

IN BRIEF

ENGINEERING CHALLENGES FOR THE 21st CENTURY

A Royal Academy of Engineering working group has taken part in a brainstorming exercise led by the US National Academy of Engineering to determine what will be the 'Grand Challenges' for engineering over the coming 100 years. Chaired by Sir Duncan Michael FREng, the working group – comprising of Fellows and specialists – was under no illusion as to the importance and severity of some of the challenges that we as engineers must expect to face. Our response proposed six 'Grand Challenges':

In order to preserve and strengthen the foundations of engineering, we must remember that our primary objective should be the promotion of the quality of human life. Key to this is the development of an ethical ethos, both in the professional world and at an educational level. Alongside this, we should engage with the public and make

them aware of the valuable roles that engineers are required to perform in everyday global challenges.

We must view energy production and distribution as another great challenge; every effort should be made by us to ensure that energy becomes affordable and sustainable for all through examining the potential for

information technologies to reduce energy expenditure, and by raising public awareness of energy optimisation.

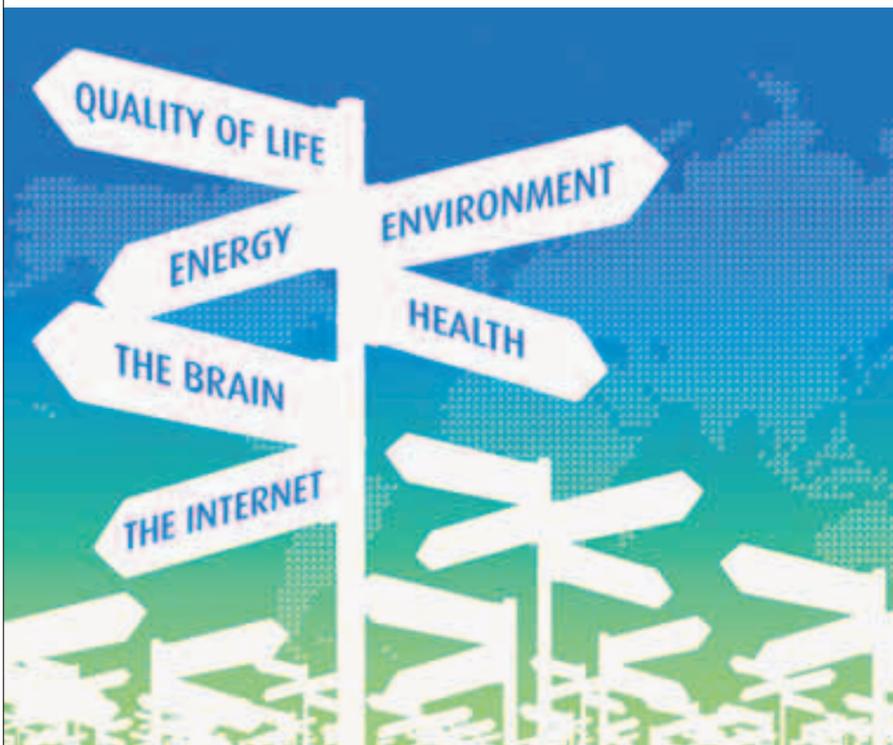
Environmentally, engineers must help in the design and implementation of the cost-effective modernisation of infrastructure such as transport networks, as well as taking part in the debate on future energy sources and the necessary technological changes that will be required to help tackle climate change.

Addressing the complexity of the human brain is a hugely important task – our response to this should be to complement the efforts of neuroscientists in the medical world and to help in the creation of more intelligent machines and computers.

We should be at the forefront of tackling global health issues. These include making surgery less invasive, ensuring effective and efficient provision and distribution of large quantities of vaccines for global pandemics, and making potable water available to all through improved infrastructures.

With the internet and the World Wide Web growing at an exponential rate, engineers have a crucial role to play in ensuring that this virtual space does not become chaotic and eventually redundant. It is important that the developed world does not leave developing countries behind, indeed ensuring that citizens from developing countries are able to get the same benefits from any advancements that engineers can make is an equally large task.

The full response is at: www.raeng.org.uk/GC



EDUCATING ENGINEERS TO FUEL THE KNOWLEDGE ECONOMY

The Royal Academy of Engineering launched a report in June 2007 titled *Educating Engineers in the 21st Century*. The report was based on a study carried out by a working group of the Academy's Standing Committee for Education and Training, chaired by Professor Julia King CBE FREng. The report, which based its findings on a survey of over 400 companies and 88 UK university engineering departments suggested that, in order to develop the UK into a 'knowledge economy', more graduate engineers will be needed and the courses that these graduates undertake will have to be modernised to meet the requirements of the 21st century world.

With rapidly growing economies such as Brazil, Russia, India and China, it is essential that the UK takes the necessary action to

continue to be able to compete on a global scale. In engineering, this means that every effort must be made to ensure that industry continues to be supplied with the required quantity of high quality engineering graduates so that it is able to deliver the Government's *Science and Innovation Investment Framework*.

The world-class quality of UK engineering graduates is not in doubt. However, there is concern that entrants onto university courses between 1994 and 2004 remained stubbornly static at about 24,500. More UK students need to be encouraged to undertake engineering courses and they must also be given an adequate education to enable them to compete in the 21st century.

Courses must provide students with the range of knowledge and innovative problem-

solving skills to work effectively in industry. New courses must be developed with close industry links to teach these skills more effectively and to embrace multi-disciplinary approaches which are particularly required in the new and expanding fields such as medical engineering and nanotechnology. Students must be given the opportunity to experience genuine industrial environments. Meanwhile, teachers must learn from the success of academic-industrial research links and develop new teaching material with input from companies.

The report concluded that the cost of implementing such changes will be high. Indeed, funding for engineering courses must rise by 50 per cent if, as the report suggests, "the UK's historic reputation for excellence" in engineering is to be retained.

SPONSORS OF THE ACADEMY AWARDS

Microsoft Ltd were one the sponsors at the Academy Awards evening in June 2007. They too have highlighted the drop in students taking up engineering reported in *Educating Engineers for the 21st Century*. They see a similar pattern emerging within the software development industry. The affect on the UK economy of a domestic skills shortage is likely to be significant.

Microsoft's *Developing the Future* report, published in 2006, highlighted a 50 per cent drop in applications for computer related degrees in the past five years, with 47 per cent fewer systems engineering students and 60 per cent fewer software engineering students.

Another key problem for the industry is not just in filling the jobs available, but to train new recruits so that employees within the 45-50 age bracket can share their knowledge with their younger counterparts before they reach retirement.

Microsoft point out that here the development of knowledge management and collaboration technologies presents an opportunity for engineering companies to formalise and capture the information and skills within their workforce before it is lost in the coming months and years as the workforce retires and moves on.

Microsoft have developed software packages that enable manufacturers to become 'people-ready', details of which are available at: www.microsoft.com/industry/manufacturing/mfgaub.mspx

The Royal Academy of Engineering is grateful for the generous sponsorship from BAE Systems, BP, E-ON, Microsoft, National Grid and Rolls-Royce plc for the Awards dinner. Details of the evening and of the award winners can be downloaded at www.raeng.org.uk/award



Image from Microsoft's *People Ready Business* campaign

THE ACADEMY MOVES

On Monday 8 October, the Academy will open its doors at 3 Carlton House Terrace, London SW1Y 5DG. The move will enhance the Academy's effectiveness and visibility. The Academy will gain a building through which we can raise the profile of engineers, engineering and engineering excellence, to the benefit of all.

Our Great Peter Street offices no longer provide sufficient or suitable space. The move will address these and other shortcomings whilst presenting new challenges.

3 Carlton House Terrace offers an excellent platform from which to highlight the importance and vitality of engineering. Its privileged location, marked improvement in well-configured and larger public spaces, open-plan environment for Fellows, staff and project partners and proximity of the other national academies on Carlton House Terrace,

are all advantages. Yet with careful investment, the further potential for 3 Carlton House Terrace is considerable.

The building will be a launch pad to greater public influence and to attracting, inspiring and motivating the next generation. The Academy will be able to give louder voice to the critically important role played by engineers and the engineering community. Such plans will take time and effort to accomplish.

3 Carlton House Terrace builds on our current successes and facilitates new goals. In short, it will help the Academy in its determination to move engineering from the periphery of society to its centre.

For more details see www.raeng.org.uk

SIR FRANK WHITTLE MEDAL WINNER 2007

In recognition of Mike Glover's achievement in the planning, design and construction of the Channel Tunnel Rail Link (CTRL), he has become the seventh winner of the The Royal Academy of Engineering's *Sir Frank Whittle Medal* in 2007. The medal is awarded to an engineer for outstanding and sustained achievement which has contributed considerably to the well-being of the nation. Innovations in the delivery of large-scale civil engineering structures were the focus for the award in 2007 and for this the CTRL project was seen as the most notable success.

Reflecting on winning the award, Mike Glover said he hoped the award would "bring focus to the massive contribution that engineers make to the wellbeing and advancement of society". He was also keen for a new generation of engineers to be inspired by the challenges that were met by him and his team on the CTRL project.

The Managing Director of Union Railways North, Dave Pointon, ranked the CTRL project alongside anything of the Victorian era. He also singled out Mike Glover's ability to combine "in-depth technical analytical skills with a creative design flair and the ability to plan for construction" as a rare combination in the engineering world.

Mike Glover is being awarded the medal on 7 September and has written about the milestone construction project on page 16.



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