

# Challenging thinking



The independent design and engineering group Arup sees benefit in backing research that challenges conventional thinking and achieves broad impact across society.

Arup's global business is in three main areas - infrastructure, building and consulting - and it sees research as an essential ingredient of business development in all three. "But unlike other organisations in these areas, we don't have any physical research laboratories ourselves," said Professor Jeremy Watson CBE FREng - Director of Global Research, Arup Group Ltd. "We have always worked closely with the Academy through long-term partnerships, and have strategic memoranda of understanding with universities around the world. The benefit from the university connection, he said, is easy access to talent and skills. The academics also value us in introducing research projects with real impact."

## The impact of research

The engineering design consultancy behind some of the world's most striking structures, including the Sydney Opera House and the 'Birds' Nest' Beijing Olympic Stadium, Arup has built its reputation by challenging convention. This applies to its portfolio of research funding as much as to its management of engineering projects. Arup's co-sponsorship of Royal Academy of Engineering's research chairs indicates the breadth of the group's interests and its willingness to do things differently.

Arup organises its research activities through a directorate called the Arup University, Professor Watson said. "We have a group that looks over the horizon at

the emerging challenges: climate change was one, but we see it as a current challenge now. There is a requirement to introduce new research programmes and to work effectively with research councils and universities. Also, there is a requirement to maintain 'skills networks' that convert research outcomes into guidance notes or engagement with real client projects."

The research chairs that Arup funds jointly with the Royal Academy of Engineering are 'the jewels in the crown' in a research network that includes up to 150 research projects. "You can place our research activities in the category of 'serendipitous

research'. This is not blue skies but is driven by academics' own agendas, where we'd be looking for emerging technologies that might be applicable to our own business. The other side is trying to shift their focus on some real problems that need to be answered. Arup's joint appointments with the Academy operate on both aspects, but the questions they are answering are perhaps more fundamental, and have wider society benefits. That's an important aspect for Arup", Professor Watson said.

The 'different thinking' approach by Professor Miles, one of the joint research chairs, has led the company to collaborate with a large Japanese partner and become joint owners of electric buses and their associated wireless battery charging infrastructure. This novel business approach has addressed the common problem of how to deliver promising and unconventional solutions in a real commercial environment. Professor Watson said "We think of it as a demonstrator and it's very exciting. The business opportunity is in designing the infrastructure systems for this type of installation and this is also a practical way to test the concept to justify the research".

## Measuring the impact

Professor John Miles, whose Research Chair at Cambridge University is jointly funded by the Academy and Arup's engineering design group, said that the ties between himself, Arup and other Academy Chairs are strong, and the business ventures that are taking on some of his work have significant Arup involvement. More widely, there are constant interchanges of human resources between Arup and all its academic partners.

Professor Watson said that the company's structure is based on employee ownership rather than external shareholders.

## Arup, The Ove Arup Foundation and the Royal Academy of Engineering's jointly funded research posts are, in different areas, challenging conventions (Past and present):

**Professor John Miles**, Professor of Transitional Energy Strategies at University of Cambridge, aims to plot a pathway towards sustainable transport – a real life example being the trial of electric buses in Milton Keynes

**Professor Luke Bisby**, currently a Research Chair at Edinburgh University, is conducting fundamental research that challenges long-held views of how fires and extremely high temperatures impact on structures of all kinds

**Dr Graham Spinardi**, Senior Research Fellow at Edinburgh University is researching ways to integrate technical and social aspects of fire safety engineering and expertise

Therefore, it enables the company to take a broader view of the research investments which extend into other areas too. "For example, the HS1 Channel Tunnel Rail Link was an eight-year commitment and I don't think we saw any fees for at least half that time. The aim of the work that the company does, is not just focussed on the time immediately before delivery; it's also about what you need to know to satisfactorily deliver the project".

This approach is not entirely due to Arup's unique corporate structure: the group has done an analysis with Imperial College and found that those which take a longer view have greatest impact in terms of revenues. "Business quite reasonably thinks it wants a solution tomorrow and wants it to be innovative, but actually there's only incremental work you can do that way," said Professor Watson. "It's important to build this into relationships and research structures so that even in hard times we don't stop doing the right things."

The 'right things' are not limited to direct benefit to Arup. Research collaborations with the Academy, tackle broad economic and societal issues and this is kind of impact that Arup wants. "We want to be engaged with policy makers in work that's relevant to the UK's position globally and our economic strength and the well-being

of the population," Professor Watson said. It is not entirely altruistic: "Areas such as assisted living research motivate us. There isn't a business there yet, but we think there will be and we're willing to put in work to develop a position and gain some research-based information."

"The challenging and issue-driven research done by the Royal Academy of Engineering research chairs is something that Arup wants to pursue more", said Professor Watson. "We'd expect to do more of it in a targeted way with the universities that we have memoranda of understanding with. We should work with key universities, placing staff members into the universities and then placing them back into our business."

Arup is involved in many aspects of the Academy's work: The Ove Arup Foundation has supported 10 Visiting Teaching Fellows who focussed on issues around the Built Environment and were the initiators of a consortium, managed by the Academy, that has supported 6 Visiting Professors in Building Engineering Physics. Arup has also been serving on national and international research councils. "We've been involved with the Academy since its inception. It's a highly regarded organisation and it's helpful to us as a company to be seen to be working closely with it", Professor Watson said.



"Royal Academy of Engineering's research schemes are encouraging the research community to do high quality research, which benefits us directly through tangible outcomes"

Professor Jeremy Watson