BRE Trust Conference 2020

Improving lives with a better built environment

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BRE Trust Annual Conference
25 February 2020. British Library, London

A wide range of leading industry figures attended the 2020 BRE Trust Conference to hear prominent experts discussing their work to deliver positive and measurable impacts on wellbeing, sustainability and resilience in the built environment.

Delegates also had the opportunity to:

- explore an Innovation Zone showcasing our projects on global challenges such as increased urbanisation, the aging population and climate change,
- see behind the scenes of the partnerships delivering this work,
- discuss impact assessments made possible by new technologies and ways of working with data,
- shape the BRE Trust's future priorities and partnerships,
- help to build a delivery network of organisations with shared goals that support the work of your organisation and the BRE Trust's vision.

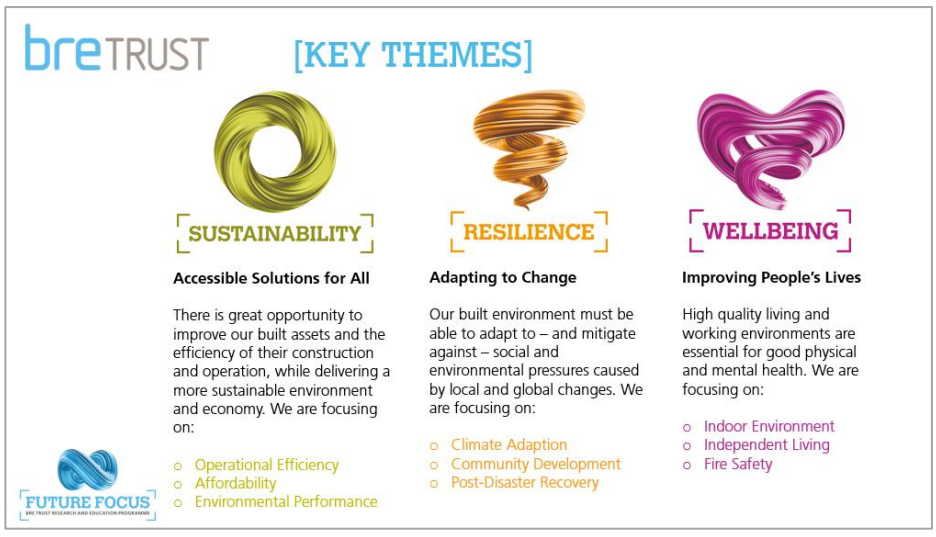
Welcome by Dr Deborah Pullen MBE – Executive Director, BRE Trust

Welcoming delegates to the conference, Deborah Pullen reflected on BRE's rich history of driving construction productivity, safety, environmental performance and advancements – and the BRE Trust's mission to both hold this national asset for the wider built environment, and support the construction research and teaching capability needed to meet the sector's changing needs.

Over the last 20 years the Trust has provided more than £25m of funding to support projects and scholarships, and attracted a further £50m in programme support from more than 30 core partners. It has recently been building on this success by establishing a number of delivery clusters with a range public, private and academic partners, including those in the teaching community and charity sector.

Impact

"It really is amazing what has been achieved by focusing on the right topics with the right people at the right time," said Deborah, "This has resulted in an increase in the pace and scale of application of new knowledge needed to address future global challenges at a time when we hear all the time that we must meet future needs. We are also working together to find better ways to measure impact and share good practice and experience of this with others so that they can also maximise the value of their efforts."



Improving resilience to disasters

David Murray – Managing Director, Article 25

Article 25 is an international development organisation that builds homes, schools and healthcare facilities in communities where they are most needed, because of recent disasters such as earthquakes or conflicts, or as a result of poverty.

Established thirteen years ago to provide buildings that are as professionally designed and constructed as they would be if delivered by commercial companies, Article 25 has worked on more than 90 projects in 34 countries.

Local knowledge and consultation

It is all too easy for well-meaning responders to waste resources by providing assistance that does not give communities what they need for a sustainable post-disaster recovery, or to alleviate the problems of poverty.

Article 25 makes a point of consulting with as wide a range of local people as possible. For example, when expanding the Bethel School in Burkina Faso, which was popular but struggling to cope and turning children away, the teachers were consulted in detail about what the school needed. This included more classrooms of course, but also science, sports and vocational training facilities.

The wider community was consulted on secondary needs such as the provision of clean water, a safe space for women and girls, and areas for events and a market.

Bethel School in Burkina Faso.
Photo: Grant Smith

Local materials and techniques

In this country we know a lot about building with steel, concrete and glass, but it is often better to consider what is normal in the project areas – what has stood against earthquakes for centuries for example – and apply traditional techniques to modern settings.

Also, using locally sourced material keeps building and maintenance costs down, and means they are available at the local marketplace when reconstruction or additional construction is needed. When building a school in Niger (inspired by the success of that in Burkina Faso), an abundant local stone call laterite was used as the main building material – cheap, attractive and with low embodied energy. In addition, a number of local people learned masonry skills during the construction process.

As far as possible, passive techniques, such as maximising natural lighting, cooling and ventilation are used in building design. A new building at the Bethel School for example, has a double skin roof to encourage air to pass through the roof space and pull heat away from the classrooms, making the learning environment more comfortable (see photograph). These techniques reduce electricity requirements, costs and environmental impact.

Local workers

Article 25 investigates who is available in the local community to work on its projects, including architects, engineers, construction professionals and unskilled workers, and who is interested in learning carpentry, electrical and bricklaying, etc skills. The participation of women in the workforce is encouraged.

In a post-earthquake housing reconstruction project in Northern Pakistan, which provided 60 homes, the first was built using a team of local workers. The remaining 59 were built by the families that would live in them, using the skills learned from the first house construction and locally available materials, and individually designed to meet their particular needs.

Assessing the impact

Article 25 recently returned to Bethel School in Burkina Faso, with BRE Trust financial support, to carry out a post-occupancy evaluation of the school since it re-opened in September 2014. They are assessing, for example, how well the double skinned roof is working, whether the building has any maintenance and repair issues, and what have been the social and economic impacts of the project for those that worked on it – such as have they retained the skills they learned and used them on other projects.

The results are still being analysed, but anecdotal evidence suggest that the construction skills learned have been put to wider use, and the vocational courses now offered by the school have helped students to set up small local businesses.

For more information visit the BRE Trust Knowledge Hub.

Affordable and sustainable energy for all

Dr Long Seng To, RAEng Research Fellow, Loughborough University

Dr To discussed the need to tackle energy resilience, the importance of building on local capacity – using examples in Nepal and Malawi – and her collaboration with the BRE Trust on QSAND.

She reflected on recent falls in photovoltaic and storage technology prices which (combined with innovative business models) are changing energy sector access. Decentralised options, such as renewables, storage, smart grids and the internet of things, are challenging the centralised energy model. Developing countries with lower investments in centralised grids have an opportunity to adopt alternative generation options.

The energy issue

There are 17 interconnected UN Sustainable Development Goals (SDGs) – with 169 targets to be achieved by 2030 – forming a plan of action for people, planet and prosperity. SDG 7 calls for affordable, reliable, sustainable and modern energy for all, with specific targets for energy access, renewable energy and energy efficiency.

A billion people have no access to electricity.
Three billion rely on traditional fuels for cooking, exposing women and children particularly to indoor air pollution and danger when collecting firewood. Developing countries also face other issues, including climate change, natural hazards and conflicts that cause disruption to infrastructure, including energy supply.

Community energy resilience

Communities are often surprisingly energy resilient. After the 2015 earthquakes in Nepal, people were reported to be salvaging their own renewable energy systems. Tasked with gathering data on this in Nepal, Dr To found that while the restoration of centralised energy services was quite slow in areas that were difficult to reach after the disaster, households and communities were very proactive in restoring some of their own energy services using informal networks.

Communities also cope with more everyday resilience challenges. Nepal is vulnerable to annual floods and landslides and climate change will impact on agriculture in the region. Communities are moving their settlements and energy systems, and sharing water sources between mini-hydro energy systems and agricultural irrigation.

In Malawi livelihoods are threatened by cycles of drought and flooding. Cyclone Idai highlighted the issue of energy resilience, and the view that a portfolio of renewable energy projects and mini grids may help to diversify power supplies away from large hydro-electric dams.

In fact, examples from around the world have demonstrated the contributions that communities can make to energy resilience. Over the next four years Dr To and her team are looking deeper at community level approaches in Malawi and Nepal, developing quantitative and qualitative measures of community energy resilience, and co-creating solutions with two communities in Nepal and two in Malawi.

QSAND

Dr To is working with the BRE Trust on the energy elements of QSAND, a very practical tool that can be used by agencies and communities to improve sustainability efforts. Also addressing much of the disaster cycle – from reduction to reconstruction – it is a decision making, design and benchmarking tool.

Models on energy planning have been developed in countries with well established centralised energy provision. Dr To is looking at countries where energy systems are now being built and are taking a more decentralised approach – addressing a knowledge gap by focussing on the community, not national level. She also wants to look at how energy interacts with other QSAND sectors such as water and shelter, and feed this back in tools to help communities plan their systems.

Improving settlements in Myanmar

Jamie Richardson, Shelter and settlements technical advisor, Catholic Relief Services (CRS)

CRS is an international humanitarian-aid organization that helps poor and vulnerable people living overseas, by responding to major emergencies, fighting disease and supporting agriculture. It works in around 100 countries, usually through a network of local partners.

Sustainability

In recent years CRS has increased the focus on sustainability issues in emergency humanitarian operations (as well as in subsequent development projects), recognising the impacts that very early decisions have on long-term outcomes. Looking for a tool to help deal with the difficulties of incorporating sustainability in complex emergency situations, CRS encountered the BRE Trust supported QSAND tool (see page 6).

QSAND was trialled in emergency operations following earthquakes in Nepal. It proved very useful but its impact was reduced because the operations there were already well underway. As part of a project in the Philippines (following a typhoon Haiyan) in which an at-risk community was given the opportunity to relocate, QSAND was used to take a snapshot of the programme to assess its success.

Community focus and participation

Moving forward, the benefits of focussing on strengthening communities and encouraging their participation is well recognised and is an important element in development projects. But this is time consuming and not easily managed in emergency situations, and the needs and resilience of every household are different. CRS therefore stripped down its development models with a view to providing a streamlined, rapid and adaptable means of supporting communities in emergencies.

Myanmar

This approach was put to the test when a million Rohingya people came across the border from Myanmar into Bangladesh, bringing very little with them. With its partners, CRS focused on 200 households and – with rapid planning and implementation driven by the community – redeveloped the site in three months. This model worked well, and a set of guidelines were developed and shared.

In contrast another, unassociated resettlement project within Myanmar had used a one-house-type-fits-all solution without community consultation, which had proved much less successful. As a result, CRS was asked to provide guidance and training for a Myanmar project based on the Bangladesh project model.

CRS also saw this as also a great opportunity to apply QSAND from the very beginning of a project to:

- gain an initial assessment, a before and after comparison and a performance score.
- provide a useful checklist for the project
- deliver an overall benchmark of project effectiveness to help promote this model.

There are 48 households involved in this pilot project and the first 11 have come together to move out of the camp they have been occupying for eight years. They are enthusiastically taking the opportunity to design and build their own homes, and are demonstrating to agencies in Myanmar that they have the drive and technical skills to do this successfully.

Improving fire safety

Raman Chagger, Principal Consultant, Fire Safety Group

Fire safety research projects at BRE typically involves a number of organisations working collaboratively with the aim of generating new knowledge that has practical, beneficial impacts.

The collaborative process

The process typically starts with a research idea that a group of stakeholders agrees could deliver valuable results. A number of partners then contribute to the work – usually including the BRE Trust which provides financial support, along with other collaborative partners who provide cash or in-kind support such as time, equipment or data.

BRE then performs the research work in collaboration with the partners, reporting the progress of the work at each stage. The new knowledge generated is used to:

- Publish guidance in the form of freely available briefing papers, videos and articles in the trade press.
- Help manufactures to develop and improve products.
- Help fire and rescue services to improve procedures.
- Develop new or revise existing standards, codes of practice and certification schemes.

Project examples

False fire alarms in buildings **–** a series of projects have identified strategies for reducing false fire alarms. These started with a small-scale study that found the best way of fully understanding the causes of false alarms would be to have a technical expert accompanying fire and rescue service staff while they attend false alarms.

A second project putting this into practice was conducted with an extensive group of stakeholders, resulting in 35 recommendations for reducing false fire alarms. This also identified the potential for multi-sensor detectors that use a number of different sensors (typically heat and smoke) to reduce false alarms.

With support from the BRE Trust, the Fire Industry Association (FIA) and a number of manufacturers, a further study found that multi-sensor detectors performed similarly to smoke detectors in warning of real fires, but were more resistant to false alarms. This has helped manufacturers to improve their products and is likely to lead to testing and certification service for false alarm resistance.

Visual alarm devices (VADs) **–** VADs give fire warning to hard of hearing people, and in noisy areas or where silent alarms are preferred.

A project privately funded by a manufacturer demonstrated that the latest LED technology, when using faster, shorter light pulse durations, can offer the same warning levels in VADs as high light intensity xenon devices. This led to changes in codes of practice, particularly in the USA, to specify shorter pulse durations for LED devices.

The research also raised a number of questions about how visual alarm devices can be more effectively used and how they should be sited. This has brought together around 15 organisations to undertake research into factors such as the impact of light and wall colour, illumination levels in the building, and the ability of people to see the warning lights when not facing the devices.

Causes of fire fatalities and serious injuries – there has been a steady decrease in fire fatalities in the UK homes over the last 35 years, but in recent years that decline has plateaued. This has prompted the BRE Trust, FIA, Scottish fire services and the Scottish Government to support a project investigating the conditions in which fire fatalities and serious injuries occur, and to use that data to propose ways in which these might be reduced.

This two-phase project is looking at the database gathered by Scottish fire and rescue services – the Incident Recording Database. The first phase has examined the records of nearly 20,000 incidents in a four-year period, and particularly those involving serious injuries and fatalities. The second phase will look in much more depth at the conditions in which the 126 fire fatalities occurred.

Full details of the first phase of this project – and of the projects described above – are available at www.bregroup.com/expertise/fire/fire-safety-research

Future project ideas

A number of project topics are being explored and partners sought for collaborative research on, for example:

- heat alarms in domestic kitchens and the impacts of dust build up and degradation with time,
- the best ways of dealing with the dangers of carbon monoxide in the home,
- the optimum spacing of CO and smoke detectors in commercial environments,
- identifying the electrical signatures of white goods and other electrical items that go on to catch fire.

Anyone interested in participating in these or other studies should contact Raman Chagger – email Raman.Chagger@bregroup.com

Quantifying the impacts of poor housing

Sue Adams, CEO, Care & Repair England

Care & Repair England is a charitable organisation set up in 1986 to improve the homes and living conditions of older people. A key element of this work is the provision of housing and cost benefit data that supports the case for action to improve housing.

The primary source of such data for England is the English House Conditions Survey conducted for government by BRE. Care & Repair England has worked with BRE to analyse this data with regard to ageing and housing conditions, and then publish reports that have been critical to making the case for action to address disrepair. The BRE Trust has provided funding and support for projects over the last five years, which have fed into this policy and practice improvement work.

There is a perception, including amongst many policy makers, that most older people live in – or *should* live in – age-specific housing such as sheltered or retirement schemes. In fact, there are 9.5milliom households (2 out of 5 homes in England) in which the head of house is over 55.

Currently, 96% of all older household, will carry on living in ordinary housing. Most people like their homes and want to stay connected with neighbours, friends and families, living independently for as long as possible. As each will experience different levels of health and fitness over their lifetime, what makes a good home will change and we need homes that can be adapted to our changing needs.

Improving existing homes

The housing stock is renewed very slowly. At current rates of replacement existing homes must last for more than 1,000 years, and 80% of the homes people will be living in by 2050 are already built. Consequently the biggest impact we can have on population health through housing improvement is by improving existing stock quality.

Care & Repair England is working with the Centre for Aging Better to set out the problem of non-decent homes and make the case for improving existing housing. The Centre has a 10-year target for reducing the number of people living in hazardous homes by a million. A joint report – which includes new analysis of EHS Data by BRE – has recently been published.

Low income home owners

The new report highlights the 10 million people living in 4.3 million non-decent homes across England, 2 million of which are occupied by someone over 55.

The biggest concentration of non-decent homes – 78% – is in the owner-occupier sector, not as many may think in the private rented and social rented housing sectors (both 11%).

The increased low-income home ownership is a relatively recent and growing issue – not solely due, as often assumed, to the 1980s right-to-buy policy – but primarily to the revolution in mortgage access amongst lower- and middle-income groups. This revolutionised housing tenure in the 1980s and 90s, changing from 50% home ownership to the peak of 76%. Unfortunately, there were no linked changes to welfare benefits or housing renewal programmes, e.g. how low-income households would afford longer term home maintenance, repair and renovation costs, particularly after retiring on low pensions.

The cost of poor housing

Recent work with the Centre for Ageing Better, using BRE data analysis, reveals a 31% growth in the number of over-75s living in non-decent homes. This is important to health and housing, as health analytics show the use of – and cost to – the NHS starts to increase after 75. Health conditions with the greatest impact on NHS costs are the incurable long-term conditions with increased incidence in later life. Most are caused or exacerbated by poor housing, e.g. respiratory and heart conditions, arthritis. To prevent NHS cost escalation, we must improve existing housing and build healthier homes for all ages.

The BRE EHS data analysis identifies the non-decent factors in homes that have the greatest impact on premature death, rates of illness and avoidable injury – and therefore the features that are most beneficial to put right. These are cold homes and fall hazards and making relatively modest housing improvements can result in significant savings for the NHS.

“BRE carries out the data analysis and provides key information, such as the fact that poor housing in England costs the NHS £1.4 billion a year in first-year treatment costs alone.” says Sue Adams, “We can then combine that information with other data sources, such as the fact that falls at home are the main cause of premature death and injury amongst older people. This solid data then underpins our work programmes, including targeted action to improve homes as well as profile raising, and campaigns for wider housing policy change.”

For more information: careandrepair-england.org.uk/

The impact of indoor environment on health and wellbeing

Ed Suttie, Director, Strategic Advisory, BRE

"My thanks to Sue Adams (the previous speaker) for highlighting the inextricable link between the health and wellbeing of individuals and the buildings they occupy for the majority of their lives," said Ed Suttie when introducing his presentation.

What defines indoor environment quality?

Indoor environment quality (IEQ) is defined by a complex range of factors such as thermal comfort, ventilation, air quality, acoustics, natural and artificial lighting, colours and views from windows. But it is also about people – how we behave in and use the space, and the fact that we all have different versions of what makes high quality and comfortable indoor environments.

There is also the interaction between indoor and outdoor environment of a building – the impact indoors of, for example, outdoor air pollution, noise and lighting, other nearby buildings, traffic, views, construction work, and issues such as the building's orientation and location. And there are unintended consequences – for example, the drive for energy efficiency and reduced carbon emissions can lead to airtight buildings without sufficient ventilation, with impacts on air quality, thermal comfort, and conditions causing dampness and mould.

Other factors include the building materials used, the fit out, maintenance and cleaning, and the tricky balance between building management system (BMS) and occupant control. The BMS will run the building efficiently, but users with different personal comfort levels may want more control.

Solid evidence

As we typically spend 90% of our lives indoors – nearer 100% for many vulnerable people – it is not surprising that IEQ has a critical impact on health and wellbeing – and productivity in the workplace, the ability to teach and learn in educational buildings, heal in health buildings, and so on.

There is now very solid scientific evidence for a wide spectrum – from irritation to morbidity – of impacts of IEQ on health and wellbeing. This has recently been added to by a new report from the Royal College of Paediatrics and Child Health and the Royal College of Physicians on, *The inside story. The impact of air pollution on children and young people*.

It is based on an extensive review of indoor pollution research, evidence from a wide range of practitioners and experts (including BRE with BRE Trust support), and conversations with children, young people and families – further details are on page 21.

Measurement and validation

BRE is engaged in range of IAQ measurement and validation activities in extensive facilities, including:

Product and system testing – a recent example has been the testing of an increasingly wide range IAQ sensors and monitors now commercially available.

30m^3 indoor air quality chamber – included in the photograph below being used to test the impact of interior green walls.

40m^3 indoor environment quality chamber – can be set up as a space within a building and occupied for full-scale indoor environment quality analysis.

Full-scale mock-ups of actual buildings or parts of buildings for measurement and validation.

Understanding occupants

It is too often forgotten that buildings should constructed or refurbished for the benefit of the people occupying them and the tasks they must carry out. Obtaining full information about the occupants and their experiences is key to getting this right. A valuable tool is pre- and post-occupancy evaluation (POE), which measures the performance around a building's life cycle – from preparation of the brief and design to handover and in-use.

A new publication on *Creating positive workspaces* has been produced, with BRE Trust support, by a partnership of BRE, Interface and Oliver Heath Design. It gives guidance on POE, and on designing workspaces that have positive impacts on health and wellbeing. It is freely available from the Interface website.

Research

Research and the generation of new knowledge is at the core of BRE's activities. One current example concerning health and wellbeing in buildings is the Biophilic Office Project.

Biophilic design is a human-centred approach that acknowledges our biological connection with nature. It brings the positive aspects of the outdoors – both living (such as plants) and non-living (such as light, water and diversity) – into the built environment.

The Biophilic Office Project at BRE's Watford campus is measuring the effects of a full biophilic refurbishment on the occupants of a 1980s office building. This working office and its occupants (and a control building) have been monitored for more than 12 months (first phase) and, following planned refurbishment using varying levels of biophilic design, will be monitored again for a further 12 months.

In addition, one of the buildings at the BRE Innovation Park in Watford is currently being converted into a demonstration biophilic space. A report on the first phase monitoring will be freely available once launched in April.

Use of data in the built environment

Professor Katherine Royse, Chief Digital Officer, British Geological Survey

The British Geological Survey (BGS) is the custodian a huge amount of data, the presentation of which has been revolutionised since Professor Royse first joined the organisation. "We've gone from colouring maps with pencils," she said, "through the digital revolution to now producing mathematical and conceptual models in 4D – bringing in time elements to understand how ground is changing with climate change."

Another major development has been in the accessibility of information to wide ranging users. "We used to produce geological maps to indicate, for example, areas at risk of subsidence. These were really useful – but only to geologists."

BGS data outputs now aim to inform all of those who need to know, typically with the help of additional data from a variety of other sources, and to meet the real needs of users. "As scientists we tended to be very good at providing solutions to problems that no-one knew they had," said Professor Royse. "We have to understand the concerns that people actually have and try to address *them*."

Data mashing to solve real problems

An example of addressing real concerns by combining BGS and other data – data mashing – is the work on debris flow, which is common in Scotland. In partnership with the Met Office, south facing slopes experiencing the worst weather which also had potential for debris flows were identified. This enabled BGS to make forecasts of debris flow risks and help transport authorities in Scotland to understand those risks.

Other examples include adding climate change data to BGS's swell/shrink data, to work out where in the country swell/shrink potential is going to get worse, and where it will get better (mostly worse). This is useful for the construction industry as it informs the types and depths of building foundations needed.

BGS has worked closely with many organisations. Two recent examples are Historic England and the Environment Agency, who BGS has worked with to understand the problems they need to address, and produce a set of products and services for them. Some of these services are free and some are premium services, but the point is they were designed with the user in mind.

Flooding

The topical issues on which BGS is working include flooding. Flood risk is not only the result of heavy rainfall, but also partly affected by groundwater conditions. In high rainfall the groundwater levels rise and once they reach the surface can remain at that level for a long time – because groundwater does not run away as rainwater does – and particularly damaging flooding can result.

BGS has been working with a company call Ambiental Risk Analytics to help it piece together the risks of groundwater and surface water flooding. The idea is to combine these to develop a whole-system approach that will provide a fuller understanding of flood risks. While organisations such as the Environment Agency may caution against building on flood plains, they recognise that there is sometimes no alternative – so it is very important to understand and mitigate the risk.

FAIR data

In these and many other projects, BGS is working to follow the principles of FAIR data – data that is findable, accessible, interoperable and reusable. Making data findable and accessible is relatively straightforward, but making it interoperable and reusable is more difficult because it is not always possible to know how people will use the data, or in what format it is needed. This is where working in partnership with those needing to use the data is so vital.

To encourage more building on brownfield sites for example, BGS has co-designed with the Greater Manchester Authority, a tool to help understand not only the ground risks but also the cost of ground remediation. It is a way of looking at the ground as a geologist, but then channelling this into Manchester's issue of large quantities of unused brownfield land, combined with its housing shortage.

Another issue that BGS has been working on is that of how sub-surface data can be applied in BIM. This has again involved working with a range of other organisations to understand their problems, enable them to use BGS data in the form that they want it, and within the systems that they want to use.

Visit the BGS website - www.bgs.ac.uk – for more information.

Understanding ground conditions is critical to flood resilience. Here extensive and vital infrastructure has been put out of action by flooding

Digital modelling to support waste management

Dr Ricardo Codinhoto, Senior lecturer, Centre for Advanced Architectural Studies, University of Bath

While the use of building information modelling (BIM) in building design and construction phases is well established, the use of BIM in the operation and management of buildings is still at a very early stage. Design and construction teams produce large amounts of data, but at building handover only a small amount of that information goes through the system for use in facilities management.

Managing operational waste

In view of the huge volumes of waste being generated in the UK and the increasingly scarce landfill availability, this research focused on waste and waste management, investigating the use of a BIM-based model in managing operational waste. The aim was also to help facilities managers with the difficult task of maintaining public assets in a time of tight budgets.

The University of Bath has 118 buildings, 20,000 occupants and annual waste generation (general and recyclable) of 280 tonnes. It was used by the project team to represent a mini-city, in which the flows of people, waste and waste services, and the geometry of the buildings, could be modelled and their interconnections examined. The University has a good track record of not sending waste to landfill, but still needs to reduce the waste generated.

The aims of the work included finding ways of improving the efficiency of waste collection, and of identifying waste generation 'hotspots' where interventions could most effectively be made to reduce waste.

The project focussed on the library building which has high occupancy and large volumes of waste generated. It examined waste generation figures and peaks, the numbers of people using the library and where they go within the building. The building has recycled waste collection twice a day, but not all of the bins would be full, so this was not the most efficient use of time.

The building was modelled, not only for the physical locations of items, but also to understand the relationship between volumes of waste generated and the location of the bins, and the different types of bins in different rooms.

A shortest-path algorithm was used to understand the best solution for waste collection and to identify improvements.

An infrared sensor was developed for the bins to provide information on how much they contained, which was made available on-line and readily accessible so that the porters would be able to target only the bins that needed emptying, thereby saving time.

Conclusions

Among the project's conclusions were that a digital system could support the reduction of waste generation, and the Internet of Things could be used to increase the accuracy of waste management systems and save a significant amount of time in waste collection.

However, the current waste information available is not generally sufficient to produce effective operational waste management models. If waste information collection was expanded, meaningful interventions are possible that could improve collection efficiency and reduce waste generation.

Next steps

The team is now modelling the whole Bath University campus in order to understand it as a system and to create generic models and systems that can be used elsewhere. Going forward, one of the ideas they are exploring is the use of robot bins that "collect themselves" and perhaps give educational messages to those throwing waste materials away.

Taking the further idea of mapping flows of people and materials through buildings, the team – with a number of international partners – is looking into ways of reducing reactive maintenance, using ideas for monitoring people to investigate loneliness, and examining fire evacuation procedures, particularly for vulnerable people.

This project was part funded by the BRE Trust supported Worshipful Company of Constructors Research Award 2018. A video in which Dr Codinhoto explains the project in more detail can be seen at the BRE Trust Knowledge Hub.

The importance of social value and how to measure it

Alan Somerville, Executive Director, Building Performance Group, BRE, and Nathan Goode, Director, Social Value Portal

Social value means different thing to different people, but for many it is about using capital for good, and for creating a better society.

Environmental and social governance (ESG) is now a key performance metric for many of the world's biggest investors. The world's largest investor Blackrock, for example, has put sustainability right at the heart of its investment strategy, reinforcing the view that driving ESG performance is good investment management. It has been reported that the UK alone has about £125 million of capital a week capital going into ESF designated funds, so it is a rapidly growing sector.

Measuring 'S' – the Social Value Portal

When it comes to measuring ESG, it is the measurement of the social value, 'S', element that is the most challenging. This issue is addressed by the Social Value Portal, an on-line platform formed in 2014, which allows organisations to measure and manage the social value they generate. It enables organisations to report both non-financial and financial data, and rewards them for doing "more good" in the community.

The Social Value Portal is applying a number of the data principles discussed earlier, such as accessibility, transparency and comparability. Reporting on social value and community benefits has a good history, but has tended to function in isolation, lacking scale and comparability.

The Portal has two component parts, the first being the platform itself. This is the data collection mechanism, designed to be as accessible and user friendly as possible. It is geospatial in functionality so that users can map where social value is being delivered.

The TOMs

The second component is the methodology for calculating social value called the TOMs – Themes, Outcomes and Measures:

Themes – the overarching strategic themes that an organisation is looking to pursue.

Outcomes – the objectives or goals that an organisation is looking to achieve that will contribute to the Theme.

Measures – the measures that can be used to assess whether these Outcomes have been achieved.

The idea is to create a framework for social value measurement which sits behind the portal and is porous and flexible enough to allow data to feed in, to build it and influence its development. The intension is to make a level playing field that will allow benchmarking of social value in the same way as is done for environmental data.

Key features of the TOMs include transparency, consultation and engagement. The Portal's development included an 18-month consultation process with a large number of public and private sector organisations, which culminated in the launch of the first set of TOMs in 2018. A national social value task force supervised the launch of the 2020 TOMs and has a conference every year to debate social value and its issues. The TOMs framework and guidance can be freely downloaded from the Social Value Portal.

SDGs

The framework has been mapped against the Sustainable Development Goals (SDGs), which make up an umbrella concept that both public and private sector organisation across the globe are now driving towards. The aim is to find out to what extent a measure against the TOMs framework delivers against a particular SDG. The Social Value Portal aims to launch this online as a plug-in application shortly.

The Social Value Portal is at socialvalueportal.com/

"Public opinion, capital markets, occupier expectations and consumers are driving an exponential change in our perceptions of value," said Alan Somerville in conclusion, "and this is driving greater demand for disclosure and transparency of performance. Data is the golden thread that runs through all of this, and robust standards, assurance and tools are the methodologies we can use to prove performance and measure impacts."

Sir James Wates – Chair, BRE Trust

Our Future Focus

Sir James Wates began by congratulating BRE Trust partners on their achievements – many exemplified in the day's presentations – at a time when funding and resources are at a premium.

The Trust continues to focus on challenges facing society, including home and business destruction in extreme weather events, fire or civil unrest. Sir James highlighted the critical need to develop and make available to industry, improved products, processes and tools that reduce the economic and environmental impacts of such events.

Collaborating with partners

He particularly emphasised the importance of collaboration, for example in capitalising on the opportunities offered by innovations, particularly digital, to give supply chains the skills to control and monitor asset performance. These assets have to perform better said Sir James. "We really do need radical change in how we conceive, construct, and maintain the buildings of the future if we as a society are going to meet zero-carbon goals."

A number of the day's presentations highlighted how new data analysis techniques can deliver more knowledge. The Trust is keen to support projects where data can be created, shared and used.

"Collaboration is at the heart of this," said Sir James, "whether this be about assessing specific impacts of an increasing ageing society, tracking geographical changes, or using BIM to manage resources more effectively. We want the BRE Trust to be a catalyst for the collaborative sharing and analysis of data."

Sir James pointed to the collaboration between academic, industry, public and charity sectors, demonstrated in the conference's showcase of Trust supported projects – which also illustrated the drive for increased impact with limited funding. "Everybody agrees that generating social value in construction projects is essential," said Sir James, "but not everybody agrees how it should be measured." The conference presentation on measuring social value showed how funders and deliverers can validate impacts.

"We are keen to hear from you"

The Trust wants to find new partners to work with – particularly in its sustainability, resilience and wellbeing focus areas – and combine knowledge and resources. "We are keen to hear from you," said Sir James. "Whether it be about bringing existing projects to the table, aligning some of your funding commitments to corporate social responsibility, or some other means to collaborate."

Great response to the Conference

The BRE Trust Conference was widely praised for the quality of its presentations and displays, and for the opportunities it presented for making new contacts and sharing ideas. A small selection of comments includes:

David Murray, Managing Director, Article 25

"It was a real pleasure being a part of yesterday's conference! Great networking opportunities, lots of business cards exchanged, real diversity in the presentation topics, and lots of useful insight."

Allan Mayo, Smart Cities Adviser, Digital Greenwich

"Many congratulations on what I thought was a really successful day. The presentations were just the right length and on interesting topics, the stands added colour, and I think you are blessed with keen and motivated staff, who also have the important characteristic of being pleasant and helpful!!"

Siobhan Shaw, Senior Trusts and Foundations Manager, Autistica

"Congratulations on a fantastic event yesterday – I really enjoyed hearing about all the different projects and partnerships the BRE Trust is involved in, and we've definitely got some further food for thought for our own initiative. It was also fantastic to hear how keen the Trust is to catalyse partnerships and drive forward projects focused on collecting and using data."