AMERICAN UNIVERSITY OF BEIRUT

INHABITING TIME:
PERPETUATING A SALINE ECOSYSTEM

by
JANA FAWZI SEMAAN

An Undergraduate Architecture Design Thesis
submitted in partial fulfillment of the requirements
for the degree of Bachelor of Architecture
to the Department of Architecture and Design
of the Maroun Semaan Faculty of Engineering and Architecture
at the American University of Beirut

Beirut, Lebanon
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Date of project presentation: May 11, 2021

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ACKNOWLEDGEMENTS

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Finally, I would like to thank the local salt makers, who have so generously welcomed me into their community and shared their story with me, and especially Youssef, who has driven me to fall in love with the craft.

ABSTRACT

Title: Inhabiting Time: Perpetuating a Saline Ecosystem

Time is one of the most mysterious metaphysical forces in the universe. Even though its interpretation is not universally agreed upon, it is an undeniable constituent of our daily lives. In the architectural discourse, time is an indispensable parameter. This thesis argues that the spatial character of a design comes in parallel with its temporal character. It explores different interpretations of Time and how they manifest spatially. It searches for opportunities to further elaborate the temporal dimension of architecture, incorporating time as a more conscious design parameter.

This is reflected in Lebanon's culture of salt extraction, that intertwines several layers of temporal experiences at once. The survival of one of the earliest industries and an essential element in forming Anfeh's identity is threatened by time, and only one site remains partially active. The project aims to reverse the effect of time on Anfeh's fleeting salt extraction practice, landscape, and culture. It rejects memorializing a fading ecosystem and instead searches for ways to perpetuate the practice in a simple, adapted way. The research looks for alternative markets for salt beyond the raw material and effectively favours a centralized model on site as an alternative to the existing one. By adopting a "Farm to Table" strategy, the thesis proposes a network of salt industries that would simultaneously create an economically, environmentally and socially sustainable landscape.

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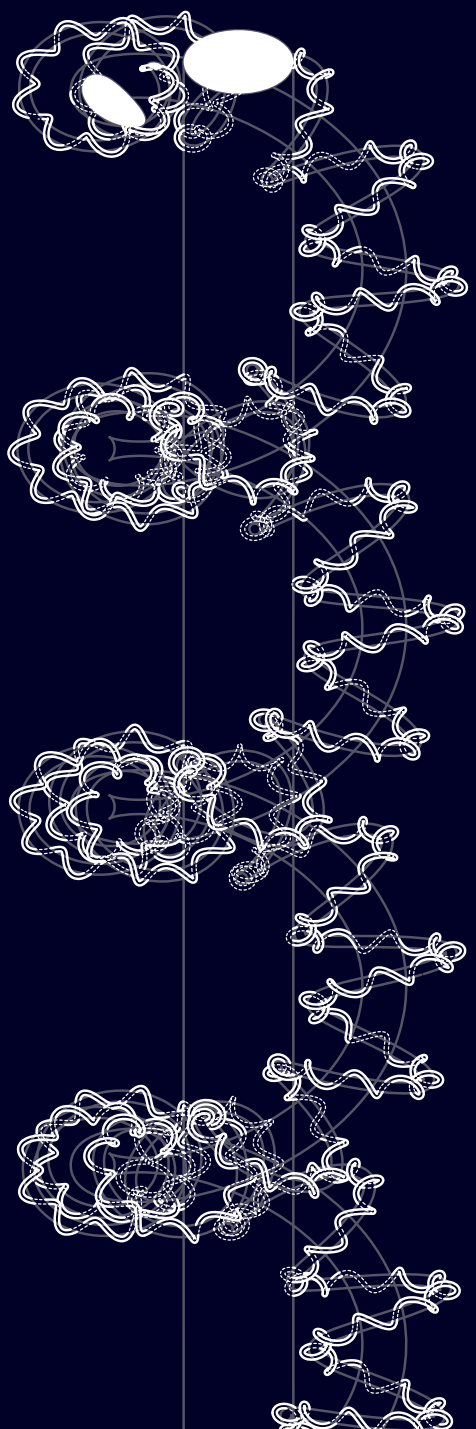


Inhabiting Time

A Thesis by Jana Semaan

Part I

Temporal Explorations

Summary

Time is one of the most mysterious metaphysical forces in the universe. Even though its interpretation is not universally agreed upon, it is an undeniable constituent of our daily lives. In the architectural discourse, time is an indispensable parameter. This thesis argues that the spatial character of a design comes in parallel with its temporal character. It explores different interpretations of Time and how they manifest spatially. It searches for opportunities to further elaborate the temporal dimension of architecture, incorporating time as a more conscious design parameter.

Under advising by Professor Sinan Hassan

Department of Architecture and Design

Fall 2020

Introduction

Time is one of the most mysterious metaphysical forces in the universe, yet it is captivatingly an undeniable constituent, in control of our daily lives. Even though time has arguably existed thereupon existence, it is a controversial concept that is always being defined and redefined, and architecture cannot be left out of the conversation.

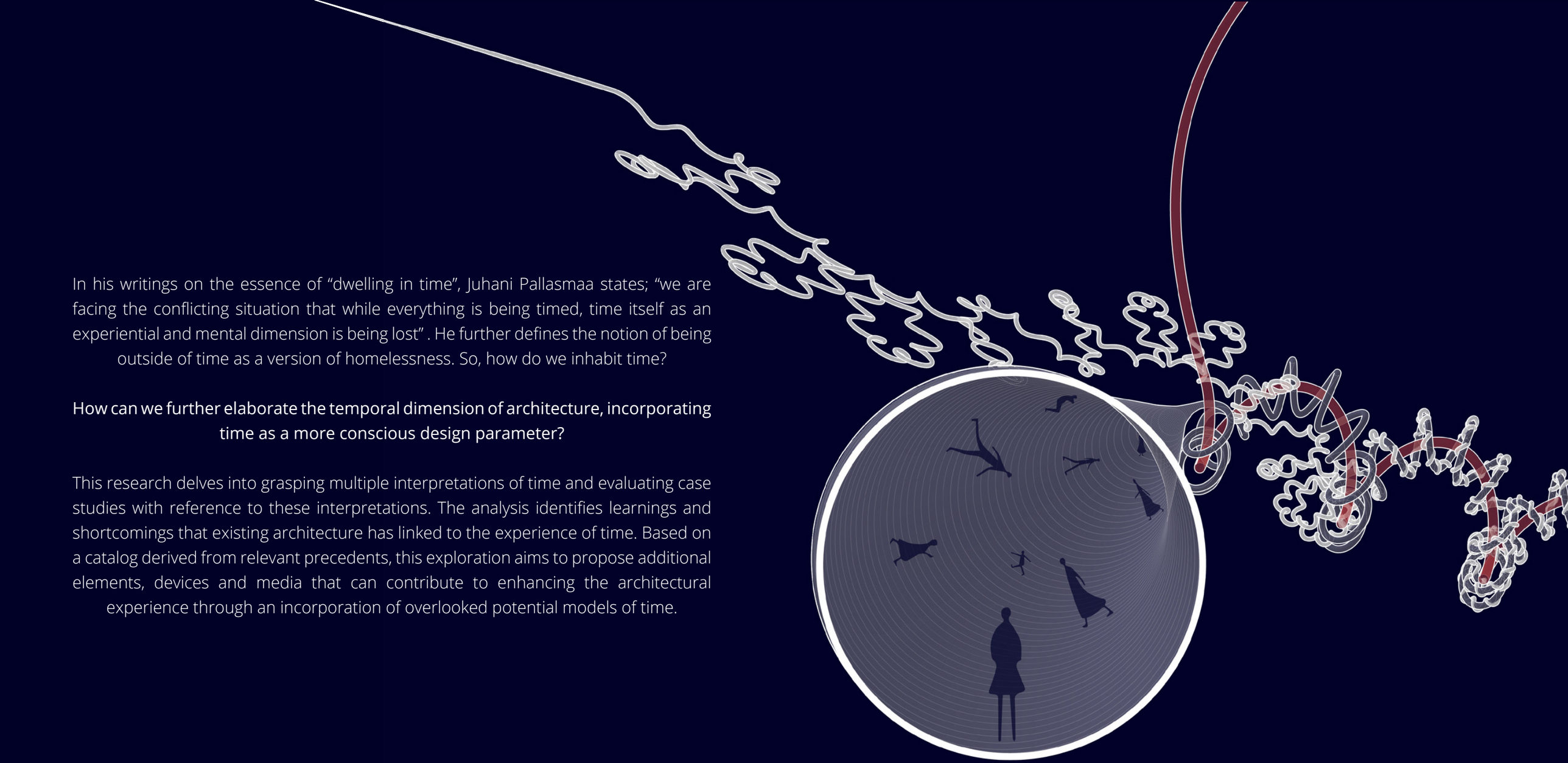
We run out of time. We lose time. We waste time. We are on time. We are frozen in time. We lose track of time. Time elapses and stretches. Time unfolds. We pass time. Time passes us. We speak of time in many ways; it is always mentioned in one form or another in daily interaction.

Minkowski defines time as the 4th dimension - we move through length, width, height, and time. Though we can manage how we navigate through the three-dimensional space, we are not entirely able to choose whether or how fast we travel through time.

In his writings on the essence of “dwelling in time”, Juhani Pallasmaa states; “we are facing the conflicting situation that while everything is being timed, time itself as an experiential and mental dimension is being lost” . He further defines the notion of being outside of time as a version of homelessness. So, how do we inhabit time?

How can we further elaborate the temporal dimension of architecture, incorporating time as a more conscious design parameter?

This research delves into grasping multiple interpretations of time and evaluating case studies with reference to these interpretations. The analysis identifies learnings and shortcomings that existing architecture has linked to the experience of time. Based on a catalog derived from relevant precedents, this exploration aims to propose additional elements, devices and media that can contribute to enhancing the architectural experience through an incorporation of overlooked potential models of time.



Interpretations of Time

/tʌɪm/

In the dictionary, the definitions of “time” occupy a good amount of space. The definition and concept of time in itself is multidimensional. It is interpreted differently by different cultures and contexts, and its implications vary from one discipline to another. There is no universally agreed upon meaning for this construct, as the discourse on time is long-lived and in continual evolution. “Time” is decoded differently in philosophy, psychology, physics, biology, literature etc.

In ancient philosophy, the Hindu and Buddhist perspective on time is an endless repeated cycle, termed the “Kalachakra”, or wheel of time. Similarly, early Greek philosophers recognized time as infinite, with no beginning and no end. On the contrary, in Christianity, Islam and Judaism, time is finite. The belief is that God created the Universe, so there was a beginning, and there will be an end.

In early modern philosophy, Newton, Barrow and Clarke classify time as a dimension with a sequence of events. They speak of “absolute time”, which is objective and independent of the perceiver. What an observer perceives is “relative time”, a measurement of distinguishable objects in motion. Leibniz claims that time is merely intellectual – an abstract concept which we are only able to describe by the events that unfold in it. Kant states that time is linear; it is used to structure experiences and measure durations.

In modern philosophy, there are two competing theories – the tenseless theory and the tensed theory. The former neglects the existence of the past, present and future as they are all equal. The latter states that the passage of time is an objective fact – the past, present and future are real.

In physics, time is defined as an infinitely divisible linear continuum that is not quantized. Classical physics adopts the Newtonian notion of absolute time, that is detached from the perceiver. Einstein advances the theory of relativity – that time dilates depending on the state of the observer. Time is thus an element of the 4-D space-time. In all cases, time is asymmetrical, it is an arrow which points in one direction. The past is fixed and immutable, and the future is unknown and not fixed.

In biology, time is cyclical – the rates of heartbeats, metabolism, respiration... Organisms also regulate to environmental cycles or cues, like a habitual alarm clock – this is known as the physiological concept of Zeitgeber. Another time-related notion in biology is the lifecycle. Different organisms and components of the organisms have different expected life spans and periods of growth and decay. The human, for example, has an average lifespan of 79 years, but its component cells regenerate at different rates. The average lifespan is 1 month for skin cells, 15 years for skeletal muscle cells, 50 years for egg cells, and 200 years for brain cells. This is analogous to the lifecycles of architecture – its infrastructure, program, circulation, structure and materiality...

In psychology, the experience of the nature and passage of time is subjective and can differ significantly from one person to another. Unlike physical time, psychological time is subjective and potentially malleable. The different conditions of the observer determine how they read or perceive time. Depending on the circumstances, one might perceive that time is fast, slow or frozen; it can be enhanced by a specific experience. Cultural background could also influence the perception of time; for example, for someone whose first language that writes from left to right, they are inclined to read the direction of the arrow of time from left to right as opposed to someone whose first language that writes from right to left, like Arabic, who might read the direction of the arrow of time from right to left. An archaeologist or an architect, might read the direction of time from the bottom up.

Depending on cultural attitudes towards time, people begin to spatialize the past, present and future differently; some perceive the past as if it were behind them and others perceive it as if it were in front of them. The Malagasy, for example, look forward to the past because they already recognize its components. The future; however, is behind them as they cannot see it and are unaware of its events. Others look forward to the future, and leave the past behind them. This personal conception of time is materialized not only in the physical orientation of the arrow of time but also in the linguistic jargon used to reference temporal activities, evident in many languages – both verbal and sign languages.

In literature, time is a chronology of events. It is not necessarily linear and fragmented. The speed of time could vary from one portion of the script to another. Flashbacks and flashforwards manipulate the directionality of time.

Regardless of the nature of time itself, everybody measures it as a form of change; the day-night cycle, the year, the seasons, the timeline. From sundials, water clocks and candle clocks, to watches, calendars, and the atomic clock. The scale is shifting from tracking the alignments and rotations of celestial bodies to computing the frequency of something as minuscule as the atom. The fascination with time-keeping has long existed, and it is constantly becoming more precise.

Wheel of Time

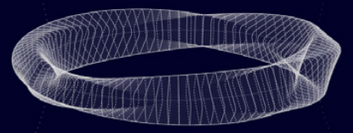
Hindu, Buddha, Maya

Wheel of Time

Early Greek

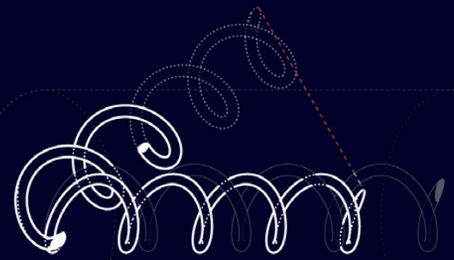
Linear Finite

Christianity, Islam, Judaism...



The Mobius

The Spiral



Relativistic Time

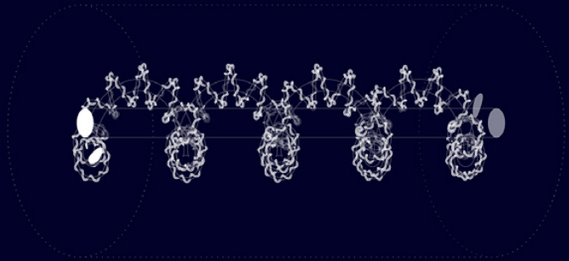
Einstein, Time Dilation

The Spiral, *infinitely subdivided into smaller cycles*

Years

The Spiral

Days



The Spiral

Hours

Personal Experience of Time

Slow Time

Personal Experience of Time

Fast Time

Personal Experience of Time

Frozen Time

Architectural Implications of Time

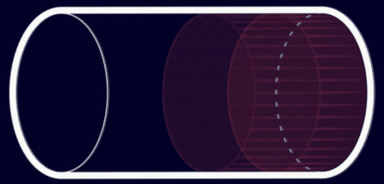
Time is an indispensable parameter in the architecture discourse. Space has the potential to interact both with the objective and the subjective traits of time. The architecture/time jargon is quite diverse, we may think about visible age, timelessness, permanence, temporality, speed, duration and more... In fact, architecture borrows from the various approaches to time mentioned above and expresses or interacts with them accordingly; consequently, it influences the experience of time of its users.

All architecture has temporal qualities, analogous to its spatial qualities. It happens that the difference is that the space character is usually more consciously considered. The attitude that architecture has towards time varies from one project to another – from neutral indifference to time, passive reflectivity of time, active incorporation of time, to ultimately interactive with time.

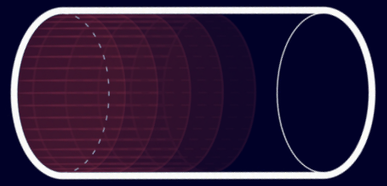
For patients staying at the Intensive Care Unit of a hospital, the lack of fenestration and natural light could drive them to a state of delirium. It could become difficult for them to distinguish between the passage of one day or one week; they lose track of time due to the indifference of the space to the changes in nature. On the other hand, a sundial building or one that reveals changes in its environment, the motion of the sun or the flow of water for example, is recognized as a mirror or recipient of time. Other designs can challenge the physical flow of time, accelerating the erosion of its materials or distorting specific spatial properties. This might warp the user's perception of time, speeding it up or slowing it down as examples.

The icons are represented as sections through the timelines, whether the spiral the cyclical or the linear etc...

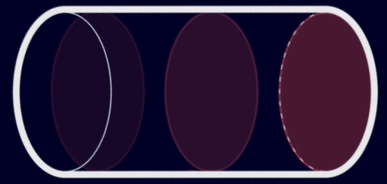
Each of these icons embodies an experience of time, possibly experienced in architecture.



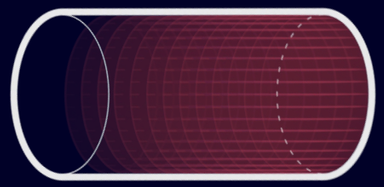
Slow Time



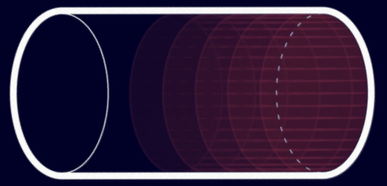
Moving Backwards



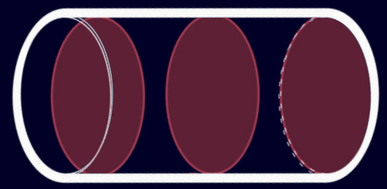
Ephemerality



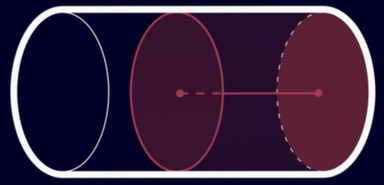
Fast Time



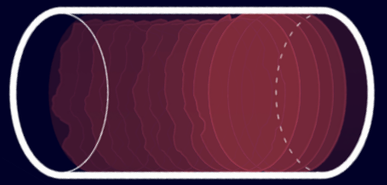
Moving Forward



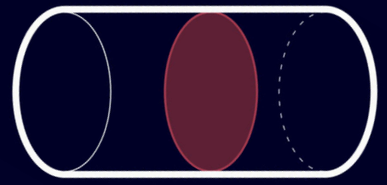
Permanence



Temporal Compass



Aging



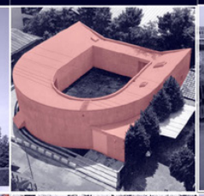
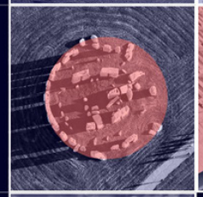
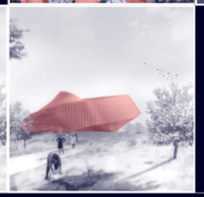
Frozen Time

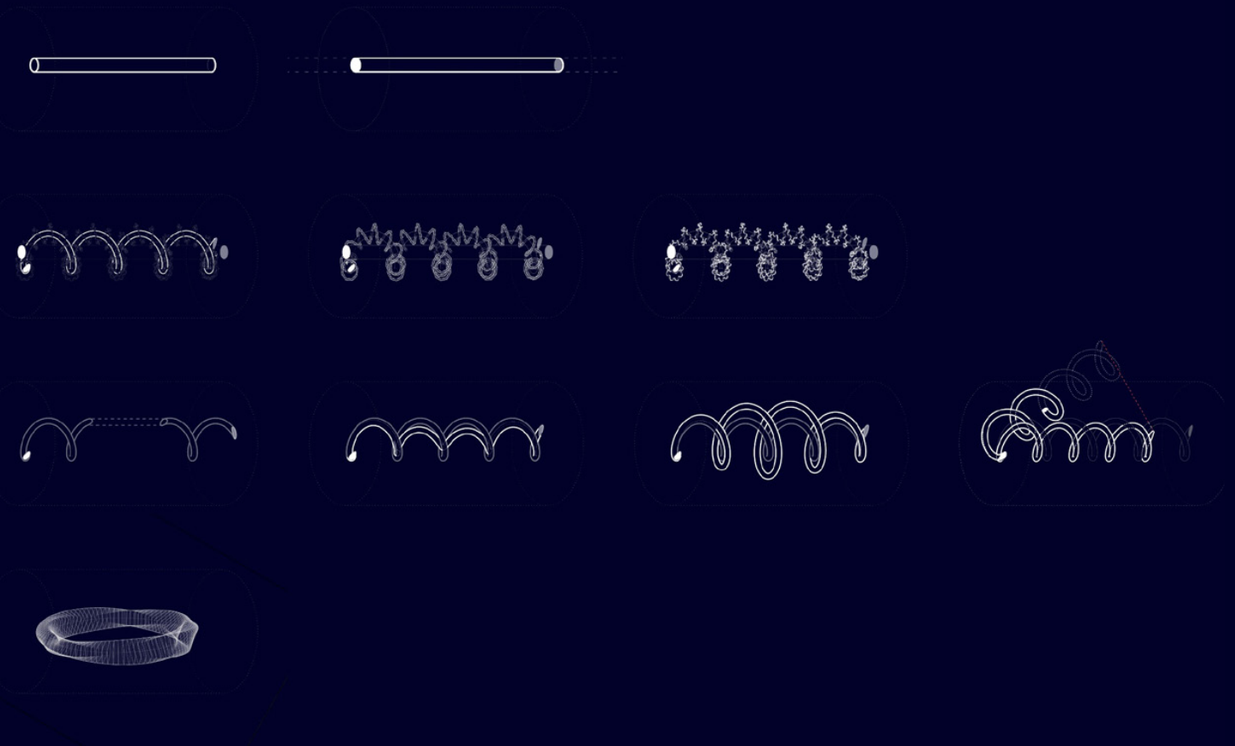
Case Studies

In the following tables, we begin to identify architectural projects that begin to integrate time into the project. We classify examples first, then proceed with a detailed analysis of 24 case studies.

ARCHITECTURAL ELEMENTS

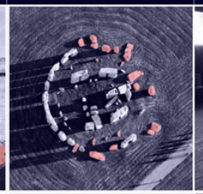
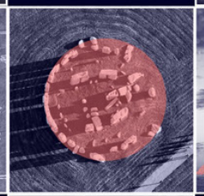
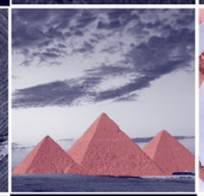
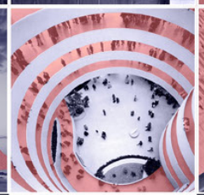
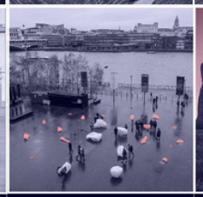
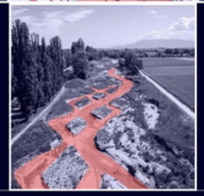
INTERPRETATIONS OF TIME

	Form	Program	Circulation	Spatial Disposition	Material
Linear Time					
Cyclical Time					
Relative Time					
Mobius Time					



ARCHITECTURAL MANIFESTATIONS

ATTITUDES

	Orientation	Form & Layout	Size	Circulation	Program	Materiality	Natural Light	Flow / Space	Growth
Passive									
Active									
Proactive									

Case Studies Criteria

For a clearer comprehension of how various existing architecture projects cater to time, we must evaluate their attitudes and implications based on a clear set of criteria.

The experience constructed by a project is understood by answering five essential questions. Who is it built for? Where/When was it built? Why was it built? How was it built? While answering these questions, we can draw parallels between the SPACE character of the project and its TIME character. To discern the TIME character of a project, we may speak of its date, scale, function, and manifestations (figure 1).

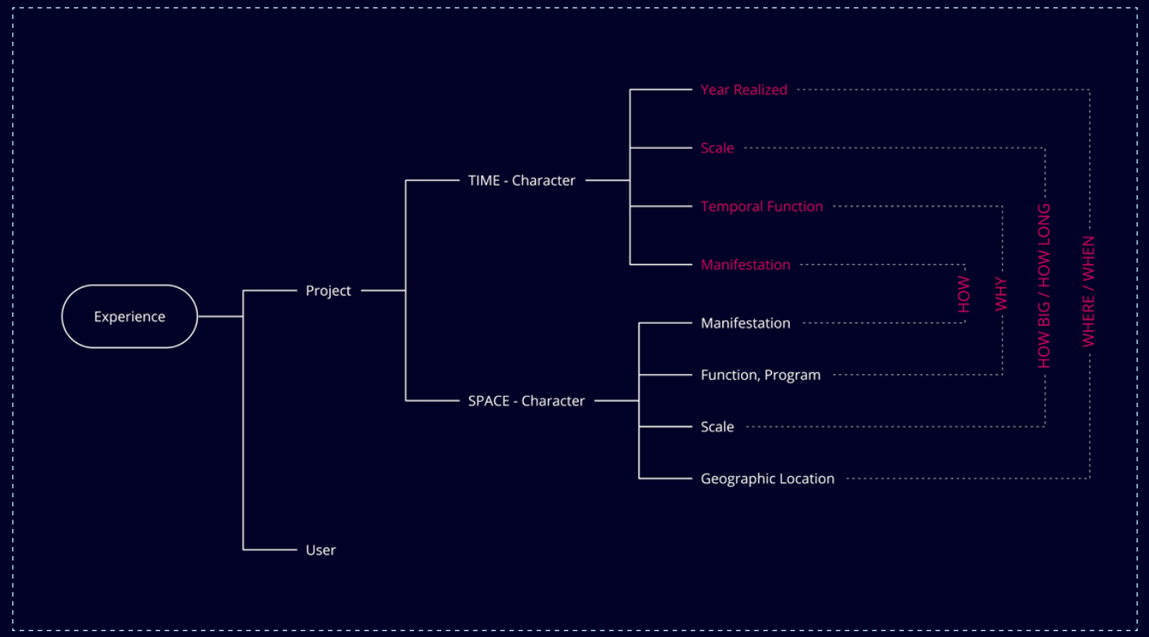
Date – When was the building completed?

Scale – How long is the experienced pattern? ex. daily, yearly, infinite (non-repetitive)

Function – Why do we experience time? Which interpretation of time do we perceive?

Manifestation – How is the TIME function physically expressed?

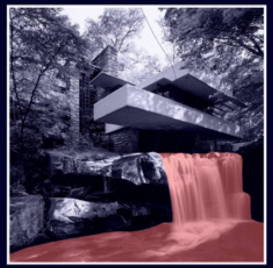
These parameters of classifying a project, when paired with a user, instigate a temporal experience expressed by the architecture. Space informs time, and time informs space.





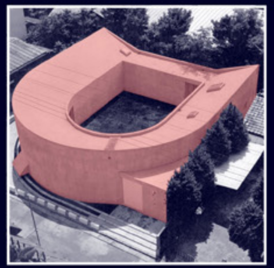










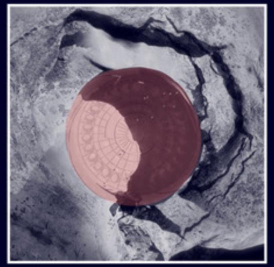













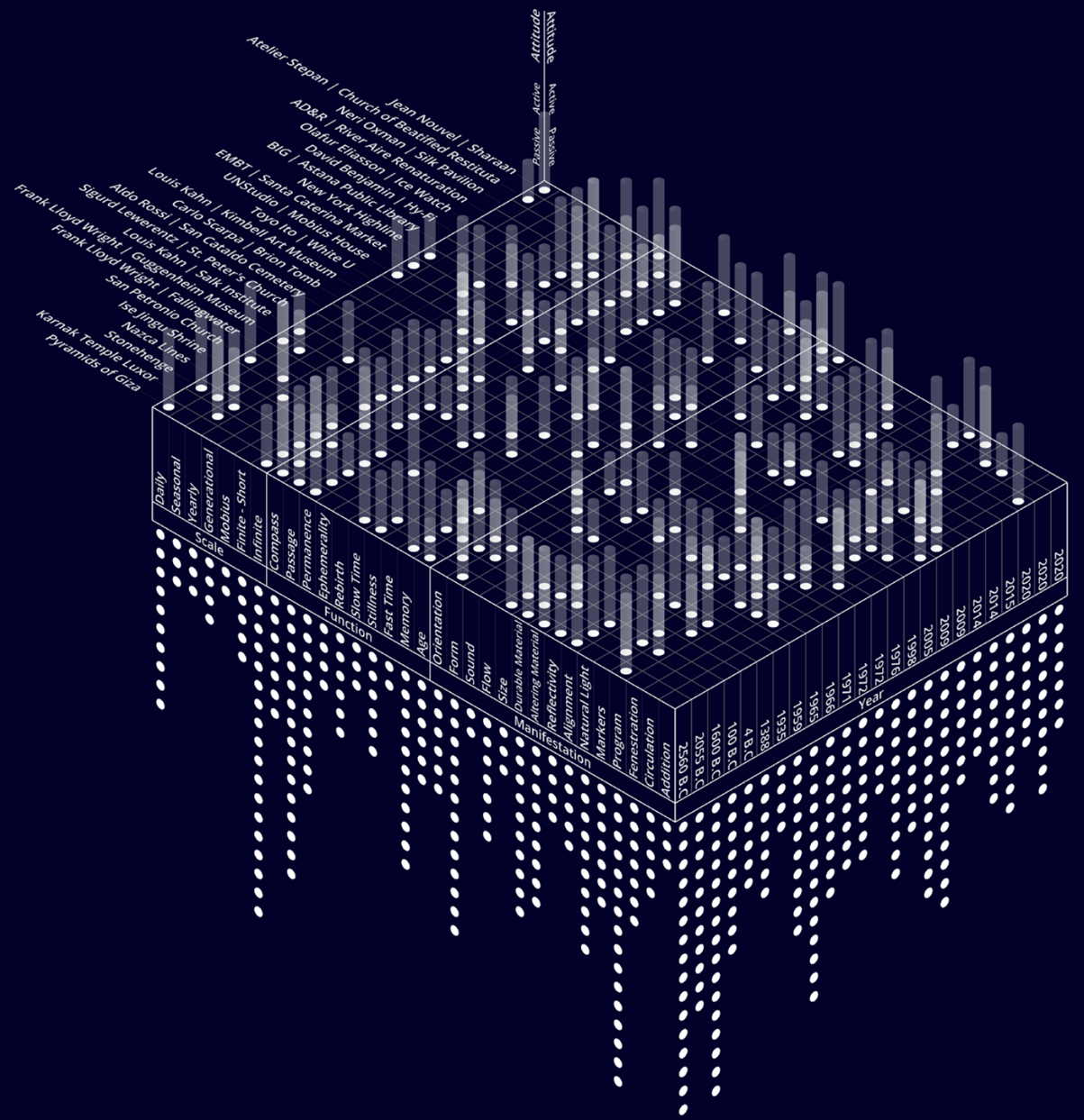
Case Studies - Collection

This table combines the analyses of 24 architectural case studies.
To read this table:

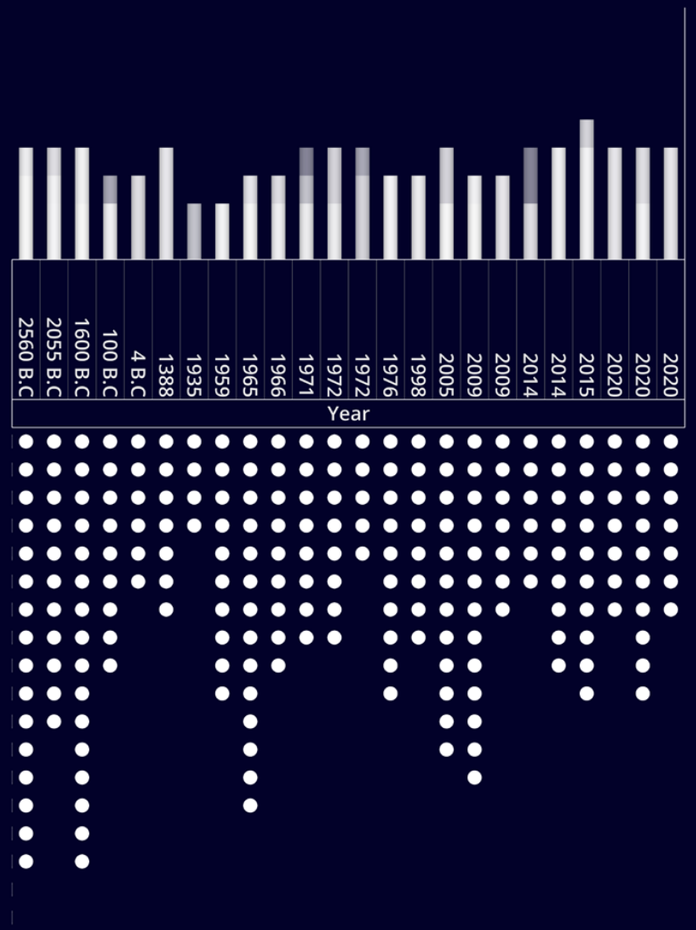
Each strip represents one project, arranged by date from 2360 B.C. till 2020.

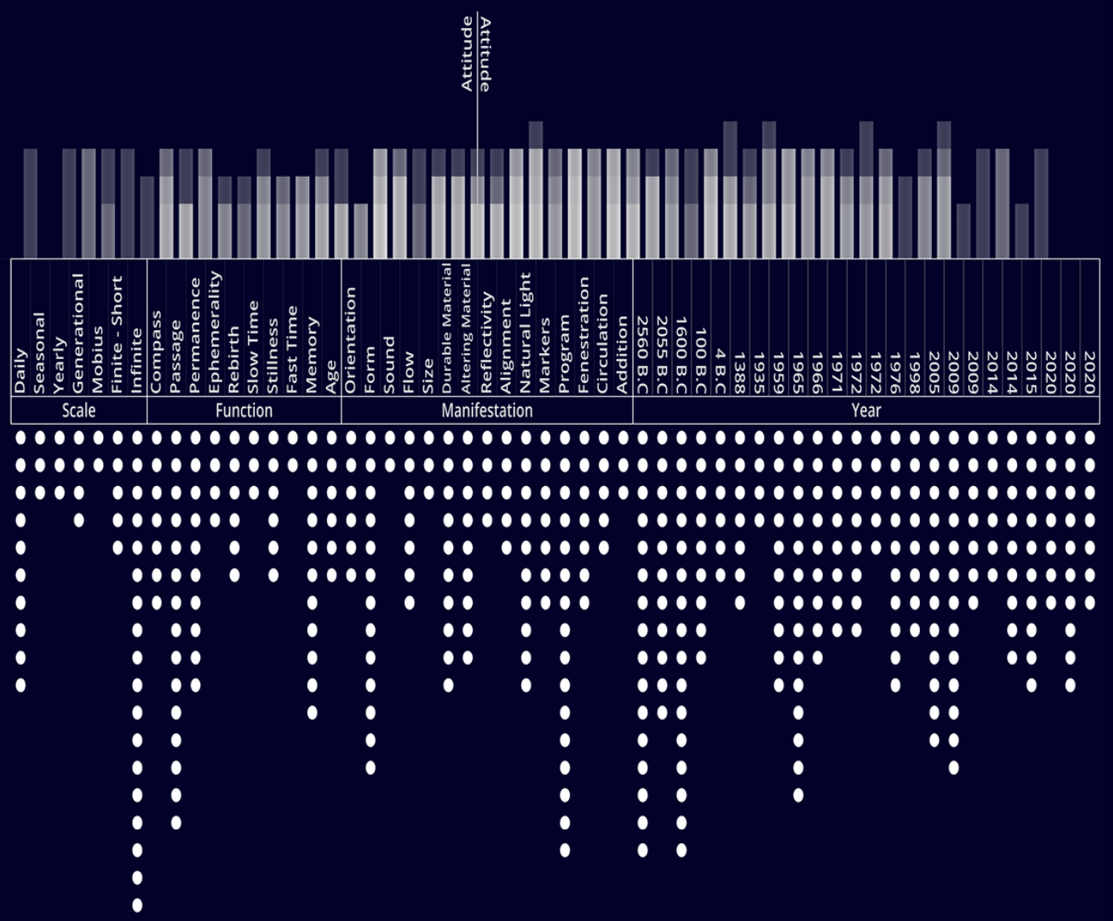
On the other horizontal axis, we can read the Time - aspect of the building subdivided into Scale, Function, Manifestation.

Along the vertical axis, we note two pieces of information; the extrusions towards the top which represent the attitude of the project towards the inclusion of time, and the dots at the bottom, which represent the frequency of involvement with time per category.

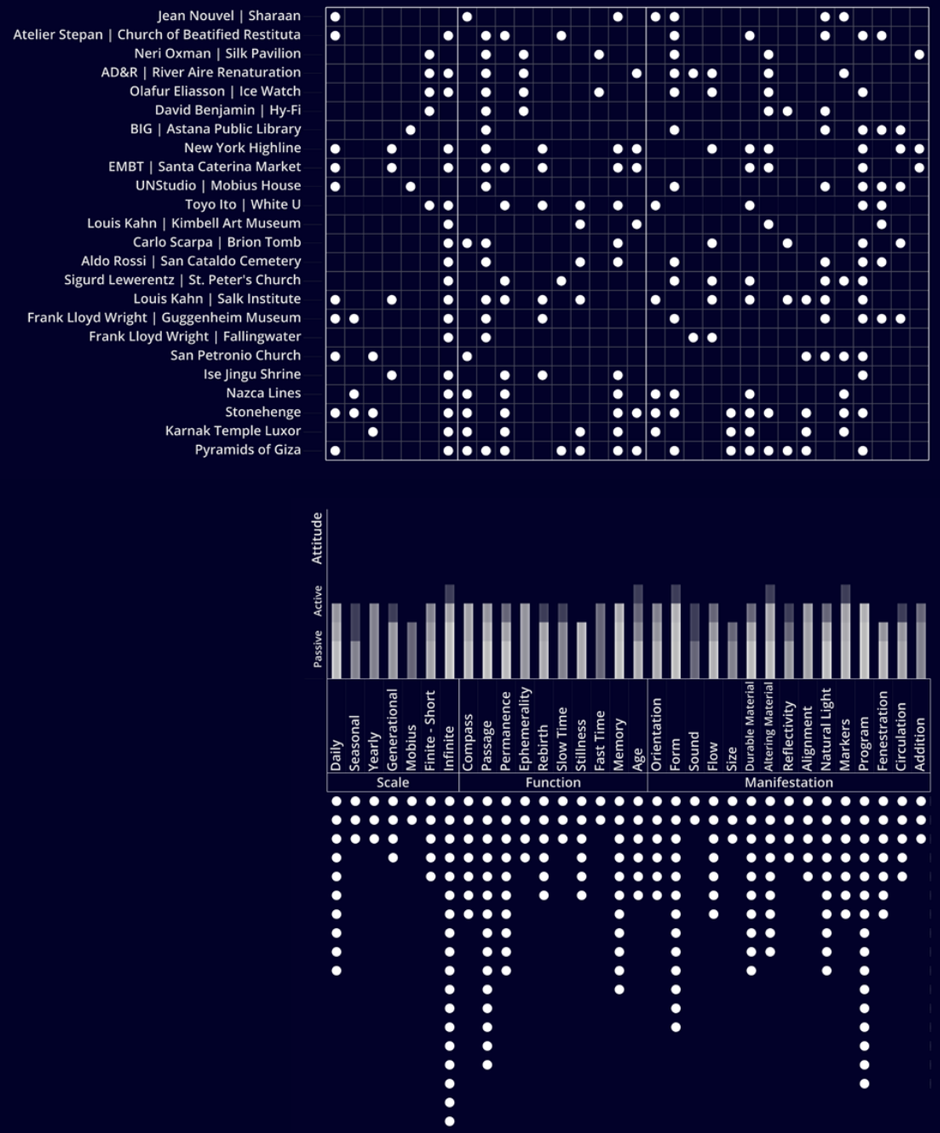


Reading the table from orthogonal views, we can start to relate frequency of involvement and overall attitudes per category, and observe how the relationship with time has changed over the years.

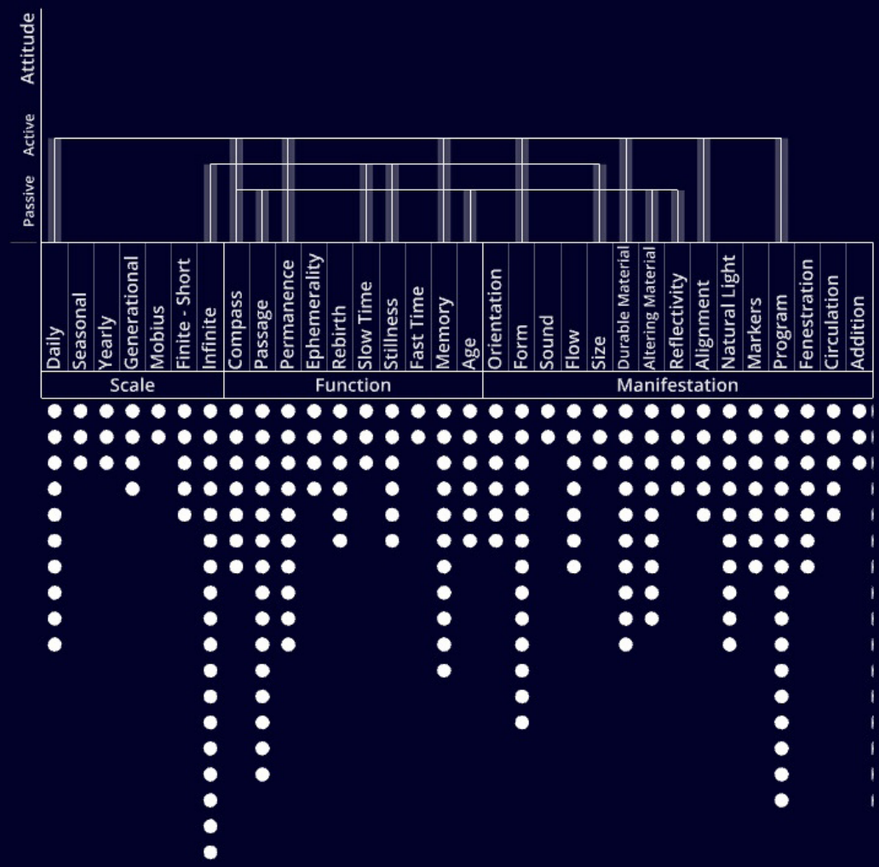




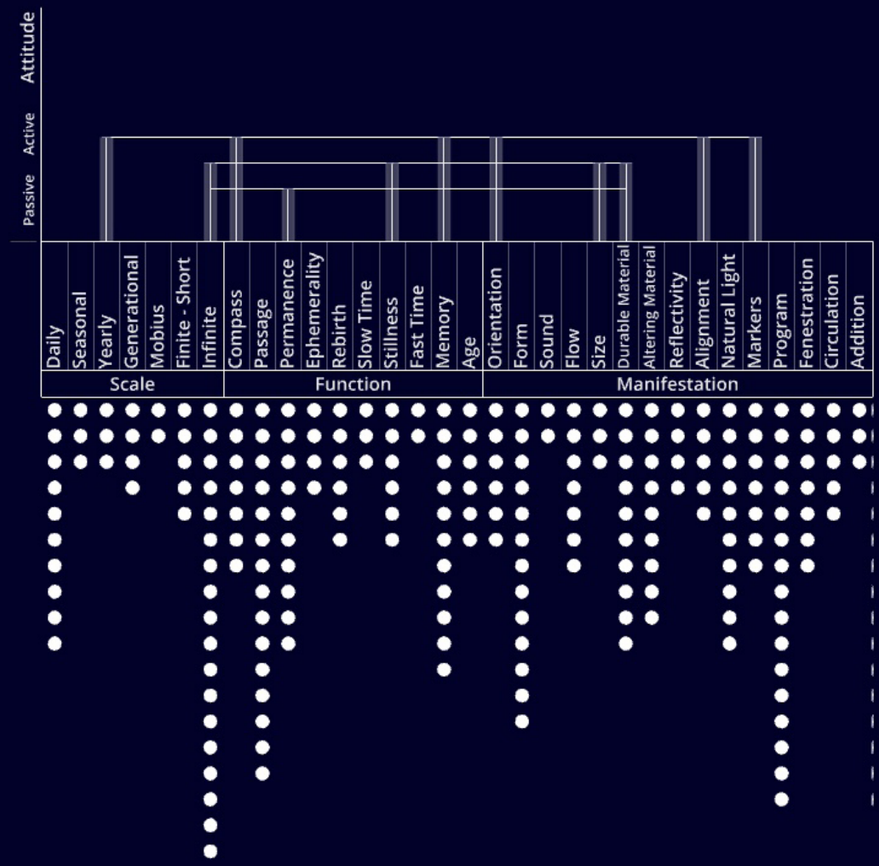
From this orthogonal view, we read the sum of all case studies at once; we may also slice through this table strip by strip, and observe the intersections of Time-scale, Time-function, and Time-manifestation per case study and begin to identify correlations. The individual readings can be found in the following pages.



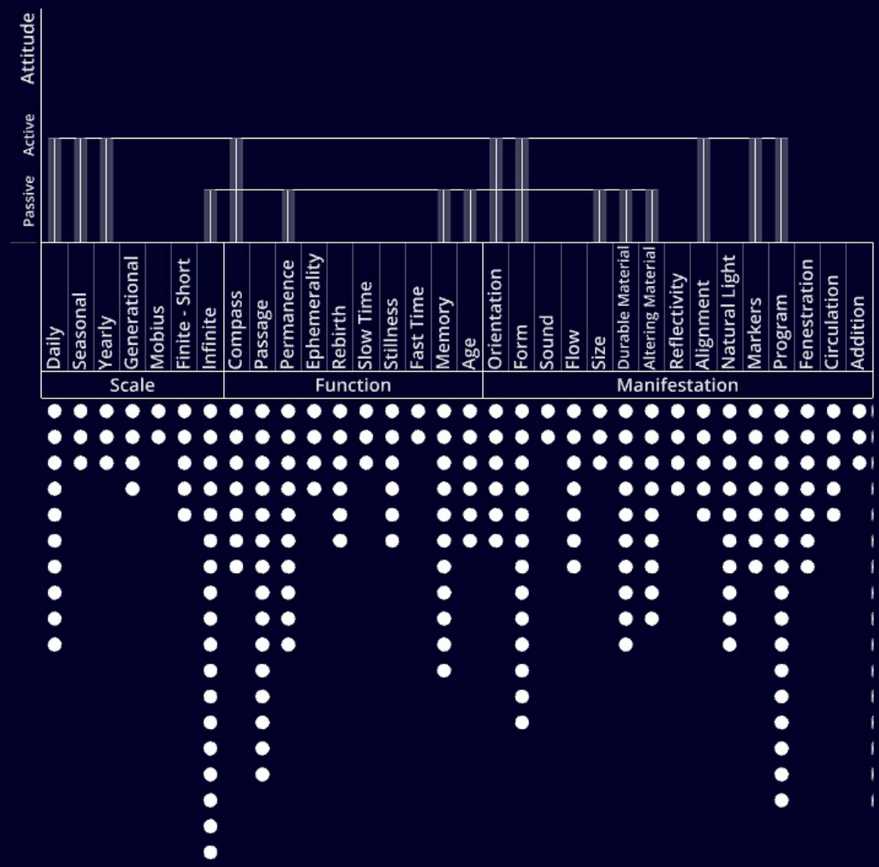
Pyramids of Giza
2560 B.C



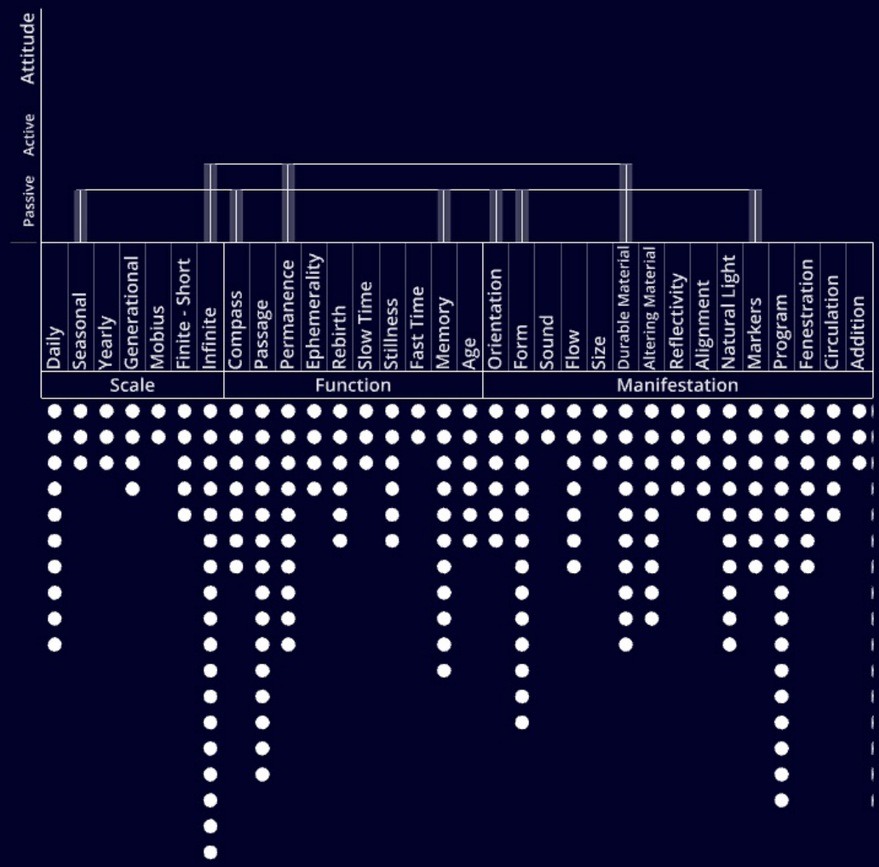
Karnak Temple Luxor
2055 B.C

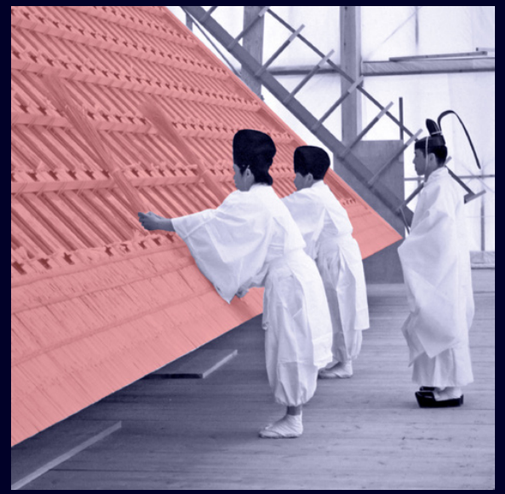


Stonehenge
1600 B.C

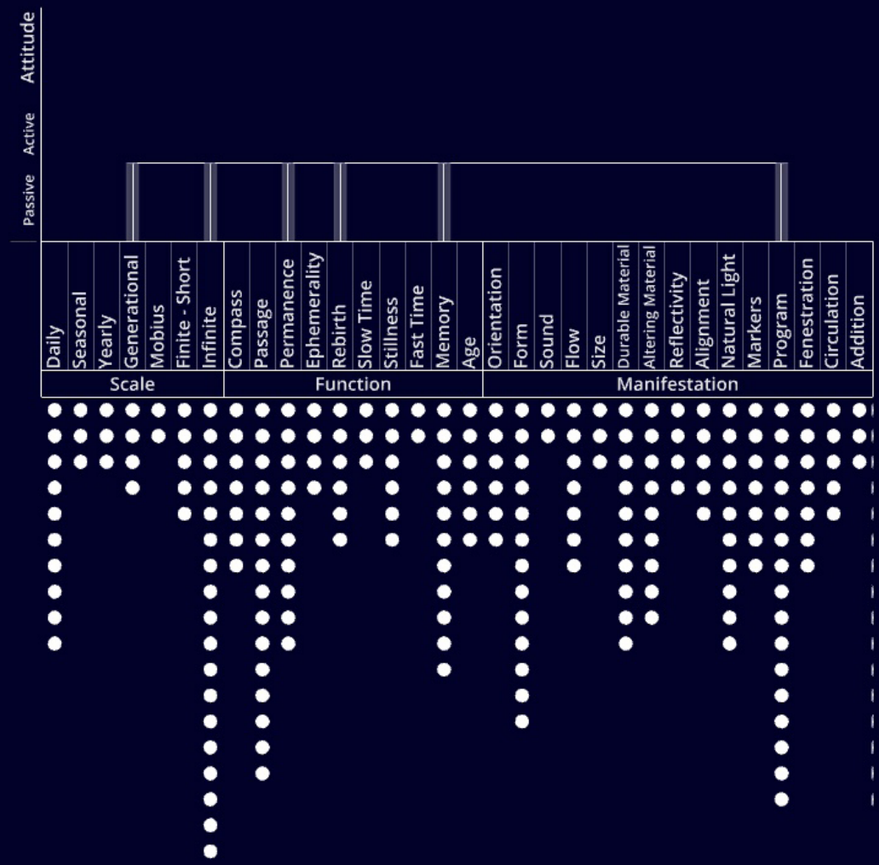


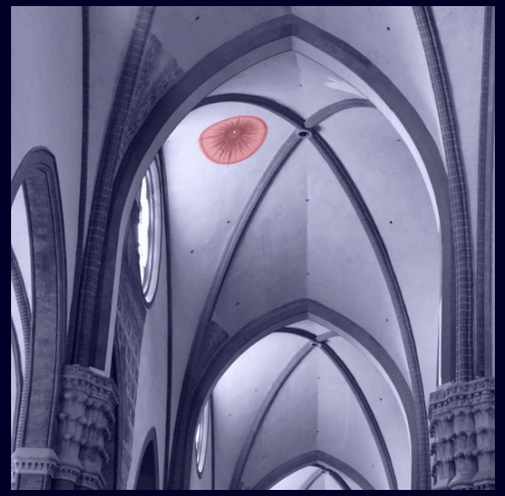
Nazca Lines
100 B.C



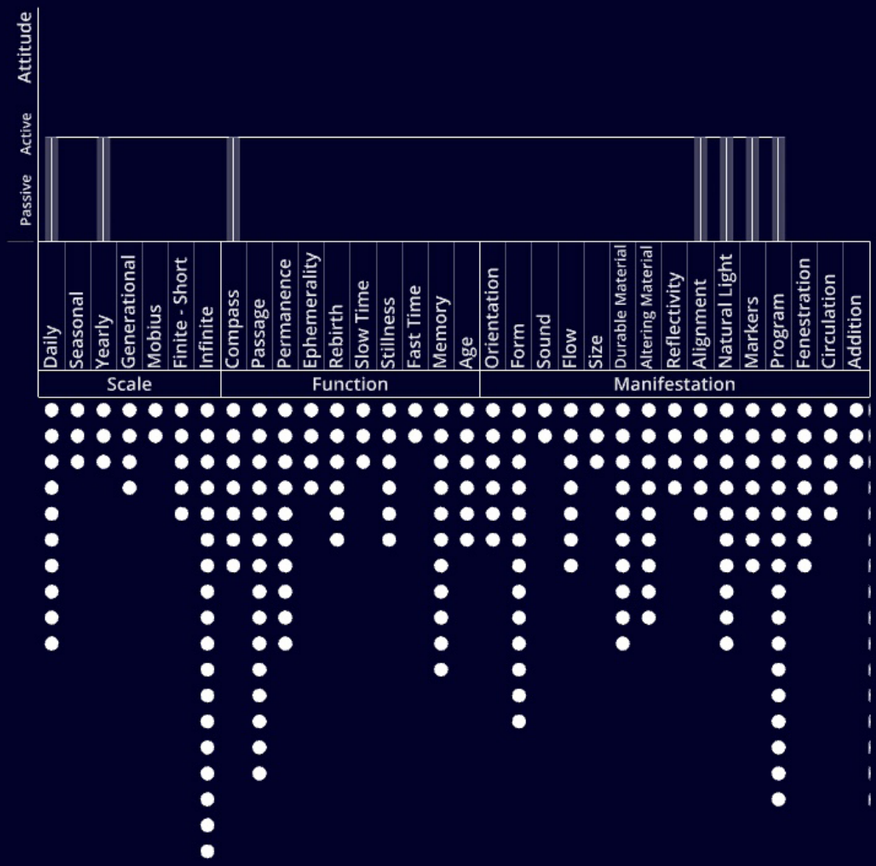


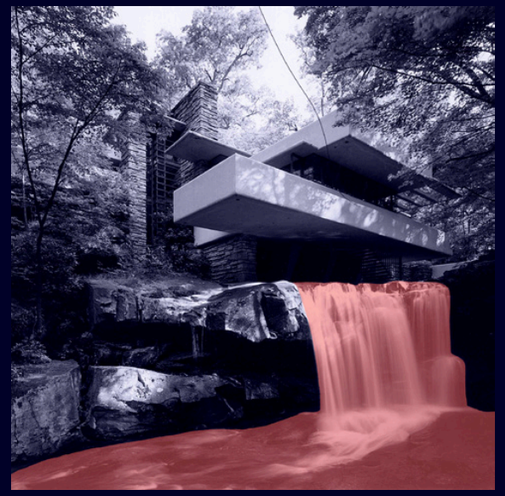
Ise Shrine
4 B.C



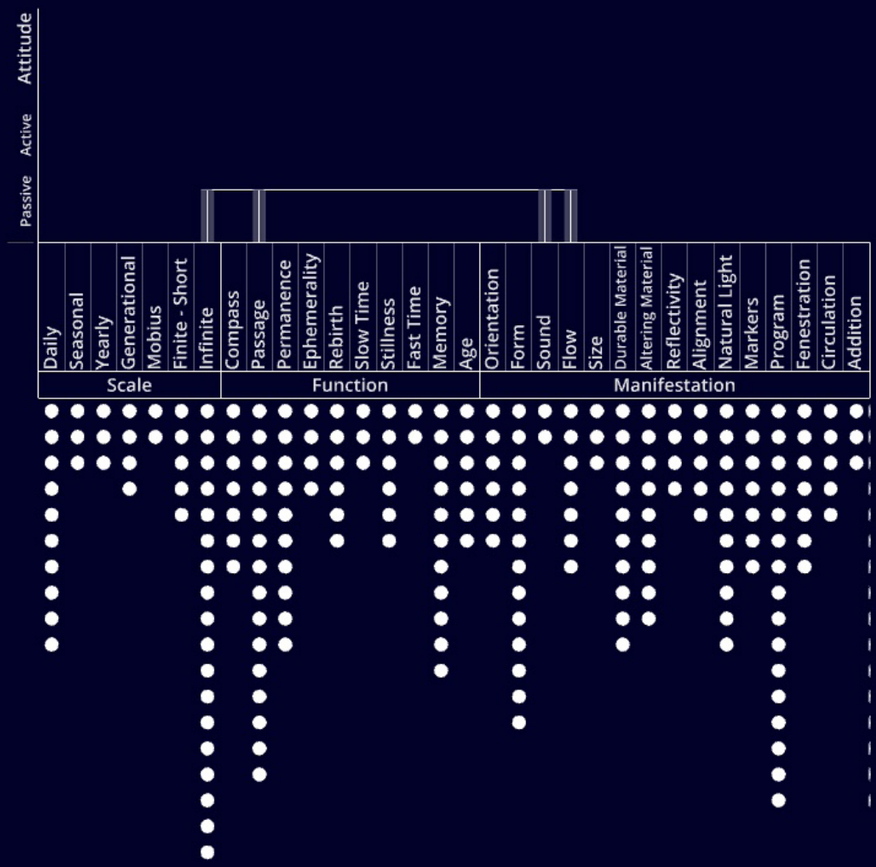


San Petronio Bologna
1388

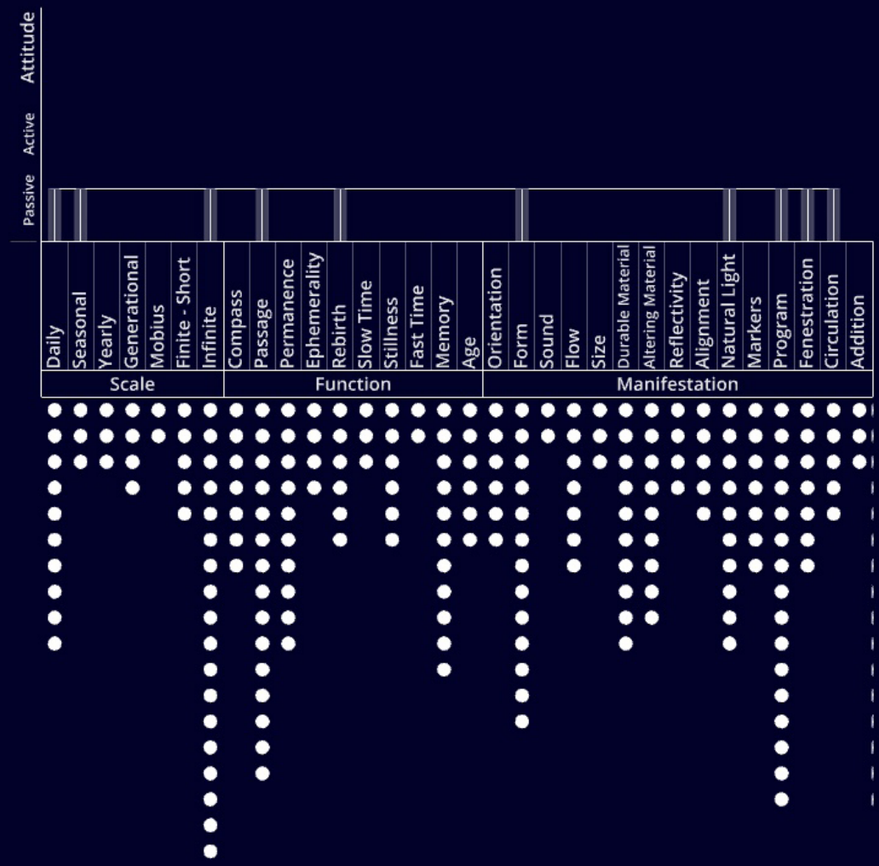




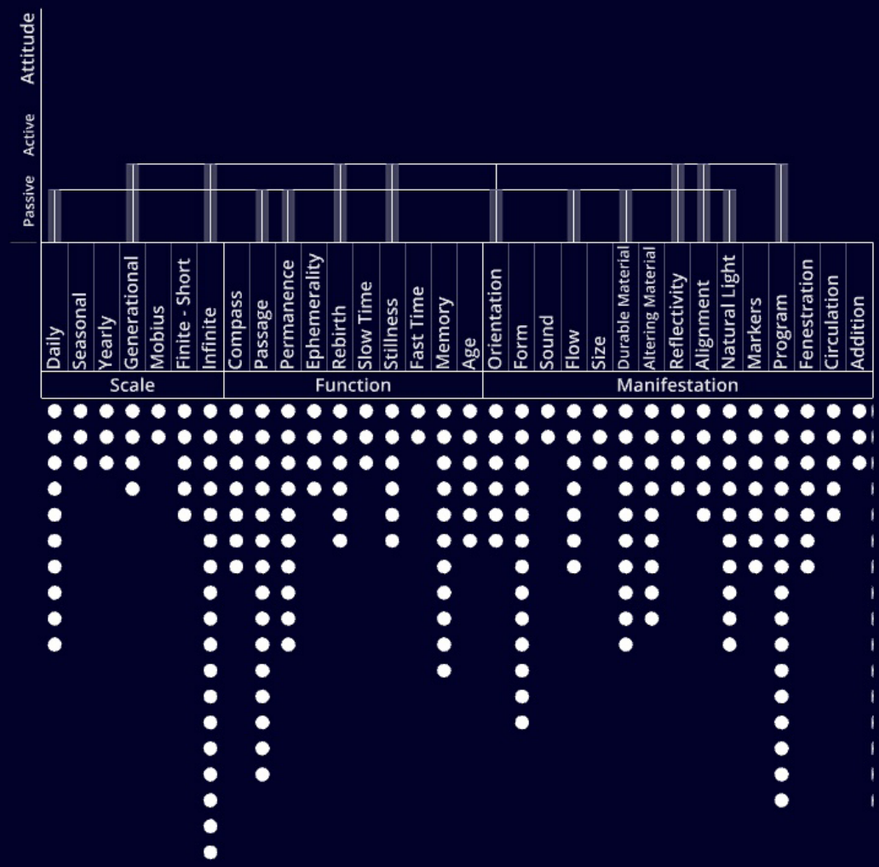
Fallingwater - Frank Lloyd Wright
1935



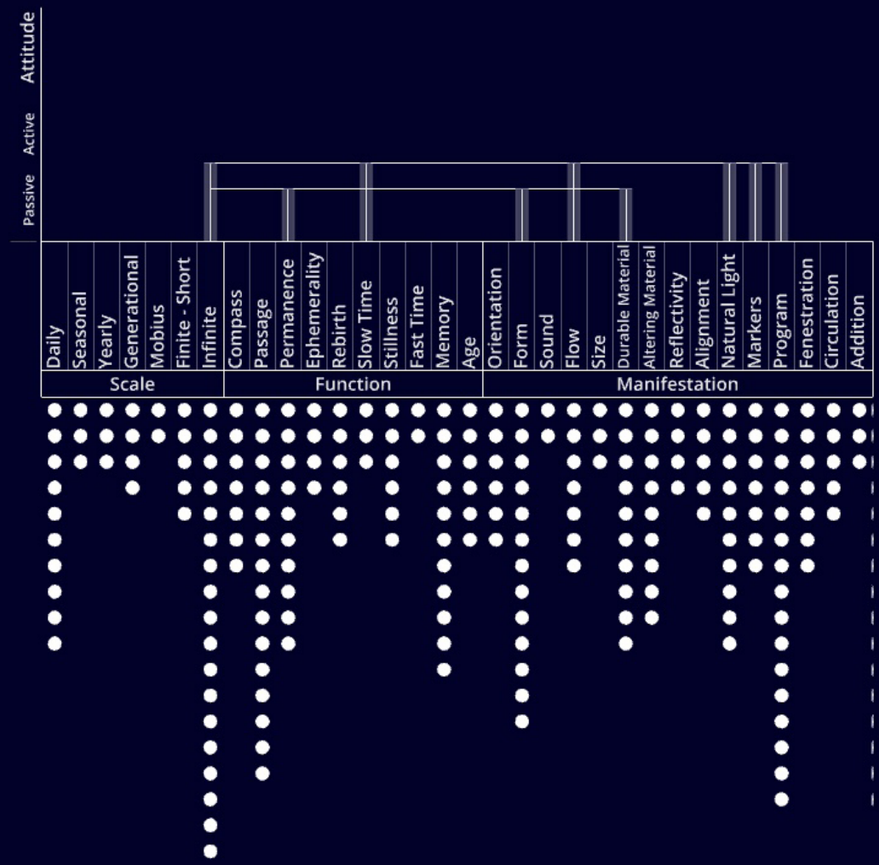
Guggenheim Museum - Frank Lloyd Wright
1959

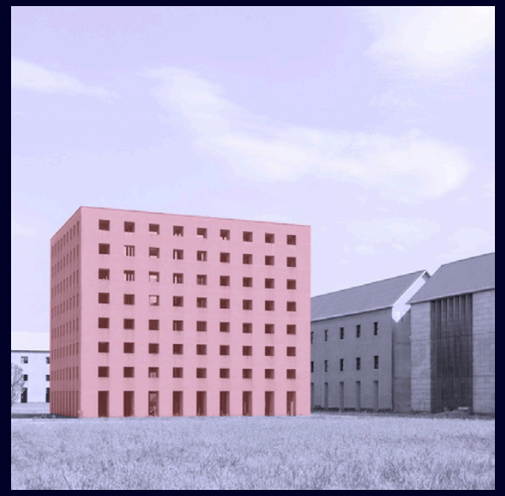


Salk Institute - Louis Kahn
1965

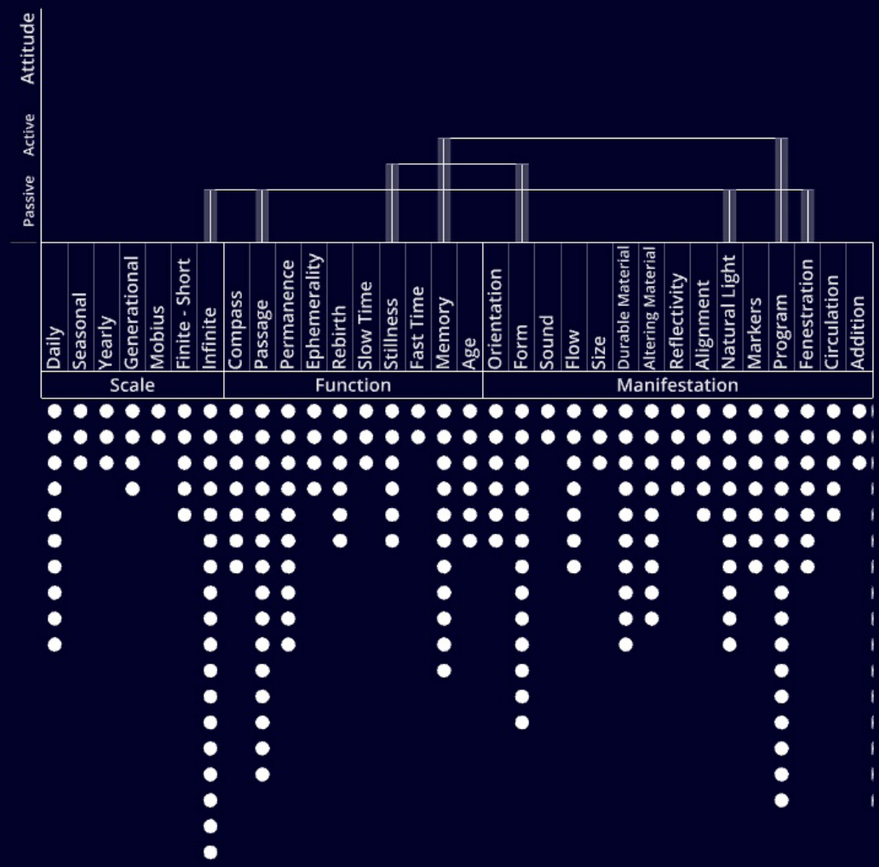


St. Peter’s Church - Sigurd Lewerentz
1966

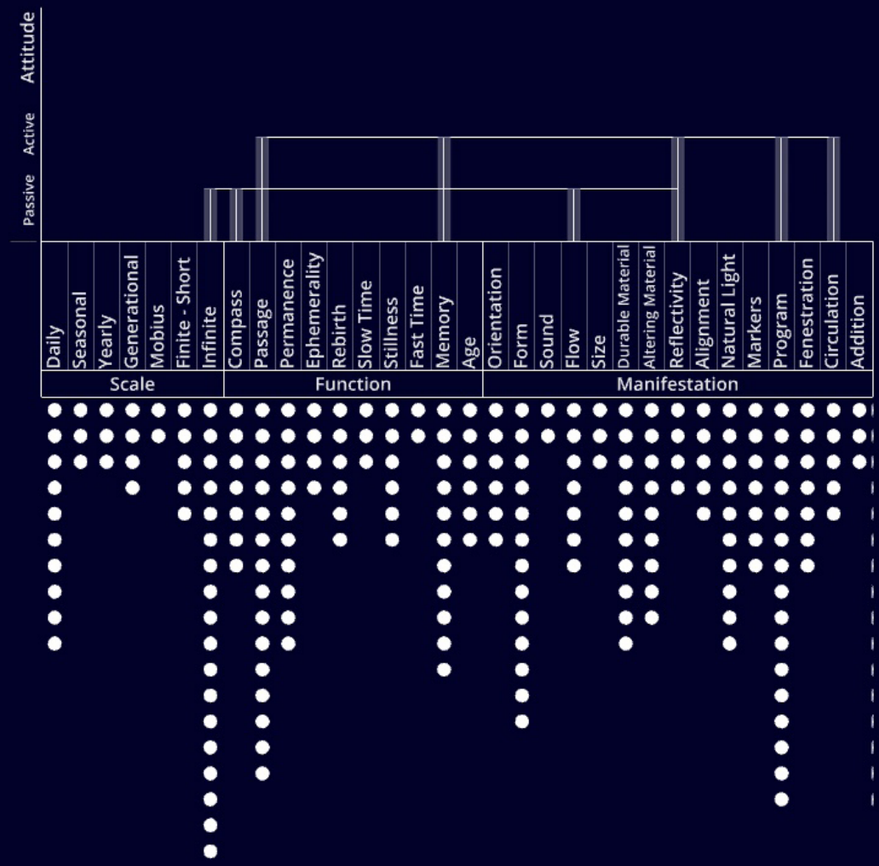


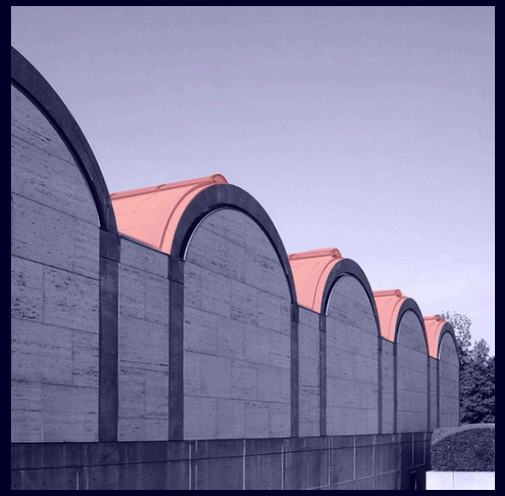


San Cataldo Cemetery - Aldo Rossi
1971

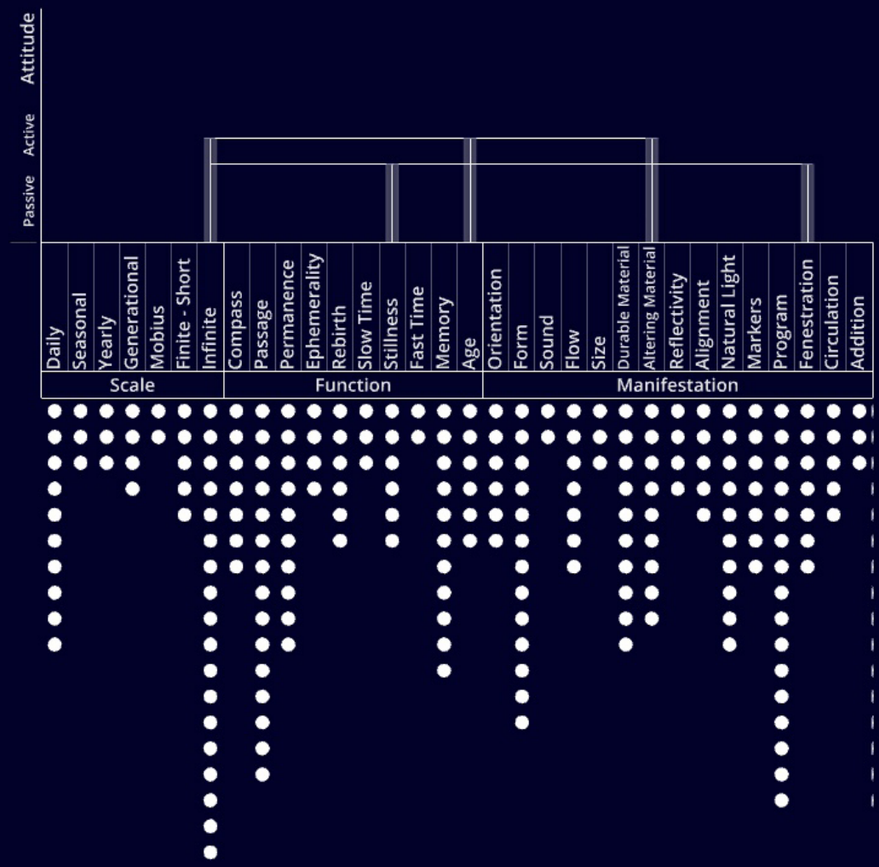


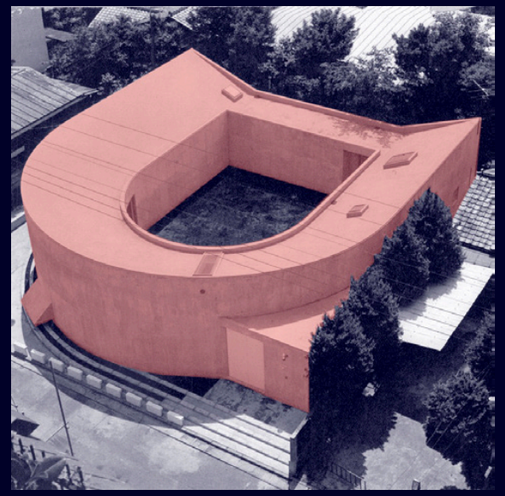
Brion Tomb - Carlo Scarpa
1972



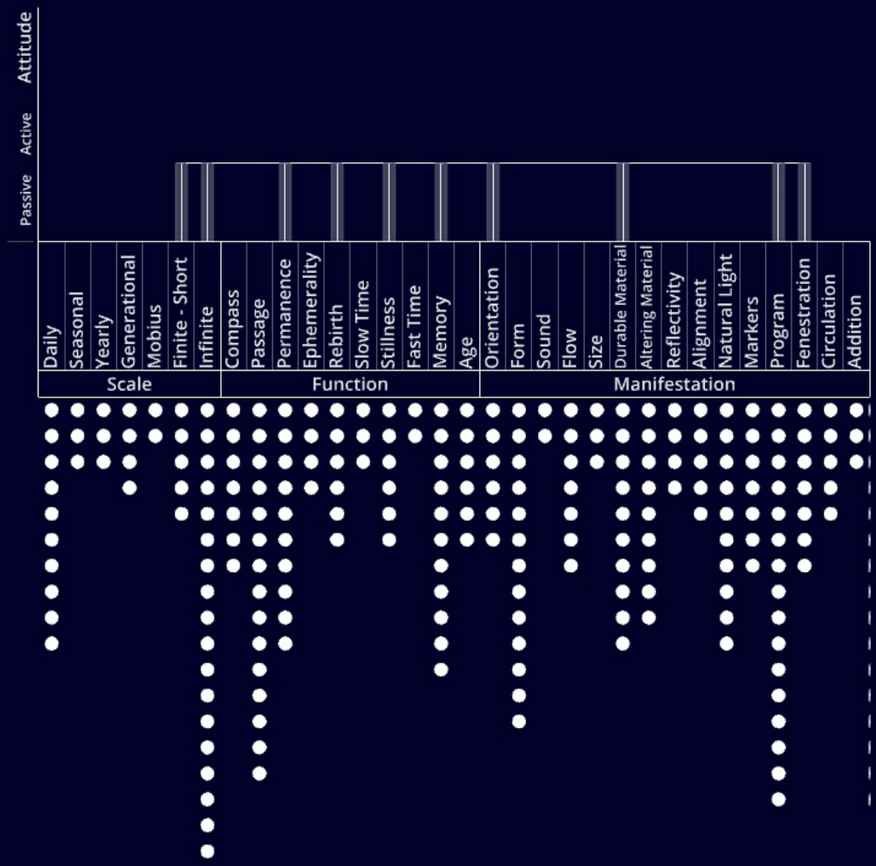


Kimbell Art Museum - Louis Kahn
1972

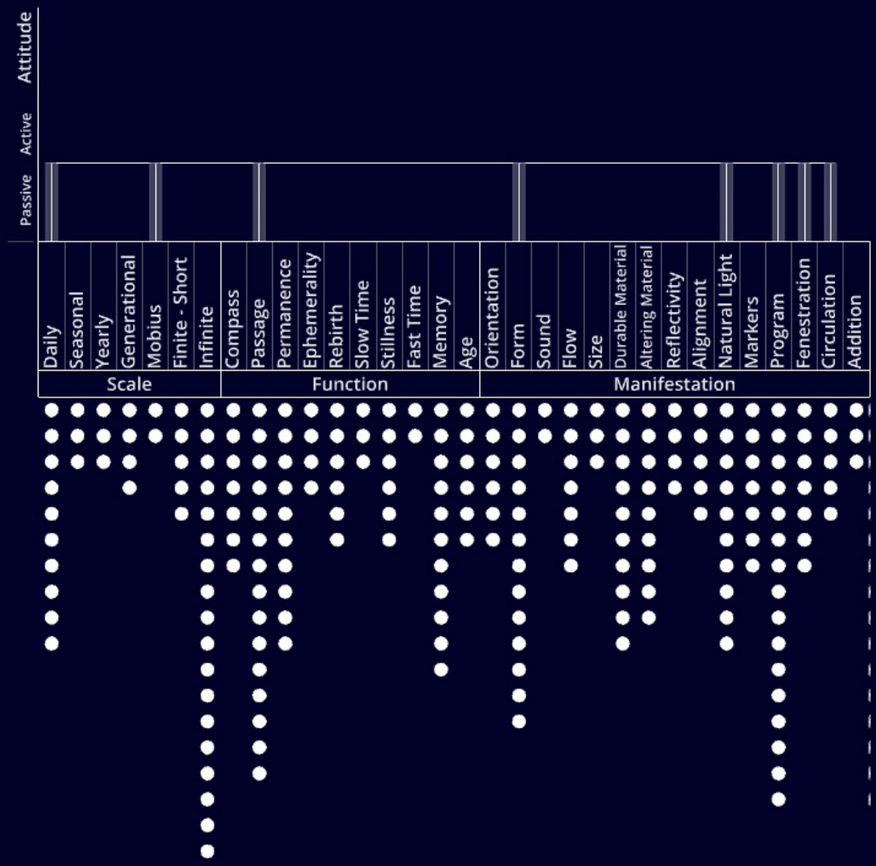




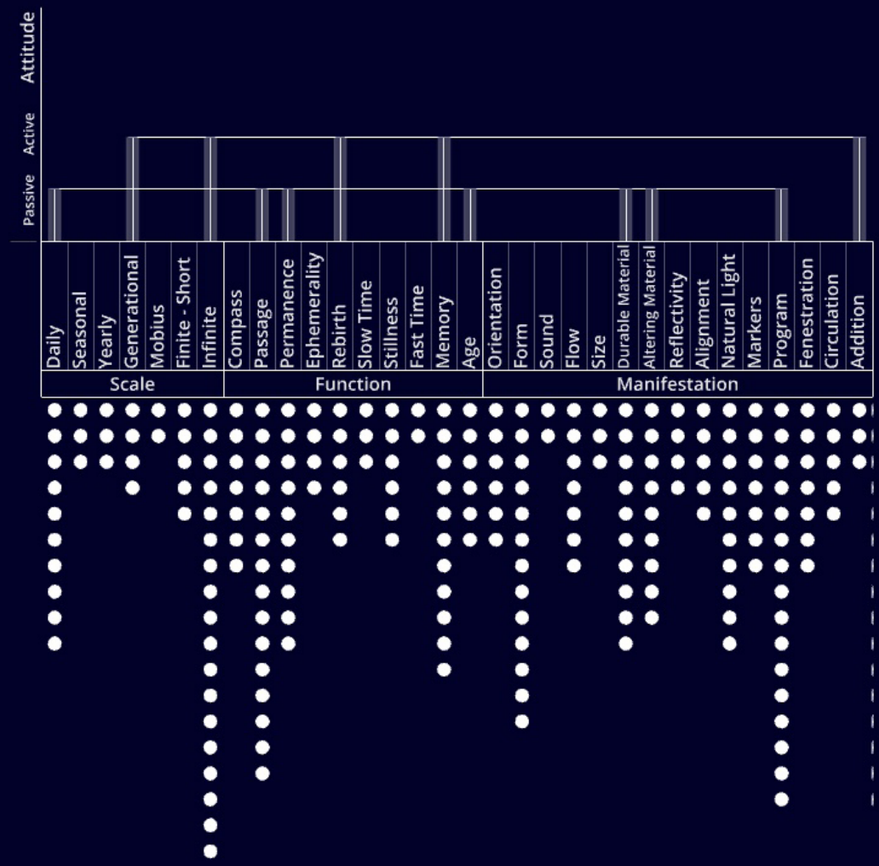
White U - Toyo Ito
1976



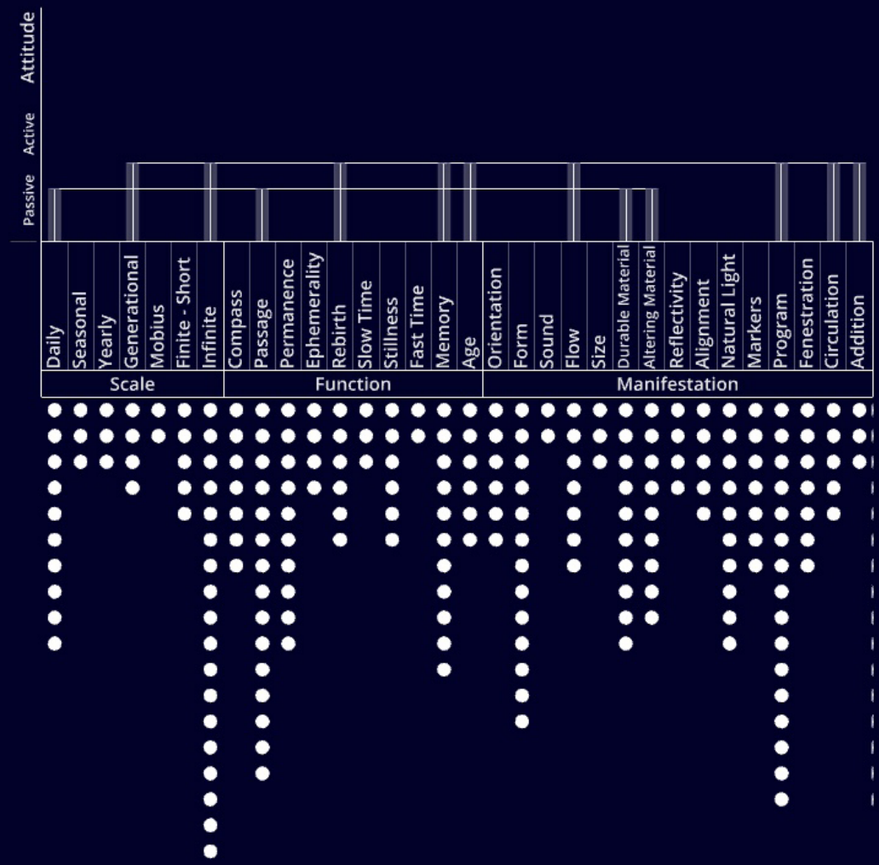
Mobius House - UNStudio
1998

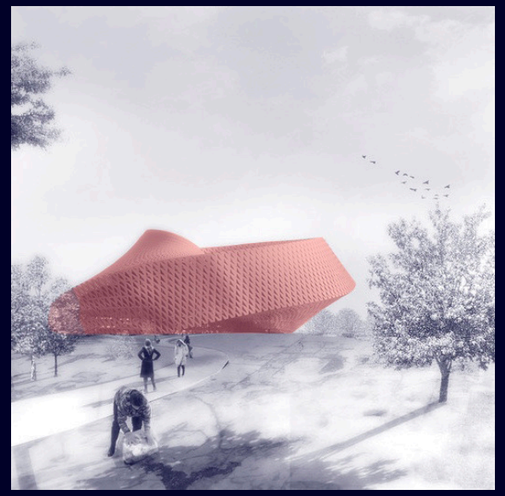


Santa Caterina Market - EMBT
2005

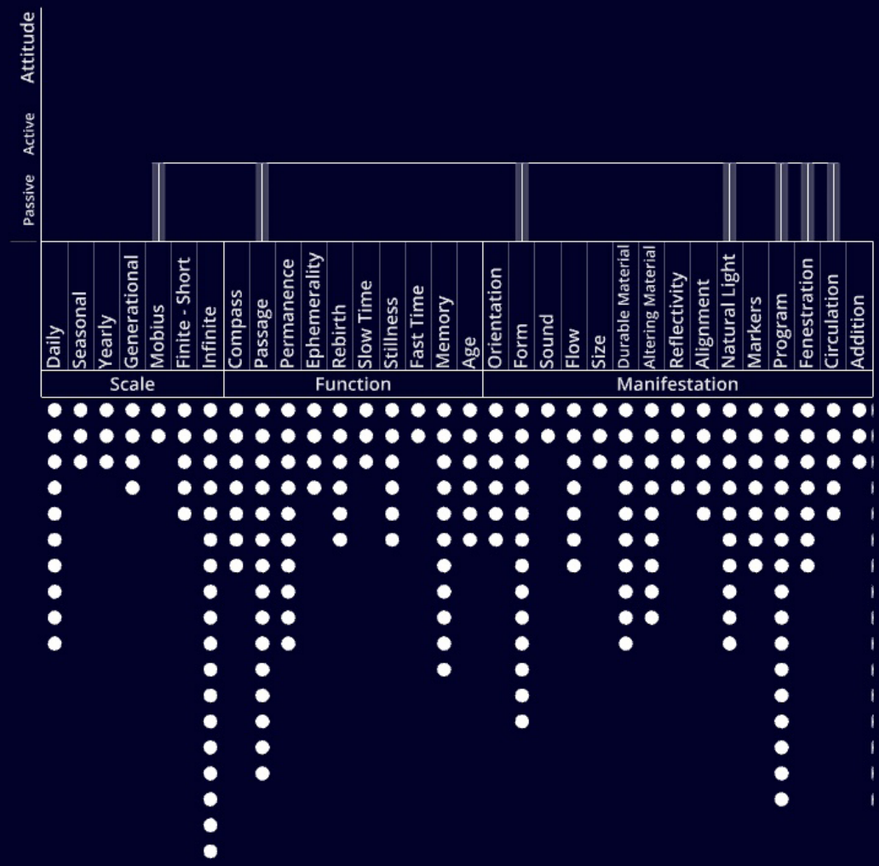


The New York Highline
2009

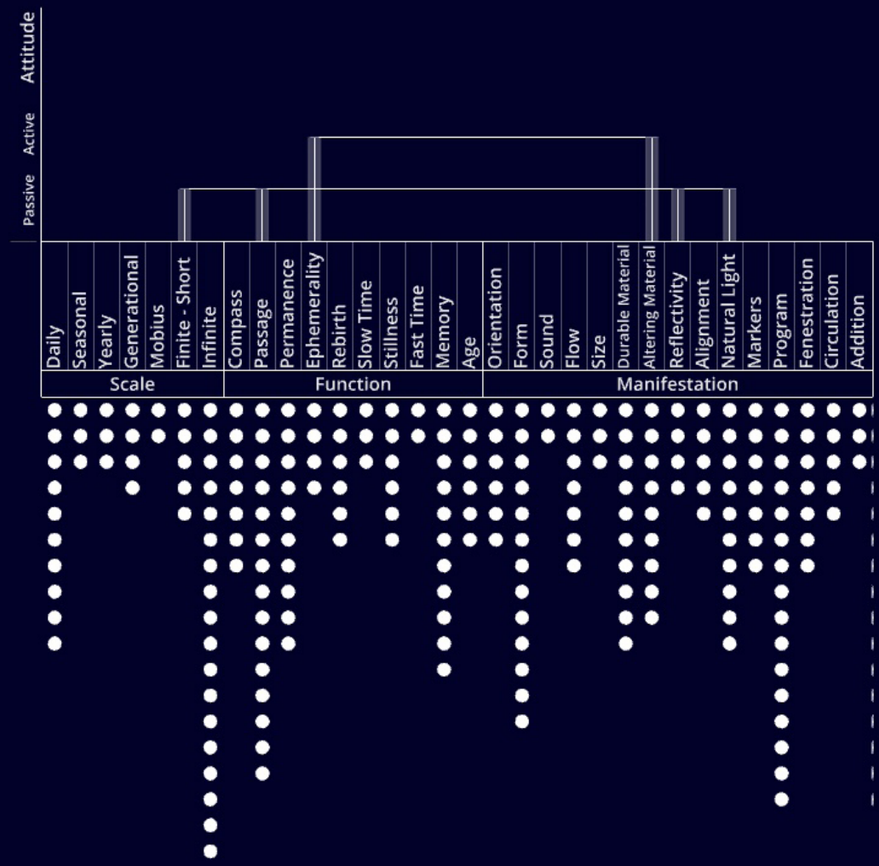




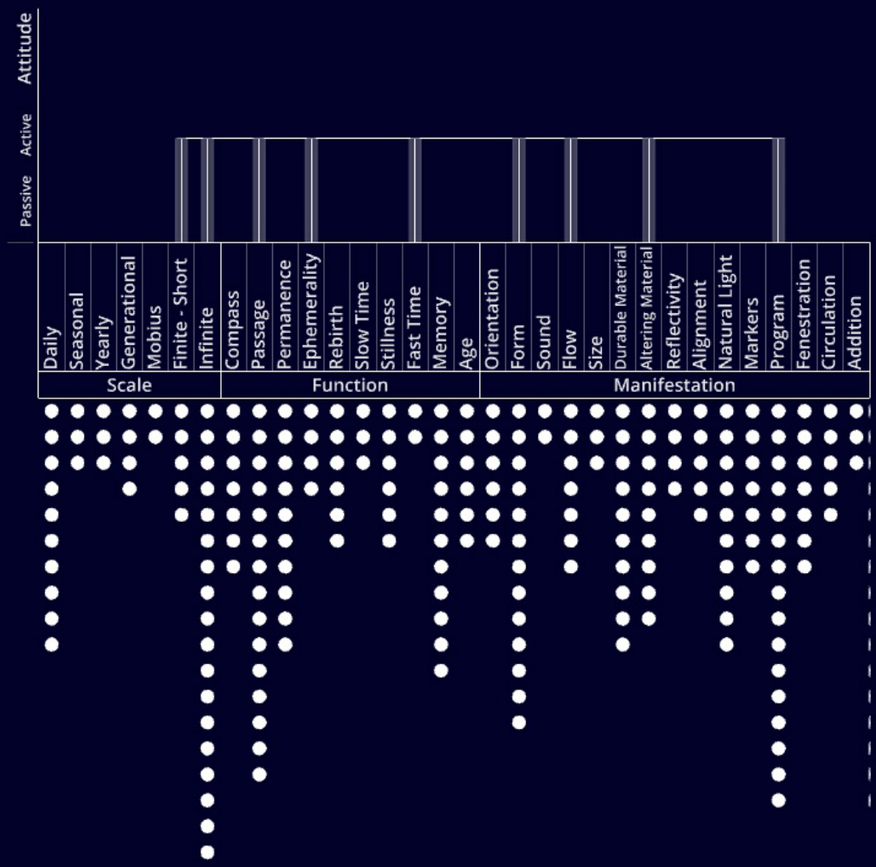
Astana National Library - BIG
2009



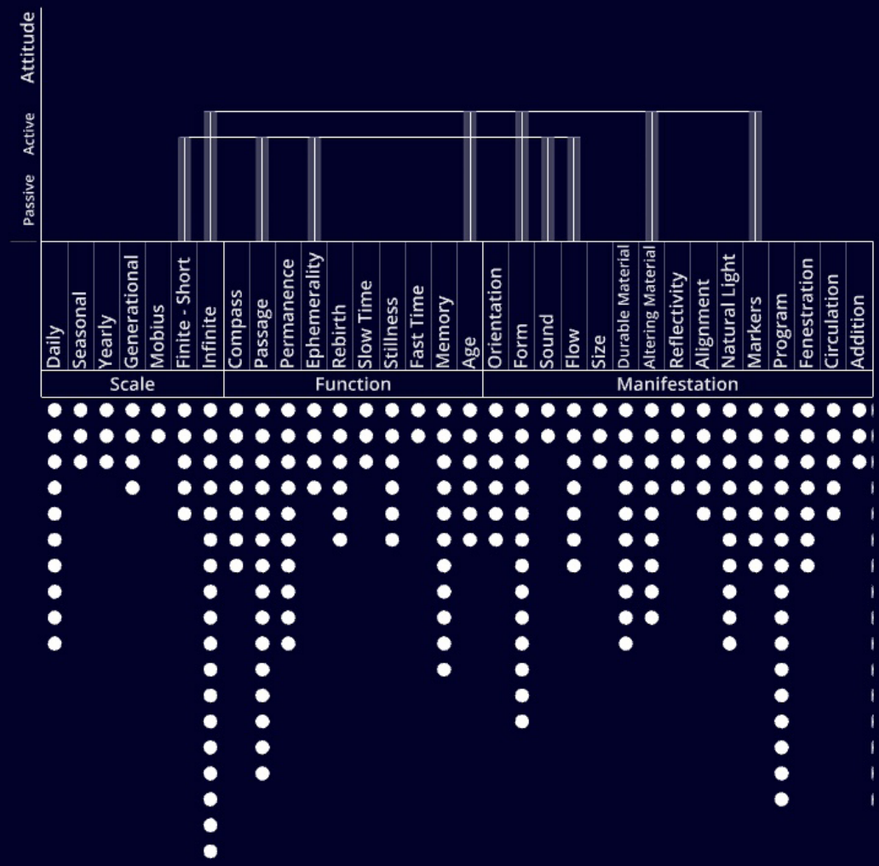
Hy-Fi - David Benjamin
2014

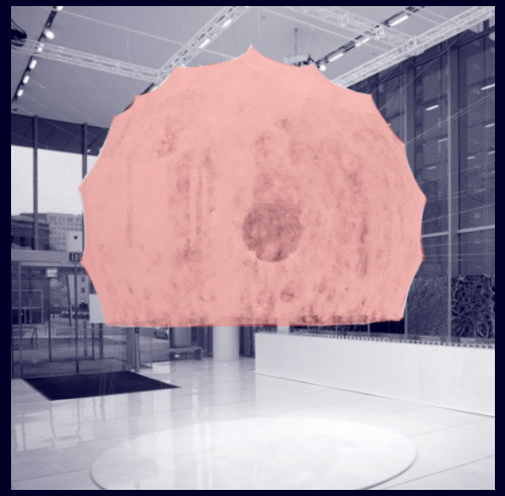


Ice Watch - Olafur Eliasson
2014

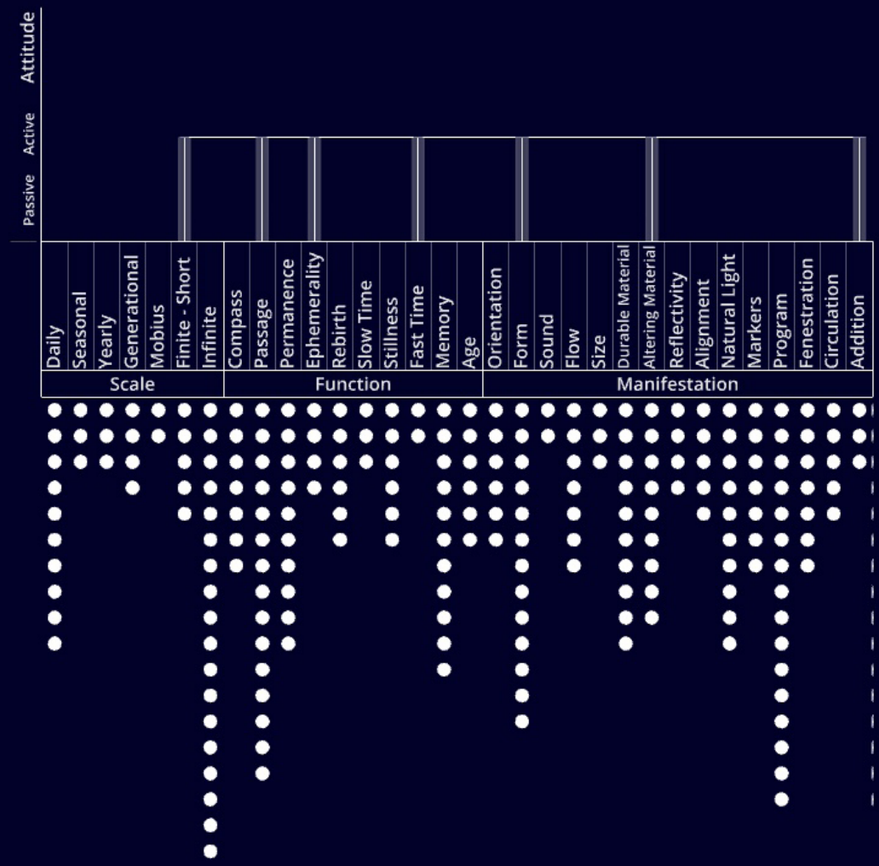


River Aire Renaturation - AD&R
2015

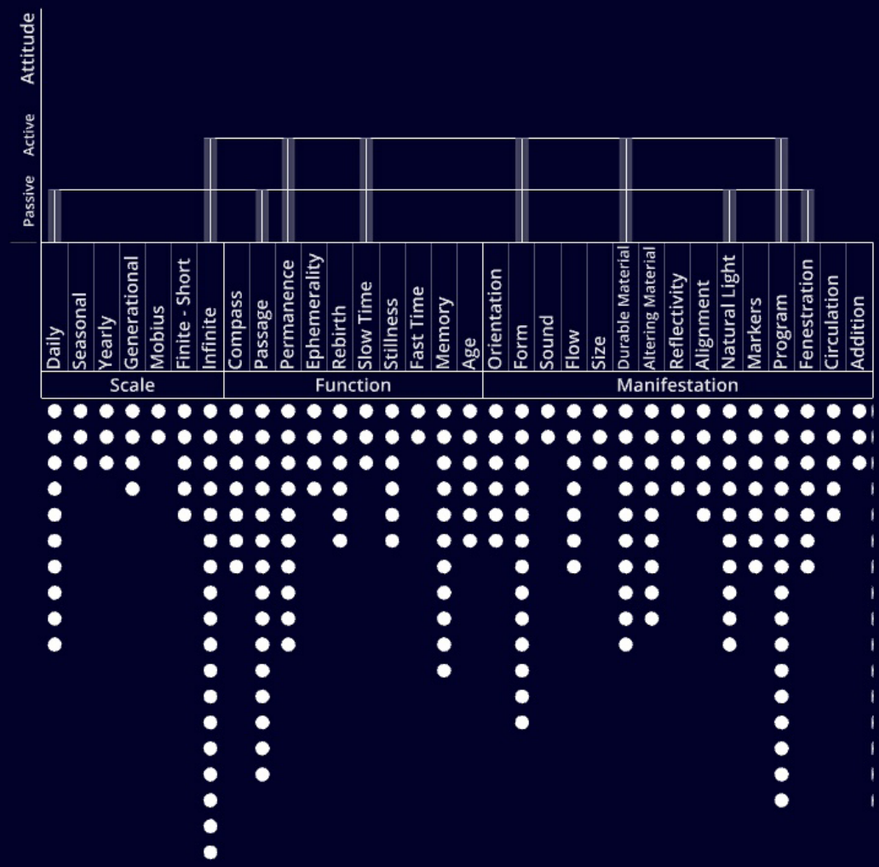


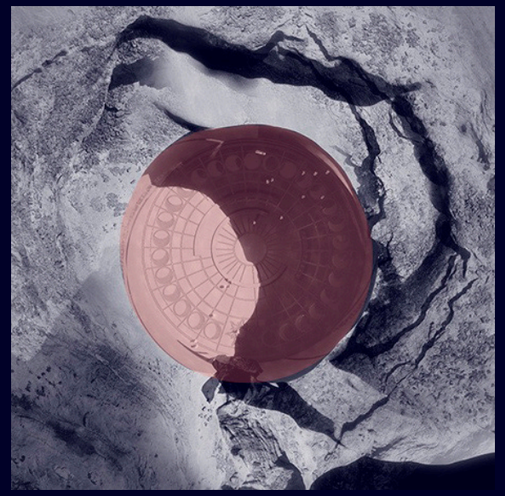


Silk Pavilion - Neri Oxman
2020

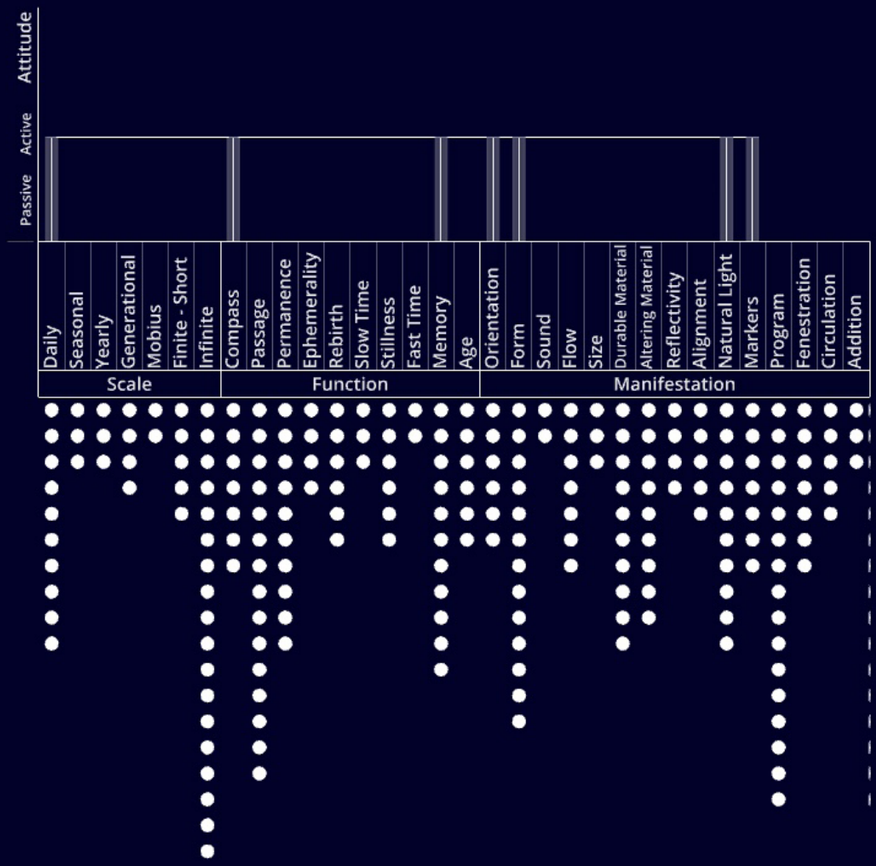


Church of Beatified Restituta - Atelier Stepan
2020





Sharaan Resort - Jean Nouvel
2020

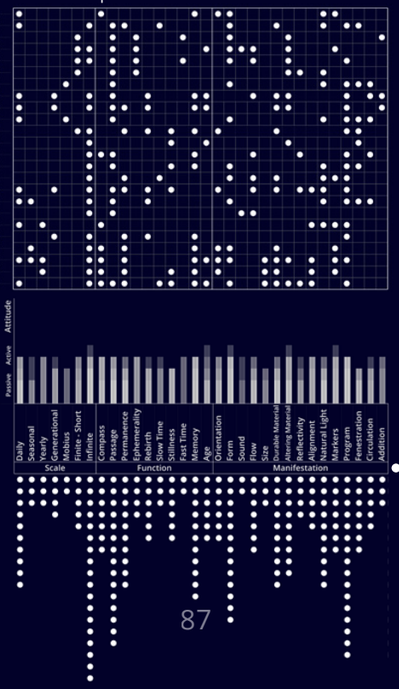


Case Studies - Synthesis

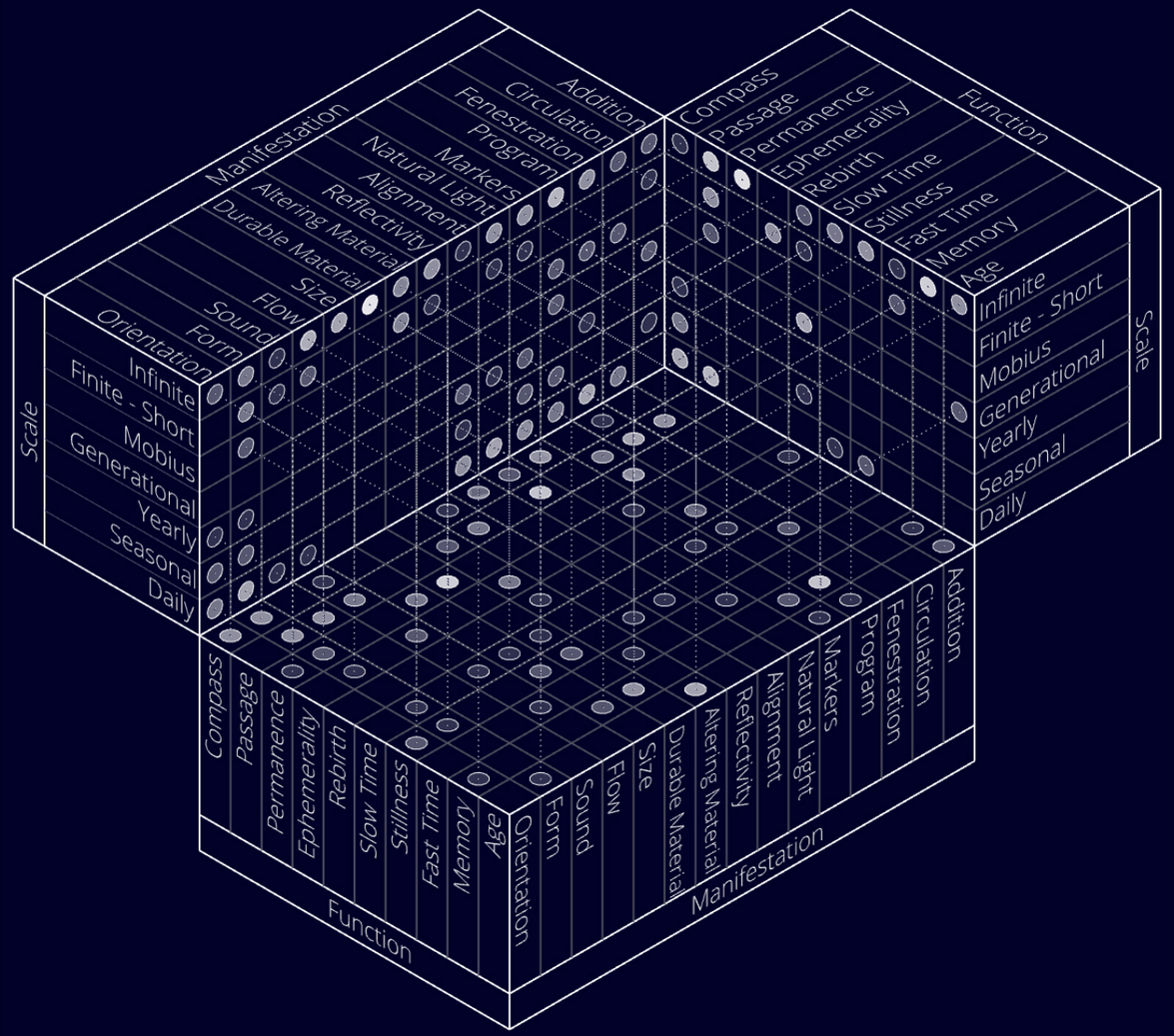
Based on the analysis of the previous case studies, we can start to draw correlations between the temporal qualities: function and scale, scale and manifestation, and function and manifestation.

By folding the horizontal axis that represents the time-aspect of the case studies, we catalog them in a 3-D table, which displays the existing combinations in addition to the frequency of each intersection - represented as the intensity of color per intersection.

This leads to an extracted catalog of temporal functions with their precedented scales and spatial manifestations.



Folded Axis

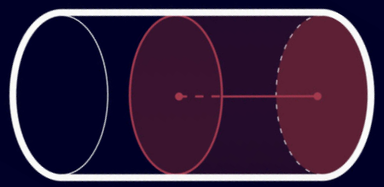


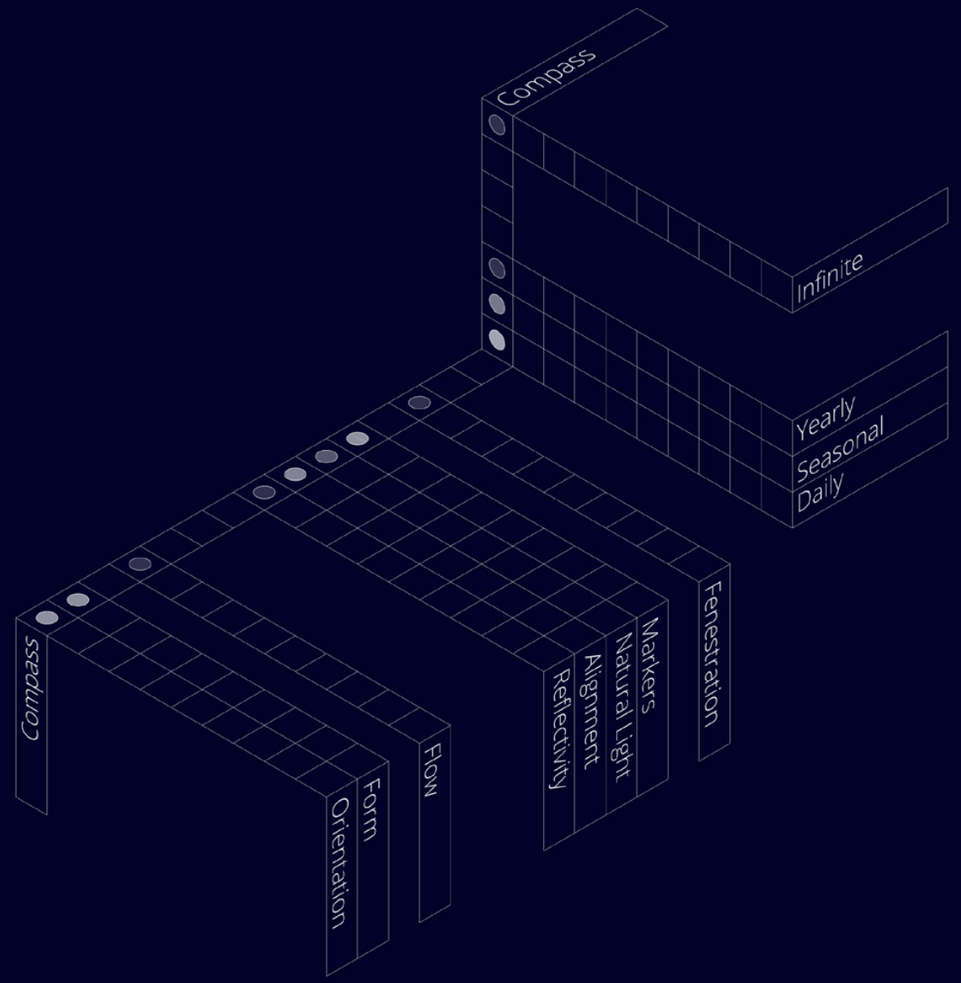
Case Studies - Extractions

Temporal Function : Compass

In many cases, architecture begins to function as a timekeeping device that could record or anticipate certain celestial events. This interest is noticeable mostly in the early stages of civilizational foundation.

This can be seen in the cases of Ancient Egypt with the pyramids and temples, prehistoric England with Stonehenge and other ‘henges’, in the Nazca desert in Peru. This is due to an innate need for orientation, mostly within newly inhabited places.
Similarly, this is also seen in more recent proposals, for example in the case of Jean Nouvel’s proposal for a resort in the middle of the desert in Saudi Arabia, time and timekeeping are central to the design proposal.

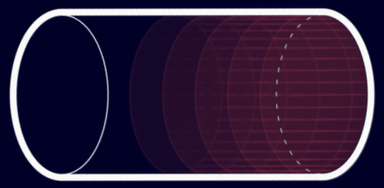


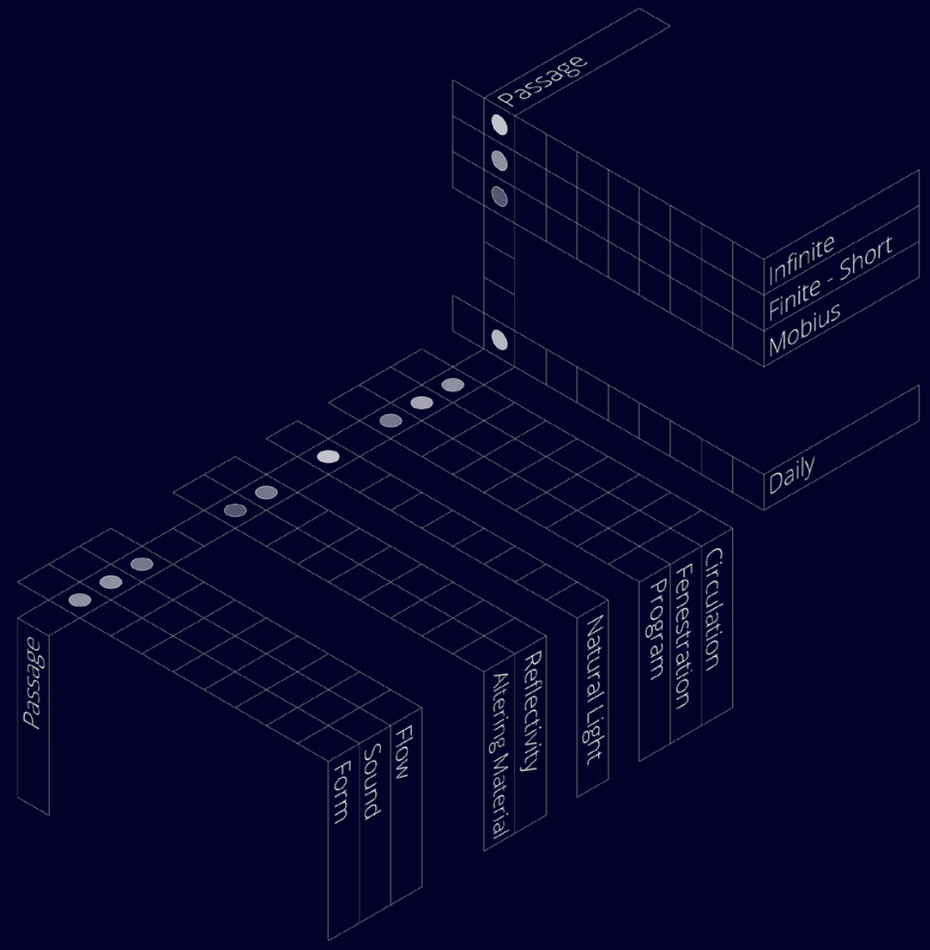


Case Studies - Extractions

Temporal Function : Passage of Time

Some case studies begin to interact with time by reflecting its passage. Through the flow and sound of water in the case of Fallingwater, or the daily changes in natural light, architecture can instigate the sense that time is moving forward. A commonality between the methods that this time function is materialized is through a display of change - a change of state, position, movement, environmental conditions...

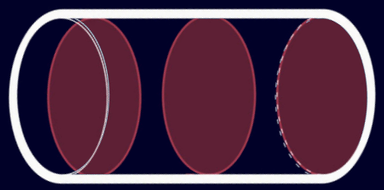


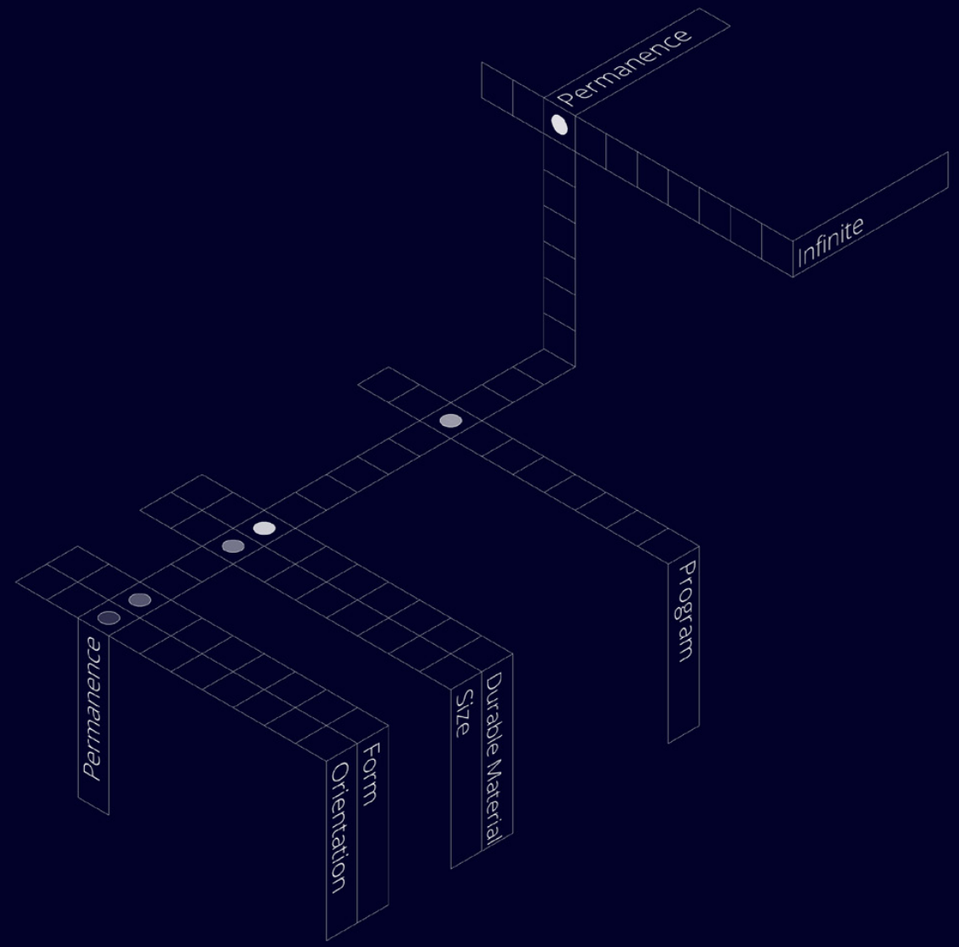


Case Studies - Extractions

Temporal Function : Permanence

The essence of some projects is permanence. This can be reflected by program, in burial setting to suggest eternal life. A building's durability can sometimes allow it to outlive generations of lifecycles. Many ancient buildings, through their massive forms and the material techniques used, attain and exhibit immortality.

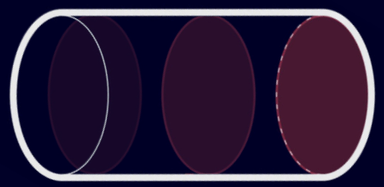


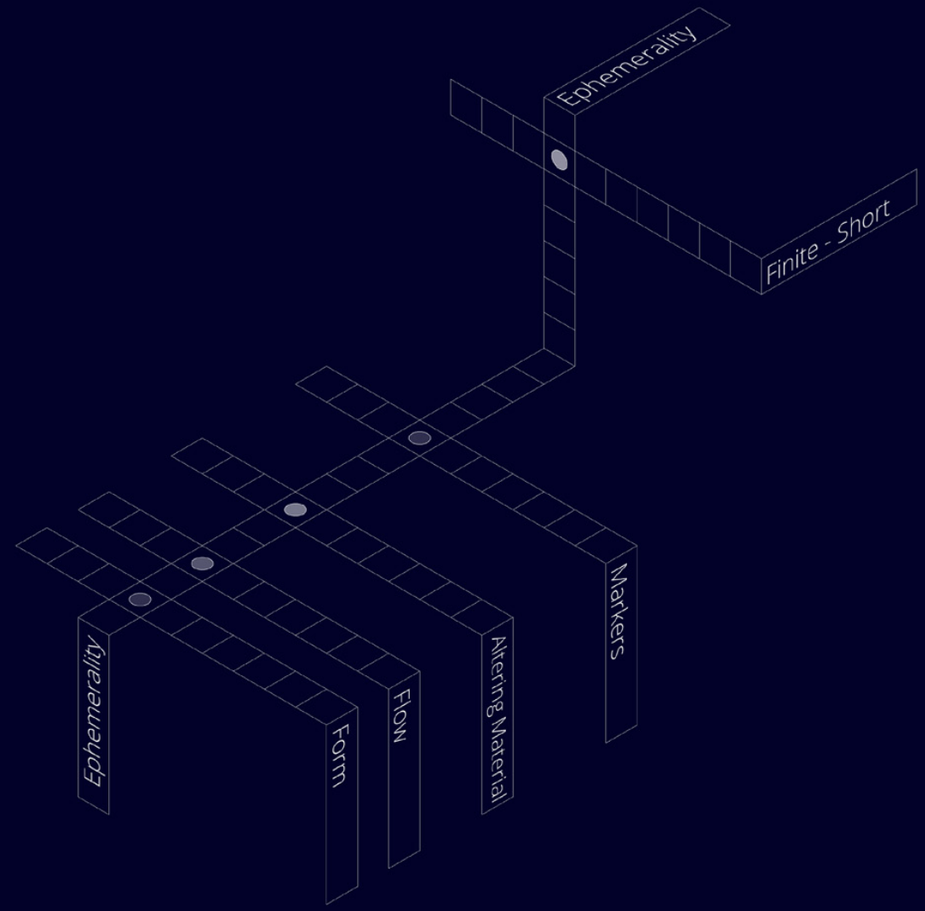


Case Studies - Extractions

Temporal Function : Ephemerality

A distinction between contemporary architecture and past interventions is the shift from the expression of permanence to that of ephemerality. Many recent installations are intrinsically temporary, with materials that change and fade. Some interventions begin to use materials that are less environmentally impactful and biodegradable. Short lived installations like the case of Ice Watch by Olafur Eliasson use the melting of glaciers to raise awareness about climate change and fleeting time.

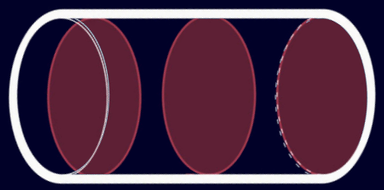


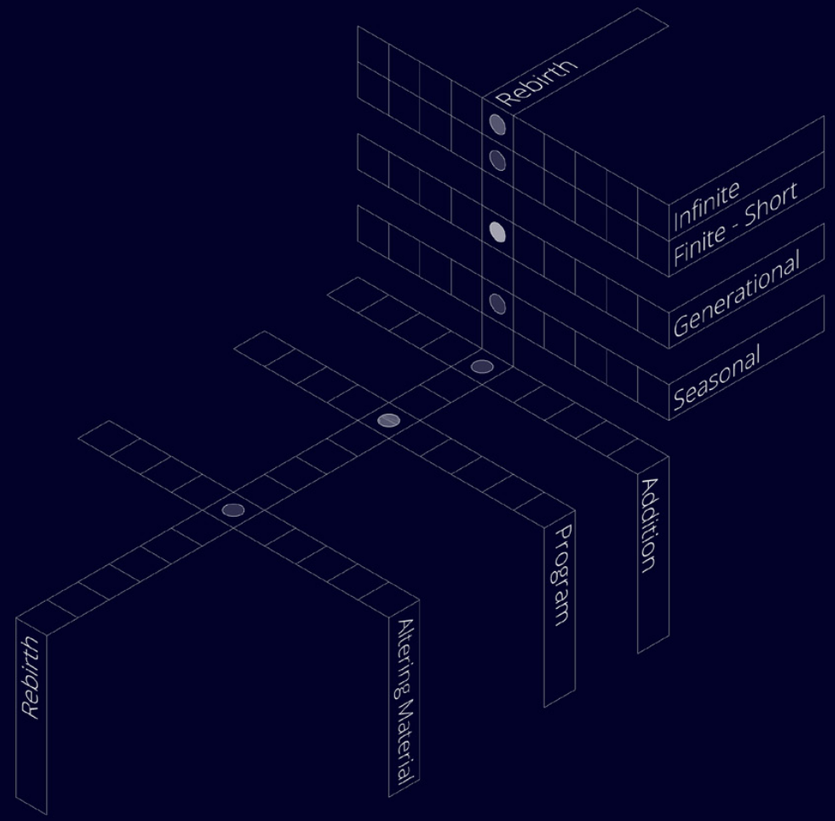


Case Studies - Extractions

Temporal Function : Rebirth

Architectural rebirth or reincarnation is realized typically at a generational time scale. This can occur at the building level as a whole, where the architecture is completely destroyed and reconstructed - this is common practive in Japanese architecture. An example is Ise shrine which is deconstructed and rebuilt every 20 years as a cultutral practice that inspires new beginnings. Rebirth can also be attained through adaptive reuse, internal additions or external modifications and expansions. These acts inject a new life into architecture.

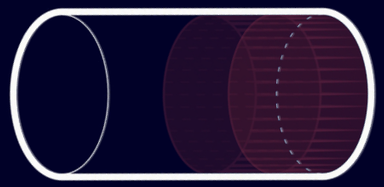


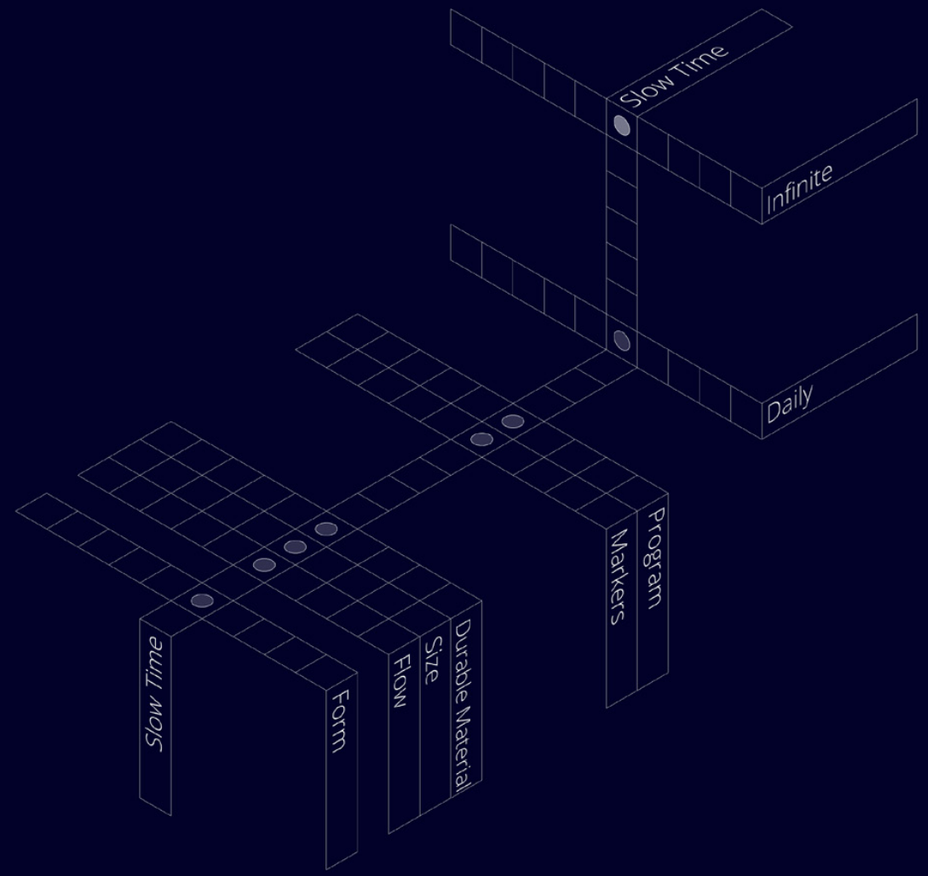


Case Studies - Extractions

Temporal Function : Slow Time

Architecture could sometimes distrort the experience of passage of time, and slow it down. Slowing down the perceived time can be achieved through program, form, materiality etc...
This is an example of a temporal experience that not many architectural interventions seem to deal with.

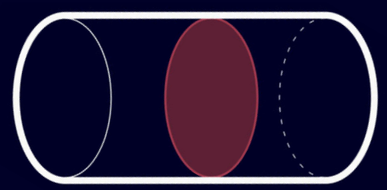


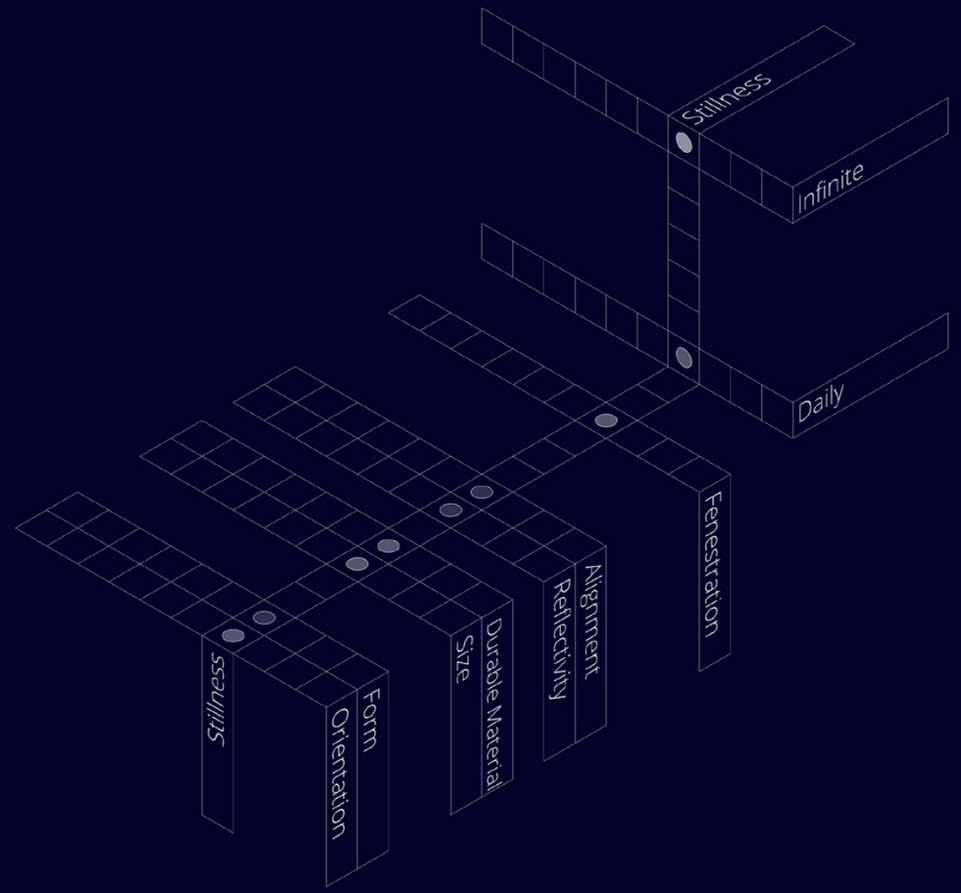


Case Studies - Extractions

Temporal Function : Stillness

Rather than reflecting the passage of time, some choose to reflect its stillness. This temporal function is analogous to permanence in some ways; the difference is that stillness is reflected more by the inner perception of the user of the building whereas permanence is more outwards towards the architecture itself.

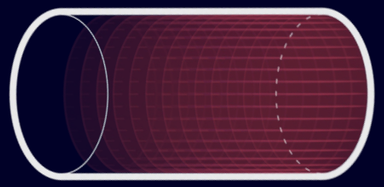


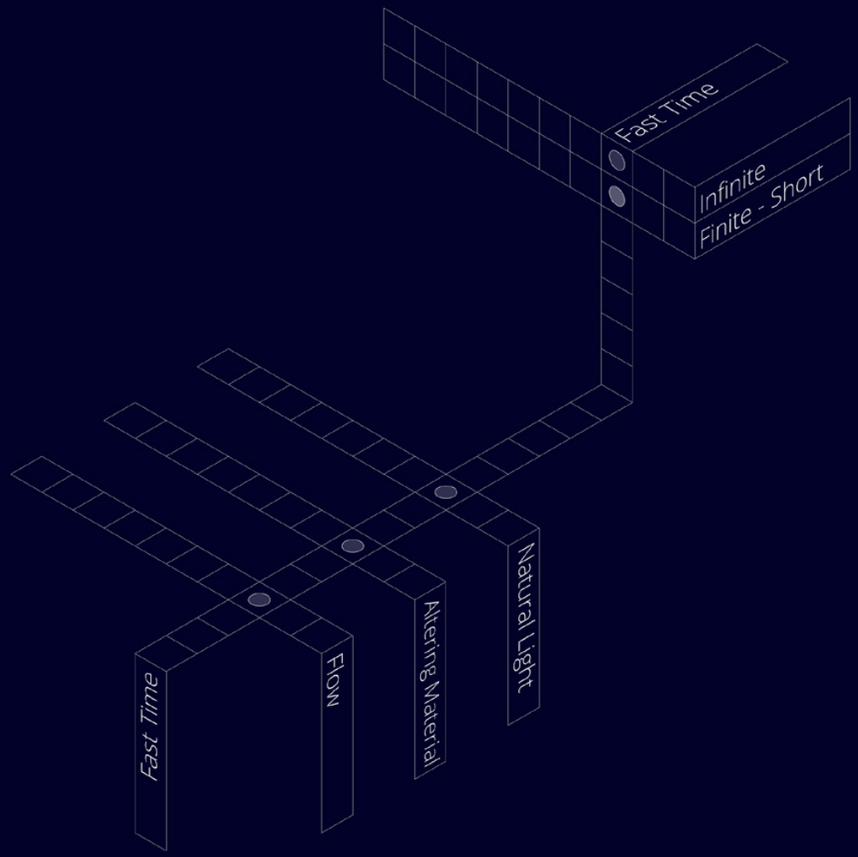


Case Studies - Extractions

Temporal Function : Fast Time

It is also possible to distort the subjective perception of time to feel that it is faster. This can usually be managed through a certai flow in space.

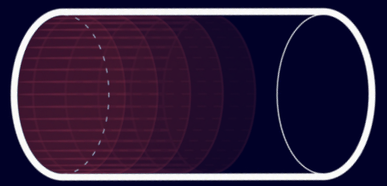


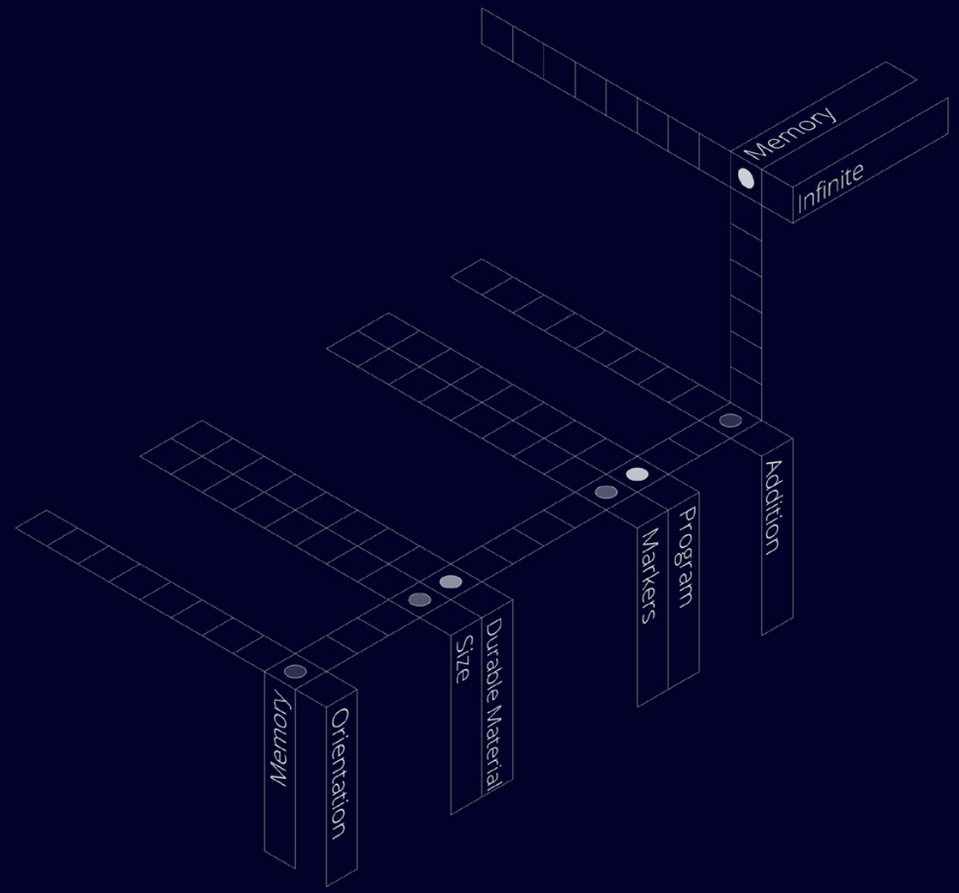


Case Studies - Extractions

Temporal Function : Memory

Memory in architecture can be experienced as a backwards movement in time, where past events or states may be brought to the present.

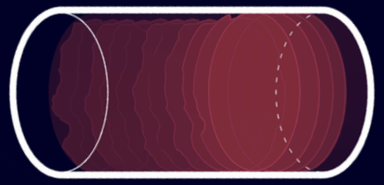


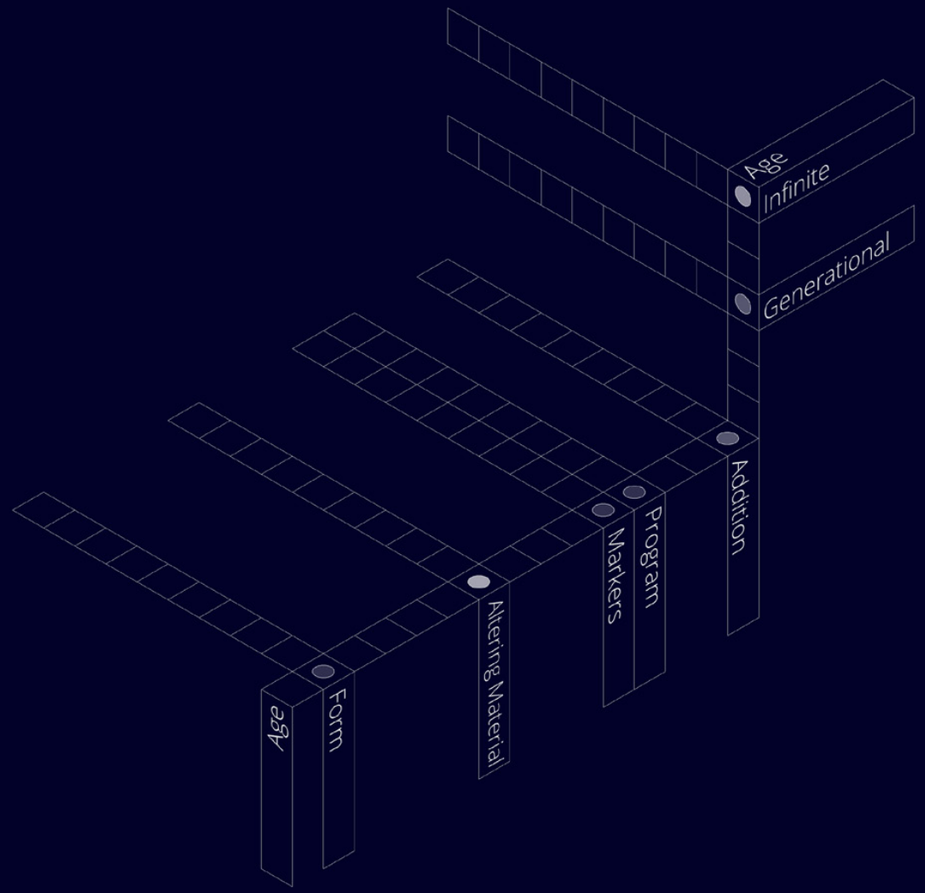


Case Studies - Extractions

Temporal Function : Age

We can read the patina of time on a building through erasure of material, changes, and markings on the building. Paul Lukez, in his book *Suburban Transformations* defines the reading of the age of a building as a summation of processes of reading, writing, and erasing. These processes can be rexhibited in many different ways.





Case Studies - Index

By compacting and compiling all the extractions of temporal functions, we can start to see which ones have been mostly intended by the chosen case studies

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as seen by the intensity of color

-

and which have been achieved in more diverse methods

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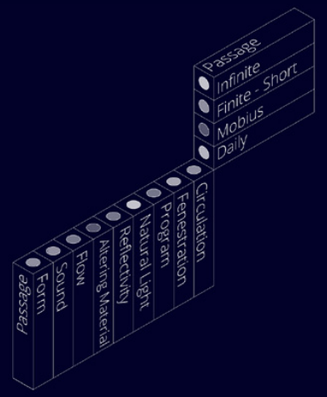
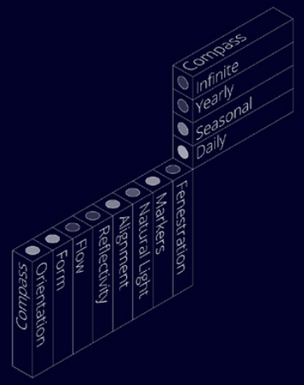
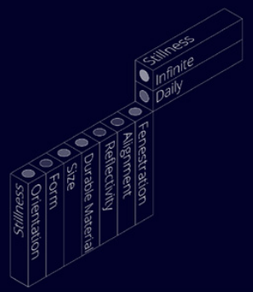
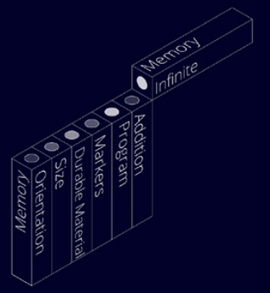
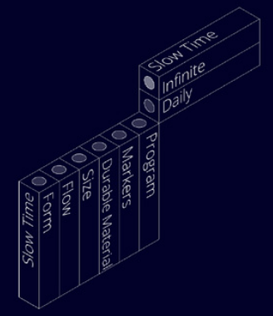
as seen by the number of categories linked to it.

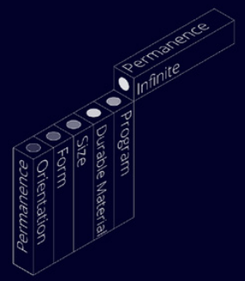


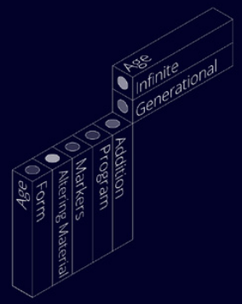


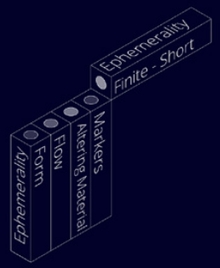


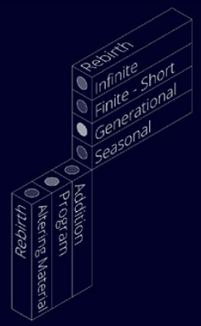


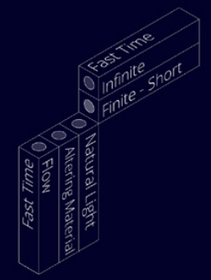


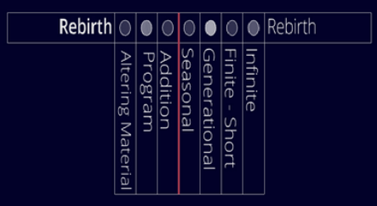


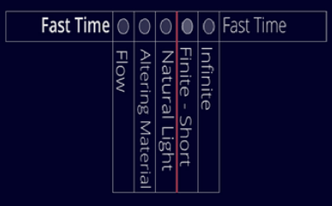


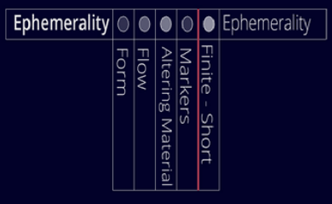


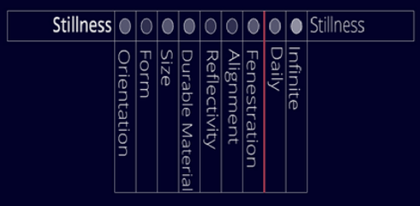


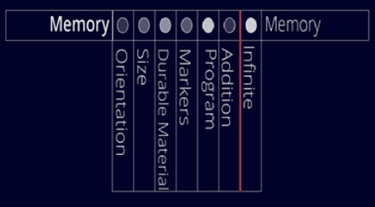


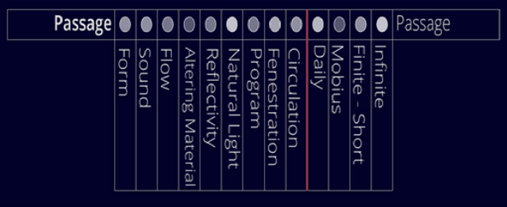


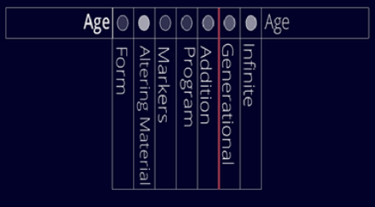


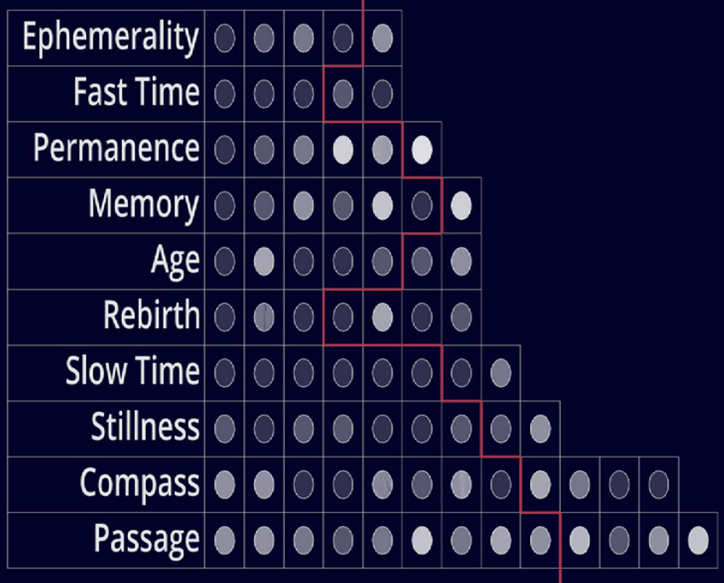












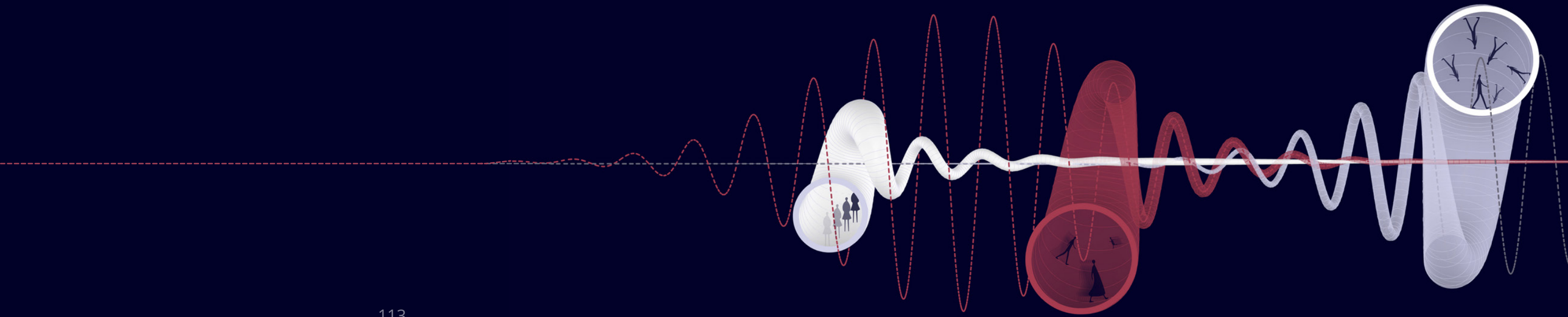
Manifestation

Scale

Potential Applications

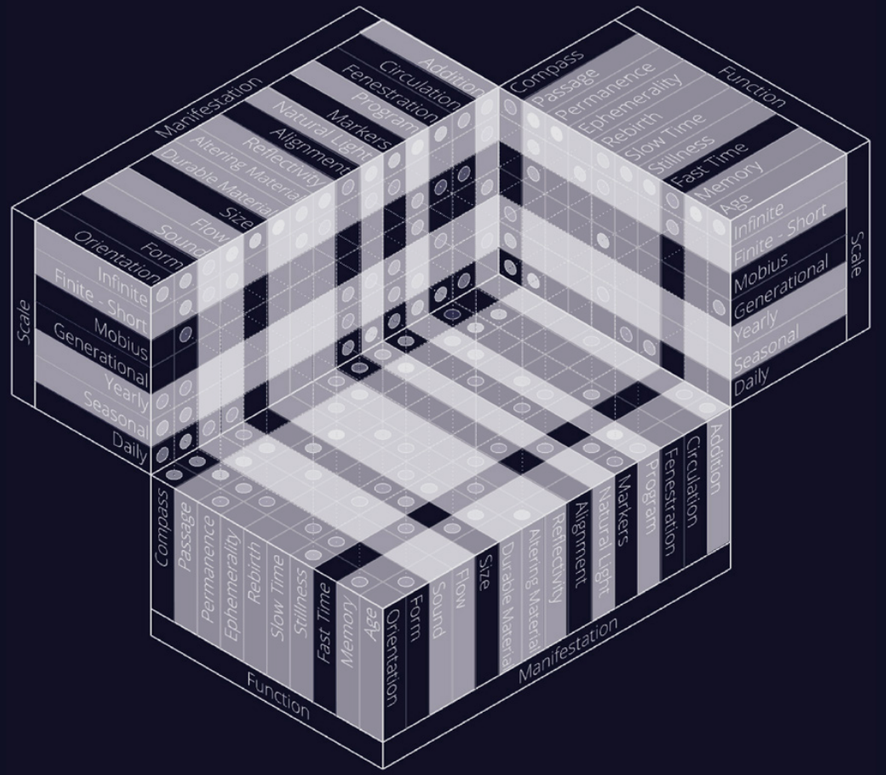
The index that I have concluded with could be used as a reference guide to a design proposal that could generate multiple experiences of time. The catalog is there to be utilized and modified by any design proposal or additional case studies.

It will be a tool to generate an architectural time machine - one that exhibits and moulds a multiplicity of temporal experiences.



An interesting application that would intertwine several layers of temporal experiences at once, is reflected in the culture of salt extraction which plays a major role in forming the identity of the coast of northern Lebanon, especially Anfeh.

This is observed from the mineral process of salt production, a product of nature, changes, and time, to the evolution of the craft over time, which is seen by an archaeological layering of salt extraction seasons and a morphological expansion of the man-made salt flats.



Part II

Perpetuating a Saline Ecosystem

Summary

The survival of one of the earliest industries and an essential element in forming Anfeh's identity is threatened by time, and only one site remains partially active. This thesis aims to reverse the effect of time on Anfeh's fleeting salt extraction practice, landscape, and culture. It rejects memorializing a fading ecosystem and instead searches for ways to perpetuate the practice in a simple, adapted way. The research looks for alternative markets for salt beyond the raw material and effectively favours a centralized model on site as an alternative to the existing one. By adopting a "Farm to Table" strategy, the thesis proposes a network of salt industries that would simultaneously create an economically, environmentally and socially sustainable landscape.

Under advising by Professor Karim Najjar

Department of Architecture and Design
Spring 2021

Preface

Behind the monastery of Deir El Natour, I was told to find Youssef, who would talk to me about sea salt extraction and would share his expertise with me. Hidden behind a concrete wall, the first thing I saw when I called for Youssef was his white hair, reflective of the 45 years he spent devoted to the salt, and a kind, lively smile. At the age of 17, he arrived in Anfeh from Idlib in 1975, to take part in a peaking industry in which other members of his family worked. After spending most of his time by the sea, he knows the salt flats like the back of his hand. He walked with me from one salt flat to the other, explaining to me the process, history and evolution of the salt flats, and along the way, he shared with me some of his stories. Salt was not a job, it was his llife.

After just a few hours with Youssef, I felt attached to the salt flats as if they were my own. I recognize the urgency to find a way to prolong the life of something that is quickly disappearing, and with every next visit, time becomes more valuable, and the urge to act increases.

Introduction

Hair as white as salt, it feels like Youssef is one of the only salt makers left on the Lebanese coast.

The survival of one of the earliest global industries and an essential element in forming Anfeh's identity is threatened by time, and only one site remains partially active.

Family Photo
from the archive of Architect G. Sassine

Sea salt extraction by solar evaporation is a craft that has existed on the Northern coast for a long time, believeably since the Phoenecian era. It was once so valuable to the locals that they would refer to it as "white gold".

Deir El Natour Promontory, 1960s
from G. Sleiman

Passing by the coast of Northern Lebanon, from El Heri to Akkar, the salt flats that would once produce 50,000 tons of salt per season were an unmissable sight.

Deir El Natour Promontory, 1960s
from G. Sleiman

This was not only due to their abundance, but also due to the energy brought about by the presence of people in them.

Deir El Natour Promontory
from the archive of Architect G. Sassine

They were a work of collaboration between people, family businesses in some cases. As seen above, two brothers share the work of one salt flat together.

Deir El Natour Promontory, 1980s
from G. Sleiman

The salt flats were not only a work destination, but a social gathering space. They were a place where locals would meet, bond with each other, and with the sea.

Deir El Natour Promontory, 2021

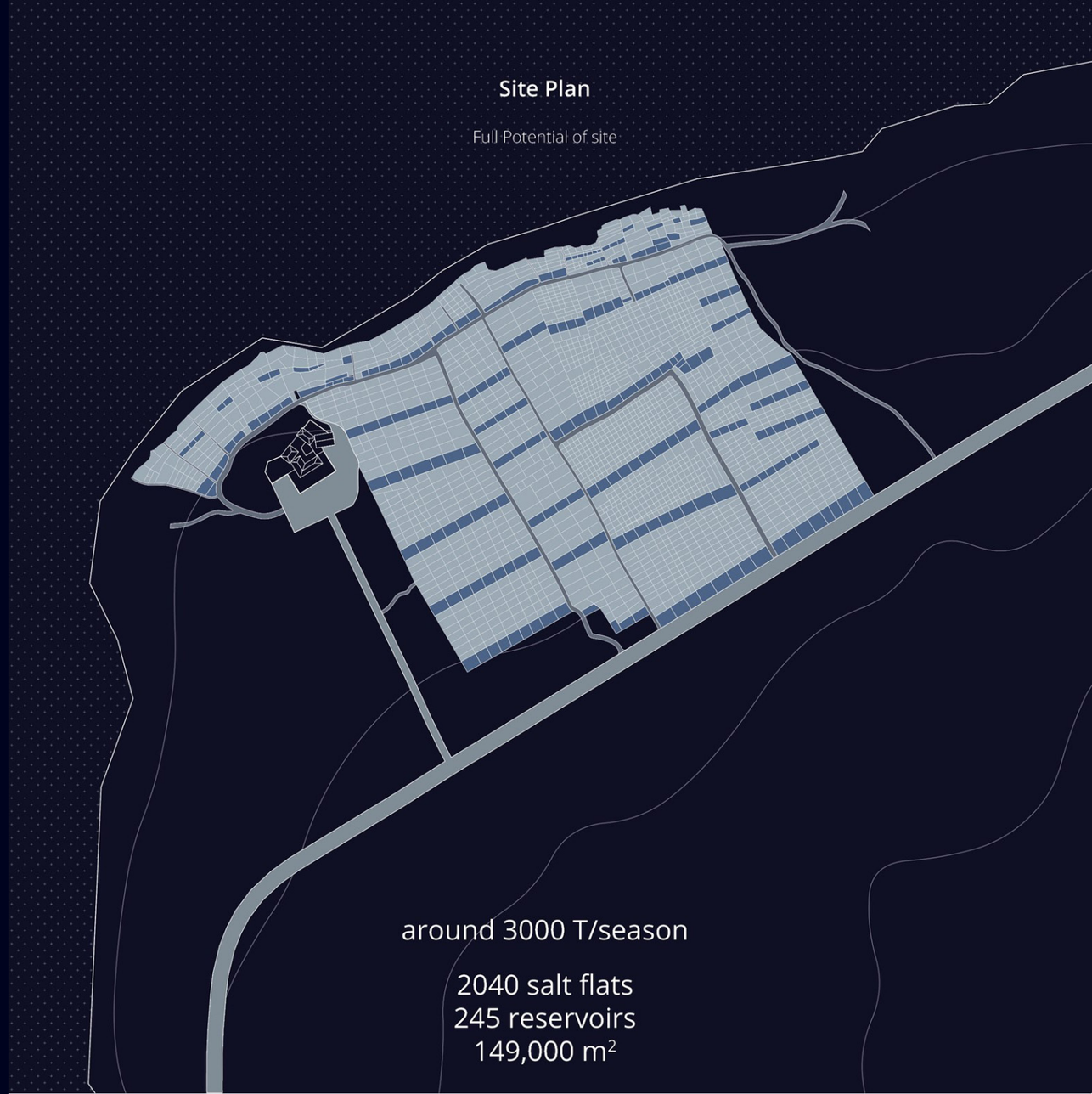
Now, they are like hidden gems, most of them abandoned, occupied by shrubs and broken stones instead of an entire community of artisans who would spend their lives by the sea.

Deir El Natour Promontory, 2021

Behind the monastery of Deir El Natour, which has been destroyed and rebuilt several times, the site is built by cycles of rebirth and preservation of archaeological layers. It is of rich religious, cultural and archaeological heritage.

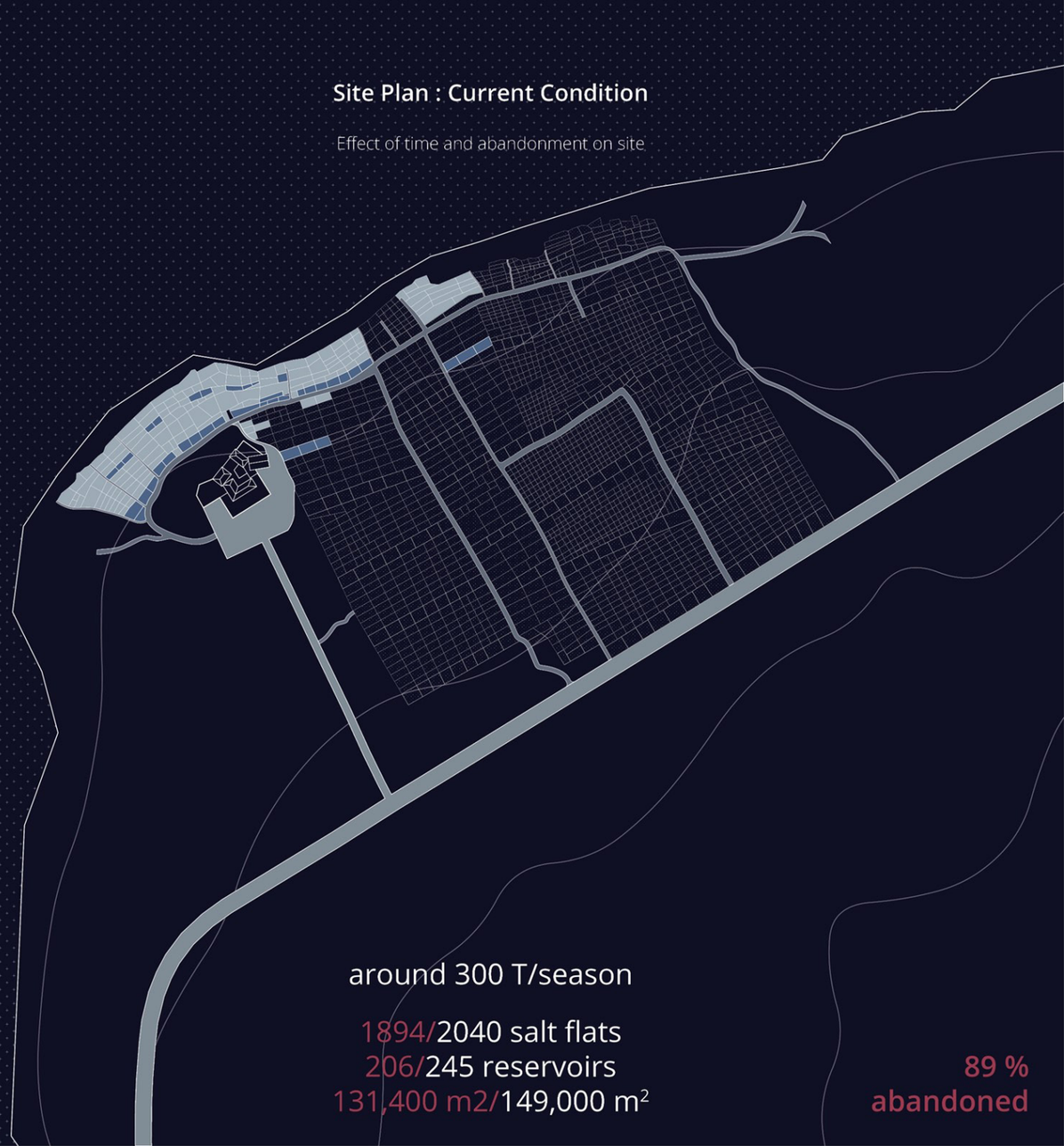
This site would once produce around 3,000 tonnes of salt.

But following a reduction of taxes on imported salt in 1990, the development of touristic resorts in the area, and the expenses and need for constant maintenance, it is now bordering on extinction.



Now, only 11% of the site’s full potential is currently active, resulting in around 300 tons of salt per season.

What was once a reliable industry, producing the “white gold” of Anfeh, remains now a burden on most.

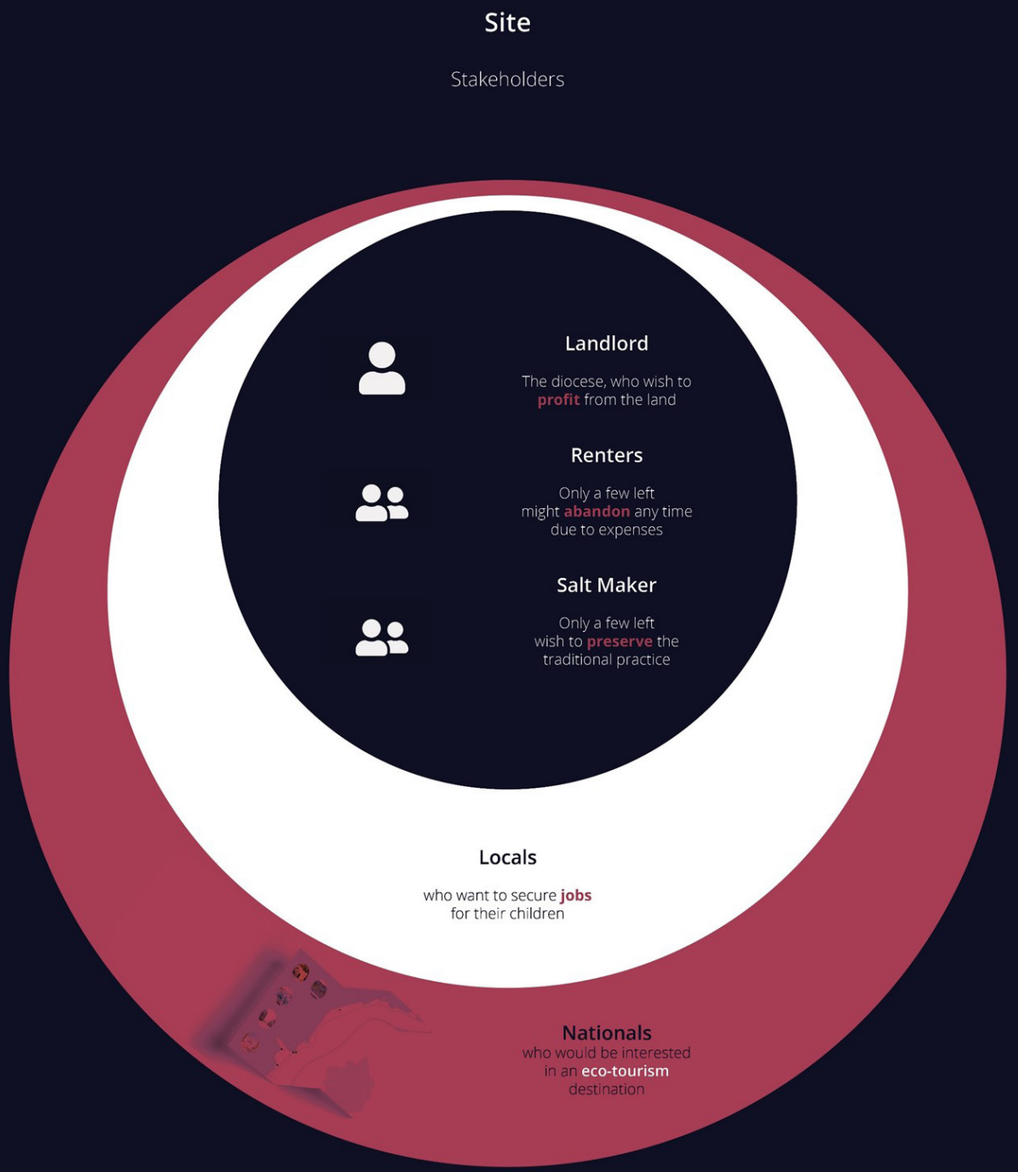


When it comes to stakeholders on site, there are many entities involved. The direct ones are the landlord - the diocese - the renters - who are locals both from Anfeh and other villages in Koura - and the salt makers who in some cases are the same as the renters. Each of these are interested in an economically productive landscape.

On a wider scale, the indirect stakeholders are the locals who are torn between preservation of heritage and finding ways to provide jobs for their children.

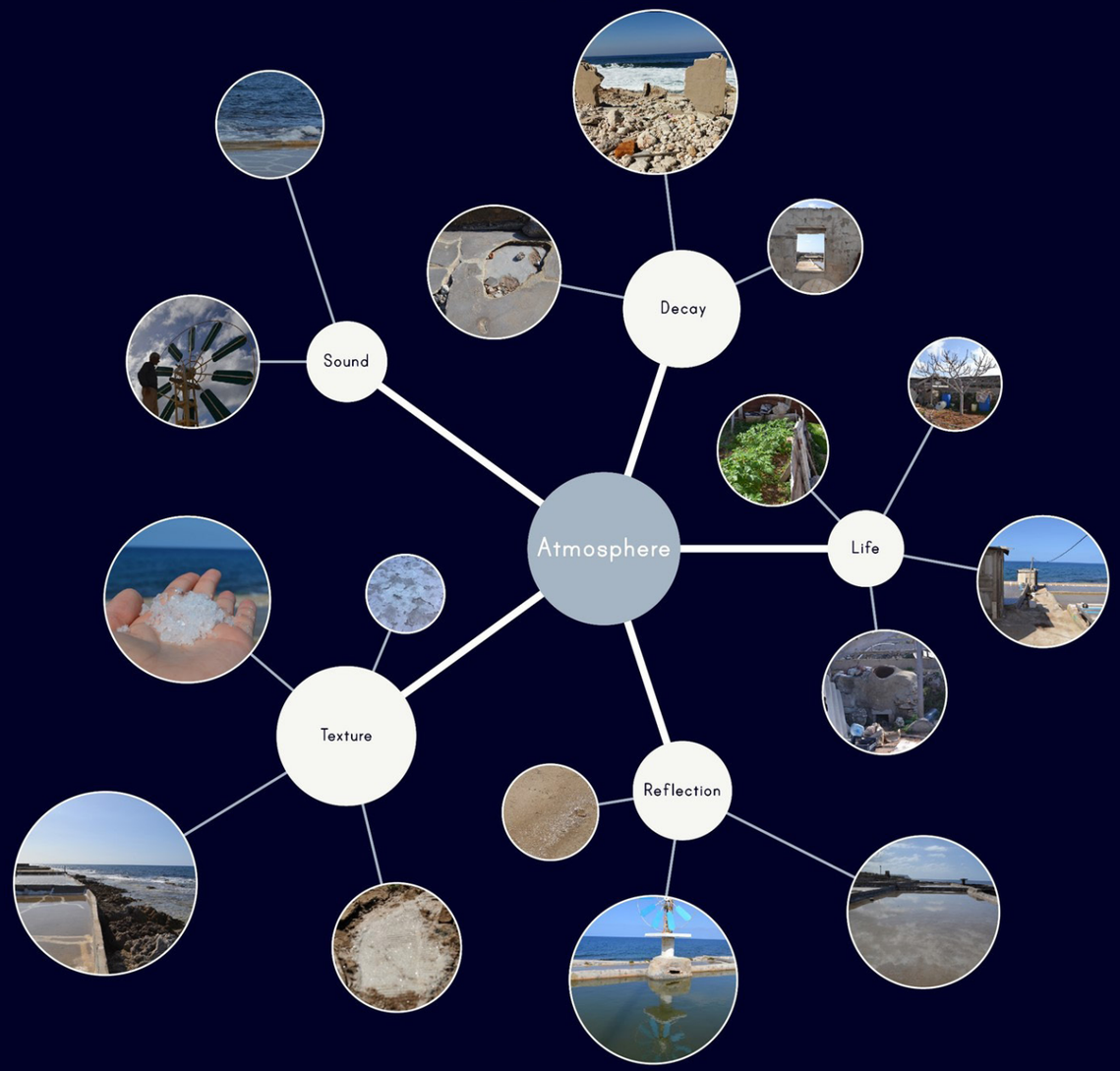
As a by-product, the Lebanese community would be interested in an eco-tourism destination as a fragment of Anfeh's landmarks.

As an economicsally boosting alternative to a perishing heritage site, some might not be opposed to a situation in which the salt flats are destroyed to accomodate for yet another resort. But as responsible architects, it is our duty to find alternative models which can equally be economically sustainable and simultaneously preservative of the culture and archaeological heritage.



Site

Atmosphere



On site, one experiences a multiplicity of atmospheres, from sounds and reflections generated by the wind and the sea, to many textures from the ground to the salt.

Both sensations of life and death are felt along the salt flats. When one is closer to Youssef's home, one is exposed to signs of life. From the fig tree and potato plants that he has raised and grown with him, to a *tannour* (oven) over which he would share meals with his family when they would visit. He would share stories about the memories he has shared with his family here and how when they are all here, they would sleep on the roof of his home, in open air. After a conversation with Youssef, one feels as though he is an integral part of the landscape.

But when one travels farther from Youssef's home, towards the abandoned portion of the site, one is overpowered with atmospheres of decay. One cannot feel but that time is fleeting, and is invited to mourn the death of the salt flats.

The site itself has unique features which have evolved and have been shaped by layers of time:

The reservoirs (1-2 meter deep) concrete pools and the salt flats (15-20 cm deep), which were previously made by carving in the stone.

The water pump/ transport system that moves the water from the sea to the reservoirs. It has evolved from a manual labour with buckets, to windmills that harness wind energy to pump the water, moving to diesel pumps. These technological changes allowed the site to progressively expand farther away from the sea.

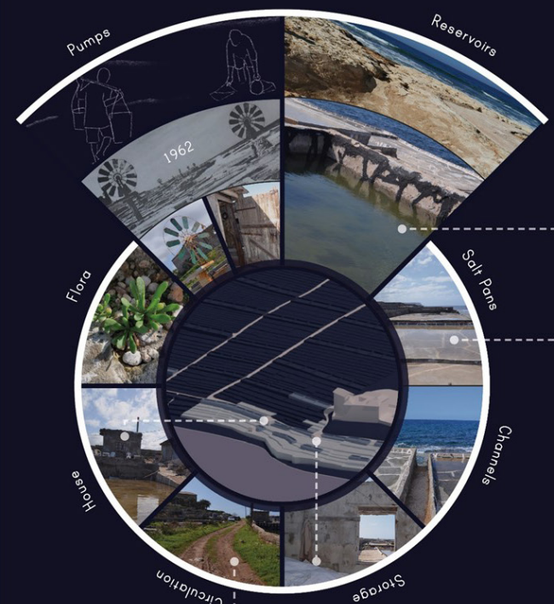
The channels, that are used for the circulation of water, saltmakers, and fishermen.

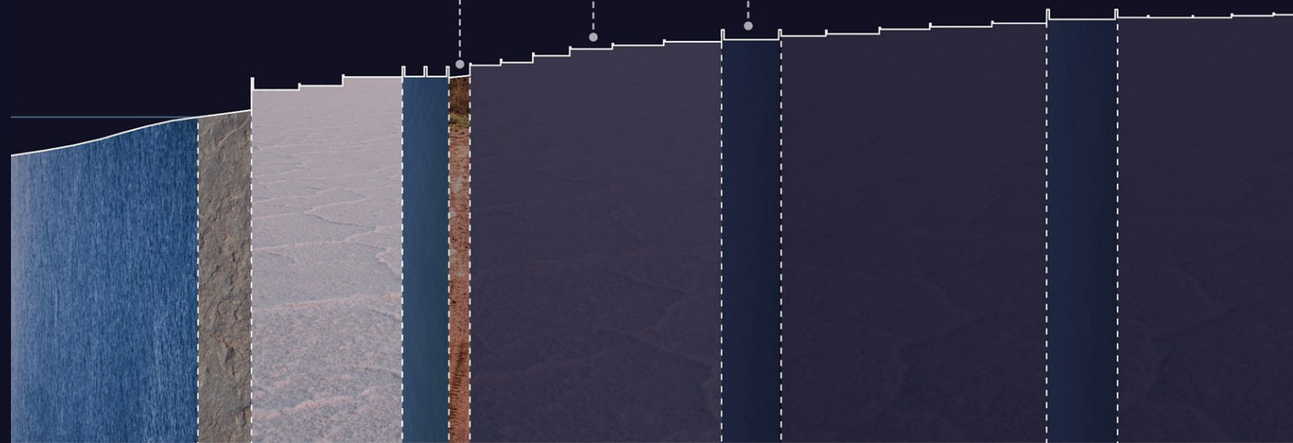
Enclosed units: the saltmaker's home, storage units, and pump rooms (when closer to the sea).

The flora on site which is unique to Anfeh's saline ecosystem and when processed with salt can be used to produce site specific food products.

Site Section

The different elements that make up the site, physically

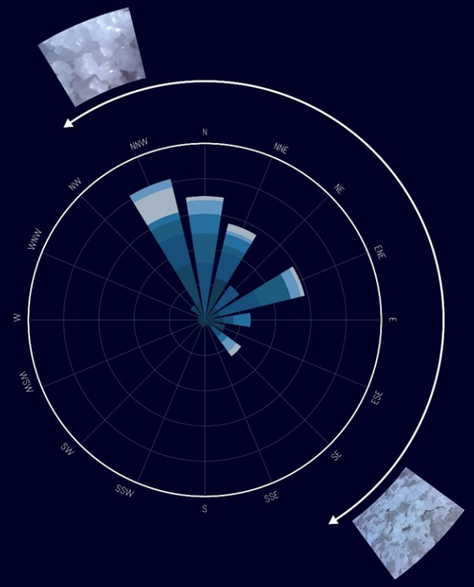




Salt Extraction

Conditions & Types of Salt

Sun + Wind + 33 L Sea water = 1 kg salt



1. Coarse Salt

Pickling + Cheese production

2. Fleur de sel

Food

3. Fine grain (CaSO4 , CaCO3)

Fertilizer

Zooming into the salt extraction process, The four essential elements needed are seawater, sunlight, wind, and time. Changes in these conditions affect the types of salt we extract, that mainly fall under a spectrum along 3 main options, each having its unique textures and uses:

Coarse salt that appears at the bottom of the salt basins, with more western winds, used for processing food like pickles and for cheese production.

Fleur de sel which is flakier and appears at the surface. This one is a result of drier climates and more Eastern winds.

A fine grain sugar-like salt(CaCO3 & CaSO4), which is collected with the dust and impurities and either thrown back into the sea or used as fertilizer.

The phases of production consist of the seawater evaporation during the summer followed by maintenance work each winter.

April – September

The salt extraction process is a lengthy cycle, with human labor and then time in waiting for the work of the elements:

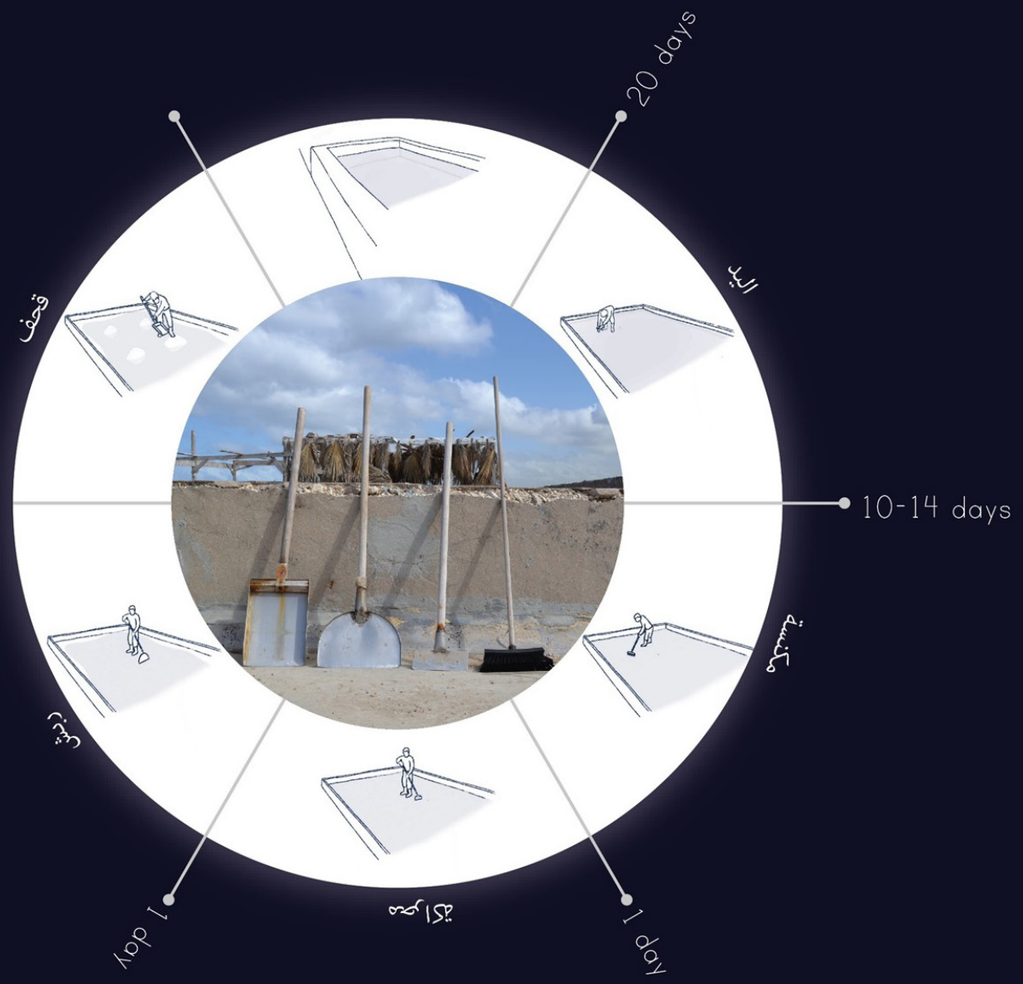
1. The seawater is first placed in 1-1.2m deep reservoirs, with fish (سمك البوري) that eat mosquitoes and other insects that might affect the purity of the salt. and are left to evaporate for around 20 days, causing the salt levels to rise from around 5% to around 17%.

2. The water is then transferred to several salt pans, with the water around 10-12 cm deep in each. The water is left to evaporate for around 10-14 days. During this time, معلّم يوسف would usually visit his wife and children back in Syria, but for the last few years, he has been staying by the sea.

3. After 10-14 days, a small bed of fine-grain salt appears at the bottom of the pan. The salt makers feel them with their boots (مثل السكر). The color of these salts can vary from white to almost red, due to the presence of sand in the sea bed. They are inedible and are an indication that the sea salt will appear in a day or two. The sugar-like salt is swept with the dust to the corner of the salt pan using the "مكنسة". They are either eventually thrown back in the sea, or sold to use as fertilizer (usually for the olive trees of Koura).

4. One day later, the sea salt begins forming at the bottom of the salt pan. If it is left untouched, it will grow each day: on the first day, it will be the size of a lentil, one day later a chickpea, and next a bean. The salt is separated from the ground and collected with a محراكة.

5. On the next morning, before the weather is too hot, the salt is collected with the ربش then loaded into bags with the قحف. The sea salt is collected while it is still slightly damp to prevent clustering together. The loading of the sea salt requires two people – one to carry the bags and another to scoop the salt.



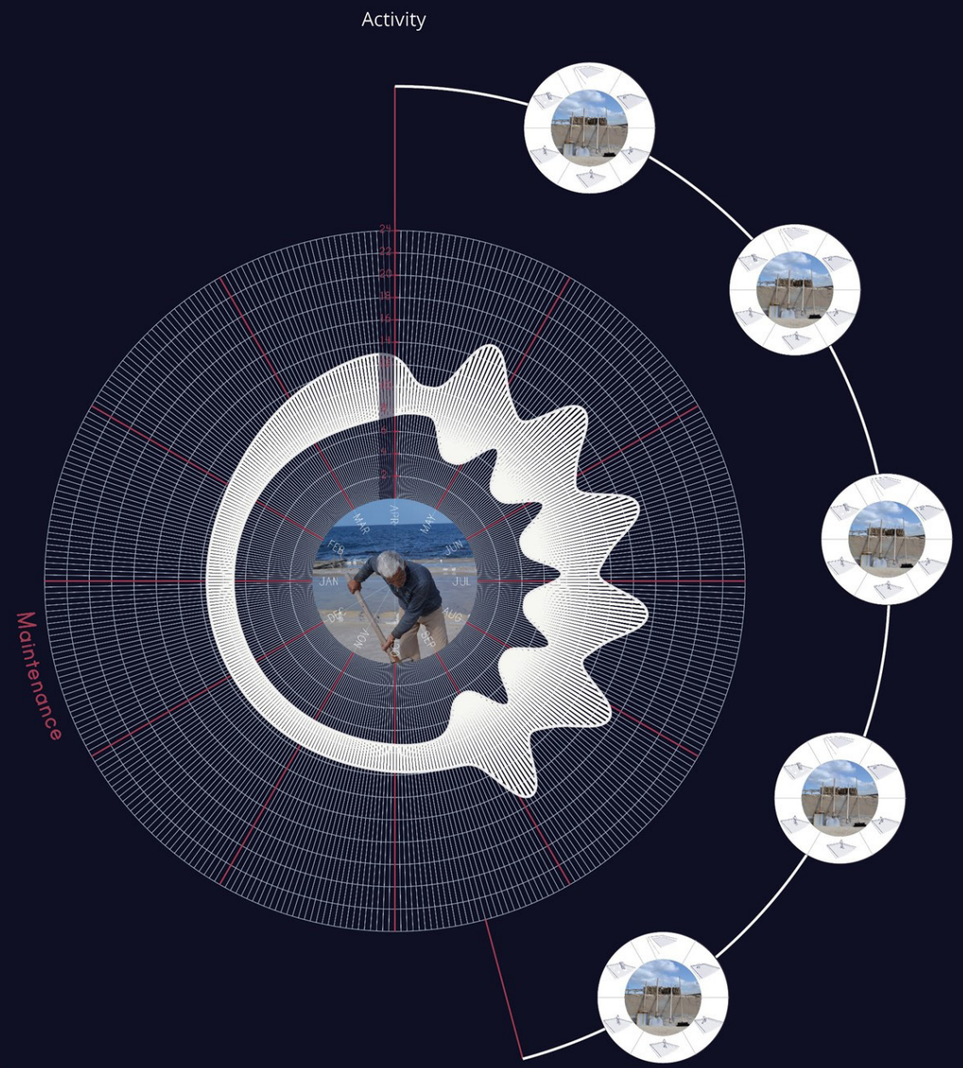
Depending on weather conditions, the process is repeated four to five times each season (قطفات). Each season, معلّم يوسف alone produces around 160-170 tons of sea salt.

September – April

Climate conditions from September through April are not ideal for salt extraction; however, the work of the salt maker does not come to a halt. Each winter, the salt maker searches for cracks in the concrete pans to cover them with plaster and paint to prevent leakages in the following seasons. This is why we can see the patterns at the bases of the salt pans.

During this time, the site experiences minimal activity. This renders the site inactive 80% of the time, which is not particularly ideal for the salt maker who is paid by the hour.

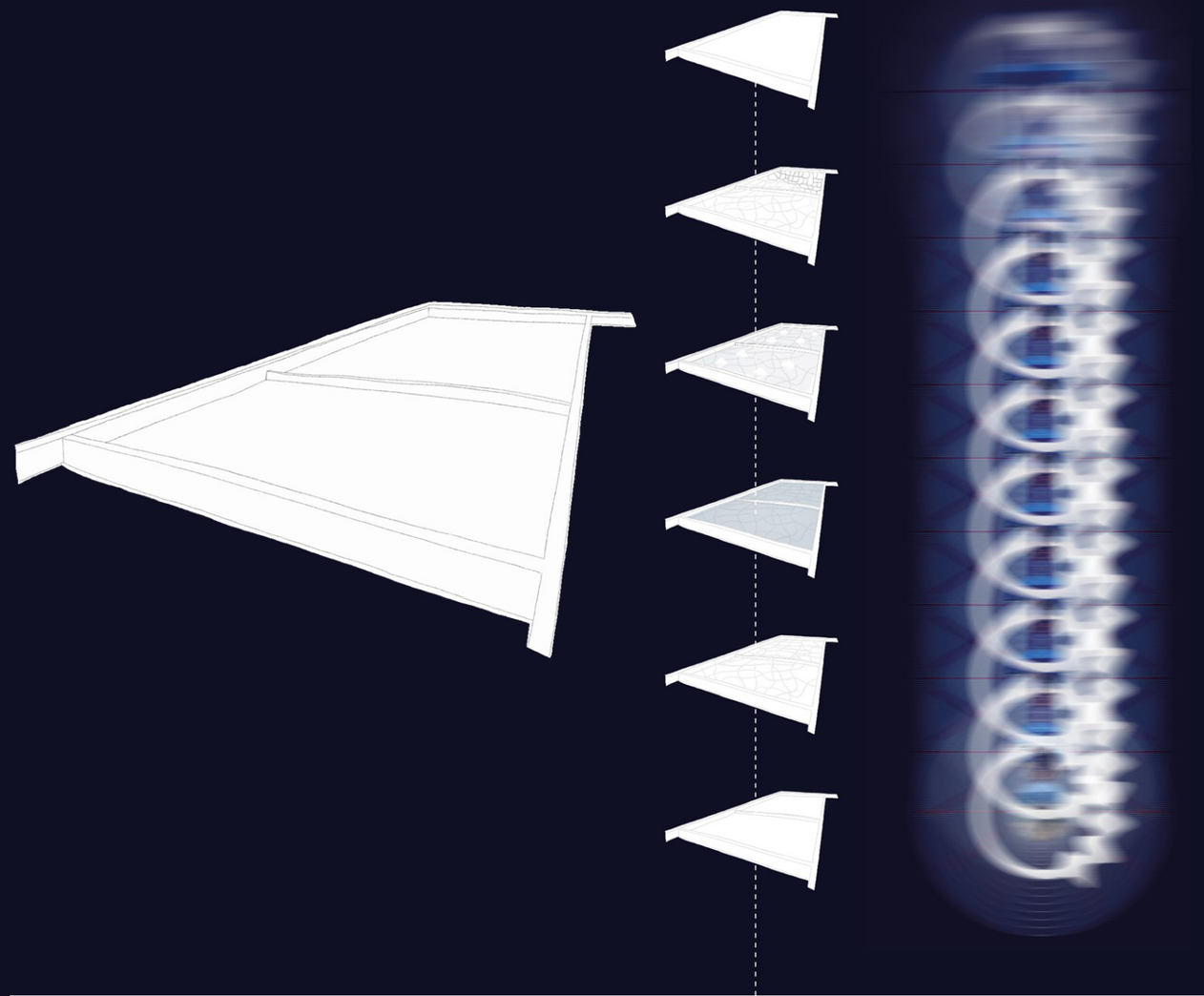
Questioning an Unsustanainable Model



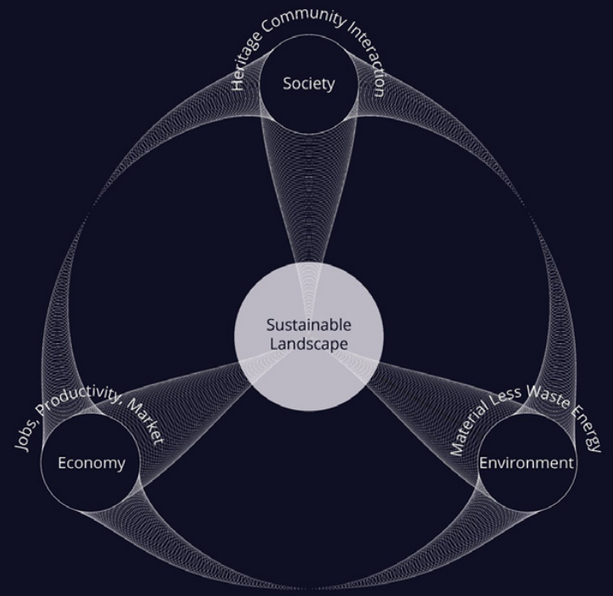
80% inactivity

paid by the **hour**

After a few cycles of patching up the cracks, some salt pans are worn out and are no longer fit for extraction, so the salt makers cast a new layer of concrete on top of the damaged salt pans, sometimes merging two or more pans to become a larger one, other times subdividing a large pan. In some of the abandoned salt pans, one can observe the stratification of salt pans through time. After a maintenance of the salt pans, the salt maker cleans all the salt pans around mid-March and is then ready to begin a new season of salt extraction.



A More Sustainable Model

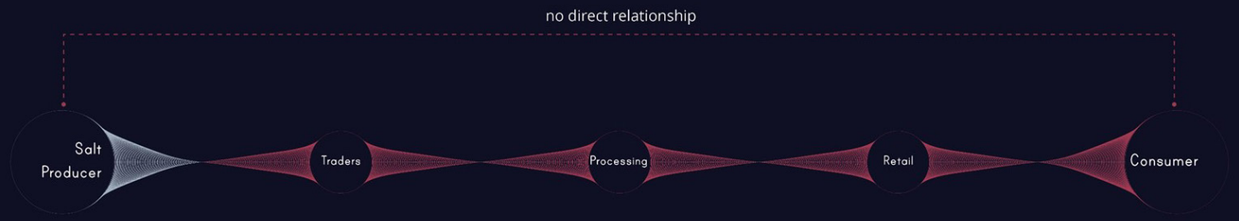


To preserve and perpetuate this saline ecosystem is not to appreciate it in a nostalgic way, but rather to adapt and reactivate it as a more sustainable landscape - one that can inject life back into the site and reverse the effects of time in a simple, efficient, and low-tech way.

Referring to the 3 pillars of sustainability: economic sustainablility by making it more productive, providing both job opportunities for the people and a wider market for the salt, environmental sustainability by reintegrating green energy and locally harvested material, and social sustainability by providing spaces that invite the community to interact with each other, the heritage, and the sea.

Questioning an Unsustanainable Model

Current Program



on site

off site

1,000 L.L / Kg

initial price

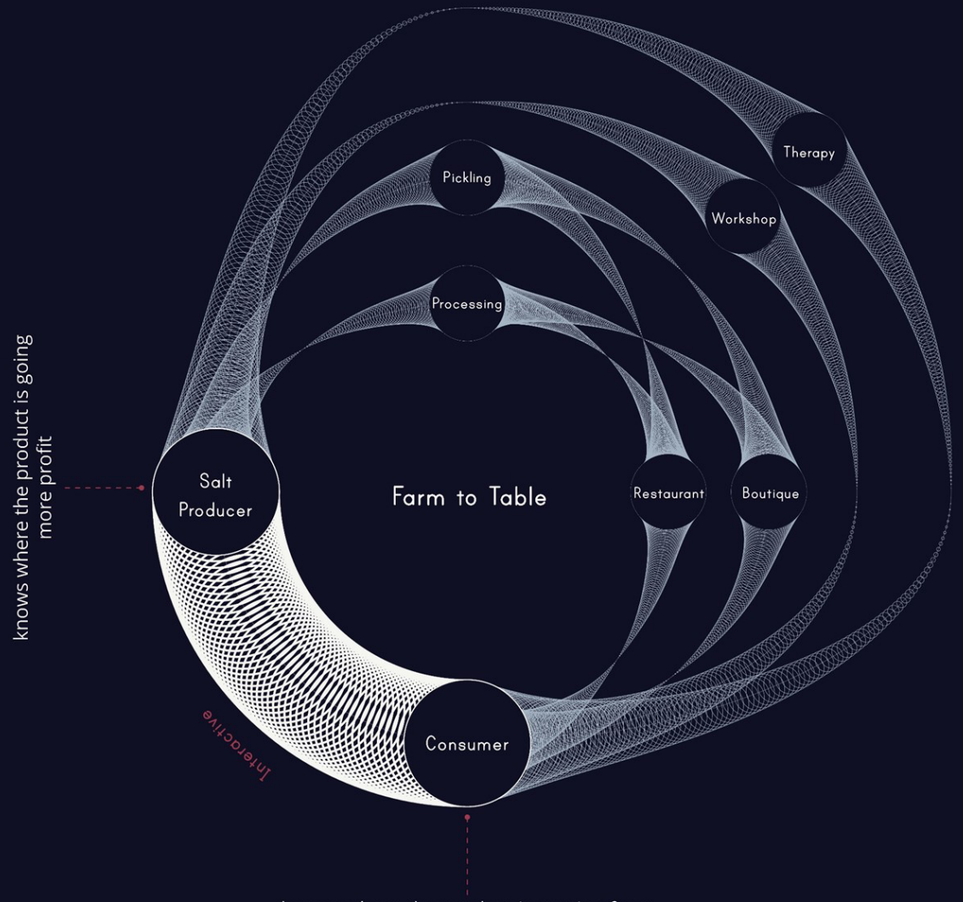
x100

12,000 L.L / **120 g**

https://wajd.organic/Sea-Salts

A More Sustainable Strategy

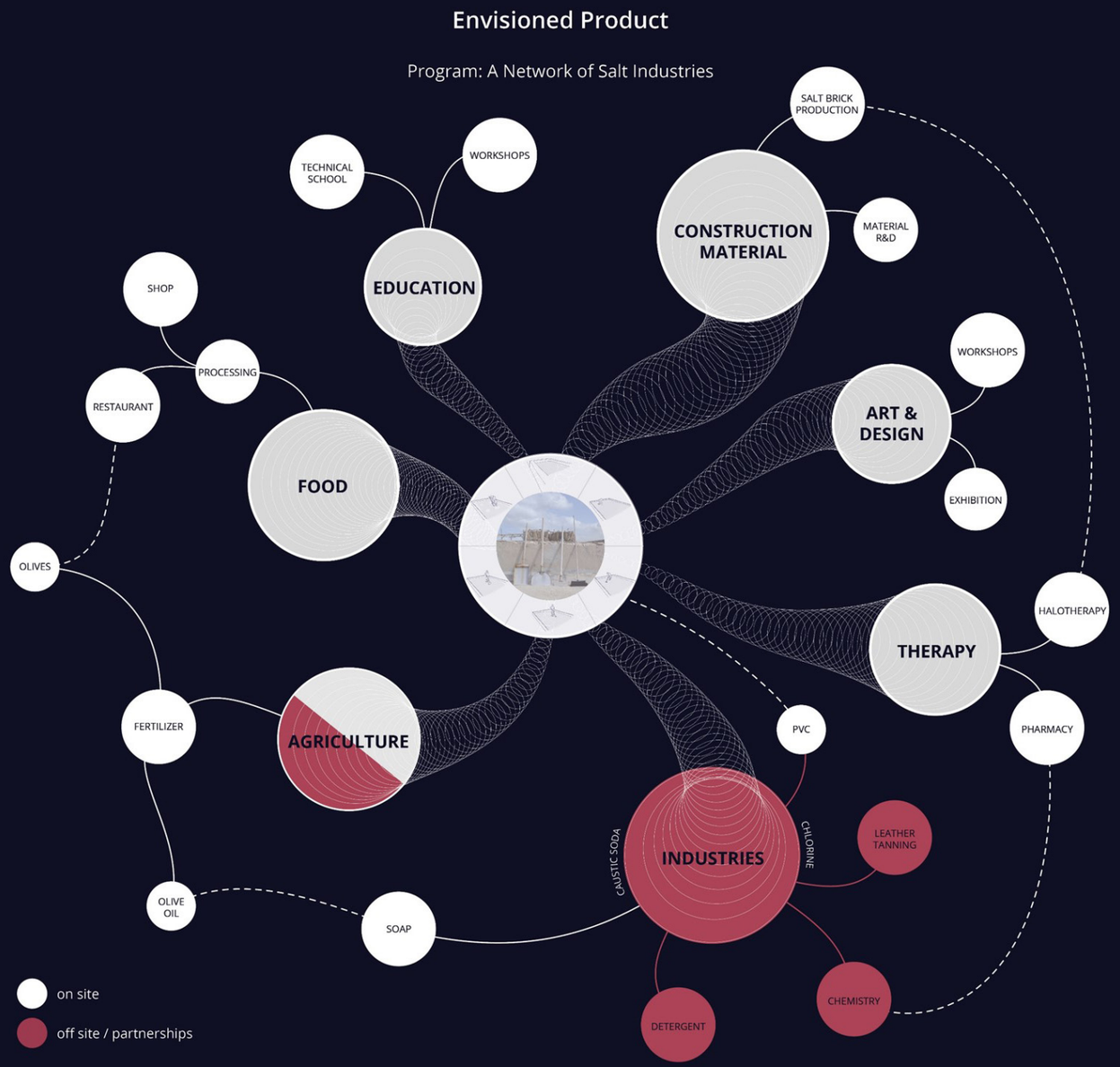
Program Example

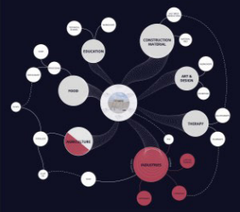


As an example, the current model is a decentralized one, where only the production of salt occurs on site, and it is then exchanged multiple times along the way before reaching the consumer. Who is in turn disconnected from the process. At the same time, the price of the salt can be augmented up to 100 times from the original price along the way.

By adopting a “Farm to Table strategy”, the consumer is brought closer to the production process, which would enhance the experience for both. The consumer is in turn more involved, knowing where the salt is coming from, and the producer would know where his salt is going. This strategy would also reduce costs on the consumer and increase profits for the producer.

This approach could apply not to only to food, but to a network of salt industries beyond the raw material, which I envision on site. There are many areas that use salt as a raw material, and centralizing the model on site is a first step in maintaining it.





Salt Potential - Food

Salt as a condiment, cheese, fish, pickling agent, infused sea salt...

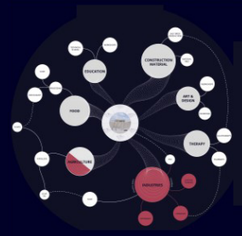
pure fleur de sel

different types of infused sea salt

cheese production

pickled greens
photo from @sleimansalinas , Instagram

salt cured fish

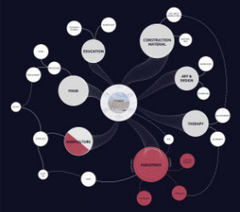


Salt Potential - Agriculture

CaCO3 as fertilizer, mainly used for Olive Trees in neighboring area

CaCO3 extracted by evaporation

Koura olive fields



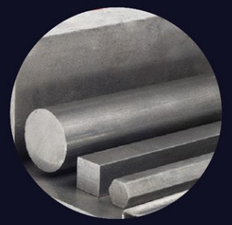
Salt Potential - Manufacturing Industries

Salt broken down into component parts and used in chemical industry and others...

CHLORINE

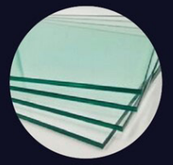
CAUSTIC SODA

leather manufacturing



steel production

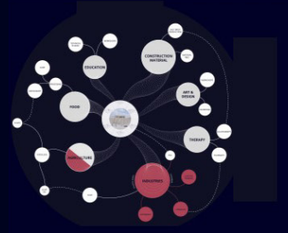
olive soap production



glass manufacturing

PVC manufacturing

bleach and desinfectant products



Salt Potential - Therapy

Halotherapy, salt scrubs, pharmaceuticals...

https://www.medicalnewstoday.com/articles/epsom-salt-foot-soak#benefits

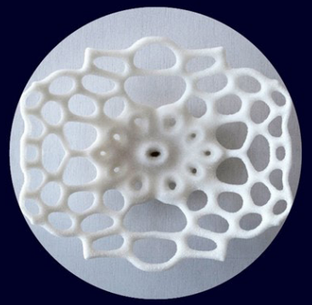
https://www.premierdeadsea-usa.com/salt-therapy

https://www.who.int/medicines/areas/quality_safety/en/

Salt Potential - Art & Design

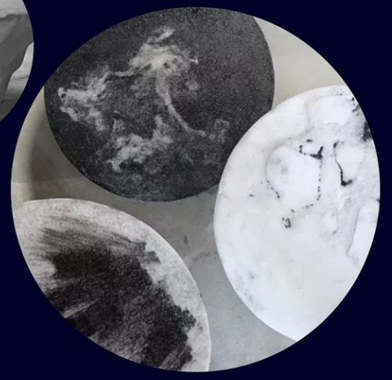
sts work with different salt objects, mixing it with other elements, or using its properties

Industry by Nature, Karlijn Sibbel

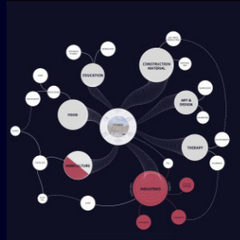


3D printed Haeckel Bowl, Emerging Objects

The Liminal Series, Hala Al Ani



Marbled Salts, Roxane Lahidji

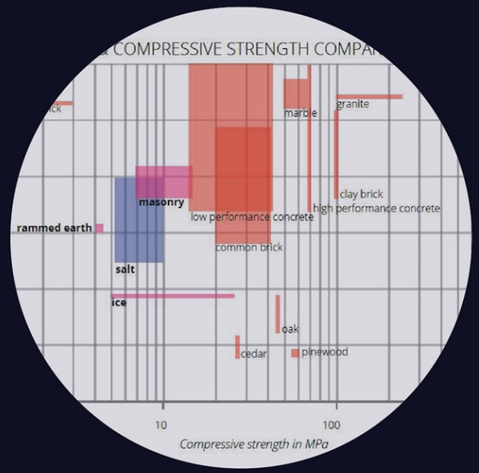


Salt Potential - Construction Material

Precedents

3D printed salt brick, Emerging Objects
8 parts salt : 1 part Maltodextrin

Saltygloo, Emerging Objects



Analysis of salt brick in compression, E. Geboers

"An excellent thermal mass, the translucent salt hydrate [5/8 inches] can absorb as much heat as a sixteen-inch-thick concrete wall. The salt makes it possible to replace thick, opaque walls with thin, transparent surfaces"

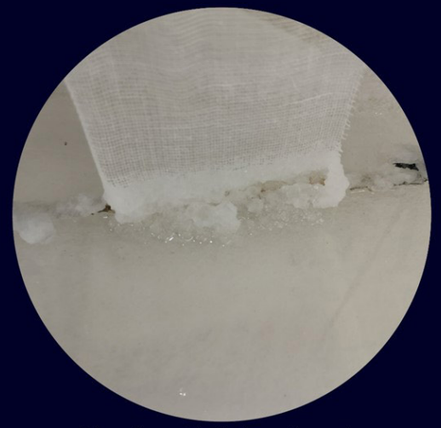
Printing Architecture: Innovative Recipes for 3D Printing, R. Rael (p 264)

Salt Potential - Construction Material

Explorations : Crystallization of salt

Translucent Salt flake
crystallized at water surface

Salt mesh crystallization on nylon fabric
at T= 7 days



Salt mesh crystallization by capillary action
at T= 28 days

Translucent salt surface
crystallized by capillary action on a biodegradable skin

Salt Potential - Construction Material

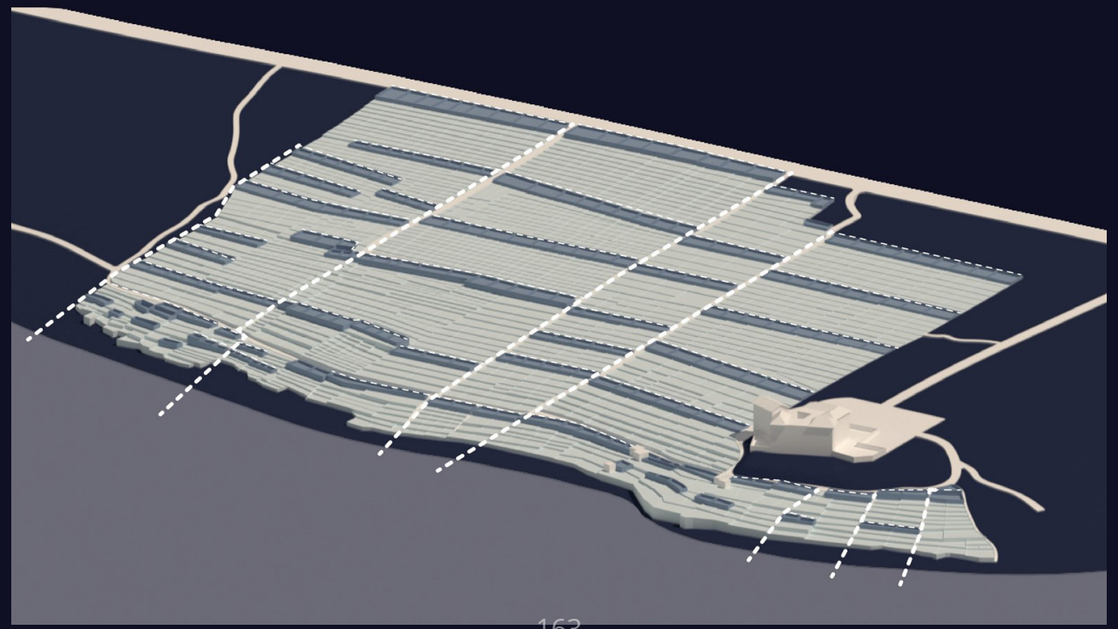
Explorations : Salt Paste / Composite Material

salt paste

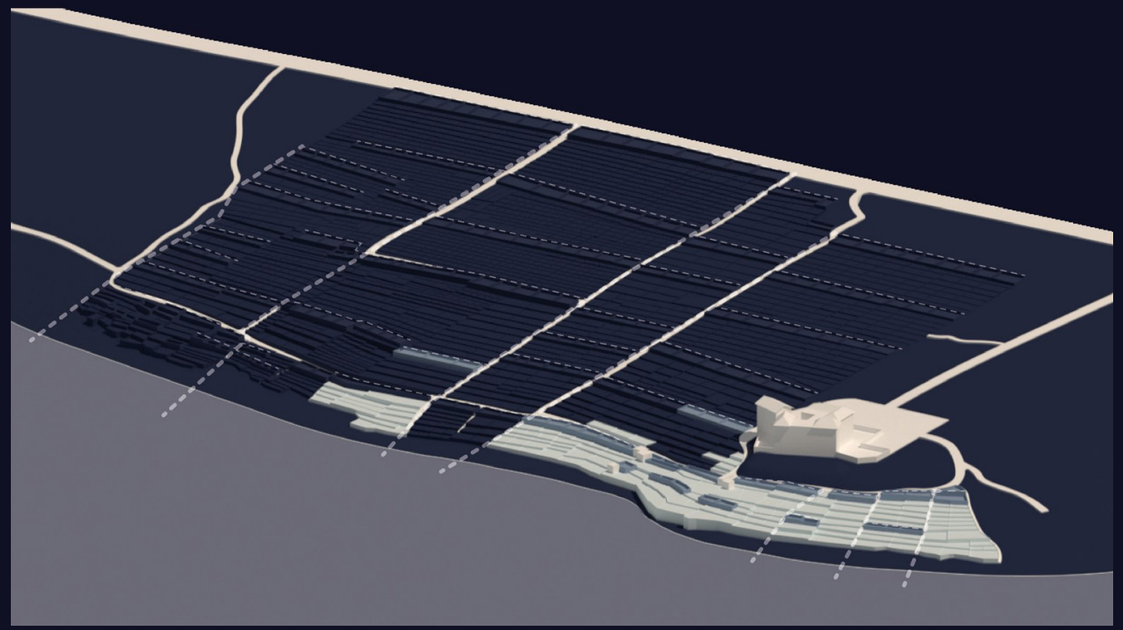
salt paste constructed as a dome
brittle, dissolves in water

salt / wax brick
layers of different compositions
(top - fine grain salt, bottom - coarse grain salt)

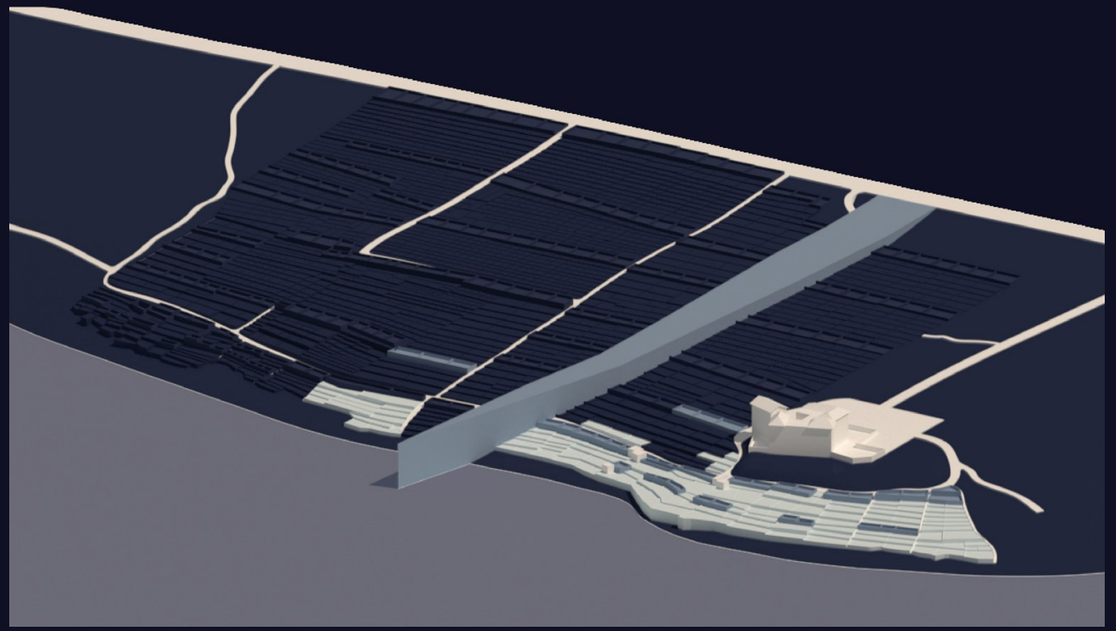
salt / wax dome
wax as a coating for the salt



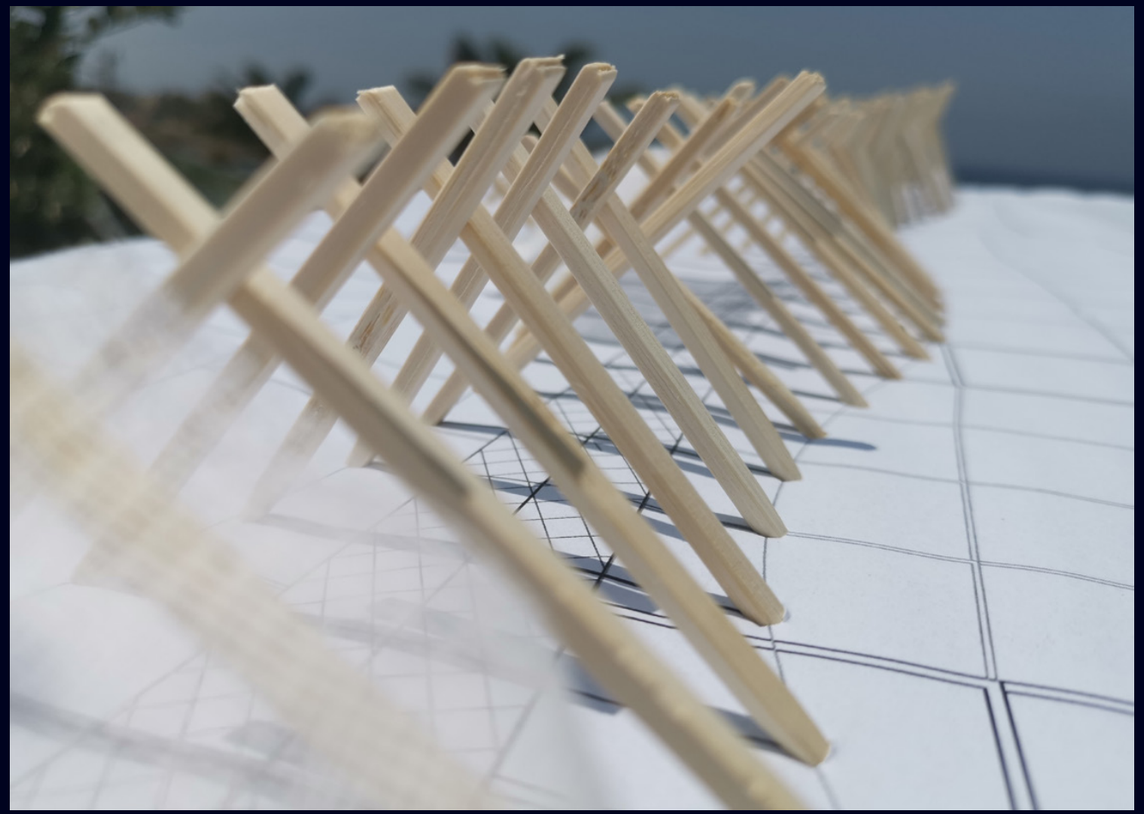
Following a series of material explorations with the integration of salt into the architecture whether by active building it out of salt brick or by passively relying on capillary action and the crystallization of salt on surfaces, I began the locating my intervention on site. First, I traced the water circulation lines to and from the salt flats, through the cycles: , from the sea, up to the reservoirs, and back down to the salt flats where they are left to evaporate. I use these lines as guides where the flow of people could follow that of water.

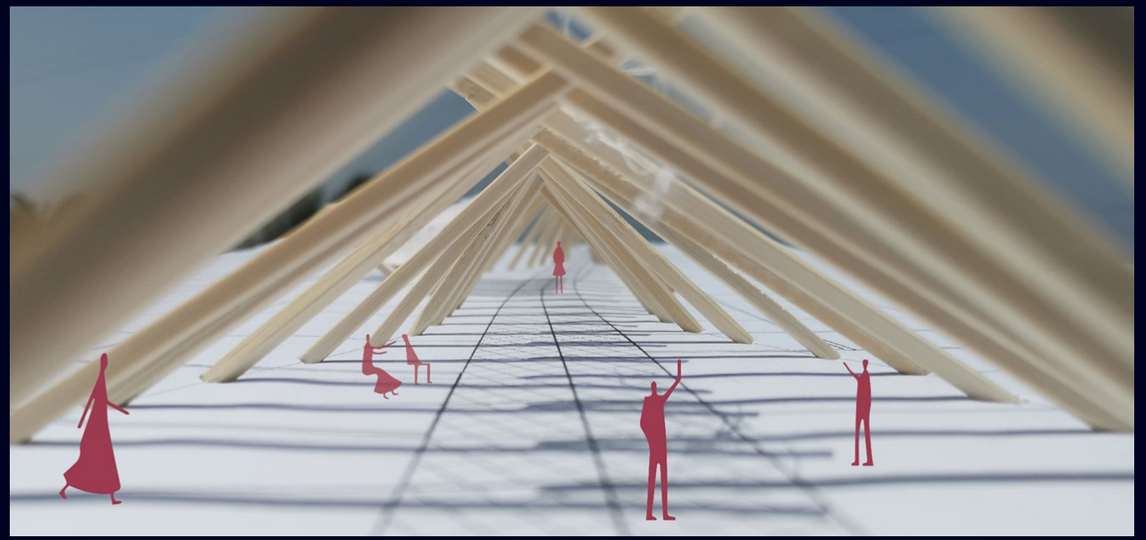


With that in mind, and considering the salt flats which are abandoned as opposed to those which are still in use, the interface between active and inactive along the lines, is a strategic location to station an infrastructural spine, which would connect the street to the sea and bring life back to the site. It is also intended to be viewed from the street as a signal of curiosity to what is happening there.



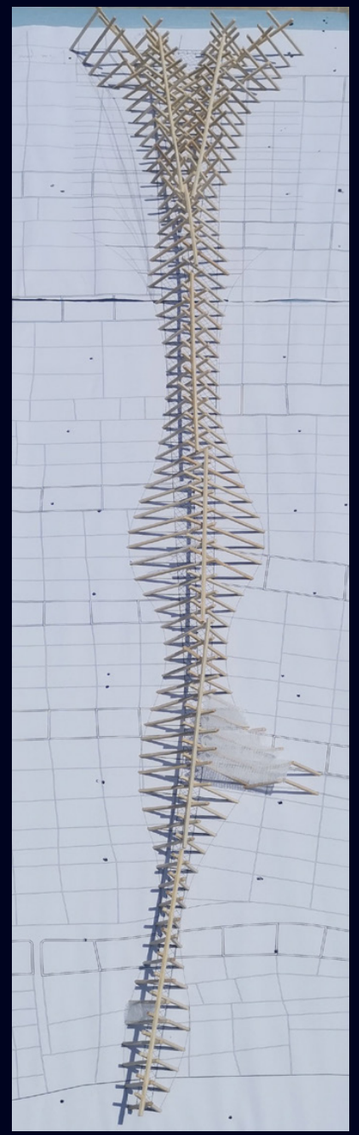
The first step was to exercise some spatial explorations on how to intervene along this trail with a lightweight, simple structure that would accomodate the “salt structures”. A system of A-Frames is one that would fall at the intersection of a spatial, structural, and infrastructural spine. The A Frames become modules, with a certain flexibility, that could host different plug-ins.

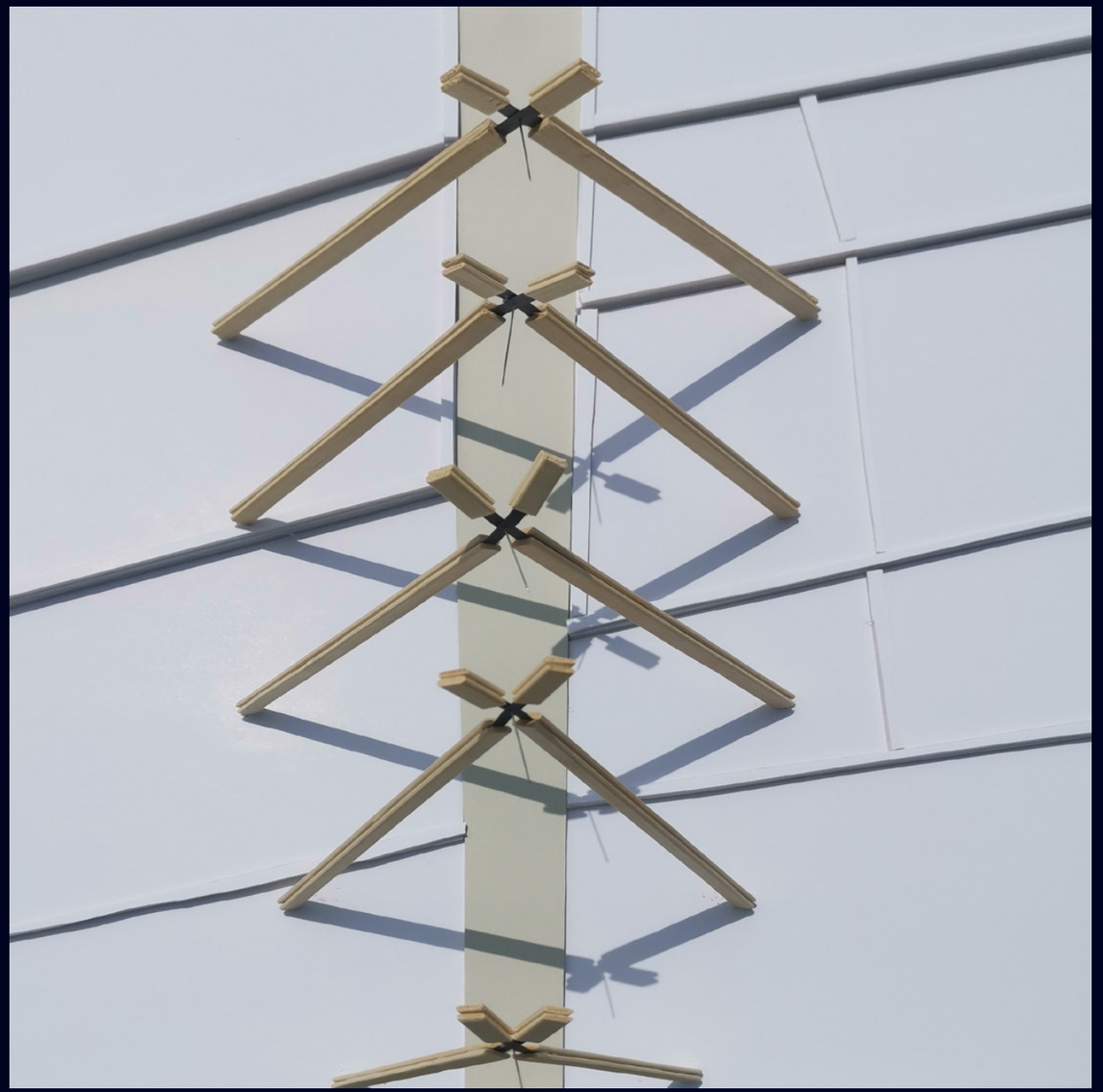




1:200 model (left)

1:50 model (right)

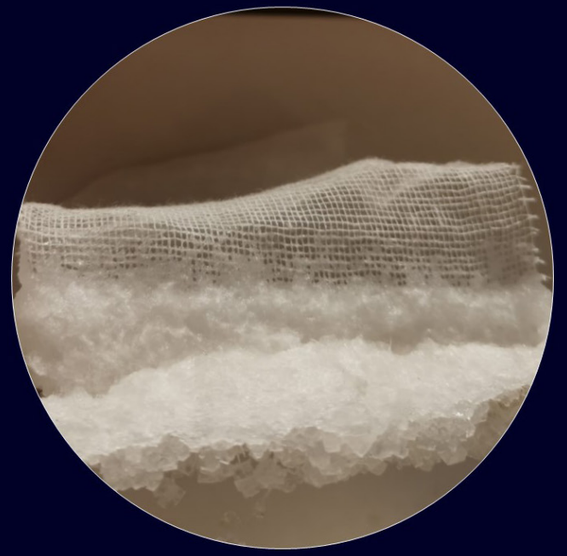




Locally harvested salt can also be integrated as part of the spatial experience. Two interesting options are first how salt crystallizes on different mesh textiles. This was achieved is by dipping part of the meshes into salt water, and by capillary action, the salt begins to crystallize, making the mesh more rigid with time and with more evaporation.

The other was using a salt paste to create sea salt bricks, whose ratio of salt could start to determine how much the salt brick would disintegrate.

These two techniques can be used to plug into the A-frames as shading devices or as parts of the furniture



Site Plan

Main Spine

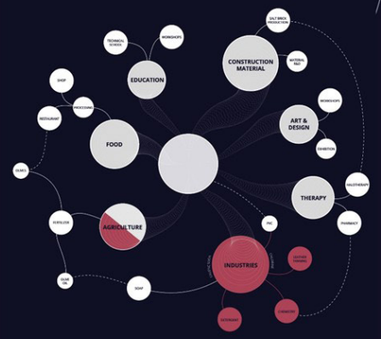
THERAPY

FOOD

ART & DESIGN

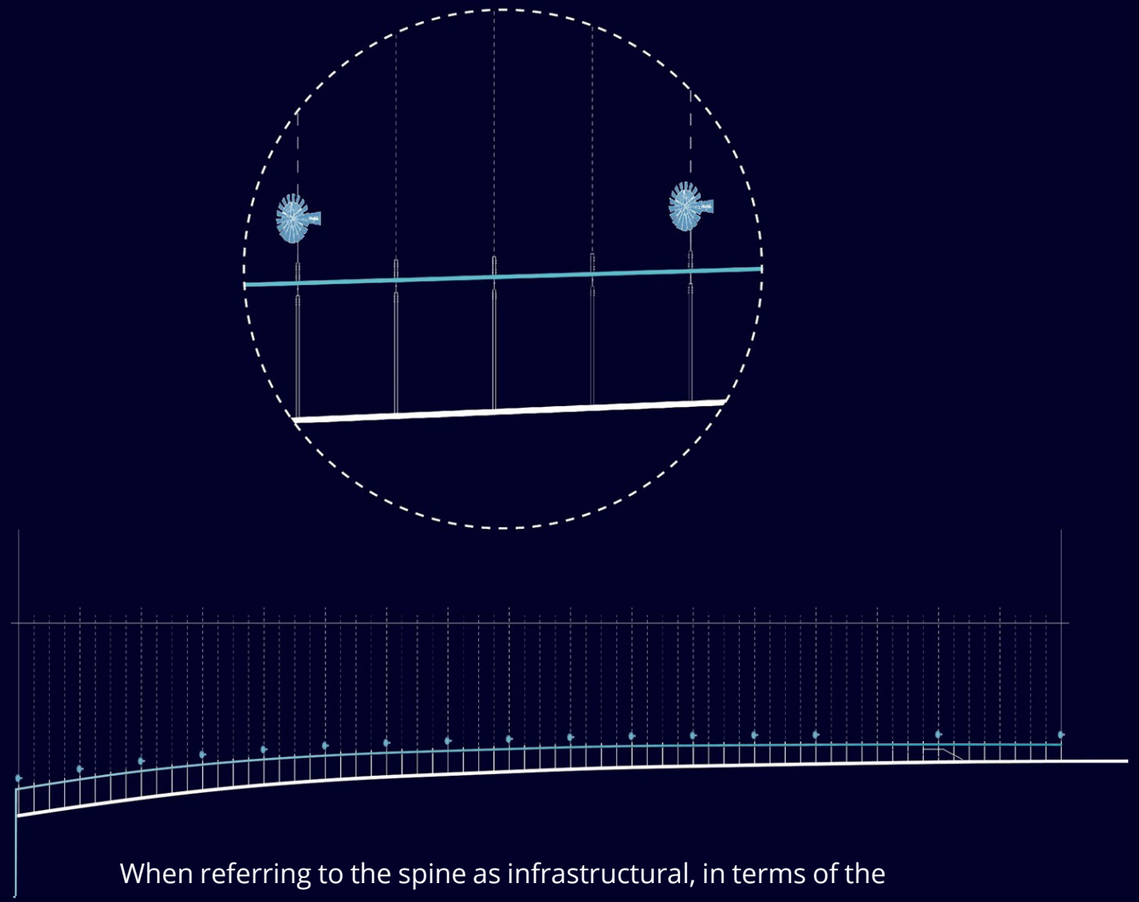
EDUCATION

CONSTRUCTION MATERIAL

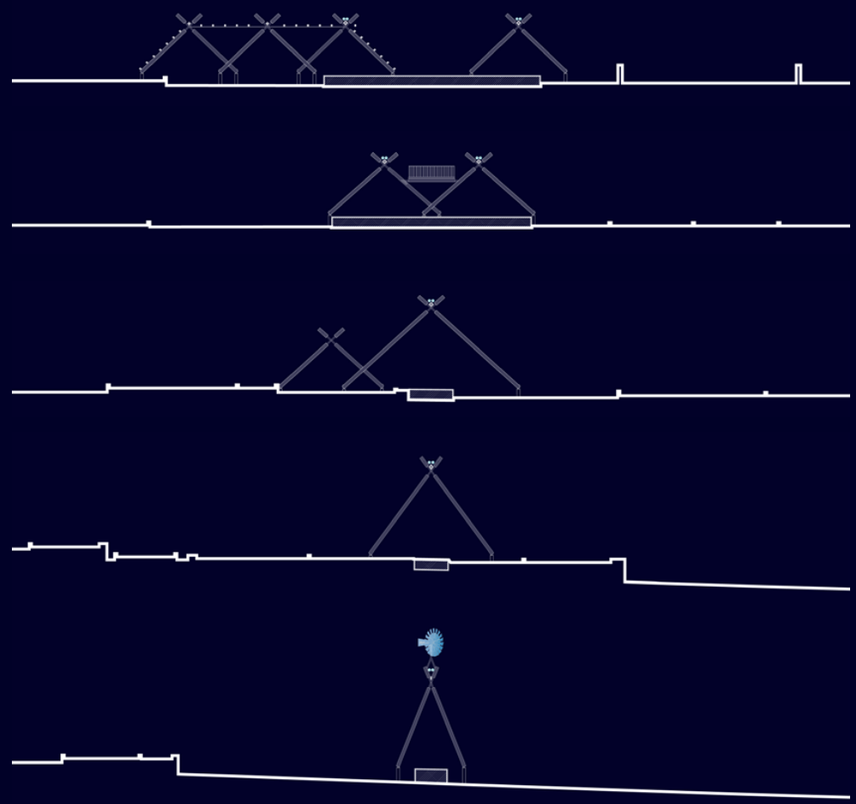


Referring back to the program diagram, it extends along the spine and distributes the network of salt industries from the sea to the road.

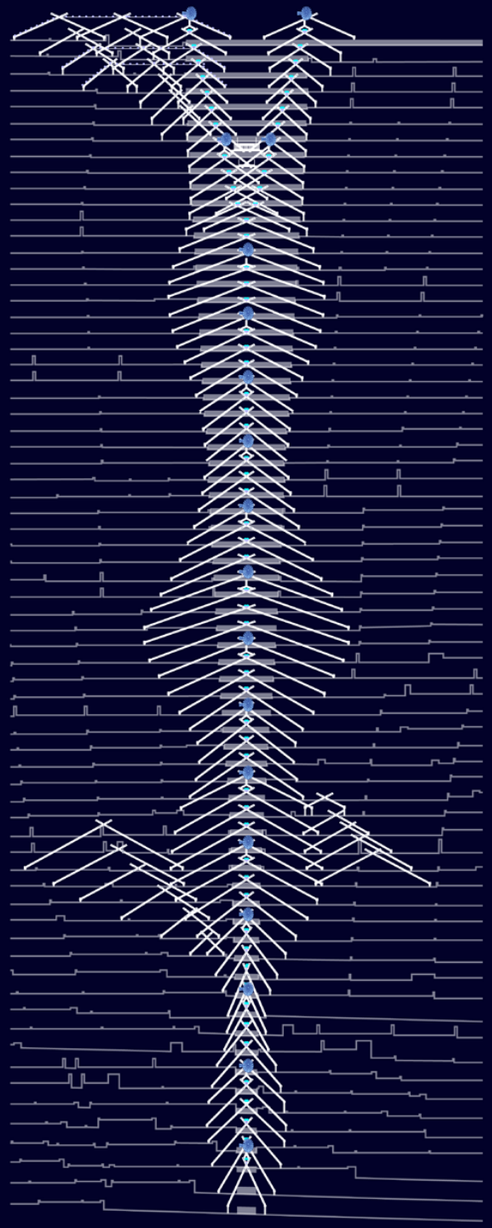
It becomes an infrastructural spine that circulates water, salt, and people, slowly activating more and more salt flats with time.

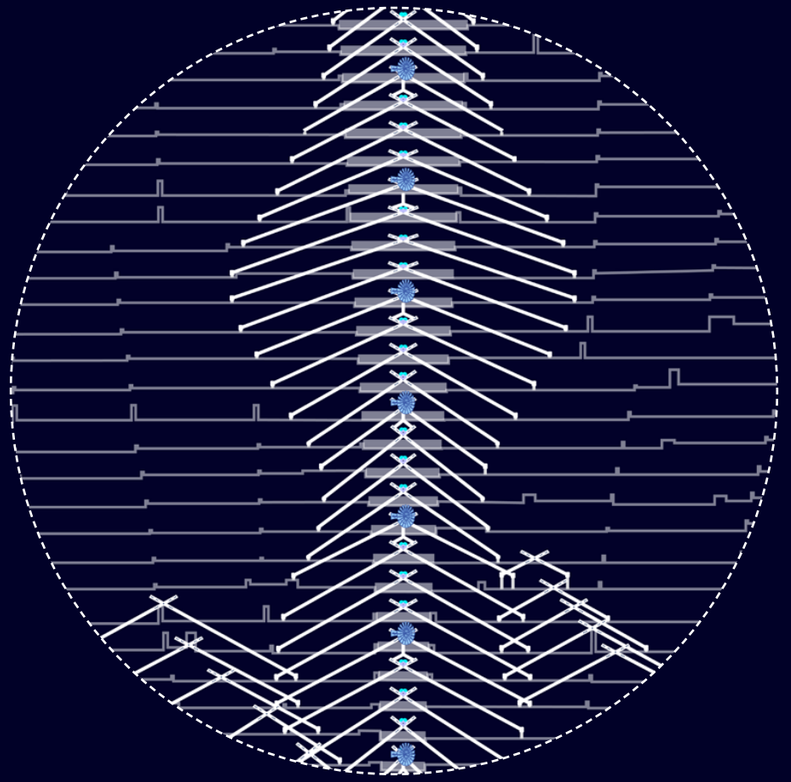


When referring to the spine as infrastructural, in terms of the water circulation it would work in the following manner: at the top of each 4 A-Frames, is a wind pump that would slowly move the water from the sea to the top of the site, distributing to the salt flats as it circulates.



In the other direction, the A-frames change their angles based on the different programs, so when it is just a path it is thinner. It widens near the market, the exhibition, the workshops... At some points they multiply to for lateral expansion as well.



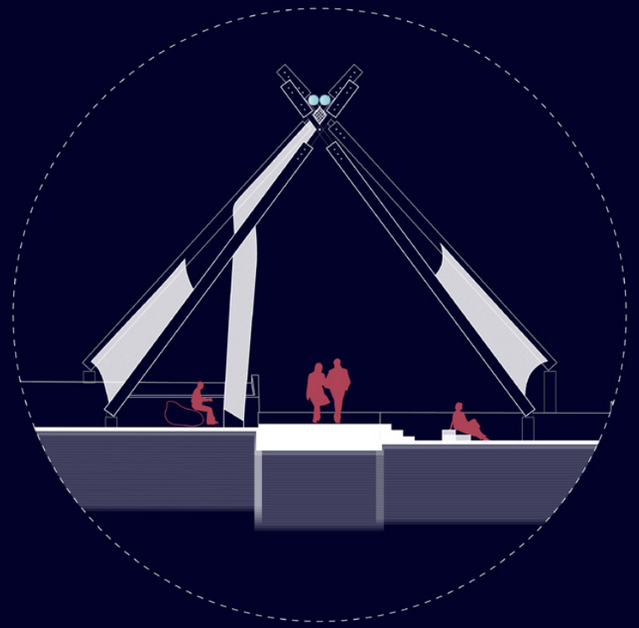


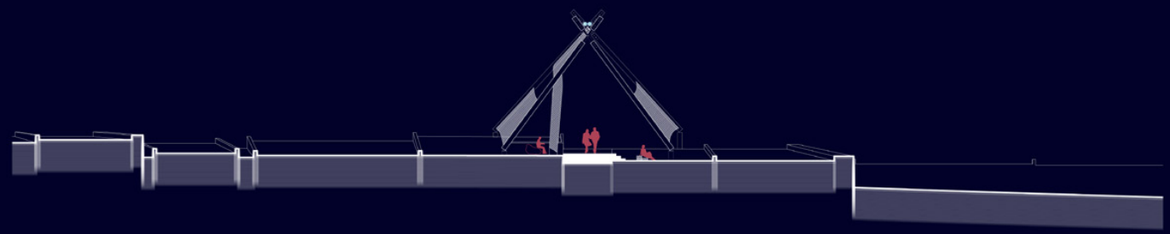
The overall structure becomes a series of frames that links together different parts of the sites and integrates people into the salt flats.

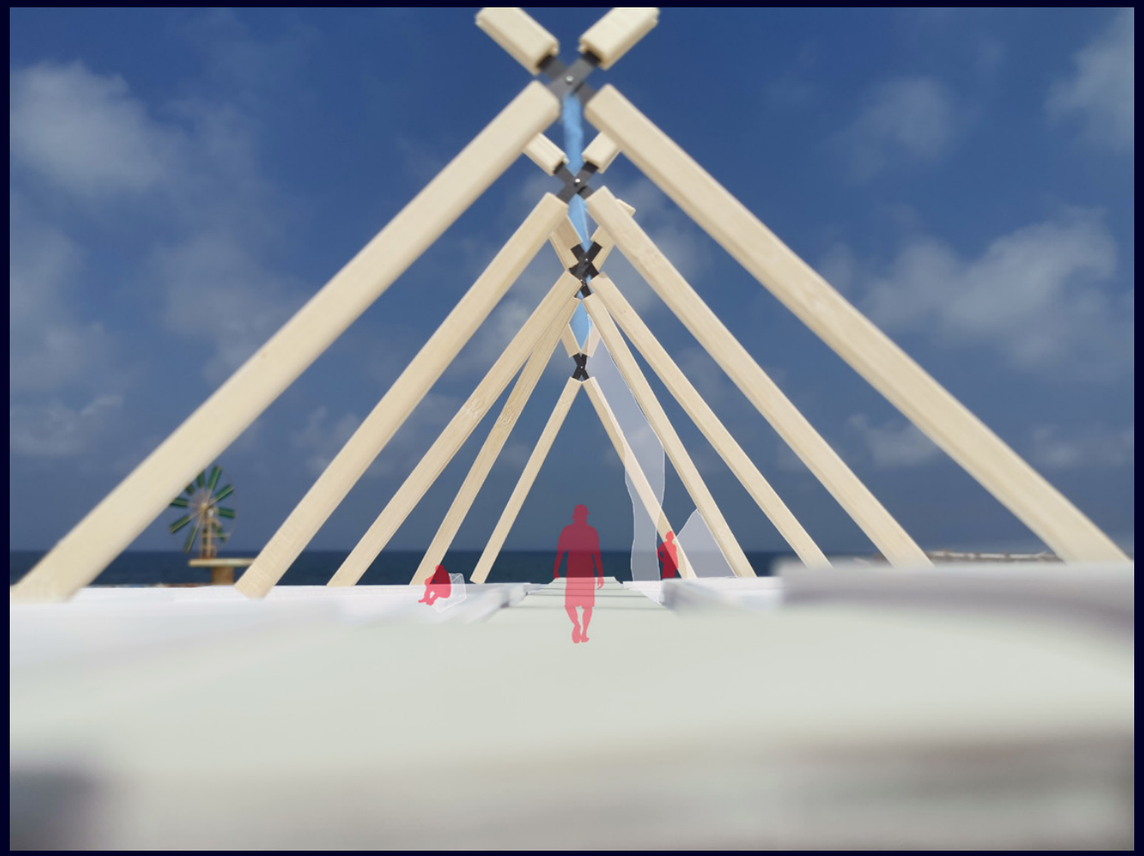
Plug-in Modes
“Therapy”

There are different modes of plugging into the structure. The “therapy” plug-in, which deals specifically with halotherapy. In this space, one is surrounded by salt-clad meshes that sparate people from the main path and allow you to look up to the sky. Another feature of these therapy spaces and the seats that are formed of salt brick which would slowly erode with time.

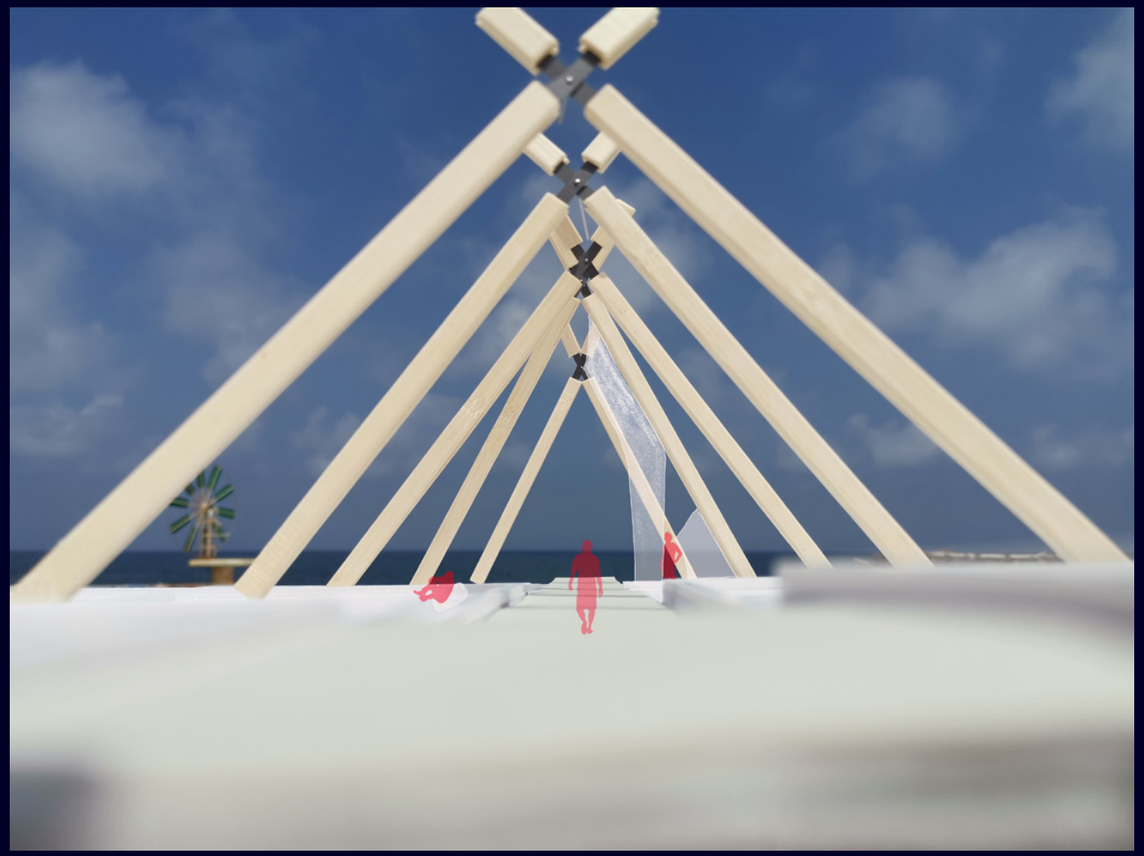
The space is dynamic, with salt water slowly pouring onto the mesh from the top, allowing the salt to slowly crystallize on the mesh. When the salt collector is not yet dense with salt, it is more flexible, flowing with the wind, but as it becomes more and more crystallized with salt, it becomes more rigid, diffusing the light and acts as a thermal insulator for the space.







T0

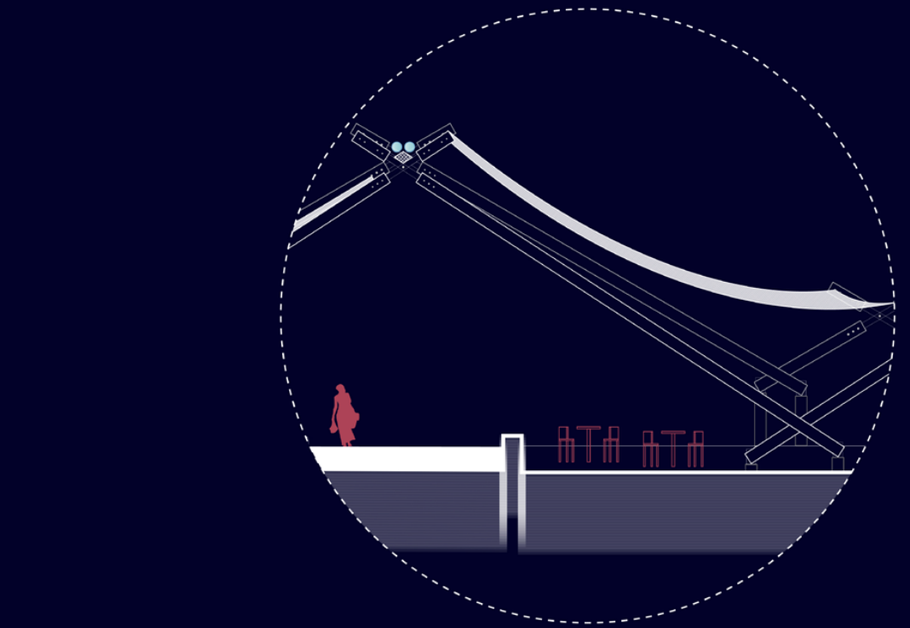


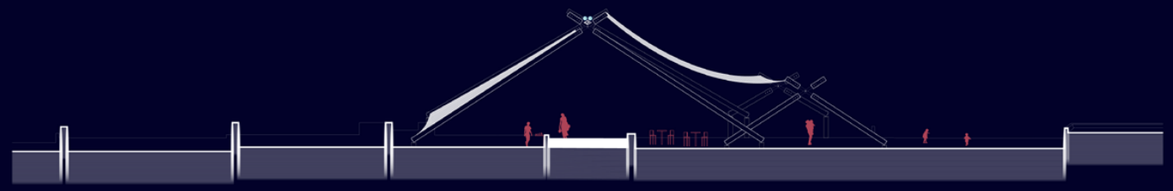
T1

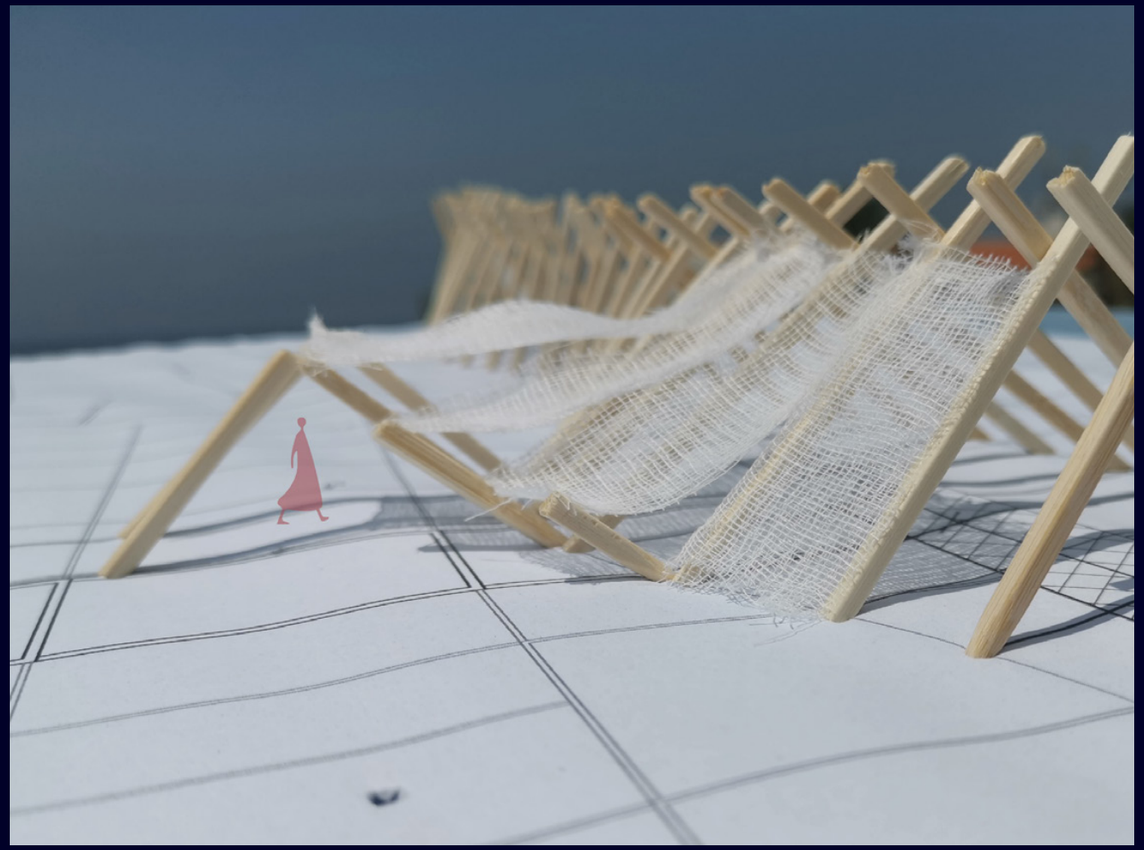
Plug-in Modes
“Market”

The second mode is the market, above which one can find have shading elements that create spots for outdoor seating. The space invites people to shop inside salt flats, and to dine in them as well, similar to how it would happen previoussly for family gatherings and lunches...

This module also allows for lateral expansion and development of side paths that branch out from the main circulation artery.







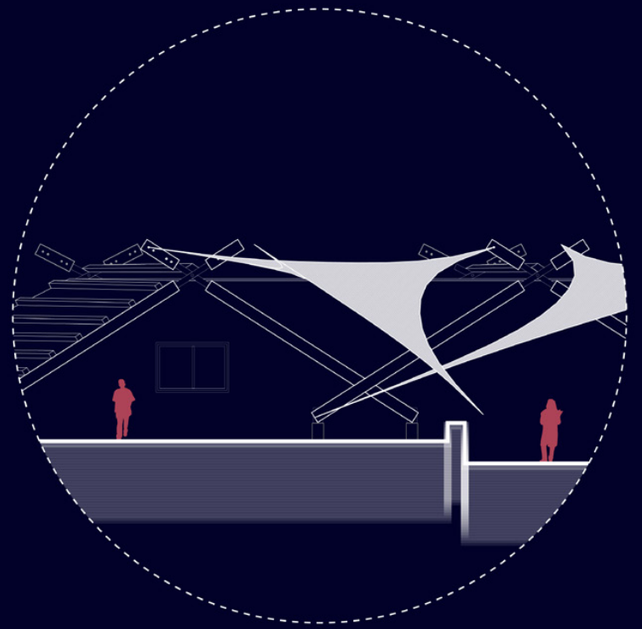
Market View (1:200 Model)

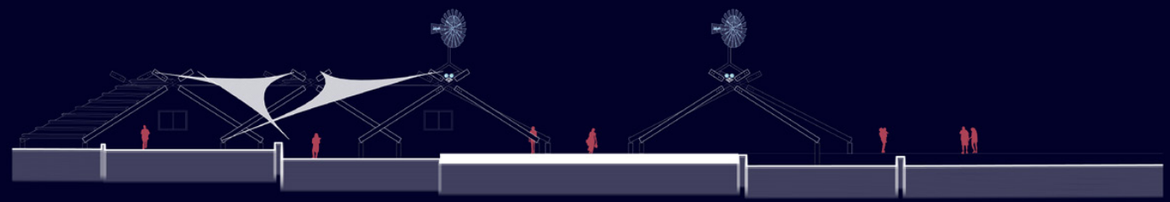
Market View (Render)

Plug-in Modes
“Workshop”

The third plug-in mode is the workshop, which comes in the form of interior spaces. The frames here become the exterior structure between which the space is enclosed.

Two enclosed spaces can thus create a semi-enclosed outdoor space between them which is shaded and used either as an extension of the workshop spaces, or as an outdoor recreatinal space.



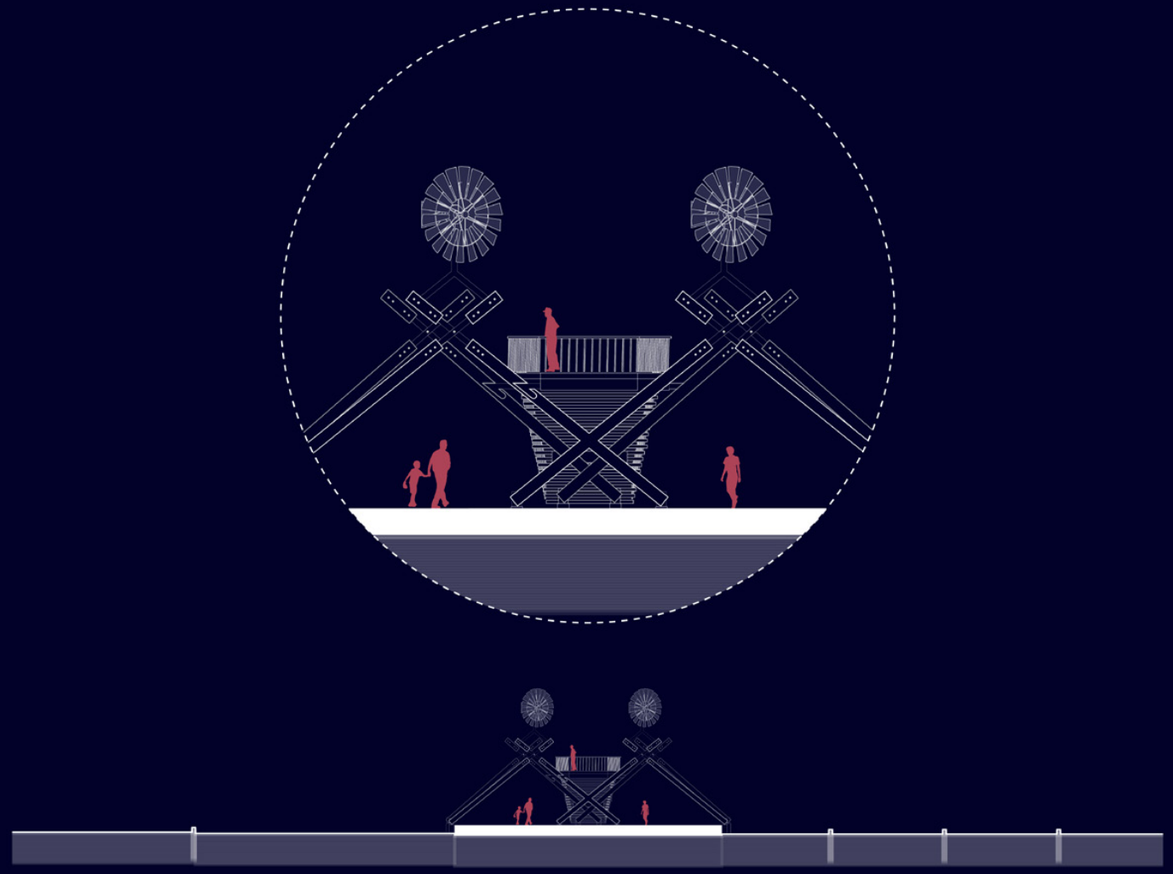


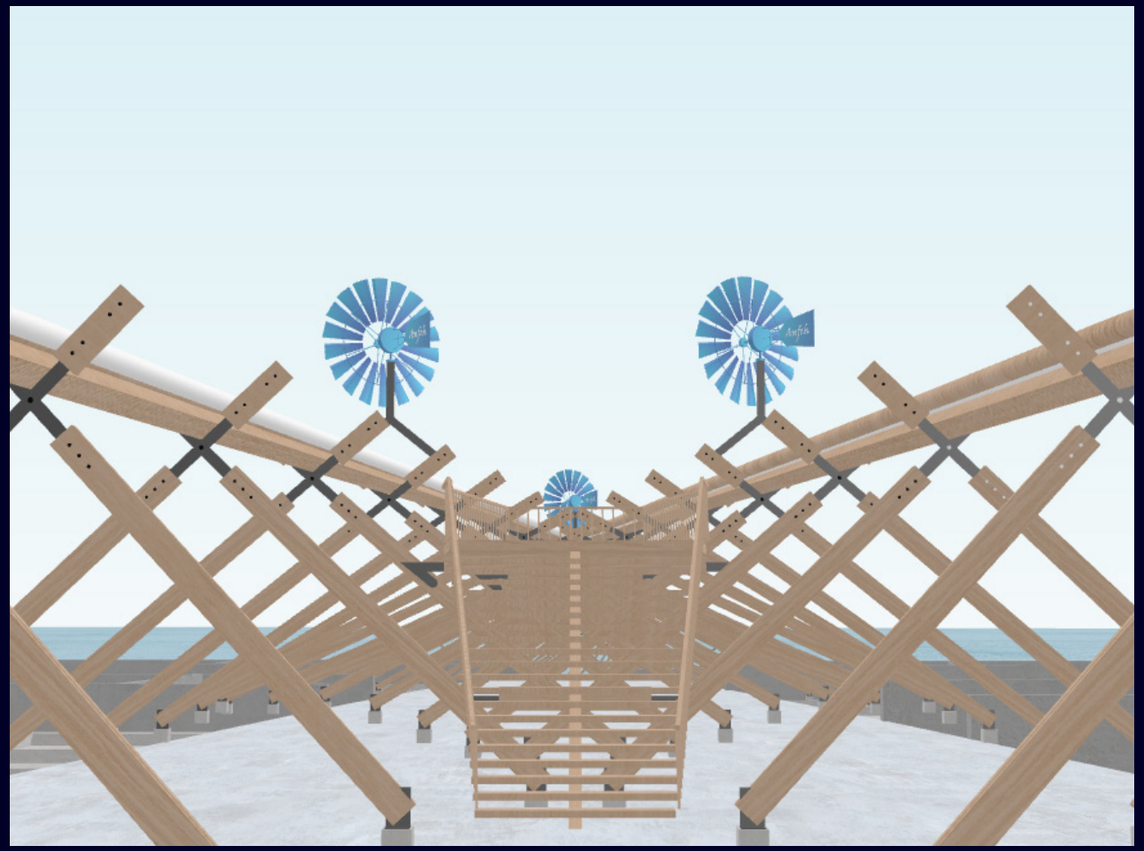
Workshops View

Workshops View

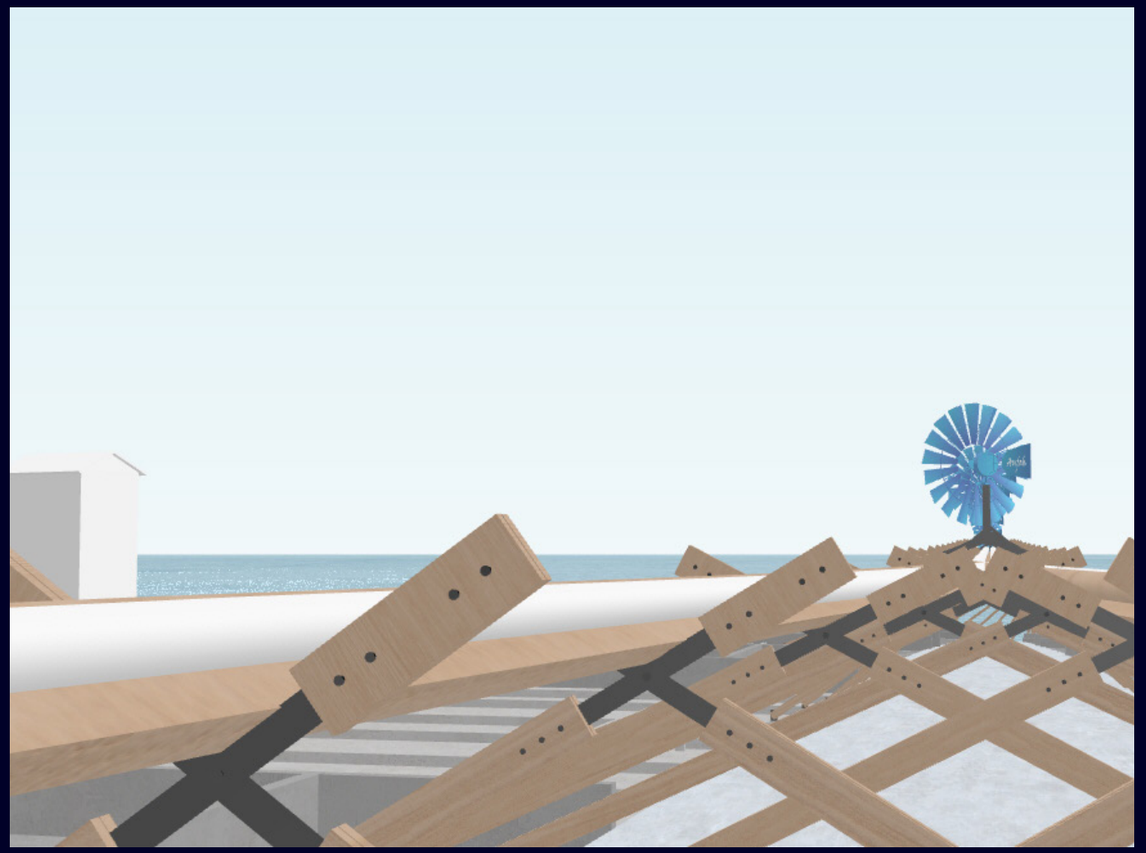
Plug-in Modes
“Staircase”

Another way of plugging in to the A-frames is in the form of a staircase, using the frames as main support. It is rendered a place where one can walk up to the level of the windmills, look at the view below and listen to the sound of water circulating.

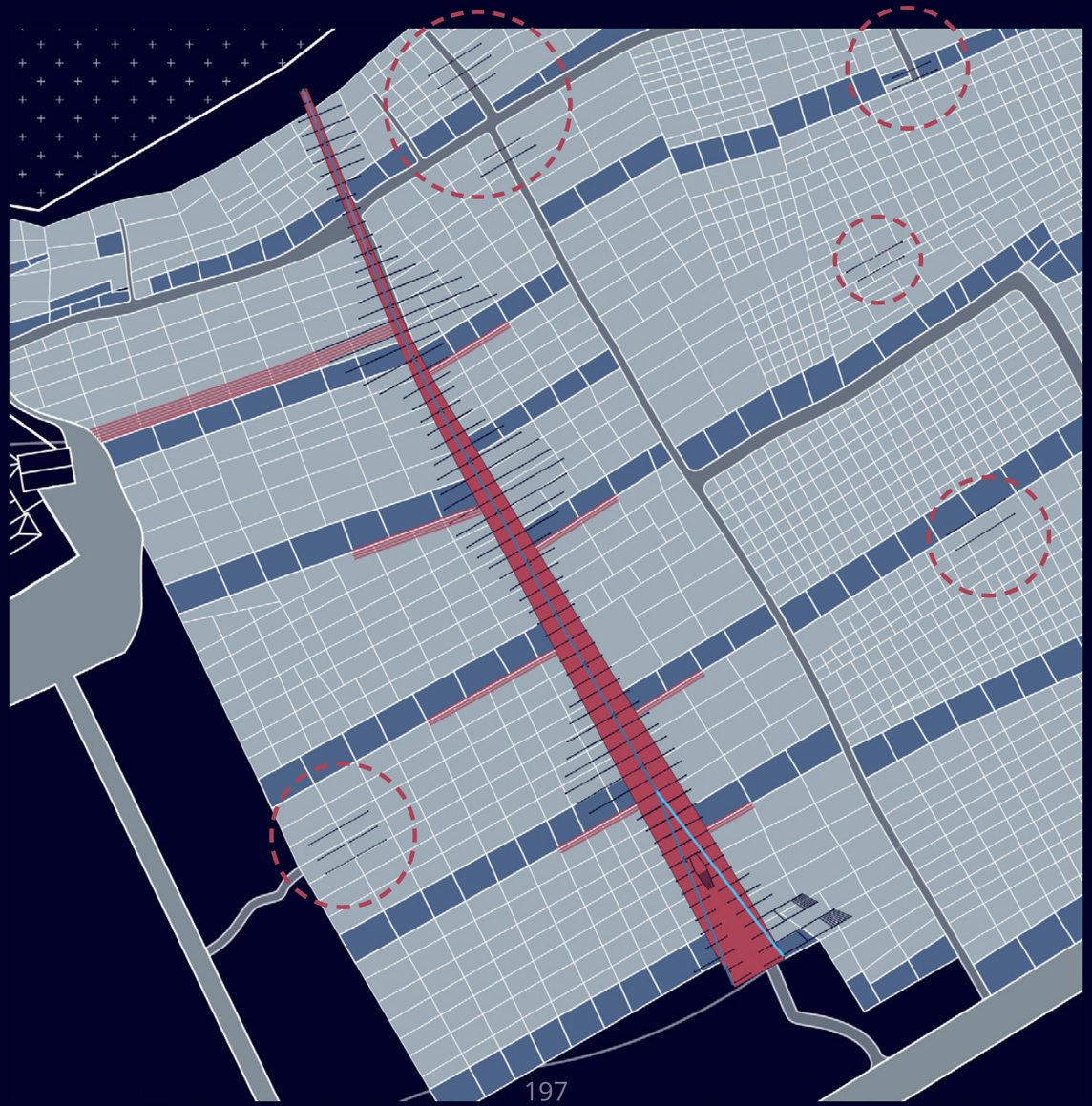




View of the Stairs

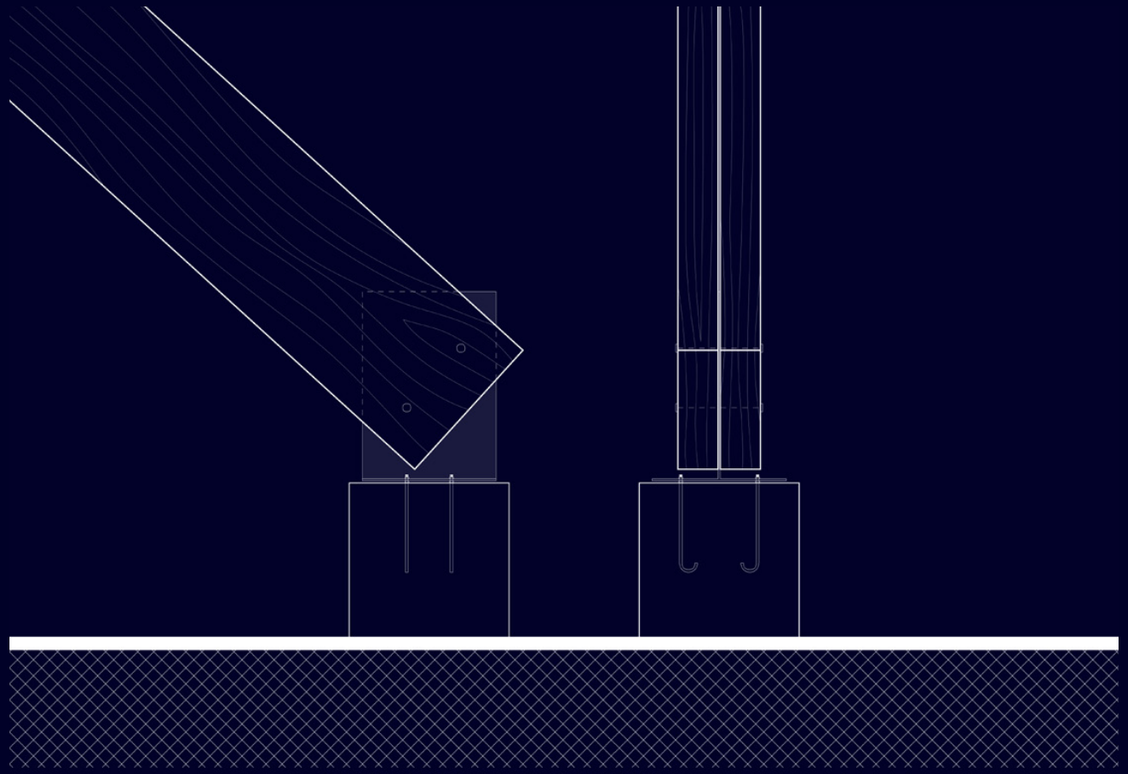


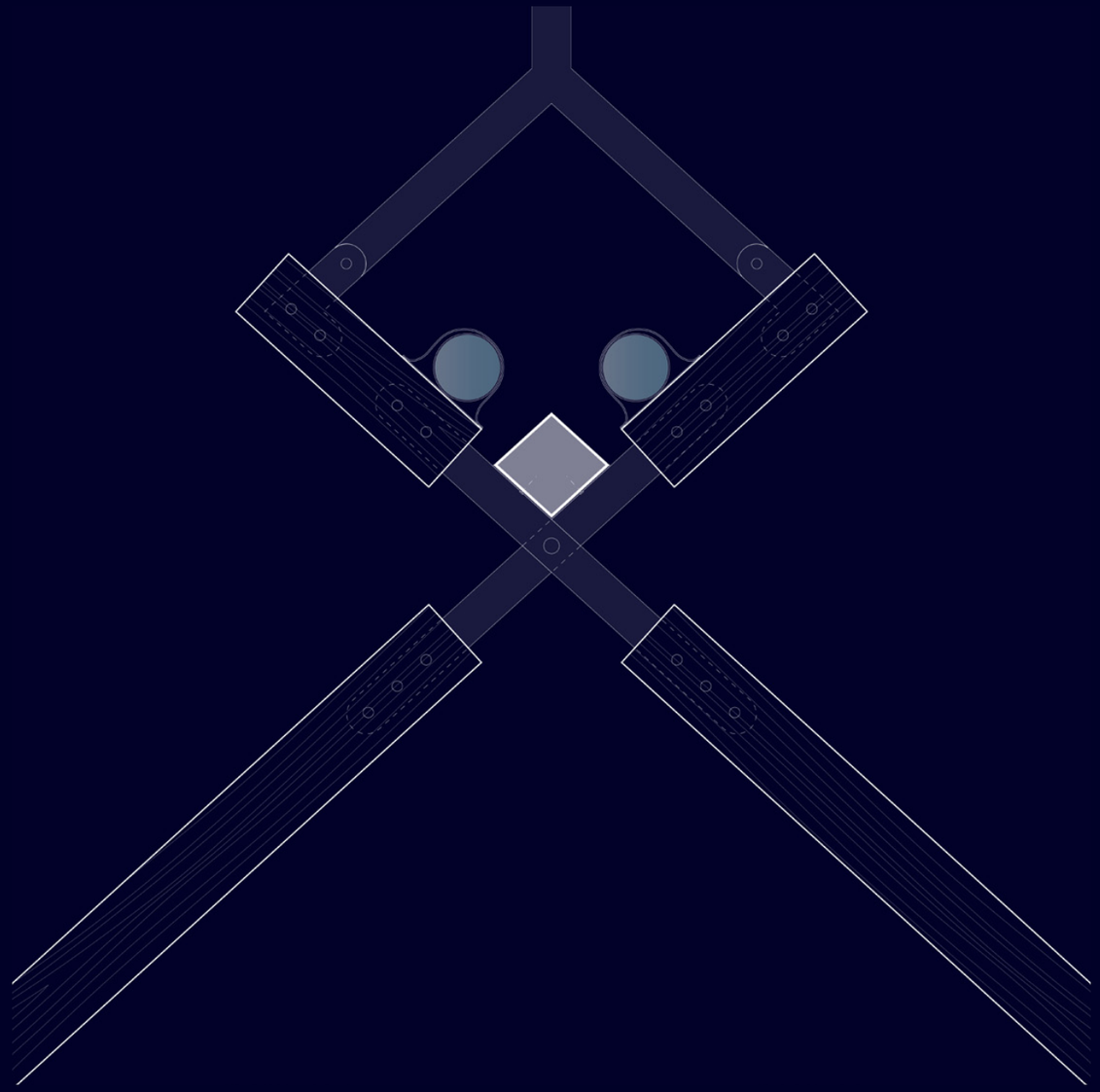
View from the Stairs



In regards to expansion of the structure/infrastructure, the modules can easily adapt to other locations on site. To make the process easier, I have written a grasshopper script, that one could give just one line of the structure, and would generate the needed dimensions and details of the structure.

In a sense the A-frames can be analogous to a salt flat, which is a module that grows organically on site based on need. The frames are thus similar but in a more contemporary way.





The details of the structures make it a simple but flexible module. At the base of the structure, a galvanized steel plate is lodged between two wooden planks and connected to a concrete foundation, touching the floor at only those points, and the top connection allows for the structures to host the main beam, water pipes, and wind pumps when needed.

View from the Sea

201

Youssef

To perpetuate a fading practice is not to look at it as a relic and perpetuate its memory but rather to adapt and reactivate its experience in a simple, efficient way.

I refuse that the site is dying and that we are running out of time. We have a responsibilty to act and reverse the effects of time on Lebanon’s rich salt ecosystem.