

The Powerhouse Pavilions

NOON SALIH: At the heart of Expo 2020 Dubai, right next to Al Wasl Plaza, is the elegant pavilion of the United Arab Emirates. It's futuristic-looking and avant-garde. An architectural marvel with wings, and I mean that literally.

SANTIAGO CALATRAVA: The principle design concept takes inspiration from the vision of the majestic falcon...

NOON SALIH: This is Dr. Santiago Calatrava, the Spanish-Swiss architect and engineer behind this stunning structure.

SANTIAGO CALATRAVA: The falcon is the national symbol of the United Arab Emirates, with its natural elegance and large wings. It represents many characteristics of the first 50 years of this young nation, such as ambition, and the brave and visionary spirit of its people.

NOON SALIH: Dr. Calatrava took this national symbol and brought it to life in the form of the host nation's pavilion. It looks like a majestic falcon in flight, with 28 wings that move up and down throughout the day. It's truly stunning, the kind of building that stops you in your tracks because you have to take it in.

Similarly, each of the Expo's thematic districts is anchored by an architectural delight that tells a unique and moving story. In this episode, we take a look at the architecture of the UAE pavilion, Alif the mobility pavilion, and Terra the sustainability pavilion. How do they continue a long tradition of World Expos being a platform for architectural innovation and placemaking?

I'm Noon Salih, and this is Inside Expo, an official podcast of Expo 2020 Dubai, where history is being made.

[INTRO STING]

NOON SALIH: Covering nearly 15,000 square metres, the UAE Pavilion is the largest on site and stands out with its 28 massive wings. The pavilion spreads these wings during the day to reveal photovoltaic cells that harvest energy from the almost-year-round sun of the Gulf region. When closed, these wings protect the cells from rain and sandstorms.

If there was ever an example of form serving content, this biomimetic design would be it.

SANTIAGO CALATRAVA: In the beginning, the idea of these wings, embracing and protecting and sheltering the pavilion, was there. Also the idea of working, looking from the actual architectural language, with a daring language. The language of the movement.

Those wings open and close like the wings of a falcon — the feathers. All of that made in the Emirates. That's important. The steel was fabricated in the Emirates. The carbon fibre. All the fibreglass and all the cladding, we have all done onsite.

NOON SALIH: To enter the pavilion, you descend a ramp that feels like a portal to another world.

The hustle and bustle of the Expo fade to the background, creating a moment of serenity almost under the shade of these wings.

SANTIAGO CALATRAVA: Now, when you go in and descend the ramp, then two worlds are coming together. The ramp is done in concrete. The bridge is also done in concrete to enter. But all these wings hanging over your head, they're done in carbon fibre. Now, you see, you have a contraposition.

NOON SALIH: By contraposition, Dr. Calatrava is referring to the contrast of traditional building materials like concrete with modern materials like carbon fibre.

SANTIAGO CALATRAVA: And this contraposition, I tell you, the people, even if they don't understand it, they can feel it.

NOON SALIH: At the end of the ramp is a courtyard with pools of water on each side and a thin stream running down the middle. This is the falaj, a traditional irrigation system used in the Gulf region.

Once you enter the pavilion, you find yourself in a desert with sand dunes of different shapes and sizes. Each sand dune corresponds to a different region of the UAE, and yet they all come together under one roof in this pavilion.

As you navigate the pavilion, you see images and footage from the UAE's past, present, and future. In one corner, you'll find a picture of the late Sheikh Zayed bin Sultan Al Nahyan, the country's founder, projected on a sand dune. In another, videos showcase snippets of vibrant daily life in the country. It all stands as a testament to the host nation's growth, diversity, and ability to achieve the impossible.

After passing through a short hallway with pictures showcasing the UAE's diverse community, you find yourself in an auditorium showing a short animated film projected on the ceiling. This film, like the ones that played in UAE Pavilions at previous World Expos, tells the story of the country over the past 50 years. But here's the twist.

As the film plays, the entire auditorium rises, like an elevator, to the main floor of the pavilion. It feels like you're jumping into the world of the film!

Finally, you emerge into the gleaming-white viewing gallery of the pavilion, where you can see displays of different Emirati innovations and achievements. At the apex of the ceiling is an oculus skylight in the form of the Expo 2020 logo. There are no beams in sight; everything feels like it's floating in the air. Almost like a falcon in flight.

SANTIAGO CALATRAVA: Something that people need to be sensible... is to an architectural concept called "architectural promenade."

So you have a real promenade. You enter, you walk under the wings, you take the ramps, you go down, you go into the gardens, then there is a pool with water. You are in a more secluded atmosphere, but over your head are the wings. And then you enter in the exhibition. So the introduction is, in my opinion, very harmonious.

This architectural promenade, even the way how you leave the pavilion and then you walk towards the Plaza... The wings are even accompanying you until the last moment. Isn't it? So, I think it's a good example of symbiosis between content and form.

NOON SALIH: From the UAE Pavilion, we go to the thematic pavilions of Expo 2020 Dubai, specifically Terra — the Sustainability Pavilion, and Alif — the Mobility Pavilion. Now, you might be wondering, “What happened to Mission Possible — the Opportunity Pavilion?” Don’t worry, we’re dedicating a two-part series to the architecture and visitor experience of Mission Possible, and it’s actually coming up next on Inside Expo!

But there’s also a common thread connecting Terra and Alif. They both were the result of a design competition launched shortly after Dubai won the bid to host the Expo. Here’s Marjan Faraidooni, Chief Experience Officer at Expo 2020 Dubai, to tell us more about this competition and how it was run.

MARJAN FARAIDOOONI: We developed design briefs for a global competition that was going to be launched in July 2015. And what was in those design briefs was very clear; we knew that these structures had to be very appealing, and they had to live up to what the themes were. So we defined our themes in the competition brief so that the architects could understand where we were coming from and what messages we wanted to deliver through these structures — architecturally, but also from a visitor experience perspective.

We really pushed these design firms to think boldly and out of the box, just like what this whole Expo is all about. So we gave them room to dream, but we also had the responsibility to make sure that whatever they wanted to put on the table was doable. Which gets me to, how did we evaluate these designs that we had?

We had around 12 criteria that we assessed against. One of them, of course, was architectural expressions. World Expos are known to be places where you inspire

people by the form of these pavilions. So the architectural expression was very important here.

But also function was important. Were these structures able to welcome as much visitors that they can on a daily basis?

How the design expressed the theme from a visitor experience and an architectural perspective was very important. Integrated design was important, meaning, did the design integrate the structure and the experience?

NOON SALIH: In addition, these architects had to consider legacy usage into their design: meaning, not only how it will operate and exist during Expo's six-month run, but also how it will transition into District 2020, the Expo's legacy site.

And so, after a long and thorough assessment process, the Expo 2020 Dubai Higher Committee chose two winning designs. The first was for Terra, the Sustainability Pavilion, designed by Grimshaw Architects.

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NOON SALIH: And really, their design proposed something quite revolutionary, especially for the region.

ANDREW WHALLEY: We thought, well, why can't we demonstrate that you really can do a building that's completely self-sustaining — not just good or very good, but quite incredible and kind of shifting the paradigm if you like?

NOON SALIH: This is Andrew Whalley, Chairman of Grimshaw Architects.

ANDREW WHALLEY: And so we thought, can we generate all our own power, make all our own cooling, generate all of our own water, deal with all the waste? So if you wanted to, you could almost unplug it and it could just exist on its own. So that was a very ambitious goal we set ourselves.

MARJAN FARAI DOONI: And the boldness of the design and the intent of really having it be the definition of sustainability was what made it a winning design.

To start with, when you are told that you're going to create a self-sufficient building from an energy perspective and a water perspective, you have no choice, but to go, "Oh, this is interesting and there's something there."

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NOON SALIH: Terra makes quite the first impression on a visitor through its striking rooftop — which you can see even while waiting in line to enter the Expo. This rooftop is one of Terra's primary sustainability features.

ANDREW WHALLEY: We thought, "Well, how do we collect the energy and keep the whole site, you know, cool?" And we were kind of inspired by Ghaf trees. You know, you have these beautiful trees in the desert with incredible deep taproots finding water. And so over the whole building, we did this design — this canopy. And so it's covered with thousands of square metres of photovoltaics, which are those solar panels that generate electricity.

But when we did our calculations, we found that all those photovoltaics still didn't give us enough power to be completely self-sustaining. And so we came up with

this idea — actually, they were kind of inspired by these wonderful Dragon trees from Yemen — but they're almost like sunflowers. So we thought, "Well, let's create these structures in the landscape that shade the landscape as well." And like a sunflower, they could follow the sun throughout the day.

And so during the daytime, we actually pump power back into the grid and share it with the rest of the Expo site. During the nighttime, we then pull that power back in again. So at the end of the day, our total power usage is zero.

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ANDREW WHALLEY: So as the temperature changes from the hot day to the cooler night, water condensates on the e-tree and we collect it. and then put it through filters, which included ultraviolet and so on to clean it and then put it back in our system.

So that's one way of generating water but actually we use a number of ways; we also use reverse osmosis, which is where you take the slightly salty water out of the ground... The water table is reasonably high here, so we could pull water out of the ground, and then we push it through filters, and that gives us fresh water. And then you get left with a byproduct, which is very saline water. And then that goes into evaporative areas, which you'll see, and we then collect the salts and use the salts. So nothing's wasted.

And then even our wastewater, that goes into reed beds, and then the reed beds help filter and clean it, and they're growing - they're quite big and lush now. And then, the water seeps into the landscape.

MARJAN FARAIDOONI: It really represented sustainability from an architectural building perspective, but also an experience perspective.

And one of the things about the submission of Terra is that there was a great family of people who were involved in delivering it from the Grimshaw perspective. So they had a very compelling advisory group that supported in pushing the envelopes of what this experience could be from a building architectural perspective, but also from a visitor experience and an exhibition perspective.

And that, I think, goes back to what this Expo is all about. It's about connecting with each other, so we did that. And that whole journey of designing for the building and the experience, it took us a year and a half to get to the final product before we actually went into [the] detailed design of the exhibition.

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ANDREW WHALLEY: You actually start millions of years ago, where there were forests in this region.

And as you make your way down, you then come through different animals as the region changed, and then you find the Bedouins and how they lived in this climate using resources very carefully. Until you finally come to [the] present day, as you come into the courtyard.

So what we did, for the Expo, is we split it into two. So when you come down into the courtyard, you have two choices: under the ocean and under the forest.

And you go from understanding the natural systems of the planet to then understanding the stresses we're creating on the planet. What's often referred to now as the Anthropocene, which is how mankind has actually changed the face of the planet and you know how we're using resources.

For instance, it shows you just [the] incredible impact... For instance, clothes and the fashion industry has on the planet, because it uses vast amounts of water and we throw away masses of resource.

It's very hands-on; you're kind of immersed in a theatrical setting. And we found that if you really engage people and entertain them, but then make them think and question themselves, it's the best way to get a message across.

As we worked up the design, we actually made a big change on the building. First of all, we lowered, below the main courtyard, we created another kind of lower courtyard, what we call the outer ring. And that's so, in the permanent condition in the summer, when it's very hot, you can still circulate between the different exhibition halls.

And really, as we did it, I kind of had this thought; wouldn't it be wonderful to find some, almost like an inner sanctum, some hidden gem, right at the core of the building. And to kind of find the reservoir of water that the building collects.

And then you step into what we call the inner core, and from there you can look down and you can see this pool of water and look up all the way through the canopy and see the sky and see the clouds. And so you get this incredible connection between the earth, the water and the sky.

I always feel that with architecture, it's really important to reconnect with nature and to connect people back to nature. And we wanted the landscape to be a big part of the story. So the gardens are really important, but then we thought, well, let's take the garden up over the building.

And so a lot of research was done going out to the desert, finding seeds, propagating those seeds. And you probably know, the plants here are quite resilient. They can sit dormant until the rain comes, then they just explode and flourish. So we wanted to see if we could use indigenous plants from the region.

And I think, you know, when you look at things that are designed and inspired by nature, they ultimately have a kind of inherent beauty and elegance to them as well.

MARJAN FARAI DOONI: And after all the work and research that we did, it was very clear that we needed to have a science and children's centre that would live on after the Expo for the region. And hence, when we had the brief of Terra, it was part and parcel of the brief that this pavilion would continue on as a children's and science centre.

So the legacy and the final state of the building was always part of the brief for the Terra Pavilion.

ANDREW WHALLEY: And so we thought about that in the first place and designed it as a permanent kind of institute in Dubai, and then thought about how we could then almost re-engineer it for the Expo.

Somebody asked me to try and sum up the pavilion in three words, And I thought, well, I suppose it would be: ingenuity, invention and delight. Because when you step into the entrance and come into that large volume of space we want people to feel... It's the uplift and joy of architecture.

MUSIC

NOON SALIH: The other winning design was from Foster + Partners for Alif, the Mobility Pavilion, a fluid, tri-petal shaped building. From the outside, it looks like an ever-moving, triple infinity loop.

MARJAN FARAI DOONI: There is an intrinsic definition within this whole concept of mobility and its future, and the ability to speak to the future.

Alif, from the get-go when you see it, you see "future." In the terms of the proposed structure, the steel that was proposed right from the first concept.

And of course, there was a journey that was looked into that was very much what it is that we were trying to define on mobility. And not a lot of people know this, part of the proposition for the experience was creating a ride that takes you from the top to the bottom.

So that was what led to you know, Foster + Partners being the winning design, that from an architectural expression perspective, it was stunning and it depicted the notion of mobility. Also from a visitor experience perspective, there was something intriguing about that and that the insides of the building was designed to create an experience that was different... And of course they were also very innovative in the

way that they were going to manage the expectations of the visitors as they were waiting to go inside.

GERARD EVENDEN: You know, architecturally, how do you get this message of mobility over?

NOON SALIH: This is Gerard Evenden, Senior Executive Partner at Foster + Partners.

GERARD EVENDEN: And in our early conversations, what we talked a lot about was what represents mobility? How can you move light around your building during the day and during the night that makes the building almost move? Can you make the outside of your building as much as this story is the inside of your building?

And one of the things that we've always been obsessed by at Fosters is the aerodynamics of buildings and the fact that aerodynamic technology, the aircraft wing... And it was very much thinking about the aircraft wing and how air moves over that wing. And also when you sit in an aircraft and you look out and see how light is reflected on the wing of the aircraft, and how you get sunrise and sunsets and how it affects the image against the sky. All of those things come together to play on this building.

And it's that which gives you the impression of motion. How do we get this building to move? The clues are there in the design of vehicles.

MARJAN FARAI DOONI: So that was one of the most attractive design components of this building, the material that they were proposing to use: steel.

And the curvatures that defined this building.

And with that curvature there was this intrinsic feeling of infinite movement which was very, very intriguing when we saw this design. And you feel this whole notion of mobility coming alive from a structural perspective.

GERARD EVENDEN: So you get light and you get elements from around the building captured in the building.

Stainless steel, when it's hit by light, has a very unique sort of glint. It's got that little sparkle where other materials... If you've done the same thing in aluminium, it would have looked flat.

We were very keen on having the building really sparkle. And it's that event when you walk through the gate, and you see this sparkling building in front of you, and it's like, "Wow, there's the Expo."

MARJAN FARAI DOONI: With the Fosters team we worked on seeing how we could define a narrative that further pushed the envelope of mobility beyond what was traditionally known. So we brought in of course the past component of what mobility was, but we did it in a way that introduced characters that played a role in human progress.

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MARJAN FARAI DOONI: It had an element of a ride with this biggest elevator that takes you to the beginning of the journey, and that was experiential in itself. And

then, you know, we commenced the story. We wanted to introduce the narrative that was not expected.

GERARD EVENDEN: And we decided early on that we needed to have a ramp that was possible that you could move around the ramp and move through the building via a ramp system. And it then became clear that we actually should get people, take them to the top of the building and then let them move down, because that would be easier physically on you.

And it was all about [the] pulse of movement through the building. And we were very focused on, what was that experience? How did you, almost magically, move up and arrive without really knowing that you'd moved up and arrived?

And then as you move down through the buildings, you move down through the three theatre spaces, which then became the story.

We were doing something at a pivotal point in history, where mobility of data, people, thinking has changed and moved to a new dimension.

When we talk about sustainability in architecture, and if you think about a triangle of cost, at the bottom of the triangle, you can achieve a huge amount by the physical positioning of the building and the physical shape of the building

The fact that we're not allowing the building to get this direct sunlight into the facade — the sun's actually missing the facade and therefore the building's not heating up — that's immediately, through the physical design of the building, reducing the energy requirement of the building.

So, there's many people who'll say, "Oh, well, I did this technically and I did that technically." And yeah, those are great things. There's nothing wrong with those things. But actually, the real thing about sustainability in architecture is if you can link the physical form of the building together with the way in which the building is being used and the way in which the building is going to be used in the future.

This building, why is it sustainable? You know, it's got a very extended lifespan beyond the Expo and beyond into the future. It physically works for both inside and outside the building.

So it's not just about gadgets. It's about true architecture.

MARJAN FARAIDOONI: Going back to how Expo planned legacy from the get-go, we understood that this city was going to invite a lot of organisations and corporates to be part of continuing its growth in the future and continuing being innovative.

MARJAN FARAIDOONI: So what we included in the brief for the Mobility Pavilion is, whatever structure we would have, we would keep it as a cultural organisation/institution post-Expo, which was a big testament to how we pushed ourselves to think differently about what this experience could be.

The Mobility and the Sustainability Pavilion are very different, and their design, both from an architectural perspective and a visitor experience perspective. But there are common themes across both of them, and that is that we've pushed the boundaries of what innovative design could look like and what innovative design could mean for themes of sustainability and mobility.

The other common thread is from the way that we approached the development of the visitor experience. It wasn't going to be, again, traditional in the way that it was going to portray information, ideas and stories. Though both of them are different in the way they have manifested, they have common ingredients of theatrics, storytelling elements that had the similar mission of telling a story in an alternative, engaging, fun yet authentic and deep way. And also in its final output of inspiring whoever comes through those exhibitions, what their role could be. Whether it is human progress or whether it is in their responsibility towards being respectful to the environment.

It's, again, the role of the visitor in progressing and developing in the context of the world that we're living in.

NOON SALIH: Throughout Inside Expo, we have given you a closer look at some of the marvels that can be found all around the Expo 2020 Dubai site; from the Entry Portals and Al Wasl Plaza, to the UAE Pavilion and the thematic pavilions. These are proof that World Expos are a space for architectural innovation and introducing structures that go on to define the cities they're in. Physical structures tell long and rich stories, and we hope that through these episodes, you, the listener, have been inspired to go out and uncover these stories.

Trust me, it's worth it.

NOON SALIH: Inside Expo takes you behind the scenes at Expo 2020 Dubai, sharing our stories and others across the 170-year history of this global event. Learn more by visiting [VirtualExpoDubai.com](https://virtualexpodubai.com).

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Tune into our upcoming Opportunity series to learn more about Mission Possible, the Opportunity Pavilion at Expo 2020 Dubai, and how it's inspiring people to become agents of change.

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