



Annual Report 2016/17

Purpose

The aim of the Foundation is: 'the advancement of education of the public directed towards the promotion, furtherance and dissemination of knowledge of matters associated with the built environment'. We pursue these, where possible, with an emphasis on 'the multi-disciplinary nature of design in engineering and architecture'.

Chairman's Statement

The year 2016-17 has been very busy with extensions of existing projects, some new smaller projects and the launch of a very significant project. Inevitably not all the work developing projects is successful, but when it is it can be the result of many months and sometime years of work.

This year saw the launch of The Digital Cities for Change project with the largest investment that The Ove Arup Foundation has made in one project. The project with Cambridge University is initially research leading to a series of multi-disciplinary teaching modules at post-graduate level. This is an example of a project which requires several years of development.

Our financial position is strong, in spite of the continuing economic pressures, and we enter the next year with confidence by continuing the pattern of supporting both short and long-term projects.

This year we continued to implement the Actions Arising from the Strategic Discussion workshop: The Next 25 Years of The Ove Arup Foundation held in 2015. We achieved this by providing grants for specific projects and hosting a workshop for young professionals to better understand their views about the future of education and the built environment.

There has been one addition to the Trustees in 2017; we welcomed Tim Chapman as the new Trustee. Also, there was one change to the Advisors to the Foundation in the past year; we would like to thank Sarah Buck for her seven years of service and commitment to the Foundation. We welcomed Tim Ibell as the new Advisor representing the Institution of Structural Engineers. The Trustees are supported by the Advisors who represent the professional bodies. Our Advisors are invaluable in helping to develop our thinking and supporting the work of the Foundation.

Once again, we are grateful for the continuing support of Arup Group which, when combined with our own endowed funds, enables us to seek wider outcomes, and to take a long term view over the scope of our activities.

Terry Hill

Chairman of The Ove Arup Foundation

Activities during 2016/17

Young Persons Forum

One of the actions arising from The Ove Arup Foundation workshop and strategic discussion about the next 25 years held in 2015 was to hold a workshop for Young Professionals to understand their views.

Future professionals will need to be better prepared for leadership roles, with a more thorough understanding of the impacts of their work on society. That, at least, was the conclusion drawn by a Young Person's Forum hosted in May 2017 by The Ove Arup Foundation.

Participants in the forum felt that those professionals already equipped with technical expertise would benefit from stronger social sciences training to support them in leadership positions. In an era where big technology companies have influential, unelected leaders of their own, a focus on the social impact of design in the built environment is vital.

The purpose of the Foundation's interactive workshop was to think about the trends and issues shaping cities over the next 25 years, and direct funding toward new challenges in the built environment. A small group of architects and engineers considered a number of trends and prioritised six – leadership; digital society; artificial intelligence; sustainable behaviours; land use patterns; and water management – and discussed their impact on the role of a built environment professional.

They went on to discuss the risks, challenges and opportunities for the sector, as well as identifying new skills, knowledge, methods and educational tools that are likely to be useful.

Besides leadership skills, Artificial Intelligence (AI) was deemed likely to have a big impact on skills in the future. It certainly needs to be part of a built environment professional's toolset and language. Climate change, too, should be addressed through improved foresight and holistic thinking in the planning process, with an emphasis on connecting citizens to the built environment, and avoiding the risk of over-engineering.

Other topics discussed included the effects that an increasingly digitally-driven society might have on consumption patterns and the shape of the city itself, and the age-old issue of how to protect long-term engineering visions in the face of short-term planning and political motivation.

Expedition Workshed,

Expedition Workshed has completed its final year developing multimedia teaching aids which present complex topics in an easily understandable way. Our commitment has encouraged other funders to support other aspects of their programme.

Projects which have been completed with TOAF funding include:

- Make a Scape for the iPad
Just launched and has already had 1000 downloads, a Hackathon has taken place to promote it
- Bare Essentials of Engineering, Geotechnics including interviews with John Burland has received 70,000 hits, it also includes Reinforced Concrete and Pre-stressed Concrete.
- Engineering Mastermind has received 900 hits. Includes sponsorship and competitions for schools and universities.
- Report on the future of Constructionarium.

Social Aspects of Fire Safety, University of Edinburgh

Dr Graham Spinardi is carrying out research into the sociological nature of fire safety.

The Masters Course which has developed as a result of his research has attracted 32 UK and International students including engineers, architects, fire scientists, social scientists and is now in its second year.

Dr Spinardi is preparing a number of research publications with two published and four in draft.

One important aspect of his research is to look at post-construction fire safety regulation and how it is applied in practice.

One London Borough has been assessing the lessons of the Grenfell Fire on the housing stock in their own borough and has asked for advice from Dr Spinardi and because of this they have appointed a Director of Regulations. There is a common belief that people in local government do not understand the regulations and neither do the general public. Dr Spinardi would like to introduce a PhD student to the London Borough to study what Fire Safety Policy is like in practice.

Another area for research is to look at informal settlements in South Africa, studying aerial photographs, interviewing the fire service and testing the existing designs of the informal settlement shack accommodation.

Two related research grants from EPSRC and ESRC have been awarded:

- Improving the Resilience of Informal Settlements to Fire
- Tackling Fire in Informal Urban Settlements: An Interdisciplinary Approach

The output from the research should lead to safer shacks and it might be possible to apply the lessons learnt to other parts of the world.

TOAF/ Anglo Danish Society Scholarship

The recipients of the 2017 award for the Ove Arup Foundation Scholarship awarded by the Anglo Danish Society were awarded to both of the short-listed students Dominic Hoehn (PhD) and Jordan Macrae (MSc); both had equally outstanding attributes and both will be studying at the Danish Academy for Fine Arts, but on different programmes.

Dominic Hoehn will study Social Anthropology considering How are future cities designed? What information do urban decision-makers consider, and what does it mean to make design 'scientific'? Jordan Macrae will study Architecture. Copenhagen has again been rated the world's most liveable city in 2016, by Metropolis Magazine. This 'liveable' image has led to huge international investment and economic growth for the city. However, the reality for many of its inhabitants is often far from 'liveable.' It is this 'housing crisis' which Jordan is currently working on within her master's program, Urbanism and Societal Change, at the School of Architecture in Copenhagen. Working as part of a think-tank alongside Københavns Kommune, she is looking at how alternative housing development models could provide opportunities to cut out the profit-driven developer and result in better and cheaper housing within the city.

Generation Place

Past TOAF grants allowed the three core groups MADE, The Architecture Centre and 22sheds to develop their work to coordinate national initiatives enabling young people to participate in multidisciplinary academies to gain some experience of a career in the Built Environment profession. In 2016-17 the three groups teamed up with Place Alliance at The Bartlett to launch Generation Place at a National Event "Urban Rooms: Engaging Communities in Place". There were 120 delegates present and it was well received.

The Generation Place website is an initiative to nurture the next generation of creative place-makers. The website offers:

- Learning programmes
- Case studies highlighting best practice
- Delivers Impact in key areas
- Provides advocacy and marketing

A further extension to the Generation Place programme was agreed for the core groups to develop and pilot an Evaluation framework and Impact materials and these will be delivered during 2018. They are also delivering a pilot programme aimed at Primary Schools.

TOAF / Edinburgh University Fire Engineering Prize

The 2017 Ove Arup Foundation Prize in Fire Safety Engineering at the University of Edinburgh was presented to Joshua Hutchison by the Head of School, Professor Hugh McCann. He is considered to have been a standout student, demonstrating a particular depth of understanding in areas related to fire safety science and engineering.

The award is made to the top student graduating on the Structural and Fire Safety Engineering degree course at Edinburgh University.

Hong Kong Polytechnic University

A four-year multi-disciplinary programme has been arranged with Professor JG Teng of the Hong Kong Polytechnic University and is now in its second year of the Distinguished Lecture series and International Symposia.

The Sustainable Urban Development Advanced Summer School and Distinguished Lecture series is designed to attract students invited from all over South East Asia including Hong Kong, Mainland China and the region.

Distinguished Lecture Series

Professor NIE Jianguo (Chinese Academy of Engineering) was due to give the lecture but was unfortunately injured. RISUD is in the process of identifying a suitable speaker for the second distinguished lecture.

International Symposium

17 speakers were invited to give presentations at the plenary sessions and 3 workshops. Despite hurricane Hato on the day before the symposium, 118 and 173 participants attended on days 1 and 2. On day 1 six presentations were delivered by distinguished research leaders in areas related to sustainable urban development including:

- Leader Dr Andrew KC Chan
- Prof Xiao-li Ding
- Prof Jin-guang Teng

Workshops addressing three frontier topics of importance were held on day 2:

- Urban Simulation
- Industrialisation of Construction
- Very large floating structures

Prominent researchers from Hong Kong gave presentations at the workshops.

Students from National Taiwan University, National Taiwan University of Science and Technology, Tongji University and Tsinghua University attended the summer symposium.

Institution of Civil Engineers (ICE) – Academic in Residence

TOAF is part funding the post of Academic in Residence at the ICE to help inform decision-making for global solutions and innovation.

The ICE appointed Professor Guymer as the Academic in Residence and since starting his work he has moved from Warwick University to Sheffield University. Sheffield University will continue to support him in all his activities for the ICE.

He is in his second year of his work. TOAF is represented on the Steering Group.

The Bartlett School of Architecture UCL

TOAF has funded a study into the feasibility of establishing a master's degree offering young structural and environmental engineers a route to dual registration for architecture and engineering. The final report is expected in 2018.

Girls Garage, Berkeley, California

Girls Garage is a one-of-a-kind design and building program with dedicated workspace for girls ages 9-13 years.

Now in its fourth year of operation, Girls Garage aims to eliminate gender inequality in the fields of architecture, design, and building trades by providing a pathway for young girls to explore, improve, and apply creative and technical skills through real projects for their community. Using research, data, curriculum development, and evaluation, they provide the next generation of female leaders with tangible steps into academic and career paths in architecture, design, and technical trades.

The grant for 2017 provided for a one-year cycle of the Girls Garage course, which enrolled and matriculated 72 girls, ages 9-13, in their 10-module architecture, design, and building program. Funding enabled the program to expand to serve greater numbers of girls (93 are now on our wait list), enabling low-income, English language learners, and first-generation girls to be empowered by Girls Garage. Girls Garage serves girls from the San Francisco East Bay Area (primarily Richmond, Oakland, and Berkeley) who are 18% African American, 22% Hispanic/Latino, 27% Caucasian, 18% Asian American, and 15% Mixed Race/Other.

DC2 – Digital Cities for Change

The University of Cambridge will carry out a four-year research programme leading to educational modules in Digital Cities for Change at graduate and executive level.

The research will address the disciplinary gulf between city managers, engineers and urban designers working towards an educational modular programme that trains built-environment professionals in a broader range of disciplines and tools, bridging infrastructure and city management solutions in order to develop the opportunities presented by the digital economy.

The research programme will address the gaps and identify the digital tools required to deliver a smart city which benefits the citizens it serves.

This programme will be delivered by a team of experts from the Centre for Smart Infrastructure and Construction (CSIC) at the University of Cambridge. Led by Dr Jennifer Schooling (CSIC, Department of Engineering), the programme will bring together academics from the disciplines of civil engineering, land economy, architecture, geography, manufacturing engineering and computer science to develop capacity and capability within UK industry to design, deliver and sustain smart cities and infrastructure solutions. The research will not be confined to the UK, but will also develop international case studies.

Meghalaya Living Root Bridges, India

The Living Root Bridges of Meghalaya are a unique phenomenon in the natural world. Woven from the aerial roots of the Indian Rubber Tree (*Ficus elastica*), spans of remarkable strength grow over the course of years. The bridges withstand floods, earthquakes, and are used as public highways. Very little is known about the bridges. In 2015, over 80 specimens of Living Root Architecture across the Khasi and Jaintia Hills in Meghalaya were documented although few had been known to the outside world.

Wilfred Middleton visited Meghalaya in 2017 to study the bridges, talking to builders, users, owners, and maintainers about the design process and their understanding of the growth mechanisms of *Ficus elastica*.

He made measurements of the bridges and the canyons they span, which will provide the basis for engineering research and a report into the strength mechanisms of trees, growth for resilience, and engineering for extreme loading. The work will bring together engineers, architects, botanists, biochemists (cuticular chemistry) local builders, environmentalists, and explorers.

Sheffield Engineering Leadership Academy

Sheffield Engineering Leadership Academy is a leadership development programme for undergraduate students which addresses the UK skills gap in engineering by supplementing the outstanding technical knowledge of Sheffield engineering graduates with the skills, confidence and aptitude to take the lead and make a positive impact.

The outcome is intended to provide:

For the members

- Improved leadership skills
- Improved communications and public engagement skills
- Access to high quality work experience and research opportunities
- Increased awareness of enterprise and entrepreneurialism
- Building networks
- Improved employability

For the University

- Positive impact on recruitment of engineering undergraduates
- Partnerships with businesses and companies
- Increased alumni engagement through mentoring, talks, workshops and visits

For society

- Help to address the skills gap in engineering
- Support the development of engineers who can become the leaders of the future
- Work towards solving some of the challenges we face today.

The grant will meet the cost of the student projects and associated activities.

Trustees

Andrew Chan
Tim Chapman
Caroline Cole
Richard Haryott
Terry Hill
Gregory Hodkinson
Joanna Kennedy
Mahadev Raman

Advisors

John Burland representing the Institution of Civil Engineers
Tim Ibell representing the Institution of Structural Engineers
Jim Croll representing the Royal Academy of Engineering
Christine Hawley representing the Royal Institute of British Architects
Doug King representing the Chartered Institution of Building Services Engineers
Ian Ritchie representing the Royal Academy of Arts

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