



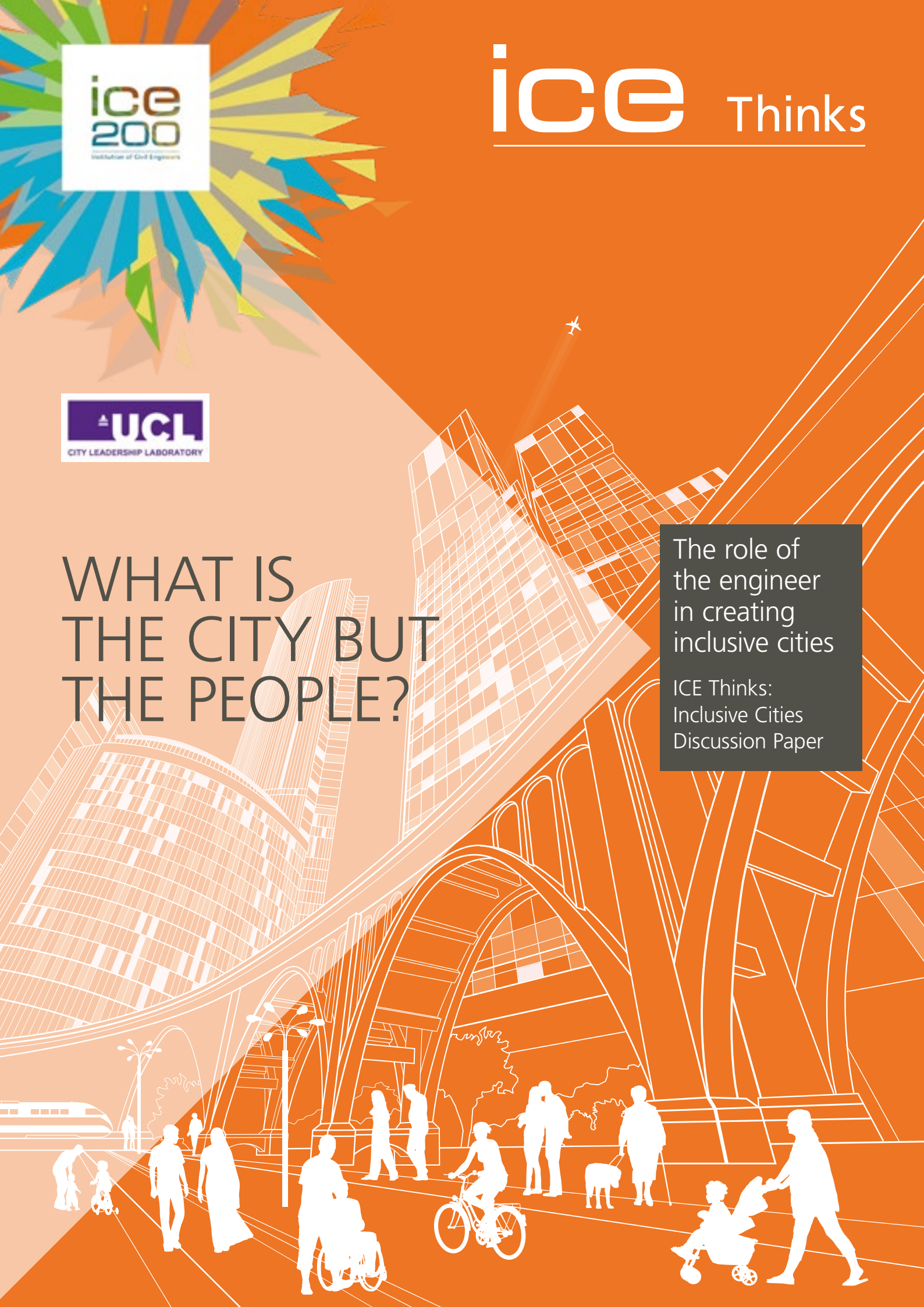
ice Thinks



WHAT IS THE CITY BUT THE PEOPLE?

The role of
the engineer
in creating
inclusive cities

ICE Thinks:
Inclusive Cities
Discussion Paper



'WHAT IS THE CITY BUT THE PEOPLE?'

The role of the engineer in creating inclusive cities

ICE Thinks: Inclusive Cities Discussion Paper



Dr Ellie Cosgrave
City Leadership Lab, UCL

Earlier this year, the Institution of Civil Engineers (ICE) welcomed over 150 delegates, from engineers to designers, policymakers, academics and third sector representatives, to debate the role built environment professionals play in creating inclusive cities.

This debate comes at an important time for the Institution. In 2018, ICE celebrates its bicentenary and ICE President Lord Robert Mair's own agenda, 'Transforming infrastructure, transforming lives.' ICE, as a public benefit charity, is at the forefront of this debate, working to ensure women, people with disabilities and other vulnerable and underrepresented groups, are able to make full use of the UK's built environment.

¹ Women in STEM workforce (2018)

For me personally, the roots of this issue were seeded many years ago when I was a 15-year-old A-level student doing my first ever work experience. We had gone on a site visit and the engineer showed me a pier on the Thames that he had been involved in designing. He explained to me that, because of the dimensions of the space, unfortunately it was physically impossible to make the ramp wheelchair accessible at low tide.

It was immediately obvious to me that there were multiple solutions to this conundrum, but he explained that the solutions I had proposed would add so much cost to the project the client wouldn't accept it. This was one of my earliest experiences of engineering; when it came to the crunch, value for money trumped values. A ramp that didn't work for people in wheelchairs 40% of the time was seen as a good enough solution. People with disabilities were seen as too complicated to include, and leaving it at that was acceptable.

What struck me more was that he had first said it was physically impossible. He had accepted so deeply the truth of the economic and value systems that made this decision acceptable, that it might as well have been a physical engineering impossibility to do it any other way. I argue that this mindset is ubiquitous in our profession, embedded in the way we design, build and manage our infrastructure.

Our challenge has to be to change minds. Value for money and the traditional cost-benefit analysis should not always trump our intrinsic values as engineers wanting to create a better, more sustainable society with infrastructure that is fit for purpose. Too often our profession is informed only by financial limitations and not the social value of the things we build. It is also true that social sustainability is often overlooked in favor of environmental and economic sustainability.

We have to understand, through education, training, lifelong learning and adaptation, how engineering design decisions impact on people's lives. We should also appreciate that cities are places where people live; the people who populate a city are as important as the environment or economic output of that city. People who work at night, the disabled, women and lower income socio-economic groups all face particular challenges in cities which are often not designed with their needs and experiences in mind.

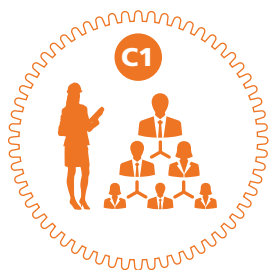
ICE intends to lead our industry in debating how cities can be safe at night; how accessible design supports people, not hinders; how women are impacted by design choices made by an industry which is 89% male;¹ and how we inform our decisions through shared values. To do this, we need to understand the social impact of infrastructure and radically rethink how we design.

Inclusivity is not a buzzword; it has a real impact on real lives. This discussion paper continues the debate started at our conference on the role engineers play in creating inclusive cities. Throughout 2018 and beyond, we will be exploring the key themes outlined in this paper at various workshops, events, panel discussions and conferences. We need to challenge ourselves, our industry, Government and the wider public to change how we do things in order to benefit everyone in society.

We hope you will join our conversation to encourage a radical rethink of how we perceive inclusivity.

The importance of thinking inclusively to improve outcomes for the users of the infrastructure which engineers design, build and maintain cannot be understated. ICE has set out three challenges and three discussion points for the industry to meet and debate.

Ongoing Challenges



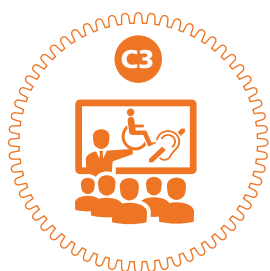
Challenge 1
ICE challenges built environment professionals to ensure greater female representation throughout the sector

The Feminist City
Page 06



Challenge 2
ICE calls on academia to commission research on how infrastructure can better support the needs of night workers and the night-time economy

The City at Night
Page 08



Challenge 3
ICE calls on engineers to think about design from the point of view of people with differing needs to their own

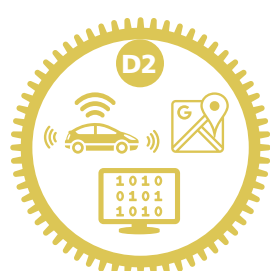
Thinking Outside the Box
Page 15

Ongoing Discussion Points



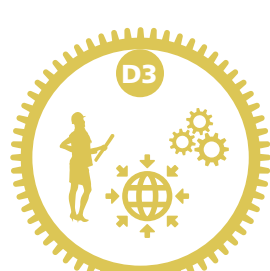
Discussion Point 1
What challenges are there for the industry in adopting the updated British Standards on the design of accessible and inclusive environments?

The Importance of Inclusivity
Page 04



Discussion Point 2
What more can built environment professionals do to improve their understanding of the wider community through emerging technologies?

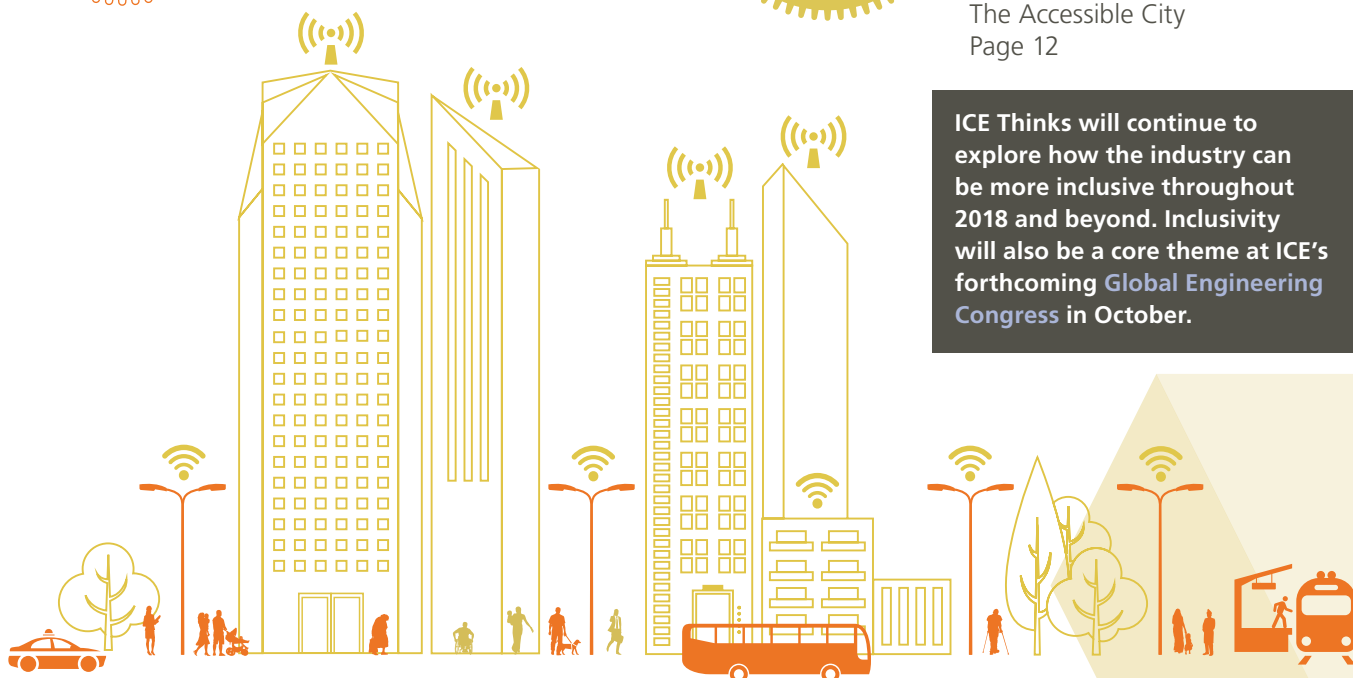
The Social Value of Engineering
Page 10



Discussion Point 3
What is the scope and opportunity to place accessibility at the heart of decision-making on new and existing infrastructure assets?

The Accessible City
Page 12

ICE Thinks will continue to explore how the industry can be more inclusive throughout 2018 and beyond. Inclusivity will also be a core theme at ICE's forthcoming [Global Engineering Congress](#) in October.



THE IMPORTANCE OF INCLUSIVITY



Professor Lord Robert Mair
President, Institution of Civil Engineers



Sadie Morgan
Director at dRMM Architects and
Commissioner at National Infrastructure
Commission



Neil Smith
Head of Inclusive Design, BuroHappold

In a session chaired by Dr Ellie Cosgrave, lecturer in Urban Innovation within UCL's City Leadership Lab, Professor Lord Robert Mair, President of the Institution of Civil Engineers, Professor Sadie Morgan of the National Infrastructure Commission and Neil Smith, Head of Inclusive Design at Buro Happold all outlined **their experiences of inclusivity in engineering** – we've captured their key insights.

The experience of our built environment, the design of the buildings, the origin of the bricks and mortar and the history which takes place within it, is a manifestation of our national identity writ large.

Engineers throughout history have used their tools and expertise to tackle social ills. They are the 'invisible superheroes' who built the sewers which defeated cholera, paved the roads and set the railway lines which enable commerce and transform our inner cities into livable spaces.

Engineering is also hugely personal. It can allow people with physical disabilities to have experiences and travel to places which would otherwise be barred to them. Yet unless this infrastructure is well designed and inclusive it can have a detrimental effect, excluding people with accessibility requirements, undermining social cohesion or even trapping people in poverty.

When it comes to how our infrastructure works and fits together, engineers need to think from all angles. The big picture has to be considered but it is the human scale, where design decisions have individual impacts, which dictates how infrastructure is used and whether it works as intended.

Engineers, designers and architects have a responsibility to consider how people work, play and live in the environment they create. Good design can transform lives, it is problem solving and the public deserves solutions which include them.





Cementing these principles means implementing best practice today and entrenching that practice in future generations. In the last two years, two updated British Standards for design of accessible and inclusive built environments have come into force. BS 8300 1 and 2, bring together the diverse range of advice on inclusive design to simplify application in the sector. The updated standards go beyond just considering disability and include everyone, irrespective of personal circumstances.

ICE welcomes the National Infrastructure Commission's recent decision to establish a Design Taskforce.² It is important the taskforce is given the opportunity to make the case for design quality, constitute a panel with long term goals and representative membership. We believe it should also consider cost effectiveness and how infrastructure sectors and businesses can better connect with each other, communities and other disciplines to ensure the industry works collaboratively, rather than in silos.

Engineering must become more diverse, welcoming to women, minority groups and other underrepresented interests, open to discourse and responsive to community and user demands. If the sector is open to new technology, proactive in recruitment and training and, focused on meeting the needs of the society of the future, then engineering, and lives, will be transformed.



D1

Discussion Point 1
What challenges are there for the industry in adopting the updated British Standards on the design of accessible and inclusive environments?

² NIC (2018) Early plans for national infrastructure design group announced

THE FEMINIST CITY

In a session chaired by Dr Ellie Cosgrave, lecturer in Urban Innovation within UCL's City Leadership Lab, Keith Waller of the Infrastructure & Projects Authority, Tiffany Lam of UCL, Kate Cairns of Cairns Consultancy and Professor Maureen Fordham of the Centre for Gender and Global Health, our panel, examined **whether engineering is doing enough to listen to, involve and recruit women.**



38% of women suggested that better street lighting would help to increase women's safety



According to the WISE campaign women make up

23% of core STEM occupations and just

11% of the total number of professional engineers¹¹



The importance of gender

We live in a society driven by gender roles, expectations and experiences which engineers must develop an ability to design for and take seriously their responsibility to address.

Some of the different experiences women face veer from the practical, such as waiting longer for the toilet, to societal inequality, such as sexual harassment. One study from the Netherlands suggested that despite an equal amount of space for toilets for men and women, the net number of toilets is lower for women, as they cannot use urinals.³ A study by Transport for London⁴ found 15% of women and girls have been subjected to unwanted sexual behavior on London transport and an opinion poll found 64% of women have experienced unwanted sexual harassment in public places.⁵

Differential gender roles and experiences affect patterns of work and how infrastructure is used. Women tend to take greater numbers of shorter journeys, breaking journeys to see friends, pick up shopping or drop children off at school or day-care, whereas men more frequently travel point to point.⁶ Individual testimonials, such as those posted on the Every Day Sexism Project⁷ talk of women

who avoid certain forms of transport because of harassment or perceived threats.

Engineers have a role to play in addressing these experiences, properly planning facilities which meet the needs of women or keeping safety in mind. One Yougov survey suggests that 38% of women think better street lighting would help to increase their safety in public places – the same percentage of women who think greater numbers of transport staff would have the same effect.⁸

One example of how infrastructure is used differently by men and women is cycling and the scarcity of inclusive cycling infrastructure. Men undertake nearly three times as many journeys as women.⁹ Design choices, such as a shortage of safer protected lanes separated from the main road, can suppress the numbers of women who cycle; Transport for London's head of surface delivery planning suggested in 2015 that the overriding reason women cycle less than men is a fear for their safety.¹⁰

Meanwhile seemingly innocuous design choices, such as glass staircases, whilst aesthetically pleasing from a design point of view, have obvious drawbacks if you wear skirts or dresses. If engineering had a greater proportion of women working and having a voice in infrastructure design such imbalances and choices might be addressed.

What is the city but the people
The role of the engineer
in creating inclusive cities

³ PHYS.org (2017) Researchers study lengths of restroom queues

⁴ British Transport Police, Department for Transport, Middlesex University London (2015) 'What Works' in Reducing Sexual Harassment and Sexual Offences on Public Transport

⁵ End Violence Against Women Coalition Yougov poll March 2016

⁶ CityLab (2013) How to Design a City for Women

⁷ The Everyday Sexism Project

⁸ End Violence Against Women Coalition Yougov poll (2016)

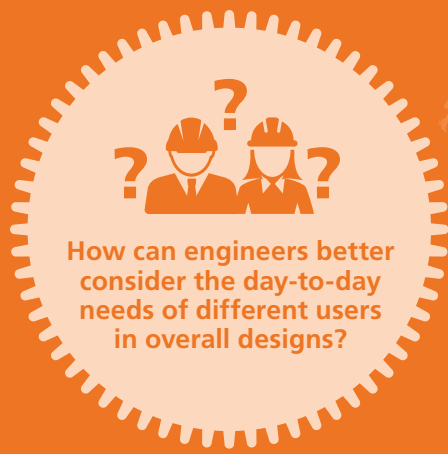
⁹ Department for Transport (2018) Analysis from the National Travel Survey

¹⁰ Guardian (2015) If there aren't as many women cycling as men... you need better infrastructure

¹¹ Women in STEM Workforce (2017)



What are the barriers to entry for female engineers and how do we overcome them?



How can engineers better consider the day-to-day needs of different users in overall designs?

Women in engineering

In an industry where nearly all executive level roles are held by men, the experiences, needs and perspectives of women are not always considered. Studies show that men are less likely to consider inclusivity a priority, with one survey finding 38% of organisations reporting male employees as being engaged in diversity and inclusivity activities.¹² This may be due to the fact that a society built by men tends to already cater to their needs.

Only 11% of professional engineers in the UK are women.¹³ The most recent data suggests that 25% of engineers in Sweden are female, whilst the figure is closer to 20% in Italy, France and Norway.¹⁴ Meanwhile 17% of undergraduates in the UK studying civil engineering were women¹⁵ whilst 27% of engineering students in India are women.¹⁶ It is important that the UK answers the question of how we address this cultural challenge and engage more women in engineering as a career path.

A greater focus on inclusivity has led to innovations such as the redesign of a main square in Stockholm with a “feminist, equality based” perspective in mind. This initiative has improved street lighting, upgraded the metro entrance and redesigned a café on the square, which was mostly used by men, as an inclusive space for both genders, to encourage more women to use the square and widen access.¹⁷

There is a need to promote female role models in engineering, not just to encourage more women to work in the industry but also to introduce representative female perspectives.

An industry more representative of all of society is a virtuous circle, supporting all built environment professionals to better gauge, then meet, the needs of end users.

Often the only professional reference points are male and there are unconscious biases which need to be challenged when it comes to recruitment, consultation and decision-making. While we do not expect that an inclusive workforce alone will produce inclusive design outcomes, we understand diversity as a core ingredient.

Without individuals offering a variety of perspectives on design and construction the industry as a whole will struggle to adapt to changing needs or deliver better outcomes. ICE’s National Needs Assessment, looking at future social and demographic needs, found the UK population will be 75 million by 2050, with a larger economy to service, an ageing society and growing numbers of people who are infirmed or otherwise disabled.¹⁸

The industry can and should do more to ensure an inclusive workforce which reflects the full diversity of the society it builds for. This requires consistent commitment through better support for women in education, adopting progressive recruitment measures and reaching out to schools to inspire the next generation.¹⁴

Universal coverage

Creating urban infrastructure for all means exploring how to bring together services and transport in a coordinated way, taking into account how men and women move through a community and use assets differently. Men tend to consider their immediate surroundings as their

community whereas women look to a wider area due to the general differences in their day-to-day activities.

This has much to do with “traditional” gender roles. Women are often the main care provider in families, both for children and disabled dependents and so will more often use parks, day centers and spaces like cafes.

Supporting these roles needs a transport system and urban design which considers access to these facilities as equally important as routes to work. A focus on better outcomes which support individual experiences, through commissioning processes, design principles and standards equipped to interpret and include gendered experiences, can create a better day-to-day experience and improve wellbeing for men and women.

There is also an economic imperative to embracing a feminist outlook. Women make up half of the population and 70% aged between 16 and 64 are in work. An infrastructure network which doesn’t work for women, and meet their needs, only suppresses productivity, social equality and efforts to end the gender pay inequality.

¹² Mercer (2015) *When Women Thrive, Businesses Thrive*

¹³ *Women in STEM Workforce* (2017)

¹⁴ *Independent* (2014) *Where are all the female engineers?*

¹⁵ *WES* (2018) *Statistics on Women in Engineering*

¹⁶ *NDTV* (2017) *Where are India’s female engineers?*

¹⁷ *Next City* (2017) *Stockholm Suburb is Transforming Public Square With Women in Mind*

¹⁸ *Institute of Civil Engineers* (2016) *National Needs Assessment - A Vision for UK Infrastructure*



C1

Challenge 1
ICE challenges built environment professionals to ensure greater female representation throughout the sector

THE CITY AT NIGHT

Our cities, and citizens, work 24 hours a day. Chaired by Amy Lamé, the London Mayor's Night Czar, Dr Ann Thorpe, UCL, Florence Lam, Arup Lighting, Enora Robin, UCL and Suzanne Bull, Attitude is Everything, debated **whether we can build cities which work around the clock?**



Is there a trade-off between safety, access and function when designing infrastructure?



A city never sleeps

Life after dark is too often an afterthought. The infrastructure needs of night workers, communities after dark and individuals active nocturnally are very different to those travelling at peak travel times, office workers and those active in daytime.

Overcoming negative perceptions is an important challenge for properly representing night-time issues. The criminal economy and homelessness are often associated with the night, but don't go away during the day.

Whilst social ills, such as the effects of excessive alcohol consumption, might be more visible during the night-time, moving beyond a mindset which views the night economy solely as a problem to be managed is fundamental to ensuring inclusivity for the many different types of people who work, play and live after dark.

The night-time economy

When most people think of the night-time economy, hospitality - bars, clubs, hotels and restaurants - is often the first thing that springs to mind. Yet the largest number of people involved in night-time work is in logistics, followed by health and social care with hospitality coming third. In London alone there are 1.26m night-time workers contributing a total value to the economy of £26.3bn - 40% of the UK total of £65.75bn.¹⁹

The size and scope of the night-time economy, three times the budget of the Department for Transport, might merit coordination through Government. Whilst a number of individual cities, including Amsterdam, Paris, London, Zurich and New York, have introduced Night Mayors in recent years, and many more are considering doing so, the concept, and regulatory coordination, is in its infancy. There is no national UK minister with a remit to consider and champion the night-time economy.

For night-time workers, transport is a particular challenge. Trains very rarely operate any sort of regular overnight service and whilst some cities have a network of night buses, many do not. Often routes are poorly mapped against concentrations of night workers and centers of commerce. Some international innovations, such as express night buses for workers in Paris, could be adopted to help address these shortcomings. For many NHS workers, carpooling is the only way to get to and from work.

Supporting night-time workers needs better data capture. Whilst census data has been used to identify concentrations of night-time workers, due to different working patterns, a disparate, poorly represented workforce and a lack of investment in out of office hours data collection, information about night-time activity is patchy at best.

¹⁹ Mayor of London (2017) Culture and the night-time economy



The night-time economy is worth **£26.3bn** in London.²⁰



This is a larger sum than the entire budget for the Department for Transport 2016/17 (**£20bn**)²¹

It's almost as large as the budget for Housing, Communities & Local Government 2016/17 (**£28bn**)²²

Accessibility and safety at night

Accessibility is such an issue at night people with disabilities often question if they should be out at all. This isn't a concept anyone in an inclusive society should have to address.

People with disabilities face challenges venturing out at night; from a lack of transport options to the need to use back entrances not designed as public spaces, poorly lit streets and venues for which accessibility is an afterthought or buildings and facilities which might be staffed during the day but not at night.

For many disabled people, going out at night means lots of waiting around in conditions which are often cold and dark, facing discrimination arising from people using alcohol or being questioned as to whether they should have access to venues or coping with vulnerable situations. An inaccessible city means many are forced to stay at home.

Engineers have a role to play in properly accounting for user needs, incorporating the challenges people face into design and building infrastructure which is accessible. This can be achieved by working with disability groups and people with disabilities to understand their access requirements.

One charity runs a secret shopper scheme, where they send in a trained person with a disability to rate venues and infrastructure and provide feedback. This style of testing could be adopted by the industry in its own interrogation of infrastructure performance.

Daily life at night

For an increasing number of people, daily life takes place at night. However there are few places, like cafés or shops, for night-time workers to take breaks and cultural or public spaces are often only accessible during the day.

Lighting has a large part to play in this. A park which might be used extensively throughout the day can become an urban black hole without light, considered dangerous and foreboding. Underpasses, tunnels or stations which can be bustling during the day will be avoided at night by users who fear they are isolated spaces. Darkness changes perceptions and design must incorporate ways to counteract this.

Further, well-lit urban areas help to reduce crime, protect vulnerable groups, and improve usability of public space. This is especially important for vulnerable groups and women who are particularly at risk in low light conditions. At the same time, it is important to ensure homes are insulated from sound and light. People who work night shifts need homes which block out the acoustics of the day and solutions to light pollution should be incorporated to let people rest.



107,136

people employed in the transport and storage sector



101,282

people work in health and social care



97,125

people employed in the hotel and restaurant industry



1.26m

jobs exist because of the night-time economy in London

C2

Challenge 2

ICE calls on academia to commission research on how infrastructure can better support the needs of night workers and the night-time economy

²⁰ Mayor of London (2017) Culture and the Night-Time Economy

²¹ Central Government Supply Estimates 2016-17

²² DCLG (2017) Annual Report and Accounts 2016-17

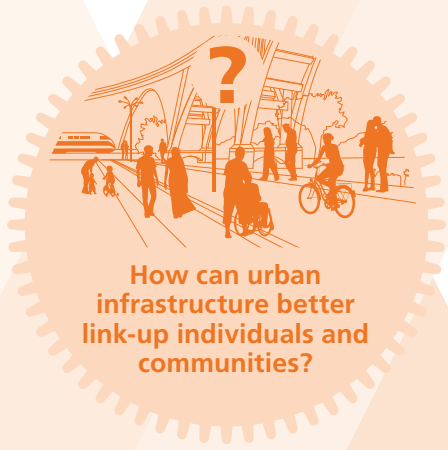
THE SOCIAL VALUE OF ENGINEERING

Chaired by Dr Ine Steenmans of UCL, Dipa Joshi, the London Mayor's Design Advocate and Michael Veale of UCL argued that **the decisions engineers make must be for social good and the designs they build must be community assets.**

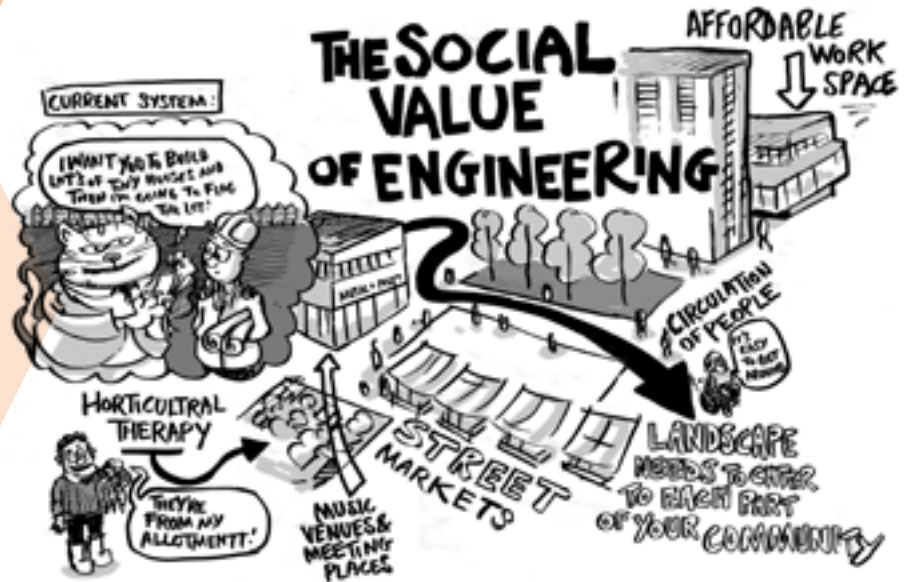
Social infrastructure

Infrastructure is interwoven within our social fabric. It reaches into most people's daily life from the moment they wake up to the moment they go to bed, it delivers water for showers and tea, it gets people from A to B, powers the lights and machines people need throughout their day and protects from the elements.

Good infrastructure enables social mobility; it encourages diversity of communities, the transfer of ideas and empowers innovation. It is the glue that binds our society together and drives our economy. Infrastructure is intended to serve as a social good. Engineers must understand the complexities inherent in providing this 'good' inclusively.



How can urban infrastructure better link-up individuals and communities?



Part of this complexity includes an understanding of how infrastructure projects are interrelated. Projects should not be taken in isolation of each other, our cities need regeneration and to be joined up so that infrastructure works as a network, both in terms of user flow and through technology. Design must cater for each part of the community, taking into account a range of interests and changing lifestyles.

We need to find answers to conflicts between private developments and public right of way. Increasingly, open areas of our cities and the infrastructure which supports them are developed and owned by private clients. These business parks, squares, shopping areas or private parks and estates, place business interests, rather than community spirit and inclusion, as the priority.

Development of unused or neglected space is welcome but ensuring that these spaces are living, rather than just working, spaces is important. Local government can perform an oversight role through retaining a stake in private developments, ensuring social housing and assets are not neglected and being a guarantor of diverse communities.

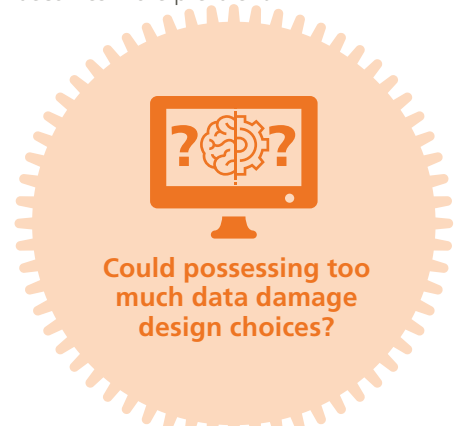
This can be facilitated by local community social media apps which link people up in a localised space by interest and through electronic monitoring of building and infrastructure use to better understand how individuals interact with their local environment as a whole.

Data driven change

Technology and digital information will play an increasingly important role in our lives. As machine learning methods improve and artificial intelligence becomes ever more capable we will better understand how our infrastructure works and develop better tools and techniques to improve design decisions.

The speed of adoption of these new technologies will depend on how infrastructure companies adapt to new technologies, with more agile firms likely being early adopters. Engineers must also design bespoke systems; whilst other industries use data to sell or persuade, engineers should bear in mind the utilitarian imperative of infrastructure.

However, we must bear in mind the social value of this emerging side of the industry. Core values of openness, inclusivity and responsible management of personal data must remain at the fore. Decisions have to be made by engineers with an eye on the wider social impact. Data driven information must improve services and a human, thinking aspect, must ensure that historical assumptions and prejudices do not become entrenched as automation becomes more prevalent.



Could possessing too much data damage design choices?

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THE ACCESSIBLE CITY

Chaired by Neil Smith of Buro Happold, Julie Fleck OBE, Construction Industry Council, Vicki Austin of the Global Disability Innovation Hub and Jenny Cook, Guide Dogs for the Blind Association examined how **social exclusion can be minimised by inclusive design.**

Olympic legacy

The United Kingdom has held the modern Olympic Games on three occasions, in 1908, 1944 and 2012. The 2012 games were the first to consider accessibility needs and inclusivity through the entire process, from design to delivery, operations and legacy.

There has been a concerted effort to continue the principles which guided the delivery of the London 2012 Olympic and Paralympic Games. This has been achieved by putting inclusivity at the heart of design principles and institutions in the wider area around the Olympic Park, which has been led by the UK Government.

Inclusive design is not just about taking into account disability, but about putting safety and ease of use for all people first. Ensuring people of all backgrounds, cultures, ages and incomes can use infrastructure independently, have choice and where possible, without the need for help, through convenient and welcoming design.

Inclusive, accessible design is also about flexibility, taking into account how different groups of people use public spaces. Women use transport differently from men whilst disabled people use infrastructure in different ways to people without impairment.

In order to deliver projects accessible for all it is necessary to take into consideration input from end users. The Built Environment Access Panel for the Olympic Park legacy development includes stakeholders who are older, disabled or expert in diversity and accessibility. The Panel has power of veto on every development in the area, but has never used it. It has been sufficient to include their expertise to improve designs, and point out shortfalls to make sure that end users are not affected by a design or architectural blind spot.

This oversight and consultation has meant that all areas of the Queen Elizabeth Park and legacy developments can be reached by individuals with mobility issues, be that older people, people with young children in pushchairs or wheelchair users.

Educating engineers to think inclusively

Entrenching inclusive design isn't just about changing attitudes but teaching through education and training. Designers, architects and engineers are too often not equipped, through courses and accreditation, to understand or take into account inclusivity and the needs of all end users. Teaching the next generation of engineers to consider the impact their work has on all societal groups should be a priority to ensure progress is not lost.

Sector bodies are working to include an inclusive attitude. The Built Environment Professional Education Project has been developed to equip students and practitioners with the confidence to deliver inclusive buildings, places and spaces throughout their careers. The Construction Industry Council are producing a teaching and learning briefing to improve knowledge, skills and understanding and the Essential Principles Guide for Built Environment Professionals is being developed.

How professional bodies support engineers in promoting inclusive and accessible thinking is an open question. Continuing to incorporate inclusive thinking into Continuing Professional Development or codes of conduct through membership bodies and the Engineering Council is one solution, as are the possibilities of creating best practice guidelines which include inclusivity targets and clauses in contracts, or training around the Equalities Act 2010.

Future proofing

In modern times we recognise the need to future proof our infrastructure to ensure longevity. Victorian infrastructure has served the nation well, but ensuring it meets modern needs and accessibility standards and incorporates modern technology poses an ongoing challenge for engineers.

We can avoid future generations having to face the same challenges with the infrastructure we build today by ensuring we build spaces which are inclusive and accessible.





What scope is there for infrastructure to meet the needs of people with accessibility requirements?



How will technological innovation support people with access requirements issues and will it improve planning and decision making in design?



How do we ensure best practice is shared within the industry?

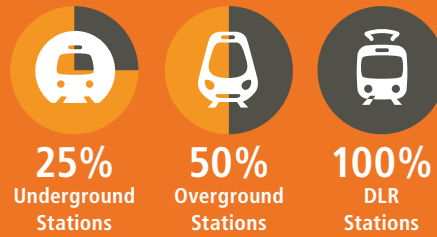
This need is pressing. The UK is an ageing society, according to the Office for National Statistics, by 2046 a quarter of the UK's population is expected to be aged 65 or over.²³ With an aging population come additional accessibility issues putting greater pressure on our existing infrastructure network.

Modern infrastructure does take inclusivity into account. Only half of the London Underground network has step free access, but every station in the much more recently delivered Docklands Light Railway and Crossrail has step free access.

Embedding inclusivity requires engineers, designers and architects to use data and technology to better understand how infrastructure is used. Co-production and assessment also has a critical role, working with third sector partners and measuring the impact of delivered infrastructure on individuals. This thinking needs to incorporate inclusive communication, recognising that individuals who don't work in the sector have different skills and limited understanding of design; engineers need to learn to relate to people outside the industry if they are to improve their lives.



STEP FREE ACCESS



In London, only around a quarter of Underground stations and half of Overground stations have step free access, although more modern lines, such as the DLR have 100% step free access²⁴

DAY-TO-DAY EXPENDITURE



Inaccessibility has personal costs on disabled people's day-to-day expenditure, for instance 'the cost of taxis in lieu of inaccessible local public transport systems.' This can mean that "once disability-related costs are taken into account the numbers of households with a disabled occupant assessed as living in poverty jumps from 23 per cent to between 40 per cent and 60 per cent."²⁵

FACTS ABOUT THE POPULATION



There are 13.3 million disabled people in the UK, or one in five of all people, of which 52% suffer from a Mobility issue, with around 14% suffering hearing or vision based disabilities.²⁶

By 2050, 4 million people will face sight loss. This presents a real challenge for designers of infrastructure and ensuring inclusivity in society.²⁷



In 2016, 18% of the population was aged 65 and over, a figure expected to rise to 25% of the population by 2046.²⁸

D3

Discussion Point 3
What is the scope and opportunity to place accessibility at the heart of decision-making on new and existing infrastructure assets?

²³ Office for National Statistics (2017) Overview of the UK Population

²⁴ Transport for London

²⁵ Demos (2010) Counting the Cost

²⁶ Department for work and Pensions (2016) Family Resources Survey 2015/16

²⁷ Office for National Statistics (2017) Overview of the UK Population

²⁸ Office for National Statistics (2017) Overview of the UK Population



Case Study: London 2012 Olympic and Paralympic Games

The London 2012 Olympic and Paralympic Games were the first modern Games to be considered as a single event. Accessibility was a priority, and considered as a key component of design for the event from conception to delivery.²⁹

The London Organising Committee ensured:

it worked with over 100 disability organisations

equal participation of spectators, athletes and workers regardless of needs

consistency across all 20 venues with an Accessibility Services Strategy

best practice has been shared with subsequent Games in Sochi, Glasgow, Rio and PyeonChang



What is the city but the people
The role of the engineer
in creating inclusive cities

ice
200
INSTITUTION OF
CIVIL ENGINEERS

INCLUSIVE CITIES

DR ELLIE GOSWAMI
FOR LORD ROBERT MANN
PLUS SASHA MORTIMER
NEVL SMITH



²⁹ Innovative Policy (2014) London 2012: The most inclusive Olympics Ever



THINKING OUTSIDE THE BOX

Guest speakers ran sessions on choreography, divergent thinking and play, sight loss and experience rather than standards to challenge industry to **rethink their perceptions of time and space.**

Thinking divergently, work as play, learning from experience, choreography or putting yourself in another's shoes; for every individual there is a different perspective informed by their experience.

Understanding how different people use and perceive space and design, seeing things from a different point of view, can be considered a prerequisite to meeting their expectations and needs. In trying to do so an engineer can improve their design, consider different approaches and better meet the needs of clients and end users.

Someone who has never suffered sight loss cannot know what it is to try and navigate the built environment blind. Suffering from sight loss poses new challenges in navigating crowds or being confronted with digital ticket machines which cannot be seen.

For someone suffering sight loss a sudden transition to stairs is a potential life or death situation. A lack of directional indicators means they can become easily lost or loud noises drown out their sense of hearing.

An ignorance of understanding by staff about when people with sight loss need help – the universal sign is pointing a cane upwards – can mean a simple task for someone with sight can take hours for someone who is blind.

Thinking differently, experiencing life from another's perspective, can improve the lives of those who engineers build for. Spending just one hour with a blindfold on could get individuals thinking about how they can design to help people who rely on tactile features like rumble strips and handrails with braille which give cues for where they are going.

Technological innovations such as feedback strips for digital haptic canes, which can give blind people cues through vibrations or through audio about their environment could immensely aid someone's quality of life and are relatively easy to incorporate in design. Training to understand the needs of people who are deaf or have a learning disability can highlight the importance of how well-designed spaces which are uncomplicated to navigate or signage which is easily understood can change lives for the better.



Challenge 3
ICE calls on engineers to think about design from the point of view of people with differing needs to their own

WHAT NEXT?

Helping people live better, less complicated, lives is at the very heart of engineering as a profession. From universal access to electricity, to digital connectivity, clean running water and sanitary sewage.

ICE's Royal Charter³⁰ commits its members to take account of the public interest, including the impact of infrastructure on future generations, improving quality of life, taking into regard the nations heritage and the broader interests of humanity as a whole.

³⁰ICE Royal Charter and By-laws



As a profession, engineering cannot afford to stand still. It is always possible to think of better ways to deliver services, relate to users and meet, then exceed, individuals needs and expectations.

Engineers can learn much from colleagues across disciplines, address accessibility of language, listen to communities and end users more and make use of new and emerging technologies as simple starting points to begin this journey.

The challenges of the future - an ageing society, increased demand on scant resources, supporting more

people with less - are challenges engineers need to grapple with, provide solutions to, and overcome. Thinking inclusively will help transform lives now and in the years to come.

ICE Thinks will continue to explore how the industry can be more inclusive throughout 2018 and beyond and inclusivity will be a core theme at ICE's forthcoming Global Engineering Congress in October

In order to take the discussion to the next level, it is important for us to know what you think and how transforming cities to be inclusive can better transform lives.




Get in touch

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About ICE

Established in 1818 and with over 95,000 members worldwide, ICE is a leading source of expertise in infrastructure and engineering policy and is widely seen as the independent voice of infrastructure. ICE provides advice to all political parties and works with industry to ensure that civil engineering and construction remain major contributors to the UK economy.

If you need this document in an alternative or accessible format please contact thoughtleadership@ice.org.uk

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