they call 'institutionalization'. It is, put simply, a process where new information, ideas, or ways of doing things undergo a sort of collective evaluation and, perhaps, incorporation into the broader stock of common knowledge.



2.3 Diagram: Social construction of new knowledge (Pre-Internet)

It is a process of, subtle or overt, debate and confrontation, where the meaning and relevance of this new information is agreed upon. The information, in itself, is arguably meaningless before this process of evaluation and translation, as it is detached from any social context.

How is knowledge and architecture related? Where, in these social processes, does architecture fit in?

Space syntax (Hiller & Hanson, 1984; Hillier, 1996) asserts that space, or more specifically spatial configuration, has a certain agency in that it effects movement patterns in the city or in buildings. The theory on natural movement proposes that the spatial configuration of the built form itself produces 'attraction inequalities' (Hillier, et al. 1993) that structures movement, on a probabilistic level, according to the relational properties of each street - according to how well integrated they are within the larger configuration. The built environment, in this way, structures movement and encounters, and so 'acts' in a social way by either bringing people together or keeping them apart.

One way in which architecture plays a part in the formation of knowledge is then as simple as the fact that throughout history, most human interaction has taken place in physical space - in cities and buildings. And the configuration of these spaces, the design of buildings and cities, has an impact on where (and if...) interaction takes place.

Hillier argues that all cities are essentially the same, once dissected to their most basic functions. The function of what he calls the 'generic city' is to facilitate human occupation and movement. He explains how, in organically grown cities, the spatial configuration of the street network has maximized the potential for these functions.

In any given city, there is a foreground network of highly integrated streets, which connect the center to the periphery, and local centers to each other at all scales. These streets are full of movement and people, and thus act generatively in that they bring people together - for economic activity or random encounters between strangers. There is also a background network of less integrated streets, which make up the more residential areas of the city. These spaces act in a socially conservative way, according to Hillier, as no new social formations arise here.

In buildings, Hillier differentiates between what he calls strong and weak programmes. Spatial configuration is seen as a framework that structures the probabilities of different people meeting. If that framework is designed to separate different users, as for example in a courthouse, there is a strong program. If, on the other hand, there are few limitations and boundaries between different spaces, as for example in a museum where visitors can take several different routes through the exhibitions, the programme is weak, which corresponds to the building being generative of new social formations.



2.4

Axial map of London. Red lines indicate the most integrated streets; the foreground network. Blue lines are more segregated and makes up the background network of the city

2.3 Movement, Perception, and Oblique Architecture

Another form of knowledge is what David Seamon (2015) calls 'body-knowledge' - knowledge inscribed in the body. In his book, 'A Geography of the Lifeworld', Seamon argues that people's movements cannot be explained only by cognition and rational choice - some movement arises involuntarily, "*from the body*", from habit. Movements, he argues, are learned, when the body has understood them. The body can then perform these movements without conscious intervention.

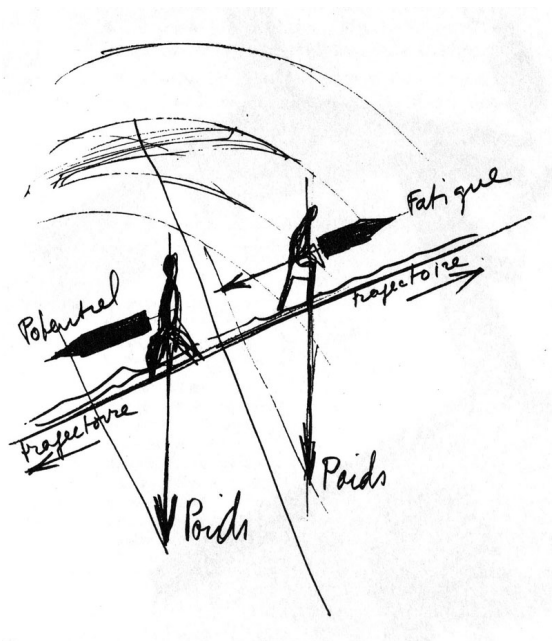
The body learns from repetition and routines. This way it frees one's mind to focus on other things while, for example, walking home from work. During habitual routines, a person gives the environment no notice and instead directs attention inwards - one is "separated from the world". Seamon, working largely from the work of phenomenologist Maurice Merleau-Ponty, shows how this kind of habitual movements, when performed by many people in the same space, brings about a sense of 'at-homeness' and a collective sense of place.

But, he also explains the situations in which the opposite happens, and cognition has to take over. For example, when a person is in a new environment, Seamon writes, he becomes intensely aware of the surroundings, to the point where there is "a break in the boundary between person and environment". Seamon, using the same terms as Hillier, describes how different ways of encountering the world implies either a generative (when a person is aware and open towards his surroundings) or a conservative (during habitual movements and

actions) outlook for the individual.

Lars Spuybroek (2004) writes that movement and perception work in a continuum within the human brain. The two complement each other - neither works without the other. He argues, as Seamon does, that they are closely linked to the environment in which the body is situated. While we perceive obstacles, we automatically direct our bodies to avert them, without conscious effort. Yet, as Spuybroek notes, architecture has rarely responded to this as a continuum, rather movement and perception has always been planned along two separate axes - the horizontal (the plan), which directs movement, and the vertical (the elevation), which directs perception.

Claude Parent and Paul Virilio's work on what they call 'the oblique function' makes an exception to this paradigm. During the 60's they experimented with the notion of a tilted architecture, a third axis between elevation and plan - the oblique axis. This way, they argued, architecture could be experienced fully with the body. The inclinations implied a new awareness of space, a merger between body and environment, due to the effort to climb up and the added speed to climb down. They envisioned not just buildings designed this way, but entire cities as well, where the boundary between architecture and urbanism is blurred.



2.5

Claude Parent & Paul Virilio:
Oblique function



2.6
Claude Parent:
French Pavilion at the Venice
Bienale (1970)

2.4 The internet, Echo chambers, and Modernist Utopianism

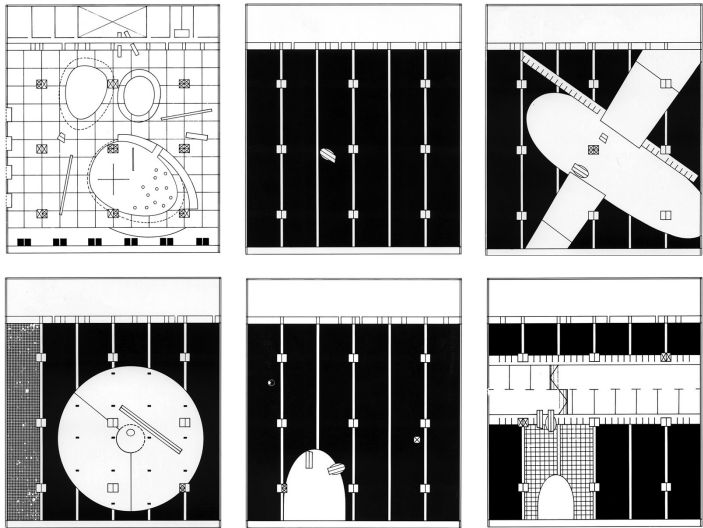
The internet came with a promise - to democratize the world and to make information accessible to all. This promise is rather reminiscent of the enlightenment ideas about the public library, but the operational logics differ vastly. Whereas the public library came as part of the early state apparatus, the vision for the internet was for it to be an entirely de-centralized entity, free from any mechanisms of state- or commercial control. Barlow wrote, addressing the governments of the world in his now classic 'A Declaration of the independence of Cyberspace' (1996):

"I declare the global social space we are building to be naturally independent of the tyrannies you seek to impose on us. You have no moral right to rule us nor do you possess any methods of enforcement we have true reason to fear."

- John Barlow

There has been an incredible surge in the amount and availability of information in the last decades, thanks to technological advancements in new media and the internet.

OMA, in a competition for a new French national library in Paris (1989), responds to this new condition by conceptualizing the library as a large mass, a solid block, of information. The volume is punctuated by irregular voids that make up the public spaces in the building. OMA, in this project, stays true to the idea that the library is an archive of all memory, even though it now comes in a wide spectrum of different media. By separating the different types of technologies to its own space in the building, each void becomes an autonomous world architecturally, a sense that is heightened by the mode of transportation between them - the elevator - which implies a mechanical, rather than architectural, relationship.

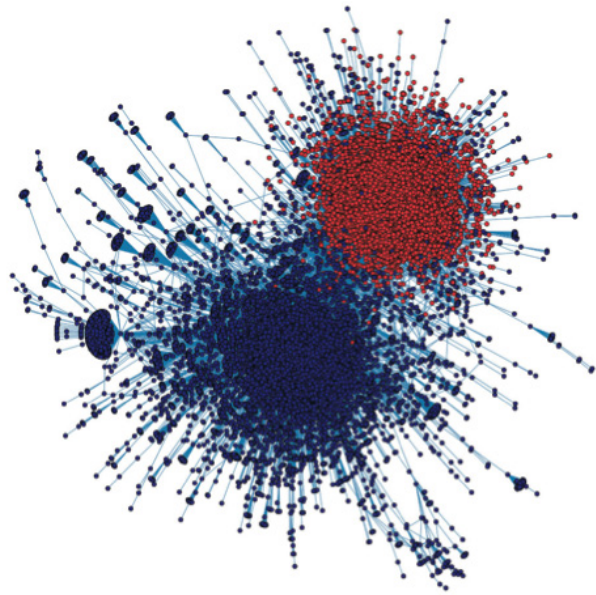


2.7

OMA, *Library in Paris* (1989)

Things did not exactly pan out the way the early idealists, such as Barlow, had hoped for the internet. In one sense, the opposite has happened. Both governments and companies record every move people make in virtual space. Gordon and Franke (2016) discuss the implications of the vast amounts of data that is recorded, and subsequently put to use within predictive (and prescriptive) algorithms on the internet. They argue that the algorithms that, for example, choose what contents are shown on a persons Facebook wall, which is dictated by previous activities ('if you liked that, you will also like this'), result in people ending up in virtual 'echo chambers'.

Within these echo chambers on social networks people are never confronted with views that differ from their own understanding of reality, as they are never presented with contradicting information unless they actively try to break this cycle. These algorithmic feedback loops have brought with them a strong polarization of opinions on social networks, where people only interact with other people of similar world-views.

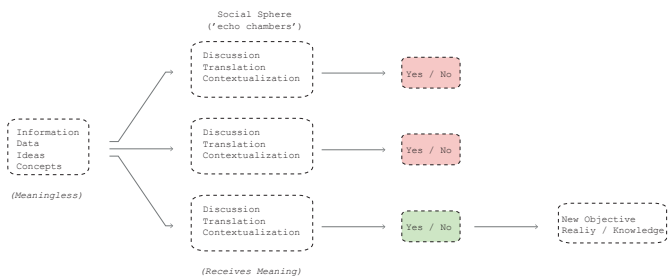


2.8

Social network analysis of retweets, and who sees them, among people of different political views.

Looked at in the light of Berger and Luckmann's theory, the effect of these echo chambers is the formation of entirely separate agreements of what constitutes objective reality and knowledge, as people from different echo chambers never interact with each other. Social cohesion - arguably one of the founding principles of the modern library - thus becomes increasingly impossible in this environment.

In one respect, however, the internet has fulfilled its promise. All the information and data ever produced is now at the fingertips of anyone with a smartphone. There is no longer a shortage of information in people's lives. The internet, in this sense, has become the ultimate heterotopia, in Foucault's terms - a virtual archive of all time and information ever produced, easily searchable by anyone with a Wi-Fi connection.



2.9

Diagram: Social construction of new knowledge (Post-Internet)

The problem now, it seems, is to create a shared understanding of the meaning and relevance of all this information.

Gordon and Franke argue that the problem of echo chambers in cyberspace is essentially an issue of unintended consequences of building predictive, and prescriptive, models of reality. The model, which is intended to explain behaviors, starts to effect the behaviors themselves. These unintended consequences and failed utopian visions are reminiscent of the modernist housing projects during the larger part of the 20th century.

The grand ideas and utopian visions of the modernists, of creating a sense of community, urban villages, and so on, rarely ever materialized as envisioned, when built. The British 'new towns', the banlieus of Paris, and the modernist suburbs of Stockholm, became sleepy commuter towns, riddled with social unrest and stagnation, rather than lively, diverse, and functioning communities. The housing estates in London are empty of life and feel unsafe, rather than, as envisioned, being calm enclaves in the city, where children could play on the lawns.

The failure of the modernist housing project could be ascribed to many different factors. Hillier has argued that the failure of, for example the housing estates in London, is partly due to the ways in which they are designed. Their spatial configuration often produces areas of extreme spatial segregation, where the original vision and intent was that

there would be movement within and through the estates.

The principles by which these areas were designed break completely with traditional urbanism, where cities grew organically, from the bottom up. This urbanism created cities that from the top may look chaotic, but from street level are both navigable and understandable. Organic cities maximize the potential of Hillier's generic function, as they are not designed from any top-down visions, built on wrong assumptions on how people would use them, but rather emerge from people's actual patterns of use.



2.10

Demolition of Pruitt - Igoe (1972), an event Charles Jenks has ascribed as 'the end of modernism'

2.5 Digital Architecture, Splines, and Big Data

Mario Carpo, in his article 'Breaking the curve' (2014), describes digital culture and design approaches in architectural practice since the 90's. He explains how, in the early days of computer-aided design, new technologies were envisioned to render the old paradigms of designing and building architecture obsolete.

Variation and complexity, it was said, would be fabricated and designed without extra cost or effort. But, he continues to argue, this vision has yet to materialize, as:

"The digital turn in architecture was hijacked by one tool that soon outweighed all others to become the protagonist - almost the monopolist - of the new digital design scene: spline modelers."

- Mario Carpo (p. 169)

Spline curves are mathematical simplifications of a set of points in virtual space. They reduce any amount of complexity to one smooth, continuous, curve. In this sense, they still work on an old scientific logic, where complexity has to be simplified in order to be formally explained.



2.11

*Example of spline architecture:
Heydar Aliyev Centre - Zaha
Hadid Architects*

Instead of simplification, Carpo argues, we can now design using 'big data'. Instead of modelling a curve using a few control points and the mathematical function, $y=f(x)$, for a spline, ever increasing computational powers and data storage capabilities would, technically, allow us to sift through endless amounts of data and extrapolate all point coordinates along that curve.

This is perhaps counter intuitive for the human brain, but computers are great at this.

Varenne (2013), advocating similar ideas, argues that we can now shift our approach to design from a top-down mathematical approach to a bottom-up generative process. Generative, because we could use the computer as an engine for creating, instead of deducting, formal calculations.

Terzidis (2008) argues similarly that the definition of design is changing under the digital paradigm. It is now essentially possible to randomly generate all design options and then simply "*search for the best one*".

2.6 Synthesis; Theory in Practice, and the problem of Flexibility

These texts, and the design process which they seem to promote (taken in a very literal way), leave me with a few obvious practical questions; What data sets should be included in this generative, 'big data', design approach? And, perhaps more importantly, how does a designer search all possible design options for the best one - what would be the search criteria?

Working from the theories of Berger and Luckmann, I argue that all information (data in this case) is meaningless before it is placed in a social context. In a design process where big data generates huge amounts of different architectural forms - and the best option is agreed upon using some search criteria - architecture could be seen as this social context. Architecture becomes the medium by which this data is 'readable' and made meaningful. Looked at from this point of view, the first question becomes irrelevant - but the second becomes much more important.

Usually fabrication or structural optimization serves as criteria to choose the best option among many digital versions. I did not want to take that direction in this project. I have tried to show in this chapter how architecture always responds to social conditions and needs in society; Boullée's architecture was a response to the french revolution and new needs in a democratic society, Hillier's analysis of the generic city shows how the built environment, throughout history and different societies, have always served the same basic social purpose - to facilitate movement and

interaction on the one hand, and habitation on the other. Therefore I argue that whether or not something can be built, or if it would support its own weight, should be a secondary concern to architecture's social performance - how it would be used; its functional, spatial, or aesthetic qualities.

Another question, which comes to mind in light of the previous analysis of the internet (i.e. echo chambers and unintended consequences), is; why this kind of big data, record-and-retrieve, prescriptive models would work for architecture, while being so flawed in cyberspace. How can architects avoid repeating the mistakes and failed promises of modernism?

If we look at the prescriptive algorithms on the internet, it is very clear that they present themselves as a very rigid framework in which people have to navigate. Put in Hillier's terms, they could be seen to represent a system with a very strong program, even though the opposite would be much more in line with the early utopian visions for cyberspace.

The example of the modernist housing estates also serves to highlight how their failure was due to the misconceptions about how people would use space. A more bottom-up approach, taking in to consideration the importance of natural movement patterns, could arguably have made some of these projects work better. By integrating these spaces more within their wider contexts, and not segregating them entirely, there would be

more people, more movement, and a different social outcome.

So, should we then strive to create spaces that are more integrated? Spaces that do not impose strong boundaries on how to use them (weak programs)? Could these make up search criteria in a "big data" design process?

In this case, where designing a library is the purpose, this seems like a good idea.

The library, I have argued, no longer needs to be an 'archive of all time'; the internet has taken over this position. What it could be, however, is an institution and a space that facilitates the necessary discussion that takes new information, and incorporates it into a shared stock of knowledge. A space, then, that is generative of new social formations. Integration, both in terms of the buildings location in the city and in its' internal spatial configuration, could be a way of achieving this.

However, some factors should be taken in to account regarding integration, and weak programs in buildings. If we simply consider a building where visual integration is maximized, that building is just one big space - the larger the better. Theoretically, this space has a very weak program, visitors can walk anywhere without obstructions, and the space is very flexible. But as Joshua Prince-Ramus, of OMA, points out when discussing their Seattle Public Library building (2006), these kind of 'flexible' spaces always tend to

become very mono-functional. At any time in the life-cycle of a building, there is often one principal focus which takes over.

Given the uncertain future of the library, the need for flexibility is pressing. OMA's answer is what they call "flexibility through compartmentalization" of programs, according to the predictability of their future use. Some spaces are predictable, and will not change in the future, so they don't need to be generic, and flexible.



2.12

*OMA: Seattle Public Library,
programmatic diagram (2006)*

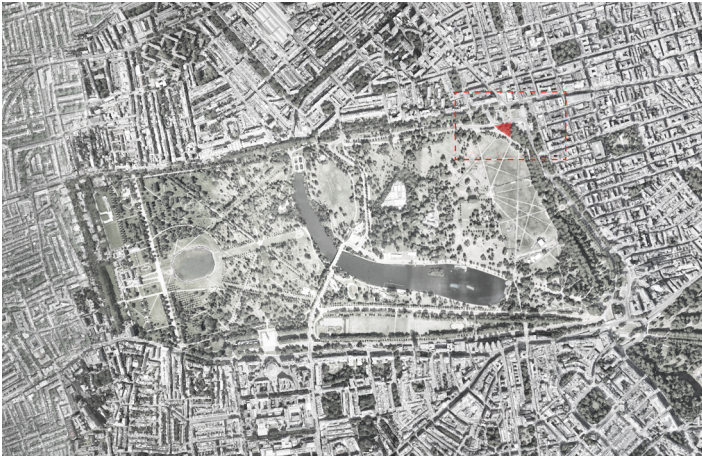
3. CONCEPT / PROCESS

This project started from a competition brief for 'the library of the future'. The brief asked for, in broad strokes, visions of what the public library should look like in the future. The specified site for the competition, which I soon abandoned, was located in the middle of Hyde Park, next to the Serpentine.

From my theoretical readings, early on in this project, I found it paradoxical to conceptualize the library as isolated from the social life of the city. Instead, I wanted to take advantage of the possibilities that Hyde Park presents as a very central location in the city of London. The site for the project, therefore, is located in the northeast corner of Hyde Park, on the border between the city and the park.



3.1
*Site - Location in City of
London*



3.2

Site - Hyde Park

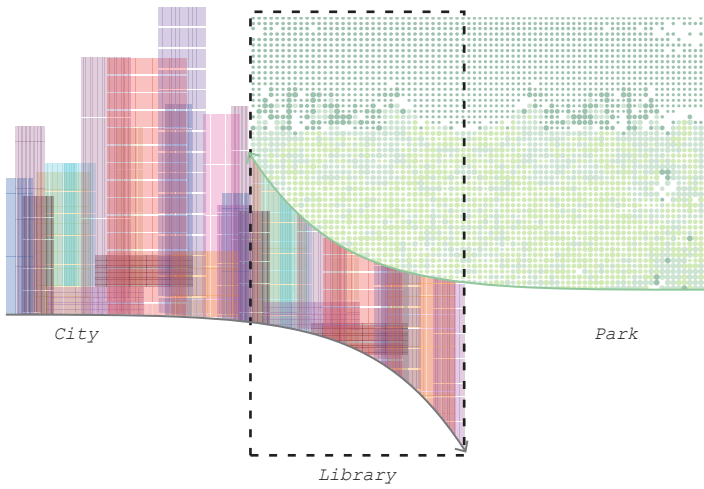
3.1 The City and the Park

The city has always been a site of confrontation. It has always been an engine for social change, and a melting pot of different ideas. People of different political affiliations, socio-economic status, religions, and worldviews live in close proximity, and all share the same streets and public spaces. This condition, as opposed to the segregated space of social media networks, is perfect for facilitating discussion amongst its' inhabitants.

The park, on the other hand, is an escape from the noise and the stress of the large city. It is a place of relaxation and leisure. A space resembling wild nature - but a romanticized version of it. Similar to a novel, in this sense, the park is an autonomous world that people enter in an effort to escape the reality of the city, and the routines of their everyday life.

Conceptually, the project connects these two conditions to what is considered the two main functions of this new public library. First, to counteract the fragmenting effect the internet has had in the 'social construction of reality', the library aims to bring people together and facilitate discussion amongst visitors. Second, the library should also serve as a space where people can turn inwards, for reading, studying or relaxing. One space of confrontation, and one for escape.

These two functions would attract different users to the library, and the close proximity of the spaces would allow



3.3
Library concept

for meetings between people with different views and personalities, as well as people in different moods and temporary states of mind.

3.1.1 Site Condition: The project thus responds to two contexts, being located on the edge of both. To the north is the city and Oxford Street, which is one of the busiest streets in London, and the most commercialized. At the end of Oxford Street is Marble Arch, a large open space with quite a lot of traffic and, at places, many people. The area closer to the site is harder to define; there are lots of people moving past the site, through to the park or on the sidewalk, but it is also a place with lots of buses on the street. It is not as busy and full of movement as just a few meters east, where Speaker's Corner is located.

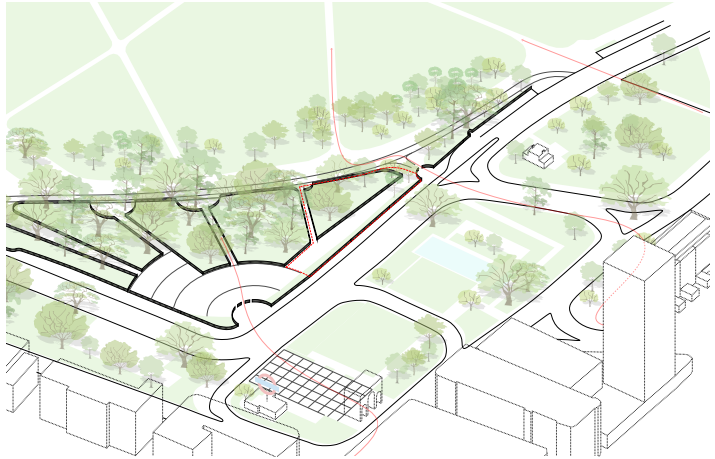
Historically, Speaker's Corner has been a great example of a space of confrontation, public debate and participation. It is a symbol for free speech, and many famous figures have spoken, or listened here - like George Orwell, or Vladimir Lenin.

The park opens up to the south of the site with the enormous lawns. These lawns are always full of people on sunny days, and sometimes there are concerts here.



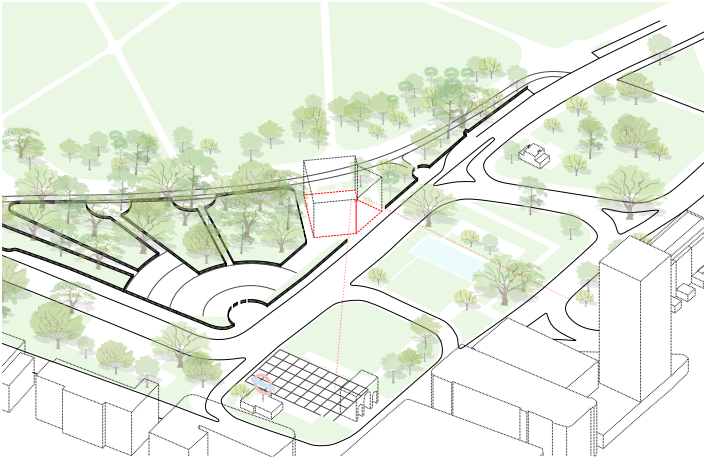
3.4
Site map

3.1.2 Volume Studies: The building takes its form as two volumes, each corresponding both conceptually and functionally to its context. The roof, which is a continuation of the landscape, divides the volumes sharply.



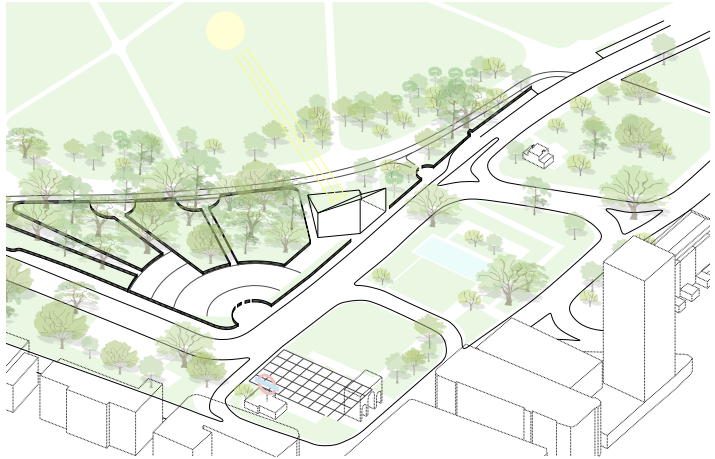
3.5

*Diagram: Site in its' context,
as it is today.*



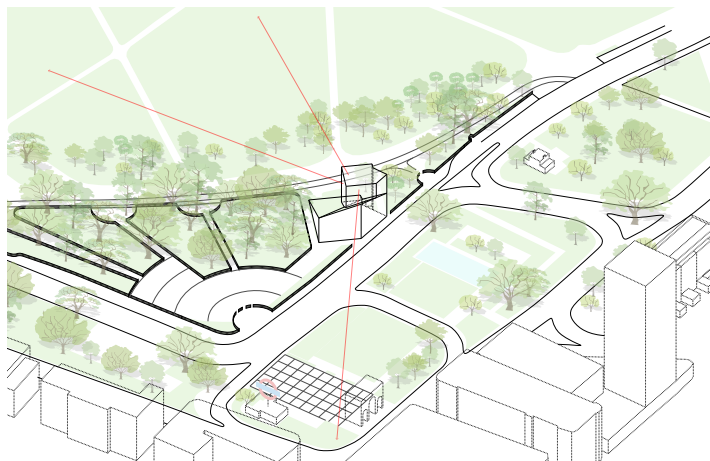
3.6

*Diagram: Building foot print.
Height of the building is
chosen to make it visible from
the surrounding context, and to
attract visitors*



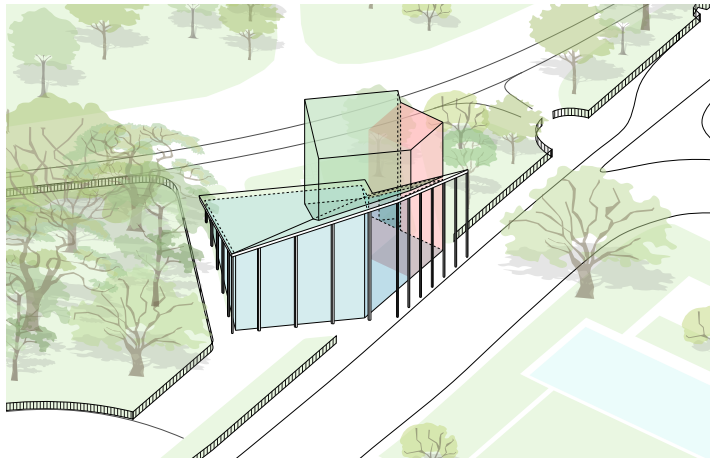
3.7

Diagram: Volume is cut to make a sloping roof, directed towards the park in the south



3.8

Diagram: Second volume is a tower with views on both the park and the city



- *Confrontation*
- *Escape*
- *Stairs*

3.9

Diagram: Final volumes

3.2 Confrontation

The function of this space is to facilitate discussion and negotiation of information, that is so necessary for the process of institutionalization Berger and Luckmann describes. As argued before, the internal logic of the internet has created echo chambers where this process is conducted amongst people who all share the same views. This undermines social cohesion, and a shared understanding of what constitutes objective knowledge, factors which are important for a functioning democratic society - and which traditionally the institution of the public library has worked to promote.

3.2.1 Big Data: As a concept for a design process, an analogy is made to the process where information is incorporated into common knowledge. Architectural form is here seen as the medium by which information (data) is readable.

As argued earlier, information is essentially meaningless before taken in to a social context. Architecture could be seen as a social context in which the meaning, or relevance, of this data can be evaluated.



3.10

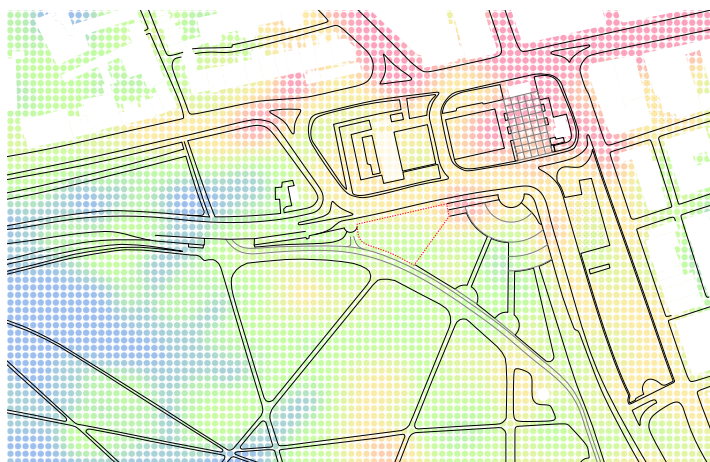
*Generative design process
based on Berger and Luckmann's
theory of how new information
is incorporated into the social
stock of knowledge*

3.2.2 Repository of Meaningless Data: The data-sets used in the form finding process are presented below. They are chosen because of their apparent uselessness, to highlight the fact that it is not the data itself that holds significance, but the ways in which it is interpreted in a social context.



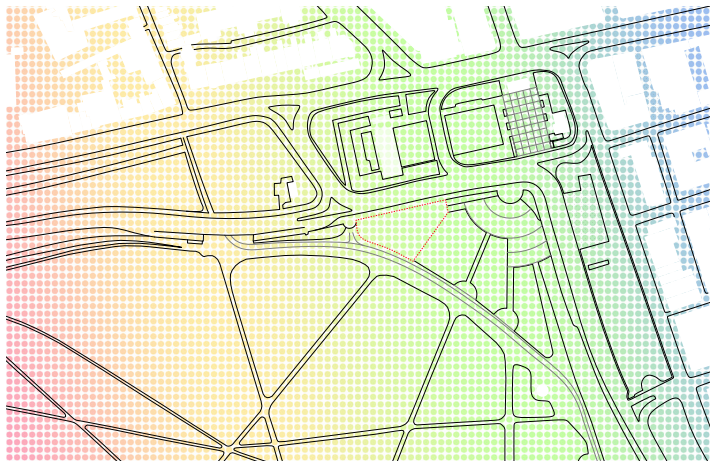
3.11

A: Proximity to closest bus stop



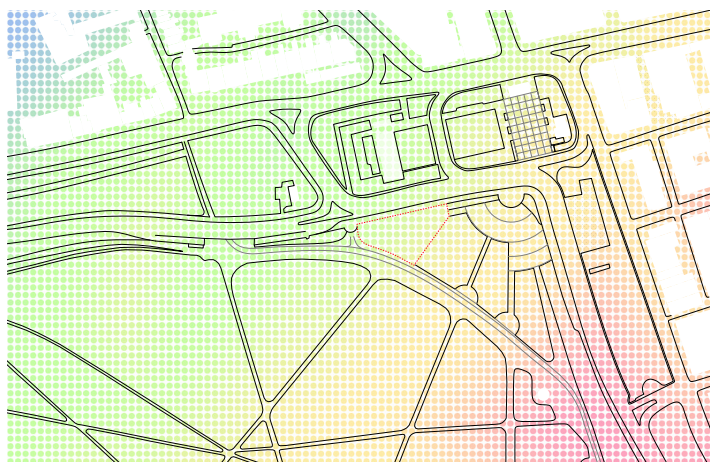
3.12

B: Density of twitter posts
(Mar 2011 - Apr 2011)



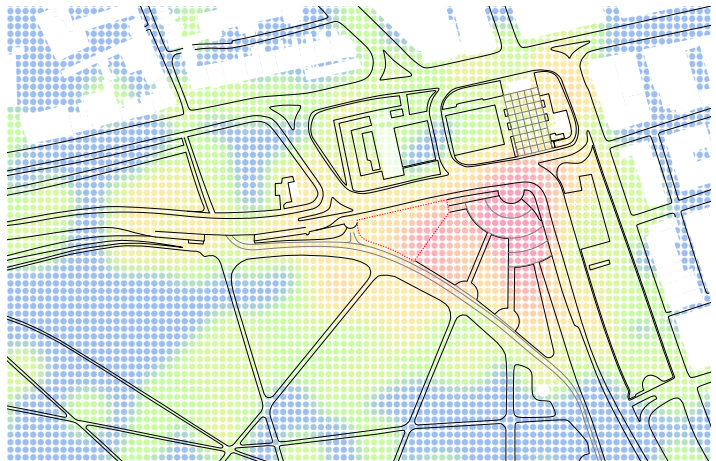
3.13

C: Average distance to
addresses of known '*Jack the
Ripper*' suspects



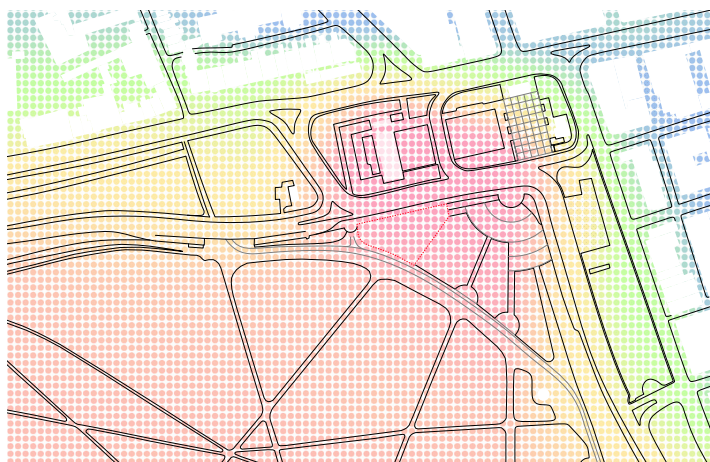
3.14

D: Median distance to
allotments within the Greater
London area



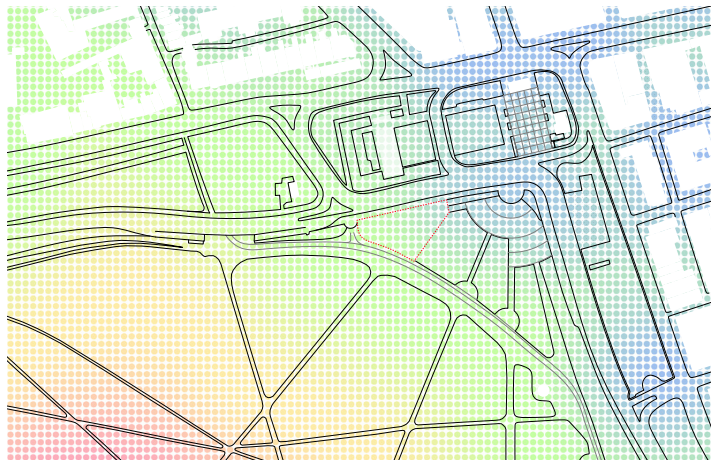
3.15

E: Density of geolocated
Flickr posts mentioning
either 'hyde park' or
'speakers corner' (2017-03-
09)



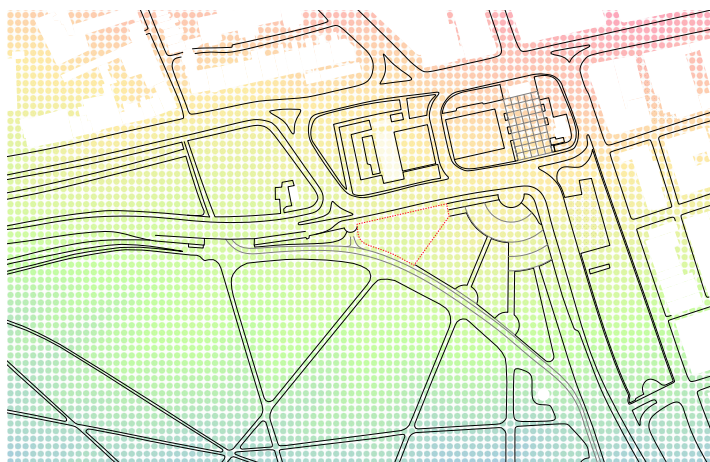
3.16

F: Mobile phone signal strength (2011)



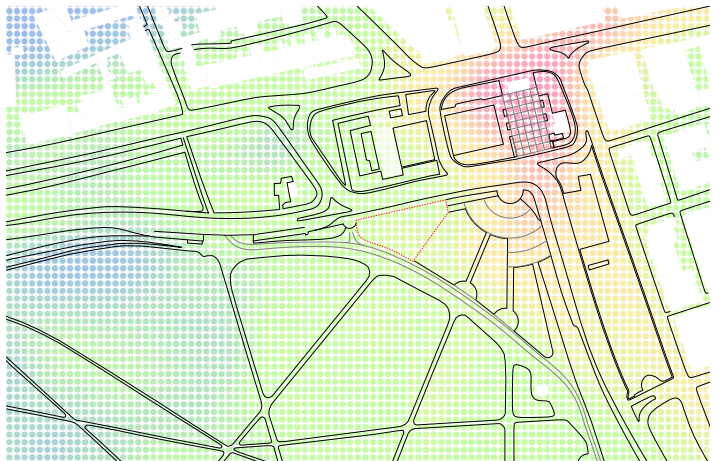
3.17

G: Average distance to
locations of burglaries
committed within a 100 meter
radius
(Nov 2016 - Jan 2017)



3.18

H: Median distance to houses of people either described as very poor ('*chronic want*') or lowest class ('*vicious, semi-criminal*') within London's inner western district according to Charles Booth's poverty map (1898 - 1899)

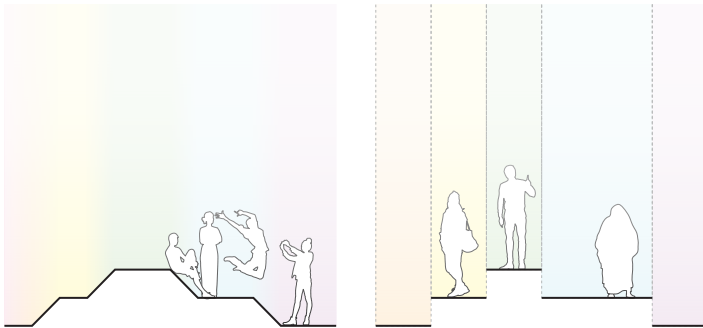


3.19

I: Density of 'picturesque routes', lines drawn between two or more Flickr posts taken by the same person on one day

3.2.3 Design Process: The generative design process is designed to output continuous landscapes that fit within the building volume. The volume is considered as a container for a formal interior arrangement that affects the use of the space. The volume, the envelope of the building, responds to exterior conditions, whereas the internal landscape creates a completely different environment within the library.

The social space, which aims to promote discussion and encounters amongst visitors, is conceived as a landscape for a few reasons. First, tied to the previous chapter on the phenomenological implications of a tilted architecture, an oblique axis, this kind of landscape would put the visitor in a very unknown environment. This would force both the body and the mind to be very present and aware of the surroundings - and hopefully of



3.20

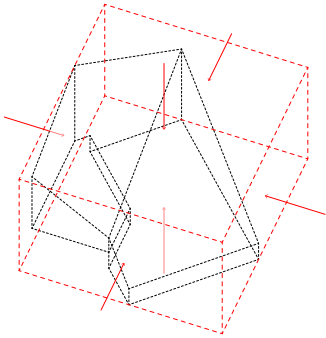
*Diagram: 'landscape' vs
division of spaces - shared
space*

the people in it.

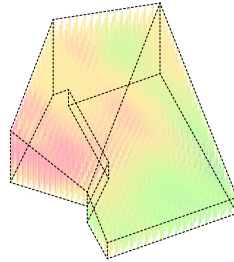
Second, the landscape works as floor, furniture, walls and roof - all in the same form. The continuous nature of this form, as opposed to discrete spaces or pieces of furniture, implies a kind of closeness to the other people present in the space.

The process is based on a translation of different kinds of data to 'voxels' that populate the interior space of the building. Different data sets are projected on a virtual box enclosing the building on all sides. Each voxel is assigned a value, according to the data closest to it on all sides. Voxels with values within a certain domain are then extrapolated and joined into a landscape. Since the process is based on voxels, there are only a limited amount of ways each voxel can take shape to connect the landscape. Depending on where each chosen voxels neighbours are, they will look differently.

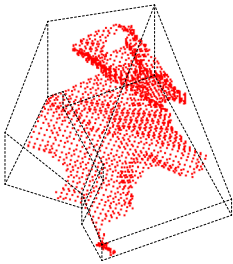
As there are so many adjustable parameters in this process, it can result in millions of different outcomes. In this project, one thousand different landscapes were generated for further evaluation, by changing the data sets, and where to project them.



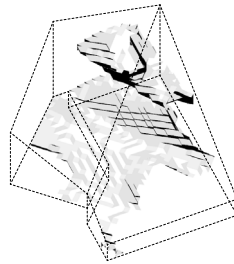
1. Data is projected on to bounding box



2. Voxels, inside the building volume, are charged with values (0-1) according to data



3. Voxels with same value (0.5) are extracted



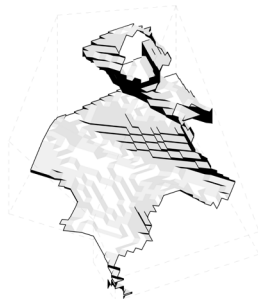
4. Landscape created by connecting voxels with neighbours

3.21

Design process: Generating landscapes from data

ITERATION 999

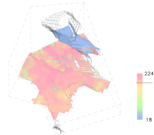
PROJECTED DATA 



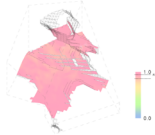
PROPERTIES

TOTAL AREA (m ²)	1044
ACCESSIBLE AREA (m ²)	781
RATIO	0.74
RATIO FLAT SPACE	0.18
AVERAGE ANGLE (HP - VERTICAL)	13.8°
AV. NORMALIZED VISUAL CONNECTIVITY	0.73
AV. CLUSTERING COEFFICIENT	0.93
NUMBER OF CONVEX SPACES	2

VISUAL CONNECTIVITY



CLUSTERING COEFFICIENT



3.22

Example of generated landscape, showing results of each analysis, as well as what data the landscape is derived from.

3.2.4 Search Criteria: Many methods used for evaluation are quite self-evident as to how they are calculated, as well as their relevance as criteria for evaluation (i.e. area, or ratio of flat spaces, etc.).

The visual properties of different points on these landscapes serve as indication of more complex spatial, experiential, and formal qualities*. Visual connectivity calculates**, from each point, the number of other points that are visible. The normalized average value of this calculation can be thought of as how much, on average, a person can see of the total amount of accessible space, from any given position on the landscape.

Visual clustering coefficient is defined as the degree to which (0-1) inter-visible points share the same network of visible points. So, for example, in a convex space all points share the same network of visible points, as all points can be seen from all positions, so they all have a clustering coefficient value of 1. If, on the other hand, the calculation were done on points in an intersection between two corridors, they would receive a lower value as the points in one corridor are not visible from the other.

**Ideally, some calculations, such as for example visual integration, should have been done for the analysis to reveal more social aspects of each iteration of landscapes. However, these kind of syntactical calculations require a lot of computational power, and could not be done.*

***The calculations are usually performed in 2D, on a plan, where walls serve as boundaries between points. Here the landscape itself is considered as boundary, since it folds and creates valleys and peaks that obstructs visibility between positions on it.*

Once clustering coefficient is calculated, it is possible to count the number of smaller clusters of points with high values. These clusters, usually in valleys or 'floors', are then seen as discrete spaces.

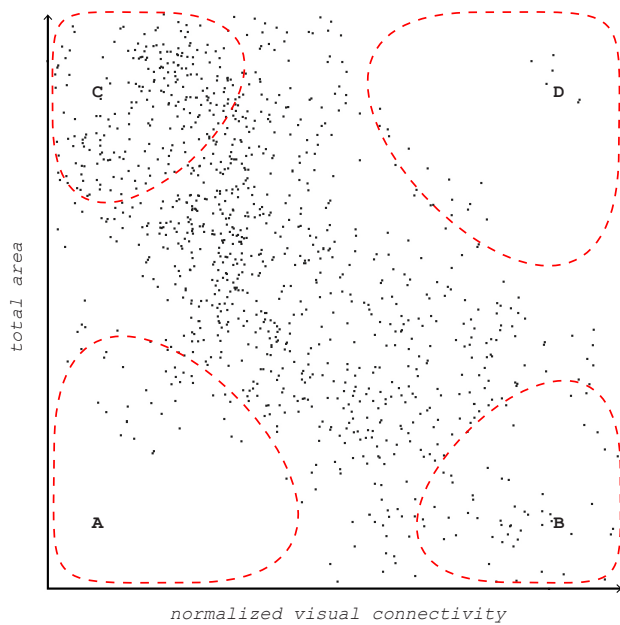
3.2.5 Evaluation of Design Options: To compare all the options, and find some similarities or 'types', they were plotted in a scatter plot with respect to different properties. One plot that reveals quite a lot of information about the resulting landscapes is one that describes total area against (normalized) visual connectivity.

From this, some similarities become apparent when looking at the extremes in the four corners of the plot.



3.24

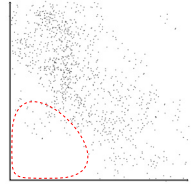
Diagram: clustering coefficient analysis of a convex space (left) and an intersection (right)



3.25

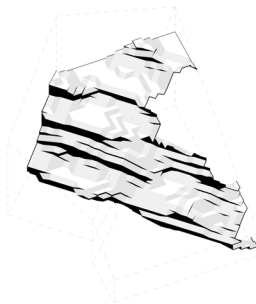
Scatter plot showing 'total area' against 'normalized visual connectivity'.

Corner A: As there is very little inter-visibility between locations on the landscape, as well as a small area, results in this corner of the analysis seem to be more like walls that folds in on themselves.



ITERATION 563

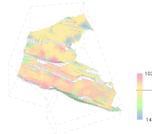
PROJECTED DATA 



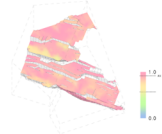
PROPERTIES

TOTAL AREA m^2	983
ACCESSIBLE AREA m^2	616
RATIO.....	0.62
RATIO FLAT SPACE.....	0.13
AVERAGE ANGLE (HP - VERTICAL).....	13.7
AV. NORMALIZED VISUAL CONNECTIVITY.....	0.32
AV. CLUSTERING COEFFICIENT.....	0.90
NUMBER OF CONVEX SPACES.....	3

VISUAL CONNECTIVITY



CLUSTERING COEFFICIENT

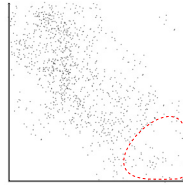


3.26

*Low Area - Low Connectivity:
Example landscape*

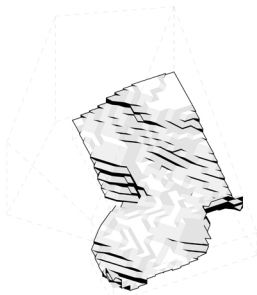
Corner B:

These landscapes are all very horizontal and simple. These landscapes seen in the building, would become the, somewhat irregular, floor of a very large generic room.



ITERATION 941

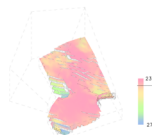
PROJECTED DATA



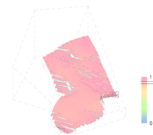
PROPERTIES

TOTAL AREA \Rightarrow	738
ACCESSIBLE AREA \Rightarrow	593
RATIO	0.80
RATIO FLAT SPACE	0.18
AVERAGE ANGLE (90° - VERTICAL)	13.7°
AV. NORMALIZED VISUAL CONNECTIVITY	0.81
AV. CLUSTERING COEFFICIENT	0.90
NUMBER OF CONVEX SPACES	1

VISUAL CONNECTIVITY



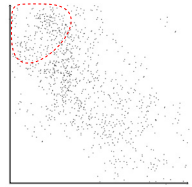
CLUSTERING COEFFICIENT



3.27

*Low Area - High Connectivity:
Example landscape*

Corner C: The more complex landscapes are in this corner. Many of them are so complex that they are virtually useless as architectural forms.



ITERATION 892

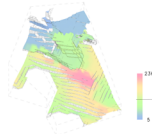
PROJECTED DATA



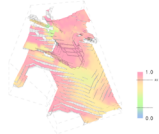
PROPERTIES

TOTAL AREA m^2	1479
ACCESSIBLE AREA m^2	987
RATIO.....	0.67
RATIO FLAT SPACE.....	0.12
AVERAGE ANGLE (HP - VERTICAL).....	14.8°
AV. NORMALIZED VISUAL CONNECTIVITY.....	0.28
AV. CLUSTERING COEFFICIENT.....	0.82
NUMBER OF CONVEX SPACES.....	6

VISUAL CONNECTIVITY



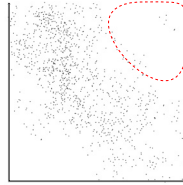
CLUSTERING COEFFICIENT



3.28

*High Area - Low Connectivity:
Example landscape*

Corner D: The type of landscapes found in this corner are shaped as steep slopes that divides the building volume in to two large spaces.



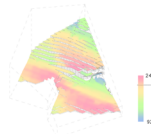
ITERATION 880



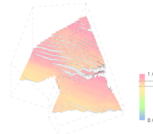
PROPERTIES

TOTAL AREA m^2	794
ACCESSIBLE AREA m^2	601
RATIO	0.75
RATIO FLAT SPACE	0.12
AVERAGE ANGLE (REF = VERTICAL)	14.8°
AV. NORMALIZED VISUAL CONNECTIVITY	0.77
AV. CLUSTERING COEFFICIENT	0.83
NUMBER OF CONVEX SPACES	1

VISUAL CONNECTIVITY



CLUSTERING COEFFICIENT



3.29

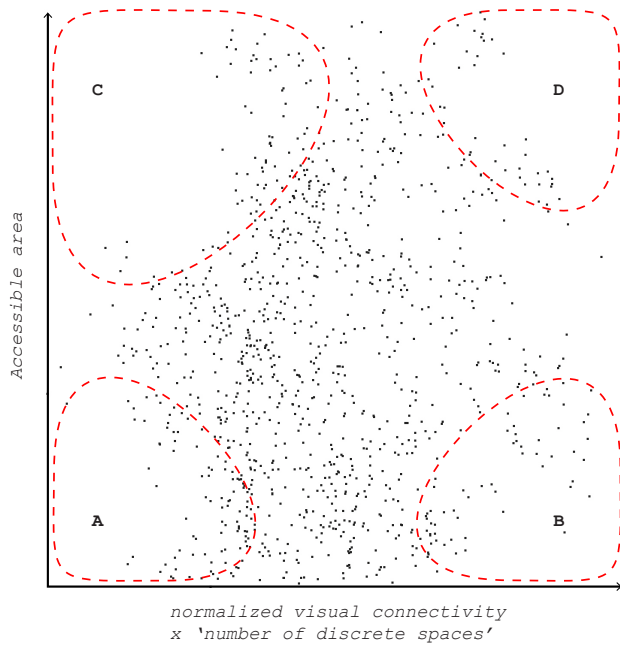
*High Area - High Connectivity:
Example landscape*

Both connectivity and complexity are favourable qualities in this search for a form that would become a social space in the library. The space should be highly connected, because that implies a space with few boundaries, where people are visually close to each other. But it should also be complex enough for it not to be just one large generic room, which in the end would become rather mono-functional.

A complex form would also be more open to appropriation by visitors, as it would be possible to differentiate between spaces, in the landscape, with separate formal and functional qualities.

These factors, however, naturally work against each other. Therefore, some kind of balance will have to be found, where both complexity and connectivity could be taken into account. In the next scatter plot, accessible area is plotted against a value derived from multiplying the number of discrete spaces on the landscape with connectivity. This value would favour landscapes that are both complex and visually connected.

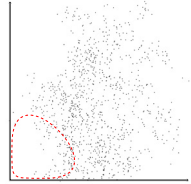
Looking at the different extremes again, other families of similar landscapes emerge.



3.30

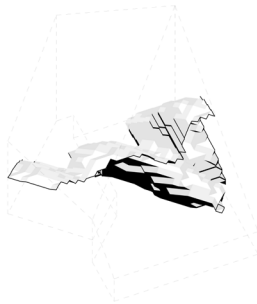
Scatter plot showing
'Accessible area' against
'normalized visual
connectivity', weighted by the
number of discrete spaces.

Corner A: In this corner, most of the completely useless forms seem to have gathered, all of which are very small, and simple.



ITERATION 075

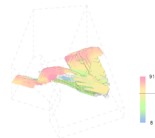
PROJECTED DATA 



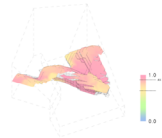
PROPERTIES

TOTAL AREA (m ²)	959
ACCESSIBLE AREA (m ²)	601
RATIO	0.62
RATIO FLAT SPACE	0.08
AVERAGE ANGLE (HP - VERTICAL)	15.5°
AV. NORMALIZED VISUAL CONNECTIVITY	0.29
AV. CLUSTERING COEFFICIENT	0.87
NUMBER OF CONVEX SPACES	4

VISUAL CONNECTIVITY



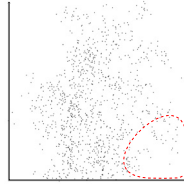
CLUSTERING COEFFICIENT



3.31

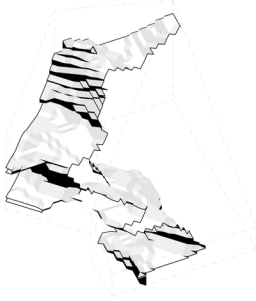
*Low Acc. Area - Low
Connectivity (weighted):
Example landscape*

Corner B: Here the landscapes are complex, formally, but since the accessible area is small, the complexity cannot be experienced, as these forms tend to fold onto themselves in creases where a person would not fit.



ITERATION 033

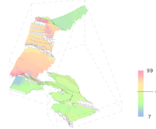
PROJECTED DATA



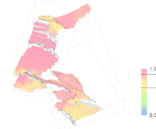
PROPERTIES

TOTAL AREA \Rightarrow	1044
ACCESSIBLE AREA \Rightarrow	634
RATIO	0.60
RATIO FLAT SPACE	0.18
AVERAGE ANGLE (W - VERTICAL)	13.5°
AV. NORMALIZED VISUAL CONNECTIVITY	0.26
AV. CLUSTERING COEFFICIENT	0.86
NUMBER OF CONVEX SPACES	7

VISUAL CONNECTIVITY



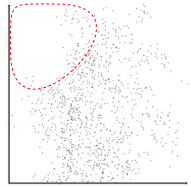
CLUSTERING COEFFICIENT



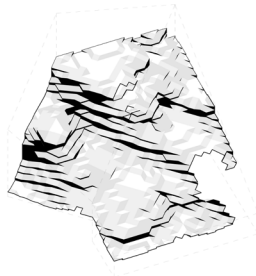
3.32

*Low Acc. Area - High
Connectivity (weighted):
Example landscape*

Corner C: Simple and large, these forms are either similar to those previous large slopes or have folded to create a second floor.



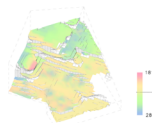
ITERATION 296



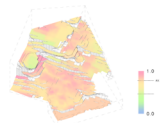
PROPERTIES

TOTAL AREA (m ²)	1264
ACCESSIBLE AREA (m ²)	862
RATIO	0.68
RATIO FLAT SPACE	0.15
AVERAGE ANGLE (HP - VERTICAL)	14.0°
AV. NORMALIZED VISUAL CONNECTIVITY	0.40
AV. CLUSTERING COEFFICIENT	0.75
NUMBER OF CONVEX SPACES	2

VISUAL CONNECTIVITY



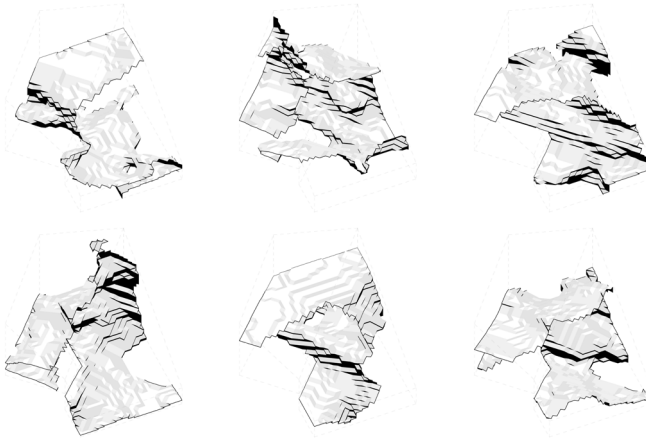
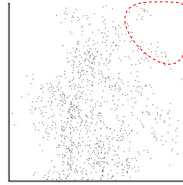
CLUSTERING COEFFICIENT



3.33

*High Acc. Area - Low
Connectivity (weighted):
Example landscape*

Corner D: In this corner, a family of landscapes presents itself, which is formally complex, with high accessible area, and relatively high connectivity values. It is from this corner the final landscape was chosen.



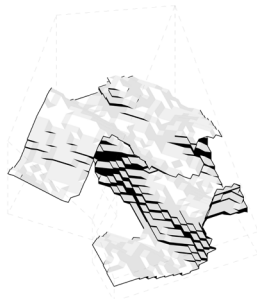
3.34

*High Acc. Area - High
Connectivity (weighted):
Example landscapes*

3.2.6 Final Form

ITERATION 818

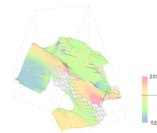
PROJECTED DATA



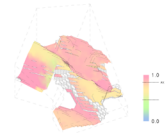
PROPERTIES

TOTAL AREA (m ²)	1402
ACCESSIBLE AREA (m ²)	999
RATIO	0.71
RATIO FLAT SPACE	0.11
AVERAGE ANGLE (HP - VERTICAL)	15.1°
AV. NORMALIZED VISUAL CONNECTIVITY	0.30
AV. CLUSTERING COEFFICIENT	0.83
NUMBER OF CONVEX SPACES	5

VISUAL CONNECTIVITY



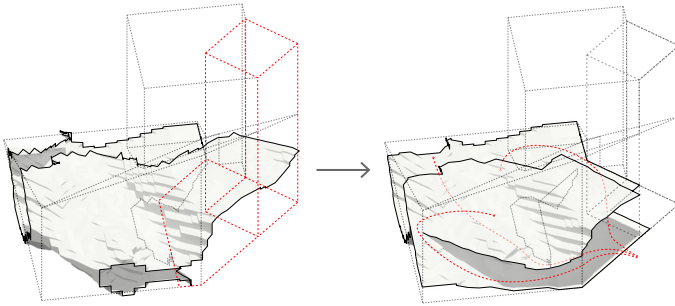
CLUSTERING COEFFICIENT



3.35

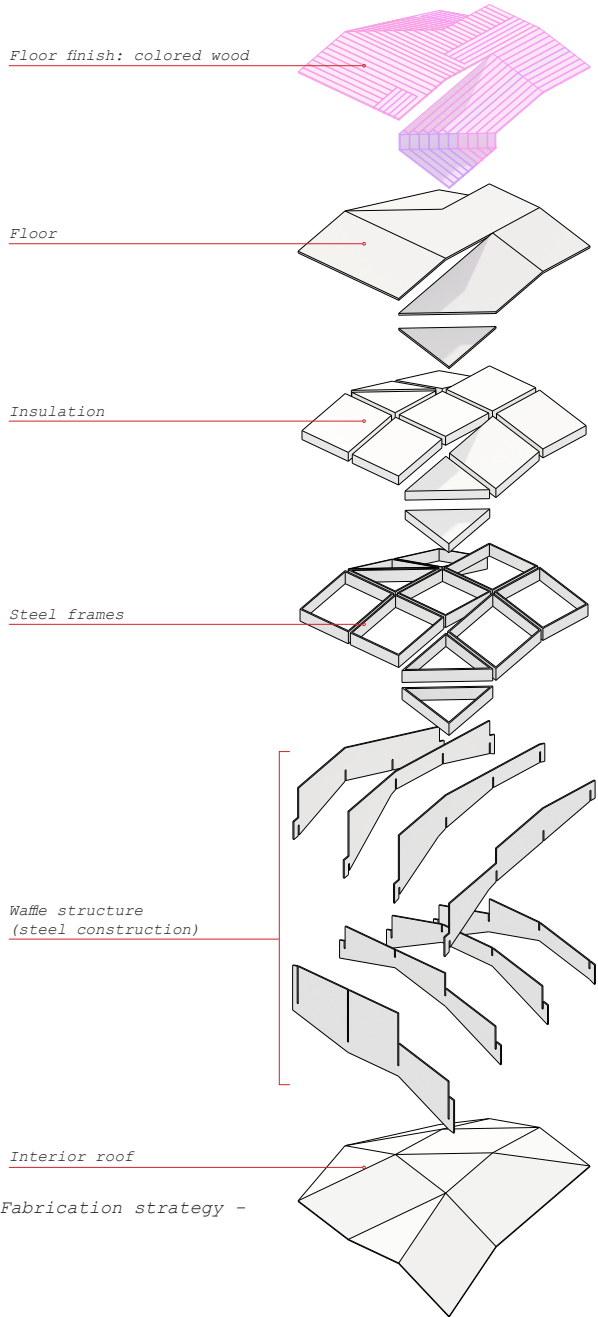
*Final landscape, chosen from
1000 options*

3.2.7 Fabrication, Circulation, and Appropriation



3.36

Diagram: Fitting the generated landscape in the building. Adjusting it to facilitate movement within and through the building

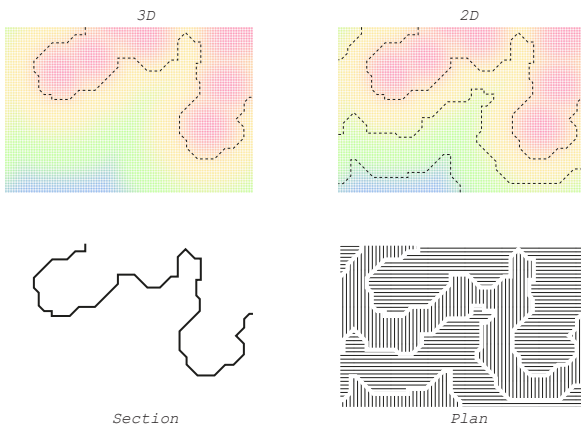


3.37

Diagram: Fabrication strategy - landscape

The graphics on top of the landscape is derived from the connectivity analysis of the form. Since there are no clear boundaries in this space, the graphics are designed to enhance a sense of zoning, which is already present through the form alone. If people are going to appropriate spaces, some differentiation between them should be possible. Instead of walls, different gradients and patterns serve as fluid divisions of different functional spaces in the landscape.

The pattern is derived from the connectivity data in a similar way that the landscapes were generated from the 'meaningless data', only with more divisions.



3.38

Diagram: Data to Landscape (left). Data to Pattern (right)

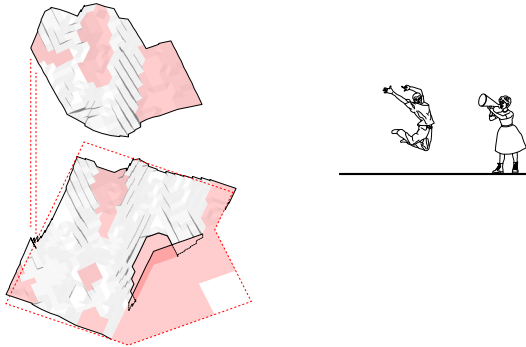


3.39

Graphic patterns on floor

3.2.8 Spatial Conditions: The form of the generated landscapes creates different spatial conditions that could cater for different functional needs in the library:

1. Flat spaces: These spaces serve as more functional areas, where people could put up tables, for example, at book fairs or other events.



3.40

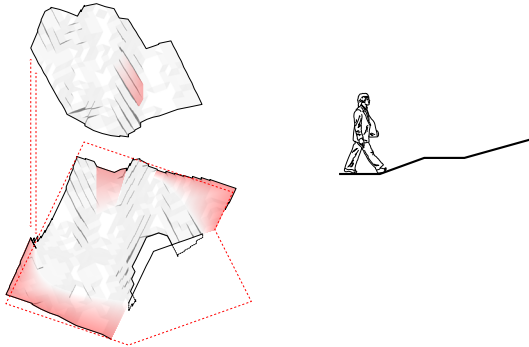
*Spatial condition: Flat -
locations in building*



3.41

Spatial condition: Flat

2. Ramps: These spaces are mainly for circulation. But also for people sitting or laying down.



3.42

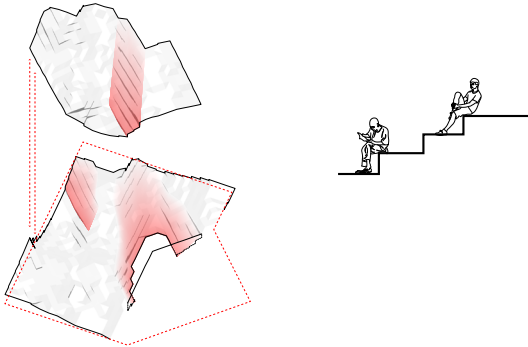
*Spatial condition: Ramp -
locations in building*



3.43

Spatial condition: Ramp

3. Steps: These spaces could be used as auditoriums, for lectures or performances.



3.44

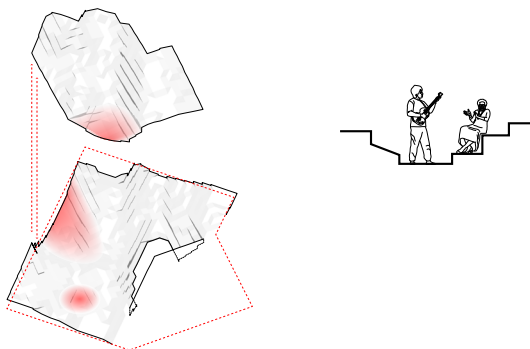
*Spatial condition: Steps -
locations in building*



3.45

Spatial condition: Steps

4. Bowls: Here, gatherings for discussions could take place. Or they serve a similar purpose as the previous 'steps', but since they are smaller and more enclosed, they are more intimate and private.



3.46

*Spatial condition: Bowl -
locations in building*

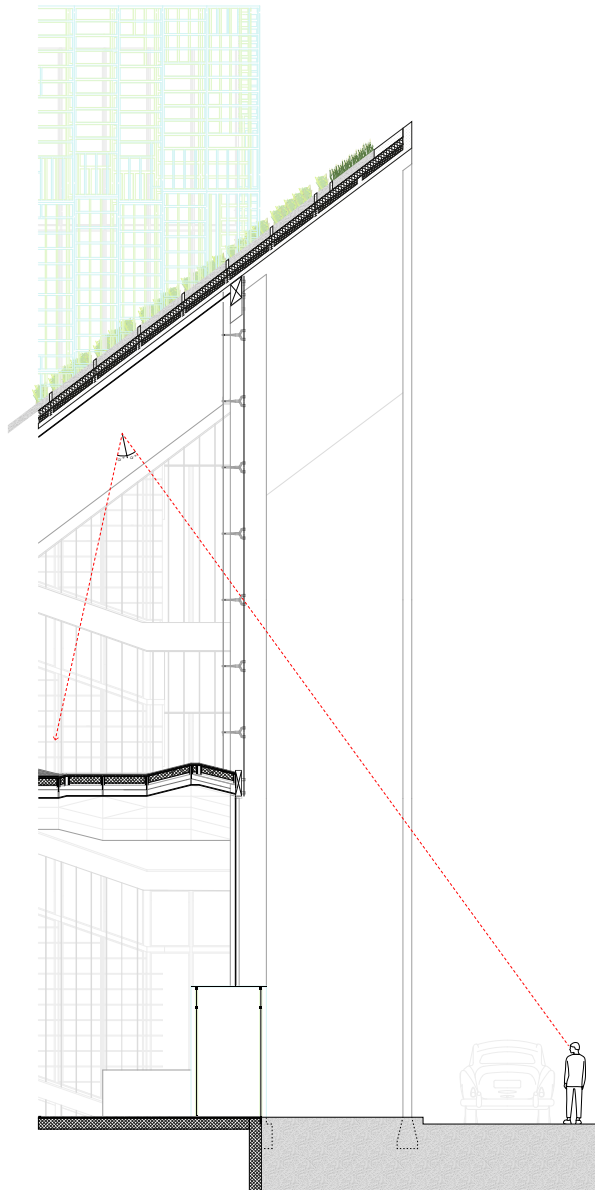


3.47

Spatial condition: Bowl

3.2.9 Connection to the City: Conceptually, this part of the library should blend seamlessly with the city outside. The social life of the city has fuelled and encouraged discussion and confrontation amongst its inhabitants throughout history, and this quality should be taken in to the library. The interior of the building is part of the city outside, and the city is part of the inside of the building.

To enhance this relationship with the context, the roof of the building cantilevers over the street, and pillars create the illusion that the sidewalk is part of both the building and the city. The height of the facade suggests that the building opens itself up to the context, and mirrors on the interior roof reveal, to people outside, the activities happening inside the library.

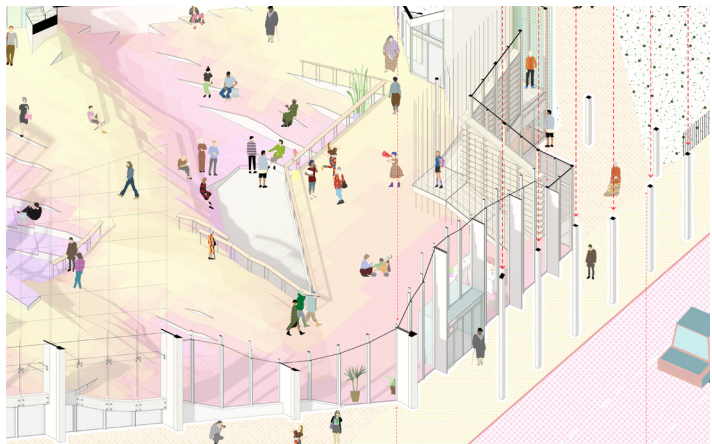


3.48

Diagram: Connection to the city

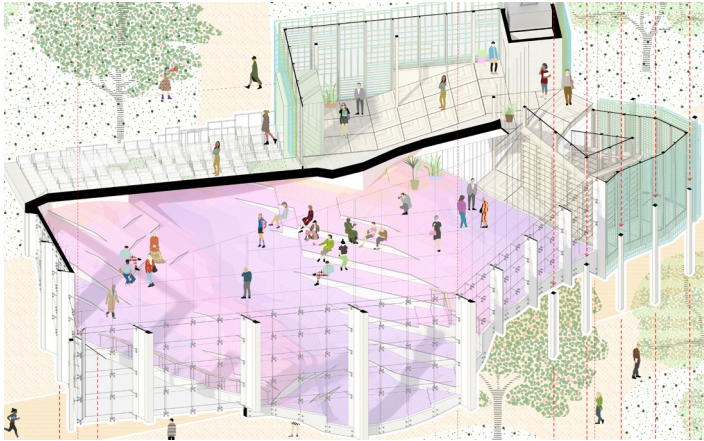


3.49
*Axonometry:
Exploded
axonometric view
from north - east*



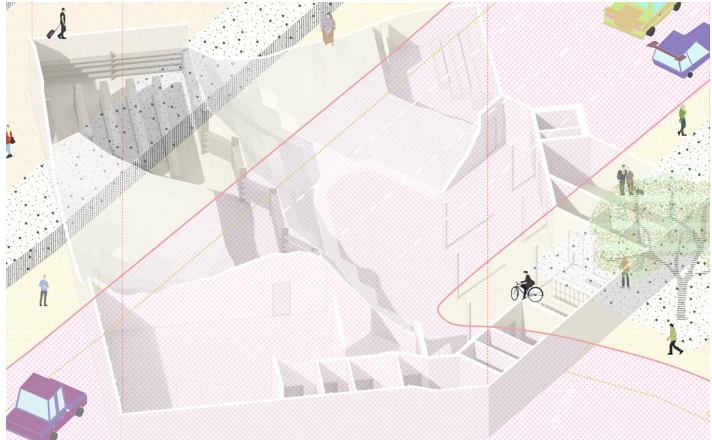
3.50

Axonometry: Close-up of ground floor, entrance towards the street



3.51

Axonometry: Close-up of second floor



3.52

Axonometry: Close-up of floor below ground, with toilets, lockers, a small archive, a cinema, and offices for the librarians.

3.3 *Escape*

The second part of the public library turns away from the city, towards the context of the park. Its function is to facilitate a space for reading, where visitors can escape from the noise and stress of the city and their everyday lives.

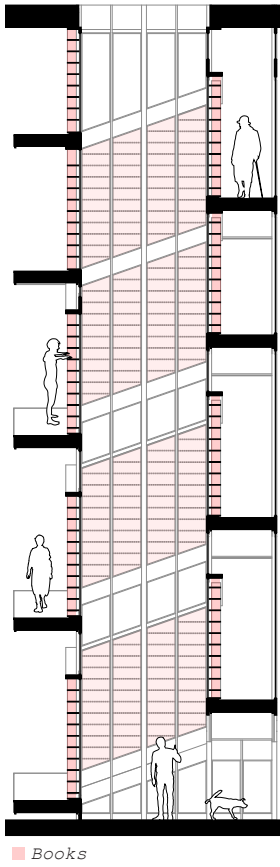
The idea is to work with sequences of arrival to the reading rooms of the library. Either visitors can arrive, from the city, through the staircase of books to an individual reading space. Alternatively, they can come from the park, from the huge lawns to the south of the library - first to the roof garden, then in to the reading rooms.

3.3.1 Books: In its' traditional typology, the book is the main inhabitant of the library. With the internet, the reasons for the library to serve as a kind of archive have become obsolete. Other technologies, such as reading tablets, could also serve to free up more space in the library from being designated to the storage for books, to become spaces for other activities - such as reading.

The bookshelves, in this library, are designed as part of the staircase leading up to the reading rooms. This is done for a few reasons. First, by placing the books in a space which serves other functions than just being a space housing books (i.e. circulation within the building); more space can be freed up for other activities. Second, even if the book in the future becomes obsolete and they

are removed from the library, their absence will not affect the other functions of the space in which they were in - it will continue to be a staircase.

Furthermore, books are beautiful objects and hold some symbolic significance, especially in a library. Here they will serve as a kind of wayfinding device. People will arrive from the street and follow the spiral of books, which implies a journey to other fictional worlds, and end up in the reading rooms.



3.53

Diagram: Books surrounding light shaft in staircase.



3.54

Image: Exterior view of stairs.

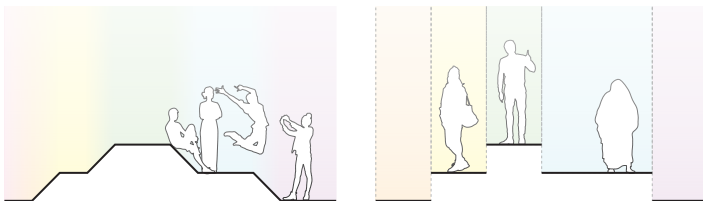


3.55

Image: Interior view of stairs

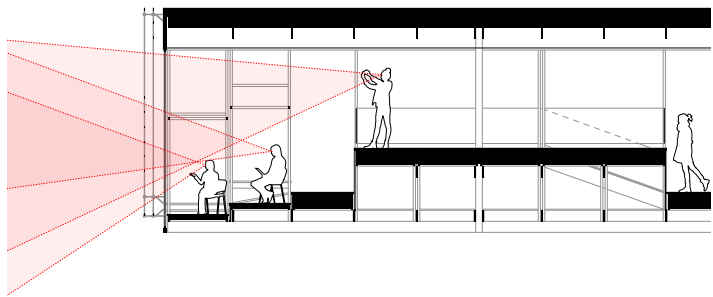
3.3.2 Reading Rooms: With books out of the way, the reading rooms are built around the individual, and individual spaces for reading. In contrast to the continuous landscape of the other part of the library, here the space is broken up in smaller elements, which are separated by slightly displacing them vertically with respect to neighbouring elements.

Drawing on the idea of creating a 'human bookshelf', where people replace the books, a system of shelves is created where each reading space is designed to be relatively private, and to have a view of the park outside. People may be close to each other, but the small space in which they sit is easily appropriated as their own territory, as is it easily distinguishable from the shelves next to it.



3.56

*Diagram: continous 'landscape'
vs division of spaces -
individual spaces*

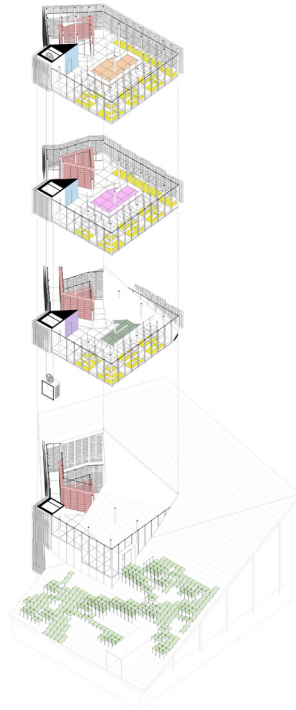


3.57

Diagram: Principle for reading rooms. Displacements in heights between shelves and levels creates unobstructed views of the park, and a sense of privacy, for everyone

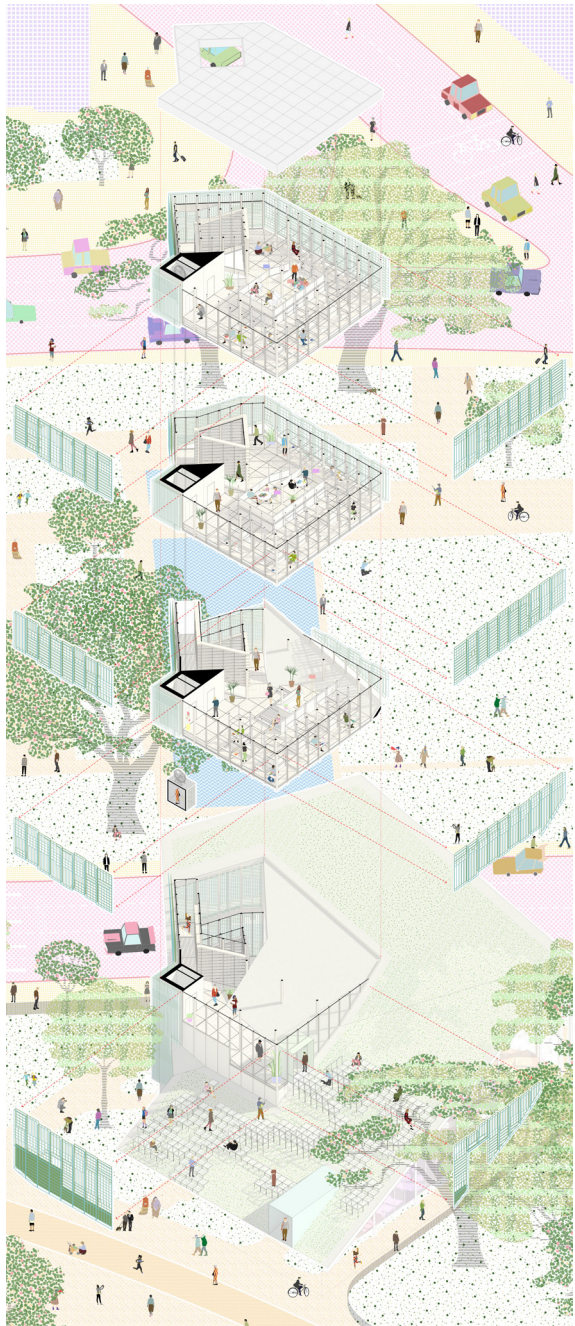
The shelves are organised around the facade of the building. In the centre, a larger mezzanine is displaced 1 meter above the regular floor. This space is more flexible and can be used for other types of interior arrangements – such as larger tables for groups, or sofas that are more comfortable. On the second floor of the tower, the centre is occupied by the reception, where librarians will receive visitors.

- Roof terraces
- Magazines
- Toilets
- Group space
- Print room
- Reception
- Reading space
- Books

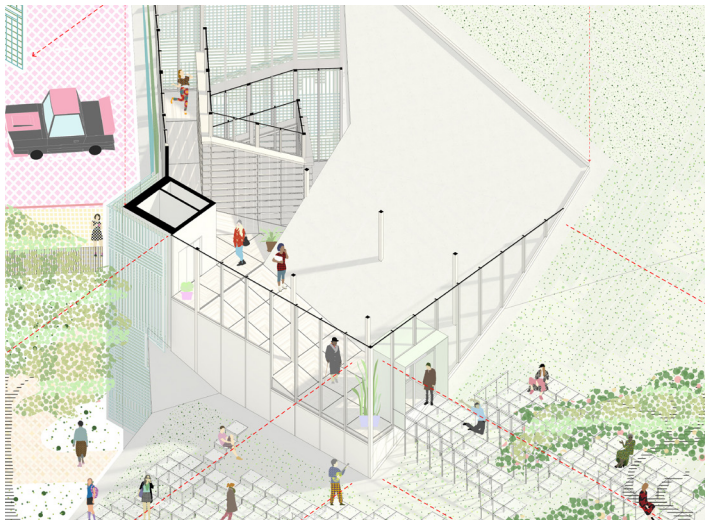


3.58

Diagram: Programs in tower

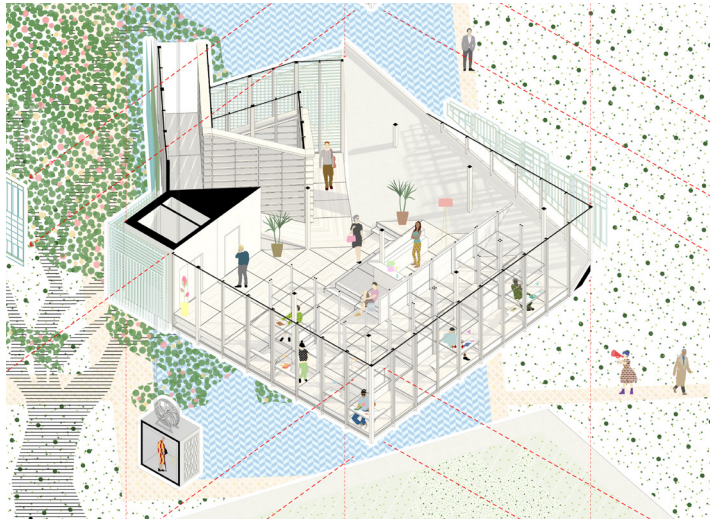


3.59
*Axonometry:
Exploded
axonometric view
from south - east*



3.60

*Axonometry: Close-up of
entrance to tower, from roof
terraces*



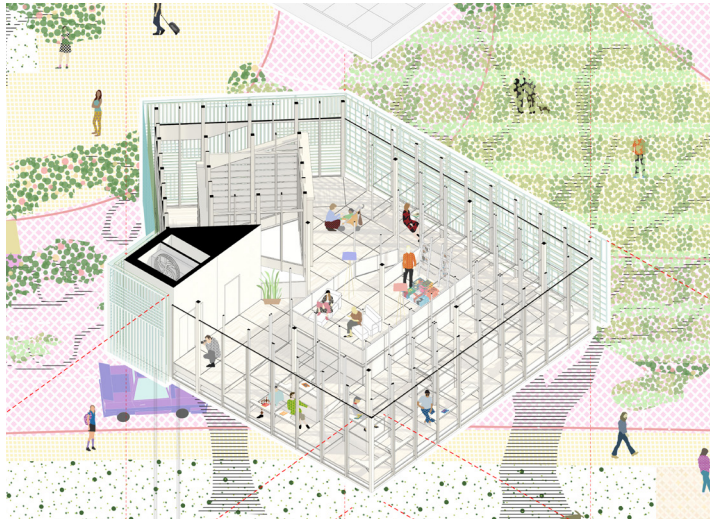
3. 61

Axonometry: Close-up of second floor



3.62

Axonometry: Close-up of third floor



3. 63

Axonometry: Close-up of top floor



3.64

Image: Interior view of reading rooms, reception area

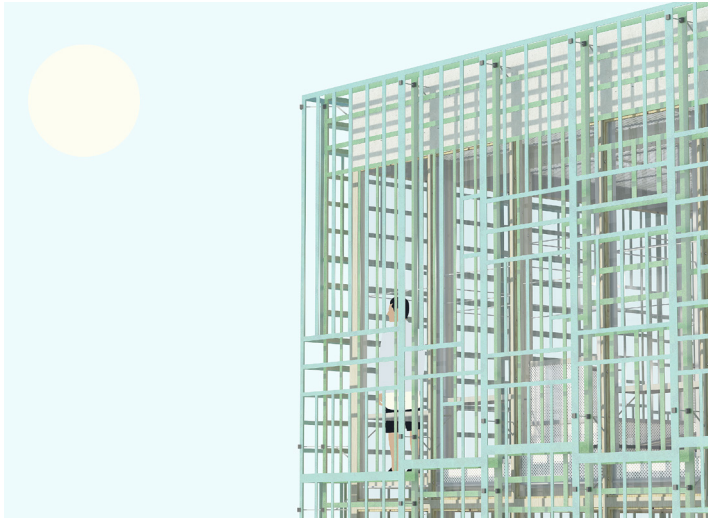


3. 65

*Image: Interior view of reading
rooms, top floor*

The materials of the tower correspond to the natural context of the park. The structure, as well as much of the interior, is made from wood. The façade is made in layers. First, the envelope of the building is largely glazed, to enhance the views from inside. Outside the glass, two layers of oxidized and perforated copper hang to obstruct the sun and create a cooler environment inside the building. The patterned perforation of the metal comes from the same data as the landscape in the other part of the building.

The copper façade also covers the stairwell, to highlight the connection between the books and the reading spaces, and to enhance the sequence from the city to the tower. A similar pattern also exists on the sloping roof, to highlight the other sequence by which people can approach the tower - from the park.

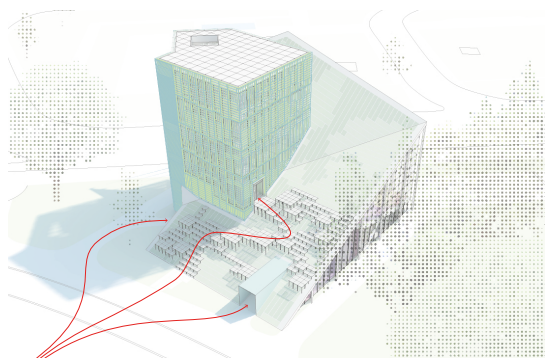


3. 66

Image: Close-up on exterior facade. 2 layers of perforated copper, oxidized with different chemicals, mediate interior light.

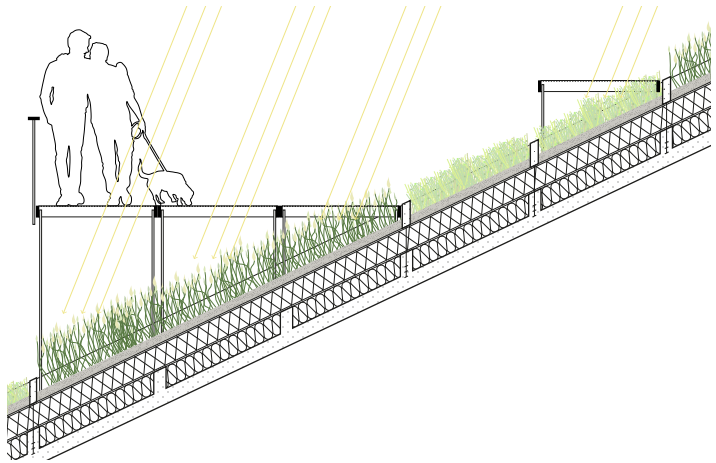
3.3.3 Roof Garden: To the south of the building, the park stretches out with enormous lawns. The roof garden, leading to the tower, is designed to be an intermediary space between the very large scale of the lawns to the small, individual spaces of the reading rooms.

Arriving from the park, people can choose to either enter the 'confrontation' part of the library, through a tunnel, or walk up on the system of terraces that lead to the tower. The terraces are floating above the green roof and are made from perforated metal plates that allow for light to reach the plants as well as the plants to grow through.



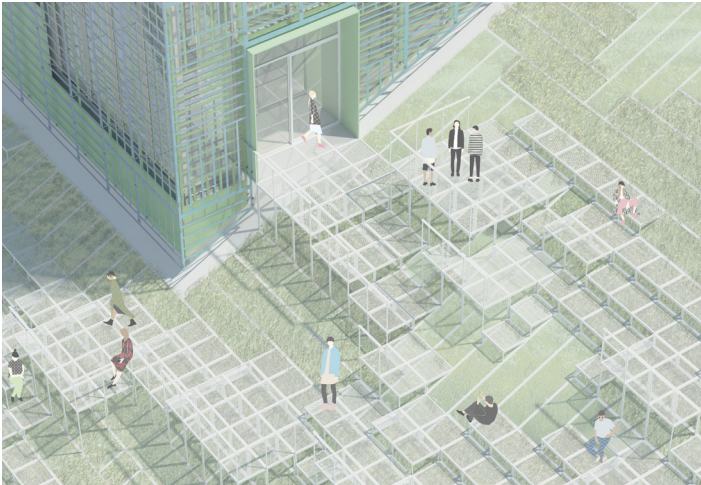
3.67

Diagram: Entrance choices from park



3. 68

*Diagram: Roof garden - terrace
principle*



3.69

*Image: Roof garden with
terraces. Entrance to tower*

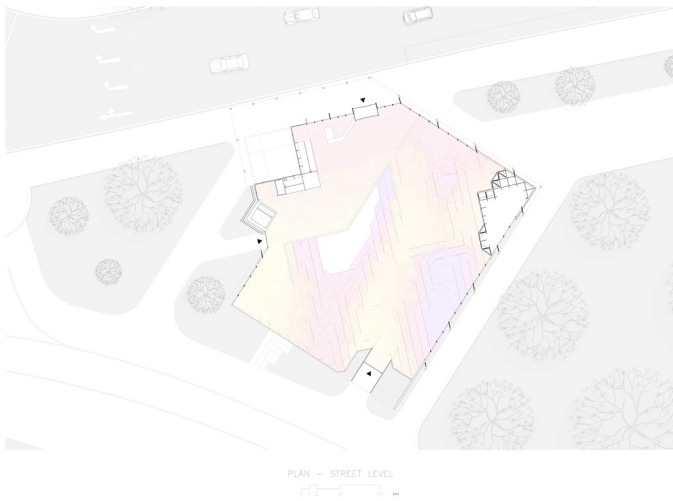
4. BUILDING

4.1 Plans & Sections



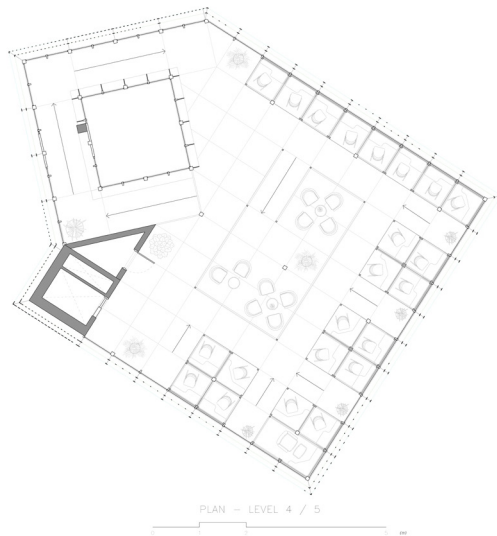
4.1

Drawing: Situation Plan



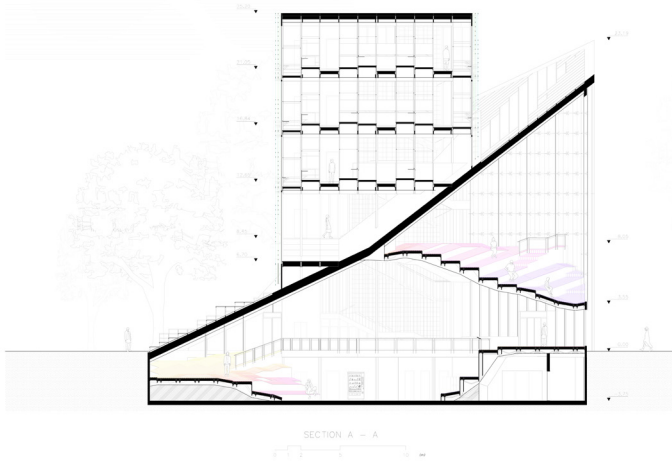
4.2

Drawing: Plan -Street level



4.3

Drawing: Plan - floors 4 or 5



4.4

Drawing: Section

5. REFLECTIONS

In this chapter I take up issues that came about during the project, as well as some reflections and ideas that has come later on, when looking back.

5.1 Optimization, Computational Power, and Syntax Analysis

The idea for the design of the interior landscape of the building was to create a generative process that could output lots of variation and provide enough meaningful information about each in order to sort out the good from the bad. In some ways I think this was successful. I got a lot of options and managed to find ways to analyse them using different parameters. In other ways, there was definitely room for improvement.

My process is blind, in the sense that there is no feedback between iterations. The good parts of one landscape could have been 'saved' for the next iteration for example. Out of 1000 design options in this project, only something like 10 % were interesting and "good", and the qualities of those with preferable properties could not be recorded and carried over to the next iteration. So a lot of the generative process, which takes a lot of time, was essentially useless.

The T1 chair (see image 5.1) is a good example of a similar approach at generative design that revolves around choosing the best option out of many. They used a genetic algorithm in order to stepwise arrive at better and better results. This kind of approach is favourable. But the problem for me lies in the fact that I wanted to use more formal and spatial qualities to distinguish between options based on the patterns of use they would encourage, rather than looking at structural optimization.

Structural analysis has simpler parameters to optimize - it is clear, when



5.1

*Philippe Morel: T1 chair
studies (2004)*

you evaluate two options, which one is best. In a process based on measures from space syntax it is much less clear what is good or bad, as the results can be interpreted in many ways.

I tried to bypass this by first creating 200 landscapes, analysing those to find out what kind of properties the best ones shared, and then, in the next round of generating landscapes, discard all those with, for example an area that was too small or that had too many flat surfaces. This kind of tuning of the parameters resulted in the last 200 or so landscapes being much more interesting than the previous ones. But it also means that I did a lot more than 1000 iterations, as even the landscapes which were discarded had to first be generated and analysed, and that the 'feedback' was very manual and only happened at a handful of occasions during the design process.

In the analysis, I tried to incorporate syntactical measures of higher order than connectivity and clustering coefficient. It would have been more interesting to look at, for example, visual integration, but these kinds of graph calculations are much more expensive in terms of computation. So, in a way, I consider connectivity as a kind of placeholder for integration - something that in the future should be exchanged, once computational power has caught up, and can perform these calculations in a reasonable time.

5.2 Landscapes and Implied Movement

Greg Lynn describes, in his text 'Animate Form' (2014), how the continuous nature of landscapes, such as those envisioned by Parent and Virilio, imply movement, even though they are static themselves. He takes the argument from physics, where object higher up on a slope has more stored energy than those below, and they want to travel down.

So working from the notion that people would take the 'path of least resistance', also in a very physical way, one could simulate movement as a function of the form sloping either downwards or upwards. It would have been interesting to incorporate this in the analysis of all the landscapes generated within the design process, but I didn't think of it in time.

Space syntax is based on a similar approach of people choosing routes according to the lowest 'cost', but the cost is here thought of in terms of cognitive effort. People walk in the city and follow the longest lines of sight. It could have been interesting, since my landscapes in this project, and the analysis performed on them, were done in a very three-dimensional way, to compare these two different types of approaches at trying to describe potential for movement.

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6.2 Images

2.1: <http://www.andrewcusack.com/2008/etienne-louis-boullée-opera/>

2.2: https://en.wikipedia.org/wiki/%C3%89tienne-Louis_Boull%C3%A9

2.5-6: <https://weaponizedarchitecture.wordpress.com/2010/09/05/reference-claude-parents-oblique-function/>

2.7: <http://oma.eu/projects/tres-grande-bibliotheque>

2.8: <http://themonkeycage.org/2011/07/is-twitter-politically-polarized/>

2.10: <https://en.wikipedia.org/wiki/Pruitt%E2%80%93Igoe>

2.11: <http://www.archdaily.com/448774/heydar-aliyev-center-zaha-hadid-architects>

2.12: <http://www.rex-ny.com/seattle-library/>

3.1, 2, 4: Google Earth

5.1: https://www.academia.edu/8171471/Computational_Chair_Design_using_Genetic_Algorithms_by_EZCT_Architecture_and_Design_Research

6.3 Data Sets

A: [Openstreetmap.org](https://openstreetmap.org)

B: https://api.tiles.mapbox.com/v4/enf.c3a2de35/page.html?access_token=pk.eyJ1IjoibWFwYm94IiwiaWUiYSI6ImNpejdueG92YjAwZHUzMnA5ZWlyMWw1zcDQifQ.acDRLVcqW0LZfWQXvC3-pw#9/33.9661/-116.8808

C: <https://data.gov.uk/>

D: <https://data.gov.uk/>

E: <http://www.pimpampum.net/labs/mapr/mapr.php#lat=51.509307&lng=-0.167918&scale=25000&layers=hydepark>

F: <http://www.geoinformationgroup.co.uk/>

G: <https://www.police.uk/metropolitan/00BK14N/crime/+UPefnY/>

H: Constructed from Booth's map of poverty (1899)

I: <https://www.citylab.com/life/2015/04/map-ping-every-citys-most-scenic-routes-one-photo-at-a-time/391775/>

