Welcome to the EPC’s 2020 Annual review, and what a year it has been.

Academic Engineering within the UK has not been short of its challenges: we have long been working to address a national skills shortage in our discipline, along with the need to bring equality, diversity and inclusion into the engineering profession. At the same time, we were looking to windward for the present and growing challenges of climate change as well as local and global sustainability. These were strong drivers for a renewed and deepened interest in engineering ethics - a focus for more recent work by the EPC as well as the Royal Academy of Engineering and others.

Politically, we’ve seen the Augar report drop with much speculation before and afterwards for what that might mean for Engineering HE - particularly in relation to any unintended consequences of funding model changes. Of course, other political changes swept us along, but the longer-term questions about funding models for HE remain and will certainly receive more attention in the near future.

Regardless of individual opinions as to Brexit and the long-term prospects the process provided much uncertainty for aspects of our work and much of that still remains, even now that Brexit has formally become a reality and the shape of future arrangements are still being settled. The EPC’s own 2019 report on the “The impact of Brexit on engineering research funding” highlighted the need to retain our inclusion in EU funding models where possible, where UK Engineering research has long punched well above its weight.

All in all, Academic Engineering in the UK faced a wide variety of challenges even before the start of 2020 and the impact of the Covid-19 pandemic. From at least the middle of March there was almost no aspect of our work that was not transformed by the emergency measures relating to the outbreak. Engineering education delivery and assessment was rapidly switched into fully online modes almost universally, with little preparation time, while students and our members also often had to juggle changes in domestic experiences and caring responsibilities. At the same time research projects were beset by researchers having less capacity while they met other challenges, and a sudden lack of access to physical lab facilities that are essential to so much of our work.

Within the EPC family, we realise our members have faced enormous challenges in their working and personal lives. Sadly, we have learned that some of our members have lost their lives to Covid-19. We extend our deepest thoughts and sympathies to the family, friends and colleagues of those members.

The pandemic caused our Board and Executive to consider how we could best support our members in meeting these challenges. We postponed our annual Congress that was to be held in Sheffield Hallam in April to September, while planning for online contingencies and began our programme of live webcasts – some with our friends in the IET. We’ve seen record levels of engagement from you with these webinars and we hope you have found this approach useful.

Going forward it is clear that we have long term challenges in responding to Covid-19 – first as an engineering profession with a responsibility to lead the recovery: our survey of members demonstrated that almost every UK Engineering Department was actively involved in research or production of PPE or other work supporting the response to the pandemic.

There will be an ongoing need to undertake our research under the conditions of the pandemic and seeking ways to do this in a safe, sustainable and still impactful way. Engineering
The year in review

This year bought us a new Prime Minister, a general election and three new(ish) Universities Ministers. The long-awaited Augar Review arrived and festered, but may yet return. Meanwhile, the post-Brexit issues of visas and Erasmus+ joined the ongoing home debates around TEF and PQA. Then, of course, all this was overtaken by Covid-19 and its unprecedented impact on the world, the HE sector and engineering.

A survey of EPC members revealed the range of pandemic responses including drones delivering medical supplies to island communities, adapting diving masks into medical equipment, and a molecular test that can diagnose Covid-19 in just half an hour.

students and academics will have to explore how to learn and teach our discipline that requires a fusion of theoretical and practical skills in very different ways, almost certainly for all of the 2020/21 academic year at least.

Adaptability and ingenuity in the face of adversity are defining hallmarks of the engineering profession - we can expect to see tremendous innovation in the process and some of that will be long lasting or extend well beyond the circumstances of the pandemic.

Within engineering education, we might expect a deeper embrace of online technologies, simulations and virtualisation - while still providing hands on opportunities for students.

Permanent changes to assessment practices are almost inevitable - engineering has perhaps long relied too heavily on formal sessional examinations which are difficult to implement in an authentic way online, especially while taking account of student circumstances and their access to bandwidth. There are already a number of initiatives seeking to revolutionise approaches to assessment, and while accreditation has sometimes been, perhaps unfairly, held up as an impediment to such innovation the Engineering Council and several PEIs are embracing these changes. It is likely that the pandemic will hit the “fast-forward button” on innovations that were, until now, only slowly gaining greater acceptance within Engineering HE.

Our research prowess will undoubtedly continue to play a pivotal role in the ongoing response to Covid-19 but also to the recovery, which itself will be long and profound. We may well emerge from the pandemic into a society that is now more willing to embrace the needs for long term sustainability and the need to robustly prepare for and tackle climate change. If so, we will undoubtedly have a central part to play in engineering that future.

EVENTS 2019/20

Covid-19 disrupted our events schedule, but, undeterred, we moved events online, making them more accessible than ever before.

MAY 19
- EPC Annual Congress 2019, ‘Engineering change’ UCL
- EPC Annual General Meeting
- Joint meeting of ACED, ICE and IStructE 2019

JUNE 19
- EPC/Engineering Council/IfATE Engineering Apprenticeships Forum Roundtable

SEPTEMBER 19
- COMEH (Inter)national Conference on Manufacturing Research 2019

OCTOBER 19
- EPC / IET Global Perspectives on New Approaches to Engineering HE Roundtable

NOVEMBER 19
- EPC Recruitment and Admissions Forum, UWTSD
- EPC / IET New Approaches to Engineering Higher Education (HE) Conference
- Association of Civil Engineering Departments (ACED) Annual Conference

DECEMBER 19
- Association of Aerospace Universities (AAU) Annual Conference

JANUARY 20
- PHEE-PHOMME Annual Conference

APRIL 20
- Live webcast: Meet Sir Mark Walport

MAY 20
- Live webcast: Accreditation Under Lockdown

JUNE 20
- Live webcast: Presidents’ Prize Address with Prof John Perkins CBE
- Live webcast: Digitally Skilled
For example, Ulster University engineers have been analysing call data from crisis helplines to show that distressed individuals are contacting crisis helplines for longer calls since the pandemic outbreak. This data is critical in showing the increased need for this helpline support while traditional face-to-face options remain unavailable.

University engineering teams’ contributions have ranged from developing augmented reality headsets to jump-start the manufacture of lifesaving ventilators, using drones to deliver medical supplies to island communities, adapting diving masks into medical equipment, and inventing a molecular test and smartphone app that can tell people if they have Covid-19 in just half an hour.

Alongside tremendous efforts from universities, engineering departments in particular have been at the forefront of the campaign against the pandemic, lending specialist equipment, resources and problem-solving skills. In fact, our research showed that 96% of engineers surveyed reported that they and their colleagues had volunteered their skills and resources, deploying their efforts in local communities and on a nationwide level.

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At The University of Birmingham student engineers co-ordinated an online quarantine hackathon – Hack Quarantine – with over 2,500 technologists and scientists across five continents taking part. In the global initiative, participants around the world worked to invent solutions to problems created by the Coronavirus pandemic.

Meanwhile, many engineering departments have been collaborating to mass-produce hundreds of thousands of face shields and other PPE for NHS and other healthcare workers. The University of Hull alone produced and distributed over 21,000 and, by working with industrial partners, engineers at the University have increased output to over 70,000 per week – certified to the highest EU standards – to buoy up the national supply chain.

“Engineering academics, technicians and students aren’t just helping address our immediate crisis. Our skills and innovations will help get the nation back on its feet logistically, practically and economically. Engineers will be the keyworkers of the recovery.”

Prof Colin Turner, EPC President
Data was the focus of this year’s annual Recruitment and Admissions Forum, including exclusive access to some revealing analysis. The Forum took place at University of Wales Trinity St David’s new SA1 Swansea Waterfront development in November. It focused on an unprecedented insight into the latest engineering student demographic profile research. Dr Tim Bullough (University of Liverpool) gave us a whistle-stop tour through his findings in this Royal Academy of Engineering research project into entry qualifications and engineering.

We then enjoyed a deep dive into engineering student demographic profile entry requirements, enrolment, continuation and outcome patterns – enabling an evidence-based look at some of the most fundamental questions facing engineering admissions today. Delegates were also treated to plenaries sharing innovative provision to enable those already in industry to study level 7 and MSE Engineering programmes; encouraging young people into STE(A)M careers; and a behavioural and evidence-driven approach to recruitment and admissions in engineering.

 lords and Prof Spurgeon turned out Bloomsbury’s engineering credentials are quite extensive) Congress 2019 was officially opened by then EPC President, Professor Sarah Spurgeon. She reflected that, "as a community, we’ve developed a roadmap to ensure engineering in future is more attractive, more inclusive and produces engineers that are fit to exploit future challenges and opportunities". The keynotes from Baroness Brown of Cambridge and David Sweeney launched a dichotomy of challenge and opportunity in the context of engineering change and Prof Spurgeon’s opening call to "use Congress to understand and to reach out to shape our wider society and economy" held through the conference.

We were alarmed and entertained in equal measure with a secret insight into security threats in engineering before sharing panel insights into accreditation, apprenticeships and the policy marketplace.

The outstanding Senate House Congress Dinner was preceded by a compelling public lecture from Lord Willetts which put us all in frame of mind for the pending Augar Review, and was closed by the hilarious Steve Cross, Comedian, Troublemaker & Nerd Celebrity.

A whistle-stop tour through the means we hold to influence policy; AI disruption in the engineering sector; and new model approaches leading change in engineering education led the proceedings to a close, courtesy of Prof Colin Turner, EPC’s incoming President.
This year saw the soft launch of the Engineering Academics Network – a new initiative for EPC members to connect as individuals.

For the moment, the EAN will connect mostly through a new LinkedIn Group which can be found at bit.ly/LinkedInEAN and through a programme of events. We brought forward these plans in response to the Covid-19 pandemic and restrictions on face-to-face networking and events.

In due course, the EAN will move to become the driving force behind the EPC’s new online offering – a redesigned and fully dynamic website and membership database.

Over the coming months, we will roll out the EAN and a range of activities on which many of the key elements on the EPC’s strategic plan rely. The intention is to provide a more user-friendly and user-tailored online experience that makes it easier for our members to find content on the site, specifically content which is relevant to their individual needs and interests.

This initiative represents the EPC’s largest ever programme of investment – the reward after many years of careful management of our limited resources.
New Approaches in Engineering Higher Education

New Approaches is the name of the initiative we have been running jointly with the IET in recent years looking at innovative pedagogies in engineering HE and other novel ways of attracting a wider and more diverse body of students and ensuring that they are prepared for the engineering challenges of tomorrow.

The starting pistol of New Approaches was fired with our international conference in 2017 and the influential publication of the proceedings. We then distilled many of key messages into ‘six facets’ that are hallmarks of an innovative approach.

The Six Facets

- Incorporating creativity into engineering
- Broadening the diversity of students
- A strong emphasis on project work
- Industry engagement in design and delivery
- Workplace experience for students
- Greater interdisciplinarity

This year our New Approaches work featured:
- 27 case studies of universities that have created ground-breaking degree courses, exemplifying the six facets with evidence of impact
- A global roundtable of academic leaders to discuss how UK engineering education is seen from abroad.
- A series of live webcasts including Professor John Perkins on ‘Engineering skills for the future’: a panel on using digital skills in new approaches; and a panel on whether accreditation is a barrier to innovation.

New Approaches events

October 2019
Global Perspectives Roundtable
The ‘Global Perspectives on New Approaches to Engineering Higher Education’ Roundtable was organised by the EPC to coincide with a visit to the UK of a delegation from Delft University of Technology led by their Vice Rector Magnificus/Vice President Education, Prof Rob Mudde.

Prof Mudde said he had been impressed by the imaginative and progressive approaches described in the discussion. It was clear that both UK and Dutch engineering schools were grappling with similar challenges around what and how to educate engineers for the next 40 years, and how to maintain global reputations for excellence in the process. He hoped that the Roundtable would mark the beginning of continuing dialogue and cooperation between UK and Dutch universities towards that shared goal.

November 2019
New Approaches in Practice
Two years on from the EPC’s landmark international conference and all the work on innovative pedagogies that has spun off since then, we held a follow-up conference in the Autumn – again in partnership with the IET – showcasing the universities and the people within them that have led the changes to create ground breaking and forward-thinking degree courses since then.

June 2020
Live webcast: Professor John Perkins on ‘Engineering Skills for the Future’
A series of live New Approaches webcasts kicked off with the author of the landmark Perkins Review assessing the progress made since its publication and the way ahead.

June 2020
Live webcast: Digitally skilled
Over 300 people attended our webcast on how digital skills are revolutionising learning with a panel including Paul Feldmen, CEO of Jisc.

July 2020
Live webcast: Accreditation & Innovation
EPC.ac.uk
ENGINEERING ETHICS

This year the EPC Board has considered in depth the EPC’s ethical responsibility – in terms of representing our members’ views, supporting good practice and as an organisation.

The Board devoted most of its biennial retreat (kindly hosted in January by UWE) to considering our ethical responsibilities and how we should reflect them in our actions. We are grateful to Engineers Without Borders UK for supporting our work.

We now intend to promote engineering ethics more proactively and adopt clear ethical positions. This will include developing an ethics education toolkit, which might include: an introduction to embedding ethics in teaching and learning; a catalogue of references to useful resources and thought leadership; summaries of those resources; examples of good practice; and cross references to AHEP.

EPC’s Education, Employability and Skills Committee (EES) has already committed to producing an updated version of the ethical curriculum map produced by Prof Raffaella Ocone (Heriot-Watt) on behalf of the EPC.

This is particularly timely as the Royal Academy of Engineering is also adopting a more proactive approach to engineering ethics and we are feeding into their activities.

ACREDITATION AND STANDARDS

The Engineering Council has been undertaking a series of reviews of standards and the Accreditation of Higher Education Programmes (AHEP) with a view to the publication of the fourth edition of AHEP to be published later in 2020.

This has involved new rules on compensation and condonement and the EPC has been vocal in expressing members’ concerns and views. We are grateful to Board members Georgina Harris and Dave Allan for contributing to the work and especially to Lisa Brodie for representing the EPC on the Engineering Council Review panel.

DEGREE APPRENTICESHIPS

EPC’s work to improve degree apprenticeships continued with a groundbreaking roundtable meetings in June and October with IFATE (the Institute for Apprenticeships and Technical Education), the Engineering Council and PEIs to establish how the sector can work together to get the best out of degree apprenticeships going forward.

This was a direct result of our previous work and our paper Experienced Enhanced that we published in 2018 in particular.

The resulting Apprenticeships Forum brought together all parties to ensure degree apprenticeships are fit for purpose.

All parties identified a key need for IFATE to ‘triangulate’ between the PEIs and Ofqual/OfS on External Quality Assurance (EQA) and this work will now be taken forwards through existing operational infrastructure.

CAMPAIGNS AND CONSULTATION RESPONSES

On behalf of members the EPC responds directly to consultations. We also participate actively in E4E (Education for Engineering) – the sector-wide policy group – and we are member of the Campaign for Science & Engineering. Through our collaborative approach, the EPC’s impact has been felt more widely.

- Future Frameworks for International Collaboration on Research & Innovation, Smith Review
- Salary threshold and points-based system, Migration Advisory Committee (with E4E)
- Improving Higher Technical Education, DfE (with E4E and a stand-alone EPC response)
- Immigration White Paper
- Compensation and Condonement, Engineering Council
- Accreditation and Standards reviews, Engineering Council
- REF2021 sub-panel nominations
- REF2021 timetable
- Engineering ethics, IDEA
- Integrity and stability of the English HE sector, OfS
ENROLMENTS SURVEY

The findings of the EPC’s annual engineering enrolments survey were launched at the Recruitment and Admissions Forum. The survey gives us all an early temperature check of the health of HE undergraduate and postgraduate engineering enrolments and is the only place you can gain this insight – many months before enrolment data for 2019/20 is published by HESA.

Some of the key findings for this year were:

- Postgraduate enrolments were dominated by Electrical, electronic and computer engineering. Levels of decline versus growth suggest continued relative stability among engineering students.
- There was growth in non-EU overseas postgraduate numbers and in Russell Group enrolments for all postgrads.
- Mechanical engineering remains the sector leader for undergraduate enrolments.
- We were able to separate Degree Apprenticeship and Foundation enrolments from other first degree undergraduates. General engineering dominated the intake.
- At discipline level, General engineering witnessed the greatest net growth.
- Chemical, process & energy engineering continued a trend of decline with the largest net fall in numbers (followed by Mechanical engineering).

BREXIT IMPACT

The EPC has continued to campaign to ensure the best possible prospects after Brexit for our members, by:

- Highlighting the EPC evidence of the impact of Brexit on UK engineering research to government, for example through Sir Adrian Smith’s Future Frameworks independent advice on the design of future UK funding schemes for international collaboration, innovation and research.
- Calling for the Department for Business, Energy & Industrial Strategy to commit to remaining inside international research partnerships and to prioritise participation in EU schemes that the UK would be unable to replicate alone, such as large-scale international collaborations.
- This is part of an on-going partnership with CEE at UCL on various Brexit-related research projects including a Royal Academy of Engineering-funded project looking at the experiences and expectations of European nationals currently studying and working in engineering HE in the United Kingdom and how the engineering education sector can support our members.

DATA PROJECTS

- Grade inflation? Analysis looking at the distributions between first, second and third-class honours in engineering.
- Recruitment & admissions: Recruitment and Admissions Committee partnership with Dr Tim Bullough to explore data and research on entry requirements.
- International students: How will the probable collapse in international student numbers as a result of Covid-19 affect UK engineering departments?
- Graduate outcomes and employability: Ongoing Engineering Education, Employability and Skills Committee research based on LEO data.
- Implications of Brexit: Royal Academy of Engineering-funded research exploring the experiences of engineering staff and students from the EU.
The President’s Prize

Every two years, the EPC awards the President’s Prize to an individual who has made an outstanding contribution to Engineering academia and education.

This year the recipient was Prof John Perkins CBE FREng, whose illustrious career includes roles at Imperial College London, the University of Manchester and the University of Sydney as well as serving as Vice President of the Royal Academy of Engineering and President of the Institution of Chemical Engineers.

From 2012 to 2015, Professor Perkins was the Chief Scientific Adviser to the Department for Business Innovation & Skills and was commissioned by the Government to author a landmark report into engineering skills, known as the Perkins Review, which was published in 2013.

The continuing impact of the Perkins Review was confirmed by the 2019 report, Engineering Skills for the Future: The Perkins Review Revisited, which Professor Perkins produced for the Royal Academy of Engineering and which included contributions from the EPC.

The EPC has also worked closely with Professor Perkins in recent years when he acted as the inaugural chair of ‘New Approaches to Engineering Higher Education’ (see pages 11 and 12). This joint initiative with the Institution of Engineering & Technology has had a wide and lasting influence on innovation in the teaching of engineering in universities in the UK and beyond.

The announcement of the prize was made by Prof Colin Turner, the EPC President, during one of EPC’s many live webcasts this year. A presentation ceremony and celebration is planned to take place in the coming months when public health controls allow.

The Hammermen Student Prize

The Hammermen Student Prize is awarded each year by the EPC and is generously sponsored by the Incorporation of the Hammermen of Glasgow in recognition of the outstanding achievements of an engineering student.

The prize is usually announced at the Annual Congress Dinner and the host institution is invited to help judge the winner.

In 2019, the prize was jointly shared by two students from UCL – Daniel Mannion and Christopher Hammond – and The year ahead

The 2020 Hammermen Student Prize is yet to be awarded due to the postponement of Congress.

However, five finalists have been shortlisted, whittled down from a longlist of 15 submissions, all of whom have been invited to present posters at Congress (when it takes place in September either at Sheffield Hallam University or online). They in turn were drawn from what we believe was a record number of entries.

Delegates at the rescheduled EPC Congress will be invited to vote on their favourite poster from the finalists and the winner(s) will be announced during at the end of Congress and will receive a share of the £500 prize fund.

HAMMERMEN STUDENT PRIZE 2020 FINALISTS

Many congratulations to the five finalists:
- Rachel Beel, Glasgow Caledonian University
- Eleni Bohacek, University College London
- Dan Hicks, University of Brighton
- Inna Lucas, Sheffield Hallam University
- Luka Vincekovic, The University of Sheffield
The EPC programme of events is always being added to and, following the success of our live webcasts, we expect 2020/21 to be our busiest year yet.

Watch the EPC bulletin and website for details of further events as they’re announced.

The EPC will continue to support, inform and represent the membership, including pursuing these priorities in particular:

- New Approaches to Engineering Higher Education
- Launching the Engineering Academic’s Network
- Higher education admissions review
- Engineering ethics toolkit
- Graduate outcomes and employability
- Brexit impact research
- International student recruitment
- Entry requirements

Forthcoming events

**JULY 20**
- Live webcast: Accreditation and Innovation – New Approaches in Engineering HE
- EPC Annual General Meeting

**SEPTEMBER 20**
- EPC Congress 2020 – Industry & Academia: Supercharging the Crucible: to be held either at Sheffield Hallam University or as a series of online sessions

**OCTOBER 20**
- Webcast: EPC / IET New approaches to blended learning in Engineering education

**NOVEMBER & DECEMBER 20**
- Recruitment and Admissions Forum: A webcast series
DIRECTORS

PRESIDENT Prof Colin Turner
VICE PRESIDENT Prof Sarah Spurgeon OBE
HONORARY TREASURER Prof Steph Haywood
HONORARY SECRETARY Prof David K Harrison

COMMITTEES

THE EXECUTIVE BOARD is chaired by the President and includes the Directors, elected and coopted members, the chairs of the sectoral groups (representing different engineering disciplines), the Congress Convenor and the executive officers.

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Deputy Chair Prof Henri Huijberts

RECRUITMENT AND ADMISSIONS COMMITTEE
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CHIEF EXECUTIVE Johnny Rich, j.rich@epc.ac.uk
POLICY & RESEARCH MANAGER Stella Fowler, s.fowler@epc.ac.uk
ADMINISTRATION MANAGER Vicky Elston, v.elston@epc.ac.uk

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Sir Peter Williams CBE FRS FREng

WALL OF FAME

This year we have supported our partner, Primary Engineer, to adorn Gatwick Airport with 11 inspirational ‘Wall of Fame’ prototypes of inventions designed by school pupils and built by engineering students and technicians from universities across the UK.

The winner was ‘The Extending Sink 6000’ by Savannagh Dunne from Abacus Belsize Primary School. The self-adjusting sink was designed to automatically rise or lower dependent on the users’ height and was built by Kingston University London.

Pictured above: EPC President Prof Colin Turner (EPC President, right) and Stephen Metcalfe MP (then Chair of Parliament’s Science & Technology Committee, left) with two budding engineers.

The EPC would like to extend its thanks to the many individuals who have served on EPC Committees and working groups over the past year, contributing their time, expertise and enthusiasm.