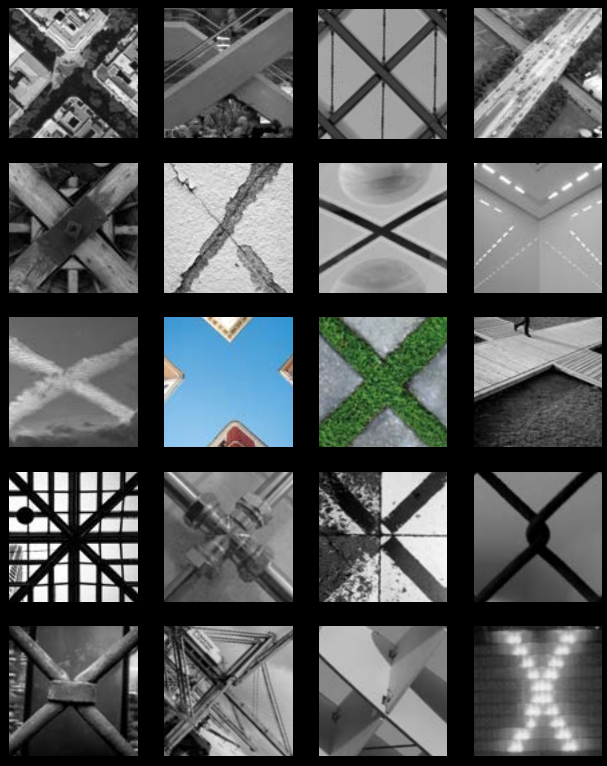


20 YEARS IN SPAIN

1993–2013

ARUP

Few of us would have imagined that 20 years after we opened a small office in Madrid we would be looking back on our contributions to some of the most innovative and influential projects that have been realized in Spain over that period. Probably none of us would have foreseen that five years after the onset of a lingering global financial crisis we would have a thriving multi-disciplinary Spanish practice, advising, planning, designing and supervising the delivery of projects all over the world. We are tremendously proud of the achievements of our colleagues in Spain over these 20 years and are confident that they will go on to achieve more great things in the next 20.

Gregory Hodkinson
Arup Group Board

20 YEARS IN SPAIN

1993 – 2013

ARUP

At the service of life

Arup has been able to successfully combine the small with the large, engineering with architecture and Scandinavian democracy with British empiricism. The firm, started in 1946 by the Danish engineer, Ove Arup, and founded in its present form in 1963 with the British architect, Philip Dowson, celebrates its first twenty years in Spain as mindful of its legacy as it is to its future. Those who have made many iconic works possible in recent decades are also responsible for minimal works in harsh and demanding social and technical environments, because as much talent is required to build a small bridge in a remote region of China as it is to erect a skyscraper in Europe.

It is a saga of mythical engineers of the likes of the late-lamented Peter Rice – without whom iconic works such as Sydney Opera House by Jørn Utzon and the Pompidou Centre by Renzo Piano and Richard Rogers would certainly be very different – or our contemporary Cecil Balmond – who collaborated with Rem Koolhaas in the design of CCTV's headquarters in Beijing and Shigeru Ban in the Pompidou Centre Metz – who have erected some of the most outstanding buildings of recent decades, the mere listing of which is dizzying: skyscrapers like the already canonical Hongkong and Shanghai Banking Corporation headquarters by Norman Foster or three of London's most unique buildings: Lloyds by Rogers, the 'Gherkin' by Foster and the Shard by Piano; great civic works by Spanish architects far away from Spain, such as Los Angeles Cathedral by Rafael Moneo and the Scottish Parliament Building by Enric Miralles; cultural realisations of the likes of the Casa da Música by Koolhaas in Porto, the California Academy of Sciences by Piano in San Francisco, Madrid's Thyssen Museum by Moneo, the transformation of the Alhóndiga Bilbao by Philippe Starck, the recent renovations in Amsterdam of the Rijksmuseum by Cruz y Ortiz and the Stedelijk by Benthem Crouwel; as well as Kansai airport by Piano, the Selfridges Building by Future Systems in Birmingham and stadiums as memorable as the Allianz Arena in Munich and the Olympic Stadium in Beijing, both by Herzog and de Meuron. Alongside these works of unanimous admiration are also a number of more controversial achievements, but no less complex to materialise: the Marina Bay Sands in Singapore by Moshe Safdie, the European Central Bank by Coop Himmelb(l)au in Frankfurt, the Arcelor Mittal Tower, which served as an icon of the London Olympics, and two buildings in Spain, the Metropol Parasol in Seville by Jürgen Mayer and Zaha Hadid's Bridge Pavilion in Zaragoza.

And, in inevitable contrast, three necessary and meticulously-designed schools – the Evelyn Grace Academy in London by Hadid, the exquisite Druk White Lotus School in Ladakh and the exemplary Shalom International School in Uganda – which represent examples of buildings that show Arup's priorities in the social field of community needs and service to people, and in the area of environmental sustainability and the effective use of resources: a firm that can work equally for the likes of Lou Reed as for CERN in Geneva, bringing to the discourse the colossal and the minimal, combining technique with nature and simultaneously pursuing beauty and invention.

Luis Fernández-Galiano
Editor of Arquitectura Viva magazine

20 YEARS AGO...

Tudor Salusbury

Founder and Director of the Madrid office from 1993 to 2009

Mark Chown

Director of the Madrid office from 2009 to the present

José de la Peña

Director and Structural Discipline Leader in the Madrid office

20 years ago, Arup entered the Spanish market, opening an office in Madrid in 1993. Why Spain?

Tudor Salusbury (TS): Like many stories in Arup, this office came about as a result of a project. In 1989, Baron Thyssen contacted Cecil Balmond, the director of the Building Engineering team at Arup in London, to refurbish the Villahermosa Palace in Madrid. Cecil gave me the opportunity to lead the project and, in 1992, I moved to Madrid to supervise the work. We opened a small project office in Barquillo Street and, although there was no real intention of creating a permanent office, we began to research the market and discover its potential. At that time, Spain had just entered an economic crisis after the intense activity it had just experienced with the Seville Expo, the Barcelona Olympics and Madrid's tenure as European Capital of Culture. It was obvious that the country would take a while to recover, but despite this, we decided to take the risk. Opening this office was not initially a strategic decision, but rather the result of a number of circumstances.

Mark Chown (MC): It is very common at Arup for expansion to occur as a result of a seemingly short and one-off project.

What was that first office like?

TS: During the course of the work on the Thyssen-Bornemisza Museum, I was alone in a small office with a fax machine and a landline phone in a market where nobody knew us. It seems incredible now, doesn't it? But that's how the office began. After the museum opened in late 1992, the project office became a market research office. In October 1993, Arup was formally constituted in Spain, and with the intention of building a design team, I moved to a 250-metre-squared office in Orellana Street. Here is where our operations really began in Spain. I remember that one of the first people who showed confidence in us was the architect Salvador Pérez Arroyo, with whom we started working on the building services design for the Castilla-La Mancha Science Museum in Cuenca.

MC: I started working on this project in London, helping Tudor to do the design, and then the possibility came up for me to come to Spain to join the group. As I was also interested in exploring new horizons, I accepted the challenge. I remember how I felt when I entered the office in Orellana Street for the first time and saw a space that was well, almost empty, with two simple tables that were actually just two white boards sitting on trestles.

1

Palace Hotel, Madrid
The Westin Palace Hotel, popularly known as the Palace Hotel, is a five-star hotel located in the heart of Madrid. Opening its doors to the public in 1912, it was, for a long time, the largest hotel in Europe. In 1995, this prestigious building with 450 guest rooms underwent a process of complete renovation and Arup carried out the building services engineering.

José de la Peña (JDP): I remember when I went to the first interview in '95, I was there with Mark and Tudor and they were telling me about their plans for the future. At that time, Arup was a completely unknown firm in Spain and, of course, unknown to me as well.

What was the process of entering such a different market like?

TS: It was very hard at the beginning. On the one hand, the market and the country was in the midst of a recession, but on the other hand, people saw us as very good engineers, albeit with a foreign mentality and expensive.

JDP: We have to thank the architects that had a more international and innovative vision, like Salvador Pérez Arroyo, Jerónimo Junquera, Josep Lluis Mateo, Francisco Longoria, Ricardo Bofill and Enrique Miralles, who understood the importance of involving Arup in their projects. They were the ones that gave us our first projects; many, who were familiar with the local market, didn't see the added value that we provided.

How did you manage to incorporate Arup's characteristic holistic design vision?

MC: It was quite difficult. In Spain, structural engineers only used to make calculations based on the structures designed by the architect, and there was not much interaction between the parties. In the case of building services, it was different: architects were accustomed to working with installers with the support of equipment manufacturers, but they didn't have an independent advisor or consultant to give an overview of all of the building services. This is where we came in by providing a holistic design, a vision of "Total Architecture", which didn't exist here at that time.

TS: The roof of the Prado Museum was one of the first projects in which we could really apply our holistic approach and offer a comprehensive solution. The sponsor of the project was the company Cubiertas & Mzov (now Acciona) and the end client was the Prado Museum Board of Trustees (chaired by José Antonio Fernández Ordóñez).We had the opportunity to work for a prestigious public institution that trusted us to resolve, through a holistic solution, a problem that it had had for many years.

Museo Nacional del Prado, Madrid
The Museo del Prado is the main Spanish national art museum located in Madrid. It features one of the world's finest collections of European art, from the 12th century to the early 19th century. El Prado is one of the most visited sites in the world, and it is considered to be among the greatest museums of art. The large number of works by El Greco, Goya, Tiziano, Rubens and El Bosco are among the highlights of the collection. In 1994, Arup carried out concept design commissioned by the President of the Royal Patronage of the Prado, for the replacement of the roof of the Villanueva building, including studies of new materials for the roof, natural lighting and environmental control in the areas under the roof.

2

For me, this project was a turning point – the moment that we realised that, at last, we were beginning to make inroads in the Spanish market.

How was the office adapted to different market conditions?

TS: By '97, the market began to move and we had a fairly well-established building design team in place, but we made the classic mistake: we were so busy working on important projects that we neglected the search for future projects. That was when we realised that we had to make more of a consistent effort on the marketing side, and refocus it towards the private sector, which was recovering faster than the public sector.

MC: At that time, we also decided to turn our attention to more international clients, for example, hotels and companies that were beginning to invest in Spain. One of the major projects within this new approach was the refurbishment of the Palace Hotel, with Starwood as the client.

JDP: In those years, we began getting many clients who were coming to do business in Spain and knew Arup, and were looking for a local contact who could understand them and who they could trust. We carried out commercial offices for clients like Credit Suisse and Tishman Speyer, industrial facilities for Procter & Gamble and Merck Sharp & Dohme, and hotels like the resort project for Petter Olsen on Tenerife, and we even ventured into projects like the design of the infrastructures for Jet Propulsion Laboratory's new antennas in Robledo de Chavela.

TS: They were clients who knew how to take advantage of Arup's skill set and the international coverage we offered. The fact that we are international has always helped us. And another very important factor at that time was the generosity of our offices around the world.

JDP: Indeed, like in the La Cala Resort project in Málaga, which came about because an Irish investor wanted to carry out the project and needed help. Arup's office in Dublin told them that the company had just opened an office in Madrid and they contacted us. We worked with them for over ten years and it was a great example of how an international client, with the challenge of doing business in the Spanish market, could rely on our local and global support.

After the beginning and the change in focus, what happened in the following years?

TS: In the first five years, we were able to put together a strong multidisciplinary team, starting with the building services department, and then structures, until we became a team of 30 people. It was a period of sustained growth in spite of the state of the market at the beginning. The year 2000 was a turning point: we had outgrown our office in Orellana Street and had to move to Alcalá Street, near the Retiro Park, which is where we are now.

And when we arrived the feeling was the same: a lot of space but… how do we fill it? This is how a period of diversification of services began with the incorporation of disciplines like project management, façades, fire, transport planning, masterplanning and sustainability – in other words, new services that clients needed, ranging from initial planning to implementation and operation.

MC: We also began to look abroad a bit more. By that time, Arup had begun to open offices in places like Milan, Amsterdam and Warsaw, and because we had an established team, we were in a good position to help. For example, our know-how in cultural

Deep Space communications complex, Madrid
Jet Propulsion Laboratory commissioned Arup to develop the detailed design of civil engineering and building services for the pedestal of two new 24m diameter antennas and associated infrastructure services and roads.

Villa Erques Resort, Tenerife
Villa Erques is an exclusive, five-star hotel and spa resort complex developed for Petter Olsen and designed to the highest environmental and aesthetic standards. The complex was designed to closely resemble a traditional Canary Island village, with the archetypal building style being adapted to meet the requirements of a modern luxury hotel. The sewage treatment plant was designed to use state-of-the-art technology and uses ozone - which both disinfects and oxidises pollutants, resulting in exceptional water quality. An innovative feature of the mechanical design is the inclusion of a condenser water ring linking the buildings to a heat exchanger in the swimming lagoons. The salt lagoon acts as a thermal storage to store or remove heat as necessary for the cooling or heating of the hotel buildings. The same system is used to provide the hotel's hot water, removing the need for either imported gas or heavy-duty electrical infrastructure.

4

Bologna High Speed Railway Station, Bolonia
This 150,000 square meters high-speed railway station in the city of Bologna was designed by Ricardo Bofill and Taller de Ideas. Arup carried out the design scheme of the structures and building services.

Merck Sharp & Domme laboratories, Madrid
This project consisted of an operational analysis and establishment of the brief for the extension of an existing laboratory facility; including study of the structural viability for the addition of two new floors above an existing building.

projects enabled us to support the Dutch team in the refurbishment of the Rijksmuseum with the Seville architects Cruz y Ortiz. We also worked on the Torino Palahockey and the Bologna High-Speed Train Station.

And then, in 2008, one of the severest economic crises in history began. What was the office's experience during those years?

TS: By 2007, it was obvious that the market was going to end up collapsing, so we started to work on a future plan based on internationalisation, courting clients from outside Spain and collaborating even closer with Arup offices around the world. In 2009, a change in the leadership of the office coincided with a highly delicate time in the market, which we, nevertheless, were able to overcome thanks to the strategy we had implemented.

MC: We had little time to refocus a team of over 160 people. 80% of our projects were located in Spain and within two or three years that was to change radically. We had to react and faced a tough restructuring process that lasted six months, but we were able to return to profit even within that financial year. It wasn't easy, but we did it.

TS: But the good thing, during that time, was that we were able to relocate many of our people to other Arup offices around the world, thanks to having a very international team, good relationships with other offices and excellent professionals.

How do you think the market will evolve in the future?

MC: Overcoming the crisis in the construction and infrastructures market will be very slow. It's going to gradually improve but very slowly. We're beginning to see renewed interest in the Spanish market by investors who are looking for good prices for five-year projects again, but it'll take a long time before business in our sector returns to 2008 levels.

TS: Fortunately, we don't depend exclusively on the Spanish market. I don't think it's a question of our size locally but our expertise and ability to work in the international market. It's about trying to give our best in every area and project we're involved in. For example, based on projects like Palmas Altas Campus in the commercial sector, we have shown what we are capable of doing with good teamwork and an architect who is open to ideas, like Richard Rogers from Rogers Stirk Harbour + Partners: creating a corporate office complex that is an example of holistic and sustainable design integrated with the architecture.

How global do you think our office is?

MC: We're becoming increasingly global. Right now, our people are getting experience in other offices around the world and when they return, they'll be able to share this experience with us. There's also a lot more cooperation with other offices like Dublin, Amsterdam, Milan and New York, with almost daily collaboration. All of this helps our people to feel that they belong to a group of 11,000 people and not just the office in Spain. I think that in the future in Europe, we'll cease to be a group of isolated offices, and become a region integrated into Arup as a whole.

TS: Previously, it was much harder to work between groups but I now see a lot more confidence. We are becoming increasingly open and international.

JDP: Because of the crisis that we've all endured, we went from having a lot of work to having almost nothing and saying things like "what do I do now?" Today, we are in constant communication with all offices to find out what's going on and what projects

will involve external help. Basically, it's all about looking for and offering support among your peers. This dynamic is the best way of dealing with the ups and downs that we've had to overcome in all countries.

MC: Our business model has changed. Now, we accompany our Spanish clients to places outside Spain, like the Middle East, North Africa, Latin America and other European countries. These projects currently account for over 70% of our work.

What makes Arup's engineers different from other engineers in Spain?

JDP: I think it's the global vision we have. It's not just about focusing on columns and beams, but wanting to understand the total behaviour of the building and how to improve user comfort. And whatever is applicable to each discipline must be seen in its entirety. That's what clients expect from us and what makes us better designers, whether of buildings, infrastructures or transport systems. Because if we want to design something well, we have to listen to all disciplines, brainstorm and bring together the best ideas to contribute innovative solutions with cutting-edge techniques and procedures.

And in this process of incorporating new techniques, how is this spirit of innovation that characterises Arup nurtured?

JDP: There are many examples. Following the guidelines of regulations is easy. But if you want to do something special and slightly different, you have to push the boundaries and move forward, and always try to go a little further. For example, in Seville, the Metropol Parasol project broke new ground in the calculation of wooden structures in Europe.

MC: And often, innovation comes from having people from different disciplines with different ideas and training around a table talking about a project, that's where new ideas come from. It's a dynamic that we try to encourage here. Not that we say "let's innovate", everything comes out of the discussions we have on a project.

TS: And the diversity of people helps a lot in this. This office has always had people from different countries with different experiences. Some have come from contractors, others from consultants or industry, and from different parts of the world. These people have different points of view that can help to enrich others.

JDP: Not to mention the training of our own employees. People value Arup's differentiating factor compared to other engineering firms in this regard. Failure to train and improve the skills of your people is being blind. If we want to be the best, what's better than having the best trained people?

What projects do you remember with the greatest pride?

TS: Over the last 20 years, we've worked on over 1,000 projects with around 600 clients. It's not about whether they're large, medium or small projects, it's about the values of the people and clients you deal with. The result is, of course, important, but so is the experience and sense of teamwork during the course of a project. I have fond memories of many projects that had that spirit. The Prado Museum, La Cala Resort, the Caixa Galicia Foundation, La Casa Encendida, the Picasso Museum or recent projects with the Fenwick Iribarren Architects studio are good examples of this relationship.

JDP: Personal relationships of trust are key. Our constant and continuous work with Mark Fenwick, for example, exemplifies this vision.

Tindaya Mountain project, Fuerteventura
After years of searching for the perfect site for his sculptural vision, Eduardo Chillida, one of Spain's most prestigious sculptors, discovered Mount Tindaya. Arup was appointed to lead the technical design of Chillida's cube-shaped "carved space" inside Mount Tindaya. Due to the geometry of the cavern, the state of the rock and its fragile environment, this project presented special challenges for the engineering.

Las Rozas Business Park, Madrid
This 50,000 square meter commercial complex was developed for Tishman Speyer Properties and included structural, mechanical, electrical and public health engineering design and site supervision.

Caixa Galicia Foundation, La Coruña

Caixa Galicia Foundation is an art and cultural centre dedicated to promote Galician art. The building features a glazed internal 'street', glass bridges, inclined panoramic elevators, column-free exhibition galleries and a 300 seat auditorium. It also incorporates state of the art audio-visual and interactive IT technology to enhance the visitor experience. The challenge for Arup was to engineer a modern, technologically avant-guard building which could be constructed on a very restrictive site in an historic city quarter.

MC: Or with Simon Smithson from Rogers Stirk Harbour + Partners. When you have a good team and there's a good working relationship, the job always works out well.

Which project presented the greatest challenges?

JDP: For me, it was undoubtedly the Metropol Parasol because it took a long time to find a solution that could work. Every time we solved a problem, another one came up...

MC: For me, in terms of design, it was the Caixa Galicia Foundation in La Coruña. I still remember the meetings with architects, trying to resolve coordination issues between the architecture, structures and building services and looking for ways to incorporate all of the complexity of the design into very confined spaces.

TS: For me, in terms of management, it was the Pavilion Bridge for Expo 2008 in Zaragoza. Part of the project was done in England and the other part here. We were under a lot of pressure as the supervisors of the work, and we had to deal, on behalf of the company, with very tense situations because the project was very complicated and subject to strict delivery deadlines.

Today, there's much talk of social and ethical responsibility. What part do these principles play in your daily work?

MC: Ethical behaviour is part of our DNA as a company. There isn't a culture of personal benefit. The benefits of our work are distributed among everybody, and that helps to eliminate any motivations that can

push you to put your personal interest above the rest, which ultimately leads to less ethical behaviour.

TS: If there's a conflict or problem regarding ethics, we have very clear limits. Historically, we've incorporated into our day-to-day business the values of Ove Arup's Key Speech and applied them to every project we carry out, and the people around us share that vision.

JDP: We have a simple rule: when you're going to do something that you have a moral doubt about, you should imagine that someone is watching you and you ask yourself, "should I still do it?" If it's your family, partners or work colleagues watching you, would you still do it? Would you mind it appearing in the newspaper the following day? If the answer is yes, then don't do it.

What values distinguish Arup from other companies?

JDP: For me, there are two fundamental values: how we look after our people and the transparency that we have in our work. The importance we attach to employees and how we keep them informed and involved in our teams is not the norm. In other companies, not everyone is aware of the fees and costs of a project. Here, we discuss our results and profits in Spain and Europe with transparency. Our people value this a lot because they can see that there are no mysteries or secrets, that things are as they are. And if things go bad, we know why.

MC: There are very few companies that are as multidisciplinary and have as much of a holistic view and capacity for internationalisation as Arup. And we go further in communication: here, someone can pick up the phone or send a message to the forum for their discipline and have access to thousands of engineers around the world. This provides a significant added value to our projects.

TS: Yes, this ability to share knowledge is unique. Here, within the team, everybody shares what they know about any subject and this is not seen as a threat, on the contrary. This is not common in other engineering firms.

Is there anything else you'd like to say about the last 20 years?

TS: This is not the story of a journey made by a few. Over these 20 years, more than 300 professionals have been part of Arup in Spain and they've made many fantastic projects possible in conjunction with clients, architects and other Arup professionals around the world.

MC: We continue with the same enthusiasm now that we had when we first started. We still have many interesting things to do.

Torino Palahockey, Turin
The XX Winter Olympics were held in Turin in early 2006. As part of the games, a new ice hockey stadium was built. The design can accommodate up to 12,500 spectators during the ice hockey games, with a maximum capacity of 17,500 for flexible post-Olympic use. Arup provided all engineering services, including building services, structural engineering, fire, acoustic consulting and specialist sports design input.

1 Deep Space communications complex
2 Museo Nacional del Prado
3 Arup's initial team talking about these 20 years
4 Bologna High-Speed Railway Station
5 Tindaya Mountain project
6 Metropol Parasol
7 Torino Palahockey

1992

A project office opens on 2 Argensola Street

Thyssen-Bornemisza Museum opens

1993

Tudor Salusbury sets up a permanent office in Madrid on 14 Orellana Street

It initially provides building engineering services

Telemadrid headquarters

1994

Prado Museum roof study

Gran Teatre del Liceu in Barcelona

Science Museum of Castilla-La Mancha

1995

The office incorporates structural engineering services

Hotel Palace refurbishment

1996

La Cala Resort project in Malaga begins

Bologna High Speed Railway Station

2002

The office incorporates Fire consulting

Foresta Business Park

La Casa Encendida

Rijksmuseum's refurbishment begins

2003

Picasso Museum opens

Tindaya Mountain project begins

2004

The office incorporates two new disciplines: façade engineering and masterplanning and urban design

Metropol Parasol project begins

2005

Basauri Masterplan

Caixa Galicia Foundation opens

2006

The office incorporates two new disciplines: transport consulting and sustainability consulting

Valencia Football Club´s new stadium begins

Torino Palasport Olimpico opens

2012

International bet: more than 50% of turnover comes from outside Spain

Rey Juan Carlos Hospital in Móstoles opens

LEED Certification for Inditex stores around the world

2013

Rijksmuseum opens

Fire and structural surveys in Bangladesh

Campus Iberdrola begins

1997

Several projects with Procter & Gamble

Deep Space communications complex

1998

Sant Pau Hospital in Barcelona

Villa Erques Resort

Several projects for Credit Suisse

1999

Holmes Place Healthclub

Iberdrola headquarters

2000

Arup moves to 54 Alcalá Street

La Alhóndiga Cultural Centre project begins

Las Rozas Business Park

2001

We are 35 people

The office incorporates Project Management consulting

Las Mercedes Business Park

2007

Jaca Ice Pavilion

M30 tunnels

Madrid City Council opens

2008

We are 180 people

Zaragoza Expo Pavilion Bridge

Adriatic LNG Terminal project in Algeciras finishes

Infanta Sofia Hospital opens

2009

Mark Chown is the new office leader of Arup in Spain

San Fernando Business Park

Palmas Altas Campus opens

2010

La Alhóndiga Cultural Centre opens

Health & Wellness project in Doha begins

Coca-Cola headquarters opens

Meda Mos II project begins

Santander waterfront

2011

Metropol Parasol opens

KAIA King Abdulaziz International Airport project begins

I

HOW MUCH IS WHAT WE BUY WORTH?

Behind every purchase is a complex system of well-coordinated professionals working towards ensuring that the experience of consumers is sufficiently satisfactory for them to want to return. The name of the game is loyalty. Design, technology, logistics, trends and popular culture are just some of the factors that interact every time we approach a shop window. Fully understanding this dynamic is essential to the success of a fashion product.

Faced with increasingly demanding consumers, the current retail market is extremely challenging. Companies have to deal with market saturation, increased commercialisation, economic stagnation and increasing pressure to incorporate environmental and social criteria into all of their operations.

One of the biggest costs for the fashion industry is energy. Given that the price of this resource could increase by between 30 and 50% in the coming years, property developers and large chains will have to find alternative ways to not only reduce energy consumption, but also improve the efficiency of the production chain.

The efficient use of resources

While the investment to improve the energy efficiency of a shop is usually high, it is viable due to reduced operating costs. A sustainable building that can fulfil quality criteria and respect the environment adds market value to the property and can have the effect of enhancing the image and corporate social responsibility credentials of its owners and occupants.

The degree of pollution that buildings can cause to the environment, their water and energy consumption efficiency, their responsible management of waste generated, their use of recycled materials and their access to natural light are some of the aspects that are taken into account when measuring the sustainability of these buildings against international criteria.

The retail sector is increasingly interested in voluntary sustainability certification that clearly demonstrates its effort to resolve this concern. Assessment tools such as BREEAM and LEED are being applied to existing and new buildings as a way of certifying improvements made.

A meaningful purchase

Large brands have promoted the idea of the act of consumption as a multisensory experience. Inviting the customer to try, interact and freely experience the purchase space is determining the direction in which this business is going.

The consumers of tomorrow will live in a world dominated by technology, communications and social networking.

This new generation will want to see stores adopting the latest technologies and will be attracted by brands that can keep pace with these changes. It will be a unique opportunity to redesign spaces and offer experiences that merge the physical with the virtual. Understanding the purchasing process as a state of mind is essential to providing the best possible experience for consumers.

The experience of Zara's eco-efficient shops

In its shop in Avenida Portal de l'Àngel in Barcelona, Zara has promoted the adoption of sustainable strategies, including energy-efficient lighting and the use of recycled greywater in toilets, to reduce the environmental impact of the establishment.

The building's enormous classical arches incorporate perforated metal panels to take advantage of natural light.

The shop has been equipped with a monitoring system that automatically adjusts the temperature, humidity and lighting according to the environmental conditions and motion detectors that turn off lights when an area is unoccupied.

The implementation of these strategies enables the shop to consume 30% less energy than other shops of this type, save up to 50% on water use and reduce CO_2 emissions by over 150 tons per year. A challenge fulfilled while still staying ahead in sales.

The eco-efficient stores save per year:

30%

50%

CO_2

150 t

Antonio Álvarez

The trend that is revolutionising fashion

In the past 20 years, Inditex has introduced a new business model to the retail sector: attending to the fashion needs and expectations of customers with the greatest possible agility and affordability.

A shop that is close to the consumer with its strategic locations, supported by online sales and environmentally-friendly; a powerful and flexible logistics system that can bring new items into the market twice a week; a design team integrated with suppliers; and the manufacturing capability and preparedness to respond with speed and quality to market demands are the most important pillars that support this strategy.

Flexibility and adaptability are what makes us stand out from the rest. We are able to distribute around 900 million garments a year with two weekly orders to over 6,000 stores on five continents.

Sustainability is another essential component. The integration of environmental and social criteria into our way of doing business comes from our commitment to the environment, our values and the reality in which we live. Understanding its importance enables us to continue serving customers and a society that is in constant evolution and change.

We are aware that, in the future, consumer demand for fashion will continue, but customers will become increasingly demanding in terms of the sustainability of the product in the store and company operations throughout the value chain.

Although our stores already have a very high level of sustainability, Inditex's goal is to continue making progress in the incorporation of new technologies that will help to reduce the consumption of energy and resources in general and the introduction of new designs that will help to improve the customer's shopping experience and ensure that it remains an important social activity.

Incorporating sustainability criteria into every stage of our value chain was the main goal from the beginning and continues to be in our current and future strategies.

Our specific objectives for 2020 are related to the reduction of our carbon footprint, eco-efficient stores, recycling, zero discharge of hazardous chemicals and the gradual transition to more sustainable materials. On a logistical level, there will also be a fundamental change: online sales will compel us to develop a different kind of customer service to that found in our stores and this is something we are also working on.

Integrating these goals into the day-to-day work of all of Inditex's employees and sharing this vision with our suppliers and other stakeholders is part of our ongoing mission. We understand that this is the only way forward and it is a journey that we have to take together.

Antonio Álvarez, Director of Environmental Sustainability at Inditex

"The integration of design with manufacturing, distribution, the sustainability of stores and the customer's needs is at the heart of our decisions."

Visual image of air traffic
between Europe and America

II

HOW FAR DO YOU WANT TO GO?

Airports are one of the main entry points into countries. Their ability to connect people is a vital function for the economy and they play a decisive role in the social and cultural development of a region or country.

Their creation, however, is not always planned well enough to take full advantage of this potential and to deal with the many challenges associated with the industry.

These include the ever-evolving technology used to control air traffic, the proliferation of low-cost airlines, constant pressure to achieve greater efficiency and cost control, and attempts to unify and simplify the operations of many companies in certain airspaces.

The industry also has to contend with the inevitable concern for the environment and the provision of control measures to compensate for the significant emissions generated.

Aviation is the only means of transport that has produced increased emissions in recent years: since 1990, emissions of carbon monoxide derived from this sector has increased by 45% and it is expected that this trend will continue to rise. Moreover, jet engines also produce steam and nitrogen oxides, which contribute to global warming.

Airports also have a profound and complex impact on the environment. They are important direct and indirect employers that exercise a decisive economic, social and environmental influence on the communities in which they are located.

For airport planning to be successful, it needs be able to have a short, medium and long-term multidisciplinary approach involving the participation of specialists in airport terminal design and air transport, as well as economists, planners and sociologists.

There is also a concern for passengers. Although, in the last decade, concern for their safety has taken precedence, their role is beginning to evolve.

As well as the provision of an increasingly sophisticated service, there is also a need to provide travellers and their companions with a truly comfortable experience, adopting alternative practices that can fulfil new demands and promote new sources of income and development for the country in which they are located.

New departures

From being mere terminals for the boarding and disembarking of passengers, airports are evolving into genuine cities capable of offering everything users need. This progress will include exclusive shopping spaces, hotels, restaurants, entertainment venues and working environments that will be sufficiently appealing as to attract, not just passengers, but also those who are not planning to fly.

These small-scale cities will become an extension of the local culture, history and economy with a high level of self-sufficiency.

These attractions, combined with increasingly simple virtual processes and technologies in which speed and efficiency are key will make travelling easier and more enjoyable.

Elegance takes off in Baku

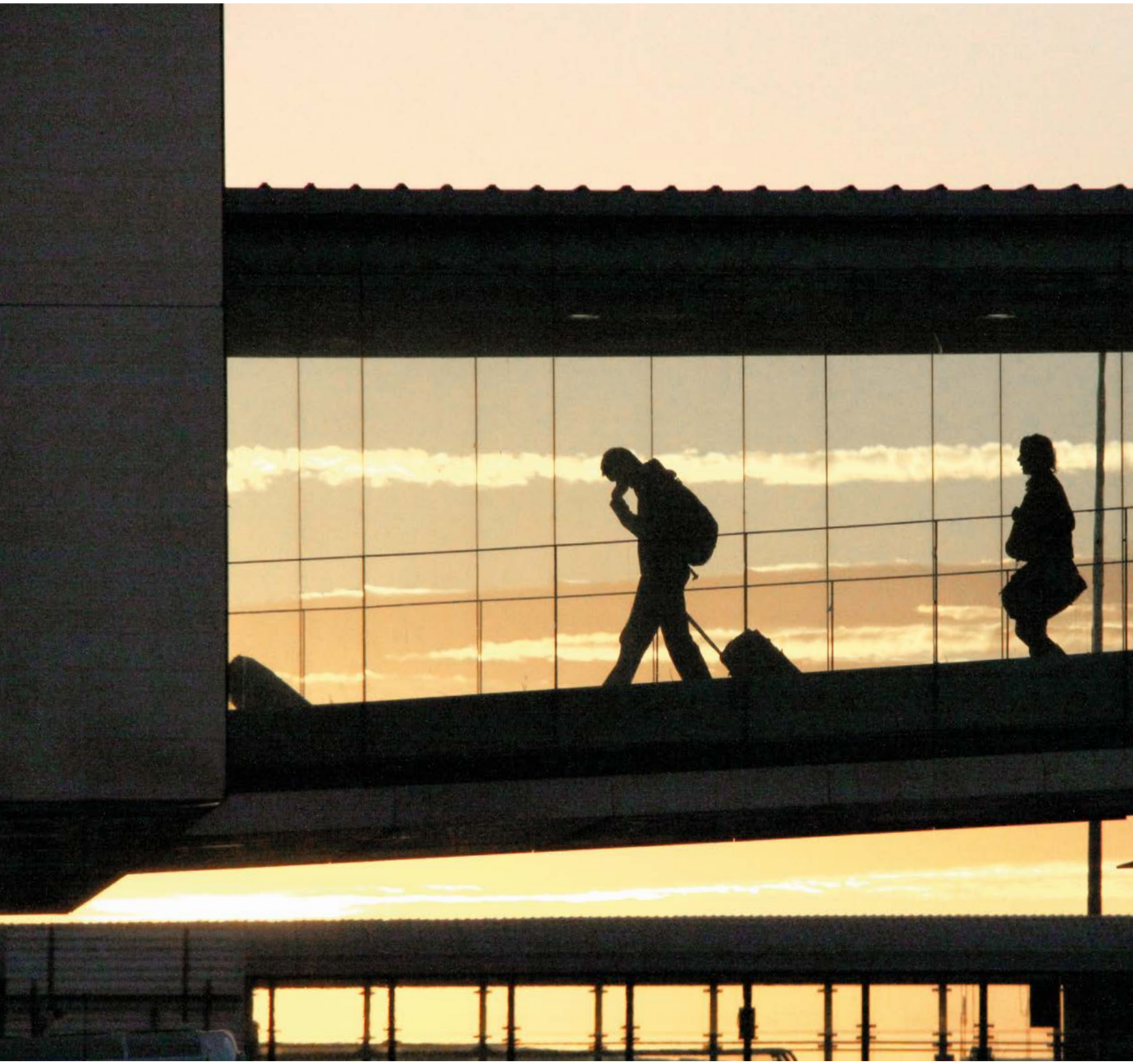
Heydar Aliyev International Airport in Baku is Azerbaijan's main airport and an important centre for the whole of the booming Caucasus region.

After its expansion, the airport is now able to receive over three million passengers a year.

The architectural and engineering design of the new building provides passengers with an improved experience, creating spaces that promote relaxation and minimise stress. This is achieved through generous proportions, which provide the spaces with natural light and wide interior and exterior views.

The steel skylights in the roof and the innovative shape of the façade provide the building with a unique appearance, enabling soft light to permeate the entire space.

Its design replicates the elegance of the city of Baku and Azerbaijan, helping to confirm this country as an increasingly attractive tourist destination.



The new KAIA King Abdulaziz International Airport

A new airport with capacity for 30 million passengers a year and an investment of over 4 billion dollars has made this the most important airport project in the Middle East.

Located in the city of Jeddah, Saudi Arabia, this expansion of the existing airport included the construction of a new 660,000-metre-squared terminal, one of the largest ever built.

The project included the construction of the main terminal, a 135-metre-high control tower, making it the tallest in the world, a railway station and other support facilities.

Following a very tight schedule, the design was developed in little over a year, a time period almost unheard of for a project of this magnitude. One of the main challenges, though, was not time, but the design of the international terminal's complex structure, which is crowned by an enormous transparent roof featuring lights that are up to 70 metres long.

To achieve an efficient design, it was decided to use a three-dimensional modular solution composed of 120,000 prefabricated elements optimised for that purpose. As a result, a lightweight yet strong structure was achieved that could be erected quickly, piece by piece, precluding the need for the hoisting of large elements.

The roof's fire safety was also an important part of the work: the original design called for a sprinkler-based fire prevention system, but after fire and heat transfer modelling was carried out, this was dispensed with. This decision not only simplified the design, but also provided the client with significant savings.

III

HOW DO YOU EXERCISE YOUR PASSION?

Stadiums are much more than just places to enjoy the shared passion for sport. These structures superbly enhance the spectator's experience, exhibit new architectural and technological trends and constitute an increasingly profitable source of revenue for the sports companies that manage them.

Their iconic forms and specific requirements make their design a real challenge and, in many cities, the only opportunity to reconcile the needs of numerous stakeholders.

Their design cannot be isolated from the environment that they inhabit. Major events are increasingly seen as stimuli for the regeneration of urban spaces. Their staging creates business opportunities, stimulates employment and promotes the creation of housing developments and new transport hubs.

Proper integration of these buildings with public spaces not only improves connectivity and social wellbeing, but also augurs the growth of surrounding communities and provides a legacy for the future.

A design that is part of the spectacle

Stadiums are places of celebration where the crowd is essential. Today, the best stadiums are spaces that are capable of eliciting a powerful connection between the crowd and the sportspeople. Their design should enrich the experience of spectators by balancing an optimum view with the proximity of the match.

The way the space is configured has to ensure that movement flows are safe for the public and functional for the sportspeople, and feature comfortable facilities equipped with everything necessary to help them compete at the highest level.

The buildings should be able to adapt to different needs with functional designs that can accommodate diverse day-to-day activities, not just large events.

Environmental comfort is also becoming increasingly important. In these buildings, factors such as temperature, humidity, airflow, lighting and acoustics have to be addressed and spectators need to be protected from the sun and rain, as well as extreme temperatures.

To fulfil these requirements, stadiums can consume a considerable amount of energy, which is why their design should be guided by principles of sustainability featuring passive architecture to provide comfort to the user without relying too heavily on active systems that require resources. This approach enables operating and maintenance costs to be optimised and helps ensure the building's future social and financial viability.

The venues of the future

In all of their variants, the stadiums of tomorrow are being designed to provide spectators with a memorable and enjoyable experience of the event, as well as other facilities, such as shopping areas, restaurants, museums and hotels, and excellent transport links to enable them to arrive, move about and return home easily.

In the future, these facilities will feature technologies with greater interactivity providing better connectivity for users. This will make a number of tools and applications available that will enhance the public's experience and enjoyment of the spectacle. The ultimate aim is for spectators in the stadium to be able to take advantage of the same information and interaction options that they have at home.

The spaces will become more comfortable and sophisticated, there will be a greater number of entertainment and dining areas, and the installations will be better equipped to protect against inclement weather.

This combination of evolution and innovation will help to increase the excitement of live events and ensure that the spectator enjoys the spectacle, regardless of the result.

Over Jaca's ice

Located at the foot of the Pyrenees, in Huesca, Aragon northern Spain, Jaca Ice Hockey pavilion was constructed in 2007 to host the Junior Euro Olympics and became a central point for the city's cultural life.

The pavilion consists of two ice rinks, and has 12 modes of operation ranging from ice hockey matches to exhibitions and concerts.

The structure, designed from a section of a larger toroid (doughnut) shape, is open and is exposed without the use of suspended ceilings.

As the pavilion would only have 'intensive' use (peak occupancy) a few times a year, one of the challenges was to engineer a system where ice storage tanks allow thermal energy to be stored overnight and used for such occupancy. Storing the thermal energy allowed to reduce the size of chillers and electrical supply. Lower-cost night-time electricity helps the pavilion to reduce operational costs.

The energy efficient strategy also includes a system to recycle waste heat from ice chillers to heat water for showers and ice melting.

Qatar 2022: a World with victorious

After winning the official candidature for the 2022 Football World Cup, Qatar will show the world how the most advanced technology can cope with adverse environmental conditions.

A population of a little less than two million people that have to fulfil the promise of filling stadiums with 50,000 seats, a country with little football history and temperatures that can reach 50 degrees Celsius in the summer have been some of the disadvantages to overcome in order to become the first country in the Middle East to host a sport event of such magnitude.

Qatar Foundation Stadium in Doha is part of the Health & Wellness Facilities, a complex designed to become a major sports facility in Doha and demonstrate that Qatar also has the ability to organize a World Cup.

The project consists of a high-quality football stadium, with a capacity of 45,500 spectators during the World Cup with the possibility of reducing the number to 27,000 for later use. The complex also includes an indoor swimming pool for competitions, a diving and a workout pool and a multi-purpose arena including an indoor running track with a capacity of 40,000 spectators.

To meet the challenges of this project, the team should carry out an innovative program of I+D that creates a qualitative leap in the field of engineering and the layout in the design of stadiums.

The passive systems and the geometry of the building surroundings have been designed to divert and combat the effects of the hot desert air. At the same time, optimization of the active systems uses the latest technology facilities. In both cases, the highest sustainability certification requirements are respected in each one of the solutions.

Mark Fenwick

The fisherman's strategy

"Stadiums will always exist, no matter how far into the future we go. We only have to see the Coliseum in Rome, and how similar it is to a modern day stadium."

Every day the world is becoming smaller and architects have to quickly learn how to work in a global and diverse market, selecting the most efficient and effective way of reaching new markets open to change. A good fisherman always looks to fish where no one else is fishing. Architects should learn a lot from fishermen.

Following that vision, we first decided to visit Qatar in 2008. Since our visit, we felt this was a perfect country to work in as it has many similarities with the culture in Spain.

After Qatar had been appointed as the destination for the World Cup in 2022, we started working for Qatar Foundation on the design of the Qatar Foundation Stadium and Health and Wellness facilities, a sports complex that includes a cutting-edge stadium within a University campus. The main design challenge has been to design a stadium for the World Cup in 2022, but at the same time make sure that the project provides a valid sports facility as a lasting legacy. Our design looks at a building which can be used every day of the year, and not just on event days. We have included uses which make the stadium and facilities, on the campus, a place of rest and culture.

Our projects always defend a variety of criteria, and this project certainly looked at many design issues.

Firstly, we feel that buildings should have a strong sense of localization and belong to where they are placed. We do not believe in Global design where a building can be placed in any location.

We therefore searched for local references, the way light reflects on the façade, the need for urban realm, the Islamic roots of architecture where the buildings and the gardens are one, water and shade, and many of the issues we have learnt in a Mediterranean architectural career.

However, tradition must also be able to integrate avant-garde movements and be able to adopt the latest technologies and tools to deliver the best design.

The main new technology applied to this stadium is without doubt the unique “Stadium Cooling Strategy”, where the research and development of unique design and technology systems can control extreme climates and cool a large space for 45,000 spectators with a fully open cover in the hostile desert environment.

This is a unique and world first stadium, where Passive and Active Architecture allows a space to be comfortable at any time of the year.

Stadiums will always exist, no matter how far into the future we go. We only have to see the Coliseum in Rome, and how similar it is to a modern day stadium. Being able to get more and more innovative and sustainable solutions to merge architecture and engineering together is part of the challenge.

Mark Fenwick, Architect and Director of Fenwick Iribarren Architects

Hormigo

IV

WHERE ARE WE GOING WITH INDUSTRIAL EVOLUTION?

In recent decades, the factories of developed economies have undergone a profound transformation. Meeting the needs of a growing demand for products with greater added value should be compatible with reducing costs, improving efficiency and more rapid launching to market.

Moreover, as well as offering more competitive products, there is also the challenge of providing better quality, more productive and less polluted work environments.

To manufacture more and better, industry should be aware of several factors that, if not considered now, will affect future productivity.

More with less

As resources become more scarce and expensive, manufacturers will have to reduce the use of raw materials, as well as energy and water. Due to new technologies and more efficient processes, some companies are now able to recycle much of their industrial waste and make them reusable as by-products for other industries and sectors.

To reduce greenhouse gas emissions, many industries are considering the use of renewable energy and the reduction of global supply chains.

It is estimated that by 2050, 70% of the world population will be living in cities. With more people living in urban centres and increased use of greener technologies, the shift towards more local manufacturing that is closer to the customer and carried out at cleaner and quieter industrial plants will mitigate the environmental impact of operations.

The construction of factories in cities will not only cause a spatial reconfiguration of production, but also of design and assembly.

Larger local networks and new intermediate services within the production chain will give additional support to products, leading to a manufacturing system that will be more cyclical, interactive and able to create value within the production process.

The evolution revolution

More integrated ways of working blur the boundaries between research, design, production and services, generating new relationships between clients, manufacturers and suppliers and greater customisation of products and services throughout their life cycle.

Information technology and the use of advanced sensors and materials that are more functional and sustainable will become increasingly present in products and processes. They will be able to provide information about the progress, quality and state of manufacture. Products will be able to “listen” to customers and information about their use will enable manufacturers to alter or improve them while they are being used.

Globalisation and the growing complexity of supply chains has increased industry’s exposure to natural disasters. The industry of the future will also have to be resilient and able to recover with ingenuity and flexibility to the conditions it encounters.

Improving collaboration and teamwork could be an effective alternative to achieving greater capacity for resilience. The new factories will be centres of creativity and innovation operating in networks of relationships with suppliers, universities and employees that, on a remote basis, will seek to create alternative ways of adding value to products.

Thinking strategically about how to integrate effectively into the assembly line of the future is part of industry’s challenge today.

-25%
energy
100%
recyclable

The Millennium Plant

With over 100,000 square metres, Gillette's new manufacturing plant in Irapuato represents the largest investment of Procter & Gamble in Mexico.

The Millennium Plant is one of the first facilities to be completed under Procter & Gamble's new Global Facility Sustainability Guidelines and main indicators of safety operations and logistics efficiency.

Through a strong commitment in reducing energy, water consumption, waste and carbon emissions, the project has managed to become a benchmark of sustainability, design and operation.

The water used in the plant is 100% recycled. Wastewater and rainwater are collected and treated on-site before being re-circulated, allowing the plant to save up to 36% of its annual water use.

Its cutting-edge lighting system reduces more than 25% of the energy used. Both the plant and the warehouse have windows and skylights installed in the ceiling which bring in natural light and automatically adjust in response to the movement of the sun. Artificial lighting includes low energy lamps and photo sensors that switch off depending on the amount of daylight available.

The project team acquired as many construction materials as possible from nearby suppliers. This decision not only increased the project's direct benefits to the local community but also reduced the environmental impact of transporting construction materials.

To provide convenient, economical and environmentally friendly access for workers, the design team took the location, public transport network and bicycle facilities into consideration. The team installed bicycle racks on-site and included public transport stops at the factory entrance.

This project involved the technical coordination of multiple stakeholders within a very limited timeframe. The plant is expected to benefit more than 120 rural communities and generate 2,500 direct and indirect jobs.

Toyota's sustainable investment

At the beginning of 2013, Toyota opened its new logistics centre in the town of Illescas, Toledo.

The 20,000-square-metres warehouse was created to improve the availability of spare parts and vehicle accessories supplied for Toyota and Lexus vehicles in Spain and become a national benchmark thanks to its innovative energy efficient systems.

The warehouse includes a building envelope that exceeds the energy performance levels set out in the regulations and is equipped with different systems committed to achieving sustainability goals.

These systems range from lighting controlled by infrared barriers and low energy consumption HVAC systems to renewable energies (photovoltaic and solar thermal) and a water strategy that collects and reuses rain water and grey water and incorporates waterless urinals.

A sustainable design, along with respect to the main indicators of security operations, logistics efficiency and a proven expansion capacity have been the cornerstones to convert this facility into an avant-garde logistics hub; ready to meet the demands of a client who is currently the global leader in the production of hybrid vehicles.

V

IS IT POSSIBLE TO RECOVER THE PAST?

The spaces we inhabit need almost constant renovation. The uncertainty of the economy, the scarcity of green field sites to build on and the need to take advantage of existing resources makes it necessary to begin to rebuild from what we already have.

Until recently, by virtue of their perceived quality, only new buildings were being championed, but this trend has now changed in favour of investing in communities, environments and buildings that already exist, with the aim of reintegrating these assets in a more profitable and sustainable way.

Obtaining finance for new construction is more difficult than reusing existing properties, and while the amount of building land in urban areas is decreasing, tenants are demanding more centrally located spaces at competitive prices. Because of this, renovation could become the dominant trend in the construction market in the coming years.

To analyse how the development of existing properties could be more effective, it is essential to consider the needs of the user. New tenants are raising issues such as the efficient use of HVAC systems, the optimisation of energy consumption and the use of more sustainable materials. But they are also looking for efficient management, improved levels of service and reduced operating costs.

Anticipate when designing

One of the priority issues to resolve is to anticipate in advance the cost of renovation and equipment changes in the future, and to calculate the necessary investment and amortisation to carry it out. Owners need to know to what extent they need to act and when to do it to get the best possible return on their investment. This is possible with tools such as life-cycle cost analyses, which are essential in renovation projects.

Assessing an investment's cash flow over several years and budgeting capital requirements are also critical to the success of the project and its financial support.

It is important to be able to identify the current state of the existing building, analyse its operating costs, detail the objectives to be achieved, propose various ways of carrying out the work and, finally, put forward different financial and energy scenarios in order to be able to compare options. All of this will enable the owner to make the best decision about the level of investment required today and throughout the life of the property.

Facilitating the making of financial decisions at the right time not only benefits the user, but also the community, the environment and the very sustainability of the property business, and helps the owner to look beyond the search for short-term profits.

Picasso returns to Malaga

Buenavista Palace, in the historic centre of Malaga, was identified as a possible site for this museum. The Council of Andalusia decided to acquire this historic building along with some adjacent properties to convert it into the new home of the Picasso Museum.

In Malaga, excavation is quite common within the city centre. However, when Phoenician remains and those of other civilisations were discovered in the building's basement, it soon became clear that this design would significantly influence the concept for the museum experience itself. The remains are now made accessible to the public and are included in the exhibition.

Whilst the original existing wall construction was found to be in generally good condition, the creation of a new configuration of museum spaces resulted in the need to underpin some existing walls and partially demolished others to create open circulation spaces. A new steel transfer structure was constructed in place of the walls to continue supporting the upper levels of the Palace.

The existing floor slabs were clearly not appropriate to take the loads required for the new museum, due principally to their low resistance and poor dynamic behaviour. Wherever possible, the existing slab has been replaced, however in certain areas of the Palace, the wooden artisan ceilings were hung from the existing floor structural slabs. Given their artistic and historic importance, it was therefore not possible to completely replace the existing slabs. An ingenious system of steel reinforcement plates was used to strengthen the structure from the upper surface, thus not affecting the wooden ceilings below.

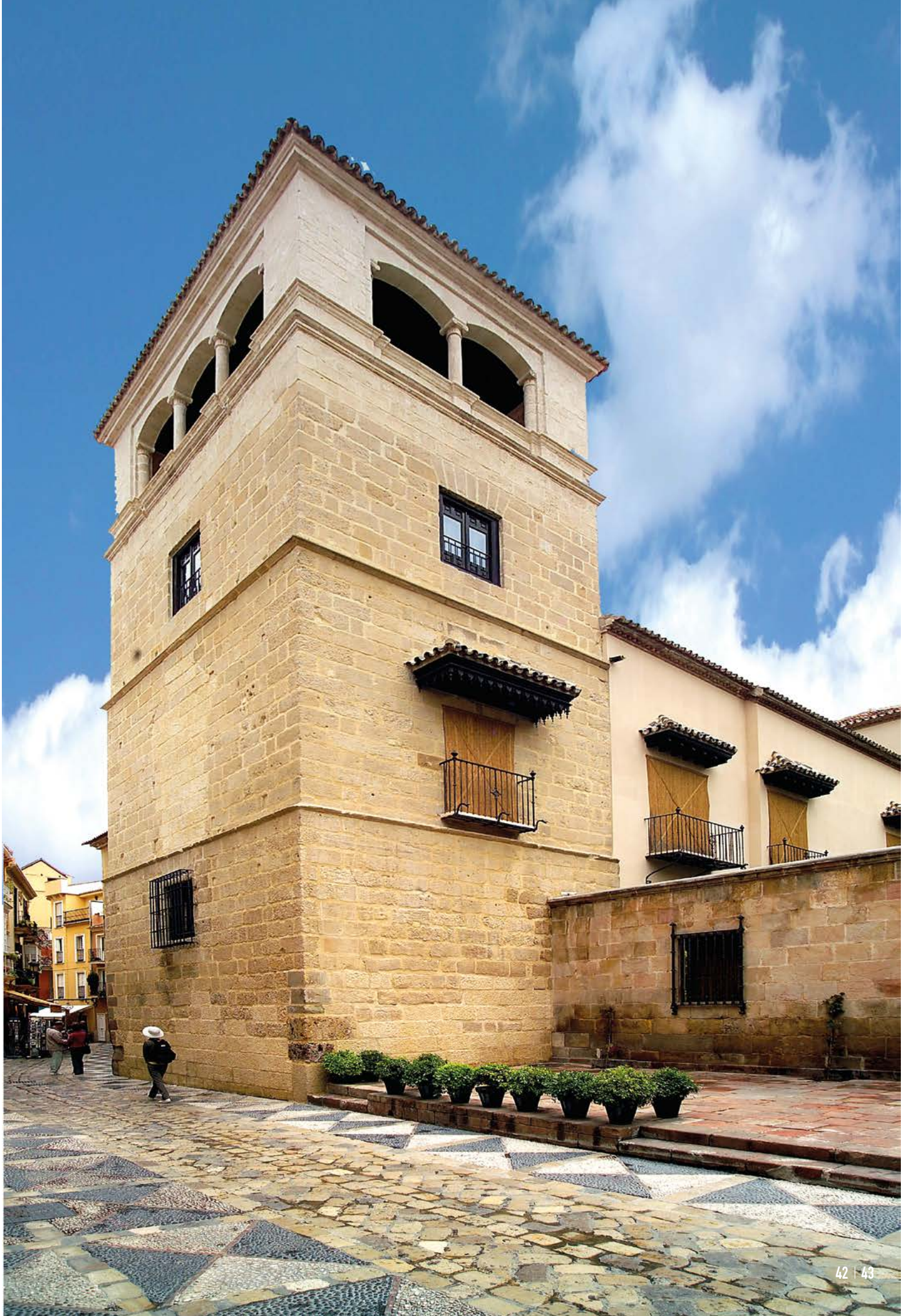
A number of the surrounding buildings have been incorporated into the museum complex. In some cases, these buildings have been completely demolished, or in other cases, given their historic value, the façades have been maintained and refurbished.

The original architectural character of the Palace clearly had to be preserved, whilst at the same time; the rooms had to provide ideal conditions to become the current home for the exceptional works of art to be exhibited inside them. The art conservationists required that the temperature and humidity conditions within the rooms met internationally accepted standards. The challenge for the engineers was to guarantee these conditions by designing modern technological systems which integrated harmoniously into the existing palace architecture.

To identify possible routes for the horizontal distribution of air from the central units to the gallery spaces, as well as electrical, data and security cabling, the existing roof spaces above the galleries were examined in detail together with the architects. The service distribution was designed to ensure that the impact on the structure was reduced to a minimum. After studying its structural capacity and identifying plausible areas, the vertical distribution was installed in recesses in the walls. Metal support structures to strengthen the brick structure were therefore necessary. In the galleries, the original wooden panels of the false ceilings provided a particular challenge for the integration of the air diffusion grilles elements.

The considered and thorough design of lighting for an art exhibition space is crucial for the successful display of works of art. In the temporary exhibition galleries, the design includes large horizontal roof skylights to provide natural lighting to the art exhibition spaces. The exposure of works of art to direct sunlight and glare has to clearly be avoided as it can potentially damage the artwork. In addition, glare is also distracting for the visitor.

Thanks to this profound transformation, the work of Pablo Picasso has finally got a special place to reside in his home town.



Culture in a warehouse

The 43,000 square metre La Alhóndiga Cultural Centre was built on the site of an old food warehouse and occupies a city block in the centre of Bilbao. Almost ten years of renovation work was necessary to convert this old modernist building into a vibrant cultural centre that includes a swimming pool and large sun terrace on the roof, a library, several cinema screens, an exhibition hall, shopping and entertainment areas and an underground car park.

While the façades and part of the interior space, designed by the architect Ricardo Bastida in the early nineteenth century, have been retained, most of the interior was demolished to accommodate new installations that were interwoven into the original structure. Quite a challenge for the designers, who had to combine the existing façade and flooring with three new buildings and two basement levels.

As a result, the exterior classicism contrasts with a distinctly urban, unique and innovative interior space designed to embody the life and energy of the city of Bilbao.

From Madrid, the sky

The Cibeles Palace is a historic site located in the centre of Madrid.

Opened in 1919, the building functioned for decades as the country's main postal distribution centre. Following an architectural renovation of its interior and some work on its exterior, this example of modernist architecture in Madrid began a new life in 2011 as the headquarters of Madrid's City Council.

The renovation included the design of a glass roof to protect the central courtyard, the closure of the Alcalá and Montalbán doors with glass panels, the preservation, restoration and replacement of the exterior woodwork and the refurbishment of the skylights of the service hall, the council chamber and the ambulatory.

The main challenge of this project was to achieve a balance between the original design of the building and the facilities that its new use demands in the twenty-first century. Throughout the redesign process, the intention was to recover the compositional strength of the openings in the façades, restoring light to the large interior space and using contemporary materials and techniques to obtain the desired features.

Madrid's characteristic sky can be enjoyed from the top of the lookout tower and through the glass roof over the old unloading yard, now converted into the capital's new urban exhibition space.

VI

HOW DO WE WANT TO WORK?

The technological evolution of the last 20 years has led to profound changes in the structure of the employment market. As a result, around 65% of the working population of the world now works in the service sector, mainly in offices, business complexes or technology campuses in urban areas.

Meanwhile, as the population density of cities grows throughout the world, the way that these buildings are used is being transformed. Generational changes and the existence of a much more global and mobile workforce affect the way of working, which raises a dilemma about how to use these spaces.

Smart occupancy

Traditionally, architectural design has focused on producing pleasant working spaces for the client, and has been less concerned about improving the wellbeing of the actual occupants. This has resulted often in inefficient and uncomfortable buildings. In recent years, however, there has been a greater focus on providing spaces that show a real interest in the user by integrating the actual needs of occupants in the design programme.

Occupant behaviour is key to increasing productivity in buildings. From a sustainable point of view, the management and promotion of smart practices, with users aware of energy and resource consumption, can not only reduce a building's costs, but also its carbon emissions, and improve comfort and productivity levels.

Technologies play a fundamental role in this change, promoting alternative solutions to enable workers to connect virtually or work remotely.

Working on it

The shift to a knowledge-based economy is transforming the way professionals relate to each other in their fields of work. There is a growing need to generate collaborative networks to solve problems.

The workspace of the future will be undefined: a combination of physical and virtual facilities that will allow people to work in flexible environments and foster collaboration and teamwork. In tomorrow's companies, location will no longer be a limiting factor, but a source of unique opportunities to improve productivity.

Large corporations are already adopting many of these features. Their new designs envisage a hybrid space configuration, a changing nature and an absence of hierarchy in floor plans. In these companies, closed offices will tend to disappear and conference rooms will become more important. The environment will be more comfortable and less energy will be consumed. The building envelope, suspended ceilings and raised floors, as well as the building services and structure, will behave like a succession of layers that provide a neutral and efficient space and prioritise user comfort.

The concept of volume will also change due to this vision and traditional towers will become more horizontal in appearance. New spaces with low-rise blocks situated around public squares, providing meeting places for discussion and exchanging of ideas, point the way to where future workspaces are heading.

Palmas Altas: a case study

After an investment of more than 100 million euros in 2009, Palmas Altas Campus, a complex to house the headquarters of Abengoa and other related businesses, has recently opened.

Located on the outskirts of the city of Seville, the campus is a great example of commitment to excellence through innovation, respect for the environment and sustainable architecture.

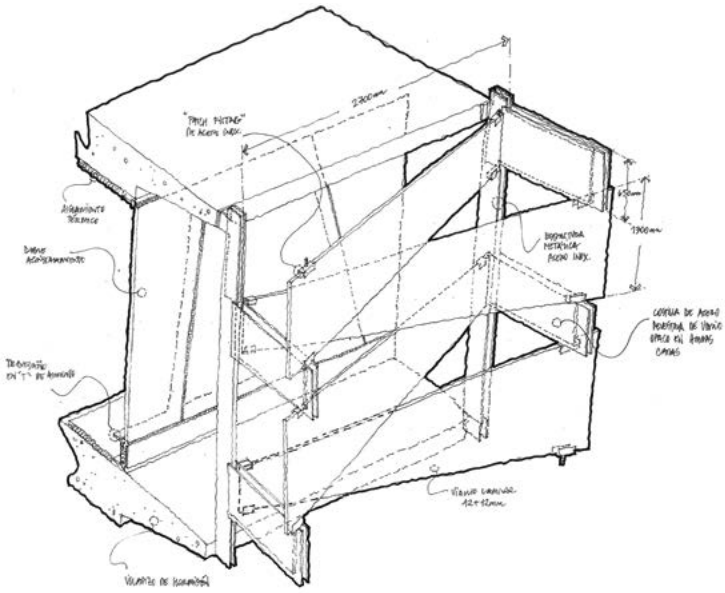
Of the 50,000 square metres of gross floor area, 30,000 are occupied by the 3,000 employees of Abengoa. The rest of this multifunctional space is occupied by synergistic companies and partners, as well as various institutions.

One of Abengoa's objectives was for the building to provide a comfortable working environment for its employees. In this spirit, the interior design of the building promotes the concept of an open office to facilitate interaction. The complex also includes a nursery, gyms, a medical centre, a travel centre, free transport to the city centre and restaurant areas.

These headquarters have become a symbol inside and outside Spain for energy efficiency, environmental leadership and CO_2 emission reduction. Its design minimises energy consumption and locally produces two-thirds of its electricity requirements through the use of different green technologies. It features parabolic trough collectors; photovoltaic panels, which convert sunlight into electricity; a trigeneration plant, which simultaneously produces electricity, with hot and chilled water; hydrogen fuel cells, which generate additional energy; and efficient HVAC and lighting systems.

The building also reduces water consumption through the use of equipment for collecting and storing rainwater.

The complex, which has been recognised with numerous international awards, is considered one of the most sustainable buildings in Europe.



The heart of Coca-Cola in Madrid

The headquarters of Coca-Cola, located next to Madrid's M-30 orbital motorway, is a 7,500-square-metre building distributed over four floors and three basement levels with wide open spaces that open onto an outdoor terrace demarcated by a glazed heart-shaped façade.

Although the main façade gives the impression of complexity due to its geometry, it is not as complex as it seems. Behind its unique shape is concealed an adaptation to the environment and a conscious decision not to draw attention to itself. The building envelopes strike a balance between protection from the sun and natural lighting through carefully – studied proportioning of areas of transparency and opacity.

This ensures that the energy balance, views of the exterior and natural lighting are optimised.

Destined to become an environmental showpiece, the building was designed with the objectives of comfort and sustainability in mind: maximum energy efficiency, FSC certification for the wooden components, minimum use of water, the planting of indigenous flowers and the reuse of grey and rain water in the building and its landscaping.

From the beginning, the project focused on reducing environmental impact and carbon emissions, and maximising the productivity of the complex's employees.

The result is an island of serenity alongside the motorway, a good indication that this ambition has been achieved.

VII

HOW DO WE SHAPE A BETTER WORLD?

In recent years, more and more companies are beginning to understand the benefits of being more socially responsible: as well as generating greater added value to promote the development of society and their surrounding communities, it also helps to encourage competitiveness.

During times of economic crisis, this social responsibility plays a fundamental role: the recession is also a crisis of trust, dialogue with employees or members of an organisation is absolutely necessary.

The insecurity and uncertainty caused by such a negative situation calls for a need to reposition. A unique opportunity in which only the companies that are capable of transforming the threats associated with an unfavourable business climate into growth opportunities will survive in the future.

By implementing social initiatives, organisations and companies can recover their so-called "social licence to operate", in other words, being recognised and accepted by their surrounding communities for their ability to meet the needs and expectations of the different interest groups in the areas where they operate. This strategy makes more transparent and comprehensive management possible, with companies assuming not only the economic and financial risks, but also social and environmental responsibility, and offering a model of sustainable production.

Concern for the environment, society and the internal and external surroundings form the basis of what we understand as being vital to improving the world in which we live.

Being socially responsible not only means fulfilling legal or financial obligations, but also going even further by investing in human capital, the environment and human relationships. And it is during this process that we learn, discover, innovate and capitalise.

Improving society also improves ourselves and ultimately helps us to shape a world that is only better if it involves the participation of everybody.

Creating water supply systems in Peru

Beyond the commitment to generating sustainable employment, developing social inclusion policies and creating wealth, companies are expected to take a greater role in the geographical and social environments in which they operate through corporate volunteering schemes. These schemes encourage employees to collaborate with international organisations to provide technical support for projects in disadvantaged areas of the world.

The settlement of Laderas del Chillón M.A.'3 in Peru is a community of 1,200 residents who did not have a sewage system.

To contribute to improving the health of the population, the Red Cross, together with local partners and in collaboration with various volunteer companies, participated in the design of a water supply and public health system to improve the physical and environmental conditions of the area.

During the project, it was decided to involve the participation of the population at every stage of development by providing local men and women with leadership roles to carry out the organisation, planning and management of the work. At a later stage, the construction of the drinking water system was carried out and civil society in the area continued to be strengthened.

As a result, the settlement not only had access to drinking water and sewage systems for the first time, but also strengthened the potential of the community itself through the practices of integration and development of the companies, specialists and other participants deeply committed to promoting social wellbeing.

"There are two ways of looking at the pursuit of happiness: one is to go straight for the things you fancy without restraints, that is, without considering anybody else besides yourself. The other is to recognise that no man is an island, that our lives are inextricably mixed up with those of our fellow human beings, and that there can be no real happiness in isolation. We opt for the second way."

Sir Ove Arup, "The Key Speech", 1970

"Young people with severe disabilities will live in a real home that is adapted to their special needs and will also be sustainable."

Elena Guembe, Patron of the Lucas Koch Foundation and Project Coordinator

A house for Lucas

The Lucas Koch Foundation is a charitable organisation that promotes projects to improve the lives of people with severe disabilities and their family members. In 2011, we came together with the foundation to help build a house in Alicante that would become home to seven children with severe disabilities.

The design of the house had the aim of meeting the physical and emotional needs of the children and included a therapy room with an indoor swimming pool. In the future, it is expected that the home will also function as a therapeutic centre during the day.

The work ranged from façade, structure and building services engineering to consulting on sustainability and fire safety. The building's design also incorporated energy-saving criteria, photovoltaic panels and its structure also took into account the seismic conditions of the region.

The interdisciplinary participation and coordination required by this project was key for the training of our engineers, not only in terms of technical skills, but also regarding how to add value to promote social wellbeing.

"Seeing the pleasure in the faces of the locals when they saw the bridge structure cross the river for the first time was a deeply moving experience."

Kayin Dawoodi, Project Manager

"The exciting part of the experience was working closely with the local community to actually build the bridge from scratch, and understanding first-hand what a difference to their lives this bridge would make"

Phil Borowiec, Project Manager

The bridge on the River Muregeya

Members of rural communities in developing countries tend to live on foot. When rivers rise and are impossible to cross, basic activities such as going to school, work or to the doctors become a real challenge.

For these populations, the construction of a simple pedestrian bridge creates connections, opportunities and improves the quality of life of the inhabitants.

The regions of Rutsiro and Karongi, in Rwanda, are divided by the river Muregeya. 10,000 inhabitants are forced to constantly cross the river to access a primary healthcare hospital, schools and the main community market.

Three months out of the year, March, April and December, the river is not crossable at all. However, basic needs make the inhabitants continue to cross, risking their lives which often results in injuries and deaths: more than ten people have died trying to cross the river in the last five years.

A pedestrian bridge safe enough for pedestrians, bicycles, motorcycles, animals and cars was essential. But local administration could not fund and manage this project due to the lack of expertise and financial limitations.

The Ministry of Infrastructure, through Rwanda Transport Development Agency (RTDA), therefore requested the Bridges to Prosperity Foundation (B2P) to construct a pedestrian bridge over the Muregeya River to serve the large population living along its banks.

B2P is an NGO that envisages a world where poverty caused by rural isolation in third world countries no longer exists.

In collaboration with other businesses and professionals, B2P sponsors help to teach communities how to construct river bridges. Thanks to this method, the community is deeply involved in the project and actively participates in its creation and maintenance.

Several of our engineers helped this NGO to build BridgeTOOL, a standard tool that allows the rapid design of suspended footbridges and is adaptable to different needs and construction designs.

After two years of intense work on the design, engineers and experts moved to Ruanda in July 2013 for a few weeks to construct a 50 metre span (long) suspension bridge with the community of Muregeya. The suspension bridge unites both sides of the river. Donated local materials were used for its structure and members of the community received training on how to build it.

The new bridge has reduced isolation of the area and has helped to strengthen links between the local people and connections within the region.

VIII

HOW DO WE RECALCULATE THE ROUTE?

Roads, railways, ports, airports and intermodal transport hubs are an intrinsic part of modern day life: they are the main arteries through which people and commerce circulate, grow and evolve.

Globalisation, population increases and economic growth in certain regions intensify the need for more and better transport infrastructure to facilitate and accompany this evolution.

While emerging cities must invest in new infrastructure to ensure balanced regional development, economically mature regions emphasise maintenance, adaptation and modernisation of existing infrastructures and more efficient and sustainable management of them.

The financing, development and operation of infrastructures has become a global concern. With many developed countries continuing to face budgetary constraints and developing countries requiring greater investment to accelerate their pace of modernisation, there is a pressing need for the private sector to play more of a significant role.

While it is likely that investment will remain the fundamental responsibility of public authorities, the need for a specialised contribution and more efficient management form part of the arguments in favour of this alternative.

Upcoming trends

New economic circumstances also result in alterations to transportation routes. The growth currently being experienced by emerging countries is changing the way certain business, such as the international maritime trade, is being conducted: traditional routes that ran parallel to the Equator are now being replaced by traffic flows that are beginning to move parallel to the meridians. Thus, as freight transport by ship moves via Africa and the United States in the direction of Asian countries like China, not only are global transport networks being reconfigured, but also the need to develop port infrastructures in these emerging economies. The future is likely to see an unprecedented growth of these ports.

In the case of roads, in recent years, some of the options promoted include the use of new technologies, vehicle traffic management and interaction with citizens to provide transportation alternatives suitable for every need. To this trend can also be added the promotion of more sustainable mobility options such as intermodality and the inclusion of less polluting vehicles.

Continuing concern about the impact of transport on the environment has resulted in increasingly important agreements and commitments to reducing emissions, more specific laws and tax measures and research into new CO_2 absorbent materials.

Today, many existing infrastructures can also be influenced by some of the effects of climate change. Ranging from earthquakes and tsunamis to floods or fires, design, construction, operation and maintenance of these infrastructures has to be able to ensure their resilience and functionality to meet these new challenges and make them a lasting legacy for future generations.

Meda-Mos II, motorways of the sea

Freight transport is one of the most important activities for the economic development of a region. Aware of this, the European Union has for many years been creating programmes to strengthen trade ties with its neighbours. Meda-Mos II is a project that started in 2010 in this spirit and has the aim of fostering various initiatives to promote this powerful activity within the Mediterranean region and contribute to its physical and economic integration.

As the Phoenicians did in their time, this project aims to overcome existing barriers and develop a free-trade area.

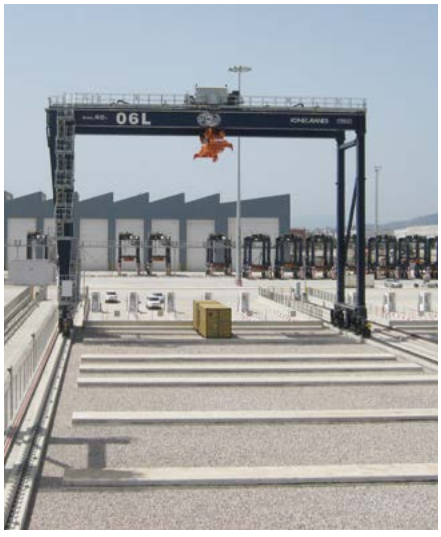
For a period of three years, numerous experts in various technical, economic, environmental and regulatory disciplines provide technical assistance to help adapt, enhance and modernise maritime and intermodal transport services between a number of beneficiary countries from the Mediterranean arc, such as Morocco, Algeria, Tunisia, Egypt, Israel, Palestine, Jordan and Lebanon, and European countries.

The complexity of this project poses many challenges, from the difficulty of articulating new strategies with existing regional planning at the national or local level to the need to balance technical proposals with the political dimension associated with any decision-making in countries where strong control of economic activity predominates.

As well as considerable technical complexity, this project also needs to address the delicate political situation in many member countries.

Meda-Mos II not only anticipates the development and consolidation of specific pilot projects, but also provides specific diagnostics from the regulatory framework of each country, proposals for improving transport, European standards of environmental assessment in ports and promotes, at the same time, greater private-sector participation in the development and management of infrastructures and maritime and port services.

The name Meda Mos stands for Mediterranean Motorways of the Sea, which refers to short sea shipping services that fulfil a number of quality and frequency criteria.



The Tercat terminal has a current capacity of 2.65 million TEU a year and could reach 3.50 million TEU in the future.

Containers of technology

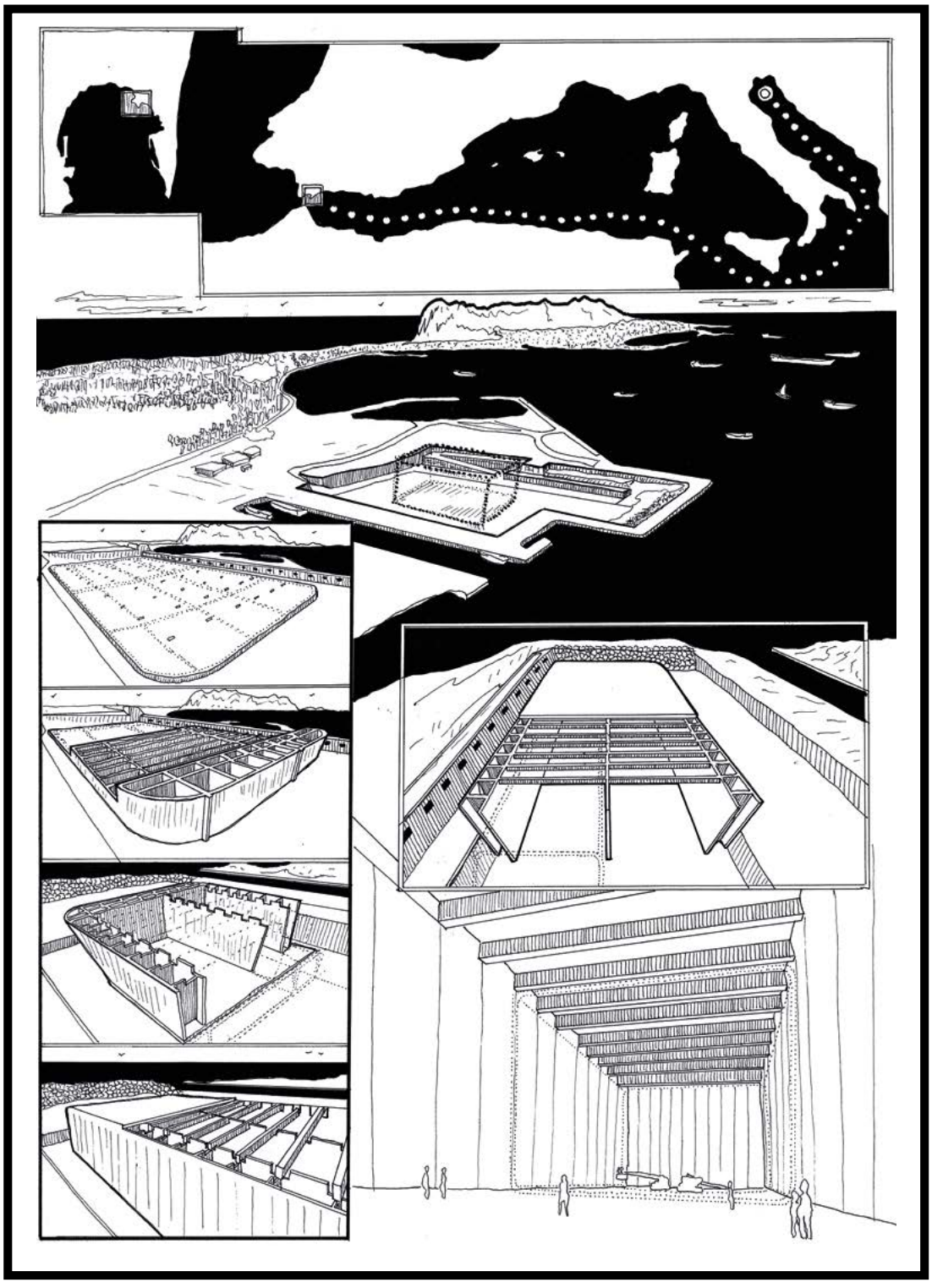
Barcelona is one of the largest and most dynamic ports in the Mediterranean. As part of a project to expand its facilities in 2001, the port authority promoted the development of a new container terminal that would allow it to strengthen its presence in the market.

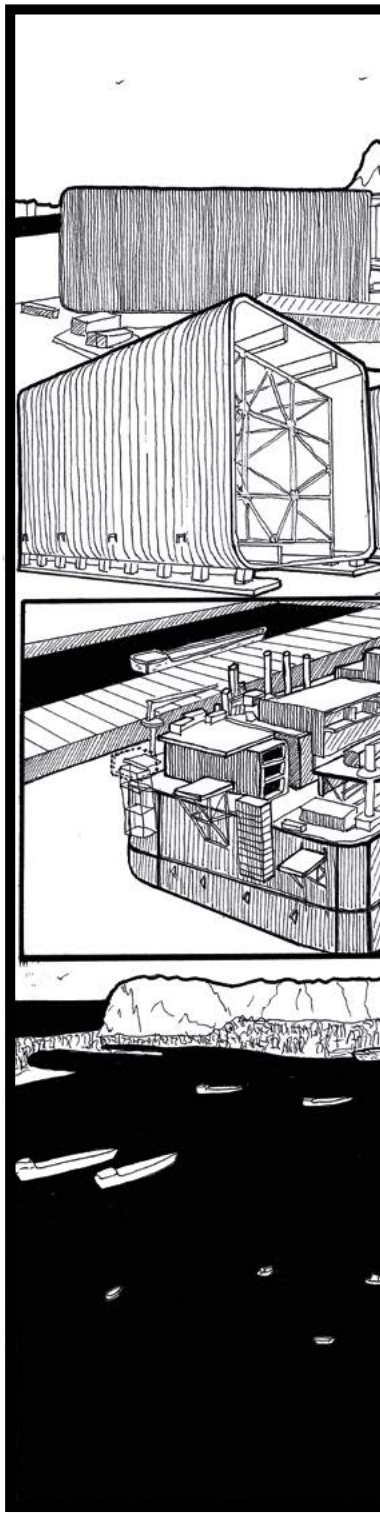
Tercat, a company controlled by Hutchison Port Holdings (HPH) and subsidiary of Hutchison Whampoa Limited, was awarded the concession to build and operate the new semi-automated container terminal, the first of its kind in the region.

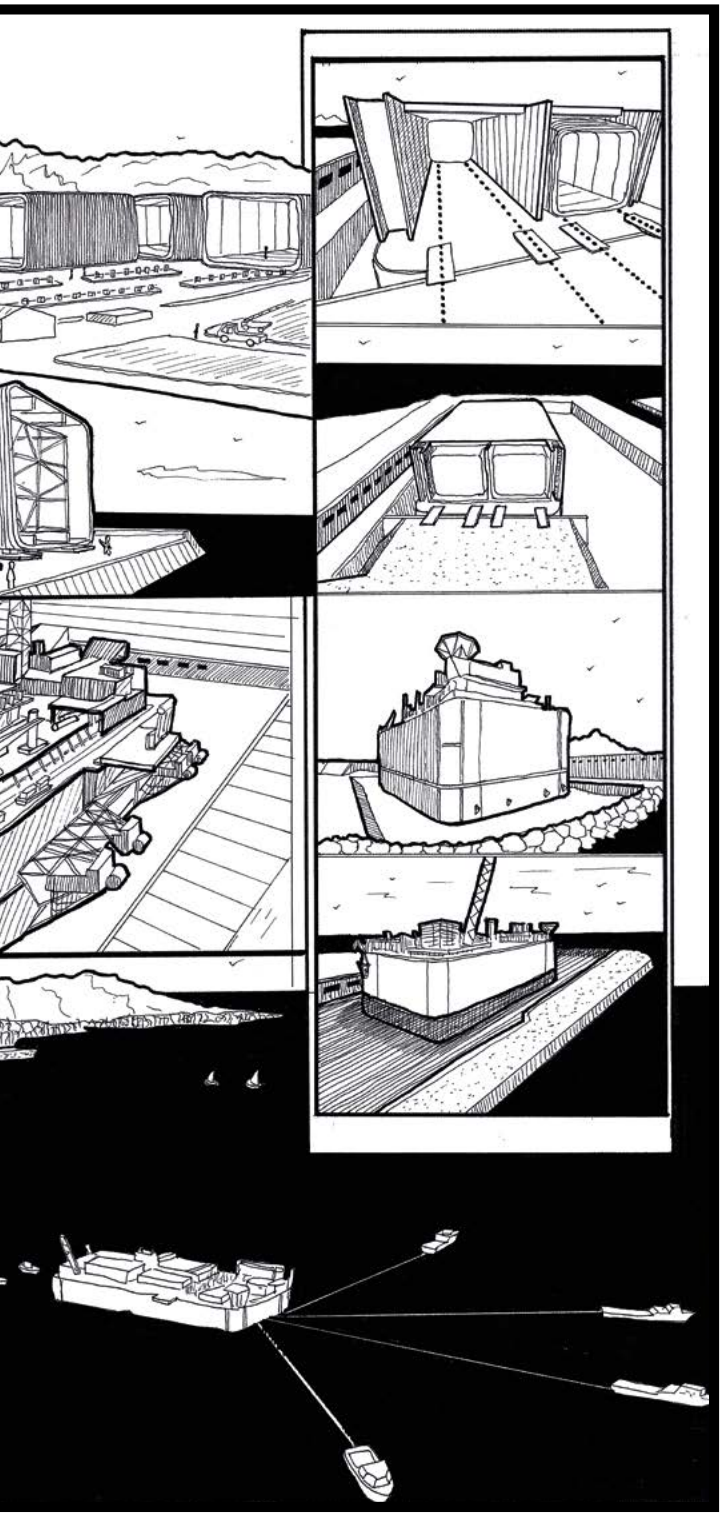
Built on an area of 132 hectares, this cutting-edge facility, when fully developed, will boast a total of 2,100 metres of quayside to berth the latest generation of container ships. The project included all civil works, installations and some additional services.

Its execution process was very demanding due to the client's high level of expertise in this type of terminal and the need to include technological applications that were previously unknown in Spain. In addition, the project was carried out against a backdrop of a widespread decline in the volume of maritime traffic and significant interference from other operations taking place in the same area.

The new terminal is currently operating successfully and helping Barcelona to strengthen its presence as a key port in the region.







A terminal to transport and be transported

The Adriatic Liquefied Natural Gas (LNG) Terminal is the first offshore facility that combines LNG offloading, storage, regasification and pipeline transport in a single integrated complex.

Over a period of 21 days, this structure became a true "floating building": it was built in a dry dock in Algeciras and transported to a site near Venice by five tugs in three weeks.

With a weight of 550,000 tons, the terminal managed to leave Spain, sail along the North African coast to Palermo, skirt around the coast of Italy and travel up the Adriatic Sea to its final destination, 30 kilometres from the town of Rovigo.

After arrival, its ballast was submerged and the terminal was positioned on the sea floor at a depth of 28 metres.

Once the installation procedures were completed, the submerged structure was coupled to a gas pipeline that runs in parallel and connected to Italy's natural gas distribution network.

The terminal receives natural gas by ship from Qatar. This gas comes in liquid form every three days and is regasified to enable it to be pumped and distributed to consumers throughout northern Italy.

With a concrete base that is 180 metres long, 88 metres wide and 50 metres high, this terminal was designed to withstand all types of structural loads, ranging from seismic activity to wind, or potential impacts from other vessels during its transportation.

With an expected life-span of 25 years, this terminal is bigger than the largest football stadiums in the world.

IX

HOW MANY SENSES DOES ART HAVE?

Art museums, galleries and centres of artistic expression are important local landmarks that can attract international attention and promote the growth of the local area.

The unique design and complex shapes of these buildings make them, in many cases, an attraction in themselves, regardless of their contents. But the diversity of styles of each space demands different priorities. Creating the best environment involves making appropriate decisions about temperature, light control, air filtration, access, security and noise levels, as well as climatic conditions and energy efficiency.

As a result of their boldness in form, these buildings often present challenges in their structural behaviour: many of their designs feature irregular spaces that restrict the use of columns and walls. Finding the right balance between structural lightness and weight, while providing the required load capacity for the numerous works they house is a challenge.

Older buildings, by contrast, require a more thorough treatment to control humidity. And lack of, or excess in, light can affect not only the view of the visitors, but also the condition of the artworks.

While many exhibitions need to be in protected areas, some museums also face the paradox that the public can experiment with them. Security sometimes conflicts with the need for open spaces and minimal aesthetic intrusion.

It is becoming increasingly necessary to attract the attention of visitors to ensure that their experience with art is as personal as possible. Resolving this concern has become a new cultural challenge.

Visitor experimentation

Art museums are facing new challenges. In an increasingly virtual world, in which we move less and less in a physical manner to obtain the information we need, we probably only tend to go to places that provide us with an enriching experience. Because of this, art museums have to find new ways of telling stories and engaging their audiences.

Currently, one of the biggest challenges for these spaces is that of reversing their traditional roles. Instead of mere passive receptacles, art museums are increasingly required to invite visitors to become part of the artwork, encouraging them to create their own content.

Culture evolves and these spaces are increasingly being seen as places for informal and participatory education. To capture the public's attention, their design has to take account of the fact that there are as many types of visitor as there are objects on display.

Hybrid art museums

Encouraging visitor participation through new technology will help to reinvent the art museum experience, create interest in remote exhibitions and tailor content to the preferences of users in real time, thereby giving new meaning to each exhibition.

The art museum of the future will also try to include more spaces with transparent enclosures capable of exhibiting objects inside. In this way, selective or variable light transmission glass will be able to communicate exhibited pieces with the outside world and attract curious passers-by, while protecting the works from ultraviolet radiation.

Art museums and their contents, of course, need not be static and fixed in time and space. Mobile exhibitions, together with temporary or modular architecture, will extend the experience and reach a greater diversity of spaces, audiences and regions.

The challenge will not be to attract more people inside, but to take these spaces outside. Creating an enriching dialogue will enable them to cement a long-term relationship with the public, avoiding the risk of them becoming static and ignored receptacles.

Art that crosses the river

Designed for the International Exhibition on Water held in Zaragoza in 2008, the Pavilion Bridge is an innovative horizontal building that combines the functions of a pedestrian walkway, main entrance to the site and home to one of the main exhibition spaces dedicated to sustainable water management.

The pedestrian bridge, designed in the shape of a gladiolus, has a variable geometry characterised by arches with pointed sections, providing it with a distinct architectural form. The structure is clad with triangular concrete panels reinforced with fiberglass in shades that fluctuate between black and white. Its over 260-metre length connects the two banks with a slightly curved line, making the crossing of the river and the views an artistic experience in themselves.

One of the most unique features of the design is under the ground in the structure's foundations. Some of the bridge's 22 piles had to be embedded to a depth of over 70 metres, which makes them the deepest piles ever sunk in Spain.

The 2,200-ton structure was built first on firm land on both banks, before being slid into its final position by a delicate process of pushing and attachment to the intermediate support.

The cladding of the triangular panels was carried out in stages before and after the bridge was opened.

During the construction programme, which only took two years, thousands of details were created, monitored and perfected, while other parts of the project were simultaneously being constructed.

The extensive teamwork from initial concept to final assembly was key to ensuring that the project was completed scarcely a few days before the official opening of the Expo.

"The use of lightweight concrete slabs reinforced with fiberglass helps to limit the loads on the structure, facilitated the hoisting and installation of the panels and promotes a comfortable indoor microclimate."

Manuela Gatto, Associate Architect at Zaha Hadid Architects

Rijksmuseum

Founded in 1800, the Rijksmuseum is the Netherlands' most important national museum and one of the most popular in its capital, showcasing the country's history and extensive arts and crafts heritage.

Between 2002 and 2013, this historic building underwent major renovation and modification of its structure. The greatest challenge was not only to return the museum to its original nineteenth-century design with twenty first-century facilities, but also to make this profound transformation while most of its collections were still open to the public.

The project involved completely redesigning the building's mechanical and electrical installations, making an acoustic, environmental and energy consumption assessment, developing a new interior lighting solution and upgrading its fire safety systems.

The redesign of the building services was based on the need to integrate them into available spaces that were not designed for that purpose, as well as creating new spaces under and around the building – a real challenge considering the city of Amsterdam's high water table.

By returning to its original architecture, the museum lost some of the technical spaces that it previously had. Integrating the building services into the building called for individual solutions to be found for each area, including locating new spaces for technical rooms and redistributing – both physically and visually – the elements in each room. The process required considerable coordination between architects and engineers, and, in many cases, joint design work.

The ten-year-long renovation included a complete overhaul of the existing building services in the main building and annexes. The main objective was to achieve stable interior temperatures to avoid sudden changes that could damage the artwork.

The final work also included changes to the façade and museum interiors, as well as the installation of an advanced building management system that would enable it to become a modern museum of international prestige.

The renovation in detail

The lighting is tailored to each space, whether it is natural, through skylights, or artificial through electrified rails or LED illuminators, depending on the area.

The environmental systems also vary between areas depending on their specific restrictions. The air diffusers on the upper floors, for example, are integrated into the architectural design of the rooms so that they can go unnoticed. In addition, all of the HVAC systems have high levels of filtration, humidification and dehumidification systems, highly-efficient recovery capabilities and exterior air and total flow control that varies according to whether or not the spaces are occupied.

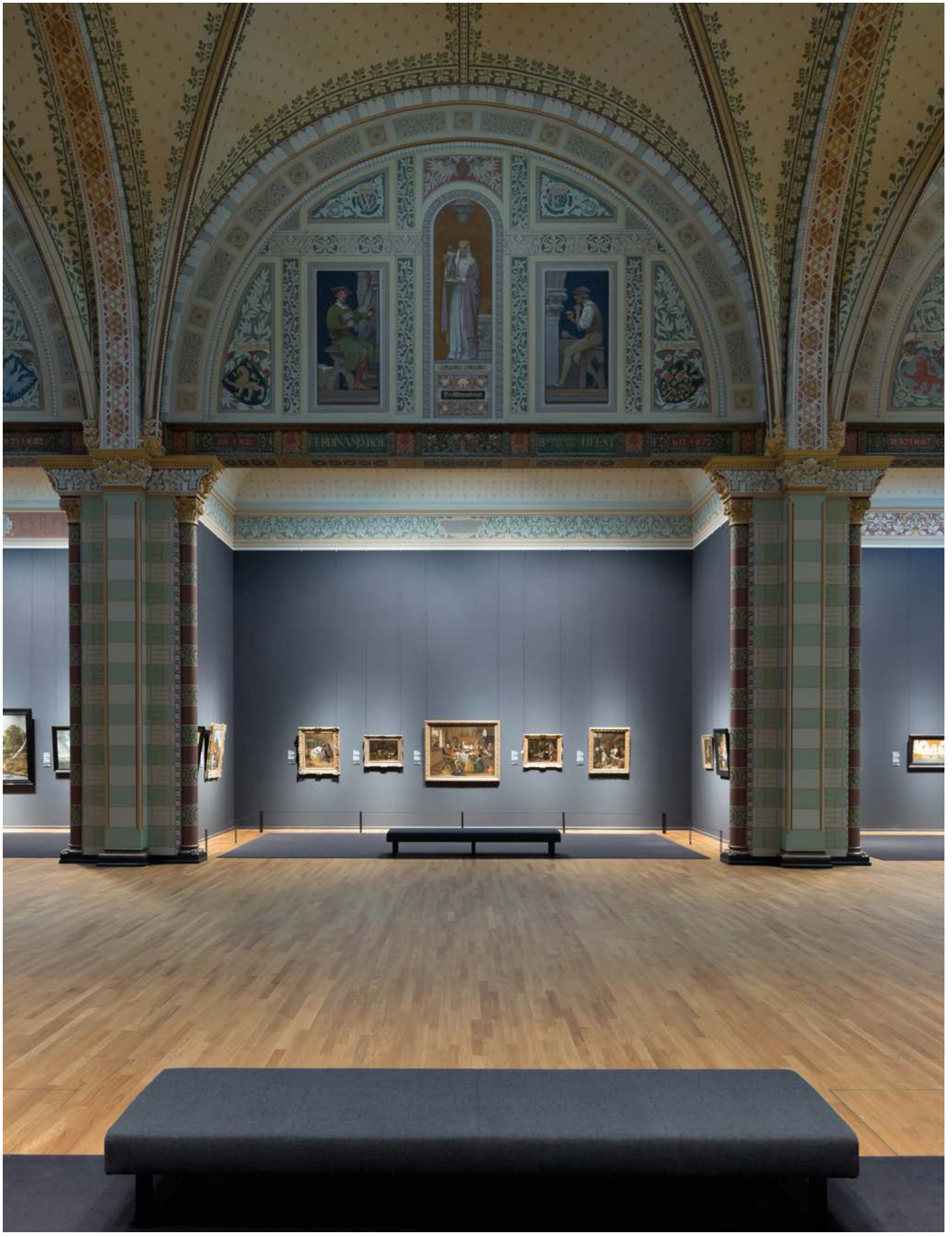
The temperature of the rooms is set according to the season with higher temperatures and humidity in autumn and winter and lower in spring and summer, as well as incremental changes each month.

The renovation has also improved the thermal insulation of the building with energy consumption reduced by half. The ventilation systems are low power and a storage mechanism in the aquifer enables excess summer heat to be accumulated and used in winter.

This renovation means that the museum is able to attract two million visitors a year, which makes the Rijksmuseum one of the 20 most visited museums in the world.

"I am thrilled the museum is restored in its original grandeur, it is the perfect environment to enjoy art. I am impressed with the way the art, the historic collection and the building all fuse into an experience of beauty."

Pien Niehe, citizen of Amsterdam



Carmen Thyssen-Bornemisza

A cultural legacy for Madrid

The Thyssen-Bornemisza Museum is a project that came about when my husband, Baron Thyssen-Bornemisza, and I were offered the Villahermosa Palace in Madrid. After examining several options, we quickly realised how beautiful the space was and the importance of its location. And we were not wrong.

I still fondly remember the day it opened, on 12 October 1992, an occasion attended by the King and Queen of Spain. It has now been open to the public for 21 years and, during that time, it has become an outstanding art museum.

Its main attraction is its artistic heritage: it is a private collection with works of art that have been collected over a period of almost 100 years with total dedication and are highly appreciated by the general public who visit us.

Its impact at national and international level, highly professional operation and enormous prestige have contributed greatly to its success and popularity among the many visitors we receive.

Through my work and that of its curator, Guillermo Solana, and the rest of the team, we have managed to organise highly significant and challenging temporary exhibitions, always with excellent results.

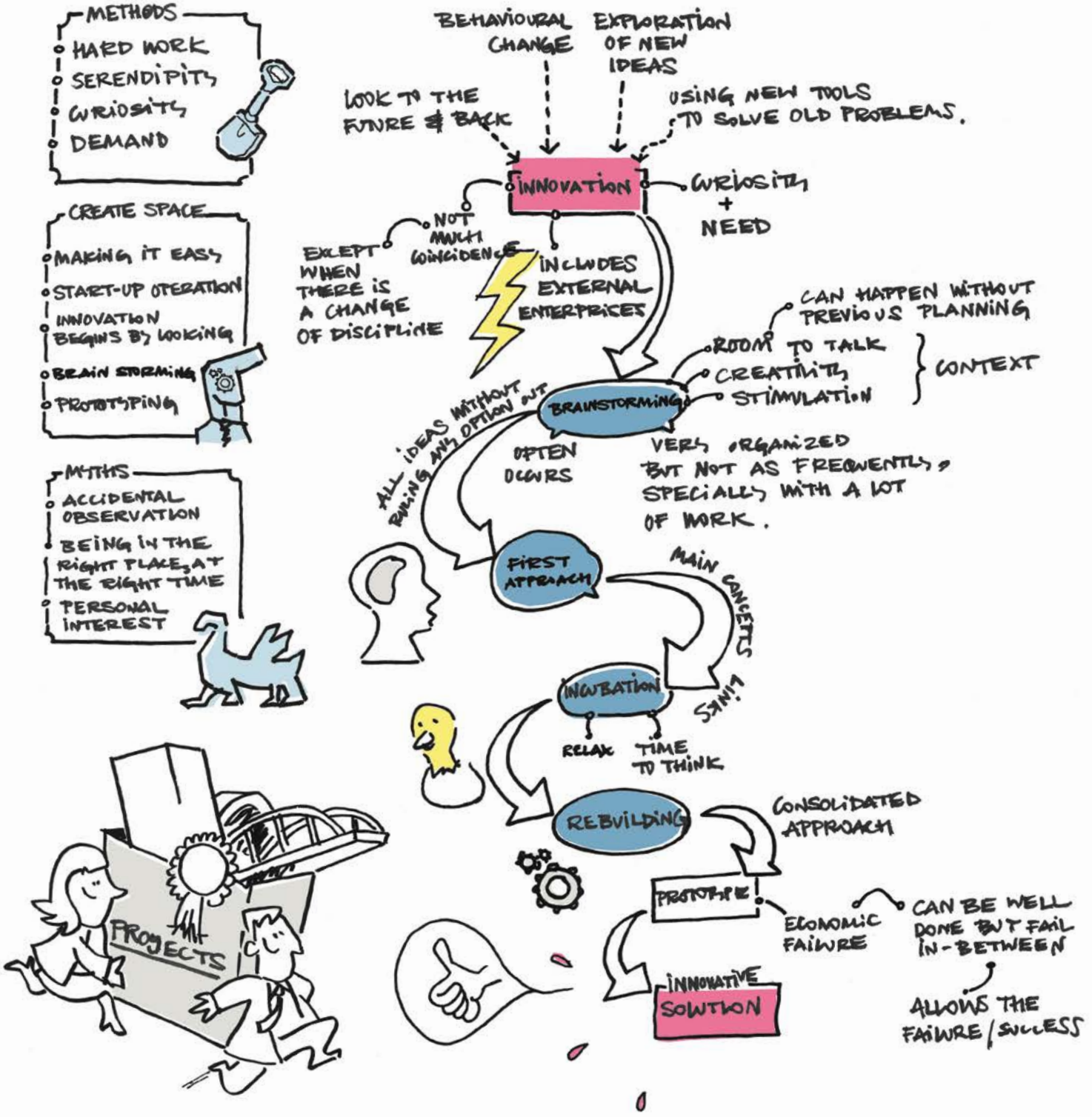
The quality and design of the interior spaces, featuring elements that prioritise visual, auditory and thermal comfort, provide the visitor with an optimum experience, evidenced by the constant flow of people who come. We are especially proud of the coexistence of the permanent and temporary exhibitions, for which it was necessary to construct an extension behind the palace in 2004.

Today, the building is an exemplary cultural hub that is always up-to-date and capable of accompanying the museum's dynamic of constant evolution both artistically and culturally. A good example of this is our "EducaThyssen" programme, which encourages the development of art in children and young people and has gained considerable prestige throughout all of this time.

In my opinion, the cultural spaces of the future will be bigger and more spacious, enabling all of us to share art and develop our enjoyment of it. This aspiration is present in the spirit of this museum.

Carmen Thyssen-Bornemisza

"Nowadays, the building is a model of cultural embrace, always up-to-date with the ability to accompany the museum in its constant dynamic development, both in its artistic and cultural side."


METHODS
HARD WORK
SERENDIPITY
CURIOSITY
DEMAND
CREATE SPACE
MAKING IT EASY
START-UP OPERATION
INNOVATION BEGINS BY LOOKING
BRAIN STORMING
PROTOTYPING
MYTHS
ACCIDENTAL OBSERVATION
BEING IN THE RIGHT PLACE, AT THE RIGHT TIME
PERSONAL INTEREST
BEHAVIOURAL CHANGE
EXPLORATION OF NEW IDEAS
LOOK TO THE FUTURE & BACK
USING NEW TOOLS TO SOLVE OLD PROBLEMS.
INNOVATION
CURIOSITY + NEED
EXCEPT WHEN THERE IS A CHANGE OF DISCIPLINE
NOT MUCH COINCIDENCE
INCLUDES EXTERNAL ENTERPRICES
CAN HAPPEN WITHOUT PREVIOUS PLANNING
ROOM TO TALK
CREATIVITY
STIMULATION
CONTEXT
BRAINSTORMING
ALL IDEAS WITHOUT PARING ANY OPTION OUT
OPTEN OCURS
VERY ORGANIZED BUT NOT AS FREQUENTLY, SPECIALLY WITH A LOT OF WORK.
FIRST APPROACH
MAIN CONCEPTS
LINKS
INCUBATION
RELAX
TIME TO THINK
REBUILDING
CONSOLIDATED APPROACH
PROTOTYPE
ECONOMIC FAILURE
CAN BE WELL DONE BUT FAIL IN-BETWEEN
ALLOWS THE FAILURE / SUCCESS
INNOVATIVE SOLUTION
PROJECTS

X

HOW POWERFUL IS AN IDEA?

We live in a world full of ideas. Every second of the day, somewhere in the world, curious minds are managing to find alternative answers to the same questions. These are ideas. Creating them is as simple as organising the imagination and reasoning in a different order, under a new format. It seems easy, possible.

But, identifying and developing ideas that can bring real innovation to society is the difficult part.

Innovation is a real effort, the result of an arduous research process that enables that mixture of curiosity and necessity to ultimately become a true paradigm shift.

For us, innovation is made possible in a work environment, which inescapably involves teams of people with different visions and goals. Sitting around a table to discuss a problem is often the source of the solution. Innovation is the result of a continuous exchange of knowledge.

An exchange between a few, however, is not usually enough. Work is enriched exponentially if we leave our own research and development spaces. It is important to look for the ideas we need in other contexts, inspired by the demands posed by clients, colleagues, students or users. Research is a constant exercise: we must, at all times, be attentive to uncover needs and opportunities.

To advance, innovative ideas also need technology. This becomes a vital ingredient that facilitates their development. Exploring new techniques and developing better tools is essential to lead change.

Advances in the 3D design, computer simulations, innovation in materials, tools and calculation that have greatly benefited the development of engineering only exist as a result of a real commitment to research and pursuit of technical excellence.

Innovation must be linked to strategic thinking in business. Companies no longer compete with products, but with solutions that form part of business models. Only those that are committed to achieving an innovative vision manage to make a difference.

The Mushrooms of Seville

Metropol Parasol consists of six giant timber “mushrooms” shading the historical Plaza de Encarnación in Seville and houses an archaeological museum, an indoor market place, an elevated square for events, a bar, restaurants and a panoramic viewpoint on top of the Parasols. The total complex is one of the largest timber structures ever built.

The timber mega-structure – about 150 metres long, 75 metres wide and 28 metres high is arranged on an orthogonal grid of 1.50 metres by 1.50 metres.

The more than 3,000 different pieces of wood represent a total volume of 2,500-cubic-metre laminated veneer lumber, protected with a 3-mm thick waterproof polyurethane coating. A top coat finish ensures UV protection and gives its surface appearance.

The design of more than 3,000 connection nodes at the intersections of the timber elements was crucial for the development of the Metropol Parasol. Engineers developed an innovative connection detail based on glued-in steel bars, which at the same time were optimized for rapid assembly on site.

As the hot climate of southern Spain would be a particular challenge for the connection detail, the engineers developed a new bonding process. Each piece was subjected to a curing process which guarantees the stability of the material to a temperature of 70 degrees Celsius.

The geometric data for the 3D architectural model was the input data for the structural analysis. Using a specially written software tool, this data was extracted and then processed using the in-house computer program of the structural engineer. The structural calculation itself requires a highly complex, 3D finite element analysis. Here, the structural engineers developed an automated iteration tool with which the thickness of each timber element can be determined and optimised at each intersection of the structure. All relevant data were automatically read out from the structural analysis and forwarded electronically to the timber contractors and architects.

The thickness and thus the weight of the timber element in each iteration were determined as a function of these previously calculated loads. The weight of the connection detail is recalculated in each iterative step and depends on the force to be transmitted.

The final result is a mega structure that has become an icon of the city and a landmark for both residents and the millions of visitors that enjoy Seville each year.

Skin that responds

The use of large glazed façades in buildings to maximise natural light and external views has become a widespread trend since the 1950s. This trend, however, often conflicts with increasingly restrictive regulations in terms of energy consumption and CO_2 emission reduction.

How should solar gain through these large panes of glass in high temperature areas be reduced? Using a system of external slats triggered by a simple temperature difference provides the answer. This idea is complemented with the use of sunshades on the outside of the façade, which automatically adjust according to external weather conditions.

This new system originates from the search for alternatives to activate solar control naturally, without resorting to complex mechanisms based on scheduled commands. Through this device, the slats can be moved according to external weather conditions without the need to use electronic devices.

As there is no energy consumption and complexity is minimised, the product is viable.

The idea is based on the use of a bimetallic alloy with “shape memory”. The temperature changes the length of a set of springs that rotate the slats and orientate them in the right way.

This provides protection from the sun on hot days and also enables solar radiation to penetrate on cold days.

The slats are no longer a passive system and participate in interior comfort, reacting to external conditions like the skin of living beings.

It is, in short, a reactive envelope idea that helps to overcome the old division between passive and active technologies on façades and provides the innovation that twenty-first century building skins require.

The prototype of the actuator is formed by springs made with a shape-memory alloy. This material reacts with temperature changes, causing its dilation and contraction. It allows a system of slats in a façade to move which contributes to the energy comfort of the building through the means of controlling solar radiation.

Building Information Modelling

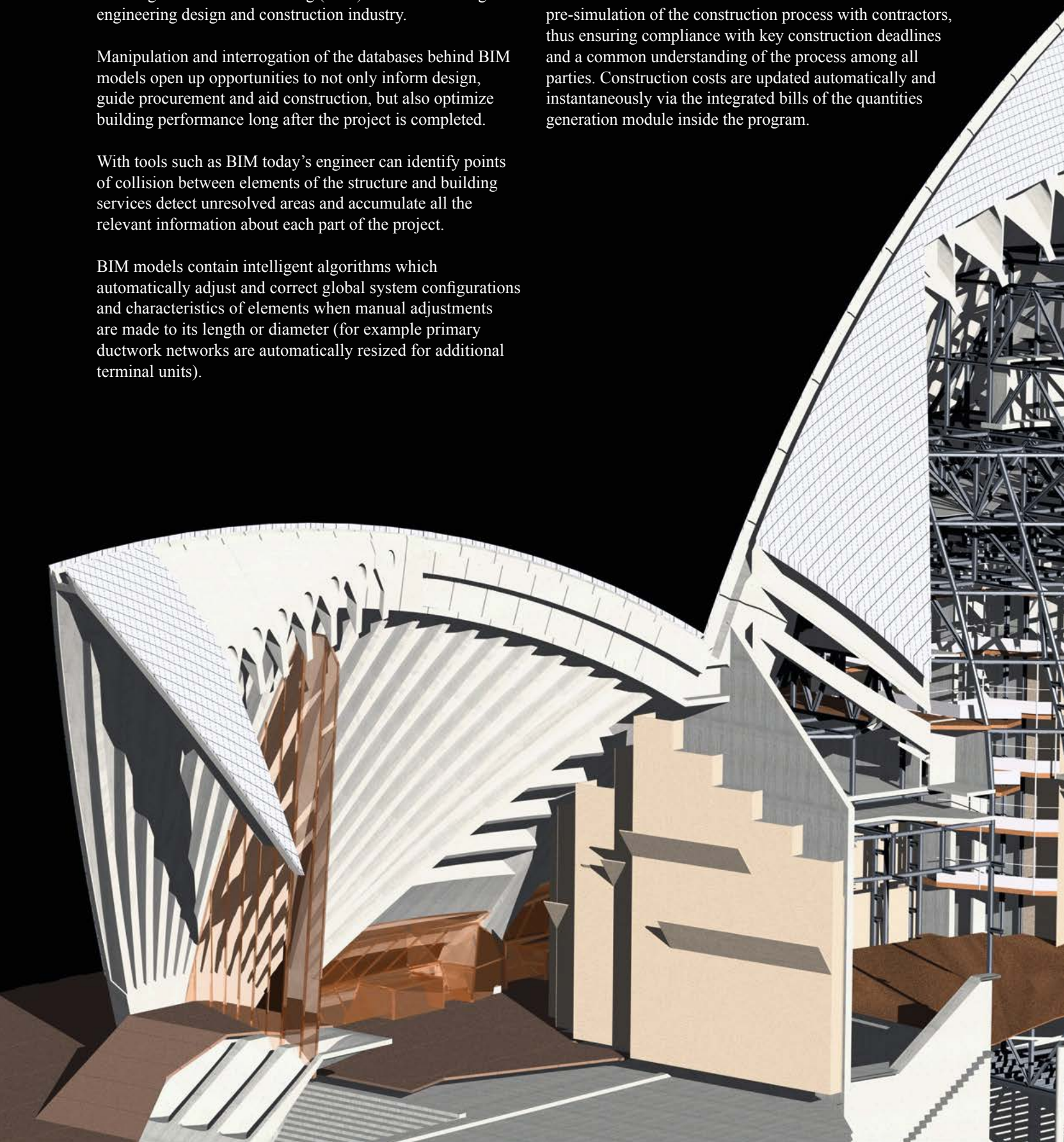
Building information modelling (BIM) is revolutionizing the engineering design and construction industry.

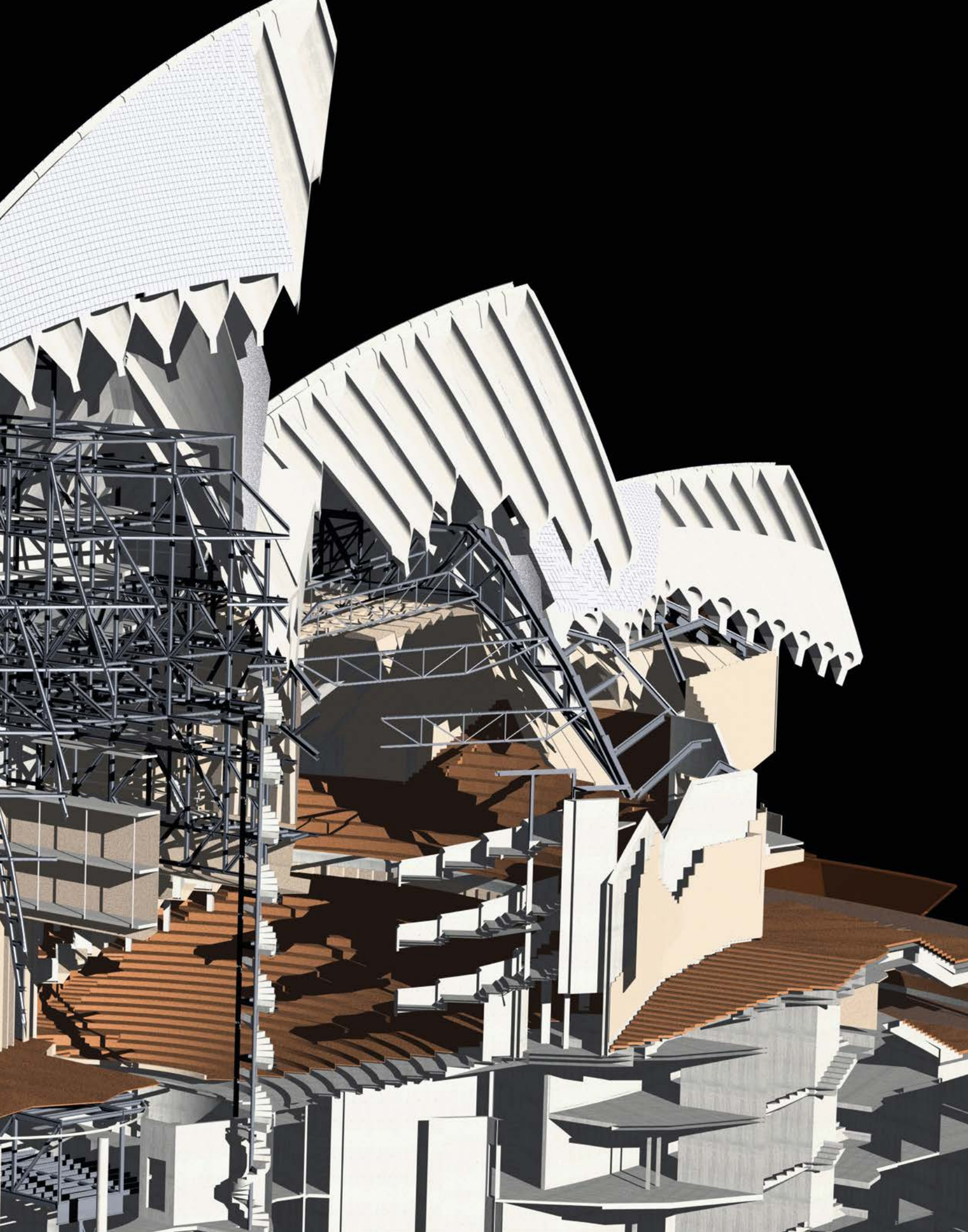
Manipulation and interrogation of the databases behind BIM models open up opportunities to not only inform design, guide procurement and aid construction, but also optimize building performance long after the project is completed.

With tools such as BIM today's engineer can identify points of collision between elements of the structure and building services detect unresolved areas and accumulate all the relevant information about each part of the project.

BIM models contain intelligent algorithms which automatically adjust and correct global system configurations and characteristics of elements when manual adjustments are made to its length or diameter (for example primary ductwork networks are automatically resized for additional terminal units).

The information embedded within the BIM model allows pre-simulation of the construction process with contractors, thus ensuring compliance with key construction deadlines and a common understanding of the process among all parties. Construction costs are updated automatically and instantaneously via the integrated bills of the quantities generation module inside the program.





Luis Vidal

Licensed to imagine

"Architecture is creativity and possibility; engineering is construction and reality. And from that tension and complementary state can be found the raison d'être of this inseparable pairing who share the same future project."

The alliance between engineering and architecture sealed the identity and determined the evolution of modern cities as we know them today.

The connection between an engineer and an architect when creating a building could perhaps be compared to the relationship between Stephen Wozniak and Steve Jobs when they worked together to create the first Apple computer. Wozniak, who understood machines better, invented a new operating system and made it work. Jobs, always the visionary, was able to identify and predict the future needs of people.

Architecture is creativity and possibility; engineering is construction and reality. And from that tension and complementary state can be found the raison d'etre of this inseparable pairing who share the same future project.

At luis vidal + architects (LVA), we believe in a multidisciplinary and cross-cutting approach to the application of technology, and dialogue with all stakeholders in the design process with the aim of providing the client with a functional, sustainable and responsible answer to their needs.

And within this framework of exchange of ideas and collective creation, the importance of an enthusiastic and professional collaborator and partner with a face, name and surname has always been and always will be present. A team that stands out for its human qualities, instinct to excel and willingness to progress.

There is no doubt that the spirit and legacy of Peter Rice and his defence of engineering with a "licence to imagine" remains at Arup. This approach, coupled with Rice's humanistic vocation, forged a new way of conceiving the exchange between architecture and engineering and created landmarks in both fields, such as the Pompidou Centre in collaboration with Richard Rogers, our friend, colleague and partner in many projects.

We have "imagined" with Arup on several occasions. Ideas and shared creativity have materialised in many projects that have become reality. And regardless of the field for which the design was intended (health, education, commercial or culture), we believe that we all share a common denominator: the desire to contribute to the building of a more human, and therefore better, reality.

Such as Can Misses Hospital in Ibiza, an "airport hospital" conceived from the idea of "curative architecture", whose ultimate aim is to contribute to the recovery of patients, and the wellbeing of families and hospital staff.

Such as the campus of Loyola University in Seville, an accessible, efficient, sustainable and responsible campus for the technological future that puts the human being first.

Such as Palmas Altas Campus, also in Seville, a new model of sustainable architecture in offices. A technological building that draws on the roots of vernacular architecture, which we developed in collaboration with Rogers Stirk Harbour + Partners.

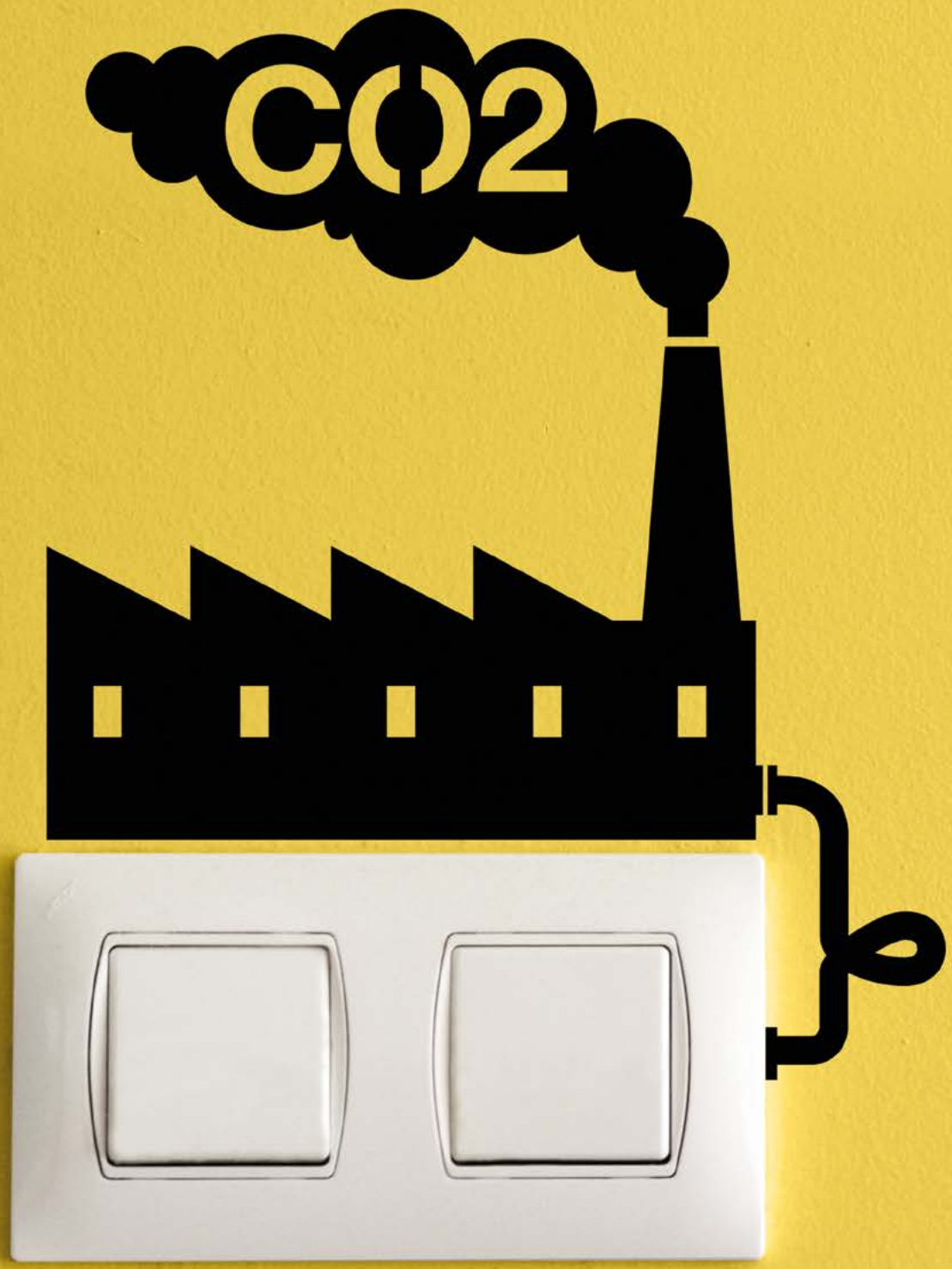
Such as the Botín Art Centre in Santander in collaboration with Renzo Piano Building Workshop (RPBW), a global, local and social project configured as a space for knowledge, reflection, art, creativity and cultural dialogue.

Or like the exciting R&D project on sustainable façades that, with no other interest than the common good, we developed together to assess the sustainability of building envelopes and evaluate the possibilities of covering buildings with natural materials such as bamboo, hemp or textile fibres.

And these are just some possible and tangible examples of these years of collaboration and mutual enrichment.

Arup celebrates twenty years in Spain; LVA will be celebrating its 10th anniversary in 2014. From here, we join the celebration with the hope that we will continue designing a better, more humane, responsible and sustainable future together.

Luis Vidal, Architect and Director of luis vidal + architects (LVA)


CO2

XI

HOW DO YOU USE YOUR ENERGY?

In the last ten years, one of the most important issues in the construction sector has been sustainability. Discussing its definition, scope, possibilities and limitations, as well as its quantification methodology and metrics, has become the current way of addressing our concerns about the future.

We live in a world that depends on energy to function and it does not seem that this dependence will diminish any time soon. As the world population grows, demand grows. It is estimated that, by 2030, the world will need 60% more energy than it currently does.

Today, our biggest problem is dependence on fossil fuels to sustain our lifestyle. But fuels like coal, oil and gas have major drawbacks: they are not inexhaustible; when they are used, they release large amounts of CO_2 and other pollutants into the atmosphere; and they generate a dependence on external energy that does not promote sustainable growth and economic stability.

Approximately 70% of global emissions come from the way we produce and use our energy. The immediate concern, therefore, is how to reduce energy demand, increase the efficiency of its use and use renewable, alternative and cleaner sources to maintain our quality of life.

Reduce to increase

Constructing and living in buildings accounts for between 20 and 50% of the energy consumed in the world, depending on climatic zones and the degree of development.

Active incorporation of renewable energy sources, passive efficiency measures in architecture and the development of more efficient HVAC, lighting and vertical transport systems are some of the alternatives that have been developed during the last decade to reduce energy demand in the buildings we construct or renovate. Thinking about aspects such as orientation, shape and shading of the building, the thermal behaviour of walls, doors and windows, the inclusion of vegetation and the incorporation of new criteria when selecting materials to be used has become part of the daily planning of a sustainable project.

This is, however, not everything. A key aspect that must be part of this task is designing its economic viability. This means taking into account not only the initial cost of construction, but also the cost of amortisation and energy savings during the life cycle of the building, to ensure the economic sustainability of the strategies implemented.

To move towards a philosophy of responsible consumption, it is necessary to raise awareness among occupants and involve designers, architects, consultants, builders and materials suppliers to ensure that the buildings are sustainable at every stage of their lives, from construction to demolition, with special attention paid to the operation phase, which is mostly responsible for the environmental impact of a building throughout its useful life.

It is true that every small action is important. But, in energy, what counts is the sum of all of the precise and orientated actions that enable economic viability, while maintaining the quality of life of the occupants through limited and prudent use of natural resources.

An increasingly green future

The real estate sector understands the importance of staying one step ahead of current regulatory imposition and achieving differentiation in the market with the incorporation of more efficient sustainability criteria. The exponential increase of LEED and BREEAM certification requests in Spain gives a clear indication of this trend.

Although strict compliance with Spanish legislation does not require the use of any certification, new energy efficiency demands are increasingly raising the environmental standards of buildings.

A sustainable building provides many advantages: it improves the productivity and motivation of its occupants and can reduce absenteeism.

In addition, obtaining sustainability certification brings with it an increase in the market value of the building and helps to enhance the image and corporate social responsibility credentials of its owners and occupants.

Sustainability metrics

These certifications have become one of the decisive factors when considering the most important aspects of a construction, both for the residents as well as for those involved in its development, management and maintenance.

Effective use of these tools, however, does not simply consist of trying to fulfil established criteria. Incorporating specific aspects and translating them into a measurable parameter is the true differential value that needs to be applied. It is, in short, all about interpreting and understanding the specific needs of each building and providing optimised solutions for each case, without being limited to following global standards that are devoid of real interaction. The way sustainability is measured and how it is actually integrated into each project make the difference.

A sustainability certification consultant should assist the project team in the design and construction process as a collaborator by showing all team members how to create sustainable design solutions, how to interpret and understand the credits and requirements system and how to coordinate the process required to obtain this certification.

It is about being able to correct short-sightedness and provide a more holistic view to enable reduction of environmental impact and obtain not only economic benefits, but also improve the quality of life of its occupants.

LEED is a certification system developed by the U.S. Green Building Council to quantify the impact of projects on the environment, and the health and productivity of its occupants. Through a system of credits, it provides a comprehensive rating and promotes improvements in different aspects, such as efficient use of water and energy, sustainable use of land, conservation of natural resources and improvement of the quality of the indoor environment.

BREEAM is a certification system developed by the British Research Establishment recently adapted to Spanish legislation. The tool provides a standard of good practice in the design, construction and operation of sustainable buildings and is one of the most complete and recognised measurement systems for the environmental performance of buildings.

Roma
Shanghai
Madrid
Melbourne
INDITEX
INDITEX
Rotterdam
Berlin
Munich
Mexico
Paris
London

A journey around the world inside Inditex

Since 2007, Inditex has opened more than 6,000 stores. This means that every day, somewhere in the world, a new shop opens its doors.

Shop spaces have been a key area within the company's business model and, since 2009, they have been built in accordance with the standards contained in the company's "Eco-efficient Store Manual". This manual arose from the need to standardise and establish environmental methodologies and practices that can function on a large scale. It contains technical instructions for electrical and HVAC installations, as well as plumbing, lighting, furniture and waste management.

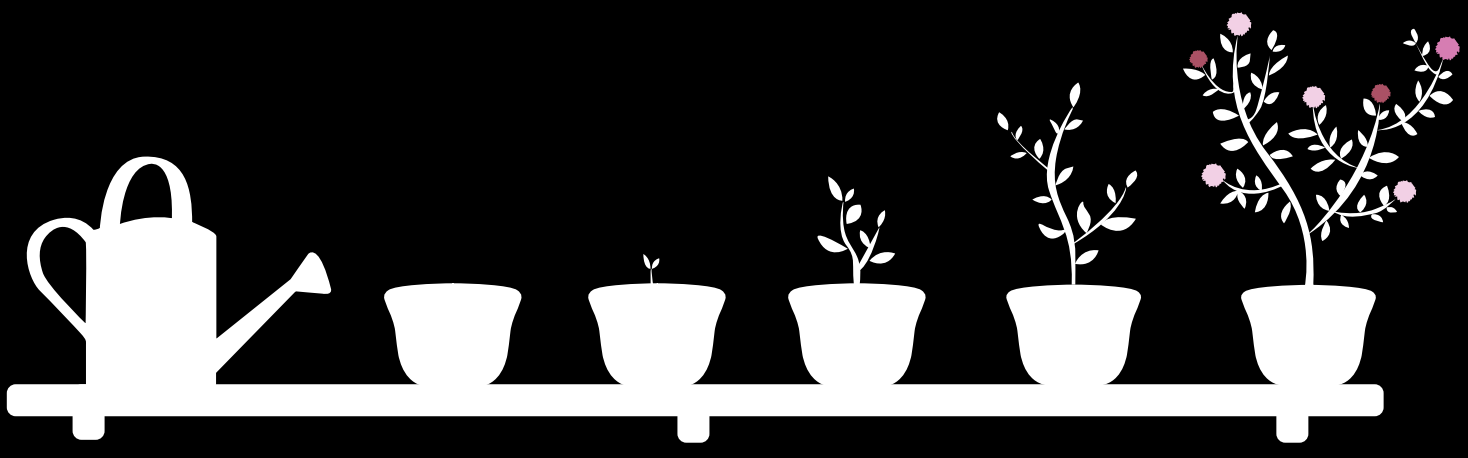
Inditex also has a BREEAM and LEED certification programme and has even developed a specific model within the LEED Volume programme. Its stores in Barcelona, Madrid, Paris, Rotterdam, Rome, Berlin, Mexico, London, Melbourne, Munich and Shanghai now have this certification at "Gold" and "Platinum" levels.

Working with Inditex is, in short, a journey into a unique and successful business model.

From the early stages of design to the final certification stage, Inditex is constantly aware of the concepts of sustainability and efficiency and promotes close collaboration between store managers and those involved in the design process, ranging from architects and builders to installers and technical partners.

As a result of this philosophy, sustainability is no longer considered an added value, but a major aspect of the company's identity – an inseparable part of the design process itself.

Because of these measures, stores save an average of 30% on electricity and 50% on water consumption compared to conventional stores. Inditex plans to make all of its stores eco-efficient by 2020.



XII

HOW IS A RELATIONSHIP CULTIVATED?

Behind every project, there is a unique relationship and a powerful creative force dedicated to providing the necessary tools to make it become a reality.

Our daily work is inspired by the contribution of a group of individuals ready to provide the solutions our clients need. We are not in the business of selling products or manufacturing tangible objects. Our engineers and consultants are a productive force and ideas our only real value.

In an industry like engineering and consulting, clients are highly varied, ranging from private corporations, banks and construction companies to public sector bodies and architects. The characteristics, aspirations and needs of each one are as different as the solutions we can provide. Only through personal relationships, based on listening and understanding what clients need, is it possible to cultivate a relationship of mutual trust that respects, but is not paralysed by, the rigidity of a signed contract.

By listening, we can learn a lot about the way clients work. And from the result of that experience, we can nurture new and better relationships.

Every contribution we receive is retransmitted through numerous messages and channels. How to organise teams, how to manage complex projects, how to properly define ambitious targets or how to implement more effective methods to optimise performance over the medium term. This is about true "cross-fertilisation": without knowing it, each different client exchanges ideas and working methods with each others thanks to our relationship with them.

Over the past 20 years, our relationship with clients has evolved very positively with the building of increasingly stronger links with the people behind the companies and projects.

Because, although we are working for companies, we are also interacting with people. Understanding their importance and the need to prioritise their interests is the key to a long-term relationship. In every work encounter, in every project meeting, our aspiration is not to just sit in front of the client, but to be at his side.

The weight behind ideas

The maturity of a relationship is measured by the ability to tell the other side something that perhaps he does not always want to hear. Honesty is at the core of our values and is the fertiliser that nourishes the trust of those who choose us.

Often, behind a project is a client concerned about reconciling the social, economic and environmental impact of his decisions. Providing a comprehensive, accurate and honest appraisal of the consequences is part of our commitment to them, to the project and to the environment in which we live.

In a changing world, our professional relationships and the way we deal with projects change in the same manner as the interests and goals that are initially established. Accompanying our clients through this evolution with a clear definition of concepts, a precise allocation of roles and a thinking that is able to respect the spirit of the project's ideas has not only enabled us to cultivate strong and lasting relationships, but also to make that experience the best way of doing business.

A long-term project

Denis Foley

My relationship with Arup Spain stretches back to the mid-nineties when I was hired by the Irish financial institution FBD Holdings to manage their 400 hectare resort investment located in Andalusia.

At that time, the project had the potential to develop over 2,000 residential units, a hotel, golf courses and various other leisure facilities.

To carry out this unique development in the area, the most immediate task was to review the infrastructure investment that had been installed and secondly to create a master plan for the significant level of investment that was outstanding. The challenge was not easy: we needed to find a company capable of developing quality future residential, commercial, hotel and leisure areas and to do this; there were no technical personnel or any technical documentation at the resort.

An engineering acquaintance in Arup in Dublin arranged for me to meet with the representatives of a new office that Arup had recently opened in Madrid. This was the beginning of a successful professional relationship that continues to this day.

The economic challenges that Spain is facing today are similar to those of the mid-nineties when unemployment last reached percentage levels of more than 20%. I am confident that the current team at Arup in Madrid is more than capable of adapting to the current market environment and identifying practical, quality and sustainable solutions for their clients at home and abroad.

Denis Foley, La Cala Resort CEO from 1996 to 2012

Pedro Negrette Medina

La Cala Resort is the largest golf and leisure complex developed in Spain by a single private investor. It includes a hotel with spa, a football pitch, a golf club with three courses and a total of 60 holes, and a golf academy, as well as the infrastructures associated with around 60 residential complexes.

The investment in all infrastructures, which exceeded 30 million euros, was executed under the supervision of Arup's Madrid office and its various engineering departments. The reliability and efficiency of the team when providing technical and economic solutions contributed a highly beneficial added value to the client and the users of the resort, which today we remember with gratitude.

Pedro Negrette Medina, General Manager Property, La Cala Resort

Air bridge

Salvador Pérez Arroyo

Arup in Spain is united in its principles to my work and me to theirs. The first moments were unforgettable and created for me an image of excitement and research that made it possible to open up new horizons in which design would, for the first time, combine with the concept of stability and security. Arup not only represents quality, but also the desire to find, among all of the possible solutions, the most harmonious and innovative.

My experience confirms to me that the best scientific and technical jobs generally have a particular beauty. Today, many technicians confuse formalism with beauty or artificial complexity with originality or art. But art, as scarce and elusive as it is, always appears hidden between solid work and the poetry of the creator, and has no fixed rules. Arup represents the solidity that we need, but also the curiosity that enables the artist to build his idea and open the way to the always scarce and desired fortune.

Salvador Pérez Arroyo, Architect, Professor at the Polytechnic University of Madrid's School of Architecture and Director of SDesign SPA

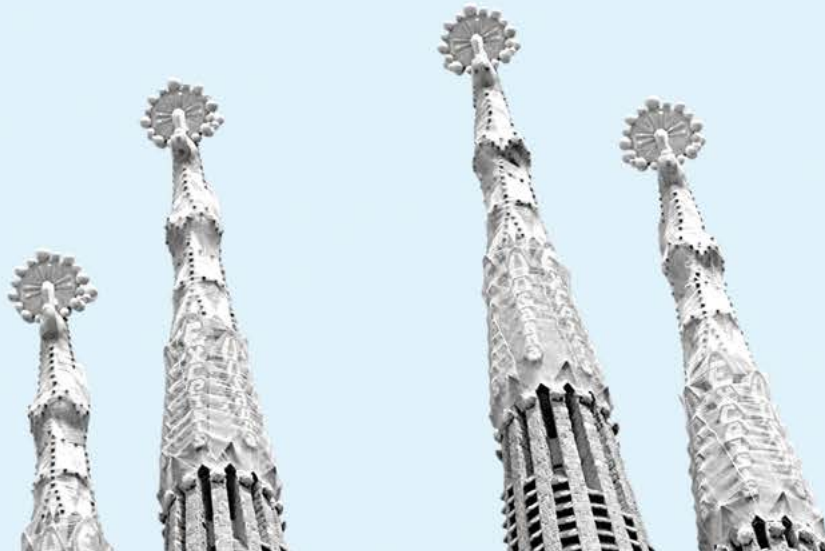
Josep Lluis Mateo and Marta Cervelló

Of all of the different collaborative work we have been able to carry out with Arup, the one that particularly stands is the lighting project for the Barcelona International Convention Centre.

A crucial moment in this project was the illumination of the sculpture Passatge de Cuore by Cristina Iglesias, a twisted iron piece hanging in the central lobby of the building. We needed to find the best light to cast the sculpture's shadow on the floor, like a work of calligraphy, and enable visitors to enjoy the experience when they went up to the upper floors on the escalator.

The enthusiasm of Arup's engineers to find the ideal solution and their skill and attentiveness helped to provide the space with the necessary warmth that enhances the artistic piece.

Josep Lluis Mateo and **Marta Cervelló,** Mateo Arquitectura in Barcelona



Calpe
Altea
Benidorm
Calpe

XIII

WHAT WILL OUR NEXT HOLIDAYS BE LIKE?

Tourism has not stopped growing around the world since the beginning of the second half of the twentieth century. The revenues earned have made this sector one of the fastest growing on a global scale.

Its rapid growth and lack of adequate planning, however, have caused negative effects on some destinations. The tourism model, in which millions of people travel to a destination to irresponsibly consume resources and generate a severe environmental impact, is as unprofitable as it is unsustainable in the long term.

Change of plan

All tourism should have as a starting point the desire to create something new, provided that whatever already exists is improved. Resolving this contradiction is part of the challenge.

From small hotels to large-scale housing projects, a competitive tourism model should encourage low emissions, respect for bioclimatic criteria and minimum consumption of resources, as differentiating factors. This model should also include energy cycle strategies, integrated waste management, implementation of sustainable drainage systems, drinking water supply and a study of purification networks and systems, sometimes beyond the scope of the field of activity.

A successful project needs to also take into account the long-term profitability of the operation and seek to maintain environmental quality and a high level of visitor satisfaction.

Ensuring that summer continues to be blue

Maintaining and enhancing natural and environmental values to provide a product that gives clear signs of social cohesion, harmony and quality of life with the necessary mixture of uses is key to making tourism a viable proposition in the long-term.

Responsible investment facilitates the financing of the project and more efficient management of not only the economic risks, but also the social and environmental.

The hotel project of the future should also anticipate the consequences of climate change. In this way, concepts such as resilience (the ability to adapt to change) will become indispensable considerations in the planning phase. Without taking on these values today, it will be difficult to ensure the viability of our holidays of tomorrow.

The beach that Palma wants

The remodelling of Platja de Palma on the island of Mallorca is a unique opportunity to understand what needs to be done – and how – in a well-established tourist destination to ensure a commitment to reducing environmental impact. Platja de Palma is a 10-km long seafront resort that receives one million tourists per year, and has 40,000 permanent residents. In the area, there are 200 hotels offering a rather obsolete tourism model.

In recent years, its remodelling has become a matter of state with local, island, regional and national authorities debating how to change its business model in order for it to become a benchmark of quality and integrated sustainability. The master plan, which has an implementation period of 25 years, includes medium-term actions and an estimated three billion euro investment, of which one billion will be provided by public institutions and the rest by the private sector.

Sustainability has been a key factor and priority in the reshaping of the area. The urban renewal measures include initiatives to improve safety and environmental quality. These measures aim to create a sustainable destination with the ability to adapt to climate change. Furthermore, as well as the functional renovation of the existing hotels, other initiatives have been put forward as alternatives to the traditional tourism model.

The project includes strategies such as reducing energy consumption through zero CO_2 emissions in buildings and infrastructures, and the use of renewable energies; improving the water supply and refuse disposal system; converting existing transport models to more sustainable means, such as electric; and limiting the growth of housing through functional renovation of existing properties according to aesthetic and energy efficiency criteria.

In the future, the aim is to replicate the model along Spain's entire Mediterranean coast.

10 km
of seafront resort

1 million
holiday-makers a year

40,000
permanent residents

3 billion
euro investment

Two plans for alternative tourism

Knowledge of local issues is a priority when planning a holiday project. Enhancing natural and environmental values in symbiosis with autochthonous features is indispensable for the development of a planning model and for ensuring that the chosen destination remains as important as the reason that led us to choosing it.

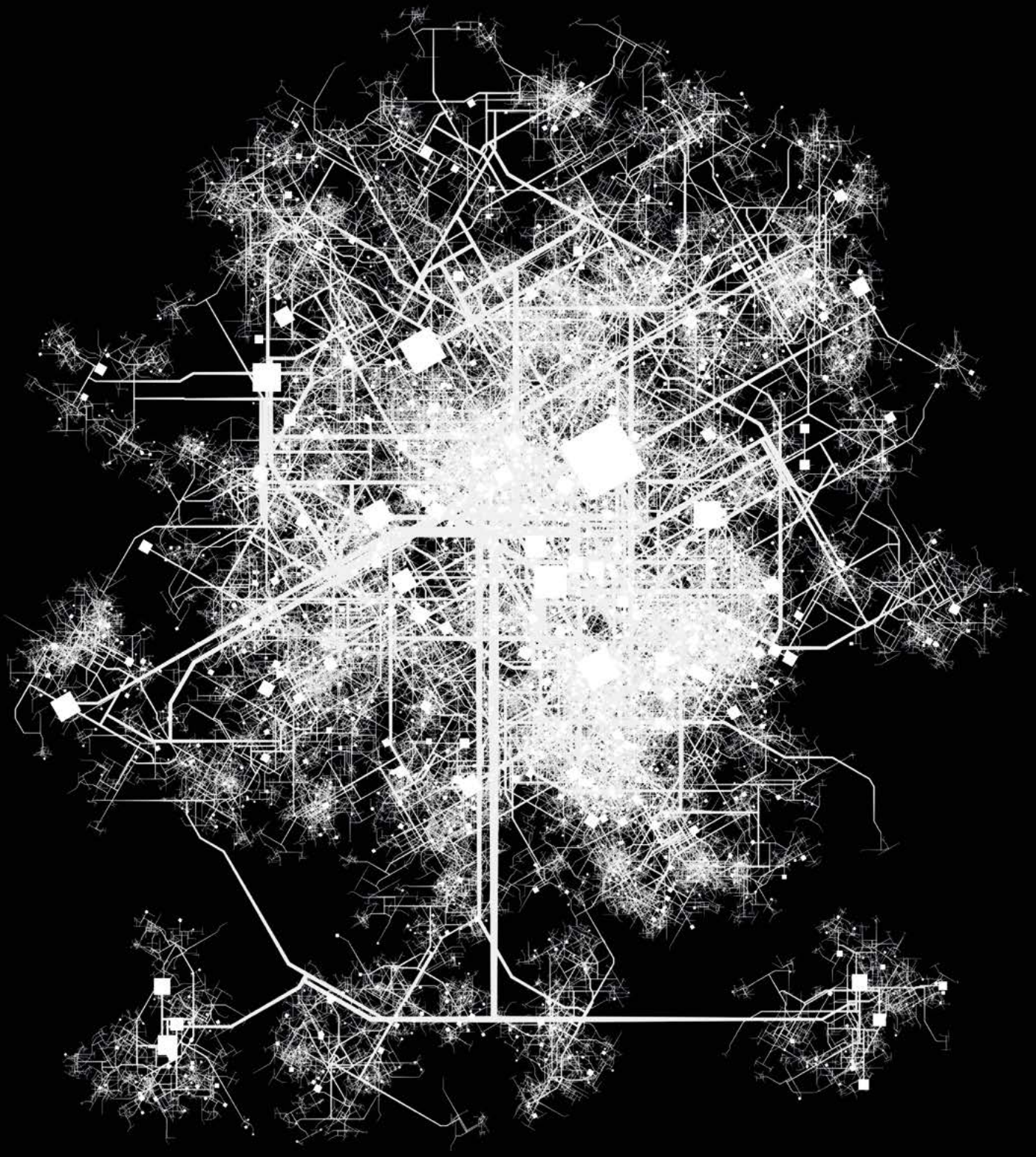
A few years ago in Haro, La Rioja, a housing development project was carried out based on creating a bioclimatic village with vineyard landscapes, green corridors, a golf course and residential buildings, alongside a collection of wine warehouses that were integrated into the urban space with respect for the characteristics of the local culture and landscape.

The advantages of this model lie in the fact that natural and cultural resources are conserved for continued use in the future and the benefits of tourism are widely spread throughout society, since they become a strategic tool for local development.

In Macairena, in the province of Granada, another initiative plans to integrate an urban development of more than 2,000 homes into an area adjacent to the Sierra Nevada Nature Reserve. For its geography of valleys and olive groves, this location is unique.

The proposed plan respects the environment by building two residential areas alongside natural spaces with a population density suitable for the creation of a community.

In addition to housing, the project includes open spaces, services, an ecological golf course, an environmental theme park, hotels and eco lodges. Its environmentally-friendly design uses renewable energy and incorporates passive building systems, giving rise to the first carbon-neutral project in Spain.



XIV

HOW DO WE CREATE A CITY THAT ALREADY EXISTS?

Today, we are witnessing a new generation of urban projects that go beyond conventional planning. Medium-sized cities have begun a journey of reinvention using culture, heritage, innovation, quality of life and collaboration between stakeholders to stand out from the rest.

These new urban models enhance local values and are conceived through consensus and participatory dialogue. It is an innovative approach which reconciles the efforts of the public sector with the private and promotes the internationalisation of regions hitherto little known to the world.

These interventions take into account economic factors as well as social and environmental benefits. The model is also able to determine future impact through innovative tools that put overall viability before purely financial returns. Regions, just like companies, will become more competitive, the more socially responsible they are.

Cities are the future

In the next 15 years, it is anticipated that 400 medium-sized cities will undergo rapid expansion and generate about 40% of global growth. The big opportunity, then, will be to adapt, improve or reinvent these existing cities effectively.

Through new models, which combine the use of land, infrastructure management, economics, environment, sociology, ecology, innovation, hydrology and sensible use of energy, the necessary tools could be provided to reverse the decline of strategic locations.

Throughout the world, cities are the beating heart of culture, social centres for face-to-face encounters and engines that drive sustainable growth. Only improvements carried out through cooperation between citizens, interest groups, companies and local authorities allow real opportunities to succeed.

"Major urban development projects break the inertia of the growth of cities because they fulfil the vision of a few and the dreams of the many. The fascinating role of engineering is to turn that dream into reality."

Alicia Hinojosa, Deputy Director of the Madrid Development Institute (IMADE) from 2004 to 2011

As part of the regeneration of the northeast of Bilbao, an artificial island at the end of the Zorrotzaurre peninsula will be created. On it will stand the BBK Tower, a 25,000-square-metre 20-storey-high office block that will house the corporate headquarters of the BBK bank. The building, which will be visible from all parts of the river, is destined to become the city's new symbol of modernity.

Reinventing the north

In the Atlantic Arc, after decades of steady decline, various metropolitan areas of the Basque Country, Cantabria and Asturias have undergone a unique process of urban renaissance. Investment has focused on creating large transport infrastructures in complex urban environments and implementing economic and cultural promotion policies. The goal, which has been largely achieved, was to promote functional transformation by converting spaces that were degraded or used for obsolete activities.

Basauri and Zorrotzaurre in Bilbao are two good examples. Both towns were for many years degraded industrial areas, remnants of an industrial past in the midst of the twenty-first century. Through recovery and urban integration projects, they have managed to foster mixed-use developments with an international profile: ranging from housing, offices, technology parks, shopping areas and leisure facilities to rail infrastructures aimed at integrating town and river. In all of these initiatives, active energy saving policies and the introduction of renewable energy have also been addressed.

Neighbourhoods have been extended while maintaining their identity and bringing the river closer to the town, through green corridors, maritime activities and connection strategies with pavements, bike lanes and tram lines.

As a result of their recent facelifts, these two cities are now championing the introduction of productive sectors based on innovation, industry, commerce and affordable housing for future generations.

The port of Santander: a seafront open to change

The port of Santander, which is closely linked to the history and development of the city, is today one of the most important economic engines of Cantabria. A few years ago, however, it was under-exploited due to advances in naval technology and the shift of port activities to other areas.

To meet the new challenges, a comprehensive restructuring strategy was put into place for a 60-hectare site that would become the port's new seafront. Along a five-kilometre-long

stretch, the seafront would become the main focus of urban life and the image of transformation that Santander wanted to promote.

The proposal balances port and fishing activities with other pursuits associated with the enjoyment of the bay, including culture, leisure, commerce and nautical sports.

The new seafront will feature berths for ferries and cruise ships, 300,000 square metres of open space and services, an extended promenade, lanes for public transport systems, new car parks and moorings for leisure craft. The seafront will also host the ISAF World Sailing Championships in 2014.

With a planned investment of over 600 million euros, the project is creating more than 1,000 jobs a year during the construction phase. Once completed, from 2015, it is expected that more than 1,500 new jobs will be created.

Íñigo de la Serna

A dialogue between port and city

"For Santander city council's management team, the reorganisation of the seafront represents an opportunity to boost one of the most valuable areas of the region."

In each of our lives, there are events that remain indelible, and our often crowded memories have space reserved in the front row for the most important. Those that really leave their mark.

Something similar happens with cities and this is one of those great moments that will stay in the memory of Santander. Great milestones, such as hosting the World Sailing Championships in September 2014 or the opening of the Botín Centre, will mark a turning point in the history and memory of Santander.

These events are part of a larger project that is much more comprehensive and far-reaching: the reorganisation of Santander's port and seafront.

After years of failed attempts and endless negotiations, all of the authorities involved in this project have managed to come together for the good of Santander and its people.

A challenge linked to the new urban model that we have designed for the city and accept as our new calling card to the world, primarily based on the modernisation and expansion of services, and the reclamation and enhancement of new spaces for the city.

For Santander city council's management team, the reorganisation of the seafront represents an opportunity to boost one of the most valuable areas of the region. And "opportunity" is precisely the key word in all of this.

The opportunity to grow, progress and expand public spaces. The opportunity to generate economic activity and improve the prospects of the business and commercial fabric of the area. The opportunity, also, to improve and enhance the image of the port of Santander and its industrial side, safeguarding its maritime character and facilitating its transformation into a new space for public use and enjoyment. The opportunity to help the city to ultimately reinvent itself and the perfect opportunity to improve the quality of life of its residents.

This strategic project for Santander can already be seen in the city with the large projects currently in progress, such as the expansion of the CEAR World Sailing Championship Headquarters, a project by the architect Alejandro Zaera, which features a public space on its roof, and the work being carried out on the Botín Foundation's Art and Culture Centre, the first project by the architect Renzo Piano in Spain, which, in addition to the new building, includes the expansion of the Pereda Gardens and the construction of underground roads, creating a new public space in the heart of the city.

Santander is thus taking a giant step forward at a key moment. In these times, few of Spain's regional capital cities can boast of undergoing a process of change of the likes of that being experienced here. Times that we are taking advantage of to build a tomorrow from the present, regardless of the difficult economic climate, which, before long, will also become a thing of the past.

Íñigo de la Serna, Mayor of Santander city and President of the Spanish Federation of Municipalities and Provinces

XV

WHERE DOES YOUR SAFETY ZONE END?

With increasing numbers of people living in cities and the expansion of infrastructures and residential areas, the environment in which we live also becomes increasingly vulnerable. Fires, earthquakes, climatic disasters and terrorist attacks can all be added to the long list of factors that shape the daily agenda of urban issues.

The scale, frequency and severity of these risks have progressively increased over the past 20 years. In 2010 alone, 263 million people around the world were affected by the consequences of such events. Experts predict that natural disasters could affect over 365 million people in 2015, representing an increase of 40% in just five years.

Against this backdrop, engineering is evolving, from preventing known risks to creating communities that are more resilient to hypothetical risks. The change in mindset consists of moving from mitigation to resilience.

The new paradigm

Resilience highlights the ability of a community or organisation of people to respond and adapt to possible alterations in their environments. Whether they are the effects of climate change or sudden upheavals in the economy, the aim is to anticipate in order to be able to address these threats. Its scope is closely tied to the decision-making process and technical innovation. And its effectiveness can only be achieved with time, as a gradual result of numerous awareness-raising initiatives aimed at changing behaviour in society and that of its political and economic leaders.

From promoting a reliable infrastructure, strategic management of health, knowledge, education, transportation to the ability to organise access to foreign aid, there are numerous ways in which planners, designers, engineers and specialists can help to promote this paradigm.

An increasingly real concept

If a city by the sea receives its drinking water from several mountain rivers, where is the best place to install the water-treatment plant and storage facilities to ensure the supply of this resource? If installed in the area closest to the city, beside the sea, there is a high risk of it being affected by a tsunami or a weather event. The ideal site would be elevated to enable the supply to be conveyed from the reservoir to the city by gravity, and in a safe area from a geotechnical point of view, away from the risk of landslides. Finding the best solution means thinking in terms of resilience.

In matters of safety, it is not only about ensuring compliance with legislation, but also about learning to be aware of our level of exposure to new risks in order to be able to make strategic decisions on how to avoid, mitigate or resist them.

Faced with a multitude of threats, we need to develop measures based on an understanding of each project, through a rigorous quantitative analysis and thorough preliminary investigation. From the design of simple buildings to major transport infrastructures, close collaboration between all disciplines involved is vital in order to find flexible and alternative measures to reduce the fragility of the world we inhabit.

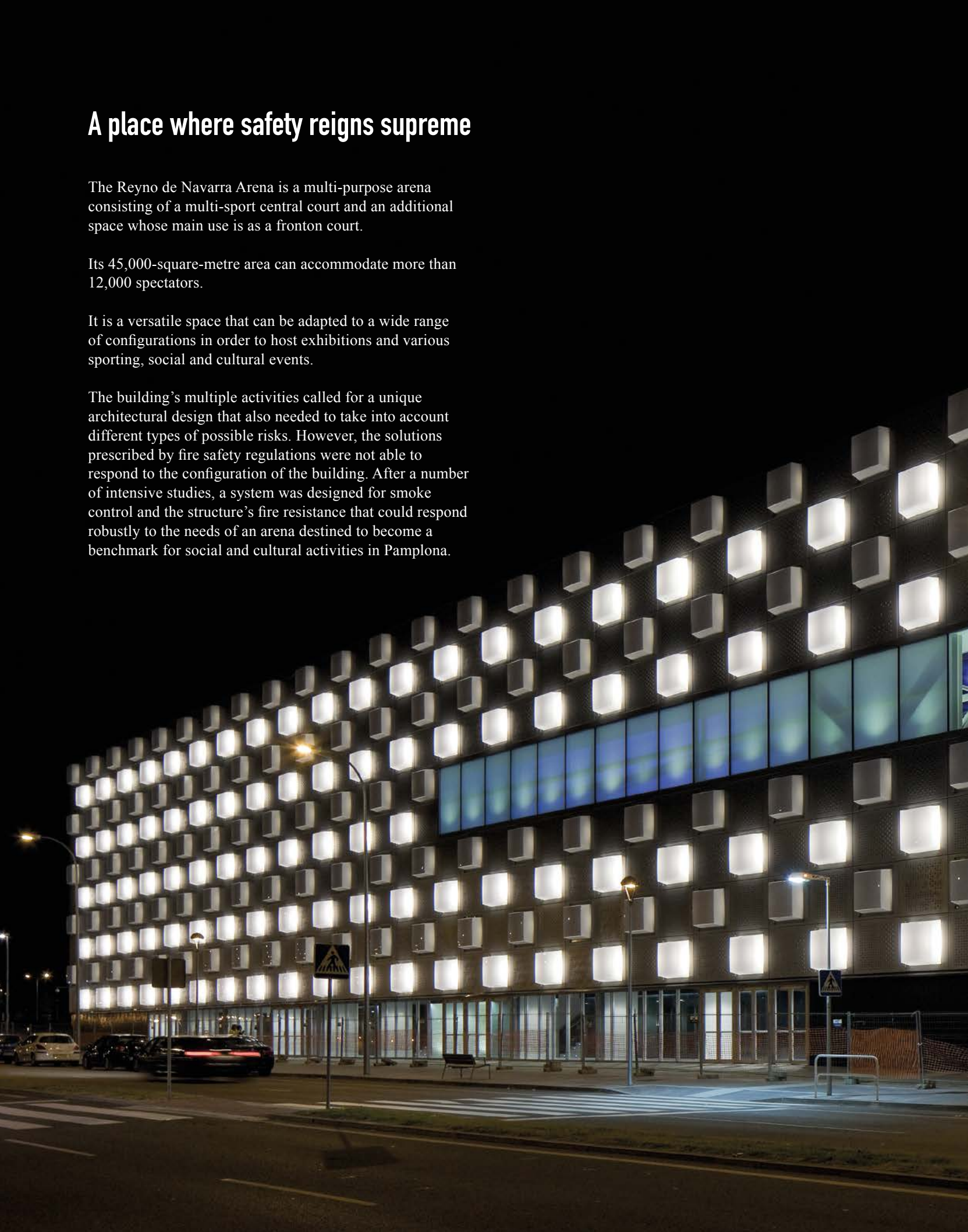
A place where safety reigns supreme

The Reyno de Navarra Arena is a multi-purpose arena consisting of a multi-sport central court and an additional space whose main use is as a fronton court.

Its 45,000-square-metre area can accommodate more than 12,000 spectators.

It is a versatile space that can be adapted to a wide range of configurations in order to host exhibitions and various sporting, social and cultural events.

The building's multiple activities called for a unique architectural design that also needed to take into account different types of possible risks. However, the solutions prescribed by fire safety regulations were not able to respond to the configuration of the building. After a number of intensive studies, a system was designed for smoke control and the structure's fire resistance that could respond robustly to the needs of an arena destined to become a benchmark for social and cultural activities in Pamplona.



A solution in the middle of the tunnel

The M-30 is a 32.5-kilometre-long orbital motorway that encircles the centre of Madrid. With a daily average traffic intensity of over 300,000 vehicles, the motorway is Spain's busiest road.

As part of a process of intensive upgrades to improve traffic flow in the city, in 2004, a section of the motorway that follows the course of the Manzanares River was built underground by means of tunnels. In its place, the area would be replaced by a new riverside park known as Madrid Río.

While the different designs of this underground work were coordinated and the fire safety measures were standardised, there was some risk in some of its sections.

One of the key measures in this process was the carrying out of a quantitative analysis of risks, estimated in annual damage, to weigh up how an increase in heavy vehicle traffic could affect the safety of the tunnels.

The analysis focused on the inherent risk of damage to the structure caused by lorries in the event of breakdowns, repairs, fire or accidents. During the process, these associated risks were compared with acceptable international risk levels. The effectiveness of different mitigation measures was quantified by means of an analysis of statistical probability and based on consequences provided by simulations.

The result provided an overview of the extent of these risks and highlighted the tools and actions needed to anticipate a successful evacuation.

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A legacy for Bangladesh

Since 1980, nearly 80% of Bangladesh's export earnings have come from the textile industry, a sector that, with 5,000 factories, attracts investment from over 70 international fashion brands and employs more than three million workers throughout the country.

This rapid growth in production has been accompanied, in many cases, by a low level of planning and supervision of safety conditions in workspaces. In recent years, the proliferation of fires and landslides in a number of factories has raised real awareness in the world of the importance and immediate need to take action.

To prevent future critical situations and improve the level of safety in its supplier factories, various companies in the retail sector are implementing methodologies to assess the structural safety of the facilities of their textile suppliers and create emergency evacuation plans for workers on each floor.

The inspection methodology was developed on the basis of prior research into structural and fire safety. Thus, by implementing a code of evaluation, each factory visited is categorised according to its degree of safety, with a range that varies from those that only need to incorporate some improvements to those whose critical defects do not allow them to continue operating.

The aim of this project is to raise real awareness of the need for buildings to be seismically designed and to create a geological map of the peripheral areas of cities. Its implementation provides an audit methodology that will be adopted by various textile companies and teaches local people how to improve safety conditions over the long term.

XVI

HOW LONG BEFORE WE ARRIVE?

A successful urban mobility strategy is one that considers all means of transport and includes them within broader strategies of regional organisation, economic development and improvement of environmental policies.

The transport systems of many cities, however, have become increasingly complex and fragmented in terms of management and operation within a scenario in which mobility demands and travel patterns are continuously changing and evolving.

Alternative routes to roads of no return

Mobility has become a major concern for both developed and developing cities.

Currently, the widespread use of vehicles is a major source of air pollution and a real threat to the economic security of many countries, as a result of the need to import oil.

Alternative ways of using the car are necessary to reduce congestion, accidents and emission of polluting gases.

While it is anticipated that, within a few years, cars could be emitting 30% less carbon dioxide per kilometre travelled, it is likely that the major contribution to the reduction of these emissions will come from a deeper awareness by users of the importance of greener mobility.

The policies of the future will probably focus on a broader concept of accessibility and understand that mobility is only part of a means to an end.

Many local and national authorities are addressing these challenges by promoting sustainable mobility, in which each journey is made with a combination of the most efficient modes of transport.

Many cities are already rebalancing the urban space occupied by old systems of transport through rail integration initiatives and new port-city or urban road strategies.

Improving conditions for cyclists and pedestrians also brings numerous benefits: streets are freed of congestion and pollution, a more secure environment is achieved and healthy habits are promoted. The road network of a city and the hierarchies it imposes not only determine its character, but also play a key role in how people perceive and interact with it.

As a result of new technologies, the supply of information about transport in real time now allows many cities to make reasoned decisions about the most appropriate mode or route for each journey.

Urban traffic control systems also help to reduce vehicle delays and the number of times they have to stop, thus reducing fuel use and emissions.

In this regard, cooperation between private operators and local authorities is crucial to achieve more sustainable and efficient cities. In the world in which we move about, investment in urban transport infrastructure is essential if we want to progress towards balanced regional development and improve the economic potential of cities.

FREE
WiFi
ZONE

Increasingly smarter avenues

To accompany the new social and urban demands that the cities of the Middle East have experienced in recent years, a new Smart Avenue design proposes the creation of smart corridors destined to transform the main avenues of these growing cities.

As public transport has never been a priority for these cities, the mobility proposal should be sufficiently reliable and attractive for users to begin to regard it as a real alternative to private car use.

Through the design of a comprehensive strategy for smart mobility, these new avenues seek to be multimodal and integrated into a diverse transport system capable of uniting the city and its inhabitants.

New mobility systems incorporate smart technologies into existing transport, prioritise the flow of public transport in the city and maximise accessibility to adjacent facilities.

Their design includes eco-mobility networks for travel within various districts that facilitate access on foot and by bicycle, as well as open spaces for doing exercise in the months when it is possible. In addition, interchange stations in these networks also have rental schemes for ecological transport, such as bicycles and segways.

These spaces also incorporate web portals with information on destinations and locations that pedestrians can download to their mobile devices via an app.

With more people on the streets and more technology within the reach of the traveller, this project aims to humanise public spaces, thus creating experimental environments for pedestrians to be integrated into the city as they travel around.

Getting Santos moving

Santos is a historic city located 60 kilometres from São Paulo in Brazil. The city, which has the largest port in South America, is not only an example of development, but also of chaotic traffic due to lack of planning.

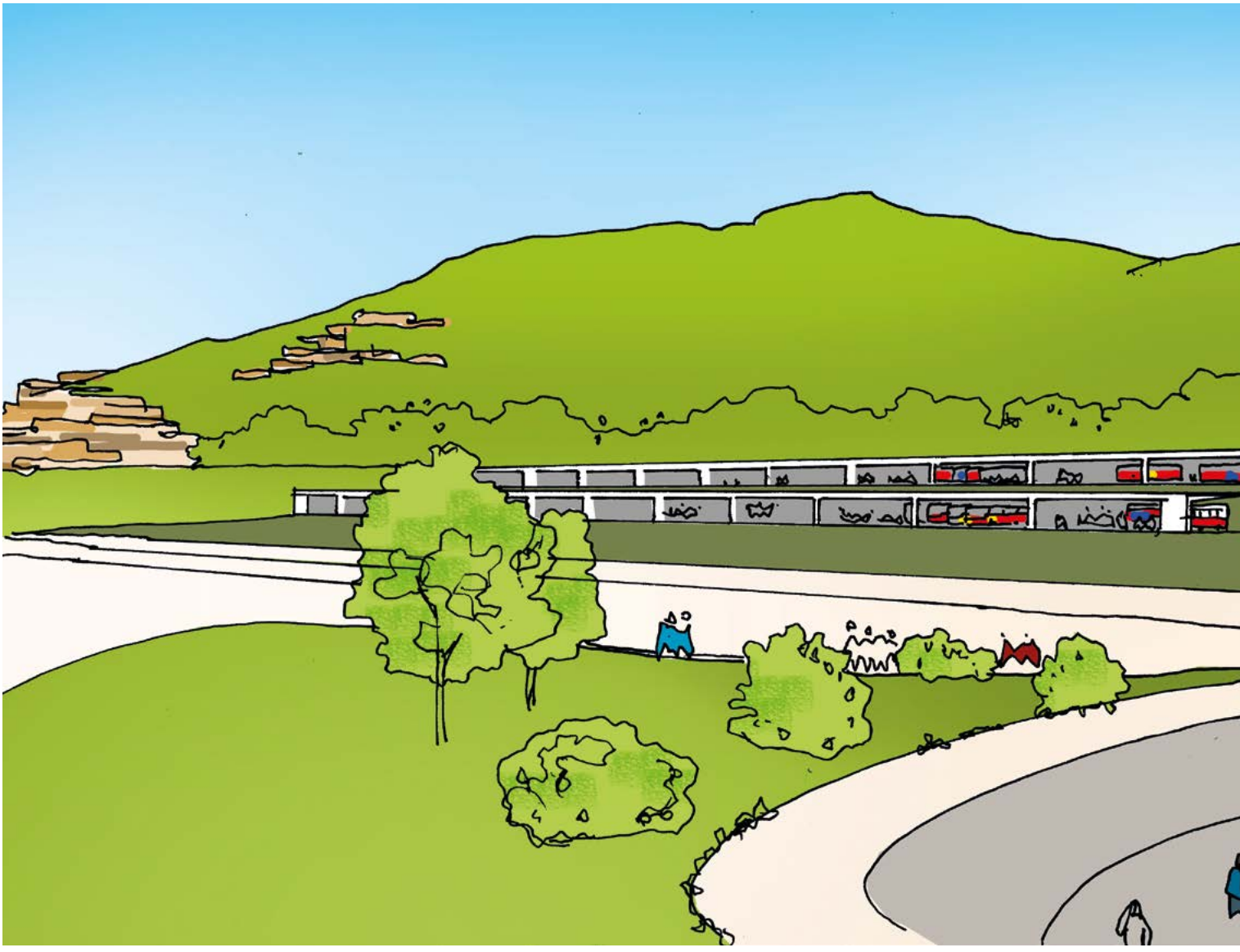
On any given day, nearly 600,000 journeys are made in Santos, and, although the modal split favours public transport, its city centre attracts many cars that enter and attempt to park in an irregular set of narrow, mostly one-way, streets with very few pedestrian routes.

To reverse this situation, the city carried out a thorough process of reorganisation of the urban space framed within a comprehensive project to restructure its waterfront and several city-centre districts.

Changing mobility priorities in Santos did not mean promoting an anti-car culture. The city sought to maximise private vehicle accessibility for journeys but in a more efficient way, preventing them from unnecessarily travelling through areas designed for enjoyment, where pedestrian traffic should take priority, and high quality urban corridors.

In this way, the city incorporates different alternatives, such as an improved pedestrian environment, promotes the use of bicycles, regulates existing parking and creates new underground spaces. Also introduced was a high-capacity and frequency light metro transport system that, added to the reorganisation of bus routes, created a public network with fare integration so that travellers do not have to pay for transfers.

Rio de Janeiro
08

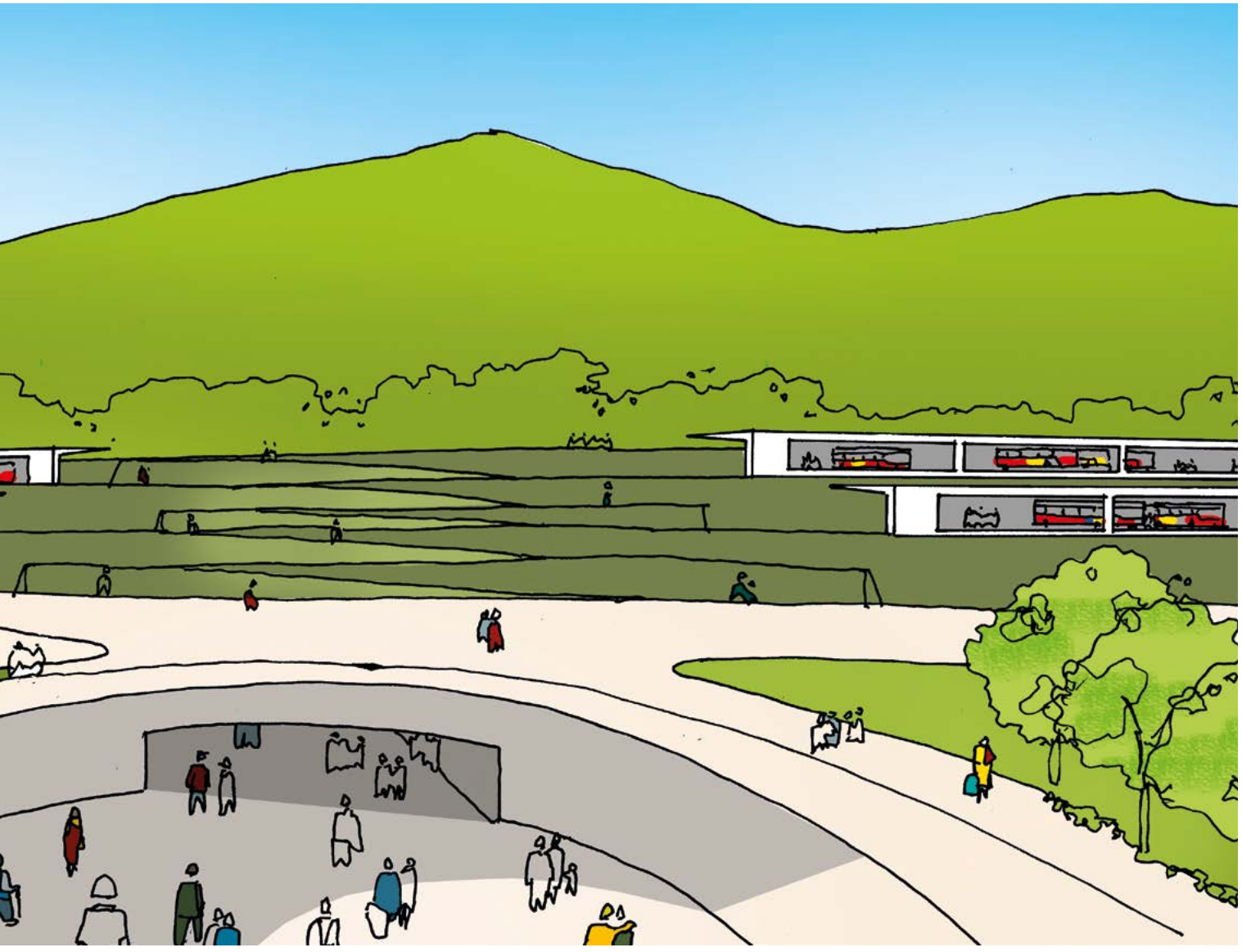


Origin and destination: La Rinconada

In Caracas, 58% of daily journeys are made on public transport, 24% in individual modes, such as cars, taxis, motorcycles and bicycles, and 18% on foot.

Although the modal split for cars seems low, it has a very high impact on the city: the lack of proper management of public transport and very low fuel prices make private vehicles seem the best option, although their use causes high congestion on most of the road network.

Urban mobility is fulfiled through a combination of different alternatives. In cities where there are different modes of transport, the most efficient way of improving intermodality is achieved with the inclusion of interchange stations at certain key points.



La Rinconada project began as a relocation exercise for La Bandera bus terminal, which, having lost its functionality within the urban area of Caracas, needed to be moved to the western entrance of the city. However, taking advantage of the existence of a metro and rail line, the project evolved to include an integrated public transport network designed to provide alternative options and improve the quality of life of the people of Caracas.

Short and long-distance buses, segregated city bus platforms, metro lines and funiculars and regulated parking are some of the new alternatives included in the project. The new urban scheme also promotes the safe integration of pedestrians into the landscape through an internal pedestrian network that connects all areas and reinforces the alternative of making journeys on foot.

Thus, through the implementation of an adequate mobility strategy, the project defines a new paradigm for access to Caracas, creating an organised space in which multiple modes of transport coexist and the car yields its hegemony to public transport and the pedestrian.

Simon Smithson

To travel in good company

When going on a journey, especially if it is to strange and distant parts, it is as well to go in good company. For the last 20 years and more Arup have proved excellent travel companions.

This of course is the concept that Ove espoused for what was to become Arup – that engineers should accompany the architect in the development of a design rather than take a back seat and wait for a project to be delivered for calculation.

Since our arrival in Spain, Rogers Stirk Harbour + Partners have had a number of extraordinary commissions and many of these have been in the company of Arup Madrid. In some cases these joint excursions have been not only figurative but also literal. Indeed as I write I am seated in a strange office in Caracas, Venezuela discussing one of our more recent and extraordinary projects – a Bus Station at the edge of the city where, in the process of siting the Bus Station, we have created a grand new Metropolitan Park for Caracas. If, together with the Mayors team, we can pull this off will, we anticipate this new open space will become the equivalent to what Montjuic is to Barcelona or Casa de Campo to Madrid – a green lung offering an escape from what is an extraordinarily hectic city.

Such ventures (or should I say adventures) would have been much more difficult (or perhaps even impossible) without support from Arup. Not only do they continue to surprise us with their ability to find, from somewhere within their organisation, professionals with the necessary skills to help you solve a particular problem but equally important they always display a willingness (indeed an eagerness) to embark on journeys which, on the face of it, have no clear destination nor guarantee of a safe return.

It has been rewarding (from an architectural perspective) and fun to lead such adventures but any success we have achieved is due in large part to the quality of the guides who have helped us along the way.

It seems to me that design is, as it has always been, difficult – but increasingly having an idea is less than half the challenge. Realising a project consumes increasing amounts of our creativity energies and providing the means to achieve our goals - this is the biggest contribution Arup have made to our projects together.

Simon Smithson, Architect and Partner at Rogers Stirk Harbour + Partners

“It seems to me that design is, as it has always been, difficult – but increasingly having an idea is less than half the challenge. Realising a project consumes increasing amounts of our creativity energies.”

XVII

IS THERE HEALTH IN STEEL AND CONCRETE?

Health can no longer be thought of in isolation. Over the last century, it has gone from being understood as an absence of disease to being considered a state of physical, psychological and social wellbeing. Another resource for everyday life, not the objective in itself. And the design of healthy environments has become the spirit of this new paradigm.

Providing more efficient healthcare with private spaces that improve patient dignity and public areas to integrate family members are some of the requirements that the current health agenda demands.

Architecture is a fundamental aspect of this healing capability, in which light, colour, ventilation, thermal efficiency, circulation and functional organisation intervene. Designing interiors that are comparable to hotel standards also helps to attract and retain a skilled workforce, resulting in improved productivity. The visual interaction of patients and medical staff with the external environment is another key component of the therapeutic space.

Other aspects that current designs address include control of pathogens and the reduction of hospital-acquired infections through, for example, internal surfaces and washable façades.

Healthy decisions

Each hospital project cannot be considered independently. There needs to be space planning that takes into account possible advances in medical technology and changes in patient needs.

The activities carried out within buildings is another key element to consider. New diagnostic equipment, and its location in specific treatment areas, needs special characteristics, such as high heat dissipation, a reinforced structure to protect against overloads or vibration control.

In existing buildings, the design needs to address how requirements and limitations can be adapted to the physical reality of the space and services available in the building, the people, the team and the work carried out. Project management techniques can be useful when scheduling the best sequence of changes to ensure success.

At the same time, appropriate energy modelling is essential for decision-making. This enables the actual performance of the building to be checked through data monitoring, and compared with predictions, thus enabling control of the passage of water and air, lighting, gains or losses of heat and solar radiation, glare or outside noise. Lastly, the final impact of the use of materials needs to be considered in order to assess whether they can be recycled or converted into energy, and whether this elimination could cause pollution.

The comfort of occupants, whether they are patients, staff or visitors, is a priority component today to ensure the success of the therapeutic space.

In the coming years, we cannot imagine what the impact of advances in the treatment of diseases, climate change, the prospect of new equipment and expected levels of occupancy will have. Future healthcare building managers will face similar challenges to those that we are addressing today. It will be of great value if current trials become the most successful models for designing the healthcare buildings of the future.

An island hospital

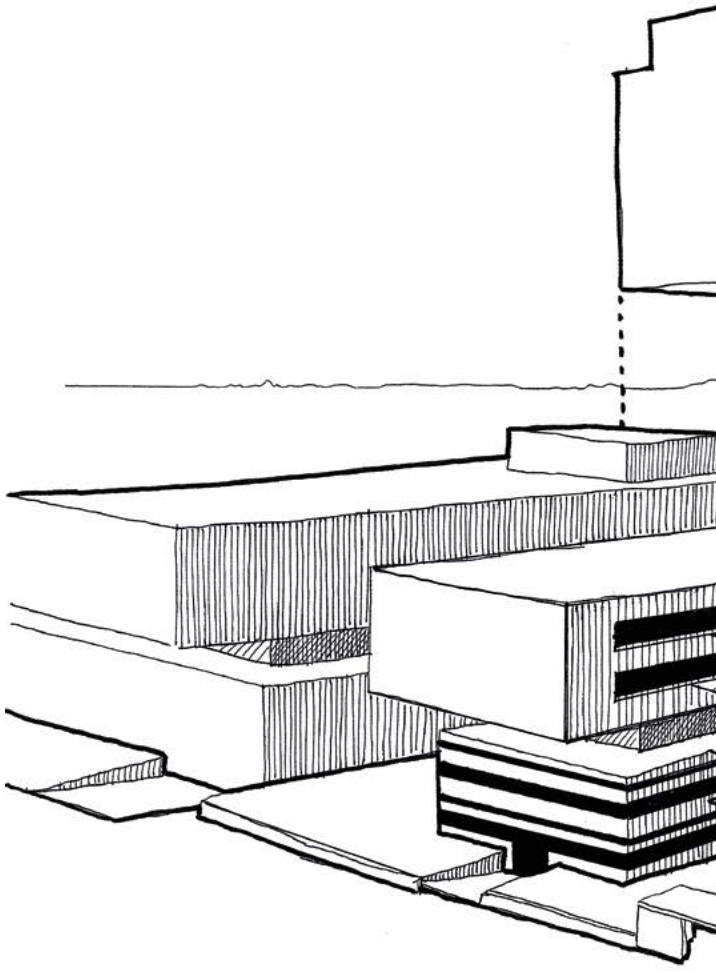
The new Can Misses Hospital is a 79,000-square-metre building with 247 beds in 199 rooms.

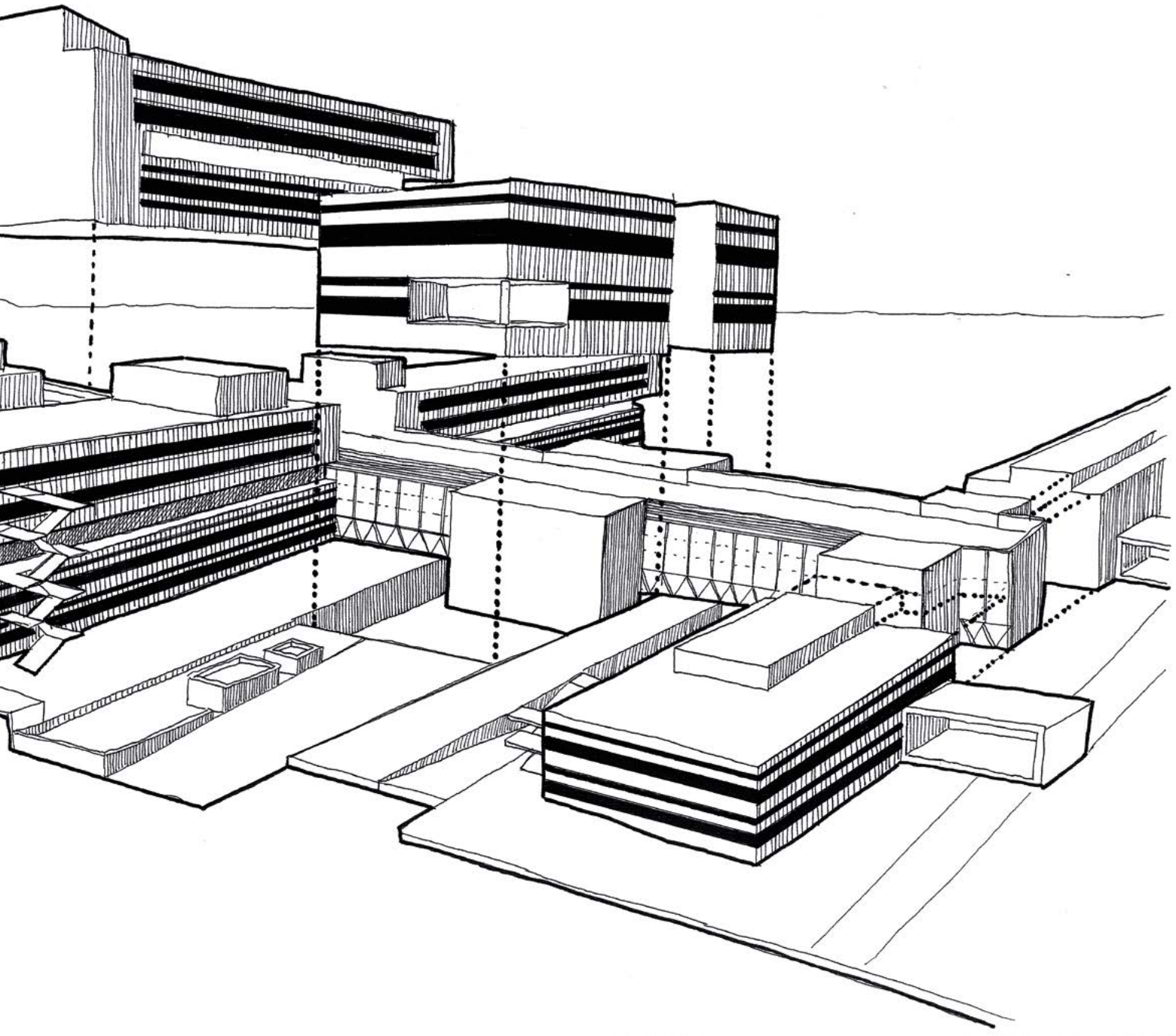
Its design of low-rise fragmented volumes facilitates a better flow of patients, visitors and staff and maximum flexibility for future modifications. This organisation also saves on maintenance costs and even energy consumption. Inside, due to its modular design, it is also possible to change, expand or reorganise spaces with ease.

The hospital includes communal areas, terraces and balconies where open spaces and views of the gardens predominate, providing abundant natural light and facilitating enjoyment. There are also plenty of places for patients, family members and staff, where timeless materials and colours help relaxation.

The design of this hospital offers a complex that is healthy, green and integrated into a pleasant environment, providing users with comfort. To achieve this, the design features measures for protection against the sun, insulation techniques, thermo-acoustic control and efficient management through state-of-the-art installations.

Can Misses also addresses sustainable aspects with a configuration that enables significant economic, energy and water savings, as well as reduced CO_2 emissions.





This hospital does not look like a hospital

Health infrastructures are active with very long life cycles. Their effective development means that it is possible to anticipate their long-term impact on the economy and the environment, as well as the capacity for the financing required for construction and operation.

While investment remains a fundamental responsibility of public authorities, new financing alternatives are becoming increasingly common.

One commonly used approach in recent years is that of public authorities joining forces with private sector

participants through a public-private partnership. While the private sector assumes the responsibility and risks of building a new infrastructure and also manages the operation and maintenance of the property in the long term, the public sector pays for its availability and functioning.

The Rey Juan Carlos Hospital in Móstoles is an example of this approach. This hospital is a public-private financed project developed by the Regional Government of Madrid, a consortium led by Capio for its construction and operation and a group of banks led by BNP Paribas. This hospital is one of seven built under this system in Madrid and is the largest in the region. This project, which was launched during a period of economic boom and completed during a time of financial crisis, is an excellent tool to generate economic activity, create jobs and provide healthcare to more than 180,000 citizens.

Going big on healthcare

The Infanta Sofía Hospital is a public health hospital built by the Regional Government of Madrid to provide specialised, high-quality and accessible healthcare to more than 300,000 residents of the area.

The project takes into account the mobility and accessibility of all citizens and attaches equal importance to functionality as it does to the harmony of its architecture and green spaces. Its design prioritises relationships of horizontal proximity and favours a circulatory system made up of streets, blocks and squares.

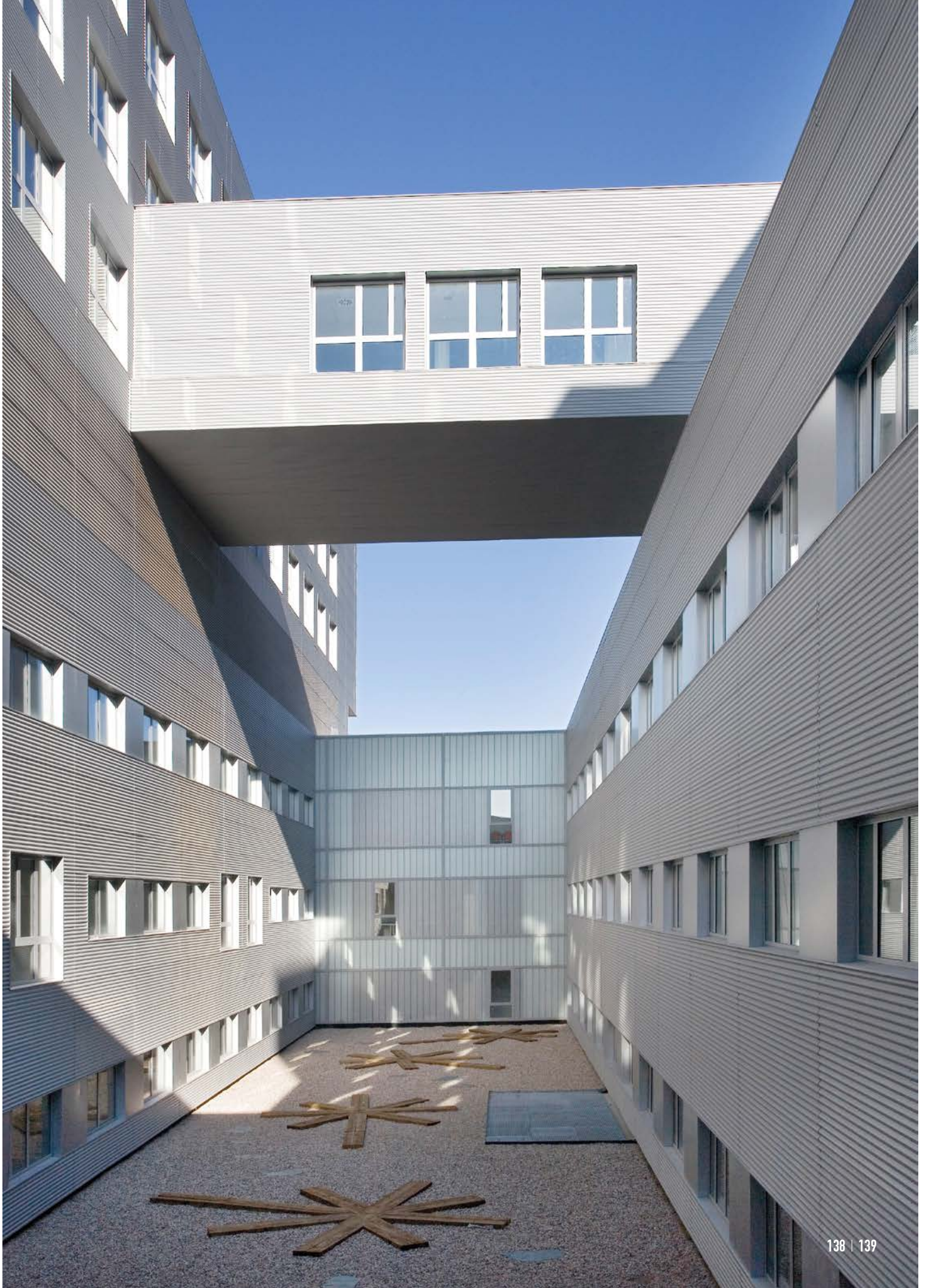
For its construction system, the material's useful life was considered: they are durable, easy to maintain, anticipate the appropriate ageing of the building and provide flexibility for possible changes of use or future expansion.

The design also tries to be human: the buildings are structurally resolved with large roof lights and open spaces that allow the entry of natural light and ensure the comfort of its occupants. The possibility of having natural ventilation and proper treatment of the waiting areas and outdoor spaces are also a priority.

Respect for the environment includes energy saving, the use of natural ventilation, waste management, radiation protection of polluting systems, thermal insulation and the layout of building services in the form of a ring.

It is also a fully computerised hospital equipped with the most advanced diagnostic and therapeutic systems. The use of information and communication technologies make it a paperless work environment – a key element to enable the hospital to be adaptable, decisive and open.

The building was completed in 2007 and is considered to be one of the best public hospitals in Spain.



XVIII

WHAT IS A RESPONSIBLE TERRITORY?

In the twenty-first century, territories we inhabit are no longer simple geographic areas. Traditional passive spaces have become real engines of change and the main physical medium of the new economy.

Their strength and development capacity are no longer sustained by traditional means of production. In an increasingly threatened and deteriorating environment, the regions that advance and evolve are those that know how to invest in their people.

Innovation, talent, creativity and the management of human knowledge that makes up a region all represent a substantial opportunity to drive regions to be more competitive.

To be competitive, a territory must be responsible. It must have sustainable planning that considers health, the environment, social relationships and the economy as parts of a whole. That territorial responsibility must involve institutions, organisations and individuals, and foster a sense of identity to mobilise every member of the community to be interested in the wellbeing and development of their areas.

Without sensitivity to these needs and without a real commitment by everybody, a region cannot achieve its own identity.

We are all responsible

Identity is a differentiating factor for territorial progress. Without it, a territory cannot know its development potential or limitations.

75% of the world population lives in areas that have been affected by earthquakes, hurricanes, floods or droughts. Similarly, most territories are constantly subjected to deep crises and social and economic changes.

Extreme changes only result in disasters when people are unable to cope with their consequences. Understanding that our territories are vulnerable is the first step towards the development of mitigation strategies to improve resilience and reduce their vulnerability. Sustainable territorial planning allows this situation to be reversed and enables real competitive advantage to be established.

The social and environmental responsibilities of a territory cannot be established unilaterally: they are the result of social consensus among all stakeholders involved, including the public and private sectors and non-governmental organisations.

In an increasingly hostile environment, thinking of a territory as a common space for everybody is the best strategy to ensure the future of the spaces we inhabit.

"We highlight this company's commitment to a place where it has operated for years and the way that, once the work has finished, it maintains its commitment to regenerating and collaborating with the local community to reorientate the activity of the area."

Cinco Días Award 2013 for "Best corporate social responsibility project"

The energy transforming As Pontes

As Pontes is a municipality of 11,000 inhabitants located in the province of La Coruña in northwestern Galicia. When a power station was constructed in the 1970s, the town became the economic centre of the region with the plant employing over 2,000 people.

To accompany the progress of the community and offer alternatives to the traditional economic model of this region, Endesa decided to develop a strategic plan that, through its vision of commitment to sustainable development, environmental protection and community development, aimed to make this Galician town stand out on the map of regional evolution.

This strategic planning addresses social issues such as job creation, infrastructure improvements and new social projects; environmental aspects such as the use of natural resources, dissemination of the values generated by the restoration of the mine and slag heap; and economic aspects through the restructuring of As Pontes' production model and the creation of more than 50 new companies.

In this way, the project will not only generate new opportunities for the region, but also a long-term vision of sustainability, viability and capability of addressing and reaching a consensus on the needs and expectations of the various interest groups, which will help to establish partnerships with public authorities and other private stakeholders involved.

To attract and retain social capital, generate economic activity and a prosperous and responsible regional model, a key part of the strategy focuses on the creation and construction of a local "blue" identity. This strategy takes advantage of the recovery of the natural environment and the creation of a lake, considering it as a regional asset, and includes the development of a model that is compatible with production and energy activities.

With economic activities ranging from hotels and rural tourism to the creation of residential and commercial areas and the promotion of sport and cultural activities, As Pontes seeks to become an attractive and dynamic regional environment. The proposed model also includes economic activities related to clean technologies and the promotion of specialised knowledge in the energy sector, thus taking advantage of and strengthening Endesa's presence in the region.

With this plan, As Pontes will be able to promote the development of the area and make its inhabitants feel proud of belonging to a socially responsible region.

Chile: the day after tomorrow

In 2010, an 8.8-magnitude earthquake and tsunami struck the Chilean region of Maule, leaving a large part of the city of Constitución in ruins, with more than 500 fatalities and millions of dollars in material losses.

Following the initiative of several stakeholders, the city was given a complete overhaul and a consortium was established to draft a Sustainable Reconstruction Plan (PRES).

The aim was to take this painful and traumatic experience and convert it into an opportunity to boost the region's development, taking the aspirations and needs of the local citizens into account.

It was a project by and for the people: since the beginning of the plan, the citizens were aware of the progress of the proposed design and were able to comment and participate in the project's development, showing their opinion through votes, on the 45th day following the week of the earthquake.

The matrix of urban reorganization included a mobility plan with various access points into the city, a rainwater plan to reduce flood areas, an anti-tsunami system, new town squares, pedestrian and shopping routes and the reconstruction of the river edge.

The project also included a housing plan using new technology in wooden prefabrication and the reconstruction of landmark buildings with seismic protection.

The plan incorporated energy saving methods in public buildings and pools by using heat produced in an adjacent industrial plant; waste management through the reclassification of plants, the recovery of biogas, and the construction of passive solar homes.

Throughout the entire process, this project sought to preserve the overall quality of life, ensure continued access to natural resources and avoid the persistence of environmental damage.

Thanks to citizen participation, the master plan was developed in 90 days and recovery work began in record time.

Before the earthquake

The day after the earthquake

Design was agreed 45 days after the earthquake

CHAPTER 1

Welcome

15:10

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Steve Jobs by Walter Isaacson

XIX

WHAT LESSONS CAN WE LEARN?

In a constantly evolving world, not only is teaching changing, but also the way people learn. The development of technology and new patterns of social mobility also have an impact on schools, colleges, universities, libraries, laboratories and educational campuses.

Faced with an increasingly demanding job market, students need to develop greater skills to be competitive. Multisectoral collaboration, centralisation of study spaces, virtual learning or 3D-technology-based education are some of the new formats that students demand.

Designing quality spaces that address the diversity of learning styles and are able to attract and retain students has become a basic requirement. Beyond technique and creativity, the design of educational spaces requires an appreciation of the economic and social context: educational facilities must not only be comfortable for the students, but also profitable in the long term.

#thepupilsoftoday

Digitally adept students are now part of the education system of the future. Brought up in an environment dominated by new technology, this generation expects their educational experience to be a natural extension of their world.

In constant connection to the web and with instant access to people, materials, information and knowledge, the students of today see education as an interactive process for which they demand learning environments that are tailored to their needs, experimented and adapted to this new reality.

Education today requires an increasingly virtual infrastructure, focused on social interaction and the creation of networks. Academic performance will be enhanced if it is possible to provide real-time access to information, lectures and high-quality specialised material and will, at the same time, benefit from the cost reductions that these technologies facilitate.

However, as long as there are students, there will remain the need to combine virtual with physical experience. The traditional face-to-face teacher-student relationship in the classroom is irreplaceable. But to compete with the new virtual spaces, traditional physical spaces need to offer additional benefits beyond simple personal interaction by providing greater functionality and tangible advantages that would otherwise be out of reach of students.

More flexible and efficient spaces will make it possible to use these environments for alternative activities which will be sufficiently attractive that those who want to learn will choose them voluntarily.

Iberdrola has training covered

The Iberdrola Campus, located in San Agustín de Guadalix, a few kilometres north of Madrid, is a corporate education centre for the technical training of staff, students and future employees of Iberdrola in aspects relating to the energy sector.

In addition to providing an innovative space that is conducive to learning, the campus seeks to become a cutting-edge centre for new technology, thereby linking training to the company's business strategy.

The work of the centre is supervised by a scientific council, consisting of professors from universities located in the different regions in which the energy company operates.

With a total of 35,000 square metres distributed over six buildings, the complex is connected together by a large 15-metre-high pergola that, like a flying carpet, embraces and protects the entire area of the campus. It also features classrooms, workshops, auditoriums, restaurants, social areas and a sports centre.

The campus model developed by Iberdrola stands out for its powerful design in which flexibility, modularity and adaptability predominate. Both the pergola and the design of its structure and building services include measures for sustainability, energy saving, different environmental aspects and comfort.

Its structure and organisation of space ensures that the campus offers an ideal environment for teamwork, interaction and the generation of the new ideas and strategies that will provide the company with the differentiating factor it seeks. Training is covered.

Humanities and new technologies in Seville

With its new facilities, Loyola University seeks to become the epicentre of higher education in Andalusia. Located in Dos Hermanas, in the province of Seville, the university anticipates a total student body of 10,000.

The university campus is designed to be functional with spaces that are conducive to thought and teaching and equipped to accommodate new technologies.

Although its main use is teaching, the campus also includes complementary activities with facilities for administration, services, and catering and various sports buildings with independent access.

Simplicity is the basis for a design that materialises through pure lines, simple structures and the use of natural and transparent materials that emphasise the spiritual nature of the campus and enhance the idea of an agile, active and versatile university.

The cross-shaped ground plan design marks two axes of circulation to which the urban proposal and buildings are orientated. While the knowledge axis is intended for classrooms and teaching areas, its intersection, the human axis, contains more humanistic spaces, such as the library, and spiritual places, such as the chapel. At the junction of these two axes is the central square, the main public space and heart of the campus.

Alternating between the two axes are landscaped paths, covered walkways, courtyards and interior galleries that connect the buildings and create a common identity of urban space. The urban proposal promotes social cohesion with

the design of meeting areas. For the way it is organised, the campus is an easy space to use, intuitive and understandable to the casual visitor.

The project is sustainable in terms of energy, provides plenty of shaded and green areas and minimises the use of water. The layout of the building is versatile and equipped to accommodate the changes that will inevitably occur over time. The original design is based on a centuries-old premise: a good university campus never ends.

José Guirao Cabrera

It's all about how you get there

La Casa Encendida, which opened in 2002, is a project developed by Caja Madrid's social projects programme. For nearly a century, this old building had been the Casa de Empeños del Monte de Piedad in Madrid.

In a similar spirit to its origins, the Casa Encendida today seeks to promote activities in which themes and issues, which had never previously been brought together, neither in a conceptual project nor in a single physical space, relate and interact in a cross-cutting manner.

The four areas of work that make up the project are education, with special interest in new educational challenges in a changing society; culture, viewed in all of its manifestations from the prism of experimentation and the avant-garde; the environment, linked to urban ecology and sustainable development; and solidarity between different groups in contemporary society, with particular emphasis on groups at risk of social exclusion.

This work takes place in versatile facilities that can be used for very different purposes. Throughout the day, the characteristics of the building ensure that everything or almost everything is possible in its spaces, without the rigidity of the facilities and technical equipment impeding or conditioning this versatility.

It is also designed as a space for reflection and thought. What matters here is not so much to achieve a predetermined outcome, but to experience the process of trial and error, through which problems can be identified and solutions sought. In all areas of the educational field, non-formal training programmes are developed to give expression to issues that are not dealt with sufficiently in formal educational.

Our students have always sought services and proposals that suit their training, intellectual, artistic and social needs and appreciate the risk and breadth of vision with which the institution addresses these needs. As new technologies often represent a barrier to broad sections of the population that are not familiar with them, we try to adapt them to be an opportunity for improvement and not an exclusionary obstacle.

The priority that we attach to experimenting with new ways of attracting the general public to our programme makes us stand out against other projects that have followed in our wake. Our focus has always been on the importance of how you get there rather than reaching a predetermined outcome. The response of the general public is often the really decisive factor.

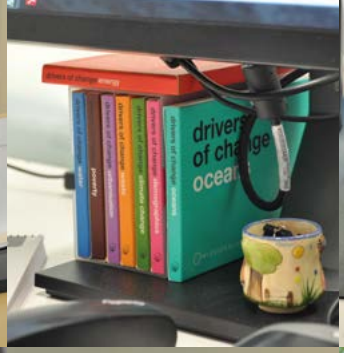
The future development of the Casa Encendida will depend on our ability to meet the needs of the new generations that join active public life. Because we work in the present, we would not have much use in anything unrelated to it and its challenges.

The future of spaces that, like ours, work in culture and education will depend not so much on their financial resources, but their ability to adapt to the uncertainty of the times in which we live.

José Guirao Cabrera, Director of La Casa Encendida and General Manager of the Caja Madrid Foundation

"The ability of Arup to study, resolve and understand the syntax between diverse requirements and technical solutions is what has made our relationship enriching and continual for over more than a decade."

ARUP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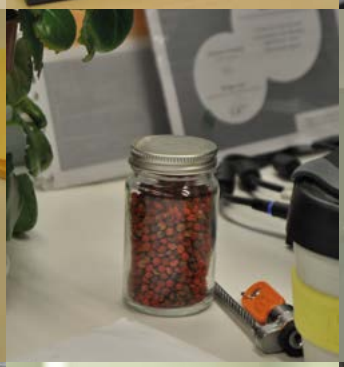
ocean

PORTAL DEL ANGEL

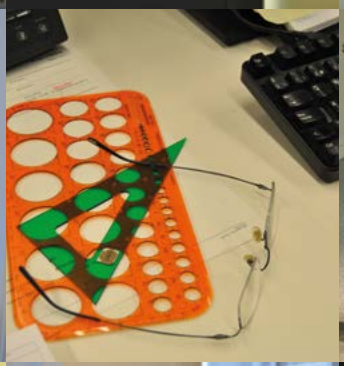


ARUP

CREF-122

DANIELA

A PALAZUELO 1914

ARUP


ARUP

HOLA
GUAPA!

ARUP

50

EHE
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Con comentarios d
de la Comisión Permanente

BRITISH AIRWAYS

XX

WHAT DOES 20 YEARS IN A TEAM ADD UP TO?

Like any building, a work organisation needs to have a strong structure equipped to withstand pressure (sometimes small earthquakes) and pillars strong enough to support the weight of growth.

In Arup's first twenty years in Spain, our way of working has undergone huge changes, driven by new market demands, the evolution of technical and communication tools and the constant progress of society.

Today's consultant engineer has greater ambition for new challenges, taking on international projects with the confidence of experience, working with professionals from other cultures in the management of new programmes and technical regulations and open to the changes that the future may bring.

One of Arup's strengths is that anyone from the company can be contacted here or on any of the five continents with the assurance of being heard and attended to.

Intercommunication between all offices is reinforced through the sharing of knowledge in intranet forums. It is as important to take advantage of the resources provided by professionals around the world as it is to participate in interesting projects. By simply selecting an area of interest, it is possible to participate, learn and exchange knowledge.

Twice a year, there is a discussion with our line manager about our professional goals, how close we are to reaching them and what help we need to achieve them. These meetings also include the contribution of colleagues, who offer us a more complete view of our work. In these conversations, it is usual that the possibility of working outside Spain is brought up. Employees can move to any office in the world for a period of up to three years depending on the characteristics of the proposal. These work placements benefit both the worker and the offices of origin and destination.

Helping our employees to adapt to technical challenges is another of our priorities. At the beginning of each year, we organise the training and specialisation of each of our groups to find out where the department and its members are heading. This enables us to clarify professional goals and set action plans to achieve them.

When laying the groundwork for the future of the company, Ove Arup emphasised the three ideas on which Arup was founded and which needed to be sustained to ensure development and growth: the quality of our brand, honesty in dealing with clients and the duty to increase the prosperity of all of its employees. The weight of these ideas continues to influence our daily work and is the measure that we use to find out how close we are to shaping a better world.

ago Gaytan / Jenna Little / Álvaro Coca / José Antonio del Rosario / Sandra Akmansoy / Patricio García / Marta Figueruelo / Belén Fernández / Joaquín Bueno / Chema Jiménez / Cristina Maroto / José Javier Barrado / Encarni Casado / Steve Fisher / Gemma Callejo / Carlos Alcocer / Lucía Arrospide / Clarissa Beatriz Camarero / Miguel Prieto / Javier Caselles / Laurent Rus / Rebeca Carabot / Joachin Guesgen / Tony Larcombe / Luis Sánchez / Ana María García / Luis García / Constantino Hidalgo / Beatriz Díaz / Ramón Rodríguez / Francisco Jiménez / Miguel Gómez / Sonia Herzog / José Luis López / María Rosa González / Adrián Roiz / Naiane Esteve / Fernando García / James MacKenzie / Alex Harris / Fraser Gillespie / Annabel Dawson / Carlos Olivera / Carmen Ríos / José Antonio Álvarez / Samy Moya / Daniel Pérez / Fidel Jorge Ruiz / Alejandra Nieto / Rachel Oates / José Ramón Revenga / David Cabezuelo / George Faller / Archie Campbell / María Belén Pérez / José Ángel Pérez / Francisco Parrilla / 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Hidalgo / Javier González / Nubia Herrera / Paz Arteijo / Valentín García / James Leahy / Paul Holloway / Robin Wilkinson / Iestyn

181,440,000
working minutes

1,200
projects

305
professionals

650
clients

11,325,000
m^2 of constructed land

21
LEED certifications

9
BREEAM certifications

24
awards

31
nationalities

746
sleepless nights

LIST OF ALL THE MENTIONED PROJECTS

Adriatic Liquified Natural Gas Terminal, Algeciras
Client
Ras Laffan Liquefied Natural Gas Company Ltd, ExxonMobil affiliates
Contractor
Aker Kvaerner Contracting AS
Key services provided
Civil engineering
Geotechnics
SMEP
Design and site supervision
Design management
License management
Contract management
Year
2003-2008

As Pontes Masterplan, As Pontes
Client
Endesa
Key services provided
Masterplanning
Year
2013

Basauri Masterplan, Bilbao
Client
BILBAO Ría 2000
Architect
UN studio
Key services provided
Geotechnics
Masterplanning
Sustainability consulting
Tunnel ventilation
Year
2005

BBK Tower, Bilbao
Client
BBK
Architect
Zaha Hadid Architects and AHB
Key services provided
MEP
Façade engineering
Geotechnics
Fire
Year
2010-2012

Bershka, Berlin
Client
Inditex
Key services provided
LEED consulting
Energy strategy
Sustainability consulting
Year
2011-2012

Bologna High Speed Railway Station, Bologna
Client
Italferr – SIS TAVSPA
Architect
Ricardo Bofill, Taller de Arquitectura
Key services provided
Structural engineering
MEP
Year
1996

Botín Foundation's Art and Culture Centre, Santander
Client
Botín Foundation
Architect
luis vidal + architects (LVA) and Renzo Piano Building Workshop (RPBW)
Key services provided
MEP
Year
2012-2014

Caixa Galicia Foundation, La Coruña
Client
Caixa Galicia Foundation
Architect
Nicholas Grimshaw & Partners
Key services provided
MEP
Structural engineering
Fire
Façade engineering
Communications
Security systems
Vertical transportation
Acoustic
Awards
Awarded by the Royal Institute of British Architects (RIBA) for its high architectural standards and contribution to the local environment
Year
1997-2005

Can Misses Hospital, Ibiza
Client
IB-SALUT
Architect
luis vidal + architects (LVA)
Key services provided
SMEP
Site supervision
Year
2008-2013

CEAR World Sailing Championship headquarters, Santander
Ultimate client
Spanish Royal Sailing Federation
Architect and client
AZPA LTD
Key services provided
SMEP
Fire
Year
2011-2013

Coca-Cola headquarters, Madrid
Client
Coca-Cola Spain
Architect
De Lapuerta Asensio y Arquitectos Asociados
Key services provided
Façade engineering
Sustainability consulting
Energy strategy
LEED consulting
Year
2007-2010

Container Terminal TERCAT, Barcelona
Client
Hutchison Port Holdings
Terminal Catalunya SA
Key services provided
Civil engineering
Maritime engineering
Geotechnics
SMEP
Detailed engineering and operation analysis
Year
2008-2010

Deep Space communications complex, Madrid
Client
Jet Propulsion Laboratory
Key services provided
Civil engineering
Year
1995-2001

Foresta Business Park, Madrid
Client
GMP Sociedad De Inversiones Inmobiliarias SA
Architect
RTKL España
Key services provided
Structural engineering
Civil engineering
Fire
Year
2002-2004

Gran Teatre del Liceu, Barcelona
Client
Gran Teatre del Liceu
Architect
Ignasi de Sola Morales
Key services provided
Fire
Acoustic consulting
Lighting consulting
Structural engineering
Year
1994

Health and Wellness Facilities, Doha
Client
Qatar Foundation
Architect
Fenwick Iribarren Architects
Key services provided
Geotechnics
SMEP
Infrastructure engineering
Sustanability consulting
Wind consulting, fluid dynamics and air conditioning strategy of open-air stadiums
Parametric Modeling of Geometry and BIM
Fire
Security consulting
Façade engineering
Year
2010

Heydar Aliyev International Airport, Baku
Client
Azerbaijan Airlines (AZAL)
Architect
Arup
Key services provided
Feasibility study
Concept design
Year
2010-2012

Holmes Place Health Club, Barcelona
Client
Holmes Place PLC
Key services provided
SMEP
Project Management
Year
1999-2001

Iberdrola Campus, San Agustín de Guadalix
Client
Iberdrola
Architect
Alonso Balaguer & Arquitectos Asociados
Key services provided
Sustainability consulting
Energy modeling
LEED consulting
Geotechnics
SMEP
Fire
Civil engineering

Façades engineering
Year
2007-2013

Iberdrola headquarters, Madrid
Client
Nexity (Europrado)
Iberdrola
Architect
Julián Colmenares
Key services provided
SMEP
Year
1999-2003

Infanta Sofía Hospital, San Sebastián de los Reyes
Client
Acciona
Architect
Inglada-Arévalo Architects
Key services provided
MEP
Life cycle cost
Site supervision
Year
2005-2008

Jaca Ice Pavilion, Jaca
Client
Jaca City Council
Architect
Coll-Barreu Architects
Key services provided
SMEP
Geotechnics
Façade engineering
Energy strategy
Year
2005-2007

KAIA King Abdulaziz International Airport, Jeddah
Client
SBG Saudi Binladin Group
Architect
Atkins & Pascall+Watson, ADPI
Key services provided
Structural engineering
Fire
Year
2011-2014

La Alhóndiga Cultural Centre, Bilbao
Client
Bilbao City Council
Architect
MECSA
Specialist consultant
Philippe Starck
Key services provided
SMEP
Fire
Year
2000-2010

La Cala Golf and Country Club, Málaga
Client
Ranchos Reunidos SA (FBD Holdings)
Architect
Patricio Martín González y Jacobsen
Key services provided
Plan technical audit development
Review of development plans
Plan review existing buildings
Project review design of access
Road infrastructure networks design
Complex infrastructure design
Highway bridge and four gateways design
Burying power line
Site supervision
Project Management
Geotechnics
Year
1996-2010

La Casa Encendida, Madrid
Client
Obra Social Caja Madrid
Architect
Carlos Manzano
Key services provided
Feasibility study
MEP
Acoustic consulting
Façades engineering
Year
2003-2008

La Rinconada, Caracas
Client
Alcaldía Libertador de Caracas
Architect
Rogers Stirk Harbour + Partners
Key services provided
Masterplanning
Transport consulting
Sustainability consulting
Geotechnics
Year
2013

Las Mercedes Business Park, Madrid
Client
Europrado
Architect
Fenwick Iribarren Architects
Key services provided
Structural engineering
Site supervision
Year
2001-2005

Las Rozas Business Park, Madrid
Client
Tishman Speyer Properties
Architect
Taller de Ideas
Key services provided
Civil engineering
SMEP
Year
2000-2003

Loyola University, Seville
Client
Loyola University
Architect
luis vidal + architects (LVA)
Key services provided
MEP
Year
2013-2015

M-30 tunnels, Madrid
Client
Madrid Calle 30
Key services provided
Fire
Risk analysis
Year
2006-2007

Macairena Masterplan, Granada
Client
Urbespacios
Architect
Rogers Stirk Harbour + Partners
Key services provided
Masterplanning and urban design
Year
2005

Meda Mos II, Mediterranean Motorways of the Sea
Client
European Commission
Key services provided
Strategic consulting
Transport and logistics consulting
Year
2010-2013

Madrid City Hall, Madrid
Client
Madrid City Hall
Architect
Arquimática
Key services provided
Façade engineering
Year
2005-2007

Merck Sharp & Domme laboratories, Madrid
Client
Merck Sharp & Dohme de España SA
Key services provided
Structural engineering
Project Management
Year
1998

Metropol Parasol, Seville
Client
Urban Planning Management
Seville City Council
Sacyr SAU
Architect
J. Mayer H.
Timber contractor
Merk Finnforest
Key services provided
Geotechnics
SMEP
Fire
Site supervision timber struture
Awards
Holcim Foundation for Sustainable Construction 2005
Year
2004-2011

Millenium Plant, Irapuato, Mexico
Client
Procter and Gamble
Collaborators
Davis Brody Bond LLP
Key services provided
Project Management
SMEP
Fire
Civil engineering
Sustainability consulting
Security consulting
ITC consulting
Lighting design
Year
2009-2010

Muregeya Footbridge, Rwanda
Client
Bridges to Prosperity
Key services provided
Structural engineering
Geotechnics
Civil engineering
Project Management
Manual design for the development of suspension bridges
Year
2011-2013

Museo Nacional del Prado, Madrid
Client
Museo Nacional del Prado

Architect
Dionisio Hernández Gil
Rafael Olalquiaga Soriano
Key services provided
Feasibility study for replacing gallery roof
Year
1994

Palace Hotel, Madrid
Client
Starwood Hotels & Resorts Worldwide
Architect
Pierre Yves Rochon
Valentín Merino López
Key services provided
MEP
Site supervision
Year
1995-1998

Palmas Altas Campus, Seville
Client
Abengoa
Architect
Rogers Stirk Harbour + Partners
luis vidal + architects (LVA)
Key services provided
SMEP
Fire
Façades engineering
Awards
2010 RIBA Award for architectural excellence
2010 AIA Award for environmental excellence
2010 Prime Property Award by Union Investment
Year
2005-2009

Pavilion Bridge, Zaragoza Expo 2008, Zaragoza
Client
Expoagua
Architect
Zaha Hadid Architects and Arup
Key services provided
SMEP
Geotechnics
Façades engineering
Fire
Materials
Civil and Infrastructure engineering
Bridge engineering
Hidrology
Design management
Cost management
Year
2005-2008

Picasso Museum, Málaga
Client
Museo Picasso in Málaga Foundation
Architect
Estudio Guadiana S.L.
Key services provided
Project Management
SMEP
Acoustic consulting
Awards
The American Institute of Architects (AIA) awarded with the highest recognition to architectural excellence, interior architecture and urban design
Year
1998-2003

Platja de Palma, Majorca
Client
Consorci Platja de Palma
Architect
West8
Key services provided
Materplanning
Sustainability consulting
Year
2009-2015

Post tsunami sustainable reconstruction plan, Constitucion, Chile
Client
Government of Chile
Architect
Elemental
Collaborators
Ministry of Housing and Urban Planning in Chile
City Constitution of Arauco
Key services provided
Masterplanning
Design of infrastructure plan
Definition of public space and facilities
Organization of a plan of houses made of wood
Energy planning
Year
2010
Award
Awarded by the Zumbotel Group for its urban developments and initiatives

Pull & Bear Gran Vía, Madrid
Client
Inditex
Key services provided
LEED consulting
Energy strategy
Sustainability consulting
Year
2010

Pull & Bear Lijnbaan, Rotterdam
Client
Inditex
Key services provided
LEED consulting
Energy modelling
Measurement and verification plan
Sustainability consulting
Project Management
MEP
Year
2011-2013

Reactive façades
Key services provided
Façades engineering
Year
2010

Rey Juan Carlos Hospital, Móstoles
Client
BNP Paribas (Capio Sanidad)
Architect
Rafael de la Hoz
Key services provided
Project Management
Year
2010-2012

Reyno de Navarra Arena, Pamplona
Client
SPRIN
Architect
TYM asociados
Key services provided
Fire
Year
2009-2013

Rijksmuseum, Amsterdam
Client
Het Nieuwe Rijksmuseum
Architect
Cruz y Ortiz Architects SL
Van Hoogevest Architecten
Jean-Michel Wilmotte
Key services provided
MEP
Building services
Building physics design
Site supervision
Fire safety
Lighting consultancy
Computational Fluid Dynamics
Thermo graphic analysis
Wind tunnel tests
Awards
Abe Bonnema Architecture Award 2013
Year
2002-2013

Safety of garment factories, Bangladesh
Key services provided
Fire
Structural engineering
Year
2013-2014

San Fernando Business Park, Madrid
Client
Arlington
Architect
Aukett Fitzroy Robinson LTD
Alonso Balaguer y Arquitectos Asociados
Key services provided
SMEP
Geotechnics
Façade engineering
Year
2005-2009

San Pau Hospital, Barcelona
Client
L'Hospital de la Santa Creu i Sant Pau
Key services provided
MEP
Year
1998

Santander waterfront, Santander
Client
Santander Port Authority
Architect
AZPA Ltd
Key services provided
Port infrastructures and urban concept design
Feasibility study for a new ferry and cruises terminal
Technical and legal support in agreement management
Financial structure of the project
Year
2007-2011

Santos Valongo waterfront regeneration, Brazil
Client
Santos City Authorities
Architect
Arup
Key service provided
Masterplanning and urban design
Transport planning
Infrastructure, maritime and transaction advice
Year
2011

Science Museum of Castilla-La Mancha, Cuenca
Client
Servicio de Bienes de Interés Cultural
Architect
Salvador Pérez Arroyo

Key services provided
MEP
Year
1992-1999

Telemadrid headquarters, Madrid
Client
Ente Público Radiotelevisión Madrid
Architect
Francisco Longoria
Key services provided
MEP
Acoustic and audio visual and multimedia consulting
Year
1993

The Lucas Koch Home, Alicante
Client
Lucas Koch Foundation
Architect
Christian Klein
Key services provided
Geotechnics
SMEP
Façades engineering
Fire
Sustainability consulting
Lighting consulting
Year
2012

Thyssen-Bornemisza Museum, Madrid
Client
Thyssen-Bornemisza Foundation
Architect
Rafael Moneo Valles
Key services provided
SMEP
Fire
Lighting consulting
Year
1989-1992

Tindaya Mountain project, Fuerteventura
Client
Saturno
Collaborator
Eduardo Chillida
Architect
Estudio Guadiana S.L.
Key services provided
Geotechnics
Feasibility study
Technical design
Year
2003

Torino Palahockey, Turin
Client
Agenzia Torino 2006
Architect
Arata Isozaki & Associates
Key services provided
SMEP
Fire
Acoustic consulting
Sports engineering
IT and Communications
Year
2002-2005

Toyota Logistics Centre, Toledo
Client
Toyota Motor Europe
Architect
Perelló de Paz Architects
Key services provided
Project Management
SMEP
Geotechnics
Civil engineering
Fire
Year
2008-2013

Valencia CF Stadium, Valencia
Client
Valencia CF
Architect
Fenwick Iribarren Architects & ArupSport
Key services provided
Sports architecture
Structural engineering
Fire
Evacuation
Year
2006

Villa Erques Resort, Tenerife
Client
Petter Olsen
Architect
HOK International
GIAD
Key services provided
Civil engineering
SMEP
Year
1998-1999

Wine Landscape and Architecture Haro, La Rioja
Client
Paisajes del Vino S.L.
Architect
Taller de Ideas
Key services provided
Masterplanning
Year
2006

Zara Madero, Mexico
Client
Inditex
Key services provided
LEED consulting
Energy strategy
Sustainability consulting
Year
2012-2013

Zara Home, Munich
Client
Inditex
Key services provided
LEED consulting
Energy consulting
Sustainability consulting
Façade engineering
Year
2012-2013

Zara Melbourne, Australia
Client
Inditex
Key services provided
LEED consulting
Energy consulting
Sustainability consulting
Project Management
Year
2010-2011

Zara Park House, London
Client
Inditex
Key services provided
LEED consulting
Energy consulting
Sustainability consulting
Project Management
Year
2012-2013

Zara Portal del l´Àngel, Barcelona
Client
Inditex
Key services provided
LEED consulting
Energy consulting
Sustainability consulting
Project Management
Year
2010

Zara West Nanjing Road, Shangai
Client
Inditex
Key services provided
LEED consulting
Energy consulting
Sustainability consulting
Project Management
Year
2010

Zara Vía del Corso, Roma
Client
Inditex
Architect
Duccio Grassi
Key services provided
LEED consulting
Energy consulting
Sustainability consulting
Project Management
Year
2010

Zorrotzaurre Masterplan, Bilbao
Client
Bilbao City Hall
Architect
Zaha Hadid Architects
Key services provided
Masterplanning
Year
2003-2004

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Once upon a time in Arup, Europe was that big Continent “over there” where English was not spoken. In the colonial heritage of Africa, South East Asia, Hong Kong, Arup had planted deep roots; and then looked to a new frontier in America. But why not Europe? Design as we understand the concept is very much a European product based on ideas arising from Western science, aesthetics, and natural philosophy, especially in the field of engineering and architecture.

So one day, sponsored by one of the Building Engineering groups that had focused prominently on European work, an engineer was sent to open an office in Spain. Little by little we started to immerse in the local culture, customs, the language, and the committed to growing an office and extend the services.

The recipe was set for expansion in Europe: international Clients for quality and profit, a leadership committed to local culture and values, and most importantly a desire from the local staff to be Arup, one global family. We practiced in Italy, Germany and Poland. Istanbul and Moscow extended the idea of Europe; and ten years after Arup began in Spain the Europe Division was formed, now grown much more to be a significant part of the Arup World.

It began with a little office in Madrid, as I recall it…

Cecil Balmond