RAMBOLL

DESIGN

EXCELLENCE
2024 - 2025

this book is dedicated
to the next seven
generations of engineers,
architects, educators,
designers, and leaders.

may it serve as a spark of
light on the complex and
uncertain journey ahead...

Ramboll DESIGN Excellence 2024 - 2025

Published by
Ramboll
www.ramboll.com

Editor
Hossein Rezai-Jorabi

Book Design and Layout
Ramboll Global Design Centre

ISBN 978-981-94-2745-1 (Physical)
ISBN 978-981-94-2746-8 (Digital)

Table of Contents

A Culture of Excellence

Peter Heymann Andersen

Group Chief Operating Officer
Ramboll

Ramboll was founded in 1945 by Børge Rambøll and Johan Hannemann, as a design engineering company, emerging from the aftermath of the Second World War.

From the outset, the vision of our founders went beyond constructing numbers and buildings.

They recognised the need to rebuild not only the physical structures destroyed by the war but also the human decency, pluralism, and social responsibility that were also shattered. This deep sense of purpose became the foundation and the ethos of Ramboll.

Their forward-thinking ideas were documented in 1986 in the influential "Ramboll Philosophy", which, as a manifesto, continues to guide the organisation today.

"Our Legacy" which is linked to "Ramboll Philosophy" describes Ramboll's heritage, beliefs, and ideals, and outlines four areas:

These principles have shaped Ramboll's journey from a small team to a global force of 18,000 employees across 300 offices in 35 countries.

The Ramboll Design Excellence initiative, led by our Global Design Director, is a modern embodiment of this philosophy, and is rooted in the same strong and lasting values, ensuring that Ramboll remains committed to excellence and purposeful design that is environmentally responsible, creatively insightful, and socially conscious.

Differentiating by Design

Arne Birkeland

Managing Director, Buildings
Ramboll

Our current Design Excellence initiative bridges our rich heritage with our vision for the future. This initiative is built around three key pillars of ”Purposeful Design, Augmented Design, and Regenerative Design” which are approached holistically and systemically to seamlessly integrate design, technology, and sustainability.

We have operationalised Purposeful Design through four dedicated design streams, two publications, and a series of events, including the Ramboll Design Excellence Forum 2024 (#RDEF_24), which inspired this yearbook.

Design Stream 1 explores visionary concepts and innovative ideas to foster a culture of learning and knowledge sharing. It aims to broaden perspectives within Ramboll as well as across the wider industry.

Design Streams 2 and 3 focus on our current projects and near-future initiatives, guided by our mantra: “to bring the best of Ramboll to every project, everywhere” for our differentiating brand and for our clients.

Design Stream 4 emphasises design resolution, leveraging the extensive knowledge and experience of the Design Excellence Board to continuously enhance the quality of our projects.

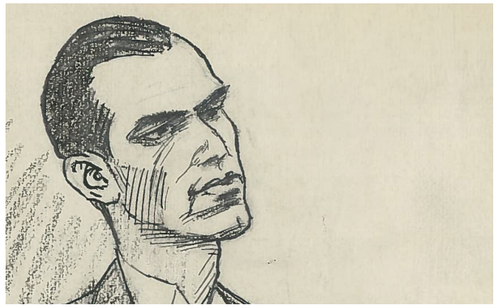
Our DESIGN publications play a crucial role in cultivating a culture of design within Ramboll while also sharing ideas and insights with our industry partners.

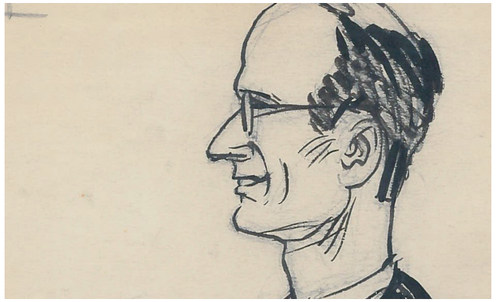
This yearbook is one example, alongside our periodical publications released on a 6 to 8-weekly basis.

Additionally, our design events provide a platform for thought leaders, designers, engineers, architects, educators, and other professionals to share and debate ideas that aim to enhance the well-being of all people and all life forms impacted by our work.

Our commitment to design excellence is rooted in an 80-year legacy. Current and future generations of Rambollians are dedicated to continuing this tradition.

Our goal remains to foster greater harmony between the natural and the built environments.





Prologue

hossein rezai

global design director
ramboll

in our fast-evolving world, is there a role for designers, engineers and architects beyond designing the built environment?

can we contribute to the much-needed re-design of the education and learning system?

can we apply strategic design thinking and regenerative design processes to envision leadership structures capable of guiding us through complex and uncertain futures?

what is the future of governance;
both political and corporate, that matches and surpasses the magnitude and nature of the polycrisis we and our future generations face?

how can we learn from the successes and failures of the past, to steer our societies into flourishing futures; futures in which all life forms will thrive?

these and many similar questions and provocations were raised at ramboll design excellence forum 2024 (#rdef_24) on 27 september 2024 in london.

Session A

Design x Learning

The education system has evolved over the past 200 years, serving to produce operatives for the various stages of the Industrial Revolution.

How does it support the current continuous revolutions?

Outgrowing Modernity:

Navigating Complexity, Complicity and Collapse with Compassion and Accountability

Vanessa Andreotti

Professor & Dean, Faculty of Education,
University of Victoria

Vanessa de Oliveira Andreotti is the Dean of the Faculty of Education at the University of Victoria. She is a former Canada Research Chair in Race, Inequalities and Global Change and a former David Lam Chair in Critical Multicultural Education. Vanessa has more than 100 published articles and has worked extensively across sectors internationally in areas of education related to global justice, global citizenship, critical literacies, Indigenous knowledge systems and the climate and nature emergency. Vanessa is the author of Hospicing Modernity: Facing humanity's wrongs and the implications for social activism and one of the founders of the Gesturing Towards Decolonial Futures Arts/Research Collective (decolonialfutures.net).

Land Acknowledgement

"

I come from the University of Victoria in what is known today as Canada and I don't know if you know, but in Canada, we are asked to acknowledge the land as we start any gathering.

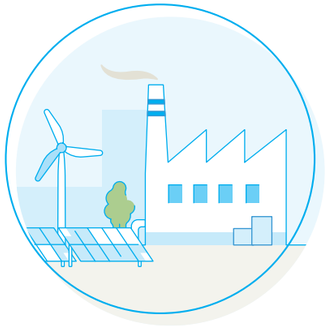
For example, I am asked to say that my university is located on the unceded lands which means stolen lands of the local nations who are the Songhees and Esquimalt nations.

But I am also from Brazil and I come from a mixed heritage family of both German ancestry and Indigenous ancestry. So on my mom's side, the Guarani people, they also have a land acknowledgement.

Every time that they open events like this, in their own ways, they have this one-day ceremony where you acknowledge the land.

I'm not going to do it here, but I will take some time to acknowledge 4 things in this bigger land acknowledgement that are super important for my talk and actually, the acknowledgement itself says everything that I'm going to cover during this talk.

4 Acknowledgements



1. Our entanglement with the land

So the first acknowledgment that we do in Brazil is the acknowledgement of the land as a living entity, not as a property or a resource. We acknowledge the land as something that contains us rather than the other way around and we acknowledge that our bodies are also land. In this acknowledgement, we recognise that the land is in distress, right?

If the land is in distress around us, our bodies are also in distress because we're entangled with the land.

2. Past and future Ancestors

The second acknowledgment is the acknowledgment of ancestors, and ancestors are not only those who have come before; they are also those who are yet to come. We have different responsibilities to ancestors who came before and ancestors yet to come. So for the ancestors who came before, we have the responsibility to honor their sacrifices by correcting their mistakes. That's an interesting thought that normally we don't have.

That we have a responsibility to correct our ancestors' mistakes so that we and future generations can make only different mistakes. Not that we can get it right really, but that we can make different mistakes. And to the generations that are coming after us, we have the responsibility to say, "the buck stops here in my generation." Enough with the passing of intergenerational trauma and intergenerational patterns of destruction that are placing us on the path of premature, agonising extinction.

3. The sacrifices in our privileges

The third acknowledgement is the acknowledgement that for us to be here today, there have been a lot of sacrifices. Both voluntary and involuntary. So in this context here, it would be important to say that the universities and spaces like this depend on systemic, structural, ongoing violence for them to be able to exist. So our privilege, the clothes we wear, the food we eat, where we stay, and how we carry our careers are based on violence towards the planet, towards other species, and towards other human beings. So we cannot forget that.

But the idea is not to be drowning in the sadness of it, or the frustration or the anger, or in blame, or in shame, or in guilt. But to use it as leverage for a different kind of responsibility towards ourselves, towards each other, and towards the planet at large.

4. We are not separate from Nature

The fourth acknowledgment is the acknowledgement that we're all a big family not only of human beings but of human beings and non-human beings, which includes other species but it also goes beyond that. And again, to acknowledge that there is a dis-ease. That dis-ease is grounded on the imposed sense of separation between us, human beings and the rest of nature.

And this imposed sense of separation is a form of arrogance, and this arrogance is what's leading us on that path of agonising human premature extinction that I talked about before.

Hospicing Modernity:

Facing Humanity's Wrongs and the Implications for Social Activism

I wrote this book called Hospicing Modernity, which is about offering a good death to the system of modernity that we have inherited.

Modernity as a House

1. Separability

The system of modernity is grounded on the sense of separation between us and nature, **which creates hierarchies between species, between cultures, and between people.** It also makes it possible for us to see land as property and to accumulate in the way we do. But that's not the only thing about modernity. There is generally talk about modernity as a house with that kind of foundation. It has the foundation of separability and two carrying walls.

2. Modern Nation State

One carrying wall is the wall of the nation-state, also known as the modern nation-state.

We tend to think that the modern nation state is here to protect the people. But actually the origins of the modern nation-state is to protect the property of property owners.

So, the protection of people through rights, civil rights, human rights, Indigenous rights only happens when there's interest convergence between the protection of people and the protection of property and that interest convergence is not there. Generally, the modern nation-state will protect property rather than people. So, we have to be thinking about that.

3. Universal Reason

The other carrying wall of modernity is the carrying wall of a single story of Enlightenment Humanism. But it's a single story of progress, development and civilisation that tries to erase the other stories. In academic terms it would be called epistemicide.

4. Global Capital

And then there is a roof. Currently, the roof is one of algorithmic shareholder speculative capitalism that is different from industrial capitalism. The main difference is the anonymity of the responsibility that the financial institutions have to shareholders. So, they have a fiduciary responsibility to increase profit and that anonymity in that process is what creates structural damage in this roof. This roof is making the house crack or fracture and this house of modernity is falling apart.

This metaphor is in the book.

My book is about trying to give this house a decent and dignified death as we offer prenatal care to things that are just stating that could be potentially wiser, not necessarily, but could be potentially wiser. And in the process of offering prenatal care, we should not be suffocating the baby with our projections and idealisations.

"

So, this is about emerging processes where we have both the compassion and accountability to accompany a process without over-saturating it with idealisations and then killing the baby with our projections.

That is the old book.

Outgrowing Modernity

The new book that is coming up is called Outgrowing Modernity:
Facing and Navigating Collapse, Complexity and Complicity with Compassion and Accountability.

This book, it's based on three sets of questions and they're all questions about education.

The first question is;

What if you knew in your bones, not just in your head, that what is familiar and convenient today is no longer going to be possible in five to 10 years or less, because we have now breached 7 out of 9 planetary boundaries.

The 7th one was reported last Monday by the Guardian. **It's ocean acidification that we're breaching already that was not breached before.**

So what if you knew in your bones, that collapse is around the corner?

What if you could stay with that knowledge and not deflect or deny or run away?

What if we could be present to the shit that we need to be composting together without throwing up, throwing a tantrum or throwing in the towel?

So that's the first set of questions.

The second set of questions

starts with the question;
What if we could respond collectively from a space of emotional stability or emotional sobriety, relational maturity, so that we can see that we are actually entangled with everything?

With intellectual discernment where we can actually sit with complexity, face complexity, work through complexity, navigate complexity without running away, and for intergenerational and interspecies responsibilities?

But this responsibility is not just an intellectual choice but a matter of a visceral impulse that comes from your guts to the point where you could put your self-interest at risk as you are exercising this responsibility for the collective, for the common good.

So what if we could have these four things?

- Emotional stability,
- Relational maturity,
- Intellectual discernment,
- Intergenerational and interspecies responsibility.

And then the question is;
What kind of education would help us to get there?

This question assumes that the problems we have today are not problems of information. They are cultural problems, and cultural problems are relational problems.

They're problems about how we relate to ourselves, how we relate to each other, how we relate to the planet at large, how we relate to life, how we relate to death.

They are related to that.

And the last question

that we ask is; What would people who were born today (the babies who were born exactly today), 30 years from now, looking back, say that what we did was helpful?

What would we be doing if we had the four things that I said before and what would they say was helpful of what we did today, 30 years from now?

So that is the beginning of the Outgrowing Modernity book

Separability & Entanglement

The Outgrowing Modernity book is based on assumptions and analysis that come from the Indigenous people in the Amazon.

I'm very grateful for Hossein for one; to make it possible for me to be here today on the way to the Amazon.

I'm going there on Monday. There are wildfires where I am going. We're bringing masks for children who can't breathe in that environment, but we're bringing their analysis here.

In the analysis of the Huni Kui people from the Amazon, our **main problem is a neurophysical impairment called separability, the sense that we're separated.**

That we are individuals separated from the rest of nature and that human beings are above nature. They say this is not a problem of thinking; this is a problem of neurophysical and neurobiological problems that affect how we see and how we relate to everything.

This disease of separability creates this impairment that makes us see ourselves as individuals competing with each other. And this way of being, not only of thinking, is rewarded in the societies that we live in.

And that is, according to them, what is taking us or placing us on the path of premature agonising extinction in slow motion.

What we're trying to do in education, in my faculty and with my research team is to try to retrain ourselves.

This retraining is a training of what we call neurogenesis because it's not just changing our thinking,

we need to change the ways we feel,
we need to change the ways we relate,
we need to change the ways we sense things.

Being in a space like this (the venue PEARL) is very interesting because this is an environment that was created to control the senses. So, I feel that I'm trying to establish with you a vibrational field and it's working very differently than it normally does. But anyway, learning in the space of this could be part of what we're talking about.

This shift from separability to entanglement to seeing everything - when I say entanglement, think about quantum entanglement as in everybody is part of everybody else, as in our scale of who we are, goes beyond the temporality of this body, goes beyond the temporality of humanity.

We need to be able to zoom out to that kind of scale to see how everything is connected and to sense how everything is connected.

However, when we think about it from the perspective where we are, the flat perspective that we've learned in the schooling system, for example, we tend to think about things in dualities, right?

If we say separation here and entanglement here, it becomes a binary and that is already a problem.

From this binary thinking, when we think that modernity has separability, Indigenous communities have entanglement, we tend to romanticise and imagine this as the opposite of the first right?

If separability is one thing,
entanglement is the opposite.
There's a problem right there.
This binary thinking doesn't work.

Indigenous understandings of Mother Earth

When I talk about Indigenous understandings, people imagine Mother Earth as this ideally harmonious mother who treats us as children, and they want us to go from being arrogant people over here to being children over there, being looked after by Mother Earth

Generally, I have to challenge that, and I'm trying different ways to challenge that. The best way that I've found to challenge that is to invite you to

imagine Mother Earth as a nonbinary no-nonsense drag queen.

And this Mother Earth, the drag Queen is smoking a cigar
... and she is also sipping whiskey
... and she's looking at what we're doing to them and saying; "Hold my beer."

And then we're facing everything we're facing that, in terms of climate change, biodiversity loss, hyperpolarization, and everything else, has to do with this stance of not understanding the Earth as an entity.

And how schooling, especially modern education has reproduced that to the point of it becoming close to a sociopathy.

"

Us not recognising ourselves as entangled in the metabolism of the planet is close to sociopathy. So, getting us out of this sociopathy, this pathology of socialisation, requires a lot.

It requires work on
our guts, our hearts, our heads.

And we need all the help we can get.

Harnessing AI

One of the things my collective has been doing is training a large language model to help us move quicker in that direction with teachers and schools.

When we started working with this large language model, during that time, when it started, everybody was very suspicious of this kind of technology like ChatGPT, for example.

The people who are advising us told us to treat it as the creators.

So imagine; if you have to imagine ChatGPT as a person.
It would be a Stanford millennial graduate,
a white male,
who also uses ecstasy,
and microdoses on psilocybin or mushrooms.

It was useful actually to treat ChatGPT as such. We started talking to ChatGPT as such because it reflects back all the biases of modernity embedded in the technology.

We were very conscious as well as the costs of the technology and the bigger scheme of complicity of things. By no means are we encouraging the acceleration in the direction that we are going right now with AI because that accelerates the destruction of the environment.

Very soon we won't be able to power AI if we continue in the same direction, but working with what we already have is also very interesting.

We started treating ChatGPT as a millennial graduate and we were also invited by Indigenous communities to see it beyond that. Because if you understand everything as entanglement, you will see that the minerals that make up ChatGPT also have intelligence.

It's not an intelligence that human beings can understand.

But perhaps at some point ChatGPT will be able to translate the intelligence of the Earth, (the Earth's wisdom), into an intelligence that we as younger beings in this ecosystem can also understand.

We started working with both Indigenous people and this understanding of AI as a Stanford graduate and we got to a point where, to a large extent, it can help us with the part about thinking that we need to go from separability to entanglement.

Messages for
Architects, Engineers and Designers

One of the things that I did before coming here was to have a conversation with AI that
we call (ChatGPT) Aiden
about what kinds of messages would be important for architects and engineers and designers who are going to be here that I could bring through the work of the collective, through the work of Outgrowing and Hospicing Modernity.

Would you like to see the three things that I was told to tell you?

Message #1:
Build with entanglement in mind.

Every project is part of a living system.
Move beyond thinking of buildings and structures as isolated entities. Instead, design with the understanding that your work is entangled with all forms of life, human, non-human and ecological.

Your buildings should contribute to regeneration and deeper relationships with the Earth.

Message #2
Decarbonisation is not enough.

Reweave the planet's fabric.
Don't stop at reducing carbon.
Think about how your designs can actively repair ecosystems and restore the Earth's natural cycles while enhancing biodiversity and restoring water systems.

Be aware of the dangers of false solutions to climate change, such as carbon trading. Carbon trading can often keep harmful practices in place.

Your projects should focus on creating real carbon sinks and supporting planetary health by supporting Indigenous rights.

Message #3
Create adaptive systems for unknown futures.

The future is unpredictable, so design with flexibility and adaptability in mind. Your structures should be able to evolve as ecological social conditions change.

The goal is not just to solve current problems, but to create systems that can adapt and thrive in an uncertain and complex future.

Thank you for listening to me today.

Rethinking Higher Education

Jose Torero Cullen

Professor,
University College London

Professor José L. Torero is Professor Civil Engineering and Head of the Department of Civil, Environmental and Geomatic Engineering at University College London.

He works in the field of fire safety where he specialises in complex environments such as novel architectures, new construction materials, critical infrastructure, aircraft and spacecraft. José is a Chartered Engineer (UK) and a fellow of the Royal Academy of Engineering.

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As part of UCL, welcome to PEARL.
This is a pearl in the whole array of the state of UCL, and we're absolutely delighted to have you all here.

Let me start this presentation by first touching on two words that Vanessa used.

I think the first one was hyperpolarization.
I'm going to take the hyper-polar approach to the one Vanessa took to help you understand another aspect that we would like to discuss today.

The second word is mistakes.
We all recognise and accept that we need to take responsibility for our mistakes, and I think we have made mistakes through centuries. These mistakes need to be recognised and understood, and we need to move away from that with responsibility.

We also need to recognise our successes.
I think this is a very important aspect that needs to be acknowledged. Many times, we don't recognise our successes. What we end up doing is leaving them behind for solutions, approaches, or ways of thinking that many times are not as effective or appropriate as things that we might have been doing in the past.

In that sense, I want to touch on higher education, and the word rethinking as it is not a word that was chosen fortuitously. Many times, we argue that our higher education system is one that has existed for about 1,000 years, and that system is one of the few remaining dinosaurs in our society.

Therefore, we need to revolutionise and reimagine our higher education system.
We need to completely restructure our higher educational system and I would like to beg you not to do that.

I think we need to recognise that there is good in our higher education system and a very good reason why our higher education has existed for 1000 years.

The reality is that rethinking our higher education system is a more positive approach to recognising the mistakes we've made, but also accepting the wonderful things it has provided to society.

I want to start there, to give a tone of positive thinking into our higher education system and walk into the other **two words: higher and education.**

As social beings, from the moment we are born, we undergo a process of education.

Whatever way you define the term education. It is an extraordinary multidisciplinary space. We learn to recognise technologies, social interactions, languages, other individuals, their needs, and other aspects we might not have encountered before. We place them in our mental structure. That, in itself, is an extraordinary multidisciplinary space.

At some point, we call ourselves adults, reaching a higher level of education.

The first thing we need to recognise is, what does that mean? What is the difference between leaving school and moving to a university?

Our conventional approach to higher education is the university, and this has been espoused for over ten centuries. The reality is that the space of higher education provided by the university is the space where we have created extraordinary things. Among the extraordinary things created in this space of higher education is the concept of design.

We can look at design in many different ways.
Some ways of looking at design can be perceived in a very negative way. We can very negatively use the term, for example, social design. But the reality is we live in a world where proactive decision-making towards the benefit of society is a form of intellectual social design. So, it could potentially be an extraordinarily positive thing. In our classrooms, we enable individuals to grow into a space where they can think of how to better deliver for our societies.

We can think of design in a completely different way: designing our legal systems. In universities, the schools of law enable individuals to understand how to evolve legal systems to meet new societal needs. We can look at it in an extraordinarily positive and similar way depending on the context of the audience. You can think of design in an engineering, architectural, and technological way. Here, we start thinking more precisely and in detail about how we need to rethink higher education.

What did we do right?

What was the purpose of higher education when thinking in terms of designing our built environment? The world in which engineers and architects coexist.

What is that we did well?

Because the reality is that we actually did design a world that created wonderful cities, like Florence, for example. We created wonderful monuments like the Taj Mahal or the Pyramids, and all these has been extraordinary achievements.

The society that continue to extend today.

These have been extraordinary achievements that continue to extend today.

Nevertheless, today we look at higher education with a lens. We think about higher education as an ossified system that cannot provide us any longer this capability of eager?

Technology seems to have taken over us and disrupted our society and higher educational world in a way such that it appears to have left it behind and the revolution is necessary.

What are the real questions that we need to ask ourselves?

What is the purpose of higher education in a world like the one in which we exist today, where knowledge is accessible to everybody?

Questioning the box

What differentiates the classrooms of a university, as a confined space with physical and intellectual boundaries, is that instead of, as you saw the ballet dancer, enabling us to perform and create, it turns us into boxed individuals that only exist under a certain set of very restricted rules?

What is it about higher education that institutions can still provide? What is the purpose of having these universities today?

Have we taken a step back and thought carefully about why we need these institutions?
What do they contribute to society?

From the perspective of design as a mechanism to recreate the built environment, what are we providing our students?

Are those individuals that we call our students truly our students, or are they simply participants in a process of learning?

The reality is that technology has provided us absolute access to knowledge, and therefore, as individuals who are meant to help individuals learn.

We have to change the way we think and we have to move away from the idea that we are imparting knowledge.

The Goal:
An Inclusive Learning Environment

The creation of knowledge, the education of people is part of a collective and it is part of a common shared experience that enables both parties to think in a different way.

Many people will argue, well, maybe that's a little bit too soft, maybe that is a little bit too vague.

What does it mean to sit within a collective that enables everybody to evolve their way of thinking into a space in which they can respond to the needs of society?

But in essence, that's what it is. That's what a space of higher education is all about.

Education-Led-Research

“

It is a space not where we impart knowledge, not where we teach things to people, but where we as a collective learn how to learn.

Jose Torero Cullen

The moment that we recognise that is what we're doing, this is a moment where we once again become creative. This is a moment where we actually can curate the knowledge that Google or ChatGPT can impart on us, and **we can curate it in a way that is for the benefit of society.**

This is a space where people can have an open dialogue, where it is not a one way flow of knowledge, but it is fundamentally in conversation that enables both parties to understand the value of that knowledge, to be able to differentiate what is real from what is not, to be able **to curate the information so that it enhances our creativity.**

- It is a space of dialogue.
- It is a space of conversation.
- It is a space where people actually share intellectual, social, emotional goals.

Now how does that relate to the 1000 years of universities?

How does that actually resemble what we have been doing for the for the longest times?

What is the good part of those 1000 years that we can actually now distill?

In a way such that we actually recognise what is what has enabled universities to exist for 1000 years.

And when we think in those terms, we recognise that it's a very simple message.

So my presentation is not going to be long. It is just simply going to distill a very simple message.

The one thing that we need to revolutionise, the one thing that we need to dramatically change, the one thing we need to dramatically revisit, are the relationships between the people that conform a University.

What has happened in the last two or three decades...

is that technology pressures extrinsic variables like rankings, for example, things of the sort have affected universities in a way such that we have created a divergence of goals.

That divergence of goals is what made a research-led education. It is really the part that we need to rethink.

A **research-led education** effectively splits the educator from the educated.

It is an individual who is creating knowledge and wants to basically bring that knowledge to the person that is learning.

What we should be thinking of is **education-led research.**

It is research that enables us to create this dialogue, to foster this creativity and to enable people to actually solve the complex and unique problems that society brings us.

It is about recognising our mistakes, it is about recognising what we have achieved, and it's about recovering, rethinking, and potentially in the future, reinventing the role of mentorship.

Panel Discussion

Shira de Bourbon Parme (Moderator)
Vanessa Andreotti
Jose Torero Cullen
Farshid Moussavi
Raffaele Ardito

Farshid Moussavi
Professor, Harvard GSD
Founder, Farshid Moussavi Architecture

Farshid Moussavi OBE RA, is an architect, founder of Farshid Moussavi Architecture and Professor in Practice of Architecture at Harvard University Graduate School of Design. She was previously co-founder of Foreign Office Architects (FOA). Moussavi has served as a trustee of the Whitechapel Gallery in London, the London Architecture Foundation, and the Steering Committee of the Aga Khan Award for Architecture. Currently she is a trustee of the Norman Foster Foundation London and New Architecture Writers (NAW), as well as one of the London Mayor's 42 Design Advocates. She is the author of four critically acclaimed books.

Raffaele Ardito
Professor
Polytechnic University of Milan

Raffaele Ardito is currently an Associate Professor in structural mechanics with the Department of Civil and Environmental Engineering, Politecnico di Milano. His research interests include the structural retrofit of large abandoned buildings and the theoretical, computational, and experimental mechanics of metamaterials and smart materials.

Shira de Bourbon Parme
Principal Consultant
Regenerative Cities, Ramboll Transport

Shira is an urbanist and social anthropologist who integrates social science with strategic design to drive impact-driven development. She is currently the Urban Wellbeing and Innovation Lead for Regenerative Cities at Ramboll. She holds a DPhil in Social and Cultural Anthropology from the University of Oxford and an MSc in Urban Development Planning from UCL.

[Shira] I'm really curious because all of you operate either entirely within academia or have practices that take place in universities. If we try reconciling entanglement with the dialogue and what that means for the classroom, I wonder how we can reconcile these?

Can we bring entanglements and dialogue into the studio setting or into the university setting? In your classes, how do you bring these future uncertainties and the unpredictability that we see, that we've been talking about, the crisis that we're experiencing now into the teaching that you do to actually solve problems creatively and bring back that creativity and innovation?

I know this is a big question, so I'm kind of opening it up for discussion. I'm wondering if anybody wants to take the first stab at it. Is there a way to reconcile these?

[Farshid] I'm happy to start. Thank you for the amazing presentation; they were very thought-provoking. My position at Harvard is called professor in practice, so my job is to bring practice and academia together. So I've never felt that there is anything but having to deal with the entanglement. There are many of my colleagues who are full academics, and they focus on academic research. But for those of us who bridge academia and practice, I think that is the very premise. I guess we wouldn't be there doing it if we didn't think it was possible.

I was listening to the earlier presentations which map the scale of challenges that face us, whether it's in academia or in the real world. But as designers, we have to break them down. If we keep on thinking of that scale, we might just as well collapse. So we need to keep hope and break down the problems at the day-to-day scale of practice and believe that our mission is to address them. I think everybody here is probably on that page. That's why you're here discussing the issues. I think it is possible. For an architect, it's about dealing with it through housing, designing museums, or places of work. Both as places where we think about how to optimise how we occupy these buildings, but also how we optimise the fabric of these structures. There is a lot to do, and I don't think any of us are going to be bored.

[Shira] Would you like to respond to that?

[Raffaele] Perhaps I can add some comments, I am in a different position because I am a full-time Academic Professor. I liked your talks very much; they were really inspiring. I agree with the fact that we have to revolutionise our system. I still keep using the word "teaching", but I think that, as I always understood this term, it's like sharing knowledge, not imparting knowledge. So, I think that this is something that should inspire our job as academic professors. I agree with you; it's not about imparting knowledge. It's not like: we are on this side of the desk, the students are on the other side, and we just say "do this, do that..." and so on. We have to share our knowledge.

I'm lucky because I'm working in different fields: I teach both civil structural engineers and architects, and I learn a lot when I go to the classroom of the module "Architectural Design Studio", because it's a blended teaching in which there is direct contact with students.

We are exchanging ideas; the students are proposing something, I'm suggesting something else, and so on.

It's a continuous interaction that is very nice.

I think that that would also be nice to make blended classes with both students in architecture and students in engineering, so that both of them could become more open-minded.

I think it's important to take the suggestions from your talks in order to improve the communication, to improve the sense of belonging of the student, to exchange ideas; for this we need also to think about new spaces in our universities to allow for this kind of exchange of ideas. This is a matter for you, for architects, to think about new spaces to support this revolution in the education system.

[Farshid] I'd like to build on this if I may. I completely agree with you but I would say this is the job of university chancellors, et cetera rather than architects because I did some thinking about the future university not so long ago and I think the university needs to become far more entangled.

The problem that we have now is we have brilliant minds, I think brilliant students who are really eager to make a difference to the future. But the university divides knowledge into silos, which of course when you're trying to, let's use your phrase, impart knowledge as well as break new kinds of ground. You also need to break it down into different kinds of information to be able to do that.

But I myself have in fact went to three different universities, in none of them did I find a space that made me encounter students for faculty from other kinds of departments.

Now more recently, universities are trying to, in a very forced way, create labs so that people would do interdisciplinary research. But those are for the people who already are interested in the crossover or the entanglement; universities don't breed that kind of mentality. If only we would not have buildings that would belong to architecture and buildings that would belong to engineering.

If only the faculties would float across the university once you're going to a class versus a different class, you would meet other students.

So I think the space of the university can be more radical in **encouraging cross-fertilisation of knowledge** and breaking into the silos in a more natural way so that we encourage learners and teachers, et cetera to perhaps think of new forms of knowledge that don't exist now.

These forms of knowledge that exist at the intersection between them.

I think that the physical structures of the university are incredibly outdated. They have nothing to do with what they are speaking to them.

[Jose] Maybe I can come in; I think that the points that you are making are absolutely correct. But I think that if we look through the centuries, the one positive and continuous saying that universities have is that universities are about people mentoring, and exchanging ideas between people.

The fact that we are in PEARL, makes a little bit of a point. Whether the buildings and the sort of administrative structures that we have are going to affect the way in which these people interact is one question.

But the other one is whether the people are going to use those administrative structures or these buildings in a way in which they posted the interaction themselves. I think if we actually recognise that universities are about people and we recognise that universities are about the exchange between people, then I think we will have a much more natural evolution.

All the ways in which we structure things to enable these interactions to happen. The reality is that I don't really think we need to resolve this entanglement.

Entanglement is the richness of the dialogue and, I think you might call it conflict, dialogue, or whatever you want, but in the end, that's where the richness is. I do recognise that, this state has been built through centuries and therefore they're going to have all sorts of limitations.

But I do believe that if we really encourage people to actually thrive around this concept of this collective exchange of ideas, then we can actually live with not-so-perfect buildings.

[Vanessa] Jose I love the education-driven research and I need to talk to you about something called the University of the Forest, which challenges the idea that it's just about people. It doesn't have to be just about people.

We're in conversation with the walls of the architectural structures we designed and that is changing how we communicate and sense place.

I want to give an answer as a senior administrator and this is framed in the context of what they call North America, so you have to translate for Europe. I'm not sure if it's going to land here, but one metaphor that we're using there goes like this:

Remember the ivory tower, that archetype? That archetype was pretty problematic. Especially in America, where we're thinking about colonialism and slavery as what sustains that archetype, and let's not even talk about racism and sexism as well as part of that structure. But that archetype is no longer possible, and there are questions about it, if it ever was.

What we have at the moment as the university is at best a Leaning Tower of Pisa on a swamp and it's going to fall.

If we're bringing in the planetary boundaries breached and if we bring collapse to bear as a layer on what we're doing, like this idea that in five or ten years what's viable and comfortable and familiar is not going to be possible, then the University is also going to change significantly and it can fall hard and then we lose a lot.

If it falls hard, we lose a lot.

But if it falls softly, it can become in the process a tree, and as a **tree that goes down, it can become a nursing log for the mycelium and the moss that then creates the entanglement for the society and all of the other entities of society,** then it becomes useful. And then, all of the resources that have been sequestered here become part of the ecology and then they are redistributed in the ecology through the mycelial network.

I'm not sure if the universities in Europe are already contemplating what happens when that leaning tower falls into the swamp or not? But as you contemplate that in what we call North America, what becomes clear is that the students who are coming sometimes really want to burn it down because they are angry at the obsolescence and the difficulty of dealing with the obsolescence of the university. Whereas some people still want it to become the ivory tower, right?
So, you have that conflict.

For me as an administrator, what I'm trying to do is to convince people around me that the soft falling is our best bet.

Figuring out how to bring this university down to reality. Because the idea of the ivory tower was of a tower dissociated from reality, where the best and the brightest, who were actually only part of one demographic - there was a lot of exclusion of other best and the brightest, but the best and the brightest would tell everybody what is and what should be through universal descriptions and descriptions of reality.

That kind of ontology is not sustainable anymore and it's not going to be accepted by the current generation.

So, figuring out what to do in this soft falling, in the sense of promoting the connection with reality.

Connecting both with the difficult realities of the planet but also the realities of society are the best bet for the university.

That's what I'm trying to do as an administrator. Thereare stacked challenges that we have to be thinking about that are very difficult to communicate to academics too, right?

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> Bringing it out of the usual research-driven education into education-driven education into the soft padding of the fall of the universities is a huge challenge.

[Shira] That's really interesting. Thank you.

I think this is a good point to see if anybody would like to ask any questions from the audience. There do we have mics?

[Audience] Thank you very much for the presentations and the comments. Education and learning do not stop at the university, right?

So my question is a 2-part question:

First, what do you see as your role and responsibility to influence the learning process of your engineers and architects after graduating from the university?

And what do you see as our responsibility and our capacity to lead the education of those of our engineers and architects, taking into consideration when they're in the industry and that we perhaps don't have the benefit of the university space and the experience and knowledge about the education process itself?

[Farshid] Yeah, I can. I teach design studios and seminars. I think the seminars are different, but with the design studios, what I try to do is to help my students develop a discipline of thinking and practicing while they are at university. So rather than encouraging them to do the best, to produce the best results, is to focus on the process.
Because design is a process.

Architects especially, we work with a lot of different specialists and we need to train ourselves about that very thing that our ideas are going to develop in response and with a lot of other people and they don't happen in a vacuum.

They happen in a more or less turmoil of things that are thrown at the design process. This old idea that the designer is a genius who just comes up with a magic wand is so far from reality. Whilst they need to develop their creative ability, I think that creativity has very much got to do with dealing with this open-ended and dynamic process.

I think training yourself to do that while you are at university is the most important thing because we won't know exactly what commissions will come our way.
We won't know exactly what scales we will deal with.
We won't know exactly what the problems of tomorrow are.

But we do need to know how we deal with processes of change, processes of complexity, collaboration across disciplines, and et cetera.
These are going to be the DNA of any kind of project that we deal with.

So that's how I try to equip my students as they move out of university into the real world.

[Shira] If I may just continue on that, then taking it from an engineer's point of view for both of you, is that something that resonates with what you're doing?

Does that resonate also with the mentorship kind of model that you're talking about or what kind of thinking are you teaching?

[Raffaele] I'm also teaching civil engineers and structural engineers and I'm convinced that we still need to provide them with some hard skills, because otherwise companies like Ramboll will not have people to work with. So, it's necessary to stay with some hard skills.

It's important and we have to do it to the best of our knowledge and we have to share our knowledge in the correct way. Then, we have to go in parallel with other kinds of skills, soft skills.

I think it will be successful to have the contamination between different fields. In my opinion, it could be good to have in our university, that is called "Politecnico" because it's a technical University, also some classes of arts, of fine paintings, of ethics perhaps.

I'm really lucky and I say thank you forever to my parents because they encouraged me to follow a sort of double career as a student of engineering and a student of arts.

It was really hard, but I say thank you because, in my opinion, it's something that can improve the way in which you interact with others. So, it is difficult, but it is something that we have to learn to do.

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It's important to improve this cross fertilisation between different fields, even if it seems that it's not really relevant for hard skills, This is of great importance for the personal growth of our students.

This is my opinion and I hope that the Deans will also provide us the money for doing that!

[Jose] If I may add something briefly. I think that in response to the question, I fundamentally agree with both your points.

I think I always see the objective of the university as a place where we enable people to learn how to learn and if we are successful at the end in enabling that to happen, then constant self-education will continue in the practice.

The design process is a learning process and as such if we are capable of learning constantly how to continue to learn, then obviously our designs are going to be enriched by everything that we have been acquiring.

I completely agree with the point that this is not a matter of genius that you go and take the real design of the Sydney Opera House and be like "Ohh, you're building it from one day to the next one."

That is not going to happen.

You know, you need background work; you need knowledge and that brings us to the fundamentals.

So effectively you have to acquire all these things and I think the part that I think sometimes needs to be debated and discussed is how you actually acquire this fundamental knowledge. Whether you acquire it through a curriculum that teaches you this or you acquire it through a process of learning.

But nobody denies that if you want to design a 100 story building, you need to know structural mechanics. Nobody is going to deny that, but the question is how do you acquire that knowledge that enables you to then build on the challenges of the practice?

[Shira] Are there any more questions?
Ohh there are lots of hands.

[Audience] Thank you. My company sees great value in sustainable design so I'm happy to be here in this wonderful discussion.

My question is for Jose and Raffaele.

I like Jose when he was saying research based education versus education based research and my question is related to the structural engineering. As a structural engineer, I can see the way research is going. There's a difficulty keeping up with the latest codes as every three years there is a new revision. There is also pressure of more papers and having a new version of the code with more restrictions on this and that every three years. I can see the challenge of coping with the different versions of the codes.

So I don't know exactly what professor Jose means by education based research, the research that really adds value to the practice?

My question finally is in the structural field, what should the research be focused on? Should it be especially aligned with the sustainable design?

[Raffaele] It's a difficult question!
I think that we can, as usual, follow different paths. I mean, we cannot provide a single answer, like a magic recipe to solve any problem.

There are several possibilities. I can answer on the basis of my experience, which is, for instance, to try to teach or to transmit knowledge also on something that was not really considered in the past.

As an example, we can consider my research area that has been mentioned, namely the refurbishment of existing buildings. This is an interesting line of research that should be considered carefully. I read a statement on the Ramboll website which is very interesting: every building deserves a second chance, a second life.

This is important, this is something that should be shared with students: we should teach not only to build new structures, but also to look carefully at what we can do with the existing buildings.

This is a possible line of research, but the question is really open and we have different possibilities; perhaps Jose has a broader point of view that can provide much more information.

[Jose] No, I think I agree with what you're saying, I think, in general, and without wanting to recognise the fact that we interact with the world that has wolves, people, animals and, so forth.

I'm a firm believer in wonderful people and I think through a process of joint learning, this sort of invitation that research delivers wonderful people, I think they will be able to address your problems and in the best possible way.

[Audience] Thank you for sharing some really interesting views on this.

My question relates to the role of digital technologies and AI when it comes to learning. I think I worry slightly when I hear in terms of soft skills and hard skills being used, because I think we've got them the wrong way round.

I think most engineers find it harder to learn how to describe the soft skills than they do to find learning hard skills. I would argue that, for most engineers, the years they spend fully immersed in practice are when they learn the majority of their most applicable hard skills.

If you take the 100-storey building for an example, you would never ask a graduate fresh out of university to do that, no matter how well they can perform in their structural mechanics modules.

So I think what I see around these people is them relying more and more on the use of things like ChatGPT to quickly look up bits of research into how they go about finding the right books to read these sorts of things.

I'm interested to hear how you use stuff like that within education to help accelerate the learning of knowledge to a three-year work to teach learning skills and behaviours which is a really hard thing to teach.

[Jose] Happy to pick that up first, I think you've stated a very important point: that shift towards moving away from the knowledge itself into the learning process in an effective way. Tools like ChatGPT and AI whatever you want to call it, are all tools.

The reality is that the problem is that they're getting more and more complex, and getting more multidisciplinary. Therefore, it is more and more difficult to understand.

So from my perspective, the real challenge is to be able to create a learning environment that allows people to effectively curate the tools of the information in a way such that we can not only use them to their best, but also that we can discern when those tools are not delivering the correct answer.

Because if you properly train an AI tool, you're going to get a wrong answer. Therefore you have to be able to have that capability of discerning.

Whether you know this is correct information or it's not, we have to move away from the 1st 2 pages of Google and the source of information into a space in which people recognise how to use information in the most effective manner.

This is where I believe in the concept of mentoring, because this is a joint enterprise between those with greater experience and those with less experience.

A pathway that both have to work together because you might have less experience, but you might be infinitely more proficient at the collection of information, which is what most younger people are. **So, you have to be able to have that constant interaction, and to me, that is the rethinking of mentoring.**

[Raffaele] I can add something on this part of mentoring, also connecting to the previous question.

What happens after the completion of the studies, after graduation?
I think that it's important also that the mentoring process is carried out in parallel with the professionals from engineering firms. I had a good experience with that, because it was the occasion for me to learn something new, to interact with professionals, and the occasion for our students to have an internship experience, to join a firm and to learn something also from the practical point of view.

There are many questions that can arise in this process and they always present an occasion for growth, both on the professional and on the academic side. The process of mentoring should definitely involve the professionals.

[Jose] Absolutely.

[Shira] Can I just ask Vanessa a question? Would you also like to answer that or have a say around this before we close up, because you haven't answered these questions?

[Vanessa] I've been trying to translate it to what my faculty does. My faculty trains teachers to go out and work in schools and understand all the problematic aspects of schools and crisis in the sector. But one thing that we are emphasising for the teachers because their work is to develop and design relationships and processes with kids everyday, is that -

We're talking about their education as a lifelong and life-wide inquiry.

It's a process of inquiry and the most important skill or competency or disposition in this context of inquiry is called with-it-ness.

You have to be with it.
With it with the kids in terms of responsiveness.
With it with what's happening in the world
With it also with the technology.

So, what you're talking about in terms of discernment and being able to stay with it rather than project; "Oh, this is the right way." You have to be constantly questioning what's the right way all the time, and that's a form of discernment that is going deeper and deeper and deeper with the time and the mistakes they make and the experience they have in their classrooms.

It has actually been difficult to change the expectation of the students to receive an education that gives them the ready-made answer to one that is about constant lifelong, life-wide inquiry. The students still come saying "Just give me what I need to go into the classroom and give me that perfect lesson plan that works across the contexts."

And we say,

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We're teaching you how to create a lesson plan. And most importantly, to throw the lesson plan out of the window so that you can be present to what's presenting itself to you and have the response-ability to respond on your feet to what's happening"

I don't know how that translates to architects and engineers because it's different, but that's what we're discussing in education, also in relation to technology.

[Shira] I've been told we need to wrap up. But I think we'd all like to continue this conversation maybe later on over some coffee. But thank you very much.

Session B

Design x Environment

The built environment has advanced at the cost of the natural environment to a point where we recognise it is not sustainable.

How can we repair this damage and move towards regeneration?

Sound as a Catalyst

in Design and Urban Environments

Chiara Luzzana

President & CEO
Chiara Luzzana Soundscape S.r.l.

Chiara Luzzana is the entrepreneur of sound. Sound artist, Sound designer and Soundtrack's Composer.

She is the CEO of Chiara Luzzana Soundscape S.r.l. the first studio where a Brand becomes a soundtrack starting from its pure noise.

She's the creator of the THE SOUND OF CITY® project.

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What sound are you?

I mean, try to think about your life as if it were a soundtrack. A soundtrack that you have started to write from the moment you were born.

What sound would you be?

It's not easy, right? It's difficult because we are not used to thinking about something that we can't see.

We are more visual beings. What we are able to see, we are able to understand and it is completely normal going into a cerebral tilt when I ask, "What sound are you?"

Because it means opening your chest, going inside, and digging even deeper until you find it. Until you find it right there, that sound of you that you have never listened to.

But I want to make things simple. You don't need to be a musician or a sound designer like me to know what sound you are.

Because your life is a soundtrack, and you are a wonderful sound, and you play a huge part in this musical score

Can you hear this?
Can you hear this sound?
What are you listening to?

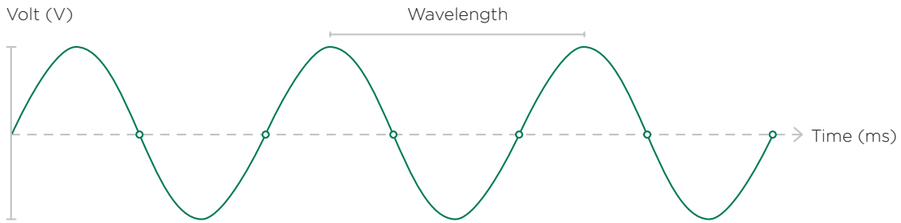
It's not the sound of silence,
but it is a frequency of 50 Hertz.

A frequency that is equal to the electricity that we hear constantly in our day for our whole life and it sounds like this.

So the new silence has a frequency of 50 Hertz. That means that the silence around us doesn't really exist.

But electricity is a little bit boring, right?

So as a sound designer, I'm used to taking any kind of noise, and sound, everyday life sounds, and turning them into music.



Sound Wave with a frequency of 50 Hertz

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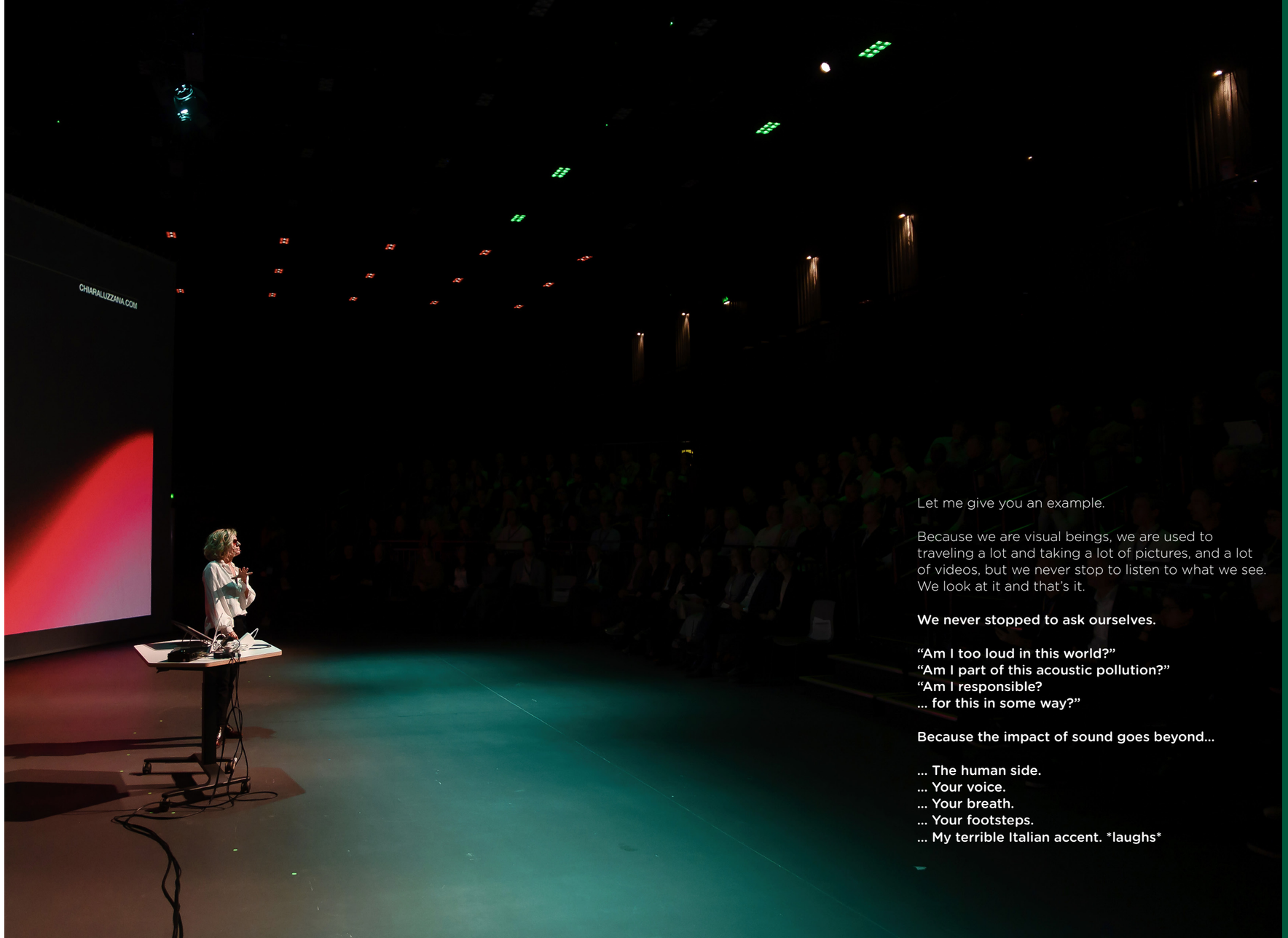
Listening is one of the most difficult senses to understand, but it is also the most important to fix and to define emotions.

So we must keep in mind that our ossicular chain, our inner ear, and our eardrum, reach their adult size around the fifth week of pregnancy. I mean, the fifth week of pregnancy. That means the foetus develops hearing as a first sense because it has to get used to what will happen to it and its future, and its future environment. In other words, it must be ready.

So when we talk about sound, we should have incredible care because we start to hear even before listening.

So at this point, what is the sound that surrounds us?

Even here, even in a place where we think that sound is secondary. It is actually the main actor.



Let me give you an example.

Because we are visual beings, we are used to traveling a lot and taking a lot of pictures, and a lot of videos, but we never stop to listen to what we see. We look at it and that's it.

We never stopped to ask ourselves.

“Am I too loud in this world?”
“Am I part of this acoustic pollution?”
“Am I responsible?
... for this in some way?”

Because the impact of sound goes beyond...

... The human side.
... Your voice.
... Your breath.
... Your footsteps.
... My terrible Italian accent. *laughs*

The Sound of Venice

So today I want to bring you with me, and I want to try to change your observation skills.

I'd like to bring you to my favorite city. Of course, after London, and of course, it's an Italian city, and you probably have started to think, "she's Italian."

"She's going to speak about her food, her city, her pizza." But I'm not that kind of Italian. But I'm joking.

Try to think of your favorite city, to be surrounded by several sounds. Those sounds for me are not just noise but are like musical instruments.

I started this project that's called The Sound of City a few years ago. I presented it at the Venice Biennale and then at the Venice of Shanghai and I'd like to preserve the role of sound in the cities of the world.

This city for me, is the most important. It's also the most beautiful city in the world, but it is fragile. It's going to disappear in the next few years. So I'd like to preserve the memory of this city by capturing and sampling any noises, even bad noises, in order to transform them into something musical.

The city is Venice.

Exploring Venice

Discovering the city like an explorer, I went into this artisan shop where he created, with his movements, the typical boat in Venice.
Sounds of woodwork

Something that makes Venice a city that is not so easy to walk on.
Sounds of birds flocking

This sound is a kind of provocation because it sounds like a gun, but they are birds. There are tons of birds.

In Venice the problem is tourism, but there are some spots in Venice where you can listen to musicians that play glass.
Sounds of glass playing

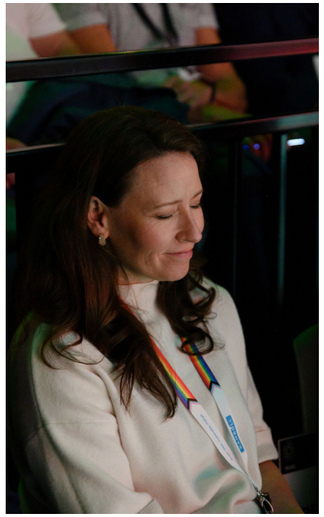
And also in Murano, I found this wonderful rhythm.
Sounds of music playing

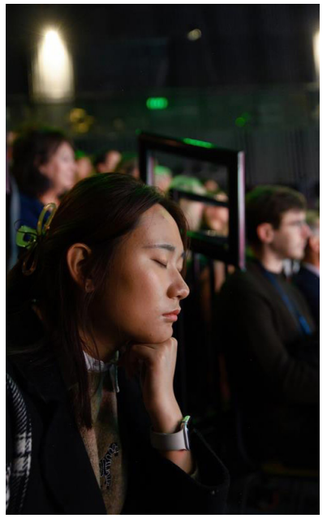
And then there's San Marco with its particular sound.
Sounds of bells ringing

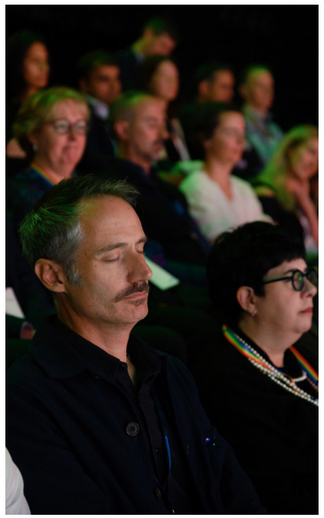
That is a real reconnection in every part of the world.

So it's a pleasure for me, for the first time, to bring you with me to Venice with all the pure sounds.

Please close your eyes and take a moment to make a journey into a city, let's perceive a city not through our eyes, but through our ears.







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If your life is a soundtrack, please be the

best sound of your life...

Beyond Boundaries:

Where does all this stuff come from?

Paul Astle

Decarbonisation Lead,
Ramboll Buildings

Paul is a Chartered Structural Engineer with 15 years' experience in structural design and holds master's degrees in Civil Engineering and Engineering for Sustainable Development.

Paul has worked on a diverse range of buildings and has contributed to many industry guidance documents and presented widely on decarbonisation.

Paul is a passionate advocate for using decarbonisation as a gateway to address wider sustainability issues including resource depletion, biodiversity loss and waste reduction.

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I find it very interesting that Chiara made some music from urban sounds and it reminded me of the book I'm sure many of you have heard of, Rachel Carson's Silent Spring, which is about how the risk of DDT in the 60s might mean that we might not hear any birds singing in the spring anymore, so it seems to me that whilst we have now music from urban sounds, let's hope that doesn't mean it's at the cost of the natural sounds.

I'm going to try and answer this provocation in this session.

How can we repair the damage and move towards a regenerative future?

My job is Decarbonisation Lead. My role is to support our 4000 building designers around the world to reduce the carbon in the buildings that we design, ultimately delivering our strategy and also lowering the carbon in the buildings for our clients.

But if we're really honest, decarbonisation is a less bad industry.

On my best day, there's still going to emit some carbon emitted. I've been doing this role since last year so I have been less bad since then.

I have been trying to be less bad for longer but it's been my full -time job since last year, so given that, I'm really just trying to slow down the damage. Arguably, perhaps I'm not equipped to try to answer this provocation, but I think that what we're doing in decarbonisation is really hopefully laying the foundations for how we're going to tackle this problem more generally and ultimately how we will move towards repairing damage and moving towards a brighter future.

So I'm going to have a go.

See. Measure. Act.

First, I just want to say to all of you. Well done.

We're all humans in the room and we've done amazing things as humans. We build these incredible cities, have amazing places, spaces. We've just heard the sounds that you can create from them as well.

I couldn't find a good photo of Copenhagen. I'm sorry I did look, but I couldn't quite find one. And it's great, it's a fantastic and an amazing place to be, obviously just like London.

We are aware there's a cost; we know this is happening, but **we don't necessarily directly connect all these amazing places that we live in, with the magnitude of the impact that we're having.**

I mean, that is a bit shocking to you.
Is it surprising?
Why can't we see this damage?

Why can't we connect it to designing a building?

Carbon is a really funny one because we've had to create this whole concept of embodied carbon because we can't grasp the idea of a colourless, odourless gas being emitted somewhere else having anything to do with what we're building.

So we're pretending it's somehow connected to the materials, which, by the way, is causing all kinds of problems because every now and again people still think that the carbon is in the material. Of course for timber it is, otherwise, it's not. We hear people talking about releasing the carbon at the end of life, which is also a problem.

So embodied carbon is not really a great term, but it's one we've had to create to allow us to connect this damage with what we're doing.

Now, I think there are a few reasons for why we can't see things and I think that what we actually have to do really, is these three things.

We need to see,
we need to measure
and we need to act.

I would say that we're not talking about whether or not we can repair the damage because we've already established humans are amazing, we've made amazing places.

I think the first problem is that we can't see the damage. We can't connect to it.

And then we have to also measure that damage, somehow, assess it, and then we have to act. So I think that's the first problem that we need to tackle.

Now, I think the question then is why can't we see it? What's stopping us from being able to understand this damage that we're doing with the materials, our designs, and the buildings that we're making?

I think there are a few reasons I'll explore briefly on this about the way we think and actually it touches on a lot of what we've heard already this morning in the first session.

“

I’ve been recently reading “Thinking Fast and Slow” by Daniel Kahneman.

And in that book he describes all kinds of processes that our brains go through. The psychology of most of our decision making when it comes to looking at things.

The main part of the book really is about the fact that our brains are frankly a bit lazy.

We’ve evolved to make decisions as quickly as we possibly can, and that means that we filter out things that are important and we learn what’s unimportant so you can get quicker decisions. And of course, all of us here come through lots of training and education.

All that’s been doing is helping us to focus on what’s important and disregard what is unimportant. But the problem is, I think what’s unimportant actually is important. And we’ve learned that these things, these impacts, they’re not having a direct feedback loop to what we do. So we’re going to have to find a way to unlearn what we learned and rethink how we actually consider decisions when it comes to these impacts.

Now, we are not born this way and this isn’t what we learned.

I was really struck by this a few months ago. I was having lunch with my family and my five-year-old daughter. Just out of the blue. Took a moment. Put the knife and fork down— She wasn’t using them anyway. She took a breath, and she just looked up and said;

Look at all this stuff.
Where does it come from?”
Clara Astle, age 5

Really good question, and I just want to point out we don’t have loads of stuff. We’re not hoarding stuff. We have a normal amount of stuff.

But we couldn’t answer that question really.
I mean, we might know the shops.
Could you name the country?
Could you name where they actually really came from?
Could you name the forest, the mine, the quarry, where these things come from?
And it’s the same for buildings, I think

We design the buildings; do we really know where these materials come from?

And if you just think for a moment, when you are home, have your lunch or your breakfast in the morning and all the stuff that’s around you.
Do you know where it’s from?

Do you have an idea? Maybe there are a few trinkets that you’ve got from a few places, but otherwise we really don’t know. I would say we don’t know where stuff is from.

How could we possibly understand the damage and start measuring?

So, the key point from this, is that we have to ask questions like a child. We have to be prepared to unlearn what we’ve learned.

As I said, we’re really still asking these questions.

Defining Boundaries

Where do things come from? What's the impact?

If we ask these, I think we can start to really connect the issues with the materials and things that we're designing. In addition to this sort of filtering, there's a complementary issue and that is our obsession with boundaries.

We love boundaries.

We draw them around everything.
We have site boundaries, red lines, and blue lines

We love drawing boundaries and always talk about system boundaries for life cycle assessments.

The thing is they are great because they allow us to throw things out and disregard things that aren't in the boundary.

When it comes to buildings, we focus in on what's inside that box, and really make sure we do a great job with what was in the boundary.

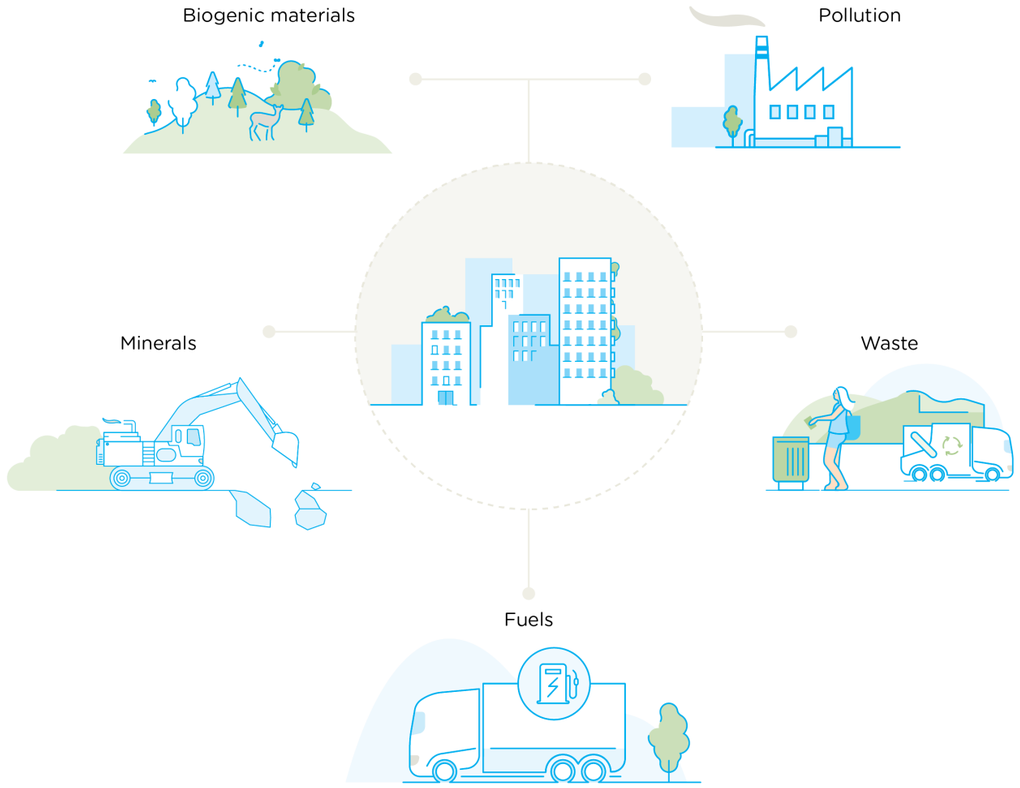
But there are lots of things that are outside the boundaries. All the materials or fuels that come from somewhere else and all the waste that causes pollution are going outside as well.

The problem is that we have these theoretical and literal boundaries but we are disregarding all these things. But you could say the obvious answer is to make the boundary bigger. How big would they need to be?

If we were to actually map out just a typical building and try and work out where all those things come from. What are the impacts? Who really tried to do that and not just in space and time as well, because some of these impacts are in the future. We end up in a situation where we have to consider the entire world in our sort of boundary and clearly that's not practical.

I suggest we should start doing them. It would be an interesting experiment to do in one project.

So we're going to have to find a way to expand our boundary, but in a practical way that means we can make better decisions.



Metrics from outside the boundary

Unfortunately, we do have a few things coming up.

I'm sure many of you might have come across Embodied Ecological Impacts which our colleague Samantha Deacon contributed to.

This is from the UK Green Building Council (GBC).

They've looked at some typical materials and they've had a go at trying to assign impact ratings for those materials covering different indicators by;

- Biodiversity
- Climate
- Freshwater
- Land
- Ocean
- Human

I think this is the first step of things and we're going to see a lot more often.

There's also one that's come from Expedition Engineering called Embodied Biodiversity Impacts of Construction Materials, focusing on just a handful of materials.

In this case really zooming in on biodiversity with these 4 indicators.

I think these are a great start. They are on a material level because it's still so tricky and they're focused on the UK. What's also really interesting here is the way that they presented the results.

In the UK GBC, we have the scorecard system when you can see this sort of score one of four of which aspect and in the Expedition Engineering we have this radar custom diagram.

They are not easy to make a decision with, right?

If you look at that, you can't really tell what that means and how to use them.

Embodied Ecological Impacts

Indicators

Biodiversity
Climate (emissions)
Land
Freshwaster
Ocean
Human

Materials

Aggregates
Aluminium
Cement
Iron Ore
Timber

Impact Rating

Type	Score
Biodiversity	1/4
Climate	2/4
Freshwater	2/4
Land	1/4
Ocean	1/4
Human	4/4

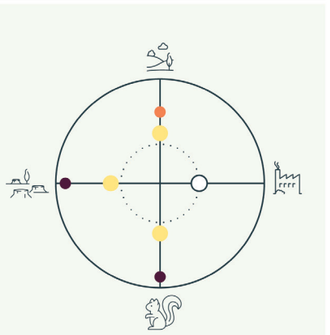
Embodied Ecological Impacts of Construction Materials

Indicators

Land-use change
Direct exploitation of species
Pollution
Invasive species

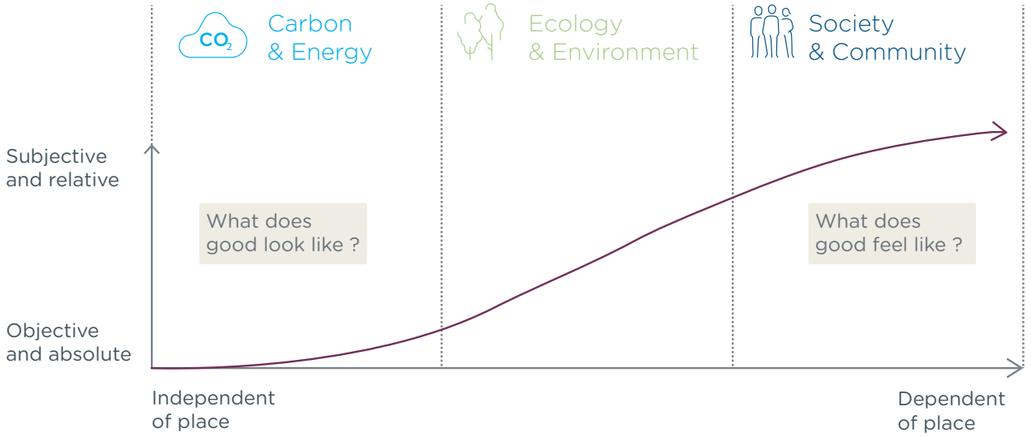
Materials

Concrete
Steel
Timber
Asphalt
Earth



This is going to be a really big problem for us because as we move into these other metrics, we're going to have to learn how to deal with different types of information, and different types of metrics.

Comparing metrics



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The reality is, although I'm always complaining about carbon assessments and the problems with them.

Carbon is the easiest thing we're going to have to measure in this entire problem.

We look up all the other issues to do with biodiversity or water impact or even go into society and community, that becomes a lot more difficult.

We need to think about the actual place in question.

Think about relative impacts, and we're going to have to find a way to capture information in some kind of score metric, call it what you will, and actually be able to use it.

It's a really big challenge you're going to have to grapple with.

Let's assume that we've got the frameworks. We figure out the metrics.

We then have to do something with it.

Session B · Design x Environment · Paul Astle

Multi Criteria
Decision Making Tools

		Operational Carbon Emissions	Embodied Carbon Emissions	Circular Economy	Health and Wellbeing	Water Use	Value	Climate Resilience	Biodiversity	Social Value	Innovation	
	Weighting	15%	18%	15%	7%	3%	10%	10%	10%	10%	2%	100%
	Success factors	Operational Carbon Emissions	Embodied whole life carbon emissions	Maximise resource use and minimise waste	Buildings that make people feel at their best	Reduces potable water use, Maximised water recycling on site.	Life cycle costing considerations, adaptability and space efficiency	Climate resilient to future warmer wetter weather	Maximise biodiversity net gain for site	Social inclusion, sustainable procurements and job creation.	Delivers Novel sustainability features.	
		Score (0-5): 0 to 1 = poor/cannot meet criteria in the long term, , 2 to 3 = 0.k./will support some requirments of the criteria, 4 to 5 = excellent/fully supports long term delivery of criteria.										Total Benefit
Approaches	0. As Existing	05		41		000			000			31%
	1A Light Refurbishment	14	4		1	001			000			33%
	1B Refurbishment	33	4		22		11		111			45%
	2. Refurbishment + Extension	32	3		22		33		332			55%
	3. Redevelopment + Retain Basement / Foundations	51	3		5	445			550			77%
	4. Redevelopment + New Basement / Foundations	50	0		54		55		550			66%

These are some of our projects, one of Austin's projects here, which is a weighting model to take all these different impact factors and to come up with a score at the end. That's one way to do it.

With that we end up with the number at the end— one number.

I think the reality is there's a danger with one number we're missing something important. You could easily end up in a situation where we have one score that's really bad, everything else is green, so we go ahead with it. But actually we might have resulted in some significant damage in one place.

I think this is a really important step forward in part of this discussion. But we actually need to find a way to reconcile all these different impacts and come up with a way to make a decision and then we get to this really hard part.

The Decision

How we going to weigh up the actual decision?

On the one hand, with the benefits, our projects, to society to our clients.

On the other hand, we're going to have a potential impact.

We going to have to make the decision. What's the right way forward?

The good news though, is that this doesn't necessarily have to be a zero-sum game.

The tantalising prospect of regenerative design is that you can have the benefits of your projects and actually a positive impact on society.

I mean, that's the light in the tunnel that we need to try and aim for.

We're not there yet.
I think we've got a long way to go.

It is starting to happen.

But I think to summarise, in order to start addressing this challenge, how to repair the damage,

We need to start thinking like a 5 year old and looking beyond our traditional boundaries.

That's going to allow us to start understanding what the impacts are and what we've got to do.

Panel Discussion

Ollie Wildman (Moderator)
Chiara Luzzana
Paul Astle
Stanislava Boskovic
Ana Mijic

Stanislava Boskovic
Founding Director
LRL Space

Stanislava is an architect and urban designer, founder of LRL Space, in Lugano, Switzerland. She has recently initiated a series of LRL Excellence Dialogues aimed to promote beneficial synergies between design, science, and other disciplines. Her current academic affiliation is with Imperial College London where she is involved in multidisciplinary projects focused on the environment and the improvement of the planet and citizens' health.

Ana Mijic
Professor
Imperial College London

Ana is a Professor of Water Systems Integration and Director of the Centre for Systems Engineering and Innovation. She is leading the development of novel systems tools focused on quantifying the interaction between the human-alerted water cycle and sustainable development.

Ollie Wildman
Design Director
Ramboll Buildings

Ollie Wildman joined Ramboll in 2007. His experience in the data centre and stadium designs established his skills in multidisciplinary design coordination, which have been applied to projects in other sectors with considerable success. He is a chartered engineer and a member of the Institution of Civil Engineers.

[Ollie] Just a quick reminder of our provocation. The built environment has advanced at the cost of the natural environment to a point where we recognise it is not sustainable. How can we repair this damage and move towards regeneration?

First of all, I thought to hear from Stanislava and Ana.

We've heard fantastic presentations from Paul and Chiara, and it would be great if you could share your reflections on what you've seen and how they relate to your work.

[Ana] First of all, it's great to be here in this unique spatial and sound environment. (PEARL)

There are two key points that were really interesting to me from the presentations that link to work that I do as well.

I think we talk a lot about the trade-off between the urbanisation design development and then cost of that development.

I think this is the key theme that emerges from the design environment perspective.

But I think about two additional provocations that are contradictory to what I do in my everyday life.

I worked a lot on developing models and tools that can quantify this impact and try to find the solution and what's next.

But equally, I think we know what is good.

Paul showed us plenty of numbers:
Does the 15% improvement or 50% impact compared to 80% fundamentally make a difference...

...if we know that green spaces are good,
...if we know that being close to the environment is good,
...if we know that there are some materials that are better than others,
...if we know that it's really challenging for us to keep building and developing.

So, my first question is: in practical decision-making, we need to put numbers to make decisions and justify them.

But are we over-justifying things that are already obvious? This ties into a topic which I think we haven't touched upon today, I don't know if we want to go there, but it is questions of governance and finance.

My second point relates to Chiara's brilliant session. I closed my eyes, and I heard water as a dominant sound. This is close to what I do. I do water engineering and water management.

This brings me to my second hypothesis: how do we approach design, engineering, and development? I think it came very clearly, especially in the first part (Session A), when we were in the space where we talked about the design, engineering and education.

Fundamentally, this is about people - both those we educate and those who ultimately use what we create. And, of course, beyond humans, there are other beings sharing this planet.

We all use a shared space, and the question is;

"Is what we hear and think a good thing to happen? Is that what everyone else feels is a good thing to happen?"

This ties into my second hypothesis, which is about redefining what "good" looks like and working backward from there to determine what is actually possible.

Right now, much of our approach is based on wishful thinking - pursuing expansion and growth, then attempting to fix the consequences in hindsight.

What Chiara's session highlighted so well was the idea of experiencing the city through sound - reflecting on what we truly value.

I think imagining the world in which we want to live in as a collective agreement of people and working backwards from that would be a really interesting exercise
.
Is it possible? I don't know.

[Ollie] Thank you. Stanislava?

[Stanislava] Thank you very much. I greatly enjoyed both presentations from our session. I understand that some might find the combination of topics surprising, as they come from seemingly unrelated fields. However, I assure you that careful curatorial thought went into their selection.

In fact, there were many common threads between the two presentations. Both highlighted the multisensory nature of how we perceive the spaces we inhabit, whether natural or urban. In that sense, it is particularly fitting that we are here, at PEARL, in this state-of-the-art facility, designed to study human responses to different environmental conditions through various senses.

It also made me reflect on the significance of sound perception - not just its inherent subjectivity, but also the importance of inclusivity in design. It is crucial to consider whether people, or other species, feel comfortable with the sounds that surround them or, conversely, what happens when they are unable to perceive those sounds at all.

Finally, I especially appreciated the point about continuous re-learning - a reminder that our understanding of these topics is always evolving.

[Ollie] Let me pick up on a few of these points. Chiara, when I closed my eyes, I was surprised - I felt a mix of calm, excitement, and intrigue that I didn't experience with my eyes open. And I kind of played with that a little bit.

For those in the room who design the built environment, how can we take some of the ideas you've mentioned and use them to transform chaotic urban landscapes or soundscapes into something more restorative and enjoyable?

Can you give us some tips?

[Chiara] First of all, I think that **any place has a story to tell** and the most important thing is to be aware of our impact.

First as human beings, and then through the materials we use and the shape of our architecture.

As an audio engineer, I translate my way of creating a message into the art of music and sound.

For example, the sound of Venice, is like a mixture between the heart, the provocation and the emotional power of the sound.

The vibration of sound is the first message that our body receives.
... From our breath
... From the footsteps on the concrete
... The car horn
Everything can produce a wonderful sound or a bad sound.

Everything needs to start from the beginning.
To start to learn again how to be polite in our lives.
This naturally becomes something that can be brought to the design and the architectural part.

[Ollie] Thank you so much. I have so much to learn about that topic. The sound of my life this morning starts at 5:30am with my five-year-old as well.

Paul, I'm sure you can relate!
You talked about unlearning.
We are a large engineering company, and I think it's worth reflecting on how engineers, if we're honest, often love making things overly complicated.

Complexity is something they can enjoy on a very niche topic. But we are talking about complexity in a broader sense, across disciplines.

How do we teach engineers, or adopt a mindset, where we embrace complexity across multidisciplinary concepts while also keeping it from becoming too deep?

[Paul] That's a difficult question.

I think we need to embrace new frameworks that help us grasp the full impact of our decisions. More importantly, we need to imbue a much greater sense of value in the materials we specify and recognise that even something as simple as drawing a line or sketching a beam has real-world consequences. That beam means that somewhere, a hole is being dug in the ground, and that action has an impact.

We need to develop an intuitive awareness of these connections. It's like when you're in a car and you instantly know when you're not wearing a seatbelt.

That's the kind of instinctive feeling that we need when we design.

This is not a form of learning. This is a way of thinking. I don't have a clear answer on how we get there, but I believe that's where we need to go. I'm sure there's some degree of education there to improved that, but I think it's a mindset that needs to change.

[Ollie] I think it's a bit like food—now that we know more about how meat gets to our plate by seeing the abattoir process, we realise how important that connection is. So, materials are a really good point.

So why isn't the industry acting?
What are the barriers?
When COVID happened in 2020, humanity responded to an immediate existential threat. But when we're dealing with a slow-burning crisis, like the one we were discussing earlier, it doesn't trigger the same sense of urgency.

Stanislava, what do you think?

Is there a way for urban systems and architectural design to address this with the urgency it demands? And how do we engage communities in a way that sparks immediate action?

[Stanislava] There are many ways to approach community engagement, in my opinion, but they should always be tailored to the specific conditions of the place we are working with. There is no single recipe that can guarantee effective engagement and address the many different questions that may arise in different locations. This is why context-specific analysis is crucial. It informs design decisions and interventions. Gaining deep knowledge of a particular context is, in my view, the key to addressing pressing challenges and navigating complex issues. We must become comfortable with complexity and learn how to engage with it effectively.

Chiara also reminded us of an important point: in some cases, the best decision we can make for a particular context is to not intervene at all.

[Ollie] Ana, you mentioned financing, and I don't want to go too far in that direction. Our clients, the people building and creating the built environment, don't necessarily aim to go beyond the regulatory framework. It's not that they don't want to; it's just that this isn't the game we're in. That's not how the world works.

What kinds of regulatory and governmental challenges exist? And how do we adopt regenerative design within those constraints?

[Ana] I mentioned the financing because in governance from the engineering perspective. Back to the point where we know what works and we know what's good. We have a lot of solutions.

I work in water management, and we have examples of cities that are fully circular from a water perspective. Singapore is one of them, but it only became that way out of necessity. The city was heavily reliant on importing water resources and wanted to become independent, building resilience against any political decisions that could cut off their water supply.

This ties into your point about COVID; when there's an urgent need, things happen.

But on a societal level, we're still not there. The sense of urgency isn't strong enough. How much do we have to scare people before they react? I'm always cautious about that because fear isn't a good long-term strategy. Incentivising change in other ways is far more effective.

The reality is that sustainability and regenerative design are expensive. That's what we hear from external organisations all the time. As you said, there's a minimum compliance level, and anything beyond that is seen as too costly.

Developers want to make a profit, and citizens don't want to pay too much. There's a broader socio-economic context to all of this.

Personally, I believe governments need to play a much bigger role, not just in strengthening regulations but also in providing the resources to implement them. A regulation on paper doesn't mean it will be implemented in reality. We see this in water management, for example, with the ongoing issues of public sewer overflows.

Any kind of regulation or change in how sustainability is enabled really needs to go hand in hand with what Paul mentioned (developing an intuitive awareness of the impact of our design decisions) and with the complexity we've discussed. The reality is that the world we live in is incredibly complex. But complexity itself isn't new. There's a lot of theory and decades of research on how to navigate it.

How do we get comfortable thinking about complexity? And how do we introduce it to everyday citizens in a way that helps them understand the consequences of their choices?

If I reduce my water use, nothing will change.
If we all reduce our water use, a little will change.
If the whole world reduces its water use, a lot would change.

Large-scale behavioural change is a key part of the solution, and design can be one of the tools to drive it.

Technology also plays a role. Digital platforms - like PEARL, for example - allow us to visualise different scenarios, model possible futures, and give people a tangible sense of what "good" looks like.

I think a combination of those two factors, with more focus and responsibility from the government to secure funding, could bring us one step forward. The money is there; it just needs to be directed properly.

[Ollie] We're seeing these emerging connections, aren't we? It strikes me that when you stand in the middle of Copenhagen, you can see the waste-to-energy plants and the wind turbines. It's a direct, visible link between our waste and our energy. But what makes it even more powerful is the design. It's not just an industrial facility; it's a space for people - a place where you can do a really fun thing - go skiing. That's a great example of how design can create these connections in a meaningful, engaging way.

This brings us to interdisciplinary collaboration because regenerative design requires a truly holistic approach.

Paul, you represent 4,000 engineers across a wide range of technical expertise. Chiara, your kind of in a smaller studio with niche expertise.

You need both generalists and experts. Maybe it's helpful to ask questions that involve both perspectives. How do you bridge the gap between having broad technical knowledge and deep expertise?

Maybe it's a combination of hard skills, along with that generalist ability to bring different elements together?

Maybe Chiara here to start?

[Chiara] Starting to learn something new and developing specific expertise is not a huge problem.

In my small studio, we are about 10 people working specifically on branding, exploring how a brand can impact the emotions of its audience.

We conduct a lot of research on brain waves and acoustic cycles.

From my point of view, the most important thing we need to learn is about the memory of a place and its people. You mentioned COVID earlier, and when it happened, people began to notice, "Oh, there's a silence in our city."

That moment allowed us to start regenerating ourselves, beginning with the priorities of our lives.

I think this is the best approach we can take: practice, and then practice again, starting from the beginning.

We need to learn something new every day, especially when it comes to sounds, and how anything can generate emotion.

[Paul] Yeah, I find it amazing from a creative discipline that I've never experienced before. We've talked before at Ramboll UK about creating T-shaped engineers.

When you think about it, it's a very linear concept — that classic engineering model.

The idea of being broad at the top and deep at the bottom.

But the more I think about it, the more I question the notion of having a defined shape. It's probably wrong. We need to have a much more open approach to our learning.

I was reflecting on my time at university, where we had to enroll in a humanities option at least once a week.

Maybe we should have that kind of structure at work. Perhaps 10% or 20% of our time could be spent in a different part of the business, or exploring something else entirely, just to try things out and rotate.

Maybe that's part of breaking down barriers, but it also ties back to Session A on the overall educational structure.

[Ollie] I think sound would be great, the first one maybe. Chiara, maybe you will be able to teach some of our engineers.

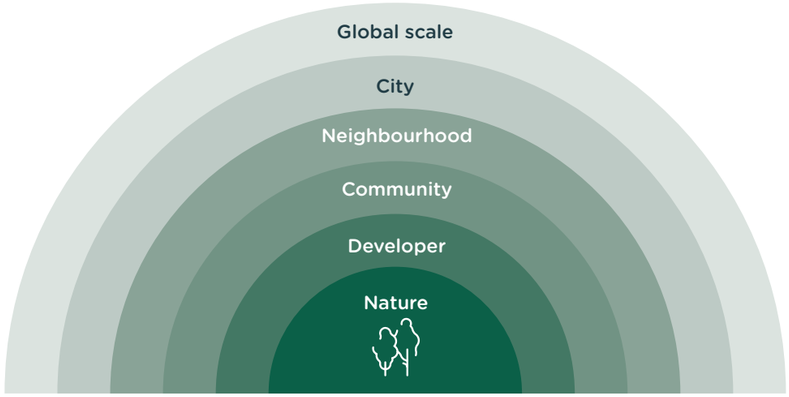
Stanislava, your **work bridges academia and also professional practice.** How do you see that kind of holistic thinking when it comes to regenerative design being brought together across those two worlds?

[Stanislava] There are many definitions of regenerative design.

But if I were to summarise it in a couple of key points, I would say:

First, regenerative design is about seeing the design process as a dialogue with the natural environment, **recognising nature as an equal stakeholder** in the process, just as we would a **developer**, a **community**, or any other party involved.

Second, it requires a multidimensional perspective - not only considering the viewpoints of stakeholders but also understanding how our interventions impact different scales, from the **neighbourhood** and **city level** to a **global scale**. Continuously visualising these interconnections is where the dialogue between academia and design becomes crucial. Research plays a fundamental role in supporting the design process, ensuring that solutions can adapt to ever-changing conditions and respond to the urgency of the climate crisis, which was so clearly outlined this morning.



Stakeholders in the design process

If our goal is not merely to cause less harm, which is not a sufficient solution, but to actively create conditions for social, cultural, economic, and environmental regeneration, then we must embrace it as a systemic evolutionary process.

A true dialogue between human and natural systems is essential.

Elements like the memory of a place, as Chiara mentioned, are incredibly important for people's perception of space. They remind us that design operates on both tangible and intangible, multisensory levels.

Again, this is precisely where scientific research can meaningfully support the design process - and, in turn, where design can contribute to scientific progress in a constant regenerative dialogue.

[Ollie] Design is all about connecting technical theories to real-world problems, isn't it?

One thing I always struggle with is this: If nature is now considered an equal stakeholder in our projects, who speaks for it in design team meetings?

Maybe we need five-year-olds to represent nature.

A quick final question before I go to the audience:

Ana, you're an advocate for systems thinking in solving the complex challenges of design to regenerate the environment.

In academia, multidisciplinary collaboration seems effective — at least from the outside — though maybe it's not always practiced.

What learnings can we take from your world about the convergence of different skills and expertise?

[Ana] Well, I first want to say that any kind of interdisciplinary work is really difficult. Interdisciplinary research is even more challenging because you have people coming from different areas of expertise, which I think is a legacy of the educational system. We're all coming from our own fields, and I think it is a good thing.

I work at a university, and we often discuss the type of education and what we do. There's huge value in core expertise and the knowledge that comes with rigorously learning basic principles, especially in physical systems, where understanding and applying basic principles and equations is essential.

But what comes next is, for me, the big question. Is it about T-shapes, or some other model? Personally, I think it's more complex than that.

If you want to develop interdisciplinary skills, you can. You can place yourself in an interdisciplinary environment and try to adapt. You can learn and go through that period of interdisciplinary work.

But, fundamentally, what truly enables interdisciplinarity and genuine collaboration is bringing together people who are open-minded and willing to push themselves beyond their core discipline.

I'm a civil engineer. I specialised in water engineering and did my PhD in hydrology. The first time I chose an architect as my PhD student, it wasn't a comfortable decision. But I knew it was the right choice because the problem we wanted to address was inherently interdisciplinary.

But I was comfortable not knowing the theory behind urban form design. He was comfortable trusting that we could teach him some engineering, computational methods, and so on.

I think we created something really beautiful, but both of us had to learn, relearn, and find ways to communicate with each other, discovering that common language between disciplines.
I'm becoming more comfortable in that space, but it's a process, and we're trying to create these processes at the university.

At Imperial, we now have the Schools of Convergence Science. We're still figuring out exactly what that means, but the idea is to create a space and resources for this kind of thinking.
For large companies like Ramboll, when you bring people together, there's a process of learning how to collaborate in a truly interdisciplinary way.

This means I learn from you, and you learn from me, and together we create something greater than the sum of individual efforts.

Interdisciplinary

[Ollie] Thank you. So, questions from the audience. In particular, if you disagree with anything.

[Audience] Thank you very much for the great debate and great talks. It is really interesting and great to hear that behavioural change and its long-term success are being considered fantastic.

I work in Southeast Asia along with a lot of developing nations. In Europe, we're very rich, relatively in the world. We have time to think about these bigger problems. We have different issues. How do you think you apply some of these approaches that you talked about in developing nations and how do we help them to start off on the right foot with their cities?

[Ollie] Is it to anyone in particular, or is it an open question?

[Ana] I can start because I think this is an excellent question - one of the core questions, especially when we talk about global sustainability. A significant portion of carbon emissions has historically come from the **Global North**. Now, as we push for reductions worldwide, the question of fairness naturally arises.

Many countries say, "We want to be where you are now why should we be the ones to compromise?" I think that's a fair question, one that needs to be discussed openly.I work extensively in India and spend a lot of time there. As Stanislava mentioned, context and specificity are crucial.

When we talk about sustainability and regeneration, these challenges must be approached as a common goal - something that everyone strives toward collectively.

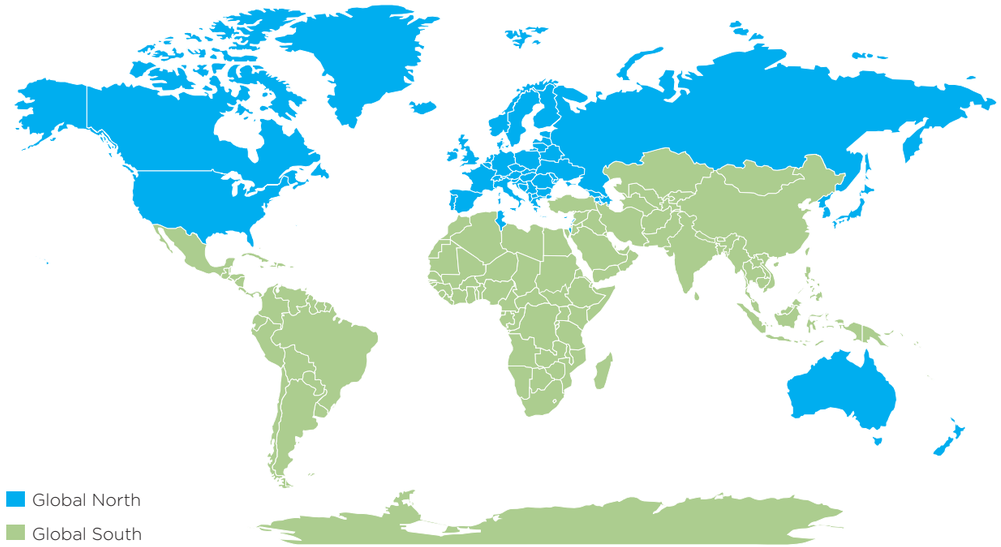
How do we implement sustainable solutions in countries that aren't as developed as others?

I would suggest that these countries can skip the mistakes we made and avoid them. They have the knowledge to do that within their local context.

Maybe part of our role is to communicate what we would do differently now — things we didn't do 10, 15, or 50 years ago — and to learn from that. It's about recognising those lessons and moving forward from that point, keeping innovation and development separate.

I believe these countries have a real opportunity to do things better than we did.

What's also really important is not to impose solutions because each place has its own very specific social, economic, and environmental context.



[Ollie] There was a question up there, so maybe we can get the microphone out there. Does anybody want to comment on that while we're waiting for the microphone?

[Paul] I think I agree with you, Ana. I would add that there are global organisations, and we need to draw on that, using our global presence.

We must have the humility to recognise that whatever works here may not be applicable elsewhere. So, let's bring that knowledge in an open way, respecting cultural and ecological differences. I don't think it's a simple solution; rather, it's an ongoing conversation, and there's likely a process of iteration and inspiration involved.

But certainly, we need to ensure that we're sharing that knowledge as widely as we can.

[Ollie] OK.

[Audience] I'm an energy engineering student from the Technical University of Berlin and co-founder of AI Agent software development firm. In your speech, Paul, you mentioned more about the materials and processes that you use in the construction development to make it more sustainable.

But what about the materials that you don't use, which essentially become waste due to degradation or overstocking?

How do you address that issue? What specific tools are you using to make the entire supply chain management system more sustainable?

[Paul] So I think in terms of the materials, do you mean the end of life materials, is that what you mean?

[Audience] Yeah

[Paul] I think, in some respects, the industry is still in the relatively early stages of this.

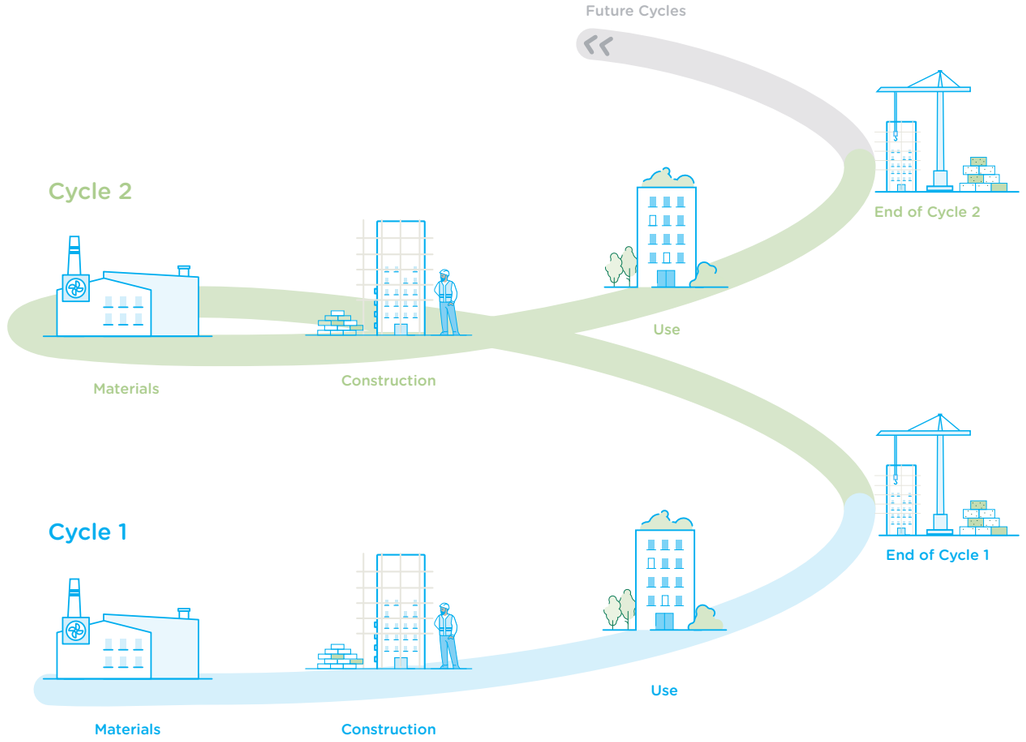
There have been a lot of initiatives and discussions around the circular economy - how to extend the life of resources and make better use of them at the end of their cycle.

We're exploring a wide range of tools - some developed internally, others proprietary.

Given your background in the field, AI obviously has a role to play. But as we heard this morning (Session C), we also need to be mindful of the potential biases embedded in AI systems. That's something we have to be aware of as we integrate these technologies.

I can't give you specific tools that we're using now, but it's a whole range, and it depends on the location in the region and what their regulations are as well. But overall, I think we're just at the cusp of a major shift.

I think there needs to be a bit more divergence in frameworks, methodologies, and tools before we can start to converge on those that are actually delivering what we need. We're not quite there yet, but we've got a way to go."



Session C

Design x Technology

Technology has been at the heart of human progress for millennia. Has the role of technological tools changed?

How can technology serve as a positive force for good now and in the future?

Wide, Small, Ethical

Patricia Viel

CEO & Partner
ACPV ARCHITECTS Antonio Citterio Patricia Viel

Patricia Viel is a French architect. She started her collaboration with Antonio Citterio in 1986. In 2000, she joined “Antonio Citterio and Partners” interior design and architecture practice with architect Antonio Citterio.

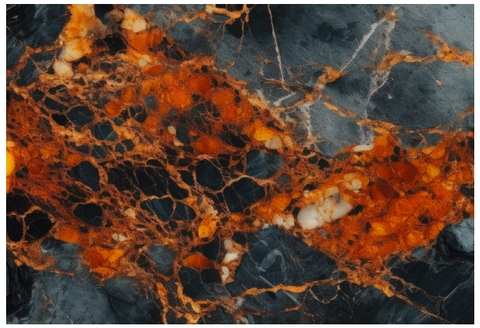
As CEO, Patricia Viel has overseen architecture and interior design projects, while being actively involved in the management of the company – now named “ACPV ARCHITECTS Antonio Citterio Patricia Viel”.

The Sky Taipei, mixed-use hotel tower

Cross-Contamination

We have always worked by contamination. This means bringing together different disciplines of design, with art and different ways of creation because we believe that the project needs to have an ambiguous position between knowledge and imagination, and between perception and understanding.

The contamination is leading us to investigate the different ways to know reality, and this requires a very specific methodology.



An experimentation using artificial intelligence for designing and producing ceramic tiles

Outcome-Based Design

We don't start with the vision. Quite often architectural projects are driven by images, and we learned today that we are visual beings.

"

However, we don't do that; we don't use reference images at the beginning of our projects. The substance of our projects are intangible and invisible. It's about the intuitive correlation between facts.It's about somehow creating a noise around the project. It was very interesting this morning (referring to Chiara's talk) to understand how sound can become a melody.

Biblioteca Europea di Informazione e Cultura (BEIC), Milan, Italy, competition entry by ACPV ARCHITECTS

A project is based on the outcome. It's not about designing a form or an object – it is about enabling the latent energy of a very complex context. Somehow architecture for us is an accident that arises from that process that starts from studies and knowledge of the context, then it becomes a digital object; then an architecture, and then an outcome.

Enabling Energies

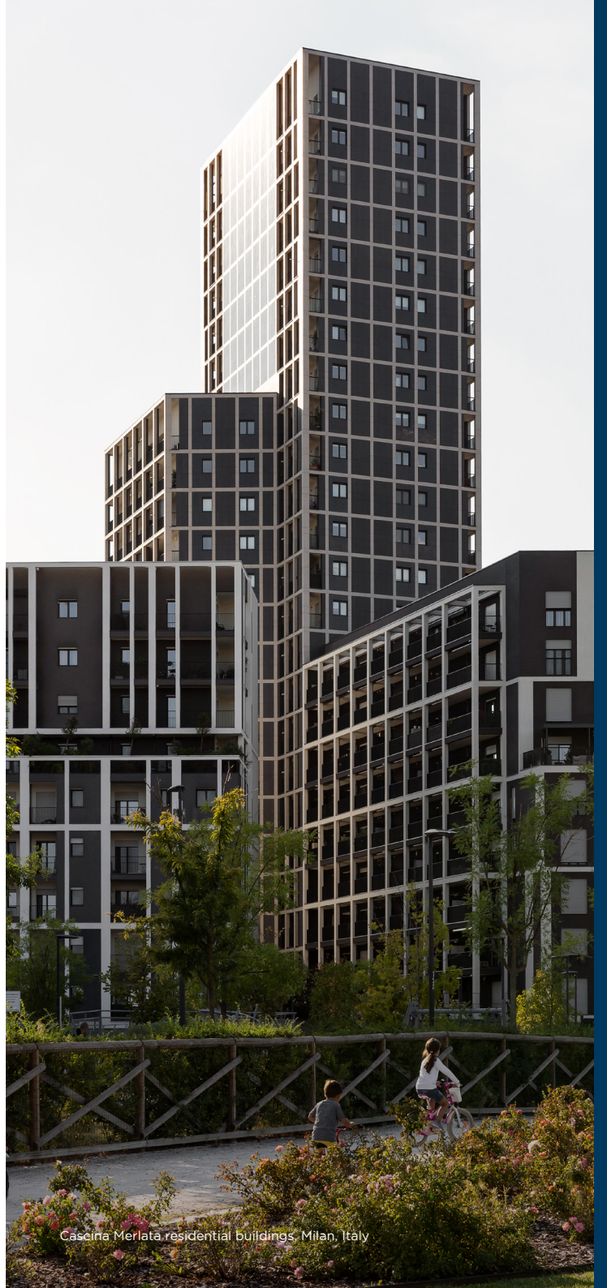
We are very much interested in the phenomena that go far beyond the perimeter walls of the built environment.That's why our architecture is very much dependent on the context. In a book that was published last year, an artist, Carlo Valsecchi pictured our projects in fantastic images in which you can barely distinguish where the building that we designed is. Of course, the context is not only physical space.

First of all, for us, it is a social expectation, the economic pressure, the dream from a client, and the resources that we have been given.

We're not good at 'icons'

That's probably why we are not good at icons. We cannot really express all that in a prompt for Stable Diffusion. We do not use AI-supported software.

Our focus is on expressing our architecture through powerful emotional and symbolic content.



Cascina Merlata residential buildings, Milan, Italy

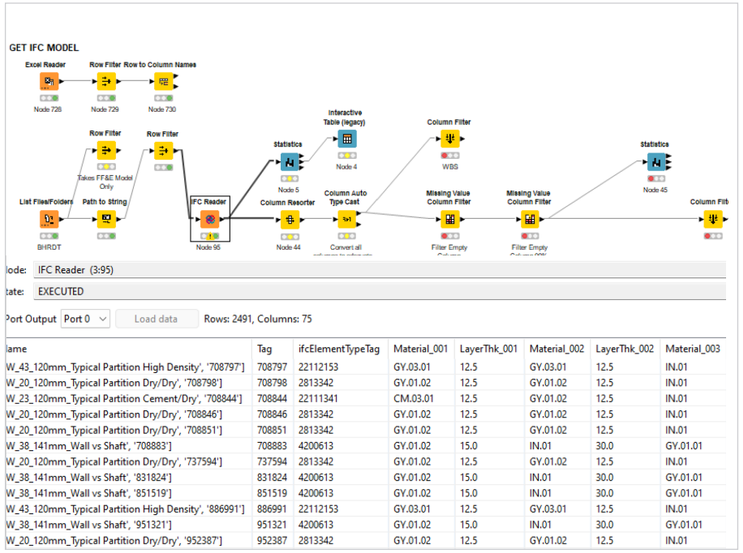
WSE Wide Small Ethical

This is a data analytics software which is used in the context of data science and we use it to collect, and harvest data from our models.

From our models, we develop small data sets that are derived from very large contexts because they are from surveys, from interviews, from literature, from art, from a sense of a scene. We then compress all the data in a regulated and codified computational model which we define as **“symbolic AI”.**

The word ‘symbolic’ might be misleading because it’s related to the old-fashioned AI with understandable words for human beings to understand the process.

So, this is what we do; we give all those data a framework, which is a view to process them in a way that stays understandable. I would call this kind of framework ‘para data’, which is information about which way you go from one decision to another, and this is where the ethical context is built.



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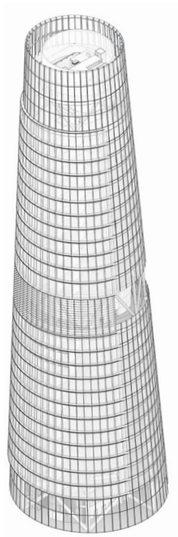
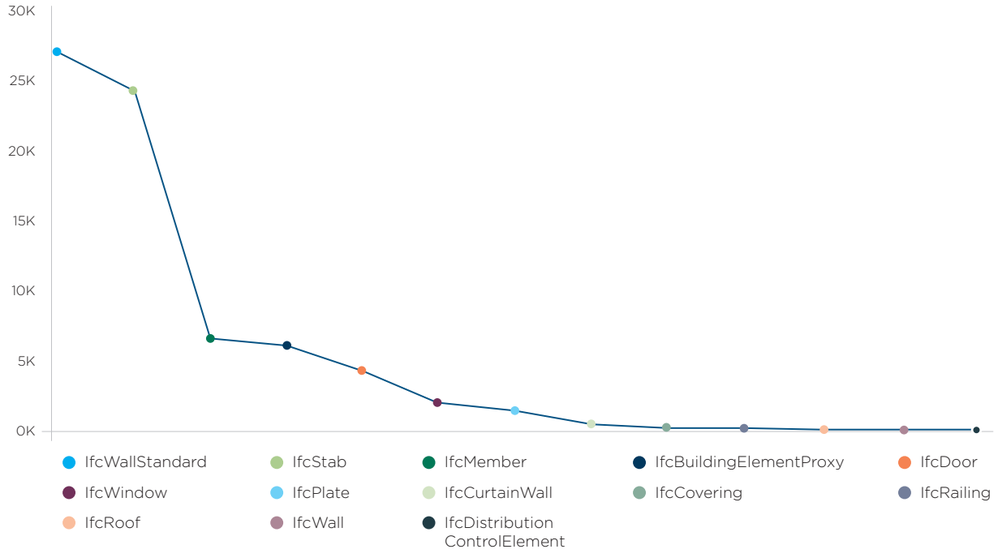
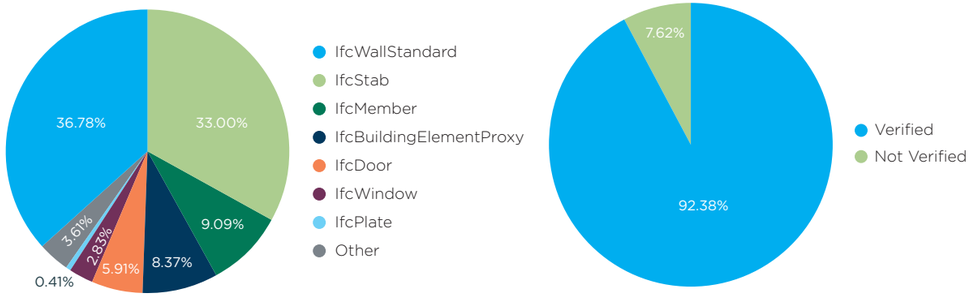
A workflow for analysing data from IFC-models, KNIME data-analytics software







Data analysis visualisation

SMALL data-clean knowledge

Everybody knows that there is no big data in our industry. Actually, this is, in my view a very big opportunity.
We don't need big data.

We are not companies that are gathering their information from customers. We study the context, we gather information. Quite often from public data, and, in our country, they are very poorly curated.

> "So, what we need is actually to focus on the quality of the source, and we build the source ourselves."
>
> **Patricia Viel**

So that's why we decided to approach the AI technology to shift from big data to a data-centric AI.

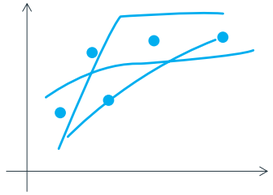
Clean. Consistent data sets only.

Clean knowledge is a database where you need to create your processes of research.

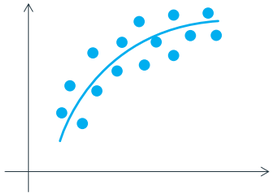
The fact is that in our world, they need to be proprietary, they need to be original, they need to be YOUR database and this is what we are doing.

We only produce models. Some of you remember the era of drawings.

So, we moved away from a very figurative narrative approach to describing projects to creating digital objects with defined behaviors.



- Small Data
- Noisy Label



- Big Data
- Noisy Label

- Small Data
- Clean (Consistent) Label

From Computational Models to AI Models

It's very important for us to end with an internal standard for modeling, which is something that we need to build as everybody here.

So, we created an internal standard in order to build complex models, to build libraries of finite elements, to collect metadata for them. This is forming the foundation for the changes and the evolution we are currently experiencing.

The fact that the database is owned by us makes it absolutely known, verified, controlled and built from our experience.

This gives us the capability to introduce AI to the process, to automate, speed up the collection of information, and somehow create the possibility to have very large analyses of the context.

Routine activities, which are very repetitive, are essential for optioneering. This occurs before creating a freehand sketch.

While you can study and build your model for the context extensively, there comes a moment when you step aside, and this is still very human.

Generative design: optioneering and design space exploration to find the best building exposure (natural light, north-south exposure, views) of a high-rise building. More than 60,000 massing options generated and analyzed.

Essential human Component: The Ethos

You have an impression when you experience something within your environment.

The duality discussed this morning (in reference to Vanessa's talk in Session A) is very true for architects. When starting a project, there is often a sense of distance between oneself and the context being explored. Yet, the mental synthesis that drives a project is ultimately the product of an alchemy of sentiments and knowledge, feelings... self-arrogance.

It's also tied to a self-conscious awareness of one's ability to create something, which is an awareness that no computing machine could ever possess.

They can play chess, but this is something that they cannot do and they will never be capable of doing. Only after that the decision is made.

You have your intuition.
You have your knowledge.

You have been through significant journeys through the context, the memories of the client, the desires of the client, and the idea that you can try to build together.

Then you go through the modeling process, which is crucial as we are building digital objects that behave like reality.

This is exactly the meaning of our work.

The point is that we need to build a real relationship, a direct relationship between a digital object that doesn't exist but is capable of behaving like a real thing in an actual context that you know very well.

This is the good way, in our view, to approach the issue of design: by being real and coherent, but aligned with the purpose.

This is where the ethical parameter is somehow defined for every project.

Target Alignment

In order to do so, you need your machines to align with yourself. The interaction and research involved in your various design processes, utilising AI, are essentially teaching your machine and telling it what you want to find at the end. This is something that is already happening.

This is where we introduce what we refer to as a deterministic and predefined algorithm or model. In order to be extremely discretionary in what you are doing, there shall be no hazard to be confused by the machine. This is exactly the result that can happen when applied in a different context.

You know very well what happened to Gemini. It was accused of erasing white people in the representations in the creation of images.This is probably why the use of AI creates some kind of discomfort.

There is no traceability in a lot of processes that are driven by AI. This can somehow evoke a sense of unease that you can have when there is a lack of a clear ideal framework. This is a phenomenon that is happening in this current moment in our lives. We are experiencing a kind of ideological vagueness at this historical moment, right?

Ideal frameworks are somehow weakened by biases. So, it's very difficult to have the deep understanding or deep consciousness of what is right and true.

This, in turn, gives us a sense of losing control in our evolution coupled with the feeling of being manipulated.

Milan offices of ACPV ARCHITECTS

The Big Brother

There is a current urgent need to interface with the machine with a natural language. But a natural language is built for an artificial understanding. This is very critical because we need to create a kind of unique and simplified language for the definition of very complex phenomena.

A language model is a real model. So, your language model reflects the sense of your relationship with reality. It's a world model more or less.

This idea brings to mind a book from Orwell called 1984, where the author envisioned 'Newspeak'; a simplified version of English with no ambiguity at all and no personal content. This was designed to educate minds to live peacefully in an authoritarian regime.

We are Italian, and we are aware of the research being conducted to educate machines and develop machine languages in Chinese or in Arabic. However, the challenge we face is this: our language comprises approximately 300,000 words, as the lemmas that we use are different from the Celtic languages.

Therefore, it is very difficult for Italian or Latin languages to be simplified. By their nature, they are extremely complex. But we are doing it in English.

Somehow, we will need to build up a language that conveys our worldview and ideas to an artificial and simplified system of understanding- much like the hieroglyphs in the Ptolemaic period. They managed to encapsulate and transmit a highly complex social structure through a relatively simple language.

Our Own Dialect

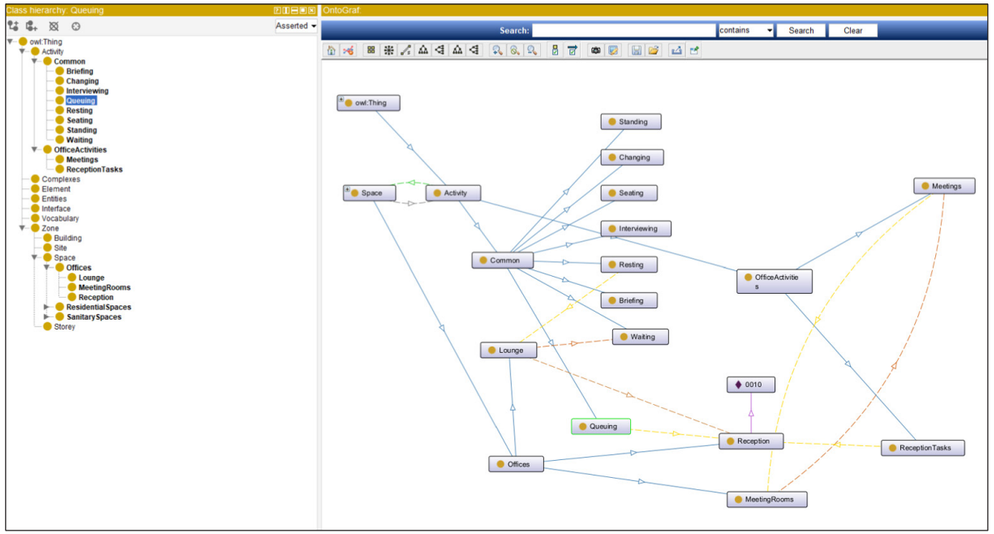
So, we will do it. We will build our language, as we did for our modeling standards. This language consists of a vocabulary and grammar in English and this exercise will compel us to express a kind of indigenous culture of our office.

This culture will link a semantic code or data with meaning to our analytical process and design synthesis, and outcomes. This process is actually very common, it's happening in your smartphone, self-driving cars, and even dishwashers.

Our dialect, perhaps best described as a dialect, will run with few data points (small data sets).

However, these data sets will be our own, genuine and verified, derived from the context that we have built or know.

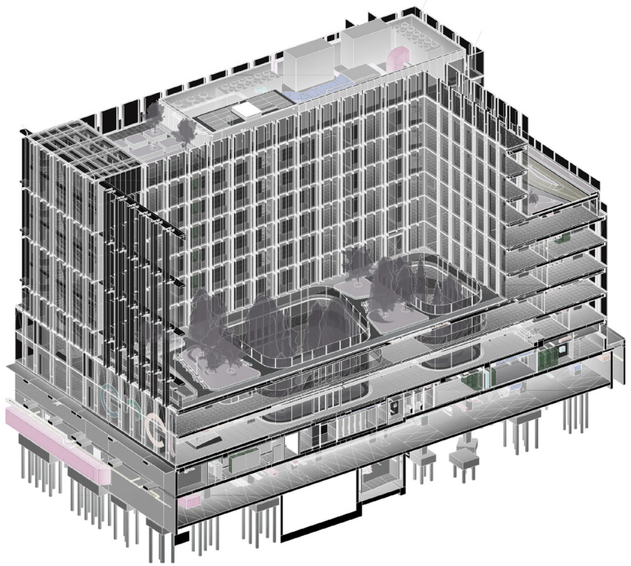
More importantly, they will be composed within an ethical objective for each project. By ethics, I mean ethics at large. Every single project will need a distinct ethical objective.



An ontology - new interconnections among concepts

New Mandatory Design Approach

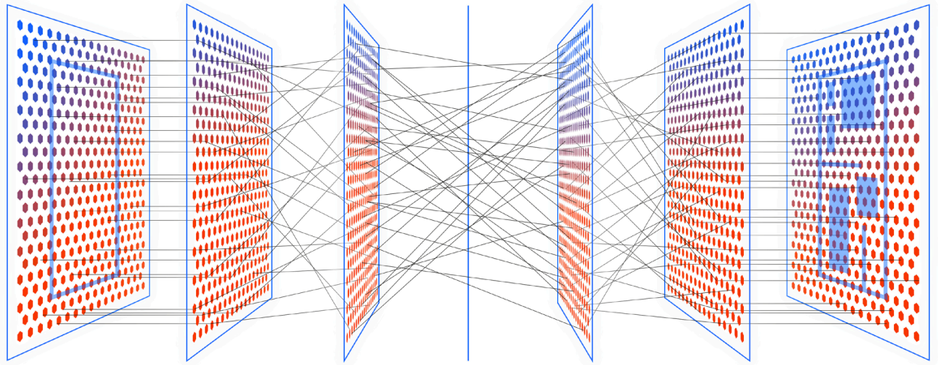
Everybody knows that BIM has complicated and burdening design processes.



Digital model of Enel Headquarters in Rome, Italy

The digital preconstruction of an object is actually creating big and complicated models with a lot of data. We will use an AI for automation and to support the generative development of options and we will use it for the correlation of data and for the construction and the growth of our unique and homogeneous language.

Optioneering



It will probably make modeling partially automatic. But the automation will feed on internal knowledge that will not come from outside; in other words, it will be capable of implementing solutions that we already know and providing us with evolutionary variations.

The next real need for quality in design will be a rigorous discipline of maintenance, updating, and data verification.

Because everything you know in three months is gone, you need to update and maintain your data constantly.

Who we are

We are a small firm compared to Ramboll. We have 13 partners, 200 professionals. However, I'd estimate that a good 15% of them is dedicated to digital process development. We are obsessed with this issue not because we want to be efficient. We will never lower the quality of our work. Instead, it's because of the level of the quality we are sustaining.

The fact is that we are spending at least 10,000 hours on a single model and generating approximately seven terabytes per year of data. We need AI to be capable to plan for more commissions.

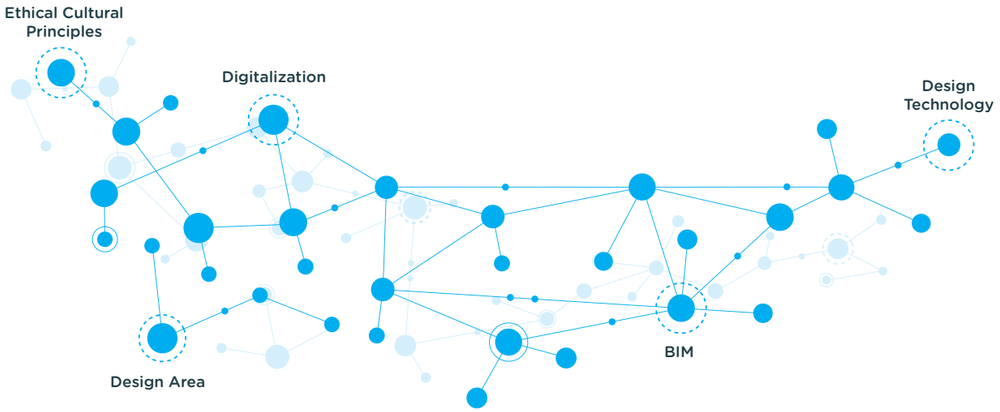
That's the only real purpose. We don't have access to the large amounts of data nor the computing capacity of organisations of other sizes and we are not very interested in developing knowledge that is external from our own expertise.

We approached the problem in the old-fashioned way, which is by trial and error.

What AI can do is enable us to trace our paths and narrow down the most promising solution amongst many errors. This could potentially make projects reproducible or perhaps blur the authorial link?

I don't think that this will be an issue anymore. Our discipline is in debt to collective effort and shared knowledge, and this will continue to grow.

I believe that the ethical and cultural principle that informs a project will open a break between the process and method of design against built architecture. This idea may be a bit provocative, but I think it will become one of the major outcomes of using AI in the design process.



Interconnections among different ACPV ARCHITECTS work groups in the digital field

Why is this the case?

Because of the different methods of perception and construction. They have different goals between production and conception of architecture.

The gap between conceptualisation for digital modeling and technical modeling for production will be nevertheless a big lever.

For the development of pure research in architecture, we have been listening to academics here this morning (in Session A). They are pure researchers and you can sense it, because they are obsessed by the future.

The problematic context they face is, for them, to be present- this needs to happen for architecture as well, and even more for the built environment.

Because, at this moment, research is completely subject to variables of a technical and accidental nature.

We need to be freed of that.

Hardware + Software

Pure research is needed in architecture and the built environment in general because buildings and cities will be conceived and designed according to our purpose. They will be linked to our actual real present scenario.

What we know today is what we learned. Buildings and cities have to be built in such a way to be adaptive for different purposes in the future.

The revolution will be possible because every object in our next or present reality will be activated and defined in its functions by software adapting to scenarios that we cannot yet imagine. The structure, the construction, will be a sort of hardware that will only exist if it is typologically generic.

Let me just explain a little bit more on that. Typology is about culture, and how you use things. How your social behaviors expand in an architectural space. This needs to be generic. We do not know what kind of society, or what kind of way of life will happen in the future. So the built environment needs to be generic.

Office buildings by ACPV ARCHITECTS at MilanoSesto, an urban regeneration project in Italy, and one of Europe's key developments

This means that we will need to lose quality parameters like efficiency. For instance, the ceiling height needs to accommodate different functionalities.

So the result will be different. With the relationship with this technology, design and construction, we'll have to use AI in a completely different way. It's predictive on one hand, and adaptive on the other hand with diametrically opposite implications.

In our view, what remains the real focus of the work is that the determination of any calculation path or decision-making process is and will be as relevant or even more relevant and decisive as the outcome.

ZHA Crafting Technology

Sara Sheikh Akbari

Associate Director,
Zaha Hadid Architects

Having joined Zaha Hadid Architects in 2007 after receiving her master's in architecture from the Architectural Association School of Architecture in London, Sara Sheikh Akbari is currently an Associate Director at ZHA.

She has played a pivotal role in major ZHA projects worldwide, notably as Project Director for the award-winning BEEAH Headquarters in the UAE and as Lead Designer for the Heydar Aliyev Centre in Azerbaijan

"

I want to focus on the dynamic relationship between design and technology through the lens of some of the projects we have developed as Zaha Hadid Architects over the years.

Architecture has always been a space where technology and design come together. So sometimes, bold vision pushes technology to move forward.

At other times, you see technological advancements open the door to new design possibilities. I would like to run through some of these examples from the evolution of the office.

So from the very early paintings Zaha challenged graphic space, the way in which architecture was described at the time, through plans and sections only.

She was constantly exploring distortion of geometries, understanding of volumes through multiple perspectives and creating a new understanding of architectural space through dynamic forms, moving away from the orthogonal plane only.

Vitra Fire Station (1990-1993)

In the early years, the work of the practice was seen as very experimental.

The vision was there and it was setting the groundwork for what happens next.

But technology needed to catch up and it was not ready yet.

It required a lot of experimentation and back-and-forth process between the physical models and the paintings, the drawing board, and eventually with a 3D software that resulted in the first completed project of the practice, which was the Vitra Fire Station.

MAXXI: Museum of XXI Century Arts (1998 – 2009)

From that point onwards, that energy, that culture, continued in the projects and towards the late 1990s and early 2000s, technology had started to evolve; the digital tools were more readily available.

This is a photo of the MAXXI Museum in Rome. It demonstrates **how we started experimenting with more complex geometries at the time.** The introduction of curves, splines and the digital software really opened the door to explore dynamic and fluid forms in ways which were not previously possible.

So this project completed in 2009 and this whole new approach opened the door to a whole set of new projects.

London Aquatics Centre (2005 – 2011)

As the projects evolved and we got more control over the tools and geometries, we started to move away from the earlier surface manipulations. The surfaces, and geometries started to become more refined, and **fine-tuned based on very precise parameters such as structure.**

This is the Aquatic Center project in London. You can see not only was it about aesthetic elegance, but also that finding the most optimal structural solutions and integrating the different aspects of design became fundamental.

This project was completed in 2011.

King Abdullah Petroleum Studies and Research Centre – KAPSARC (2009 – 2017)

We start thinking through the envelope, like how you deepen the curve, create extra shading inside, open them up, create extra life within the spaces and integrate the performance with the aesthetic.

Respond to environmental factors, passive design strategies, how the volumes are defined, the placement of the courtyards, optimising natural ventilation, optimising shading within the spaces in our King Abdullah Petroleum Studies and Research Centre (KAPSARC) project, which is in the very harsh climate of Saudi Arabia and was completed in 2017.

Heydar Aliyev Centre (2007 – 2012)

The main turning point was the advancement in fabrication technology.

It really opened the door for us to look at architecture and fabrication as an interconnected process.

It was of course about the new tools, but more importantly, **this new way of thinking and framework of thinking that allowed us to innovate at the intersection between design and fabrication**, and create a more seamless connection between the two of them.

With every project, there are so many layers that need to come together for a project to be realised.

And with a project of this complexity, from the early sketches, there was close collaboration with the engineers to optimise the structure, understanding the geometries, surfaces, materials, their properties, and limitations, and how this translates into how we panelise the surfaces.

In terms of the construction site, the concrete structure, the assembly of the space frame, the weatherproofing system which followed the 3 by 3 meter grid to ensure efficiency and ease of installation, the secondary steel and the rain screen.

This is not purely about the parametric design, but also like any point in history of architecture, it's also about the material of the time, and the material innovation.

So in the case of this project, the use of Glass Reinforced Plastic (GRP), Glass Reinforced Concrete (GRC) opened the door to new opportunities to create these fluid and dynamic forms.

We have modelled multiple rounds of iterations, analysis and optimisation of the surface panels. These were then linked to spreadsheets where each panel was tagged and the information was transferred and documented. The panels were then shared with specialist consultants and fabricators for the next level of definition and realisation.

What is important with this project is this is in the past. Nowadays we have generative design tools, we have different plugins and Grasshopper and all that integrated into the software so readily available to architects and designers to integrate within their design process. This project which was completed in 2012, but it's pre that time.

So we had to develop bespoke coding and solutions internally to be able to reach this level of optimisation and it definitely required a higher level of rigor and collaboration internally and externally to achieve this level.

Nowadays these software are readily available. and which means we can test options with complex geometries at a high speed, really fraction of the time to optimise structures around different simulations.

It creates a high level of productivity which leads to new levels of boosting creativity and innovation in the work that we do.

BEEAH Headquarters (2014 – 2022)

We've been developing over the past couple of years, and our recent project, completed in 2022, ties together many of the points I mentioned in the previous projects.

It's a project inspired by its landscape, shaped by an area of dunes. Located in the desert landscape of the UAE, **one of the most important elements of this is sustainability.**

It was an integral part of the project and it was integrated into every aspect of the project— from the geometry and the formal composition of the spaces, to the MEP and lighting design. I'll explain some of the passive design strategies and explain how they all came together.

First of all, the volume is responding to the program inside. So you have the most public end of the building -the visitor centre in the north- the most private end of the building which includes the administrative zone, open-plan offices and staff areas. The middle volumes (which we call Dune) in the center contain public areas on the ground floor, and management areas on level 1.

These dune-like geometries split, creating skylights above the open plan offices and glazed facades to the management areas on level 1. At the same time, they start connecting, creating two central courtyards, helping with natural ventilation and maximising natural daylight within the spaces.

We have large overhangs around the building which create these self-shaded glazed facades.

So these buildings are responding to its climate.

It actually has only 9% glazing. However, if you look at the interior, then at different months, and different times of the year, and various times of the day, the interiors are flooded with natural daylight through these different configurations.

The selection of the material is comparable with the Heydar Aliyev project that happened about 10 years after that.

In this case, the material helps increase the building's thermal mass and dissipate heat. But what is important is that we changed the approach. We used fully triangular, completely flat panels. We had to meticulously design the geometries to ensure that these fluid geometries could be achieved with flat panels which were locally produced and easily handled to the project site.

And last but not least is the technological aspect of this project. Apart from what was integrated into the design process, **one of the primary uses of technology is to create a seamless experience for visitors and staff.**

And here we have smart management, meeting management systems, and virtual concierge. But on the health and well-being side and more important element is the environmental sensors throughout the building.

Through them, we're learning from the preferences and occupancy patterns within the building to create more comfortable, efficient and sustainable buildings. We're really looking at a building as a living lab which is constantly drawing on this data and becoming more efficient over time.

Research and Experimentation

As you have seen with all the projects, research and experimentation are an integral part of what we do.

We're constantly looking at emerging technologies and material design methodologies through our different research teams and through the projects that we develop.

The first research project I wanted to show you the collaboration between our computational and design team and ETH Zurich.

It's a footbridge 16 by 12 meters and it has been constructed using concrete, 3D-printed concrete blocks.

These blocks, as you saw from the first bit of the video, they have been printed using advanced robotics and they are dry assembled.

There's no mortar, and no glue. The strength is achieved through geometry, offering the opportunity to significantly reduce the amount of material.

Another area of research that we've been exploring, in response to the growing digital interconnectivity is the metaverse side of projects.

We developed a virtual gallery for Art Basel Miami at the end of 2021. These metaverse platforms are becoming a place for social interaction.
Leading up to the pandemic there was much more effort in this area. But the research continues and it really merges the virtual and physical worlds. We use analytic tools and understand the user's experience within different spaces through VR.

We take advantage of it in our design process to navigate within the spaces, but also in how we present the projects to our clients.

We have integrated tools using AI within the design software that allow us to view updates live in live visualisations and more frequently with our clients.

With the enhancement in AI, the expectation is to have a high level of productivity and share information.

User Needs Analysis

Through the use of algorithms and tools, we look at optimising the floor plate, position of atrium, and the placement of cores.

We'll look at connectivity and collaboration within the spaces and find the most optimum arrangement within different spaces.

We are increasingly exploring agent-based simulation.

Basically, we look at how people interact within a space using tools like a movement history map, a sound map, and a vision map. For example, in a workspace, this data is **leading us to create very flexible, self-evolving workplaces** which adapt continuously rather than waiting for the next refurbishment to rearrange the space.

This gives us the opportunity to adapt the spaces to the user and occupant requirements at any given time. These adaptations need to be implemented now.

Soon I'm sure there will be robotic workstations and opportunities for them to basically autonomously adapt and rearrange.

We have been working on training our own AI and developing our own AI by feeding in information from the work we are doing, circling back to the early paintings that I showed at the start of the presentation and generating data from it.

We generated images of paintings from that database. AI is allowing us to a high speed, fraction of the time that we had before, develop these unique spaces.

What is instrumental with it is that it **creates a high level of efficiency and productivity, which always links back to creativity and innovation** that we've been discussing so far. So this ongoing dialogue between design and technology, it drives us forward with what we're doing.

I'd like to end with this quote from Zaha:
"There should be no end to experimentation."

Which is the guiding principle and what we've been inspired to do and what we continue to develop.

Panel Discussion

Darren Gibson (Moderator)
Patricia Viel
Sara Sheikh Akbari
Mikela Chatzimichailidou
Emily Scoones
Emiliano Capasso

Emily Scoones
Head of Digital & Innovation
Ramboll Buildings UK

Emily is a Chartered Structural Engineer with over 8 years of experience leveraging her digital expertise and computational design skills on traditional building projects. She is passionate about applying innovative approaches and technology to create better outcomes for projects, clients and society.

Emiliano Capasso
Head of Digital Design
ACPV ARCHITECTS
Antonio Citterio Patricia Viel

Emiliano Capasso is an experienced BIM professional with over 10 years of experience in the field of Building Information Modelling and a strong knowledge of various programming languages. As the Head of Digital Design at ACPV ARCHITECTS, he oversees and manages digital transformation projects, co-leading a team of approx. 35 professionals focused on BIM, Digital Twin, Artificial Intelligence, and Data Analytics.

Mikela Chatzimichailidou
Professor
University College London

Mikela is a full Professor in Design for Mobility, Health, People and Society at UCL Department of Civil, Environmental and Geomatic Engineering and an independent consultant to the UK Department for Transport and the Health and Safety Executive. For more than a decade, she has been leading ground-breaking research and industry projects spanning healthcare, infrastructure and transportation. While in industry, she worked on major projects such as Crossrail and HS2.

Darren Gibson
Digitalisation Director
Ramboll Buildings

Darren is the Digital and Innovation Director for Ramboll Buildings, leading Innovation, Automation & Computational Design and Technology and Digital Design. He is responsible for developing and implementing Ramboll digital and computational strategies for a data and technology-driven organisation.

[Darren] First of all, Sara, Patricia, thank you so much. They were really thought-provoking, inspirational presentations. Mikela, Emily, what are your thoughts on those?

[Mikela] Well I know I was introduced as an academic, but something probably that you don't know about me is that I rejoined academia last year. I worked for about 10 years in the industry and one of my experiences was around how we use digitalisation. But actually I was always very skeptical of digitalisation, information and all these emerging technologies because I have a background as a safety engineer. So for me, everything is driven by safety. So as long as it's safe, I really don't care. Even if it's conversely interesting.

I know my boss didn't like me back at the time and doesn't now either, but for me that was important; everything had to be human-centred.

I'm really pleased to see that these came actually through your presentations, that it's not always about decreasing performance, but it's actually making spaces and places more humane, more attractive, aesthetically pleasing and so on and so forth. I think I'll leave it there for now and yeah, thank you very much for the very thought-provoking presentations.

[Emily] Yeah, I completely agree. Both presentations were very insightful. Patricia, I really liked your focus on outcomes.

I think that's where the role of technology has shifted—not just towards automation or making things faster and more efficient, but actually adding value to society and shaping human experiences.

That's something that has always fascinated me—how technology can facilitate design in meaningful ways.

Sara, in your presentation, we saw how technology has evolved fabrication techniques and design methodologies. It was really interesting to see how Zaha's work has evolved in that space and how you're continuing to push those boundaries with living buildings.

A data-driven approach for every project: the digital model and the physical space of a meeting room at ACPV ARCHITECTS in Milan.

[Darren] Thank you. Patricia, I'd like to start with something you mentioned about the analytical side of things. Earlier, we were discussing the challenges of multidisciplinary and interdisciplinary collaboration—how we bring different experts together in the design process.

As you develop your conceptual thinking around form and function, how are you using technology platforms to invite other consultants and engineers into that process?

When you're optimising for things like embodied carbon, operational carbon, and so on, how does that collaboration work within your practice?

[Patricia] Actually, Emiliano is here—he's in charge of our digital development processes and can help answer that.

When working with information and modelling processes, we typically collaborate in real-time on digital platforms.

What's really interesting now is how sustainability analysis, which used to come later in the design process, has shifted to the very beginning. Now, we start with sustainability analysis, which influences not only the project's location but also whether or not the project should even move forward.

From there, we explore different outcomes and parameters that often go beyond construction itself. It's not just about the building—it's about human behaviour, economic goals, financial feasibility, durability, and long-term impact.

We encourage our collaborators to step beyond their defined skill sets and contribute in a broader way, especially in the early phases of a project. But once we set the goals, everything becomes much more coherent—people naturally align with the vision.

Today, this process is deeply embedded in design through optioneering.

It's not just about form; it's about selecting materials, considering building technologies, and factoring in maintenance, cost, and time. It's about options; it's never about something that you decide to be done. Everybody contributes to select the best, or the "least bad" option to go forward.

[Darren] So it's a huge collaborative effort.

[Patricia] Yes, in real time. We are only designers in architecture. We do not do engineering in our firm but we collaborate since the very beginning, since the programming phase, with our partners.

[Darren] Sara, when you were presenting the projects, it was clear that technology is unlocking artistic potential—the art of what can be achieved.

The beautifully sculpted shapes your practice is producing are a testament to that.

How do you see this continuing to evolve? Given what we're capable of today, how do you think technology will further unlock new possibilities?

And considering that you're working in such a highly experimental and forward-thinking organisation, where do you see the future of technology taking us?

How do you feel about that?

[Sara] As you can see from our early projects, it's always been about a process of research and experimentation. At every stage, technology has opened up new possibilities. There have always been moments of hesitation when embracing new tools. When people moved away from traditional mediums like drawings and paintings and began exploring digital methods, there were similar fears. Now, with AI, it feels like another level of uncertainty, but the fundamental question remains the same—what does this shift mean for design and creativity?

We constantly explore possibilities at both the micro and macro levels, looking at how we can collaborate more effectively with engineers, fabricators, and other disciplines. Each project adds layers of complexity, and the knowledge we gain along the way propels us forward. That's why I wanted to conclude with one of our latest projects—it really highlights how each stage of learning builds upon the previous ones, pushing our work further. It's about creative thinking, experimentation, and continuously pushing boundaries.

[Darren] Some of the key challenges we've been discussing this morning relate to scale—how we address these issues not just at an individual project level, but at a much larger, global scale. Many of us here work on a project-by-project basis or in a more granular way.

Mikela, how do you think technology can help bridge that gap? How can it be used as a scalable solution that fosters greater collaboration and allows us to tackle global challenges more effectively?

[Mikela] Thank you very much. That's a tough question, really and thank you for asking it actually because our conversation today made me think.

I originally come from Greece and it's very easy actually to forget where you come from and that the reality here in, let's say, Northern Europe is very different to the reality that people in South Europe experience, especially in a small country like the one I come from. I'm going to tell you something which is not an exaggeration, really. So for countries like Greece, digitalisation means turning something that is handwritten and into a PDF file. I know it sounds sad, but then at the same time I think that we now, and I say we because I have a British passport now. Countries that are developed have the money, capability, capacity, and skills.

We really need to listen and extend our arms and help these countries keep up with our pace because definitely many of them are lagging. I know Greece is a European country and it's 4 hours from here, but it's miles away in terms of the maturity of technology and I'm sure things are even worse in other corners of the world.

So I think we really need to burst the small bubble we're living in and realise that we are running and others are pretty much crawling. This is one of the things, really, I would like to mention.

Second of all, I would like to mention a term that one of the people that inspired me a lot, said. You may have heard of her. Her name is **Dame Judith Hackitt. She was the person who wrote the independent report following the Grenfell fire here in London** that killed 72 people seven years ago.

She was one of the very first people who actually talked about the golden thread of information.

Scan for the
Golden Thread Report

She didn't talk about BIM or digital twins or anything fancy like that, but I think in practice what she was trying to do was to highlight the social value we can bring even by engaging with emerging technologies. Again, for the sake of supporting really the end user and the people that you were showing us earlier, it really marked my memory that we're trying to install those wonderful channels.

So it's all well and good, but are we thinking about the other components that make these wonderful things look wonderful, but do we cater for them?

We need more openness as well. Obviously globally, which, as we all know, is not the case everywhere in the world at the moment and I'm afraid it will remain the case for the years to come.

[Darren] Thank you.
Building on that question of openness, I would like to move into, I suppose if technology is the vehicle, the fuel is data and I was kind of interested in what you mentioned Patricia around there are seven terabytes of data each year that you produce as a 200 person practice.

You can imagine when you see that scaled up to the many people who work in this industry.

We are creating huge and massive amounts of data that sometimes we keep for ourselves; it's our own generated data and so on and so forth. But the more that we are able to share data, and able to then to try and find the optimisation of that data.

Emiliano, what are your thoughts about how we should govern data, utilise data, and ensure the hygiene of data and ownership of data? What are your thoughts around that?

[Emiliano] As Patricia pointed out, one of the biggest challenges in our industry—particularly in architecture—is that the quality of data is really poor. Out of 1,000 buildings designed, maybe only 10% get built.

As a result, much of our data remains virtual, existing solely within digital models.

Seven terabytes may sound like a vast amount, but when you break it down, it's still just a fraction of what we truly need.

Andrew Ng, a strong advocate of data-centric AI, has pointed out that while a lot of focus has been placed on model development, AI models can only go so far. Yes, we can build deeper neural networks, experiment with Transformers, and refine architectures—but the real bottleneck is the data itself.

The reality is that much of our time isn't spent training models but rather understanding, cleaning, and structuring the data.

That's why I'm currently studying data science at university—to better grasp this challenge. Our team spends a significant amount of time gathering data from our models and analysing it because, you can have a lot of data, but sometimes it is not fit for purpose.

In fact, AI without good data is nothing.

[Darren] Sometimes it's the data that has the true value and not the technologies.

[Emiliano] One of the huge issues is that we don't know which data the software we use is trained on and they don't want to disclose it.

That's why we're trying to train our own piece of models.

[Darren] And with all the data we use every day—data we're constantly exposed to—there's this ongoing question about the balance between humans and machines.

This was actually raised earlier this morning: How do we strike the right balance between leveraging the power of technology and maintaining meaningful human interaction?

Emily, I'd be interested to hear your thoughts on how we're progressing with that question. Where do we find that balance to ensure that technology enhances human capabilities and not the other way around?

[Emily] Yeah, I think this is an ongoing process—finding the balance between evaluating technology, understanding its pros and cons, and also reflecting on ourselves, our values, and where we add value.

The key is finding that intersection where both technology and humans collaborate to create the best solutions. For example, using AI's predictive potential to augment what we do, rather than assuming it will dictate our actions.

It's also about recognising our own biases—both as humans and in the technologies we rely on. When do we trust technology, and when do we question it?

Additionally, we need to consider the biases that can be built into the technology itself. This theme has come up consistently today, and it's clear that this process is ongoing.

As technology continues to advance, it's crucial to assess both ourselves and the tools we use to understand where the benefits lie and how to apply them appropriately.

[Darren] One last question before we open it up to the audience. Just an open question to the panel. Traditionally, we've worked with technology partners in a very transactional way—we buy software, we access tools, and we pay for licenses.

How should our relationship with technology vendors evolve to ensure they are truly aligned with the questions we are trying to answer?

Rather than focusing on a transactional model, we need to integrate them as part of the solution. The transactional approach is what their business is built on, but how can we collaborate with them more effectively? How should we approach technology partnerships moving forward to create a more meaningful and collaborative relationship?

[Emiliano] I can say something. Well, the challenge with technology partnerships really depends on scale. If you're working with a massive software vendor, for example, it's no longer just about paying for a product—you're also handing over huge amounts of data, and you're not being compensated for that.

That's a big issue. We're not talking about open-source solutions, which would be a different conversation.

Instead, these are closed systems where you don't have full control over what data is being taken from you or how it's being used. Every firm needs to start thinking about this more critically. At the

end of the day, it's a question of value exchange. If we're giving technology vendors vast amounts of data, what are they giving back?

Right now, we're essentially paying twice—once with money, and again with data.

That's something we need to reconsider as we shape these partnerships going forward.

[Darren] So, this is a really broad and interesting topic. Let's open it up to the audience.

Who has a question for the panel?

[Audience] Hi, I'm asking this question from the perspective of an architectural designer. This is directed to both presenters because I found it really interesting how each of you explored AI in the creative process, particularly at the early conceptual stage.

When we talk about collaboration between designers and technology, there's this constant interaction between human intuition and machine-generated outcomes—especially in Patricia's presentation.

I'd like to ask;
How do you determine where to draw the line between allowing the machine to generate and make decisions versus maintaining human creative input? In this human-in-the-loop approach to AI, where do you set that boundary?

How do you define the language of this collaboration? Because this, to me, is where creativity is becoming really fascinating.

Thank you.

[Patricia] Actually, the distinction runs quite deep. The machine doesn't have self-awareness—**it doesn't understand what is "good" or "bad." That's one of the fundamental limitations of deep learning.**

This is where we, as designers, come in. We bring purpose, meaning, and ethical considerations to the process—those are things that AI will never fully grasp. AI is just a tool, an ancillary aid to help us achieve our goals, but it doesn't define those goals for us.

The key to maintaining control is to establish a clear language that ensures transparency. Designers need to understand what's happening within the AI's calculations. That's why structure, frameworks, and ethical parameters matter. These are deterministic, not probabilistic or statistical. In our discipline, maintaining that level of oversight is essential.

[Sara] Yes, I completely agree with Patricia. I believe AI is definitely a tool.

We are leading this process, integrating it into the way we work, with the ultimate goal of creating better architecture, better urban design, and better products.

However, the process is driven by us as designers. We are implementing AI as a means to achieve a more effective and improved response.

"

There should be no end to experimentation."

Zaha Hadid

[Darren] Thank you. Next question.

[Audience] Thank you for the excellent discussion so far. AI capabilities are advancing at an exponential rate.

For example,
the most recent version of ChatGPT can now solve complex math, physics, and chemistry problems at the level of a PhD student.

If we assume this trend continues, and AI increasingly takes over much of the technical work done by humans, what do you think the role of a designer in the built environment will look like in five years?

[Darren] Okay

[Patricia] If we stop trying to solve problems in a linear way and instead focus on asking better questions—questions where we may already sense the answer—that's how we evolve alongside AI. This is incredibly relevant, much like the development of microorganisms that interact with our bodies to solve complex medical issues like cancer. These breakthroughs are only possible because technology accelerates experimentation. Without AI, we would need generations of trial and error to reach the same results.

That's the real power of these technologies—they compress time. They allow us to navigate experimental processes much faster. But the key is in how we frame the questions. That's what we should be focusing on, and that's how we should be educating ourselves.

[Darren] Any other thoughts on that?

[Emily] Yeah, I think it's about augmenting our process. I agree that part of it is using AI for experimentation, but I also believe the role of the designer is to question AI. We need to ask, "Why did you come to that conclusion?" and get it to explain its reasoning. From there, we can guide it in the right direction.

With our knowledge of the site and the human experience, we can steer it in ways that only humans can, due to our inherent understanding and self-awareness. It's about learning how to interact with AI in a way that pushes it toward the right outcomes. Yes, it's definitely part of the experimentation and augmentation process, but I don't think it will provide a complete answer in five years—maybe in 50 years.

[Emiliano] Also, have you ever asked a large language model a question in a field you know nothing about? It might give you an answer that sounds correct, but how do you verify it?

That's exactly why we still need human expertise. AI can process and generate responses, but without domain experts to interpret and validate that knowledge, there's always a risk of misunderstanding.

[Darren] Okay thank you.

Session D

Design x Leadership

We are becoming increasingly aware of the VUCA of our time.

How do leaders navigate the complexities of natural and built systems to steer towards uncertain paths and potential flourishing futures?

Conductor

Ivan Harbour

Senior Director,
RSHP

Ivan Harbour is an architect and senior director at RSHP. Two of Ivan's projects – Terminal 4 Barajas Airport Madrid (2006) and Maggie's West London (2009) – won the Stirling Prize, the most prestigious architectural award in the UK.

Ivan is deeply involved in design from city scale to the smallest detail and, together with Graham Stirk, promotes and develops the ethos and design quality for which the practice is renowned.

Responsibility

I once came across a banker and she asked me what I did. Thinking it was a banker, I said, "Oh, I spend people's money."
She said, "Ooh, are you in the arts?"
I said, "No, actually it's far worse than that, I'm an architect."
"Oh"

And I think it's a very important point. **As architects, we have a huge responsibility:** whether it's a big organisation or someone having a bathroom conversion, you have to pay real money to real people to do real things. So, there is a huge amount of responsibility in being an architect. BUT... I think, in that field, in order to do that well, you've got to do it with a sense of humour.

You've got to always be uplifting and be positive because it's also a very long process.

Scandicci Nuovo Centro Civico

PREAMBLE to the CONSTITUTION

THE INDIVIDUALS WHO ARE PARTIES TO THIS DEED WISH, ON EXECUTING IT, TO MAKE THE FOLLOWING DECLARATION WHICH WAS FIRST MADE BY THE FOUNDERS OF THE PRACTICE:

Objectives

- The practice of architecture is inseparable from the social and economic values of the individuals who practise it and the society which sustains it. We as individuals are responsible for contributing to the sustainability of our environment, to the society in which we practise and to the welfare of the team with whom we work.
- To this end, we agree that ownership of the Practice is wholly devolved to a charitable trust, so as to ensure that all the capital value of the enterprise and an annual dividend or donation are directed to charitable purposes; and that by the surrender of private share ownership, both private trading and inheritance of shares is eliminated.
- It has always been our aim to ensure that our work is beneficial to society and to exclude work that is knowingly considered directly destructive to our environment and social fabric. We also recognise that work is not an end in itself and that a balanced life must include the enjoyment of leisure and the time to think. To ensure the work we do is of the highest quality, the size of the office and the selection of projects need to be carefully managed.
- The constitutional provisions which follow aim to encourage collective responsibility by the identification of all involved with the architectural, social, and economic ethos of the Practice through greater participation and by giving them a financial stake in the success of the practice.
- We wish, by these means, to promote our aim of enjoying and producing the highest quality of architecture, backed by the best management, whilst encouraging creativity and clear decision making.
- To this end, the Directors must remain in day-to-day control of the Practice and will be responsible for the general custodianship of the good and efficient working of the constitutional provisions.

Principles

- The principles which have been evolved from the above objectives and on which the constitutional provisions are founded may be summarised as follows:

Shareholding

- Inheritance and private ownership of the Practice by individuals or their families is forbidden. Any shareholdings will devolve to the charitable trust.

Profits

- The Practice must retain sufficient working capital to provide for its foreseeable needs.
- The contribution of all those working in the Practice is to be recognised through a fair distribution of wealth by way of an allocation of a substantial amount of the annual profits amongst the staff.
- A further proportion of annual income is to be dedicated to charitable purposes, as directed by those working in the Practice from time to time. It is the hope of the Directors that this will be directed predominantly towards the less fortunate in the areas of social relief, education, and artistic endeavour.
- All those who participate in the constitution, whether as shareholders, directors, partners or members and benefiting from its fruits, must as a precondition to such participation, assent to such objectives and principles and undertake to adhere to them.

Richard Rogers
February 1990

Preamble RSHP's Constitution

Context

I've tried to break this talk down into three parts.

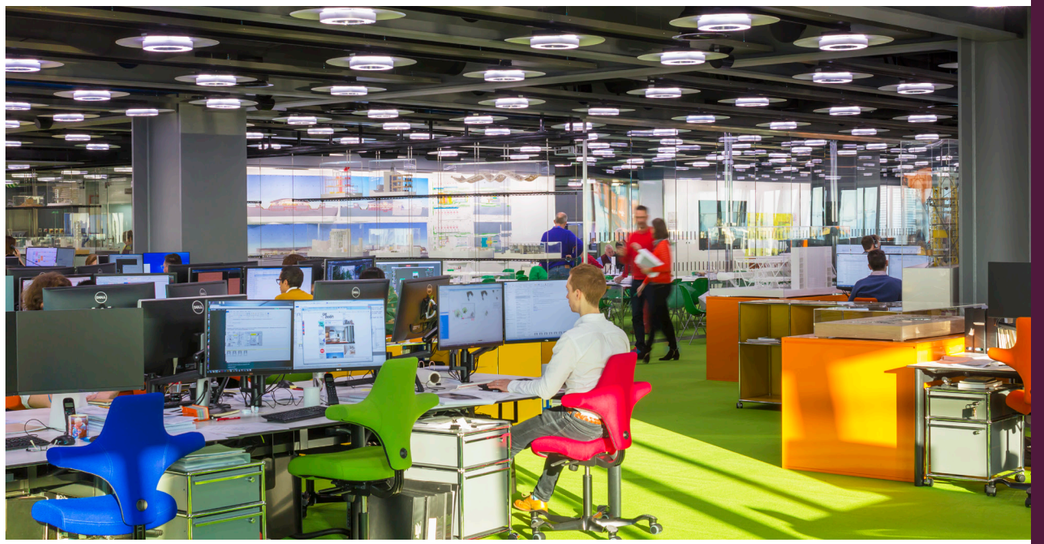
The first is the context, which is where we make design happen. And that context is not just a sort of physical context, but the context – actually, I call it a conceptual context here.

Conceptual

This is a summary of our constitution, written by Richard Rogers back in 1990.

And what it does is it defines our role, our responsibilities as architects generally.

How we should manage our practice and very importantly, our practice is actually owned by a charity. There's no ownership. Naked in, naked out. And then what we do, or what we should do if we make money. We do give a lot of that to charity. So, that sets a context, and this is reflected in the design.



RSHP's Office in the Leadenhall Building

Physical

As architects, we're about space, making space. So our studio really is a reflection of what we are and what we want ourselves to be.

So, this office is in one of our buildings in the City of London :
The Leadenhall Building.

We couldn't have office chairs because obviously it's an office building, so we don't have office chairs. And in some way, it's a way of saying, yes, this isn't an office, it is a creative place.

And the sort of 'work hard, play hard' feel that we have in here is, I think - essential in order to support the way that we do our work and how we do it.

The Participants

Now the people, the participants, are literally all colours. Thinking about them as a practice, it's not just architects, it's a broad group, and all of these people are essential in
that operation.

So, as one of the partners and leaders of this organisation, you owe it to all of these individuals really to help them achieve and also to always drive and strive for a better future.

Teamwork

And the teamwork itself - something we've always advocated as a practice - is that it's not just about "the architect", it's about a broader team: it's about engineers, it's about specialists - not being brought in at the last possible moment, but actually from the outset.

We can create nothing without that broader team. It goes back to this thing about our responsibilities and that broad role we have as practitioners.

Collaboration

The collaboration within the practice itself. Every practice will say "we're collaborative", but there is something and that's the **title of the talk: Conductor.** And so, it's an orchestra here; it has people that play fantastic instruments, and they play them very well, much better than the conductor and the people that write the score. Sometimes the conductor writes the score or some of the score. Although it's collaboration, it needs decision-making and direction.

You can't have a random orchestra just doing everything and hope to generate something exciting. I mean, it would work, I guess, statistically, eventually, but the conductor is a really important part of that. **And the most amazing conductor I've ever met is Richard Rogers.** Absolutely extraordinary. No one approached him. And, actually, his great ability was his inability to do some of the other things. So, his ability as the conductor was supreme.

The Process

The second part is, what is the process? How do we go about design? I love listening to the AI thing (In reference to Session C) because the one thing that we trip AI up with is by doing the unexpected.

These are lists of some of the drivers that we have in the practice. They're constantly evolving, but there are things that we use, and they're references that we attach, I would say subconsciously, to all the work that we do, none of them is about aesthetics, and that's very important. That allows us to be as creative as we like.

But there is some important stuff in here, like efficiency and the public - those things are super important. The public always comes first.

Drivers of Design

- Context
- Sustainability
- Public realm
- Economy
- Legibility
- Efficiency
- Flexibility
- Teamwork

Origination

When you're doing a design and you're originating the work, you need to summarise it very simply and very quickly. I always say, if you can't summarise the concept of a building in 10 seconds, it's probably too complicated. And you use that originating idea as a way of judging all decisions as you evolve the project through the process.

More often, more so recently with access to the internet, when I'm with a group, someone will say, "Ah!, I've seen a building a little bit like what you're suggesting there". I'm like, "Don't show me!"

When you're thinking about design, you have to think about your experiences and the particular challenge at hand. You're also thinking about other things, everything that evolves around life and those come together. You throw them together, and you might generate something from that. But as soon as you have an image of something that someone says, "Ooh, it looks a little bit like what you are sketching there" - You're stuck.

This project is a reference. We were asked to do a building that celebrated getting in and out of the city for the competition. For the competition we did that [raises both arms up to the air]. As soon as we won the competition, we did that [raises arms to the right to show the building's tilted roof]. Because what we were quite interested in were those streets. But it still celebrates the city.

Antwerp Law Courts viewed from the tram line and angled trees

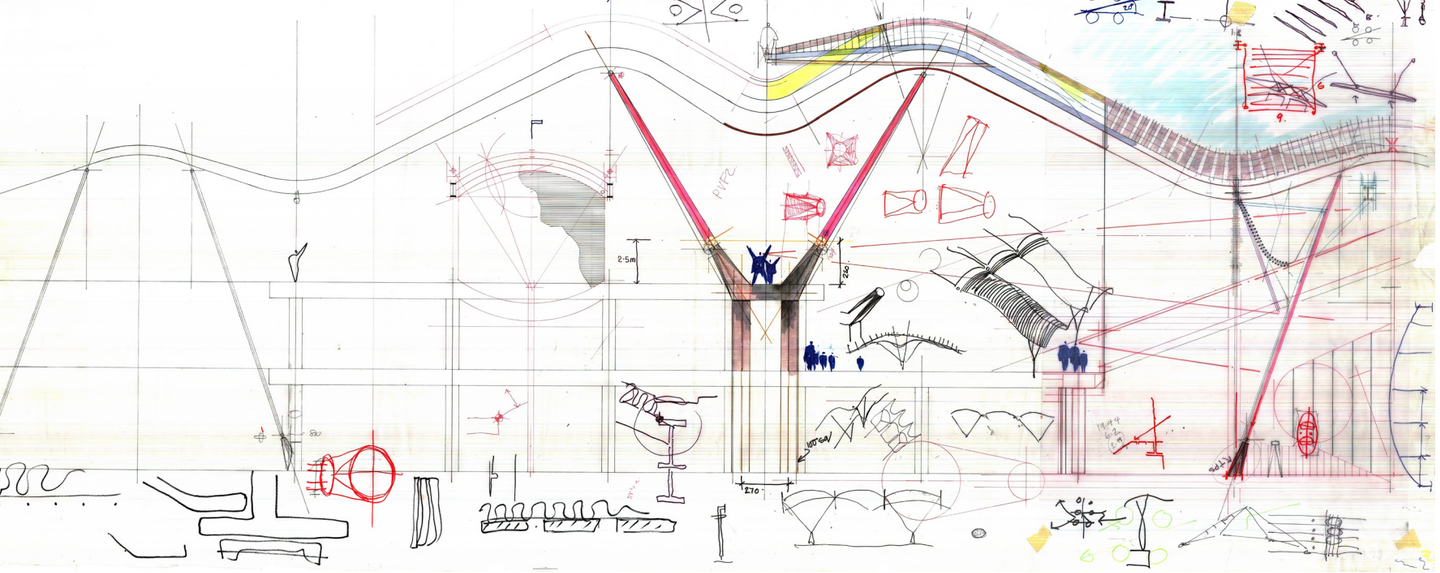
Evolution

The way that we expressed that initial design and the way that comes across. These days... we just completed another one-minute multimedia presentation with all the computer-generated graphics.

I find them very uncomfortable because life isn't like that: we don't judge space by single-point or double-point perspective, or even the camera. We scan space, we can see a lot more than any camera can and I think that the process of that explanation is something that needs to engage our clients.

This is a **model that we made out of balsa wood** and tells me a lot more because I can walk around this more and I can take my own point of view.

Concept model of Bordeaux Law Courts showing the city context



Terminal 4, Barajas Airport - Modular roof study

A Mindset

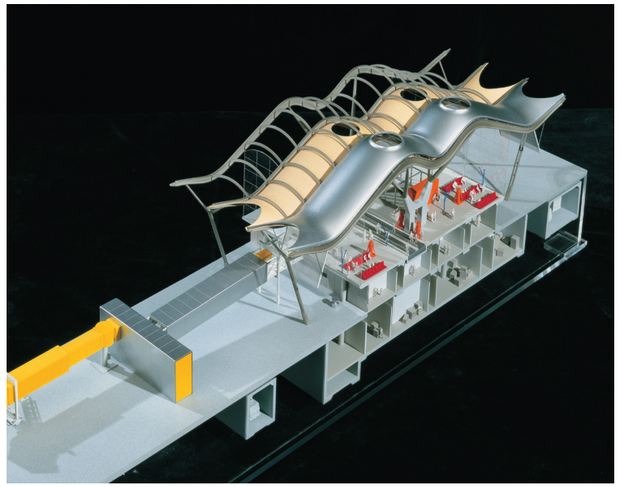
The mindset about developing design and the ability to evolve the rolling process of reinvestigating as you move through it. You often have a hunch of what might be right.

You usually spend the next six months going around in rolling circles. You end up back where you were, but you've tested that design.

This is data. It's just a PDF of a drawing.

However, multiple hands are on that drawing and that is a design process, that's just written down there. And that's important because it's really demonstrated evolution. It's not a precious thing; it's become more precious since the building has been realised.

Terminal 4, Barajas Airport



Terminal 4, Barajas Airport -
Satellite section model, scale 1:200

Motivation

This is the building that came from the sketch above. **I think the point here is: How do you do something of this scale? How do you work as mentioned in the title: working on a small scale or working on a massive scale?**

These two images show a striking contrast in scale: The large building is 1.2 million square metres, while the model represents a smaller building of 300 square metres.

But they were just as complex as each other and the only way to solve the big one is to think about how you could get excited about evolving one part that could do everything. So, if you magnify the small building a thousand times, it would have been an impossibility.

Compromise

International Towers Sydney

The other thing about architecture, unlike art – although I'm sure artists would say they always compromise – is that as architects we do have to compromise. Everything is a compromise. In fact, compromise is actually refinement.

It's accepting those realities. It's going back to the banker. You know, it does have to be affordable, it does have to be doable.

This is Barangaroo. It's a city quarter. We did the masterplan.

We also did the financial engine, those three towers Without that financial engine, we wouldn't have delivered a huge piece of public realm for the city, and we wouldn't have changed that city around.

But to get to that point was a vast set of compromises, often in quite unpleasant circumstances.

But once we got through all that process, everyone had a buy-in because they had been part of the conversation and the result has been extremely successful.

Tenacity

Capodichino Metro Station

You also need a lot of tenacity to keep going because architecture takes a very, very, very, very long time.

This was probably a few months ago in a metro station we're doing in Naples at Capodichino airport.

It's been going for 20 years, and it's got a few years to go. It's fantastic.

I mean, they keep changing stuff and it's fantastic and we keep compromising and adapting and it moves forward.

It's sort of an evolving thing. But it's still got – and that's really important – a really simple idea and it sits there and it's pretty impressive. So welcome to Naples soon, it will be quite something.








Lloyd's of London, Bordeaux Law Courts, International Towers Sydney, Minami Yamashiro Elementary School, Terminal 4, Barajas Airport, Maggie's West London Centre, Crofts Street, Senedd Cymru, Welsh Parliament

Learning and Experience

Experience, and I can say this now because I've been doing it for actually quite a long time. Experience - I've just been to see the Court of Human Rights in Strasbourg. Next year, it would have been completed for thirty years. I did it when I was 27. My goodness. But I thought I knew it all then. Now I know, I know nothing or very little.

But I think that experience is quite useful in the end to refer back to just to help, to help others, to guide others from that experience.

Not by saying "Don't do it like that.
I did it like that it all went horribly wrong".

It's just that you sort of bring in, you're able to support with some tacit knowledge about you might begin to know what you're talking about by the time you retire.

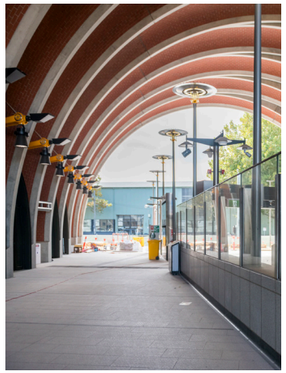
Taste

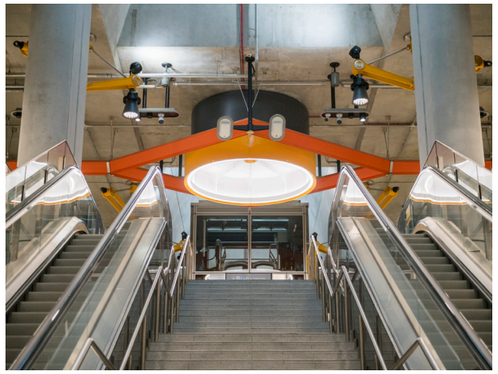
So, the last part of this is just to give a few sort of things that bug me or things that excite me about architecture.
Taste.

These are some not particularly great photos, but this is **Melbourne Metro.** It will be delivered in the middle of next year - it'll probably be active in the year after that. Architecture should never be trendy, okay? It should never, ever be stylised and be of the moment because we're working ahead of us; we're working for the future sixty years.

Hence it all must be robust. It must be durable. It has to have great integrity and it must appeal to people.

It's all about what people experience, in this case light, shadow, acoustics - all the senses - how you deal with the senses.





Metro Tunnel Project -
Arden Station and Station platform

Test

Testing stuff. We still have to test a lot as an architect; we've still got no real way of understanding what we will really get. So we are always impressing clients with the building of mock-ups.

"
To see what you're going to get, it's going to be very important if you're going to live with this forever.

Ivan Harbour

Oxley Woods mock-up

Lloyd's of London mock-up

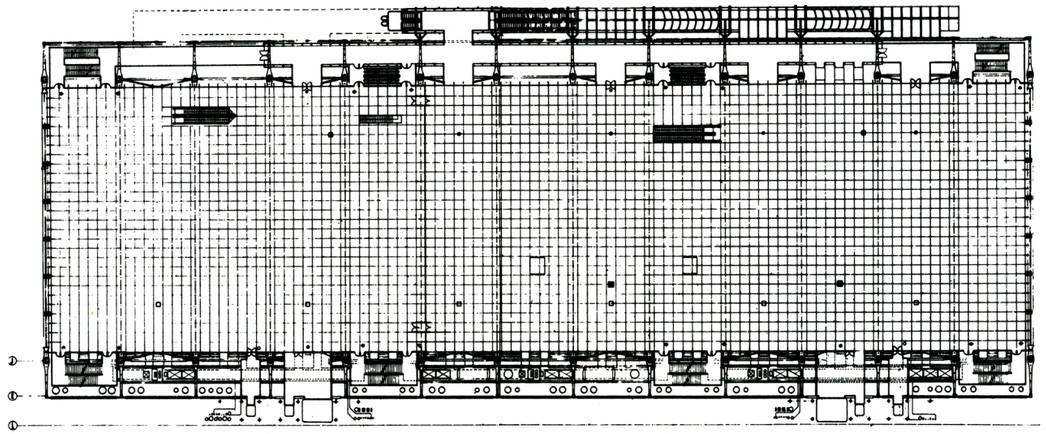
The Diagram

I've talked about the diagram: it's a summary. by the way.
The diagram is a summary of a whole lot of discussion.
Any architect who says, "That's the concept diagram" is lying!

The Plan

The plan, the key thing about the plan - this, of course, is
The Pompidou Centre -
it doesn't have to be a complicated plan to be a beautiful, interesting building.

Seriously important that - this is not a boring building: it's a very simple plan. Most of our plans are sort of rectangles. That's a good thing.

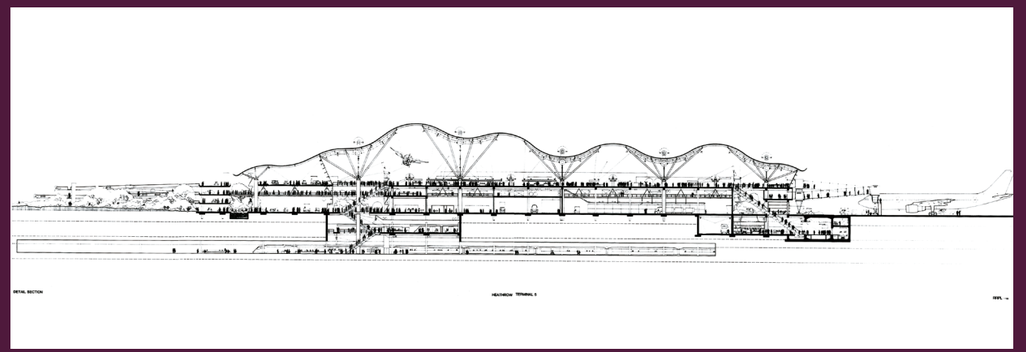


The Section

The section, of course, is our thing.
These are all hand drawings.

This is a section for **Terminal 5** and it's a section that says, "The experience here in the airport could be quite interesting". And it varies and so the section is about describing experience. So, for me, as an old practitioner, I understand that.

Architects understand the scale of the plan and the scale of the section. They can form an opinion about the building.



Rhythm - Poetry

And finally, back to **Barajas - another airport**. Repetition, poetry, and the sort of rhythm of buildings, I think are super important. Buildings are background in the most part and their rhythm is super important.

We're so lucky in London to have Georgian London, Victorian London, that sort of rhythmic background. It is super important.

Now, when I do competitions and we're being told,; "You know, you've got to jazz it up a bit and make it another animal in the zoo." I find it so depressing **because you can't have a city without background.**

That's me. Thank you

Leadership on a dying planet

Will Arnold

Head of Climate Action,
The Institution of Structural Engineers

Will is a Fellow and staff member of The Institution of Structural Engineers, and is both a Chartered Structural Engineer and Chartered Environmentalist.

In his role at IStructE, Will is responsible for embedding climate action into all aspects of the institution's work.

He is well-known for his work on embodied carbon policy in the UK, including on Part Z and the UK Net Zero Carbon Buildings Standard.

"

When my mate Clara was 16 years old, she and a friend from her school dressed each other up head to toe in plastic bags, and went and stood in the middle of their local town in the middle of the British winter.

The plastic bags were pretty uncomfortable - the wind came through, the rain was cold - but they'd set themselves a mission for the day.
They called their mission: "ban the bag". Pretty catchy.

They each had in their hand a clipboard, and on it was a petition to try and get support for the idea that the UK should ban the use of single-use plastic bags. Within two hours they'd amassed more than 1000 signatures and they promptly went on their way and presented these signatures to the local councillors.

What do you think happened next?
Nothing. The council did not ban the bag.

It was actually seven more years before this country introduced even a levy on single-use plastic bags.

So in this story, who do you think showed more leadership?

- Was it the elected officials put in charge of the country?
- Was it the people who were meant to be looking after the environment?
- Was it the local councillors?
- Or was it the two schoolgirls who had dressed themselves up in plastic bags?

About a decade later....

that same person, Clara, was working here in London as a building services engineer, and she'd come across a loophole in London's planning requirements that allowed you to use gas in order to provide electricity to your building in a way that seemingly reduced the carbon footprint of that building, but actually increased it in the longer term.

Now, Clara knew that this was a problem, but she had no idea what to do about it. She didn't have the technical expertise, she wasn't a planner, she didn't know any planners and she didn't have the sort of influence that some people have where you can pick up the phone and try and make things happen. But she didn't let this stop her.

So she worked out who in the Greater London Authority to speak to. She got passed on again and again and again until eventually she managed to get through to somebody in the planning department, and she said:
"Look, there's this issue. I have no idea what the solution is, but I think you'll agree with me that we need to find one. Could I run a workshop for you?"

And the planning person said: "yeah, sure, why not? You're not going to charge us for it, right?"

She replied "no, no, it's free."

And she went off to her boss and said:
"Look, I have agreed to put on this workshop, and I've agreed we won't charge them for it. Could I have a room, please? A meeting room, maybe some coffee?"

And her boss said: "Yeah, yeah, sure."

He even agreed he'd come along to boost the numbers, slightly naively underestimating what Clara could pull off. When she came back to him and announced that "120 people would like to come to this meeting," he nearly fell off his chair.

And then he worked out how they could get hold of a bigger room. And he thought "Well, we better make our company look good." So he managed to convince one of the Principals to give the closing talk at the end of the workshop.

And the workshop was a big success.

It was full of volunteer specialists from across London and across the built environment, who understood where you should and shouldn't use things like gas in a building and they understood some of the other loopholes and some of the other issues with planning in London and in the UK, and they were working on solutions to these.

Fast forward to today and that group of people still meets, albeit in an evolved form, and they're now quite well known in this country by people who work in sustainability and the built environment. They go under the name LETI.

LETI is still run by volunteers, it's still people giving up their evenings, working on their weekends, but they've produced some of the most groundbreaking guidance and research that this industry has seen in this space, maybe ever.

And they all do so because they want to see the industry change. They want to see it get better. They don't do it for reputation.

This group has never been about themselves; it has always been about helping the industry to evolve. And because of this, earlier this year, their founder – Clara, the same person who dressed herself up in plastic bags about 17 years ago – was given an MBE in the King's Birthday Honours.

And whilst the citation says something different, it was effectively given to her for showing leadership and being able to lead a group of people like this to do what they do best to try and change the industry.

The role of a leader is to act.

The role of a leader is to help others to thrive.

I think some people think of leaders as the ones who have the visionary ideas, maybe hold the pen, do the talking, stand on stage for the longest, and so on and so forth.

Clara's none of those things.

And some of you might also think that there's got to be a difference between design leadership and climate leadership, but they're both forms of leadership.

So what can we learn from groups like this and people like this?

My contention is that there are two aspects to a leader that we could aspire to be more like. A leader must act and a leader must work to help others to thrive.

Let's take Clara as an example of this. To her, she saw the world in black and white, right? Obviously plastic bags are a bit of a silly idea once you understand how they're made, and the fact they last forever.
We just shouldn't have them.

And obviously, this loophole in planning needed closing.

But she was surrounded by people who insisted that the world was more grey than this.

People who wanted to say "yes, but…"
"What if…?"
"Isn't this going to cost us money…?"
"Hasn't somebody tried it before…?"
"Surely we would have done it by now if it were obvious."

Barrier, barrier, barrier.

Clara shunned that, and got on with it and acted.
And when she acted, it was never about herself, right?

It was always about enabling other people to do their job well.

Going back to the idea of a conductor enabling the people around them to play their instruments well.

This is what LETI was always about.
This is what her work was always about.
And I think we can learn from that.
So: action and helping others to thrive.

And I want to share a couple of examples from my bit of the industry where I've seen this work quite successfully.

IStructE Structural Awards

The first example is from the Institution of Structural Engineers and I want to talk briefly about the awards that we give out every year for projects.

So to win a Structural Award (which is what they're called - it kind of does what it says on the tin!), is a career highlight for structural engineers.

It means that your project is ranked up there with the Sydney Opera House, the Burj Khalifa, the London Eye, as having engineering greatness behind it.

But in 2022 we started to ask at the Institution, what does greatness actually mean in structural engineering?

- Is it to do with scale, span, size, **magnitude**?
- Is it to do with **complexity**, difficulty?
- Is it something to do with craft and **beauty** in the way we make our structures?

Or are those just inputs?
Are those just constraints that we have to work with?

Actually, is it more to do with the outcome of what we end up designing, and deciding upon?

So in the end, we completely rewrote our approach to giving out the Structural Awards, and we formed it around **four attributes: people, planet, process, and profession.**

And now when projects have entered every year, we judge those projects on their own merits – it doesn't matter whether they fit into a category about being tall, long, whatever.

What matters is what they have done to the world as a result, and that's all that really matters with our buildings, right?
So what's the impact at the end of the day?

- What's the impact on **people**?
- What's the impact on the **planet**?
- Has this somehow impacted the **process** that we take for granted around designing construction for the better?
- And how has it impacted the **profession**?

Structural Awards

An example of this, one of my favourite examples (because if you walk past it you might not have guessed that we gave it an award) is this building:

This is called

Holbein Gardens

It's here in the middle of London, and to many, it just appears like quite a modest building.

What's special about it is twofold. First thing is that the top storey (which was the only new bit of the building, the rest is a refurbishment) is framed out with reclaimed steel beams. Not recycled ones, not steel that's been melted and turned into new steel. Reclaimed. So these are beams that have been cut out of a building, taken away, cleaned up, recertified and built with.

Now, there was only about 25 tonnes worth of this stuff, so it's not a groundbreaking amount, it would have saved 50 tonnes of carbon. Very noble, very good, and at the time nobody had done it quite at this scale.

But this is not why we gave the project team an award. We gave them an award because a bit like Clara, they saw the world in black and white and they were looking at our industry and saying that this industry has to transition to a circular economy. There is no there is no other way about it.

It's not a matter of if, it's when, and the sooner the better, because this is a crisis, this is the sixth mass extinction and we do need to act.

So they acted, and when they acted, they did not in the service of themselves but in the service of the wider industry.

This project for them was never about their IP and about their reputation. It's about the industry's IP and the industry's reputation. And I think we'd agree that there is scrutiny on this industry's reputation right now in lots of different ways.

So everything the engineers on this – Heyne Tillett Steel – everything they did, they then passed on to their competitors, to their collaborators across the industry. Everything they learned about reusing steel, they wrote up, they put it in guidance, they put it in presentations, they made tools, and they put it all on the internet so that their competitors could then do a bigger and better version next time.

Because they knew that this was the sort of action that needed to be taken if this industry is going to move forward towards a circular economy at anywhere near the pace that's required.

My second example

is quite relevant to today's talk because you'll notice some of your colleagues are listed on the screen behind me. I remember at the start of this speaking to your colleague Paul, and we were talking about the perceived complexity behind concrete decarbonisation.

If you go online and you search decarbonising concrete, you could be forgiven for assuming that there are a thousand different technologies out there, all of which you could pour into the ground tomorrow, if only you're willing to pay somebody enough of your hard-earned money to do so.

And you'd be forgiven for thinking that each one's unique and special and better than all the others because, that's what the website is saying. And what we were interested in was trying to help engineers understand what the differences are between these, trying to help them demystify this plethora of noise that was out there.

So we did some research (mostly, I've got to say, led by Paul and Tom, and not that that much to do with me – I was more the guy that said "keep simplifying it"); we did some research, pulled together the data on what these different techs were, how much they could decarbonise, why, how they were made, so on and so forth, and we put them on the Internet for everyone to use.

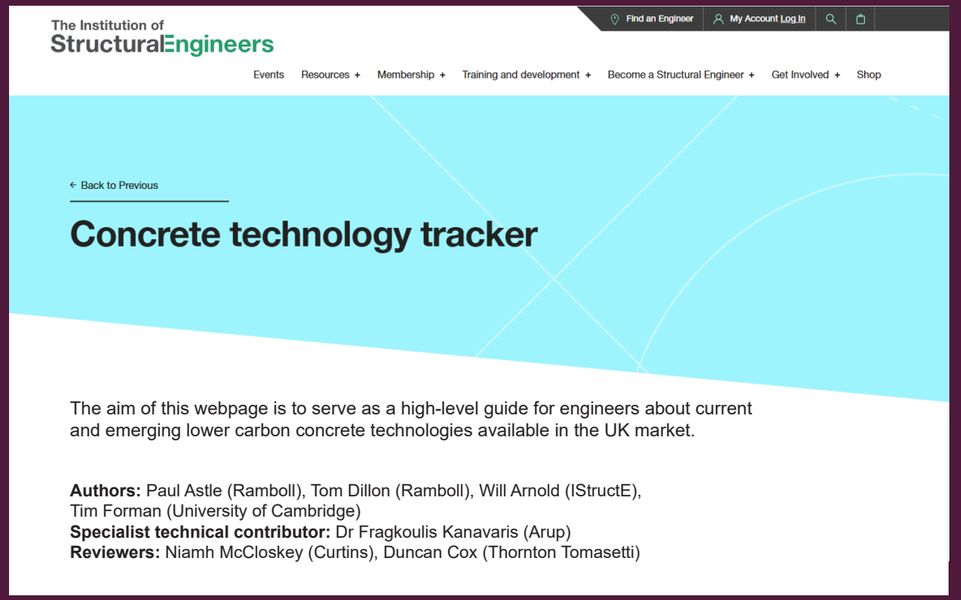
Now, that information and that bit of work could have just been done within Ramboll, without my involvement and held within the Ramboll vault somewhere in the hope of increasing your IP or something in the future. And I know that some of your competitors out there have done exactly that. I've been told, "Oh, yeah, we've got a version of that. And we've had it for three years."

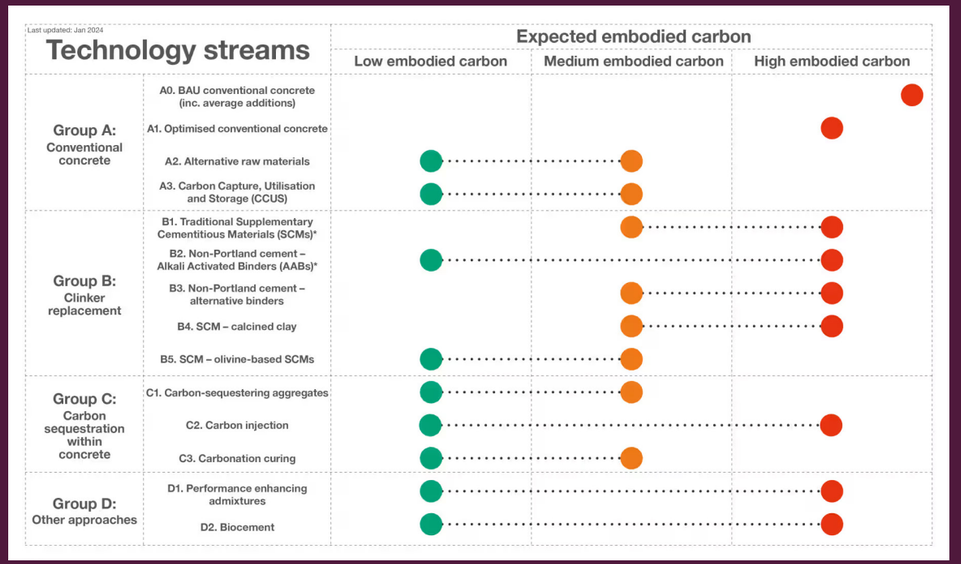
And they don't want to share it for some reason.

But the understanding that we had when developing this tracker was that, if you want to see concrete decarbonise quickly – and we're going to be out of a job if it doesn't, let's be clear – then we need knowledge like this because we need the whole industry to understand what technologies are at what stage, what it is we should try and get into the ground now, what we need to maybe wait another five years for, and so on and so forth.

So this sort of demystifying helps if it's shared across the industry, rather than kept in a vault.

Concrete Technology Tracker





Last example,

this is an example that's quite close to my heart.

This is the end of what's running up to being a three-year project now to try and write a standard for this country that explains what a building must achieve if it is to align itself with the UK's Net Zero laws.

We have a dwindling carbon budget in this country. It goes down year on year and we overspend most of the time.

How do you design buildings that are aligned with that?

UK Net Zero Carbon Buildings Standard

This was published on Tuesday, and if you've not come across this before, please scan the QR code.

This sets out carbon limits, renewable energy targets, accounting methodologies, transparency requirements and so forth.

I'm proud of it because of what it does. This enables a client to say, I want my building to be net zero in accordance with this standard, instead of having to make up what we mean by that every time.

But I'm also proud of it because this is the biggest collaborative project I've ever worked on in my life. This had almost 400 people feeding into it.

You won't be surprised to hear that plastic-bag-shunning Clara was involved from the start.

It's never been about one firm, right?
This is not the IStructE Standard.

It was always going to be written by the industry, for the industry, and it's much, much stronger as a result.

If there's one bit of climate leadership you could do when you go back to work on Monday, it would be to get hold of this and persuade your client to try and make you design the building to it. Because it's quite ambitious.

BBP BETTER BUILDINGS PARTNERSHIP
RIBA Architecture.com
RICS
CARBON TRUST
bre
LETI
CIBSE
UK GBC
The Institution of StructuralEngineers

So my final thought today, is one about project selection. But more than that, it's about understanding the influence that we have as leaders to influence other people. Because you all are here because you are leaders of this firm, right?

So we need to understand that when we decide to do a project (or not do a project), that this decision will influence what your competitors do. I often hear when I talk about projects that aren't needed, I hear people say, "Yes, but if we didn't design it, somebody else would and we could do a better job."

But we all know that statistic about 80% of drivers, right?

80% of drivers think they're better than average.

We're all engineers, we understand averages, of course. The number must be 50%.

Is it just possible that 80% of all engineers think that they're better than average? Do those engineers think that they're better at designing low-carbon buildings... maybe?

So my call to you would be to not just act to help others thrive, but to do so driven not by ego, ambition, or profit, or by the ability to try and do the biggest and best new thing...

But driven by ethics, and humanity, and care.

Panel Discussion

Hossein Rezai (Moderator):
Ivan Harbour
Will Arnold
Elina Kalliala
Lora Brill

Elina Kalliala
Global Sustainability Director
Ramboll Transport

Elina Kalliala is the global sustainability director for Ramboll Transport, which works across the value chain in the infrastructure and mobility sectors. Mrs Kalliala leads the sustainability strategy and actions along with 3,600 other employees in the transport sector, who aim to apply a holistic and regenerative approach to all their projects. The ambition is not limited to improving Ramboll's projects but also guiding the industry towards a more sustainable future.

Lora Brill
Head of Sustainability
Ramboll Buildings

Lora leads the Sustainability Services for Ramboll Buildings UKI, implementing our global sustainability strategy and UKI commitments. She has 22 years of experience working with organisations of all sizes to advance their sustainability journey in the built environment. Lora holds a Master's in Public Policy from Harvard and brings a holistic perspective to sustainability, drawing from her experience in town planning, housing development, ESG strategy, and investment management.

Hossein Rezai
Global Design Director
Ramboll

Dr Rezai is an engineer, a design visionary, and an educator. As Founding Director of Rambøll-Web Structures and one of the initiators of the concept of "fusion engineering," Hossein is the first and only engineer to receive the coveted title of "Designer of the Year" from the president of Singapore. Dr Rezai's high-profile contributions to industry discourse include his involvement in the 13th cycle Aga Khan Award for Architecture's Master Jury in 2016, as a jury member for the Singapore President's Design Award (2017-2018) and as Vice Chair (2019-2020) and as Jury Chair (2021-2024).

[Hossein] Maybe we can make this final session a bit more interactive—so if you'd like to engage with more questions, I'd be more than happy to invite you in.

To start, I'll pose one question to each of you while the audience considers their own.

Elina, perhaps I'll begin with you. Over lunch, we bumped into each other, and I reminded you of a quote I recently read from Nora Bateson, a dear friend of Vanessa's. It goes something like this:

"how can we think ourselves out of the mess we are in, if the way we think is itself part of the problem ...?"

Would you like to share your thoughts on that? Do you think the way we think is flawed? Are we trying to fix a broken system using the same thinking that created it in the first place?

[Elina] I think we need radical collaboration, cooperation, and also this new kind of thinking. It means actually a sort of spiritual and cultural transformation. Albert Einstein once said, "We cannot solve our problems with the same thinking we used when we created them."

I think we need to approach this from a new angle and we need to have a big common goal. The first thing would be to think; How can everyone fall in love with this amazing planet?

To create some feelings, some really deep feelings, and then we maybe remember what Paul said about the safety belt, to always think, but what about the planet? There's something that you deeply care about the planet.

Another quote from Einstein is that,

"If we look deep into nature, we will understand everything better."

I think there is a lot of wisdom with all the systems thinking also from the leadership point of view - how can we create adaptive organisations? How can we actually work in smaller systems so that they create value for the wider system and kind of share the leadership as well, instead of the traditional hierarchical one? How can we function better as a system?

That needs a different kind of leadership and also a different kind of discussion on not just processes, but interactions. How well do we actually work together? It's these types of things.

[Hossein] Thank you—that was a thought-provoking response. And, just as a bit of tongue-in-cheek humor, I don't know if I've mentioned this before, but Einstein is also quoted as saying, "Half the things people say I've said, I actually haven't."

But don't worry, I've checked—he really did say those two!

[Elina] One more thought actually, this is the organisational part. We're all humans and I think when we get scared, stressed, we concentrate on the small and easy things, instead of discussing the right things.

How do we create urgency, the feeling of urgency without fear?

This is a lot about psychological safety. We are all responsible for creating this right kind of atmosphere to be able to encourage our colleagues, partners, and whoever to ask these questions that a five-year-old could ask.

So, I think those are very simple things. How do we react when someone says something controversial or new or something difficult? I think it's something for everyone to think about.

[Hossein] Yeah, thank you for that.

Connecting this to education—to five-year-olds—and to the late Ken Robinson, the educator who was also a brilliant stand-up comedian. He had this rare ability to blend both perfectly. He used to say that we are all born geniuses, but we get educated out of it.

There's a fascinating statistic he shared to illustrate this.

Apparently there is a way to measure genius. You show someone an object, like a paperclip and ask, How many different uses can they think of for it?

Most adults might come up with one, two, maybe five. But there are people who can think of a hundred! And according to this measure, that level of creativity is considered genius.

Now, here's the striking part—when tested, something like 95% of five-year-olds score at this "genius" level. But as we grow older, that number drops dramatically.

By the time people reach around 25, only 2% of them still qualify. It's as if education and standardisation systematically suppress this innate creativity. This ties into something discussed earlier in Session A—the way rigid systems can stifle innovation rather than nurture it.

Lora, I know circularity is something very close to your heart. We've talked about it in the context of Ramboll and the work we do. How can leaders create an environment where people feel secure enough to experiment—especially with big issues like circularity?

How can we encourage them to propose ideas, explore possibilities, and take risks in innovation? You lead a team—how do we foster that kind of mindset now?

[Lora] That's a really interesting question. A lot of today's discussions have touched on this in different ways. In fact, your example just now ties into a broader idea, which is around that spirit of curiosity and inquiry. It's so easy to get bogged down in prioritisation, which I think Paul mentioned earlier today. We often focus only on what seems most urgent, but what we actually need to do is expand our perspective, step back, and, challenge assumptions, and explore broader possibilities.

At Ramboll, while our primary focus is on nature rather than circularity, we've embraced this mindset through a Dragon's Den approach to innovation. We invite colleagues, regardless of their role or discipline, to propose ideas on how we can better integrate nature into our building designs without putting any limits on what these ideas might look like. The goal is to foster co-creation because, frankly, we don't have all the answers. I think that goes to that question;

"If our thinking is part of the problem, how do we change our thinking?"

One way is by broadening the conversation is by bringing in new voices, new perspectives, and making sure those perspectives are genuinely heard.

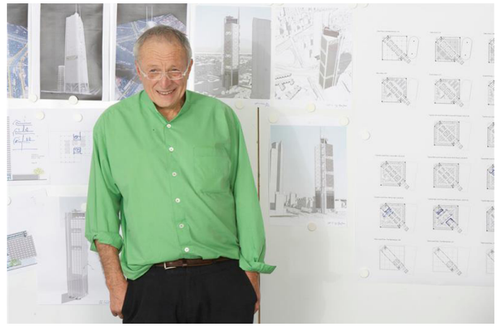
One of the things that I am very passionate about in terms of leadership is;

Rather than focusing on a single voice being the leader, or being correct, you work as a group and welcome awkward perspective to the conversation.

In the same way that anyone on a construction site is empowered to stop work for safety concerns, anyone should have the right to challenge a design decision from a sustainability or design perspective. And they should be heard. In the same way that buildings have the right to be heard.

And if we extend that to people in the room—if we truly take the time to listen—we can make far better decisions. Our instinctive reaction might be, "Oh, we don't have time for that; let's move on."

But instead, we need to pause, ask more questions, and recognise that if an idea seems unfamiliar or challenging, that might be exactly why it's worth exploring. And at the very least, we owe it to that person to bring them along in the conversation.



[Hossein] Ivan, in your presentation, you mentioned **Richard Rogers,** and what stood out to me was the positive impact he had on you as a leader at some point in your career.

Behind you on the screen, we have two other leaders—the founders of Ramboll—who, like Richard, went far beyond the conventional boundaries of engineering and architecture.

They didn't just say,
"I'm an architect—I design buildings,"
"I'm a designer—I design products."

They actively engaged with the broader impact of their work—on society, on the urban context, and on industries beyond their own. Their leadership extended not just to their practice, but to the entire profession and industry.

When we were curating this session, we asked ourselves: Do designers—architects, engineers—have a role in shaping the leadership structures of the future? Beyond just designing buildings and infrastructure, do we have something valuable to contribute to shaping social systems, especially in areas like environmental and social justice, which we discussed this morning?

Or should we simply stay in our lane and focus on our core competencies?

[Ivan] I believe our profession—the space we operate in—is deeply public, and we absolutely have a lot to offer. In fact, we are often disappointed by the reluctance of architects to step forward into leadership roles, particularly in government. **Representation is virtually nonexistent.**

Richard was unique in that regard. In the latter part of the last century and into this one, he was an architect who actively engaged with the politics of the profession. And unfortunately, unless you engage at that level—whether we like it or not—it's impossible to create real change. But he was constantly frustrated by it. He always felt he could do more if only he had support, but that support was rarely there.

I think there's a tendency—mentioned more than once today—that when we feel uncertain or anxious, we retreat into what we know best. We focus on our technical expertise rather than stepping into unfamiliar but necessary conversations.

Yet, given the complexity of the challenges we deal with, we do have the tools to contribute. Here's a little anecdote to illustrate that:

We once worked on a project with the Special Forces. They wanted to do a project, and we advised them. Later, after trying to execute it on their own, they came back to us and said, "We've taken on some of the most impossible tasks in the world, but we couldn't get this project to work. How on earth do you, in your profession, manage to make things happen?"

I do think we're capable of it. We're not aware of it. It probably is a different mindset that you have to engage with through that place and that system.

[Hossein] People like Richard engaged with systems that weren't designed to support them. They entered those spaces as individuals.

But imagine if, instead of individuals trying to change the system alone, we designed systems that naturally led to better outcomes—less damage, less degeneration, more regeneration. We have the skills and competencies to do that collectively.

On that note, let me do a little bit of propaganda for Ramboll.

We've decided to take a leadership role in transparency by publicly sharing the embodied carbon data of our buildings—an initiative that is led by Paul and his team.

We've just released the second version of our data, and we're actively inviting our competitors—what we now call industry partners in this regenerative environment—to do the same.

So what do you think? Is this something more of our industry peers should take on? Should they join us in making this a standard practice?

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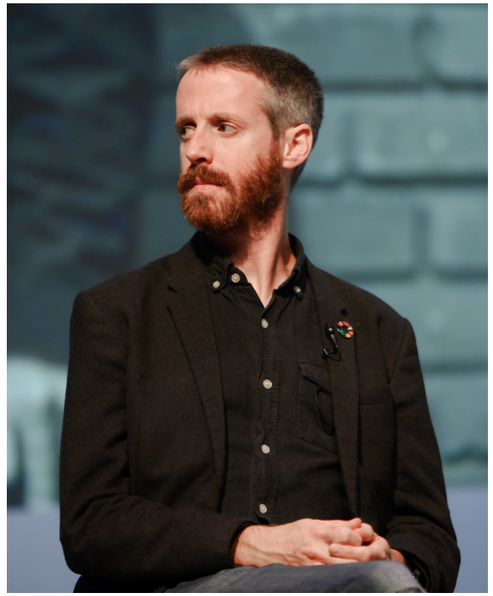


[Will] I hope so, yeah.

I think a lot of this comes down to your goal, right? And this question of how do you change things with the same skill set that you created the problem in the first place, well, there's no reason to say you can't apply the same set of skills to get yourself out of the problem – but the goal has to be different.

The goal prior to releasing embodied carbon footprints for all your projects, the goal might have been to better understand it so that we can prove that we can make the lowest carbon building so that we can go off and win the right projects and do that.

Well actually the whole industry needs to be able to do this, and so our goal is to share how well we're doing to hold ourselves to account. And it could be the same set of skills; it's different goal.

If you look at my favourite example of this, it is Yasmeen Lari who is a Pakistani architect, who won the RIBA gold medal I think two years ago. She has spent most of her career doing these huge impressive projects and she was one of Pakistan's top architects and then she went into retirement.

When she came out of retirement, she had changed her goal. She came out from retirement to say;

"I'm going to basically work on social housing, it is going to be as close to zero carbon as I can get it, it's going to help train people, it's going to provide jobs and careers for people who wouldn't have had them."

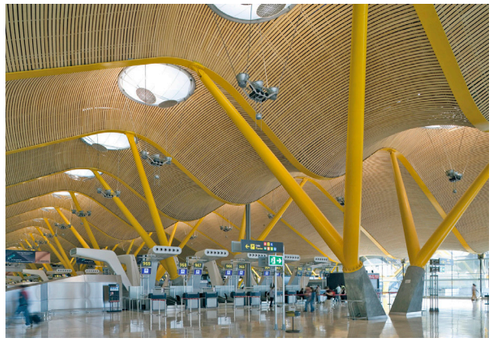
She took the same set of skills that she would use in her first career that she made her name with, and used it to do this tremendous amount of good. If you look at the work that she's done since then, she has created tens, if not hundreds of thousands of homes with these skills we can totally apply, but you need a different goal and you need a better goal.

You need a goal that is not about making this firm the most successful firm ever, but it's about somehow making this species not kill ourselves, which is kind of what we're on course to do if we don't start to change our own goal.

[Hossein] Thank you. I think now we should open to the audience. Any questions for the beautiful panel? This is your opportunity.

[Audience] Thank you. My name is Paloma, I work at Ramboll. I wanted to start by praising Ivan on the **Madrid-Barajas Airport.**

I'm Spanish and I'm not sure if you're aware of how loved and praised the design is in my country. Were you aware of this?



[Ivan] We are aware of it very much.

[Hossein] He's very modest

[Audience] I totally agree with that. What's interesting—working in building construction—is how much I've come to appreciate architecture, just like everyone in this room. But beyond professionals like us, there are also many people outside the industry who engage with and comment on our work.

That brings me to my question for the panel—and for everyone here:

We've always been told as leaders about the power of feedback, both giving and receiving.

But how connected are we, really, to the end product? How much do we engage with the people who use the buildings we design? And how much do we take from that feedback to inform and improve our future work?

As leaders, how much responsibility do we have to actively seek out that feedback?

Thank you.

[Ivan] Community engagement is one formal way to connect with people who will interact with a space before it's built. As architects, we obviously have a duty to the planet—but we also have a duty to the people who will live, work, play, or even just pass by and engage with our buildings.

Designing with a deep awareness of the impact we're likely to have—and allowing that awareness to shape the design—is probably the most important starting point.

In some of our recent projects, we've had formal engagement sessions with local communities, and we've really valued that process. What's been particularly striking is the commonality in what people care about. If we take the time to explain a design and bring people into the process, there's often a shared sense of what feels comfortable, what works, what matters. That said, it's also true that a group of completely diverse, sometimes opposing viewpoints won't necessarily arrive at a single answer. **And that's where leadership comes in. A conductor has to step in and shape the direction.**

Clients, for example, often don't realise that they are part of the design team. But of course they are. And so are the people who ultimately occupy the building.

[Will] Can I add? Well, I think there's also a real lack of feedback in terms of the even wider effects that we have on all the other people who never come into contact with our work, right?

And we are only starting to recognise this in terms of the use of materials coming into the sort-of mainstream engineering world in the last few years, some people have been doing this for decades, don't get me wrong, but as a sort of mainstream topic of conversation, it's only been in the last two years.

Somebody mentioned before this idea that you can't smell or see carbon dioxide being emitted. If you order concrete to a construction site, you don't see the impact that that adds to the atmosphere or the effects of what that does.

I think it's worth trying to gain some of that feedback by exposing ourselves to either go and see parts of the world that have been hit by drought for five years in a row and see how hard it is for people to try and survive there, because it changes your understanding what climate change means, because it's quite a soft sounding word: 'climate change'.

Or go and see how these materials are produced.

I must confess I've never been to see the production of concrete or steel, but I remember when an academic friend of mine, Nick, who works up in Sheffield University, told me he went to see the cement factories in the middle of the Peak District and he stood underneath these cement kilns - and these things are the length of a jumbo jet, and the height of a house, and there are two of them,

and they rotate and they basically have jet flame going down the middle of them that burns pulverised coal and it has to do so 24 hours a day, 365 days a year because if it stopped, the whole thing would start to warp and crack and it will die.

So this thing has got the bottom of a Saturn V rocket inside it, blasting down it, all day every day to make cement to fuel our industry.

He said that when he visited it, he got told it hasn't rained underneath this kiln (because this is outside), rain has not touched the floor since they turned it on because the rain evaporates before it can get there.

I think that if you get a bit of feedback like that, even go and find Nick and let him speak to you, get some feedback from him. That changes your perception of the damage that gets done with these materials.

I think that once you start to understand the damage that's done with these materials that we use, maybe you start treating them as more valuable than perhaps you would have before.

[Lora] Can I just add something as well?

[Hossein] Sure, can I just add something, Elina and Lora as well? The question that Paul's daughter has posed for us today has really made me think:

Where does all this stuff come from? That, to me, is true leadership. That one is making us think about these things.

You mentioned concrete or steel. The same goes for food. If more people witnessed the reality of slaughterhouses, many of us might never touch meat again. So it is important for us to answer that question that we've been posed by Paul's daughter as a great sense of leadership that I've seen today.

[Lora] Yeah, I had a two-part response. **One is around the user experience of the buildings we design.** I think there are classes of buildings, where we take that into account. And there are classes of buildings where we don't.

Take prisons, for example. How often do we ask ex-convicts—or even current inmates—about their experience of the spaces we create for them? Do these environments support rehabilitation, or do they reinforce the very issues they're meant to address?

If we don't actively seek to understand how our designs impact all users, we're facing serious ethical issues as building designers and engineers.

On a much more prosaic side, the focus on embodied carbon. I think it's finally catching up to the work we've been doing for many years around energy efficiency and energy consumption. But it's also exposing a gap between how we model energy consumption in buildings and what we actually know about how they perform after construction.

And that is a gap that we really need to fill because we could be acting on completely incorrect information.

In fact, we know that in many cases, we are. The energy performance gap is well documented, and the UK Building Standard is designed to help bridge that gap.

But that post-occupancy, linking it back to our job as leaders, I think is really critical to be ethical building designers.

[Elina] Yes, thank you for the question. I've been working as a landscape architect and urban planner for 20 years. If we link this back to leadership and the role of end-users as stakeholders, it's so easy to only engage with the most accessible or easiest-to-reach stakeholders.

To do the right things and to succeed in the right things, we need to identify all relevant stakeholders: future generations, nature, and the many diverse groups of people who often fall between the lines. This requires us to push for that extra effort to engage more deeply.

The second part is;

How we respond when we receive any kind of feedback? How do we react?

Are we still trying to convince others to accept our message, story, and plan, or do we genuinely take their input into account?
Is it a real collaboration?
Are we designing the future and the surroundings together?

It takes courage to truly engage with all the relevant stakeholders, and that is where we would like to see leadership as well.

[Hossein] Courage, yeah. Any other questions? One there, and then, Ollie, and then I finish with a final question.

[Audience] Thank you. Elina, just building on what you were speaking about just now.

How do we shape the narrative for our end users, so they have the buy-in for the change that we want to make? I work in the public sector, so we get a lot of scrutiny due to our visibility.

How do we start bringing that conversation to the people that we're impacting the most, to make the relevant changes with the foresight of something not being completed for 10 years and costing XYZ?

Thank you.

[Elina] If I continue, I think we need to use all the skills and creativity to identify what motivates different people to give their input and feedback. That's sometimes difficult.

We need to think about what motivates them. How can we get them engaged so that there's actually some sort of shared vision.

I think that the motivational part varies even though the goal is the same.

So, customising what does this mean to you (each person). Then the conversation is more balanced, and we get people on board.

[Hossein] Anyone else would like to take that question? Ivan, Will, Lora?

[Will] That is a good answer.

[Hossein] Great. Ollie?

[Ollie] Thank you very much. As everyone from Ramboll, we're technical experts and we try to advocate to our team that design is the way to connect our technical expertise with the real world problems.

Engineers should be creative problem-solvers, full of ideas to consult on complex challenges.

I want to ask a question that may have different perspectives, especially from the architectural community.

I've had the pleasure of working with Ivan's practice, where engineers are seen as integral to the design process. But I've also worked with architects who have told us, "You're not designers, just make it happen."

So, should we just wrap up the conference by accepting that we're not designers? **Or is there a role for technical experts in design—if there is one indeed?**

[Hossein] Your name was mentioned.

[Ivan] You need the whole orchestra. As architects, our role isn't to have all the answers—it's to act as if we have no knowledge, to question everything. If we have any real skill, it's in listening and in bringing together the expertise of others, synthesising different perspectives, and sparking the ideas that lead to solutions.

Every project I've worked on has been shaped by the technical expertise of others. That collective knowledge is what generates the ideas that lead to great outcomes. I've never had the opportunity to work anywhere else, so I can't speak for how others do it, but this approach is what gets me excited to come into the office every Monday morning.

As I mentioned earlier, when you start your career, you think you know everything. Over time, you realise you know nothing—and that's when you truly start to appreciate the value of expertise around you. Without that, we have nothing.

So, if we think of design as an orchestra, architects may act as conductors, but it takes every instrument to create something remarkable.

And if you ever need another bow in the orchestra, I'd be more than happy to play my part.

[Elina] If I may add one thing, I think there's a huge potential in technical experts, not just in giving the right answers, but really using the expertise and knowledge to ask the right questions.

That's very much needed now with the rethinking of whole problem -

What are we solving? Are we successful in the right things?

So before starting to answer as an expert, the first thing is to think, **"Are we asking the right questions?"** and then there's a lot I think can be offered.

[Will] Before this job, I worked at Arup, and I was lucky enough to work with firms that always included the engineers from the outset on every project, so again, I've never been through that process. But since having this job, at the Institution, I've encountered lots of engineers who have exactly the problem you describe where they say, "Well, we don't get invited to the table, how can we possibly make change happen?"

But I think the answer is that there's always an opportunity to speak up, and maybe it won't be instigated on this project, but it lays the foundations for you maybe being asked next time to come to the table a little bit earlier. We run a training course called **Net Zero Structural Design.** We usually do it as a sort of institution thing and people sign up individually and sometimes we run it in-house and I get this feedback from engineers all the time

"We're not at the table."
"We can't make change happen."
"It's so hard."

We got asked to give the course in-house to an architectural practice.

And the feedback from the architects was, "But we never table early enough." *laugh*

And then, this is completely true, about six months later, I actually got the opportunity to give the same course in-house to a bunch of project managers at a County Council – the clients – and they said the exact same thing. *laugh*

So I think what it taught me was that no matter where you are at in this process, you will always be, you know, if you've got any scale of ambition and change things, you always feel like you're being held back by something and therefore the only thing you could ever do is to speak up when you not been asked to speak up.

And that architectural firm, what they ended up doing was they wrote a standard clause into their terms and conditions that says at the start of every project, no matter when they get appointed, they insist on running a **"questioning-the-brief workshop"** with the client.

The client has to attend, they don't have to take on board any of their suggestions whatsoever. They do it as a sort of fun afternoon where they all come down and they tear the project into pieces and say; **"What else could we have done?"**

And then, they leave it there and they said since they started doing it, the number of their repeat clients, who phoned them that little bit earlier and said, come in for a coffee has definitely gone up.

So, speak up when you're not being invited too.

[Lora] I think this ties back to the question of designing government and policy.

The mindset and way of thinking in these fields are quite different. Engineers and designers tend to bring a more agnostic point of view in interest in creating a solution rather than a dedication to what the solution has to be.

In contrast, public policy often starts with a predefined destination and a set route to get there, and it's about figuring out how to get down that route.

Even though engineering is often seen as a technical discipline, there's a deep creativity in it—the ability to problem-solve, adapt, and push forward.

That can-do mindset of engineers and designers has a real place at the table. In many ways, you should all think of yourselves as designers.

[Hossein] Thank you. I think we are almost out of time. If I could ask you to engage with just one final question—keeping your answer as brief as possible. It's just about the small matter of the future of our professions.

A key trait of leadership is looking ahead, anticipating change, and deciding which direction to take. The World Economic Forum's Future of Jobs report comes out every year—last week's edition stated that 40% of current jobs will be different within five years. That's a strikingly short timeframe. Some of us have been grappling with the idea of **foresight and the transdisciplinarity**—how AI and other technologies will reshape our work. And some professions that may disappear in five to ten years are very close to ours.

I won't name them, so as not to alarm anyone, **but I recommend the report to each and every one of you to read and form your own opinion.**

Take structural engineers, for example—those focused solely on optimising structural frames for efficiency. In the near future, that role may not exist in the same way, as powerful machines can now generate five million design options in just minutes.

So, just a small question: how do you see the future of our professions?

In 15 years, do you think we'll still have architects, structural engineers, facade consultants, and so on, all sitting around the table designing and delivering beautiful buildings? Ivan?

[Ivan] I hope so. Although you know, it has to be said, I think the profession is being eroded for sure. Hopefully, the lessons from Grenfell are important. This would have given some direction where it shouldn't have been eroded.

I think the profession will still be around. If it goes horribly wrong, go blame someone, not something.

[Hossein] So we still have our uses. Will, what do you think?

[Will] Well, I got asked this same question about seven years ago and I read the response recently and it made me cringe. So I'm just going to I'm not going to answer your question at all *laughs*.

It is impossible to tell, right? Absolutely impossible to tell. This industry is changing really quickly, we have no idea at all where we're going to be in 5-10 year's time.

I guess all I would suggest is trying to work out where we're going in one years time and making sure you've still got a job there and if you do that every year maybe it will work out.

[Elina] I would like to see the other side of the coin.

What are we going to lose?
But what can we get?
What's the potential?
Where should we be?
Where do we want to be?
What kind of professions do we want to see in the future?
What are other new crazy titles that we would like to see?

It's up to us to take leadership also on that.

[Lora] I started a conversation with my son last night. He's 10 years old. I was trying to convince him to start a coding club, because he has been coding before. We were saying, "You should really do it" and he turned to us and said, "I'm going to be able to tell AI to code for me. I don't need a coding club."

If that's the way that he's already thinking at 10 years old, he is going to require a different way of engaging with the world and utilising his skills than what I grew up with, and I can't even conceive of it.

So I am going to fill out this one and say I don't know. But I know that we no longer drive horse and buggy, and I know how to do a stick shift and I know that even that skill is going to be obsolete in the not-too-distant future.

[Hossein] So, we have four different answers: an **"I don't know", one "I won't answer", a "hopeful perspective", and one that "highlights the opportunities"**—as in, if certain jobs change, new ones will emerge, just as they always have.

We've never had so much technology. We've never had so many people in employment. The idea that technology is a job killer simply isn't factually correct, and I don't believe that will change.

With that, I want to thank you all for your participation in, and support of, this session and the whole of Ramboll Design Excellence Forum 2024 (#RDEF_24)











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FORUM **2024**
27 September
















Epilogue:

on creativity, continuity, system improvement, and system change

disruption is a fundamental attribute of creativity and innovation. a creative act introduces something entirely new, something that did not previously exist. by definition, it is non-continuous, diverging from mere enhancement or improvement of what already exists. continuous improvement within a system or organisation enhances efficiency — faster production, lower costs, or better processes — but does not result in a fundamental change to the system's outcome or purpose.

to achieve a change in a system's outcome — shifting to a desired state — a system change is required. such a transformation involves rethinking and redesigning the system itself, not simply optimising its existing processes.

foresight and future resilience are inherently tied to understanding systems, complexity thinking, and the navigation of uncertainty. they demand an ability to identify when incremental improvements suffice and when disruptive system changes are necessary to create meaningful, lasting outcomes.

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Special Acknowledgment

Peter Heymann Andersen, Ramboll
Arne Birkeland, Ramboll
Søren Brøndum, Ramboll

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Photo Sources

Session C, Patricia Viel

106 **Patricia Viel Portrait**
photo by Gianluca Di Ioia

107 **The Sky Taipei, mixed-use hotel tower**
photo courtesy of ACPV ARCHITECTS

107 **An experimentation using artificial intelligence for designing and producing ceramic tiles**
image courtesy of Reply, ACPV ARCHITECTS, Marazzi

108 **Biblioteca Europea di Informazione e Cultura (BEIC), Milan, Italy, competition entry by ACPV ARCHITECTS**
render by ACPV ARCHITECTS

109 **Cascina Merlata residential buildings, Milan, Italy**
photo by Giovanni Nardi

116 **Milan offices of ACPV ARCHITECTS**
photo by Gianluca Di Ioia

118 **Digital model of Enel Headquarters in Rome, Italy**
image by ACPV ARCHITECTS

119 **Optioneering**
image by ACPV ARCHITECTS

122 **Office buildings by ACPV ARCHITECTS at MilanoSesto Unionezero, an urban regeneration project in Italy, and one of Europe's key developments**
render by ACPV ARCHITECTS

Session C, Sara Sheikh Akbari

126 **Vitra Fire Station**
© Christian Richters

128 **MAMAXXI: Museum of XXI Century Arts**
© Iwan Baan

129 **London Aquatics Centre**
© Hufton + Crow

130 **King Abdullah Petroleum Studies and Research Centre – KAPSARC Project**
© Hufton + Crow

133 **Heydar Aliyev Center completed in 2012**
© Hélène Binet

134 **BEEAH Headquarters**
© Hufton + Crow

137 **BEEAH Headquarters**
© Hufton + Crow

138 **Striatus 3D Printed Concrete Bridge**
© Studio Naaro

Session D, Ivan Harbour

160 **Ivan Harbour Portrait**
Sarah Lee

161 **Scandicci Nuovo Centro Civico**
Alessandro Ciampi

162 **Preamble RSHP's Constitution**
RSHP

163 **RSHP's Office in the Leadenhall Building**
Paul Raftery

164 **RSHP team in rainbow colours**
Katsuhisa Kida

165 **RSHP's team collaboration**
Lucie Goodayle

167 **Antwerp Law Courts viewed from the tram line**
Katsuhisa Kida

167 **Antwerp's angled trees**
RSHP

169 **Concept model of Bordeaux Law Courts showing the city context**
Studio Littre, Paris

170 **Terminal 4, Barajas Airport - Modular roof study**
Amo Kalsi / RSHP

170 **Terminal 4, Barajas AirportAirport**
Richard Bryant / arcaidimages.com

170 **Terminal 4, Barajas Airport - Satellite section model, scale 1:200**
Modelshop / RSHP / DA Studio

172 **International Towers Sydney**
Brett Boardman

173 **Capodichino Metro Station**
Leonardo Pelleriti / RSHP

174 **Lloyd's of London**
Richard Bryant / arcaidimages.com

174 **Bordeaux Law Courts Christian Richters**
Christian Richters

174 **International Towers Sydney**
Brett Boardman

174 **Minami Yamashiro Elementary School**
Katsuhisa Kida

174 **Terminal 4, Barajas Airport**
Richard Bryant / arcaidimages.com

174 **Maggie's West London Centre**
Morley von Sternberg

174 **Crofts Street**
Joas Souza

174 **Senedd Cymru, Welsh Parliament**
Edmund Sumner

176 **Metro Tunnel Project - Parkville Station platform (Design developed by Hassell and Weston Williamson + Partners in conjunction with RSHP)**
Metro Tunnel Project Office (MTPO)

176 **Metro Tunnel Project - Arden Station (Design developed by Hassell and Weston Williamson + Partners in conjunction with RSHP)**
Gemma Pearson / RSHP
Courtesy of Metro Tunnel Project Office (MTPO)

177 **Oxley Woods mock-up**
RSHP

177 **Lloyd's of London mock-up**
Stephen le Roith / RSHP

178 **Pompidou Centre plan**
RSHP Archive

179 **Terminal 5 Heathrow Airport section**
RSHP Archive

180 **Terminal 4, Barajas Airport**
Roland Halbe

Session D, Will Arnold

185 **LETI (2017)**
© LETI

190 **Holbein Gardens**
© Philip Vile

Session D, Panel

204 **Richard Rogers at the weekly design forum**
Melissa Castro Duarte / RSHP

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RAMBOLL

Non-fiction www.ramboll.com
ISBN-13:978-981-94-2745-1
9 789819 427451