Going for gold in a changing world

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Synopsis

In his inaugural address, 2017 President of The Institution of Structural Engineers, Ian Firth, celebrates the role of the structural engineer in contributing to the built environment and highlights some of the challenges and opportunities facing the profession today: the need to communicate to the public what structural engineers do and to inspire young people to join the profession; the value society places on aesthetics and high-quality design; the dangers of forgoing independent checking and supervision; the threat to innovation from ever-shorter preconstruction times; the questions posed by environmental considerations; the moral imperative to engage in humanitarian activities; and the creative disruption brought about by technological change.

Introduction

In the beginning was the world – a world without structures before mankind learned how to build. But over the centuries the ingenuity of man has created a civilisation in which nearly all our functions take place in and around buildings. And with that ingenuity comes great responsibility – to use our skills to make the highest quality impact that we can, in the most appropriate way to suit the context.

Designing and constructing buildings involves skill. Some buildings clearly demand more of the engineer's skill than others: while many do not require an engineer's input at all, other, more complex buildings could not be built, or even conceived, without skilled and experienced structural engineers. But the structural engineer's contribution goes way beyond merely arranging the structural components properly – we should be much more influential than that. Engineers, by their nature, are highly creative, imaginative and innovative; but can we nurture, develop and apply those characteristics more effectively, I wonder?

I regularly encounter people who clearly have no idea what structural engineers do. They think that all the buildings and bridges they see around them are the work of architects, and attribute any perceived characteristics of design quality only to the architects. One of the reasons for this is that, by and large, engineers tend to be very bad at communicating what they do. High quality in design really matters, but it seems that most engineers have lost their voice when it comes to matters of design quality, and the appearance or social acceptability of the structures around us. These are the lasting characteristics that really make a difference to the quality of our lives, and it is vital for us to develop opinions on these things, and to express them. We need to discover our voice and make ourselves heard so as to draw attention to our vital role in the built environment.

Our members are engaged in a broad spectrum of different kinds of work. We celebrate some of the big, headline-grabbing projects at our Structural Awards every year. These are great for drawing attention to our vital role in society and we will continue to shout about these whenever we can. But most of our members do excellent and important work without such recognition. Their role is no less vital to the public they serve, and we need to celebrate and promote their work too. This year we relaunch the Structural Awards, with new award categories which focus more on the structural characteristics and less on the functional type of the building. We hope this will help to attract an even wider cross-section of projects from our members around the world.

Everyone knows the importance of inspiration. Think about what messages our young people are picking up about engineers

Figure 1
Sailing is an excellent introduction to how structures work

ISTOCK

and engineering when they start to consider career choices. What or who are they inspired by? What do they know about inspirational engineers and engineering projects? Educators know that you need to inspire young people if you are to motivate them to pursue a worthwhile career, and if we want to inspire our young people we have to reach out to them and enthusiastically talk about the vital and exciting work we do. Pointing out the structures that everywhere surround us, and drawing attention to brilliant engineering projects, is vital for engaging the interest of young people. But have you noticed how little engineering there is on TV? That must change if we want to inspire more young people to consider a career in engineering. I hope that working together with the other built environment professionals we can promote more media coverage to celebrate the fantastic and essential work that our members do, day in and day out.

We are witnessing an explosion in the development of new digital tools and technologies that are transforming the way we work and are opening up exciting new opportunities for the future direction of our profession. We need to embrace these technologies if we are not to be left behind, and since young people tend to be naturally skilful in this area, we can use this developing aspect of our work to spark their interest and attract them into structural engineering.

So let's not be afraid to shout about the wonderful work we do and embrace the challenges presented by new digital technologies. If each of our members encouraged just one young person to consider taking up structural engineering each year, just think what a difference that would make. We all started because of some encouragement or early influence on our lives. So ask yourself – who are you encouraging and influencing?

Early influences and a world of bridges

It has become customary in these addresses to touch on a few aspects of the new President's background. So, how and why did I get into engineering, and what sort of engineering do I do?

I suspect it partly goes back to growing up with a wonderfully practical father who was constantly making and repairing things at home. I consider myself to be fairly practical (which is handy in an engineer!)

ALAMY

Figure 2
My love of singing was fostered as a chorister at Winchester Cathedral

and any ability I have in this area I attribute mainly to my father. For example, I remember helping him build a plywood sailing dinghy, which was a lot of fun and led on to a love of sailing, which I believe was one of my early formative influences. Sailing is, by its nature, an excellent introduction to how structures work (Figure 1). I quickly learned intuitively how things behaved – ropes in tension, spars in compression, booms in bending, membrane effects and so on, and I think that somehow this experience was part of my becoming a structural engineer.

Another great influence has been singing, which started as a chorister in Winchester Cathedral Choir, Hampshire (Figure 2), where I had to learn very quickly what it means to deliver on time, come what may! The discipline of having to stand up in front of a lot of people to perform, usually at short notice and without hesitation, has stood me in very good stead throughout my career. Engineers need to be able to communicate confidently, and this is something that I believe needs to be learned early.

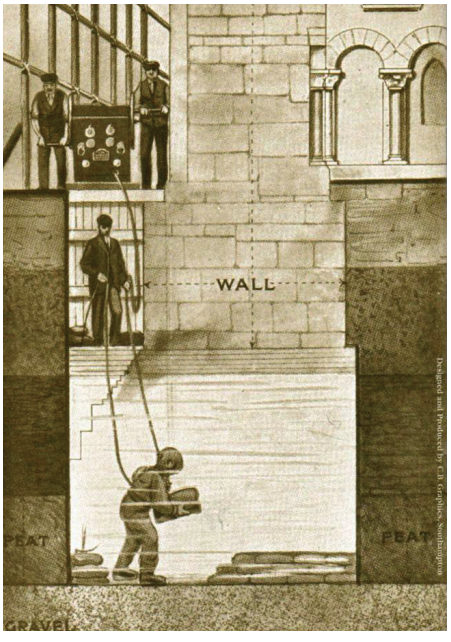
I was also reminded recently of something from my time at Winchester that I had not previously identified as an early influence on a young structural-engineer-in-waiting. The cathedral had historical problems with foundation settlement, and I learned the story of William Walker, the diver who underpinned the foundations by hand over nearly six years between 1905 and 1911 (Figure 3).

Part of the cathedral had been on the point of collapse due to excessive settlement of the foundations on peat. Before underpinning could be done, the groundwater level would have to be lowered, but this would have made matters worse. So over 200 deep pits were dug to enable Walker to go down under water, in total darkness because of the dense sediment, to shore up the walls with bags of concrete. When he had finished, the ground water could be pumped out safely since the concrete columns he had formed could now support the walls. Then conventional brickwork underpinning could be carried out in the dry.

The fact of the settlement, the distortion of the structure, and the ingenuity and courage of the hero who stopped it getting any worse must have made an impression on me, and maybe in some subliminal sort of way pointed me towards a life in structural engineering.

From choir school in Winchester I went to Marlborough College in Wiltshire and then on to Bristol University, where I was strongly influenced by Institution Past President, Professor David Blockley. Then, through a fortunate referral by my final-year project tutor, Professor Roy Severn, I found myself interviewed by Dr Tony Flint, Gold Medallist of this Institution, who was kind enough to offer me a job.

At Flint & Neill the technical challenges came thick and fast, and the size and character of the firm meant that I had to learn quickly and turn my hand to some pretty complex and unfamiliar concepts from the start. I was surrounded by a fantastic team with inspirational leadership and I was enjoying myself!



REPRODUCED WITH PERMISSION OF WINCHESTER CATHEDRAL

Figure 3
William Walker, who underpinned the foundations at Winchester Cathedral, was an early influence on a budding structural engineer

Early work on tall, slender guyed masts and towers led on to bridges and building structures. This was 1979, and we were all still getting used to limit state design. Codes and standards were evolving fast, so I found myself helping with some of the calibration exercises and studies to support the Partners in this work. In particular, steel bridge technology was rapidly developing, having recovered from the disastrous box-girder collapses of the early 1970s, and I found myself in exactly the right place to experience the excitement of that rebirth.

Then came an MSc in Structural Steel Design at Imperial College London, tutored by two more Past Presidents of the Institution, Patrick Dowling and Graham Owens, followed by the first really major project of my career – the strengthening of the Wye Bridge and Beachley Viaduct as part of the upgrade and rehabilitation of the original Severn Crossing on the English/Welsh border (Figure 4). This was a hugely significant project on any level, breaking new ground in the strengthening and renovation of such structures, and led on to similar work on the Erskine (Scotland), Milford Haven (Wales) and West Gate (Australia) bridges. Such projects have been a major thread of work at Flint & Neill, and I am privileged to have been part of them. I am a great believer in learning good engineering design through the lessons of detailed investigations and assessments of previous designs in need of modification, and this has certainly been very significant for me.

Today, most of my work involves new bridge design. This really kicked off with winning, in 1997, the design competition for the Poole Harbour Crossing in southern England, in a team which included Dissing+Weitling Architects (Figure 5). This was a watershed moment for my career (no one was more surprised than me!) and for Flint & Neill. Sadly, the bridge was never built as a result of the infrastructure spending review initiated by a newly elected government that year, but this result led on to other competition wins and the design of some unique and sometimes unusual bridges which are perhaps my most familiar projects. There have been many happy and proud moments, but perhaps none more than winning the hard-fought Poole Harbour design competition and the one for the Stonecutters Bridge in Hong Kong (also with Dissing+Weitling) a few years later.

Other projects have included large-span roof structures, such as checking the design of the Millennium Dome and the Olympic Stadium roof, both in London, and the design of ongoing structural interventions at the National Theatre on the South Bank of the River Thames, originally designed by the firm back in the 1970s (Figure 6).

Flint & Neill joined the Danish COWI Group in 2008 and finally changed its name to COWI in 2017. I continue to work with a fantastic international team on several exciting and elegant projects in many parts of the world. I consider myself fortunate to have worked with some of the world's leading bridge architects, and have contributed to projects as diverse as the little Bridge of Aspiration in Covent Garden, London (Figure 7), the Pont Schuman in France, the Inner Harbour Bridge in Copenhagen and the yet-to-be-completed Messina Strait Bridge in Italy. These bridges all have unique characteristics, but they all have one thing in common: they are born out of an innovation mind-set and an unswerving desire to achieve long-lasting quality in performance and appearance. This quest for real, lasting quality through innovation has been my focus, and is (or should be) in the DNA of all structural engineers.

Design quality matters

As structural engineers, we have a duty not only to make our structures safe and sustainable, but also to do so to the highest standards at our disposal. High-quality standards must be our benchmark.

But what do we mean by high standards? I'm not talking here about mere compliance with the appropriate codes of practice, nor even being able to design to a particular (and probably diminishing) budget or programme. Such things are necessary but do not on their own deliver high quality. No, the secret lies in a much broader appreciation of what we do; a creative approach to structural design, innovation in structural form, the clever use of materials, imaginative ideas for efficient construction, and above all a sensitivity to those people who will use and

Figure 4
Wye Bridge after strengthening and replacement of main cables

Figure 5
Poole Harbour Crossing, design competition win, 1997

encounter our structures. A few years ago, at his inauguration as President, Tim Ibell noted that our Gold Medallists each exhibited high quality and excellence in what they did. Tim spoke about the importance of creativity, and pointed out that creativity is on the path to excellence. Creativity is to be nurtured in all engineers, and mediocrity is the death knell of creativity. Those Gold Medallists certainly did not settle for mediocrity. Mediocrity smacks of mere code compliance. Creativity demands more, and leads to excellence.

Obviously, not everyone is destined to be a Gold Medallist, and sometimes our structures do not give us an opportunity to do much more than provide the safe skeleton for the building in keeping with the client's and architect's intent. It may be tempting to settle for making the structure simply good enough and reckon that nothing more is needed. But good enough is not good enough, and we have a duty to aim for the most elegant, economic, sustainable, constructible and maintainable solution, every time. It is the quality (or lack of it) that will define a project in the long term, and we must constantly fight to design and deliver to the best-quality standards achievable.

It is, of course, much easier to achieve real, lasting quality outcomes if the client is committed to it. We need clients who understand the importance of innovation, creativity and imagination, and who set out to achieve quality by a procurement process that encourages it. Sadly, many don't think like this, and their procurement processes tend to favour lowest cost, which sometimes means poor quality. This has to change. In the UK it is encouraging to have heard the recent statement from the Minister of State for Transport, John Hayes MP, about the need for a change in direction to improve the quality of infrastructure and the built environment (www.gov.uk/government/speeches/the-journey-to-beauty). We will watch these developments with keen interest.

One aspect of design quality concerns appearance – the visual quality. The buildings and structures around us together form the built environment in which we live and work. The quality of that environment matters greatly, and we all know that a pleasant and attractive environment is better for our health and well-being than an unpleasant one. Either our structures improve the quality of the environment around us, or they spoil it. Now, you may say that it is architects who decide how our buildings look, and you would be right to an extent, but structural engineers also have an important role to play here. We need to engage with all aspects of the planning, design and delivery of our built

Figure 6
London's National Theatre – a constant thread through many years

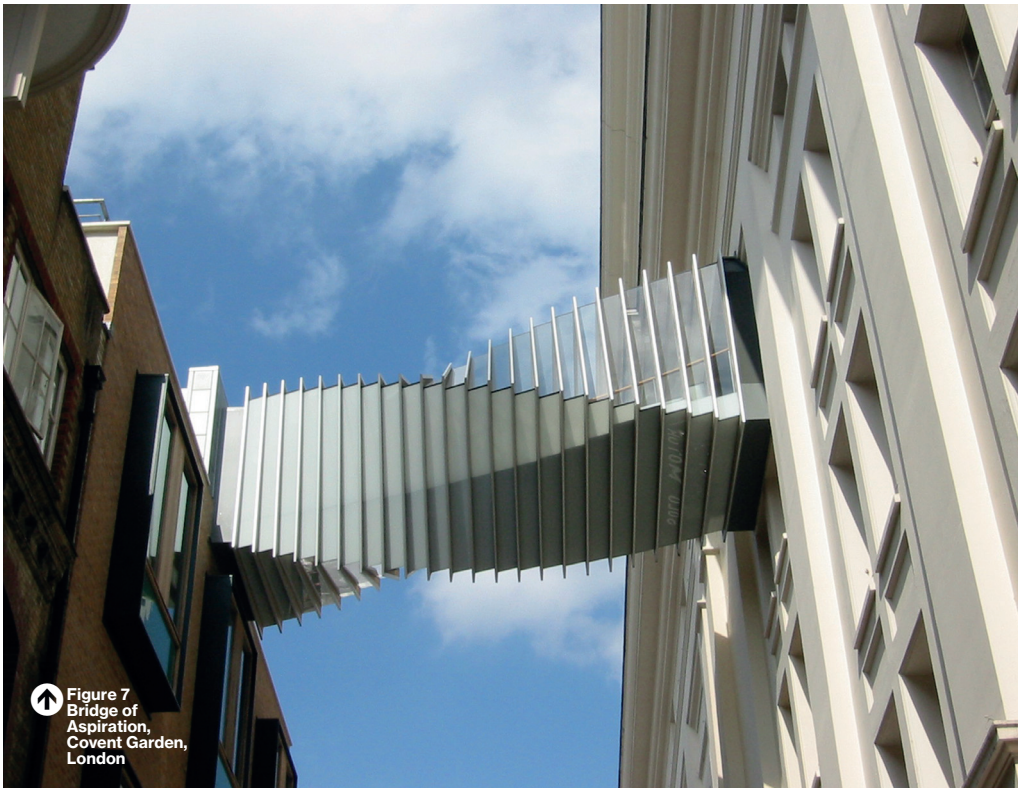


Figure 7
Bridge of Aspiration, Covent Garden, London

environment and consider the broader human impact of what we are doing.

Much of my work over the past 37 years has been associated with bridges, and I have long campaigned for a greater focus on the appearance of our bridges. This is because it is their appearance and the way they suit their context (or not) that largely determines their acceptability to society. Beauty enriches life; ugliness impoverishes it. We would all prefer to surround ourselves with beauty because it feeds directly into the human soul and enhances a sense of well-being. In the same way, we would prefer it if our appliances always worked properly and the car started reliably. No one sets out to make an appliance that doesn't work or a car that doesn't start, so why would anyone design an ugly bridge (Figure 8)?

Unfortunately, there are those for whom the need to design elegant structures seems to come a distant third to designing purely for function and safety. I am amazed how often I come across engineers who do not give a second thought to the appearance of what they are designing. For me, Vitruvius's three principles of *utilitas, firmitas* and *venustas* (or, put simply, 'utility', 'safety' and 'delight') are equally weighted, and all three need to be satisfied for a successful outcome. These are the long-term, lasting values of any building or structure. They embody the prerequisites of satisfying strength/stability and functional requirements, and set them equally alongside the other lasting quality of elegance or beauty.

Bridge design is not primarily about structural analysis and calculation, nor does it mainly involve checking material stresses and component sizes, although these are among the tasks necessary to deliver a bridge design. The essence of bridge design, certainly any good bridge design, is much more about dealing with how people will experience the bridge. With buildings, such considerations are usually the domain of the architect, but ours is a collaborative profession and we should not work in isolation. Elegance, appearance, attractiveness and aesthetics are all the stuff of engineering design and not the sole province of architects and artists. They should be seen as an essential and integral part of the engineer's role, and not some kind of optional extra. The architect and the engineer, when working well together, will exchange views and ideas and strive together towards a satisfactory solution in which the architecture and the engineering are in sympathy. This requires an understanding of each other's craft and we engineers must concern ourselves with such things in my view. We would certainly earn ourselves greater appreciation if we did.

"I AM AMAZED HOW OFTEN I COME ACROSS ENGINEERS WHO DO NOT GIVE A SECOND THOUGHT TO THE APPEARANCE OF WHAT THEY ARE DESIGNING"

Figure 8
Lyne Bridge over M25 in southern England – voted ugliest by civil engineers

ALAMY

I believe we need to focus on making improvements in the following areas:

- **Appreciation:** Observe and appreciate the difference between designs that merely serve their function and those that do so with elegance and efficiency. Some people seem to walk through life without really noticing what differentiates excellence from mediocrity.
- **Criticism:** Routinely subject your own work to criticism by your peers, and encourage them to do the same. Learn from each other's successes and mistakes. Architects do this routinely as it is part of their education and practice and the most enlightened engineering firms do the same.
- **Education:** In addition to structural behaviour and analysis, engineering students need to learn to appreciate the parameters that lead to elegance and delight. Some degree courses and training programmes include such aspects, but most need to make more room for them.
- **Precedent:** Learn from the great exemplars of our craft. It is inconceivable that a student of music would not study the works of Bach and Mozart, or an architect would not be familiar with Palladio and Le Corbusier. Likewise, engineers should learn from the work of Maillart, Freyssinet, Candela, Torroja, Schlaich and the many other champions of our profession.

Maximising value, minimising risk

In the early years of my career, I spent most of my time checking designs prepared by others. Indeed, design checking is still a significant part of our work at COWI (formerly Flint & Neill). This is an important discipline for any engineer, and I believe that those who start out as checkers go on to make the best designers. I am not referring to the routine self-checking and peer review that should be a part of any good quality assurance (QA) procedure – I hope we all do that. No, I mean the rigorous and fully independent design checking and certification by an independent team performing independent analysis using independent software and methods. This is an established principle, certainly familiar to all bridge engineers and also commonly used in large and complex building projects. But it was not always so.

In June 1970, the UK's Milford Haven Bridge collapsed during construction (Figure 9). Just over four months later, the West Gate Bridge across the Yarra river in Melbourne, Australia,

collapsed during construction, killing 35 people. The following year, a bridge across the Rhine at Koblenz in Germany collapsed during construction. What emerged from the intense activity that followed these disasters was not only a much needed set of new design rules, but also two key procedural recommendations:

- the requirement for fully independent design checking
- the retention of the designer to supervise construction.

By and large, these recommendations have been followed, but sadly, the lessons are no longer heeded in some quarters and it is not uncommon under modern procurement rules to find that corners are cut, ostensibly to achieve savings. Some clients try to dispense with or dilute the independent check and assume that a basic QA process is sufficient, even on quite complex structures. And in many cases the designer is not responsible for construction supervision, this role being entrusted to others.

This is extremely short sighted, and if such practices persist I am afraid that it is only a matter of time before we have another catastrophic collapse, perhaps with more loss of life. With increasingly seamless digital design processes, new procedures are needed to enable proper scrutiny by a senior engineer, and the need for fully independent design checking, using a separate and independent design team and process, has never been greater.

Such independent checking and supervision is, of course, particularly important when doing something new for the first time. So, while we want to encourage creativity and innovation, because these are the lifeblood of any good engineer, we also need to be aware of the risks and take appropriate precautions. Such was the lesson of the early 1970s that when you do something new you need extra checks in place to really understand the behaviour and reduce the risks.

So what is the answer? Clearly, an awareness of the risks is essential, and blind dependency on mere code compliance and QA processes is an extremely dangerous position to take, especially where the engineering involves some innovation or unfamiliar uncertainty. Our members manage risks every day – that is what engineers do – and should be ready to call for an independent design check when necessary.

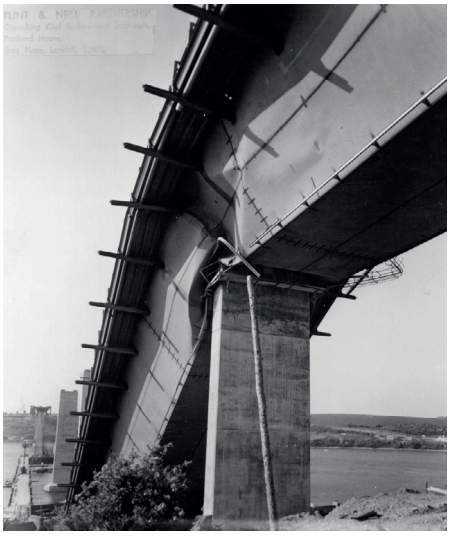


Figure 9
Milford Haven Bridge collapse

I believe our members understand this well, but the problem comes with those who commission our services. It is not uncommon for clients to refuse to pay for an independent design check, preferring to rely on a simple internal QA review, but this may expose them to unacceptable risks in many cases. We all have a duty to inform our clients of the risks and insist on a return to these essential values where necessary if we are to reduce the risk of future catastrophe.

To make things worse, project risks are heightened by the seemingly steady erosion of the preconstruction time available to designers. Project programmes are getting ever shorter, and the pressure is on to start construction as soon as possible, compressing preconstruction time to the barest minimum. This means the designer has less thinking time available to properly mitigate risks and come up with optimised solutions, with two inevitable consequences. Firstly, designers do not have time to iron out the avoidable risks, and secondly, they are less likely to want to try something new (because it is inherently more risky) and thus innovation is stifled.

All designers know that refining the design to achieve the desired quality in the details takes time, but this is the very time that is being denied us. We end up with either mediocre, unimaginative and unoriginal work (low risk but no time to try anything new) or risky and unchecked work (trying something new but no time to check it properly). We need both – innovation and low risk, but we cannot do this properly if design programmes are too short. Add to this the long-hours culture which our members generally experience, and combine tiredness with having to work in haste due to lack of time, and you have a potentially disastrous combination.

I believe the time has come for a thorough review, across the whole construction industry, of modern procurement and design processes; to review the checks and balances that enable this essential profession to deliver the safe public service that we are here to provide. We need to ensure that developing processes allow us to work within a framework where risks are minimised and innovation is encouraged. This is a topic that rightly requires a collaborative effort across professional bodies and I am glad to say that over the last couple of years there has been far more collective activity between us. I look forward, during my year as President, to pressing for a cross-sector grouping to examine modern procurement and design processes in an initiative to enable us, working together, to achieve significant advances for the construction industry, its clients and society at large.

Our wider responsibilities to society

As structural engineers, we should be aware of our wider responsibilities to society, which go beyond those we have to our clients and the immediate project team. We are built environment professionals, and even though our education and training is focused mainly on the structural aspects, we are also able to apply our intellect to the wider implications of what we build, including the social, cultural and environmental impacts, for example, and we need to make our voice heard on these issues too. The Institution has built strong relationships with our brother and sister organisations in the built environment, and I hope we will continue to build on these to form even stronger ties with them so that we begin to speak with a stronger, common voice

on the wider issues that affect the whole of humanity.

What, for example, is our position on the issue of achieving zero-carbon housing, which is now part of UK Government policy? All new residential projects in London involving 10 homes or more now need to be zero carbon (meaning that CO_2 emissions from regulated energy use – heating, hot water, lighting, etc. – are reduced to zero) or else the developers must make an offset payment.

Most argue that achieving this is virtually impossible in such a high-density context as most of London. Where do you put the solar panels? The roof area is only large enough to support a few households and this limits the potential height of the building, and photovoltaics also compete in the demand for space. Whatever the arguments for or against, it seems that most agree that you cannot have both high density and zero carbon. So, having seen decades of rapid urbanisation (more than 50% of the world's population is predicted to be living in cities by 2050) with increasing housing density, maybe a zero-carbon target might begin to reverse this trend (Figure 10).


DENI WILLIAMS

Figure 10
Is zero carbon feasible here?

There are other competing factors of course which shape our cities, but this is where most of us earn our bread and butter, so this is absolutely of concern to structural engineers. If our cities change, perhaps towards a more human-scaled and friendly environment, then maybe the type of structures we are called on to design would change too. This may not be central to most of our members' daily concerns, but my point is that we need to join in the debate and not simply leave these discussions to planners and architects. We are key contributors in the built environment and our voice needs to be heard alongside theirs.

And what about the developing world? I believe we have a responsibility to the whole of society. People everywhere need shelter, places to live, offices, factories, buildings to congregate in, places to meet, bridges to cross – you name it, structural engineers have a role to play. And I put it to you that for at least some of the time we should use our skills to help those who need our help, wherever we encounter them. I refer to those many millions who lack even the most basic facilities that we in the UK take for granted. Thankfully, many of our members already engage in humanitarian activity, disaster relief, resilience planning and development in poor parts of the world, and I am delighted to say that this seems to be growing.

Figure 11
Bridge built in Rwanda by Bridges to Prosperity with Flint & Neill and Balfour Beatty

The Institution is a founding member, alongside the Royal Institute of British Architects (RIBA) and the Royal Town Planning Institute (RTPI), of the UK Built Environment Advisory Group (UKBEAG) supporting humanitarian action, which was launched last year. We were at the UN's Habitat III congress in Ecuador in October 2016 and are closely aligned with the Global Alliance for Urban Crises. I am very excited about this new initiative, and am delighted that the Institution has established a new Humanitarian and International Development Panel in 2017, which will serve as the focal point for our activity in this area. The panel will keep abreast of developments and be in a position to provide advice to members on humanitarian and international development issues.

Among the helpful demographic data published by the UN, you will find one highlighting the plight of more than one billion people worldwide who are denied access to basic facilities such as schools, markets, medical care and so on. This is often due to

Figure 12
AECOM using virtual reality tools in design office (Trimble Connect with Microsoft HoloLens)

AECOM

flood-prone rivers, and they are consigned to a life of poverty simply due to the lack of a bridge. Structural engineers have an obvious role to play here. I have recently become involved with Bridges to Prosperity, a charity which addresses this need, which was a natural step considering my background in bridges (Figure 11).

By building pedestrian bridges across flood-prone rivers in poor rural communities, the charity enables children to attend school, women to find work, farmers to get their produce to market, sick people to find medical help and thousands to have their lives transformed. Working alongside the local communities to build these bridges safely and sustainably is one of the greatest joys imaginable. Structural engineers are particularly well suited to this work, and I am delighted that the Institution continues to broaden its support for those charitable organisations operating in the humanitarian arena and economically challenged parts of our world.

Of course, there are many other charities and organisations which do similar work. Structural engineers can play a significant role in advising city planners and local authorities in earthquake-, hurricane-, typhoon-, flood- or fire-prone areas on the importance of appropriate design standards, resilience planning, effective emergency strategies and so on. I hope that many more of our members will engage with this kind of work, and I warmly encourage employers to enable them to do so.

Living in a changing digital world

The way we work has been changing radically in recent years. Some of the digital tools now available to us were unthinkable even just a few years ago, and the pace of change shows no sign of letting up. Three-dimensional (3D) computer modelling for visualisation, geometry definition, structural analysis, services integration, clash detection, construction planning and ultimately delivery, operation and maintenance in a seamless digital workflow is now a reality. This is a rapidly developing field, and we are using virtual and augmented reality, 3D printers, robotic construction and goodness knows what else in an increasingly digital brave new world (Figures 12 and 13).

It is clear that today's engineers need very different skills to those I was taught, and there is a constant need to keep up with the latest technologies. Powerful computers take the grind out of analysis, optimisation and design verification, and we now have the option of a virtually seamless (and paperless) digital workflow from concept to completion. This releases us to focus on creative, imaginative and innovative design, which is as it should be. But this also has major implications for the way we educate and train our engineers. For the individual member, whether wanting to learn about digital tools or develop creative design skills, this means continuing professional development (CPD) is essential. Consequently, the Institution runs

"SOME OF THE DIGITAL TOOLS NOW AVAILABLE TO US WERE UNTHINKABLE EVEN JUST A FEW YEARS AGO, AND THE PACE OF CHANGE SHOWS NO SIGN OF LETTING UP"

Figure 13
MX3D is planning a robotically constructed bridge in Amsterdam

JORIS LAARMAN LAB / MX3D

courses and seminars on these and other subjects, with online participation planned for those unable to attend in person.

But for many members, adoption of these new digital tools is seen as an obstacle and not yet a viable reality. In spite of a plethora of material now available on how to introduce such tools into the design office, many members still prefer to remain with traditional techniques and thus miss out on the design possibilities and potential efficiencies that are rapidly becoming much more readily available and affordable.

The Institution recognises that its members do not all work for big firms with the budgets, staff and resources to implement such processes, and it is important that we continue to provide support and leadership for both groups. Accordingly, I am delighted that in 2017 we are also establishing a new Digital Workflows and Computational Design Panel specifically to explore and keep abreast of developments in digital workflow processes and computational design tools in the workplace. This is partly so we can provide advice and support to all our members, and be in a position to assist those who would like to adopt new digital design tools but are uncertain or fearful of the process and the consequences.

And it is not just about digital design. The Institution has embarked on a major digital transformation project to embrace rapidly developing technologies which will fundamentally affect the way we communicate with each other, find and share information, manage our operations and much more. We will begin to see the effect of this in a year or two as we continue to keep step with the rapid pace of change around us. Collaborating through the use of common, seamless digital tools is absolutely the way we are going. They provide a much greater facility for efficient collaboration – an essential characteristic of every successful team – and unlock countless otherwise unimaginable possibilities.

The Institution recognises the changing way in which our members are performing their work and the vital importance of aiming for high-quality, low-risk outcomes. Engineers are using digital tools and working within diverse teams with a variety of backgrounds and in ways previously not envisaged. The design process and the contractual framework within which it is delivered is constantly changing, and our members are adapting to developing technologies. The need for whole-of-career learning and CPD has never been greater. These and other factors are kept under review by the Institution in developing the Chartered Membership Examination, the routes to membership and its CPD programmes, so as to ensure that those who are elected to membership of the Institution continue to lead the profession and uphold the very high standards that are the hallmark of our members around the world.

WATCH ONLINE

You can also watch a webinar of Ian Firth's Inaugural Address at www.istructe.org/events-awards/conference-and-lectures/president-s-inaugural-address-(1).

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