



# Imperial ENGINEER



**LEARNING & TEACHING STRATEGY**

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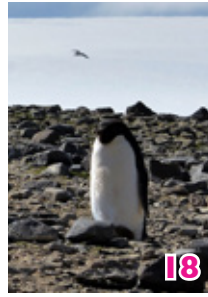
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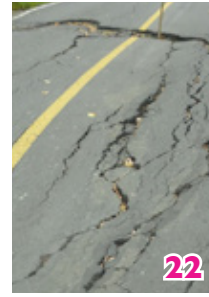
For members of City & Guilds College Association  
and The Royal School of Mines Association

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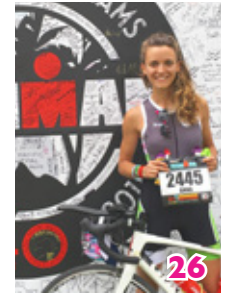
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Front and back cover  
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Iceberg off the  
Antarctic Peninsula.  
Image courtesy of  
Madeleine Hann.  
(See pages 18-20)

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URLs at the end of items indicate more details online.

Where appropriate we use bit.ly short-links for readability and useability.

Faculty news items that are derived from Imperial News have a short-link to the original item where full attribution details can be found.



One of the most enjoyable events of the CGCA calendar is the 5 & 10 reunion lunch organised by Peter Chase. This year's event, held at the Polish Club on Saturday 17<sup>th</sup> November, was attended by over 53 alumni, partners and guests. As in previous years, a number of the alumni spoke about their careers and experiences. The oldest member to present was Malcolm Bennett, an aeronautics graduate from 1953. Other speakers included Haroon Ahmed, Peter Garratt, Martyn Hart and Cathy Hunsley. See page 30 for more details and some photos.

Perhaps the most important change that has happened to the CGCA in recent years is its conversion from an Unincorporated Association to a Company Limited by Guarantee. This was approved before Christmas by an overwhelming majority of members. CGCA Ltd was formally created and registered on 19<sup>th</sup> December 2018. The transfer from the Unincorporated Association to CGCA Ltd occurred at midnight on the 31<sup>st</sup> December, 2018 / 1<sup>st</sup> January, 2019. The former Unincorporated Association has now been officially disbanded. It is important to note that as part of the change of status the aim has been to replicate the existing CGCA Constitution as closely as possible. Any changes that have occurred as a result of the incorporation have, wherever possible, been limited to those that are necessary or to match custom and practice. The change to a company was necessary in order to stabilise the future of the Association, particularly in relation to the new information disclosure laws that have recently come into force. We are particularly grateful to Roger Venables and other members of the Executive for their sterling work in creating CGCA Ltd.

The Annual Dinner was another high spot. This was held at the Carpenters' Hall on Friday, 15<sup>th</sup> February and was attended by 106 members of the Association, their partners and guests. The principal speaker was Sir Colin Humphreys, who is Emeritus Professor in the Department of Materials Science and Metallurgy, Director of the Rolls Royce University Technology Partnership in Advanced Materials, and Fellow of Selwyn College, all in the University of Cambridge. Colin spoke about his career and the fact that he is also a graduate of Imperial College, although from the Physics Department. He has been responsible for much important work on advanced materials in relation to Rolls-Royce aero engines. The reply for the Guests was given by John Burland, Emeritus Professor and Senior Research Investigator in Geotechnics, Imperial College, London. John has undertaken important work in the field of Civil Engineering throughout his career – but is probably most famous for his work on stabilising the Leaning Tower of Pisa. He said that the overall project had taken almost 10 years to complete. Many of the guests gave the Association feedback on the dinner, saying that it had been a particularly enjoyable evening. One of the highlights of the dinner was the number of students who attended. The Association is very keen to attract more student members and will make particular effort to increase student attendance at next year's Dinner. See pages 8-9 for some photographs.

*(Continued overleaf)*



## Richard Kitney

# PRESIDENTS REPORT



## Tim Cotton

There are lots of great things that the RSMA and RSMU have been doing since I last wrote in September last year. The biggest is probably the awarding of three £1000 bursaries to final year students in mid September (see pages 10-11). This is a significant example of how you are directly supporting students at the RSM. Remember ALL the funds for this Bursary have been raised by YOU through your kind generosity at events and specifically by those members who have supported the 100 Club. This is an amazing achievement and is a concrete example of former students of the RSM who want to give back to the current student body. The 100 Club is slowly growing and I would encourage you, if you are able, to sign up and support the RSMA via the 100 Club, or by a one-off donation. Your support is truly appreciated!

The 134<sup>th</sup> annual dinner was held on Friday 23<sup>rd</sup> November at the Rembrandt Hotel in Knightsbridge and saw the Committee and me joined by 107 guests, of which 50 were current RSMU students. A great night was had by all with students almost out-numbering members (see pages 6-7). The trick now is to get all these students signed up! At the dinner, we were able to award in person the Peter Harding Memorial to Professor Rees Rawlings, and the Professor Rees Rawlings Award to Dr Eleanor Jay. In addition, we drew the third winner of the 100 Club Draw and this went to Bernie Pryor; Bernie has very graciously re-donated the prize back to the Association. Our speaker for the evening was Dr Eleanor Jay on her career journey since leaving the RSM. Once again, the members of the RSMA were extremely generous and sponsored the vast majority of students attending. This level of support is very much appreciated by the students and I would like to personally thank all those members who supported the students.

Following the success of an RSMU/RSMA careers event in 2018, in early February the Committee once again supported the students with an engaging careers evening (see page 7). During the evening, the RSMA gave a presentation on the history, aims and membership of the RSMA in order to get students to join the RSMA whilst studying.

Late afternoon on Saturday 23<sup>rd</sup> February 2019, at a field near Heathrow, triumph! The RSM rugby team won 15-5 to regain the 117<sup>th</sup> Bottle Match. The weekend was host to a number of other sporting events. Friday, the first day, saw CSM win at Badminton, Squash and Netball. On Saturday, the lacrosse team gained the first victory of the weekend over CSM with a 12-6 win. Hockey carried tales of woe for our teams; our women's team battled well, but fell to a loss, and our men lost the Sharply trophy! Football was an amazing success story with RSM winning 1-0 for the first time in 14 years! Great effort from everyone who played and supported. See pages 12-14 for a more detailed account of each and every game.

The Committee continues to maintain a very active relationship with the RSMU, and has begun to further the links in ESE and Materials. A key piece is engaging with the key societies within them, such as De La Beche, MatSoc and GeoPhysicsSoc, having them join the RSMA Committee meetings, and providing financial support where needed.

There are a number of upcoming events for your calendars. Planning is already under way for the 2019 Summer BBQ for Final Year Students and this will be occurring on Thursday June 27<sup>th</sup>, the day before the last day of term, at the Union Bar in Beit Quad. Also a date has been confirmed for the 135<sup>th</sup> Annual Dinner as Friday November 22<sup>nd</sup> 2019. The Friday before Mines and Money London starts.

The RSMA is diligently working through our membership database to clean up our records regarding membership status, contact details and subscriptions paid. Big shout out to the Imperial College Alumni Office for their on-going support in this effort. In the near future, you may receive a letter or email from myself asking you to update your annual membership to £15. Please consider doing so as with this small amount we can make a big difference to a student at the RSM.

I hope you find this issue informative and I look forward to seeing some of you in the RSM and /or at an RSMA event in the near future. Lastly, many thanks for your support, it is truly appreciated. Remember you can all still use the email address [rsma@imperial.ac.uk](mailto:rsma@imperial.ac.uk) to contact the RSMA at any time. Please send us your news and we will look to share it with the wider RSM Community.

## CGCA PRESIDENT'S REPORT continued

The final event on which I would like to report is the Careers/Alumni evening that was held jointly by the CGCA and the Department of Bioengineering. The event was held in the Department's space on Levels 1 and 2 of the Bessemer Building and took place on the evening of Tuesday, 19<sup>th</sup> March. The event was a sell-out, with over 60 of the students of the Department attending, together with alumni and members of the CGCA. The evening began with reflections on their careers by four of the Department's alumni. Anil Bharath, who is a Reader in the Department, talked about how his research as an academic has translated into a successful company – Cortexica Vision Systems. Cortexica began actively trading in 2009 and since then has provided visual search services to eBay, John Lewis, Macys and others. This was followed by a description by Ben Reeve (a relatively recent Doctoral Graduate of the Department) of his role as CTO of an exciting SME that was spun out of the Department, CustoMem. The company specialises in advanced water filtration, based on synthetic biology techniques. The third alumnus to speak was Stefan Claesen. Stefan graduated from the Department in the 1990s and is now the CEO and one of the Principal Founders of a successful biomedical systems company called Visbion Ltd. Again, the company was spun out of the Department. He described how the company has developed into a world leader in secure medical image transfer, storage and display – with over a thousand systems in 10 countries. The final speaker was Vanela Bushi who is a Masters Graduate of the Department. Vanela is a Director in the Portfolio and Transactions Strategy Team at Syneos Health, a life sciences-focused organisation with over 24,000 employees globally. She talked about the company and 12 years of experience across corporate strategy, deal support advisory and investments – working for a range of organisations, from early stage biotech and medtech companies to large pharma, both in Europe and the US.

All of the speakers stressed how their time in the Department, in terms of both formal courses and interaction with other students and staff, had been a highly valuable experience, helping to develop their subsequent careers. The presentations were followed by a Q and A session. The final part of the evening comprised a one-and-a-half-hour reception with food and drinks. This proved to be an excellent opportunity for networking. The evening was greatly enjoyed by all those who attended. It is a model which the Association wishes to continue in engineering departments within the College.

## CGCA AGM 10 June 2019

City & Guilds College Association Ltd's first Annual General Meeting will be held on Monday, 10<sup>th</sup> June 2019. And just as with the unincorporated CGCA, it will be followed by the President's Evening Supper. Both will take place in 58 Princes Gate, on Imperial's South Kensington campus.

The meeting will be chaired by Professor Richard Kitney, our President since 2017. It will start at 17:30 in the Billiard Room and will be followed by a talk by Dame Judith Hackitt (CGCA President 2016 – 17) entitled 'Systems Thinking – taking an engineering approach to reviewing regulatory failure'. The talk covers the review, led by Dame Judith, of Building Regulations in the

wake of the Grenfell Tower tragedy.

The President's Evening Supper will start with a drinks reception at approximately 19:00 in the Garden Room. Refreshments will be available in the Billiard Room from 17:00.

The AGM and talk are free to attend, and if you wish to partake of the supper advance reservations are needed at £37 for members/guests and £25 for current students. There is a flyer with the details in the packaging of this issue of Imperial ENGINEER or just go to the CGCA Website at:

<http://cgca.org.uk>

## Festival / Alumni Weekend 29-30 June 2019

This year, the Alumni Weekend will be running alongside a special version of the Imperial Festival on 29-30 June. For the first time, Imperial are joining forces with their neighbours for a huge celebration of art, science, technology and curiosity. A collaboration between some of the world's most iconic museums and institutions (including Imperial, the Natural History Museum, the Science Museum, the V&A and the Royal Albert Hall), The Great Exhibition Road Festival invokes the spirit of the first Great Exhibition in 1851 and marks the bicentenary of the births of Queen Victoria and Prince Albert.

### Alumni Lounge, tours and other activities

You can use the Alumni Lounge to escape the crowds, relax and refuel. There's free tea and coffee all day and a few extra treats including a free gift and a drinks voucher for the Union Bars. There will be loads going on at the Festival and you can get a sneak preview on the Saturday. There will be some tours, including the tunnels and the Queen's Tower. Why not get your class together for a reunion? – the Alumni team can help you get back in touch with lost classmates. Many departments will be running special alumni receptions where you can see familiar faces and hear the latest news and research.

All talks and tours are bookable in advance and will only be available to those alumni and guests who have already registered for the Alumni Weekend. All registered alumni will receive an email with a special code to access tour and workshop tickets. Tickets for these events will be released in late April. Some of these events carry a small extra cost in addition to your registration for the Alumni Weekend.

### Milestone welcome

There will be milestone celebrations too. Did you finish your course in 2009, 1999, 1989, 1979, 1969, 1959 or 1949? Drop by the Alumni Visitor Centre in the Main Entrance on Saturday, between 12.00 and 14.00, to celebrate your milestone year with cake and a glass of bubbles.

### Milestone breakfast

Did you finish your course in 1989, 1984, 1979, 1974, 1969, 1964, 1959, 1954 or 1949? Come to the stunning grade II listed 170 Queen's Gate for Sunday breakfast, with a special introductory talk from an Imperial member of staff. The breakfast will take place on Sunday between 10.00 and 12.00. It costs £15 including an Alumni Weekend ticket for the day. The buffet breakfast includes bacon and sausage rolls, pastries, fruit, natural yoghurt with chopped fruit, nuts and honey, tea, coffee and a glass of sparkling wine. You'll need to book your place at the breakfast in advance.

### Reunions

If you want to try to organise a reunion, you'll need to give the Alumni Relations team at least three weeks to produce the necessary data and send out mailings, so get in touch as soon as possible.

Already confirmed class reunions:

### FRIDAY 28 JUNE

Aeronautics, class of 1972  
Petroleum Engineering, class of 1979

### SATURDAY 29 JUNE

Chemistry, class of 1969  
Chemistry, class of 1979  
Petroleum Engineering, class of 1984  
Mechanical Engineering, class of 2009  
International Health Management, class of 2009  
Imperial College Club of Germany 20 year reunion

Registration for the Alumni Weekend is now open. For more details and to register, visit:

<https://www.imperial.ac.uk/alumni/events/alumni-weekend/>

# CGCA / Mech Soc Careers Event

CGCA and Mech Soc (the students' society for the Department of Mechanical Engineering) jointly held a careers event at the College's City & Guilds Building, on the evening of 19<sup>th</sup> March 2019.

In 'Life After Mech Eng' six recent alumni of the department kindly gave up their evening to engage with current students about their careers and their transition from being a student at Imperial to starting a career.

Following previous successful events, Mech Soc decided to adopt a 'speed-networking' approach.

This involved about forty students (mostly in their second year at the department) arranged around six tables. An alumnus / alumna visited each table in turn for ten minutes, to answer questions on and talk to the students about their time in College and their careers to date.

The questions included:

- What attracted you to your current industry/organisation?
- What is your typical working day?
- What challenges have you had to overcome in your career?
- What lessons have you learned?
- What do you wish you had known earlier in your career or whilst you were studying?
- What would you now do differently?
- What are the best and worst things about your career?
- What's the best advice you can give to a current student?

Whilst previous such events have had alumni with a spread of graduation years, this time they had all graduated from the department within the last ten years.

**Disha Panchal, Vincent Chan** and **Alan Mathew** graduated last year. Disha now works with PricewaterhouseCoopers in data and analytics, and is also looking at how data-gathering technology worn by sports-men and -women can be used to help them analyse and improve their performance. Vincent is a wealth analyst with Mercer's and specialises in investment funds related to the insurance and re-insurance markets. Alan is a risk advisory professional at Moody's, the credit-rating agency, where he focuses on supporting clients (typically tier-one banks) with their portfolio management and risk analytics. **Simran Dhadda** graduated in 2011 and now organises and delivers marketing events with Airbus, in which role she travels all over the world. **Adam Gottlieb** graduated in 2015 and, having worked in various subsea oil and gas engineering firms, has lately taken on a new challenge in the business strategy sector as a consultant with OC&C Strategy Consultants. **Aakeen Parikh**, still in the Department and due to graduate this year, talked about her year spent on placement with General Electric.

Careers events such as these can give to students a personalised view of life in industry that is a valuable alternative to that given by the staff of companies during their annual recruitment rounds. Judged by their positive feedback, these events are much appreciated by the students.

Pizza and drinks were provided by Mech Soc and funded by the CGCA, which was represented at the event by departmental alumnus Charles Parry, who, at its close, gave



a short pitch on the merits of joining CGCA and on the OC Trust awards and grants available to students.

Thanks are due: to Mech Soc's Alumni Relations Officer, Nicholas Perry, who organised the students and alumni to attend, and arranged the venue and catering; to Kellianne Bartley, the College's Alumni Volunteer Officer, for writing and disseminating briefing notes for the alumni and for arranging handouts

and badges for them; and to all the students and alumni who took part.

The CGCA always welcomes the opportunity to support joint activities between alumni and current students. We will also provide experienced alumni to mentor students and recently graduated alumni. If you would like to help in that regard or would like more information on these events, contact us at [cgca@imperial.ac.uk](mailto:cgca@imperial.ac.uk)



Left to right: Adam Gottlieb, Alan Mathew, Simran Dhadda, Disha Panchal, Aakeen Parikh and Vincent Chan

# 2018 RSMA Annual Dinner

## Another great evening, brimming with RSM spirit

The 134<sup>th</sup> annual dinner was held on Friday 23<sup>rd</sup> November 2018, at the Rembrandt Hotel in Knightsbridge.

This year, the Committee was joined by 107 members and guests, of which 50 were current RSMU students. As is always the case, the members of the RSMA were extremely generous and sponsored three quarters of the students attending.

After a glass or two of fizz, members and guests were treated with an excellent dinner of a salmon starter, beef and chocolate pud.

We were very happy to welcome Dr Eleanor Jay as our speaker for the evening.

Elly has been a very active member of the RSM and RSMA. Her notable achievements include winning the RSMA Essay Prize, twice(!) and she is this year's winner of the Professor Rees Rawlings Award.

Her story of her journey through the RSM, obtaining a PhD and now working in industry as a Senior Associate at Hawkins & Associates (specialising in forensic investigation and root cause analysis) was entertaining, heartfelt and well received by all.

The Association was pleased to be able to hand out in person the two

RSMA awards announced at the June AGM.

The Peter Harding Memorial Award was presented to Professor Rees Rawlings for his continuing hard work in supporting the RSMA and RSM.

Rees Rawlings was obviously in attendance to personally give Dr Eleanor Jay the Professor Rees Rawlings Award for her hard work in supporting the RSM as a younger RSMA member.

Elly's efforts as the RSMA Web Designer / Editor and ongoing commitment to the RSMA Committee have been very welcome.

To close out the awards, the third 100 Club Draw was conducted.

The prize was won by Bernie Pryor in London. Bernie has very graciously re-donated the prize back to the Association.

The support of the 100 Club members cannot be overstated as they have allowed the Association to be able to award three £1000 bursaries to penultimate year students to assist them in completing their final years at RSM (see the article on page 10, describing the first three bursars).



Photos: Georgios Charitchevlikos, RSMU

**Rees and Anne Rawlings with the Peter Harding Medal.**



Finally it was left to Marta Wolinska, the RSMU President, to close out the evening with a few words and the Mines Song.

Marta has carved herself a place in RSMA history as she gave a festive interpretation of the Mines Song to the tune of Jingle Bells!

All in all an excellent event and good times were had by all and after the speeches and songs the members and guests stayed a while before dispersing.



**Right: Elly in full swing during her speech**



## RSMA 2019 Careers Events

### Supporting RSM students in their next career steps

During early February, forty students and a dozen alumni met in the RSM at the second annual RSMA/RSMU Careers evening. A number of alumni spoke about their experiences at the RSM and explained how this has helped shape their careers. There was a broad cross-section of speakers, ranging from recently graduated to retired, covering a wide variety of professions.

At the end of the evening there was a networking event where all participants were able to mix over a refreshment to follow up on questions and exchange contact details.

Sam Casement, RSMU Honorary Secretary, the organiser, reflected on the event and said, "I thought Thursday night was incredibly successful! It was a great chance for us as students to talk to alumni from each stage of a person's career. On the whole I think the evening went very well and should definitely become a regular occurrence in the RSM calendar."

On March 7<sup>th</sup>, Beth Holman and a few other newly graduated alumni put together an event for the students in ESE. They showcased their journeys from university into work/PhDs/Masters and in doing so showed the current students all the possible opportunities they have open to them.

The alumni wanted to highlight the variation in how they all found their next steps and show that there is no one conventional route to follow for success. As part of this, they put together a booklet of graduated students' stories for the



**Dr Chris Webb getting animated about his career**

current students to take away.

Beth and her compatriots – from the same year and years above – all recognised a need to share experiences in order to offer reassurance, motivation and a fresh perspective to students who are still at university and thinking about their futures. This personal perspective is something students can't always get from the Careers Service.

It can be very, very hard to imagine your life post-RSM and Imperial, and equally easy to forget your university life once you've left. The alumni explained not only how they had applied for and secured jobs/PhDs/Masters, but also how each part of the process had made them feel and how they feel now, looking back on it all.

After the event, Beth commented, "The event went well, but it was clear by the end of it that the most valuable part for the students was

definitely the booklet so I am very glad that we managed to get that printed. The students were very very grateful and felt that it would really help them understand how other students graduated and where they are now. They have kept three

printed copies for their undergrad room, and I have shared the pdf with the department so it should be made available to all students. For these reasons, I'm glad I did it and I'm thankful for the RSMA support in helping offset the printing costs."



**Students and alumni networking after the event**

# CGCA ANNUAL DINNER 2019

On 15<sup>th</sup> February 2019, the CGCA President, Professor Richard Kitney, hosted the Association's 106<sup>th</sup> annual dinner at the Carpenters' Hall, in the City of London. It proved to be a splendid and well-attended occasion, with a fine mix of members, guests and students. The location of the dinner varies from year to year and this time, 106 diners made a welcome return to the Carpenters' Hall after an absence of 9 years. The catering was provided by a City company, the Cook and Butler, which has provided for us on many previous occasions and the wine, as usual, was provided from the Association's cellar.



a former Bo Driver, and current Chairman of the South African Branch of the Association who, visiting London, attended his first annual dinner since his student days.



Photos: Malcolm Mao

**Bo, Bolt and Spanner were in attendance**



**Prof Nigel Brandon, Dean of Engineering, chats with Roger Venables, past CGCA President**



**Prof Richard Kitney, CGCA President, welcomes guest Prof John Burland, with Prof David Nethercot, past CGCA President**



The principal guests were: Sir Colin Humphreys, Emeritus Professor in the Department of Materials Science and Metallurgy, Director of the Rolls Royce University Technology Partnership in Advanced Materials, Fellow of Selwyn College,

University of Cambridge; and John Burland, Emeritus Professor and Senior Research Investigator in Geotechnics, Imperial College London. Both have made important contributions to Engineering, in terms of their own professional activities and in the way they have talked about them more widely to the general public, and both entertained the diners with anecdotes and stories about the their work over many years.



**Sir Colin Humphreys**

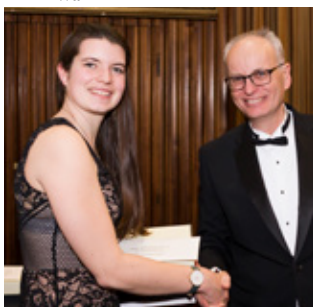
In addition to these speakers, other guests included some of the President's colleagues and research collaborators, as well as senior officers from sister organisations such as the RSMA, the IET and the Worshipful Company of Engineers. A special word of welcome was also made to Mr Richard Gunderson,





It is good to report that students were also well represented. Among the 20 or so in attendance were a number of prize winners, who are listed below.

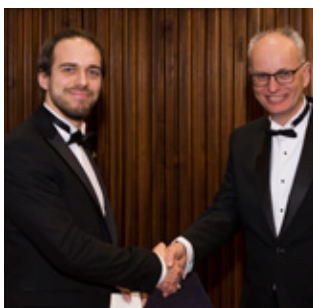
- Esme Hotston Moore (Aero): Holbein Memorial Award, as Sportsperson of the Year
- Ed Speirs (Mech Eng): Peter Moore Memorial Award, as this year's Bo Driver
- Jochen Cremer (EEE): John and Frances Jones Prize, for best all-round contribution to College life by a postgraduate student
- Anna Lawson (Chem Eng): Centenary Enterprise Award
- Matthew Homburg (Mech Eng): Centenary Enterprise Award



**Esme Hotston Moore**



**Ed Speirs**



**Jochen Cremer**



**Anna Lawson**



The first three in the above list are the main prizes of the Association, made every year, to mark outstanding all-round contributions to student life and student activity, or in the case of the Peter Moore award, to recognise the work of the Bo Driver.

Centenary Enterprise awards are only made occasionally to recognise particular achievements. This year, Anna Lawson was recognised for her remarkable sporting achievement in triathlon, coming 7<sup>th</sup> for her age category in the IRONMAN World Championships in Kona, Hawaii, in October, 2018 (see page 26).

Matthew Homburg, a former Bo driver, was recognised for his work in rebuilding Bo's engine, after the major failure which occurred a short distance into the 2017 Brighton Run. The damage amounted to catastrophic failure of one complete half of the crankcase, necessitating making a new one from scratch. This involved many separate operations, starting with laser-scanning the remaining half to produce a computer model, and then using 3D printers to create a pattern from which a mould and core boxes could be made to facilitate a new casting. Once the aluminium casting had been produced – at the second attempt – it needed to be heat-treated to increase its strength, and then machined to fit its twin half and to ensure correct alignment of all the bearings and other moving parts. It will be no surprise that this took almost a whole year, but the effort was entirely successful, with Bo being able to take part in the 2018 Brighton Run and to make a return to the annual dinner after an absence in 2018.



**Matthew Homburg**



In recent years, we have scheduled the dinner on a Friday evening in late February or early March in a Livery Company hall. Early in the summer, we will begin to think about the arrangements for the 2020 dinner, details of which will be made available at the time of the autumn issue of IE.

With this in mind, members, whether they are regular attendees or not, who have any thoughts or comments on the organisation of the dinner and how things might be improved, are invited to send them to me at [c.j.kerr@imperial.ac.uk](mailto:c.j.kerr@imperial.ac.uk).

Colin J Kerr (Civ Eng)



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<http://www.imperial.ac.uk/news/>

# RSMA Bursary Prize Winners

100 Club Sponsors allow awards to 3 RSMA 2018 Final Year Bursary Prize Winners. Over the summer of 2018, the RSMA, in conjunction with the Earth Sciences and Engineering and Materials Departmental Directors of Undergraduate Studies, sought applications for the RSMA Final Year Bursary Prize.

At the start of the Autumn terms we were pleased to announce the following winners;

Emily Gusterson, ESE

Simran Kukran, Materials

Avni Patel, ESE

These three, out of nine applicants, were all outstanding in showing the true RSM Spirit and acting as ambassadors for the RSM. They were able to show the Selection Committee commitment, achievement and excellence above that of their peers in areas such as academic excellence, community & RSM Union involvement, sporting prowess, or contribution to a sport or club within the RSM. Each will receive £1000 from Royal School of Mines Association. These funds have been generously donated by 100 Club supporters who are members of the Royal School of Mines Association, as part of their commitment to supporting the students of the RSM. Read on to learn more about the new Bursars.

**Hi! I'm Emily** and am in my final year of Geology at the wonderful RSM.



It has been an incredible four years, made special by all the amazing people that make up Imperial's best department. Leaving is going to be hard and I wish I was starting out as a

little fresher all over again. But the time has come to wave cheerio to lectures and field trips and join the 'adult' world. The rest of the year will see me hopefully not leaving my suitcase at airports/losing phones as I'm planning on hopping over the pond to British Columbia in Canada where, fingers crossed, I will drool over rocks all the way down to San Francisco before coming back to start work at BP. The graduate scheme I'm joining is a relatively new one and is in Subsurface Information Management (or SIM) following on from an internship I did there last summer. Due to the generosity of the RSMA, I have been able to fully throw myself into life as a 4<sup>th</sup> year by committing to both my MSci project and RSM Hockey which is dear to my heart... The club has seen a great uptake of new members this year and has continued to feel like a family both on and off the pitch (aka, between Belushi's and Harlington). The bursary was the reason that I could still be on the committee of the club, partake in all the goings on in the RSM (including the RSMA and Christmas dinners) and get fully stuck in on my MSci project (with great success - yay!). With this in mind, I would like to say a HUGE thank you to the RSMA for helping me through the final year!

Best memory of the RSM: far too many to choose, but RSM winning the Bottle Match this year was definitely a highlight.

**I am Simran**, a 4<sup>th</sup> Year Materials Science and Engineering student, and wellbeing rep. I am also an undergraduate representative to council and music editor at Felix, the student newspaper.

My Masters project is focused on developing a biosensor for cancer detection. My working day is largely spent in the lab – running experiments until they break and need tweaking again.



I have been lucky enough to truly enjoy my work and meet wonderful people who will be friends for life.

I am keen to help others get the best out of their university experiences, especially when faced with hardship. In council, I am working on lobbying college to review its mitigation guidelines.

I am also working on a paper to encourage college to revise the way students on an interruption are registered, so it is easier for them to take part in union activities.

Getting involved in the RSM and union as a whole has been one of the highlights at my time at university. Before my first bar night, as a fresher, I spent the afternoon helping a friend fashion medieval armour out of cardboard. Despite our efforts and intricate decorations, the hail and wind decimated the costume on the short walk from Eastside. We arrived at the union in hysterics, and remember it fondly each time.

It is something of a shock to realise that was three and a half years ago, and I am grateful for all the opportunities I have been given. My time in the RSM has allowed me to mature and change my world view by meeting different types of people.

This year, the money from the bursary prize has given me a cushion that means I don't have to think twice about how I'll get train

## A very welcome boost at just the right time

In some circles, the award of £1000 may be considered a "drop in the ocean" or "not enough to make an impact". So, for context, here are a few words from the Heads of Department for ESE and Materials as to what they think £1000 means to a final year student.

**Professor Mark Sephton, ESE:**



"For our students who are in the final year of their studies, their enthusiasm is unrelenting but the cumulative financial impact can be sizeable.

The award of £1000 can provide a very welcome financial boost at just the right time.

Yet, I imagine the recognition is worth far more.

To be selected for the award provides valuable encouragement and inspiration for our stars of the future."

**Professor Peter Hayes, Materials:**

"Many students in their final year face a transition from study to employment that is both exciting and daunting.

The prospect of relocation and other costs combined with other uncertainties can make it stressful year.

The impact of a £1,000 award can therefore transform the experience of final year students, ensuring that they are able to make the most of their time at Imperial."



tickets to an interview, or an extra takeaway when I am too tired (or lazy) to cook.

In October, I'll be starting a PhD and the extra cash means I don't have to work over the summer to save for a flat deposit. My project will be developing MRI sequences for brain tumour detection and, although I'm really excited about it, I know I'll really miss my department and the day-to-day friendly faces.

It has been a wonderful experience to watch my materials "children" go from uncertain freshers to MatSoc president and RSM VPCS.

Of course it's not really goodbye and I greatly look forward to coming back to visit them and continue to cheer them on as they make the RSM even better for future members.

**Hi this is Avni!** My time at the RSM has been full of wonderful memories and opportunities. Coming to the end of my fourth year studying Geology, I have had the pleasure of interacting with the RSMA over the years.



Photos: Imperial College

In my first year, after suffering a tear in my ACL and undergoing reconstruction surgery, I received critical financial support from the RSMA, which aided with the extra costs of travel and helped me to maintain involvement in RSMU activities.

Without this help, it is unlikely that I would've developed my affiliation with the RSM that then led to a strong involvement in the RSMU committee and sports clubs later in the year.

During this final year, I have benefitted again from this amazing generosity by receiving the RSMA bursary.

The bursary allowed me to continue dedicating time to the RSMU and focus attention on my studies in the final year. Without this extra help, I would have struggled to maintain involvement in RSM activities as I would've had to spend a considerable amount of time working part-time.

With this extra time, I was also able to dedicate more time and effort into my MSci project, which led me to discover my interest in research. I now hope to pursue a PhD!

My fondest memory of the RSM would have to be Bottle Match this year, the highlights of this momentous occasion included playing in three teams, being awarded man of the match, winning the football for the first time in 14 years, and bringing home the Bottle!

The spirit of the RSM was alive, and the excitement of both players and spectators alike definitely makes it one of my happiest memories here.

# Where were you in Spring 2000?

**Association Update**  
ISSUE 10 SPRING 2000

**Successful dinner date**  
DURING a return trip from downunder, Peter Lewis (right) renewed acquaintance with Brian Wallace and RSMA committee member Fiona Cassidy. They are pictured in the IC Union bar after the annual dinner held in November. See inside for pictures and story.

**Come and join us!**  
TO AVOID RSMA committee and officers becoming well-perpetuating perhaps you should consider nominating someone (even yourself) for next year's committee. That's the message from next year's president Sam Grahb. There are usually three com-

**Where are they now?**  
THE MAILING of 4,200 copies of Update to everyone graduating or leaving RSM since 1979 has raised only 91 enquiries so far. From that 36 joined RSMA, including eight recent graduates. Of the 26 new members, we have sent £50 for five years. Despite falling well short of meeting the cost, the committee will still be justified. Only one notification of a death resulted from the article 'Where are they now?'. This was a random selection of 20 chosen from around 350 for which there are no addresses. With RSM's 150th anniversary due in 12 months, it's most important to be able to contact members, says membership secretary John Warren. Please help by asking fellow alumni if the RSMA office knows their address.

**Fourth year win for RSM's pacy XV**  
THE RSM rugby XV recorded its fourth successive victory over CSM on a heavy woadstap Cornish pitch. First blood was drawn by Jason Duggin, making an incisive run, showing the power and pace that has crippled CSM in recent years. The second try, which epitomised the team's performance followed shortly as constant recycling went down Cambridge defence, before the ball was spread wide and scrum-half James Philip scored in the corner. CSM started long periods of pressure throughout the match which were authoritatively deflected by the RSM pack. Gareth Ellis in particular put in some mighty tackles. In the second half, with the wind behind, RSM was nearly unstoppable. Fly-half Nick Parker was on form with a fine display of tactical kicking and creative defence. by RSMU secretary, James Philip. Ultimately, this capped the energy out of Cambridge, whose principal strength was in the pack. Many powerful running from the rearguard RSM forwards, led by Matt Cockayne, paved the way for RSM's third try scored again by Philip from a five yard rack. RSM's third try was orchestrated by Gloucester captain Olegovon Lawson. He carried through CSM's defence and put in a fairly weighted chip kick for left wing Phoenix Alakija to score. Congratulations go to all those leaving this year who have never lost a Bottle Match. Long may it last!

**2001 odyssey**  
PROVISIONAL plans for the weekend of events to mark RSM's 150th anniversary are being finalised. Further details are included on the separate insert which will accompany this issue. We urge all our members to ensure these dates. Hopefully overseas members will look a trip back to the UK to coincide with the celebrations, says president Peter Gaffney.

back as far as it could go.

I'd had enough. I grabbed the back of his seat and tried to shove it back where it should have been. He twisted round to see who was doing this to him, and I got a look at his big enraged face.

Immediately my red mist faded, and I remembered we were flying to Bogota, the capital of Columbia, which at that time in the 90's was going through the worst drug-induced violence in its history.

The man in front was wearing a leather jacket the colour of dried blood, and an unmatching green shirt. A couple of tough-looking characters were sitting on either side of him. Let's just say they

Going back through the archives, an RSMA Update (a precursor to Imperial ENGINEER) was found.

Reading through the four pages, there was an Annual Dinner update, the awarding of the first Essay Prize winner, RSM won the Bottle, a cry for more members to join the RSMA Committee and some interesting pieces of information from the past. This is what has sparked this little piece – a bit of a walk down memory lane. It is hoped that in future issues of Imperial ENGINEER there can be more of these time capsules published.

Penning by the RSMA's very own correspondent who has taken the pseudonym John Simpson. Here follows a little snippet of advice wrapped up in a story from our correspondent's career.

## The joys of travelling in economy... a word to the wise.

The time was about three in the morning, the point during a flight when, if you're 6ft 2in tall and have been jammed into an economy seat too small for a child for six hours, you are at your lowest.

The big man in the seat in front shifted, snored briefly, woke up and jammed his seat

didn't look like chartered accountants.

In the aisle seat next to me, my Columbian fixer was going quietly spare. She was charming and brave, but she was also clever – too clever to get into a mid-air punch up with three cartel-type gangsters.

"Just be quiet," she hissed.

And so, mercifully, the chaps in front went back to sleep. By the time we were waiting for our luggage to arrive – his seemed to consist of heavily taped cardboard boxes – we were almost friendly. He shook my hand firmly as he left, as if to say "no hard feelings", and it hurt for minutes afterwards.

Like lots of habitual travellers, I normally believe in keeping my seat upright throughout the flight, in order not to make the lives of the people behind too miserable.

But maintaining that posture for a flight to Johannesburg or Hong Kong does become pretty painful, and you arrive shattered.

So, if I am desperate for an extra two or three inches that the reclining seat gives you, I look round and make an apologetic grimace before pressing the button.

It doesn't help the poor so-and-so behind, but at least it shows you care.

# DEVELOPMENTS AROUND THE ENGINEERING FACULTY

## The Bottle Match 2019

### Rugby

RSM Reclaim the Bottle: Royal School of Mines 15-5 Camborne School of Mines.

Following last year's away loss to CSM, the stage was set for the RSM rugby boys to put in a huge performance. With the glorious sunshine, RSM looked strong from the off. RSM kicked off with CSM being dazzled by the Harlington sun. A knock-on from kick off allowed for RSM to start their game strongly within the half of the opposition. A solid, well-worked set piece move from the backs of RSM, followed by some dominant carries from the

forward pack, set the tone of the first half – RSM boys consistently breaking the game line, and the backs committing CSM to some hard lines and out the back plays.

After a solid 10 minutes in the CSM half, a try was deservedly scored by RSM. Parker leapt over the line to take the lead to 5-0, with a successful conversion from the RSM fly-half, Kirrane, taking the score to 7-0. Short exits from the CSM half-backs, allowed for RSM to continue their plays in the CSM half. The success of RSM's structured play led to a strong carry from

Hallett resulting in another RSM try out near the touch line. The two sides then had a chance to regroup at half time, with a score of 12-0.

The game then took a turn at the start of the second half. With CSM kicking off this time, the ball was deep into the RSM twenty-two. RSM missed a chance to exit and after conceding two penalties on their own try line, CSM took their chance and worked their way over the line. An unsuccessful conversion took the score to 12-5. RSM taking their foot slightly off the pedal, gave way for some potential CSM plays to be

made. Although solid commitment from both defensive lines allowed for play to be made around the half way mark of the pitch. RSM gaining momentum and CSM beginning to fatigue, CSM conceded a penalty within their own twenty-two. RSM made the decision to kick for the sticks, successfully taking them up to a 10 point lead. The 10 point deficit deflated the away team and finally the game was put to an end giving RSM the win, with a score of 15-5, and the bottle being returned home.

*George Morgan, RSM 1st XV*

### Netball

This year's Netball Bottle Match proved to be a tough one. With CSM winning the coin toss, they took the first centre and the game began. It soon became apparent that the CSM team had found last year's scoreline a bit close for comfort, considering that they have held the netball trophy since netball became a Bottle Match sport a few years ago.

With a team consisting of Exeter and Falmouth players, against our RSM-ers, our brave battle was no match. The RSM team managed to sneak past the CSM-ers many times and a skillful GK on the part of the CSM scuppered chances of closing

the score gap. This, along with an inhumanly accurate CSM GS, meant that the game was CSM-dominated. This being said, the goals that were scored by the RSM were met with wild cheers from the RSM support.

By the end of the match, CSM remained the victors of the Bottle Match, the Netball win eluding us for one more year. Despite this, the home crowd, homemade flags, banners, and of course those trusty megaphones kept the morale high and CSM-ers aware of the fight that the RSM were going to bring for the rest of the Bottle Match weekend.

### Women's Hockey



Photos: RSMU

Sunny weather greeted us at Harlington as the Women's hockey took first push back, RSM supporters having no competition with CSM for being the loudest.

We had a strong start from the attack, having the majority possession for the first 15 minutes of the game. Unfortunately we had a lull where CSM scored their first 3 goals. This didn't stop us though and we managed to turn the ball around and, for the first time in four years, we scored a goal! This lifted our spirits and spurred us to try and pull it back and beat CSM. Our defence and attack both fought hard, trying

to prevent them from getting their next goal. In the second half, with CSM 4-1 up, the RSM crowd were roaring and we got off to another strong start and, about half way through, we got another goal! With a few more unfortunate CSM goals, with their fast turnarounds getting the best of our team, we finished the match with a 7-2 score.

Even though this was a loss, we definitely did the game justice and, with a such a strong team, CSM didn't know what had hit them. We worked so hard and most importantly we had a really fun game, it was a win for us!



### Badminton

After the 'true' CSM badminton team, in which only 2 out of 6 players were miners (GEOGRAPHERS), won the trophy last year, this year, surprisingly, CSM bothered to send their actual team (of course, a NO-MINER team) to London. However, neither waking up at 5.30am nor a 6-hour drive demolished their excellent racket skills and superb footwork. Again, CSM re-emphasized their dominance of the trophy.

Although the trophy is still out there waiting to be brought home, RSM did much better this year. Not only did we finally have our personalised team shirts on, but we

also managed to win 2 matches, with the final score 8-2 to CSM.

Despite the fact that RSM players were only paired up 2 weeks beforehand, all three pairs fought extremely hard, with good spirits and sportsmanship.

RSM team, undoubtedly, enjoyed the short 45-min game (which was equivalent to the exercise of 3 normal RSM sessions) and displayed some fairly close games for spectators to enjoy. We all have faith that next year RSM Badminton will be crowned champions in Bottle Match and bring the trophy back!



# DEVELOPMENTS AROUND THE ENGINEERING FACULTY

## Football

After a summer of nearlys, Football's finally come home: RSM 1 – 0 CSM.

Following a run of excellent league results, RSM Football went into the big one in high spirits. It had been 14 years of pain since their last varsity victory, although on the back of a draw and narrow loss in the past two years, there were whisperings that this could be the year.

The first half was played out in a manner reminiscent of many a varsity; scrappy with a lack of clear-cut chances, but no lack of endeavour and some typically crunching tackles. Some rogue chanting from a couple of unnamed ex-players (one has a black eye and a love for dirty mattresses, the other an unfathomable enjoyment of a port shower with younger men), kept the CSM players on their toes, however the first big save of the game was pulled off by RSM's resident cat, Jamie Stringer, tipping a header over the top of the bar after a rare breach of the otherwise rock solid defence.

The second half saw the game open up, with Mickey Yu complaining of a cricked neck as he panned his camera from end to end. Captain for the day, Matthew Campbell, thought he'd grabbed the headlines when stroking the ball into an empty net after a fumble from the



CSM keeper, although unfortunately he'd forgotten that kicking the ball out of a goalie's hands has been illegal for longer than he's been a virgin. This sparked a memorable celebration from RSM's yesterday man, Lekan Ogunlana, executing repeated straight drives with yard in hand before being cruelly escorted off the pitch. The introduction of the rapid Jake Bluston stretched the CSM defence, and he proved to be the match winner in the 87<sup>th</sup> minute, chasing a delightfully chipped through ball over the top

to hold off the centre back, and slot past the keeper. The post goal celebratory scenes were a blur, with many hoarse voices still struggling to tell the tale.

Five minutes of stress followed, with some backs to the wall defending ensuring the clean sheet remained intact.

After what seemed an age, the full time whistle finally sounded to prompt pandemonium, with players shedding an understandable tear at the scale of the achievement. Amidst a blubber, Sam 'Bitchell' Mitchell

whimpered that he hadn't cried this much since Alex Whittaker denied him a PhD, and Hockey youngster Dan Lindsey realised he hadn't been conceived the last time RSM had won the football.

In truth, this was a game won by an excellent defensive performance, with George Decaudeveine, Matthew Morris, James 'bullshit' Burtonshaw and Jamie Stringer all outstanding.

However it was the fresher that made the difference.

Jake Bluston for president?

## Men's Hockey

'Twas the last week of Feb  
And all through the mines  
Oh the RSM was stirring  
And giving out fines.

The hockey socks were hung up  
In the changing rooms with care,  
In hopes that the  
Sharply Cup soon would be there.

The CSM were nestled and snug in  
their beds,  
And visions of failure danced in their  
heads.

Eddy in his pads  
and I in my shield,  
Had just settled down for a long  
weekend on the field.

When down on the pitch there  
arose such a clatter,  
I sprang from the sideline to see  
what was the matter.

Dom broke from the back  
he flew like a flash,  
Tore open their defence  
and flicked in a blast.

After five years at the royal miner's  
home,  
The CSM arrived with weapons  
honed.

Despite the home crowd's hearty  
support,  
Our chances of winning were  
ultimately blown.

Jay Ward

## Squash



With no feature in last year's bottle, Squash returned with noise and lots of it.

Ethos witnessed an atmosphere rivalling sporting cathedral and also quality squash played in a great competitive spirit.

RSM took an early lead, thanks to 4<sup>th</sup> string, George Meddings, who won 3/0 but were levelled when 2<sup>nd</sup> string, Jamie Stringer, was outlasted 3/1 by the opposition captain.

Jamie was 1 game and 9-9 in the 2<sup>nd</sup>, so perhaps can be counted as unlucky not to sneak through!

Our 5<sup>th</sup> string, Oliver Taylor-Rose, was out-powered 3/0 by his

opposite number, but played some great Squash himself at times.

At 2/1 down in the tie, 3<sup>rd</sup> string, Eric Newland, needed to win to keep RSM hopes alive but was defeated in three tight games by an experienced opponent.

With the match gone, some pride was restored as team captain and 1<sup>st</sup> string blitzed his opposite number 3/0, leaving the final match score at 3-2 CSM.

With a packed gallery and a great atmosphere, the Friday Squash fuelled enthusiasm for the rest of the weekend sport, here's hoping it stays for next year!

# DEVELOPMENTS AROUND THE ENGINEERING FACULTY

## The Bottle Match continued...

### Lacrosse

Feeling the pressure of being the first team to play on the Saturday of Bottle Match, tensions were high but the raucous support on the sidelines (great banners and chants all round) quickly calmed the nerves before the game began.

The RSM supporters had witnessed unfortunate losses the day before and the RSM Lacrosse team were eager to give them a good performance and win to start the day correctly. Their prayers were swiftly answered and the CSM cheers almost instantly extinguished as 3 goals were scored by the RSM in the early minutes, due to some great drawing from Arianna. The first quarter ended with an excellent 6-1 scoreline to the RSM.

The second and third quarter continued in a similar fashion, with the highlight being a great pass from Arianna almost half the pitch up to Claudia who quickly scored after taking the ball on the crease.

Goals from Arianna, Annie and

Matthew during this period led to a commanding 12-4 lead to the RSM by the end of the 3<sup>rd</sup> quarter.

At this point, however, it seemed as if CSM had suddenly discovered

some newfound energy, as the RSM team lost some vital players to hockey. CSM quickly rallied, scoring two goals past an increasingly angry RSM Goalkeeper. In the end though,

RSM were not to be denied, and to the dismay of many CSM fans the RSM played keep-ball until the final whistle and the game ending 12-6.



## President's Address 2019: We Are International

In her annual address to the Imperial community, entitled 'We are International', Professor Gast called on the government to be "ambitious in liberating mobility for academics and students" while securing continued and new European and global research opportunities.

She welcomed the government's announcement of a new 'Startup Visa', extending the duration of graduate entrepreneur visas: a reform that President Gast and Imperial have campaigned for.

She also urged the government to implement science and innovation-friendly policies as the wider immigration system is reformed.

Opening the address, President Gast took the chance to celebrate members of the Imperial community who have received external awards. This year's winners come from more than 25 countries, she noted.

She explained how internationalism is pivotal to Imperial's success. Imperial was international from its 1907 founding, by 1925 nearly a fifth of our students came from abroad. In the last decade, more than half of the College's research papers – 105,000 – had international co-authors, spanning 192 countries.

Meanwhile, about two-thirds of Imperial's corporate support comes



Photo: Imperial College

from collaborations with businesses outside the UK, while students hail from 130 countries.

Such diversity leads to research breakthroughs, she said. For example, Professor Elio Riboli leads one of the world's largest cancer cohort studies, involving half a million participants across 10 European countries over two decades, receiving financial support from both the WHO and the EU.

Professor Gast said that Professor Riboli's 'European Prospective Investigation into Cancer and Nutrition' (EPIC) is showing that a diet based on fruit, vegetables, whole grains and moderate consumption of poultry and fish reduces risk of

obesity, diabetes, cardiovascular disease and cancer.

"Our new School of Public Health in White City will bring this international insight to West London where over 120 languages are spoken in communities having a variety of traditions, cultures and ethnic backgrounds."

Another outstanding researcher, Professor Molly Stevens, "leads a research group made up of academics from more than 25 countries. Their different cultural and disciplinary perspectives have helped the Stevens Group to transform the development of biosensors and brought bioengineering approaches to regenerative medicine."

President Gast added: "I firmly believe that collaborations are important not only across disciplines, but also across cultures. They bring new combined insights, lead to new approaches and help create new discoveries".

President Gast is "proud that Imperial is making international engagement a high priority. We have new and growing collaborations in Africa, Asia and the Middle East, and are augmenting and strengthening our collaborations in Europe and the Americas." Despite current political uncertainty around Brexit, President Gast made it clear that

Imperial "will continue to establish partnerships and collaborations in Europe and throughout the world. We call upon government to expand opportunities to support international students and scholars and to foster and fund international collaborations."

The College will "vigorously defend our right to collaborate with international partners. Apart from national security concerns or government restrictions, we will work with others to further research, education and science diplomacy, no matter where they are from," she said.

The President concluded: "Our international community, our collaborations and partnerships, and our own experiences in other cultures and places have an immeasurable and profound effect on the world.

"We have a great heritage of mixing people, views, ideas and cultures to create wonderful discoveries, insights and works. We must ensure that such synergy continues for our benefit, and for the benefit of society."

<http://bit.ly/IE30-Pres>

Read the full text of Professor Gast's address here: <http://bit.ly/IE30-Gast>

# Fake Honey

Although this issue of IE is being produced in April, the title above is not a joke. Honey has been collected and used by humankind as both a food and medicine for thousands of years. However, in the modern economy, honey has become subject to mislabelling and adulteration making it the third most faked food product in the world.

The international scale of fraudulent honey has had both economic and environmental ramifications. In a recent paper, Peter He (1<sup>st</sup> Year Computing) along with two other authors, Alexis Gkantiragas from UCL and Gerard Glowacki from Hampton Court House School, proposed a novel method of identifying fraudulent honey using machine learning augmented bright-field microscopy.

The Old Centralians' Trust helped fund a trip for Peter to the 32<sup>nd</sup> Conference on Neural Information Processing Systems (NIPS 2018) in Montréal, Canada in December 2018, enabling him to present the paper as part of the 'AI for Social Good' workshop.

Due to the pervasiveness of fraudulent honey products, the authentication of honey has become an active area of research, with nations such as New Zealand seeking to protect their valuable Manuka honey exports and the European Union trying to protect domestic consumer and producer interests.

Current honey authentication procedures include a variety of laboratory-based procedures, conducted by specialists using analytical tests such as quantitative polymerase chain reaction (qPCR), near-infrared spectroscopy (NIR), nuclear magnetic resonance spectroscopy (NMR) and liquid chromatography mass spectrometry (LC-MS), which require expensive specialised equipment. The authentication of honey through microscopy proves difficult too, due to the pollen-identifying expertise required of the operator.

In their paper, He and his colleagues propose a method of honey authentication which utilises microscopy while at the same time eliminating the need for an expert operator. This is achieved through the automation of

pollen classification using machine learning techniques. In this way, honey authentication via pollen can be carried out by non-specialists and at scale (in contrast to centralised testing facilities). Furthermore, their method lays the groundwork for accelerating more advanced quantitative approaches to honey authentication using pollen.

Their proposed pipeline comprises two separate components: the pollen identification network and the authentication network. Given an image obtained from a microscope, the pollen identification network segments and identifies the botanical origin, density and distribution of the extracted pollen grains. The outputs from the pollen identification network are then passed (alongside any other test results, both physical and chemical) into the authentication network, which outputs a decision as to whether or not the honey is genuine.

This modular pipeline allows the authentication network to be retrained for any purpose while the pollen identification network remains static. Furthermore, it allows the authentication network to be replaced entirely with any other classifier (such as a decision tree, for added interpretability).

They were able to demonstrate that their method works by building a proof-of-concept. By using microscopy images from various samples of different honeys, they extracted approximately 2500 pollen images with which to train their networks. They then tasked the network with differentiating five samples of eucalyptus melliodora honey from five samples of manuka honey. All ten samples were classified correctly.

He, Gkantiragas and Glowacki conclude that their proof-of-concept for the proposed solution gives promising results, forming a strong case for further investigation using more state-of-the-art techniques.

Using a modular pipeline would enable the separate final authentication network to be integrated with existing authentication processes. Such a system could prove to be a powerful tool in the fight against fraudulent



Photos: He, Gkantiragas and Glowacki

## Low cost proof of concept workstation

honey, which has cost livelihoods, consumer confidence and the environment.

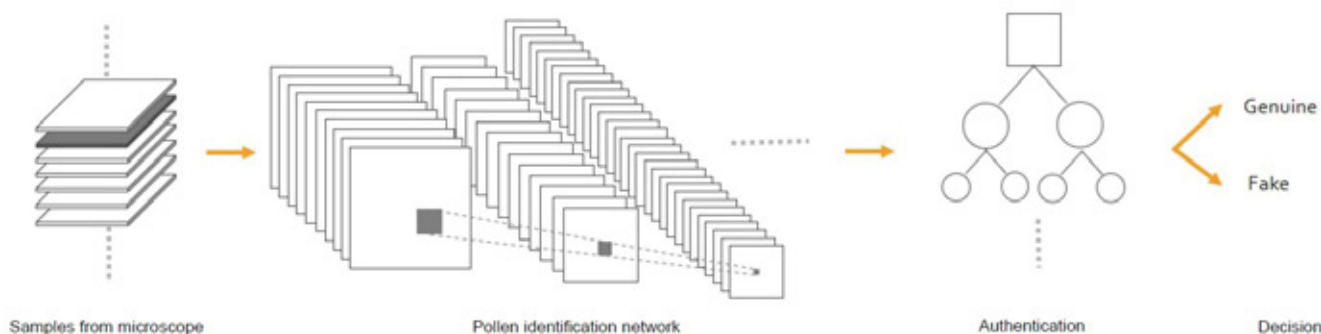
Peter He reported back to the OC Trust on his trip: "It has been an excellent opportunity to learn more about my field, and practice my French (which I'm taking as an Horizons option).

"Through poster viewing and presenting, many a stimulating conversation was started, with topics ranging from the topology of latent spaces in generative models, to the visual system of crabs. I made connections with people from UK universities as well as those around the world including some economists/NGOs who expressed interest in trialling the system across South Africa.

"Overall, the conference was very successful on my part. I achieved everything I intended to (except perhaps revising as much as I would have liked for exams) and had a great time doing so. I learnt a lot and am now catching up with literature in continual learning, a field about which's approaches I had only a foggy idea until now (it's very much in its infancy and I reckon there's a lot of interesting contributions to be made).

In terms of future studies and career, you'll probably be relieved to hear that I've resisted being lured out of college by industry headhunters. In fact, this experience has instead swayed me towards the research path which I hope to continue to pursue beyond the conference at Imperial."

<https://arxiv.org/abs/1901.00516v1>



# Learning and

In November 2016, the College embarked upon a 4-month consultation process with staff and students to assess their views about the state of learning and teaching within Imperial. This coincided with the arrival of a new Vice-Provost for Education, Professor Simone Buitendijk, who had joined from Leiden University in the Netherlands, and led to the formulation of a strategy for learning and teaching (the Strategy), which is currently being implemented. In addition to being based on the wide consultation, the Strategy is influenced by innovation and practice in the east coast universities of the USA such as Harvard and MIT.

## Introduction

A large and growing body of evidence has shown that using more interactive techniques in higher education enables more effective learning, by actively engaging students, increasing their sense of personal and professional identity, improving learning outcomes and creating a stronger sense of community. The Strategy therefore sets out to develop programmes of study based on the latest educational research, some of it done here at Imperial, and to ask questions such as “Does what we do now work or are we just doing what we do for the sake of it?” and “Are there better and more effective methods we can employ?” It is based on four main

themes: a major curriculum review; interactive teaching; inclusion and diversity; and online and digital technologies. This article sets out what the College is trying to achieve and is based heavily on material produced by College to promote the Strategy. It will be followed by another in the autumn edition of IE which will report how the Faculty of Engineering has responded.

At the outset, a budget of £7 million was established, for the appointment of new staff, including people to cover for those in Departments who would be working on the Strategy, as well as for equipment and refurbishment work associated with its implementation. Since then, the budget

has been increased as ideas and details have developed.

The Strategy is based on consultation and research and the College will continue to be led by evidence in its implementation. In particular, this means rigorous evaluation and adjustment of teaching methods based on the evidence. The College is about half way through the process and evaluation of it will begin in the coming years.

## A Review of Curricula and Assessment

In reviewing curricula, the focus will be on building on good practice already taking place at Imperial and on creating the time and space needed to introduce innovation. There will also be a focus on students being able to engage in multidisciplinary activity and to reflect on their learning. The approach will be to enable students to develop higher order skills, such as critical thinking and problem solving, alongside practical discipline mastery. Learning outcomes and forms of assessment will reflect the skills required for the 21<sup>st</sup> century context.

By providing opportunities to apply knowledge in new and unexpected contexts, and time and space to reflect on learning, students will be supported as they deepen their understanding of their discipline and their practical and applicable skills. Feedback is vitally important in this process and will be emphasised within the review, key features of which will include:

- A modular structure that enables greater choice and flexibility within programmes and across disciplines.
- Applying knowledge in new contexts, which could include societal engagement, entrepreneurship and student-led projects.
- Breadth of education; going beyond subject boundaries.
- Authentic assessment, including a variety of assessment methods to evaluate the full range of students’ achievements and skills.

It is recognised that this will mean a considerable increase in workload for Departments, so additional staff resources will be made available.



Photo: Liz Swift, Imperial College



# Teaching Strategy

## Make Teaching More Interactive

The aim here is to move away from the idea of a student passively sitting in lectures, towards a teaching and learning environment in which students are partners in shaping and enhancing their own education. This means enhancing classroom sessions with teaching that is challenging and rewarding, encouraging students to go beyond the retention of information and to place more emphasis on the understanding of concepts.

All Departments have been invited to bid for funding to transform their teaching methods. Staff support and additional resources will be available to underpin the change process and to employ additional discipline specialists where necessary. Funding will also be available to build capacity in evaluation and educational research. Physical spaces on campus will be adapted to facilitate the creation of interactive environments, and to support an inclusive scholarly community.

Deep disciplinary knowledge will remain central to the curriculum, but will be facilitated through an emphasis on inquiry and discovery, analysis, evaluation and reflection. The existing literature on higher education and the many examples of good practice presently available at Imperial will be very important considerations. Success will depend on the creation of world class learning spaces, the use of high quality data, and the implementation of research evidence to inform decision making and evaluate education.

## An Inclusive and Diverse Community

Imperial has always been a diverse community, with staff and students from all over the world, but it may be that we have not always fostered an atmosphere in which different backgrounds and cultures are cherished and recognised as critical to excellence in education. Furthermore, the traditional approach within the College has been to assume that all students are capable and resilient enough to find their own way to success. These days, this may no longer be the case. The Strategy will therefore create and nurture a supportive environment for staff and students that rewards and recognises innovation and encourages active student engagement in positive change.

Training for all staff who teach will be enhanced and strengthened, something that did not always happen in the past. A new scheme will award grants to students who work with staff to implement change within their Departments. More emphasis will be placed on student services to provide the modern, professional and comprehensive support our students deserve. The College will also invest in new initiatives to embed equality, diversity and inclusivity in the campus community.

The creation of a supportive environment is key to fostering a sense of community and this will be enhanced by:

- Supporting staff and students to turn diverse backgrounds and cultures into an opportunity for mutual learning, taking advantage of different experiences and perspectives.
- Strengthening support for students and working to embed equality, diversity and inclusivity in the campus community.
- Establishing a culture that values teaching as highly as research. This means improving recognition of and achieving greater parity of esteem for teaching.
- Creating time for staff to step back from existing workloads to develop innovative approaches to their teaching.
- Establishing new ways for students to contribute to their own and to their peers' educational experience as co-creators of teaching innovations.

## Online and Digital Learning

It is widely understood that digital and online technology can facilitate interaction and participation, enhancing learning, assessment and the development of transferable skills

Imperial has been active in this for many years, but there can always be improvements in this regard. The Strategy therefore proposes more emphasis on digital technology to support interactive teaching, the creation of a stronger sense of community and the application of the latest innovations in learning.

Physical and digital learning environments will be enhanced in order to improve students' broader experience. This will be done by investment in a new resource-rich Digital Learning Hub which will support staff and students in using technology to enhance education. It will also provide expertise and support in learning analytics, educational research and the development of different teaching techniques.

Departments will be encouraged and supported to transform their pedagogy, to be innovative in their use of technology, and to enlist the help of learning technologists in their specific discipline. By developing both open and private online courses, the College will aim to reach even larger cohorts of learners, creating a global community of actively engaged students.

In this way, the College hopes to:

- Enhance the experience of our on-campus students, by supporting the move towards more interactive teaching in classrooms and labs.



Photo: Thomas Angus, Imperial College

- Increase its global footprint in education, by developing online courses for large groups of learners across the globe.
- Create global citizens able to use digital technology in professional environments, by building membership of a community which collaborates and learns effectively both in person and online.

# Stronger Together

Royal Miner Madeleine Hann adventures to Antarctica with the Homeward Bound Project to learn about climate optimism and the power of women leaders.

What did I learn from a 12 month leadership training programme and a 3 week expedition to Antarctica with 80 women in STEMM? How can I concisely communicate why we need more women in climate leadership? This is how...

## We are stronger together

Last year I was selected to take part in the Homeward Bound Project. Homeward Bound is an unprecedented leadership training program for women in STEMM (science, technology, engineering, maths and medicine). The training happens over 12 months, culminating in a 3 week transformational expedition to Antarctica on board ship, with 80 women from around the world. Created by the leadership visionary and dreamer, Fabian Dattner, this international movement facilitates women in four key areas: leadership development, strategic capabilities, visibility and science collaboration.

## The Homeward Bound vision:

To build a global collaboration of 1000 women leaders with STEMM backgrounds in 10 years.

Why leadership? Global leadership is in crisis. As engineers, we know that under current leadership we are pushing the natural world to its absolute limit. The status quo is unsustainable. Women are vastly under-represented at the highest levels of leadership. Homeward Bound is equipping women with the skills and network they require, to have influence in the world for the greater good: a small but meaningful contribution to a very complex challenge.

## Stubborn Climate Optimism

I am part of the 3<sup>rd</sup> of 10 Homeward Bound cohorts. The incredible group of women with whom I shared the Antarctic journey included conservationists, scientists, doctors, engineers, activists, teachers, planners and entrepreneurs. We were joined on the ship by Christiana Figueres. She is an expert in climate justice and led the UN Secretariat during the Paris Agreement negotiations in 2015. She has an

*“The  
HOMeward BOUND  
vision is to build a  
global collaboration  
of 1000 women  
leaders with STEMM  
backgrounds in 10  
years”*

unwavering faith in the ability of humanity to exist harmoniously with the rest of the natural world. She therefore taught us the meaning and need for true, stubborn optimism in the face of climate crisis.

Why women? Systematic, conscious

and unconscious discrimination exists everywhere. The road to leadership is littered with additional obstacles to women. While studying at Imperial, I was excluded from spaces by sports teams and so-called ‘tie clubs’. I found it was not socially acceptable to question this discrimination. I felt intimidated at networking events where I could not see myself reflected in any of the faces in the room. I chanted sexist songs at the top of my voice because I thought this was normal and harmless.

Then I began to think about my behaviour and the behaviour of the people around me. As a young person taking your first steps into the world, these were complicated issues to understand. This was the start of my leadership journey which led me to Antarctica.

## Change is Happening

In 2015, Dr Alison Phipps, and colleagues from the Centre for Gender Studies at the University of Sussex, conducted an independent review of gender bias and organisational culture at Imperial College. This was a necessary step towards an equitable and inclusive community we must strive to achieve.

There are many people doing great work for better at Imperial: from Student Union representatives and Alumni Associations, to the activism of Dr. Jess Wade and Dr. Emma Chapman, to the commitment of Assistant Provost for Equality, Diversity and Inclusion, Prof. Stephen Curry. You only need to read the previous issue of IE to see a showcase of women achieving great things at Imperial College. Change is happening.



## Antarctica brings international challenges into focus

Why Antarctica? Going to Antarctica provides two things: 1) an isolated environment to learn and become a bonded group, and 2) an opportunity to see at first hand what is at stake when we talk about a 2 degrees C temperature change.

Climate breakdown is the most important challenge facing international leadership today. Nothing sharpens your focus on the urgency of the situation more than an intimate proximity to an Antarctic iceberg.

On the ship, we learnt to be compassionate, generous leaders. We taught each other to listen deeply, with curiosity not judgement. We learned to treat each other as resourceful



Photo: Deborah O'Connell



Photo: Kylie Lewis

## Royal Miner in Antarctica

It was a privilege to represent my science and my communities in Antarctica. I am proud of where I come from. I am proud to be the granddaughter of a County Durham coal miner and proud to be a Royal Miner.

I am the youngest member of the Homeward Bound Project. This produced a certain degree of apprehension for me leading up to the journey; an undercurrent of imposter syndrome. But I soon learned that women of all ages and cultures have the same fear and dreams. We all want a safe, stable world. We all want to do what is necessary to achieve this.

and whole. "I am not here to fix you; I trust you have all the tools to fix yourself." Empathy and listening are key skills if you want to make decisions which have lasting positive impact.

## Be a better leader everyday

It is necessary for us all to choose courage over comfort in order to lead constructively. The world desperately needs constructive leaders right now. We can all lead, every day: in the values we live by, our behaviour and our actions. But the key message of Homeward Bound is that we do not have to lead alone. We can do hard things, but we do them together.



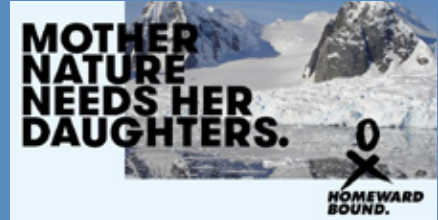
Photo: Kylie Lewis



Photo: Deborah O'Connell



Photo: Kylie Lewis



Follow Homeward Bound Projects:  
 Website: [homewardboundprojects.com.au](http://homewardboundprojects.com.au)  
 Twitter: @HomewardBound16  
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 Follow Madeleine:  
 Twitter: @GeomorphMad  
 Blog: [www.geomorphmad.wordpress.com](http://www.geomorphmad.wordpress.com)  
 Review of gender bias and organisational culture at Imperial College 2015: <http://bit.ly/IE30-Equality>

**Power of Community**

The power of community is undeniable. Prior to my journey south, I attended the annual Royal School of Mines Association Dinner in South Kensington. I arrived alone and was nervous walking through the doors of the familiar Rembrandt Hotel, but I was greeted with open arms by many familiar faces and had a fantastic time meeting current students. I was reminded that we are a family, and no matter how far we wander, our family will always be there to support us. We are stronger together.

Many thanks to the Royal School of Mine Association and all friend and colleagues from Imperial College for their generous contributions to the crowdfunding campaign

which allowed me to take part in the Antarctic expedition.



Photo: Kirstin Mitchell



Photo: Kylie Lewis



Photo: Deborah O'Connell



Madeleine Hann (Geology 2013-17) is a geologist, geographer and advocate for women in STEM. During her 4 years studying at the Royal School of Mines, Madeleine was heavily involved in sports and Student Union activities. She was Vice President for Clubs and Societies for the RSMU and played 3 Bottle Matches as field-hockey keeper. Madeleine is now a Doctoral Researcher in Physical Geography at the University of Manchester, UK. Her current research examines the impact of past climate change on river systems in the High Atlas Mountains of Morocco.

# GR20 Corsica Expedition

In September 2017, five Earth Science students – Max Ralston (MSci Geology), Georgios Chatzitheoklitos (MSci Geophysics), Carla Huynh (MSci Geophysics), Diane Tavignot (BSc Geology) and Harry Brookes (MSci Geology) – were supported by the RSMA Trust to make an expedition to Corsica to hike along GR20, the toughest long distance trail in Europe.



The five Earth Scientists making up the group on the expedition met in Toulon on the sunny Mediterranean coast of France. After a transfer to Corsica, and impatient to begin, at 5am on the 7<sup>th</sup> of September, we departed from the jumping off point in Calenzana. It was a cool start, but the rapid incline dispelled any shivers; this was to be a common feature of the days and weeks to come. That first day was a shock to the system of some and an exhilarating thrill ride to others.

At dinner, we made our introductions to those who would be hiking along the same route as us for the next two weeks. These were from all walks of life: retirees, who made expeditions like this a full time hobby; professionals, spending valuable vacation time on escaping the city; and students who, like us, enjoyed the challenge and freedom of the wilderness.

The following days sustained an incredible level of intensity as we hiked through bare, primitive landscapes where little seemed to survive. Upon reaching the summit of Monte Cinto, the tallest mountain in

Corsica at 2706m, we were greeted with the most magnificent of sights yet: the rugged mountains extending out to sea all around us and our final glimpse of where we'd begun, just a small shadow perched by the glistening blue Ligurian. However, as a result of a storm day, we'd been caught by a company of Belgian Paratroopers who proceeded to clog the queues for every utility. In return, we took great pleasure in overtaking them at every opportunity, receiving many a sour glance in the process. For the next few days the weather was periodically appalling, with gale force winds and persistent drizzle that would disappear just as soon as it arrived. Fortunately, the mountain refuges, though inaccessible by road, were always well stocked with supplies and offered warm if basic shelter from the elements.

We were always glad to treat ourselves to a refuge-cooked dinner in the evening, though it always made crawling into the tent and sleeping on the uneven rocky mountain slopes that much less desirable. On the seventh day however, the weather cleared and we were treated to views of jagged peaks extending far around us. It was hard not to be taken by the rugged isolation of this island, which seemed so far from modern Europe. Nothing worked out there; there was no signal, no power, supplies were delivered by helicopter and walking out onto the paved road, which bisects the island, on the 9<sup>th</sup> day, was like returning to civilization. This wasn't all bad. What it meant was a lot of time for contemplation and self-reflection. Vizzavona, a 'town' marking the midpoint of the trek, was certainly not what had been promised and we were greeted with nothing but a couple of restaurants and a shop being run out of a shed. The place was packed full of tourists anyway. It was hard not to look down on these people, going for little

day walks up actual paths, the cobbled likes of which were an alien sight. We were filthy and scraggly and must have looked more akin to mountain men than fellow travellers.

Every day so far we'd tackled ridge lines higher than 2200m, an average daily climb of 900m, scrambling along stony ledges, as well as descending precipitous faces that, when regarded from some distance onward, it was impossible to deduce a route down. The second half of the trek saw an abrupt end to this madness. That ascent was instead converted into additional distance each day, and small dirt paths began appearing through woodland which sprang up in this new, more forgiving, environment. This didn't reduce the impact of the scenery whatsoever. In fact, we were stunned on the morning of day ten when we came over a saddle to see a spectacular vista. A river valley, shrouded in mist, wound around spurs out onto the coastal plane, where lagoons by the sea glowed in the morning sun and puffs of steam rose from hamlets in the foothills.

Although the island was beautiful and the terrain exciting and interesting to traverse, there was a physical toll to be paid. Swollen knees were standard; the real issues were sprains, exhaustion and blisters, which could stop a walker in their tracks even if they were on top of their mental game. Those last days played out in one of two ways; some gathered all their energy for one final push, doubling the time hiking each day in order to finish sooner, while others slowed and enjoyed a slow ride into Conca, our final destination.

In all, we were overjoyed to finish, having seen the sights of our lives and come through it all relatively healthy. We are also very grateful to the RSMA Trust for helping to make it possible.



# The Ecuador Earthquake

A tale of a civil engineer stress-test, by Nina Jirouskova (Civ and Env Eng)

## The Earthquake

On the 16<sup>th</sup> of April 2016, at 18:58 local time, the strongest earthquake to hit Ecuador since 1979 – a 7.8Mw event – struck the coastal region of Manabi in Ecuador, originating in the vicinity of Muisne at a depth of 19km below surface. The associated fault rupture propagation had a strong South-West directionality, resulting in most of its significant impacts being localised on the Manabi coast, between Manta and Pedernales, with associated intensities of VI-VIII on the Modified Mercalli Intensity (MMI) scale. Recorded peak ground accelerations (PGA) ranged from 0.51g in the South (Portoviejo) to 1.55g in the North (Pedernales).

Within a month of the earthquake, nine aftershocks above 6Mw were also recorded, adding to the original damage from the main shock of April. The earthquake is estimated to have caused about 700 fatalities, 7000 severe injuries, 35,000 buildings badly damaged or destroyed and significant damage to utilities and infrastructure. The events led to about 2\$ to 3\$ billion USD losses and 2 Million people in need of humanitarian assistance. The event resulted in a major dent to the economy of the region, critical to the nation thanks to its major contribution to the tourism and shrimp farming industries.

## The Mission

Between the 24<sup>th</sup> of May and the 7<sup>th</sup> of June 2016, a team was deployed by the Earthquake Engineering Field Investigation Team (EEFIT) to the Manabi region to carry out a post-event investigation mission. EEFIT sits within the Institution for Structural Engineers (IStructE) and has been carrying out such missions across the globe since 1982, as a joint effort by the industry and academia. The aim of the missions is to carry out a detailed technical evaluation of the performance of the structures, geotechnical features, and infrastructure; collect geological and seismographic data; as well as assess the effectiveness of the earthquake preparedness



**The EEFIT Team and some of our essential helpers**

and response efforts on the impacted natural environment, population, engineered systems and socio-economic setting.

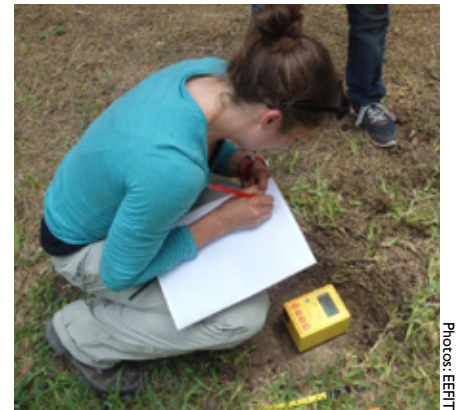
The team consisted of four structural engineers, three geotechnical engineers and a social scientist. The Imperial College presence was significant, with two Imperial College Alumni – Jorge Lopez and Sebastian Kaminski (both currently working at Arup, London) and myself, currently completing my PhD within the Department of Civil and Environmental Engineering.

Contributing to the resilience of communities to natural disasters and earthquakes in particular has consistently been the red thread of my professional experience, from my experience at Fugro on the volcanic Reunion Island, working for four years as a geoseismic engineer at Arup and now carrying out my research to optimise natural disaster impact assessments at Imperial College. Being selected as part of the team sent to Ecuador was a great privilege and opportunity to apply my skills in the unique context of a post-event reconnaissance mission.

My involvement was generously supported by the EPSRC Centre for Doctoral Training for Sustainable Civil Engineering and the Old Centralian Trust, without which I would not have been able to participate in this unique and complex experience – evenly meaningful, impactful, eye-opening, intense, tearful and yet also most enjoyable.

In this article, I will try to share with you what provided depth to the personal and professional experience it has been and how it's been instrumental in sharpening my understanding of the current challenges of earthquake risk analysis and management, and in guiding my research. Now that I am about to finish my thesis, and enter the next stage of my professional experience, I will continue to draw upon this experience. I hope that many more students and alumni of Imperial College will keep participating in such missions, for the challenge they represent, the absolute necessity of field experience they respond to, the questions they raise, and all the inspiration that they provide.

Detailed findings of the mission are presented in a report publicly available on the IStructE website (<http://bit.ly/IE30-EEFIT>).



**Carrying out a microtremor test**

Photos: EEFIT

## The Challenges

**An organisational and communication stress-test: An ode to the essential helpers.**

Typically, missions are carried out after a month from the event, in order to avoid disrupting short term response efforts. The timeline between the event and the mobilisation on site of the EEFIT team is therefore relatively short. This month is utilised fully in preparatory works of the mission to plan the logistics, ensure health and safety and manage risks for the team on site, as well as gather resources (funding, equipment, partnerships, background literature and information on the event). This phase is an essential and integral part of the mission and can also be presented as a key organisational and communication stress-test. The performance of the mission, its efficiency and outputs heavily depend on it.

A key step of the preparatory phase is to liaise with peer associations such as EERI, GEER, the European Civil Protection Team, Red Cross and others who send humanitarian and civil engineering technical teams after events. They may have already been on site, gathered knowledge on the event's impacts and local conditions, aligned local contacts and resources and identified particular points



**The 16<sup>th</sup> of April 2016 event mainshock PAGER Intensity map (left) (USGS, 2016) and the reconnaissance mission route – the green indicates that only geotechnical investigations were carried out there.**

# 2016 Investigation Mission

of interest of the event worth investigating further. In this mission, the team leader Guillermo Franco, actively engaged ahead of the mission with EERI and the European Civil Protection Team who had already sent teams on site ahead of us. This led to a much greater efficiency of the mission in utilising pre-existing contacts, avoiding redundant efforts in areas already sufficiently covered by similar investigations, and identifying gaps and points of interest worth focusing on.

Such contacts prior to the mission also provide the opportunity of envisaging partnerships to gather and combine efforts for a greater impact. The geotechnical team I was part of took a proactive approach to setup a collaboration with the British Geological Society to carry out an exercise of site proofing their novel satellite-imagery-based co-seismic landslide and liquefaction mapping methodology. This was a key novel contribution of our mission. It showed that the technique is very promising and could be key to enhancing response operations, road clearing, and emergency route identification. The exercise also highlighted some limitations to the technique and identified key further development requirements. Those included the major limitation associated with cloud cover to satellite imagery, as well as an overall poor performance for the identification of liquefaction-induced lateral spreading. The method was proved to be mostly successful for the identification of landslides otherwise.

At the same time, Sebastian Kaminski's contacts in the bamboo industry were capitalised upon to foster an active collaboration with the International Network for Bamboo and Rattan (INBAR). This was of particular interest in the context of many positive feedbacks on the performance of bamboo structures in the earthquake and an envisaged – and ultimately successful – revision of the Ecuadorian National Construction Code (NEC) to include Bamboo structures. The collaboration with INBAR led to the invaluable addition of one of their associated members – Nicolas Van Drunen – to our team throughout the length of our mission and access to bamboo housing post-event reconstruction sites.

Whether through such contacts or otherwise, finding and liaising with local



**Shelters in Canoa**

contacts is crucial to the success of such a mission. They ensure that current knowledge of the fast-paced ever-evolving post-event conditions on site is at hand to inform the investigation plan (route plan, tests and surveys need as well as associated feasibility assessment) and they provide tangible support once on site. This mission's logistics, security, access to high-level response task forces as well as to the most heavily damaged restricted urban areas was facilitated by the continuous and proactive support of Manuel Querembas of the Corps of Engineers of the Ecuadorian Army. Additionally, civil Ecuadorian students, architects and engineers also accompanied the team. Their local knowledge was invaluable, particularly in guiding us through Portoviejo's damage. This diversified local support was key to the success of the mission.

It is indeed important to utilise the contacts and support available but also to be conscious of the bias or challenge that contacts facilitating the interface between the EEFIT team and the local environment and population may represent. Army and civil forces may sometimes entertain conflictual or difficult relationships and would have their own specific view of the disaster. It is the EEFIT team's responsibility to ensure the neutrality of the investigative process. The approach taken here was to diversify as much as possible the types of stakeholder profiles as source of information.

Time was taken at the start of the mission for three days by Sebastian Kaminski and I to stay in Quito before the rest of the team arrived and arrange meetings with as many key stakeholders as possible, ranging from academics to high-level managers of the national response force (Secretaría de Gestión de Riesgos) through to Shelter Cluster, Red

Cross, AIMA and other organisations. These meetings were critical in securing geological, seismological, structural damage survey data as well as other helpful resources and information, and provided a comfortable neutral, well informed and rational ground to the mission.

## **A human stress-test: the disaster impact and scientific neutrality.**

Although rationality of the scientific investigation process is key to any such mission, any team member is necessarily confronted with the reality of the disaster, triggering emotions and initiating behaviours that may be difficult to handle appropriately. Arriving on site, the desolation hits you: the destruction all around, shelters, tents of displaced population scattered everywhere. But when approaching the local population for their account of the event and its impact, the real emotional realisation of the natural disaster kicks in.

For the scientist, their information is crucial. It allows us to confirm co-seismicity of the impacts observed through direct testimony as well as provide information such as ground movement directionality and duration of the motion during the earthquake. And in order to gather it in a systematic and robust way, one needs to remain cool-headed but, when we hear of testimonies of deaths, of entire sources of livelihoods lost, and see the desperation of the people – open, kind and still hopeful enough to share their stories with us in the hope that somehow it might help them recover – it really is difficult. In these moments, it is important to rely on team members as a relay, so that one can take over when it gets too overwhelming for the other. Ultimately, it hits everyone.

Although it was hard, and one might say



**Examples of some of the damage observed in Manta, Portoviejo and San Isidro (left to right)**

## FEATURES

it impedes the scientific process, I believe now, that it is actually an essential part of the process. Empathy drives us to be the best we can on site and reminds us of why, for most of us, we've been driven to specialise in this field. It reminds us that the structures, the geotechnical features, the engineered systems cannot be considered without considering for whom they have been designed, those who live with, around and in them – and whose lives will ultimately be impacted by the earthquake, not just in terms of economic loss, injuries and deaths, but as impacts to family life, social cohesion, livelihoods, jobs and self-worth.

Through the testimonies, I realised for example how important it is to better plan against the risk of population displacement and to better manage it. How, therefore, transportation links are excessively important in post-earthquake situations not only for emergency response access but also to ensure a certain continuity of social cohesion and access to jobs as essential support for the impacted populations and families after a disaster. The novel systemic approach to the mission's investigation – combining a social survey with geotechnical and structural surveys – was key to approaching more holistically the earthquake impact analysis.

### **An engineering stress-test: Code and theory vs reality – benchmarking and characterising the exceptions or generalities?**

From an engineering standpoint, an earthquake event represents a life-size stress test of the civil engineering capabilities in the impacted region, for the level of ground motion encountered. It provides key findings regarding current issues in code and construction practice which may in turn drive scientific knowledge development, funding strategies, inform code improvements and support civil engineering projects investment, delivery and risk management strategies.

Though the damage to the building stock is partly associated with constructions predating the Ecuadorian building codes regarding seismic design, or with informal structures not complying to any standard of construction, many recent concrete buildings were reported to have suffered heavy damage from the earthquake. This therefore raises the question of whether the damage was due to issues in the code, to local site effects, or to inappropriate construction practice. All three hypotheses were tested through the observations and investigation methods of the EEFIT mission.

First, the description as heavy damage and characteristics of damage needed to be better understood. In the mission's preparatory phase, discussions with peer institutions flagged discrepancies between observations and building damage coding in areas structurally surveyed, which prompted our team to further explore the reasons for such discrepancies and motivated extending the data sampling for the structural survey via fast-paced on-route camera surveying and drone imagery utilisation. Once the damage was characterised, its cause was investigated.

The current building code was found to



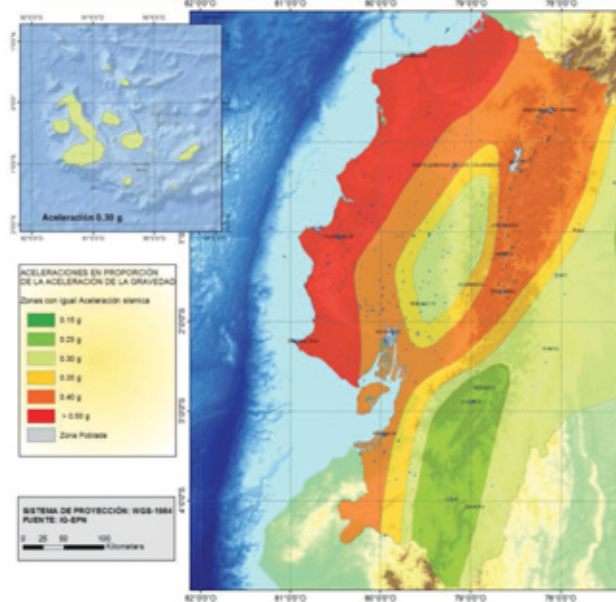
be fairly robust, however with very coarse hazard factor zonation. The impacted Manabi region is uniformly characterised in the code by the highest hazard factor. However, recorded accelerations in the region significantly exceeded the most recent design accelerations provisions at most locations, for a wide range of structural periods. The code's recommendations for site effects consideration proved unconservative as well.

Historically, the seismic hazard of the region has been little studied, whilst literature has shown that tectonics and seismogenic sources are very complex, particularly where the Muisne earthquake originated, close to the North boundary of the Carnegie Ridge. This may explain the significant room for improvement in the hazard map zonation in the code. It also certainly played a role in the generalised lack of seismic hazard awareness before the event and a consideration of the 2016 event as “unexpected” by authorities, newspapers and the general public. However, through our literature review, it appeared that a recent study by Chlieh et al. (2014) had identified a seismic rupture gap precisely where the 2016 mainshock originated and had clearly identified it as the highest seismic hazard location at the time. Research had therefore identified the hazard but the information had not yet reached the relevant decision-makers. This highlights the importance of knowledge dissemination from academia and technical experts to natural disasters' management actors.

From a geological standpoint, the extensive literature review carried out ahead of the mission as well as communications with local geological and seismological university departments identified a significant lack of local geological data and therefore a poor understanding of potential site effects at play. A key objective of the mission was therefore determined to be the gathering of geological data. An innovative microtremor test method was successfully used. Complex geologies and topographies with significant potential for ground motion amplification were identified, especially through our investigation of the heavily damaged city of Portoviejo. Detailed site response analyses rather than the use of simplified design code spectra would be recommended in such settings and significant efforts to acquire detailed and robust geological data at regional level are required to inform earthquake resilience plans and appropriately manage the risks.

Aside from limitations to the code, and a lack of understanding of geological and seismogenic regional settings, some of the damage was also due to issues in construction practice. Inadequate design and construction of masonry infill walls, concrete columns, foundations and connections were numerous, leading to weak and soft storey failures, short columns, extensive non-structural and structural damage. Generally, the concrete and reinforcement were found to be very poor. The concrete was observed at many locations to be clearly inhomogeneous and having too much or too little coarse aggregate. The use of sea sand and/or sea water for construction was also highlighted, through discussions with local experts, and found to be common.

A post-event mission represents an additional challenge with regard to inference from observation to interpretation. Ultimately, the impacts observed are most likely to be a combination of effects, seismological, geological, geotechnical, structural and human. With the intrinsic limitations of a post-event mission, the interpretation of the investigation results cannot be those of a well-



**Seismic hazard zonation map from NECI5**





**Evidence of poor construction practice and lack of earthquake safety measures associated to non-structural elements**

rounded impact analysis. It can only aim at identifying part of the issues and highlighting some key impact contributing factors. The question remains then whether those impact contributing factors are representative of issues throughout the country or the region, of local effects, or simply relate to exceptional deviations from more general trends. Critical thinking and clear communication of the results are both essential to avoid risks of inappropriately extrapolating between theory, code, observations and reality.

In order to truly allow extrapolated analysis from particular observations to general trends identification, data sampling needs to be extensive. In this mission, we actively tried to broaden as much as possible our data gathering efforts on site by utilising non-invasive and quick geophysical testing using microtremor tests, drone imagery and fast-paced on-route camera footage. Ultimately, investigative missions cannot replace wider local/national broader missions of investigations. They can however provide useful information to inform broader data gathering programs.

### The mission: A success?

#### The challenge of target setting and the perception of success

Overall, I believe the mission was a great success, from its scientific findings to the innovative methods of investigation used and the range of investigations carried out – for the first time for such a mission, also including a social survey. It was also successful in terms of outputs delivered, including: a thorough report, publicly available; a presentation of findings to the World Conference on Earthquake Engineering shortly after the mission (Franco et al., WCEE16); and a chapter in a forthcoming book. The mission was also a clear success in terms of logistics and synergies with local and international partners.

On a personal level, I believe the mission made me overall a better engineer and natural disaster analyst by enhancing my understanding of what disasters actually represent in reality and how theory and models can diverge from, or meet, observations. I had the opportunity of developing skills such as those associated with the microtremor testing which were new to me and developed observational acuteness in the surveys I carried out. An important added value for me came from the on-site interviews and the meetings for preliminary data gathering in Quito. Encountering such a wide variety of

stakeholders, at all levels of the scientific and natural disaster management chain, provided me with a greater awareness of stakeholders' dynamics and a better understanding of the variety of scope of actions and interests of each.

One key problem that these meetings highlighted was the difficult communication and alignment of interests to establish collaboration plans. In a post-disaster setting, 'everyone coming together' also means a lot of interested parties with different targets in sight trying to push forward their commercial services, political agendas or whichever interest they may have in the situation. Although EEFIT gathers efforts from academia and the industry associated with civil engineering, it aims to be objective and therefore does not represent any specific commercial interests. When on site, it was therefore important to make this goal clear and maintain the appropriate distance from all the parties at play.

However, this also presented a challenge in collaboration planning, where an exchange of values – be it useful information, technical expertise or reputational weight, for example – would be expected for it to work. I personally believe that a better understanding of stakeholders' dynamics and the drafting of potential collaboration plans meeting EEFIT's missions values would be key to further enhance the efficiency, impact, outreach, and overall success of future post-event investigation missions.

### What next?

The mission was instrumental in driving my research. It confirmed to me the criticality and current gap in stakeholders' dynamics

consideration in impact analyses, as well as the importance of the 'human factor', social aspects, and systemic effects in vulnerability and response behaviours to natural disasters.

My research therefore developed a methodological framework for natural disaster vulnerability assessment that is carried out based on a top-down approach, accounting for stakeholder dynamics and for systemic effects linking physical assets, operational and management systems. The framework allows outputs of the impact analysis and the methodology of the assessment to be optimised and adapted for each stakeholder's specific targets. It also opens up opportunities for the optimisation of data gathering strategies which could be utilised in missions such as EEFIT and informs stakeholder engagement through the analysis of exchanged value flows. The thesis will be openly accessible from 2020. Readers are welcome to get in touch should they be interested in knowing more about it.

With regards to EEFIT's future, this mission has started to show the path to a more holistic approach to post-event investigations and I believe that efforts to push further in that direction should be supported. Adding investigation streams on systemic effects, infrastructure networks, critical infrastructure and industries impacts would be interesting ways forward. A more systematic approach to collaboration with local and international partners would be equally beneficial. An element of investigation associated not only with the hazard and risk elements, but also with factors contributing to recovery and resilience of the systems impacted would also add value to the currently ongoing transition from risk to resilience thinking.



Nina Jirouskova is a final year PhD student, in the Department of Civil and Environmental Engineering, dedicated to improving the resilience of communities to natural disasters, and reducing resilience and protection gaps globally. Her special interest in earthquakes, is evidenced by her background as an earthquake engineer at Arup. Her PhD aims to develop an integrated approach to the vulnerability assessment of container terminals to natural disasters, with the objective of optimising it and improving, through stakeholder collaboration, the associated operational risk and resilience

management frameworks. Her research and professional efforts are underpinned by the strong belief that it is through better understanding the three pillars: nature, people and engineered system, as well as the interactions among them, that true integration and harmonisation of our societies and associated socio-economic systems will be achieved, ultimately resulting in resilience and positive evolution of humankind. Natural disasters are the ultimate stress points of the equilibrium between these three pillars, and the EEFIT Ecuador mission presented a unique opportunity to observe this.

# Ironman success

In October 2018, Anna Lawson (Chem Eng 2014-18) competed in the Ironman World Championships in Hawaii, with some support from the OC Trust. She sent us a report of her experience.

On the 13<sup>th</sup> of October, 2018, I competed in the Ironman World Championships in Kona, Hawaii. For those of you who aren't familiar with Ironman, it's a race involving a 3.8 km swim, 180 km bike and 42.2 km run, consecutively. I finished the race in 7<sup>th</sup> place for my age category (18-24 years) which, two weeks later, I'm still in disbelief about.

For those with a free five minutes, here's my story. So where did it begin?

It was only at university that I started running/triathlon, so I really began from level zero. I was soon hooked and by 3<sup>rd</sup> year I did my first marathon and a half Ironman. I love a challenge and in August of last year I signed up to my first full Ironman (Nice, France), as a way of rounding off an amazing four years of uni.

Admittedly, I'm not the smartest cookie; training for such a huge endurance event whilst also completing Final Year probably isn't something I'd advise...

In Nice, I finished in a time of 11:02 – I was over the moon and I'd won my age category, which qualified me for the Ironman World Championships (IM WCs).

The most prestigious race in triathlon, this is held in Hawaii, where conditions are unforgiving: high winds, relentless sun and humidity. This was truly a once in a lifetime experience and something many athletes dream of for years – I had to go.

Sadly, qualification doesn't equal a free race, IM is incredibly expensive, and Hawaii even more so. I am incredibly fortunate and proud to say that IC Chemical Engineering department and the Old Centralians' Trust, a charitable body from the CGCA, offered to sponsor my trip and made a crazy dream, a very real reality. My closest friends sent a



to cycle the 112 miles in 6 hours so, when I hit the second transition in -5.45, I was beaming. Just a marathon to go...

The heat was pretty horrible at this point; it was 2pm and the sun was at its worst. Every mile was a station with water, ice, coke, gatorade, wet sponges and food. My arms were lathered in suncream but my legs were cooking like drumsticks and my skin was sore from the layers of salt that had built over the day. Within 5 km I knew I was in 13<sup>th</sup> and 6 minutes behind 8<sup>th</sup> place. The heat had exhausted

me and at every step my body wanted to stop but being that close gave me the motivation I needed. I'm not the fastest cyclist but generally I'm faster on my feet and every person I went past gave me an extra spark of energy. I couldn't tell if I was passing people in my age category, but I'd gone past enough to know I was probably in the top ten.

The final 100m of an Ironman are the best. You run down a red carpet, lined with screaming fans, family members, ex-pros and admiring children. My name was called out over the speakers, "Anna Lawson, you are an Ironman".

I'd made it. At the time, I didn't care if I was 1<sup>st</sup> or 2500<sup>th</sup>. I'd crossed the line in a time of 10:41, knocking 20 minutes off my personal best in a race that was every bit harder than my first. It's humbling, emotional and inspiring and filled with relief that it's over but also gives you a life-long thrill of achievement. I'd finished in 7<sup>th</sup> place for my age group – will I ever get used to saying that?

So what now? I've already signed up to compete in my next Ironman in 2019, it's all going to begin again... But for now, I'm due some celebration and some serious rest. Tri has introduced me to some amazing people and given me a chance to travel the world. It's been hard, given me a porridge-addiction and meant that I'll never have enough money to buy nice clothes, nor time to wear anything but lycra, but I wouldn't change it for the world.

To my tri friends, my family, Iain, the Chemical Engineering department and the Old Centralians' Trust; I owe a lifetime of gratitude for making this possible.

Race day: The race is an early start at 7.20, so prep begins from about 4 am. The swim is a mass start – you all line up in the water and when the gun goes off, a chaos of flying feet and fists ensues. I'm an average swimmer and I came in at a respectable time of 1:10. Now for the fun. The bike was spectacular; intense sun with no sections of shade. There were stations of volunteers every 10 miles, handing out bottles of various drinks and foods to grab as you flew past. My aim was



## New Year Honours

Chemical engineer Professor Geoff Maitland was awarded a CBE for services to chemical engineering in the New Year Honours list.

Professor Maitland's work on interactions at the molecular and colloidal level and the bulk properties of materials is contributing to the development of affordable, high capacity, renewable, low CO<sub>2</sub> emission energy systems. At Imperial, he has helped develop the College's world-leading work in carbon capture and storage, exploitation of non-conventional sources of hydrocarbons and renewable production of hydrogen using green algae and cyanobacteria.

Professor Maitland has also played a key role in Greening Imperial, a cross-campus and community initiative to improve the College's performance in sustainability and enhance its actions on tackling environmental challenges and climate change.



Photo: Imperial College

Professor Maitland said: "It is a great honour to be recognised by HM The Queen in this way. I feel it is also recognition of the contributions and support I have received throughout my career from a wide range of superb students, colleagues and collaborators, as well as from my family and close friends."

Two alumni were honoured with MBEs: Dr Adrian Bowyer (Mechanical Engineering 1973, PhD 1977) for services to 3D Printing, and Alan Stoyel (DIC Geology 1961) for services to Water Mill Heritage.

<http://bit.ly/IE30-Honours>

## First Egyptian alumni event held in Cairo



Photo: Imperial College

The first Imperial alumni event in Egypt was held in Cairo in January. The reception was hosted by Imperial's Dr Mona El-Bahrawy (PhD Clinical Medicine Research 2001), Adjunct Reader and Consultant Histopathologist, and was attended by the Egyptian Minister of Electricity and Energy and Imperial alumnus, Dr Mohamed Shaker El Markabi (PhD Electrical Engineering 1977).

Dr El-Bahrawy, also an Imperial alumna, updated the gathered alumni on the College's future plans and strategy before moderating a question and answer session.

In her opening remarks, Dr El-Bahrawy said: "I am most privileged and delighted to be hosting this first Egyptian Alumni gathering on behalf of Imperial College and to meet fellow alumni. I hope that this meeting ignites a new or rekindles an existing passion to reconnect with Imperial College and with one another."

Dr El-Bahrawy also updated the gathered alumni on Imperial's new White City campus. Dr El-Bahrawy said: "This centre hosts different hubs and programs that all work on providing support to transform ideas to reality."

The Egyptian Minister spoke of his happiness to be at the event and meet old friends and colleagues who he had not met for many years. He also spoke about the major advances and developments Egypt has made in recent years in the field of electricity and how there is a will to build further on that.

Professor Shaker Helmi, Professor of Environmental Studies at the Institute of Graduate Studies and Research, Alexandria, shared his memories of being a PhD student at Imperial. He spoke about the balance between work and personal and family obligations, including helping one another to get through it all on a very tight budget, and how they were challenging, but happy, years.

Maha Wagdy Hamada (MSc Surgery and Cancer 2015) said: "It was great to meet with fellow alumni who I'd otherwise never have had the chance to meet."

Egypt is Imperial's second biggest collaborator in Africa – publishing around 170 research papers together every year.

There are around 300 alumni living in Egypt and over 700 alumni of Egyptian nationality around the world.

<http://bit.ly/IE30-Egypt>

## Imperial celebrates growing ties with South Africa

South African alumni gathered in Cape Town and Johannesburg to hear how Imperial is strengthening its ties with the country.

Nearly 100 alumni met with President Alice Gast and other Imperial academics to share their post-study experiences and discuss Imperial's growing partnerships in South Africa.

Speaking to the gathered alumni, President Gast highlighted some of Imperial's major research projects in the region, including the new MIT Africa Imperial seed fund – which has awarded funding to three projects in South Africa, including: a collaboration with the University of Cape Town to understand how tuberculosis is spread; a project with the University of Pretoria investigating eco-friendly refrigerants; and a project with the University of the Witwatersrand that aims to improve our understanding of high energy physics, particularly the area of string theory.

South Africa is Imperial's biggest African collaborator – publishing more than 200 joint research papers every year.

President Gast said: "We are trying to look at our many collaborations and partnerships and think how we could work better in Africa."

President Gast also spoke about internationalism – the theme of this year's President's address – and the need for international mobility.

Professor Jan Cilliers, Chair in Mineral Processing at Imperial's Department of Earth Science & Engineering, spoke at the event in

Johannesburg. He said: "It was so exciting to meet with our alumni and to hear what they have achieved. I was very pleased to tell them about our lunar mining research – I don't think any of them thought that's what they were going to hear about."

Imperial has a growing alumni network in South Africa. Academic Dr Michael Inggs (Electrical Engineering 1977) and his son, Gordon Inggs (PhD 2016, Electrical Engineering), joined the event in Cape Town.

Other notable Imperial engineering alumni in South Africa include James Campbell (Geology 1985) who is Managing Director of Botswana Diamonds, and Ghanaian national Sir Sam Jonah (MSc Resources Engineering 1979), the Executive Chairman of Jonah Capital.



Photo: Imperial College

**Imperial's Professor Jan Cilliers (centre), Chair in Mineral Processing from the Department of Earth Science & Engineering, met with alumni including Richard Gundersen (right), Chairman of the South African branch of CGCA**

<http://bit.ly/IE30-SouthAfrica>



# 50<sup>th</sup> Triode meeting, 4<sup>th</sup> January 2019



**From left to right: Sid Seth, Rut Patel, Hari Singh, Peter Chung, Tony Godber, Peter Wright, Pete Marlow, Chris Gaukroger, Nick Hiscock, Sue Hiscock and Martyn Hart.**

## Ideas for the 50<sup>th</sup> Year after graduation

Ten Triodes (Electrical Engineering graduates of 1973) and one partner appeared at The George for our 50<sup>th</sup> reunion/meeting (we always meet on the first Friday after 1<sup>st</sup> January.

Most of the Triodes, arriving early, had taken over the Fleet Street end of the pub making it a bit easier to circulate this year. Set out below is what the Triodes have been up to over the last year.

Much discussion was had about the CGCA 5&10 Reunion Lunch which was held on 17<sup>th</sup> November 2018, which was our 49<sup>th</sup> reunion in our 45 years. Twelve Triodes (including Triode partners) came and it was a fun event, especially the reminisces from other years!

2023 will be the 50<sup>th</sup> year since we graduated so, as that will be a bit special, we should do something different. It's been suggested that we book a function room somewhere (perhaps in London); or have a very special party with (or after) the CGCA 5&10 Reunion Lunch in November 2023; or even combine it with the 100<sup>th</sup> Birthday of Professor Brown ('our' Head of Department in 1973) in July 2023 (Prof Brown's family willing of course). We need to agree soon on what we should do.

After catching up in the pub we moved on to have dinner at the usual nearby Thai restaurant (who else would have so many seats spare on a Friday night?). As tradition dictates we stopped at the now dimly lit Triode Loo and got a passer-by to photograph us! (See above). At the restaurant we (as always) opted for the set menu and continued on until late in the night. Another excellent

reunion; well attended, though not quite as many as our 48<sup>th</sup>, but will we break the record next year?

## The next two Triode Yearly Reunions

The next yearly Triode reunion (it will be our 51<sup>st</sup> as we had two meetings in year one, two in 2003, two in 2013 and 2 in 2018!) will be on Friday 3<sup>rd</sup> January, 2020 at The George, Fleet Street, from about 7 pm. The following year's reunion (52<sup>nd</sup>) will be on Friday 8<sup>th</sup> January 2021 (2020 is a leap year). So mark up your diaries now!

## Those who came on the 4<sup>th</sup> January (10 of us!)

**Peter Cheung:** Since early 2018, Peter has split his time between IC's EEE and the Dyson School of Design Engineering. He is also working as a 'normal' professor 4 days a week but will probably return to full-time in summer 2019. How does he do it? As always, if you are near IC, let Peter know and, if he is free, he'd love to show you what he's doing.

**Chris Gaukroger:** We haven't seen Chris since 1985! He has worked in IT – at ICL (remember them?), ESTEC in the Netherlands, Vickers in Eastleigh (the division that designed the Spitfire) and Xenotron (newspaper display ad composition) amongst others – on hardware and software for Minis but mainly Micros (computers that is). After 11 years in industry, he went back to IC to play badminton again and study Robotics. Then he moved to Cornwall (where he still lives) and worked for ECC (the mining company) on robots and for MA Instruments on EMC test equipment. Then Wandel &

Goltermann/Acterna/JSU, (the name kept changing) and now he is with Bombardier in Plymouth working on embedded software for track circuits in the railway industry.

**Tony Godber:** Tony made it to London for the third time in a row; so far he has covered some 36,000 miles 'commuting' to us from Perth, Australia, a record surely! He's working on interesting automation projects within Rio Tinto rail operations in Perth but is definitely moving towards retirement, now only working 4 days a week and that will reduce again soon. Though given the international spread of his children, their partners and their kids, it looks like Tony will be commuting for a long time to come!

**Martyn Hart:** Martyn works two days a week (often four or five) in the public sector, mainly in the commercial area on large outsourcing/framework contracts. Now settled in the Triangle House in Ingatestone in Essex, he's involved with the local cycling, photography and other clubs and even the Parish Council he says!

**Nick and Sue Hiscock:** Nick reports a frantic year as the Hon. Sec. of Warsash Sailing Club, but hopes to have more time refurbishing weapons in 2019. This year he will again be seen at the UK 'Battle Proms' supporting the cavalry demonstrations as their armourer. However, after being enthused by Peter Cheung, Nick has also got his rusty old soldering iron out (bought whilst at IC in the early 70s) and claims he has been soldering micro-controllers, transistors, etc to circuit boards in his study! His wife, Sue (who joined us) still does a few

days vetting despite being officially retired. Daughter Jenny continues to build her Supra-Molecular Chemistry research team at the University of Kent and Pippa is still at Roke Manor Research, mostly seconded to the Home Office to supply mathematical rigour.

**Peter Marlow:** Peter and wife Sally are really enjoying retirement; this year they visited South Africa – Blue Train, Cape Town, Winelands & Garden Route – and will be returning next summer to go on safari and visit Victoria Falls. For summer 2018, they ambled through France to the Pyrenees via the Dordogne. Nearer to home, Peter and fellow Triode, Pete Wright, completed the Capital Ring (see below). Peter & Sally both sing in a chamber choir (six to a part) which gives concerts around Gloucestershire, and went on a choir tour to Bruges at Easter. Peter is on the board of PM4NGOs ([www.pm4ngos.org](http://www.pm4ngos.org)), an international organisation that promotes and sustains the professionalism of programme and project management in the international development sector.

**Rut Patel:** Rut had a very busy start to the New Year as he was on jury service for two weeks in Croydon Magistrates Court. The case was rather odd as the defendant did a runner on the last day of the trial so sentencing was delayed. Perhaps he knew the outcome? Most of Rut's time is devoted to the duties of being a granddad which he says is stressful and pleasurable in equal measures. This year he took the grandkids to Center Parcs in Suffolk and to Abu Dhabi. But he did manage a week without them in Lisbon for a

wedding which included a visit to the most westerly point in mainland Europe. He enjoyed the summer as India's cricket team visited England but sadly India lost the Test Series even though they put on a spirited performance. This year Rut turned 66, it reminds him of US Route 66 which he had travelled in Arizona (in 2000). Maybe he will complete it?

**Sid Seth:** Sid is now working on a new 'secret' project. He still won't tell us what it is, but it's something to do with cyber and IoT. He is keen to use the latest technology, particularly AI, to help improve lives. Maybe he'll be a multi-millionaire by the next reunion?

**Hari Singh:** Hari and his wife spent six weeks in India and also did the famous Triangle tour. He says it was very informative. In addition, he had golfing holidays with his buddies in France. This is his fourth year as Captain of the Seniors at Downshire Golf Club and he enjoys managing and running the seniors section of the Club. Any spare time is spent playing with his four grandsons.

**Peter Wright:** Peter is still heavily involved in running his local Scout District as Secretary, Appointments Chair and various other roles including caretaker and handyman, some of which involves brushing up on wiring regulations! This year, with Peter Marlow, he completed the Capital Ring – a walk around London of over 75 miles! He has a new hobby: learning Python so he can programme his Raspberry Pi.

#### Those that couldn't make it and we've heard from:

**Ady Adesara:** Ady was working away from London and couldn't join us, due to a major customer issue. He wished everyone a happy new year and said he was extremely sad that he missed the get-together. He is still working at Vodafone and he runs his own business too. He plans to scale down working soon, he said, "You never know, but maybe by next year I may have actually have time to put my feet up and come to our next reunion."

**Geoff Banks:** Geoff is sorry he missed the reunion. He is feeling much fitter now (though still not 100%) after a pulmonary embolism struck him in October, but he was advised to stick to local travel for a while yet. He definitely hopes to make it next year.

**Graham Castellano:** Graham missed the reunion this year, but hopes to be back next year. Not a lot has changed for him, but it will be different after the forthcoming birth of his first grandchild! The work continues at 're-modelling' both sons' houses. Apart from skiing, sailing and Italian holidays, one of Graham's highlights last year was visiting Rick Stein's in Padstow. He

was booked in for a two night stay but the 'Beast from the East' arrived and he was snowed-in and 'forced' to stay on for another night. He says it is well recommended, by the way!

**Paul Cheung:** Paul wasn't able to make it, but offered to invite any of us (and family) to dinner if we visit Hong Kong (provided that he is around at the time of course). He said he will definitely retire in June and will travel a lot more and maybe even see us again!

**Joan Clemow:** Joan has been a National Trust volunteer at Montacute House for six years now and they have given her a badge to prove it! She sees her four grandchildren regularly; she collects her daughter's two from school one day a week and helps with some maths at their school one morning a week. Joan enjoys travelling and has plans to visit Iceland and India in the near future.

**Martin Clemow:** Martin says that he has very little 'new news' as things are much the same now as they were last year. He has finally managed to semi-retire, the agreement being to work three days a week. The good side is that he works from home and, to a degree, can choose when he works. The trouble is that the new owner of the company has moved it to St Clears in South Wales and cannot find suitable staff. There is definitely a shortage of qualified, or even competent, engineers and those that do exist don't want to relocate to the end of the world. So they have more work than they can cope with, but not enough resource. Other than that, he spent quite a lot of time at his place in France last year and is hoping to live over there during the summer this year and put it on the market. He sent best wishes to everyone and he hopes to see us next year.

**Hugh Culverhouse:** Hugh says that although he is retired he still teaches Business English, giving a max of four lessons a week, which at present are all on one day at the same company, so he has effectively one full day of work per week. Another full day is taken up every week with physio and associated exercises and on Fridays, he has French Conversation lessons. In the rest of the time sport remains very important, with training every day: cycling or running or both. Races are now few and far between, as he is definitely getting slower (surprise, surprise!). He did a 10km race last December in 48m58s, taking second place in the M65 class. He is much too busy for a pensioner!

**Tim Dye:** Tim is still pottering about quietly in Norfolk, although this year the TV studio he helps out at hit the big time by producing ten one-hour wrestling programmes that were transmitted on ITV. A

rock music show is now being developed too! On the home front, walking, cycling and line dancing are still to the fore, with WEA courses and ancestry tracing to keep the old brain ticking over.

**George Gabrielczyk:** George resigned the chairmanship of one of his public companies in summer, leaving him with one left. He just needs to sell the shares in that business then he will be clear of anything resembling work! George can then focus on restoring the Jelenino manor house, renegotiating deer breeding legislation in Brussels and rebuilding Land Rovers. He and his son finished the rebuild of his son's classic 1999 County Defender this year (nearly 3 years' work, a 'nut + bolt job' including a new chassis). George says it looks smashing and he ferried the bridesmaids in it to his son's wedding last summer.

**Chris and Daphne Giles:** Chris & Daphne Giles are both fine and Chris has scheduled his 4<sup>th</sup> attempt at retirement for March 2019. This time it should work! Having given up boat and vintage diesel engine re-building, he is now constructing analogue computers.

**Steve Glenn:** Steve had planned to attend the reunion, even had a hotel room, but at the last minute his daughter was rushed into hospital with a problem appendix, leaving Steve and Anne to look after the grandchildren! He is still working at the MOD, three to five days per week, Anne has actually retired, and a sixth grandchild will arrive in April!

**John Harding:** John sent his apologies for absence. He is still working with CACI, mainly on process improvement work for its many telecoms clients. He says retirement will happen, though not necessarily this year because he is really enjoying his work and is still learning new things about telecoms.

**Phil Harris:** Phil and Lina continue their quiet retirement; Phil said "We're grateful to have had fairly good health over our mostly quiet year. The main excitement was the arrival and growth of a new granddaughter. We also continue to enjoy the company of her brother, who's now at school. My daughter is now a 'Newly Qualified Teacher' of Design Technology and one of her GCSE courses is Electronics. I have to think really hard to answer some of the questions that she passes to me from her pupils! Also I can recommend an award-winning place for craft beer and cider in Southampton – see <[www.facebook.com/BookshopAlehouse/](http://www.facebook.com/BookshopAlehouse/)>" (It's Phil's son's, but he doesn't get commission!)

**Richard Lewis:** Richard couldn't make it because he was in his house in the Pyrenees, sitting in front of a blazing wood fire (thinking about

us perhaps?). He said he didn't have much to report other than he is continuing to teach A-level Maths 3 days per week with half the workload being Further Maths. The only thing he doesn't touch is Stats: he understands the principles but doesn't like all the formulae and the impossibility of deriving stuff from basics! He is already being canvassed by the school on whether he'd be willing to continue next year teaching a reduced timetable of exclusively Further Maths given the shortage of teachers at that level. But he says, "I'll be 68 that year, will it never end?"

**Patrick Mason:** Patrick is still very involved with his company GlobalWebPay ([www.globalwebpay.com](http://www.globalwebpay.com)), which allows consumers to send money abroad quickly and cheaply. Pat is investing in completing the major re-write of their systems to take advantage of developments in consumer connectivity to the internet (e.g. devices and social media). He re-iterated his offer to Triodes of great rates for anyone looking to move a sizeable amount overseas – please contact him direct.

**Dave Mansfield:** Dave says he has finished his two-year building project on the East London property he inherited from his father; it's now been successfully converted to five flats. Healthwise, it's not been a good year; his wife, aged 66, has recently been diagnosed with early stage Alzheimer's, and he's been waiting in an NHS queue for surgery for the last six months! His younger son got married to his long-standing Indian girlfriend in the summer with a full Indian wedding in Ilkley, Yorks – it sounds fantastic!

**Alice Spain:** Alice's news is that work on the house and garden has continued and she is about to get heating in the house. "Being warm will be a great step forward!" she says. The utility room now has its units so they're beginning to be able to sort through 'stuff' that's been in boxes for five years. Most of it seems to be rubbish, but there are a few gems in there they'd forgotten about. Alice's middle daughter got married in October and the day was amazing. Alice really enjoyed being Mother of the Bride!

#### And those that didn't make it and we haven't heard from (Can anyone help?):

- John Baird
- Jacquie Buzzard
- Paul Chung,
- Al Farbridge
- Ian Heap
- John Macfarlane
- Keith Marshall
- Alistair Rogers
- Richard Wylsome.

Have a great 2019.

Martyn, Arch Triode

# 5&10 Reunion Lunch, 2018

The traditional CGCA '5&10' Reunion Lunch took place on Saturday 17<sup>th</sup> November 2018, at the Polish Club. Held in a private dining room with views over both Exhibition Road and Princes Gardens, the event was very well attended, with 53 alumni, partners and guests present, including six students, our President Professor Dick Kitney, and Nicola Pogson from Imperial's Alumni Relations department.

The oldest member present was Malcolm 'Ben' Bennett, an Aeronautics graduate of 1953. He showed us some fascinating photographs of his time at College. These included some where a party of him and his comrades snaffled the RSC mascot, which in those days was a drum. This was duly returned, but full of concrete!

Between courses, as is customary at these lunches, several alumni spoke of life in their time at College. Haroon Ahmed entertained us first, about life at Imperial in the late fifties. Back in those days, the quality of teaching was not quite as good as one might have wished. He commented that the fabled Dennis Gabor, despite being a Nobel prize winner for inventing holography, was completely incomprehensible. I was also particularly taken with his dry remark that some brown-baggers (those known to be rather nerdy, and so-called because they tended to carry brown leather briefcases) were so good at maths that sometimes their score in tests was as high as 113%!

After our main course, Peter Garratt (ex CGCA President and a civils graduate of 1968) drew attention to the terrible imbalance of the sexes at Imperial in days of yore. Only two things tended to occupy the minds of the male student population in those days: their studies and girls. As there were so few of the latter at College, many local schools for nurses and teachers tended to be the 'target' on a Saturday evening. Some of the wives with us at the lunch were testament to these 'hunting trips', having now been happily married to Imperial chaps for many years!

Peter also asked us to raise a glass to absent friends. This was a nice touch, given the passage of time has permanently robbed us of the company of some old classmates.

Martyn Hart, who had assembled a marvellous group of no less than 12 electrical engineers and wives from 1973 – wonderfully named the 'triodes' – built on some of Peter Garratt's themes. But the difference between the swinging sixties and his days of the early seventies made you



wonder where it all went so wrong for the country. Three day weeks, strikes, and no electricity half the time made for quite a contrast.

Just before leaving College at the end of their course, the triodes apparently agreed to meet every year on the first Friday of January in a specific pub in central London. It is thanks to this that, over the years, their cohort has held together. At times, some have disappeared for a while, only to pop up again at the appointed pub several years after having last been seen. What a thrill that must be!

After dessert, Cathy Hunsley spoke to us of her time as a mechanical engineer who left in 1978. She was then the only girl on her course, and the start of a slow but inexorable improvement in the male/female ratio. Even so, she explained, some lecturers still didn't 'agree' with young women being in their lectures, and attitudes were still very male-dominated. She and her husband Colin – a fellow MechEng student of the same year – had come as part of a group of eight, making another of the several groups of old friends attending.

Matters were brought to a close, and very much up to date, by this year's CGCU President Andrew Hill. He proudly told us of their recent exploits to steal mascots from RSM and RCS, and indeed the proof was there for us all to see – Spanner and Bolt alongside Davy and Theta. Most satisfactory!

He ended the lunch by calling a Boomalaka – enjoyed by all – before some then departed to Princes Gardens to admire our most illustrious mascot of all, Bo. Recently restored to full health after a cracked crankcase sustained in the 2017 Brighton Run, Bo was firing on all (two) cylinders and had completed this year's Brighton Run in fine style in around eight-and-a-half hours.

It was, as ever, wonderful to see old friends reunited and enjoying each other's company. It is strange to observe that after those who left in the late seventies, people seem not to be so interested in reunions. I really do not understand why. The joy of seeing old classmates come together, sometimes after many years, to reflect on times gone by, is clearly deeply felt. I am also sure that it is more meaningful to meet as a group than any number of one-to-one letters, calls or emails can achieve (good though it is to stay in touch). Younger readers please note! If it's 'your' year next year (i.e. you left in a year ending 4 or 9) then why not come along?

Peter Chase

Photos: Chris Lumb

## DIARY

**Thu, 2 May, 17:30 – 19:30****The Centre for Smart Connected Futures***Towards next generation smart IoT*

Professor Jiannong Cao, Hong Kong Polytechnic Univ.  
Lecture theatre 311, Huxley Building, South Kensington  
Campus, Imperial College  
<http://bit.ly/IE30-IoT>

**Fri, 3 May, 17:30 – 21:30****RSMA Perth, Australia***Monthly Sundowner*

The Celtic Club, 48 Ord St, West Perth, WA, 6005  
Alan Dickson – [alan@dickson.com.au](mailto:alan@dickson.com.au)  
John Sykes – [johnpsykes@gmail.com](mailto:johnpsykes@gmail.com)

**Thu, 9 May, 14:00 – 15:00****IMSE Highlight Seminar***Molecular engineering of precision nanomedicines*

Professor Giuseppe Battaglia, Chair of the Molecular  
Bionics group, University College London  
RSM G20 (G35 refreshments), South Kensington  
Campus, Imperial College  
<http://bit.ly/IE30-Nanomedicines>

**Tue, 14 May, 19:00-20:00****Friends of Imperial College***What can stem cells do for us?*

Professor Melanie Welham, CEO Biotechnology and  
Biological Science Research Council, Imperial Alumna  
Sir Alexander Fleming Building, South Kensington  
Campus, Imperial College  
<http://bit.ly/IE30-FOI-Stems>

**Wed, 15 May, 12:30 – 14:30****Imperial Engineering Alumni***Quarterly Johannesburg Lunch*

Baron & Quail, Woodmead, Johannesburg, South Africa  
Contact Richard Gundersen@yebo.co.za

**Mon 20 May, 19:00 – 21:30****Pint of Science Festival****Keep the rabbit going: Opportunities and risks****in future energy production**

The Stane Street Syndicate, 196 Clapham High St,  
Clapham, London SW4 7UD

*Moving ground: On the relations between earthquakes and fracking*

Dr Stephen Hicks (Research Associate, Department of  
Earth Science & Engineering, Imperial)

*Can we print solar energy?*

Dr. Piers Barnes (Lecturer in Experimental Solid State  
Physics, Department of Physics, Imperial)  
<http://bit.ly/IE30-Pint-Energy>

**Wed 22 May, 19:00 – 21:00****Pint of Science Festival****Studying our Restless Planet**

The Stane Street Syndicate, 196 Clapham High St,  
Clapham, London SW4 7UD

*Slip, sliding away: Submarine landslides and associated geohazards*

Professor Chris Jackson (Professor of Basin Analysis,  
Department of Earth Science & Engineering, Imperial)

*A journey to the East African Rift*

Dr Ian Bastow (Senior Lecturer in Geophysics,  
Department of Earth Science & Engineering, Imperial)  
<http://bit.ly/IE30-Pint-Planet>

**Wed 22 May, 19:00 – 21:30****Pint of Science Festival****All the small things: 'Small' tech leads to big advances in renewable fuels**

The Crabtree, Rainville Road, London W6 9HA

*Chirality: Through the Looking Glass*

Dr Jochen Brandt (Research Associate, Imperial)

*A quest for the perfect defects*

Dr Stefano Mezzavilla (Research Fellow, Imperial)

*What can sunshine do for hydrogen?*

Dr Anna Hankin (Research Associate, Imperial)  
<http://bit.ly/IE30-Pint-Small>

**Fri, 24 May, 12:00****RSMA Toronto, Canada**

*Informal RSM meeting, noon, Last Friday of every month.*  
Jason George Pub, 100 Front Street East, Toronto

**Wed, 29 May, 17:30 – 18:30****The Bioengineering Lecture 2019***From Lab on Chip to Organ on Chip*

Professor Albert Van Den Berg  
Lecture theatre G16, Sir Alexander Fleming Building,  
South Kensington Campus, Imperial College  
<http://bit.ly/IE30-Bioengineering>

**Thu, 30 May, 17:30 – 18:30****Peter Lindsay Memorial Lecture***The AI revolution: Hype vs Reality*

Professor Chris Bishop, University of Edinburgh;  
Director of the Microsoft Research Lab in Cambridge  
Lecture theatre G16, Sir Alexander Fleming Building,  
South Kensington Campus, Imperial College  
<http://bit.ly/IE30-Bishop>

**Sun, 2 Jun****Ringling of the Alexandra Peal of bells in Queen's Tower**

Alexandra Peal of bells in Queen's Tower rung to  
celebrate Coronation Day

**Fri, 7 Jun, 17:30 – 21:30****RSMA Perth, Australia***Monthly Sundowner*

The Celtic Club, 48 Ord St, West Perth, WA, 6005  
Alan Dickson – [alan@dickson.com.au](mailto:alan@dickson.com.au)  
John Sykes – [johnpsykes@gmail.com](mailto:johnpsykes@gmail.com)

**Mon, 10 Jun****Ringling of the Alexandra Peal of bells in Queen's Tower**

Alexandra Peal of bells in Queen's Tower rung to  
celebrate the birthday of HRH The Duke of Edinburgh

**Mon, 10 Jun, 17:00 – 19:00****CGCA AGM**

Followed by talk:

*Systems Thinking – taking an engineering approach to  
reviewing regulatory failure* – Dame Judith Hackitt  
58 Princes Gate, South Kensington Campus, Imperial  
College

Followed by President's Evening Supper from 19:00  
Booking details for the supper in the IE Mailing or at  
<http://cgca.org.uk/>

**Thu, 13 Jun, 17:30 – 18:30****Inaugural IMSE Annual Lecture**

Tony Wood, Senior Vice President, Medicinal Science &  
Technology, GSK  
Venue: TBC  
<http://bit.ly/IE30-IMSE>

**Thu, 13 Jun, 19:00-20:00****Friends of Imperial College***Life on Mars*

Sanjeev Gupta Professor of Earth Sciences  
Sir Alexander Fleming Building, South Kensington  
Campus, Imperial College  
<http://bit.ly/IE30-FOI-Mars>

**Thu, 27 Jun****RSMA Summer BBQ**

Union Bar, Beit Quad, Imperial College

**Fri, 28 Jun, 12:00****RSMA Toronto, Canada**

*Informal RSM meeting, noon, Last Friday of every month.*  
Jason George Pub, 100 Front Street East, Toronto

**Sat-Sun, 29-30 Jun, 11:00 – 17:00****The Great Exhibition Road Festival 2019**

Exhibition Road, South Kensington, London SW7 2QG  
<http://bit.ly/IE30-Festival>

**Fri, 26 Jul, 12:00****RSMA Toronto, Canada**

*Informal RSM meeting, noon, Last Friday of every month.*  
Jason George Pub, 100 Front Street East, Toronto

**Fri, 2 Aug, 17:30 – 21:30****RSMA Perth, Australia***Monthly Sundowner*

The Celtic Club, 48 Ord St, West Perth, WA, 6005  
Alan Dickson – [alan@dickson.com.au](mailto:alan@dickson.com.au)  
John Sykes – [johnpsykes@gmail.com](mailto:johnpsykes@gmail.com)

**Thu, 15 Aug****Ringling of the Alexandra Peal of bells in Queen's Tower**

Alexandra Peal of bells in Queen's Tower rung to  
celebrate the birthday of HRH The Princess Royal

**Wed, 21 Aug, 12:30 – 14:30****Imperial Engineering Alumni***Quarterly Johannesburg Lunch*

Baron & Quail, Woodmead, Johannesburg, South Africa  
Contact Richard Gundersen@yebo.co.za

**Fri, 23 Aug, 12:00****RSMA Toronto, Canada**

*Informal RSM meeting, noon, Last Friday of every month.*  
Jason George Pub, 100 Front Street East, Toronto

**Fri, 6 Sep, 17:30 – 21:30****RSMA Perth, Australia***Monthly Sundowner*

The Celtic Club, 48 Ord St, West Perth, WA, 6005  
Alan Dickson – [alan@dickson.com.au](mailto:alan@dickson.com.au)  
John Sykes – [johnpsykes@gmail.com](mailto:johnpsykes@gmail.com)

**Fri, 27 Sep, 12:00****RSMA Toronto, Canada**

*Informal RSM meeting, noon, Last Friday of every month.*  
Jason George Pub, 100 Front Street East, Toronto

**Fri, 4 Oct, 17:30 – 21:30****RSMA Perth, Australia***Monthly Sundowner*

The Celtic Club, 48 Ord St, West Perth, WA, 6005  
Alan Dickson – [alan@dickson.com.au](mailto:alan@dickson.com.au)  
John Sykes – [johnpsykes@gmail.com](mailto:johnpsykes@gmail.com)

**Fri, 25 Oct, 12:00****RSMA Toronto, Canada**

*Informal RSM meeting, noon, Last Friday of every month.*  
Jason George Pub, 100 Front Street East, Toronto

**Fri, 1 Nov, 17:30 – 21:30****RSMA Perth, Australia***Monthly Sundowner*

The Celtic Club, 48 Ord St, West Perth, WA, 6005  
Alan Dickson – [alan@dickson.com.au](mailto:alan@dickson.com.au)  
John Sykes – [johnpsykes@gmail.com](mailto:johnpsykes@gmail.com)

**Thu, 14 Nov****Ringling of the Alexandra Peal of bells in Queen's Tower**

Alexandra Peal of bells in Queen's Tower rung to  
celebrate the birthday of HRH The Prince of Wales

**Wed, 20 Nov, 12:30 – 14:30****Imperial Engineering Alumni***Quarterly Johannesburg Lunch*

Baron & Quail, Woodmead, Johannesburg, South Africa  
Contact Richard Gundersen@yebo.co.za

**Wed, 20 Nov****Ringling of the Alexandra Peal of bells in Queen's Tower**

Alexandra Peal of bells in Queen's Tower rung to  
celebrate the wedding anniversary of HM Queen  
Elizabeth II and HRH The Duke of Edinburgh

**Fri, 22 Nov, 12:00****RSMA Toronto, Canada**

*Informal RSM meeting, noon, Last Friday of every month.*  
Jason George Pub, 100 Front Street East, Toronto

**Fri, 22 Nov****RSMA 135<sup>th</sup> Annual Dinner**

Details to be confirmed

**Fri, 6 Dec, 17:30 – 21:30****RSMA Perth, Australia***Monthly Sundowner*

The Celtic Club, 48 Ord St, West Perth, WA, 6005  
Alan Dickson – [alan@dickson.com.au](mailto:alan@dickson.com.au)  
John Sykes – [johnpsykes@gmail.com](mailto:johnpsykes@gmail.com)

**Fri, 27 Dec, 12:00****RSMA Toronto, Canada**

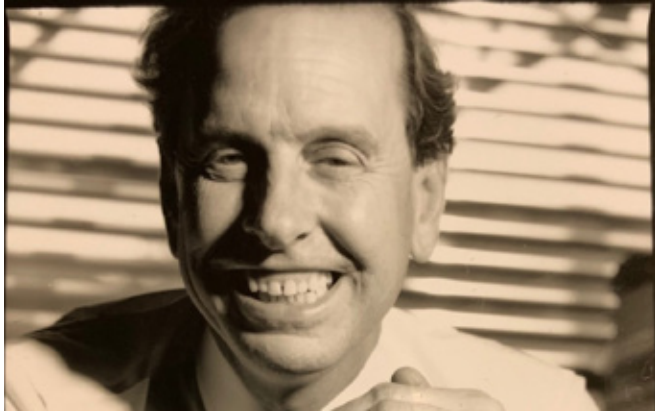
*Informal RSM meeting, noon, Last Friday of every month.*  
Jason George Pub, 100 Front Street East, Toronto

An up-to-date calendar of events of interest to CGCA and RSMA members is always available on the CGCA and RSMA websites. Imperial College maintains a calendar of college events at [bit.ly/IE-ImperialEvents](http://bit.ly/IE-ImperialEvents) and the Friends of Imperial College regularly organise events of interest to alumni (see [bit.ly/IE-FOI](http://bit.ly/IE-FOI))

Please note that while many of these events are open to all and often free, they usually require registration in advance. Please follow the links in the entry to get more information including if and how to register and whether there is any cost.

For more information follow links, or see page 2 for contact details

# Respected engineer and engineering historian



LAWRANCE HURST  
(Civ Eng 1952-56)

Bertram Lawrance Hurst (always known as Lawrance), has been described as 'one of the most highly respected engineers and engineering historians of his generation'. He was a life member of CGCA and a Fellow of the City and Guilds of London Institute (FCGI).

He was the youngest of four children, and his engineer father, also named Bertram Lawrance Hurst, set up in 1910 a consultancy called Hurst, Peirce + Malcolm, which earned an excellent reputation and which is still active today.

Lawrance was born in February 1934 and, in 1939, was evacuated to a Prep School in Devon, and then to Eastbourne for a further period. In 1943 – the same year that his father died – Lawrance started at Oundle School, where he came to be inspired by the school workshops and the printing press. In 1952 he came to City & Guilds College, and graduated with BSc(Eng) and ACGI in Civil Engineering. During National Service with the Royal Air Force, he was soon involved in building and maintaining airfields – primarily in North Africa and the Middle East.

On demobilisation, Lawrance took up employment with Andrews Kent and Stone, spending ten years with them until 1967 before joining his father's firm. In 1969 he was made a partner, and in 1991 became Senior Partner, a position he held until retirement in 1999, after which he remained as a consultant. The family presence within Hurst, Peirce + Malcolm is still ongoing, as Lawrance's son Philip is currently one of the Partners.

During his long career Lawrance worked on numerous projects all around the country, many in Central London. Throughout his long working life, Lawrance also maintained a strong interest in the history of 19<sup>th</sup> & 20<sup>th</sup> Century engineering and building construction and materials, building up a substantial library. He believed in sharing his acquired

knowledge as widely as possible through articles and book chapters, and for many years – as a co-opted member of the Royal Albert Hall's fabric committee – he advised on care of that iconic building. He also served on the estates and buildings advisory committee for the Natural History Museum.

Through much experience, Lawrance became an acknowledged expert in structural aspects of party walls, and he became a member of the 'Pyramus and Thisbe Club' for party wall surveyors. On his retirement in 1999, amongst other projects, he was still advising more than 120 surveyors in respect of 93 different party walls.

As an active member of both the ICE and the IStructE, Lawrance gave long service on various of their committees, including the Professional Conduct Committees of both, and for 14 years was convenor of the IStructE's History Study Group. In 1999, he gave the prestigious James Sutherland History Lecture at the IStructE, and in 2006 was awarded the Institution's Lewis Kent Award.

In their spare time, Lawrance and his brother Michael both shared an interest in clocks, and were founder members of the Antiquarian Horological Society. Lawrance also became closely involved with the Clockmakers' Livery Company, and was chair of their Museum and Educational Trust. Perhaps unsurprisingly, he was elected to its Court in 2001, and he was still serving in this role and attending meetings until shortly before his death.

Lawrance died in November 2018, at the age of 84, after a short illness, and is deeply mourned by his wife of 54 years, Pam, by their children Philip & Jo, daughter- and son-in-law Hil and Jim, and by four grandchildren, as well as niece and nephew, Rosey and Edward. Lawrance is also sorely missed by very many friends, business contacts and associates.

# Education, experience and intuition

RICHARD HERBERT TRAIN  
GARNETT (Min Eng 1954-57, 57-62)

Richard was born on 7 August, 1936 in Leeds. During his 55-year career as a mining engineer and geologist, he was instrumental in the discovery and expansion of several deposits, including Voisey's Bay, Donlin Creek and the Geevor Tin Mine in Cornwall.

At age 10, he was awarded a scholarship to Hymers College, Hull, a success which, he later claimed, opened career opportunities he would not otherwise have dreamt of. In 1954, Richard entered the Royal School of Mines on a state scholarship to study Mining Engineering. He graduated with first class honours in 1957, aged 20.

His newly acquired degree exempted Richard from two years of otherwise compulsory national military service and he decided to put the time to good use by gaining a further degree in Mineral Exploration and, finally, in 1962, his PhD in Economic Geological Engineering. Simultaneously, he rose through the ranks of the Student's Union to become President of the Union in 1958/59.



In 1987, Richard and Valerie moved to Alaska with responsibilities centred on Anglo American's gold interests in Canada and the USA. In 1988, Richard successfully applied his experienced intuition to the successful guidance of his team in the Donlin Creek 40-million-ounce gold deposit in Alaska. He was recognized internationally for his role in this successful venture. The deposit is now being brought into production by a US company.

In the early nineties, Richard settled in Canada and became an independent consultant. As the Technical Director of Diamond Field Resources, he was instrumental in the early recognition and exploration of the Voisey's Bay nickel deposit.

Richard's approach to life, and to business, was to gain a full understanding of any problem before making a major decision. He employed this approach with great success in the practical search for mineral deposits. His education, experience and intuition were all brought to bear on any investment or development decision.

Richard became recognised as a world expert on the exploration and exploitation of marine placer deposits after working on them in Alaska, Malaysia and Namibia.

Richard fully embraced his chosen career and was enormously successful and well respected by his colleagues in the mining industry. He had a breadth of knowledge that spanned asbestos to zinc and became a valuable source of knowledge and experience to many younger professionals joining the industry. His core values of integrity, fairness, dedication and pure hard work were manifest wherever he was employed.

As a result of ill-health Richard retired in 2016, but not before he had played a major role in bringing into production South America's first successful hard rock diamond mine in Brazil.

Richard passed away on 26th of January, 2019, at his home in Oakville, Ontario. He leaves his wife, Valerie, three daughters, three sons-in-law and six grandchildren.



His PhD led to his tin ore discovery at the Geevor Tin Mine, Cornwall, adding 30 years to the Life-of-Mine. While in Cornwall Richard met his wife, Valerie, whom he married in 1961.

His impressive career included employment with Rio Tinto, Anglo American, Hudson Bay Mining and Diamond Field Resources, as well as becoming a sought-after industry consultant until the age of 79. During his career, he worked on five continents, spending five years in South East Asia, two in Spain, two in the United Kingdom, 12 in Southern Africa and the remainder of his career in North America. He began as a geologist and rose through the mining industry ranks to join a number of corporate Boards as a director.



## A polymath with wide-ranging interests



JOHN KENNETH ALMOND  
(Metallurgy 1949-52, 52-55)

Born in Colchester, Essex on 12 October 1928, to John William, a Methodist minister, and Evelyn May (née Wilton). John – known to all his friends as Jake – spent his early years in Chelmsford and Hartley Witney, attending secondary schools in Ramsgate, Southwell and the Holme Valley, before serving two years' conscription (1947-49) in the Royal Air Force; training as a Leading Aircraftsman wireless fitter and enjoying the experience.

Jake then studied for three years at the Royal School of Mines in London as an undergraduate in Metallurgy, with mineralogy lectures from the legendary Prof H H Read. Jake won the Nuffield Vacation Scholarship in 1951, spending three months with the Rhodesia Broken Hill Development Company. He also spent four months in 1952 at Stanhope, Co. Durham, working as a mill shift operator for Fluorspar Ltd in their gravity and flotation plant; an experience he wrote up as the winning entry to RSM's 1952 Students' Competition, and subsequently published in *Mine & Quarry Engineering* in 1953. This was followed by another three years in the same school as a postgraduate research student in Mineral Engineering, in 1955 submitting his successful thesis for his PhD. He won the Arthur Claudet Prize of the IMM for an article resulting from his PhD studies. Thus he left London with the qualifications BSc (Eng) in Metallurgy, Associateship of the Royal School of Mines, PhD in Mineral Engineering, and Diploma of Imperial College.

His professional employment started in 1955 in Gambia where he spent 18 months as mill shift boss for Gambian Minerals Ltd (a subsidiary

of British Titan Products). Duties included recruitment and training of local staff, and safety. Whilst in Gambia, he married Honor Powell with whom he spent the next 47 happy years.

There followed nearly three years as technical manager in Kerala, South India for Hopkin and Williams (Travancore) Ltd, processing beachsands at two plants. Jake designed and commissioned equipment for rutile recovery, implemented a mechanisation programme, and for six months had overall responsibility for the entire Indian operation.

In 1960, Jake joined the Government of Uganda Geological Survey and Mines Department, Entebbe, in charge of their laboratory unit and responsible for advising miners and prospectors on physical and chemical processing methods. Jake prepared trial batches of minerals in a programme to promote growth of the Ugandan mineral economy and contributed to the first national growth plan.

After a disastrous flooding from Lake Victoria in 1964, Jake designed and commissioned an entirely new facility including versatile, small-scale, water-efficient, continuous plant that he described in an article in the *Transactions of the Institution of Mining and Metallurgy*. He entered the cultural life too, for some years was Committee Member and Editor for the Uganda Literary and Scientific Society, and took a great interest in local wildlife studies.

His career was interrupted in 1968 by a thyroid problem. Returning to the UK, he took a course of technical-teacher training, obtaining a distinction in teaching practice in the Metallurgy Department of Sir John Cass College.

In 1970, Jake took up a post as lecturer in extractive metallurgy at Teesside Polytechnic (later University). In 1971, he was appointed to senior lecturer; a post he held until retirement in 1994. The main thrusts of his teaching work were hydrometallurgy, electrometallurgy, and mineral processing for degree level students, together with iron & steelmaking and raw material resources, for various levels ranging from technician to post-graduate. Jake also undertook teaching work for the Open University for over 25 years, participating in summer schools and field trips.

During his long career, he was elected Member of the Institution of Mining and Metallurgy, and a Chartered Engineer; Member of

the American Institute of Mining Engineers; and Member of the Institution of Metallurgists.

Whilst lecturing in Middlesbrough, Jake studied part-time at Durham University for a Master of Education degree, that he was awarded in 1982.

By then, he had become firmly involved in industrial archaeology becoming, for example, a committee member of the Teesside, soon to be renamed Cleveland Industrial Archaeology Society (CIAS) in 1971, Chairman in 1973, Treasurer from 1976-86, and Editorial Board Member from 1974 to the time of his death. As Editor also of TIAS and CIAS Newsletters (118 editions in total) from 1973 until his death, Jake insisted on producing them on an antique typewriter until September 2011. He became a leading light in CIAS and a long-time member and valued contributor to many other societies including The Historical Metallurgy Society. He was also involved with the Newcomen Society, Cleveland Institute of Engineers, Yorkshire Archaeological and Historical Society, Association for Industrial Archaeology, Teesside Ships Society and the National Traction Engine Club.

His deep interest in mining extended to the Pennines, where he had spent time as a student. From 1996 through to 2011, he was a Trustee of the North Pennines Heritage Trust at Nenthead. This required working collaboratively with archaeologists, enthusiasts, Trust employees and business people to conserve and interpret this important site. In 2003, he collaborated in the production of a book covering the fluorspar industry of the North Pennines. He was a keen member of The Friends of Killhope, Peak District Mines Historical Society, and Northern Mines Research Society.

His papers and scientific articles number over 30, plus many unpublished technical reports from his time in Africa. He wrote a detailed section on zinc production technology in the British Museum publication about zinc and brass in 1990, and other papers followed on such subjects as the history of steel making, steam locomotives, and the early history of froth flotation.

Always a popular speaker, Jake was invited to lecture to the Royal Society of Chemistry, won an Iron and Steel Institute prize for a lecture given in Sheffield, and delivered to local history and specialist groups frequent talks that were always well-attended. His particular skills and training put him in demand for help with research studies. He also reviewed books for the IMM Bulletin; contributed to books on Victorian technical education, 19th Century steelmaking, and on alum

making; and collaborated in 1983 on the compilation/revision of a Slovenian metallurgical/technical dictionary.

The sheer breadth of Jake's interests was legendary, and he became a hub for information exchange on matters of industrial archaeology, not only relating to mining and metallurgy but to the industrial history of the nation. His collection of books, papers and manuscript notes is so large and detailed that it will be conserved and form the basis of a J K Almond archive graciously housed at the Materials Processing Institute, Middlesbrough, where it will be available for researchers. Jake was passionate about conserving records of past industrial activities and discoveries; and this will be an excellent memorial. He was a polymath and his interests included wireless radio construction, from his early days in the RAF. He was a keen member of the British Vintage Wireless Society and collected a vast array of spare parts of radios and other electrical equipment! He was also a music lover, and shared with Honor a passion particularly for organ music, reflected in his membership of the Electronic Organ Constructors Society and the Cleveland Organists and Choir Masters Association. Until age and frailty reduced his mobility, he was a keen gardener and delighted in his orchard, spending many hours researching old varieties of apples and recipes for the annual harvest. He never lost his interest and concern for Africa and the development of its mineral economy; and kept up-to-date with current issues of politics, unfair division of wealth, and the role played by illegal mining in funding paramilitary groups. Nor was he solely interested in the past with respect to energy. He was certainly expert on the history of mining and fossil fuels, but was also deeply interested in nuclear power and in the prospects for renewables. Despite his Methodist upbringing, in later life Jake was a committed humanist and member of the Northeast Humanists.

His cruel and untimely death on 13 December 2018 following a fall at home robbed us of a kind, gentle, generous, and intelligent man with incisive wit, encyclopaedic knowledge and remarkable perspective on how the past forged our today and will shape our future.

Jake's wife Honor died in 2002 and they had no children. He is survived by niece Rosalind, and nephews Martin and Colin.

*Dr FW Smith  
with contributions by E Birch,  
P Jackson, and C Morris*

## A brilliant teacher



PETER LINDON  
(Elec Eng 1957-60, 60-61)

Peter was born in January, 1939. He studied Electrical Engineering at City & Guilds College, graduating in 1960 with a First, and then continued studying for a further year to attain his MSc and DIC. In 1961, he moved to the University of Glasgow, receiving his PhD in 1966.

On leaving university, Peter considered following in the family tradition, having come from a gifted artistic musical family (his father was the Principal Violinist and Leader for the London Symphony Orchestra). Peter worked for a short period in adult education as a Director and Producer for BBC Television, but then returned to his main interest of electrical engineering and joined the fledgling University of Sussex as a founding member of the School of Engineering and Applied Sciences.

At Sussex, Peter proved to be a brilliant teacher loved by his students. During the 1970s, he worked with others on a Research Council-funded project to investigate a novel form of linear electric motor for

advanced ground transport. After that, he concentrated on power electronics, supervising several DPhil students on projects in advanced electrical drive systems. He was able to combine his love of electrical engineering and the theatre when he helped design a novel new lighting system for Andrew Lloyd Weber's musical *Starlight Express*.

Peter had many interests outside the University. He was a first-class administrator and made an exceptional contribution to the community through his work in the NHS for over 20 years. He was appointed Chairman of East Sussex Area Health Authority in 1977 and later became Vice Chairman of Hastings and Rother NHS Trust. He also became Chairman of the New Sussex Opera Society, and this latter role reflected his deep love of classical music associated with the musical heritage from his violinist father. In performing all of these roles, Peter showed exemplary charm, efficiency and tact.

After he retired in 2001, Peter's musical interest came to the fore and he became determined to learn to play the French Horn. This he did successfully and he was able to play with the Lewes Concert Orchestra.

Sadly, towards the end of his life he suffered the devastating consequences of Alzheimer's, dying of a brain tumour in January, 2018.

Peter was dearly loved by his devoted wife, Jill, by four children and stepchildren, nine grandchildren and one great grandchild.

*With thanks to Jill,  
and to Colin Finn,  
Emeritus Reader in  
Experimental Physics,  
University of Sussex.*

## The very best of 'old school'



PETER ARTHUR COX  
(Civ Eng 1940-42)

Peter Cox was born in London on 30 October, 1922, and attended Westcliff High School in Essex. He studied at City & Guilds College 1940-42, attaining a BSc(Eng) and ACGI in Civil Engineering. He was renowned for his Morphy Day activities, and as a member of the College's Tug-of-War team.

From 1942 to 1947 Peter served as a commissioned officer in the Royal Engineers in Europe and Palestine, and was mentioned in dispatches. After de-mobilisation he joined Lewis and Duvivier, Consulting Engineers, spending two years from 1952-54 in the offices of Rendel Palmer and Tritton (RTP). Then, after periods with Peter Lind & Co. Ltd. and Sir Bruce White, Wolfe Barry and Partners, he re-joined RTP as Resident Engineer for a marine project in Iran. On his return to the UK, he was responsible for port and maritime works at home and overseas, the most noteworthy being the Thames Barrier. He retired as the last senior partner of Rendel, Palmer and Tritton, before it merged with High-Point to become High-Point Rendel in 1985.

Peter sat on the Councils of the Association of Consulting Engineers and the Institution of Civil

Engineers, serving as President of the ICE in 1980-81 and as President of the Smeatonian Society of Civil Engineers for 1999. He initiated the Infrastructure Policy Group of the ICE and also chaired its Legal Affairs Committee for several years. He served as a Board member of Dover Harbour Board, and of British Maritime Technology Ltd. He was a Fellow of the Royal Academy of Engineering.

Peter was an active member of the General Committee of the Old Centralians, and in 1989-90 served as President of the Association. He spent a number of years as a member of Council at the City and Guilds of London Institute, something that CGCA and Imperial College have cause to be extremely grateful for, since in the 1990s Peter argued strongly to persuade the Institute not to proceed with a plan to open up the ACGI award to anyone who had studied for City & Guilds qualifications. In the event, the Associateship was preserved as solely for graduates in engineering at City & Guilds College, and the Institute introduced a new class of Graduate (GCGI) for the other candidates.

In retirement, Peter moved from Croydon to Pewsey, Wiltshire, still attending Dinners and reunions in London until a few years ago, although latterly he moved to sheltered accommodation. He is remembered warmly by Prof David Nethercot, also a Past President of CGCA: "Peter was always the same – calm, courteous, interested in what was going on and unafraid to make a suggestion, always expressed in the most polite of terms. The very best of 'old school'."

Peter died on 17 November 2018, aged 96.

## Avid rugby player – and historian

JAMES PATRICK (JIM) KEHOE  
(Mech Eng 1958-62)

Jim Kehoe was born on 24 November, 1939 in Bristol, England. He arrived at City & Guilds College in October 1958 after attending St Brendans, Bristol to study for a degree in Mechanical Engineering, graduating in 1962. Whilst at college he was an avid member of the Rugby Club and was Captain of the Imperial College 1st XV in 1961-62. He also played for the University of London 1st XV. He remained an avid rugby fan throughout his life.

Later degrees included an MBA in General Business from the University of New South Wales (1967-70), and a further MBA in Technology Management from Deakin University (1993-

96). Between 2002 and 2004 he studied for the degree of MLitt in History from the University of Central Queensland, and in 2007 he obtained a Master of Project Management from the University of Southern Queensland.

After graduation he spent some time working for AEL in Manchester and Larne, Northern Ireland. In 1964 he moved to Australia to take up a position at the newly commissioned Poatina Power Station, located in the central highland region of Tasmania. He went on to spend over 25 years with IBMAustralia in Adelaide and Sydney. He later worked as a consultant with Communication Design & Management, and subsequently with Aspect Computing Pty Ltd.

On retirement in 2005 he took up a part-time teaching appointment with TAFE NSW (Technical and Further Education), continuing until 2012, when he was advised that TAFE wished to have only full-time teaching staff.

Concurrently he set up his own consultancy - JONAKE Consulting - in 2006, and in due course published a book entitled "From Whites to Muddies" a history of Rugby Union in the Royal Australian Navy. This book was published by Ian Gordon at Barrallier Books in Canberra. From 2004 he also acted as a Historian for Services Rugby and having completed a history of Navy Rugby was researching 'Australian Services Rugby Union'.

At the time of his death he was

working on a History of Rugby at Imperial College.

From 1990, Jim served as the Honorary Secretary for the Sydney and NSW Branch of CGCA, in which rôle he will be sorely missed by many members both in Australia and in the UK.

Jim died suddenly on 9 August 2018, after a fall whilst on holiday in New Caledonia. He is survived by his wife Muriel and daughters Fiona and Penny.

*We included an obituary for Jim in IE29, but due to gremlins the version that was printed included some errors. We have therefore taken this opportunity to print the corrected version of that obituary and apologise unreservedly to Jim's family for any distress caused.*

## 'The best brain in the department'

THOMAS ALAN WYATT  
(Civ Eng 1949-52, 52-55)

Professor Tom Wyatt died in January 2018, at the age of 85. Although not a member of CGCA, he will be remembered by many. The following obituary has been provided by CGCA Past President, Professor David Nethercot.

Tom Wyatt graduated as the top student in the Civil class of 1952, following this with a PhD 3 years later. He then proceeded to a highly successful career with the consulting firm Freeman Fox – arguably the world's leading designer of long span bridges. Included in this was working as a key member of the team responsible for the groundbreaking Severn Bridge. Tom was one of the 5 named recipients when that project won the first McRobert Award from the Royal Academy of Engineering. Tom's specialism was wind loading and dynamics – a topic of great importance for slender structures, especially those located on exposed sites. But Tom was a 'real scholar', as evidenced by his taking a lecturer post back at Imperial. Research on dynamics continued, conducted alongside many commissions to provide expert advice on the most challenging and high profile projects worldwide. He was one of those who solved the mystery of the vibration of the Millennium footbridge across the Thames and, only last year, produced a prompt, cogent and correct explanation for the fatigue damage to some temporary works on the Queensferry Bridge. He continued

to teach Structural Design to both final year and MSc students well into his 80s, inculcating in the students his own high standards of rigour and respect. Despite being described to me by a former colleague as 'the best brain in the Department', Tom was unfailingly modest, reluctant to criticise and 'a real gentleman'.



Two comments from his teaching colleagues are worth repeating:

"I will never forget when, on more than one occasion, Tom put up a slide on floor dynamics to our 4<sup>th</sup> years and I couldn't help thinking there was about 5 lectures worth of material on that one slide!" – Dr Luke Louca.

"A friendly helpful gentleman of the old school. A genius with it, and someone who was always keen to help colleagues and students alike. Someone that we will all miss." – Emeritus Professor Roger Hobbs.

Tom is survived by his wife Eileen and daughter Marie-Claire, together with son-in-law Michael and grandchildren Thomas and John.



The Department are collating a booklet of reminiscences about Tom. If you would like to contribute a paragraph please contact Fionnuala Ni Dhonnabhain at [f.donovan@imperial.ac.uk](mailto:f.donovan@imperial.ac.uk)

## An inspiration, a visionary



ROGER SARGENT  
(Chem Eng 1944-47, 47-51)

The founding father of process systems engineering, Roger's career spanned 50 years and had an immeasurable impact on chemical engineers across the globe.

Born in Bedford on October 14, 1926, Sargent was a bright student, winning a scholarship to attend Bedford School. He went on to begin his career with Imperial College in 1944 as one of 14 students admitted to the highly selective BSc in Chemical Engineering. After graduating in 1947, he completed his PhD on low temperature separation techniques at Imperial under the supervision of Dudley Newitt.

In 1951 he moved with his wife Shirley to Paris where he joined Air Liquide and further explored the use of computers in solving a wide range of industrial air separation problems. His first major paper was published in 1958 and concluded that "design methods have been developed to such a point that any plant design can be carried through with confidence, provided the requisite basic data is available".

Sargent returned to Imperial in 1958 as senior lecturer in Chemical Engineering, and was promoted to professor (1962), then chair, and Courtauld's chair of Engineering (1962 and 1966 respectively), dean of the City and Guilds College (1973-96), and head of department for chemical engineering (1975-88). In 1964, he became a Fellow of IChemE and in 1973 was elected president. In 2014, the organisation established the Sargent Medal to recognise major contributions to research in the area of computer-aided product and process engineering.

Sargent's work has often been described as visionary and ahead of its time. Outlining his vision for PSE in a 1967 article, he highlighted the need for the development of sophisticated mathematical and computational tools for the design, control, operations, and optimisation of chemical processes, and advocated for an interdisciplinary approach which would see chemical engineers

working with researchers in fields including control engineering, numerical analysis and computer science.

To this end, he established the Centre for Process Systems Engineering (CPSE) at Imperial College in 1989 and was director until his retirement in 1992. Current CPSE director, Claire Adjiman paid tribute to its founder: "Roger foresaw early on the potential impact of computers on the process industries. In working to realise that impact, he instilled in people a desire to pursue research excellence while developing solutions of relevance to industry and practice. He founded the CPSE with this ethos in mind and we are deeply grateful for this legacy."

Ignacio Grossmann said: "Professor Roger Sargent meant a lot to me. He had a tremendous impact on my career. I was truly fortunate and privileged for having him as my PhD advisor. He was a true inspiration, a visionary scholar with very high standards who believed in the power of mathematical optimisation. He was a true gentleman, and above all, a very kind human being. I will sorely miss him."

Roger passed away on 11 September, 2018, at the age of 91, following a short illness. He is survived by his wife Shirley, sons Tony and Philip, and four grandchildren.

*Prof Nilay Shah, Head of Department of Chemical Engineering*

### IN BRIEF

PETER EDWARD ROBSON  
(Mech Eng 1965-68)

Peter Robson, a CGCA member, who was born in 1947 and studied Mechanical Engineering at City & Guilds College between 1965 and 1968, sadly died in December 2016, at the age of 69.

Peter had been in membership for over 16 years, and lived in Stoke Gabriel, Devon. He worked for some time with Docking Systems Limited and Baltic Wharf Limited.

