COP 26

PAVILION PROPOSALS

DESIGN TEAM:

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PREFACE

The United Nations climate body, holds an annual summit known as a COP, or Conference of the Parties, attended by national ministers and, for the key summits, heads of state. All countries are ‘parties to the Convention’ and the COP is it’s supreme decision making body.

To kick off our adventures as M-Arch Architecture Part II students, 8 students in 4 groups of 2, were tasked to create a pavilion proposal for the United Nations climate summit which will be held in Glasgow, November 2021.

The main goal is to design a Pavilion that has the capabilities of accommodating 100 delegates from the summit. This space is where delegates will conduct further speeches and presentations, Furthermore, the design for COP 26 will include not only Michael Pinsky’s copper roof sculpture but some element of peatlands in an effort to provide further exposure to the importance of peatlands on our planet.

This booklet aims to document our design and narrative that have helped us form our pavilions and support our final proposals for COP 26.

PROGRAM

The UN delegates will use the external pavilion in between their meeting schedules or as they change between the two buildings on site. it is a chance to explore the significance and visual and sensory qualities of the peat bog pavilion to delegates from all around the world to raise appropriate awareness for this issue.
The delegates will also be able to see into the surrounding area of Glasgow as will pedestrians in the nearby streets have a chance to view the pavilion and gather interest.

1.0 MICHAEL PINSKY

Michael Pinsky is a British visual artist who's known for his art installations, that have an innovative and challenging approach to environmental and social issues. He is quite sensitive with the environmental issues. Most of his works goes back to the idea of bringing awareness to the climate change. In his understanding, as climate change is such a slow process, people tend to loose track of what is happening and as there were not as evident issues in big urban areas (before fires in California, Brazila and Austria, flooding in European cities recently), his work tries to accentuate the climate change to bring awareness.

Michael Pinsky works with various type of media like video, sculptures and mapping system etc, to bring the audience attentiveness to the subject in matter. These installations have been displayed as exhibitions in great museums and galleries such as the TATE Britain, Saatchi Gallery, V&A and many more and also in the public realm.

In his recently finished work, a dome like shape,"PODS", was recreating level of pollution in different places inside the dome so people could experience the realities in places where things are 'worse' but are overlooked because they are not in the centre of discussions.

Moving on to this art installation for the COP 26, his aim is to bring awareness to climate change, flooding which are recurring around our planet. By creating this copper object that is formed like a funnel so it can collect the rainwater through its drain points, using copper also emphasises the sound of rain. With this method, he'll engage the viewer with the water element both visually and aurally.

The roof would collect the water and the noise (that will then amplified by utilizing the roof shape along with a sound system and recorded rain) refer to flooding issues - and that goes back to peatlands because this vegetation drain a lot of water and prevent this issues to happen.

The whole ethos of the roof is to portray the drastically situation of climate change which is also accelerating due to our current way of living (economy, populations growth, cosumerism, etc).

2.0 PEATLANDS

The name peatlands is derived from the peat soil and wetland habitat growing on it’s surface. Peatlands are a type of wetlands which make up some of the planet’s valuable ecosystems. They appear in almost every country on earth and cover 3% of the global land surface and are important to global efforts to tackle climate change, as well as the wider goal of sustainable development.

The protection and restoration of peatlands is pivotal in the transition towards a low carbon and circular economy. In their natural, wet state peatlands provide vital ecosystem service. By regulating water flows, they help minimise the risk of flooding and drought and prevent seawater intrusion.

Draining peatlands reduces the quality of drinking water due to the pollution from dissolved compounds. Damage to peatlands also results in biodiversity loss. Damaged peatlands also contribute to 10% of greenhouse gas emission.

3.0 INTRO TO GRIDSHELL

Gridshells are complex structures with an interesting potential to respond to innovative architectural forms. These structures have the shape and stiffness of a double curvature shell; however, they are made by beam elements instead of a continuous surface (Bouhaya L.)[1]

The invention of the gridshell concept is commonly attributed to the innovative architect Frei Otto, a German architect who devoted several years to gridshells. He developed the concept of gridshells which could be designed by a funicular modelling method and constructed from an equal mesh net of timber laths bent into the planned shape. In 1970 this technique was used to construct a 9000 m2 curved roof structure from 5cm square timber laths.

Gridshell is technically grids behaving like shells but is made of a grid. from a mechanical point of view this means that stresses acting on the structure are mainly transmitted through compression and tension.[2]

Thus, the material is not spread continuously as shells, but it is organized in a discrete grid pattern. Like shells, gridshells derive their stiffness from their double curvature shape. These structures can cross large spans with very few materials.

A shell is a three dimensional structure that resists applied loads through its inherent shape. There are a several forms of structure that belong to this group of load bearing structures, which carry applied loads mainly by way of membrane forces.

They carry loads by way of tension, compression and shear forces in the plane of the shell and thus are structurally efficient and for this reason thin sections are possible. It is possible to build structures with stable surfaces either both curved in the same sense or curved in opposite senses with the tensile forces in one direction stabilising the tendency to buckle out of plane in the other direction which is being compressed. Shell structures take many forms. If regular holes are made in the shell, with the removed material concentrated into the remaining strips, the resulting structure is known as a gridshell.[3]

The following section aims to provide a clear understanding on what the gridshell structure system offers and what lead us to propose it as a viable option.

THE ADVANTAGES OF USING GRIDSHELLS

- Gridshell structures are lightweight,
- Such structures were initially designed to shelter public (Baverel O. and ouhaya L.).
- A grid behaving like a shell—and a specific construction process—using the bending flexibility of the material.
- Lacking shear stiffness, is elastically deformed up to a targeted shape with the help of stays, and then braced and covered.
- Offers a very elegant manner to materialize freeform shapes from an initially flat and regular grid, which obviously has many practical benefits: planar geometry, standard connection nodes, standard profiles.
- Long span structures comprised of a lattice of single layer members forming a curved surface. Grid shells can be made of a wide range of materials from steel to wood.
- They have potential to be used in readapting existing spaces or in new aesthetically pleasing structures.
- Their shape directly derives from their flow of forces and defines their load-bearing behaviour and lightness [4].
- The structural performance of gridshell structures is strongly related to shape,
- Minimum use of materials, structural efficiency and the creation of a large volume, as well as the potential for quick and cost-effective construction. A gridshell is a structure that gains its strength and stiffness through its double curvature configuration.
- Because of their original organic shape and the column free space that they provide, the design of grid shell structures challenges architects and structural engineers in more than one way. Very few grid shell building exist around the world. This scarcity may be explained by the level of innovation required in such fields as design technique; construction scheme, use of material.[5]

4.1 GRIDSHELL GROUP 1

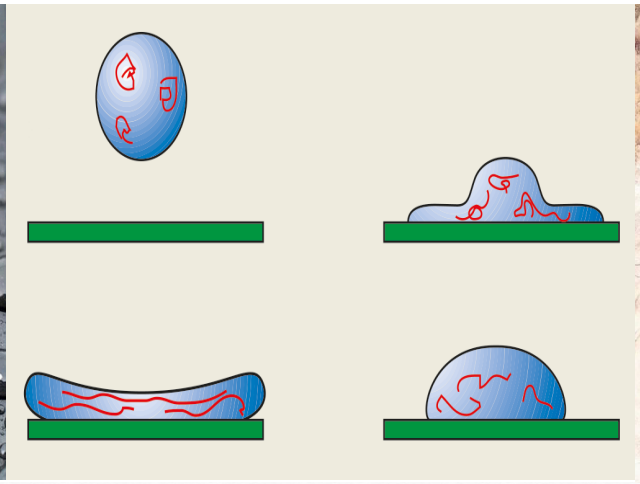
HUSSEIN ALI KASIM & MOHAMMED PATEL

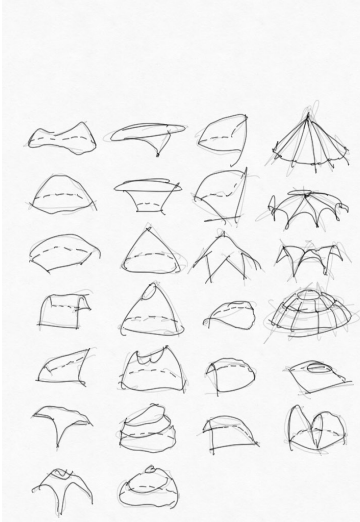
Our pavilion is dedicated to telling many stories regarding climate change. The first story is told by the form our pavilion takes. Dedicated to nature, it symbolises rainfall and the cycle a rain drop takes to be formed before coming to rest on a surface. It also represents the collection of water that subsequently creates a type of peatlands call bogs. Finally the skin of our pavilion is scattered and fragmented, which is in direct relation to the destruction of our planet and how fragmented we are as humans, from actually looking after our planet.

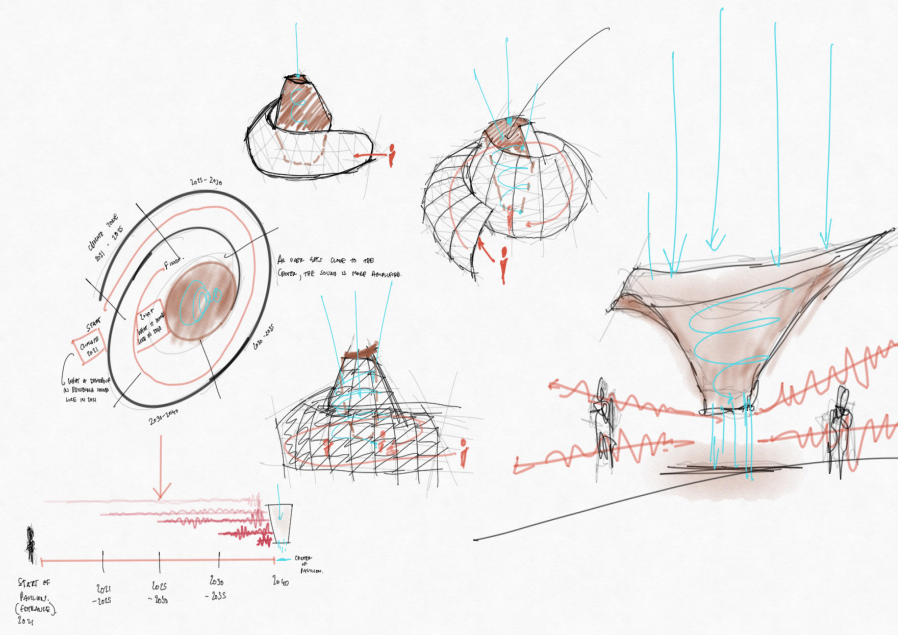
Peatlands takes an important role within our pavilion. Not only does the majority of the pavilion take the form of bog peats, but the narrative inside the pavilion is paramount. Peatlands are importance to the planet. Not many people know what damaging our peatlands really does in our fight towards climate change. This pavilion is designed to set that right. What we have dubbed ‘climate experience’ within our pavilion, is set to walk users through a range of different, sensory and audible experiences of what is happening around the world when it comes to the topic of climate change. Whether this is via a direct outcome of climate change or an impact that is causing an overall de stabilisation of our ecosystem.

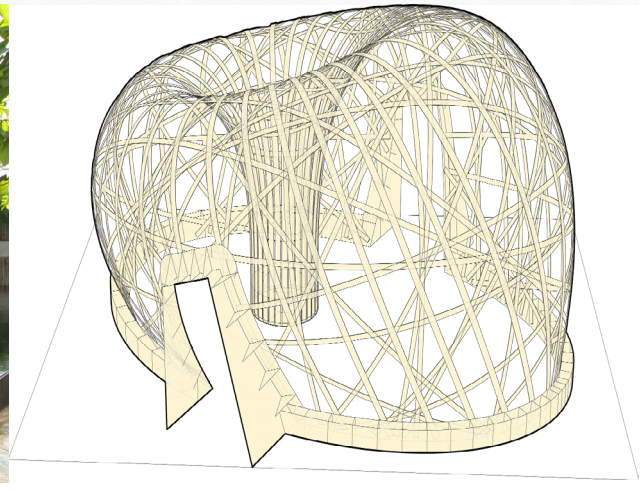
The final piece to our narrative jigsaw is located in the ‘droplet’. A space that houses Michael Pinsky’s copper roof sculpture that is designed to raise awareness of flooding by amplifying the noise of rain water by the materiality used and the integrated sound system. This once again links back to our narrative of the peatlands as this vegetation drains a lot of water and prevents this issues from happening. We also wanted to expand on this narrative and used the rain water collected via the sculpture to create an overflow flooding system that floods 15 chambers that represent 15 cities that could potential disappear by 2100 due to flooding and rising sea levels. We wanted a visual representation of this as we felt people tend to loose track of what is happening so a visual representation of this could potential bring awareness to an event that we are ignoring.

PRECEDENTS + RESEARCH







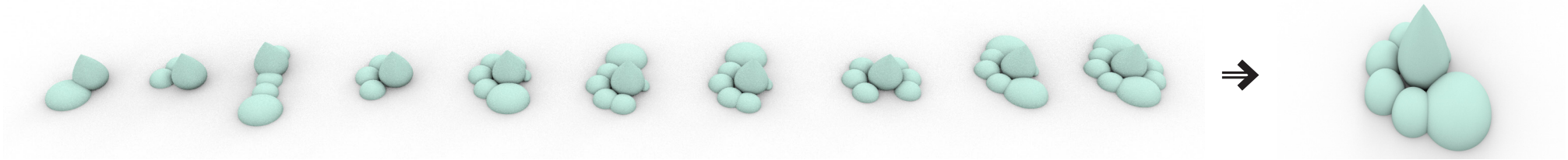


DESIGN FORMULATION

FORM FINDING

THE SHAPE OF RAIN

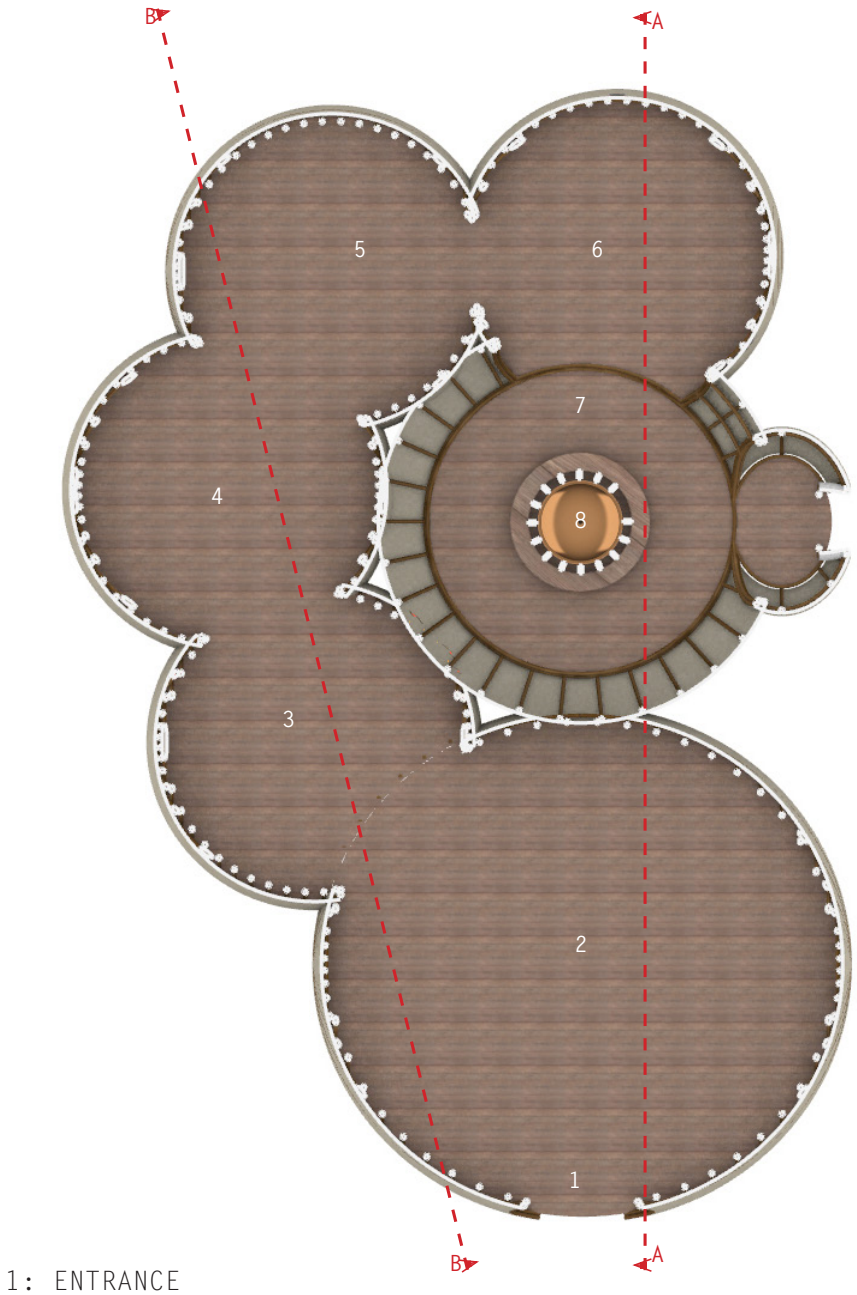
FORMED FROM NATURE



From the start our design philosophy was based around linking our proposal to nature and to tell a story. Michael Pinsky’s copper roof sculpture was the catalyst behind looking at rain and the physics that make up a raindrop and it’s formation. We carefully looked at how a raindrop is formed as it descends from the clouds. This is a continuous cycle until the raindrop finally makes contact with it’s resting surface. We then looked at how they gathered upon this surface and were deeply inspired but the randomness and forms that were created.

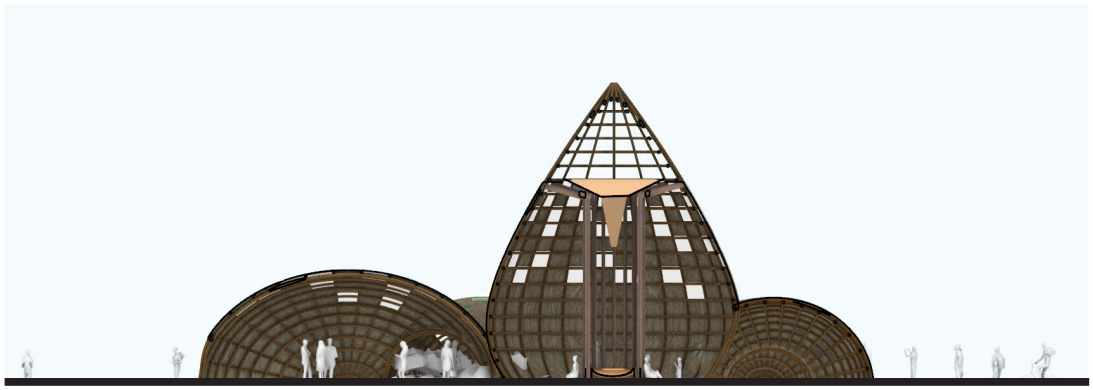
PLAN & SECTIONS

PLAN



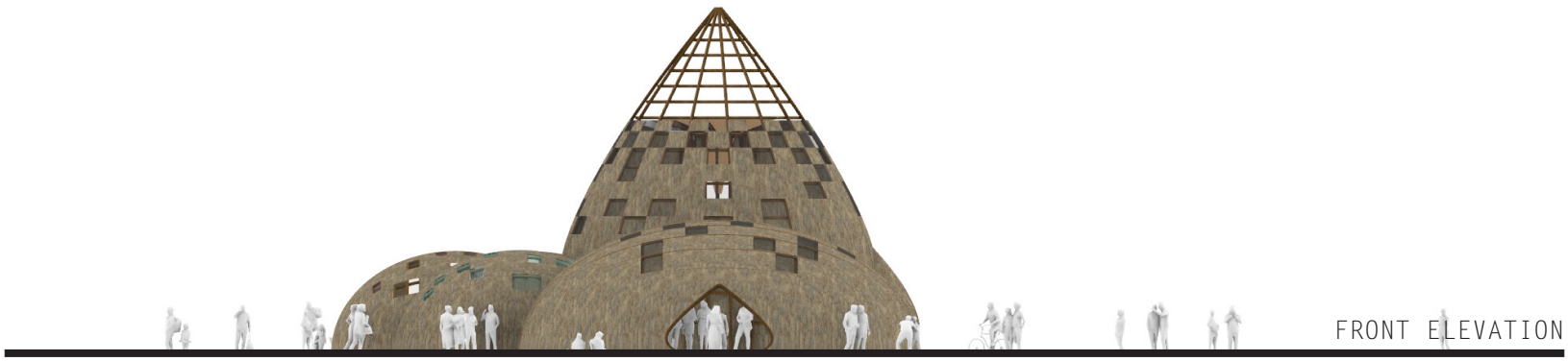
1: ENTRANCE
2: ATRIUM
3-6: PEATLANDS EXPERIENCE
7: THE DROPLET
8: MICHAEL PINSKY'S SCULPTURE
9: EXIT

SECTION A-A

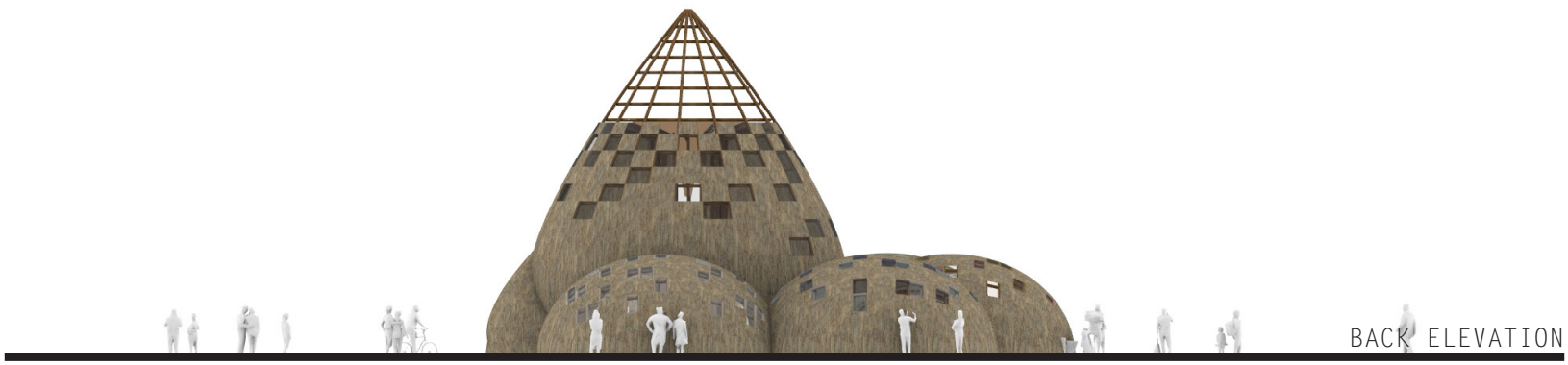


SECTION B-B

ELEVATIONS



FRONT ELEVATION



BACK ELEVATION

SIDE ELEVATION 1

SIDE ELEVATION 2

NARRATIVE

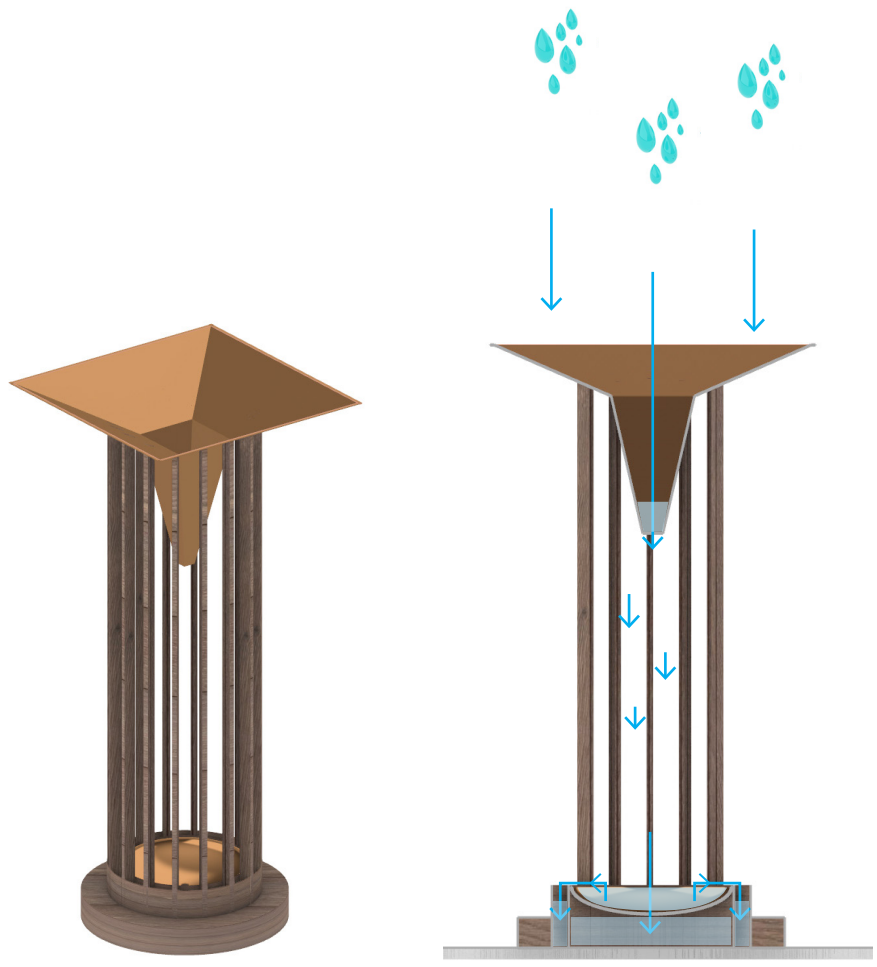
PROTECT THE PEATLANDS

Portraying the story of the peatlands and how important they are to the planet is a unique opportunity to tell a compelling narrative and one that we could bring to the attention of people visiting the pavilion that may not know just how important the peatlands truly are.

We decided that each of the 4 mini shells would act as it's own warning to climate change. These 4 shells have been dubbed the 'Peatlands Experience' where users would experience different peatlands around the world, their unique characteristics and how they are so beneficial to our planet. Each shell would have acrylic sheets representing the colour of the particular event, with amplified sounds of the event and the ecosystem and wildlife being affected by peatlands destruction.

NARRATIVE

TIME RUNS OUT



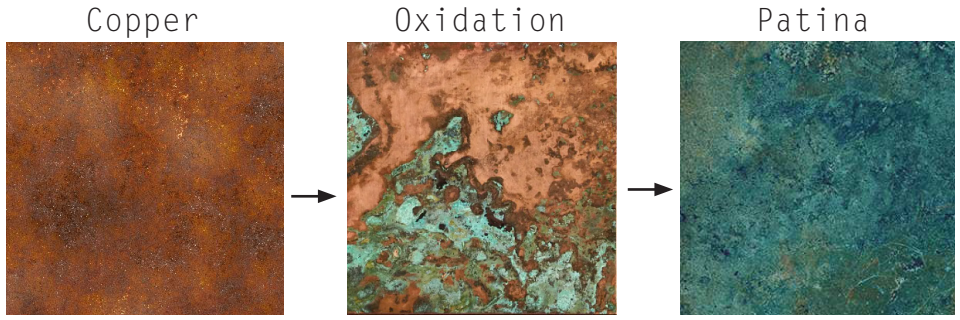
Michael Pinsky has not only created an incredible sculpture that shows how passionate about the topic of climate change but a piece that really made us expand further behind the story and how we incorporated it within our pavilion. Not only did we want to achieve Michael's objective if amplifying the sound of rain and it's collection to relate to the flooding issues seen around the world due to the destruction of the peatlands but we wanted to include a metaphor of time is of the essence. We designed the frame that represents an hour glass. The water would be collected in a basin below and would eventually overflow to represent flooding. The water would eventually overflow in the 15 separate chambers that represent cities around the world that are more susceptible to flooding due to climate change in the next 50 years.

MATERIALITY

MATERIAL

Copper is being used as the main material for the COP 26. Unlike other metals such as iron, Copper oxidises instead of rust. Rust gives a negative impact on the material, slowly destroying the properties of the metal. However, oxidisation happens when exposed to air, allowing a film to coat over the copper giving it protection. Over time the colour changes into a green like substances called Patina.

Example of oxidisation on the Statue of Liberty.



Reed is a widely used material throughout the world including Austria, China, France, Turkey & many more, specially the UK. Reed has a long life span as well as being tough in it’s build qualities making it the best for thatching.

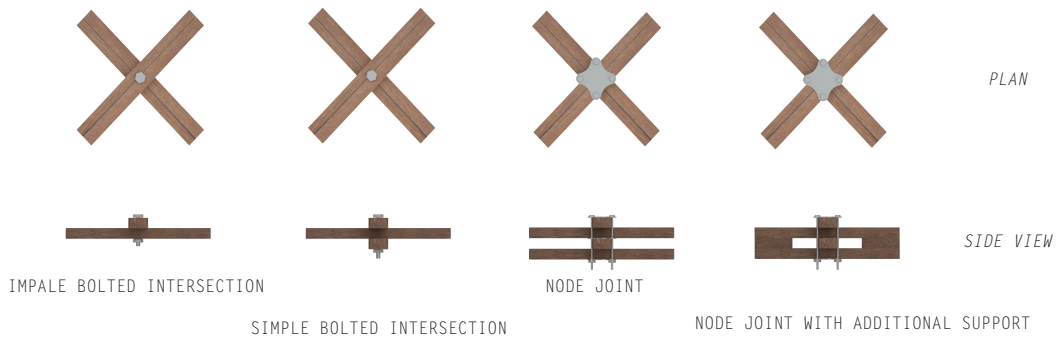
Why reed:

- It is an ecologically renewable source.
- Makes for a superb insulator in winter, yet is also cool in summer.
- When compared with tile roofing, thatching is comparatively cheap.
- Natural water & wind resistance.

PUTTING IT ALL TOGETHER

1. Michael Pinsky’s Sculpture
2. Roof & Sculpture Support
3. Splash Guard + Rain Flow Support
4. Copper Basin Amplifier
5. 15 Timber Frames Representing Cites At Risk of Flooding
6. Overflow System
7. Seating
8. Vertical Bamboo Frame
9. Horizontal Bamboo Frame
10. Reed Shell

Different types of joints were looked at to see the best possible system that can be used for our grid shell. In our research we discovered the stronger the joint the less flexible the grid can become, giving the grid more tension which can cause damage over time. One of the outcomes was to tie the grids with string, allowing it to be strong within the connection module while also maintain flexibility. This is also beatifically to a structure that can be put together and taken apart later on.



Connecting the Reed.

The reeds are placed as batch onto the roof and pinned down with a reed pin. Once aligned the reed batch is cut open to allow the reed to spread, equalising the reed in an angle to give the roof a diagonal look which will allow water to flow down on rainy days. Coarser (hook) are used to hold the reed in place. A torx screw is used to wrap a stainless steel wire into the reed to permanently place the reed on the roof. This can be then repeated for each layer.

AFTERLIFE

WELCOME TO THE AFTERLIFE

Shelter in local parks

Bike shelter / parking space. Theft is an issue and is 20% of the reported crime in Cambridge due to lack of secure parking.

Market stalls. Working with council, provide stall coverage for those that follow a no waste policy and help Distribute food to the homeless in Cambridge.

Potential use for community gardens and allotments that work with the Cambridge city council to mitigate climate change and reduce carbon emissions.

Main atrium to be utilised as a children hut for potential primary schools situated in Cambridge that don’t have the biggest budget to upgrade facilities.

Materials to be recycled for Michael Pinsky’s Cambridge plot.

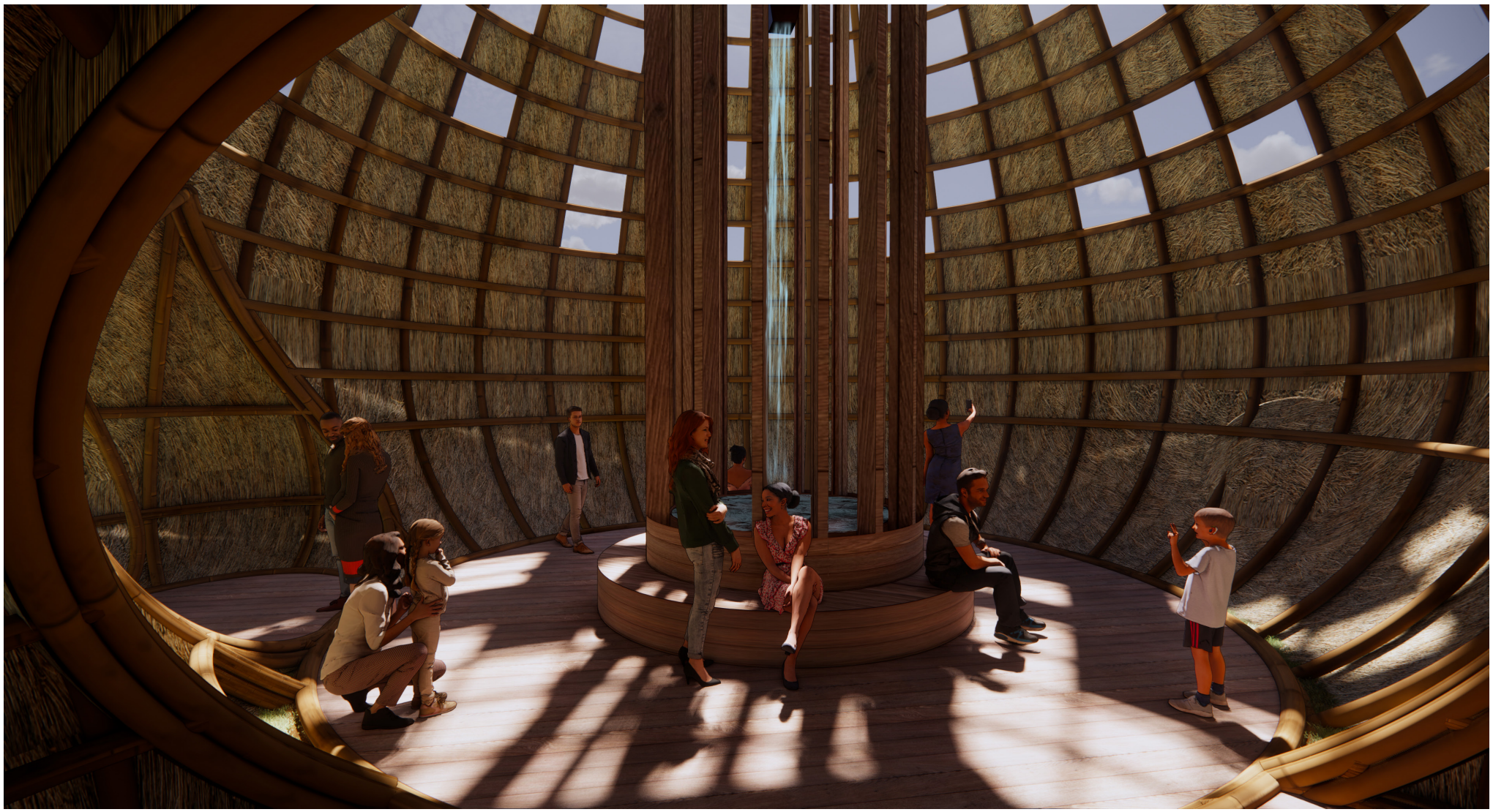
VISUALISATION

EXTERIOR VIEW

VISUALISATION

THE ATRIUM

VISUALISATION



THE DROPLET