



Imperial ENGINEER



IDE AT 40
ROCK SOLID CAREER
CHRIS LUMB INTERVIEW
ILLUMINATING CLIMATE CHANGE
MOUNTAINEERING ON MONTE ROSA

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

ISSUE 34 SPRING 2021

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Cover Image

**Benedict Krueger
summitting the 4554m
Signalkuppe /
Punta Gnifetti.
Image © Nicolas Felka.
(See pages 18-23)**

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URLs at the end of items indicate more details online.
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Since my last report in Autumn 2020, we have continued to be in some form of lockdown in the UK. Despite these difficult times, you will be pleased to know CGCA has learnt to work virtually and thrived.

As we see some green shoots at the end of this pandemic in some parts of the world, it is important to reflect on our history, what we have achieved as Imperial Engineers during the pandemic and the contribution we can make in the future. Engineering at Imperial is now 145 years strong – over those years, our engineers have faced many crises and have helped to shape the world. Over the last year, Imperial Engineers have been at the forefront of developing innovative solutions to tackle the current pandemic and the Faculty is playing a leading role in shaping the post-Covid world. We organised excellent member events in March and December to celebrate our Engineering Faculty's achievements. Our thanks go to Professor Dick Kitney, Dr Ana Mijic, Richard Gundersen, Dr Joseph van Batenburg-Sherwood and Jumpei Kashiwakura for their contribution at these events.

CGCA continues to play an important role helping students' and members' well-being during the current pandemic. Despite the constraints of lockdowns, we have organised careers and social events for our students, launched the first alumni-alumni mentoring scheme, produced an excellent IE magazine and helped students in need through the Old Centralians Trust. The accuracy of membership data continues to be a focus area for the Committee so that we can target events to our CGCA community. Our popular Annual Dinner, scheduled for February 2021, has been postponed to February 2022. I hope there will be a good turnout among alumni and students.

We could not have done these events without the support of the committee and the wider membership. I would like to express my appreciation to the leadership provided by Nigel Creswell as Honorary Secretary, ably supported by Honorary Assistant Secretary, Milia Hasbani. We thank Peter Chase, our Honorary Treasurer, who will be stepping down at the next AGM and will take over as Chair of the Old Centralians Trust. Peter replaces Chris Lumb who is stepping down as Chair after nearly 21 years. We are delighted that Peter and Chris will continue to be members of the CGCA Committee. We also welcome our new Honorary Treasurer, Andrew Hill. Once again, under difficult circumstances, Peter and Alison Buck have done outstanding work in producing Imperial ENGINEER – an important link to our members.

Once again, a special thanks to the younger members of the committee who have been critical in adapting our virtual events schedule and planning for 2021/2022.

I look forward to remotely seeing most of you at a CGCA event in the near future.



**Atula
Abeysekera**

PRESIDENTS REPORT



**Tim
Cotton**

"Spring brings with it a sign of renewal that makes itself known in a thousand ways." (Anon.)

2021 could be the year of renewal for all of us and whilst it has been a particularly hard year for students who have not been able to enjoy normal college life with all of the usual lectures, field trips, social and sporting events and interactions, we have definitely turned a corner in coping with the pandemic. So, thinking positively, here are a number of upcoming events for your calendars:

The Bottle Match Weekend that was tentatively arranged in London for the weekend of June 11-13th HAS BEEN CANCELLED. Unfortunately, the RSM and CSM have been unable to steer a path through the maze of Government and College Public Health rules to safely organise the weekend. With term ending on 25th June, there will not be enough time to fit in the event after 21st June when it is hoped all Government restrictions will end.

Planning is under way for the 2021 Annual General Meeting and **POTENTIALLY the Summer BBQ for Final Year Students!** Given current Government guidelines, these will both be occurring on Thursday June 24th, the day before the last day of term, at the Union Bar in Beit Quad. In addition, a date has been booked at the Rembrandt Hotel, South Kensington for the **136th Annual Dinner, for Friday November 26th 2021.**

Following the recent successes of the annual RSMU/RSMA careers event, in early March 2021, the committee once again supported the students with an engaging virtual careers evening. Teigan Collins, the RSMU HonSec, organised a great event and has provided a brief report for you all to read (see page 5).

The committee continues to maintain a very active relationship with the RSMU and key societies within the RSM such as Geology, MatSoc and GeoPhysicsSoc. All of them are Represented on the RSMA Committee meetings and the RSMA provides financial support where needed. These Clubs and Societies are the life blood of the RSM and it is very pleasing to report that these organisations managed to maintain a very active schedule of virtual events throughout the year. As mentioned earlier, all organisations enjoy, and want more, interaction with the wider alumni group.

The RSMA continues to work 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. 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.

In the 2020 Autumn term, the RSMA Trust awarded five £1000 bursaries to final year students. This is now the third year running that the Bursaries have been awarded and 11 students have so far benefitted from the tremendous generosity of RSMA members. This year, the selection Committee had 16 worthy applicants from across the RSM. 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. Lastly, 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. The Committee has recently set up different ways to allow members to support the 100 Club, for example offering a monthly direct debit to spread the cost. See pages 6 and 7 for a piece from the five new RSMA Final Year Bursars and how you can sign up and keep helping the RSM students.

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. The RSMA is always looking to attract more Committee members so if you can spare a few hours every couple of months please do get in touch. Remember you can all still use the email address 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.

DIARY

As a result of the ongoing worldwide COVID-19 pandemic, events in most locations have been cancelled or converted to virtual events. Local restrictions are varied, therefore before considering attending any event, please contact the organisers to check whether the event is still taking place.

RSMA Toronto, Canada**Informal RSM meeting**

Last Friday of every month, noon.
Jason George Pub, 100 Front Street East, Toronto
Contact: rsma.1851@gmail.com

RSMA Perth, Australia**Monthly Sundowner**

First Friday of every month.
The Celtic Club, 48 Ord St, West Perth, WA, 6005
Contact:
Alan Dickson – alan@dickson.com.au
John Sykes – johnsykes@gmail.com

Imperial Alumni, Houston, US

Alumni social
Third Thursday of every month, 6pm
Capital Grille, 840 West Sam Houston Pkwy N, Houston, TX 77024
Contact: Matt Bell – matt@in2oilandgas.com

Imperial Engineering Alumni, Johannesburg, South Africa

Quarterly Johannesburg Lunch
(19th May, 18th Aug, 17th Nov, 16th Feb)
Baron & Quail, Woodmead, Johannesburg, South Africa
Contact: Richard Gundersen – Gundersen@yabo.co.za

CGCA**AGM**

Monday, 14th June, from 17:30
(Virtual event via Zoom)

RSMA

AGM + Final Year Students' BBQ
Thursday, 24th June
Union Bar, Beit Quad

CGCA

Traditional Reunion Luncheon
Saturday, 13th November, 12:30 for 13:00
The Polish Club, 55 Prince's Gate, Exhibition Rd, South Kensington
(See booking form with this issue)

RSMA**136th Annual Dinner**

Friday, 26th November
Rembrandt Hotel, South Kensington
Details TBD

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-WhatsOn and the Friends of Imperial College regularly organise events of interest to alumni (see 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

CGCA Annual General Meeting 2021

The CGCA Annual General Meeting, AGM, will be held on Monday, 14th June, starting at 17:30 (UK Time, UTC+1) and will again be using the ZOOM platform. Your President, Professor Atula Abeysekera will review the last year, one dominated by the COVID pandemic, and highlight how the Association has continued to hold events, send out communications and move forward with new initiatives such as Alumni-Alumni Mentoring programme.

The AGM will include the election of all Committee posts except President for the 2021/22 academic year. If you wish to stand for any post please email the Hon Sec, Nigel Cresswell (email

Guildshs2018@outlook.com) identifying yourself and the post you wish to stand for.

We are particularly interested in finding a Membership Secretary who will lead a membership drive, primarily aimed at students and younger members. If this interests you, please email the Hon Sec.

The 2020 Accounts will be presented for approval as well.

As the session is expected to be virtual (ZOOM details will follow in newsletters and be posted on social media and website) the usual President's Evening supper will not be held this year.

Please mark your diaries and look out for further details.

CGCA Decade Reunion Luncheon

The Decade Reunion luncheon for 2021 will be going ahead at The Polish Club on Saturday 13th November for those who graduated

in years ending 0, 1, 4, 5, 6, or 9. Hopefully restrictions will have been lifted by then. The booking form is included with this issue of IE.

John & Frances Jones Prize

Each year Departments are invited to nominate a postgraduate student for the John & Frances Jones Prize. In response to the call, for academic year 2019-20, nominations were received from three Departments. Adjudication of these nominations was carried out by Professors Richard Jardine and Martyn Boutelle, as College Consuls for the Faculty of Engineering. They found that all three of those nominated were clearly very appropriately and well qualified in terms of their overall contributions, both academically and in extra-curricular affairs. This made the selection process a matter of fine judgement, but ultimately a decision was made as to the most worthy.

The nominee selected to receive the prize for 2019-20 was **Ms Julia Sun** of Bioengineering. Julia is in the final year of her PhD, during which she identified and corrected a 40-year-old misconception in the field of silicon etching. Her paper on this, as sole experimental author, was published in 'Advanced Materials

Interfaces' and became a top 10% most accessed paper in the journal the following year. She has been described as an exceptional GTA, receiving the 'Best GTA' Award at the Student Academic Choice awards 2 years in a row, along with the Faculty of Engineering 'GTA-of-the-Year' award. Julia's outstanding service as a Sub-Warden for Beit Hall since 2018 has been highly recognised, and during the closing months of the 2020 academic year, resulted in a highly unusual request – for her to serve as the Assistant Warden for Beit Hall, a role generally not held by PhD students. She has been a long-time volunteer with St John's Ambulance, and in April 2020, Julia assisted with front-line medical support at St Mary's Hospital, spending many long days in the COVID and vascular wards to aid NHS staff. She has also regularly volunteered at Bishop Creighton House to help isolated and vulnerable individuals.

The John and Frances Jones Prize celebrates the life – and generous bequest – of John Jones, who was the first Registrar of Imperial College from its formation in 1907 until his retirement in 1927. Since 2013-14 the prize has been administered by the Old Centralians' Trust on behalf of the City & Guilds College Association. Ms Sun will receive the award in the form of a cheque for £200, although sadly it will not be possible for this to be presented at the 2021 CGCA Annual Dinner, as the pandemic has necessitated cancellation of that event. However, the hope remains that she may be able to attend the Dinner in 2022 for her success to be recognised.



Julia Sun, PhD student in Bioengineering

Photo: Imperial College

OC Trust Chair

Prof Bob Schroter, a founder member of the OC Trust Board, who has served on the Board in an unbroken run over the intervening 56 years, heard that we were interviewing Chris Lumb as he retires from Chairing the OC Trust Board (see page 9), and shared with us a copy of an email (extract below) that he had just sent to Chris.

Dear Chris,

[...]

Quite simply, and completely unchallengeably, you, as its Chairman, have nurtured the Trust for around 40% of its existence. Your predecessors had all sorts of issues to successfully steer the Trust through, but none had to face the enormous task you have lived with and successfully grappled throughout almost all of your chairmanship.

In your inimitable way, you have quietly led the interpretation of the Trust's objects out of the 1960's and into the 21st Century. It has been on your Watch that all sorts of societal and structural changes have gone on around us and you have ensured the Trust adapts in due form. You have shown a patient, yet utterly committed, resolve to get things right and suitably documented. At the same time, you have succeeded in keeping the various factions enthusiastically united behind our ideals and the Trust is consciously aware of its strategy and ways to ensure its future value to students of the College. Future generations of students will be able to look back on what you have managed with enormous gratitude.

I so realise that the time and committed energy you have poured into the Trust must have come at a huge cost to you and your family. Gill must have been an incredible support to you throughout and had to cope with many losses within your family time. Gill's giving to our mission is greatly appreciated and I hope she will forgive us a little bit in view of what you have achieved. The demands of the Trust have also placed competitive pressure on your parental and grand parental desires, for which we must also apologise - but I hope your family will be able to enjoy the satisfaction of being a part of you and thus all you have achieved selflessly for others over so many years and also into the future.

Chris, all I can say at this point is "Thank you" from Students and Trust Board Members past and present.

With very best wishes from everyone for your future happiness and health,
Bob

RSMU Careers Evening – Monday 1st March 2021

On Monday the 1st March, the RSMU hosted its annual Careers Evening, held online this year through Microsoft Teams. As per the successes of previous years' events, the evening aimed to bring together both current students and alumni to hear from those who have been in their shoes, provide an insight into a wide range of industries and further study whilst expanding connections and networking all around. The evening was one of the best attended RSMU virtual events this academic year, with nearly 30 attendees at any given time, however we expect the final number of individuals to have been higher as people tuned in for specific talks of interest.

A total of 6 speakers spoke about their experience in the RSM and how this has only assisted them in their various career pathways across a wide range of professions, including those recently graduated to those not so recent. We were kindly joined by:

- Arka Dyuti Sarkar on 'An international student's perspective to both further study and work in the UK'
- Jim Platt on 'A fateful career in Mining Geology'
- Marta Wolinska on 'Changing industries, understanding the consulting market and getting into the Big Four'
- Madeleine Hann on 'Looking beyond the PhD to a career in the Public Sector: Applying to the British Military and the Civil Service'
- Sam Casement on 'Graduating in the COVID Era and a career in Earth Observation'
- Dan Keogh on 'Life as a Management Consultant and working abroad'

The varied and extremely insightful line-up attracted a wide range of participants, both undergraduate from 1st year to final year MSci, research postgraduates and alumni from Earth Science and Engineering and Materials departments alike. Throughout the evening, thought-provoking conversation starters were contributed from a wide range of perspectives in the chat function and allowed for a great discussion between all involved during the networking breaks, perhaps a silver lining to the virtual realm.

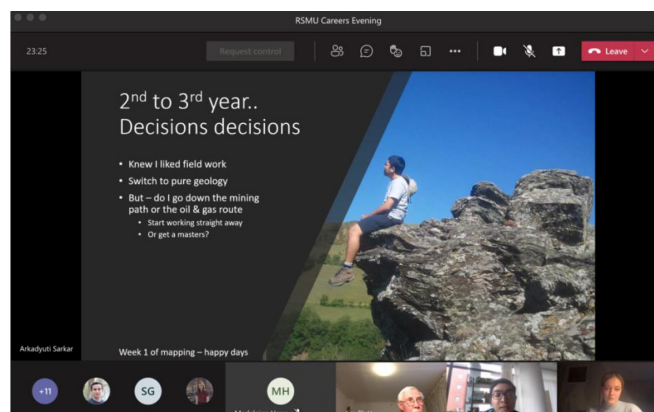
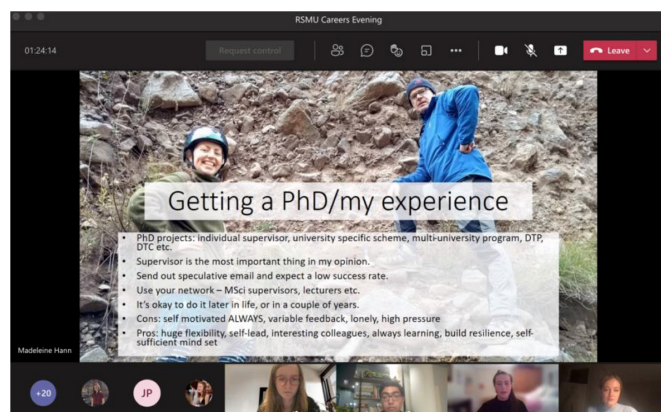
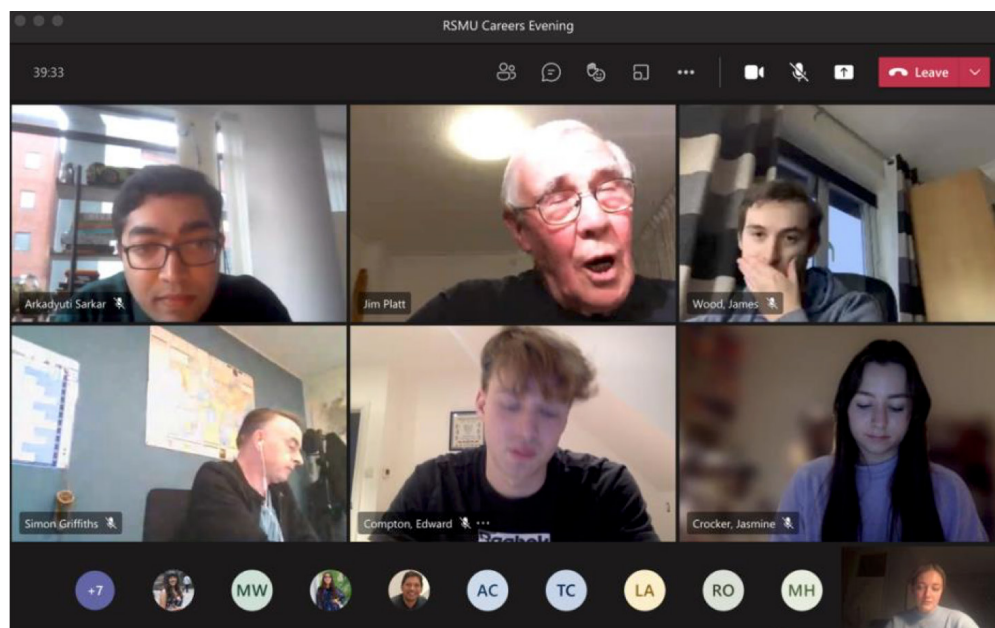
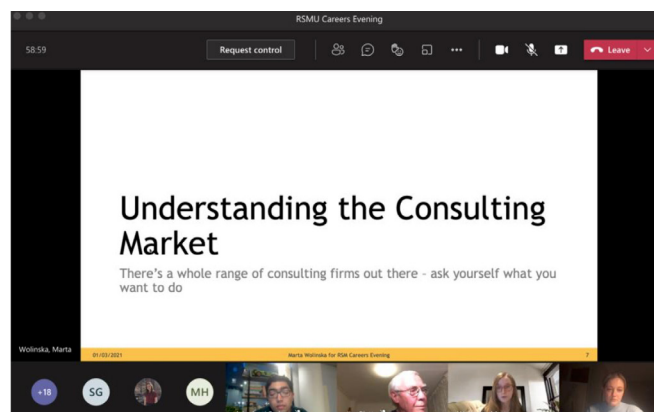
A particularly strong point from this year's event was perhaps the more recently graduated cohorts' ability to reassure students with regards to entering the world of work in this so-called 'new normal', some pearls of wisdom an event such as this is able to provide. The majority of our guests were also heavily involved in volunteer roles during the duration of their degrees and hence were also able to provide some inspiration to our newer members of the RSM, highlighting the importance of these roles not

only in personal development, but to uphold the RSMU as we all know and love.

On behalf of the RSMU, I would like to extend a huge thank you to those who volunteered their time to speak to provide some words of wisdom, and would encourage any other members of the RSM to get involved in our future events. Overall, the event was very well received, students perhaps took

away greater appreciation for other ways in which their degree from the RSM can provide in later life and it is an event we strongly wish to continue its successes in the future. We are grateful for the RSM for its support as we cannot run these events without contributions from its members and who better than those who have gone before us!

Teigan Collins
RSMU Honorary Secretary



RSMA Trust 100 Club Final Year Bursary : Round 3!

The Club continues to be a success and thanks to the generosity of the 100 Club members, over £28000 has been raised to date, which has allowed 5 bursaries each of £1000 to be awarded in 2020. Just as importantly, the 100 Club fund also allows the RSMA Trust more scope to award students who may be disadvantaged, either financially or in other ways and this is done in conjunction with the respective departmental undergraduate directors. With the onset of Covid, the hardship category has taken a new dimension and more students, due to family circumstances or other, are feeling the strain. With the build-up of the fund, we are now in a position to look at increasing the scope of hardship awards to better support this category. In conjunction with the RSMA Trust and college staff,

we will still look to assisting with sponsorship for college-approved field trips and activities, though with Covid these are currently on hold. Note, the 100 Club does not sponsor RSMU sporting or social activities – those sponsorships are solely in the domain of the RSMA.

We have received feedback from the more recent graduates that an annual contribution of £200 to the Club is onerous and that, for them to participate, £100 may be more appropriate for their circumstances. Many have also suggested a monthly, rather than annual Direct Debit, set at £8.50 per month. To date there has been a hard core of contributors to the Club (the founding members) to whom the RSMA is extremely grateful but the committee feels it is more appropriate to encourage greater participation from members,

albeit at a reduced rate. We see the Club, in the first instance, as a seven to ten year project during which Club funds would be built up whilst allowing disbursements of, say £5000pa.

Attached on the back of the address label is a form to complete if you are either joining the RSMA 100 Club, updating your details or revising your contribution and includes an option of £100pa or a monthly contribution of £8.50. Those who contributed (at £200pa) from the outset and are thus responsible for the initial success of the Club will be recognised as the “founding members”, but, understandably, may wish to reduce their donation with this revised option. A provision has also been included for a lump sum contribution which may be more suitable for overseas members.

Electronic banking is the preferred option for all payments and if you are a UK taxpayer you can Gift Aid your payment. In which case you must complete the form fully and return to the RSMA.

Below are 5 articles on each of the 2020 winners and these are a wonderful testimony to the Club's objectives and we ask that you please consider supporting **your** college, **the Royal School of Mines**. This is a great opportunity to give back to the Royal School of Mines, of which we all have many fond memories, and to positively support today's generation of students. Let us not leave the support to the hard core few. So if you can commit, in any way, it would be very much appreciated by the students, staff and the RSMA.

Abigail Wong

When I first heard I received the RSMA Final Year Bursary Award, I



was completely in shock and could not believe I had just won £1000. I remember receiving an email from Tim (RSMA President) with an attached letter titled “RSMA Bursary Prize” and was over the moon when I read that I was a winner of the prize. Overwhelming feelings of happiness, joy and excitement filled me but most importantly the feeling of gratitude and appreciation for the RSMA. I am incredibly grateful for the RSMA and their generosity. Receiving this award has meant a lot for me in my final year of study. Part of the money I have received has gone towards saving up for a new laptop. The current Covid-19 pandemic has definitely seen a more constant need for technology,

especially since majority of the year has been moved online. The growing demand for improved technology has resulted in my decision to purchase a new laptop and that would not have been possible without the help and contributions from the RSMA bursary funds. Alongside this, as society president of Imperial Dance Company, I organised a fundraiser where we ran 1000 miles in one month as a society to raise money and awareness for youth homelessness and Centrepunt Charity. I donated part of the money I received to this fundraiser as it is something I strongly believe in and I'm so thankful that the RSMA has given me this opportunity. Lastly, I have put the rest of the funds into

my savings for the future. Hopefully in the near future, with reduced restrictions, I'll be able to put the money towards travel expenses for university activities well as RSM events. Also, as this is a final year award it has definitely reminded me that I really am in my last year here at the RSM and my time here is coming to an end which makes me quite sad. I am so grateful for all the people, both students and lecturers that I have met during my time here at the RSM as well as all the opportunities I've had and will always cherish the memories I have made. I am so proud to be part of the RSM community and I hope to one day be able to give back to them everything they've given me.

Annie Mao

Being a member of the RSM has been an amazing experience of my university life. I am now in my final year of university studying Geophysics.

In my third year, I was the Vice President Clubs and Societies (VPCS) of the RSMU. I represented



the RSMU and helped our clubs to overcome financial difficulties. The highlight of my year as VPCS had to be organising the 118th Bottle Match. It was a challenging but incredibly rewarding experience. With the support from both departments and the RSMU executive committee, I engaged a great number of players and spectators from emerging sports and set a new sports record.

In terms of sports, I have been playing for the RSM Badminton and Lacrosse teams since my first year. I was the Secretary of the badminton club in my second year, where I hugely improved the engagement of the club via regular social media updates and hosting multiple social events throughout the year. As a result, we doubled the number of members and made the club the largest society in the RSMU.

This year, I am continuing my work in the RSM Badminton committee as the President of the club. I've

been focusing on establishing a more structured committee and collaborating with other badminton clubs at Imperial. At the same time, during the global pandemic, we also managed to look after our members' physical and mental health through holding regular training sessions (when allowed) and online social events.

Academically, I have always been interested in implementing Maths and Physics theories in the world of geoscience. My MSci project aimed to use mathematical models to evaluate the carbon storage development trajectories in the UK and the EU. I have learnt a great deal of analytical skills via extracting and processing large data sets. I also found my interest in the carbon storage industry where I hope my geophysical skills will be applicable.

I felt extremely honoured to receive the RSMA bursary. The bursary aided me enormously

during national lockdowns. As an international student, I was not able to travel home due to the travel ban. The bursary lifted the financial pressure from living in London. I also used it to set up a home office. It helped me to work more efficiently and maintain a healthy work style, especially while I was doing research for my MSci project.

For me, the RSMA bursary is not only an award, but also the best recognition I can get from the RSM community. My university life was made special because of the incredible people in this community. I have been inspired by the passion my peers have towards geoscience and the work they have done to make RSM supportive and inclusive. Their spirit encouraged me to get involved and stand for what I believe. I am incredibly grateful to the RSMA for the generosity. I will always endeavour to endure this spirit and act as an ambassador for the RSM.

Chris Carter

The Royal School of Mines has been an integral part of my time at Imperial. All alumni will know that moving to London and starting university can be incredibly daunting; arriving in a new city, joining a new



community and taking on new academic challenges. Despite my nerves, I threw myself into the events and revelled in the collegiate atmosphere and within days, I'd decided the RSMU was the right community for me. Thanks to the RSMU, all doubts about whether Imperial and London were places I belonged were eliminated.

When the time came, in March of my second year, to consider running for a senior volunteer position, I threw my hat in the ring to serve as President of the RSMU. I hoped as President to be able to provide the same community and quality of experience as I had had in my first year; I wanted to make sure that every incoming student felt as comfortable and included in the RSMU as I had and, indeed, still do.

While my year as President was tough with some unexpected

challenges (I certainly couldn't have anticipated ending the year in lockdown) I am so proud of the work that I, and the committee I worked with, managed to get done. Applying for the RSMA Final Year Bursary was an opportunity for me to reflect on my accomplishments and my time as a volunteer with the RSMU. Upon hearing I'd been awarded the bursary, I felt validated in the work that I had done; it was fantastic to know that the RSMA were proud of my contribution to the RSMU community, just as I am.

I must admit that when I actually received the funds, they went straight into a savings account! By the time the announcement was made, I had begun to consider applying to graduate programs in science and technology policy in the United States. As I'm sure many of you will know, a Master's degree in

the US is not cheap, so this award from the RSMA was the first step in arranging the funds necessary to support my move to the US. Once I've accepted a place, this bursary will help me pay for my flight out and all necessary documentation.

My time at Imperial and with the RSMU have been the best four years of my life so far; I've made some great friends and had some fantastic experiences, and I've grown and developed both personally and professionally in ways I didn't think were possible at age 18. And now, with the support of the RSMA and the Imperial community, I'm so excited to take the next step in my career. I'll be sure to keep in touch with the Royal School of Mines and Imperial communities from wherever I end up next year: after all, even after you graduate you're always a Royal Miner! Thank you.

Emilia Dobb

When I heard I'd received the award, I was incredibly happy and overwhelmingly touched by it. It meant so much to me that the RSMA felt I have shown true RSM



spirit and acted as an ambassador to the RSM throughout my degree. The RSM is a wonderful community that I am proud to be a part of, and I'm very thankful and grateful to have received the award.

The award has had a hugely positive impact on my final year. It has meant I don't have to worry about finances for equipment and so on, and can instead just enjoy my final year to the full. The best item I have bought with the funds would be my iPad and Apple Pencil. It has helped so much with my lectures during remote working, as well as reading papers during my MSci project. It has meant I don't have to print off lecture notes, which saves lots of money in ink and helps the environment too. It is really handy to

just take notes on my iPad. I suffer from joint pain, which is exacerbated when writing for long periods of time. Writing with my Apple Pencil has much less strain on my wrists and joints in my hands, meaning I can work for longer periods of time and be in less pain. It has also allowed me to explore my creativity in my spare time, using the app Procreate, where I enjoy calligraphy and drawing.

I have also purchased a new mouse for my laptop, and some warm outdoor clothing for walking during the winter months. It has meant I can go for a walk, even when it is bitterly cold outside, because the clothing is really insulating. I enjoy going for a walk between studies, particularly during lockdown, to get a change of scenery and help my

mental health.

I have purchased the Rosetta Stone lifetime subscription too, in order to learn more languages – something I very much enjoy doing. It's a nice addition to supplement my final year learning, and I will be able to continue with it beyond graduation, with the lifetime subscription. I have bought some textbooks for my course, and also for my interest, in various areas of Geology. I am also planning to attend some conferences later in the year, using the funds.

Receiving the award has meant I have been able to enrich my final year with more opportunities without the burden of finances, and I am very thankful for that.

Megan Facey

My relationship with the RSMA developed most during my third year of study, when I was elected Honorary Secretary, acting as the link between the alumni and current students. I had the great pleasure



of helping to organise the student component of the RSMA dinner, and hosted a highly successful careers event, heavily supported by a huge number of alumni. Working with the RSMA has been a privilege, and I've been lucky enough to meet many interesting people during my time as Secretary. Hearing their stories and learning about all the different career paths I could take, following my time at Imperial, has been both inspiring and reassuring.

I applied for the RSMA Final Year Bursary following a very difficult time in both my personal and academic life. During my third year I balanced my Honorary Secretary responsibilities with writing my hugely important BSc dissertation. My difficult first term was followed by the sad passing of my Dad after

a period of complex ill-health, something which has affected my experience throughout my degree. Despite the difficulties posed by last year, I am proud of my own resilience and will be forever grateful for the support of the Royal School of Mines, and the RSMA.

Upon receiving the award, I was able to relax and stop feeling stressed about funding the end of my final year. My time at university has not been without financial concerns; I am supported by the Imperial Bursary and also work as a tutor to supplement my income and afford the rent and living costs of London. Receiving the RSMA Final Year Bursary has had a hugely positive impact on my academic life; it has allowed me to focus my energy on completing my MSci thesis and

making the most of my remaining time at Imperial. Before coming to university I had debated whether living in London was financially feasible, however I knew I wanted to study at the best institution available, and I was confident that moving to London would offer me the opportunities for work that I was looking for. It is thanks to the funds from the RSMA that I will be financially stable, particularly in the time between finishing my degree and beginning my job in Investment in September. I plan to use the funds as my personal deposit on a flat in London with my partner, as we hope to move in together this summer. I'd like to thank the RSMA for their constant support of current students, and for awarding me this generous bursary.

The form to join the 100 Club, or to update your membership details or contribution is on the back of your address label for this issue of Imperial ENGINEER

DEVELOPMENTS AROUND THE ENGINEERING FACULTY

Prof. Chris Toumazou elected to the NAE

Professor Chris Toumazou, of the Department of Electrical and Electronic Engineering, who has frequently appeared in these pages, has been elected to membership of the National Academy of Engineering in the USA. Membership honours those who have made outstanding contributions to "engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature" and to "the pioneering of new and developing fields of technology, making major advancements in traditional fields

of engineering, or developing/implementing innovative approaches to engineering education."

Professor Toumazou was recognised 'for innovations in electronics for medicine, including rapid diagnostics', in particular for his lab-in-a-cartridge COVID-19 PCR test CovidNudge. He will be formally inducted in October.

In 2019, Imperial bioengineer Professor Molly Stevens (see also below) was inducted into the NAE alongside Imperial alumnus Sir Sam Jonah (MSc Resources Engineering 1979).

Prof. Molly Stevens wins Women in Science Award

Professor Molly Stevens, of the Departments of Materials and Bioengineering, receives the award for her innovative bioengineering approach that addresses key problems in regenerative medicine and biosensing. She leads the multidisciplinary Stevens Group, whose research has advanced the understanding of biomaterial surfaces. Their results have led to the invention of new biosensing approaches and enabled the development of point-of-care tests for tumours and viruses such as coronavirus, HIV and ebolavirus.

The Federation of European Biochemical Societies (FEBS)/European Molecular Biology Organisation (EMBO) Women in Science Award annually recognises outstanding scientific achievements of a female life scientist who has worked in Europe in the last five years. The recipients are also inspiring role models for future generations of scientists.

The FEBS/EMBO Women in Science Award of €10,000 and a bronze statue will be presented to



Photo: Imperial College

Professor Stevens at the 45th FEBS Congress in Ljubljana, Slovenia, on 5 July 2021. She will give a plenary lecture at the meeting, which might be held virtually.

Professor Stevens has received more than 30 awards and honours, including the Karen Burt Memorial Award of the Women's Engineering Society, UK, and the Rosalind Franklin Medal and Prize of the Institute of Physics, UK. She is a Fellow of eight learned societies in the UK, including the Royal Society.

The Institution of Chemical Engineers Awards

The IChemE medals and prizes, awarded annually to recognise excellence in chemical engineering research and academia, this year includes five recipients from the Department of Chemical Engineering and the Centre for Environmental Policy.

Professor Geoffrey Maitland CBE has been awarded the Ambassador Prize for his sustained impact on chemical engineering. The prize is awarded to a volunteer who has made exceptional contributions, within an IChemE Special Interest Group, Members Group or as an ambassador for the Institution and/or profession more widely.

Professor Maitland has been a prominent figure in the Department since he joined as a lecturer in 1974. He then went on to work in industry in 1985 before returning to Imperial in 2005. He was Director of the Shell Grand Challenge on Clean Fossil Fuels and Director of the Qatar Carbonates and Carbon Storage Research Centre. He served as President of the Institution of Chemical Engineers, and was recognised with a CBE in 2018.

Dr Salvador Eslava has been unanimously awarded the Warner Prize which recognises an individual in the early stages of their career who has shown exceptional promise in the field of sustainable chemical process technology, nuclear technology or in making chemical engineering more accessible to a wider scientific community.

Dr Eslava joined the Department in 2019 after five years as a Lecturer in Chemical Engineering at University of Bath. Prior to his role at the University of Bath, he was a Postdoctoral Researcher in the Materials Department at

Imperial, and in the Chemistry Department at the University of Cambridge. He leads a group on novel synthesis approaches for (photo)electrochemical and (photo) catalytic materials.

Dr David Danaci, **Dr Mai Bui** and **Professor Niall Mac Dowell** have been awarded the Junior Moulton Medal which recognises the most meritorious paper published by IChemE during the last year by an author, or co-author, who has graduated within the last ten years.

The team were awarded the medal for their contribution to the paper published in *Molecular Systems Design and Engineering*, 'Exploring the limits of absorption-based CO₂ capture using MOFs with PVSA – from molecular design to process economics.'

Dr Danaci is a Research Associate working on a UKCCSRC project looking at metal-organic frameworks for post-combustion and CO₂ capture.

Dr Bui is a Senior Research Associate at the Centre for Environmental Policy in the Faculty of Natural Sciences at Imperial. She is also a member of the Centre for Process Systems Engineering (CPSE) and co-leads the Clean Fossil and Bioenergy Research Group (CleanFaB) with Dr Niall Mac Dowell. She is a Future Energy Leader at the Energy Centre of the Institute of Chemical Engineers (IChemE) and a committee member of the SCI Energy Group.

Professor Mac Dowell is a Professor in Energy Systems Engineering. He is a Chartered Engineer, and a Fellow of both the IChemE and the Royal Society of Chemistry.

Dr Zahra Sharif Khodaei becomes WES Fellow

Dr Zahra Sharif Khodaei, of the Department of Aeronautics, has been elected to Fellow of the Women's Engineering Society (WES). WES is a charity and also a professional network of women engineers, scientists and technologists, offering inspiration, support and professional

development. Its aim is to support and inspire women to achieve as engineers, scientists and as leaders, to encourage the education of engineering, and to support companies with gender diversity and inclusion. Fellow is the Society's highest grade of membership, awarded to those who have made an outstanding contribution to the field of engineering or to the sustained encouragement of women in STEM.

Dr Sharif Khodaei's research focuses on structural integrity and health monitoring, with a focus on composite structures. She is also the Department's Tutor for Women, and it is in this capacity that she intends to forge stronger links between the Society and the Department's female staff and students.



Photo: Imperial College

Prof. Spencer Sherwin awarded ECCOMAS medal

Professor Spencer Sherwin, the Head of Aerodynamics in the Department of Aeronautics, has received the Prandtl Medal for his outstanding and sustained contributions to computational fluid dynamics research.

ECCOMAS (the European Community on Computational Methods in Applied Sciences) groups together European associations who have interests in developing and applying computational methods in science and technology.

Professor Sherwin leads a research group that specialises in developing and applying parallel high order spectral/hp element methods (Nektar) for flow around complex geometries. The research has a particular emphasis on vortical



Photo: Imperial College

and bluff body flows and biomedical modelling of the cardiovascular system. He has worked on developing industrial applications of these methods through partnerships with McLaren Racing, Airbus and Rolls Royce. He completed a RAEng/McLaren Racing Fellowship during which spectral/hp element methods were applied to problems of interest in Formula One aerodynamics.

Chris Lumb

Although there have been some well-known and high-profile people in the Executive of the CGCA and the Old Centralians' Trust, behind the scenes there have been others working diligently to help the Association run as smoothly as possible. Someone who has been doing that continuously since 1977, is Chris Lumb (Elec Eng 1958-61). Quiet and unassuming, Chris has been, at various times, Executive Committee Secretary, Honorary Secretary, Membership Secretary, and – since 1999 – Chair of the Old Centralians Trust Board. Having been retired from a varied working career since 2004, Chris has recently celebrated his 80th birthday and will be stepping down as Trust Chair at the next CGCA AGM, so it seemed like an opportune moment to catch up with him for a (socially-distanced) chat.

You went to school in Gosport, Hampshire?

Yes – my parents originated from the West Riding of Yorkshire. My father was a clerk working in local government and he'd moved to Gosport, on the west side of Portsmouth Harbour, in the 1930s in order to broaden his experience. He and my mother married in 1937, and I was the second of their four children. Paradoxically, although my parents had settled in the south, I was born in Yorkshire, since when my mother was pregnant for the second time in the autumn of 1940 (I had one elder brother, and – later – a younger brother and sister), Portsmouth was being heavily bombed by the Luftwaffe, so she moved back to stay with her family in Yorkshire, where I was born in 1941. Meanwhile, my father would spend the day working in his local government job before spending long periods at night as an Air Raid Warden – and during the day he might be liaising with the nearby military establishments to find emergency messing for the hundreds of firemen from all corners of Hampshire who had been brought in to deal with the many fires and casualties. I made good progress at primary school and was somehow fast-tracked, so that I was only ten when I passed the eleven-plus exam and started at Grammar School.

...and then you went up to Imperial to study Electrical Engineering in 1958. Why Imperial?

I think my Physics teacher said Imperial would be a good place to apply to (although this may possibly have been because he had a friend on the college staff?) I also applied to, and attended interviews at, Leeds and Birmingham Universities, but Imperial was my first choice. I remember being asked some challenging questions at interview which required careful thought before replying, and I returned home with no 'feel' for how well I had done, so was more than pleased to hear later that I'd been accepted. It was being said that there were 8 or 10 applicants for every place, although I imagine it must be very much more competitive now. My parents, who were from a working class background – one of my grandfathers worked in a coal



Chris on a Railway Trip in 2014

mine, the other as a school caretaker – were not particularly knowledgeable about engineering as a profession, but they were fully supportive of my wish to go on to higher education.

What was City & Guilds College like in the 1950s?

So very much has changed, but some parts did appear much as they do now: the Royal School of Mines, Goldsmiths Extension, IC Union building and Beit Hall, also the Roderick Hill building. The old Imperial Institute was still in place, and there was no Sherfield Building nor any thought of a 'Blue Box'! I remember that engineering lectures – at least in my first and second years – were almost all held in the original 1884 'Central Institution' building (designed by Alfred Waterhouse, who also designed the Natural History Museum), which had been absorbed into Imperial upon the latter's formation in 1907. This was a very impressive red brick edifice, with high ceilings and some large lecture theatres. As for the student body, I remember that there were very few overseas students, and almost no women students at all – none in my year and just one in the year above. In fact, of the entire student body of about 2,000, there were just 100 or so women. Another aspect was

that in the 1950s National Service for men was still obligatory, although this could be deferred until after finishing university studies. But it did mean that there were others in my year who had already fulfilled their service, and so many were three or four years older than me, and one or two even up to ten years older. I was still aged 17, and not particularly gregarious, but I was pleased to find a wide range of societies that I could join. I'd been a keen member of the choir at my school, so I joined the Imperial College choir and – within weeks – was singing '*Gaudeamus Igitur*' with them at the 1958 Commemoration Day in the Royal Albert Hall, with Queen Elizabeth the Queen Mother in attendance as Chancellor of London University. But my membership of the choir only lasted one term, since after we had been set some tests at the end of the first term, I was warned that I needed to do more work, and felt that choral singing was something I could always pick up again later – I wasn't prepared to give up my other activities!

Where did you live?

There was very little in the way of student hall accommodation in those days – only about 200 places for men, and under 20 for women, in four small halls, one of which was Beit Hall. With help from the accommodation office I managed to find 'digs' in Chiswick, where there were three other students, all from the College of Estate Management. Although I had cycled everywhere at home I didn't bring my bike to London at first, but soon found using the underground rather expensive, not least as I had also joined the Boat Club and needed to get to and from Putney as well. So after the Christmas vacation I brought my bike back with me, and hardly ever used the tube for the rest of my three years at IC. It seems strange now to remember that my first year's subsistence grant worked out at about £6 a week, out of which I needed £3.25 for the landlady, so had just £2.75 left for travel, lunches and entertainment, which sounds very strange today!

During my first year I was paired for lab

FEATURES

work with a student who, like me, was a Methodist; he was staying in a Methodist Church hostel close to Ealing Broadway, and at some stage he suggested that I should go and have a look. I did that, liked what I saw, and applied for a place, so my second and third years were spent amongst a group of about 50 young people – mostly students of a variety of London colleges, of whom about three or four were from Imperial. The hostel environment made up to a large extent for not being in a college hall, but it did mean that it was much less practical to join in ‘campus’ activities in the evenings.

Why Electrical Engineering – had that always been your interest?

No, in truth it hadn't – I was not one of those people who grew up knowing from a tender age what they wanted to do in life. And no-one in my family had ever been to university, so I had no role models family-wise. In the sixth form I studied Maths, Physics and Applied Maths, achieving very good marks at ‘A’ level, and in the event the Physics teacher had a lot to do with my choice – he said “You're good at Maths and Physics, so you should think about electrical engineering”. But when I arrived in South Kensington it became clear that a number of my fellow students had benefitted from a third year in the sixth form, leading to ‘Scholarship Level’ qualifications, so they were finding the mathematical side much more manageable than I did, and although I was successful in the ‘finals’ this wasn't at First Class level, so it was clear that my future path was not going to be in research!

While you were at college you were an active member of the Boat Club?

Yes, although I was not slow to join the Imperial College Choir, I also discovered that those without previous experience could join the Imperial College Boat Club as a novice and learn to row. (Whilst I was at school – despite the fact that we were so near to the sea – rowing had not been on the agenda.) So I lost no time in turning up at Putney to become a novice oarsman! From being a complete beginner, I managed to progress reasonably well, and taking part in the ‘Head of the River’ race – initially starting towards the tail end of the 300 or so crews taking part, began to excite one's interest in competition. And after two years of steady improvement I was more than delighted, in my third year, to be given a place in the Imperial College Second Eight. During 1960-61 we took part in a number of contests and regattas up and down the Thames, with one or two wins, and in July 1961 represented the college at Henley Royal Regatta – an unforgettable experience. After graduating and starting work I was able to do some more rowing with clubs near where I lived, but within a few years started to experience back trouble, so decided not to continue. Having said that, I've always retained an affinity for the water and even



Chris with the winners of prizes and awards at the 2018 CGCA Annual Dinner

now, whenever the opportunity arises, be it on a river, lake or a Norwegian fjord, I'll take out anything with oars and enjoy a good row.

Your wife Gillian was at Bedford College, also part of London University at the time. How did you meet?

We met at the hostel in Ealing. Gill was studying Botany and Zoology at Bedford; she was a couple of years ahead of me, and had just graduated; she then studied for a further year at the Institute of Education for her PGCE before taking up a teaching post in Streatham. When I graduated in 1961 I chose – from amongst a range of job offers made by companies in areas ranging from South Wales to Tyneside – to take up a Graduate Apprenticeship with the General Chemicals Division of Imperial Chemical Industries (ICI) in Cheshire. ICI was using a considerable amount of electrical power in various electro-chemical processes to manufacture Chlorine, Sodium and Calcium Carbide in bulk, so they had their own 100MW power station (the manager of which I later discovered to be a Guilds graduate), together with a 33kv connection to the National Grid, drawing another 240MW or so, and an extensive high-

voltage distribution network serving several ICI factories in the area. Gill and I married in Darlington in December 1962 before making our first home in Runcorn.

You left college to work at ICI, and over the years have worked at a variety of companies?

Yes, I've had a very varied career, but although that probably means that I'm versatile, it shows that I never really planned my career! The ACGI has been very helpful. And I managed to avoid the stress of becoming management.

Did you join CGCA while you were still a student or when you graduated?

Whilst I was a student. In my final year I attended the ‘graduating students’ reception’ that the then-named ‘Old Centralians’ held each year, essentially to allow the students to meet older alumni and seek or receive advice, although it may also to some extent have provided an informal recruiting opportunity for both students and alumni. This regular event was popular for many years, and I feel sad that the event was discontinued a decade or more ago. But when I attended, if a student joined the OCs before the reception, there would be a free bus ride to the Livery Hall venue (I remember it being the Carpenters’ Hall when I participated). I don't actually remember whether I was one of those who joined the OCs just to benefit from the free ride, or whether I'd already joined, but I did join at about that time, and have remained a member ever since.

In those days there were regional ‘branches’ of the OCs in several parts of the UK, and when Gill and I were living in Cheshire some years later, there was a branch in Manchester. This branch held a monthly gathering at a pub in Sale, but sadly – mainly due to work and family commitments – I never managed to get to any of those, although I did attend one annual dinner, held at UMIST. It was some years later, when I had moved to work in London after 1975, that I re-connected with the Old Centralians. The OCs were



Gill and Chris at CGCA's 2017 Annual Dinner

then holding ‘monthly luncheons’ at the Eccleston Hotel in Victoria, with a topical speaker, and I did manage to get to quite a few of those, although as a relatively junior member of staff I sometimes needed to be imaginative in explaining why I’d been away from the office for so long!

You joined the Old Centralians’ General Committee in 1977, and the OC Trust Board in 1987. Since then you’ve been variously Exec Committee Secretary (1990-2006), CGCA Hon Sec (2006-2011), Membership Secretary (2011-2018), and Chair of the OC Trust Board since 1999. Now you’re stepping down as OC Trust Chair at the next CGCA AGM, but you’re still going to be involved supporting your successor, Peter Chase?

Yes, having reached my ninth decade, it seems reasonable to stand to one side and let others take on the responsibility. But of course, after being involved for so long, there is a lot of detail in my mind of how the Trust operates, so I certainly hope I can provide some support to Peter as he works into the role.

You’ll have become known to many students through the years because of the help and support that the OC Trust has provided, whether in times of hardship or supporting activities like expeditions, and it’s often been you that has been able to provide the good news to them. Is that the best part of the role?

It is certainly satisfying to be able to pass on the good news. But overall I feel that I’ve been very fortunate to be in a position to do this work on behalf of all the alumni who’ve given money to the Trust. Not just those who have left considerable legacies, like Professor Peter Lindsay, Jessel Rosen and Jack Fenton, but also the many members who have given more modest donations or bequests, ranging from a few pounds to £10,000 or more. Their sole purpose in doing so has been to support those students who follow behind them, and we in the Trust believe this gives us an overriding duty to ensure that their wishes are complied with.

You said that you retired from work in 2004, but ever since I’ve known you through Imperial ENGINEER you’re always really busy working for CGCA and the OC Trust. Do you get time to do other things?

I mentioned having sung at school, and having left the Imperial College choir after one term. But some eight years after leaving college I went back to singing when I joined the Runcorn and Widnes Orpheus Choir, and have been singing almost continuously ever since – until the lock-down, that is! Whilst living in Northamptonshire I spent nearly three years singing with the Northampton Philharmonic Choir, and then on moving to Berkhamsted joined a choir which met in the town, but in 1979 joined the Aeolian Singers in Hemel Hempstead. The conductor of the Aeolians had some good connections, and as

well as giving concerts locally, we sang in a number of Ernest Read concerts for children held at the Royal Festival Hall and in the Barbican. We also sang at the Royal Albert Hall in several major works, including the Britten War Requiem and Verdi Requiem, organised by the British Council for the Prevention of Blindness to raise serious amounts of money for their work. In 1995 I sang in another performance of the War Requiem at the RAH, as a guest singer with Bartholomew’s Hospital Choral Society. The list goes on, but one of my greatest pleasures has been as a guest singer with the Goldsmiths’ Choral Union, at the Royal Albert Hall, in over twenty separate performances of *The Messiah*, accompanied by the Royal Philharmonic Orchestra as part of the ‘Christmas Festival’ staged by the impresario Raymond Gubbay. Since 2018 the Raymond Gubbay organisation has somehow fallen from favour at the RAH, so for the 2018 and 2019 performances we sang in the Royal Festival Hall instead – but it’s enormous fun wherever it’s performed.

Apart from singing, I enjoy photography, and have had a lot of fun with my latest camera – a Nikon Coolpix B700, with a 60x Zoom lens. Also, for the last 15 years or so I’ve been largely responsible for the maintenance of our church which is a 100-year-old red-brick building, with a very high roof, heated partly by oil and partly by gas, and always needing something to be managed – at the moment we’re trying to get somebody to mend the roof. Fortunately the church treasurer is helping quite a lot, so I don’t have to shoulder it all myself now.

And, as any other grandparents will appreciate, we gain enormous pleasure from watching our eight grandchildren grow and develop, including the youngest – six-year-old twins!

Have any of your children or grandchildren followed you into engineering? Any been to, or aiming for Imperial?

Yes as regards children. The youngest of our four offspring, Catherine, went to Edinburgh University (Imperial was ‘too close to home’) where she studied Mechanical Engineering, graduating in 2004. She went on to work with Arup, with whom she’d enjoyed a placement during a ‘year out’ before going to Edinburgh, and had also worked on vacation placements with them. On graduating she was successful in applying for a permanent position, and worked in Building Services, achieving MIMechE and CEng in 2008. But, having married in 2004, she had by that time become a mother, and after juggling work and family for a year or two, is currently taking a career break. Meanwhile, our eldest grandchild is currently in the lower sixth – he’s very interested in science and computing, but up to now has not shown any strong interest in Engineering. We shall just have to wait and see what he and the others decide to do!

I believe you’re an Honorary member of CGLI?

Well, yes, some 15 years or so ago I received a letter from the City and Guilds of London Institute, completely ‘out of the blue’, inviting me to become an Honorary Member. I accepted of course, and was sent an impressive Certificate. This does mean that I am invited to attend the Institute’s ‘Yearly Meetings’, held in one or other of the City Livery Halls. Since the Institute was so closely involved with the birth of Imperial, and has remained closely involved ever since, it’s very pleasing to have this connection.

There have been a number of photographs of you in Imperial ENGINEER over the years, at various events. We have reproduced a couple in this article. But I don’t think I’ve seen any of you in Bo?

I’m pleased to have had several rides in Bo, mostly over the past decade or two. One was when the students brought Bo to Putney to join in the ‘wake’ for Rogers Knight in 2015 – a very poignant occasion since Rogers had been a close friend of John Garland who originally bought Bo in 1934. I don’t know of any pictures that include me, although I myself have taken a number of pictures of Bo over the years, including one of Rogers riding in Bo on his 95th birthday in 2010. It’s also very pleasing that the Trust is able to help the ‘Bo Team’ of past Bo drivers and enthusiasts provide ongoing gift-aided financial support.

Have you enjoyed your active involvement in CGCA and the OC Trust over the last 45 years or so?

If I hadn’t enjoyed it, I don’t think I’d have been doing it! But we do also have much cause to be very grateful to people such as Roger Venables and Barry Brooks who’ve really supported CGCA when it’s been in a difficult position and subject to change. I do feel that I’ve been able to make a significant contribution over the years into the running of the Association, helping to keep it going and providing some continuity. I feel very gratified about that. My one regret is that CGCA has not managed, over the years, to attract a higher proportion of ‘Guilds’ graduates into membership.

Thanks Chris.



“Where’s that bird gone?” Chris with an Arctic Tern in Iceland in 2017

STEMulator

Explore > Discover > Learn



Richard Gundersen (Elec Eng 1973-76), has been worrying about a lack of students pursuing education and subsequent careers in STEM. So he instigated the STEMulator – an online initiative of professional STEM societies in South Africa, designed to stimulate an interest in STEM among young people. The goal: Ensuring a youthful pipeline of STEM practitioners and professionals.

It's a world-wide phenomenon. The talent pool for STEM (Science, Engineering, Technology and Mathematics) is shrinking. Youngsters are being lured into 'glamorous' professions; scientific subjects are being dropped at school at a dangerous age, prematurely; irrecoverable, career-limiting decisions. Dreams of wealth cloud the pursuit of a passion. Role models are no longer professional friends and neighbours, but a select few successful public figures.

Lego and Meccano are great, but the frontiers of science and technology have long-since advanced from our back yard into the micro and macro worlds of laboratories and the universe. Taking things to pieces is not so easy.

Imagine a virtual world where every object reveals its inner self – from throbbing hearts pumping life blood through our veins to rockets powering spacecraft into interplanetary transport. And into the natural world, where sunflowers and peanuts convert water into oil and little critters repair the damage inflicted by humans. And where microwaves can cook food or transmit intelligent signals.

Welcome to the STEMulator, an on-line, free-to-all, virtual XplorITory, designed to captivate and stimulate the imagination of youngsters, "The Hidden World Revealed", "Explore > Discover > Learn", bursting with animated content, exploded diagrams, things we cannot see, places we cannot reach.

Most significantly, laid out for an inquisitive mind to explore at will, hopping from object to object, at the click of a mouse, pursuing a self-guided voyage of discovery, at leisure, at one's own pace. At the same time presenting an insight into related careers and study courses.

I graduated from Imperial, Elec. Eng. in 1976. This is professional 'pay-back' time. The STEMulator evolved from a careers guidance poster used by professional engineers at careers guidance fairs for schools. The Covid period has provided the impetus to take this into the on-line environment.

The project is the initiative of the professional STEM societies of South Africa. One of its aims is to sow STEM seeds in remote areas, for which purpose the STEMulator is also available on stand-alone server-router hubs for multiple users in schools and a compact version is available on USB memory sticks.

The content is selected from readily available material and fully acknowledged. The thrill is in the layout and connectivity within the virtual world. Visuals and animations are the priority, text is at a minimum for literacy considerations. The STEMulator is an appetiser, hyperlinks connect to detailed on-line material.

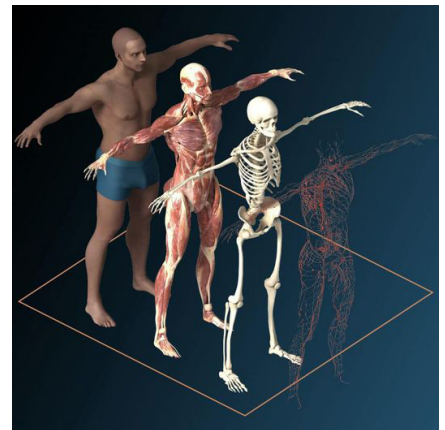
- The milk in the fridge leads you to the cow in the field – or vice versa – with notes on dieticians, farmers, agriculturists, microbiologists...
- The cell phone in your hand leads you to satellites and telecoms – electronic engineers, digital networks...
- The clouds in the sky lead you to weather systems and global warming to the water in your tap – meteorology, chemistry...

Did I mention the olive-harvesting machine I spotted a few weeks ago? Now where did I see it? Not to worry, in the STEMulator you'll find it where it belongs, in the farm, in the orchard, in the olive grove.

A school has been added to the landscape and will soon contain country-specific curriculum-relevant content, including scientific experiments.

So, where are we at? The prototype has been launched and is freely available at <https://stemulator.org>. The STEMulator has been registered as a not-for-profit organisation. It has an identity on the major social platforms. This article is, unashamedly, part of a world-wide public-awareness campaign.

Think of the STEMulator as a visual Wikipedia. Currently, the search is on for



additional content – succinct, compact animations – appetisers to attract youngsters into the exciting STEM world and to swell the pipeline. With time and increasing public awareness it is hoped the STEMulator will attract content from contributors on its own merits.

Then there is an advisory group comprising 'Friends of the STEMulator' – like-minded philanthropic individuals and professionals sharing a passion for kindling the STEM flame. The search is on for new contacts to swell the STEMulator's circle of friends.

Lastly, it is hoped the STEMulator will attract additional funding. The development of the prototype and the current programme have been funded from a trust fund belonging to the professional societies as well as a grant from The Carl & Emily Fuchs Foundation, and a few private donations.

The STEMulator needs YOU! You can make a difference. Together we can boost the flow of new talent into the STEM pipeline for a better world. Follow the STEMulator on social media and help us spread the word:



@TheSTEMulator



@the_stemulator



STEMulator

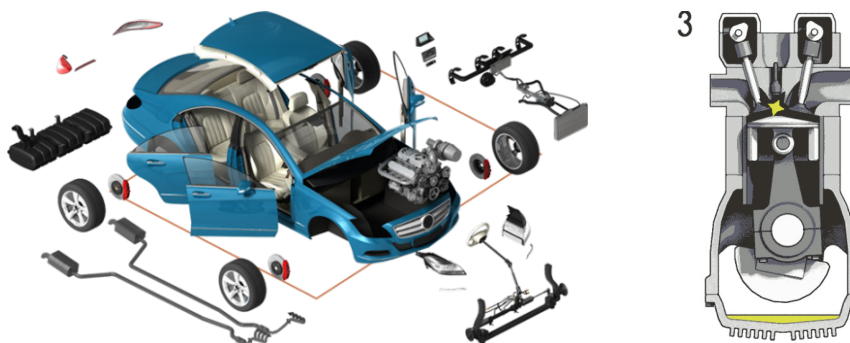
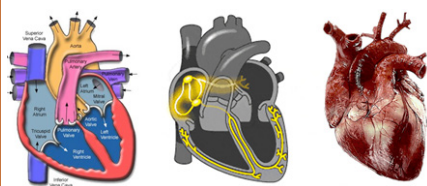


@STEMulator1



How does STEMulator work?

An explorer enters the STEMulator world through the master landscape, displaying a variety of clickable areas, representing many fields of interest such as human physiology, agriculture, transport, energy, hospitals, the natural environment, mining and construction – even space. Click on any one of these areas and it unpacks to reveal a selection of elements, clickable objects that open up and display diagrams of inner structures and animations of working parts. Most of these ‘pages’ contain hyperlinks to video clips providing a further depth of understanding. Information in the STEMulator assists learners to understand the STEM world, to enhance school projects and suggest relevant career options.



What does STEMulator do?

The STEMulator is a unique instrument where youngsters can **Explore > Discover > Learn**. It **Reveals the Hidden World** and demonstrates, describes and gives career guidance of the many exciting possibilities that the world of STEM provides. Choosing a career can be daunting for young people. The STEMulator presents the many careers in STEM clearly, concisely and in context.



E-learning and teacher support

The STEMulator enhances e-learning by presenting the world of STEM to users wherever they are – whether to the teacher in the classroom or to the learner studying at home. It boasts a virtual school which is populated with curriculum-related content. Teachers can find everything STEM in one place and can use the STEMulator in lessons and teachings. It assists the educator as a source of information when preparing for teaching and sourcing learning material. This type of learning can revolutionise the education system, providing young minds with the technology and information they need to spark future brilliance in STEM disciplines.

Working on-line, off-line and remotely

As the world becomes increasingly digital, more so in the context of Covid-19, online teaching and learning has shown significant growth. The internet allows anyone to find literally anything, making personal and professional development as easy as clicking. The STEMulator provides a landscape to access this information visually, in context, available to learners, teachers and the community at large. With each layer of the STEMulator, one is able to visually dive a little deeper into every object in the fascinating world of STEM. In addition to the full on-line version, the STEMulator is available on USB memory sticks and server-routers to reach and function in even the most remote areas.

Include your work and brand in the STEMulator

As a non-profit company, the STEMulator is open to collaborate through collective effort with any individual or organisation. Contributions of visual material are called for. Any virtual contributions of the STEM environment can be hosted on the platform.

If you or your organisation are passionate about helping young minds reach the stars, get involved in the STEMulator project. By contributing to the STEMulator you will help stimulate that initial curiosity of the young mind and encourage maths and science education/learning leading to careers in STEM.



Big dreams need big support – there are multiple ways for contributors to grow the STEMulator world. We welcome new ideas, feedback, suggestions and content contributions. The NSTF proSET sector is looking forward to hearing your great ideas. Tell us by e-mailing: info@stemulator.org or call the Project Leader, Mr Richard Gundersen at +27 (0)82 654 6476.

40 years of ~~iteration~~ innovation

After a year of chaos, IDE alumna Raakhi Chotai reflects on the legacy of the Innovation Design Engineering MA/MSc during its 40th anniversary year, and looks forward to what the future holds.

It's hard not to feel somewhat optimistic, coming out of the world's most devastating pandemic of the last 100 years. There's a global sense of cautious hope, as vaccines are deployed, as fatalities fall and as (for some) life can begin to return to normal. One can't help but feel we are on the brink of some new, exciting era.

This global post-pandemic context will undoubtedly change the face of innovation forever. As humanity is faced with growing challenges that require collaborative, culturally sensitive responses, the need for creative, technical thinking is crucial. From fake news to climate change, food insecurity and public health, Innovation Design Engineering has been moulding minds to solve exactly those problems for the last 40 years.

Founded in the late 70s, Professors Misha Black and Frank Height conceived of IDE with a vision: to forge a creative partnership between designers and engineers. Working at the intersection of art and science, IDE is the result of a pioneering collaboration between Imperial College and the Royal College of Art, celebrating the importance of transdisciplinary innovation.

On Monday 6 October 1980, after six years of planning, the course that would become the IDE we know today was launched at the RCA. And at its core, embedded into its values was a unique culture of experimentation and creativity. The course took advantage of the skills and cultures of a predominantly technical university (Imperial) and a college of art and design (RCA), effectively combining the rigor and precision of science and engineering with the inspirational and creative aspects of design.

If the last 40 years has shown us anything, the resilience of IDE comes from its ability

to adapt. Even its name, formerly Industrial Design, then Industrial Design Engineering, and today Innovation Design Engineering, has shifted to reflect changing times. From a cohort of just 7 in 1980, the course has expanded to host around 50 new students each year. Initially just designers and engineers, IDE now recruits from across the academic spectrum, including humanities such as journalism, business and social sciences. It has changed locations, from the original studio space on Level 3 of the RCA's Darwin building, to an ex-painting studio on the ground floor, and now to (when COVID restrictions allow) its current home in the Stevens building alongside use of the Dyson Design Engineering building at Imperial. IDE has embraced cutting edge technologies, new approaches to design, and an ever-shifting understanding of how to apply creativity. It's fair to say that change is at the heart of IDE.

"It will continue to be the place where design, science, technology, sustainability, ethics and social evolution intersect"

Savina Torissi
RCA Head of Programme and
IDE Senior Tutor

"The power of IDE comes from the synergy of the talent, contexts and processes that constitute our output."

Dr Stephen Green
Joint Head of Programme
for Innovation Design Engineering

The constant, then, is curiosity. Fuelled by its inquisitive cohort, IDE has a knack for finding minds who seek. While methods vary from the analytic to the artistic, every student of IDE retains that unique *je ne sais quoi*, that inexplicable quality that bonds members of the IDE family. Dr Stephen Green, joint Head of Programme for Innovation Design Engineering charmingly refers to it as the 'IDE alchemy'. 'The power of IDE,' he says, 'comes from the synergy of the talent, contexts and processes that constitute our output.'

Call it what you will, its impact is undeniable. IDE has birthed countless startups, product innovations and technologies. But perhaps more importantly, it has unlocked the potential of more than 700 students, great minds, all of whom have survived the enthralling (and, admittedly, sometimes gruelling) halls of IDE. As an alumna myself, I am humbled to be counted among such company. IDE is not for the faint-hearted; and for those brave enough to embark on the journey, I offer this advice: Be bold. There is no other place where you will be allowed such creative freedom, with such little risk. You will never regret taking advantage of it.

As I reflect on the history of this institution and on my own personal experience, I'm excited by the future of IDE. 'It will continue to be the place where design, science, technology, sustainability, ethics and social evolution intersect,' explains Savina Torissi, acting Head of Programme for the RCA and Senior Tutor for IDE. 'It will be where we make sense of the complexity of the present and the hyper-complexity of the future.' And if 2020 showed us anything, it's that the speed of change and innovation is going to have to accelerate, in step with the world. As the course plays host to new, more diverse classes, I'm eager to see what's to come.



A hybrid writer and strategist constantly fascinated by the overlap between the two disciplines, Raakhi Chotai graduated from the University of Bristol with a first class honours in Economics and Politics in 2012. She trained as a journalist, covering trends in design, technology, business strategy and innovation, before joining the Innovation Design Engineering MA/MSc at the Royal College of Art and Imperial College London. Since her graduation in 2018, she has been working as Strategic Senior Writer at design and innovation agency R/GA.

<https://www.rga.com/>

As we look forward to the future of IDE, it's important to remember the people and projects who have contributed to its success so far. Below and over the next two pages, we are featuring just a few highlights from the IDE family.

Apple

Duncan Kerr (IDE 1987)

After leaving IDE, Kerr worked as a product designer for five years, before returning to the fold to teach the course. Following a four year stint on staff, he moved to California, first joining IDEO, and then the Industrial Design team at Apple in 1999. Kerr's name appears on patents for the original iPhone's design, the design of the MacBook Air and more.

developer.apple.com/design

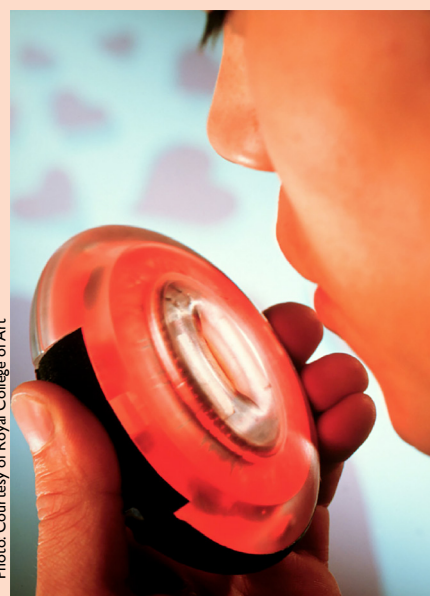


Photo: Courtesy of Royal College of Art

Image: concept work whilst at IDEO

World Food Programme

Elena Figus (IDE 2010)

Elena Figus left her 'bean counter' job in the city to join the IDE course in a move she describes as a momentous gamble. Drawn towards roles with a clear social impact, since graduating she has worked at the World Agroforestry Centre and more recently, the World Food Programme, which was awarded the Nobel Peace Prize this year for its efforts to combat hunger in conflict-affected areas.

wfp.org



Photo: Courtesy of Royal College of Art

Image: Elena in the workshops in 2010

SafetyNet Technologies

Dan Watson (IDE 2011), Larissa Kunstel-Tabet, Aran Dasan (IDE 2012)

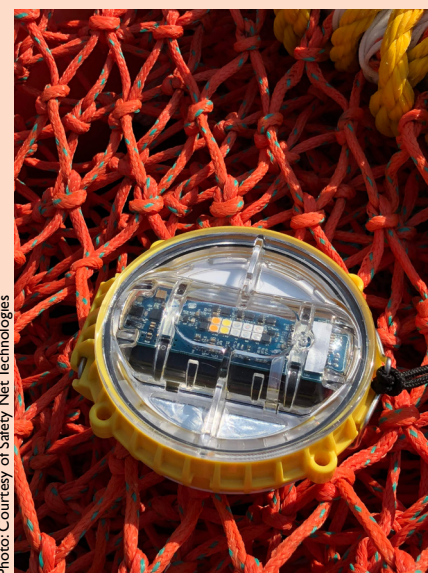


Photo: Courtesy of Safety Net Technologies

16m tons of fish are wasted every year, contributing to huge environmental, economic, and ecological damage to our oceans. SafetyNet Technologies changes that, using light emitting devices to help fishermen catch the right fish, avoiding excessive bycatch. The enterprise has attracted more than £2.5 million funding in VC funding, grants and innovation prize money, and has been deployed globally.

sntech.co.uk

The Polyfloss Factory

Emile De Visscher, Nick Paget, Christophe Machet, Audrey Gaulard (IDE 2012)

The Polyfloss Factory is a new manufacturing process inspired by candy-floss, which recycles thermoplastics into fibres for insulation, packaging and textile production. The company is currently working with young entrepreneurs in Madagascar to develop recycling facilities, as well as Engineers without Borders Norway and the Red Cross to develop recycling techniques and insulation for emergency shelters in refugee camps.

thepolyflossfactory.com

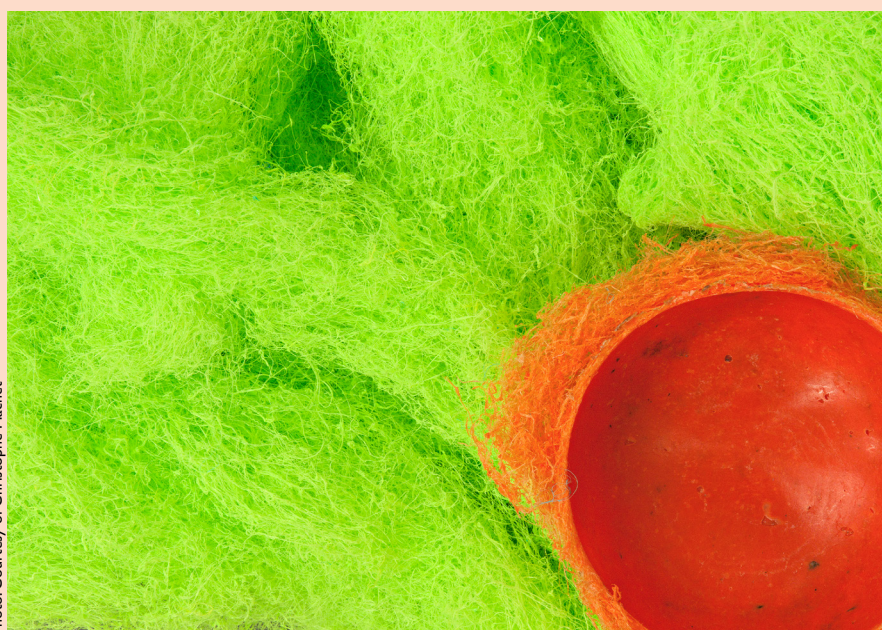


Photo: Courtesy of Christophe Machet

Gravity Sketch

Oluwaseyi Sosanya, Daniela Paredes (IDE 2014)

Gravity Sketch was developed with the vision to revolutionise the way physical products are designed, developed, and brought to market. The product consists of an intuitive 3D design platform for cross-disciplinary teams to create and collaborate in an entirely new way. Today, the company is a leading innovator in the digital design industry, a market worth an estimated €8.4 billion by 2022.

gravitysketch.com

Photo: Courtesy of Innovate UK Women in Innovation campaign



Charco

Lucy Jung (IDE 2015)

Charco Neurotech's lead device, CUE¹, is a simple, elegant device designed to improve a wide range of motor dysfunction symptoms for people suffering from Parkinsons. It attaches to the sternum using medical adhesive and produces controlled vibrations which have been shown to help patients walk, move their hands and use tools more quickly and easily in testing.

charconeurotech.com

Photo: Courtesy of Charco Neurotech



Quell

Lorenzo Spreafico, Cameron Brookhouse (IDE 2019)

Designed to make exercise more enjoyable, Quell is an immersive fitness game where users get fit by fighting their way through a fantasy world, via a lightweight wearable and smart resistance bands. Since its founding, this scrappy start-up has sold £500,000+ worth of pre-orders, raised \$3m in seed funding, and been part of prestigious accelerator Y-Combinator.

quell.tech

Photo: Courtesy of Lorenzo Spreafico



Shellworks

Amir Afshar, Insiya Jafferjee, Ed Jones (IDE 2019)

Shellworks creates compostable materials from seafood waste, which can be used for packaging products in lieu of plastics. The team uses a biopolymer called 'chitin,' extracted from waste crustacean shells in its manufacturing process, and can manipulate the appearance and properties of its products to suit different commercial needs.

theshellworks.com

Photo: Courtesy of Shellworks



SaltyCo

Nelly Taheri, Julian Ellis Brown, Antonia Jara-Contreras, Finn Duncan (IDE 2020)

Often an overlooked environment, salt-marshes are highly ecologically significant, acting as protection from flooding and as carbon sinks for pollution. By planting and harvesting salt-tolerant plants, SaltyCo aims to create a sustainable alternative to plastic fibre fill for apparel and other applications. Using a unique fibre extraction process, the company promises its textiles are planet-positive at the point of delivery.

saltyco.uk

Photo: Courtesy of Salty Co



The Tyre Collective

Hanson Cheng, Hugo Richardson, Deepak Mallya, Siobhan Anderson (IDE 2020)

The Tyre Collective is a startup with a mission to reduce tyre wear emissions – the second-largest source of microplastic pollution in our air and water – with a wheel-fitted device that uses electrostatics to collect particles as they are emitted. They are currently working with some of the largest tyre and vehicle manufacturers to develop their technology further.

thetyrecollective.com

Photo: Courtesy of The Tyre Collective



Mountaineering in the

The Old Centralians' Trust agreed to support several expeditions that were due to take place over the summer of 2020. Due to the COVID pandemic, some were abandoned, while others were postponed until 2021 in the hope that the virus will have been brought under control by then. Only one of the expeditions actually went ahead, although they did have to change their plans due to the restrictions imposed to deal with the coronavirus. This article is based on their report.

This is an overview of an alpine tour conducted in the Monte Rosa massif in August 2020, supported by the Exploration Board of Imperial College London and the Old Centralians' Trust. The common interest of our team was to take our first steps in high-altitude mountaineering. We were also keen to explore how the adverse environmental impact of such a trip may be minimised through choices made at the planning stage. The report covers preparatory work, an alpine training course in the Scottish Cairngorms and details of the tour in the Swiss and Italian alps taking in several peaks above 4000m.

Aims

- Train mountaineering skills
- Summit more than ten peaks above 4000m in one week
- Minimise environmental impact

Background

Monte Rosa

The Monte Rosa mountain massif is set in the Swiss-Italian border region and is part of the Pennine Alps. The peaks of the Monte Rosa are among the highest and most challenging peaks in the Alps. The highest summit is the Dufourspitze, rising 4634m above sea level. The region is known for its glaciers and steep east walls which are adventurous playgrounds for well-trained and appropriately equipped mountaineers. One of the alpine huts located in Monte Rosa, the Capanna Regina Margherita, holds the record of being the highest hut in the entire Alps. It is also known as 'headache box' due to its remarkable altitude and the fact that the international centre for high-altitude research is based in the refuge.

'Spaghetti Tour'

The so-called Spaghetti Tour gets its name from the Italian huts along this iconic route. The cuisine which is served here seems to impress the mountaineers as much as the spectacular scenery. It is a six-day high-altitude alpine tour including more than ten peaks over 4000m. As most of the tour is spent above 3500m,

the major challenges of the Spaghetti Tour are dealing with the typical phenomena of great heights, technical ice and rock climbing, crossing of glaciers and walking on narrow ridges.

The start and end point of the tour is the alpine village of Zermatt, in Switzerland. The first half of the tour leads from west to east, crossing the Swiss-Italian border several times. The second part of the U-shaped route runs from east to west in the heart of the Pennine Alps, where summits are higher and closer together than anywhere else in the Alps.

The personal requirements to successfully master this tour involve both physical and mental fitness, as mountaineers must be able to climb over 1500m of altitude a day, in regions with decreased oxygen levels, for as long as nine hours a day. Besides professional equipment, basic technical skills in handling ice axes and crampons are required. The difficulty of the Spaghetti Tour is classified as easy to moderate on the scale for high-altitude expeditions of the German Alpine Club (DAV).

Monte Rosa Massif

Low Impact Travel

Our undertaking aims to show that it is possible to enjoy a great adventure whilst trying to minimise adverse environmental impact based on the choices we make at the planning stage. The first choice was to keep as close as possible; so we arranged for a tailored alpine preparation course in the Scottish Cairngorms in winter, instead of training for the necessary mountaineering skills in the alps in summer as we had initially thought to do. Concerning the alpine tour, we resisted the lure of heading to the Himalayas and sought out a tour in the alps that maximised our time at altitude. Secondly, we agreed not to travel by air and take the train where possible. And thirdly, we planned on hiring mountaineering equipment or sourcing it secondhand.

Planning

Given the coronavirus pandemic, the initial tour plan was slightly modified. While some of our earlier planning choices proved beneficial to the new and dynamically changing regulations, other aspects of the planning had to be compromised. The choice to minimise distances saved this project. We were able to travel to Scotland for

mountaineering training before the lockdown started in March and could complete the tour in Switzerland and Italy once the international travel restrictions were loosened in August. Unfortunately, we largely had to buy equipment as the stores of alpine clubs were temporarily closed.

Further, reduced baggage services on the Eurostar meant that it was impossible to transport crampons and ice axes, forcing us to travel from London to Switzerland by car.

Schedule

- 6–10 March 2020 Mountaineering training, Glenmore Lodge, Scotland
- 5–16 August 2020 Spaghetti Tour, Monte Rosa Massif, Switzerland and Italy, including contingency days before and after the tour

Mountaineering training

Itinerary

We set out to Scotland with a mindset of wanting to learn about how to deal with alpine emergencies. How do you catch a fall? How do you navigate in a whiteout? How do you conduct a crevasse rescue? We learned about all these things, but we returned from our training with a changed attitude.

It is important to learn about dealing with alpine emergencies, but more important is avoiding them in the first place. How do you move safely in high-altitude alpine conditions? How do you avoid poor weather and avalanches? How do you minimise the risk of crevasse falls? During our three-day training course, we covered the following areas.

- Assessing weather conditions and avalanche risk
- Moving in snowy and icy conditions with crampons and ice axe
- Self-arrest
- Moving in steep alpine terrain and placing protection
- Building ice anchors / buried axe
- Navigating in alpine terrain
- Moving in a rope team
- Crevasse rescue
- Tour planning



Laura and Jack ascending Vincent Pyramid as the sun rises

FEATURES

Tour itinerary

Day 1: Taesch (1449m) to Domhuette (2940m)

This hiking tour of moderate difficulty took us up into breathtaking alpine landscapes north of Zermatt, spotting Edelweiss and marmots along the way. Sleeping at nearly 3000m was a crucial part of acclimatising in preparation of nights spent above 3000m and the many peaks above 4000m that were awaiting us in the following days.

Day 2: Domhuette to Taesch

For further acclimatisation, we spent the morning on the Domhuette discussing our plans for the following days and enjoying the beautiful scenery. Following this, we descended to Taesch, crossing the world's longest pedestrian suspension bridge at a length of 494m.

Day 3: Zermatt (1608m) to Rifugio Guide della Val d'Ayas (3425m)

A series of cable cars transported us to the beginning of our tour. After climbing Breithorn Occidentale (4164m) and continuing along the ridge to Breithorn Centrale (4259m), we trekked over a glacier until we reached the Refuge Guide d'Ayas. This was the first test of our newly acquired alpine skills, moving in two rope teams. We perceived how important our training had been, especially when one team member crashed through a snow bridge over a crevasse and got stuck waist deep, legs dangling freely in the void. It was also the first day that altitude made itself noticeable and hydration, food and rest became increasingly important.



Photo: Nicolas Felka

Night view of Zermatt and the Matterhorn from the Domhuette

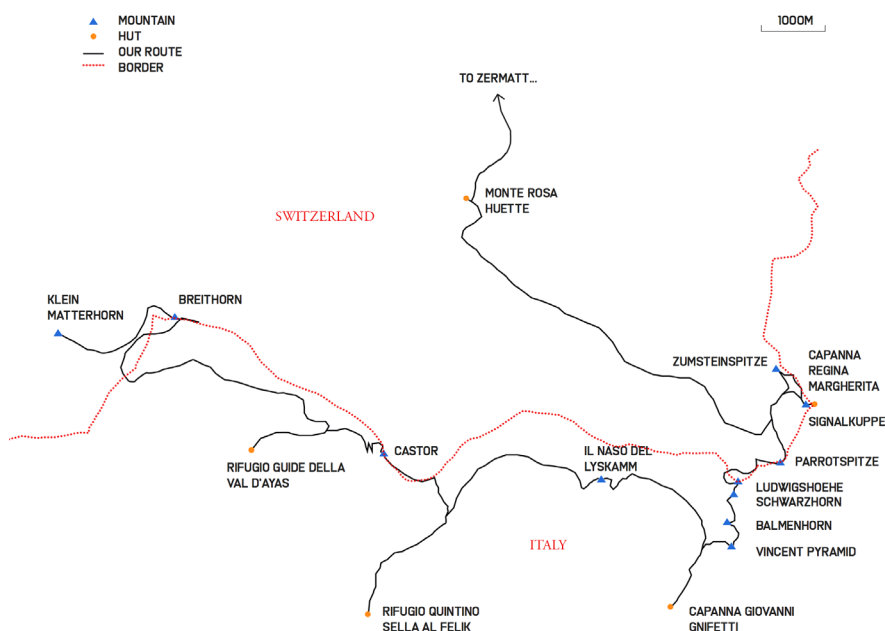


Photo: Nicolas Felka

Narrow ridge of Castor



Photo: Nicolas Felka

Ben arriving at the Rifugio D'Ayas hut



Photo: Jack Morford

Laura risks a glance into the abyss

Day 4: Rifugio Guide della Val d'Ayas to Rifugio Quintino Sella al Felik (3585m)

Backtracking our steps up the glacier, we proceeded to the peak of Castor (4223m) and onwards to the next hut. More technical than the previous day, one stage required the placement of ice screws for protection, followed by a hair-raising narrow ridge leading to the peak. The scenery was spectacular and matched by the gorgeous food served in the Italian huts. By the end of day two we had witnessed two incidents on exposed ridges, where other teams had taken unnecessary risks leading to precarious situations saved by their rope teams.

Day 5: Rifugio Quintino Sella al Felik to Capanna Giovanni Gnifetti (3647m)

Today's challenge was to overcome the steep approach to il Naso del Lyskamm (4272m). Jack, the alpine technical lead, ascended first and placed ice screws for protection. The remaining team was then belayed up until the slope of the face decreased to a safer angle. A hurried descent due to an incoming thunderstorm saw us clearing crevasse-infested ground to reach the Capanna Gnifetti in time for lunch.

Day 6: Capanna Giovanni Gnifetti to Capanna Regina Margherita (4554m)

Cumulatively, we reached six peaks above 4000 metres in one day: Vincent Pyramid (4215m), Balmenhorn (4167m), Schwarzhorn (4321m), Ludwigshöhe (4341m), Parrotspitze (4432m) and Signalkuppe (4554m). This terrain can suitably be described as a mountaineer's playground, boasting the highest density of peaks above 4000m anywhere in the alps. The last peak was home to Europe's highest inhabited structure and our stopover for the night, the Capanna Regina Margherita.

Day 7: Capanna Regina Margherita to Monte Rosa Huette (2883m)

After scaling Switzerland's second highest mountain, the Zumsteinspitze (4563m), we followed the Grenzletscher downhill until we reached the futuristic and beautifully located Monte Rosa hut.



Photo: Nicolas Felka

Breathtaking scenes on the descent from Castor



Photo: Jack Morford

Laura in the morning sun on top of Vincent Pyramid



Photo: Jack Morford

View of Lyskamm from the Regina Margherita Hut

Day 8: Monte Rosa Huette to Zermatt

A long and exciting week came to a close after we crossed the Gornerletscher, climbed up the Gornergrat and descended down into Zermatt. Crossing glacier territory for one last time, we were in awe of the beauty of the landscape that we were leaving behind us.



Photo: Nicolas Felka

Travelling over the Grenzletscher to reach the Monte Rosa Hut

Reflections

This trip has developed us both individually and as a team. We have acquired the skills necessary to manage and navigate through alpine risks. But we have also tested our personal boundaries and strengthened our team spirit by supporting each other through the strenuous effects of altitude and unexpected fears of moving through extremely exposed terrain. While we were not able to meet all of our environmental targets, we would like to encourage anyone who is planning an adventurous trip to think about how they can minimise their environmental impact.

The Team

Laura Braun

Role: Expedition Leader

Occupation: PhD Student, Imperial

Age: 30

Laura researches technical interventions in the fight against neglected tropical diseases. Her passion for the outdoors manifests itself in the many hours spent climbing every week. Whenever London becomes too hectic, her touring bike quite literally becomes her escape. But often the downward facing dog, the warrior or child's pose will also have the desired effect.

Benedict Krueger

Role: Deputy expedition leader, med. officer

Occupation: PhD Student, Imperial

Age: 27

Ben's research focusses on exploring novel treatment technologies for human waste to improve sanitation in low- and middle-income countries. He spends his free time singing in a choir and playing sports. Every year he embarks on some form of outdoor adventure, from climbing snow-capped summits in the Atlas Mountains to trekking through beautifully rugged Icelandic landscapes.

Nicolas Felka

Role: Logistics and treasurer

Occupation: Pilot

Age: 28

As a pilot, Nico specialises in propeller-driven aircraft, serving destinations in the alpine region. He enjoys an active lifestyle through cycling, football and mountaineering. Examples from his track record include the GR20 in Corsica and the Watzmann Ridge Traverse. He takes a particular interest in the research and preparation of adventurous tours, where fellow mountaineers benefit from his entertaining background knowledge en route.

Jack Morford

Role: Alpine Technical Lead

Occupation: Technical Project Manager

Age: 30

Completing his doctorate in Astrophysics at the end of 2016, Jack turned to the world of 'fintech start-ups'. A combination of indoor climbing and yoga keeps him focussed throughout the busy weeks. Weekends offer escapes to UK crags to climb, or the hills of Surrey and Kent for on- (and off-) road cycling. As an environmentalist and with a passion for the outdoors, his holidays revolve around the next climbing destination.



Photo: Nicolas Felka

The team, from L to R: Laura Braun, Jack Morford, Benedict Krueger, Nicolas Felka



Photo: Nicolas Felka

The Capanna Regina Margherita hut can be seen on top of the Signalkuppe mountain

Acknowledgements

First and foremost, we would like to express our gratitude towards Imperial's Exploration Board and the Old Centralians' Trust. We appreciate not only the generous financial support, but also the guidance during the planning phase.

Further thanks go to Nikwax, the Ordnance Survey, Eat Natural, Huel and RXBAR for supplying us with water-proofing products, maps and food supplies.



Photo: Nicolas Felka

Laura and Jack on top of Vincent Pyramid

Photo: Nicolas Felka

Ben descending from Lyskamm

Photo: Laura Braun

Nico on the ridge of Castor

The new Monte Rosa Hut

The first hut, Cabane Bétemps, was named after its donor François Bétemps who bequeathed funds in his will to the Swiss Alpine Club (SAC) to construct the hut. Originally built in 1895, it was repeatedly expanded over the years. In 1939 a major renovation was undertaken and it was renamed the Monte Rosa Hütte. Further renovations and expansions were undertaken, including adding solar power, a pumping station for drinking water and a septic tank. By 2002 the hut was showing serious signs of ageing and a SAC report concluded that a full reconstruction was inevitable.

The Swiss Federal Institute of Technology (ETH) Zurich, was looking for a major project for its 150th anniversary, and heard about the required reconstruction project. The Architecture Department, under the direction of Professor Andrea Deplazes, worked with architecture students on the assignment and in an architectural competition that took place in 2004, a 'Crystal Design' for the new Monte Rosa Hut was selected. The crystal-shaped building is designed with bands of windows to make sunlight spiral inside while redistributing thermal body heat from occupants to heat the lodge naturally. It combines a wooden interior with an aluminium and glass shell that not only allows amazing views of the Gorner Glacier, but reflects the light and landscape of its high-altitude environment to be a dazzling sight in itself.

Construction, which was only possible thanks to the support of numerous patrons and sponsors, commenced on site in 2009. The method of construction and associated new technologies were developed by students at ETH Zurich, under Dr. Meinrad K. Eberle. The construction materials and prefabricated elements were transported by train to Zermatt and 3,000 helicopter trips were needed to take 35 workers and the materials up to the glacier. The six-storey polygonal building was built on stainless steel foundations with a spiral interior made out of wood, the exterior being covered with an aluminium shell. Thanks to a photovoltaic system as well as thermal solar collectors integrated in the south façade of the building, the hut obtains 90 percent of its power needs from the sun. Excess energy is stored in valve-regulated lead-acid battery cells, which supply power when it is overcast.



Photo: Jack Morford

The hi-tech and very comfortable Monte Rosa Hut, with the Matterhorn visible behind

Water is collected from melting glaciers and stored in a large rock cavern reservoir 40 metres above the hut. A microfilter plant uses bacteria to clean the wastewater and greywater which is reused for flushing the toilets. Sophisticated energy management is required for the hut to achieve such a high level of energy self-sufficiency as well as the interplay of the individual components. ETH Zurich developed the software to manage and monitor the technologies deployed in the building. The hut is also used a research station by students from the ETH Zurich.

The Hut opened in September 2009. It has

120 beds, multiple showers, a fully equipped kitchen, and a spacious cafeteria with stunning views.

On 14 July 2011, the old Monte Rosa hut, 100 metres below the new refuge, was blown up by the Swiss army as part of an exercise. Permission for construction of the new hut had been granted on condition the old hut be removed, because there are supposed to be no unused buildings in this highly sensitive region around the Alps' highest peaks.

Watch a video of the construction of the new Monte Rosa hut at: <http://bit.ly/IE34-MRHut>

In pursuit of a

Peter Williamson has travelled a long way since graduating in Geology from Imperial College's class of 2002. He cemented his career in quarrying and minerals extractives with a variety of roles, starting out straight from university as a graduate trainee with industry giant Hanson Aggregates. Having lived the life of a quarrying nomad, Peter subsequently crossed over from the aggregates sector to the world of civil engineering and is now settled in Hampshire, having achieved great things both in his career and as a volunteer trustee of the Institute of Quarrying.

After graduating with a BSc in Geology, I quickly landed a fantastic trainee role with one of the minerals extractive big five. Hanson Aggregates is right up there with Tarmac, Aggregates Industries, CEMEX and Breedon, who between them are estimated to have around 60 per cent of the UK sand and gravel market. The other 40 per cent is divided up between a raft of smaller, independent operators spread across the UK.

Having read Geology at the Royal School of Mines, I was more interested in the commercial and engineering elements of extractive industries than the academic or analytical side and was keen to have a hands-on job. Quarry management offered a really exciting opportunity: heavy engineering, project management, people-management, budgeting and finance, commercials and even a bit of retail... and I didn't have to wear a tie all day!

My first role was based out of a small sand and gravel pit at Thorington in Suffolk. I then moved to a larger sand and gravel plant near Cannock, where I got my first experience as an asphalt production supervisor. Like many of my migratory colleagues in the industry, the opportunities to move with promotion are many, so my next stop was in Conderver near Shrewsbury for my first role as a quarry manager, with additional responsibility for the Shrewsbury Concrete Plant.

The next few years involved roles across the East and West Midlands, including Shropshire and Derbyshire, then onto the Cotswolds. I took on a full-time IT role and trained as a business analyst whilst working on a project to combine Heidelberg's financials with Hanson Australia's logistics. It was a fantastic opportunity. I was still firmly rooted in operations and logistics, but spent time all around the UK, in Australia and Heidelberg learning a huge amount about how business operations are supported by IT systems.

I've been in my current role for over five and half years now. Knights Brown is a privately owned medium-sized civil engineering and building contractor working all over the UK in a diverse range of sectors. Each member of the senior leadership team leads or works on a number of business change or improvement initiatives through the year. As well as the technology-based things you might expect, I've helped to re-brand the company, worked



Peter Williamson

Photos: courtesy of Knights Brown

on the planning and presentation of corporate away-days, and represented the company at awards ceremonies and innovation committees. Our next big collective task is to bring about the changes required to tackle the climate-emergency.

The importance of topping up my skills and knowledge is something that I prioritise. I did my DAPS (DAPS was the Doncaster Assisted Private Study course to achieve the IQ Professional quarrying qualification. It has now been superseded by the Foundation Degree in Mineral Extractives Technology at the University of Derby), 2003-5; I loved it. I've had formal training in IOSH, business management and administration, business analysis, finance, project and programme management and negotiation skills. I'm also continuously enhancing my skills with

continuing professional development (CPD). CPD is vital; helping to run a growing business and working with technology means I have to be learning every day.

Alongside my own professional development, I am a proud volunteer trustee of the Institute of Quarrying (IQ), on the Finance, Audit and Risk Committee. That's about giving something back to an industry that has been kind to me, providing me with a career and direction that has led me to where I am today. The solid academic grounding and opportunities to grow as a person that I received at Imperial College have influenced both my career and my own personal development. The industry rewards hard-workers and innovators from all walks of life. The work we do is tangible; there's a physical product with a practical and useful application. There are countless job roles and the door is never shut to moving from one area of expertise to another; just look at me!

On the subject of personal development, Knights Brown is an advocate of creating opportunities and granting early responsibility to individuals with a flair for our way of doing business. We aim to provide the right environment for our people to develop and realise their long-term career aspirations.

Currently, over 12% of our employees are in graduate, trainee or apprenticeship roles. As most organisations aspire to 5%, we are pretty proud of that figure.



The Knights Brown team at the Cardiff Central Square site

rock solid career

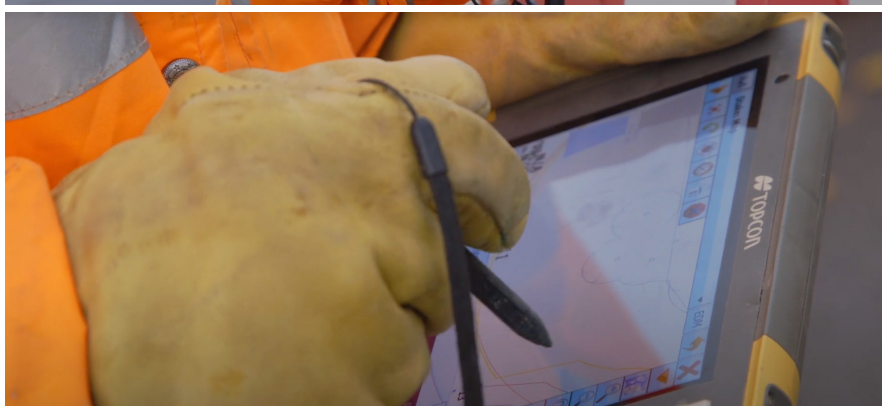


Moving utilities at the Cardiff Central Square project

We invest in our new entrants' programme, which is critical to the business's future success. We have a track record of taking on year in industry and summer placement students, and a high number return to take up graduate positions. I can recommend taking a look at the videos some of our graduates and undergraduates made recently, they're available through the film archive on our website.



Jermaine Perpetua, undertook an autumn placement with Knights Brown while studying, and subsequently returned as a Graduate Civil Engineer. Here she's working at the Cardiff Central Square project.



Joseph Tucker, undertook his year in industry at Knights Brown and, after graduation, returned as a Graduate Engineer. Here he can be seen working on a West Cheltenham highways improvement project.

On the apprenticeship side, in collaboration with Fareham College, Knights Brown helped create a bespoke programme targetted at preparing young people and adults for careers in civil engineering occupations. Apprentices regularly join us from this scheme, which is proving an invaluable source of new skills, including our first female apprentice groundworker.

I consider construction well-placed as an industry to help young people get their careers back on track where they've been derailed by the pandemic. We have opportunities available through the Government's Kickstart scheme and there's information on our website about our graduate and apprenticeship schemes. Anyone is always welcome to drop a line to our HR team speculatively as well.

You can watch videos of both Jermaine and Joseph on the Knights Brown website, talking about their experience so far and their plans towards ICE qualification.

<https://www.knightsbrown.co.uk/>

Alumni, tell us your news
See page 2 for contact details

Illustrating climate change

Our regular Canadian correspondent Nigel Fitzpatrick (Metallurgy 1962-65, 65-68) paid a visit to the Vancouver Maritime Museum and was reminded of how he once illustrated the effects of climate change.

Two decades after leaving Alcan it fell to my lot to give a keynote talk at an Energy Seminar in Dubai in September 2005. I wondered how to broach Climate Change where you walk with water in hand. The graphic on top right of the closing slide was the opening i.e. the relative speeds of the first east to west voyage through the NW passage and a re-enactment in 2000 – 58 years later. The opening worked for me and was not questioned.

With more time to stand this year I noticed a display at the Vancouver Maritime Museum and saw with surprise that the Alcan logo was on the Royal Canadian Mounted Police patrol boat *Nadon* at the time of its re-enactment as *St. Roch II*.

The Logo was confirmation that there was awareness of Climate Change at Alcan from the 1980s. This firm ground is now being built upon by Rio Tinto. In 2006, Alcan's then CEO, Travis Engen, supported a Climate Change Technology Conference in Ottawa and Alcan's Simon Laddychuck was a speaker.

Conclusions



Climate Change is serious for example the NW Passage

1940/42 St. Roch almost trapped by ice
2000 St. Roch II not delayed

- Universities, government and industry have successfully interacted in Canada
- Customer's specifications turn research projects into products: involve potential customers; necessity is truly the mother of invention
- Performance specifications, cost, reliability, need for a product for financing dictate a niche approach with a vision
- Multiple fuels and technologies including hydrogen have roles separately and together in hybridized stationary and mobile systems
- The Aluminum produced in this area is already "energy currency" and means that coal fired power stations are not used
- Remember Svante Arrhenius and do not exclude ideas from the past !

ACQUIRE

The closing slide of Nigel's 2005 keynote speech



A very popular exhibit at the Vancouver Maritime Museum, the *St. Roch* (left) is open for visitors to climb aboard. Alongside (above) is a model of the *Nadon*, renamed *St. Roch II* for the re-enactment in 2000. The *Nadon* is now moored outside the museum in the Heritage Harbour (below). The photo of the *Nadon* in action accompanying the model (below left) includes the Alcan logo that surprised Nigel.



The *St. Roch* was built in 1928 as a RCMP patrol vessel for Arctic service. On June 23, 1940, it left Vancouver under the command of Captain Henry Larsen, to make the first-ever west-east journey through the Northwest Passage, arriving in Halifax Harbour on October 11 1942, having been frozen in Arctic ice through two winters. She subsequently went on circumnavigate North America via the Panama Canal.

On July 1, 2000, the RCMP patrol vessel *Nadon*, under the assumed name *St. Roch II*,



left Vancouver on a 'Voyage of Rediscovery', to circumnavigate North America – recreating the epic voyage of the *St. Roch*. It arrived back at Vancouver on December 16, 2000.

What had taken the *St. Roch* 27 months took the *St. Roch II* one month. Skipper Sgt. Ken Burton said, "Concern should be registered with the fact that we didn't see any ice."

My Journeys through Life

Tony Brewis

RSM Mining 1949-52, post-grad year in Mineral Processing 1960-61

Having joined a University of the Third Age' group called "Write Your Life Story" I am shortly due to have my effort in that respect published. Being a bit long-winded, I am told it will run to three volumes, covering as it does my earliest years during which, aged 16½, I wrote in my diary "I will be a mining engineer"; through to my times at the RSM. From there, it is tunnelling in Gibraltar, mining copper underground in India, iron ore in an open pit in Sierra Leone, and later spells with consultants Atkins, including 3½ years in Mexico designing and constructing an iron ore concentrator. Before switching to editing the *Mining Magazine* from 1979 to 1996, with overseas trips to many places to describe their mines. Finally, after retirement, a spell 2013-2016 as a STEMNET "Ambassador" going into schools trying to get teenagers to think of careers in the minerals industry.

An excerpt from the text describes a memorable meeting of the De La Beche Club (now known as the Imperial College Geological Society) ...

"At the beginning of my final year, I had joined the De La Beche Club, an informal group which met every now and then to hear a talk on some geological theme. H. H. Read gave an account of a tour he had made that summer in the southern U.S.A. where, as guest of one after another of the local geological societies, he sounded to have had a great time. At one location in Utah, he told us, they wanted to show him a famous phenomenon just eleven miles out of town. It was

the kind of place, he said, where they would saddle a horse just to go down the road to post a letter. They naturally provided him with a horse for the twenty-two mile round trip. However, he found the saddle was not suited to his middle-aged spread, and found it most uncomfortable. Being used to hiking miles across the Scottish Highlands, he said, after they had gone about a mile, that if they didn't mind he would rather walk. So he dismounted and went on foot for the rest of the journey, leading his horse ten miles there and eleven miles back. Such a thing was so unheard of, that word went around like wildfire, and everyone in town got drunk that night.

On another occasion, he was guest of honour at a dinner given by a geological society in some city in Texas. The man called upon to give the final speech of the evening in response to the toast for The Guests was the head of the geological society in another city, the two societies being great rivals. He rose to his feet and startled his audience by beginning with an admission they had never expected to hear.

"Ladies and gentlemen, it gives me great pleasure to be here in your glorious city tonight. It is a unique city!"

At this point his words were cut short by thunderous applause. What an admission, from such a man! When the clapping subsided, the speaker continued:

"And we all know the derivation of the word unique. It comes from the Latin – unus, one, equus, a horse!"

With nothing more to say, he sat down.

* University of the Third Age

Founded in 1982, University of the Third Age (u3a) is a UK-wide movement of locally-run interest groups that provide a wide range of opportunities to come together to learn for fun. Members explore new ideas, skills and activities together.

u3a has members who draw upon their knowledge and experience to teach and learn from each other, but there are no qualifications to pass – it is just for pleasure. Learning is its own reward.

It's all voluntary; a typical u3a will be home to many activity groups covering hundreds of different subjects - from art to zoology and everything in between.

Formed over 35 years ago, there are now over 1,050 u3as across the UK, with thousands of interest groups between them and more than 450,000 members nationally.

The u3a national body – the Third Age Trust – looks after all the u3as in the UK, providing educational and administrative support.

The Trust is overseen by a Board of Directors, to which any u3a member may be elected.

'Top Submerged Lancing'

John Floy

RSM 1966-70

I read with interest the report in the Imperial ENGINEER Issue 33, Autumn 2020, of the visit by a group of students from RSM and other institutions to Central and Southern Peru. I thought that the students might be interested to know that there is a connection between Imperial College and the Funsur smelter at Pisco that they visited on 4 September 2019.

As an MSc graduate from The University of Melbourne, I rode a motorbike overland to England in 1966 to carry out a PhD on oxygen diffusion in solid oxide electrolytes, under the supervision of Dr Brian Steele in The Nuffield Research Group of Professor F D Richardson at RSM.

After completing my PhD and a post-doctoral year, I returned to Melbourne (overland by Austin Mini van with my wife) and started work in CSIRO on a novel smelting technology that I thought might improve the efficiency, costs and environmental performance of tin smelting operations. After ten years in CSIRO, despite a successful installation at Associated Tin Smelters in Sydney and with good results in developments for production of other non-ferrous metals, the CSIRO terminated my project.

I resigned from CSIRO and founded the company Ausmelt to further develop and commercialise the technology. The company expanded and developed the technology and applications to include lead, copper, nickel, secondary metals and waste processing and became a public company in 1994. Ausmelt carried out marketing, design and supply of commercial plants and plant upgrades for

smelting operations in many countries. The tin smelter for Minsur at Pisco was built by Ausmelt and started up in 1996. The story of this technology is told in the paper "Converting an Idea into a Worldwide Business Commercializing Smelting Technology." *Metallurgical and Materials Transactions B*, Volume 36B, October 2005, pp 557-575. My involvement with the company continued as a director until it was taken over by the large Finnish metallurgical company, Outotec, in 2010. Outotec was taken over by the even larger Finnish company, Metso, this year, who now operate the business as Metso Outotec, which continues to provide Ausmelt technology to the worldwide mining, metallurgical and waste processing industries from the same base in Melbourne, with many of the same staff of Ausmelt Ltd.

The technology uses a lance lowered vertically into the slag layer of a furnace to provide heat, chemical reactions and intense mixing of various regions of the bath of liquid materials held in the furnace. I named it Sirosmelt in CSIRO and then it became Ausmelt, after the company providing it. In 1989, another Australian company was provided with the rights to the original lance patent I took out in CSIRO. This resulted in yet another trade name – Isasmelt. To avoid confusion, the technology has been given the generic name "Top Submerged Lancing" which is the name used in your article.

The above might be of interest to your students.

Sincerely,
John Floy



Photo: courtesy of Imperial SEG Student Chapter

Pisco Funsur tin smelter

52nd Triode meeting 8th January 2021

With Covid rampant and London in lockdown there was no way we could meet as usual at the George. So, instead, 21 Triodes met via Zoom (see picture); it was the first time so many Triodes had actually met together, albeit virtually, since 1973! Many thanks to Paul Cheung who allowed us to use his Zoom account. We had participants from all over the world who joined what became a mammoth session!

Peter Cheung gave us an update on Imperial; what amazed us all was the ingenuity shown by Peter and his team in getting a test and measuring set out to all his students, who (because of Covid) are having to work from home. Not just because he managed to provide them with electronic goodies plus a multimeter and single-channel oscilloscope (all for around £30) but that he managed to source it from Hong Kong (via Paul of course!) and have it delivered to the students even when Covid had cut out most international delivery services. International Imperial Innovation!

The next Triode reunion will be a summer bash on Friday 16th July at The George, Fleet Street, from 7pm. The following year's reunion will be on Friday 7th January 2022. Then of course there will be our actual 50th year, in 2023.

Those that Zoomed

Addy Adesara

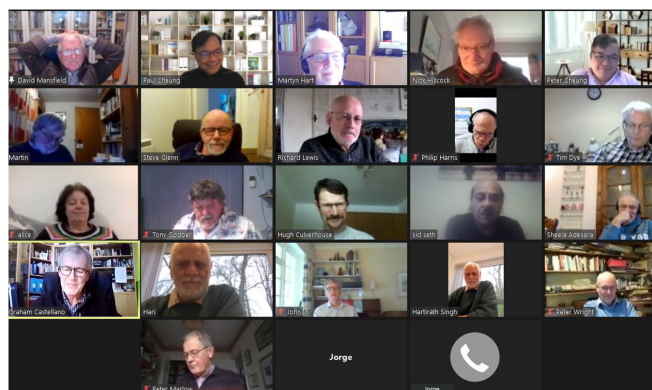
Addy spent Christmas without children as his doctor daughters are working in London on the Covid front line so they couldn't be with him. His younger daughter is also quite active in politics, especially in the media about protecting the NHS, so look out for her. He is still working at Vodafone, decommissioning systems he built 20 years ago! In 2020, he had a new hip; he is getting better all the time and expects to be playing hockey soon.

Alice Spain

Due to Covid, Alice spent many happy hours in 2020 on things she would not normally have had time for. The birth of her first grandchild, Jude, prompted her to crochet a huge play mat made of 108 3-D animal squares sewn onto a double bed mattress protector; she showed us it over Zoom! Her four-acre garden has kept her from going stir-crazy during restrictions and she has found a couple of lovely walks from home to exercise her two flat-coat retrievers and this has helped her keep fit. She also says she did six thousand fewer miles in her car than usual during 2020! But she's expecting a busy 2021!

Tony Godber

Tony was relaxing after a 43°C day in Perth! He told us he had his right



Top L to R: David Mansfield, Paul Cheung, Martyn Hart, Nick Hiscock, Peter Cheung; 2nd: Martin Clemow, Steve Glenn, Richard Lewis, Phil Harris, Tim Dye; 3rd: Alice Spain, Tony Godber, Hugh Culverhouse, Sid Seth, Addy Adesara; 4th: Graham Castellano, Hari Singh (video), John Harding, Hari Singh (audio), Peter Wright; bottom: Peter Marlow, Jorge Gabrielczyk (video), Jorge (audio)

knee joint replaced in February; it's been a total success and he's fully recovered. Because of Covid, both Deb and Tony lived and worked in Karratha from April. Tropical cyclone Damien passed through Karratha in February causing significant damage; Tony lost a mango tree but also gained a new and much better roof.

He is still working part-time for Rio Tinto Iron Ore, but has now changed career from signalling to future energy strategy (i.e. stopping using diesel for trains) and has completed a Graduate Diploma Degree on the subject! They have joined the ranks of Triode grandparents with the arrival of their first grandchild in November (Audrey, daughter to son, Justin, and Lauren). Finally, in the interests of reducing their own carbon footprint they have replaced the air conditioning in the Karratha house from a central ducted system to individual split systems in each room, making around 40% reduction in electricity consumption.

Dave Mansfield

Dave looked well and told us how he and his wife Liz had just managed (after two years) to sell their property in France, the day before total lockdown! His son is still working at the UN for the FCO but of course they haven't seen him for some time because of the restrictions. Dave is now looking forward to getting the vaccine so he can get out and about!

Graham Castellano

Graham told us that it had been a quiet year. He retired for the second time (after 10 years working) but it was more of a year for things not happening. He did get away to Italy for a week and had some time in the Cotswolds. Luckily, he lives near Southsea beach so he can get out for walks there. He is just doing small jobs around the house but realises that his rental properties need work. With both parents still alive, he is spending more time looking after them. He has missed sailing,

but is looking forward to a second grandson coming in 2021.

Hari Singh

Like the rest of us, Hari and family have been locked in most of the time. They returned from their annual trip to India in the last week of January 2020, just before governments started stopping international flights! Golf was intermittent due to lockdowns and his annual golf trips to France and Portugal had to be cancelled. The only bright spot was that they did manage to have a week's holiday away in August with his daughter and sons' families.

Hugh Culverhouse

Superman Hugh forgot that the word 'boredom' exists in the English language and had a very busy year in 2020, although he did greatly miss being able to meet up with friends at regular intervals thanks to Coronavirus! The year started with the completion of his flat renovation following water damage in 2018; a new bathroom was finished just before the first lockdown and parquet renovation followed. As spring came, some new ideas were implemented in the garden. His fleet of many racing bikes was updated or/and renovated and the tandem was sadly sold. He fitted in two short hiking holidays during the relaxation of restrictions in Germany over the summer. In autumn, it was time to get going again (after a long break) on the family tree. It's an activity which he started as a child and which will continue for years to come, as will work on his history book of the Plessey Company. Of course throughout the year sport has remained central to Hugh's life; cycling (over 15,000 km in the year) and running (over 1200 km in the year) alternating over the year. He has not missed a day's training since 3rd June 2017! That's why we think of him as Superman!

John Harding

John gave us an update and wished us all well.

George (Jorge) Gabrielczyk

George said that although world affairs passed them by, thankfully, the down-to-earth problems of tractor failure persecuted him through 2020. His little 50hp Zetor failed to revive in spring despite a relatively mild winter. After new cylinder liners, pistons and rings it was back in service; this was just as well, as the 70hp Zetor then fried its engine. This engine rebuild was a bigger job, including a crankshaft regrind, and unfortunately, at the same time, the front axle fell off the 100hp Massey Ferguson. So its whole axle case assembly had to be rebuilt (with much cursing and swearing, as the tractor weighs 5 tons) and the machine is currently performing well. Finally, the aircon failed on the 140hp Massey Ferguson; but George doesn't include that in the tally, as it fails every year when needed!

All Triodes are welcome to visit him at Jelenino, only 200 km from Berlin airport, but currently you must bring your own bedding!

Martin Clemow

Martin says that he is lucky to live in an area of the country, in Somerset just south of Bristol, where the levels of Covid are relatively low. It is a rural area with a low population density and it is not unusual for him to walk his dog for forty minutes or more without meeting another person. He says "goodness knows" what he has done during the last year but he hasn't had much time to relax! In fact, he only managed to get over to his house in France for a total of two and a half days which was definitely not enough to prepare it for sale. He hopes to achieve more in 2021.

Of his children, two, Simon and Elisabeth, are both working from home, helping with home schooling their children and only going into work when absolutely necessary; David is managing to continue working as a cabinet maker, being in a large workshop with only one other person; and Philip has returned to Imperial College as a Senior Teaching Fellow in the ABB Digital Energy Demonstrator in the Energy Futures Lab and has contact with Peter Cheung.

Nick and Sue Hiscock

2020 started on a high note as their younger daughter, Pippa, was married at the end of January; they then entered a series of low notes as Covid got ever closer and then hit. Nick became beleaguered at his sailing club; as Rear Commodore, it fell to Nick to make, and then keep, the clubhouses, jetties and 1500 members Covid secure, as the rules vacillated between various stages of lockdown and recovery. He also had to keep essential maintenance

and repair going, not easy when contractors were also locked down; novel engineering solutions were required more than once. Meanwhile, Sue found that she could help her old veterinary practice by forgetting she was retired and taking on-phone consultations from home. Mathematician daughter, Pippa, carried on working as a consultant but now from home and Chemistry Reader daughter, Jenny, focused on keeping her research team working effectively and getting papers published. Nick thinks both daughters, like the rest of us, found living and working a real struggle.

Paul Cheung

Paul retired from the University of Hong Kong (HKU) in July 2018 and is enjoying the retirement stage of life in good health. He and his wife, Jane, still live in Hong Kong where, much like the rest of China, he says they have handled the Covid pandemic reasonably well! Although they had just about got through their Third Wave and their daily local new cases are in single digits, the whole population of Hong Kong is still very cautious and most are observing the guidelines to guard against the pandemic. They still have meeting restriction of 2-4 persons (depending on the wave of pandemic!). Jane and he now spend more time with each other at home than at any other period in their four decades-plus being together! Paul still serves as Honorary Professor at HKU and also runs a Pen Makers Workshop teaching people how to make pens (which will restart after the pandemic). Their son, Timothy, is working at NYU in New York as a researcher in Parkinson's disease, while their daughter, Celeste, is working from home in London as a Research Project Manager and mum to her first child, Tina, who is now 15 months old.

Peter Cheung

Peter says he was supposed to retire about the same time as Paul but he was asked to take up the job of Head of the Dyson School of Design Engineering at Imperial and is back working (more than) full time! More than full time because he is still teaching (see introduction) and tutoring students. He too has a granddaughter and he showed us an amazingly carved full size rocking horse he has made for her – fantastic!

Steve Glenn

Steve retired in December 2019, just in time to enjoy Christmas and then go into lockdown! So he has not had much time to travel or see his family including his grandchildren, aged between 2 and 8, two girls and four boys. He has started part-time study for a degree in History with the OU, with the aim of ultimately doing a PhD, and he is also still doing voluntary work.

Peter Marlow

Peter and wife Sally managed an excellent city break to Lisbon in February before Covid kicked off, especially enjoying the old trams and elevators. In August, they had a staycation in Western Scotland and had surprisingly good weather! They are looking forward to becoming grandparents for the second time in February. Peter continues to work with PM4NGOs, a non-profit organisation that promotes and sustains the professionalisation of project management in the international development sector.

Peter Wright

Peter is still spending a lot of his time with his local Scout District as Secretary, Webmaster and various other roles including lead interviewer and handyman. Covid has hit them hard; with no income or activities, Zoom is keeping them alive. The control of his racing lawn mower has now been upgraded with an Arduino and Adafruit development which will make it world beating, he says!

Phil Harris

As for many, 2020 was a 'missing' year for Phil; missing hugging his grandchildren (and children), missing holidays and missing social activities like his dancing club and U3A trips. On the positive side, Phil and wife, Lina, did not catch Covid (he assumes that at their age they wouldn't be asymptomatic if they had) and they've kept in touch with the family by Zoom and distanced meetings when permitted. He has kept himself occupied with redecorating some rooms in their house but still has more to do in 2021!

Richard Lewis

Richard managed to make some trips in 2020 at times of rules relaxation. Over Zoom he showed us slides from visits to France and Northern Ireland in January/February before Covid really got going and another French trip during the summer lull (they did have to self-isolate for two weeks on their return then).

He was quizzed about using his Tesla on long journeys and he answered that, because of Elon Musk's foresight in establishing in advance a network of high-speed charge points, you're never far away from a Supercharger as long as you stay on major roads. Most charging stops are only 20 minutes so the 11,000 miles they did last year were not significantly lengthened by the charging breaks. In fact rather the opposite, on several occasions they wanted a longer break and so had to move the car once it had charged!

Hobby-wise Richard is using modern day components to re-create a Sinclair X20 amplifier.

Sid Seth

Sid gave us a rapid fire report; in March, he and his wife went to India to get apparel for his daughter's

wedding planned for June in the UK. They just managed to get back before the first Covid lockdown. Unfortunately the wedding had to be postponed to June 2021. Meanwhile he says he is working on a couple of ideas using the latest technology. He is amazed at the pace of change of new technology and how others have beaten him to the market. He says he will not give up, but keeps his projects secret until success!

Tim Dye

Tim said that, although retired, he was missing the buzz of a TV studio so he has been working occasionally as a camera operator at EPIC Studios Norwich, filming wrestling, boxing, music gigs, etc. to be live-streamed pay per view (sometimes) to fans.

But with the lockdowns they couldn't allow the 600 or so crowd into the studio any more so the studio boss bought two OB vans. The twist was that he asked Tim to get them up to scratch! After ten years away from TV engineering it stretched his old brain a bit as now it's all HD. But he got them into a reasonable state for a curious event: drive-in kick-boxing! On the hottest day of the year, on a large country estate, a ring was set up with a mammoth TV screen behind. Audio commentary was sent to the audience in their cars via an FM transmitter and it was a great success. Since then he has also covered an outdoor pop gig on (almost) the coldest and wettest days of last year; so at least the systems have passed their thermal-range tests!

Martyn Hart

Martyn stills works two days a week (often four or five!) in the public sector, mainly in the commercial area on large outsourcing/framework contracts. He is a Parish Councillor for his village (Ingatstone) and also the business rep for village businesses within the local Borough Council. He is still cycling, photographing, etc. and has also been busy redecorating the Triangle House.

Those that couldn't make it

Geoff Banks

Geoff was sorry to miss the reunion but health issues meant he was waiting on consultant calls that afternoon. He is still undergoing hormone therapy for prostate cancer which was diagnosed in 2019. Radiation treatment is proposed for the coming year and he hopes to make it to the George in July 2021 or January 2022.

Joan Clemow

Joan couldn't make it but wished us all a Happy New Year. She said her report was very short as her volunteering and other activities have mostly been cancelled! She has spent a lot of time with her daughter and her family and, when she was able to, her other children. As she has been at home a lot more, the garden

is looking very tidy and she has finally got round to sorting out some of the boxes of papers (dating back to the 1930s) which she inherited from her parents. She has found quite a few gems, including a letter her father wrote to her maternal grandfather asking to marry her mother!

Chris and Daphne Giles

Although retired from real work, Chris is now 'Engineer in Residence' at Analog Paradigm, a German company which builds analogue computers; although 'Out of Residence' would be a more accurate description for 2020! He is also currently designing a large off-grid electrical installation for a remote farm.

Patrick Mason

Patrick missed the call but he reports that he is still heavily involved with the internet international payments company he co-founded (GlobalWebPay.com). To his delight, the pandemic didn't damage business; indeed they managed to still grow 30%! He is close to implementing a totally new software system for the company; it's a project that has taken three years and increased his grey hairs!

When not working he enjoys: his role as a grandfather, now to two grandchildren as his granddaughter has a new brother (born in December); lots of country walking in Sussex; playing some tennis (lockdowns permitting!); and wine tasting which lockdown does permit! He is still running his local wine tasting society; the society's visit to vineyards in Chablis in April 2020 was of course cancelled but he's planning a return in the autumn of 2021 if at all possible. Of course, he's hoping for the vaccine asap!

Rut Patel

Rut was unable to join as he was supporting his two grandsons' remote learning; however he reported that earlier in the year he had a successful kidney stone procedure. Unfortunately, after a few days he had problems which resulted in being admitted to hospital with sepsis. This was in mid-March just when lockdown began and because he had a high temperature they suspected that he had Covid. So he was quarantined and allowed no visitors! He had the Covid swab test but they refused to allow him home while they waited for the test results, even though he had recovered from sepsis. After a couple of days they decided to release him even though they hadn't got the results; they said that the assumption was negative. Rut was certainly relieved to get out of hospital! His holidays in April and May were cancelled and he also had tickets for the UEFA Euro football at Wembley but hopes he might be able to go in 2021 instead.

Martyn, Arch Triode

Student leader, renowned civil engineer and diplomat



PHILIP ANDERSON DESMOND ALLSOPP (Civil Eng 1949-54)

Born on 8 August, 1926, in British Guiana (subsequently called Guyana since independence), Philip aspired at an early age to become an engineer. Observing the need for better roads in his hometown at that time (1930s), he decided then he wanted to become a road and soils engineer. People laughed at him because, in British Guiana at the time, improving the stone and sandy brick roads was not considered a priority. He also recalled being inspired by a picture of the Waterloo Bridge, a beautiful structure, and said he "wanted to build something like that in Guyana one day."

In 1949, Philip was awarded a Victory Engineering Scholarship to pursue civil engineering at the Imperial College of Science and Technology, in London. His university life was marked with distinction. He met and socialised with students of all walks of life and was appreciated for his fair vision of society. A keen member of the debating society since his youth, he earned respect from his peers with his personable wit and

oratory skills, which may well have contributed to his being proposed, then elected, as President of the City and Guilds Student Union. He was the first foreign student (from a British colony) to be elected to this position. The secretary of the student union at the time was Brian Walker.

Philip's ease with people and sociability, observed in the student magazine of the time may well have accounted for his appreciation by his peers:

"The considerable variety and balance of his activities is reflected in his character. Philip inclines to be quiet and retiring rather than pushful, but he is not a man of few words. He can talk for whole Union meetings on any subject without notes, and without digression. He does not actively force discussion towards his own set opinion, but he uses his soft, inexhaustible voice to great effect in making a point clear against the happy hecklers in the Guilds'. Philip will lead the College anywhere, anytime, provided he is persuaded that the majority really want to go that way, and that he is not just listening to the agitating



At the student residence, of Mr and Mrs Lowry

few." ('Profile' in Felix, 1953)

Despite his mainly scientific studies, Philip's knowledge of Latin, and interest in history and culture also served him as the Editor of Guilds Engineer, the City and Guilds student magazine.

Philip obtained a Bachelor's degree in Civil Engineering with Honours and was awarded the Unwin Prize for the student who had excelled both academically and in others areas of university life.

His engineering and personal experience was broadened while at University with public works stints in Holland, Denmark and Norway. During his student life, one of the professors he greatly admired and who influenced his approach to life was Sir Roderic Hill, a visionary of the university. Philip also had deep respect for Prof Pippard, who was very supportive of him in his early days as he adapted to student life in uncharted territory.

The Unwin scholarship allowed Philip to pursue a master's degree in civil engineering and he graduated from Imperial College in 1954 with an MSc. with a specialisation in 'Stabilisation of a Tropical Clay for Highway Construction'. Although he was offered a very prestigious position in London, after graduation, Philip chose to return to his beloved homeland where he lived and worked for the rest of his life, punctuated with stints abroad in the

representation of his country.

Philip returned to British Guiana in October 1954 and was immediately appointed as Construction Engineer, where he was the first to introduce scientific methods of road design in Guyana, and became the first Guyanese in the country's history to hold the post of Chief Engineer.

He went on to serve thirty three years of civil service in Works and Hydraulics, where he was responsible for the planning of all roadways and coastal sea defences. He was responsible for the establishment of the first Engineering Laboratory in the Public Works Department, and the first Roads Laboratory in Guyana.

A decade later, in 1978, Philip retired from the Guyana Civil Service and became a managing partner in an engineering and planning firm.

Due to his influence and experience in international affairs, Philip was invited to serve as Guyana's Deputy High Commissioner in London, in 1988, and later as the Ambassador to Brazil, from 1990 until 1992. Over the years, he was honored for his outstanding service:

- In 1977, National award, the Golden Arrow of Achievement for dedicated service in the field of engineering.
- In 1992, the Order of Rio Branco from Brazil, for distinction in diplomatic activity.
- In honour of his immense contribution in mapping the way to Lethem in Guyana, the road junction linking the interior road to the country's coast, was named Allsopp Point, after him.

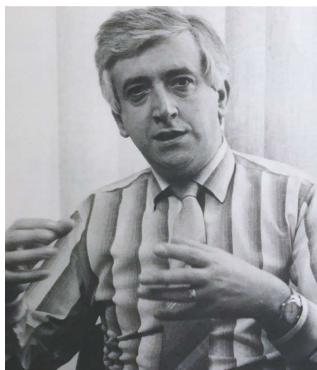
Apart from his academic and professional achievements Philip will also be remembered for his high social conscience and moral standings, giving frequent talks on the radio's "Viewpoint" where he shared his stand on the values of our society, as well as the morals and ethics that he felt important to share and uphold.

Philip was married to O'Donna, his wife of 63 years. They leave four children.



Pictured here in London, in 1952, Philip leads the inaugural procession as the newly elected president of the City and Guilds Student body.

Innovative leadership



JOHN PAUL AUTON (Elec Eng 1958-62)

Paul was born on 29 February, 1940 and came to City & Guilds in 1958 to study Electrical Engineering, but a health setback meant that he was not able to graduate until 1962.

After graduating, he joined Marconi but, seven years later, took up employment with Cambridge Consultants, which was then just nine years old and based in Bar Hill. The business was not doing all that well financially, and three years later was acquired by the American Arthur D Little management consultancy. At this point, Paul was taken onto the Board.

During the 1970s, the firm expanded considerably, gaining stability and a sound asset base, and was carrying out a significant amount of government work. It

also achieved a spin-out success in 1978 with Domino Printing Sciences, a business set up to exploit inkjet technology which went from strength to strength and was bought by Brother for over £1 billion.

In 1983, Paul moved from Deputy to be the CEO of Cambridge Consultants, and, over the next fifteen years, he led the transition towards commercial lines of business.

A former senior colleague of Paul's has observed of this period: "He encouraged working practices that have been woven into the DNA of the key Cambridge technology consultancies – all of which are destinations for other businesses from around the world seeking innovation".

Amongst the various spinouts spawned under Paul's leadership were Cambridge Silicon Radio, Xaar, Inca and many others. After relinquishing the CEO position, Paul served as Chairman for three years before taking retirement in 2001.

In 2014, Cambridge Consultants unveiled a new £6 million extension of its facilities at Cambridge Science Park, and Paul was invited to unveil a plaque, naming it the 'Auton Building'.

Paul died on 9 July 2020, and is survived by his wife, Colette, daughter, Martine, and son, Stéphane.

Award-winning research and design

Prof PETER JOHN BELL CLARRICOATS, CBE, FEng, FRS (Elec Eng 1950-53)

Peter was born in Southgate, North London, on 6 April, 1932, and came to City & Guilds in 1950 to study Electrical Engineering. Upon graduating, in 1953, he went on to study for a higher degree and was awarded a University of London PhD in 1958. He commenced his academic career at Queens University, Belfast, subsequently taking up a professorship at Leeds in 1963, his main area of interest being microwave engineering.

In 1967 he was appointed to a chair at Queen Mary College, London, where he founded a department for Electromagnetics and Antennae. In addition to being responsible for a large number of developments concerning microwave antennae, he also carried out much work on optical fibres, from 1976 onwards, establishing the theory of electromagnetic propagation on dielectric and ferrite structures, which has since been widely used in the context of optical fibres and elsewhere. His designs for microwave antennae are now used throughout the world for satellite communications, including in spacecraft.

Peter received many awards for his work over a 40-year career, was



vice-president of the Institution of Electrical Engineers from 1989 to 1991, and was elected to Fellowship of the Royal Society, the Royal Academy of Engineering, the Institute of Electrical and Electronics Engineers (IEEE) and the Institution of Engineering and Technology (IET). In 1996 he was awarded the CBE.

After retiring from full-time work, in 1997, Peter continued to supervise research and to design new antennae for satellites and spacecraft. In 2015, he was awarded the Sir Frank Whittle medal of the Royal Academy of Engineering, one of that body's highest accolades.

Peter died on 17 January 2020, after a short illness.

'Offering encouragement, never criticism'

REGINALD NOEL SHIELD (Aeronautics 1954-57)

Reginald Noel Shield (Reg) was born in Peterborough on 16 January, 1936. He was educated at Hookergate Grammar School near Newcastle-upon-Tyne, where he met Laureen, who would become his wife. He studied aeronautical engineering at City & Guilds College in 1954.

Whilst at university, Reg joined the Imperial College Motor Club and became a Bo driver, taking Boanerges around the streets of the capital and causing traffic to come to a standstill as passers-by admired the vehicle.

After leaving university, Reg worked for English Electric, building aeroplanes at Wharton in Lancashire, including work on the Lightning and the ill-fated TSR-2. During this time, he and Laureen had two children, Christine and Ian. In 1966, Reg returned to his native Tyneside to work as a Project Manager for Parsons, later moving to Vickers as a Commercial Manager. In 1980, the building where Reg

worked was closed down and, still with Vickers, he moved to Eastleigh in Hampshire as a director of the Special Projects Group, which designed and delivered one-off engineering projects into the aerospace, defence, nuclear and high-end civil markets. A colleague from that time described Reg as: "Very much a people person, always open for discussion and offering encouragement, never criticism, even when we were really up against it."

Reg won a contract for Vickers to provide some unique sub-sea equipment for use in the North Sea, which required a great deal of time being spent in the USA. Consequently, he and Laureen moved to Dallas for six months in 1982, living in a hotel and working in a cramped portacabin. Laureen provided secretarial support, without pay, to fill her time.

In 1987, came one final move, to Plymouth and Devonport Management Ltd (DML), where Reg became Commercial Director. DML took over the commercial

management of the Devonport dockyard from the Ministry of Defence, requiring a great deal of work to renegotiate all the ongoing contracts in a short space of time. As the workforce was cut, Reg became focused on supplementing a rapidly reducing Royal Navy workload. Sales of ex-RN warships to foreign governments were an area that Reg and his team pursued vigorously: at one stage, Reg's claim to fame could have been that he had turned the dockyard company into a global top 40 naval force. The company literally owned two Leander Class frigates and a couple of Oberon Class submarines while overseas buyers were sought. A major theme that Reg initiated and followed up was the super-yacht market. The cachet of a Royal Dockyard working on an owner's yacht proved to be a sound marketing angle.

As Reg approached retirement, the business grew and his initiatives resulted in a number of extremely challenging 'design and build' contracts for some very demanding owners. These one-off contracts

were worth many tens of millions of pounds and provided important jobs and experience, both in Devonport and later Appledore in north Devon. Reg finally retired in 2001, at the age of 65.

A capable engineer and businessman at work, at home he was a skilled craftsman, building intricate and authentic model boats, planes and baroque musical instruments, many of which he also played. He enjoyed a glass of fine wine, travelling in France and spending time on the English canals on his narrowboat, Debdale.

A sudden and catastrophic illness in July 2014 left Reg with significant disabilities. He was nursed with dedication by Laureen, his wife of sixty years, and he fought hard to recover, defying the doctors' expectations.

However, his many illnesses finally got the better of him and Reg passed away peacefully at home, on 3 July, 2018.

With thanks to Reg's wife, Laureen, and their daughter

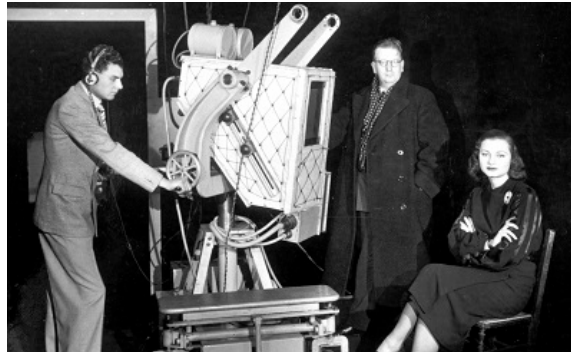
TV pioneer – Senior engineer to John Logie Baird

PAUL VERNON REVELEY (Elec Eng 1928-31)

Paul Reveley, whose death on 12 March, 2017, at the age of 105, has only recently come to our notice, was a personal technical assistant, and subsequently senior engineer to the television pioneer, John Logie Baird, and thus played an important part in the development of television.

Paul was born in North London on 29 July 1911, and studied at City & Guilds College between 1928 and 1931. After graduating in light-current electrical engineering at the age of 20, he started work with Baird early in 1932. One of his first assignments was to assist in what was only Logie Baird's second major live outside broadcast for the BBC, which was to cover the 1932 'Derby' horse race at Epsom, using simultaneous vision and sound radio transmissions. Paul recounted how this was also fed by cable to a London cinema – the Metropole – where a special video projection system that he himself had built and installed was used to show the race to the cinema audience.

Paul subsequently spent five more years working directly for Logie Baird as his senior engineer, and thus



played a key role in the design and demonstration of Baird's television projection systems, which by 1938 were capable of demonstrating live closed-circuit colour television in another London theatre. It is said that his scanner for colour projection television rotated so fast (17,500rpm) that the scanning mirrors experienced 6,000 times the force of gravity, travelling at over 200mph. The main parts of the system that was used now form part of the displays in the London Science Museum, whilst the scanner itself is now at the National Science and Media Museum in Bradford. During this period of rapid development of broadcast technology, Paul was credited with five patents relating to

the television systems involved.

In 1938, aged 27, he joined the UK's Colonial Service, and became an assistant radio engineer in Hong Kong. This meant that in late 1941, when Hong Kong was overrun by the Japanese, he was amongst the many government employees who were imprisoned at the Stanley Internment Camp there. During this time, he was responsible for organising food rations amongst the prisoners, who were obliged to survive on just 340g of rice per day.

After the end of WW2, Paul moved on to become an independent contractor, and was involved in installing, running and managing electricity services for many remote communities, including

a number in North Borneo – and CGCA's records indicate that in 1990 he was based in Kota Kinabalu, Sabah. This work continued from the Late 1940s right through until the early 1990s, and he was in his 80s when he retired and returned to the UK.

It has been said that, during retirement, Paul retained an exceptional memory and enthusiasm for – and keen knowledge of – current affairs, recalling events in the 1930s as if they happened only recently. This would have been evident to anyone who saw him in the BBC4 documentary, 'Television's Opening Night: How the Box was Born', that was shown in November 2016 (and after which Paul was interviewed on Newsnight).

Friends said of him that, in conversation, Paul could transport you to that pioneering television era, providing first-hand accounts of his work as the engineer who had spent the longest time working directly for Baird, and that his near-perfect recall meant that discussion with him was an 'uncanny experience'.

Paul died on 12 March, 2017, in King's Lynn and was survived by one daughter.

A generous benefactor to the Old Centralian's Trust

PETER ANTHONY SLANN (Aero Eng 1951-54)

Peter was born on 26 May, 1928, and studied at City & Guilds College in the 1950s and 60s.

After a first degree in Aeronautics, he studied for a DIC in Civil Engineering, from which he graduated in about 1967.

He is believed to have worked as

a lecturer for some years, but later as a self-employed consultant, based at Godalming, Surrey.

In retirement, Peter lived in Lochgilphead, Argyll, where he owned land and was active in community affairs, playing a part in a group formed to oppose the re-introduction of badgers.

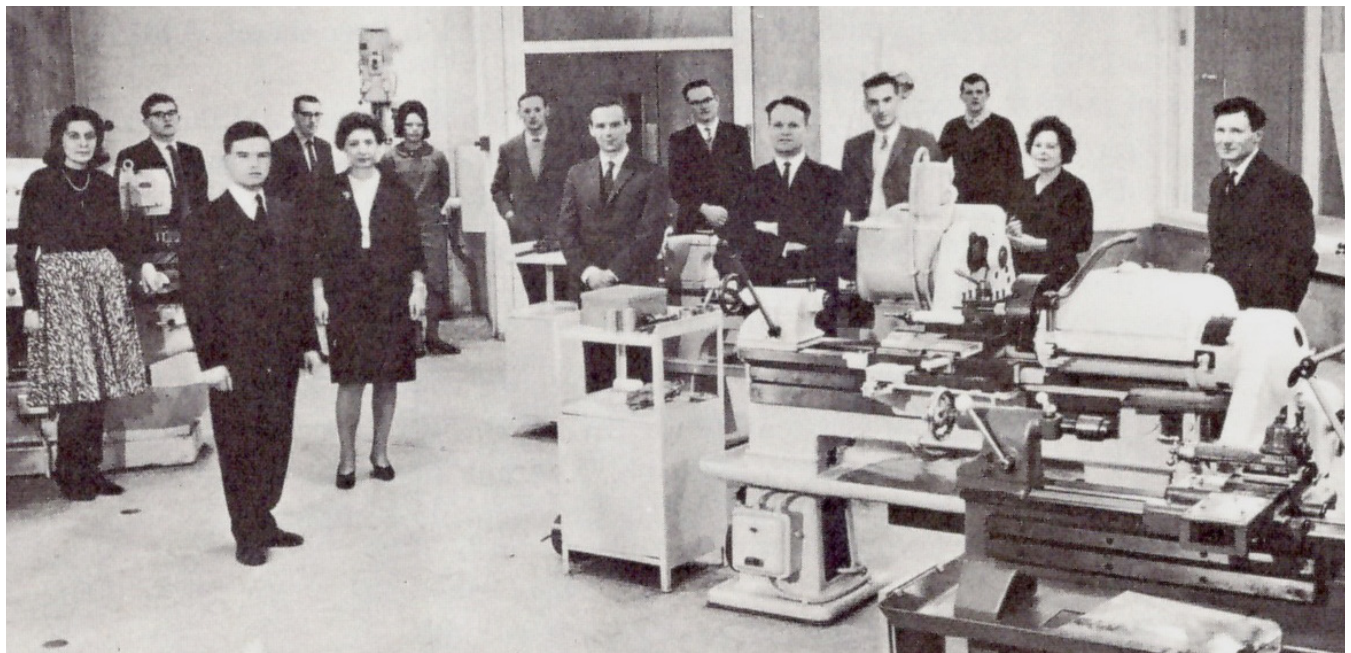
Peter has been remembered, by

a Chemical Engineer, who studied between 1959 and 1964, as having been a very personable and helpful graduate teaching assistant in the early 1960s.

In 1962, as a lecturer, Peter was involved in organising the first meeting of the Design Research Society, and, in 2016, was able to provide some reel-to-reel tape

recordings of the 1962 gathering to the organisers of its 50th Anniversary Conference.

Peter was a life member of CGCA and, after his death, on 3 May, 2018 – about three weeks short of his 90th birthday – his will was found to include a generous bequest of £10,000 to the Old Centralians' Trust.



Peter (4th from the right) amongst DDR Group, circa 1965

‘Talented, charismatic, optimistic and courageous’



S.C.C. (STEVE) BARNETT
(Metallurgy 1972-76)

Born in 1954, Steve Barnett would go on to have a distinguished career in the metals sector, spanning over forty years.

After achieving an MSc in Metallurgy from Imperial College, in 1976, and stints at Davy Process Technology (UK) and JCI (South Africa), Steve joined what became BHP Billiton, in 1981. There, he commissioned the Cerro Matoso ferro nickel plant in Columbia and worked on numerous other base metals projects.

Steve spent time in mergers and acquisitions in the Hague and Johannesburg.

In 1998, he moved to Brisbane to lead project development and HSEC

for Billiton Nickel, and then BHP Billiton Stainless Steel Materials, before joining the Nickel Institute. He was President of the Nickel Institute during challenging times (2006-2010), and was later both an industry consultant and an active member of MinSouth.

Steve enjoyed mentoring younger professionals. He was truly international, talented, charismatic, optimistic, able and courageous, and remained so, until his untimely passing on 4 November 2020, in Brisbane.

Steve will be deeply missed by his family: wife, Jane, of 43 years; daughter, Sarah; son, Andrew; and 3 grandchildren; and by numerous friends and colleagues around the globe

A sense of adventure and love of travel

CHRISTOPHER JEFFREY ALLEN
(Elec Eng 1973-76)

Chris was born in Chatham on 3 January, 1953, moving to Plymouth and then Birmingham in his teens.

He was very actively involved in scouting at this time and achieved the Chief Scout's Award in 1968. In 1970 he went for the Explorer Belt, for which he spent one week with a partner, trekking across Morocco, meeting and staying with the local population.

Chris never lost his sense of

adventure and travelled all over the world for work and for pleasure.

In 1973, Chris came to City & Guilds College to study for his degree in Electrical Engineering, graduating in 1976.

He spent most of his working life with the Ministry of Defence, where he made a significant contribution to defence engineering, science and technology over a long and distinguished career. After retiring from the MoD in 2011, he worked at Bromley, Lewisham and Greenwich

MIND, where he used his expertise to set up good IT and mobile phone infrastructure – a legacy which proved invaluable during the COVID-19 pandemic.

As part of a full and active social life, Chris enjoyed diving, sailing, walking and photography. Whilst at college, he was a member of the Imperial College Underwater Club, and continued to meet up with friends from there throughout his life. Latterly, he developed an interest in art, especially printmaking,

in which he became very proficient. In 2018, he submitted a print to the summer exhibition at the Royal Academy.

Chris died in September, 2019. He had maintained the scouting ideal of service to others throughout his life, always ready to help his family, friends and the wider community. He was a long-term member of the Old Centralians and CGCA.

*With thanks to Dorothy Froude,
Chris' sister*

Enthusiast for roads

CHARLES STUART BRINDLEY
(Civil Eng 1953-59 and 1977-78)

Charles was brought up in South Africa, where he was born on 27 December, 1932. He came to study Civil Engineering at City & Guilds College in 1953. Graduating in 1959, he became a life member of CGCA.

After working for one or two companies in the UK, he decided to move overseas, enjoying the chance to operate 'away from all the bureaucracy'. His particular interest and specialism was in road-building, and he, 'loved nothing more than searching a new route for a road, by striding through the bush on his own, mainly in Africa but later also in S.E. Asia'. In 1977, he returned to South Kensington, to study for his MSc and DIC in Civil Engineering.

After an unsuccessful first marriage, Charles met his second wife, Sue, in Tanzania, and they shared many happy years together.

Following his retirement they returned to the UK, finding an agreeable place to live in Cambridgeshire, where Charles died in March 2020, at the age of 87.

Circumnavigated Great Britain



KENNETH WILLIAM SHAW (Civil Eng 1955-56)

On 6 July, 2017, Ken Shaw, a former Director of Ove Arup and Partners, passed peacefully away at his home in Maidenhead, at the age of 86. Ken was born on 3 July, 1931, in Paarl, South Africa. He studied civil engineering at the University

of Cape Town and moved to England, working as an engineer for Taylor Woodrow, FJ Samuel & Partners and then Richard Costain. Taking a year out, Ken took a post graduate course in Concrete Technology at Imperial College. He then joined Ove Arup and Partners, with whom he was to spend the remainder of his career. During this time, Ken met Sue. They were married in 1956.

In 1957, Ken joined the East Africa division of Ove Arup and Partners as an Associate Partner. In 1958, his wife joined him, after giving birth to their daughter. They had two boys while in Kenya but left in 1963, following Kenya's independence. Ken was then invited by Fraser Anderson to join Ove Arup & Partners in Edinburgh. After 4 years, Poul Ahm asked him to set up the Newcastle Office as a Founder Associate, and subsequently Director.

In 1979, Ken and the family moved to Maidenhead, where he was invited to become a Director of Ove Arup & Partners in London, responsible for a multi-disciplinary group of engineers, designing buildings in the UK and the Middle East.

Ken was an active member of various professional bodies, with various publications to his name. He was made a Fellow of the Institution of Civil Engineers, a Fellow of the Institution of Structural Engineers and a Fellow of the Royal Society of Arts. He also won a number of awards, including the British Steel Award, and the Structural Steel Design Award. Ken retired in 1991, but continued to work as an expert witness for several years.

In retirement, Ken kept busy with his various hobbies, including: gardening, bee-keeping, croquet, and furniture restoration. His main passion was sailing and he circumnavigated Great Britain. Ken is survived by his wife of 60 years and his two sons.

With thanks to Ken's son, Graeme.

'Oxford was not for him'

PETER GORDON HINES (Civil Eng 1965-68)

Peter Hines and his twin sister Deborah were born in Tanganyika on 28 October, 1944. Their accountant father, David Gordon Hines, was a Captain in the King's African Rifles. After the war ended, the family moved to Dar-es-Salaam, the capital of Tanganyika at that time, where David was involved in developing farming co-operatives in Tanganyika and Uganda in the post-war years. The twins' childhood was therefore spent mostly in a suburb of Dar-es-Salaam called Oyster Bay, which Peter recalled as "an absolutely fabulous place to grow up ... as we were totally free!"

From the age of 13, Peter was educated in Britain at his father's old school, Blundell's, in Devon, from where he continued to Hertford College, Oxford. However, despite becoming an expert punter, Peter decided that Oxford was not for him and gained a place at City & Guilds College to read Civil Engineering from 1965, graduating in 1968.

Peter started his career with Taylor Woodrow, working on the construction of tower blocks and a bus station at Anderston Cross, in Glasgow. He was then assigned to Nigeria to work on an earth-satellite communication centre and a chain of microwave towers. Peter worked next in Romania, building an irrigation system, before moving on to the northern part of Western Australia, with temperatures sometimes reaching 140°F or so, to work on repairs to the 265-mile long Mount Newman Railway line, which carried iron-ore trains of up to a mile or more in length. He recalled the sheep here being 'as big as donkeys'.

Peter then moved back to Europe, becoming involved in the Offshore Oil industry, in Scotland and Scandinavia, on steel and concrete jackets for deep-water platforms. One of these was the massive

340,000-tonne concrete base structure for the Ninian Central platform. In 1977, after a brief spell as an engineer supervising work on a coffer dam in the River Thames as part of the Thames Barrier project, his chosen profession then took him to the Far East.

Over the next 20 years, he worked on projects in Hong Kong, Thailand and Indonesia, mainly as a consultant on bridge works, but also on flood control measures and highway upgrades. Whilst not professing to be a linguist, he had learned to speak Swahili as a child, and this seems to have given him the ability, later in life, to become fluent in Romanian, and to speak Bahasa Indonesia with confidence. He also achieved a useful level of ability in Cantonese and Thai, all of which greatly aided local work negotiations.

At school, Peter had excelled at sport, captaining rugby and cricket teams. He was also a keen skier, firstly in the Alps and later in Scandinavia. When in the Far East, he sailed – for some time owning a third of a Ruffian sailing boat in Hong Kong – and twice crewed in the 565-mile South China Yacht Races. He also skippered annually – ten or so times engaging in bareboat sailing with friends in the Cyclades and elsewhere. He fully enjoyed the social side of being an 'ex-pat' in exotic locations.

On retiring, at the age of 52, he returned to the UK and – having never married – took up residence in the home of his elder sister, not far from the Thames, using this as a base for his love of playing both golf and bridge, whilst enjoying the social life available in local pubs.

Just before Christmas 2020, Peter became ill with a health condition for which doctors sent him to Kingston Hospital. Unfortunately, whilst there, he caught Covid-19, from which he died on 10 January, 2021, at the age of 76.



Peter with his twin sister, Deborah Ogilvie, at their 40th birthday party

Guildsman who invented the Computer Mouse!



Prof RALPH BENJAMIN, CB, FREng, FIET, FRSA (Elec Eng 1941-44)

Ralph Benjamin was born in Darmstadt, Germany, in 1922. He attended boarding school in Switzerland from 1937, and was sent to England in 1939 as a refugee. He studied at Ellesmere College and at City & Guilds College, where he graduated with a 1st class Honours degree in Electronic Engineering. Sadly, both of his parents had died in Auschwitz.

Ralph joined the Royal Naval Scientific Service in 1944, beginning his career at the Admiralty Surface Weapons Establishment (ASWE). Between 1947 and 1957, he developed the first force-wide integrated Command and Control System. This included patenting the use of an interlaced cursor controlled by a tracker ball to link displays to stored digital information, the first ever digital compression of video data, and the creation of the Navy's first digital data link and network which is still in use NATO-wide as "Link 11". His tracker ball system for cursor control has led to him being widely hailed as the inventor of the Computer Mouse.

From 1961 to 1964, he was Head of Research and Deputy Director of the Admiralty Surface Weapons Establishment, then in 1964 he became Chief Scientist Admiralty Underwater Weapons Establishment (AUWE), combined with Director, AUWE, and MoD Director Underwater Weapons R&D – posts he held until 1971. Original publications during this time resulted in a DSC and he published a textbook on "Modulation, Resolution and Signal processing" that was later unofficially translated into Russian. He also trained as a navy diver to better understand some of the challenges faced by the Royal Navy.

In 1971, he became Chief Scientist, Chief Engineer and Superintending

Director at GCHQ, where he stayed until 1982. He was responsible for fast-track Research, Development, Procurement, and Deployment, and for the use of equipment and techniques for Signals Intelligence. During most of this time, he was also Chief Scientific Advisor to the Intelligence Services and national Co-ordinator Intelligence R&D. At GCHQ, he also played an important role in the original development of "non-secret cryptography" (albeit later independently discovered by others): 'public-key cryptography'.

He also taught as a visiting Professor at the University of Surrey between 1972 and 1978, and here he helped to start the Surrey University mini-satellite programme.

Following retirement from the civil service, he became Head of Communications Techniques & Networks at the Supreme Headquarters Allied Powers Europe (SHAPE) Technical Centre, from 1982 to 1987. He graduated from the NATO Staff College in 1983.

On his return to England, Ralph became a visiting Research Professor at University College, London, and, from 1993, at Bristol University. He was also a visiting Professor at Imperial College, the Open University, and the Royal Military College of Science, also serving as a Member of Court at Brunel University. He was awarded an honorary DEng by Bristol University in 2000, won the IET Heinrich Hertz premium twice, also the Marconi premium and the Clarke Maxwell premium. In 2006, he was given the Achievement in Electronics Award and, also in 2006, the Oliver Lodge Medal for IT.

In his seventies, Ralph wrote an autobiography, which he called 'Five Lives in One'; this was published in 1996. Ralph died on 7 May 2019, at the age of 96.

IEEE Oral History interview at: <http://bit.ly/IE34-Benjamin>

A lifetime of volunteering to help his community

ERNEST A HARVEY (Chem Eng 1952-55 and 1955-58)



"Ernie" was born in London on 10 November, 1934, coming to

City & Guilds College in 1952, to study for a BSc(Eng) and PhD in Chemical Engineering. In June 1954, he married Joan Ashmore, and they went on to raise two daughters and two sons.

For much of his career, Ernie lived and worked in the United States, for the past several decades living in Green Bay, Wisconsin.

His son records that Ernie developed a passion for the paper making industry early in his career, quietly distinguishing himself through his knowledge and benevolent leadership, earning executive and ownership positions in pulp and paper processing, production and consulting. He served as a Principal Partner and Director of a highly

regarded engineering consultancy in the pulp and paper industry – S J Baisch Associates Inc.

Throughout his life, Ernie sought out opportunities to better the communities in which he lived and worked by volunteering his leadership skills, particularly for groups and activities for which he had innate interest. He loved and excelled at two of his native England's most popular sports, Rugby and Soccer, and his involvement over more than 20 years of coaching, refereeing, advocating and leading were instrumental in the development and growth of these sports in Wisconsin.

Ernie maintained a strong commitment to higher education

throughout his life, and this was demonstrated through his support and affiliations with the St. Norbert College, where he and Joan endowed a generous, enduring annual scholarship to emphasise and reward community leadership within the student body.

In his spare time, Ernie greatly enjoyed listening to the sounds of brass bands. In 2005, he organised and sponsored a concert in Green Bay that brought a prominent brass band from England to play in a concert series.

Ernie died in Punta Gorda at the age of 85 on 25 August, 2020. He is survived by his wife of 66 years, his four children, fourteen grandchildren and seven great-grandchildren.

"Golf courses are in beautiful places"



Prof JOHN MOORE (Mech Eng 1962-65)

John Moore, a life member of CGCA, was born on the Wirral peninsula of North West England, and raised in Bebington by his grandparents, Samuel and Mary Payne. He attended the elite Birkenhead School, on a County Council scholarship. He studied at City & Guilds College for a degree in Mechanical Engineering, and then for his Masters and Doctorate from the Massachusetts Institute of Technology, where he met his wife, Joan, in the Gas Turbine Laboratory.

John's technical passion was three-dimensional fluid flow in turbomachinery. He received the ASME Gas Turbine Power Award for his doctoral experiments and

innovative computations explaining the flow in a rotating passage.

After 4 years working with a combustion group at the General Electric Research Laboratory in Niskayuna, NY, John returned to England in 1973 to take a 5-year teaching position at Cambridge University. Assigned to teach Thermodynamics, he added this to his fluid flow expertise to develop (now also with the aid of his wife Joan) computational methods that could predict performance of centrifugal impellers in the classic form of a temperature-entropy diagram. This was applied by the Rolls-Royce large engine division to significantly improve the turbine in their RB211 jet engine.

After another year working

in combustion, this time on computations for Rolls-Royce in Bristol, John returned to the United States in 1979, to become a Professor of Mechanical Engineering at Virginia Tech, settling permanently in Ellett Valley, east of Blacksburg. His teaching and research continued, including the analysis of rocket pumps, both for the French (SEP) and for NASA. He lectured at many professional development short courses in both Europe and the U.S., being awarded the ASME IGTI Education Committee's 'Best Paper' Award, in 1996.

John's passion for golf started with his grandfather shortening and giving him a 5-iron on his 4th birthday, and in adult life he would often say, "golf courses are in beautiful places." He also greatly enjoyed hiking in the mountains: in Wales, near where he grew up; in the Pyrenees, whilst at college; in New Hampshire, whilst at MIT; and, ultimately, right outside his door in Ellett Valley.

Taking early retirement from Virginia Tech in the late 1990s, John became president of the Blacksburg Country Club Homeowners' Association. To celebrate the year 2000, he decided to research the early settlers of Ellett Valley, and this turned into a passion for local history. He was well-known for regaling his neighbours with stories of the early settlers and the great flood that occurred in the 1700s. John and Joan also went on many family history trips, researching both his and Joan's family history.

Sadly, John was preceded in death by his son, David Moore, but was survived by Joan (after 52 years of marriage), by his step-son Stephen Kukulich, Stephen's wife Linda, and by their two children.

Collaborative researcher

Prof PETER (PETE) BETTESS, FREng (Civil Eng 1964-67, 67-68)

Peter was born on 17 June 1945, and arrived at City & Guilds College in October 1964 to study Civil Engineering. He obtained a BSc(Eng) in 1967, with First Class Honours. He returned to the College for a year from October 1967, as a postgraduate student following the advanced course in structural engineering, in the department of Civil Engineering, obtaining an MSc in January 1969 and DIC in May 1969. Peter joined the Old Centralians, and was a life member of CGCA.

After launching into an academic career, Peter became interested in finite element analysis and collaborated with Professor Olgierd ('Olek') Zienkiewicz (Civil Eng 1942-45), a pioneer of the method, in over twenty academic papers on this topic between 1976 and 1985. Peter's Career took him to Durham University, where he became a Professor. His wife, Dr Jacqueline (Jackie) Bettess, was Assistant Director of the Computer Centre at Durham, and they also worked together on finite analysis. In 1999, Peter was awarded a DSc(Eng) for work in the field of numerical methods in engineering, and in July 2000 he was elected as a Fellow of the Royal Academy of Engineering.

In 2005, Peter and Jackie moved to live in Kentmere, not far from Windermere in the Lake District, where they played an active part in campaigning to have fast broadband delivered by Openreach, an objective that was achieved in May 2018. Sadly, Peter died on 7 March, 2020, so will only have been able to derive benefit from the fibre service for a limited time.

