Stephen O'Connor joined IPEM's Fellowship Panel in 2015 and took over as Chair in 2016. He also sits on the Professional Standards Committee. Stephen is a great advocate of the distinction grade of Fellowship, to which a member can aspire, awarded for outstanding contribution to engineering or physical science applied to medicine. Fellowship recognises a very high standard of scientific achievement and/or professional practice and the standard required to achieve the distinction is also high. Fellowship is important to Stephen as it demonstrates his senior status, level of experience, competence and reputation within his peer group and to other professional colleagues. For Stephen, a particularly rewarding part of being a Fellow is the ability to share experiences and to contribute to IPEM. Over his years of membership, Stephen has had responsibility for the Chartered Engineering Panel, the Engineering Group Board, acted as the IPEM representative to the Engineering Council, as an interviewer for Chartered Engineer professional reviews and as an external supervisor for trainees on IPEM training schemes. Proud to be able to use the post-nominals 'FIPEM' and wear his Fellowship badge with pride, Stephen also values the opportunity Fellowship affords him by being able to give back to more junior colleagues and students by offering support in the same way that support was given to him, patiently, in his formative years. As Stephen points out, "the future of our profession is in the hands of our younger members".

Stephen's career is both long and distinguished and he has had the privilege to work in the many exciting areas of breakthrough medical device technologies in cardiology and neurology designed to improve diagnosis, treatment and, most importantly, patient outcomes, together with some of the most talented physicians and surgeons in Europe, the Americas, Australia and Asia.

Starting his education at St. Francis Xavier's College, a Jesuit run grammar school, in Liverpool, Stephen proceeded to King's College London and then the Medical College of St. Bartholomew's Hospital, University of London for undergraduate and post-graduate studies respectively. His PhD project centred on developing a fast response venturi head, pneumotachograph and electronic spirometer which he then used to measure the effect of naturally occurring respiratory infections on pulmonary function in a group of normal volunteers over a six month period. He also produced the first cough flow-volume curves, which explained the reason why patients with obstructive lung disease have such difficulty expectorating. He collaborated with anaesthetists who wanted to continuously record ventilation in the spontaneously breathing anaesthetised patient. Stephen designed and constructed, with the help of the skilled mechanical engineers in the Medical Electronics department, a wet wedge spirometer. The system was then used to evaluate the claims from pharmaceutical companies to have drugs with 'strong analgesia but no respiratory depression'. The work of the research group was not popular in some quarters! The original wet wedge spirometer has been in use for over 25 years.

Joining a pharmaceutical company, Stephen worked on the clinical trials of the prototype of the first dry powder drug delivery system for patients with asthma. He then moved on to managing a research engineering group of

very talented electronic and mechanical engineers who designed and manufactured equipment for the internal R&D groups which was not commercially available. One interesting project was an electronic counter mounted on an aerosol inhaler to record the number of actuations, particularly important to know in trials on new pharmaceutical products for respiratory diseases, such as asthma and bronchitis, as drug development runs to hundreds of millions of pounds but could fail simply because the drug is not taken by the patient, as prescribed.

Upon moving into a clinical role with the medical devices for cardiology, Stephen worked with the early generations of programmable implantable defibrillators, with a major part of his role being to support implants at hospitals throughout Europe. His observations at the coal face impacted patient safety, efficacy, patient outcomes as well as product design and development. Initially, procedures were open chest, requiring silicone backed titanium patches and screw-in electrodes being placed on the epicardium with a peri-operative mortality of 9.6%, even greater when concomitant cardiac procedures were performed. Transvenous leads, which can sense heart rate as well as deliver defibrillation energy, were introduced and the peri-operative mortality fell to <0.5%. The R&D engineers became very concerned about under-sensing ventricular arrhythmias with this technology, especially during redetection, due to myocardial stunning. Stephen's CEO gave him five days to collate, analyse and present the European data to a hastily convened International Medical Advisory Board. Whilst the R&D engineers presented a doomsday scenario, the Medical Advisory Board was unanimous in supporting the continuation of the programme following Stephen's presentation of 'evidence based medicine' proving that the issues had only occurred when the instructions for use on intra-operative QRS amplitude were not respected. The Board's decision allowed this particular transvenous technology to flourish and become the first transvenous implantable defibrillator approved by the United States Food and Drug Administration, FDA. The rest, as they say, is history.

Transvenous implantable defibrillators remain the gold standard with a market that has grown to $8bn globally. The European market has grown from the meagre 0.25k in 1990 when Stephen started in this endeavour to 63k, 85k, 103k patients in 2006, 2008 and 2015 respectively. There are now approximately 200k 'de novo' implants in the USA annually. During this time, Stephen was honoured to work with Dr Morton Mower, co-inventor of the implantable cardioverter defibrillator. From the early research, extensive intra-operative testing, invasive follow-ups, intra-operative and follow-up observations a good product became excellent. Many millions of patients have benefitted together with family and friends, and continue to do so, from the life-saving therapy provided by implantable cardioverter defibrillators.

Later in his career, he was re-acquainted with former colleagues pulled together to develop the subcutaneous implantable cardioverter defibrillator, S-ICD. This device overcame the 'Achilles' heel' of transvenous defibrillation, the lead itself within the heart. The S-ICD requires no leads on or in the heart. Stephen managed the clinical trials programme commencing with acute clinical studies, leading to first in man and the study for CE certification, as well as contributing patients to the FDA approval study. He worked for 10 months in the USA once FDA approval was granted, supporting implants during the day and giving presentations in the evening. There are

now >25,000 patients implanted with the S-ICD. The S-ICD won innovation awards at Cardiostim 2012 and EuroPace 2015.

Stephen has also worked with the world leader in cryo-ablation therapy for the treatment of cardiac arrhythmias, establishing their International Patient Registry to identify the acute and chronic efficacy and safety of cryo-therapy for specific arrhythmias and catheters. He secured 2.2m Canadian dollars for the project and enrolled 1000 patients from 40 centres across 16 countries within one year, publishing and presenting internationally. New catheters were developed based on the results and improved both the treatment and outcome for patients requiring cardiac ablation procedures.

Stephen joined a start-up company primarily to drive their clinical trial programme on an ultrasound based, wireless left ventricular endocardial pacing system for patients requiring cardiac synchronisation therapy, CRT, for heart failure. This was a regulatory study for CE Mark certification in six centres within four European countries, which was granted in 2015. This system provides patients with a much needed additional CRT option, as the conventional systems are not effective in approximately 38% of patients. In addition, he submitted the technology for a prize at Europace 2015 and it won the 'Favourite Innovation Award'.

Stephen also has worked in neurology, stimulating the vagus nerve to treat epilepsy. The system comprised a pair of helical electrodes placed on the left vagus nerve within the carotid sheath. The electrode was connected to a small pulse generator placed in the left upper thoracic quadrant. Clinical trials demonstrated a 50% reduction in seizure activity in 50% of the patients. However, as often occurs, when clinical practice takes over from clinical trial, the results are even better. Stephen also worked on clinical studies on possible new indications with vagus nerve stimulation in the fields of depression, Alzheimer's disease, pain and obesity. The epilepsy and depression indications were approved in Europe and eventually in the USA, thereby allowing improved outcomes for many severely affected patients.

Stephen has worked as a consultant to a number of medical device companies over the years. He has acted as a consultant for a company with high intensity focused ultrasound (HIFU) technology for ablation of the pulmonary veins for treatment of atrial fibrillation and designed their international patient registry. This highlighted the serious, highly undesirable side effects of oesophageal perforation, which led to demise of the company. He now consults for companies wishing to perform clinical studies or commercialise their novel products in Europe. One such project is a seven day, P-wave centric cardiac Holter monitor which increases correct patient diagnosis, compared with conventional Holters and other early patch technologies, allowing appropriate therapy to be implemented in order to improve patient outcomes.

As well as an IPEM Fellow, Stephen is a Fellow of the Institute of Physics (IoP), a Chartered Engineer (CEng) and a Chartered Physicist (CPhys). In addition to his role as Chair of IPEM's Fellowship Panel, he is a member of both IoP's Chartered Engineering and Fellowship Panels. Stephen was elected an Honorary Fellow of the Royal College

of Physicians in London in 2005 – the highest honour that the College can bestow upon a non-medically qualified person.

Living up to his mantra of giving back to newer and younger professionals, Stephen, as a Liveryman of the Worshipful Company of Scientific Instrument Makers, is an Apprentice Master looking after one apprentice formally and mentoring another. He also mentors an extremely intelligent overseas bio-engineering student who is now proceeding to post-graduate studies in Scotland later this year. Stephen is a member of the Strategic Advisory Board of the School of Mathematics, Computer Science and Engineering at City, University of London who conferred on him the title of 'Honorary Visiting Professor' in December 2011. Furthermore, Stephen was awarded an IPEM prize, the Manufacturers' Award for Innovation, in 2014.

Having published in peer reviewed journals in all fields of his endeavor, Stephen, in his 'spare' time, regularly reviews manuscripts for cardiology journals. He conducts his work in his native 'Liverpudlian', as well as French and German. And, when he's not checking on the welfare of detained persons in his volunteer role as an Independent Custody Visitor with Bedfordshire Police, Stephen can be found working in and enjoying the peaceful surroundings of his garden.