



Imperial ENGINEER

**FUKUSHIMA
IN RETROSPECT
BIOENGINEERING
BIRTHDAY
FIRST-CLASS TUBE
IN THE STEPS
OF TELFORD
HOLBEIN –
INSPIRER OF YOUTH**

ISSUE FIFTEEN *AUTUMN 2011*

For members of The City & Guilds College Association and The Royal School of Mines Association

ISSUE FIFTEEN *AUTUMN 2011*

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COVER: *The Great Wave sweeps over the Fukushima Daiichi nuclear plant in an image by Slim Smith. See four-page feature, pages 13 – 16.*

Imperial ENGINEER

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I HOPE that you have all had a good summer. As the winter nights draw in, College has suddenly become very busy again as a record number of new undergraduates have started their courses.

Since I last wrote, we have had the AGM where we had an interesting talk from the new principal of the Faculty of Engineering, Professor Jeff Magee. He told us about his research interests but also updated us on the College's plans for the introduction of the new tuition fees (see article on pages 4 and 7).

The executive and general committees have devoted much of their time to considering how to boost our recruitment of new members. This debate started at the 2011 annual meeting and we hope to have firm proposals to put to the AGM in 2012.

The autumn term is a busy one for social engagements. We have the Decade Reunion lunch on November 26 - last year we had a bumper turnout and I hope that will be repeated this year. Our Christmas Luncheon will be on December 13, when the guest speaker will be Baroness Eliza Manningham-Buller, the new chair of College's Council and fresh from this year's Reith Lectures.

We have continued to improve our interactions with CGCU (the students' union). By the time you receive this, we will have had our annual social event with the incoming and outgoing union officers on September 27 (see next page), a CGCA presence at the Freshers' Welcome Dinner (at the Café de Paris this year - October 21) and a joint CGCA/CGCU social occasion taking in several local hostelrys (November 8).

The Annual Dinner will take place on February 29 at the Cutlers' Hall. I am delighted that our principal guest will be Sir William (Bill) Wakeham. Many of you will know Bill from his time at Imperial (1971-2001) where, amongst other things, he was head of Chemical Engineering and then deputy rector. He left the College in 2001 to become vice chancellor of Southampton University from which he retired in 2009. He is the current president of the Institution of Chemical Engineers and senior vice president of the Royal Academy of Engineering. I hope to see many of you at the dinner which promises to be a superb event.



**Chris
Hankin**



**Mark
Burridge**

PRESIDENT'S REPORT

HAVING enjoyed the camaraderie of the association for the past several years, I'm really looking forward to getting more involved as the new president alongside the rest of the committee. Like most of us, I'll need to balance the RSMA with a very busy work and travel schedule - but with the ongoing support of members (and the help of my Blackberry), I'm sure this will be an enjoyable experience.

By the time you read this, the 127th RSMA Annual Dinner will probably have happened on November 18. It has been well attended for the past several years, with a good cross-section of attendees, ranging from students to industry leaders. This year's event looks as if it will be equally well attended. Once again, a number of RSMA members are generously sponsoring students to come to the dinner. If you receive this magazine before November 18, and you would like to attend, you can ring Teresa Sergot (020 75941184) to see if there is any room.

I have taken over as president from Coen Louwarts who has done a great job in advancing the RSMA's interests and network. Please join me in thanking him. We've also welcomed new committee officers, Elly Jay, who takes on the role of junior vice-president and Danny Hill.

In June, Danny took over as treasurer from Rupert Banerjee (we thank Rup for a good job over several years). You can see a complete list of executive members on page 7 of this Imperial Engineer.

Discussion is on-going about current and planned activities of the RSMA. One of these key initiatives we are looking to develop over the next year is to expand networking between the university, alumni and friends, through both social media and re-inforcement of regular reunions in various parts of the world. Information on this initiative is detailed on page 6 in this issue of Imperial Engineer. Separately, we will be sending out occasional emails updating you of events.

I also hope that by enhancing our network we can encourage some new memberships (including lapsed members). So, if you know anyone in this regard, please encourage them to (re)join.

Another initiative being launched this year is the 1851 club. The key purpose of the club is to raise industry and individual sponsorship to enable students to gain practical experience while they are studying. We will let you know more about this around the Annual Dinner.

In case of any questions or comments, the committee and I remain at your disposal.

For a profile of Mark, see page seven. Ed

DIARY

Friday November 18

RSMA 127th Annual Dinner
Ballroom, Polish Club
Ognisko, 55 Exhibition
Road, 19:00 for 19:30.
Phone Teresa Sergot for late
booking

Saturday November 26

CGCA 2011 Decade
Reunion Luncheon, Polish
Club Ognisko, 55 Exhibition
Road, 12:00 for 12:30.
Booking form on back of
address carrier.

Tuesday December 13

CGCA Christmas Lunch,
170 Queen's Gate, 12:00
for 12:30

Wednesday February 29

CGCA Annual Dinner,
Cutlers' Hall, 18:45 to 22:45

LONDON WALKS

Saturday November 19

London Walks – St Pancras
Russell Square to Euston
Road, British Library, St
Pancras Station, new St
Pancras Hotel for a drink.
All welcome. Please email
johnsheilabackhurst@tiscali.
co.uk for further details

Saturday February 11

London Walks – St Johns
Wood, homes for the rich,
cricket lovers, The Beatles
crossing.
All welcome. Details above

Saturday April 28

Down at the Old Bull &
Bush – Old Hampstead, the
Heath, beautiful Golders
Hill Park, Old Bull & Bush.
All welcome. Details above

TBA [June?]

The Olympic Site – visit to
be arranged when the site
is completely open.
All welcome. Details above

**More information
and booking for any
events, contact
Teresa Sergot
t.sergot@imperial.
ac.uk or phone
020 7594 1184**

Ex-MI5 chief heads Imperial Court

IN OCTOBER, Baroness Manningham-Buller (right) presided over her first graduation ceremony as the new chairman of the Court and Council of Imperial College. She is the first woman to hold the post. She replaces Lord Kerr, who gave outstanding service to the College through a period of considerable change which established Imperial as an independent university.

'Eliza's contributions to our nation have been profound and her appointment as our next chairman is an honour for the College. Her outstanding leadership skills will be an invaluable asset to Imperial,' commented Imperial's Rector.

Renowned as the first female director-general of MI5, Eliza Manningham-Buller is a novelist



and recently shone as this year's Reith lecturer. She is also chairman of the Lords Select Committee on Lords' Conduct and a trustee of the Wellcome Trust.

Two new external Council members have also been appointed. They are Iain Conn (Chem Eng 85) chief executive, refining and marketing at BP and Philip Dilley, chairman of Arup Group (Civils 76).



OC Trust spreads the word

AS A new initiative to extend knowledge of its range of awards for students, the Old Centralians' Trust held a reception in mid-June. Invited were the newly-elected executive officers and society representatives for 2011-12.

At this well-attended event, they met members of the CGCA and the Trust board, and to hear a brief talk on the awards by Chris Lumb, Trust chairman. Details of the Trust and of its range of awards were also made available by hard copy and e-mail.

Around 20 student guests attended, and many expressed appreciation that the reception had enabled them to learn about the activities of the Trust and the wide range of awards that are available. Pictured with treasurer Peter Chase (right) are Aero Sooc chairman Daniel Cowen, and CGCU Rugby captain Ed Jinks.

New term appointments

PROFESSOR of Concrete Structures, Nick Buenfeld, has become head of Civil and Environmental Engineering for five years. He replaces Professor David Nethercot, who is retiring.

Nick joined Imperial in 1981 as a research assistant and gained his PhD, fellowship and lectureship. He became reader in Concrete Structures and professor in 2000.

Two new pro rectors – Dr Simon Buckle and Professor Donal Bradley – have been ap-

pointed to the Rector's team.

Simon's career has taken him from post-grad at Imperial via the Foreign Office, the Bank of England and the Defence Ministry (lately in Kabul and Paris). He is collaborating with world-class researchers, attracting the best students and reaching out to all supporters

Donal is responsible for strategic research issues internally and externally. As a physicist he spearheaded the development of plastic electronics research at Imperial.

Imperial makes money available for bright students

HAVING increased its fees to £9,000, starting this autumn, Imperial has introduced financial support package for UK undergraduates.

The package is ensuring that all those with demonstrated ability to manage Imperial's courses can take a place. It includes tuition fee waivers and financial support on a sliding scale, for students from household incomes of up to £60,000. The College currently spends approximately £3.5 million on financial support.

New accommodation

FIRST residents of Imperial's new postgraduate accommodation, Griffon Studios, moved in at the start of the new term.

It consists of 566 studios in Battersea and was developed by the College with construction company Berkeley First. There is a shortage of high-quality, postgraduate accommodation in London in general, so the Studios are a great addition.

More to follow?

FOLLOW computer links at the end of articles throughout this issue to read more. Or go to www.imperial.ac.uk/engineering/ to read more of articles marked at the end with an asterisk*.

Bioengineering birthday

IN MAY, Imperial celebrated 20 years of bioengineering teaching and research at the College, and the enduring partnership that has made it all possible. The Bagrit Centre, forerunner to the Department of Bioengineering, was set up in 1991 with support from the Sir Leon Bagrit Memorial Trust.

Now the Department boasts 400 students and 76 researchers. Their work ranges from understanding the brain in more detail to developing new techniques to regenerate damaged bone and tissue.

Professor Ross Ethier, head of the Department says: 'It is only thanks to the vital support from organisations such as the Sir Leon Bagrit Memorial Trust

that we have been able to make such progress in the last 20 years. Its continuing support was celebrated.

As a further part of the celebrations, the inaugural Bagrit lecture, 'From cellular mechano transduction to biologically inspired engineering', was given by Professor Don Ingber. He is director of the Wyss Institute for Biologically Inspired Engineering at Harvard

In his lecture, Professor Ingber talked about some of the advantages of using organ-on-a-chip technologies. It could accelerate the introduction of new drugs to the market, provide an alternative to animal studies, and lower research costs.

Queen recognises excellence

THE FOLLOWING were listed in the Queen's Birthday Honours:

PROFESSOR PAUL JOWITT (Civils 72, 74, 80), Professor of Civil Engineering Systems at Heriot Watt, immediate past-president of the Institution of Civil Engineers – a CBE

PROFESSOR JOHN LOUGHHEAD (Mech Eng 71, 72), immediate past-president CGCA and past president Institution of Engineering & Technology – an OBE.

Engineering principal joins other City & Guilds fellows

PROFESSOR Jeff Magee, who became principal of the Faculty of Engineering earlier this year, has become an honorary fellow of City & Guilds London Institute.

Also made honorary fellows in late 2010 were Imperial's Rector Professor Sir Keith O'Nions and Roger Venables (Civils 69) managing director of Crane Environmental.

This year Professor Sir Brian Hoskins – director, Imperial's Grantham Institute for Climate Change – was made a fellow, alongside some other staff from Imperial.

The City & Guilds Fellowship scheme recognises those who have chosen the vocational pathway, whether as an engineer, entrepreneur or educationalist, and have excelled in their career.

Fellowship of the City & Guilds of London Institute was originally constituted to recog-



Jeff McGee (right) becomes a City & Guilds fellow. Left is Michael Howell, City & Guilds chairman.

nise only the most outstanding engineers from Imperial College. It harks back to the foundation of the College by City & Guilds.

The Fellowship programme was broadened 20 years ago and now invites nominations from across the broad range of sectors in which City & Guilds offers vocational qualifications.

Most fellows are nominated by their peers and there is an extensive review process to consider the credentials and suitability of potential fellows.

Contribution to College excellence recognised

DURING October's graduation ceremony in the Royal Albert Hall, Imperial also honoured current and former staff for their contributions to the College. Among three receiving the Imperial College Medal for 'longstanding contributions to the College which enhance its reputation, mission and objectives', was Bob Schroter.

After gaining his BSc and PhD in chemical engineering, Bob's career has been involved in the ultimate development of Bioengineering. He became its deputy head for many years and is now emeritus professor

and senior research investigator in Bioengineering, holding the personal chair in Biological Mechanics since 1994.

Bob's contributions to student activities, including the College Boat Club, and his research spanning the disciplines of biology, medicine and veterinary science, and physical and engineering science were lauded.

Engineering Faculty members receiving Rector's Medals were Bioengineering's Dr Martyn Boutelle (for excellence in pastoral care), Professor Sandra Shefelbine (Department of Bioengineering) and Zen



Makuch (Centre for Environmental policy) for outstanding contributions to teaching excellence; also Dr Lorraine Craig (Earth Science and Engineering) for supporting the student experience.

Molly top again

MOLLY STEVENS, 36, a professor in Materials since 2004, has been listed by *The Guardian* as one of the top 100 women in the world for 2011 to celebrate International Women's Day on March 8.

The recognition is for her research into the development of a range of materials which could one day help the body repair itself and includes bone-like materials, which could be used to mend bones.

Last year, Molly was listed among the 10 scientists under the age of 40.

New-look mag

THE FIRST edition of a new-look magazine was published during the summer to replace *Imperial Matters*. *Imperial* is aimed at friends, supporters and alumni and has a fresh design and content.

Read all it at <http://bit.ly/qwhz5x>

Pulsar finder discusses their properties

THE FOURTH Peter Lindsay Memorial Lecture, organised on behalf of the Old Centralians' Trust by Electrical & Electronic Engineering, was delivered in May in College by Professor Dame Jocelyn Bell Burnell, FRS,

visiting professor in astrophysics at Oxford University and a fellow of Mansfield College.

As a doctoral student, Jocelyn Bell discovered pulsars, which won a Nobel prize for her supervisor! In this lecture

she introduced these amazing pulsing radio stars and discussed their extreme properties.

The lecture may be seen on YouTube at http://www.youtube.com/watch?v=TfEcf_ssSFA

PRODUCING graduates with degrees in geology and engineering, there's little surprise that RSM alumni end up in all corners of the world. For decades now, RSM Sundowners (social meet-ups after work) have occurred regularly in Australia, Canada, South Africa and elsewhere. They've always been one of the defining parts of RSM alumni life.

Here at RSMA headquarters though we'd like to find out when and where these events are. The aim is to create a calendar for each issue of *Imperial Engineer*, listing events going on worldwide, so that local alumni and those in town on business can meet up and catch up!

I recently sent an email around the RSMA and was pleased to receive well over 50 responses from alumni keen to see events in their area. I also confirmed that there are regular events in Perth and Sydney, Toronto and Ljubljana, Slovenia, so it's true to say the sun never sets on the RSMA!

As well as those mentioned, I've received rumours of events in Vancouver, France, India, Japan, South Africa, California and Zimbabwe. I will be investigating over the coming months and hoping to add to the calendar in due course.

Shrewder readers will have noticed that current Sundowners owe a lot to a mining heritage with events in the key countries of Australia, Canada, South Africa and Zimbabwe. However RSM alumni now work in a great many industries, in particular oil and gas,

Sun never sets on the RSMA

writes John Sykes
RSMA senior vice president

and I've received requests for other Sundowners to be organised elsewhere in the world. So far there are requests for events in Melbourne, Santiago, Colombia, Guyana, Holland, Chennai and Kolkata, Rome, Tabasco (Mexico), New Zealand,

Whilst the RSMA organises two events every year in London for alumni (the Annual Dinner in November and the Final Year's Barbecue in June), it's time that there was a Sundowner in London, so that visiting alumni always have an event to attend and



SEVEN London trailblazers, from left, myself (Geol 06), Stuart Fordyce (Geol & Geophys 09), Russell Garwood (Geol07), former RSMA president Simon Wynn (Min 75), Anna Novitzky (Chemistry 07), Gareth Northam (Geol 00) and Toby Dalton (Geol 06).

Oman, Doha, Saudi Arabia, Madrid, Dubai, Uganda, Los Angeles, Malibu, St Louis, North Carolina, Pittsburgh, El Paso, Houston and Salt Lake City. With such global enthusiasm we are exploring the possibilities.

In all the places mentioned, there's one obvious place missing – the RSM's home, London!

can easily catch up with what's going on in College.

With this in mind, on August 4 we organised the first London Sundowner which was attended by seven trailblazers. The event started

at the New Cavendish Club (which we have already outgrown!) so we moved on to The Carpenters Arms.

The group reflected the truly diverse nature of the modern RSM graduate, with people working not only in the traditional mining and oil and gas sectors, but also broadcasting and even an academic studying palaeobiology using a synchrotron!

The plan now is to run a London Sundowner on the first Thursday of every month.

Another event was held on September 2 in the Union Bar. It was moved to the Friday so that Alan Dickson (Mining 68), who organises the Perth Sundowner and Ron Butler (Mining 52) organiser of RSMA events in Sydney, could be welcomed. Ed Cortis (Paleontology 94), who is currently based in Melbourne, held a '20 year reunion' as well. On the same day Downunder, a special Sundowner was organised for Isobel Clark, sponsored by her company Xtract.

I'm sure you'll all agree that a global spread of the RSM Sundowner would be a great thing for alumni, in particular the regular business travellers. So if you know of an RSMA Sundowner or similar event that should be included in the calendar, you'd like to propose somewhere to start an event, or if you would like to find out more about the London Sundowner, please contact me.

(johnpsykes@gmail.com).

GLOBAL SUNDOWNERS' DIARY

London RSMA Sundowner, venue TBC, first Thursday of each month from 5.30pm. Contact johnpsykes@gmail.com

Perth, Australia – RSMA/CSMA Sundowner, first Friday of month from 5.30pm, Celtic Club, West Perth. Contact alan@dickson.com.au

Sydney, Australia Imperial/RSMA Alumni Dinner from noon, Friday November 4, Phillip's Foote Restaurant, Rocks Area, Sydney Central Business District. Contact Ron Butler (rbutler@acenet.com.au) or Bill Macmillan (macmillanw@bigpond.com)

Toronto, Canada RSMA/CSMA/IOM3 Sundowner, Jason George Pub, 100 Front Street, M5A 1E, last Friday of the month from noon. Contact Harry Burgess (hburgess@micon-international.com)

Ljubljana, Slovenia RSMA Sundowner, Restaurant Kovac, Tomacevo, from 7pm, usually a Wednesday night in November/December and June. Contact andrej.paulin@omm.ntf.uni-lj.si

WE NEED YOUR NEWS

Let us know your news and stories.

Or have you an idea for a feature?

Editorial assistance is available!

Contact is Teresa Sergot

(address on page two).

STORY IDEAS FOR NEXT ISSUE: JANUARY 11
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ASSOCIATIONS & COMMITTEES

Nothing endures but change

SPEAKING at the president's evening, following CGCA's AGM, Prof Jeff Magee took as his theme 'Nothing Endures but Change'.

An award-winning software specialist, whose research is primarily concerned with software engineering of distributed systems – which has been put to considerable commercial use – he became principal of the Engineering Faculty in January. He holds MSc and PhD degrees in Computing Science from Imperial.

Jeff outlined some of his latest research which is targeted at dealing with the inevitability and unpredictability of change in software systems. He addressed concerns about the nature of the software evolution Continuing with the theme of change, Jeff's talk conclude by looking at the challenges facing the Faculty as a result of changes in both research and teaching funding and the responses needed to address these challenges.

CGCA OFFICERS 2011-2012

President Prof Chris Hankin
 Senior vice-president Prof David Nethercot
 Honorary secretary Nigel Cresswell (Civils 71)
 Honorary treasurer Peter Chase (Comp 82)
 Assistant hon secretary Peter Lynch (Chem Eng 73)
 Academic representative .. Prof Richard Jardine (Civils 71)
 Membership secretary Chris Lumb (Elect Eng 61)
 This year's City & Guilds College Union (CGCU) executive includes president Tsz Shing (Jacky) Kwan, hon secretary Thomas McFadden, vice-president (finance & societies) Patrick P H Pang and vice-president (activities) William

CHRIS LUMB (Elect Eng 61, below right), who has been secretary of the CGCA for five years (and of the executive committee for 15 years before that), is now its membership secretary. He's also continuing as chairman of the Old Centralians' Trust (see right).

When he was interviewed recently by Colleen Shilstone Richardson (Elect Eng 45), he said: 'We have less appeal today as an Association than we had five years ago, particularly when Imperial itself is offering far more to students in the way of activities and clubs than it did in the past.

'There are very few staff now that are members of the CGCA. Hardly any of them mention the Association to students. The exception is Bob Schroter who still finds time to talk to his classes and tell them they should join!

'Recently we've changed our recruiting methods. We used to be heavily into sponsoring reduced price events like the Annual Dinner.

'Despite sterling efforts by president Peter Garratt, we

Chris sets out to solve modern Association problems



should have not been able to interest students in the Association through the departmental societies.

'As modern Association presidents aren't always able to attend executive meetings, more responsibilities falls on the hon sec. I hope my replacement Nigel Cresswell is prepared! Then there's the problem of finding people among members of the committee to take over as president.'

MARK BURRIDGE (Geol 90, right) was appointed president of the RSMA during its AGM.

He is currently working on the development of two new ventures. The first is REBgold Corp, a gold company backed by blue chip industry investors and with a mandate to acquire, develop and operate gold mines globally, in particular where it can use its expertise in bio-leaching to create value. The second is International Copper Company, a private company engaged in the exploration, acquisition and development of copper assets in Chile.

Mark began his career as a geologist working on mines in Africa and North America. Later he joined Merrill Lynch as a mining analyst before helping found Hatch Corporate Finance, a boutique investment bank specialising in the metals and mining sector.

Back in 2007, Mark joined



Mark heads RSMA for two years

Cambrian Mining as CEO and proceeded to transform it from an investment conglomerate into a focused coal mining entity.

Mark's restructuring process involved overseeing the development of new gold and coal mines, various merger and acquisition activity and concluded with the merger of Western Canadian Coal and Cambrian in mid 2009. It created a new tiered coal company with an eventual market capitalisation of over \$2bn.

RSMA OFFICERS 2011-2012

President: Mark Burridge (Geol 90)
 Senior vice-president: John Sykes Geol 06)
 Junior vice-president: Elly Jay (Materials 08)
 Past-president: Coen Louwarts (Min 95)
 Hon secretary: Paul Holmes (ESE 94)
 Hon. treasurer: Danny Hill (ESE 09)
 This year's Royal School of Mines Union (RSMU) executive includes president Richard Simons, hon secretary Ben Bell and treasurer Alexander Karvelas.

All change at OC Trust

THERE were significant changes to the board of the Old Centralians' Trust this year. Firstly, long-serving trustee and founder member Rogers Knight (Elec Eng 1934-37, Mech Eng 1937-38) had chosen to step down as an active trustee after making key contributions to the Trust over 46 years. Rogers is remaining involved as an invited member of the board.

For around a quarter-century, the posts of honorary secretary and treasurer have been held in combination by Bryan Spooner (Aero 53 & 55), who has now stepped down. John Collins (Civils 06) is now honorary secretary and Dan Lehmann (Elec 06) honorary treasurer. Bryan's extensive knowledge and experience is not be lost to the Trust, however, as he has agreed to stay on as a trustee.

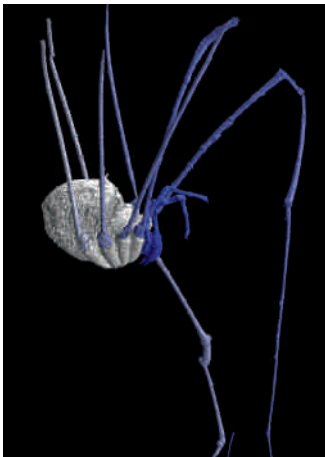
Nigel Cresswell has also joined the board as an ex-officio trustee, and Chris Lumb, who has been chairman of the board since 1998, now also becomes a trustee. Colin Kerr (operations manager, Civil & Environmental Engineering) joined the board. Colin's experience in college operations will be of great value.

DEVELOPMENTS AROUND THE ENGINEERING FACULTY

Seaweed to power portables?

WHEN mixed with a silicon nano-powder, scientists say a sugar extracted from brown algae (seaweed) could help improve the storage capacity and life-cycle of lithium-ion batteries. Commenting, Emeritus Professor Mino Green (Electrical and Electronic) said: 'Improving the anode capacity alone only gives a limited battery capacity improvement, because there is still the unimproved cathode that is heavy and bulky.'

Just as they were...



RESEARCH by an international team, including that by Dr Russell Garwood in Earth Science and Engineering, has created 3D models of two fossilised species of harvestmen (also known as 'daddy long legs').

The 3-D models are providing fresh insights into how these ancient eight-legged creatures survived in the Earth's ancient forests and how harvestmen as a group have evolved.

However, it is not possible to say scientifically why harvestmen have changed so little through Earth history. Basically everything else on land at this time in the carboniferous was in a very primitive form. These creatures were pretty much as they appear now.'

Machine could be prescription for success

IMPERIAL's spinout company DNA Electronics (DNAE) has announced that a prototype of its hand-held SNP DR (pronounced 'snip doctor') device has performed well in a preliminary pilot study.

SNP DR works by analysing DNA in saliva samples. 'We see it as the perfect aid for doctors, helping them right at the start of treatments, before medications are prescribed to patients,' said Professor Chris Toumazou.

Chris, from the Institute of Biomedical Engineering is the founder and CEO of DNAE. .

'If the most appropriate drug dosages can be determined at this stage, it could reduce the number of people admitted to hospital because medication goes wrong..

'Most importantly, it could also minimise the trauma and impact that repeat hospitalisations have on people, their families and the healthcare system. itself.' [http:// bit.ly/pdz6xH](http://bit.ly/pdz6xH)



Perfect place for roll-out

IT WAS appropriate that the Secretary of State for Culture, Olympics, Media and Sport chose Imperial to unveil details of the government's broadband strategy.

Secretary Jeremy Hunt (below) announced a £362 million investment to roll-out broad-

band to all homes and businesses in England and Scotland

Professor David Gann (Imperial Business School) said: 'Here, much of our research is concerned with the future of the digital economy, and superfast broadband will underpin the next few decades.'



Public needs encouraging

A BRIEFING paper, published by Imperial's Grantham Institute for Climate Change, stresses that wholesale adoption of technologies such as heat pumps (effectively refrigerators working in reverse) is vital if the government is to meet its long-term commitment of reducing carbon emissions in the UK by 80% by 2050.

Professor Sir Brian Hoskins (Grantham Institute) said: 'By issuing these briefing papers, we hope to inform policy and policy debate. One of the clear messages from this work is that we already have the technology available to make home heating more sustainable. Looking ahead, we need to come up with a clear strategy for the full scale implementation of these technologies in homes, so we can make a real dent in our carbon emissions.' <http://bit.ly/oj9kGy>

Friendly computer bugs made from bacteria

SCIENTISTS at Imperial have successfully demonstrated that they can build some of the basic components for digital devices out of bacteria and DNA. This could pave the way for a new generation of biological computing devices.

They have demonstrated that they can build logic gates, which are used for processing information in devices such as computers and microprocessors. Their creation makes them the most advanced biological logic gates ever devised.

Professor Richard Kitney (Bioengineering) reports: 'Logic gates are the fundamental building blocks in silicon circuitry and our entire digital age is based on them. Without them, we could not process digital information.'

'Now that we have demonstrated that we can replicate these parts using bacteria and DNA, we hope that our work could lead to a new generation of biological processors. Their applications in information processing could be as important as their electronic equivalents,' he concluded.

<http://bit.ly/o1VWHg>

DEVELOPMENTS AROUND THE ENGINEERING FACULTY

Graduate realises artistic vision

GAETANO LING (Mech Eng), who has just graduated from the innovation design engineering course, has developed prototype virtual reality glasses that 'magically' reveal the creative processes behind artwork.

They are a device called a sound brush that enables visually-impaired children to hear sounds linked to a particular painting and a Harry Potter-style map that gradually re-

veals more of itself to make navigating galleries and museums a more adventurous experience.

'The interactive tools I've developed could provide a completely new way for young people to view artwork, empowering them with technology and turning the tables so that they can teach adults about the masterpieces they are looking at,' says Gaetano.



A UK ENERGY consortium has suggested that the Fylde coast of Lancashire could become the centre of one of the biggest gas drilling operations in Europe.

According to results from its test wells, there are 200 trillion cubic feet of natural gas under the ground, trapped in a layer of compacted mud.

However, geologists are questioning the consortium's figures. Prof Al Fraser (ESE) has said he's sceptical about these numbers and thinks they

COMMENT

Doubts voiced about gas drilling

could be out by a factor of 10. Others are saying that recent local earth tremors have been caused by the drilling.

<http://bit.ly/pH75zd>

Leaning tower of London?

WITH this year's return to Pisa still strong in his memory, Emeritus Professor John Burland (Civil and Environmental Engineering) has been casting an expert eye over the Houses of Parliament's 'Big Ben' tower.

John was part of a major international effort to rescue the Leaning Tower 20 years ago and recently returned to the city with the BBC's *One Show* in tow.

'It was a great moment when I showed my family around the tower, which is one of the proudest achievements in my career,' John said.

London's iconic tower has been slowly tilting for years due to natural subsidence, but it has accelerated since the building of the Jubilee Line extension. 'Unless that accelerates further, I don't think we need to do anything for a few years yet,' says John.

Students enjoy getting hands dirty

CIVIL Engineering students donned hard hats and high-vis jackets to take part in Imperial's Constructionarium 2011.

Held at the National Construction College in Norfolk, this initiative allows student engineers to work on real-life engineering projects, featuring scaled down versions of bridges, buildings and other civil engineering projects.

For the first time, this year's students also had to construct a scaled-down model of a new



'Nuclear power station' dome ready for the concrete

build nuclear power station facility. Extra challenges for the student team on this project were the need to respond to much higher site security and construction specification demands.

'Constructionarium has

opened my eyes to the reality of the construction industry and what it can offer. It was great to get my hands dirty; holding a reinforcing bar, rather than a pencil!' said student Camilla Nicholson.

<http://bit.ly/l8Gi8v>

Clean, green driving machines

ENGINEERS at Imperial are driving forward a new £3.5 million project to help develop the next generation of low-emission vehicles.

The FUTURE initiative aims to devise new computer models which will help Britain's automotive industry improve the performance of batteries, fuel cells and supercapacitors.

'We're still a long way from developing low-emission vehicles that can compete with their combustion engine cousins on performance and price,' says Dr Gregory Offer (Earth Science and Engineering). 'This project aims to provide much needed support so that ultimately, our motorways in 50 years' time will be cleaner and greener.'

The source of most of these articles is the College's press releases. For more on these stories go to www3.imperial.ac.uk/news or use the links at the end of some articles.

Old Centralians continue support of student ventures

DURING the last academic year The Old Centralians' Trust (OCT) helped support a number of extra-curricular projects. These included help for post grads needing to travel and take part in conferences, to others widening their experiences through sport, exploration and adventure and those giving practical help in poor countries.

These included a group which developed seven new routes in Nepal's Reru valley and climbed four peaks and an application to Arctic Svalbard (see opposite).

Sponsorship for sporting events went to help Imperial's hockey team play in Malaysia and C&G's rugby team play in Berlin.

The OCT has continued to support E.quinox's development of battery charging kiosks and rainwater harvesting in Tanzania.

Two go to Honduras

IN THE summer of 2010, two students, Sarah Jeyaprakash and Marcello Colombino took up the opportunity given by US-based Engineering World Health Summer Institute to gain hands-on repair and design experience while providing support to hospitals that serve people in poor communities in developing countries.

After one month in Costa Rica, with mornings spent learning Spanish or Swahili (in Sarah and Marcello's case Spanish) and afternoons receiving three hours' of technical training in the operation and repair of medical equipment, they were ready to travel to their host hospital.

During the first month, when they lived with a host family, there were also day trips to Costa Rica's breathtaking natural features, including the beaches.

Sarah was based in the San Marcos Hospital with her hospital partner Lillian Gu. While there they experienced days of huge successes and frustra-

Old Centralians' Trust original aims were, and still are –

- * the provision of assistance to any students of the City & Guilds College who may, through no fault of their own, find themselves in financial difficulty, and
- * the provision of support from City & Guilds alumni towards student enterprise, travel, research and endeavour.

Since its beginnings in the 60s, the Fund has benefited from coventanted and one-off donations and several substantial legacies. It disburses £60,000 annually.



The team which explored and lived for a month, unsupported, on the ice and rock of Svalbard, an uninhabited archipelago of islands, of which only the main island,

Spitsbergen, is inhabited. Pictured, they are Alex Kendall (leader), Nathaniel Bottrell, Sietse Braakman, Ally Cott, Ande Elliott and Heather Jones.

A month in the Arctic Circle

TRAINING was intensive for the six-'man' team that completed most of its agreed aims while in Svalbard for a month from August to September. It included stamina, first aid, and shooting (protection against polar bears) training as well as crevasse rescue methods.

The aims were to climb the highest mountain (Newton-toppen, 1713m), to reach 80°N and live for a month in the Arctic without support. Supplementary objectives included filming a video diary and compiling data to encourage and help others to travel to the Arctic. They also carried out some scientific work, including logging of flora and fauna and trialled equipment used from pulks to stoves.

Although they were driven back by melting glaciers at just under 80°N, the expedition was voted a great success overall.



Not a terrain to trust, so the Arctic explorers turned back.

tions but they managed to fix 20 items of equipment, including incubators

Marcello had to be in an operating theatre during an operation so that he could see what needed mending in a laparoscopy machine. After trawling electrical shops with

his bioengineering colleague from Indiana, they were able to install heat-shrink tubing to insulate the machine.

Read three stories of these experiences of a lifetime at imperial.ac.uk/engineering/alumni/imperial_engineer



ABOVE: Sarah and Lillian (left) with their host family. Picture by Lillian Gu.

RIGHT: Marcello gets to grips with a repair job.



In this issue, we begin the first of an occasional series of articles celebrating those whose influence and example have made the Faculty of Engineering or the alumni associations what they are today. The first is –

ARTHUR 'BEAN' HOLBEIN

A DISTINGUISHED civil engineer, Arthur Holbein, or Bean as he was affectionately known, died in 1970, but his endeavours on behalf of students and Old Centralians (the fore-runner to CGCA) still live on.

Bean joined City and Guilds in 1915 but, after a year, his course was interrupted by WWI and he joined the Royal Field Artillery. After reaching the rank of captain, he was seriously wounded.

...the confidence he inspired...smoothed out many difficulties

Despite his injuries, he became Captain of Rugby and a leader in athletics and all Union activities on his return to college. As one of his contemporaries recalled: 'There were few aspects of College affairs in which he did not have a hand, and he – more than anyone else – was responsible for bringing together Guildsmen and the RSM and RCS students.'

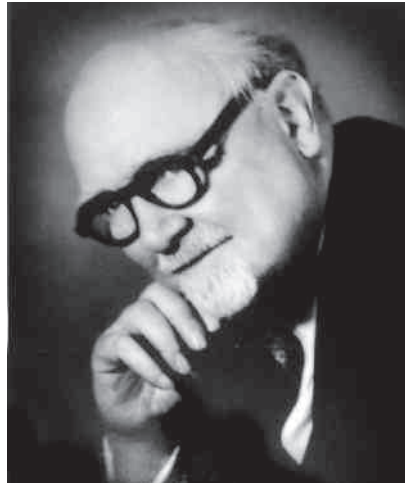
Later, he was the moving spirit in organising sherry parties at which students and old students could get to know each other.

Leaving Imperial in 1922 with a BSc and its Diploma, Bean spent the next 10 years gaining practical experience. He rapidly advanced due to his strong personality and great ability.

He worked on the widening of the City and South London Railway; was agent on the Old Street and Trafalgar Square escalators, and completed the sea wall at Sidmouth where others had failed. After three years working on Bromborough Dock he was asked to complete the sea wall at Aberystwyth, because of his reputation.

In 1931 he was appointed a director and chief engineer of Demolition & Construction Co Ltd and quickly became a figure to be reckoned with in civil engineering. He rapidly expanded the firm to the first rank, while at the same time becoming involved in the immense amount of voluntary work which was to be his great contribution to technology.

After WWII, Holbein was awarded the CBE for his services in so many



an inspirer of youth in technology

spheres of the war effort – on Ministry of Works and other committees, where his leadership and the confidence he inspired in trade union leaders smoothed out many difficulties.

In 1944, he became chairman of the Federation of Civil Engineering Contractors and was its president from 1956 to 1958. He also served on the Building Research Board from 1947 to 1951, and became a director of Newton Chambers in 1950. His work at that time, on the Committee of Inquiry into unofficial stoppages in the London Docks was a natural sequel to his war-time activities.

...service recognised by Prince Philip...

But he will be best remembered for his ceaseless efforts in the advancement of technological education and technical training. He was very active in the City and Guilds of London Institute from 1944 and his service were recognised in 1958 by his nomination as a vice-president by Prince Philip, the Institute's president.

In 1953 the City and Guilds of London Institute elected him a governor of the Imperial College, of which he became a fellow the following year.

As a governor, he took a constant and personal interest in the students and all their activities, and had the great gift of speaking to them on their own level.

Undoubtedly, Bean derived the greatest satisfaction from his work on behalf of young technicians. He was deputy chairman of the National Advisory Council on Education for Industry and of the UK Committee of the Commonwealth

...for many years he was the Old Centralians.

Holbein was equally active in the Old Centralians. As secretary during the 50s, as with everything he touched, he caused it to grow out of all recognition. Not his least triumph was to compel members to become involved in helping students of the College in every possible way. His efforts led to his being elected president for 1960-61.

Friends contributing to his obituary in *The Centralian* (fore-runner to *Imperial Engineer*) wrote:

'A born leader of men and especially of youth, Holbein never lost the common touch and was always welcomed by students and apprentices wherever he went.'

'He had a wonderful way with people; he just phoned up and told you what your next job was for the OCs –and you did it!'

'After all, for many years he was the Old Centralians.'

'...my principal memory of Bean will be of his endearing sense of fun, never dimmed by the ill health of his later years.'

'Bless you Bean, not only for what you did for us all but for the cheer you brought to so many lives'

Following his death, the Holbein Appeal added greatly to the funds of the Old Centralians' Trust and tangible memorials to Bean included a bronze bust of him unveiled in the hall of residence named after him and a portrait hung in the Union.

So that Bean's name is permanently remembered, the annual Holbein Award is given each year to the student 'sportsman' of the year – in the widest sense of the word. This year's winner was Joseph Harris.

Volcanic eruptions and climate change: past to present

The last few years have seen a dramatic increase in research on the relationship between volcanic eruptions and recent weather conditions in different parts of the world. To address this renaissance, a poster session has been co-convened by Kenneth Verosub (University of California Davis) and Wyss Yim (University of Hong Kong, RSM 74). It is to be held from December 5-9, during the Fall Meeting at the Moscone Center in San Francisco

THE GOAL of this session is to bring together perspectives on volcanic eruptions and climate, ranging from small eruptions like Eyjafjallajökull to large super-eruptions like Toba. It will span the quaternary to today, with the expectation that cross-fertilization of ideas among disciplines will further advance the underlying science.

The topics covered in the 18 posters include:

- * Rise of volcanic plumes to the stratosphere aided by penetrative convection above large lava flows (Kaminski et al.)
- * Variable climate impact of volcanic eruptions (Graf)
- * Volcanic forcing as a major source of European decadal variability during the last millennium (Zanchettin et al.)
- * Potential of thermal infrared radiometry for remote sensing of volcanic ash clouds (Dubuisson et al.)
- * New secondary particle formation in a volcanic plume: from observation to modeling (Boulon et al.)
- * Deciphering the climate effects of volcanic aerosols: what lies ahead and why should we care? (Self)
- * Time evolution of climate response to supervolcano eruption (Stenchikov)
- * Revisiting the question of the magnitude and intensity of the ~73 ka Toba eruption (Gatti et al.)
- * Toba eruption simulations with 74 ka B.P. forcing (Robock)
- * Tephra layers in abyssal sediments off western Sumatra, Indonesia (Qiu et al.)
- * Non-linear Holocene climate behaviour reconstructed from Icelandic lake sediment linked to both explosive and diffusive volcanism (Geirsdottir et al.)
- * New perspectives on the frequency and importance of Tambora-like events (Verosub)
- * Interaction between Mt. Pinatubo aerosols and the stratospheric circulation (Aquila et al.)
- * Summer circulation patterns over South America after the El Chichon and Mt Pinatubo volcanic eruptions (Da Silva et al.)
- * Variability of the stratospheric aerosol layer due to volcanic eruptions in the last decade: Odin-OSIRIS measurements (Bourassa and Degenstein)
- * Voluminous Icelandic basaltic eruptions appear to cause abrupt global warming (Ward)
- * Climatic effects of atmospheric water vapor distribution through volcanic eruptions (Yim)
- * Geo-engineering: whiter skies? (Kravitz and MacMynowski)

Abstracts are available for viewing at <http://sites.agu.org/fallmeeting/>.

Although the role of volcanic eruptions in climate change has been grossly underestimated up to now, this session should go some way to change this view.

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- Garriss, E B (2011a). *Beware of volcanoes with unpronounceable names*. Browning Newsletter, vol 36, no 1 Fraser Management Publication, 8p.
- Garriss, E B (2011b). *The volcano eruption report - north and south*. Browning Newsletter, vol. 36, no. 7, 8p.

Wyss Yim

Solar cycle may affect winter weather

ANALYSIS of five years' data from the Spectral Irradiance Monitor (SIM) on the SORCE satellite has revealed that there is much greater variation in the wavelengths of radiation from the Sun during its 11 year cycle than had previously been supposed.

Specifically, there has been an unanticipated large decline in the ultraviolet (UV) spectrum observed during the period of reducing sunspot activity from April 2004 to November 2007.

This large decline was largely offset, in terms of total solar energy output, by an increase in radiation at visible wavelengths. According

to atmospheric computer models, produced by contributor, Professor Jo Haigh and her team from Physics, this shift from the UV to the visible spectrum should have caused a modest warming but this is too small to detect in observed data, given intrinsic variability in climate and 'noise' in the data.

The models suggest, however, that the UV impact on stratospheric ozone might be detectable and Jo's team has found some evidence of this in an independent ozone data set.

News stories have been developed from these findings which appeared in an article in *Nature* published late last year. But, as Jo says: 'Compared with the effect of man-made emissions over the last century, solar variations still have a very minor effect on long-term global climate trends, but this study shows they may have a detectable influence on winter climate.'

However, the SORCE satellite will shortly go out of service and NASA has no funds for a replacement. This is quite frustrating for both the researchers and others seeking to understand more about the complexities of the global climate.

THE EARTHQUAKE AND ITS IMMEDIATE AFTERMATH

ON THE afternoon of Friday, March 11, 2011, an earthquake of Richter magnitude 9 occurred with its epicentre off the northeast coast of the Japanese island of Honshu. The Japanese infrastructure withstood the earthquake well but was devastated by the tsunami that followed, with unprecedented loss of life and property.

The Fukushima I nuclear complex is owned and operated by Tokyo Electric Power Company (TEPCO) and consists of six boiling water reactors (BWRs) of General Electric Company (GE) design. The first reactor was commissioned in 1971.

At the time the event took place, units 1, 2 and 3 were operating and units 4, 5 and 6 were shut down for periodic inspection. Units 1, 2 and 3 started the process of automatic shutdown (SCRAM) when the earthquake struck.

None of the reactor containment vessels was compromised despite the earthquake's magnitude being considerably greater than the maximum design specifications for the reactors.

The tsunami arrived 50 minutes later and, at a height of 13m, overwhelmed the 5.7m sea wall. The diesel generators providing emergency power were flooded and put out of action, leaving the cooling water pumps dependent upon batteries. The pumps shut down after depletion of the batteries.

This loss of cooling water led to partial meltdowns in reactors 1, 2 and 3 in the hours and days following the accident. The inability to control temperatures also caused the metallic cladding, that contains the uranium dioxide fuel, to react with the residual water and evolve hydrogen. This was released from the reactor pressure vessels and collected in the roof space above the reactors. It detonated on March 12, 14 and 15. Unit 4 also suffered explosive roof damage on March 15.

It is now thought that the hydrogen source was unit 3 rather than a source in unit 4. The situation was stabilised over several weeks using a series of *ad hoc* measures, including sea water flooding.

Fukushima II complex of four reactors is situated 7.5 kilometers from Fukushima I. It also experienced cool-

FUKUSHIMA IN RETROSPECT

The welcome absence of international press attention has permitted the Japanese authorities and the International Atomic Energy Agency (IAEA) to return to their work in relative peace and quiet. These four pages, compiled by managing editor Bill McAuley with the help of Robin Grimes (director of Imperial's Centre for Nuclear Engineering), review the Japanese event and its long-term impact on the continuing development of nuclear energy. They also summarise the way Imperial continues to contribute to the debate and the cross-discipline research taking place.

ing water systems failures but achieved cold shutdown by March 15.

PRESENT STATUS

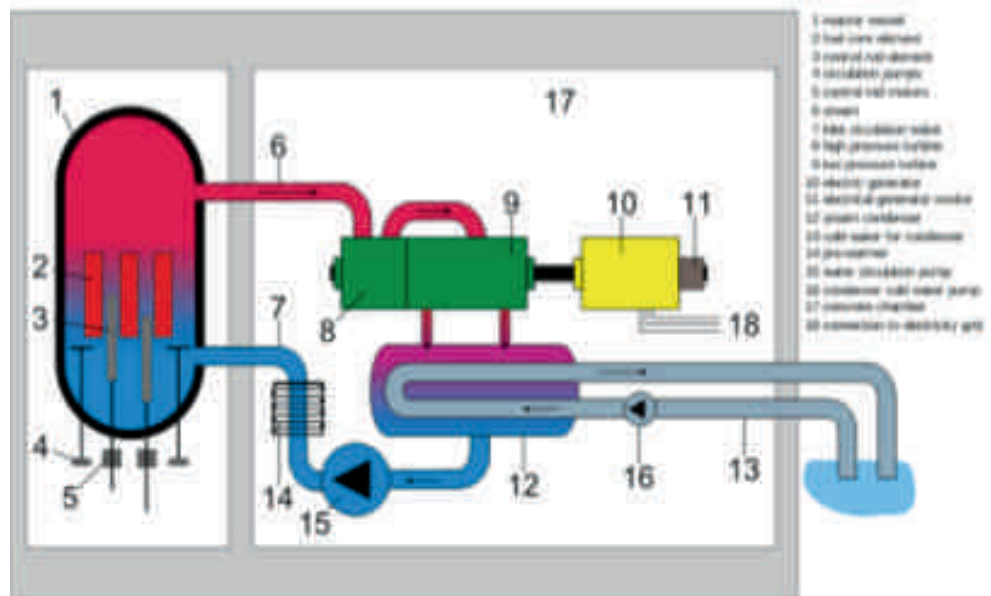
At the time of writing, reactors 4, 5 and 6 are in cold shutdown (sustained temperatures below 100°C). Reactor 4 is defueled. Reactors 1, 2 and 3 are targeted to be in cold shutdown by the end of the year and the nuclear world will be closely monitoring progress towards this goal.

Internationally supported efforts continue to cool the reactor cores and

to decontaminate the very large quantities of sea and fresh water used for emergency cooling in the early stages of the accident. Total cleanup will take at least 10 years according to TEPCO and up to 30 years in the opinion of others. TEPCO has announced that reactors 1-4 will be scrapped. The fate of 5 and 6 is uncertain, as is that of Fukushima II.

The 20km exclusion zone remains, although a few intrepid souls have returned.

(Continued on page 16)



Simplified diagram of a boiling water reactor. Key: 1 Reactor vessel, 2 Fuel core element, 3 Control rod element, 4 Circulation pumps, 5 Control rod motors, 6 Steam, 7 Inlet water circulation, 8 High-pressure turbine, 9 Low pressure turbine, 10, 11 Electrical generator, 12 Steam condenser, 13 Cold water for condenser, 14 Pre-warmer, 15 Water circulation pump, 16 Condenser cold water pump, 17 Concrete chamber, 18 Connection to electricity grid.

Crisis communications

Imperial academics were in great demand for informed opinion within minutes of the earthquake and tsunami hitting Fukushima on March 11. Below are three of those comments.

PROFESSOR GERRY THOMAS (Surgery and Cancer), director of the Chernobyl Tissue Bank at Imperial... explained why authorities were preparing to distribute iodine to protect people from radioactive exposure. 'The thyroid actually takes up iodine to make the thyroid hormones. It remains in the gland and the tissues in the thyroid,' she said. People in the affected area of Japan were being encouraged to take iodine because: 'It is important to get stable iodine into the thyroid gland to prevent the uptake of radioactive iodine' but noted: 'It is extremely unlikely there will be a significant release (of radioactive iodine) from the Fukushima plant).'

JULIAN BOMMER Professor of Earthquake Risk Assessment (Civil and Environmental Engineering) 'Geohazards are key criteria when siting a nuclear power station – plants are very unlikely to be built on soft or unstable soil. Then there will be a very detailed assessment of the potential seismic hazard – in other words, the probability of different levels of ground shaking at the site.'

PROFESSOR ROBIN GRIMES Director of the Imperial Centre for Nuclear Engineering (Materials) explained what worried him about the design of the Fukushima Daiichi nuclear plant that made it particularly vulnerable to this kind of accident. 'There are a number of things that would not be able to pass a safety inspection for a new reactor at the moment. One is the idea that they have this large condensing ring – this doughnut-shaped thing that we've been hearing about – which is actually outside the containment vessel. In a modern design, anything to do with a reactor in which the primary circuits are concerned would have to be within a very strong containment vessel. The containment vessels have actually done very well, despite the fact this is a 40 year-old reactor. It's this doughnut-shaped exterior structure that seems to have failed, to some extent, in a couple of cases.'

Fukushima, Impe

In our initial newflash in the spring issue we invited... Below are those contributions. Some address the subject of whether nuclear power should be developed. We also include pieces a

Health scare exaggerated

says Don Higson (Chem Eng 57)

I would say the 'immediate threats to public health' from radiation at Fukushima are essentially zero (except for the mental health effects caused by removal of people from their homes and by unwarranted anxiety about radiation). Temporary evacuation was justified as a precaution, at potential dose levels well below levels that would be dangerous to physical health, but I do hope that the evacuation is not prolonged more than is absolutely necessary.

I think your figure of 60 for the total fatalities in the Chernobyl incident is a bit high, if you mean near-term fatalities attributable to radiation. I would put it at less than 50. There were, of course, another two who died immediately from other causes and one who disappeared, presumed dead. The figure of 20 deaths, referred to in my paper as having 'since died from illnesses that are considered to have been associated with acute exposure' actually includes a number of cases where radiation was really not a likely cause (eg when I last looked, it included someone killed in a car accident). Deaths from thyroid cancer came years later.

I doubt that the number of thyroid cancer deaths that were probably caused by radiation will ever reach 500, but we will never know. Please see my attached paper on this subject. (see www.imperial.ac.uk/engineering)

I expect there will eventually be about 2,000 identifiable cases of thyroid cancer likely to have been caused by radiation from Chernobyl than anything else, and that these cases would eventually lead to around 100 deaths. Some people *might* call this 'a major public health impact'.

There will also be statistical predictions of increased incidences of other cancer deaths but these increases will not be significant compared with normal. Essentially, they will be speculative. No individual case (apart from thyroid cancers discussed above) will be identifiable as having been caused by the Chernobyl accident.

bigsond@bigpond.net.au

'We need

...SO SAYS Ashley Catterall (Materials 52) He writes:

'The over-riding responsibility of any government in the energy scene is to ensure security of supply of fuel and power to its community. This requirement takes precedence over all other considerations, including climate change. The social and economic consequences of a failure to do so are immediate, severe and widespread. As a result it has to take account of the political and technical situations existing at the prime sources overseas, particularly

Small and minia

DESPITE the setback caused by the problems with Japanese reactors, following the tsunami and some loss of confidence by politicians, indications are that electricity from nuclear energy is to continue as a significant element in the world for the foreseeable future.

Public opinion, while still wary, seems now to accept nuclear as a major contributor to electrical supply. Developments of new nuclear construction in, for example, the US, France, UK, Russia, Sweden and Finland, support this view.

Internationally, the application of established designs of nuclear power plants is spreading, while in China, India, Korea and South America, de-

Support in Japa

FOUR Imperial medics studying in Tokyo experienced the earthquake first-hand. They were in the same boat as Japanese students as none had lived through anything so big before.

One medic, Kelly Ameneshoa, said that although the media had been good at capturing the devastation in northern Japan, she felt the coverage has given the impression that life in Japan has completely stopped. In fact, it was pretty much back to normal in Tokyo very quickly. Kelly stressed the care and kindness shown them before, during

Serial and alumni

invited readers' comments on the Fukushima incident. nuclear has a future, some its drawbacks and others suggest how it should es about how it affected Imperial College.

ed nuclear'

of oil and gas, which may be unstable and outside the control of the government.

To maximise security, therefore, it is prudent to have a mix of sources including coal, oil, gas, nuclear and renewables, so that if oil and gas supplies are interrupted, the wind doesn't blow, or the sun doesn't shine, some energy is available to the system.

The exceptionally severe tsunami in Japan, of magnitude 9 or so on the Richter scale, caused between 15,000 and 20,000 deaths according to reports, but

media coverage has concentrated almost entirely on the incident surrounding the nuclear station at Fukushima. So far this has caused no deaths.

The reactor designs of Fukushima, the oldest nuclear station in Japan, were of 1960s vintage, and a long way from current designs. Moreover, there are around 50 nuclear power plants on some 17 sites in Japan, which were unaffected by the tsunami.

So let us keep a sense of proportion. The nuclear industry has a good safety record and does not deserve the vilification it receives. We need it. jacatterall@btinternet.com

miniature reactors: a nuclear future?

PETER RILEY (Elect Eng 58), a lecturer in environmental law with a project management background in the nuclear field, introduces his recent paper on the nuclear future. He is adapting his this paper for the next issue of Imperial Engineer.

development of national projects has continued despite doubts elsewhere. Internationally, nuclear will play a significant part in the regeneration of the engineering industry, the improvement in economies and in meeting environmental targets.

New nuclear technology and reactor types are already leading to potential applications in ways

previously seen as tentative.

The International Atomic Energy Association (IAEA) has extensively reviewed small reactor development. The Generation IV International Forum, in the 2008 annual report, identified goals for nuclear energy systems.

US energy secretary Steven Chu described small modular reactors as 'one of the most promising areas' for the future of nuclear power. Russia is building the first of eight small floating nuclear plants for deployment in Arctic regions.

In addition, TerraPower, a company backed by Microsoft chairman Bill Gates and Toshiba, among others, is investigating technology for mini-reactors. priley0@gmail.com

pan and Imperial

and after the earthquake.

At Imperial, sympathy has been felt across campus for the many thousands who were killed or whose livelihoods have been ruined.

Yosuke Hamada (Biochemistry), president of Imperial's Japanese Society which organised a number of cake sales and collections around the College said: 'Watching this tragedy happen, when we are so far away, has been really hard and we wanted to find a way to express our grief for the victims.'

With the support of the College Union, the Society raised around £6,000 for the Japanese Red Cross within days.

What about Katla?

WILL your review consider whether something similar could happen at Dounreay when Katla erupts? And/or whether anyone is doing anything to prevent that?

Fiona Sinclair (Maths 81, Aero DIC 82)
fnsnchr@btinternet.com

Perhaps someone would like to write us the answer in time for the next issue? Send to the Managing Editor on williammcauley@talktalk.net

Plans for a fail-safe nuclear

IN MARCH this year, Jolyon Nove (Civils 60) applied for an Australian provisional patent for his idea, a Fail Safe Nuclear Power Plant.

Jolyon is proposing a reactor containment vessel that is mostly buried below ground level. The principal advantages cited are:

- The reactor would be a second or higher generation one.
- The below-ground site would be chosen so that the construction, with a containment floor, could be anchored to the surrounding strata.
- The containment structure and perimeter containment walls would be of steel-reinforced concrete.
- A buried reactor should minimise local radiation.
- The cooling water system can be gravity fed, and hence can be constructed to be independent of mechanical/electrical systems for fail-safe operation.
- It encompasses an access ramp, which would facilitate future upgrades.
- Decommissioning and long-term radwaste storage will be easier

He contends that operating cost savings and reduced insurance premiums will justify the higher capital costs involved. But would it be better in the case of a tsunami?

Non-starter, comments Vernon

NUCLEAR power in the wake of Fukushima?... this really is a non-starter as a topic!

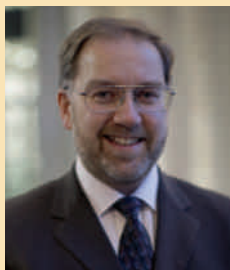
I don't see what has changed apart from 'Don't build nuclear plants on tectonic plate boundaries especially near the coast.' Speaking as a chartered civil engineer, I could have told you that much before Fukushima, as no doubt countless others would too. Not hindsight, just commonsense.

The issue previously was dictated by greed, not engineering consideration.

Vernon Gaskell (Civils 85)
vernon5678@hotmail.com

Head of Imperial's nuclear research appeals for work placement opportunities

AS PROFESSOR of Materials Physics and director of the Centre for Nuclear Engineering, Robin Grimes (pictured) is a driving force behind Imperial's courses in Nuclear Engineering, in addition to his research responsibilities. He is also currently specialist advisor to the House of Lords' science and technology select committee while they deliberate what nuclear research is needed through to 2050.



The Centre for Nuclear Engineering brings together a number of disciplines including Mechanical, Chemical and Materials engineering, but also specialist modelling and radio ecology people, to create one of the most comprehensive research and teaching groups in Europe dedicated to nuclear engineering and science. Greater cross-disciplinary awareness

of the research interests and capabilities of Centre members encourages collaboration and supports joint teaching activities.

Imperial College has a long history of nuclear research and teaching, dating back to the immediate post-war period. However, the present undergraduate nuclear engineering courses were started five years ago and now graduate between 20 and 30 students a year. There is also a new MSc in Nuclear Engineering that graduated students for the first time last year. Robin is very anxious to develop work placement opportunities for the students. Readers whose organisations may be able to offer these are urged to contact him or his PA Emma Warriss on their e-mail addresses : r.grimes@imperial.ac.uk e.warriss@imperial.ac.uk

Fukushima in retrospect

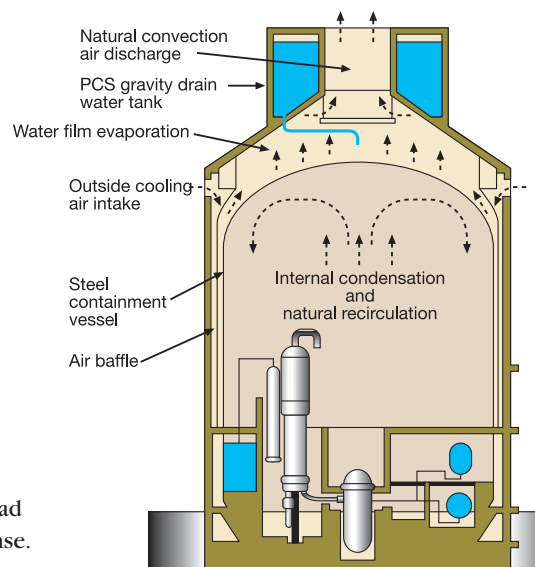
In the wake of the earthquake, tsunami and accident, over half of Japan's 54 reactors are not currently operating, resulting in extreme pressures on the country's electric grid. The debate has been reopened on the future of nuclear power, both within Japan and in the wider world.

ROOT CAUSES

It would be very presumptuous of this publication to pronounce too far on this topic but some general comments can be made. In spite of their age, the reactors survived a earthquake of unprecedented magnitude. However, the cooling systems did fail and the plans to deal with this eventuality were not adequate, as evidenced by the ad hoc nature of the initial response. An obvious deficiency was the installation of the emergency pumping equipment at ground level. Since the probable consequence of an offshore earthquake would be a major tsunami, it is inconsistent to design reactors to survive severe seismic events but not carry this thinking through to the auxiliary systems. There is, however, a more subtle factor at work. During the last several decades, the international climate of antipathy towards new generation plants has encouraged extending the life of existing facilities. At the

(Continued from page 13)

same time, cost pressures have tended to discourage capital improvements at these facilities.



Westinghouse's passive containment cooling system.

THEN AND NOW

The basic design of Fukushima I dates from the late sixties. That is almost 45 years ago! A review of the improvements in other technologies since then makes one instantly realise how much the technology must have improved – but to many of the general public nuclear power remains mysterious and menacing. With the salutary exception

of France, Korea, India and China, countries discontinued most of their nuclear power development programmes from the late 70s.

The industry convention is to group reactors into Generations I, II, III and IV. Simply put, I represents the prototypes built until the mid-60s; II the plants built from then until the mid-90s (ie most plants in current operation) and III the 'new versions' incorporating improved fuel technology, thermal efficiency, passive safety systems and standardised designs. Generation IV are design concepts and therefore beyond the scope of this discussion.

The overriding issue is safety and in this context it is worth examining the four Westinghouse AP1000 plants currently under construction in China. This Generation III+ design employs a passive cooling system.

Crucially, external AC power is NOT required for maintenance of cooling in the type of emergency experienced at Fukushima or Three Mile Island. In addition, water cannot drain from the spent fuel pool even if water is lost. The design was approved by the Nuclear Regulatory Commission in 2005 and is currently under assessment by the UK office for nuclear regulation.

With the merciful absence of any serious long-term threat to human health from the incident (so far!), Western governments should finally give the green light for replacement and expansion of our Generation II plants.

NUCLEAR ENERGY (what everyone needs to know)

by Charles D Ferguson
ISBN 978-0-19-975946-0
Published by OUP, 2011

THIS book answers a large number of FAQs (frequently asked questions) on its subject topic. It might reasonably be renamed 'Atomic Power for Dummies' (no disrespect to the author, who is a trained physicist and nuclear engineer).

Charles D has a background of service with the US Government on nuclear policy and is an adjunct professor at Georgetown University.

The book brings together a number of strands with sections on energy security and the cost of building plants, proliferation, safety, physical security and radioactive waste management. It is reasonable to assume that it presents the conventional US wisdom on the subject. It includes concise technical descriptions of the accidents at Fukushima Daiichi, Chernobyl and Three Mile Island.

The book is relatively light on figures and tables, but I found table 2.1 on p 65 of particular interest, 'Countries with nuclear power plants'. It throws up some interesting and/or surprising facts. Of the countries in

the nuclear energy 32-member club:-

- * Lithuania has no nuclear plants of its own, but over 75% of its electricity is 'nuclear', slightly greater than France,
- * France and Sweden are clear tops of the list in the nuclear kWh /citizen listing - Pakistan and India are bottom,
- * USA, France and Japan are top of the list in installed generating capacity - Netherlands is close to the bottom, although Belgium is mid-table,
- * Africa's one member is South Africa; South America has Argentina and Brazil.
- * The UK is 11th in the number of installed plants, 9th in terms of generated electricity and 8th in installed capacity.

The book covers the present engineering situation in some detail. We could be looking at a century of design and construction business, the author suggests, if not more. Areva in France (part owned by Siemens) is the only European organisation equipped to handle an integrated project. It is currently struggling up a learning curve at its Olkiluoto 3 project in Finland, where it is constructing its first Generation III European Pressurised

Reactor (EPR). The project is running seriously over time and over budget. Areva's competitors are in the USA, Russia, Japan and South Korea. All that

FROM DOT-DASH TO DOT COM

by Andrew Wheen (EEE 77)
ISBN: 978-1-4419-6759-6
e-ISBN: 978-1-4419-6760-2
Published by Springer-Praxis

IN OUR daily lives, few of us pause to reflect how profoundly life has changed in the past two centuries. This is particularly true in communications.

In 1800, methods were virtually unchanged from classical times - road or seaborne transport of oral or written messages required weeks or months before information could be delivered from one continent to another. Then, starting with the telegraph, the revolution began.

Once electricity had been discovered, it was possible to develop instantaneous delivery of information, at first through local networks and then, with the laying of the first cables in the 1860s, across the Atlantic. The invention of telephone a decade later allowed direct voice transmission, and the advent of radio in the early 1900s completed the transition to a global system.

Post WWII, the arrival of satellite technology and television networks enabled the world to become completely interconnected. The arrival of the internet and mobile telephony has removed all limits on the quantity and detail of information that can be transported from one part of the planet to anywhere else.

Andrew Wheen (EEE 74) has written a fascinating technical history of this adventure. While a basic grasp of physics is necessary for a full understanding, the lay person will be able to follow the narrative quite well with the aid of the excellently simple diagrams that layout each concept throughout the text.

Andrew's background of three decades in the telecoms industry places him well to connect the theoretical with the practical. I confess that I've not completely finished it (because I'm making sure I completely understand each chapter before going on the next!) and I look forward to his answers to the question - what's to come ?

POWER POLITICS: Political Encounters in Industry and Engineering

by Francis Tombs
ISBN:
Published by I B Taurus & Co, 2011

IN THIS entertaining new book, Lord Tombs explains how instead of government having a duty to ensure a continuous supply of electricity, political decisions by successive post-war governments 'have resulted in a situation where the reliability of electricity supply throughout the UK will be in serious jeopardy for many years to come'.

Lord Tombs is particularly well placed to make such a judgement. He started work at 15 at GEC in Birmingham and, after gaining his qualifications in electrical engineering and a degree in economics and accountancy, he followed that with a distinguished career in industry. He eventually became chairman of the South of Scotland Electricity Board, the larger of Scotland's two electricity supply boards, and later

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became chairman of the Electricity Council.

His advice was then sought (but seldom followed) by a succession of energy ministers who sought to re-organise the industry by apparently relying on political dogma (sometimes nationalisation, sometimes privatisation) rather than using technical knowledge and experience.

The first chapter is an account of how the re-organisation of the electrical supply industry was mis-handled after the war. Before the war the construction of the National Grid in the 1920s and 30s, which allowed for the first time the nation wide transmission of electricity, had been a major technical achievement which replaced the previous system of expensive and inefficient local generation and distribution.

In 1947, the industry was nationalised under the control of the British Electricity Authority. The subsequent

(Continued on page 21)

FEATURES

LONDON Underground has a vision of being a world-class tube for a world-class city. Even today, it carries more than a billion passengers a year and up to four million a day – and the demand will only increase. To achieve the vision requires improvement across the board, from operating the service more reliably to delivering new infrastructure – better stations, new rolling stock, advanced signalling, better track – more effectively.

The division responsible for the infrastructure is the capital programmes directorate (CPD). At any one time CPD runs more than 300 projects on the network. With an annual spend of more than £1bn and a skilled staff of close to 2,000, high-quality project management is at the core of the renewal.

The importance of the work lies in the fact that efficient ‘hard’ project delivery is critically dependent on the environment of delivery – processes, systems, understanding and meeting stakeholder needs. A disciplined change methodology

- (i) analysed the current position and put in place a process to measure improvement;
- (ii) addressed the weakness and developed a solution, and
- (iii) implemented and embedded the change in a complex organisation.

Analysis helped understand what was happening and measure improvement.

The UK Government’s ‘P3M3’ model was used as the vehicle for assessment (see diagram right). Through questionnaires and interviews, carried out by an independent assessor, the model reviewed CPD against seven dimensions:

- organisational governance,
- management control,
- finance management,
- benefits management,
- risk management,
- resource management,
- stakeholder engagement.

An initial result, in December 2007, of 0.8, on a maturity scale up to 5, indicated weaknesses in terms of *ad hoc* processes across the organisation and low uniformity. Following the actions described below, a result of 2.1, in November 2009, showed that processes were in place but that there was low evidence of consistent application. Further embedment work followed and CPD achieved a certification at level 3

Working for a world -

Arnab Banerjee, describes one critical part of London Underground’s improvement change programme – the development and embedment of a new project management system in the capital programmes directorate. He leads the change and embedment workstream.

in March 2011 which verified that the new methodology was being followed across the organisation.

The assessment was rigorous with 29 one-to-one interviews and 234 returned questionnaires from project managers out of 660 distributed. While waiting to be interviewed, one project manager said: ‘We must have improved surely: it just feels a different place from even a year ago.’

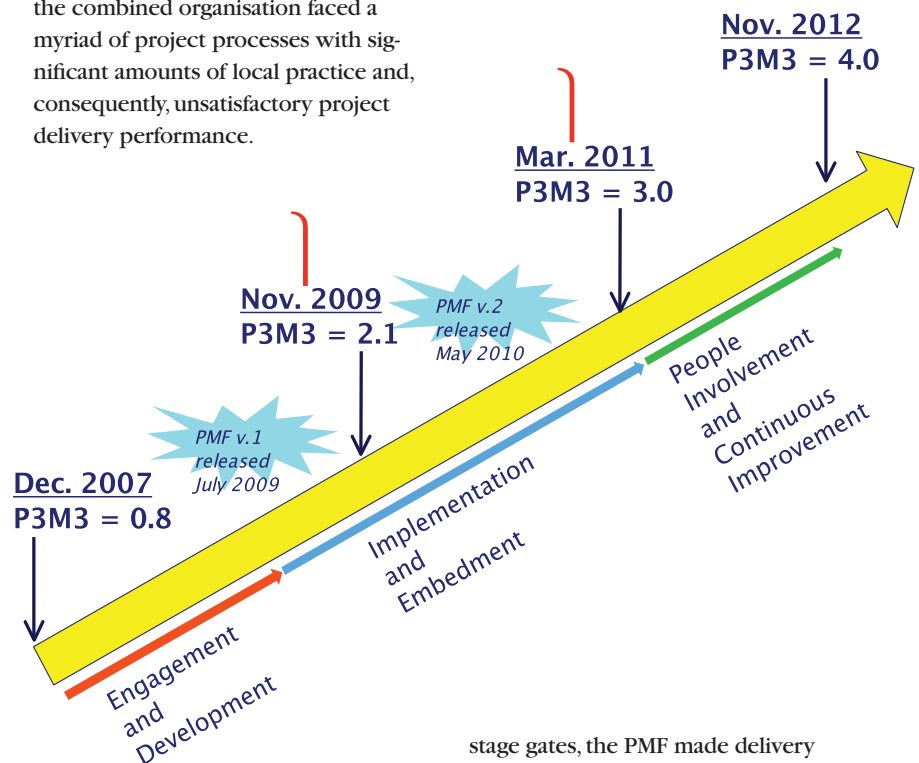
Addressing weaknesses – the project management framework (PMF); a new methodology

Following the incorporation of Metro-net into London Underground in 2007, the combined organisation faced a myriad of project processes with significant amounts of local practice and, consequently, unsatisfactory project delivery performance.

Platinum Award for Cross-Functional Working.

Removing historically-dense procedure documents containing complex flow diagrams, the PMF opted to create a ‘product based’ delivery scheme which specified the ‘what’ rather than the ‘how’. This addressed the lament from a typical project manager who said: ‘I don’t care what you want me to do, just tell me on a sheet of A4 *what* you want me to do.’

By creating a common vocabulary and lifecycle across the organisation, rationalising the stakeholder requirements, creating clear role definitions, improving interface arrangements and setting up a system of



The PMF was developed as a new methodology to replace the existing confusions and was done with full engagement from the users in the business. It was so successful that the PMF team was awarded London Underground’s highest accolade – the

stage gates, the PMF made delivery easier through improving the environment in which project teams worked.

There was also the recognition that project delivery is about far more than just project managers. The changes crossed organisational boundaries from setting requirements at the ‘sponsorship’ stage through to effective handover to the maintainers and operators.

World-class tube for a world-class city

Implementing and embedding the change

A business users' group - members of delivery teams around CPD - was set up at the start of the process and, at one of the first meetings, a senior project manager asked: '...this is the fourth time in seven years that we have been in a room like this with people like you telling us to change. How is this *different*?'

Any major change of this nature which

ownership of the PMF and its processes. This left the corporate team to continue to work with users on improvement. It was achieved.

A director of the assessor organisation stated: 'Few companies maintain the momentum of change that LU has achieved. Moving up one level in maturity is not uncommon, but moving up almost three levels is very rare. The improvements in the way things are done are huge.'

of change is for the rock star. This is where the rewards and recognition lie. This is where most human resources management systems provide reinforcement. But the back side, or late stage of change, is different. It's for the roadie. Indeed, most of the incentives have dried up, the thrill is gone and it comes down to grinding discipline and unrecognized and inglorious execution to take the initiative the distance.'

This initiative has, so far, answered the challenge posed by the senior project manager at the start: 'It has been different because it has kept on going to complete the task.'

And finally...

The achievement of level 3 on the P3M3 maturity scale was simply the end of the first phase. A target of achieving P3M3 level 4 has now been set. This will be done through significant investment in project management systems, focusing on people development, further involving users in improvement through special interest groups and communities and generating efficiencies through measurement of processes.

In a sense, the first phase was the easy part with the 'mechanical' development of a new methodology and then its determined implementation. Building a culture of spontaneous user-involvement through the use of lessons learned, knowledge management and communities, is the next - a much harder challenge.

Readers of this article who have good examples in organisations are more than welcome to get in touch: arnab.banerjee@tube.tfl.gov.uk.



affects the working lives of thousands of people needs three elements:

- (i) A clear rationale (from the P3M3 assessments).
- (ii) A good product (the PMF - developed with widespread user consultation) and
- (iii) Sufficient management support to see through the embedment phase which involves significant training, communication and support to users.

To succeed, the implementation and embedment of the PMF could not be an initiative which would be released and then not supported.

Within four weeks of initial release in July 2009, there had been 90 unique briefing events, ranging from small teams to groups of more than 100. Then, over more than a year, came the hundreds of one to one interactions between members of the embedment team and individuals in the business - mostly sitting with people at their desks.

A target of October 2010 was set by which the various programmes/business units making up CPD would be wholly in

The necessity to maintain a single-minded focus on embedment cannot be emphasised enough. London Underground had the wisdom to maintain the investment to drive through the full cycle of change from initial diagnosis to radical development, embedment and now continuous improvement. As a well-known writer on change management once commented: '...the front end



ARNAB BANERJEE, 42 (MEng 92, FIMechE) has spent all his career in heavy engineering - initially in the power industry and now transport - with front-line experience of sales, strategy, project management and change management.

For the work described in the article, Arnab led the change and embedment workstream - from writing the initial case for change to ensuring that the initiative was successfully implemented and achieved certification. He currently leads the improvement and embedment team for the projects division of London Underground. He has additional responsibility for knowledge management and people development.

Arnab is married to a development programme manager working with NGOs and has a five year old son who has formally stated that he intends to 'do nothing, like you Dad,' as a career. Arnab's always happy to connect on LinkedIn.

FEATURES

THE ROLE of ICE president is several-fold

- chairing the ICE Council (the trustee body of the Institution);
- ambassadorial: internally to its 80,000 members worldwide and externally to key stakeholders, ranging from governments to society at large;
- providing strategic leadership for the profession.

All-in-all it makes for a roller-coaster year, but a memorable one. And it leads to unexpected reunions in unexpected places – in my case with some fellow students from my UG days at Imperial; many students I'd taught (some of whom kindly said they seemed to have benefited from the experience!), and some former colleagues I'd worked with on various projects.

Presidential rhythm

The year as president has a traditional rhythm set by particular events – starting with the presidential address on the first Tuesday in November. ('Now is the Time' – www.ice.org.uk/getattachment/21ec2403-13ff-43ef-a883-5a23a1f25c27/Presidential-Address-2009.aspx), with a syncopation provided by many other events, especially presiding over specialist conferences and visits overseas.

However, they can accommodate some of a president's particular themes for the year – in my case

- critical infrastructure,
- international development,
- supporting young engineers.

These have been with me throughout my career.

Throughout his life, Thomas Telford mentored his young engineers. So it was fitting that when the ICE celebrated the 250th anniversary of his birth that the then president, Gordon Masterton, introduced a President's Apprentice Scheme to allow a small group of young engineers to work-shadow the President

PAUL Jowitt, former student (Civils 72, 74) and member of academic staff in Civil Engineering at Imperial (191974-87) is Professor of Civil Engineering Systems and executive director of the Scottish Institute of Sustainable Technology at Heriot Watt University, Edinburgh. He was director of two spinout companies (Tynemarch at Imperial and SISTech at Heriot Watt) and nonexecutive director of Scottish Water and United Utilities. Paul was author of the ICE's 6th International Brunel Lecture – 'Engineering Civilisation from the Shadows'. (www.ice.org.uk/Information-resources/Document-Library/Brunel-International-Lecture-2006).



Paul Jowitt writes about a key development during his year as 145th president of the Institution of Civil Engineers (2009–2010). Founded in 1818, it had Thomas Telford as its first president from 1820 until he died in 1834.

Following Telford's lead mentoring young engineers

during his year of office. They spent time accompanying him to various ICE events and meetings. It has been continued by successive ICE Presidents.

My presidential themes prompted a radical change in the format of the Apprentice Scheme. They would work with me and lead tutors Charles Ainger (MWH) and Ron Watermeyer (SS Inc, South Africa) to produce an engineers toolkit for international development. It also meant that the net for the recruitment of the apprentices would have to be cast wider than the UK to include graduates working overseas. The 12 apprentices came from the UK, China, Nigeria, South Africa, Sri Lanka, Ghana, Hong Kong and Zimbabwe. Twelve different first degrees (including graduates from Imperial and Heriot Watt!), 12 different employers, four women and eight men. And four were based overseas.

The result was *An Engineers Toolkit for a Developing World* (www.ice.org.uk/patoolkit) – an open source set of materials and ideas to help engineers plan and deliver infrastructure for international development, poverty alleviation and the UN Millennium Development Goals (MDGs). The culmination of a year's work, the Toolkit is a first in the civil engineering field. It was launched on October 19 2010.

The Toolkit was produced through a series of high-level CPD events in London, Durban, Johannesburg and

at UNESCO in Paris, and delivered by experts from industry, academia and NGOs. The Durban sessions were augmented by various site visits including the eThekweni Zibambele Road Maintenance Project where impoverished households generate income by maintaining roads.

All these projects clearly demonstrated the connection between construction and maintenance of infrastructure and community livelihoods. The apprentices learnt about the role of infrastructure in the delivery of the UN MDGs and its impact in delivering social and economic objectives. In between, the apprentices worked offline and through email with each other and the tutors to produce a set of 76 themed method cards.

Project themes

These are arranged in five themes and then applied across four stages of a project, namely –

- * **Policy**, which sets the agenda for the planning, procurement, delivery, maintenance and decommissioning of sustainable infrastructure.
- * **Planning**, which links infrastructure needs to organisational objectives, policies and strategies?
- * **Implementation**, where decisions are made regarding the design, procurement and delivery of infrastructure.
- * **In-use**, where infrastructure is operated and maintained before finally being decommissioned in an orderly way. See chart opposite.

The Toolkit had its international launch in Ghana in April 2011 at the Ghana Institution of Engineers in Accra to over 60 engineers and then to over 350 students at the Kwame Nkrumah University of Science and Technology in Kumasi.

Between the launches in London

	Policy	Planning	Implementation	In-use
Sustainable infrastructure				
Climate change				
Financing and anti-corruption in sustainable infrastructure				
Procurement and delivery of sustainable infrastructure				
Building capacity for sustainable infrastructure				

This interactive chart is central to the Toolkit. By clicking any of the icons, users are taken to the various themed method cards. As the website says: ‘Dive straight into the Toolkit’. (www.ice.org.uk/patoolkit)

and Ghana the Toolkit has been showcased at Engineers without Borders meetings, at workshops in Manchester, Strathclyde and at the Royal Academy of Engineering in London and Kentucky, USA, where it drew a particularly positive response from Dirk Bouma (former

chair of the SE Technical Advisory Committee of EWB-USA). The Toolkit has featured in regional meetings of the ICE in the UK, Hong Kong, the Zimbabwe Institution of Engineers UK, the Nigerian Society of Engineers and the Association of Consulting Engineers.

Conservative government followed the recommendations of the 1957 Herbert Committee to separate generation (in England and Wales) from distribution and sales. Lord Tombs describes this as an odd decision which was ‘entirely political, with little or no thought for the practical managerial consequences’.

Thus was created the Central Electricity Generating Board. It had a monopoly of generation, until privatisation in 1988, and 12 local boards responsible for the separate job of distribution and sales. One consequence of this inefficient arrangement, writes Lord Tombs, was that the CEGB promoted the construction of gold-plated power stations which contractors found were not competitive for overseas customers.

He recommended forming an electricity corporation with a potential division into five competing divisions, each large enough to finance and build large power stations.

Apparently the 1979 Conservative government found it politically

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(Continued from page 17)

impossible to implement this proposal, favoured by the previous administration, and chose a different route for privatisation. A consequence of this has been that a number of our electricity utilities have passed into foreign ownership.

The advent of cheap gas was probably a mixed blessing. Gas-fired power stations are quick and cheap to build but we have very little storage capacity to cover interruptions in supply. The reliance on one fuel (which we now have to import) has led to a decline in our traditional industries building turbo-generators and combustion plant. In future, we shall have to buy abroad.

Lord Tombs is also critical of Labour’s love affair with wind power. He describes it as expensive to build and the potential value has been greatly exaggerated. Government’s estimate

Almost all of these presentations have been undertaken by the apprentices. The Toolkit has also featured in numerous magazine articles (*NCE, the South African Institution of Civil Engineering Journal, and the Global Urbanist*) and various in-house corporate newsletters.

Project themes

Funding has been received from the Royal Academy of Engineering’s “Ingenious” public engagement scheme to roll-out the Toolkit in the UK to companies, universities, school and civil society. Twelve events are planned, and the search has begun to find suitable venues in each of the UK’s 12 ICE regions. Plans are in hand to extend the Toolkit contents and turn it into an i-App, and UNESCO are funding the printing of 4000 hard copy samples of the Toolkit for worldwide distribution.

There is no doubt that the successful delivery of the Toolkit was the highlight of my year. There were many who doubted it was possible and in the lead-in to my presidency I was often asked ‘what was plan B?’ There was no plan B. The apprentices delivered. And that is what we expect our graduates to do. To deliver. To be confident. And to know their subject and its context.

of the subsidy required by wind power – £30 billion by year 2020 – ‘a stealth tax in all but name’ he calls it. It is more than sufficient to meet the cost of replacing nuclear power stations.

Lord Tombs sees the ‘visceral opposition of the Labour government to nuclear power and the accompanying obsession with wind power’ as a threat to our future supplies. For the solution he says ‘we sorely need a technically competent and independent body capable of long-term strategic planning for a national electricity supply’.

This chapter should be essential reading for all interested in our electricity supply, especially the young. It explains why we are in the present situation and how we can avoid in the future.

The political horizon is too short for an industry which has to plan for 30 years ahead, and at the end of this book the reader is left with the clear conviction that planning the national electrical supply system is best guided by engineers. **Robert Freer (Civils DIC 55)**

Bridge builder's expertise recognised

DR ROBIN SHAM (Civils 82) has just become one of an elite group to be awarded a fellowship of City & Guilds of London Institute.

Director of global long-span and speciality bridges for AECOM, Robin has been recognised by his peers on a number of occasions.

In 2009, the Institution of Civil Engineers gave him a



prize for the best paper published during the year. Robin highlighted AECOM's innovative achievements with the Stonecutters Bridge project in Hong Kong. It has since been featured on the Dis-

covery Channel's Extreme Engineering series.

The following year, China's Sutong Bridge was named '2010 Outstanding Civil Engineering Achievement' by the American Society of Civil Engineers.

Friends celebrate 80th birthday

LEN GORE (Aero 53) recently attended the 80th birthday celebration of one of his closest friends from undergraduate days, Malcolm Bennett.

He writes: 'The celebration took place on Malcolm's actual 80th, September 25, and was attended by numerous family and friends.'

lengore@talktalk.net

From left John Stoton (Mech Eng 53), Malcolm Bennett (Aero 53) the birthday 'boy', and Len.

Imperial Boat Club celebrates 50 years



ON JUNE 30, some 13 members of Imperial College Boat Club's first and second eights of 1960/61, with John

Galley (Zoology 64 & staff, 1st VIII 1958/59) and a bevy of wives and partners, met in Henley.

They were celebrating the golden anniversary of having represented Imperial in the Henley Royal Regatta of 1961.

Those present included the entire crew and cox of the first eight and four members of the second eight, some having come from as far away as Australia, Thailand and the USA in order to take part.

The party enjoyed a sumptuous champagne lunch in the Thames Room of the Henley River & Rowing Museum, before proceeding to the Upper Thames



Rowing Club Enclosure, strategically placed at Remenham, to watch the day's racing. All the while they continued to exchange news and reminisce over the intervening 50 years.

These celebrations had been excellently organised by former Club captain David Kealey (Chemistry 61) and each attendee received a souvenir Golden Anniversary Crew Record, with photos and details of their wins. Grateful thanks were accorded to David, and also to John Galley for facilitating free access to the Upper Thames Rowing Club Enclosure.



Lead mining recorded by Derbyshire villagers

ANYONE interested in the history of lead mining will be glad to hear that residents of the Derbyshire villages of the Hucklows have produced a book, *Lead in the Veins*.

It was conceived and edited by a local poet with chapters written by different villagers. They had decided it was an essential part of their local heritage that needed recording before it passed from memory.

Tony Greenfield (Min 52) helped with the editing and detail checking, spending a number of days in Imperial's library.

Tony's wife, who is considered a bit of an expert on social and economic effects of the

lead mining industry in the Peak district, wrote a long chapter based on her own research.

The book has been published using money from a Heritage Lottery Fund grant. Villagers have also produced an illustrated Lead Rake Trail leaflet and interpretation boards and made accessible archive of material including a collection of some 3,000 documents.

Lead in the Veins is produced by Hucklow Publishing and costs £5 (ISBN 978-0-9563473-0-5). It is available through local bookshops, the Peak District Mining Museum in Matlock Bath and Peak District National Park information centres.



College visit evokes memories

OVER FIFTY years ago, a bunch of fresh-faced young hopefuls walked up the steps to the Royal School of Mines to launch their mining careers. Now captains of industry from Canada and the Australian outback, the ex-owner of a leading mining publication, mining industry advisers and subway constructors, they came back to Imperial College to celebrate that day in 1964.

Ten of that initial bunch visited RSM in August to be

welcomed by John Cosgrove, professor of structural geology. The alumni, plus their spouses, were treated to a tour around the college, which had not been visited by some of the group since graduation.

Of course the place had changed. The colours were fresher, the rooms more orderly, but the tour evoked memories of those days when we were studying for our future.

Then a stroll around to 58 Princes Gardens to the Garden

Room, to lunch upon country paté, fillet steak and a dessert of chocolate brownies, accompanied by Imperial's finest claret and sauvignon blanc.

To ensure that we were still in good form after that, John took a group of us up Queen's Tower, after which we adjourned to the Zetland Arms in Old Brompton Road, one of our, old and many, watering holes in South Kensington.

Julian Bennett
julian.bennett@btinternet.com

THE FOURTH CGCA London Walk of 2010-11, entitled 'Without the City Walls', took place on June 25. It was at full capacity with some 19 members and guests, of a variety of ages, taking part.

Starting outside Tower Hill tube, guide Malcolm Dick talked about the section of Roman city wall nearby. Moving on, we passed over the Roman wall to Fenchurch Street Station. In Crutched Friars, we saw the modern statue of two *fratres cruciferi*, members of the numerous orders founded in the 13th century.

We moved on into Houndsditch, whose name remains despite big business attempts to change it to something more 'pleasant'. We noted the church of St Botolph without Aldwych (saint of travellers), where a church has stood for 1,000 years. After passing the Metropolitan Line stations of Aldgate (1876) and Aldgate East (1884 & 1938), we arrived at Brick Lane. On the way we

Walks raise money for Guide Dogs



saw the sites of the gruesome 'Whitechapel Murders'.

In Brick Lane, with its many Bangladeshi-run eating houses, we arrived at the mosque, formerly a synagogue, and before that a Methodist chapel and earlier a Huguenot church. In Fournier Street, where properties currently change hands for over £2m, the roof-top many-windowed workshops of the ancient silk-weavers could be seen. This rich helping of his-

tory ended when we arrived at the impressive Christ Church, Spitalfields, completed on a massive scale to a design by Nicholas Hawksmoor in 1729.

The walkers, by this time parched, were delighted to repair to a nearby hostelry before dispersing. Organiser, John Backhurst thanked the walkers for their support for the Guide Dogs charity which has received £400 from the past year's walks.
Chris Lumb (Elect Eng 61)

IN BRIEF

Calling Chem Eng from 1972

DURING the summer of 2012, a 40th year reunion is being planned for those who graduated in 1972 from Chemical Engineering. If you have not yet been contacted, or know someone from the year, please send a message to gjackson@triocompany.com or via [facebook.com/gordon.jackson.123](https://www.facebook.com/gordon.jackson.123)

Miners are useful!

WHEN you next down a classic daiquiri (made from white rum, lime and sugar), take a moment to drink a toast to an unnamed mining engineer. Coen Louwarts (Min 95) found the following on a menu...

'...supposedly invented by a mining engineer after he ran out of gin while entertaining some guests and named the cocktail after the mine.'

50 years on

I'VE BEEN to the golden wedding celebrations in Sudbury, Ontario, of Ian and Ann-Margret (née Radford) Plummer (Min 58 and Maths 58 respectively), writes John Bramley (Min Tech 56, 58). 'Ian had been my best man in 1961. Also at the party were Gillian Bullock (née Tilden-Smith, Biology 59) and Bill Hudson (Met 55).'

80s winner

IN JULY, Ted (or Ed, Min 52) Whitlock competed in the Masters' World Track and Field Championships in Sacramento. He won the 1500, 5000, and 10000 meter races in the Over-80s. And very easily.

He didn't run in the marathon, but the man who won was 25 minutes slower than Ted's world record time earlier this year.

Jim's work not held back by illness

JAMES WENDON (always known as Jim) died suddenly on August 7 after a long illness. He was 78.

Returning from National Service in Korea in 1954, Jim came to City & Guilds to study mechanical engineering. He joined the Railway Society and Photographic Society.

He became interested in the Free-Piston gas producer used for either air compression or in conjunction with an exhaust gas-turbine, and had an article published in the Guilds Engineer.

When he graduated, Jim joined English Electric as a graduate trainee, eventually joining the

patent department. Eventually he joined Metal Box as head of the patents department which he set up.

As a singer's son, Jim joined a Gilbert and Sullivan company where he met his wife, Marian..

On leaving Metal Box, Jim set up in practice on his own.

In 1998, Jim suffered major heart problems and he only survived due to Marian's insistence that he received the correct treatment. In 1999, they moved to Southsea, to be nearer to the children.

Although far from well, Jim carried on working, only giving up two years ago. However, he became a cathedral guide and a volunteer in the Library of the Royal Marines Museum.

He was a great friend and we shall miss him.*

Richard Wood (Mech Eng'57)

An all world-rounder

JOHN ARREGGER (Chem Eng 52) was re named 'Big Bill Arregger' by fellow Dulwich College pupil Bob Monkhouse, when he returned from evacuation in Canada with a pronounced accent. His nickname was Bill thereafter.

While studying chemical engineering, John was the proud owner of a 1953 TR3 (still in the family) and was playing trumpet in various groups, becoming a regular member of Pigotts Music Camp and Bernard Wheeler Robinson's informal orchestra.

After marrying in 1958, John was a successful chemical engineering consultant, which included flying all over the world to act as an expert witness in legal disputes.



John and Bridget Arregger

Following his divorce in 1996, John replaced his Nicholson 32 yacht with a Hallberg Rassy 42, more suited to sailing round the world. He embarked on his 10-year circumnavigation, accompanied by many friends and relations, including Bridget Adams, lecturer and writer, whom he met at Music Camp.

Bridget's book of the trials and tribulations of partnering a sailing enthusiast, not yet published, makes it clear why she decided not to crew the whole way around the world, though she fly out to join him and sail some of the shorter legs. They eventually married in 2009 after they bought a house together in the Cotswolds. John died on June 16 aged 82.

Relationship skills put to good use

A MERCHANT Taylors scholar, Don Bartho graduated as an 'Electrical' in 1954. He passed his National Service as electrical officer on HMS Alert in the Far East and, on return to the UK, joined AEI to resume training.

In 1961, Don married Catherine, an Australian, and settled

near Sydney where he joined AEI as a projects engineer, working for the rapidly expanding steel industry. After GEC and AEI merged, Don's skill in personal relations led in 1982 to his appointment as manager of the projects division before he left to become a consultant. Don

also worked for Mission Australia, assisting the long term unemployed.

In 1997, Don contracted Parkinson's disease and during the last few years he was lovingly supported by his wife. Don died on August 5 and is survived by his wife and three daughters.

Busy till 90

HAVING joined the TA in summer 1939, Eric Cox saw service in key theatres of WWII, landing on Gold beach on D-day, After demob as Major commanding the 8th Armed Signals, he gained a first in Electrical Engineering in 1949.

Eric started work as a graduate apprentice with BTHA, Rugby. Later, he was district engineer with British Oxygen, reorganised the Post Office engineering department in Northern Ireland and Eire and, from 1963, was with Radyne Wokingham. It was a world leader in induction and dielectric heating, and Eric later became commercial director.

Eric worked with CAB, was a parish councillor and school governor after retirement. He enjoyed golf, which he played into his 90th year, dinghy sailing, choral singing, watercolours and travel.

Computer training helped 45 countries

CHARLES EASTELL died peacefully with his family by his bedside on Christmas Day, 2010, aged 83.

As his widow Mary writes: 'He had enjoyed a long active life, loved his teaching years, family activities, travel and varied hobbies, including walking, reading, music and as a DJ with the local hospital radio.'

Charles (Min 52) studied at the RSM where he was a keen member of the rugby team. After five years in the commercial world, he became assistant professor of metallurgical engineering at McGill University, Montreal. He also found the time for further studies and graduated with an MEng.

Back in England in the 60s, Charles was a senior systems engineer with IBM and Hawker Siddeley. He was glad then to return to academic life.

Charles' lecturing and management roles in computing courses at University College were wide. In particular, he had key involvement during the seventies with the Computer Management Course for Developing Countries. All

the postgraduate students who completed this course returned to one of 45 countries able to manage new computer centres providing services for training, administrative data processing, technical computing, research and education.*

Not in father's footsteps!

DESPITE being the son of a president of the Institute of Electrical Engineers, David Angwin chose to take his degree in mechanical engineering. He started this in 1940, but service with combined operations on D-Day and submarines meant he only qualified in 1948.

David's career started with GEC and continued with two years in the US. In the mid-50s he was engineer and then consultant in building three atomic

power stations, including the Tokai Muri reactor in Japan.

After a series of senior managerial roles with GKN, David became a consultant specialising in recovering and refinancing manufacturing industries. Directorship of a range of companies followed.

A member of Worcester Samaritans since 1988, David visited the Antarctic three times and the Arctic twice. He died on July 15 aged 88.

Ivan loved simple things in life

This obituary is an abbreviation of one in The Guardian and was written by Anne Burgess. To read it in full see the panel on this page.

MY HUSBAND and best friend, Ivan Burgess (Elect Eng 57) died of oesophageal cancer aged 65, on April 27. He had a full life and a passion for real ale. In 1976, while working as a studio engineer at the BBC, he applied for a job to convert the disused Melbourn Brothers brewery in Stamford, Lincolnshire, into a museum. Just over a year later it had registered more than 10,000 visitors.

An Essex boy, Ivan attended King Edward VI school, Chelms-

ford and took electrical engineering at Imperial and had an apprenticeship at Marconi, before joining the BBC. He worked often in the Lime Grove studios, and founded the Lime Grove Beer and Railway Appreciation Society. In the mid-70s he was chairman of the west London branch of the CAMRA

In the early 1980s he worked with a video unit that made training films for Barclays Bank. Later, as a freelance engineer, he created Independent Broadcast Services Ltd.

Ivan jokingly said that he overcame his lifelong aversion to the Scots by marrying me

in 1983. We shared very happy times together. A gentle-natured and noble man, with a big beard, beaming face and unfailing enthusiasm, Ivan loved the simple things in life – real bread, real beer, real coffee and true friends.

Music, both classical and jazz, was his favourite relaxation and he played the piano and the church organ.

Ivan was a loyal friend and a generous colleague who willingly shared his expertise with others. An independent spirit with well-developed views on many things, he had a wealth of anecdotes which he loved to share. He enriched our lives.*

Tribute to Pete

AFTER graduating from Imperial (Min Eng 95 ARSM, MSc DIC CEng), Peter Calderbank spent the rest of his working life in Turkey working for various companies on numerous projects until his final years. He returned to the UK where he was a study manager for Wardrop Mining and Minerals UK Division.

Pete had fond memories of his time spent at Imperial, especially with their rugby team and social occasions as well as the sponsored cycle ride to Seoul Olympics for Great Ormond Street Hospital. He played left back for the City and Guilds soccer team.

The funeral on September 15 was attended by Pete's contemporaries at RSM – Kurt Budge, Eddie Gadd, Lewis Hands, Mike and Anne Oxley, Rob Rowe and Warren Turner.

Pete's family would like to extend their gratitude for all the kind words and letters received from fellow Imperial friends and colleagues and also from the worldwide mining community.

From William Calderbank

Late news

AN INTERCHANGE of emails has brought to light the sad fact that John Reason (Elect Eng 61) died in 2007.

Described in an obituary as 'award-winning industry editor and humanitarian', John was with *Electrical World* during the 80s and 90s, eventually becoming editor-in-chief.

An obituary has also been received for Tony Barringer (Geol & PhD 54).

To read these go to the website published below left.

David spent life in films

DAVID WEEKS died peacefully from Alzheimers, on February 11, aged 84.

In 1946, he completed a two-year degree in mechanical engineering, aged just 19. During a post-graduate year he conducted research for Imperial, assisting the Admiralty to determine the safety of turning full steam onto a steam turbine without warming through first. He also played left back for the City & Guilds soccer team.

After National Service, where he worked for the RAF conducting operational research into aircraft frequency down the

Berlin airlift corridor, he returned to City & Guilds in 1949, again assisting the Admiralty. He worked under Professor O A Saunders investigating radiant heat transfer in industrial gas turbine combustion chambers burning heavy fuel oils. He simultaneously contributed to a flame radiation project with the Royal Dutch Steelworks at Hoogovens.

After his PhD in 1954, David's commercial life was spent at ICI Films. He conducted research into the screw extrusion of plastics and after a spell as works engineer at Dumfries,



settled as group manager of Films Research.

Following his retirement, David undertook consultancy work for the Crown Agents and set up a computer group for Mind in Hatfield.

From John Weeks

'Miner' who went to top of the world

GEORGE BAND, who died on August 26 aged 82, was one of the last surviving climbers of the 1953 expedition which put Hillary and Tenzing on the summit of Everest.

Two years later he was the only Britain to conquer any of the 14 peaks worldwide over 8,000m.

Returning to Cambridge to

complete his degree in geology after the whirlwind of official Everest celebrations, friends noted that he gave as many public lectures as his dons!

Having received his MSc in petroleum engineering from the RSM, George joined Royal Dutch Shell ending as MD in Sarawak and Sabah. From 1984 to 1990, he was direc-

tor-general of the UK Offshore Operators' Association. He was the speaker at the RSMA annual dinner in 1996.

Award-winning miner

BRIAN COLLINS died at home on March 5. He gained a first class honours degree in mining in 1960 and was awarded the Bennet H Brough Medal and prize for excellence in mine surveying.

Brian's career took him worldwide, starting in Luanshya, Northern Rhodesia, to USA, various locations in Australia, South Africa and ending up in

Canada. He gained a number of additional qualifications along the way in South Africa and Australia.

In 1999, Brian returned to the UK to spend his retirement close to me, his sister, and my family. I have been very touched by all the messages of condolence from friends and colleagues around the world.

Jill Davies

WE REGRET that it has become necessary to abbreviate obituaries published in these pages. In particular, notices of alumni deaths which are more than a year old will be very brief. Those marked with an asterisk * will be available to read in full at www.imperial.ac.uk/engineering/alumni/imperialengineer

OBITUARIES
(continued)

OUR SYMPATHIES go out to relations and friends of those mentioned on the preceding pages and below.

We have received brief information about others mentioned in this column.

RICHARD SYRETT DIC studied mechanical engineering between 1944 and 1947. He died last December aged 84.

PETER TURNER, who died on February 26, studied civil engineering at City & Guilds between 1942-3 and 1946-50. He was 87. Records show that in 1969, he was working for Mears Bros (Contractors).

JOHN WHEATCROFT died on March 14 aged 79. John read mechanical engineering from 1951 to 1954 and 1956-58.

PROFESSOR JAMES LIVESEY (Mech Eng 52) died on May 20, aged 83.

TONY HOADLEY read civil engineering from 1952 and 1956. He died on March aged 76.

JOHN FLASHMAN, life member of the Links Club, died in the summer, aged 97. He read electrical engineering for three years from 1937 and was president of CGCU in 1940. He was also 50th master of Imperial College Lodge in 1972-73.

Sharper in academe

DAVID Doran (Civil DIC 53) remembers, following a n obituary in last issue –
FOR SEVEN years (1973-1981) Dr John 'Jack' Chapman was my boss when he was Ttechnical director of George Wimpey plc. I once asked him how he compared life in contracting as opposed to academic life. Without hesitation he said the knives are sharper in academe!
david.doran@btinternet.com



¡Feliz cumpleaños!

STAFF and postgraduates at UPC (Universitat Catalunya Politècnica) in Barcelona organised an 80th birthday party for the man who has helped so much with their ability to communicate after their doctorates. Concerned closely with training and the writer of a number of key textbooks, Tony Greenfield (Min 52) has, for some time, given them lessons in the correct way to write their research in English. The theme, in reference to his name, was green. He is pictured with a post grad research student and a lecturer in the department of statistics.

'Genuine giant' recognised in States

FOUR mechanical engineering graduates, who all received firsts in 1954, have met several times in recent years. They are Bernard Baines, Sandy Sandercott, Tony Maxworthy and John Radford.

Tony, who has lived in the USA since graduation missed the most recent get-together. However, the group feel that the information that he has been awarded the American Physical Society's (APS) Fluid Dynamics Prize, should be celebrated.

Transformative

'Tony has been a truly transformative faculty member,' says Yannis Yortsos, dean of the University of Southern California's (USC) Viterbi School of Engineering. He called him a 'genuine giant'.

Tony joined USC in 1967 and became professor of mechanical engineering in 1970. He is now Smith International Professor of Mechanical Engineering

and a professor of aerospace engineering. He was chair of Mechanical Engineering for 10 years from 1979.

Influential

'His stature has been hugely influential in attracting top students and faculty to the Department of Aerospace and Mechanical Engineering,' writes the chair of the school.

Tony received the award for 'outstanding and sustained contributions to fluid dynamics, elucidating stability of fluid interfaces, vortex dynamics, insect flight and, notably, to geophysical and environmental fluid dynamics, including stratified and rotating flow phenomena, gravity currents and convective processes'.

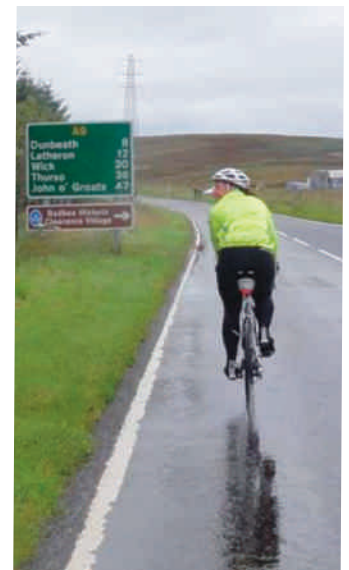
Contact any of the quartet on maxworth@usc.edu, sandys@dsl.pipex.com, BainesBH@aol.com, jm.radford2@ntworld.com

Ride raises over 4,000 hours of nursing

RUTH EASTERBROOK (ARSM Geol 01), colleagues from the NHBC (where she is senior environmental engineer) and others completed the Land's End John O'Groats cycle ride in 10 days.

At the same time, they raised £91,850.64 which will provide 4,593 hours of nursing for Marie Curie! Individually she raised just short of £3,500, thanks to help from Imperial alumni.

The ride included over 10,500m of total ascent through some of England, Wales and Scotland's most beautiful scenery. The weather was almost perfect with only two days of obliging Scottish downpours pesky Scottish midges at bay.



Ruth towards the end of the ride.

NEXT ISSUE

See these pages for the story of how a talk given to a sixth form led to a friendly letter many years later and ultimately a reunion.

I'M FINALLY getting down-to-Earth on Vancouver Island, by starting to do something which I should have done even before going to IC! Success then would have meant that I might never have seen the hallowed halls of the Aero Department! But then I might not have had the varied and challenging career from which I retired in order to live out a relaxed retirement.

Relaxed might be the wrong word because I've been so busy. I've been lecturing on space to the uninitiated through the University of Victoria and by the Continuing Education Programme of Sooke, where I live.

I was a pioneer in setting up the Canadian Space Station Programme, brought space technology down-to-Earth through the European Space Agency's Harsh Environments Initiative and was the first training officer and deputy director of the Canadian

How not to get rich

or panning for gold on Vancouver Island

by Parvez Kumar PEng, ACGI, FCASI (Aero 62)

Astronaut Programme, so from up there in space, to down here on my knees swirling water in my pan along the Leech River is quite a change! (Pictured)

How I ended up on my knees is a story which began with me becoming part of the Juan de Fuca Search & Rescue team of volunteers dedicated to assisting those in need or hopelessly lost in the wilds.

Countless trips and hikes into the 'back-country' familiarised me with the beauty of the wilderness and the rivers and streams that flowed through it. 'There must be gold in them thar hills and rivers', I thought.

The rest is history. I joined

with the Vancouver Island Placer Mining Association and, under the mentorship of one of my senior search and rescue managers, I am now learning the trade!

Getting to the appropriate claim one must drive many kilometres on an old and rough logging road, praying constantly not to have a puncture as help is non-existent except for my few compatriots in the cavalcade. Food and water for an unplanned overnight stop are essential. Here my Search & Rescue skills come to the fore.

One arrives at the planned GPS coordinates and then slides

and scrambles down the steep slope to the river bed carrying all the essentials for 'becoming rich'! What a hope – this river has been panned out since the 1860s! Parked at the side of an old logging road in the wilderness. Bear poop is indicative of the native inhabitants!



AT IMPERIAL, with a little bit of luck, I became a film extra, and took my engineering studies with me as I went to studios around London.

I might be dressed in the uniform of a German sailor in the movie *Sink the Bismark* while designing a bridge or a factory building, when the call would come – 'Everyone on set'. We would take our places on a mockup of a German battleship. In *Around the World in 80 Days* my face is hidden by huge Victorian whiskers.

I graduated in June but I was making too much money in movies to go to work as an engineer. In November, when the sun disappeared in England, I joined a firm of engineering consultants in Victoria Street. It was utterly boring, and in May I ran away to Canada.

Again a little bit of luck. In Montreal I interviewed for a post as a site engineer building a radar station in Labrador. The job was really out of my league. It meant being responsible for four other stations. I would be in charge of three engineers and several hundred tough construction workers. My total experience was six months in a drafting office.

The zone engineer looked

Many and various are the careers pursued by engineering alumni John Rogan (Civils 55 below), who diversified even as he studied, and carried on his life of change.

With a little bit of luck!

at my application and asked 'You were in the Royal Engineers?' I was in the Canadian Royal Engineers, and we met a lot of Brits. Good guys. Did you build any Bailey bridges? I'd been a training officer teaching raw recruits how to put Bailey bridges together. So we chatted, and I was hired.

It was a great experience, and with a little bit of luck and a lot of bluff I managed to build the radar stations. I made friends with two Mounties and their Eskimo friends and went 'on patrol' across the frozen ocean.

After two years in the frigid north I wanted to get warm, so I jumped on a boat for the Canary Islands. Sun and palm trees, Spanish cooking and wine and tapas, and beaches.

I had my Canadian Airlines bag over my shoulder when someone called, 'Hi Canada, where you from?' Four Canadian

journalists from the Vancouver Sun were sitting on the beach. They started to brainwash me about British Columbia. 'Mountains? The Alps are nothing. Come and see the Rockies, and Whistler Mountain' and so on.

I arrived in Vancouver a few days after 200 engineers had been laid off by a consulting firm. Too stubborn to go back to Montreal, I drove taxi.

I sold insurance. I finally got into engineering and unwillingly became an expert in designing plate girder bridges.

Then I met S. She was a paediatrician and had never known an engineer before. She was swept off her feet and we were married, with a small house and a sailboat.

The sailboat became part of the problem. I'd always yearned to go around the world in a sailboat. We were going to Europe

for a vacation, so I suggested a ride back on a sailboat.

After skiing in the Alps, we bought a Lambretta in Milan and drove across France and up to England. We ended up on a fishing boat, converted into a motor sailer, 60 years old and 39 foot long. The skipper was a professor of law.

I should have put S on a liner, because that was also the year I told her that I was going to go back to school to become a doctor. The divorce was friendly: she kept the house while I kept the sailboat.

Soon I was broke and in debt. But I was doing work that I enjoyed more than any other work I had ever done in my life.

In French Canada I learned all the medical terms in French. Then I came down to South Texas, and had to do the same thing all over again in Spanish.

I enjoyed my years as an emergency physician, and then opened my own clinic. I semi-retired several years ago, and with that I'll end this short story.

johnrogan@yahoo.com

