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Global Engineering Congress (GEC): Notes and Goals from the 2018 Conference

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ABSTRACT

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From 22 October 2018 to 26 October 2018, the Institution of Civil Engineers (ICE) in London hosted the Global Engineering Congress (GEC). The GEC formed part of the ICE 200 bicentenary programme, the 50th anniversary of the World Federation of Engineering Organizations, and the UK Government's Year of Engineering. The Congress focused on five of the 17 global United Nations (UN) Sustainable Development Goals set in 2015. These five goals are inextricably linked with the world's coastal community and its environment. Using the numbering system of the UN, these five goals are: Clean Water and Sanitation (Goal 6); Affordable and Clean Energy (Goal 7); Industry, Innovation, and Infrastructure (Goal 9); Sustainable Cities and Communities (Goal 11); and Climate Action (Goal 13). They are absolutely vital for all of us, who as a global community, urgently need to take action on climate change and address issues such as delivering clean water to all, sustainable energy, and connectivity. This communication reports on the GEC and the role that the global coastal community can play and has to play in addressing the major issues at stake.

ADDITIONAL INDEX WORDS: *Sustainable development goals, SDGs, United Nations Development Programme, civil engineering, resilience, global warming, climate change.*

GLOBAL ENGINEERING CONGRESS

This Global Engineering Congress (GEC), which incidentally coincided with Fechner Day, was held in London from 22 October 2018 to 26 October 2018 at the Institution of Civil Engineers (ICE) (Figure 1). The five-day conference marked its 200th anniversary (ICE Staff, 2018) this past year and brought together large sways of the global engineering community, as well as international policy makers, asset managers, and experts. Covering a wide range of professional fields represented by more than 70 countries, the congress attendees were there to exchange ideas on the central topic of the United Nations Sustainable Development Goals (UN SDGs). The UN SDGs are a broad and interdependent collection of 17 global goals set by the UN General Assembly back in 2015 covering both social and economic development targets between 2015 and 2030 (UN Staff, 2015). The GEC focused on five of these goals, where the engineering community in general and the coastal and maritime engineering community in particular can truly make real meaningful contributions. According to the numbering system of the UN, the five fields discussed at the GEC were: Clean Water and Sanitation (Goal 6); Affordable and Clean Energy (Goal 7);

Industry, Innovation, and Infrastructure (Goal 9); Sustainable Cities and Communities (Goal 11); and Climate Action (Goal 13). Though coastal engineers, scientists, and researchers by means of the nature of their work are for the most part quite familiar with thinking in terms of large and at times interconnected systems, this is unfortunately not the case for the majority of the population. People tend to understandably think in terms of what is readily and easily perceivable (*i.e.* what covers the near-immediate special surroundings and what, in terms of timescales, are at best seasonal rather than decadal or even beyond that). Perhaps, therefore, it is not surprising to observe that quite a lot of people still think that the issues that the global SDG are trying to address are all rather recent developments whose sails only recently and suddenly appeared on the horizon or, possibly even worse, that they are merely “potential” issues or even “nonissues,” as some might even venture to say. The fallacy of such a position can already be illuminated by taking a mere historic stroll along the banks of the River Thames just outside the home of the ICE in London and casting one's mind back to the days of the first Industrial Revolution. The history buffs amongst us will know that this period took place from roughly the middle of the 18th to the end of the 19th centuries and was when the mostly agrarian, rural societies of Europe and America became vastly more industrial and urban in nature. The lifeblood for this transformation was mostly the textile and iron industries, at the time empowered by the then ever so relentless force of steam engines. London could veritably be

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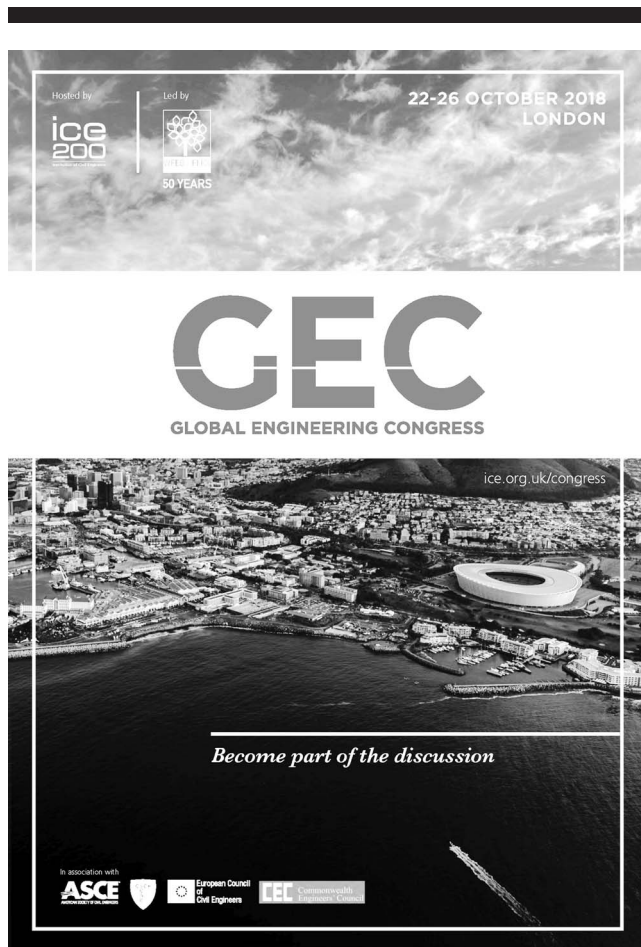


Figure 1. GEC—Global Engineering Congress—title page of the initial brochure.

considered the epicentre for all this. A till-then-unseen boom in per capita growth of domestic product also came with the unexpected bad. With the combined explosion in wealth and population, the River Thames water essentially became supersaturated with effluents from toilets, slaughterhouses, streets, factories, *etc.* In the summer of 1858 things got so bad that the Houses of Parliament had to install curtains soaked in chloride of lime in a vain attempt to suppress the sickening stench, and serious consideration was even given to moving the parliamentary proceedings away from the river. Luckily this spiralling calamity was addressed by, amongst others, civil engineer Sir Joseph William Bazalgette, who was instrumental in the construction of the sewer network for central London and the reclamation of the Victoria, Chelsea, and Albert embankments that also served as training works for the river. Eventually London was left with a state-of-the-art sewage system and an early river management system that would free the city from the stench of effluent and prevent cholera epidemics. The installation at the time was sized to the largest population density in the area and allowed for a growth to about double that throughout the area. Clearly they had growth and resilience in mind.

The casual observer might be forgiven for thinking that, as we have dealt with similar issues in the past, all will work out automatically. Those who have read *Blue Urbanism: Exploring Connections Between Cities and Oceans* (Beatley, 2014) clearly know that this is not the case. The awareness of the urgency to act is still very often lacking. It takes hard work, a concerted and on-going effort, and more than ever a truly global approach. Thus, over the course of the five conference days, the five SDGs mentioned above were all approached from different angles by a contingent of no fewer than 200 speakers. The framework provided for this was a matrix approach in which each day was started with a keynote address by three speakers followed by up to six concurrent sessions, each covering one of the five selected SDGs, with the sixth session looking at the broader societal questions on how to inspire the next generations or how institutions can assist in developing and implementing the SDGs. Throughout the congress, ample time between sessions allowed for networking, and the end of each day was rounded up with a closing keynote address and a panel discussion to tackle some of the issues raised.

Though it is impossible to highlight all sessions that the more than 2500 attendees could choose from and that took place over the course of the five days, it is useful to take a whistle-stop tour and highlight some concepts through our own lens of a coastal engineer or scientist that the reader might find interesting and worthy of further exploration later on. The first day looked predominately at the role of engineering in the progression of the UN SDGs. All speakers were in unison that a paradigm shift is needed in the way and speed with which we address the global development challenges. Miguel Clüsener-Godt, Director of the Ecological and Earth Science Division of the UN Educational, Scientific, and Cultural Organization, stated that more than ever interdisciplinary insights are needed and that engineering is vital in achieving the SDGs, thus also bringing to the foreground the need for capacity building in more remote locations such as Africa. Alain Bentéjac, President of the International Federation of Consulting Engineers (FIDIC), in his presentation highlighted, among other points, that cost-based procurement still reigns supreme instead of quality-based selection. This preference, though in part is likely due to a perceived “cheapest solution” approach, also is likely due in part to the difficulty in engineering decision making when faced with climate uncertainty. David Lapp, Manager of Globalization and Sustainable Development of Engineers Canada, in his talk on integrated climate vulnerability assessment with asset management to build resilient infrastructure, highlighted the difficulties that crop up when having to account for both extreme climate events and climate creep. Though devolving infrastructure resilience is rapidly becoming absolutely indispensable, accounting for it still remains difficult. Clearly, a lot of the drivers, such as population growth and its demographics, urban development, coastal protection, energy, *etc.*, are all affecting the five SDGs and are also exactly what drives the coastal engineering industry in general and niche industries thereof, such as the dredging industry (Daemen *et al.*, 2018). And, yes, although the maritime construction industry has witnessed robust growth in related segments, such as offshore wind power, figures from the International Association of Dredging Companies and the European Dredging Association

(EuDA) show that over the period 2000–2016, the bulk of the sector's growth came from trade-related capital works, whilst the segment of pure coastal works has remained almost constant in absolute terms (EuDA Staff, 2018). Day 2 of the congress looked at the Challenges, Opportunities, and Solutions, and tried to define ways to enable the changes a global society needs. Professor R. Raymond Issa, Director of the Rinker School of Construction Management at the University of Florida, pointed out that an awful lot of thinking is still in pure terms of probabilistic approaches (*i.e.* the $1/x$ year event), while it is becoming more and more apparent that we should really be looking at how resilient we are, meaning how elastic we are and how fast we can bounce back to the original state. In the latter context, the continued emergence of resilience bonds is perhaps an especially noteworthy trend that the author wishes to expand on slightly for the benefit of the reader. One can think of these bonds as an insurance product that links existing catastrophe bonds with traditional project finance to support the implementation of large-scale resilient infrastructure projects and their development. Similar to a life insurance policy that includes a reduction in premiums for risk-avoiding or -reducing behaviour, a resilience bond applies this same mechanism of a catastrophe bond and generates savings in the form of a rebate, which can apply to projects, such as various types of coastal defences that preventively reduce damages from extreme climate events. This topic almost naturally flows into the theme of the third day, being Building Sustainable Economies and Resilient Communities. As highlighted in one of the keynote addresses that day by Nick O'Regan, Director of Infrastructure and Project Management at the UN Office for Project Services (UNOPS), and a recent publication by UNOPS (Thacker *et al.*, 2018), infrastructure is essential for achieving the UN SDGs, but it must be the right infrastructure with the SDGs embedded, whereby a holistic approach is taken towards the planning, delivery, and management of national infrastructure away from a silo approach, but coming rather from a systems-based angle. Throughout the day, when also looking into some more detail in such topics as evidence-based infrastructure development in Curacao, the financing of decarbonisation, global perspectives on the energy transition, *etc.*, one of the questions that bubbled up quite frequently during the questions and answers sessions and the breakout sessions at this well-attended congress (Figure 2) was how to find the financing. Just how challenging it is and will still be to find the financing is, perhaps, well reflected by a study of Renaissance Capital, who found that the relationship between country-level Environmental, Social, and Governance (ESG) scores and financial performance is weak at best and, at worst, nonexistent (Smith, 2018). Of course, on a positive note, this by default only takes into account historic data, whilst there are some real rays of hope with, for example, BlackRock Inc., the world's largest investment asset manager, going "all in" on ESG (Smith, 2018).

Day 4 of the congress delved into the subject of engineering and its social impact. To this end, a joint statement of intent to take action on climate change was signed that morning by ICE, the American Society of Civil Engineers, and the Canadian Society for Civil Engineering (CSCE) outlining the three organisations' intentions to raise the standards of civil



Figure 2. Congress attendants mingling and discussing insights during a breakout session.

engineering and require their members to demonstrate a sound knowledge of sustainable development and the SDGs. Professor Lord Robert Mair, ICE President, said the three institutions hold a huge amount of knowledge and power. It was important to use that power effectively, which can be done by showing strong leadership and demonstrating knowledge of sustainable development, the SDGs, and the 2030 Agenda. Beating our own drum is perhaps something that civil or coastal engineers are not quite as good at as they perhaps should be. Nevertheless, as engineers, we have a huge impact on the study and alteration of the physical world around us; yet it often happens unbeknownst to the general public. To this end the ICE is holding a year-long exhibition titled "Invisible Superheroes," which was also open to the GEC attendants focusing on the unsung heroes behind some of the world's most amazing engineering projects (Figure 3). Glenn Hewus, President of the CSCE, perhaps summarised it best when he said: "Be Seen, Be Heard, Be Relevant, and . . . Be Proud!" And so we should be. The day saw an entire myriad of amazing projects being presented, ranging from hydroelectric power in the eastern Democratic Republic of Congo, to the politics and social aspects of waste-to-energy in London, to the first and only offshore wind farm in the United States, *etc.*, proving that the positive social impact is there. We just need to work harder at getting more clicks, shares, and likes perhaps in this day and age of social media. Day 5 of this whirlwind of a congress came all too soon and saw the delegates getting immersed in how a driving combination of investment, education, and governance can be compiled to truly drive change towards achieving the SDGs. And this is much needed indeed. Peter Grevatt, Director of the Office of Ground Water and Drinking Water at the US Environmental Protection Agency, showed the attendees some of the complexities most clearly when he outlined the financial

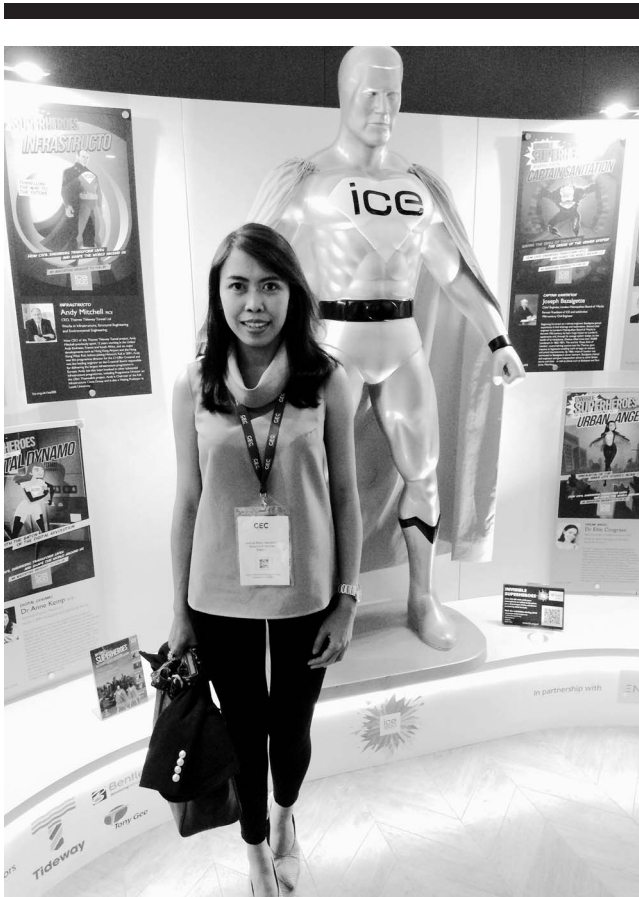


Figure 3. Congress attendant visiting the Invisible Superheroes exhibition.

challenges caused by different population changes. Over time in declining rural communities, there may likely be no tax base left to fund the building of much needed water infrastructure, whilst in urban locations, there's often a wide disparity in income that sees large sways of the population struggling to pay the required water tariffs. However, water can be a powerful “connector” as Håkan Tropp, Head of the Water Governance Programme at the Organisation for Economic Cooperation and Development, showed in his presentation, thus also underlining the sense of investing in water, as by doing so we are also investing in other SDGs. These sorts of realisations may help to get increasing numbers of private companies to invest in such infrastructure projects, as it helps to reduce the perceived risk profile, something both Jordan Schwartz, Director for Infrastructure, Public Private Partner, and Guarantees at the World Bank, and Andy Rose, CEO of Global Infrastructure Investor Association, also talked about. Of course, in talking about a paradigm shift, not every project likely will be suitably profitable when evaluated under an old measurement system of values. We will also have to start valuing social returns and as Alex Money, an Oxford University researcher and a consultant to the World Water Council, put it: “We have to accept that not everything will generate revenue . . . either we take the SDGs seriously or we don't.” Using portfolios of projects that can at times cross-

subsidise each other and possibly even work better individually by doing so, may offer part of the solution.

In conclusion, it is perhaps the most coincidental start of the congress coinciding with 2018 Fechner Day that underlines most crucially why it is so important for all of us to keep working at the UN SDGs and even intensify our efforts. Gustav Fechner was an early pioneer in experimental psychology and founder of psychophysics, whose law states that the subjective sensation is proportional to the logarithm of the stimulus intensity. Put differently, the perceived loudness (*e.g.*, at a music concert) by a human subject in the audience is proportional to the logarithm of the actual intensity measured objectively with an accurate nonhuman instrument. Might this, in some way help to explain why it is so hard to have nonbelievers in climate change read the ever-intensifying signals and move into the believer camp, let alone even into the positive action camp? Who will tell? It is said at times that on the morning of the 22 October 1850, which through the efforts of the International Society for Psychophysics has now come to be known as Fechner Day, Gustav Fechner awoke with a sudden new insight into how to study the human mind. Let us all hope for our sake and that of our children that the world will soon wake up with brave new insights on how to make the UN SDGs a reality rather than giving in to the temptation of hitting the snooze button because, as Ban Ki-moon, the United Nations Secretary-General from 2007 to 2016, stated: “We don't have a plan B because there is no planet B!” As the coastal science and engineering community, let us get involved even more than we already have and help shape the world for the good of today's generation and those to come.

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