

the

edit

the edit

Welcome to The Edit, a magazine showcasing the very best of Buro Happold's work over the past year.

Find out how we are tackling the climate emergency, as well as our commitment to equity. We cover the future of modular construction and examine the link between good design and mental health. Ground engineering and all its challenges are discussed, plus we reflect on the economic and social value of urban renewal.

Speaking to six female engineers, we discuss their careers and what they and their colleagues really want. Specialists Becky and Paul talk through their work in Analytics and Coastal and Maritime Engineering, plus there's insight into low emission zones, digital twins, inclusive design and much more.

Founded in 1976, Buro Happold is a world-class global practice of engineers, consultants and advisers. Our founder, Sir Ted Happold, believed that it was out of the different skills and bodies of knowledge we have across our firm, that the quality of what we do really emerges. This culture of collaboration and respect is as strong today as ever.

The Edit was produced remotely from the kitchen tables of Bath, with support from colleagues (and their kitchen tables) all around the globe. We're grateful to everyone who contributed to this first edition — we couldn't have done it without Teams, and without you.

Welcome

- 6 **CEO introduction**
James Bruce on how we are creating positive outcomes for our clients and communities.
- 8 **Client forward. Customer focused. Outcomes delivered.**
Craig Schwitter on the legacy of our work and nurturing client relationships.
- 12 **Equity above all else**
What we are doing to reduce inequality and promote equity.
- 16 **Putting our people first**
Misti Melville on how we are improving our business through the growth and development of our people.
- 88 **Financial focus**
Sean Mulligan on growth, expanding our consultancy and advisory services; profits, performance, liquidity and capital.

Key projects

- 10 **Providence River Pedestrian Bridge**
Curved geometry, a steel frame and wood decking characterise this structure.
- 14 **Academy Museum of Motion Pictures**
The world's premier moving image museum.
- 20 **European Spallation Source (ESS): Target Building Roof**
The opening of the ESS heralds a new era of particle science research.
- 86 **Fry Building, University of Bristol**
A winning formula for a sophisticated heritage refurbishment.

10



Features

- 22 **The green recovery**
Six ways Buro Happold is fighting the climate and biodiversity emergency.
- 28 **What happens when a building stops being useful**
Transforming buildings to align with how we live now.
- 36 **Designing in happiness**
The link between the built environment and our mental health.
- 42 **Riding high**
Buro Happold's top Indian projects, plus reflections on the development of Mumbai.
- 46 **Data is king**
Why building management and data collection are more important than ever.
- 50 **Changing perceptions**
What women who work in engineering really want.
- 58 **Unit trust**
Why clients can put their faith in our creative approach to design for modular construction.

- 62 **Connecting communities**
Plans for urban regeneration in Hong Kong and cultural development in Shenzhen, China, plus a new computational consulting service.
- 64 **Intelligent masterplanning**
Successful projects start with solid masterplans; we look at Berlin Brandenburg and the New Gartenfeld in Germany.
- 70 **On solid ground**
Contamination, communication and coffins; big issues Buro Happold's ground engineers have to deal with.
- 74 **Q&A with Wolf Mangelsdorf**
The Global Head of Design, Technology and Innovation on shaping and developing his vision for the business.
- 78 **Redlining land use – then and now**
Tackling the inequities of discriminatory housing and land use policies that intentionally segregated communities.
- 96 **Matt+Fiona's Design Unlimited Workshop**
Our community outreach work with the Happold Foundation.

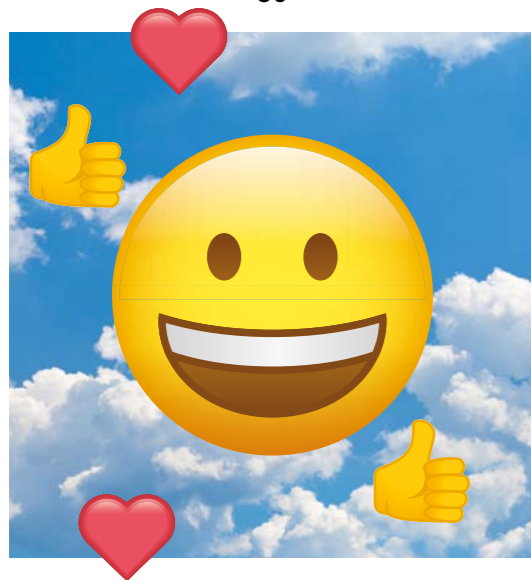
Specialist Q&As

- 34 **Becky Hayward**
Analytics expert Becky on why we need to embrace data.
- 68 **Paul Brenton**
We talk to a marine expert Paul about the threats facing our coastline.

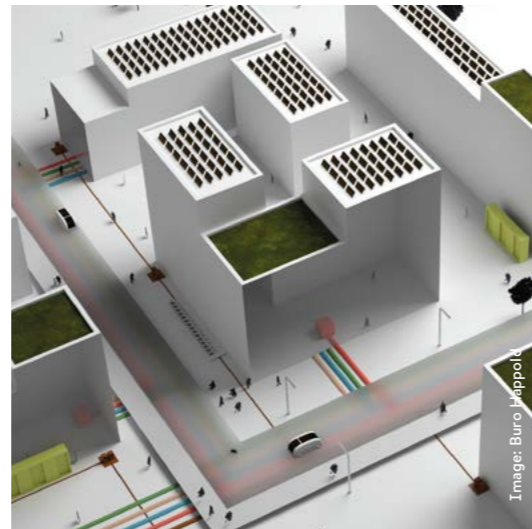
On...

- 54 **Digitisation revolutionising the construction industry**
- 55 **How Jewel entices travellers to Singapore**
- 56 **Maintaining inclusive practices during the pandemic**
- 57 **Why Ultra Low Emission Zones work for cities**
- 82 **Repurposing science buildings**
- 83 **Supporting New York's small venue theatre industry**
- 84 **Beautiful bridges**

36



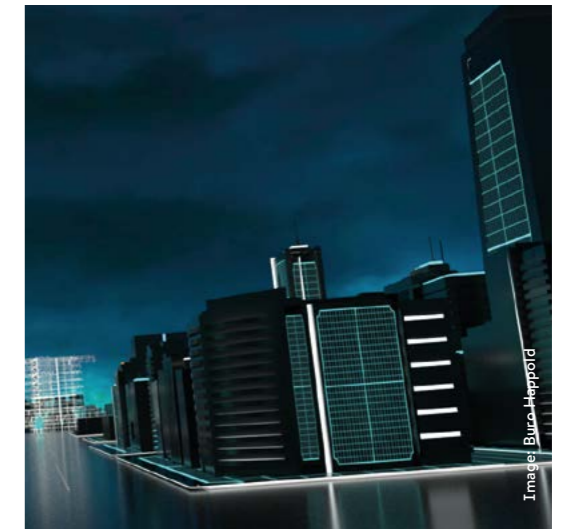
64



34



54



CEO introduction James Bruce



James Bruce
Chief Executive Officer

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Our 45-year heritage of tackling complex engineering challenges in the built environment puts us in the perfect position to advise and design exceptional solutions for our clients, anywhere in the world.”

Buro Happold has faced some major challenges over the last two years. However, our core characteristics ensure that we continue to thrive, creating positive outcomes for our clients and the communities we serve. Our strategy remains the same — we aim to build greater resilience, grow our capabilities outside the UK, expand our consultancy and advisory services and above all, attract and retain the very best talent in every discipline.

The impact of the Covid-19 pandemic tested our economic resilience and adaptability. However, the skill, dedication and enthusiasm of our people, and the agility of our business, meant we learnt to work in a new way.

We are more than a business. We care about the legacy of our work, our people and the planet. Our culture is driven by a collective responsibility to create a better built environment for all. Our values and vision underpin everything that we do — we are a diverse, one-firm culture that strives for inclusivity and equity above all else.

Equity above all else

The social, economic and political unrest of the last two years has had a seismic impact on our global business. It made our global leadership team reassess our definitions of equity and reconsider how we support all minority communities. We have strengthened our connections and created new communities among our people. These are positive steps, but they need to be maintained.

Our commitment to being a truly anti-racist organisation must not waver. These crises — alongside the climate and biodiversity emergency — have brought a heightened focus to the critical importance of equity in everything that we do.

Our founder, Sir Ted Happold, rooted the company's ethos in the importance of social value. We are continuing to work with our clients, partners and the wider industry to address the impact the built environment is having on social value, equity and climate change. We must address these inequalities and deliver exceptional outcomes for our clients, our communities and the planet.

Our consultancy, advisory and engineering excellence

Our heritage of design excellence underpins the transformation of our business. We design outstanding buildings and tackle complex engineering challenges. This puts us in the perfect position to advise and design outstanding solutions for our clients, anywhere in the world.

With this in mind, we are enhancing our consultancy capabilities in addition to our world-renowned engineering expertise for a period of rapid acceleration.

The growth of our consultancy and advisory service by 20% in 2021 shows this work has already begun. By using technology to collect and analyse data, our consultancy experts help clients to make the best decisions. The creation of a new building may not always be the right choice; adapting or repurposing existing facilities could provide a better, less impactful, solution. Our understanding of this data turns insight into opportunity and opportunity into revenue.

We have worked on some of the world's most influential buildings. From Tottenham Hotspur's new football stadium in London and Dubai's Museum of the Future to Jewel Changi Airport in Singapore and Los Angeles' Academy Museum of Motion Pictures, we have built a world-class reputation for delivering innovative, creative and sustainable solutions.

Our expertise in building retrofit has allowed us to reimagine existing structures around the world. From Manchester's Jewish Museum to New York City's Tammany Hall, we prioritise building restoration, refurbishment and retrofit over demolition in order to minimise our environmental impact.

Our consultants have been working with C40 Cities to develop climate action plans for 26 cities across South America, Asia and Africa to tackle climate change and drive sustainable urban development. Moreover, we are also advising cities like Toronto and Milan on how to transition to Clean Construction.

Our routes to market through our sectors have remained strong. We are also extending our global reach. Our presence in Europe, Asia and the US has strengthened, supported by the opening of new offices in The Netherlands, India and Indonesia.

In 2021, we bolstered our specialist consulting capabilities with the acquisition of brightspot, Paladino, Vanguardia Ltd, and its subsidiary Crowd Dynamics International. Higher education consultancy brightspot and sustainability consultancy Paladino not only enhance our growth strategy in the US, but they also broaden our service offering to clients in the region. UK-based Vanguardia and Crowd Dynamics International are world-leading acoustics and audio-visual consultancies. Having worked together on renowned sports and entertainment projects for more than two decades, Buro Happold and Vanguardia have delivered some of the finest venues and experiences across the globe.

These acquisitions signal a period of rapid acceleration for our business and the wider industry. It increases our breadth and depth of expertise, strengthens our client consultant teams and helps to solve the complex challenges affecting the built environment. More than ever, Buro Happold remains committed to client focus, creativity and collaboration.

Our climate commitments

We are continuing to work towards an equitable and green recovery to mitigate the climate and biodiversity crisis. Achieving a net zero carbon world remains our greatest challenge.

In April 2021, we hit an exciting milestone on our sustainability journey. In line with the UN Global Compact and the ambitious target set in the Paris Agreement, Buro Happold became net zero carbon globally. We have committed to reducing our operational carbon emissions to help keep global warming below 1.5°C, and our five-year targets have recently been verified by the Science-Based Target Initiative (SBTi).

This positions Buro Happold as an industry leader. We have the skills, expertise and drive to spearhead a green recovery that is healthy, sustainable and fair. We have pledged that all our new build projects will be net zero carbon in operations by 2030. In addition, we have set a target to reduce the embodied carbon intensity of all new buildings, major retrofits and infrastructure projects by 50% by 2030.

Our people

Buro Happold is proud to reflect the varied cultures of the communities and clients we serve. We strive to create a safe and inclusive workplace for all our people to thrive.

The appointment of 17 new Partners in May 2021 (the highest number chosen in a single year) is a celebration of the evolving practice that we are today. The cohort work in five countries, 12 offices and within a variety of disciplines and specialisms. They bring broad geographical and industry expertise, diverse lived experiences and an energy that will drive the growth of our business. The work they do supports our commitment to shape an equitable and sustainable future. Moreover, the appointment of two non-executive directors adds further strength and diversity to our leadership team, supporting our strategy for continued growth in 2021 and beyond.

Over the next six years, I plan to grow the practice significantly, in order to create a more regionally balanced business. Currently active in 26 locations worldwide, my ambition is to double our practice from 2,000 to 4,000 employees. We aim to build greater resilience, grow our capabilities outside the UK, expand our consultancy and advisory services, and above all, attract and retain the very best talent in every discipline.

The fact that we not only survived but thrived during 2020, and continue to do so in 2021, is testament to our people. I have always known that Buro Happold was an exceptionally talented community of individuals, but we have proven to be an exceptionally resourceful, dedicated, flexible and robust team of experts.

The business continues its strong performance by vigorously promoting a strategic focus on design, consultancy, sustainability, equity and technology. It is a really exciting time for Buro Happold. **BH**

CLIENT FORWARD. CUSTOMER FOCUSED. OUTCOMES DELIVERED.

Change. Transform. Shift. Move. Accelerate.

If the last two years have demonstrated anything, it's to be agile in the way we work. We must continue to rethink our approach and respond to the rapidly changing needs of our clients. The motivations for this are all around us – climate change, health security, new modes of working and digital independence. All of these factors have an impact on urban and rural infrastructure.



Craig Schwitter
Senior Partner, Chair of the Global Board



As we put clients at the heart of our organisation, we are starting to think of their problems and challenges as if they were our own.

Image: Buro Happold

How does Buro Happold continue to evolve and compete in this dynamic world?

We go back to where the firm started in 1976 – with relationships. Technology shifts and their successful implementation are created through personal connections and relationships cultivated over time. These relationships are changing for Buro Happold.

We need to focus on working together and collaborating with our clients, getting deeper into their organisations and really understanding their needs and challenges. Whilst we've been shifting our focus in this direction for the past decade, it's the next five years that will see the most change in our practice. We are accelerating and these relationships are at the heart of a client centric and client forward approach.

How do we achieve this?

Whilst key projects remain the lifeblood of our practice – the next stunning stadium, the next carbon neutral headquarters etc. – the larger scale challenges of our clients can only be addressed across their wider enterprises.

Our next step isn't just to improve a client's building, but rather, how can we move their business forward.

For example, how does a multi-national technology company become carbon neutral? How does a client with facilities around the world adapt its infrastructure to climate change? How does a city reimagine their transport network? What are the higher education models of the future? How can government investment in urban development deliver a cultural change to its citizens?

Our projects won't be end cases alone. Rather, they will be part of a broader scope of work with our clients. This connectivity is a journey to more successful outcomes and outputs for their organisations. As we put clients at the heart of our organisation, we are starting to think of their problems and challenges as if they were our own.

Looking to the future

As engineers, designers and consultants, we've been trained to optimise the many components of our clients' problems. Our engineering solutions have delivered everything from lighter

buildings and efficient environmental controls to less congested transport networks and drought resilient landscapes. These skills have served us well and will continue to do so.

However, we must now consider the entire system and not merely be satisfied with that single climate friendly solution. Our focus needs to be on how that solution enables our clients to further research, develop, discover, educate, invest, entertain, manufacture, etc.

Our next steps don't leave behind all the successful projects Buro Happold has delivered to date. We will continue to build upon our legacy and strengthen these skills, as well as widening our services as we adapt to our clients' needs.

We must be agile to new challenges and adopt new skill sets. We must open ourselves up to not knowing how to solve every solution; but we must remain confident that as a firm we can achieve anything together.

It's time for a new chapter at Buro Happold. Buckle up. **BH**

PROVIDENCE RIVER PEDESTRIAN BRIDGE

PROVIDENCE, RHODE ISLAND, USA

Services provided by Buro Happold:
Structural engineering.



Equity above all else

The Covid-19 pandemic highlighted the depth of inequality within our societies, with the most vulnerable groups often experiencing the harshest impacts. As global events shaped our everyday lives, we retreated into our homes, and some of us increased our connectivity exponentially in a new virtual world. Inequality became more visible.

As we continue to learn how to navigate our way through the effects of the pandemic, we continue to focus on our inclusion efforts through an equity lens.

Our commitment to **Equity Above All Else** remains strong. We are proud to see the collective efforts of our employees come to life through our project work, and the benefit this brings to the communities we serve. As a global business, we have concentrated on ensuring that each of

our regions has a clear plan of action as outlined in their regional equity plans. Within these plans are metrics that highlight improved representation of minority groups, more complete demographic data collection, gender pay gap reductions and insights into retention.

By adopting a model of **continual listening**, we will use data to help us better understand the employee experience, which allows us to measure inclusion at Buro Happold. We are dedicated to measuring our progress and holding ourselves accountable through improved people analytics. Analysing and publishing our UK Ethnicity Pay gap for the first time is an example of this.

In response to the findings of our externally led **Inclusion Audit**, we are focusing on ways to enhance our supplier diversity. Moreover, we are helping all those we engage with on

their inclusion aims where possible. Engaging with minority or women owned business collaborators is a priority for us.

In partnership with trusted organisations and leading institutions, we are continuing our work to **reduce barriers** into entering the architecture, engineering and construction (AEC) industry. In addition, we are engaging with mentoring and internships programmes such as #10,000 Black Interns, AEC Mentor Programme and the RAE Engineering Leading Scholarships Scheme. In turn, we are increasing the breadth of our talent pipeline through ensuring opportunities to enter the profession are available to everyone including marginalised communities.

Building on the work we have done over the past 12 months on **inclusive behaviours and leadership**, we have chosen allyship

as our 2022 focus. We recognise that this is a life-long process of building relationships based on trust. Therefore, we are equipping ourselves with the knowledge and tools to actively promote and advance inclusion at Buro Happold and within the AEC industry as a whole.

Our 2021 Culture Survey revealed that 98% of our employees feel that they have a **responsibility to create an inclusive culture**. Our next step is ensuring that everyone has the tools and confidence to do this comfortably. Creating psychologically safe spaces for employees will be key to our success.

We are excited to be working and learning as one collective global practice. Together, we are shaping a more inclusive and equitable future for ourselves and our communities. **BH**

“

Our commitment to *Equity Above All Else* remains strong. We are proud to see the collective efforts of our employees come to life through our project work and the benefit this brings to the communities we serve.”



ACADEMY MUSEUM OF MOTION PICTURES
LOS ANGELES, CALIFORNIA, USA
Services provided by Buro Happold:
Structural engineering, MEP engineering,
environmental consultancy, energy consultancy,
IT services, lighting design and sustainability.

Putting our people first



Misti Melville
Chief People Officer

Buro Happold’s Chief People Officer Misti Melville on how we’re strengthening our practice with a talent-centric recruitment and retention strategy.

Valuing our people

What’s unique about working for Buro Happold is our commitment to being both client and talent centric. We have strong beliefs that everyone can make a positive difference in the world – on their projects, for their clients and for themselves. Our people care about the legacy of our work and the impact it has on our planet and our communities. This is embedded in our culture and values.

The Buro Happold values underpin the growth of our practice. Our business model is democratic. It’s built upon on a combination of regional empowerment and global connectivity, embracing shared knowledge and collective communication between our leaders and our people. Fostering an inclusive, equitable and diverse business is at the centre of everything we do.

My focus as Chief People Officer is on improving business performance through the growth and development of our people. Unleashing the potential of our highly talented teams is our priority. Engaging and retaining talent as well as driving a culture of shared learning and collaboration are the areas where my team and I add value to the business. Currently, we are focusing on bringing in senior leaders to drive this change through regional empowerment across our sectors, disciplines and specialisms.

The challenge for our teams is to find the balance between engaging and empowering their teams whilst also bringing in

new talent to achieve a symbiosis between our talent attraction strategy and our talent retention strategy. In my role, I aim to guide the business to ensure that we achieve a balance between the two.

I don’t think there’s ever been more of a focus on talent than right now. It’s the number one issue not only for our industry but across all sectors. We know that it’s the differentiation of how we approach talent that will give us the edge. I believe that we need to lead and engage our teams with a similar approach to how we nurture client relationships. This will ensure that we deliver their drivers, needs and ambitions, and we are placing real emphasis on developing team leaders to drive this agenda.

Our differentiation

Buro Happold is founded on our great people, which is what makes our firm so special. As we’re not a behemoth company, so we can be more agile and nimble in comparison to many of our competitors. Therefore, our people can make a bigger impact within their sector or specialism, particularly within our environmental, social, and corporate governance (ESG) agenda.

We don’t just pay lip service to our ESG agenda and policies. Our global leadership and HR teams are working on ESG-centric policies to ensure that we instigate positive change within the built environment. Taking collective climate action and setting sustainability objectives applies to all areas of our business – in our operations, on our projects and in our individual career plan objectives (My CPO). My CPO encourages →



Images: Buro Happold



Réka’s story

I always knew that I wanted to be an engineer.

I think what Buro Happold does really well is to have this carefully curated group of people trying to, you know, make the world a better place.

Réka Berkes
Infrastructure Engineer
on Elephant Park, London



our employees to set personal annual targets not only related to their role but to the impact they can make on the environment and/or equity for all. We want our people, policies and practices to be influenced from the ground up, not the top down.

Fostering a culture of equity and inclusivity

We are continuing to improve our organisation by embracing mutual responsibility and reflecting the varied cultures of the communities and clients we serve. Global connectivity and knowledge sharing are the foundation of a strong business model.

We encourage multiple forums to capture the voice of our people, particularly around equity, diversity and inclusion. Our computational collectives drive digital excellence, while innovation labs and other programmes develop skills in building trusted adviser relationships with clients. Our equity initiatives have evolved by using many different channels to hear what people across the firm have to contribute. By amplifying employee voices, we are driving positive change within our ESG strategy.

We know we have a lot more to achieve but we're on the right path to becoming an even more inclusive and diverse organisation. The results of our 2021 Culture Survey indicate that Buro Happold fosters a culture of inclusivity and that our people feel a strong sense of community within their teams. It's significant that 98% of our employees believe they have a responsibility to help nurture this culture. We want everyone to have a place where they belong, a voice that's heard and the opportunity to thrive at work. Our global HR team help drive this cultural evolution in partnership with our leaders and employee representatives. We believe that allyship is key to our success and longevity as a business.

I'm very proud that my team is so passionate about employee engagement and empowerment. They encourage open dialogue, raise awareness, nurture an inclusive environment and provide many learning and developmental opportunities to help people understand their role in fostering a diverse and inclusive environment.

I believe that our people are our most precious resource. Their engagement is the key to driving trusted client relationships.

Regional empowerment, global connectivity and business growth

Our growth strategy around client and talent centricity aims to build relationships of trust with our clients, collaborators and our people. Not only is this about safeguarding business resilience and providing a healthy return on our investment, but it's also about providing continuous learning and career opportunities for our people.

For over 40 years we have built a world-class reputation for delivering innovative and value-led engineering solutions. However, that doesn't mean we're resting on our laurels. We care deeply about the ongoing improvements to the quality and legacy of our work.

It's not a one size fits all approach at Buro Happold. We understand that all our offices have an individual identity. People need a sense of belonging to their team as well as regional autonomy. Our focus is also on the benefits of our people being joined up globally around clients' needs, areas of expertise (our disciplines), and our deep sector knowledge.

Buro Happold is continuing to grow around the world, and I believe it's an exciting time for people to be part of this growth. Consultancy, advisory and technology are important areas for this growth alongside continuing to offer design excellence and innovation.

I believe that our people are our most precious resource. Their engagement is the key to driving trusted client relationships. What's different about Buro Happold is that we celebrate the people behind the projects. Our recent Culture Survey revealed that 95% of our employees felt pride working for Buro Happold. However, they're also hungry to upskill, gain new expertise, learn about different cultures, achieve diversity of thinking and relish new ways of working.

Our recent acquisitions of Vanguardia Ltd, and its subsidiary Crowd Dynamics International, help us achieve this as they share this set of values. These companies continue to have their own identity, but they add to our rich culture by being part of Buro Happold. Our aim is to partner and collaborate with them – we believe that we'll learn as much from them as they will from us.

Flexible career paths

As a result of the increased digitisation of our industry, we provide continuous on the job career and development opportunities for our people. We offer a more agile career path with global and multidisciplinary service offerings.

My career advice for everyone is to broaden your ideas on what's possible and be open to opportunities along the way, especially those that take you out of your comfort zone or help you develop a global mindset. Now that we're moving away from more traditional or rigid career path trajectories, embracing diversity of thinking and experience will make us more resilient.

Now that we're moving away from more traditional or rigid career path trajectories, embracing diversity of thinking and experience will make us more resilient.

This philosophy also helps to push the boundaries and encourage people to be less risk adverse with their careers. Increased digitisation means that we must continue to evolve our careers with client-centricity playing a key part. This requires a proactive and multifaceted approach to client relationships. Part of our differentiation as a firm will be in the identification of non-technical skills that are also required on projects. By taking a more holistic approach to our projects we can provide advice or consultancy that's valuable to our clients based on experience that goes beyond technical qualifications.

Wellbeing and resilience – the impact of the Covid-19 pandemic

From the beginning of this unprecedented global pandemic, we have put our people's wellbeing first. Company-wide collaboration and responsiveness through continuous monitoring and communications via multiple channels has meant that we've been resilient as a business. It's testament to the efforts from every person in the firm that we achieved this resilience. The result from our Culture Survey indicates that 96% of our people feel that Buro Happold responded well to the Covid-19 pandemic.

What the pandemic has shown us is that some of the fears we had around physical team supervision, control of work and presenteeism were unfounded. Of course, we are still finding our way through Covid-19 and are continuing to adapt our business operations and organisational design. We are adapting not just from a Covid-19 perspective, but in terms of how people want to manage the future of their working relationships, with both clients and colleagues. Covid-19 has accelerated the flexible work practices that were already in operation. Through our internal surveys, feedback and other forums, we know that our people want increased flexibility in terms of where they work, how they work and the times they work.

We've learnt that our teams work very effectively without having to see each other face-to-face every day, and indeed not reside in the same location. Yet, the majority of

our people also want the face-to-face social interaction, mentoring and career development that comes from being in an office environment. However, I know that people won't want to go back to one strict model of working.

No one person is the same – everyone has different needs and views on what their working pattern should be dependent on their individual role and circumstances. The sweet spot is finding a balance between what works for the individual, what works collectively for the team and what works for our clients.

Our flexible hybrid working model has been made possible through the utilisation of technology. Fortunately, we've proved that we're a highly digital workforce, particularly in the way we collaborate internally and with our clients. The momentous efforts from our people and leaders throughout our global practice, our superb team of HR professionals, the reliable systems and technology, and the strong support from our IT team has helped us through the pandemic. This increased digitalisation has bolstered our collective working practices to enable us to seamlessly operate and effectively serve our clients and communities.

Of course, it's a real work in progress as we continue to develop our agile working practices. I want to see how we can personalise the approach as much as possible in order to provide opportunities that cater for both the individual and our teams. Whilst each country that we work in operates different tax and legal systems, I have no doubt that people want a new working paradigm. We have the expertise within Buro Happold to drive this change.

Despite all the challenges over the last 18 months, our business has remained resilient. We continue to put our people first, striving for a sustainable and equitable environment for all. Our people are overwhelmingly proud to work at Buro Happold (95% say so in our 2021 Culture Survey) as am I. I know that we have the right foundations in place to grow from strength to strength. **BH**

**EUROPEAN SPALLATION SOURCE (ESS):
TARGET BUILDING ROOF**
LUND, SWEDEN

Services provided by Buro Happold:
Computational engineering, structural engineering,
and facade engineering



The green recovery

How Buro Happold is fighting the climate and biodiversity emergency

Buro Happold has had to move fast. Climate change and decarbonisation are at the forefront of every client's agenda, and it is our job to provide the high-level technical and consultancy skills to help them address these issues.

Things aren't normal at the moment, but the promise of normality is coming. We want to ensure that as we return to buildings and cities, we are able to "tilt" that normal, and use our experience to create better, more balanced environments. In our field of work, we can make a big difference to the new world we all seek to build.

We understand the urgency of the climate and biodiversity crisis facing us. As we emerge from the depths of the Covid crisis, this needs to be our top priority – both in terms of how we tackle individual projects and the guiding principles by which we live and work.

This is about far more than restoring things to how they were before the pandemic. For built environment professionals, the greatest impact we can have is on how our work affects the environmental future of the world around us.

The principles we will have to adopt are absolute and will cause disruption and change at every level. At Buro Happold we pride ourselves on bringing change and have the expertise, skills and drive to spearhead a green recovery. This isn't just an aspiration, but something we have long been promoting in every aspect of our work.

Here, we outline just some of the work we are doing to become a positive force in the fight against climate change. →

The Road to COP26:

Human-induced climate change is here.

Extreme weather events are occurring in every region across the globe, causing social, environmental and economic crises. If emissions do not fall in the next two decades then it is very likely that temperatures will continue to rise to three degrees above pre-industrial levels, intensifying the emergency.

However, it is still possible to work together to change course. It is still possible to make deep reductions in greenhouse gas emissions, to limit global warming to 1.5 degrees, and to enable environmental and social justice for all.

Buro Happold is committed to restoring our ecosystems and habitats for humans and non-humans alike. We recognise that the industry must make strong, sustained change to design and create environments from the building to a regional scale that are sustainable and fair. As engineers and consultants, we are committed to working with clients and partners to better our industry, our cities and our communities.

Together, we must have the courage to effect change and take collective climate action.

Collective Climate
ACTION



Thinking ahead

We can't just create buildings and cities which improve things today — we have to consider ways to ensure they can adapt with the times. Resilience in design is crucial to our work — we know that today's cutting-edge solutions will be tomorrow's second best. This focus on futureproofing goes across society, community and economy, but the environmental element involves us implementing systems which allow for change, both now and in the future.



I can see clearly that structural engineers have the knowledge and ability to change things. We have a duty to help drive construction decarbonisation and reverse the damage done to the planet through greenhouse gas emissions and direct destruction of natural systems. I want to look forward to the future — because the next 50 years matter a lot more than the last. I do this with some trepidation, but I am convinced there is potentially a lot to look forward to — if we do what needs to be done, NOW.”

Dr Mike Cook, Project Principal

We are declaring a climate emergency

Buro Happold was part of the first group to take action as architecture, engineering and construction firms declared a climate emergency and made tangible commitments to tackle the problem. Last year, we were instrumental in encouraging companies and industry bodies to make these commitments, by instigating the formation of Engineers Declare and Architects Declare. We have continued to build relationships across sectors to encourage others to adopt the “Declare” goals, both in our day-to-day relationships and through networking and engagement.

We are working with our communities

The green recovery is something we are all focused on, so we can't afford to work in silos. We have to align with sectors and disciplines outside of engineering, and outside of the private sector. Our work isn't just about devising innovative solutions ourselves. Stakeholder and community engagement is vital for tapping into the local knowledge we need to achieve forward-thinking and far-reaching outcomes for our clients.

We've worked with the University of California Los Angeles (UCLA), local leaders and community stakeholders to develop a roadmap to provide a healthy, sustainable region. The Los Angeles Countywide Sustainability Plan tackles

climate and sustainability problems in the most complex county in the United States, with over 10 million residents and 88 incorporated cities. The plan covers resources and services including water, energy, transport, health and housing, to leverage resources across Los Angeles County, with the goal of making this well-known area one of the most sustainable on the planet.

Our people are looking at change on a bigger scale

Masterplanning a region offers opportunities for a much greater scale of change. We can make a building sustainable, but to be given the opportunity to address the problems of any city or region is an incredible opportunity. This is exactly what we've been doing in Berlin-Brandenburg.

Our work in this region takes a new approach to masterplanning, one which examines how an area can become a sustainable, self-sufficient system. Brandenburg is rich in material resources such as water, energy and building materials, and our masterplanning solution, set out on pages 60-63, uses these resources to help the city of Berlin generate what it needs locally.

We create healthy buildings

The offices of the future will provide more than just a place to work. New designs will prioritise employee wellbeing and create workspaces which can be run more sustainably. In many

ways, the innovations needed to achieve this go hand-in-hand with transformations which boost their climate credentials.

A prime example of this is our work at Castlemead in Bristol — which transformed the basement of a 1970s office block into the highest-rated cycling facility in the UK. Encouraging office workers to use the facility improves both their own health and gives them an incentive to leave their car at home. Buro Happold will be continuing work at Castlemead over the coming year to create an open plan office and design a workspace which uses less energy but boosts the health and wellbeing of its occupants by using natural light.

We will meet and exceed our net zero carbon goals

We're not just limping into a commitment to reduce our carbon usage — we want to be a positive force for change. This doesn't just mean helping individual clients build in a sustainable way, but taking extra steps to make all Buro Happold's operations carbon neutral.

In April 2021, we validated our Science Based Targets (SBT) and the offset of our greenhouse gas emission for 2019/20. This aligns with our net zero carbon commitments in our projects and our operations. This achievement sets up apart from the vast majority of business across all sectors. We are following this up with work to ensure that all new build projects achieve net zero carbon by 2030. In addition, we continue to work with government and industry bodies to meet and exceed net zero commitments.

We are changing our energy infrastructure

When discussing tackling climate change, the question of where our energy and fuel comes from is one of the primary topics — whether the conversation takes place in a pub or in a boardroom. It's easy to forget, however, that it isn't just about changing our fuel sources to something more sustainable. We have to consider what to do with the decades of infrastructure built to supply yesterday's world.

Over the past two years we have been part of the Home Energy Efficiency Team (HEET) in Massachusetts, developing a feasibility study into replacing the state's gas infrastructure. Extensive, data-led research examined the economic and engineering viability of replacing 6,000 miles of ageing and leak prone pipes with GeoMicroDistricts — GSHP networks, serving street segments that are interconnected across a district. This solution improves as the customer base increases, both in terms of efficiency and economy. It can also better manage system capacity, integrating thermal energy sources and backup systems as needed. Following the release of our study, HEET is now piloting the GeoMicroDistrict concept in 2021. →



Mayfield

First new park for 100 years

Located in the heart of Manchester, UK, next to Piccadilly station, the Mayfield project lies within a disused, urban setting which no longer provided any use for the community. It was a derelict industrial site which had seemingly become Manchester's forgotten district. However, redevelopment plans have proposed a mixed-use scheme with 1,500 homes, office spaces and a vast array of amenities.

Buro Happold's role was to progress the careful work needed to restore and retain elements which help support the city's biodiversity. As well as transforming the site in line with the client's aims, we helped create a haven for nature in the midst of an industrial, urban setting.

Revitalising the river

The River Medlock runs through the centre of the site, and Mayfield is one of the first urban developments to make use of a watercourse running through it. In its existing form, the river is canalised with brick on both sides, but in opening it out through the removal of these walls, we improve the quality of the river with natural flooding.

Breathing space for city residents

It will provide the first new park in Manchester for over 100 years, and the only one located in the city centre. While this offers residents a green space in the most unlikely of places, a core focus of its construction was increasing biodiversity. Native wildflower species and trees have been planted throughout, including on the banks of the river, to offer a habitat for wildlife. One section of the river will be designed to flood almost entirely. This area will be vital to allow wildlife to survive and thrive.

New homes, and not just for people

The design will also allow wildlife habitats to flourish on the rest of the site. The first step is to protect the bat roosts already in place and replenish habitats through the addition of more bat boxes. Elsewhere, wagtails and kingfishers known to make the riverside their home will be given bird boxes so their numbers can grow.



Santa Monica

Energy positive building

An extension to the coastal Californian city's existing City Hall, our work has ensured the building's energy-efficient design will be state of the art. Buro Happold will meet the Living Building Challenge criteria – the most rigorous performance standards in the built environment – which demands that a building makes a positive contribution to its environment, rather than just having a less negative impact.

A first for California

Improving heating and cooling performance through natural light and ventilation, achieved through using passive design techniques, the building delivers key services whilst ensuring a healthy, enjoyable space. In addition, the building's electricity requirements will be met through the installation of a photovoltaic array on the roof.

This passive approach is also used when it comes to water; Buro Happold devised strategies to cut the need for it, as well as utilising rainwater and capturing greywater.

Healthy buildings

Already heralded as “one of the world's most sustainable municipal buildings” and “one of America's greenest City Hall buildings” in the architectural press, Buro Happold's work has set the bar for other cities and counties to adopt a higher standard as they plan upgrades.

Managing Partner David Herd said, “This project was the perfect candidate for the Living Building Challenge. Cities must make the investment to build sustainable, resilient, and healthy buildings that will ultimately save the planet, as well as taxpayer dollars. Now that Santa Monica has set a stellar example. Other municipalities can benefit from the lessons learned, reducing the scariness of the unknown and minimising schedule and cost risk.”

What do we do with the ghosts of buildings past?

The silence was sometimes too much to bear. As we walked round our shuttered cities, the ghosts of purpose past seemed to haunt at every turn. Empty office blocks and silent cafes. Pleasure boats floating in the harbour, unmanned, unused, useful only as a seagull perches. Locked theatres, with the poster for the show that was meant to be running, still advertised on the board.

Post-pandemic, many of these buildings and business will open up again, their purpose renewed. But there are those that will not reopen. Buildings that even before the pandemic, had lost their way, becoming not just a financial liability to their owners, but a blight on the community surrounding them.

Cities change constantly, and at Buro Happold, it is our role to see the opportunities that exist in the changing built environment. These so-called “stranded” infrastructures — those empty offices and defunct shopping malls — are assets awaiting adaptation.

By transforming these buildings into structures that align with how we live now, we are not only reducing financial risk for owners, but also benefitting the community and the environment.

The meaning of “stranded asset” is changing. According to the dictionary, a stranded asset in its true, financial

sense is an asset “that has suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities”. It is also defined as an “asset that has become obsolete or non-performing, but must be recorded on the balance sheet as a loss of profit”.

However, in recent years, the concept of a stranded asset includes buildings and structures that have not adjusted their investment levels in line with the emission targets needed to tackle global warming. According to UK think-tank Carbon Tracker, stranded assets are “assets that turn out to be worth less than expected as a result of changes associated with the energy transition”.

Lower demand for oil and gas

This transition was highlighted in the announcement from Royal Dutch Shell that it is drastically cutting the value of its oil and gas assets by up to \$22 billion. BP is reducing the values of its assets by up to \$17.5 billion. Triggered by a move away from fossil fuels, the shift has been accelerated by falling global demand, and the recession caused by the pandemic. As a result of this devaluation, many of Shell and BP assets are at risk of becoming “stranded” — oil and gas around the world becomes too expensive to extract, and therefore

both the oil field, and the infrastructure based around it, becomes stranded.

A move away from fossil fuels is just one of the reasons assets lose their purpose and potential for profit. Buro Happold urban planners Richard Ainsley and Roger Savage have identified six “drivers for change”. These include:

Regulatory change

A change in policy or legislation affects the usefulness of the asset.

Physical change

For example, climate change impact.

Technological change

Innovation leading to obsolescence.

Cultural change

Changes in habits and preferences.

Macroeconomic change

Wider economic or population shifts impacts demand.

Microeconomic change

Relative change in costs/ prices affecting the asset.

So, who recognises this change is happening? When does the owner of an asset realise that their building or structure is failing? Richard Ainsley gives an example, “Often, an asset owner comes to us and asks for advice on how they can transform their asset. Buro Happold are working with Edinburgh City Council to transform



Folkestone Harbour Regeneration. Part of the initiative involved the renovation of the station with extensive repairs to the platforms and the station canopies for weather protection. Image: Buro Happold.

a former gasometer. The asset sits within quite a deprived part of the city, and is obviously a bit of an eyesore. The gasometer is really performing no real function for the city.

“So our lighting team have been working on how we can transform the look and feel of the gas holder, and we are working with the council and city more broadly to see what the use of that asset could be.”

Keeping your asset valuable

Investment in property is often on a cyclical basis. If a library is not well-stocked with books, the building is cold and the seating shabby, why would you visit? If everyone stops visiting, the value of the library declines, and therefore the financial risk to the owner increases. Cue — huge investment, lots more books, a shiny updated building and more visitors. However, if this investment is not maintained, the cycle starts again.

“For some of our corporate clients, we find they are looking at their assets as part of their regular asset management activities, in the case of higher education activities or local authorities,” said Roger. “They take a more strategic look than just their day-to-day refurbishment and updating of sites.”

These stranded assets, or adaptive reuse projects do not just happen at building level. Assets can be of significant size and may transcend multiple sites.

Sometimes a whole town needs renewal. “The town of Folkestone had become a bit down at heel because of changes at its port, the closure of a railway station and its relatively peripheral location as a coastal town in the UK,” explains Roger. “We worked together with a whole series of local partners in developing a strategy for regenerating the town, and establishing a new cultural district.”

“It has delivered results in drawing new people into the town, helping to revive the High Street, and also attract new housing.”

On an even bigger scale, Buro Happold is working with the city of Detroit, a city that has suffered from a huge shift in purpose and population due to changes in the car-making industry. Roger explains, “We have worked with a whole series of different stakeholders, in developing a city-wide strategy, as well as on individual assets within the city.”

The Detroit Works Long Term Planning Project was initiated in 2010 and focuses on identifying an integrated economic, land use, environmental and systems strategy to support long-term transformation. Buro Happold →



The Erie Canal.
The Reimagine the Canals Competition was devised to help develop a strategy for the future of the New York State Canal System. Image: New York State Canal Corporation.

has been instrumental in working out how to re-configure the city for a smaller population and a different economic geography, and then testing alternative land-use scenarios from both technical and fiscal perspectives.

Another Buro Happold US project that is even larger, or perhaps we should say, longer is the Erie Canal. The canal stretches over 350 miles in length from Albany to Buffalo and consists of 42 cities of all scales. The original historic canal was completed in 1825, and then expanded twice.

New York-based Alice Shay, an urban planner and engineer for Buro Happold, worked on the project and said, “(The Erie Canal) is the reason that New York is the economic powerhouse it is today”.

By the 1950s, it was functionally obsolete with most shipping having shifted to rail or highways. The New York Power Authority (NYPA) assumed control of the canal system and initiated a strategic planning process to assure its long-term vitality.

As part of this process, NYPA and the New York State Canal Corporation engaged Buro Happold to run the Reimagine the Canals Competition and help develop a strategy for the future of the New York State Canal System.

Now, not only is recreation booming, but the Erie Canal is acting as the catalyst for economic growth. The village of Canastota is developing new models for canal-side living in areas that were once waterfront manufacturing sites. The town of Pittsford has adapted a feeder canal segment into a white-water racing course, and the new Empire State Trail is a multi-use trail that lines the full length of the Erie Canal.

A history of urban shift

Cities have always seen churn, in terms of people and purpose. Urbanist and activist Jane Jacobs once said, “There is no logic that can be superimposed on the city; people make it, and it is to them, not buildings, that we must fit our plans.”

The buildings that make up a city are secondary to what people do in them, and what they do changes all the time. What will become of those huge office blocks post pandemic, now most white-collar workers are comfortable working from home? What happens to the shops, now we all seem to shop online?

The big challenge for engineers, and asset-owners, is deciding when to “reimagine” these structures, injecting new purpose, and when to decommission and dismantle them.

Many big pieces of infrastructure in our cities, built for the heavy industry so prevalent in the past, are reaching 100-150 years old. But the decision to dispose of these assets must be taken with care, as there may be heavy environmental consequences, as well as great cost. All engineers agree that adaptive urban reuse, with a move towards a circular economy, is preferable in almost all circumstances.

“It was a rusting hulk. It was a turning point in planning to realise there is a huge value in this asset, to the character. And reinvent it.” Cristobal Correa, Principal in the Buro Happold New York office remembers The High Line in New York, before it was transformed.

Giving purpose to infrastructure

This abandoned stretch of elevated railroad that spanned Manhattan’s meatpacking district was an eyesore, a relict from another age. The obvious thing to do was to pull it down, but thanks to Buro Happold’s masterplan work, the “relict” is now a thriving city park — it now has purpose.

“It is something that would never be built now,” explained Cristobal. “We all crave a bit of friction with our fellow New Yorkers, and spaces where we run into people can be →



Image: Joel Chester Fildes

Manchester Jewish Museum

Situated in the city’s oldest synagogue, the Manchester Jewish Museum has undergone a major restoration and expansion. Opening its doors in July 2021, the museum is a place where culture, tradition and unity are celebrated and preserved for the next generation.

Originally built in 1874, this £6 million National Lottery Heritage Funded (NHLF) project extends the Grade II* listed synagogue by two stories; doubling the size of the museum to provide a new gallery, archive room, shop, café and event spaces. The historically sensitive approach of our engineering team ensured the preservation of this architectural gem, which is one of the finest Victorian Gothic buildings in the UK.

The architectural and engineering design of the expansion not only compliments the existing building, but ensures the restoration process preserves and pays homage to the Judaism. The synagogue has been repaired and restored to function as a new performance space for concerts and artistic installations. The purpose of the museum is to tell the personal histories, stories and traditions of Manchester’s diverse Jewish community.

Our multidisciplinary engineers have been working with architects Citizens Design Bureau (CBD) since 2017 to augment the synagogue’s significance, whilst unifying the building’s extension into the streetscape. Our expertise in heritage buildings and conservation, allowed us to deliver discrete and meticulous structural work on the historic facade.

This project is also an example of sustainable redevelopment. Prioritising decarbonisation and energy efficiency, the existing assets were repurposed as part of a circular economic approach. As a heritage building, demolition was never an option. Our engineers ensured that the client’s ambitious energy targets were delivered despite the museum’s expansion.

A gallery extension of this size would typically increase the energy density of a building. However, our passive design approach reduced the carbon intensity by around 20%. This has reduced the embodied carbon impact of the project by 250 tonnes, in comparison to if it had been rebuilt from scratch. The result is a energy efficient, trailblazing cultural organisation for the City of Manchester.

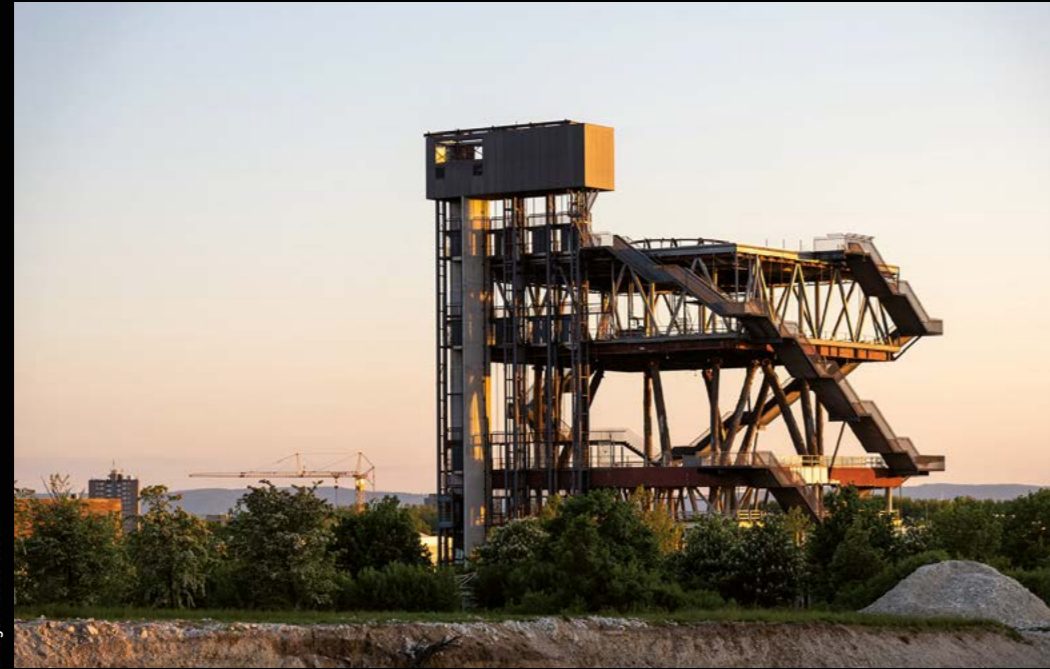


Image: Adobe Stock

HY_live Pavilion

In Hanover, North Germany, a former landmark building from the World Expo 2000 is being revived. Designed twenty years ago by MVRDV architects, the derelict HY_live Pavilion will be transformed into a pioneering commercial and cultural hub. Scheduled to complete in 2023, Buro Happold is supporting DIE WOHNKOMPANIE with sustainability services and district certification on this restoration project.

The design concept is based on the motto, “Connected to change”. This coworking space will reimagine the traditional workspace, encouraging flexible, agile and cooperative working. The ethos of HY_live is to encourage

interdisciplinary collaboration between industries. The project aims to break the silos between the business, culture, media and science sectors in order to bolster the economy of the Hanover region.

The unique architecture of the pavilion will be restored to create 4,700 square metres of commercial office space, meeting rooms, creative studios, and food and beverage amenities, with over 2,000 square metres of this space being solely dedicated to coworking. The project’s aim is to revitalise the local community, create economic prosperity and deliver social value.



A section of The High Line. The High Line generates \$75m to \$100m of tax revenue a year for New York City. It has paid for itself multiple times. Image: Iwan Baan.

refreshing when we are all in front of our screens a lot. In terms of providing a space for the city, I think The High Line is a wonderful addition.

As well as creating a green walkway for the city, The High Line’s reinvention has had solid financial results despite being free to access, with bars, restaurants and hotels springing up in its vicinity. Partner Craig Schwitter explains, “I think the real story of The High Line is how it has just driven a big chunk of the economy of that area. The High Line now generates \$75m to \$100m of tax revenue a year for New York City. It has paid for itself multiple times.”

Community engagement is vital

Buildings and structures do not stand alone, they exist within their communities. An asset may be privately owned, owned by a public agency, or by multiple people. Even those who do not own it will have used it, or just feel it is “theirs”, as it exists in their neighbourhood. Feelings may run high, especially when it comes to paying for the building’s regeneration.

Strong community support is often key to success. With the Erie Canal, Alice explains that on top of the ideas competition, which garnered “so much excitement and energy”, Buro Happold

also organised a state-wide taskforce that brought together six different estate agencies and stakeholders representing key constituency groups.

“Community engagement was particularly key. All of the public were able to weigh in on this process. The biggest challenge was communicating the future potentials...Communities or individuals can be very invested in the way that they see the system today or in the past.

“There are ways to support people to really dream big, and think of what the future can hold. Competitions are a really great way of doing this.”

Roger Savage agrees, adding that if funding for a project is needed, often the community will come together to raise money, “Seeking and developing a case for funding is sometimes why people come to us at Buro Happold. We have even seen people look at crowd sourcing to draw attention to a particular asset.”

Bringing life into our cities

All our experts conclude that the best way to deal with a stranded asset is to stop it becoming “stranded” in the first place. Roger says, “We encourage our clients to look beyond their day to day business, track emerging

trends and different forces affecting their business. We help them to anticipate change and learn about the uncertainties they are dealing with.”

But sometimes buildings and cities have to change. Transforming buildings and cities that have lost their purpose allows us to reimagine our cities, to align with how we live now. It demonstrates our commitment to live together in equitable, sustainable and resilient cities, and refurbishing and adaptively reusing underutilised or abandoned buildings revitalises neighbourhoods and brings environmental benefits.

This type of work is of increasing importance to Buro Happold. “Earlier in my career I would have said what makes Buro Happold, Buro Happold, was iconic new buildings,” explains Craig. “And yet, as I have grown up around The High Line, and started to understand its power, I have started to see that these projects are as iconic and more powerful than those new buildings.”

Whatever you like to call them, stranded asset or adaptive urban reuse projects are vital to maintaining the fabric of cities. These projects are here to stay. **BH**



**SPECIALIST
Q&A**

Becky Hayward
Associate Director,
Analytics



“We’re looking to use Analytics to support wellbeing, improve sustainability, and make the world a better place.”

Q What is Analytics?

In a nutshell, Analytics is the use of data and different types of predictive modelling to inform insights and facilitate decision making. We started off using predictive modelling to resolve crowd issues in spaces that contain large volumes of people – such as new stadiums, or train stations – and that helped us optimise the design. We then realised we could use this data-driven approach to improve people’s experiences and their productivity, as well as finding ways to spark spontaneous interactions. We now use it across a wide range of projects.

Q How much of your Analytics work is data-based, and how much is drawn from psychology?

We incorporate both these elements, as they each have different strengths and weaknesses. Typically, what we do is more data-driven, but we’re increasingly trying to broaden our understanding of psychology and how it impacts human behaviour. A lot of research is coming out about the feedback loop between the spaces we live and work in, and the impact they have on our cognitive performance and wellbeing.

Factors that affect us include everything from ceiling height and room temperature, to light levels and smells – even the colour of the walls changes the way we think and feel. It’s fascinating.

Q It’s an ever-evolving specialism...

Definitely. As well as the psychology, there’s also new technologies that change how we behave. For example, we now have to take smartphones into account when we’re working on masterplans, as when people are moving they’re likely looking at their phone and not what’s going on around them. This can change walking speeds, or increase the risk of people bumping into each other. But smartphones also have the advantage of helping people with wayfinding. So we have to be aware of evolving technologies, understand how we can use them, and leverage the advantages they offer in our designs.

Q Do you find it hard to switch off your Analytics brain?

Like most people in our team – and I’m not sure if it’s a product of our work, or if we’re just born this way – I can’t

help but start looking at places through that lens, even in my downtime. I’ll go to an exhibition at a museum, or see a performance in a concert hall, and on the way out I’ll be watching how people are leaving to see if there are any areas of congestion. Everyone in our team has the same mindset. Wherever you go, you can’t help but look and notice.

Q Is Analytics unique to Buro Happold in the engineering field?

Yes. Other consultants may carry out elements of our work, but the strength of what we offer is that we bring everything together. By collaborating with other disciplines and specialisms within Buro Happold, we can undertake the modelling, the testing, the data analytics and the consultancy, and then present a full picture back to our client.

The way we’re able to demonstrate our Analytics is also a key differentiator. The outputs are highly visual, and we’ve developed a set of simple dashboards with slider bars that allow us to play out different parameters – such as more people in a space, or the backlog from a delayed train – and visually see the impact of the changes we make. That makes our work very easy to interpret.

Q Can you tell me more about the team behind this approach?

We all come from different backgrounds – there are a couple of engineers, as well as physicists, computer scientists, anthropologists, architects and transport planners on the team. One of our graduates even has a computational arts degree. I think this diversity, and as a result our ability to draw on a wide range of expertise, makes our Analytics approach very creative. It’s also really interesting and valuable to work with people from such a variety of backgrounds.

Q How did you get into Analytics?

I studied maths and biology, and my PhD research at Bath University focused on examining ant colonies. I was looking at how ants interact, what social networks they form, how they distribute resources, and using lots of modelling techniques to understand their efficiency.

When I finished, a friend told me about Buro Happold’s Analytics

team, which Shrikant Sharma heads up. I approached him and we had an informal conversation, followed by an interview, and I joined the team as an intern. There’s definitely synergy between my PhD and what the team is doing – I graduated from looking at little ants to big people!

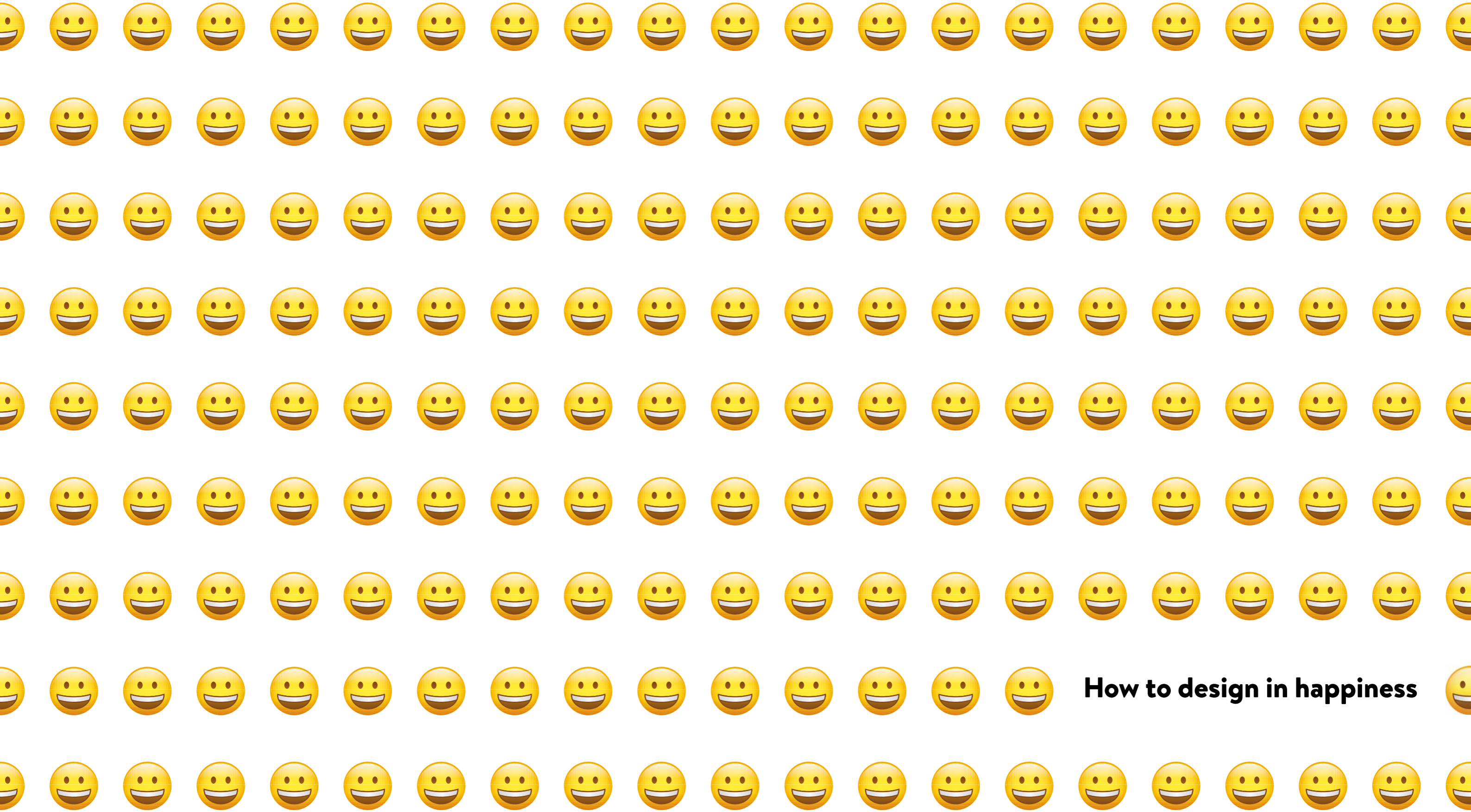
Q What’s been your favourite project to work on at Buro Happold?

There are so many, but it’s been a real privilege to work with the Natural History Museum on and off for the last five years. When they were refurbishing Hintz Hall, we helped them optimise visitor flow so they could keep the museum open during the works, and still deliver a really positive experience even though this central area was closed. During that time, the museum received great visitor feedback and an increase in donations, which they attributed to us providing a more streamlined and calm visitor experience. We’re now working with them to redesign the external gardens – and help make them a destination in their own right. I also loved visiting The High Line in New York. That was a very exciting project to be involved with, and it’s rewarding to be able to see the outputs of our work at such a popular attraction.

Q Where do you go from here?

Even though we’ve worked on all sorts of international projects – from the Museum of the Future in Dubai, to the Hamburg Elbphilharmonie – I still feel like we’re at the tip of the iceberg of what can be achieved with Analytics. We focus a lot on solving small term issues – be that cost-saving, crowd concerns, or even how businesses can reopen in compliance with social distancing post-Covid-19.

But that’s just one part of the puzzle. There’s so much data being generated around us, every second of every day, and I think the real power will come from tapping into that in a positive and transparent way. We’re planning to link up with the other specialisms within Buro Happold, as well as external collaborators to use Analytics to realise built environments that support mental health and wellbeing, improve sustainability, and make the world a better place for us all. **BH**



How to design in happiness



Can good design make us happy? Given that we spend most of our time in buildings, should we not have a better understanding of how they make us feel?

The built environment has come into sharp focus during the Covid-19 pandemic. With many of us now working remotely, the intersection between design and mental health has become ubiquitous. There is no doubt that a poor quality working environment affects both our physical and mental health. It can be argued that Covid-19 has exaggerated the UK's mental health crisis exponentially. There is an inextricable link between the built environment and psychology in terms of how our surroundings affect our mental health. Environmental psychologists have been researching this since the 1980s, with positive psychology gaining prominence in the 1990s. Their research proves that good design makes us happier as it supports pleasurable and meaningful experiences. Lockdown has offered new perspectives on how buildings should be designed for functionality, mobility, safety and wellbeing. Building design and construction should take a more nuanced approach rather than prioritising return on investment. Instead, buildings should focus on the human experience.

The science of happy

We can all identify with the feeling of happiness. A euphoric and elevating state of mind, happiness transforms our disposition. In the emotional

hierarchy, it is the “gold standard”, and is what we strive to achieve during our lifetime. Happiness goes beyond a positive mood. It is a sense of deep contentment that comes from leading a life of purpose and meaning. Above all, happiness lies in human connection.

A highly contextual and relative term, the science behind happiness is highly contextual. Happiness can be influenced by several factors, but it is widely recognised that our physical environment has a major impact on our health, wellbeing and productivity. The medical community has been studying what makes human tick since the late nineteenth century. Positive psychologist Sonja Lyubomirsky attributes happiness to three sources – 50% is based on your genetics, 40% is environmental and 10% is attributed to intense experience. If 40% of our happiness can be determined by our physical environment, architects and engineers have a responsibility to design mindfully.

Designing for our mental health

Buildings are the backdrops of people's lives, and yet it is no secret that staying indoors for prolonged periods of time affects our mental health and heightens feelings of stress and anxiety. Given that our physical and mental health contribute to a positive emotional outlook, how we feel in a space is just as important as what we are doing in that space.



According to Ben Channon, architect and mental wellbeing ambassador at Assael Architecture, “it is well known that we spend the majority of our time indoors and so it is absolutely essential that we rethink our relationship with the buildings around us.”

Ben is an accredited mindfulness practitioner and the author of *Happy by Design*, and advocates for wellbeing-led design in all buildings. This encourages built environment professionals to pursue elements of design that improve our livelihoods by prioritising the end user above all else.

Ben's book explores these themes in detail, looking at how environmental factors such as colour, biophilia, light and ventilation impact our relationship with buildings, and ultimately the people we encounter in these buildings. He reveals some surprising insights about how our happiness is affected by our surroundings, for example, “messy homes stimulate the release of stress hormone cortisol. It is not surprising Scandinavia place so much importance on well-designed storage”.

To truly design in happiness, what are the design fundamentals? Buro Happold's experts have identified nine quantifiable criteria for built environment design:

LIGHTING

Use of natural light boosts Vitamin D.

VENTILATION

Air quality, thermal comfort and large windows.

NATURE AND BIOPHILIA

Views of the outdoor landscape and indoor plants.

ACOUSTICS

Noise level absorption.

COLOUR

Certain colours evoke certain moods; green is calming, blue is stimulating, brown is grounding, red induces creativity, etc.

PROPORTIONS

High ceilings and large rooms.

POSITION

Interior layout and exterior positioning.

INCLUSIVITY

Disability and additional needs access.

COMMUNITY

Facilitating social interaction.



Taking inspiration from nature

50% of the world's population now live in cities. We have an in-built affinity with the natural world, and yet, we spend most of our lifetime indoors. This can often attribute to feeling lonely and isolated. Poor quality ventilation, low ceilings, small rooms and lack of natural daylight – all these environmental factors are not conducive with good mental health.

Biophilic design is therefore an integral part of designing for happiness. We are highly sensory beings who value connection, whether that be with other human beings or to nature. Buildings need to serve the communities that use them.

As Ben reiterates, "In the UK alone, one in four people will experience problems with their mental wellbeing. And as we spend 90 percent of our time inside buildings, the spaces we live and work in are going to have a significant impact on our physical and mental wellbeing."

Happy design is inclusive

Happy design is intuitive by nature. It should delight not frustrate, and make the end-user feel calm, safe and in control. Users should feel free to move about the space, curating their own sensory experience. Ultimately, it is

about feeling connected – to the built environment itself and the people you are with. As engineers and designers, we should be "designing to avoid loneliness

and improve interaction between people" says Mike Entwisle, Buro Happold Partner and Global Education Sector Lead.

"Those with additional needs need choice and control over their environment in order to feel calm and secure within buildings."

Jean Hewitt, Senior Inclusive Design Consultant

Image: Chansom Pantip / Adobe Stock

Society contains a diverse range of people, all with specific needs, so the built environment should reflect this. We are all unique human beings so will experience the same environment differently. As Buro Happold's Senior Inclusive Design Consultant Jean Hewitt explains, "putting choice and control at the heart of good design. Those with additional needs need choice and control over their environment in order to feel calm and secure within buildings."

Inclusive Design is about understanding the concept of universal design; the needs and concerns of people, what they want from an environment and the experience they will have within it. That is why inclusivity is so important when we consider designing for happiness.

The International WELL Building Institute (IWBI) is leading the global movement to transform our buildings and communities in ways that help people thrive. Similarly, research at the Delft Institute of Positive Design formulates effective strategies to help designers increase our wellbeing and long-term happiness. A healthy society makes the world a better place. The aspiration of most designers is to make a positive contribution to society with their work.

Putting students first

A sector of the built environment that dramatically impacts mental health is the university campus. Where you learn is as important as what you learn. The building aesthetics, location and layout of a university can make or break your student experience. Buro Happold is researching and exploring how the physical environment can affect student mental health. Our findings conclude that connectivity is vital for good mental health.

As Mike states, "we have surveyed over 5,000 students globally and found that a staggering 44% considered the design of university facilities to be average or

poor, with issues of capacity and physical connectivity called into question."

University students and staff need to understand the role of the environment and community in protecting mental health. As Mike points out, "none of the university league tables in the UK or beyond reference the quality of the environment in determining national and global rankings. I think these are real failings of the system that we have in terms of how people choose universities."

Universities must learn to put students first, and dramatically change their campus design. Students are now looking for multi-functional environments; spaces that are a hybrid between work and leisure. Communal spaces serve all aspects of student wellbeing and safeguard them in this initially unfamiliar environment.

Research carried out in 2018 by UK charity Mind found that 60-70% of university students struggled with mental health issues. Research by the Mental Health Foundation in 2018 stated that "75 per cent of mental health problems start by the age of 24", so university students are a high risk group.

High fees, and high expectations, mean that those attending UK and US universities are already under pressure to succeed. The atmosphere at some institutions is highly competitive and students can be exposed to stress, anxiety and academic pressure. There is a complexity around student mental health versus societal expectation which must be addressed.

Imposter syndrome and comparison culture are inherent to Generation Z. It has never been more important to recognise that the social aspects of university make students feel that they belong. "That fundamentally

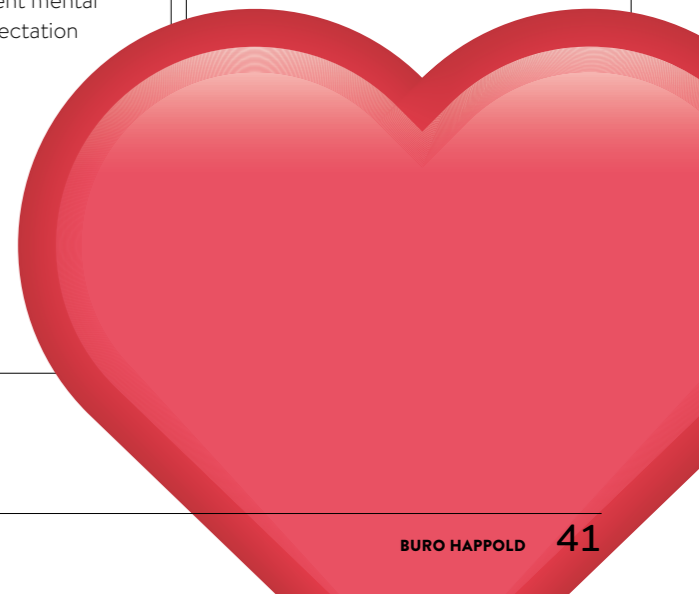
comes down to designing to avoid loneliness and to improve interaction between people. If you improve the environment, it improves the outcome for everyone," says Mike.

Happy design benefits all

One Buro Happold project that embodies the fundamentals of happy design is **The Forum, University of Exeter**. Connectivity was the focal point of the design process, using natural light, cutting-edge acoustics and tactile materials like timber and glass to bring the outdoors in. The gridshell roof structure creates a multifaceted environment for learning, teaching, research and collaboration. The centrepiece is the hub of the university, providing state-of-the-art educational and pastoral facilities for everyone at the institution.

This type of work is incredibly important to Buro Happold. After all, prioritising happiness in our building design, especially within the Higher Education sector benefits the future generation of engineers, architects and designers.

Priorities in building design are changing. Clients not only want sustainable buildings but environments that positively impact society. Buildings must be designed to make happiness a reality for everyone. BH



Riding high

Rapid growth, boundless ambition and a strong desire to develop and innovate. Buro Happold's work in India is expanding rapidly, with projects that include the largest commercial development in Buro Happold's history and the world's tallest residential tower.

In Southern India, several high-profile project wins have resulted in the expansion of our footprint in the region, with the opening of a new office in Hyderabad, an ideal location to serve commercial and hi-tech clients across southern India.

Our design office in Mumbai also supports a growing client base. From here we provide structural and MEP design services, specialising in high-rise and sustainable design solutions. Current projects for this office include **Lodha Place** for Lodha Group and **Waters Edge** in Bangalore for Equinox Realty.

Here is a look at four projects our Buro Happold teams have been working on in the region.

Life Hub+, Kokapet

Set to deliver 41.2M ft² of “Grade A” commercial IT office space across 14 towers, Life Hub+ is a large-scale masterplan and mixed-use project in Kokapet, by the Hyderabad developer My Home Group. The impressive development is part of the wider Kokapet SEZ development, which aims to deliver a new city with a workspace comparable to nearby Hyderabad.

Buro Happold, working with Korea-based architect Space Group, is providing building services engineering for the project, as well as health, wellbeing and productivity consultancy and site-wide infrastructure engineering services, including traffic, parking and pedestrian area design.

Designed to benefit both the business owner and the occupants, the development will include a district-wide cooling distribution system, a 48-hour power backup and indoor air quality monitoring to help improve occupant wellbeing. The project is also aiming for LEED and WELL certification.

67 RCR (RCR Mahalaxmi), Mumbai

The two striking mixed-use commercial towers designed by architects OMA will stand at 175m and 275m, and provide 2.7M ft² of commercial space, mainly consisting of grade A office spaces and retail spaces in Mumbai.

The location and desire for column-free floorplates presented several challenges for our structural engineers. The first key challenge was developing an efficient lateral load-resisting structural system (LLRS) for the taller of the towers, which will be the tallest commercial development in India with an eccentric core. The second is developing a shallow, gravity load-resisting floor system (GLRFS). This will result in an impressive 18m span of column-free space — 4.2m floor-to-floor and 3m in clear height.

The development’s sustainable features include energy-efficient HVAC systems, 100% wastewater utilisation, rainwater harvesting and solar PV. The project is aiming for LEED certification as well as providing community spaces and gateways.

Krrish Square, Sri Lanka

Situated in Sri Lanka’s central business district of Colombo, the Krrish Square development is made up of two impressive towers standing at 280m and 250m that will house a five-star hotel, luxury apartments, and a new podium complete with food and retail outlets.

With two of the towers at Krrish Square set to be the tallest in Sri Lanka, the project aims to represent the city’s economic and cultural progress. Contributing to a wider drive to modernise the Colombo cityscape, Krrish Square will provide exceptional facilities to a dynamic community.

World One Tower, Mumbai

Designed by Pei Cobb Freed & Partners in New York, with interior design by Giorgio Armani, this Mumbai residential skyscraper will have 117 storeys and will eventually stand at 452m high.

Once completed, World One in Mumbai will be the world’s tallest purely residential structure. The complex will feature swimming pools, gyms, a health club and even a cricket pitch complete with pavilion, for residents to enjoy.

Image: Buro Happold

How I see it

Project Principal Anil Hira began his career in Australia in the 1980s. As a result of that decade’s skyscraper boom, he developed expertise in all aspects of tall building design and has worked on more than 70 buildings over 200m high across the world. Here, he reflects on his work in Mumbai...



It is hard to believe that a decade has passed by since I was given the opportunity to work in Mumbai, India. It took me only a matter of days to get on that flight to Mumbai, the city that never sleeps, for an unplanned and eventful trip that lasted for eight years.

During this period, Mumbai’s appetite for high-rise, luxurious living and high-class corporate office space in Mumbai grew immensely, thanks to an increasingly influential and affluent population and the city’s desire to be compared with some of the other great financial centres of the world. Within a short time, Buro Happold was playing a pivotal role in introducing world-class technological advances to tall building design here. We are the engineers of over 50 towers in Mumbai ranging from 150m to 450m in height, and have collaborated with world-renowned architects such as Foster + Partners, OMA, SOM, PCF, KPF, Make and 3XN.

Buro Happold’s incredible global brand, and our appetite for creativity and leading-edge technology, combined with a talented and enthusiastic Mumbai staff, made the task of establishing a successful business in a challenging environment relatively easy. Our Buro Happold “stamp” will be embedded in the Mumbai skyline for many years to come.

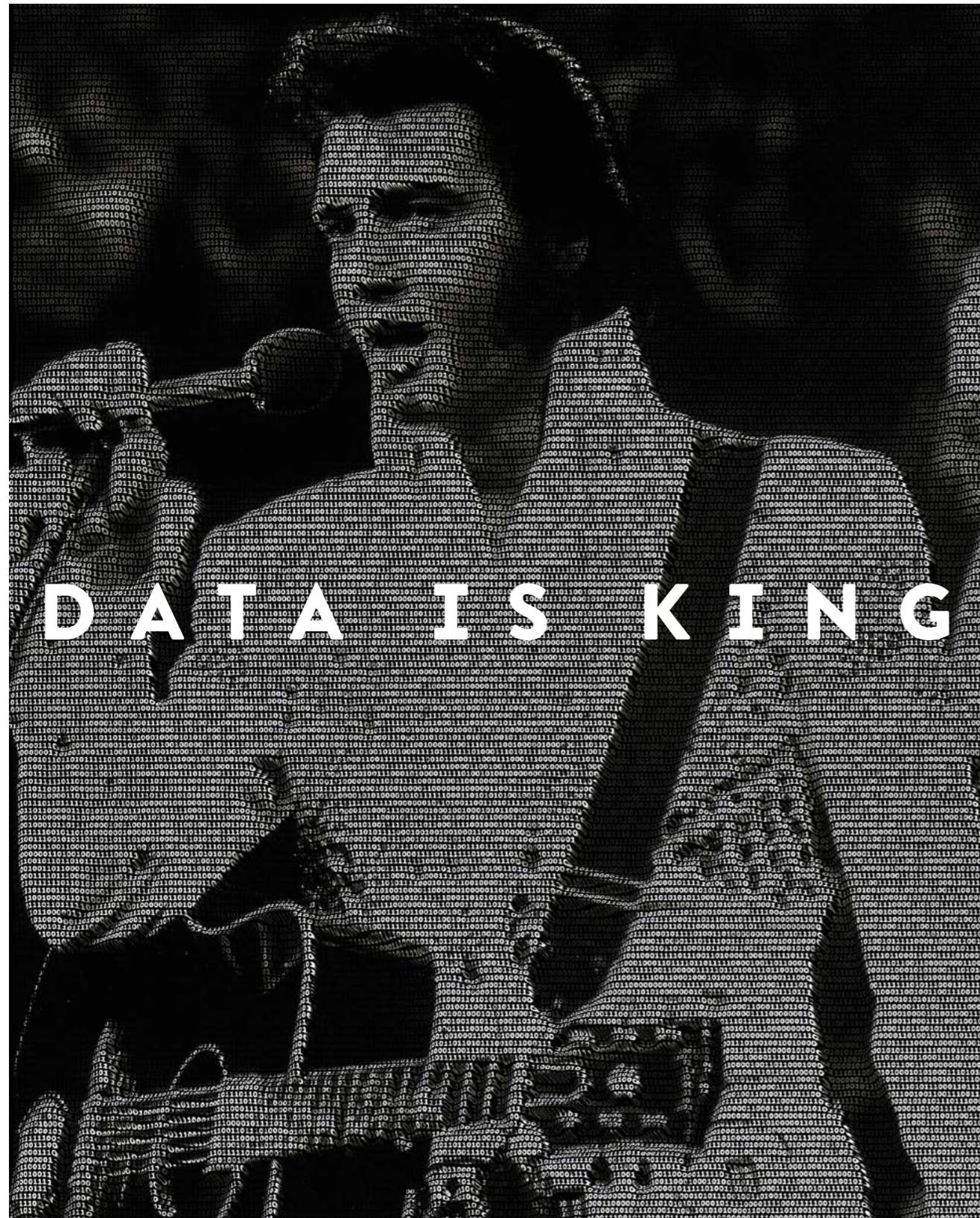
Mumbai, with its severe geographical constraints, rapid population growth and deterioration of public infrastructure and building stock, driven by labour migration, has massive challenges. Astronomically high real estate prices means a decent standard of living is out of reach for the vast majority of its citizens, including the growing middle class. I feel Covid-19 could act as a catalyst for all of the community, from the super-rich to the slum dwellers, to stop for a moment and recognise the huge importance of addressing the three pillars of sustainability; environment, social and economic, and the impact of climate change.

With our current strategy drive for advisory and consulting work, and our project focus on environment preservation, regeneration and occupant wellbeing, we have the potential to reshape the city of Mumbai in a meaningful way that is not only limited to its skyline.

My ultimate dream for Mumbai is to continue seeing the incredible smiles on all Mumbaikars, especially the young, when I visit next. I hope that Buro Happold continues to play a pivotal role in the creation of a much-improved city environment and more equitable living conditions, adding to the energy and beauty of this wonderful city. **BH**

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I feel Covid-19 has acted as a catalyst for all of the community, from the super-rich to the slum dwellers, to stop for a moment and recognise the huge importance of addressing the three pillars of sustainability; environment, social and economic, and the impact of climate change.

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Anil Hira, Project Principal



In every sector and across every industry the collection, analysis and management of information has never been more important in advancing our understanding of systems and people. Finance, the government and the creative industries are embracing technology and data in their work, but other sectors are lagging behind. The AEC industry is one of them.

Technology moves fast, but building projects generally don't. It's tricky to keep pace," says Tom Hopton, associate at Buro Happold and expert in building management systems and technology. "The building industry is a difficult industry for technology and data awareness, and requires effective means of stakeholder collaboration, engagement and education. We have to really elevate the importance of technology, and crucially, data."

So, what is holding the AEC industry back in terms of embracing data in buildings? We look at the five major issues facing the AEC industry and its ongoing relationship with data, with a special focus on operationalising building data.

Fancy sensors are great but they need to be managed properly

We all use the word "data", but what does it actually mean? Numbers? Statistics? Observations? Data, according to the Oxford dictionary, is "facts and statistics collected together for reference or analysis". A more complex interpretation is given as "the quantities, characters, or symbols on which operations are performed by a computer, which may be stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media". According to these definitions, what seems to make data tangible, is not the mere collecting of the information, but how it's analysed.

Building management systems, a term used here in its wider context of any data-generating system in a building, will use data in various ways. Sensors record how and by which route people enter and leave buildings, as well as control aspects like the heating and lighting. People movement is tracked, giving managers the option to adjust the heating and cooling according to where people are congregated. The data is "managed" to help users and owners improve performance, save energy and optimise how building space is used. As more buildings and systems become connected or "smart", more data is collected, giving constant, accurate feedback on all aspects of building use, making sure it's being used in an optimal way, with no wasted energy, water or light.

Sounds perfect, doesn't it? Except that it isn't, according to Tom. "All too often we go back to buildings and we see that control systems aren't commissioned correctly and that has led to inefficiencies. Why is that? It is about exposing the value and importance of specifying not only the right systems but the delivery of those systems, which maximises the potential of data beyond the native system needs."

So a building may contain the 'smartest' sensors in the world, and yet, if that data is not exposed, curated and analysed correctly, it becomes worthless.

Clients and engineers need to pay just as much attention to data as they do to physical assets

A lack of understanding about building management systems is often a problem throughout the design process. As Tom explains in his article in the CIBSE Journal, *Data with destiny – BMS protocols*, "consultant engineers must understand the discipline, and be able to communicate opportunities to clients effectively. They must be competent enough to understand the system integration and include programming and software in design specifications. If these aren't robust, the design will be put under cost pressure at the tendering stage and key outcomes may not be realised".

The client must not only be informed in a comprehensive way about the technology landscape available to them, and the benefits they will bring, but should also be educated in the management of those systems. How could the data be used to benefit them and the building's users? As Tom says, the importance of controls and building management systems must be emphasised. If they aren't, the costs of the BMS system will be queried and perhaps discarded at a later stage in the building process.

Educating everyone involved, from clients to engineers, seems to be key to advancing the use of data in buildings. Buro Happold is tackling this in a number of ways, including the →

creation of a ‘touchy-feely’ innovation centre at the London office. Customers will be able to look at smart meters, video walls, smart kiosks and smart benches up close. The aim is to give clients a better understanding of the new technology.

The new innovation centre may be on hold until we can welcome people back into the office post-Covid, but the people at Buro Happold realise the importance of showing our clients the physical technology that goes into smart buildings, and most importantly, how it will be used.

A need for more controls and integration specialists is also a priority in the AEC industry. The Building Controls Institute Association (BCIA) has set up a BEMS apprenticeship programme to address this skills gap, and Buro Happold is also bolstering its specialist teams with controls, integration, network communication and OT skills.

Transitioning from a traditional to digital workplace can be challenging

Getting organisations or capital project managers to embrace data and understand the benefits of technology is not easy. Remember the move from paper to computers in offices? This shift to a data-led future is even more difficult.

Steven Wood is a “digital transformation specialist” working for Digital Catapult. Having helped multiple companies through this often-painful process, he is all too aware that some companies are far more forward-thinking than others. Talking about the “big established ones”, he says, “they’re the ones that have the most to lose, and they’re the ones that find change the most difficult. The smaller, agile organisations, those with a certain amount of fearlessness and hunger — these are the people who are really innovating with digital technology.”

Stephen believes that the key thing to do is to get these two types of organisations together, as they can benefit from each other’s experiences.

Eduardo Bayod, head of the London office at Fide Partners, a strategy and management consultancy firm, is hopeful that things are going to change purely because of the amount of money being put into smart cities, “If you look at the smart cities slice of the pie, typically those who are spearheading it are in telecoms and software. But if you think of the pie and the spending, nine per cent of spending in smart cities is around connectivity and communications, 20 per cent on software, 32 per cent on hardware. The people in the smaller pieces of the pie are those making the most noise around smart cities.”

People need to become prosumers and understand their energy

With all this talk of data in buildings, it’s easy for designers to forget that what gives them purpose, are the people who live and work in them. By engaging them in the digital transformation process, further progress can be made in terms of energy efficiency.

Associate Director for Energy Phil Proctor thinks that getting the public to understand their energy usage better is key to reducing energy costs. As people’s habits have changed, with more streaming of television services, less traditional work patterns meaning different patterns in terms of hot water and light, and an increasing number of items that need charging including electric cars and bikes, it’s more difficult for the National Grid to manage and provide energy at the right moments in the day. Better data, and a more personalised, consumer-led approach could solve that.

“Traditionally (a building) has been an isolated system — passing the energy down,” explains Phil. “The big component part is what we call passive — that is, there’s no intelligence in it. Cables and wires transmit that energy, with no real need for intelligence.

“Going forward, what we’ve seen is the need for more intelligence in the systems, at all levels. There are a number of big changes in what a meter could do for example. One way is adding additional intelligence into the network to get it to perform better, and the other way is to involve the prosumer (consumer) to understand what they are using, how they are using it, and even perhaps generate their own.

“You are involving people in the system. In simple terms, you could have a solar PV system on your roof and generate energy from that. You could be using that energy yourself or you could be delivering that into the grid — you have become a prosumer.”

We need to curate data and make it accessible for the public good

“Within building management systems, everyone is working on their own little project and that may be why there isn’t a unified system.” Eduardo thinks one of the greatest problems in data management in buildings is a lack of unity and cohesion across the industry.

Buro Happold has decided to tackle this. Tom Hopton, alongside industry partners, is promoting the unification of building data and working towards the creation of an industry-wide national building data exchange to reveal building performance insights at a national level. Tom believes this will fuel the growth of a competitive and diverse building optimisation marketplace

and reveal key national insights, with grid operators as just one example. It will also provide evidence-based data for future building projects, as well as act as a key national driver towards the UK’s net zero carbon target of 2050.

In his paper, Tom states, “It’s widely acknowledged that Building Controls and Building Management Systems (BMS) offer the greatest opportunity for improving building performance. Whilst we have seen more efficient building services products and systems, we rarely see these efficiencies in operation due to how equipment is integrated, and how control of equipment is programmed within our BMS.” Exposing these inefficiencies however is challenging. But as Tom explains, as an industry we’ve adopted open protocols but the curation of this data is often poor, creating messy and unstructured data with no destiny.

“Our ‘grand challenge’ is to create a national building data exchange platform to expose building performance data in an open and virtual marketplace. An open and public data exchange, for the public good,” says Tom. “Such a data exchange will allow building owners and operators and other stakeholders, to access the data, who using experience, processes and digital tools such as ML and AI are able to identify improvements across our national built assets.”

Data is vital to all parts of our industry, with an expanding marketplace to consume this data and turn it into value. By promoting techniques for curation of building data and pushing for industry-wide data exchange, Buro Happold is confident the use and scope of good data in our built environment is only going to grow and strengthen.

AEC can do better and Buro Happold will make it happen

Wider knowledge sharing, elevating the value of data at all stages in a project, and legislation to standardise data curation and create a data exchange. What’s clear is that there’s huge, untapped potential in what a truly data-led built environment can achieve. Cost and energy saving are merely the beginning, and the shift to a digitally built and operated built environment isn’t going to be easy.

“None of these changes are small,” said Steven. “The nature of digital technology is that it’s highly disruptive, so if you’re going to get into this game, you’re going to have to be disruptive and disrupted at the same time. And that’s a scary thing. A lot of organisations are going to have to make some really big changes.”

It seems data really is king, and there’s no going back. Now is the time to embrace the challenges it brings, and realise the benefits. **BH**

“With all this talk of data in buildings, it’s easy for designers to forget that what gives them purpose, are the people who live and work in them.”



Tom Hopton
Global Leader for Smart Buildings and Controls

Changing perceptions: what women who work in engineering want

The UK has the lowest percentage of female engineering professionals in Europe, at less than 12%. 13% of engineers in the US are female. Spain, on the other hand, has relatively equal numbers. The argument has always been that women don't have access to STEM subjects, or they lack role models in the area. But is the real problem to do with how engineering is perceived?

Victoria Bentley talks to six female engineers to find out the truth about their roles, their responsibilities and what challenges they face...

Victoria: Do you think that engineering has an image problem?

Ellie: Engineering is not really understood. A lot of people in the UK see engineering as fixing cars. Whereas in Europe and America, it's seen as the equivalent to a lawyer, so it has a very different status.

Heidi: I agree that there is a perception issue. There aren't that many role models for young women to look up to. I think if women really understood the variety of roles you can have in an engineering firm, they would be really excited to join a firm like Buro Happold and solve some of the important issues that we're tackling.

Paula: I have an architectural background, and during my studies we were more than 50% women in the

class, perhaps 70%. But the proportion of women that you see in the profession in leading positions gets smaller. The five guys that we had in the class are now directors or owners of companies. When it comes to women, they don't disappear from the profession, but they don't get the visibility.

Patti: I completely agree with Paula. My class was close to 50% women, but very few are still in our industry – and they aren't stay at home moms. One is a lawyer, one is running an art supply company... They are finding success in other industries. I've seen many women get passed over for leadership opportunities and then leave the engineering field. The glass ceiling is a significant barrier.

Farah: My engineering class was only 3% women. I've been working for over 15 years now, and the percentage of women, especially at mid-management

level has always been very low. I ran my own MEP team in Southeast Asia, and it was 17 men and one woman. I agree with Heidi that there aren't many visible role models. Engineers are either seen as someone who fixes your car or air conditioning, or he's a middle-aged, white man with no hair!

Recently, I've been reading this book called *How Women Rise*. In it, they talk about the art of humble self-promotion. Men do a lot of self-promotion, which connects with Paula's point - the three boys in her class are now directors of their own companies. The book states that women don't verbalise their values, they feel it's bragging.

Heidi: Paula, I'm an architect by training as well. When people refer to me as an engineer, I take it as a compliment. Talking to people in the US who teach university engineering programmes, engineering firms are →



Ellie

Based in Bath, Senior Structural Engineer Ellie has worked on a variety of international projects within the sport and entertainment sector.

Farah

With 15 years of sustainability experience within the UK, USA and UAE, Farah's work encompasses environmentally-conscious architectural design, urban planning, energy masterplanning and project management.

Heidi

Based in Los Angeles, Associate Principal Heidi has worked in the green building industry for 15 years. She focuses on sustainability and wellness-focused design engineering.



Oyin

Oyin is a London based energy engineer and consultant. She specialises in district heating energy strategies and low carbon energy systems.

Patti

Principal and US West Coast Aviation Lead Patti is passionate about community-centric work, adaptive reuse, seismic retrofit, sustainable design and aviation projects.

Paula

With a background in architecture and urban planning, Paula is Head of Lighting Design at our Berlin office, and has also worked in Brazil and the UK.

increasingly going to be competing with big tech companies for talent. We really need to be shouting about our wonderful industry more.

Victoria:
How conscious are you of being a female engineer, as opposed to just an engineer?

Oyin: When I joined my team three years ago, I was the only female engineer, and I was very conscious about that in meetings, both external and internal. Usually I was the only woman in there, and definitely the only woman of colour. But despite being very conscious of it, I don't think it has necessarily affected my career so far. I have good line managers who always try to bring me into the discussion as well.

Ellie: I think I'm most conscious when people ask me, so are you conscious that you're a female engineer? In our team, it's not 50/50 but it's quite balanced. A lot of the architects I work with are female, but on site, it's usually quite male.

Farah: Can I say something? I never even think about it!

Heidi: I would say the same.

Farah: But when coworkers or clients say to me that I look colour-coordinated, like a designer, rather than an engineer, I really take a moment. I think they have this idea of an engineer as Einstein with crazy hair, rather than a woman who has coordinated her shoes and bag. It really surprises me when I go to schools to talk to young girls, and they say, oh, you're so colourful, I thought you were some kind of a designer! When kids say something like that, it shows that there is a perception issue somewhere.

Heidi: Most of the time, I'm not thinking about it, but sometimes, I'm very aware of it. I've had sexist

or inappropriate comments made to me, when I'm the only woman in a roomful of 20 men. Sometimes, if there's one another woman with me in a meeting, I'm almost even more aware of being a female engineer.

Sometimes you'll hear a woman say something, but then a few minutes later, you'll hear a man say it, and people then listen to him, not the woman. Things like that are constantly happening, which is really frustrating.

I'm not very confrontational, which doesn't help when a sexist comment is made. I do feel the other men in the room have a responsibility to stand up and say something. That needs to change. The silence is compliant and acts as agreement that that comment was okay.

There was an interesting study where a woman actually learned to lower her voice in business situations. Afterwards, she was literally heard by the men in a different way.

Patti: Heidi is right, men also bear responsibility to advocate for equity. We all need to speak up for under-represented groups if we want to achieve positive change.

Paula: In meetings, some women tend to be too quiet and maybe sit back a little, not quite at the table. Nowadays, when I'm in a meeting with a lot of men I make a point to wear colourful clothing so that they see me. I'm not super extrovert, but I just want to be noticed.

Victoria:
Does that upset you? Having to act or dress in a way that you don't normally dress, in order to be noticed?

Paula: No, I think it came more or less naturally, thanks to a job I took as an architectural student. I was

supervising a small construction site for an engineering company. They hired me not because I was a woman or anything, but because I lived next door to the construction site. The site was very loud, and I realised that I needed to change my voice. So instead of being "the nice quiet girl", I created this stronger voice.

I also noticed that if I wore a boot with higher heels, my posture was different, and I felt a little bit more respected. I was leading this construction site, and I had to be strong.

Farah: I totally understand what Heidi and Paula are talking about. That was my experience before I came to the Middle East. But when I came here, something shifted. When I first had to go to a meeting, I was worried, as I had heard all these stories about women being submissive in this culture. I was in a meeting room full of Arabic men, and it was intimidating and extremely scary. I was the only woman, and you know what I noticed? When I tried to say something, another male engineer cut me short. Instantly the Arabic person, the client, held his hand to the other guy and asked me to speak. That shifted the whole scenario.

In the Middle East, whenever I'm in a meeting, I'm so comfortable. I don't have to prove anything, there's an built-in respect for women. If you're the only woman in the room, you'll be respected more. If you want to say something, you'll be heard first before anyone else. On construction sites, the construction workers are also extremely respectful; I've never, ever experienced this anywhere else in my life.

Paula: How does it feel? Coming from a Western culture where you need to toughen up?

Farah: I feel so free. That extra pressure has gone. If I go to a site, I'll be treated equally. My brain will be seen before my looks, or my gender. I could never say that before.

Victoria:
Do you think things are getting better for female engineers?

Heidi: Change is happening more slowly than I would like. If you look at our younger staff, it's pretty balanced in terms of gender. I think we're doing above average there. But when you look at leadership, it does this (makes a triangle with her hands). It's much more complicated than just the maternity issue, there are a lot more nuances and unconscious biases.

I don't want women to be promoted just because there's a target that needs to be hit. The process needs to be much more engrained, looking at what we value and how we bring people up to Principal and Partner level, and really understanding what those barriers are.

Paula: In my old job I worked part-time. I worked 9am to 4pm. When I came to Buro Happold, I said in the interview, I only want to work part-time, is that okay? The HR representative told me to stop worrying, as Buro Happold was fine with that. Just because you have a child and work fewer hours, doesn't mean that you can do less "brain" work – you can still do big things in fewer hours. There must be a very strong connection with HR if things are to get better for female engineers.

Patti: I think that's a really great story. That makes me feel good about working here. But Heidi, I know in the US it's a little bit different, what do you think?

Heidi: When I started at Buro Happold about nine and half years ago, I was actually pregnant with my second child. I started working 32 hours a week, but this year, the head of our office came to me and said, you're providing more value than we're compensating you for. I want you to work full-time so we can pay you what you're worth.

I've probably worked 40 hours a week for most of my career, so when my boss said that to me, I thought, oh, have I been doing myself a disservice this whole time? There's this guilt that you're not working enough. Have I been under compensated for almost a decade? Sorry, I'm going to get a little emotional...

Victoria:
It's tough, and we all do what we have to, to get through it. What about you Farah, I know you have a baby, how is it working for you?

Farah: Maternity leave in the UAE is six or seven weeks. Then you can combine holidays and unpaid leave to extend it. What worked for me at the beginning was leaving the office by 3pm or 4pm but then logging in later that night. I really appreciated that flexibility with my team. I rearranged my work hours based on my baby's sleep times.

Victoria:
What are the non-obvious things that men can do to make things better for female engineers?

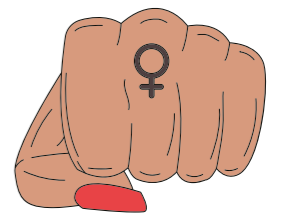
Ellie: I think it depends. In internal meetings, I think it's more about personality than gender. With external meetings and on site, I think some older male colleagues treat you like a "daughter", when maybe they should think of you as a "sister". With a sister, you're able to argue with them and they're your equal, right? When they treat you like a daughter, they're really protective, but somehow you're kind of less than them, a bit smaller.

Equally, some older guys totally respect you as an engineer, and appreciate it's a bit harder to be there if you're female. I think it does vary.

Patti: This is something I've been thinking about a lot, not just about men and women, but about under-represented people in our industry. It took me a while to figure this out. Nobody is going to advance in their career without an advocate. It doesn't really matter how good you are, if you don't have somebody higher up that's helping you progress through the ranks, it's just not going to happen. I think that one thing that men can do, or honestly, all of us can do to help make our profession more diverse, is to be proactive about mentoring people, particularly people that are under-represented. I think that's really, really important.

Heidi: I totally agree, Patti just took the words right out of my mouth. One things that men could do is think about who are they spending time with? Who are they reaching out to? Who are they having lunch with? Who are they inviting to events? They need to make sure that they've got a really good balance of contacts.

Paula: It's not that we want men to do something for us. We want to be equal. It's not only about women and men, it's about everyone. **BH**



On...

Observations and comment on what's important from the people of Buro Happold



May Winfield, Global Director of Commercial, Legal and Digital Risks

On... digitisation revolutionising the construction industry

DIGITAL TECHNOLOGY is transforming the way we work. The last decade has seen greater use of technology within the construction industry.

This has been partly catalysed by the 2011 UK Government Construction Strategy, as well as white papers promoting the use of off-site construction and drones. There are now conferences devoted to discussing the use

of Blockchain in construction, and 3D printing is a reality.

The built environment is undergoing a major but slow transition towards Construction 4.0, with increased digitalisation, automated production, assembly and delivery. The impact of the Covid-19 pandemic has propelled our use of technology and innovative processes. Not only to make continued working possible, but also in response to increased awareness

around cost, efficiency, and health and safety benefits. Harnessing big data provides us with greater insight into the way people use and interact with the spaces we design, ultimately improving building performance.

Embracing digital technologies

The digital revolution of the built environment is happening slowly but surely. For example, the concept

of a golden thread of information — made possible due to the use of technologies like building information modeling (BIM) — has now been consolidated in the Building Safety Bill. BIM has also gathered renewed interest recently due to the publication of the BIM international standards, the ISO19650 series. This is based on the previous UK standards and is being implemented worldwide.

There has been increased awareness and requests for the use of BIM within the industry. Buro Happold uses BIM as standard, and so as a result, we have positioned ourselves as a digital leader in our industry. Embracing digital technologies creates a better, more efficient built environment. It allows us to gain a deeper understanding of the impact our designs have on people, along with their wider social and economic consequences.

The digital revolution is happening slowly but surely

The other technology concept or buzzword garnering regular attention is that of digital twins — a digital replica of potential and actual physical assets, processes, people, places, systems and devices. Some people say it is just the latest technology jargon, but I disagree. Digital twins are developing in a more organised way than they appear. I was a member of a working group that produced the UK National Digital Twin Roadmap, which is in the process of being implemented as an industry standard.

However, one unfortunate and consequential impact of Covid-19 has been the hardening of the insurance market. The availability and scope of professional indemnity insurance for consultants and contractors has become increasingly stringent or narrow. The costs for cover have also increased exponentially.

All these factors make it sound like the construction industry is in the midst of an immediate revolution. In truth, the pace is far more leisurely, despite increased digitisation and efficient use of technology being essential for the survival of the industry.

There are various reasons for this, not least mindset and lack of clarity

in documentation. There are many of us in the industry working to resolve both these issues. With that being said, the digital revolution is happening slowly but surely. We have at least moved beyond people claiming, that all this technology is “just CAD on steroids” and will be forgotten tomorrow.

Cristobal Correa, Principal – Structures

On... how Jewel entices travellers to Singapore



TO MOST PEOPLE, AIRPORTS are a gateway — just part of the process of getting from A to B. However, the amenities they house have the potential to generate income not just from passengers, but also from those living in the local area. In the wake of Covid-19, do airport owners and operators need to re-evaluate their priorities to consider how they can generate more revenue landside?

Airports provide vast spaces accommodating dozens of restaurants, retail outlets and facilities; a comfortable setting for travellers. Currently, most of this is located airside. However, I think that what operators should be looking at more and more is not just how to impress tourists, but how to draw local people in for the same experience. The function of airports is no longer singular — and the need

for operators to find other sources of income has been accelerated considerably in recent months.

The basic design concept is straightforward. We need large, open-plan recreational areas located landside that are designed as places local people want to visit — essentially competing with other attractions in the area. The Jewel development at Changi Airport, Singapore, is a perfect example.

A new structure at the centre of the airport, located between existing terminals, Jewel features landside retail, accommodation and leisure facilities as well as a 5.6 acre garden housing the largest indoor waterfall in the world. Jewel entices travellers to choose Singapore over other transit airports in the region and, importantly, the placement of the amenities on the landside attracts locals too.

Right now, Jewel is a public space like no other in the world, but as priorities and business realities shift, this is certain to change. Redesigning airports so they become destinations in their own right is clearly the way to ensure revenue continues to flow in.

In these uncertain times, we need a change which will keep the industry robust. As Jewel proves, we have the space, the technology and the ability to achieve this.

Jean Hewitt, Senior Inclusive Design Consultant
and Elle Beange, Graduate Inclusive Design Consultant

On... maintaining inclusive practices during the pandemic

COVID-19 HAS DRASTICALLY changed our lives. What does this mean from an inclusive perspective? Some of the safety measures implemented into public infrastructure can present a significant challenge to people with additional needs.

Public bodies are making alterations to enable distancing, such as pavement widening to accommodate more pedestrians. This may result in unintended shared space, which poses a risk to people who are blind or partially sighted.

Transport must be appraised. Prioritised parking and drop off zones for people with disabilities should be considered. There is much discussion around one-way routes to increase distance between pedestrians; it is vital these routes can still accommodate wheelchair users and mobility aid users.

There may be an increase in cyclist commuters, meaning that more cycle

stands need to be added. Cycle stands must comply with guidance, such as ensuring that there is a detectable warning surface underfoot and some flexibility to accommodate adapted cycles. Cyclists and pedestrians should still be segregated.

Regarding wayfinding, individuals may have used visual cues to familiarise themselves with routes. An altered environment could result in a reduction of familiarity and less independence in travel. For people who are blind or partially sighted, physical guiding might be required. This may also be the case for people with guide dogs, as the dogs must get to know a new route.

Technology can play a significant part in planning and supporting social distancing measures. For example, data analytics of people movement can enable assessments to be made about maximum occupancy levels for distancing rules.

Data analytics can also predict how a building or space might be populated and used, while tracking apps can be a highly responsive management tool in identifying issues. Such technology allows managers and operators to pre-test and react in an informed manner.

Apps can be beneficial in helping people to navigate a building or environment. Wayfinding apps increase independence for some people with disabilities; they can provide audio feedback to people with visual impairments who are unable to see or interpret floor markers and directional signs.

It is vital during this pandemic that we place people at the heart of this dynamic decision-making process. Consideration must be given to the diversity of human need. Flexibility and some personal control are key to wellbeing, efficiency, productivity and motivation — offering as much choice as possible should create win-win arrangements that benefit everyone.

Connor Rusby, Air Quality Consultant

On... why Ultra Low Emission Zones work for cities

THE DECISION TO EXPAND London's Ultra Low Emission Zone (ULEZ) is of little surprise to those of us who have seen its effect. While there is still a vast amount of work to do to reduce London's air pollution, the ULEZ is making a significant contribution — and from 25 October 2021 it will be extended to the north and south circular roads.

It is concerning, however, that so few people seem aware of this plan. During our Air Quality team's discussions with planning professionals about this, we were surprised to find how many were not considering it in their work or simply had no knowledge of it.

This lack of knowledge was more of a surprise as the change will not

just impact environmental policy, but business operations too.

Let's look at business continuity and industrial land allocation — both essential to London's economic consistency. There are many strategic industrial locations inside the new ULEZ zone; policy protected areas which perform important roles in logistics, waste management and transport, as well as providing relatively affordable workspace.

The majority of these industries are serviced by HGVs — vehicles which are not often compliant with emissions standards, and for which there are few practical alternatives. To avoid an additional daily charge for each vehicle there are two choices — either replace your fleet

or find another base outside the zone — at a time when businesses are likely to be still recovering financially from Covid-19.

A year will go by faster than we think, and businesses, planning consultants and local authorities should be working to prepare for the effects of the extension in order to avoid vital services being compromised.

Tackling climate change is our first priority as a society, but as we work to improve our capital's air quality we have to consider the associated effects. The extension must be properly prepared for within the planning process, and businesses must evaluate its effect on them. Let's start that conversation now, while we still have time.



UNIT TRUST

Why clients put their faith in our creative approach to design for modular construction.

The sun has yet to rise over Pevensey Bay, Sussex. It is a Thursday, the 28th September 1066. The Duke of Normandy — soon to be better known as William the Conqueror — begins his invasion of England. Having defeated a spirited Norwegian force at the Battle of Stamford Bridge three days earlier, King Harold's armies are far away in the north.

This new naval threat — about 700 ships — arrives unopposed. First to disembark are the archers, followed by knights and their warhorses. Then come the carpenters. Though they carry huge axes, heavy planes and various other bladed tools, these craftsmen are here to work rather than fight. Their immediate task is to fortify the position by assembling a timber castle transported in kit form.

Chroniclers of the time take up the story: "They had brought with them in the fleet, three pre-built wooden castles from Normandy, all in pieces,

ready for fitting together, and they took the materials of one of these out of the ships. Before evening had set in, they had finished a good castle on English ground and placed their stores there. All then ate and drank and were glad to be ashore."

The principles of designing for offsite prefabrication and modular assembly were in place even when the most sophisticated means of capturing building data was the Bayeux Tapestry. Indeed, over a thousand years before the Battle of Hastings, the Romans built Warwickshire's Lunt Fort using elm sections produced in Gaul. So where do we stand in the 21st century?

Adopting a creative approach to modular construction

There's no doubt that fast-track construction programmes are becoming increasingly common to meet demand, particularly for housing. Within this context, the capability to reduce site costs and delays while

improving safety, productivity and quality makes modular construction a viable alternative to traditional methods. Moreover, an approach informed by manufacturing can be applied to a broad range of building design, from utilitarian civic projects through to intricate statement architecture. Sounds great. Why hasn't it really caught on?

Mark Ireland is the chief engineer of technology strategy for the Manufacturing Technology Centre, a UK government organisation that works with industry and academia to help businesses perform internationally. "Clearly, there are quite a few differences between a manufacturing environment and construction," he says. "The construction sector is very transient in nature with no longevity of order book. That would be a bit like football only existing as these transient teams who, every time they want to play a game, have to recruit the manager, a coach and all the players. Once the match is over — win, lose

or draw — the team is disbanded and the whole thing starts again." This short-termism, and lack of meaningful collaboration between participants, dissuades the industry from investing in development of innovative capabilities as a manufacturing firm would; while manufacturing is driven by products and assemblies, construction tends to hinge on established trades and roles.

"It's a very fragmented process," agrees Buro Happold Partner Dr Mike Cook. "It has a traditional way of starting with design that is allowed — possibly sometimes even encouraged — to be very bespoke". As Mike explains, site conditions may well necessitate a high degree of bespoke design. Beyond that, though, the client is often looking for something unique and aesthetically alluring. In such cases, the option to use standardised products is rarely seized upon. Quite honestly, beyond refining how it is delivered, modular construction also requires some rehabilitation in terms of public image. →

A brief history of pre-fabrication

The earliest documented prefabricated house was created in 1837 by a carpenter called Henry Manning. Built for his son, who was emigrating from London to Australia, once assembled this modest property sparked sufficient interest to support a business for Manning and an industry of imitators.

As the century progressed, this approach was adopted to accommodate prospectors pouring into California during the Gold Rush. Expanding on scale and complexity, Isambard Kingdom Brunel devised a modular hospital for 1,000 patients that was shipped from the UK to Turkey during the Crimean War. Most strikingly of all, Crystal Palace, then the world's largest glass building, was constructed from modules in Hyde Park for the Great Exhibition of 1851.

Once disassembled, this Victorian masterpiece was moved to South London where it stood for 82 years until burning to the ground in 1936. Speaking to *Dezeen* in 2019, estimable architect Norman Foster named Crystal Palace as the building from the past that he would most like to visit. "That really was the birth of modern architecture, of prefabrication, of soaring spans of transparency," he said. "That was a truly seminal building."

Putting bespoke practices into prefabrication

Conversely, widespread modular programmes of more recent years have engendered an enduring association with boxy post-war prefab homes or motorway-adjacent budget hotels that is

no longer representative. As evidenced by Buro Happold's recent work on the Officers' House at London's Royal Arsenal Riverside — which features a new, high-end residential development of 19 apartments using fully finished volumetric modules imported from northern Europe — there is no doubt that this is a reliable means of delivering exceptional results that goes far beyond the mass production of identical parts in the service of monotonous form.

"The challenge for us, perhaps, is to still allow a degree of that bespoke nature in our buildings, because that is something that brings people pleasure and, maybe, gives commercial value," says Mike Cook. "The question is, how do we reduce the level of interfaces between all the different people — the designers, the supply chain — that actually deliver the product? What we're keen to do is find ways to pre-assemble pieces a bit like you bring the engine to the car — you don't craft it in the middle of the factory."

The move towards mass customisation

To this end, the conventional mindset needs to shift. "What the construction sector does is mass personalisation," says Mark. "Everything can be different. The client can have whatever ceiling height they want, whatever floor areas they want, but variation costs you money." In describing the move towards a more efficient technique — mass customisation — Mark outlines how car makers offer customers a bounded palette of choice that makes economic sense. "You're designing

a product, already knowing how you're going to make it, but you build in ways that each of those process steps can be varied without adding much cost," he continues. "I've seen some amazing stats from BMW's Mini on how many different variants that they've made. Fundamentally, they all go down the same production line. They're made by the same people, assembled with the same supply chain using the same equipment."

Procurement of large buildings with recurring universal requirements — such as hospitals and schools — can certainly be improved by a greater understanding of what modular construction has to offer as regards performance and function with an affordable individualised look. For the student accommodation market, this is an opportunity to minimise disruption to campuses while ensuring excellent build quality. Standalone units, typically one "pod" per residence, are factory manufactured then brought to site; once in position, they can be connected to services and operational within a matter of hours. Elsewhere, looking at mass private and social housing, changing the way that we build can help to close the abiding gap between supply and demand.

"It's striking that balance between utilising as much standardisation that we can — and I believe that runs through how pieces go together rather than what the pieces look like — and the ability to customise things," observes Buro Happold Partner Wolf Mangelsdorf. As Wolf explains, viewing a building as a kit of parts to be prefabricated offsite in elements of deliverable size can work across all sectors. "What stops us from treating a museum project or a theatre project in the same way? The challenges are exactly the same."

"It's really just about a process and a collaborative kind of engagement in designing out the unknowns that ultimately leads to the industrialisation of a product or a project."

Industrialising construction

Sticking with the prevailing vehicular motif to describe how easily a componentised structure fits together ("Like a car does. Clickety-click.") Wolf points out that extraordinarily elaborate buildings can be completed in no other way. "My best experience with designing for prefabrication and treating a project like a product is the Morpheus Hotel in Macau with Zaha Hadid," he says, referencing a notoriously challenging megalith that involved a 40-storey, free-form exoskeleton and more than 30 facade systems. "Every piece of steelwork was slightly different, each one clad in aluminium. We would have never been able to build this if it hadn't been all resolved before it goes to site because there is no opportunity to adjust things there. So, there was a massive effort between the design team and the supply chain. You can't leave it to chance — it's too complex."

Far from stifling creativity, then, a kit of parts approach allows all imaginable possibilities to be explored using Buro Happold's digital expertise and advanced computational tools. What is more, this manner of building is compatible with imperative sustainability goals. "We have put climate emergency on top of our agenda," says Wolf. "As we're drilling deeper into it, we're seeing that the challenges are formidable. We can do a lot now, I think, by using the right processes. Industrialising construction and reducing waste, reducing the amount of energy and time it takes to piece things together, will make a big contribution."

"It feels like we're at this junction where we can do almost anything, which sounds a bit grand," says Mike. "This is a journey we've been on for a long time. I see Buro Happold honing what we do and speaking more positively and strongly with clients, architects and other collaborators about ways in which we can deliver better quality, better price and much more planet-responsive construction." **BH**

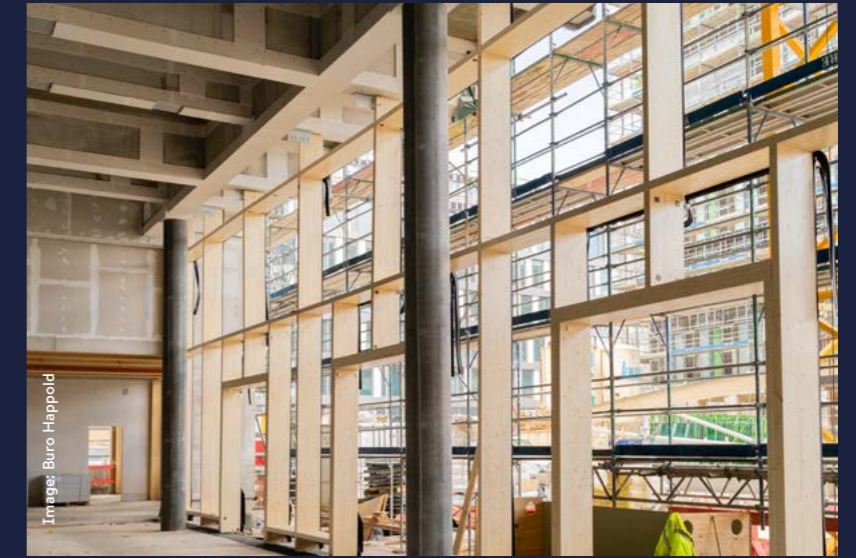


Image: Buro Happold

EDGE Suedkreuz, Berlin

EDGE Suedkreuz in Berlin is Germany's largest modular building. This timber hybrid structure is a blueprint for sustainable office design. The future headquarters for Vattenfall Germany, this revolutionary 30,000m² office development is a landmark commercial project.

Working with OVG Real Estate and CREE by Rhomberg, Buro Happold used sustainable and innovative design principles to inform all aspects of the project. By using timber and concrete in this hybrid structure, we have significantly reduced the building's embodied carbon.

At the design stage, our data management experts devised a BIM execution plan to merge the separate discipline models into one coordinated 3D representation. This computational method ensured efficient and accurate coordination of the structure. At the construction stage, the use of timber as the primary building material reduces CO₂ emissions by approximately 80% per sqm, in comparison to conventional reinforced concrete.

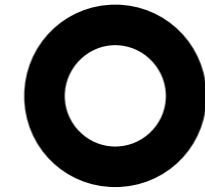
The advantages of this modular building include rapid construction, reduced labour costs, the use of sustainable materials and the realisation of a healthier working environment. As a result, the project has achieved DGNB Platinum and WELL Core & Shell Gold pre-certification.

"IT FEELS LIKE WE'RE AT THIS JUNCTION WHERE WE CAN DO ALMOST ANYTHING..."

Dr Mike Cook Buro Happold Partner

Connecting communities

Despite multiple challenges, Buro Happold's teams in Hong Kong, Beijing and Shenzhen continue to work on new and existing projects, widening collaboration and extending our expertise in multiple directions



Our Asian reach is expanding. Alongside our Hong Kong and Beijing offices, Buro Happold now has a base in Shenzhen. Creating a Buro Happold office here presents us with huge opportunities

in terms of real estate, sports and cultural development. Development in the Greater Bay area is mainly commercial at present, but there is increasing investment in cultural projects such as the Shenzhen Conservatory of Music, the Shenzhen Opera House, and museums for art and natural history.

The wider vision is to create somewhere that will compete with San Francisco Bay in terms of attracting talent and growth as a technology hub, whilst also offering an attractive lifestyle.

Shenzhen Bao'an Performance Centre

A key Buro Happold cultural project completed in 2020 is the new Performance Centre in Binhai Cultural Park. It is one of three buildings that make up the cultural centre in Bao'an Central District and is aligned along a central axis that extends from the city's hinterland into the South China Sea. The buildings, together with a series of interwoven public plazas, form a unified presence on the site.

With a total land area of about 20,000 square metres, the project includes a 1,500-seat grand theatre and a 600-seat smaller theatre. Although the centre is relatively square, almost every surface is curved or inclined. In order to ensure the accuracy of the design, Buro Happold's designers adopted the Rhino model reference plane positioning method to solve the positioning of the building and structure outline, the relationship between the door and window openings and the curved surface, as well as the complex height differences in the theatre.

Economic boost from Wan Chai Connect

Hong Kong probably has one of the best public transport systems in the world, but trying to navigate it on foot is frustrating. The north shore of Hong Kong Island used to be a waterfront community. It was then developed on reclaimed land over successive generations, with city planners prioritising the motorcar. A great example of this is the building of the east to west eight-lane Gloucester Road (including a service road), which cuts off north Wan Chai from south Wan Chai. There are sparse but multiple walkways that cross the highway, and the initial idea was to join them all together and create an elevated linear walkway over the road to improve connectivity.

The government then announced it was selling its offices in Wan Chai, which stand front and centre to the problem of connectivity. This presented a real opportunity for imaginative regeneration, and alongside a team of collaborators – Studio B, Knight Frank, Executive Counsel, DCMSTUDIOS, Currie and Brown and Water Economics – Buro Happold created a conceptual masterplan.

Our aim is to reconnect Wan Chai from the harbourfront to old Wan Chai, the multi-modal transport interchanges within

a one kilometre sphere of influence and the extended Hong Kong Conference and Exhibition Centre. The concept brings people, nature, culture and heritage together to create a landmark elevated park, bringing a similar economic benefit for Wan Chai as The High Line has done for New York City.

Buro Happold is using examples of elevated walkways in Hong Kong and Seoul to demonstrate the concept, and how it could create something unique for Hong Kong. We are leading the discussion through the government departments, and even with Covid-19 restricting social interactions, we have managed to meet and present to Wan Chai District Council, Design HK, Walk DVRC, The Harbourfront Commission and the Real Estate Developers Association (REDA).

"We are receiving great recognition for it on social media, from key stakeholders and our peers in the construction community," said Robert Gordon, regional director. "In doing so, it enhances the Buro Happold brand as drivers for thought leadership for the sustainable betterment of our city and its communities."

The next step is to engage with other key stakeholders to put this conceptual idea on the path to implementation.

Computational consulting service on offer

Mega projects need mega solutions. Morpheus, the West Kowloon Terminus Station and the Xiqu Centre to name a few, presented our team with very unique challenges. As a result, Buro Happold has become a pioneer in advanced computational methods, leveraging bespoke code and algorithms as part of our daily work.

Buro Happold is now offering computational consulting as a service, bridging the gap between discipline expertise, big data and analytics. The service is a flexible and powerful approach to problem solving using data at all stages of the property life cycle. The methodology can be applied to problems faced by property developers, investment managers, contractors and asset managers who want to use data to gain a competitive advantage in the market.

Associate Director Emidio Piermarini explains, "There is a special type of power you have to solve problems when you have an office full of expert problem solvers, who all have empathy for the built environment, and are equipped with the power to code their way to solutions. We are excited to be one of the first companies to offer this power to leverage bespoke computation to create value for our clients, rather than just keeping the power of this methodology hidden away in the 'back of house'."

The work of our teams in Asia pushes the boundaries of what inspired design can create. Technology and innovation are key pillars of our work, and we are well placed in the region to not only serve China, the biggest construction market in the world, but also the emerging economies in Vietnam, Thailand and Indonesia. We are all looking forward to the next decade. **BH**

Intelligent masterplanning

With cities facing major challenges related to the climate emergency, increasing urbanisation and digitalisation, how urban planners and engineers' approach masterplanning is changing. Sustainability, flow of resources and reducing reliance on cars are vital to the modern masterplan. City governments are increasingly heeding this advice, seeking expert engineering consultancy when planning large scale, complex urban developments.

Berlin-Brandenburg

When Buro Happold was invited to work with architects Barbara Hoidn and Wilfried Wang to develop a set of urban design principles for the Berlin-Brandenburg 2070 competition, we decided to take a holistic approach, putting sustainability at the forefront of how we live.

The competition aimed to spark a social debate on the future of the region. Architects, urban planners and landscape architects were asked to submit bold proposals that responded to the interdisciplinary challenges of the area, reimagining its future.

The status quo

The city of Berlin and the surrounding Brandenburg region are inherently different. Brandenburg is rural and agricultural. Not only does the land produce food, it also acts as a water source and renewable energy hub. Berlin is an epicentre for politics, culture, education, commerce and entertainment. Despite their differences, the two areas rely on each other. Residents of Brandenburg benefit from Berlin's employment opportunities, while the citizens of Berlin need the clean energy and food produced in Brandenburg.

Although this two-way connection appears mutually beneficial, the region is far from self-sufficient. It remains part of the globalised network of import and export.

A new approach to masterplanning

Our Berlin-based team, led by Senior

Partner Paul Rogers, Graduate Consultant Abdelrahman Helal and Cities Consultant Aron Bohmann, applied innovative thinking to the competition response. As Aron explains, "The customary approach to developing a regional masterplan, or vision for change, would be to think spatially, however, on this occasion, our approach was based on the availability and flow of resources."

Current resource flows in the Brandenburg region, like many other regions around the world, are characterised by an intense global trade network, i.e., goods are not produced where they are consumed (see fig. 1). This strong interdependence on international supply chains creates fragility.

The solution to this problem was to emphasise sustainable resource cycles, prioritising the resources available within the region to underpin the local economy. For example, material resources like water, energy and building materials should be sourced from Brandenburg, whilst more abstract resources such as governance, culture and politics should remain nationally or globally integrated.

What is a sustainable resource cycle?

Brandenburg is rich in physical and natural resources, which are the essential ingredients for a future beyond fossil fuels. With the appropriate management, together with sustainable harvesting and replanting, it is possible to establish a circular and replenishing regionalised supply chain of resources like fresh food and raw materials, that protect the region's natural heritage (see fig. 2).

Our research demonstrated that the wind and photovoltaic parks (that are already part of the region's landscape) could be used in combination with its plentiful supply of water to generate enough hydrogen to meet Berlin-Brandenburg's energy demands and export it to a wider market (see fig. 3).

A refocusing towards regional production and consumption shifts the economy from linear to circular. This type of self-sustaining system is based on replenishment and sustainable holistic values rather than economic consumerism.

Using data to build our case

Data provides us with information about the past and so provides a basis for sound planning. This in-depth knowledge enables us to understand and formulate the spatial potential of the masterplan and shape visions for the future.

As Consultant and Data Specialist Abdelrahman Helal tells us, "Data analysis was critical to the development of our masterplan principles. We researched, analysed and visualised a wide range of open-sourced data that enabled us to base our thinking on hard evidence rather than scenarios that may never materialise."

The need for change

The climate emergency, economic recession and the Covid-19 pandemic have revealed the fragility of our global networks and how easily international supply chains can disintegrate. To mitigate these challenges, we need to establish robust local and regional resource-management models. By shifting our perspective, we can build a more resilient and balanced world. →

Fig 1 2020 Resource flow

The flow of material resources is strongly reliant on global networks, while regional exchange of material resources is kept to a minimum.

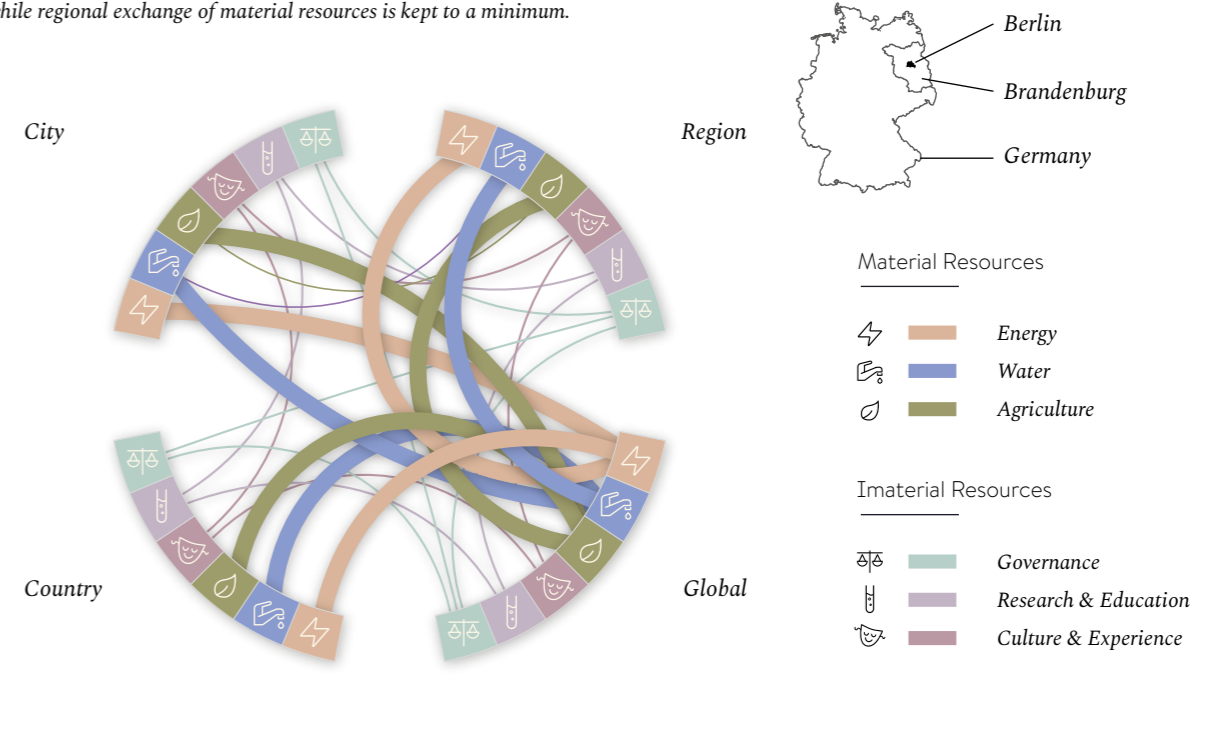


Fig 2 2070 Resource flow

Shift of material resource flow from global to regional. The flow of immaterial resources is stronger between city, region, country and the global community.

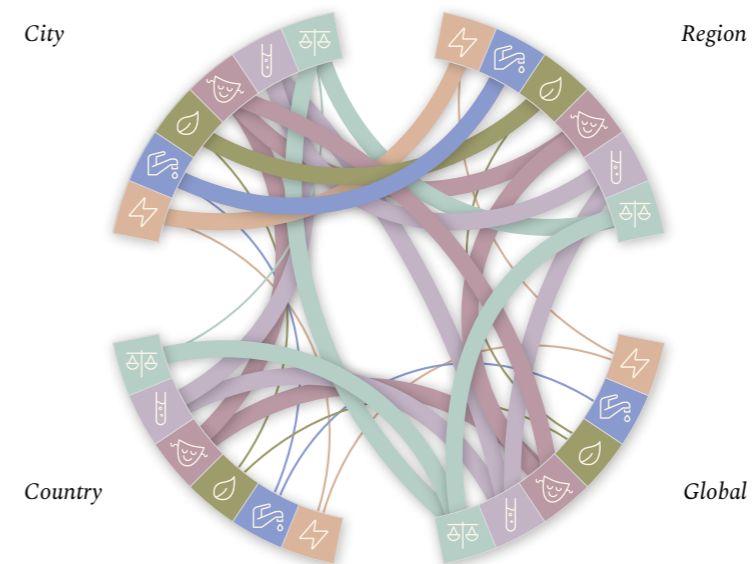
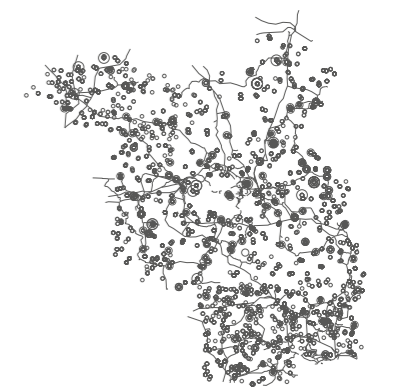


Fig 3 Existing renewable energy infrastructure



Data-based visualisation of the existing renewable energy infrastructure to evidence the potential of completely fossil-free energy supply within the region.

Fig 4 Envisioned infrastructure for The New Gartenfeld

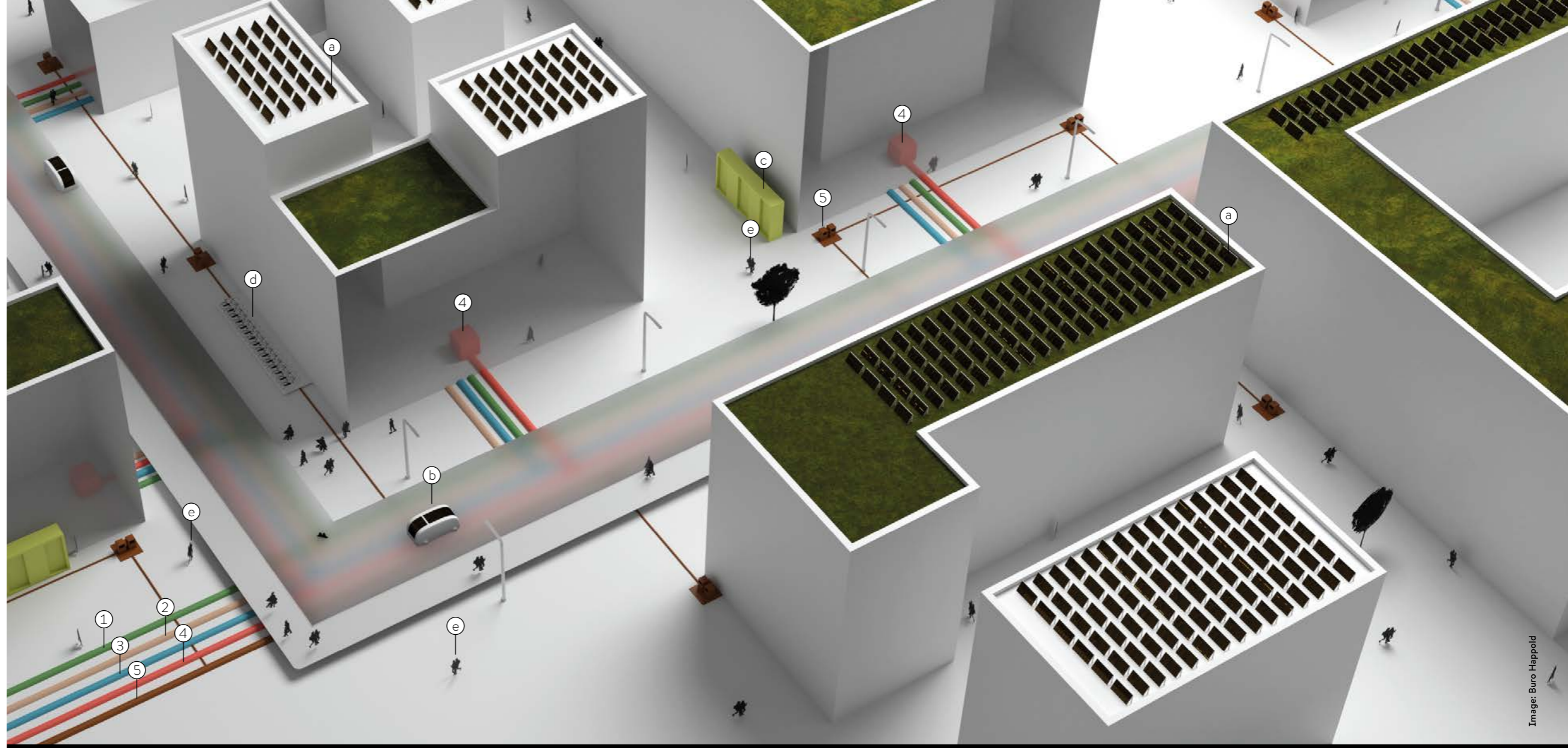
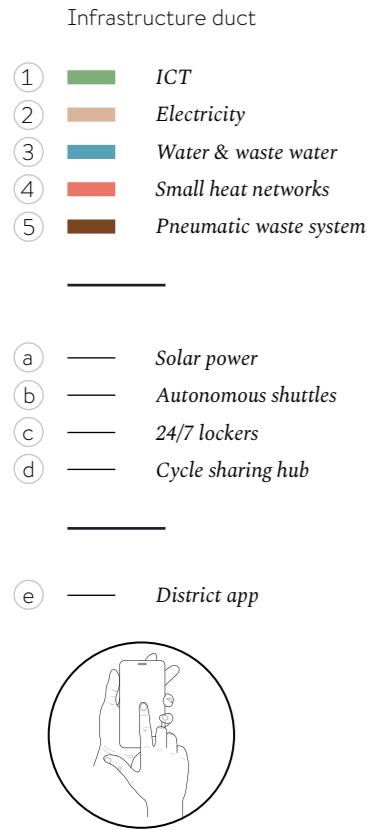


Image: Buro Happold

The New Gartenfeld

A blueprint for forward-thinking and collaborative development, the New Gartenfeld district in Berlin is an example of resource-led masterplanning principles being put into practice. Leading the task group and working closely with the developer Planungsgemeinschaft “Das Neue Gartenfeld” GmbH & Co. KG, we’ve shaped a multidisciplinary and integrated approach. By taking the philosophy of a shared economy as our starting point, Buro Happold is breathing new life into this 40ha brownfield site on the outskirts of the city.

Asked by our client to create a “city of the future”, we’ve devised a residential district founded entirely on sustainable principles. Focused on five key pillars: mobility, energy, digital connectivity, water and logistics, our autonomous, self-sufficient masterplan brings together innovative concepts relating to each pillar, resulting in a quantum leap in neighbourhood development.

As a result, residents of the 4,000 new homes will live in a neighbourhood designed to improve their wellbeing and the environment that surrounds them. Based on the principle that people don’t want – and most importantly, don’t need – to own everything, services

and infrastructure will be shared by all. This includes the communal reuse of rainwater, a neighbourhood ICT platform and shared transport system.

A car-free development

“Our greatest challenge was meeting the client’s objective of creating a car-free mobility strategy”, says Sebastian Seelig, project director, “so we’ve developed a concept for an autonomous public transport loop for the district with two mobility hubs connected to the city’s wider public transport network.” A lack of parking spaces within the development will actively discourage car ownership.

Integrated utilities

Urban Planning Specialist Aron Bohmann explains our approach to managing services across the district, “In what we believe to be a first, infrastructure for all utilities – including water, power and transport – will be completely integrated and managed at district level by a single consortium. Not only will this deliver infrastructure efficiencies and lower utility costs, it will open up a completely new business model.”

The ‘Manage your Life’ app

The shared services so integral to New Gartenfeld’s ethos will be managed

by residents via the ‘Manage your Life’ app. Aron explains it’s importance, “This innovative, user-oriented technology will both empower residents with intelligent energy management and give them a sense of shared responsibility over the operation of key services”.

Environmental sustainability

We’ve embedded sustainable principles throughout the masterplan to reduce resource flows between Gartenfeld and the surrounding area. For example, small district heating networks shared by several buildings will have an emphasis on renewable energy: 100% of stormwater will

be reused, 60% of buildings will have a green roof and biowaste will be recycled in a biogas plant.

Innovative use of data

Abdelrahman explains, “We’ve integrated GIS-based data on each element of the development’s infrastructure to create a 3D district data model. Having initially been used to aid our planning work, the model can become a vital tool in the ongoing maintenance of the district’s utilities.” **BH**

SPECIALIST
Q&A

Paul Brenton
Technical Director,
Coastal and Maritime



Tensions between development and conservation are going to increase as the coastline comes under more pressure.”

Image: Buro Happold

Q Sea engineering must be a very exciting environment to work in?

It is, and it's also hugely challenging. We've all experienced how the sea can be calm and idyllic one moment, then turn into a seething threat to life and property the next. And it's not just the sea, but the shoreline and beaches that can also change on every tide – even to the point of an entire building or road being lost in a storm. The coast is the most dynamic environment that humans live and play in, and that's why it pulls us in and fascinates us.

Q Is that what drew you to this particular specialism?

I think I was always destined to be an engineer. I'm from a naval family and I grew up by the sea, spending my childhood on beaches in the southwest of England. That certainly brings home both how dangerous the sea can be and the beauty of the ever-changing natural environment. At school, my favourite subjects were maths and geography, and I love problem-solving – all of which I now encapsulate in my technical work.

Q How do you balance defence from the sea with the celebration of it?

That's a major challenge. People want to live near the sea, but in doing so we're putting pressure on that environment and, essentially, damaging it. Because we value it so highly, we also want to protect it, and that creates real conflict. This tension is only going to intensify as more and more people migrate towards the sea and the coastline comes under increasing pressure, particularly from sea level rise. We're seeing this on some of our Red Sea projects at the moment. Working with our environmental team, we're obtaining data early on that helps us shape and direct development to the most appropriate places, and lessen its impact as far as possible.

Q Which projects are you currently involved with on the Red Sea?

The main one is AMAALA, a tourist-level led development around natural coastal bays and islands. These are incredibly sensitive environments, home to extremely rare turtles and dugongs, as well as nesting migratory birds. Our client wants to develop the area to attract people from around the world, but to balance that against the

impact on what's currently a pristine marine environment. In many ways, it's a project that talks directly to the core issues of development at the shoreline.

Q How do you gather data?

In terms of the Red Sea, we've worked on a lot of projects up and down that shoreline so have a cumulative knowledge base that we can deploy. We also use remote sensing such as satellite derived bathymetry, which uses satellite imagery to work out the depth of the seabed. We've used it on all of the Red Sea projects, and it enables us to work out where the most sensitive areas are likely to be so we know where best to concentrate development, and equally, where it's best avoided.

Q It seems you have to balance multiple different interests on projects...

Yes, and that's always complicated. By developing at the shoreline, clients aspire to realise the 'Instagrammable' image of the seaside on a peaceful, sunny day. As engineers, we need to also think about the typhoon that's coming next year, or the looming threat of sea level rise. We work closely with the environment, transport and energy teams here at Buro Happold to get a full understanding of the risks involved on each project, so that we can inform our clients about them early on. This enables us to reach decisions together that maintain the vision while remaining grounded in reality.

Q What's the most complex project you've worked on to date?

In terms of technical challenge, it has to be Louvre, Abu Dhabi. Delivering a reinforced concrete building – reinforced concrete and salt water don't like each other very much – that is built many metres below sea level, exposed to waves and housing priceless artwork. That was an incredibly difficult project, but ultimately very rewarding.

Q And the most inspiring?

That would be the regeneration of Hayle and Folkestone harbours, which are two of the largest UK projects that we've done. Each project presented us with numerous challenges in terms of flood risk, contaminated ground, heritage considerations and environmental issues, but beyond that

both proved to be game changers in terms of catalysing regeneration. That's what has been so inspiring – seeing the benefits brought to the wider community in two towns that have been through pretty tough times.

Q They sound like big projects...

Folkestone, in particular, is a complete cradle-to-grave project for us. We've been involved for over a decade, working across two masterplans and providing everything from environmental impact assessments to the supervising of construction contracts. It's drawn on specialisms from across our Cities and Buildings teams – including water, environment, structures, ground engineering, energy and transport. When we completed both the enabling works to protect the site from flooding, and the restoration of the historic railway core, our Cities Group handed over to our Buildings Group, who are leading the next stages. Phase one is currently being built and will create 50 seafront properties.

Q The Cities Group structure, where energy, transportation, bridges, environment and water disciplines are grouped, allows specialisms at Buro Happold to work together?

Yes, and the client in Folkestone really appreciated the way that enabled us to mobilise and provide a rapid response to changing situations. Our teams are very close-knit, and that means we're able to keep on top of things and work together to help our clients make the right decisions. I think it's this agility and responsiveness, and what that means for client care, which sets us apart.

Q What's next for the coastal and maritime team at Buro Happold?

I think we're in a strong position to meet the challenges facing us, which are only going to get bigger with population growth, increasing migration to the coastline, and the desire to create new places for people to live and holiday in. We've got an amazing portfolio of projects behind us, and a great team that we're looking to expand, so I'm really excited for the future. **BH**

On solid ground

Rachel Monteith and Alison Nicholson spend their days getting people out of holes. Mostly metaphorically, but quite often, it happens for real, especially when it comes to over-enthusiastic archeologists. Victoria Bentley talks to them about the big issues in ground engineering...

Image: Adobe Stock / seiglin

Google must be confused. Doing research for this article, I found myself putting in search terms such as “biggest foundation failure” and “most treasure found at building site”, as well the slightly more worrying, “what happens if you dig up a body?”. So alongside the usual adverts on my social media feed, I am now being asked to take a refresher course in foundation design, buy a metal detector, and I am sure, very soon, will be getting a call from the police to ask exactly where I buried that body.

Of course, foundations, treasure and buried bodies are all part of week’s work for Buro Happold’s Senior Geoenvironmental Consultant Alison Nicholson and Ground Engineering Director, Rachel Monteith. Rachel joined Buro Happold in 2016 after a long stint as a Principal Geotechnical Engineer at Sir Robert McAlpine. She specialises in construction, tendering, forensic work, as well as all aspects of design, from scheme development to detailed design and validation and control. Alison also joined Buro Happold in 2016 after working in London, then Vancouver, as a geoenvironmental specialist. Alison is a specialist in Land Condition (SiLC), a SiLC assessor and has fourteen years’ experience assisting clients in the assessment of brownfield sites for acquisition and redevelopment.

“We have a good range of expertise,” says Rachel. “Larger consultancies may have several teams and the geotechnical engineers won’t be talking to the geoenvironmental engineers or engineering geologists, but we all work closely together.”

Building on solid ground

When you stand up, the land under your feet feels stable, doesn’t it? Don’t be fooled, said Rachel. “If you look at old churches, they tend to be built on the highest, most solid ground. People knew where the solid ground was, and they are built straight onto the ground. Now we build even bigger things, and we built on marginal land, and build on land that is previously used. We are still using the ground, but it has got a whole lot more complicated.”

Rock, soil, tunnels, mine working, rubbish dumps; the land you want to build on may not be as reliable as you think. It is Rachel and Alison’s job to manage that risk and advise you on the best course of action. Firstly, you need to know what you are dealing with, and the good news is that a thorough desk study and subsequent site investigation will do this. The bad news is, that you may not like what Rachel and Alison find.

“Everyone believes the ground is solid. It is not. Anyone of a certain age will remember old town gas sites in the UK,”

says Rachel. “They are all over the country and are being redeveloped. But of course, they have huge legacy issues.

“We have to understand the history, understand what impact we are going to have. We have to know whether there are any tunnels underneath, know whether there is a dirty great big pit full of goodness knows what. We collect as much information as we can before putting anything in the ground. It is a good, sensible starting place.”

So what solutions are needed to create safe and suitable developments on brownfield sites? It depends on the contamination, what the land will be used for, the client’s attitude to risk, and how much the client is willing to spend.

Alison explains that her job is to understand the risks, to mitigate those risks and to reduce uncertainty for our clients. Contamination was an issue in an old metal plating factory, where, as Alison put it, “they used to throw degreasing solvents out of the back door because they thought they evaporated. Unfortunately, they do not. The vast majority trickle down, through made ground, potentially through natural strata, through groundwater and through bedrock. There, the contamination sits, because it is heavier than water. What it does then, is travel along the topography of the bedrock.

“So it can be difficult (although not impossible) to predict where these chlorinated solvents end up,” explains Alison. “One drop of chlorinated solvent could contaminate thousands of litres of groundwater. Luckily, in some areas like London, there is often a substantial thickness of London Clay underlying the site; this can protect the underlying chalk aquifer that you draw water from to drink.”

Enter, the conceptual site model, or CSM. This vital ground engineering tool allowed Alison to build a picture of the site, examining the physical, chemical and biological processes that control the transport, migration and potential impacts of contamination to human, groundwater and surface water receptors.

“If you encounter a shallow localised area of impacted groundwater that is not being extracted, okay, we can manage that easily. But if say, a pile is driven through the London Clay into the chalk that can create a pathway to an aquifer used for drinking water abstraction, that is a whole other conversation! But that is unlikely to happen if you use the right piling technique.” →



'Blue billy' :) derived from historical gas works. Contains high levels of cyanide and ammonia compounds.

Alison and Rachel's roles are not just about understanding and disseminating the strata and its makeup, it is knowing what will be built. Where will the foundations and underground utilities go? Will they introduce a pathway for the contaminants that will create a problem? Who is going to be impacted?

Understanding the context

"If I have high levels of arsenic in the soil, and I have a big landscaped area with lots of toddlers playing around potentially eating soil, that is a high risk to the future users," says Alison. "However, if I have the same level of arsenic in the soil and I decide to put a cap, or some hardstanding, or a building over that, then we do not have a pathway between our source of contamination and our receptor and the risk is lower."

Land may need to be dug out, whether it is contaminated or not, "You might want to put a double height basement in an area of contaminated land, in which case, this is a great opportunity for betterment as we were going to excavate it anyway!"

There are risky sites and there are risk-averse clients. Both Rachel and Alison's roles involve communicating one to the other, as Rachel explained, "Alison and I look at two different aspects of the ground. What we are both doing, what all of the team is doing, is managing risk."

This risk management is needed whether clients already own the land, or whether they are thinking of buying it and need Buro Happold's expert help.

Alison explained, "A lot of our work is managing risk perception of both clients and our communities. Some people are more risk averse than others. It is all to do with how you communicate that risk to another party so they are informed, and they understand what the actual risks are, not just the perceived risks."

Reassuring the residents

In 2017, Buro Happold was appointed to investigate a residential development that had been built on a former gasworks. The investigation for the 1980s redevelopment was limited and there was little reliable evidence of remediation or current land condition. Under their responsibilities under the Environmental Protection Act, Elmbridge council identified the site as a priority for investigation.

Of particular concern was the potential for benzene (a carcinogen) to enter people's homes as a vapour derived from the gasworks tars potentially still present in the below ground soils and groundwater. If the investigation proved there was contamination, it could result in residents being responsible and financially liable in law for any necessary remedial action in their homes or gardens.

Buro Happold's investigation was designed to interrogate contaminant linkages and uncertainties. It required not only the rigorous application of best practice, but also sensitive communication with all of the residents, as we were sampling in their gardens and drilling on their roads and pavements.

Complex and detailed modelling and risk assessments demonstrated that most contaminants presented a low risk. Although some limited risks were greater than low, they did not exceed the legal test limits of the Environmental Protection Act and there was no "significant possibility of significant harm". Buro Happold's report explained that no remedial action was required for the residents to continue the safe enjoyment of their homes and neighbourhood.

"Risk communication was very important," said Alison. "We were successful as we informed the residents what was going to happen and when, did exactly what we said we were going to do, and then we confirmed what we had done."

Bring up the bodies... and gold

It is satisfying when a client comes away reassured, but sometimes, there are unwelcome surprises. When completing a desk study at an old incandescent mantel works, Alison discovered that thorium, which is radioactive, was likely to be present in the ground. On advising the client of the potential risks, liabilities and likely mitigation measures needed to ensure a safe and suitable development, the client decided not to purchase the property.

Sometimes the surprises are merely interesting, rather than unwelcome or costly. Both Rachel and Alison have seen a lot of items dug up from sites over the years. When bodies are found which have to be moved, they are normally carefully reinterred.

Rachel had responsibility for the geotechnical work on a site which included a deep basement. The archaeologists had to clear the site of burials known to be present before work started. The find of a decorated lead coffin in Roman sarcophagus, and a woman in it, was entirely unexpected. "It was just fabulous – a superb piece of archaeology," said Rachel. The coffin now resides in the Museum of London.

Some bodies are dug up and taken away, but as Rachel explains, what happens to human remains has changed in recent years. "Archaeologists prefer to leave everything in situ if all possible. Zero disturbance is the aim. However, all artifacts which are actually excavated, will be removed, and this includes skeletons."

Very occasionally, something might be found that changes a project, and a client's finances, in a big way. A site investigation company working at a London City Livery Hall found a stash of gold coins whilst working in the basement. The value of the haul was enough to pay for the entire development.

When it comes to finding priceless gold coins, Buro Happold's ground engineers are still waiting for their turn. It seems that their roles, from reassuring clients to assessing contamination, discovering hidden tunnels to navigating mine workings, are far more interesting than merely hunting for treasure. BH



Palaeolithic axe head found on site.

Image: Adobe Stock / Simon Tang

“WE HAVE SO MANY
INQUISITIVE AND
IMAGINATIVE
MINDS WITHIN
THE COMPANY.
I CAN TAP INTO
THIS TALENT AND
UNLEASH IT.”

Q&A with **Wolf Mangelsdorf**,
Global Head of Design,
Technology and Innovation



What are you most excited about in your new role as Global Head of Design, Technology and Innovation and what do you hope to accomplish?

Buro Happold has a reputation for creative and innovative design-led projects, as well as our cutting-edge work with technology. So, I'm excited to be taking on the role of Global Head of Design, Technology and Innovation. We have so many inquisitive and imaginative minds within the company. I can tap into this talent and unleash it. Whilst it's challenging to start a position afresh, it's a great opportunity to shape and develop the role based on my vision that's been driving my career.

Our computational engineering capabilities across the practice are built on the concept of our Computational Collective. It's all about co-creation and mass participation – with around a third of our employees actively involved. I'm bringing the same concept to design and innovation.

I want everyone to feel confident to put forward their ideas regardless of their seniority or title. Innovation isn't the responsibility of a select team; it happens because someone has a good idea or discovers a problem that needs solving. This is what we want to encourage and drive. But in order to turn our innovative thinking into

outcomes, I've set up a management process that allows us to do that in a structured way.

For this, I'm creating an 'Innovator Network' which focuses on strengthening and driving our culture of innovation. We already have some initiatives and forums in place, such as Urban C:Lab (a cross practice development programme) and the Young Engineers Forum and I am building on that. We will use these to encourage those who have a knack for innovation at an early stage in their career and providing them with tools to develop this further to carry into the practice.

In the same spirit, I'm forming a collective of design leaders that's open to everyone in the practice. Both The Innovator Network and the Design Leaders are supported by a small steering group, working closely with me to set the direction, define what success looks like, and guide the collectives.

However, co-creation and mass participation extends far beyond these constructs. Every region across the globe has a Design, Technology Innovation Board sponsor whom I meet with quarterly. Together with the Global Discipline Leaders and the Technology Board, we establish what our drivers and goals are in each region and align our agendas across the practice. →

What does design, innovation and technology mean to you?

For me, design is the application of creative engineering thinking to a problem. Establishing what needs solving — challenging it, exploring it and ultimately making it better. It's about the creative process that shapes something from nothing.

This may be a building, a city, a campus or even a strategy or a process. What makes Buro Happold so special is that we don't see our role as just 'to make something work'. We're there to engage with our clients and collaborators and apply our creativity and engineering expertise so we can help shape that final outcome.

Innovation has similarities, and overlaps with design, but there's a subtle difference. It's about having our eyes open to what's happening within the industry and beginning to look for solutions that haven't even presented themselves yet. Sometimes it's also about studying current processes and questioning whether we can do it differently.

Technology is the enabler that allows us to do things differently, or to do different things all together. This is often a driver of innovation in itself.

What are some of the challenges Buro Happold faces across the business?

We're acting in increasingly competitive markets, and so ensuring that we stand out from the crowd is a challenge we face everywhere. There's a downward pressure on fees, and so we need to be able to show the value that we can bring to a client's project.

Value doesn't come from designing the most beautiful project or delivering it on the cheapest budget. It comes from approaching and working with our clients in an engaging way. That's where we really shine.

What opportunities or challenges have been presented by the Covid-19 pandemic?

There's concern about how growth will be impacted as we emerge from the pandemic, but I believe there's also a huge opportunity to drive real change. Over the past several years, questions of how we work and live have

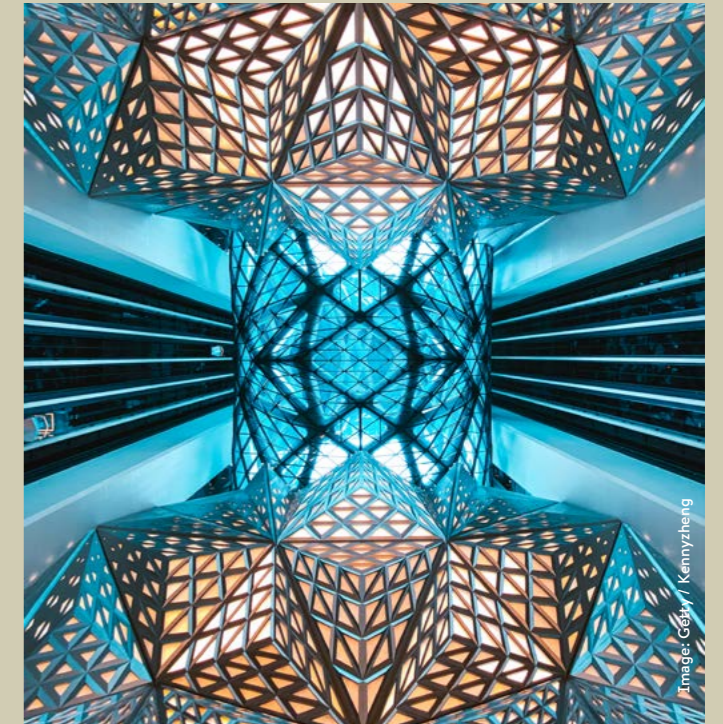
come to the fore, especially in relation to the climate and biodiversity crisis. I've been lucky enough to have worked with pretty much all of our teams across the world. Surprisingly, working remotely has somehow made us all much more connected across different disciplines and offices. The more we embrace that, the more we can pull people together with the right skills to produce something special, irrespective of where they are in the world. Our only remaining challenge is being in different time zones.

All of this features highly in our global strategic goals. We're in a fantastic position to lead the charge on the climate emergency by identifying and discussing these issues with our clients, and of course, presenting them with solutions.

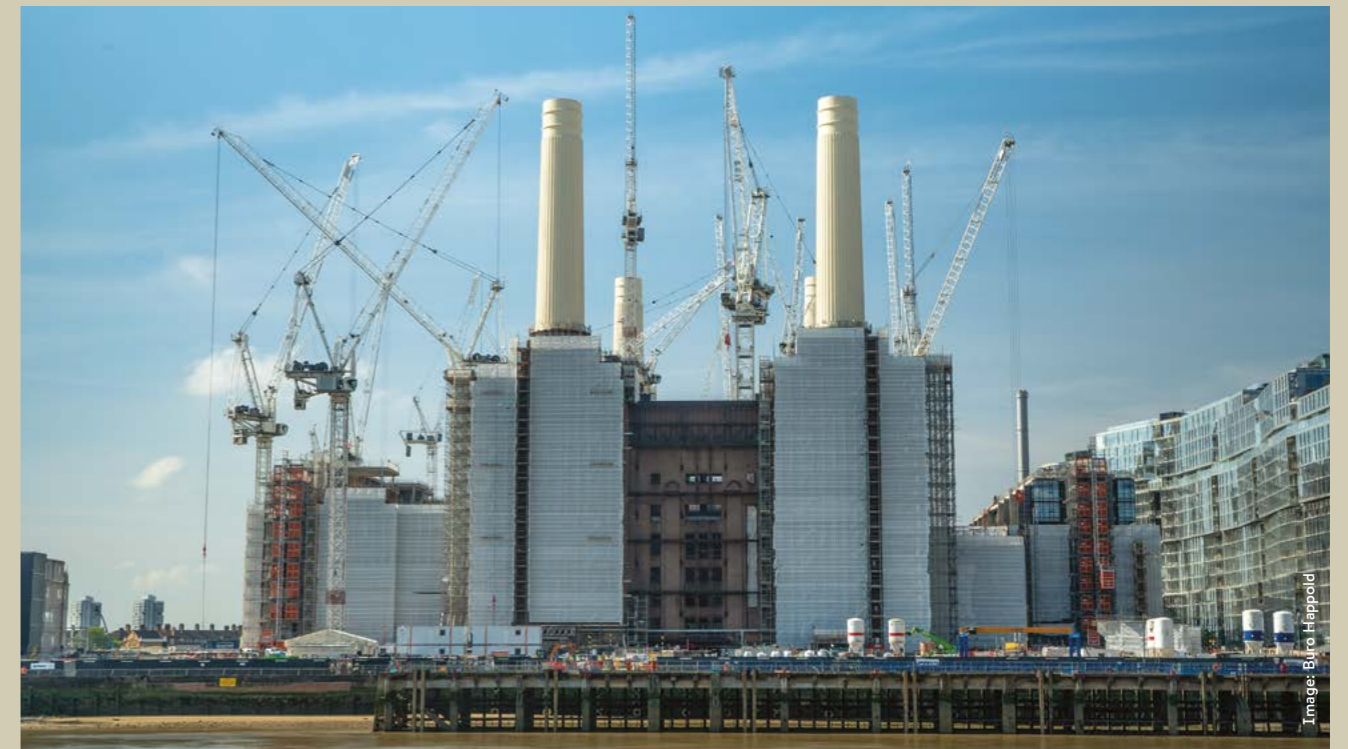
Describe a dream project.

I've worked on some of the world's most incredible projects, from Zaha Hadid's City of Dreams development in Macau to London's Battersea Power Station. A dream project? It's probably one where we can challenge our views and perceptions to find innovative solutions. **BH**

“I'VE WORKED ON SOME OF THE WORLD'S MOST INCREDIBLE PROJECTS, NOT TO MENTION THE MOST STRUCTURALLY COMPLEX BUILDINGS, FROM ZAHA HADID'S CITY OF DREAMS IN MACAU TO LONDON'S BATTERSEA POWER STATION.”



Above: Morpheus City of Dreams, Macau.
Below: Battersea Power Station Redevelopment, London, UK



REDLINING LAND USE

– THEN AND NOW

It is no accident that communities of color are often clustered in areas with the greatest exposure to air pollution, the least access to economic opportunity and the poorest health outcomes.

Chris Rhie, Associate Principal



Koreatown, Los Angeles.



Buro Happold led workshops to help formulate ideas for a Countywide Sustainability Plan for Los Angeles.

These inequities are the direct result of discriminatory housing and land use policies that intentionally segregated communities throughout the twentieth century. If we do not take active measures to right these wrongs, this form of white supremacy will become the legacy of the twenty-first century as well.

In the United States — not unlike many other countries across the globe — there is a sordid history of redlining. During the Great Depression, the Home Owners' Loan Corporation (HOLC) was established to stabilize the housing market. The HOLC programme relied upon lenders to determine where to approve home loans. Those lenders rated neighborhoods based on their “desirability,” a thinly veiled code word for racial discrimination.

People of Color (POC) were excluded from purchasing homes in predominantly white areas and faced barriers to securing home loans, buying property and accumulating wealth that could be passed on to the next generation. This was exacerbated by other discriminatory practices such as racially restrictive covenants, which prohibited homeowners in white communities from selling or renting property to people of certain races, ethnic origins and/or religions.

Unable to buy property in “desirable” neighborhoods, many People of Color (POC) moved to areas that had less access to jobs,

“**Though banned in 1968, the practice of redlining entrenched inequality and public disinvestment in ethnic minority communities. As a result, many of these communities still face higher levels of environmental pollution that impact their economic, physical, and mental health.**”

high quality schools, health care, nutritious food, parks, recreation and other factors which increased the intergenerational wealth gap. On average, white families have nearly eight times of their black counterparts today.

For example, it is the formerly redlined neighborhoods that experience the greatest urban heat island effect today, driven by sparse tree canopy and an abundance of heat trapping surfaces, in addition to being targeted by planners for highway construction and industrial land uses¹. Koreatown in Los Angeles — the redlined neighborhood where my own family immigrated in the 1970s — is one of the most population dense and park poor areas in the United States.

Redlined neighbourhoods also face increased exposure to criteria air pollutants that affect residents’ respiratory systems. This has had a devastating impact on health outcomes, including those related to Covid-19. The pandemic has been shown to be more severe in communities with long-term air pollution exposure, a finding consistent with previous links to air pollution and infectious disease outbreak severity.² While Covid-19 has decreased US life expectancy for white men by eight-tenths of a year in the first half of 2020, this figure was three years for black men.³

Power plants, waste transfer stations and transitional housing are amongst the infrastructure that continue to face opposition

from white neighborhoods, despite being critical to societal function. There are also overt instances of People of Color (POC) being shown fewer homes by real estate agents, or receiving much lower home appraisals in comparison to when they ask their white friends to pose as the homeowner.

Perhaps most famously, the predatory lending practices represented by subprime mortgages not only contributed to a global economic downturn, but imposed economic stress on many of the same neighborhoods which have been unfairly targeted.

What Buro Happold is doing

Placing equity at the centre of urban planning discussions is essential to ensure just outcomes for our communities. We must provide access to equal opportunity and achieve positive health and wellbeing outcomes for all residents – regardless of race, class, religion, gender, age, disability, sexual orientation or residency status.

While various definitions of equity have been used by public agencies and non-governmental organizations, most are organized around a set of lenses that guide the development of public policy to address the needs of the most disadvantaged communities and individuals.

In the North American Cities practice, we generally refer to the Urban Sustainability

“**Confronting the impacts of redlining and other forms of systemic racism must continue to be a major aspect of our work at Buro Happold. We must bring environmental justice to the forefront to ensure a sustainable and equitable future.**”

Sources:

- <https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html>
- <https://pubmed.ncbi.nlm.nih.gov/33148655/>
- <https://www.pbs.org/newshour/health/covid-19-has-already-cut-u-s-life-expectancy-by-a-year-for-black-americans-its-worse>

Directors Network (USDN) Equity Scan Steering Committee definition as presented below. Equity in sustainability incorporates the procedures, distribution of benefits and burdens, structural accountability and generational impact. This includes:

Procedural Equity – inclusive, accessible, authentic engagement and representation in processes to develop or implement sustainability programs and policies.

Distributional Equity – sustainability programs and policies result in fair distribution of benefits and burdens across all segments of a community, prioritizing those with highest need.

Structural Equity – sustainability decision-makers institutionalize accountability. Decisions are made with a recognition of the historical, cultural and institutional dynamics and structures that have routinely advantaged privileged groups in society and resulted in chronic, cumulative disadvantage for subordinated groups.

Transgenerational Equity – sustainability decisions consider generational impacts and do not result in unfair burdens on future generations.

In addition, we refer to the racial equity as a key lens, focusing on an end state in which race can no longer be used to predict life outcomes. This ensure outcomes for all groups are improved. **BH**

On...

Observations and comment on what's important from the people of Buro Happold

Andy Parker, Cluster Leader and Project Principal

On... repurposing science buildings

IN RESPONSE TO THE ENORMOUS challenge the UK is facing in tackling the present outbreak of Covid-19, Buro Happold partnered with Abell Nepp and Arcadis this year to undertake qualitative research to generate an accurate understanding of the space and infrastructure needs of healthcare and scientific organisations within the UK. Having spoken to senior decision makers in leading universities, research institutes, private pharmaceutical firms and Public Health England, the research team developed an understanding of what is required.

There are two areas of focus. The use of space, notably repurposing and upgrading at a building scale, and the identification of potential issues in critical infrastructural at an estate (large hospital/science park) scale.

First and foremost, the need for innovative and intelligent thinking on how space is designed, used and created will be paramount. This is not only in the healthcare sector but across the broader science sector too. Testing and vaccine development facilities and scientific infrastructure will be prioritised and demand for spaces that are flexible and quick and economic to repurpose will escalate.

Not all current clinical space will be suitable for Covid-19 testing and vaccine development. Lower containment level facilities are unsuitable and will need to be upgraded. Time pressure is very real, and there is an urgent need for speedy upgrades of lower containment laboratories to levels three and four.

The response to the Covid-19 pandemic drastically increases the "load" on the existing critical site infrastructure, particularly at large hospital and science park estates. Critical infrastructure readiness will need to be assessed when adding or even repurposing existing

facilities. How asset performance impacts larger hospitals and science parks needs to be investigated, including the discovery, design and implementation of solutions to deliver the best possible performance over the asset lifecycle.

Extra measures will be needed for some estate-scale science and healthcare enterprises so that they can continue to respond to the pandemic. It is likely that some will require asset safety audits, business change initiatives to improve operational capability and the development of class-leading asset management strategies.



Image: Adobe Stock



Image: Unsplash / kilyan-sockalingum

Shayan Lofti, Head of Economics, USA

On... supporting New York's small venue theatre industry

NEW YORK CITY'S SMALL venue theatre industry, which includes any theatre off-Broadway, is a cornerstone of the global performing arts ecosystem. Despite its significant growth in recent years, grassroots theatre companies face increasing challenges related to space provisions, production development, talent acquisition, funding and revenue generation.

These challenges existed prior to the Covid-19 pandemic, so amidst the outbreak they have been exacerbated. The future of live performing arts has been called into question. As the operation of urban economies undergo a paradigmatic change, there is an urgent need to support this industry with a forward-thinking and adaptive approach to recovery. We need to help our cultural institutions re-mobilise and remain resilient.

In 2019, Buro Happold were contracted by the Mayor's Office of Media and Entertainment (MOME) to conduct an impact assessment study on this industry. The intention of the study was to quantify and assess both the economic and social impacts on the industry, articulate to local government how valuable it is to the city's artistic fabric, identify solutions for financial support, facilitate accessibility and advocate for increased equity. The intersection between economics and the built environment is often underestimated, which is why this study was so important.

The small venue theatre industry is a vibrant and diverse community. It not only produces daring and innovative work, but it directly feeds into the pipeline of the wider arts ecosystem in New York and

the United States overall. Many commercially successful artists learn their craft at smaller theatres before transferring to Broadway or indeed the wider entertainment industry, such as television and film. It is worth noting that one in eleven New York City jobs are in the creative industries and it is the third largest industry in New York State, generating \$114 billion annually.

As built environment professionals, we have a responsibility to foster an all-encompassing definition of public cultural spaces. Even in times of hardship, there is always a desire for arts and culture; however, we know that equal opportunity is often dictated by affluence. Unsurprisingly, there has been a reckoning about representation and inclusivity in the theatre industry.

Post-pandemic, we need to think about what the cultural facilities in this new world will look like. Our unique understanding of both building design and economic policy gives us a multi-faceted perspective. We are cognisant of how our work in this industry directly affects the community. Ultimately, the work we do affects the art that is being made.



David Ferdman, Associate Principal

On... beautiful bridges

I GOT INVOLVED IN THE Providence River Pedestrian Bridge project on the very first day I joined Buro Happold in Boston. I became the project lead, working with our wider Boston team alongside the architect, Inform Studio. The idea for the bridge started as a design competition as part of a larger redevelopment project that originated from the rerouting of Interstate 195.

The bridge takes the place of the rerouted highway, leaving open space for a park on either side of the river, along with land parcels that will be further developed. This urban infrastructure helps to “stitch together” the area, providing a new link between neighbourhoods as well as a place for the community to gather.

The bridge is so much more than just a land connector. There are upper and lower levels, which ensures safe circulation for bikers, runners, walkers, and strollers. Terraced gardens provide seating and connect the two pathway zones. The design includes a boardwalk and landscaped green space linking the two new riverside parks together. The alignment of this urban green space guides fluid movement, with a focus on orientation and views both from the bridge, and of the bridge from each riverbank.

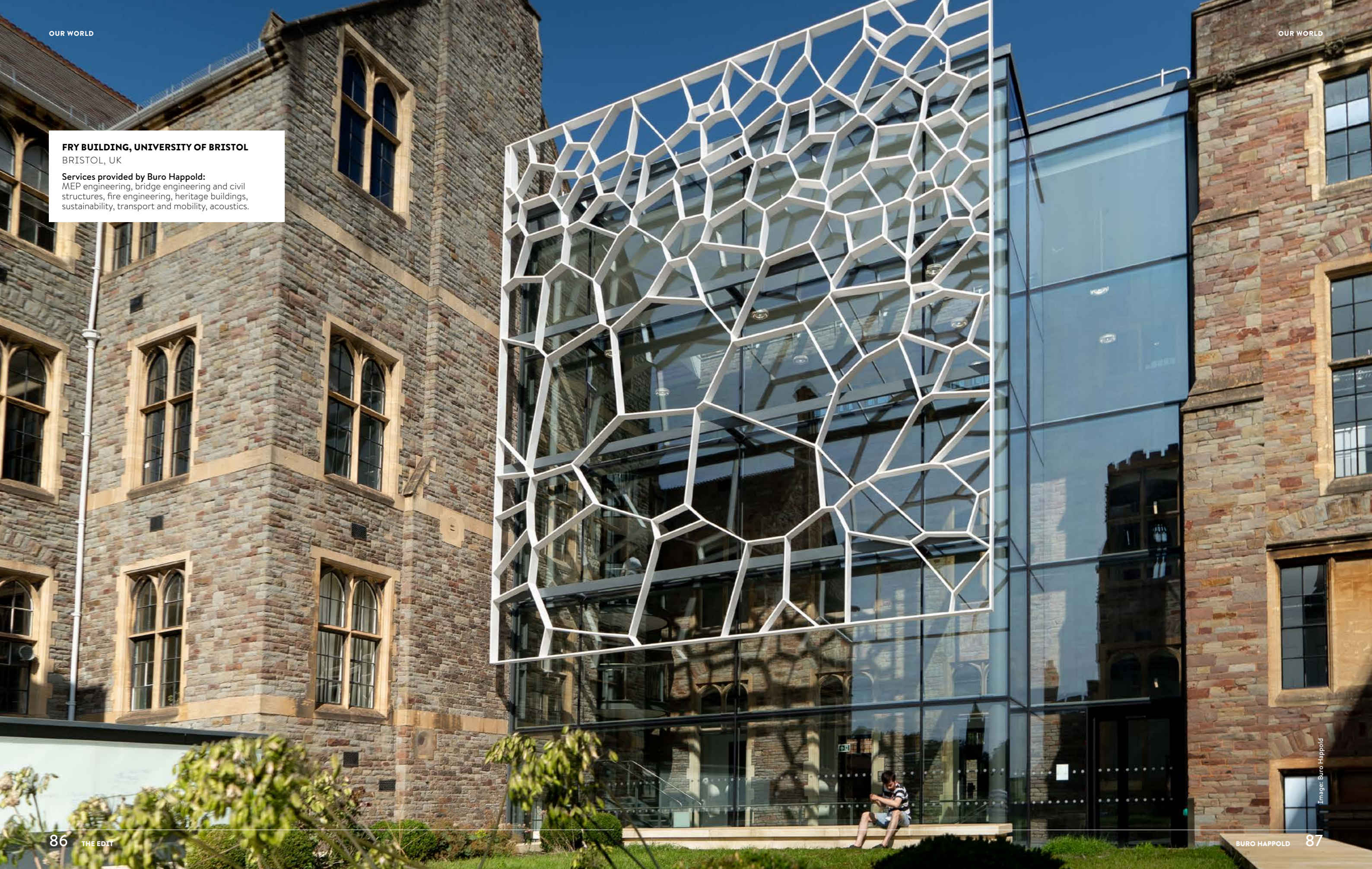
We did have one issue when we were asked to check for potential sea level water rise. The guidelines recommended we accommodate three feet of rise, but there was a problem. Some of the bridge structure would be below water during high tide and my team decided that it would be not be feasible to design a bridge that would accommodate the rising water and any potential river ice in winter. The most economical solution would be to raise the entire bridge by one and half feet, which we did.

Whilst the structure is quite simple, the side panels follow a 3D curved surface. Grasshopper scripting was the best approach to modelling it, but the bridge owner wasn't familiar with the software, so it took some time to convince him that the curved panels could be designed and manufactured as intended.

When the bridge was complete, lots of people noted how beautiful it was. I feel the bridge magnifies the connectivity between residential districts, commerce, tourism, and culture. It also opens up discussions about the history and ecology of the Providence, Seekonk, and Taunton Rivers, as well as Narragansett Bay. I am very proud to have worked on it.

FRY BUILDING, UNIVERSITY OF BRISTOL
BRISTOL, UK

Services provided by Buro Happold:
MEP engineering, bridge engineering and civil structures, fire engineering, heritage buildings, sustainability, transport and mobility, acoustics.



Financial focus

Sean Mulligan



Buro Happold reacted swiftly to Covid-19 executing a well-developed plan to manage our resource and cost base allowing us to report a strong set of results for the 2020/2021 financial year. Operating profit margin increased to 12% (2020: 11%), a significant achievement considering the economic conditions.

The reduction in turnover of 8% from £204.7m to £188.2m was anticipated following Covid-19. Buro Happold continues to generate the most significant proportion of turnover from projects located in the UK (30%), closely followed by the Middle East (29%). The increased turnover in the Middle East being primarily driven by a key project located in Saudi Arabia.

We continue to uphold strong working capital management in all areas of the business reporting a closing cash balance of £29.1m (2020: net cash of £20.7m), the increase in cash being linked to a decrease in DSO from 119 to 106 days.

Moving forward we will continue to balance geographies, sectors and services allowing us to deliver consistently excellent services to clients and exceptional results on world-class projects.

Sean Mulligan
Chief Financial Officer



Buro Happold is continuing to build upon our world-class reputation of designing, advising and delivering innovative, value-led solutions for our clients around the world.”

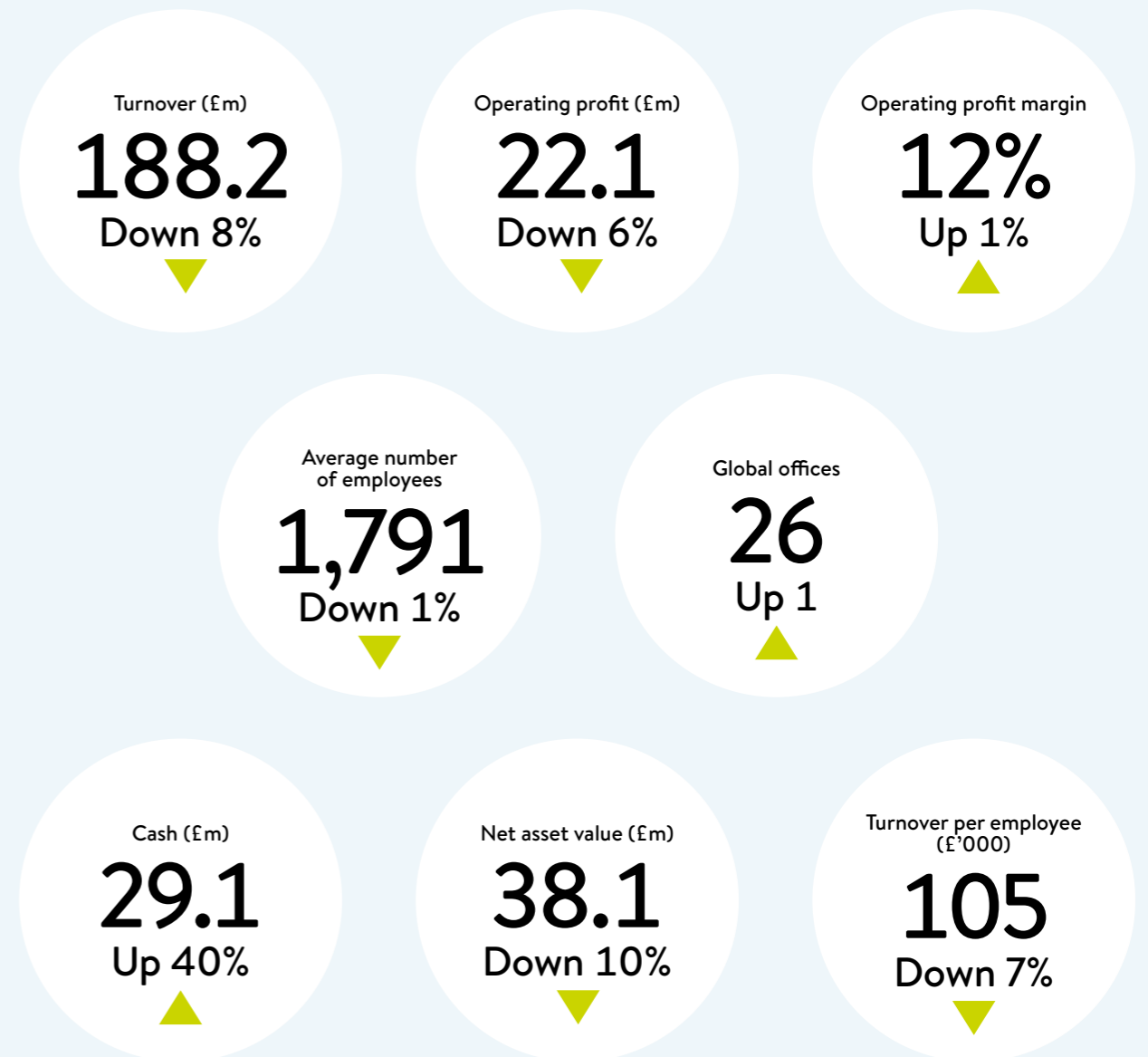
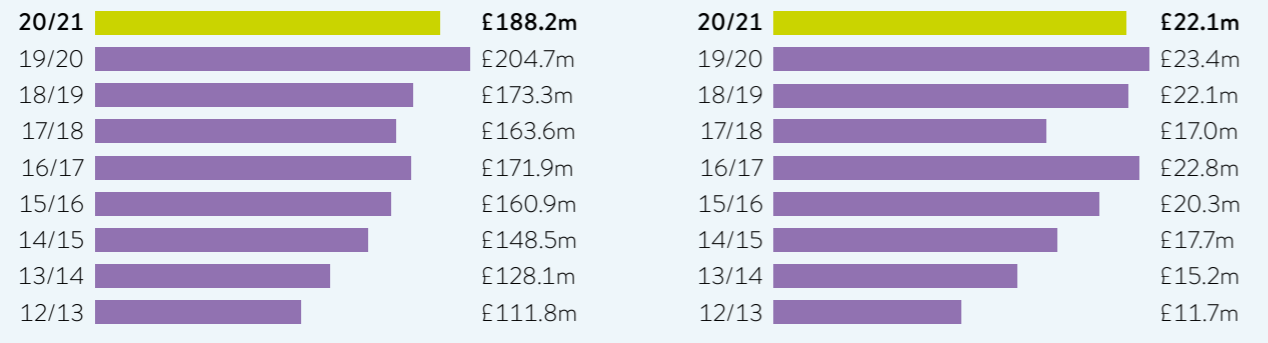


Image: Buro Happold

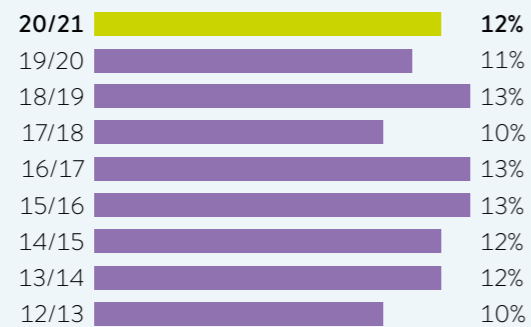
Performance

As a professional services firm providing a wide variety of high-end consultancy services to a broad range of markets, we have both a natural resilience and an ability to adapt in response to changes in global economic conditions, such as those arising from Covid-19. Despite the reduction in turnover of 8% to £188.2m, which was anticipated following Covid-19, we successfully managed our resource and cost base leading to a 1% increase in operating profit margin.



Turnover

Operating profit

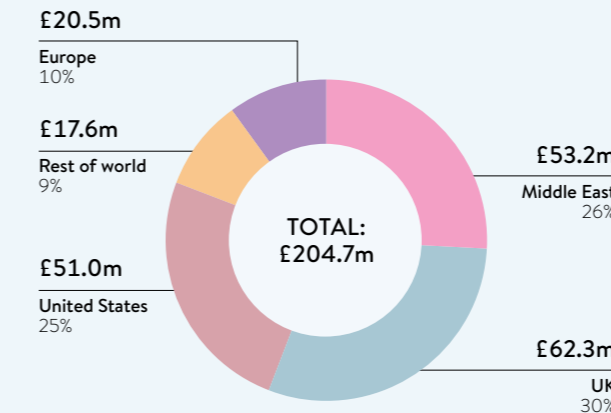


Operating profit margin

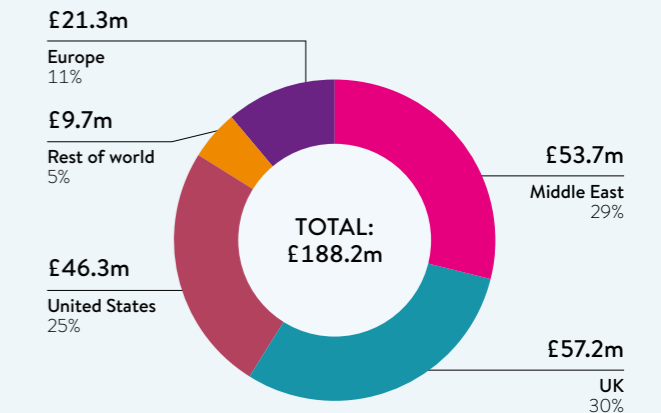
Geographical analysis

Buro Happold has a wide geographic spread and during 2020/21 generated turnover from projects in over 70 countries.

We continued to generate the most significant proportion of turnover from projects located in the UK (30%), closely followed by the Middle East (29%). Turnover generated from projects in Europe and the United States remained in line with prior year, with a reduction in turnover generated from the rest of the world.



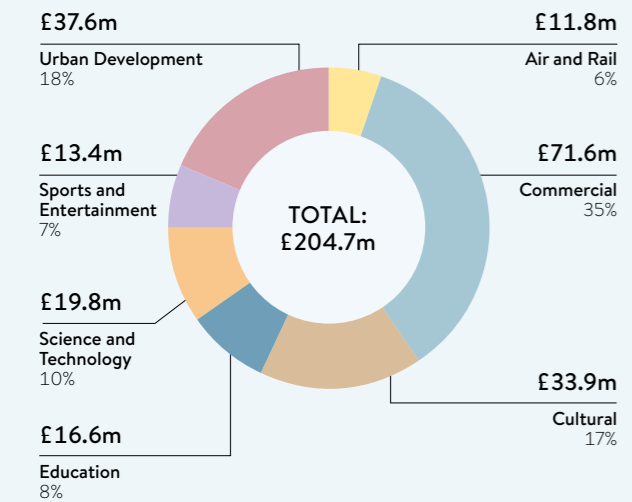
Turnover by region 2019/20



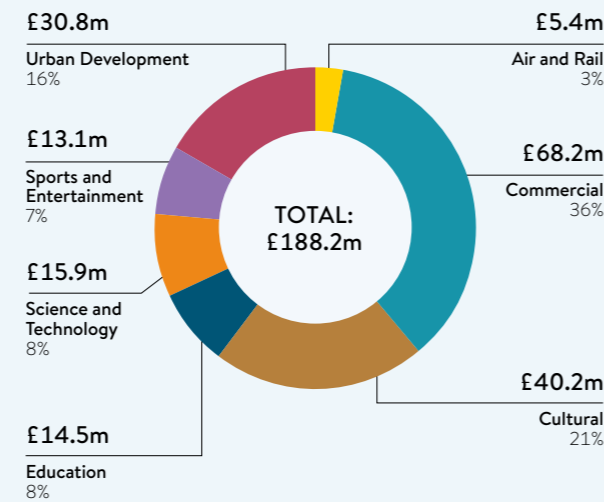
Turnover by region 2020/21

Sector analysis

Our routes to market through our client sectors of Cultural, Commercial and Urban Development remain as strong and balanced as ever. Holding a multi-sector portfolio is of strategic importance as it allows us to understand a targeted selection of clients and their core business needs while simultaneously allowing those experiences, insights and innovation gains to be cross-fertilised. This enriches our contribution to each and every sector.



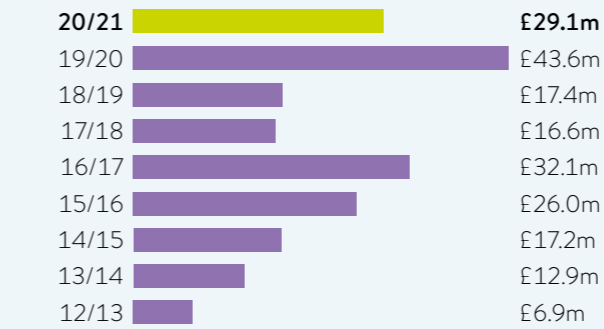
Turnover by sector 2019/20



Turnover by sector 2020/21

Liquidity

In the prior year, given the uncertainty as to the impact and duration of Covid-19 we fully utilised our £20m revolving credit facility and \$5m US line of credit facility. The facilities were repaid in full during the year with the group reporting a closing cash balance of £29.1m (2020: net cash of £20.7m).



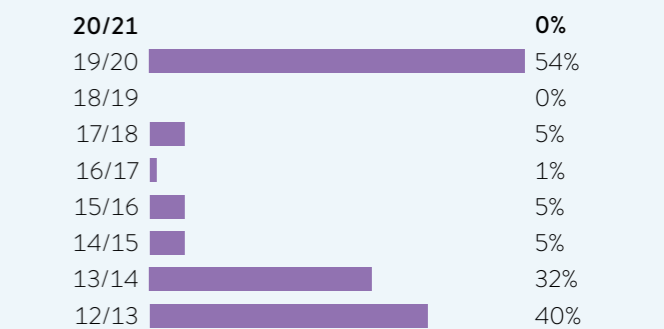
Cash



Overdraft and loans



Net cash/(debt)



Debt to equity ratio

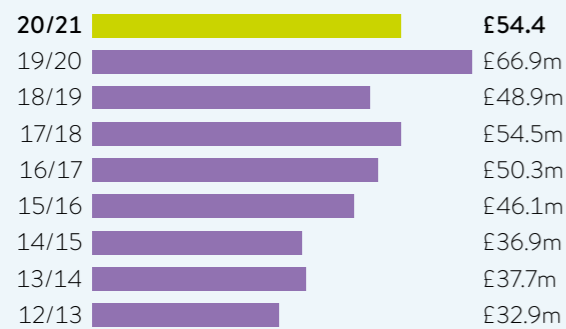
Working capital

Working capital management continues to remain a key focus of Buro Happold during these unprecedented times. The successful collection of outstanding debt led to a reduction in trade debtors to £54.4m (2020: £66.9m), with DSO reducing 11% to 106 days.



DSO days

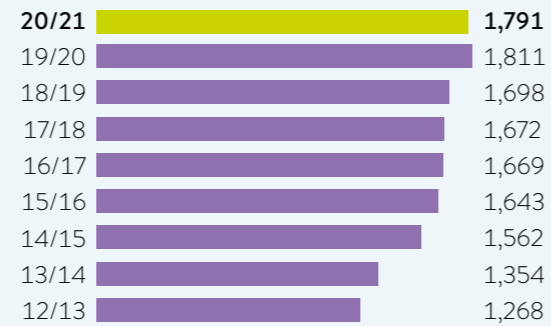
Days Sales Outstanding (DSO) represents the average number of days in which trade debtors are paid.



Trade debtors

People

We are dependent on the skills and commitment of our people, and throughout the year we have been extremely proud to be able to attract and nurture exceptional talent at all levels. Through development, succession planning and strategic recruitment we aim to ensure our leadership capabilities are focussed where they are most needed, facilitating sustainable growth throughout the business. We engage employees through our Young Engineers Forum, Share our Skills and other programmes, which help to inspire the next generation of engineers and professionals. We are a diverse and inclusive practice, reflecting the varied cultures of the communities and clients we serve. We strive to not only create a sense of belonging but also a safe and inclusive workplace for all our employees to thrive and be accepted for who they are.



Average number of employees

Energy and carbon

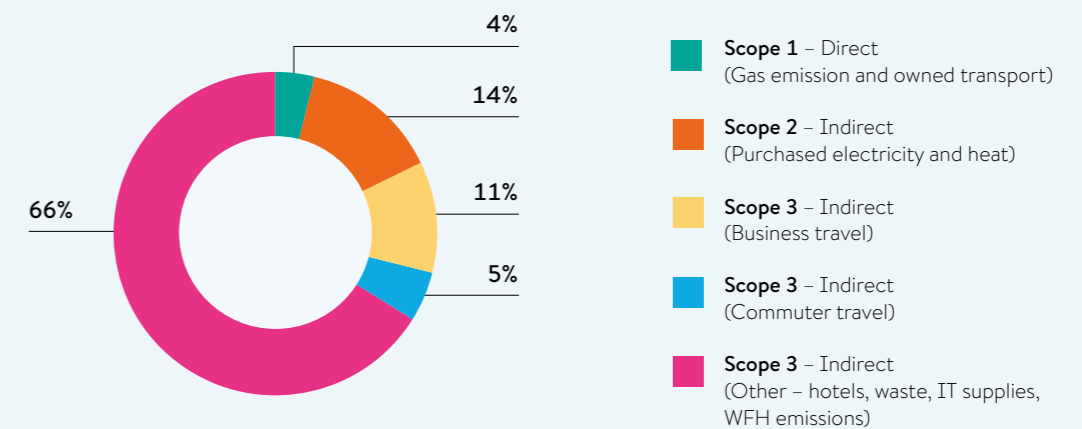
An estimate of our Global Carbon Footprint from May 2020 to April 2021 is:

Type of Emission	Tonnes of CO ₂ e/person	Absolute Tonnes of CO ₂ e	% difference compared to 2019/20
(a) Scope 1 – Direct (Gas emission and owned transport)	0.039	75	-42%
(b) Scope 2 – Indirect (Purchased electricity and heat)	0.140	267	-45%
(c) Scope 3 – Indirect (Business travel)	0.110	209	-93%
(d) Scope 3 – Indirect (Commuter travel)	0.047	89	-89%
(e) Scope 3 – Indirect (Other - hotels, waste, IT supplies, Work from Home emissions)	0.640	1217	-21%*
TOTAL (with renewable energy)	0.976	1857	-69%*

* Scope 3 now includes working from home emissions, embodied carbon from purchased IT equipment and an estimated 10% addition of other unmeasured Scope 3 emissions.

Buro Happold global emissions 2020-21

Tonnes of CO₂e/person

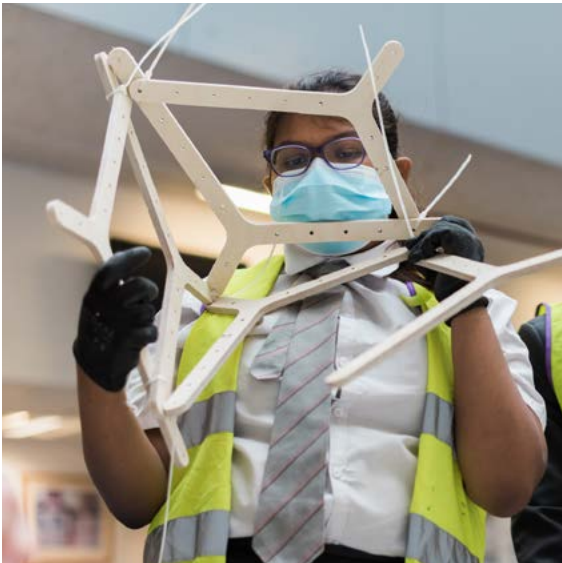


All data first published in our Global Sustainability Report.



Matt+Fiona

The Design Unlimited workshop



Giving young people the opportunity to experience built environment design and construction processes is at the heart of the inspiring work of Matt+Fiona. Buro Happold and the Happold Foundation are delighted to support them in their mission.

Matt+Fiona's mission is to provide new experiences and opportunities for children within engineering, architecture and construction, encouraging collaboration, teamwork and constructive learning. Buro Happold's engineers work alongside them on various projects, including this recent one at St Pauls Way Trust School in London.

The Design Unlimited workshop allowed the Year 7 students to explore how built environment professionals influence the spaces we live and work in. Together with Buro Happold's engineers and volunteers from UCL's Barlett School of Architecture, the students designed and built a unique timber and fabric structure. The installation creates a new reading space for the school.

The Happold Foundation is Matt+Fiona's Engineering Industry Champion. The Foundation is a charity supported by donations from Buro Happold's Partners and made possible by the hard work of everyone in our company. Knowing the huge contribution that engineering can have on society, the charity brings together a community of talented industry experts to help shape the future for all communities.

Acknowledgement

We are grateful to all those who have contributed to this snapshot of our work over the last year and beyond. We always work as part of a larger collaborative network, both internally and with our external collaborators. It would have been impossible to produce this without their enthusiasm, knowledge and experience.

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the edit
