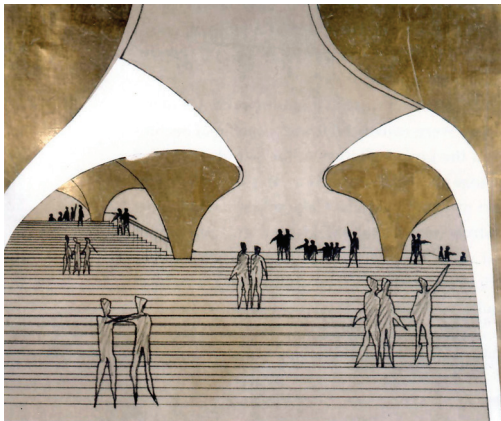


05 The Life of a Design: the Sydney Opera House Carles Muro

The Sydney Opera House is capable of representing not only the city of Sydney, but also the whole of Australia. It is also one of the most unique works of architecture to be built in the third quarter of the 20th century. However, the process by which Jørn Utzon's brilliant competition entry was transformed into an internationally recognised building was far from smooth. Taking the Sydney Opera House as a case study, this article explores how architecture is brought to life and argues that a design is not necessarily a closed, sealed, lifeless document that enables a fully defined building to be constructed with no alterations, but that the construction of a work of architecture inevitably entails changes as part of a process of negotiation shaped by multiple parameters, some of which are impossible to foresee. Utzon's design for the Sydney Opera House not only met the competition requirements but also raised questions. The answer to these questions only became apparent in the process of implementing the design.



1. On 20 October 1973, Queen Elizabeth II of the United Kingdom, who was also the Sovereign of Australia, officially inaugurated the Sydney Opera House. The ceremony brought a symbolic end to the beleaguered saga of its construction and marked the start of its life as a building, which would serve as an opera house¹ and concert hall.

From that point on, the Sydney Opera House could be said to have had a good life, filled with satisfaction and recognition. In a very short space of time, it became the most striking symbol of the city of Sydney and, more broadly, of a still young Australia. Few architectural works have come to represent a city, much less an entire country, quite so intensely².

In her short inaugural speech, which she struggled to deliver due to the strong winds blowing that austral spring morning, Elizabeth II rightly declared:

"The Sydney Opera House has captured the imagination of the world, though I understand that its construction has not been totally without problems."³

Indeed, from the moment when the winning tender project was announced in late January 1957, the distinctive silhouette of its roofs, the founding force of the platform above which they stood and even the way in which the competition entry was portrayed captivated people's imaginations around the world and served as a source of inspiration for many architects.

Meanwhile, as Queen Elizabeth II noted in her speech, the process by which the impressive competition entry was transformed into a robust building was long and difficult. The chaotic story of the construction of the Sydney Opera House is well-known today. Its leading character is heroic architect, Jørn Utzon, who gained almost legendary status with his resignation as project manager for the construction works before they were completed and his departure from Sydney, never to return again.

The aim of these notes is not to reiterate the extraordinary adventure of the Sydney Opera House's construction, but to draw on several key points in this epic saga in order to reflect on one of the meanings of the concept of life applied to architectural design⁴.

2. In December 1967, *Arquitectura* magazine published an article by Félix Candela titled "The scandal of the Sydney Opera House"⁵. The text presents a controversial account of the almost ten-year period between

Utzon starting work on his competition entry in summer 1956 and being forced to resign as project manager of the construction works in February 1966.

Two particular excerpts from the article cast light on the struggle to understand the Sydney Opera House project and, by extension, architectural design as a specific form of knowledge. In the first excerpt, Candela explains:

Nobody had ever constructed a building of the shape and size proposed by Utzon, a monumental sculpture on such a gigantic scale. And nobody —including Utzon himself— had the faintest idea of how it could be built, or even *if* it could be built.

Candela first emphasises the exceptional characteristics of the design in terms of its shape and size, before stating that neither the author of the design nor the jury that selected it knew exactly how it could be built when the winning entry was announced.

What might have been no more than the mere statement of a fact that would be entirely understandable in a project of this scale and character becomes the central focus of a harsh critique by the article's author due to the tone employed, the context and the paragraphs that follow⁶. These words from Félix Candela —whose work forms part of one of the most interesting lines of research on the relationship between form and structure to emerge in the mid-twentieth century— are surprising, as, in my view, they are based on a series of prejudices and misunderstandings regarding what architectural design should or can be.

Candela appears to understand a design to be a series of precise, unalterable instructions for constructing a building. In his eyes, it is a closed, sealed, lifeless document. By extension, the trajectory from design to construction is a linear process that progresses with certainty, without hesitation, along well-trodden paths. These paths lead to a building that yields no surprises and coincides exactly with the architect's original design. In my view, this is a very narrow way of understanding architectural design. This is how it might be understood by a judge or a notary, for example.

However, there are other ways of conceiving what architectural design could or should be. On the one hand, a design is not so much a series of instructions as a set of rules, which are just as precise but open up opportunities rather than shut them down, setting the game in motion and enabling play. On the other, a design is also the seed or embryo of the building, which lies in a dormant

state within it. Here, it is important to recognise that a design has a life of its own and that the architect's main task is to accompany and nurture that life. With his customary poetic precision, Álvaro Siza described this way of engaging with design:

There are times when the design takes on a life of its own. Then it becomes a fickle animal, with restless paws and hesitant eyes. If its transfigurations are not understood or its desires not satisfied beyond its most basic needs, it turns into a monster. If everything in it that seems evident and beautiful is made static, it becomes ridiculous. If it is too constrained, it stops breathing and dies⁷.

In a display of talent, intelligence and determination, Utzon accompanied the life of the Sydney design for as long as he was able, trying to prevent it from turning into a monster, becoming ridiculous or ceasing to breathe. Despite all the struggles he faced, he was able to preserve the intensity that his brilliant competition entry promised and demanded at every stage of its development.

Indeed, as we saw above, nobody knew exactly how to put his design into practice. Both Utzon and the competition jury, however, were completely convinced that it was possible to do so. The main (or at least the most obvious) challenge posed by the design was establishing the geometry of the roofs and identifying a construction system that would allow them to be executed. A few days after the winning entry was announced, the two non-Australian jury members, Eero Saarinen and Leslie Martin, who were aware of the significance of the project and its implementation, showed an unusual degree of engagement when they met with Utzon in London to convey their enthusiasm, offer their support and discuss what to do next. During their meeting, Saarinen and Martin suggested that Utzon contact Ove Arup for support with the design and calculation of the roof structure. Arup enthusiastically joined the project, marking the start of a partnership that was long and fruitful but not free from problems.

It is important to understand that Utzon's design is not only a brilliant response to the competition requirements, it is also a major question mark. Some designs (and architects) raise questions and the Sydney Opera House certainly belongs to this category. At the very least, the questions posed by the project caught the attention of an exceptional jury and one of the best engineers working at the time.

In the second excerpt from the aforementioned article, Félix Candela declares:

But Utzon – unfortunately for him and for the population of Sydney – had to build his design and this is where the problems, which proved almost insurmountable, began.

Unlike Candela, I myself am convinced that the best thing that could have happened to Utzon – and to the population of Sydney – was that his design was built.

No architectural design is without difficulty. Design is a constant negotiation with all the factors (technical, economic, regulatory, programmatic, etc.) that influence it. This process of negotiation does not come to an end when construction begins, much less when new difficulties emerge. In contrast to Candela, the Sydney Opera House design seems to me to be an exemplary case study. The way in which Utzon responded to and resolved the constraints (both external and self-imposed) affecting the conversion of design into building, one by one, merely enriched the design and gave it greater depth.

It is also worth considering a small yet important detail in Candela's text, where he describes the difficulties faced as "almost insurmountable". Indeed, they proved *almost* insurmountable, but they were not ultimately insurmountable. The difference between the two is no trivial matter. Utzon took a series of risks but remained deeply convinced that he and his teams of partners and advisers

would be capable of responding to each and every one of the questions raised. Risk-taking is not synonymous with irresponsibility. On the contrary, it was most likely a sense of responsibility that prompted Utzon to continue to pursue his endeavour. A project that raises questions and opens up new paths must also be able to take certain risks. While the Sydney Opera House was being built, Utzon frequently found himself on the brink of the abyss but he displayed the confidence, training and determination shown by the very best mountaineers as they seek to conquer unexplored peaks, driven by the desire to reach the summit and the conviction that they are capable of doing so.

As we saw earlier, Utzon immediately set to work with Ove Arup's team to address the problem of the roofs⁸. None of the solutions proposed by the engineers was to the architect's complete satisfaction, but Utzon remained convinced that together they would find a solution that would fulfil both the static requirements and the standards that he himself had imposed. In the meantime, more and more problems built up. Not only was the plot chosen for the Opera House far less suitable for the building than was originally believed when the competition was organised, but in March 1958, after the design development had been submitted⁹ and when the geometry of the roofs had not yet been resolved, it was decided that construction had to begin at the start of the following year for political strategy reasons.

While continuing to work hard on the roofs, Utzon turned his attention to the platform. I would go as far as to say that what interested Utzon the most was the construction of the ground and the precise definition of the large, tiered platform where people could walk around and gather to enjoy concerts and shows¹⁰. The solution adopted for the platform improves and enriches the diagrammatic section of the competition entry. Whereas the architect achieves an impeccable, ample horizontal plane in the upper part, which is surfaced with large slabs of natural stone, the geometry of the large beams supporting it, with a section that changes according to the bending moment, creates a powerful yet delicate texture akin to an immense coffered ceiling above visitors arriving at the theatre by car. This combination of face and underside is undoubtedly one of the most beautiful aspects of the design.

While the platform was being built after more than three years of frequent discussion between the architect and the engineers, who tried out numerous geometric and construction solutions, Utzon finally found a way to solve the issue of the roofs once and for all in October 1961. The roofs could all be made from spherical triangles taken from a single sphere. This solution not only established a geometric relationship between all the elements, but also allowed the structure to be prefabricated, standardised and, eventually, clad in tiles. The conceptual beauty of Utzon's solution is reminiscent of some of the most brilliant mathematical equations¹¹.

Candela criticises Utzon for having to change the profile and the geometry of the roofs, yet architecture must inevitably be transformed as it is built. Utzon did not intend — as Candela appears to suggest, his bias causing him to mistake Utzon's tenacity for petulant, wilful obstinacy — the engineers to find a way to build the exact profile that he had designed for the competition entry. Instead, he was looking for complete convergence between the invention of the form and the solution employed to construct this form. Despite the pressure and difficulty he faced, he never gave up. Utzon managed to find the solution to a problem that he himself had created.

Once the works were underway, Utzon solved the issues raised by the design one by one. Despite varying degrees of difficulty, he remained convinced that the project would come to fruition. First came the platform, then the roofs, and finally the enclosures and the interior finishes in the halls. Although Utzon had already prepared a strategy for both, they were not executed according to his design. When Utzon left Sydney on 28 April 1966, the large platform and

roofs were already in place. Utzon never saw his project completed. However, I would venture to say that the fundamentals of Utzon's architecture for the Opera House were already in place by the time he left Sydney.

The fundamentals of Utzon's architecture are embodied by the relationship between the construction of a horizontal plane suitable for different activities and the roofs floating above the platform at different heights, compressing and dilating the space to create different zones within it. Were it not for climate control, acoustic and safety considerations, the project might well have been completed earlier.

The architecture left behind by Utzon when he left Sydney coincides with his competition entry to a surprising degree. Unlike the other entrants, Utzon opted not to submit an image of his overall design and instead included a wonderful perspective of the space between the two halls, which is shown as a cascade of steps and stands, partially covered on both sides by large white shells with the intrados coated in gold leaf. If Eero Saarinen had returned to Sydney in the middle of 1966, he would no doubt have recognised the space. Were he to have walked across the platform, climbing towards the sea before taking a seat in the highest stands for a rest, I am convinced that he would have deemed the decision he made almost 10 years earlier to have been the right one¹².

3. Since it was inaugurated in 1973, hundreds of concerts, plays and events have been held at the Sydney Opera House. Naturally, the venue's programme has been dominated by opera from the outset and the voices of the best sopranos in the last 25 years of the twentieth century have rung out in its halls, from Jessye Norman to Kiri Te Kanawa. In 1974, the great Australian soprano Joan Sutherland performed for the first time at an opera hall that would eventually come to bear her name¹³.

The best classical and jazz orchestras and soloists have filled the halls of the Sydney Opera House with their music, from the Berlin Philharmonic and the Academy of Saint Martin in the Fields to Ella Fitzgerald and Keith Jarrett. Many of the most well-known figures on the contemporary music scene have also performed at the venue¹⁴.

However, the halls are not the only place where concerts and performances have been held. On many occasions, the large platform has been used for all kinds of shows and events, with its rich topography accommodating a wide range of performers and the crowds who gather to see and hear them. The mood at this open-air stage is often processional, as the performer climbs the platform among the crowds. Besides Queen Elizabeth II, other noteworthy visits to the Sydney Opera House include that of Pope John Paul II in 1986 and Nelson Mandela's speech to 40,000 people a few months after his release from prison in 1990.

Finally, the sheer size of the building has made it suitable as a venue for unique art interventions¹⁵. The Sydney Opera House has always played a central role on occasions when the eyes of millions of viewers around the world have turned to Sydney and Australia. The Opera House was the venue and backdrop for the spectacular firework display held to mark the new millennium. A few months later, in September 2000, Marc Newson created an attractive lighting show on the roofs of the Opera House during the opening ceremony for the Olympic Games. The building's location in Sydney Harbour has contributed to the immense popularity of its nocturnal projections, which can be seen from different parts of the city¹⁶.

In her inaugural speech, Queen Elizabeth II also said:

"The human spirit must sometimes take wings or sails, and create something that is not just utilitarian or commonplace."¹⁷

Almost 50 years after the building was inaugurated, the city of Sydney, which opted to take those wings or sails, paid a unique tribute to the late monarch by projecting her face onto the largest of the sails that Jørn Utzon had unfurled with such great effort in Sydney Harbour¹⁸.

Carles Muro

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Notes

01. The first public performance at the opera house — a production of 'War and Peace' by Sergei Prokofiev — had been held almost a month earlier on 28 September 1973.

02. Perhaps the only constructions to have succeeded in playing a similar role in the public imagination were the Statue of Liberty in New York (1886) and the Eiffel Tower in Paris (1889). However, neither of them is a building as such. It would take an additional 25 years after the inauguration of the Sydney Opera House for another work capable of achieving similar status to appear: the Guggenheim Museum in Bilbao (1997).

03. <https://www.sydneyoperahouse.com/our-story/50-years-extraordinary-moments>

04. This essay explores just one possible meaning of the life of a design: the trajectory leading from design to construction. A specific way of translating or converting drawing into substance, in constant negotiation with the constraints imposed by the construction process. What we are talking about here is more commonly referred to as design development. I will address other ways of developing and prolonging the life of projects in which the Sydney Opera House has played a productive role at another time. Every design encompasses and prolongs the life of other designs. It is born of previous designs and serves as fuel for those that come after it. Designs continuously appear, one after the other, changing every time the baton is passed. The Sydney Opera House encompasses and prolongs the life of many other architectural designs. Above all, it prolongs the life of the Maya cities of Uxmal and Chichén Itzá, as well as that of the great platform of Monte Albán, the ancient Zapotec capital, which Utzon discovered during his first trip to Mexico and the United States in 1949. As Utzon's first non-domestic project, the Sydney Opera House is also extended through his own work, with the Elviria competition entries (1960), the theatres in Zurich (1964) and Wolfsburg (1965) and the pared-down Bagsvaerd

Church (1968-1976), among many other projects. Finally, when the winning competition entry was published, it was also extended through the work of many other architects. Identifying traces of Utzon's design in the work of these other architects is an endeavour that I will embark upon at a later date.

05. *Arquitectura*, n.º. 108, Madrid, December 1967, pp. 29-34. The text had already been published in the Mexican magazine *Arquitectura* (n.º. 298, 1967).

06. Candela describes what happened in Sydney as evidence of "unbridled arrogance" and "disdain for even the most obvious laws of physics". The article was so aggressive in tone that the young Rafael Moneo, who was a member of the magazine's editorial board, published an article defending Utzon in response to Candela's critique in the following issue. In his text, Moneo describes Candela as displaying "premeditated hostility". Rafael Moneo had first-hand knowledge of the episode because he worked with Jørn Utzon at his Hellebaek studio in 1961 and 1962 [see: Moneo, Rafael, "Sobre el escándalo de Sidney", *Arquitectura*, n.º. 109, Madrid, January 1968, pp. 52-54].

07. Siza, Álvaro, "Ein Haus zu bauen... / Building a house...", *Daidalos*, n.º. 5, Berlin, September 1982, pp. 42-43.

08. The team was initially led by Ronald Jenkins, one of Arup's partners — and "the firm's main theorist", according to Candela — and, later on, by Jack Zunz, who drew up the proposal using spherical triangles. A very young Peter Rice (1935-1992) provided practical support for the project from the outset.

09. The lengthy document submitted by Utzon in March 1958, which contained updated project plans, the development of the platform structure and contributions from different branches of engineering, is equivalent to the design development. The document is known as the "Red Book" due to the colour of its cover.

10. The most significant text written by Utzon conveys his evident fascination with the use of platforms in the history of

architecture. Starting with the Maya constructions at Uxmal and Chichén Itzá, he touches on the Jama Masjid mosque in Delhi and presents an extraordinary reflection on the role of the ground in Japanese architecture, before discussing the Sydney Opera House and the potential held by platforms in contemporary architecture. Utzon, Jørn, "Platforms and Plateaus: Ideas of a Danish Architect", *Zodiac*, n°. 10, Milan, 1962, pp. 113-117.

11. Aware of the strength and brilliance of his solution, Utzon commissioned a series of scale models in which spherical triangles were cut out of a spherical shell made from solid wood and painted white to make up half of the roofs. Like a magician, Utzon redesigns the profile of the roofs by hand in a beautiful series of 16 black-and-white photographs [see: "The Sydney Opera House", *Zodiac*, n°. 14, Milan, 1965].

12. The competition rules required an image "of the elevation considered by the entrant to be the main facade and/or entrance to the building". The majority of the entrants submitted general views of their designs, but Utzon opted instead to present a fragment of the processional route along the platform. According to the legend surrounding the project, Eero Saarinen played a major role in the jury's selection of Utzon's design. Saarinen's enthusiasm even prompted him to produce a colour view of the Danish architect's design, which he based on the elevations from the competition entry and a walk around Sydney Harbour. This was used by Arthur Baldwinson – an architect who had worked with Maxwell Fry and Gropius in London in the 1930s and who was a colleague of Henry Ingham Ashworth, one of the main proponents of the project and a member of the jury, at the University of Sydney at the time – to create the image that would be used to announce the winning design in the press [*The Sydney Morning Herald*, 30 January 1957]. The competition rules, known as "The Brown Book" due to the colour of the cover, can be viewed at <https://www.utzon-archives.aau.dk/documents/Folios/the-brown-book/>

13. In October 2012, two years after the Australian soprano singer had died, the opera hall was renamed the "Joan Sutherland Theatre".

14. Prince, Sting, Lou Reed, Laurie Anderson, Patti Smith, Björk... and the list goes on.

15. In March 2010, Spencer Tunick covered the platform at the Sydney Opera House with a thick carpet made up of more than 5,000 naked bodies.

16. In May and June 2009, for example, Brian Eno projected a version of his "77 Million Paintings" onto the roofs of the Sydney Opera House. These projections have become extremely popular and are now a kind of night-time attraction, which are often used for major celebrations in the city.

17. <https://www.sydneyoperahouse.com/our-story/50-years-extraordinary-moments>

18. Queen Elizabeth II died on 8 September 2022 and the projections were on display during the two nights following her death.

Images

01. Perspective of the competition proposal (1956).

02. Queen Elisabeth II during the open ceremony of the Sydney Opera House (October, 20 1973).

03. Drawing of Sydney Opera House by Eero Saarinen in January 1957. The drawing is dedicated to John Joseph Cahill, prime minister of South New Gales between 1952 and 1959 and main promoter.

04. The four jury members in front of a competition perspective by Utzon. From left to right, Henry Ingham Ashworth, Cobden Parkes, Eero Saarinen and Leslie Martin (January 1957).

05. Jørn Utzon hands showing how all roofs have their origin in a single sphere (*Zodiac*, n°. 14)

06. Status of works in the moment Utzon leaves Sydney. Photo by Mogens Prip-Buus, one of the main Jørn Utzon collaborators.

07. One of Jørn Utzon's drawings illustrating his essay "Platforms and Plateaus: Ideas of a Danish Architect" [*From Zodiac*, n°. 10, 1962].

08. Queen Elisabeth II on display over the roofs of the Sydney Opera House (september, 9-10 2022).