Volume 49 No 3 May/June 2023

ACOUSTICS BULLETIN

Institute of Acoustics
Sound • Noise • Vibration

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ACOUSTICS BULLETIN

Acoustics Bulletin Volume 49 No 3 May/June 2023

Cover image: Philip Newell FIOA describes his personal experience of progressive hearing degradation and the way in which it affected his perception while he was working as a designer of recording studios and loudspeaker systems. Page 24

Institute affairs

Features

Regular

Technical articles review procedure

All technical contributions are reviewed by an expert identified by the IOA Publications Committee. This review picks up key points that may need clarifying before publication, and is not an in-depth peer review.

Institute of Acoustics
Sound • Noise • Vibration

The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration. It was formed in 1974 from the amalgamation of the Acoustics Group of the Institute of Physics and the British Acoustical Society. The Institute of Acoustics is a nominated body of the Engineering Council, offering registration at Chartered and Incorporated Engineer levels.

The Institute has over 3000 members working in a diverse range of research, educational, governmental and industrial organisations. This multidisciplinary culture provides a productive environment for cross-fertilisation of ideas and initiatives. The range of interests of members within the world of acoustics is equally wide, embracing such aspects as aerodynamics, architectural acoustics, building acoustics, electroacoustic, engineering dynamics, noise and vibration, hearing, speech, physical acoustics, underwater acoustics, together with a variety of environmental aspects. The Institute is a Registered Charity no. 267026

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Dear Member

I finished off my last letter by 'penning' the collective thought that what we all want is for our safety, health and wellbeing to be protected and that an important contribution to this would be to ensure sound, noise and vibration standards are derived from robust research on health and wellbeing impacts. This theme continues with more great content in this latest edition of Acoustics Bulletin.

Professor Charlotte Clark is to be commended for her ongoing work in understanding noise and health and her article Impact of noise on health, (page 32) is particularly timely when as an Institute, we seek to focus more on academic research and health impact messaging.

Hearing health

The impact of hearing loss and tinnitus on health, wellbeing and our working lives can be significant and we have two articles relating to this area. Firstly, *Tinnitus UK* (formerly British Tinnitus Association) have contributed an article on page 20) about their recent research in tinnitus and its causes. We also have a fascinating account by *Philip Newell* (page 24) of his journey over the years of practicing as a designer of recording studios and loudspeaker systems, whilst at the same time experiencing changes to his hearing. Thank you, Philip, for your insights, which I'm sure will be equally helpful for all who look forward to many years ahead in an acoustics career, and those of us with many years to look back on whilst continuing to practice with some hearing degradation.

Recognising achievements

The IOA annually honours people whose contributions to acoustics, or to the Institute, have been particularly noteworthy. Unfortunately, the pandemic prevented us from presenting these in the usual way at a conference, but finally, we have been able to organise an in-person event to celebrate their achievements over the last three years. A 'catch-up' Medals and Awards Lunch in April recognised the accomplishments of 18 individuals. There were two Raleigh Medal recipients, Jian Kang and Stephen Stansfeld, and we very much look forward to the presentation of their medal lectures at Acoustics 2023 in Winchester in October.

Royal Charter

Looking ahead to a notable event at some point in the future, I thought I would bring you up to date as to where we are with our Charter application process. We are in the final stages of drafting the Charter and Bylaws (equivalent to our current Articles of Association). The plan is that once final drafts are approved by Council,

they will be disseminated to members via Branch meetings (in-person and online and hybrid) with the expectation of holding a Special General Meeting of the Institute to request approval from the Membership in order to submit petition to His Majesty's Privy Council.

I will close by paying tribute to the life and achievements of Richard Cowell and pointing you in the direction of his obituary on page 50. We are grateful to *Raj Patel*, a colleague from Arup, for providing this tribute. Richard made a massive contribution to many aspects of acoustics, but particularly in relation to his passion for sustainability. After retiring, he gave generously of his time to our Institute.

Alistair Somerville, IOA President

Engineering Division

The IOA Engineering Division will support you through the process to help you become one of almost 229,000 registrants that hold international professional recognition.

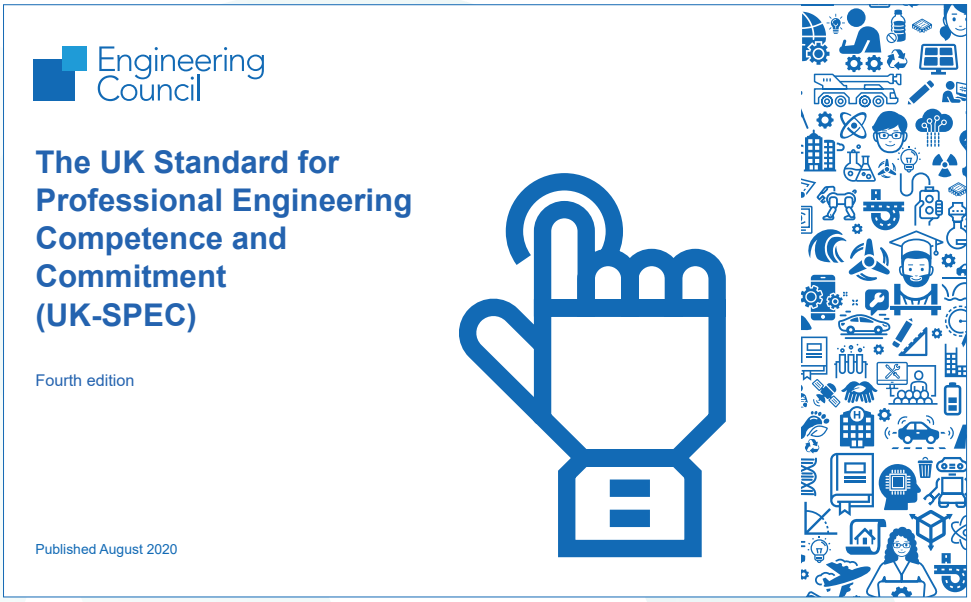
By Blane Judd BEng FCGI CEng FIET FCIBSE, Engineering Manager

All professional engineering institutions who hold an Engineering Council license to offer professional registration, work to the same standards and are regulated by the Engineering Council to make sure the process is fair and equitable across all licensed bodies.

We interviewed two candidates in March (their profiles will feature in the next issue of Acoustics Bulletin) and this was a good opportunity to train some new interviewers – some led the interviews for the first time while others just observed until they feel ready to start out on their own. We often ask applicants who have been successful if they would like to join our growing group of interviewers. Those who have said yes, report it is an interesting and worthwhile thing to do. I personally interview for another Professional Institute and recently underwent some refresher training. I must admit it is a great way to keep your CPD up-to-date, as there is always something to learn and reflect on.

If you have been through the process and would like the chance to become an interviewer, we would love to hear from you.

It is vital to look at UK-SPEC 4 when drafting your report. The better you demonstrate the competencies the more likely you are to get to interview quickly. We still get a few candidates who, once they have paid their invoice, then ask what the next steps are. These are all clearly laid out in the guidance. Please take the time to study it as it will tell you what documents are needed, and which items need to be endorsed by your sponsors. It also explains what to do if you cannot find IOA members to act as your sponsors.



When you first approach us about becoming registered, we send you the guidance document, it is important that you read this together with UK SPEC as some reports do not initially address the competencies. We are always ready to comment on the content of your professional review report prior to submitting the final draft and we will always comment on submissions and ask for re-drafted versions, but to avoid an iterative process, try to include evidence that shows you have the underpinning knowledge related to the projects you have submitted. For example, if you have selected a particular software to conduct modelling, explain why you chose it, what the shortfalls are, what results you were expecting and how you validated the outputs. These are all part of the A and B competencies and will save you having to do several rewrites.

Emma Lilliman has completed the housekeeping and some of you will have been asked if you still intend to go through the registration process. There are a couple of reasons for this. Firstly, we are now interviewing using the Engineering Council UK SPEC version 4 which is available from their website here: **https://www.engc.org.uk/ukspec** and secondly, we have been asked to avoid keeping old data which we do not intend to use.

Neil Ferguson still helps us with academic equivalence support for those candidates who do not have recognised qualifications. You can check for yourself if your qualifications meet the required specification by visiting the Engineering Council website **http://www.engc.org.uk/courses**

But please don't panic if your specific qualification is not listed, as we can still help you through the process using individual assessment (see later in the article).

We hold several interview events through the year, depending on the number of candidates we have coming forward for registration. Our next set are scheduled for 14 and 15 June 2023. If you are interested in taking the next step to becoming a professionally registered engineer, email us on **acousticsengineering@ioa.org.uk** sending a copy of your CV, copies of certificates and transcripts of your qualifications. It is important that we have all of your further and higher education certificates, not just your highest attainment.

There are two routes to registration:

The **recognised qualification** route, if you have achieved the required learning outcomes through recognised qualifications in acoustics. Qualifications which provide the required level of knowledge and understanding are for IEng and accredited Bachelor's degree and for CEng an accredited integrated Master's degree or a combination of accredited Bachelor's and Master's degrees (see table below).

The **individual assessment** route, for applicants who do not have the recognised qualifications and who will have an individual assessment of their qualifications and any other relevant learning such as: formal academic programmes, in-employment training and experiential learning self-directed learning. In many instances, it is likely to be a combination of some or all these options.

Remember we are here to help you get through the process and advice and support is offered to every candidate personally.

For **individual assessment**, the Institute accepts several courses from certain academic centres in relevant subjects, such as audio technology, as being equivalent to accredited courses for the purposes of EC registration, without the need for further assessment.

The Institute recognises the IOA Diploma course and the several Master's courses linked to it as providing evidence if you are looking to gain CEng registration. You could also offer a PhD qualification, depending upon the content of the associated taught element. We can also offer support for registration via a 'technical report' route, if you do not have the relevant qualifications to help you demonstrate you are working as a professional engineer in acoustics. If you need to follow the technical route, we will discuss this with you before you embark on that process.

Election process

The election process is overseen by the Institute's Engineering Division Committee, which is made up of volunteers from the membership. They represent the ever-growing number of members holding EC registration and provide the essential peer review process that affirms that you are at the appropriate level for recognition as an Engineering Council Registered Professional Engineer.

Recognised qualifications

Incorporated Engineer (IEng) One of the following:	Chartered Engineer (CEng) One of the following:
An accredited Bachelor's or honours degree in engineering or technology	An accredited Bachelor's degree with honours in engineering or technology, plus either an appropriate Master's degree or engineering doctorate accredited by a licensee, or appropriate further learning to Master's level*
An accredited Higher National Certificate (HNC) or Higher National Diploma (HND) in engineering or technology started before September 1999	An accredited integrated MEng degree
An HNC or HND started after September 1999 (but before September 2010 in the case of the HNC) or a foundation degree in engineering or technology, plus appropriate further learning to degree level	An accredited Bachelor's degree with honours in engineering or technology started before September 1999
A National Vocational Qualification (NVQ) or Scottish Vocational Qualification (SVQ) at level 4 that has been approved by a licensee, plus appropriate further learning to degree level*	Equivalent qualifications or apprenticeships accredited or approved by a licensee, or at an equivalent level in a relevant national or international qualifications framework†
Equivalent qualifications or apprenticeships accredited or approved by a Licensee, or at an equivalent level in a relevant national or international qualifications framework†	

* See: **www.engc.org.uk/ukspec4th** for qualification levels and HE reference points.
† For example, UNESCO's International Standard Classification of Education (ISCED) framework.

Our video explains how members can gain professional recognition and Engineering Council registration through the IOA.
https://www.ioa.org.uk/video/recognising-your-professionalism-0

IOA Events for 2023

Organised by the Measurement & Instrumentation Group & Building Acoustics Group
The Story of (Document) O
Compliance with Approved Document O and other Measurements in Building Acoustics
29 June 2023
Building Compliance Testers Association (BCTA), Loudwater, Bucks

Organised by the Underwater Acoustics Group
5th International Conference on Synthetic Aperture in Sonar and Radar
6-8 September 2023
Villa Marigola, Italy
https://www.ioa.org.uk/civicrm/event/info?reset=1&id=718

11th International Conference on Auditorium Acoustics
28-30 September 2023
SNFCC, Athens Greece
https://auditorium2023.org

Acoustics 2023
Institute of Acoustics Annual Conference, Exhibition and Dinner
16-17 October 2023
The Guildhall, Winchester
https://www.ioa.org.uk/civicrm/event/info?reset=1&id=750

Organised by the Electroacoustic Group
REPRODUCED SOUND 2023
Audio accessibility – the ingredients for success
14-16 November 2023
The Bristol Hotel, Bristol

For up-to-date information visit www.ioa.org.uk

New guidance provides sound advice on acoustics in gym environments

Cutting-edge guidance detailing the unique requirements of acoustics in gyms has been launched under a cross-organisational approach.

The Association of Noise Consultants (ANC) has led the production of the Gym Acoustics Guidance in partnership with the IOA and the Chartered Institute of Environmental Health (CIEH).

The three organisations formed a working group to draw up a blueprint to standardise the approach to acoustics for gym operators, developers and local authorities for the first time globally.

Under the Agent of Change principle, existing gyms are often sited near to residential properties, as a result of Permitted Development rights, which allows commercial units to be developed with minimal consideration for noise impact. The guidance provides a proactive approach to preserving quality of life and minimising the risk of complaints.

The trend for gym developments also increasingly needs to balance the drive for net zero buildings with more traditional buildings that are in close proximity to residential areas.

The Gym Acoustics Guidance working group Chair is IOA Council Member, Peter Rogers of Sustainable Acoustics Ltd. Peter, said: "This document represents two years of work by experts who have pooled their knowledge to help those trying to navigate the tricky technical waters to operate new or existing gyms, develop residential developments near to gyms, or residents who have complaints about gym noise that they want to be considered.

"In all these cases, this guidance provides a way through, using the science of acoustics to achieve the balance necessary for gym uses to co-exist alongside residential environments, and to assist Local Authorities with a consistent way to deal with such matters.

"This is an essential part of achieving sustainable development and addressing an obstacle to a low carbon future."

Chair of the ANC, Russell Richardson, of RBA Acoustics, said: "By reaching agreement and making this document a ProPG, we have a clear way forward in this technical area.

"We will continue to work together with our colleagues in the IOA and CIEH to keep this document under review, to reflect best practice and to give both operators and Local Authorities the tools they need."

The Gym Acoustics Guidance is the second in the ANC, IOA and CIEH's Professional Practice Guidance (ProPG) series. The first ProPG, covering Planning and Noise, was published in 2017.

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Refreshers based on the IOA Diploma

Is it a while since you were taught acoustics fundamentals and need to refresh your memory accordingly? Are you moving from one branch of acoustically-related activity to another and need a bitesize introduction to, or quick reminder of principles and concepts that might help in the new area?

By Professor Keith Attenborough, HonFIOA, Education Manager

If so, you might find it useful to have a look at a series of short online refreshers which recycle and repackage videos produced for the blended learning version of the IOA Diploma. Six of these online refreshers will be launched later this year.

The Diploma requires an initial study of the General Principles of Acoustics (GPA) Module which introduces many of the principles, concepts and standards important to acoustically-related jobs. This is followed by a choice of two Specialist Modules (SM) from Building Acoustics (BA), Environmental Noise (EN), Regulation and Assessment of Noise (RAN), and Noise and Vibration Control Engineering (NVCE). The short refresher videos bring together contents from GPA and SM videos selected according to the topic of each video.

The **Human Response to Noise Refresher** consists of four videos based on those created for Unit 3 of GPA and Unit 8 of BA.

The video topics are:

- the ear and the hearing mechanism;
- health surveillance and hearing protection;
- loudness, calculation of loudness, speech intelligibility, noise rating and noise criteria; and
- speech interference level, speech transmission index, vocal effort and privacy.

The **Human Response to Vibration Refresher** consists of three videos containing extracts from those for GPA, BA, EN and NVCE. Some of the content is repeated but this ensures that each part of the refresher video is self-contained in respect of references to the appropriate vibration indices and standards. The video topics are:

- effects and assessment of vibration introducing the various vibration indices;
- vibrations from transport, industrial, construction and quarrying sources, and building vibrations; and
- vibration effects continued and aspects of measuring and controlling vibrations.

The **Room Acoustics Refresher** is based on Unit 5 of GPA and units 1 and 8 of BA. It has four videos:

- sound absorption, sound absorbers and sound absorption measurement;
- standing waves and room modes;
- room acoustics calculations; and
- aspects of design for good room acoustics including auditorium acoustics.

The **Sound Insulation Refresher** is based on GPA, BA and NVCE and has seven videos:

- principles of sound transmission;
- factors that influence sound insulation and ways of improving sound insulation;
- airborne and impact sound insulation measurement;
- sound insulation rating;
- sound insulation in practice covers topics such as robust details, and guidance on relevant considerations in schools and hospitals;
- control of building vibrations; and
- noise from building services.

The **Vibration Refresher**, based on extracts from GPA and BA videos, has two parts relating respectively to vibration fundamentals and building vibrations

The **Sound Propagation Outdoors Refresher** is based on videos created for GPA and looks at wavefront spreading, radiation from finite planar sources and building façades, reflections from vertical surfaces and the ground, atmospheric refraction and turbulence, transmission around barriers and through vegetation and prediction schemes.

The **Transport Noise Refresher** consists of four videos: two are on road traffic noise, and the other two are on railway noise and aircraft noise respectively. They recycle video content from EN and RAN.

These online refreshers will be (freely) available to members and do not involve any assessment (self or otherwise). In these respects, they differ from the online CPD courses described in the Jan/Feb issue of Acoustics Bulletin which will include online quizzes. There will be a charge for non-members of the IOA. As a reminder, the topics of the CPD videos in preparation are environmental noise measurement, healthcare building acoustics, sustainability, gym acoustics and electroacoustics.

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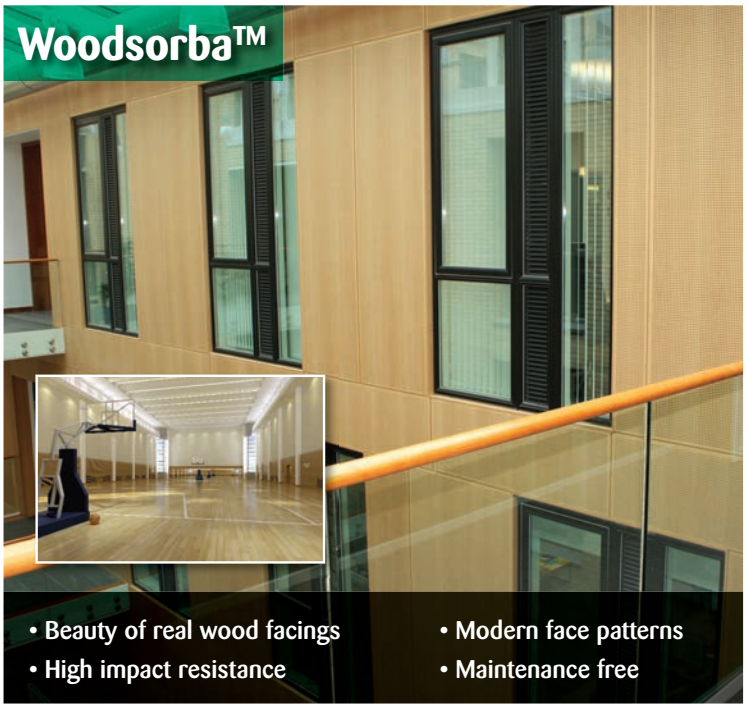

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IOA education and training news

If there are enough applicants, the IOA will be offering the following Certificate courses in the remainder of 2023:

- **Certificate of Competence in Environmental Noise Measurement** (CCENM): Examination dates: 19 May and 6 October
- **Certificate of Competence in Workplace Noise Risk Assessment** (CCWNRA): Examination date: 29 September
- **Certificate of Competence in Building Acoustics Measurement** (CCBAM): Examination date: 3 November
- **Certificate of Competence in Irish Building Acoustics Measurement** (CCIBAM) might be offered also. For enquiries and to book a place please contact **info@soundtestingireland.com**
- **Advanced Certificate in Report Evaluation** This course aims to provide more experienced practitioners with the knowledge and skills to critique the technical written work of others effectively, thereby enabling the issue of good quality work while freeing up more time for the more experienced personnel. Subject to sufficient progress and recruitment, this course will be run in autumn 2023. For more information and / or to book a place contact **education@kpacoustics.com**

The details of the Centres accredited for these courses is at **www.ioa.org.uk/education-training** Centres should be contacted directly for information on course dates, delivery methods and course fees.

Typically Certificate courses run for five days onsite once in the spring and the other in the autumn, with a practical assessment and a written examination on the final day. However, some Centres may only run one sitting per year and offer a slightly different format.

Certificate Centres may be able to deliver bespoke courses onsite. This is subject to acceptance of the arrangements by appropriate management committees, and the number of candidates being enough for the course delivery to be viable.

Holders of Certificate courses may apply for Tech IOA membership (further details are available from **membership@ioa.org.uk**).

IOA Diploma 2023-24

Applications and registrations for the Diploma in Acoustics and Noise Control are open for studying at an accredited Centre or via tutored distance learning for academic year 2023-24.

The accredited Centres for 2023-24 include the University of Derby (resuming after a year) and KP Acoustics Research Labs who, as well as through their regular Southampton base, will be offering the Diploma in Manchester. Classes will be taught by the KP Acoustics team, and hosted by the University of Salford, giving students access to Salford's world-leading laboratory facilities for practical sessions. The course delivery in Manchester will include around 20 days of in-person teaching and lab sessions in five blocks of three to five days across the year, as well as five days of online revision sessions in the weeks running up to the summer exams. All enquiries about studying the Diploma in Manchester should be sent by email to **education@kpacoustics.com**

Further details for Derby University and KP Acoustics Research Labs are available on **https://www.ioa.org.uk/education-training**

Also, the IOA Education team will be happy to help with any enquiries about the IOA education and training programmes at **education@ioa.org.uk**

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SEMH Primary School visit

IOA STEM ambassador, Sarah Barnes talks about her recent visit along with Vicky Wills, Matt Torjussen, to Waterside SEMH (Social, Emotional and Mental Health) Primary school. It's a brilliant specialist facility focusing on ADHD (attention deficit hyperactivity disorder) and ASD (autism spectrum disorder) in primary school pupils.

By Sarah Barnes

We gave a presentation about what a career in acoustics is all about, and ran some practical experiments. The pupils learnt about why our ears are so amazing, got first-hand experience looking at an acoustic camera and almost couldn't tell which direction sound was coming from with the confusaphone listening devices.

Learning is fun

STEM (Science, Technology, Engineering, and Mathematics) Outreach is an initiative designed to promote careers like acoustics to pupils that have an interest in STEM fields. STEM Outreach is typically implemented in primary, secondary, and post-secondary educational institutions to introduce pupils to careers that they may not have thought of and to help prepare them for college and career success in the STEM fields.

The main objective of our visit was to engage pupils in a hands-on and fun STEM activity as part of British Science Week. The activities are designed to make pupils curious, excited and knowledgeable about science-related subjects, so we introduced them to acoustics and showed them how sound works and its applications in everyday life and explained why our ears are so important.

We discussed the properties of sound waves, such as frequency, amplitude and wavelength and how they affect the perception of sound – we had some fantastic contributions from the pupils with at least four of them saying that their favourite sounds were made by their cat.

We talked about some places where sound is important, from announcements at Tube stations to protecting green spaces, including how human activities in oceans impact aquatic life.

Above: Matt Torjussen showing pupils how to use the acoustic camera and sound analyser

The pupils split into groups and were given two practical exercises. One group was shown an acoustic camera as well as a demonstration on amplitude vs frequency, and the other group took turns to use the confusaphones and other listening devices.

We also gave them the the opportunity to test out a vibration speaker on different surfaces within the school hall, and they determined what the best surfaces were to make the sound as loud or as quiet as possible.

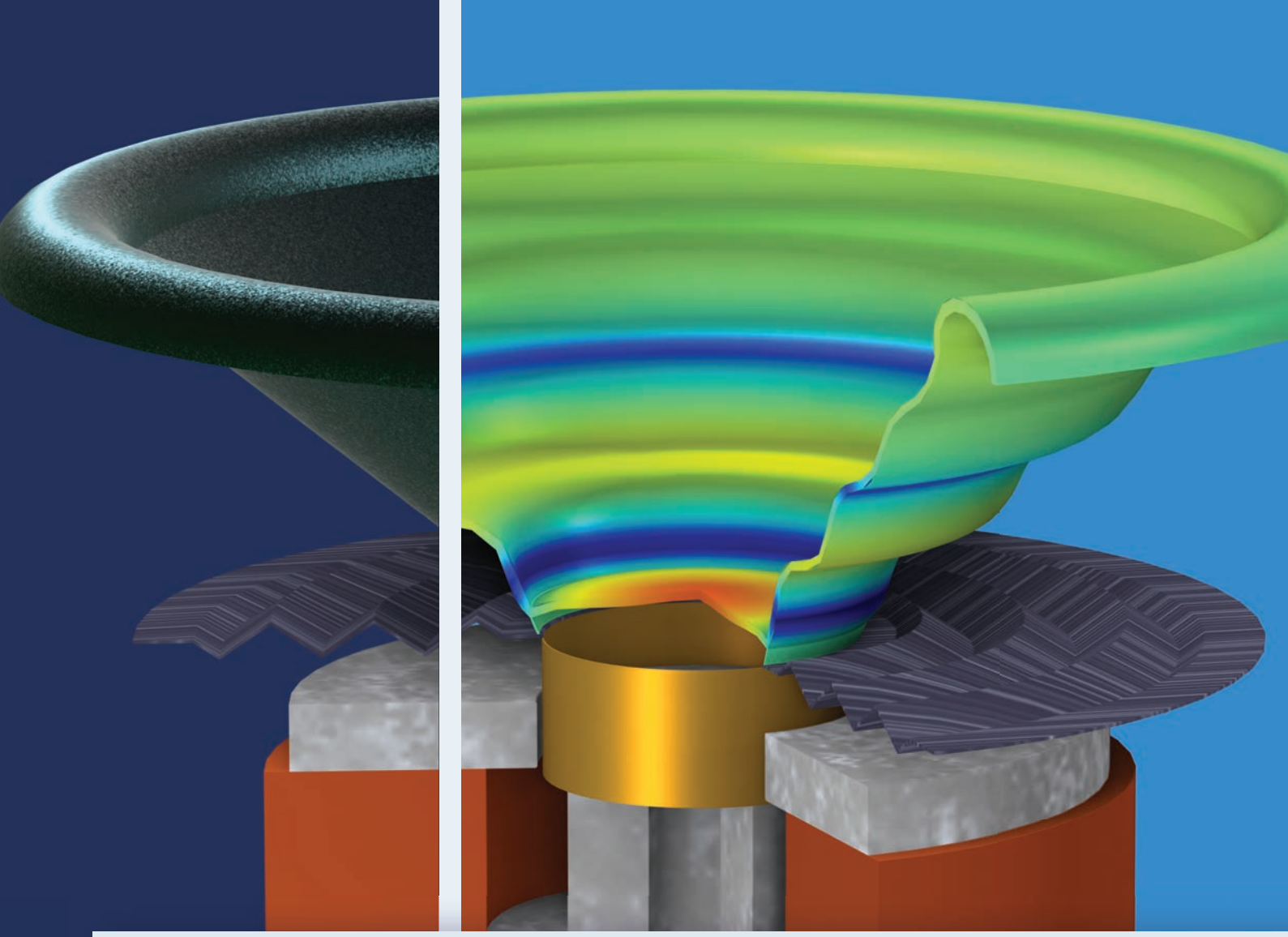
IOA primary schools competition

In the assembly at the end of the day, we told the pupils about the IOA Primary School Competition (see page 16 of this issue), which is an excellent opportunity for children to think more deeply about sound and to express creativity. We also shared our own backgrounds in acoustics and what a day in the life looks like for a consultant at Atkins and as an acoustic lead at ANV.

Tony Stacey wasn't able to join us on the day because of the train strikes, but his help on the lead up to the event was invaluable.

The school does a wonderful job emphasising the importance of neurodiversity by recognising that differences are not just normal, but also valuable and necessary for the diversity and richness of human experience. Embracing neurodiversity means that we can move beyond stigmatisation, and instead focus on supporting and accommodating individuals with diverse ways of thinking and processing information. Head teacher, Neal Collard, said: "All the pupils absolutely loved the day and you all made the experience so accessible and enjoyable that pupils felt not only comfortable to discuss what they knew but also take on challenges of things and ideas that were new to them. For our pupils this is a huge step forward in opening their eyes to STEM and broadening their learning. Thank you all."

There is an SEMH Secondary school interested in hosting us for a STEM outreach day on acoustics, so please get in touch at **stem@ioa.org.uk** if you can help.



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The 2022 IOA primary school competition

Following the success of the 2021 secondary school competition, the IOA organised a primary school competition for children in 2022.

By Angela Lamacraft, Sustainable Acoustics Ltd

The competition introduced the concept of soundscapes and asked children, as individuals or in small groups, to create a piece of art (drawing, picture, patchwork, collage or similar) to illustrate some of the sounds they like to hear and some of the sounds they don't like to hear.

A total of 14 entries were received, which was very encouraging for our first year. The judges were really impressed with the creativity of some of the children, with entries including drawings, collages, and papier mâché projects. Some of the entries also demonstrated that the children really understood the brief and were inspired to think about the sounds around them, what creates them and how they make them feel. There is a real pool of talented soundscape enthusiasts out there!

Winner

Jessica Davies and Sienna Cox from Old Sarum Primary School, Salisbury were commended for their entry, and Cressida Kilby from St Birinus CE School, Dorchester-on-Thames was highly commended. The winner of the competition, with a highly personal piece of art that dug deep into the emotions that sound can awaken, was Alicia Aitken from Our Lady of Lourdes Primary School, Rottingdean. Alicia's detailed piece, entitled *The Sounds of My Life*, is an A3 collage using a variety of materials such as carboard, felt, cotton, foil, and bubble wrap. It depicted the sources of sound and the descriptions of her feelings very well, for example, the sounds of her breath, a light switch and a key in the front door. Combined with the imagery the descriptions really made the judges feel them too.

2023 IOA schools competitions

This year's primary school competition asks children to create a piece of art showing a sound they don't like to hear and an idea for how to improve it. Or, if you have or know of secondary school age children, this year's secondary school competition explores the connection between ecology and acoustics by asking children to use the BirdNET app to identify the birds present in three acoustically different areas.

Congratulations again to Alicia, Cressida, Jessica and Sienna; keep listening to the soundscapes you're in!

Left:
Competition winner, Alicia Aitken from Our Lady of Lourdes Primary School, Rottingdean, with IOA President, Alistair Sommerville

Institute of Acoustics
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Can you improve the sound of something?

The Competition

Produce a hand-made drawing, picture, patchwork, collage or similar to illustrate a sound (noise) you don't like to hear and an idea for how to improve it. The competition is open to children aged 7 to 11 years old working individually or in groups of up to four children.

The Prize

The winning entrant(s) will each receive a prize of £25 plus £500 for their school. The winning school will also receive an engraved crystal trophy.

Entry Deadline

The deadline for entries will be 31st July 2023. Entries will be judged by a panel of experts. The decision of the judging panel will be final.

Please check the IOA website for further details, terms and conditions:
https://qrco.de/primarysch23

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Courtesy of Luis Gomez-Agustina

IOA Early Careers Group

The IOA Early Careers Group (ECG) Winter social at Bloomsbury Bowling Lanes.

By Aaron Tomlinson

In February, around 25 members of the Early Careers Group met at the Bloomsbury Bowling Lanes for a mid-week social. ECG members, Josie Nixon, Diogo Pereira and Aaron Tomlinson welcomed all those arriving and introduced new/sole attendees to others. Socials like this are for anyone to come along for whatever purpose they might have and it was reassuring to see that everyone was enjoying a chat and new arrivals warmly welcomed.

Nothing is more nostalgic than the cheesy 90s graphics displayed on the overhead screens for the inevitable 'SPARE' or the occasional 'STRIKE'. Needless to say, scores varied with occasional bouts of skill (luck?).

There was an unexpected karaoke interlude after the first game as the group were shown into a private room until another lane became free. Did they know that acousticians are stereotypically ex-musicians?! Either way, if you haven't heard a gaggle of young acousticians enthusiastically belting out Toto's *Africa*, then you better come along to the next social!

After the interlude, those left standing equipped themselves again in their bowling lanes. During the next game, a kind member of the group ordered pizza which was enjoyed by us all. Whoever you are, we thank you.

Following the evening, the flurry of LinkedIn activity demonstrated the power these events have to connect people. Thanks to all those who attended and to the organisers. We look forward to seeing you at the next one. Finally, a massive thank you from the ECG Committee to SLR consulting, who kindly sponsored this event – everyone had a great time!

ECG Representatives

Here, we introduce you to ECG Representatives, Ilaria Fichera, Kial Jackson, George Taylor and Adam Woolley.

Ilaria Fichera, Membership Committee ECG Representative

Ilaria is a PhD student in the Building Acoustics Group at the Eindhoven University of Technology in the Netherlands. Before starting her PhD in 2022, she acquired considerable knowledge in acoustics consultancy during her five years working in the UK. She specialises in acoustics modelling and room acoustics.

Ilaria joined the IOA ECG Committee and the Membership Committee in 2020 to get more involved in the acoustics community and to get insight into managerial aspects within the IOA. As the ECG Rep of the IOA Membership Committee, Ilaria promotes new ideas for the Committee, identifies members' needs, and encourages more people to become members through networking.

Kial Jackson, Meetings Committee ECG Representative

Kial began his career in consultancy in 2016 with a focus on architectural acoustics. He joined the ECG Committee in September 2022 as the Rep for the IOA's Meetings Committee.

Within the Meetings Committee, Kial helps to plan, coordinate, and oversee the IOA's annual programme of events. He hopes to be able to provide ECG members with learning and networking opportunities that can help them further their knowledge and develop professionally.

George Taylor, Noise & Vibration Engineering ECG Representative

George is a senior project engineer for Mason UK, working mainly on UK-based projects delivering design and supply packages for building vibration isolation and box in box systems.

Since 2020, George has been a member of the ECG as the Noise and Vibration Engineering Group representative. The Group has been delivering quarterly webinars covering a wide range of topics from drone noise to active noise control with specialists from their respective fields presenting to hundreds of attendees.

Adam Woolley, Underwater Acoustics ECG Representative

Adam is an acoustic engineer at one of the world's leading naval sonar providers, specialising in the design of sonar for anti-submarine warfare and mine countermeasures. He is also studying part-time for a PhD in underwater acoustics at the University of Southampton.

Adam joined the ECG as the Underwater Acoustics Group's Rep in 2019 and later served as Secretary between 2020 and 2022. His role in the ECG afforded him a seat on the planning committee for the IOA's International Conference on Underwater Acoustics (ICUA), co-chairing a session on underwater signal processing at ICUA2020 and chairing an early careers event at ICUA2022 (Southampton, UK).

The ECG is open to all members of the Institute (both corporate and non-corporate) who shall normally be under 35 years of age or within first five years of their career. The group is always keen to hear from members and non-members alike. To join the Early Careers Group, to find out more information or to voice your concerns, visit **https://www.ioa.org.uk/early-careers-group**

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Not music to the ears: how having a good time can leave more than memories

"A mosquito"; "reminds me of a steam train"; "it's hard to describe, it's not like anything I've heard before". These people are talking about tinnitus.

By Nic Wray, Communications Manager, Tinnitus UK

Tinnitus is the perception of sound, which can be permanent or temporary (Cima et al, 2019)[1], in the absence of an external source.

It is experienced by around one in seven adults in the UK (14.2%) (Biswas et al., 2021)[2], and for many it can be bothersome. Problems reported by people living with tinnitus include an effect on listening ability, inability to concentrate, insomnia, depression, anxiety and reduced quality of life (Watts et al., 2018[3]; Weidt et al., 2016)[4].

Tinnitus is primarily associated with the ageing process (Eggermont and Roberts, 2004)[5], hearing loss (Ratnayake et al., 2009)[6] and noise exposure (Steinmetz et al., 2009[7]; Eggermont, 2012)[8] and it is the latter two that I will be discussing in this article.

Amongst populations exposed to industrial noise, noise exposure and noise-induced hearing loss (NIHL) have been found to be the factors most commonly associated with tinnitus. Also at a high risk of NIHL and tinnitus are professional musicians who perform and practice music regularly. They have been identified as a 'high-risk group' who are 'in particular danger of developing tinnitus' by the American Tinnitus Association (2019)[9]. As musicians rely upon their hearing in their profession, it is thought that they may be more vigilant and interested in hearing health (Zhao et al., 2010)[10] but our research does not necessarily support that hypothesis.

How loud is too loud?

In working environments where the decibel level is regularly over 80dB employees should be trained to understand the risks involved. In an environment where the volume is 85dB and above this is the level at which noise becomes unsafe without the use of hearing protection and this should be provided by the employer.

Decibel level and maximum exposure time

The noise exposure level takes account of both the sound intensity and duration. The potential for hearing damage is ordinarily related to the noise dose a person experiences.

Table 1 gives some examples of average intensity of a sound made by different things and the maximum amount of time it is safe to be exposed to these each day, without needing hearing protection (Health and Safety Executive, 2008).

Cumulative sound exposure leads to hearing damage, work-related or not, so all sound exposure needs to be considered.

Below:
Table 1:
How long it takes to reach a particular noise dose (HSE, 2008)[15]

dB	Source of sound	Length of time
15	Leaves rustling	Indefinite – safe level
30	A quiet room	Indefinite – safe level
40	A quiet library, birds calling, refrigerator hum	Indefinite – safe level
55	Normal conversation	Indefinite – safe level
60	Dishwasher	Indefinite – safe level
70	Car at 10m, vacuum cleaner, washing machine, shower, piano practice	Indefinite – safe level
80	Busy traffic at 10m, alarm clock, whistle, freight train at 15m	Indefinite – safe level
85	Kitchen blender, noisy restaurant	8 hours
88	Forklift truck	4 hours
90	Power tools, lawnmower, kitchen blenders, hair dryers, Tube train, diesel truck	2 hours
100	Bulldozer, road drill at 1m, chain saw, jet ski, hand dryer	15 minutes
103	MP3 player at full volume	7 minutes 30 seconds
106	Motorbike, nightclub, bars	3 minutes 45 seconds
110	Sporting events, car horns, symphony orchestra, leaf blower, riveting machine	1 minute 42 seconds
115	Ambulance siren, live rock band	28 seconds
120	Loud car stereo, amplified music at 2m, thunderclap, siren at 1m, oxygen torch	7 seconds
130	Jet taking off at 100m	< 1 second
140	Rifle firing at 1m	No safe time
150	Rock music peak	No safe time

Noise exposure at music venues

Performers

In a survey of professional musicians over half (51%) reported getting tinnitus due to 'sudden or prolonged exposure to loud noise/music'. Ineffective use/lack of hearing protection devices was reported as the second most common reason for their tinnitus by 22%.

Professional musicians have identified issues around hearing protection, including accessing and selecting appropriate devices. Additionally, some have also highlighted a lack of education about noise exposure and hearing protection during their music-based education (British Tinnitus Association, 2021)[11].

In the same survey, almost half of the musicians (45%) said that they either 'always' (19%) or 'usually' (26%) wore hearing protection. In contrast, almost a quarter (23%) of the musicians said they 'never' wore hearing protection.

This number drops even further when amateur musicians are surveyed with only 17% of respondents in a 2022 survey who played a musical instrument regularly 'regularly' or 'sometimes' wearing hearing protection (Tinnitus UK, 2023)[12].

Staff

Whether or not artists use hearing protection is a matter for their own risk assessment but in 2008, workers in the music and entertainment sectors became protected from exposure to excessive noise under the Control of Noise at Work Regulations 2005.(HSE, 2008)[13]

Employers are responsible for ensuring that their employees are not exposed to levels of noise that may damage their hearing. Venue managers must assess the noise levels and decide on methods to control the risk. If PPE, such as hearing protection, will be one of those methods then the employer must provide and pay for it.

Attendees

In social environments, there are no rules to protect customers. It is up to customers to make their own judgements and provide their own hearing protection in the same environment as protected employees. However, less than one in four attendees (23%) 'regularly' or 'sometimes' chose to use hearing protection (Tinnitus UK, 2023)[14].

The World Health Organization (WHO) have said that nearly 40% of teenagers and young adults aged 12-35 in middle and high-income countries are exposed to potentially damaging sound levels in venues such as nightclubs and bars. Their recommendation is that such venues should have a maximum average sound level of 100dB. (WHO, 2015)[15]

Reducing risk

The HSE makes it clear that collective protective measures should always be used in preference to personal protective measures. Control of noise should be approached by:

- eliminating the hazard or risk entirely;
- controlling the risk at source;
- reducing the noise as it travels to the people exposed; and
- reducing exposure.

The HSE strongly recommends consulting with a competent acoustician before undertaking a new build or major refurbishment of a venue. However, they also set out in their publication *Sound Advice* (2008) a range of simple and cost-effective actions that can be used by venues to control or reduce exposure to noise following noise risk assessment. These can include room layout and design, use of sound-absorbent panels, acoustic screens and soft furnishings, positioning of monitors, restricting access to certain zones and staff rotation.

The WHO also said that it recommended live monitoring of sound levels and designated quiet zones at venues (WHO, 2015)[15].

Noise exposure at cinemas

Also alarming, due to the nearly universal cinema attendance of the survey respondents, is that fewer than one in eight (12%) use hearing protection when watching a film at the cinema.

This is despite research showing that sound levels in cinema auditoriums can range from 74 to 104dB. At the higher end of the scale, this can cause hearing damage in less than the time for one trailer. This issue was highlighted by film star Hugh Grant, who believed his local cinema was much too loud and "unendurable" (The Observer, 2019)[16].

Dolby (sound system) has traditionally set the volume control at the equivalent of 85dB but also advises that each cinema needs to make adjustments depending on the size of the room and the size of the audience.

Conclusions

Getting a prevention message across is a tough task. None of us like to have it pointed out that our behaviours may be harming our health.

With noise exposure, the situation is complicated by the mixture of legislation and reliance on self-directed behaviours depending on the status of the individual. There is confusion and lack of clarity, which makes it even more important that we talk about the risks to our hearing from everyday noise exposure.

References

1 Cima RFF, Mazurek B, Haider H, et al. A multidisciplinary European guideline for tinnitus: Diagnostics, assessment, and treatment. HNO, (2019) 67(1), 10-42
2 Biswas R, Lugo A, Akeroyd MA, et al. Tinnitus prevalence in Europe: a multi-country cross-sectional population study. The Lancet Regional Health – Europe, (2022) Volume 12 100250
3 Watts EJ, Fackrell K, Smith S, et al. Why is tinnitus a problem? A qualitative analysis of problems reported by tinnitus patients. Trends in Hearing (2018) 22
4 Weidt S, Delsignore A, Meyer M, et al. Which tinnitus-related characteristics affect current health-related quality of life and depression? A cross-sectional cohort study. Psychiatry Research (2016) 237, 114-121
5 Eggermont JJ and Roberts LE. The neuroscience of tinnitus. Trends in Neuroscience (2004). 27 (11), 676-682
6 Ratnayake SA, Jayarajan V and Bartlett J. Could an underlying hearing loss be a significant factor in the handicap caused by tinnitus? Noise Health (2009) 11 (44) 156-160
7 Steinmetz LG, Zeigelboim BS, Lacerda AB, et al. The characteristics of tinnitus in workers exposed to noise. Brazilian Journal of Otorhinolaryngology (2009) 75 (1) 7-14
8 Eggermont JJ. The Neuroscience of Tinnitus (2012)
9 American Tinnitus Association. Understanding the Facts: Demographics (online) (2019)
10 Zhao F, Manchaiah VK, French D and Price S. Music exposure and hearing disorders: An overview. International Journal of Audiology (2010) 49(1), 54-64
11 British Tinnitus Association (now Tinnitus UK), Music to your ears: the impact of tinnitus on professional musicians (2021)
12, 14 Tinnitus UK, A lot to lose: noise exposure and tinnitus (2023)
13 Health and Safety Executive, Sound Advice (HSG260) (2008)
15 World Health Organization, Make Listening Safe (2015)
16 The Observer, Deafening cinema sound is ruining films, claims Hugh Grant (2019)

IOA Working Groups

Many volunteers help to further the field of acoustics by donating their time to the IOA Working Groups, investigating a particular challenge and putting together ideas for improvements. The Working Groups vary in size, but the diversity of each is important for their collective intelligence.

By Angela Lamacraft, Chair of the IOA EDI Working Group

In this article, we provide a summary of some of the IOA Working Groups and Committees in the words of their Chairs.

Equality, Diversity and Inclusion (Chair: Angela Lamacraft)

The Equality, Diversity and Inclusion (EDI) Working Group was set up to review the diversity of the Institute membership and consider how it can be improved by looking at the current composition of the membership and where we needed to focus our efforts. We've discussed EDI at a number of meetings and written several articles and blogs for Acoustics Bulletin and the website. Our next aim is to prepare the IOA's first EDI Strategy, seeing how membership forms can be made more accessible and meetings can be made more inclusive.

Bursary Fund (Chair: Reena Mahtani)

The Bursary Fund has been set up by the IOA to support members wanting to improve their employability skills by retraining in a different field of acoustics or those undertaking STEM activities where funding for props and experiments may be required. The bursary is open to all members, with priority given to those unemployed and students.

Sustainability Design Task Force (Chair: Richard Grove)

The Sustainable Design Task Force (SDTF) was formed in 2015 to drive sustainable design within the acoustics industry. Thec chaired by Peter Rogers, and formed of representation from the IOA's membership, the Task Force established a range of recommendations that were summarised in the Final Report to IOA Council in 2015. Following Inter-Noise 2022 and with the pressing need to address issues around environmental, social and economic sustainability and resilience across all areas of our industry, the SDTF has been rebooted for 2023. It will take the form of a central core with multiple groups engaging with others in the Task Force as well as external stakeholders and advisors to ensure sustainability is woven through each of the existing committees.

The Task Force is now reviewing and implementing the recommendations of the 2015 report to IOA Council, and formulating a refreshed group of broad-minded, enthusiastic people from throughout the acoustics industry to work across disciplines and sectors to achieve a more sustainable future.

Acoustics Engineering Technician Trailblazer Group (Chair: Richard Grove)

In response to a noticeable decrease in numbers of acousticians coming through academia and into the industry, and following the introduction of the apprenticeship levy, the Acoustics Engineering Technician Trailblazer Group was formed by members of the IOA, with the backing of the Association of Noise Consultants (ANC). Richard Grove, Chair of the Trailblazer Group since its inception, contacted the

Government's Institute for Apprenticeships, IfA (now the Institute for Apprenticeships and Technical Education, IfATE) firstly to ratify the Acoustics Engineering Technician Apprenticeship for delivery, and then to develop the Apprenticeship Standard and End Point Assessment Plan in conjunction with the IOA as the End Point Assessment Organisation, which has required further liaison with OfQual. Navigating the various changes in approach by Government as well as a pandemic, the growing Trailblazer Group has been delighted to see the increased interest and enthusiasm for the Apprenticeship, taking in the first cohort at the start of the 2021 academic year and looking forward to an increased uptake by industry for the next intake. As higher education costs continue to be high, the apprenticeship presents a clear pathway for people of all backgrounds and learning styles to engage with the acoustics industry and forge a career, learning while they earn whilst contributing to the resilience of acoustics education and industry.

Parliamentary Liaison Group (Chair: Peter Rogers)

The Parliamentary Liaison Group (PLG) was formed in 2018 by Peter Rogers following a mandate by Council to explore how the IOA engaged with decision-makers on a Parliamentary level. The Group began small and included Colin Grimwood, Stephen Turner and the late Richard Cowell .

Following traction with the Parliamentary and Scientific Committee (PSC) All Party Parliamentary Group and input to a number of other All Party Parliamentary Groups including Healthy Homes and Buildings (HHB) and Net Zero, the PLG made a presentation to the PSC in February 2020 on issues relating to noise, sound and health, having previously given written and oral evidence to the HHB.

The Group remains active and now produces briefing notes for parliamentarians, and with its new direction it aims to inform the public also.

The Group remains focused on delivering the IOA vision to promote acoustics and to do so amongst decision-makers and those who elect them.

STEM Group (Chair: Matt Muirhead)

The IOA STEM Committee oversees the Institute's outreach activities with schools and colleges. It provides strategic direction for the approach taken to engaging young people in acoustics, from liaising with related organisations to creating promotional videos and advertising opportunities to inspire the next generation of acousticians. The Committee creates and curates lesson plans, activities, work experience programmes, and material for members to use when visiting schools and science and careers fairs.

Joining a Working Group or Committee of the IOA is an excellent place to start if you feel like you can help to improve the way the Institute serves your needs or the needs of other, over-looked, members. If you would like to be considered for a Working Group or Committee, please email **ioa@ioa.org.uk** . Remember that the working groups will be richer for being diverse, so please consider volunteering, especially if you feel under-represented.

Insidious hearing degradation – as it happened

This article is a follow-up to a paper *Hearing Degradation – A Personal Account* which I presented at the 2022 IOA Reproduced Sound conference, in Bristol. That paper, in turn, was partly inspired by my remote attendance, the previous March, at an IOA Midlands Branch meeting presentation, titled *Living well with tinnitus? A way to prevent or manage tinnitus*, by Angela Pollard and Colette Bunker, of the British Tinnitus Association (now known as Tinnitus UK[1]).

By Philip Newell FIOA

The Bristol presentation was a report of my own insidiously progressive hearing degradation, and the way in which it had affected my perception while I was primarily working as a designer of recording studios and loudspeaker systems. The many symptoms included presbycusis, tinnitus, loudness recruitment, the perception of non-existent non-linear distortion, and various other perception anomalies.

All forms of reproduced sound are ultimately assessed by people's ears, and even without hearing loss, the perception of sound can be quite variable from person to person, but the gradual loss of your own, personal, fine-tuned references can be alarming if judgements about sound form part of your daily work. It is also clear that the creeping changes tend to be idiosyncratic, with the combinations of different symptoms frequently affecting no two people in exactly the same way. Consequently, what is still often considered to be *normal* hearing, may actually be a long way from the *average* hearing of the general population.

In reality, to some degree, hearing loss seems to begin affecting *most* people as they pass their adult prime, but many professionals who rely upon their ears may be loath to acknowledge any degradation of acuity if they worry that it could undermine the credibility of their opinions. Nevertheless, the insight gained from understanding any new limitations can also open up whole new areas of useful experience of a very practical nature, so why is this so often treated as a taboo subject? Indeed, had I been better informed about what I could have *expected* in terms of my own hearing degradation, many wasteful mistakes could have been avoided.

The first signs of change

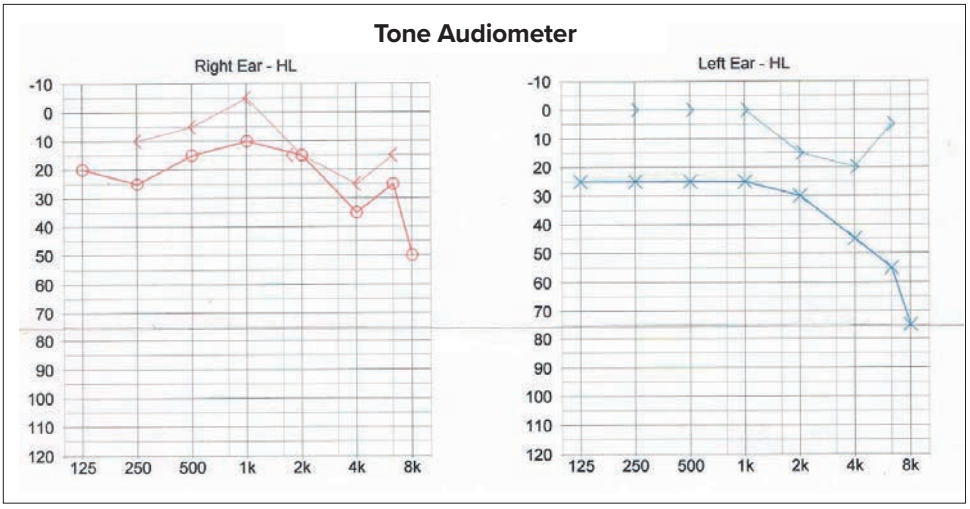
Between the ages of 20 and 40 years old, I spent much of my time working in many recording studios, most of which used analogue tape recorders. These machines were usually aligned each day with the use of reference tapes, having tones at 100 Hz, 1 kHz, 10 kHz and 15 kHz, all recorded at some standard operating level. Regularly hearing these tones provided me with a rough check of the comparison between the perceived loudness of the high frequencies and the lower ones, but by the time that I passed my 40th birthday, digital recording had become the norm, so my exposure to the analogue test-tones became less frequent. However, by that time, my principal occupation had already changed to the design of recording studios and their loudspeaker systems, which could *not* be aligned by simple tones, so once their basic responses had been verified by means of measurements, I had a wide selection of CDs with which to make the final assessments of the tonal balances in the control rooms. Overall, I knew what I was listening for in each individual recording, so if the measurements and the aural assessments corresponded with my expectations, it was a good indication that the system performance could be relied upon for monitoring.

Just prior to me taking part in some extended listening tests of mid-frequency loudspeakers at Southampton University, when I was 40 years old, my hearing was tested in the audiology department in the ISVR. The results showed an essentially 'normal' response up to around 7 kHz, albeit with signs of a gentle roll-off beginning in the 8 kHz band, and a slightly lower low-frequency sensitivity in the left ear, but despite these minor losses of sensitivity, even 10 years later, I had still not noticed any significant changes in my hearing acuity. That is to say, I do not recall noticing any particular changes in the tonal or instrumental balances of my 'reference' CDs, which I thought my experience as a recording engineer would have made obvious had they been present. (Triangles still didn't sound musically deficient to me in orchestral mixes, and cymbals didn't sound to be lacking in the balances of the drum kits.) Like everybody else, I had sometimes experienced hearing deficiencies after having had a cold, or suffered brief periods of threshold shifts after flying, but looking back, it now seems clear to me that some aspects of my 'normal' perception had begun to change more permanently by the time that I was in my mid-to-late 50s.

The diaphragm deception

A significant change became apparent after the owner of a studio contacted me, to request a check of the overall sound balance in a control room, after the original mixing console had been changed for a physically much larger one. I had designed this studio some years earlier, and I knew it very well, but on listening to my usual selection of CDs, the expected 'air' in the sound appeared to be lacking. This is not to say that the music sounded as though the high frequencies were being *attenuated* (and the measurements confirmed they were not), but there seemed to be a sensation of less subjective 'clarity', or 'transparency' in the sound. The effect was not untypical of what I had previously heard in loudspeaker systems whose aluminium high-frequency diaphragms had become fatigued (although this was not easy to measure), but in virtually all such cases, if the diaphragms were at fault, the return of the extra 'life' would become obvious when new diaphragms were installed. However, in the case being discussed here, the high-frequency (HF) loudspeakers were of a beryllium type, which did not usually suffer from such ageing, and the younger people in the studio (who were often the first to point out HF deficiencies) said that they had not noticed anything significantly missing at the treble end of the spectrum.

Despite these observations, I asked for new diaphragms to be ordered, but after they were installed, neither I nor the studio staff heard any change. That is to say, *I* did not hear the improvement that I had expected, and the studio staff thought that the HF sound was still the same as before – with nothing lacking. Fortunately for me, the studio owner decided to keep the new diaphragms in the loudspeakers, and retain the older ones as spares, and I would probably have thought little more about this had I not then visited two more studios shortly afterwards, and noticed a similar characteristic change to the sound of my CDs. As all of the loudspeakers involved were from the same range, I initially suspected that there could be some common problem developing with them, but it was somewhat disconcerting that nobody else in the studios was complaining about the high-frequency sound. Somewhat oddly, other than from loudspeakers, nothing else seemed to sound different to me in the outside world, although, coincidentally or not, it must also have been around this time that I first began to notice sporadic bouts of tinnitus.



Below:
Figure 1:
The state of the author's hearing loss (HL) at the age of 60, said to be within the normal range for his age. The zero level represents normal hearing sensitivity, and the upper traces are the bone-conduction responses

Hearing tests and further shocks

Around the time that I was 60 years old, the general subject of hearing sensitivity arose during a conversation when, along with several younger engineers and assistants (with ages ranging from about 20 to 40 years old), I was installing a newly-developed type of loudspeaker system in a studio. As a result of the discussions about its various characteristics, I suggested that we should all go for hearing tests to a local audiometry clinic, which we did, but the *spread* of our results surprised us all. In the event, no two of us had similar hearing, although the audiometrist insisted that all the deviations were 'within the normal ranges for our ages'. Even so, my own results looked disastrous, which the plots shown in Figure 1 would seem to confirm, but this deterioration must have been increasing gradually over many years, if not decades. Of course, these are measurements of the *thresholds of hearing*, which does *not* mean that all sounds at higher levels seem to have an electrical filter with this curve imposed upon them (which is not the sensation at all), but the plots do also indicate a loss of *overall* sensitivity, as well as the loss of the more subtle high-frequency aspects of many sounds.

Perhaps not unsurprisingly, the sight of those threshold plots immediately led me to doubt my ability to make *any* judgements about sound quality, and from that day forth, I never passed any 'professional' opinions about the high-frequency responses of any loudspeakers. I realised that, by then, what I heard related to me,

and me alone. Then, about five years later, the Spanish Government ran a publicly-funded campaign to test the hearing of the over 60s in the general population, so I took advantage of this invitation, and went to see a clinical audiologist. After further tests, she, also stated that my hearing was 'within the normal limits for my age', but I then asked her, if *my* tests were relatively normal for my age, whether she had ever measured *any man of my age* with what would be considered to be *truly* normal hearing. That is to say, did any of the men of 60 have hearing which would be considered to be normal for a person of 25, but the audiologist's reply was that, if she *did* encounter such a man, it would be a sure sign that he was extra-terrestrial. Interestingly, this prompted a discussion about whether the age-related hearing losses in women were generally as widespread as those in men.

The wall of silence

Later that same year, I wrote an article intended for a very reputable recording industry magazine, in which I referred to the state of my own hearing, but I also questioned some of the frequent claims and opinions made by various 'audiophiles' of my own age and beyond. I found it difficult to accept that many older people could, by listening alone, claim to be able to reliably make a half-dB 'correction' to a recording at 15 kHz, or, irrespective of the frequency content of a signal, judge the stability of phantom centre-images to within one or two degrees. However, the editor flatly refused to publish the article. Only after considerable re-writing did I at least manage to state that my own hearing was far less than perfect, but I was absolutely not allowed to go near the subject of age-related hearing loss in general – *or* the normality of the degradation. It was taboo!

Granted, as the importance of many such musical decisions by audiophiles is ultimately an *artistic* judgement, justifying their claims may not actually be required if they serve their specific purposes. Indeed, we cannot disregard the validity of such subjective assessments, or publicly doubt anyone's competence to make them, but surely, nor can we give them the definitive credence that we are often expected to accept. True, what we can hear *comparatively* may well be more important than hearing in an objectively 'accurate' manner, so experienced judgements may still be very insightful, but research done by Harman still indicates that judgements made by people with even lightly impaired hearing may not be completely reliable – a subject which has been extensively discussed by Toole[2].

Tinnitus

Tinnitus is something which has been variously described as a humming, a whistling, a buzzing, or a hissing sensation which is present 'in the ears' when no such external sound is present. In my own case, it is definitely a multi-toned, high-pitched whistling sensation, with a different tonality in each ear, but severe tinnitus is something which is known to drive some people to absolute despair. Occasionally, I also 'hear' pure-ish tones of short-duration (<10 seconds), perhaps at around 1 kHz, and sometimes quite loudly, but I think that some of the higher pitches that I perceive in the whistling sounds are actually above the frequencies of the tones that I could now hear in the normal way. The tinnitus has crept up on me since my mid-50s, but although it is now always there, fortunately, I don't always notice it in my daily life. Nevertheless, it definitely gets in the way if I am trying to listen critically to a quiet sound, such as bird-song at a distance, and it can noticeably increase in level on seeing certain politicians on television. (I am not joking!) In my own case, the tinnitus tends to be more noticeable at night, and less when I wake up in the morning, so it perhaps also increases with tiredness, but the fact that I also notice it if I am *concentrating* on listening means that no music can now decay into silence, which is sad. What is more, I think it also interferes with my perception of the clarity of other high-frequency sounds.

Loudness recruitment, reflected sounds and processed signals

Also around the time when I reached 60 years of age, in the country where I lived, the switch was made to digital terrestrial television broadcasting, and the analogue transmissions ceased. Many of the hotels that I frequented at that time had rapidly begun to remove their older televisions, and install flat-screen 'digital-ready' models in the rooms, most of which had loudspeakers on the rear. As the majority of these new televisions were mounted on or close to the walls, the sound could only radiate into the rooms by reflecting from the surface behind them, and by diffracting around the edges of the screens, so there was no direct sound-path to my ears. I will never be sure whether the difficulties which I subsequently suffered with the general intelligibility of dialogue from these televisions was a result of my age, or due to the lack of a direct sound path, but I noticed a sudden and significant degradation in my understanding of the dialogue. Furthermore, I also began to notice that I was having more difficulty understanding the lower level dialogue in the programmes, especially when people were speaking softly for dramatic effect.

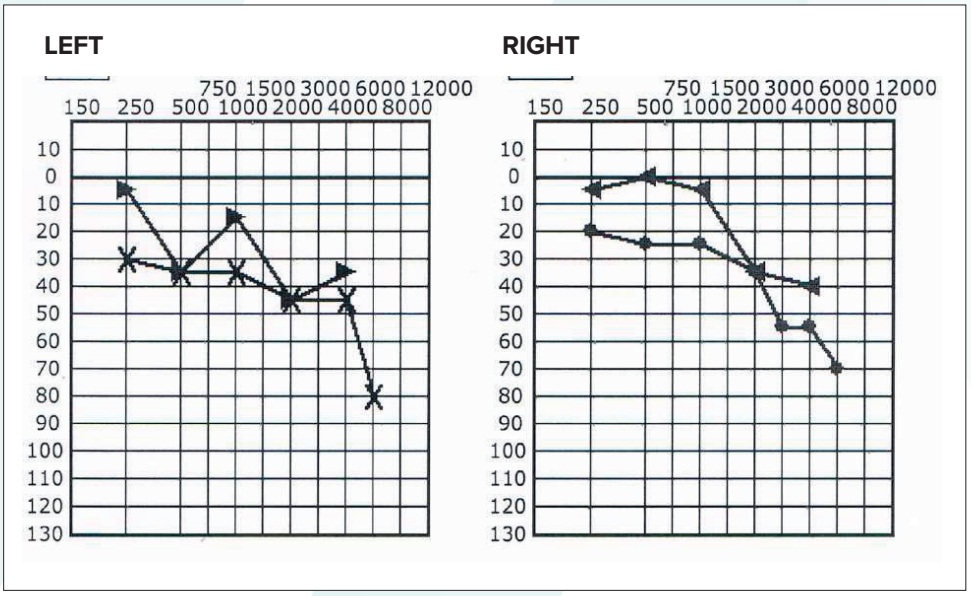
In fact, with some particular *series* of programmes, the general dialogue was becoming harder for me to understand than in various other series, although younger people who may have been listening with me usually said that they at least *understood* what was being said in most of the programmes, even if they agreed that the sound quality was not great. To me, the voices of certain actors were also beginning to exhibit a type of dynamic expansion, almost like listening through a loudspeaker with some hi-Q equalisation applied, and at times, voices could also sound downwardly expanded, thus suppressing some of their subtler characteristics. 'Is this what is meant by loudness recruitment?' I wondered, because it was a subject that I had *heard* about, even if I had never previously experienced it. Once again, though, my younger friends and relatives did not seem to be experiencing the same effects.

Soon after the wider proliferation of the televisions with rear-facing loudspeakers, I noticed that the addition of forward-facing 'sound-bars' could significantly help me to understand the dialogue, but I was concurrently also having more difficulty understanding conversations in reverberant surroundings. My conclusion P28

was that it was the *reflected* sound that was becoming an obstacle to intelligibility for me, because I still seemed to be able to understand low-level dialogue in acoustically 'dry' rooms – or outside – as long as there was not too much background noise. Evidently, for me, the spatial discrimination ability of the 'cocktail party effect' was diminishing, but whether this was more of a cognitive function than an audiological one, I had no idea. However, concurrently, landline telephone conversations were seemingly becoming less 'taxing of the brain' than conversations via many (albeit not all) mobile phones, so I also wondered if data compression could be behind some of this. Indeed, when listening to the radio through good quality loudspeakers, the dialogue tended to remain far more intelligible than through inferior loudspeakers, even without elevating the level, so it was becoming clear that my difficulties with general intelligibility were much more pronounced with poorer quality and highly processed sounds.

Non-linear distortion

A further effect that began to occur during my mid-60s was the perception of some forms of non-linear distortion, or sometimes high pitched rattling sounds, which other people seemed not to be noticing in loudspeaker reproduction. I wondered if some non-linearity products from the loudspeakers were somehow clashing with the tinnitus frequencies, or whether it could be that the low-pass roll-off of my hearing was resulting in me perceiving 'unnatural' harmonic structures that would have sounded more natural had I been able to actually hear the higher frequencies in the reproduction. Either way, something was clearly not right, but strangely, it seemed that I did not perceive this type of sound when listening to acoustic instruments at similar sound levels to their reproduction via loudspeakers. Unfortunately though, I don't ever recall being pre-warned that this type of perceived distortion was likely to occur with advancing age, so I had never even imagined it. Only after experiencing the problem did I discover that literature existed which referred to it [e.g reference 2, Ch 17].



Above: Figure 2: Left and right ear responses (Xs and dots respectively) in 70th year. The age-related neuro-sensorial loss is still considered to be 'light'

Consequences

By the age of 70, it was patently evident to me that although I could still *enjoy listening* to music, without much noticeable detriment at all, it had been at least a decade since I could accurately assess either the timbral balances, the dynamic responses, or the non-linear aspects of loudspeakers. The threshold sensitivity of my hearing had also deteriorated further, as shown in Figure 2. Despite this, the audiometrists *still* considered my hearing-loss to be 'light', because it did not significantly affect me going about my daily domestic life, so it was not considered to be a medical issue.

'Professionally speaking', I know that I now simply hear what I hear in the way that I hear it, in which case, I cannot make reliable judgements about how anything would sound to the average person of 30 or below. The different combinations of the degradations have also made the perceived losses very programme dependent. I now have significant difficulty in *understanding* digitally-disguised voices, even though I can actually *hear* them quite clearly. In effect, they become more like noises than speech, but also in a more general way, the less natural a voice sounds, the greater the difficulty I can have in understanding it. Whether this is a result of reduced hearing sensitivity, reduced frequency-discrimination due to hair cell damage/aging in my inner ear, or reduced processing power in my brain, I still do not know, but the quality issue might be more wide-ranging than I had previously thought.

It may appear to be 'obvious' that compressing the dynamic range of speech would allow for a higher L_{eq}, and a consequent increase in the speech-to-noise ratio for public address systems, but Leembruggen noted that in noisy environments, tests had indicated that the subjective intelligibility can be higher *without* compression, seemingly because the compression degrades the natural modulations that may be critical for intelligibility[3]. So, if hearing acuity is compromised, does *quality* actually trump quantity?

Summary and further comments

I knew for many years about the *existence* of some of the consequences of hearing loss, but it was not until I suffered from them myself (albeit only 'officially' lightly) that I could begin to understand their true implications. Almost without doubt, even though many younger people may also suffer from various degrees of hearing loss, a *very significant* proportion of audiences consisting of people with a wide range of ages will be suffering from significant degrees of hearing loss. It therefore needs to be remembered that what we consider to be 'normal' hearing is not likely to be possessed by much more than half of any general audience, so if everything is referenced to *normal* hearing, such as in the mixing of television programmes or cinema soundtracks, it will automatically tend to lead to perceptual

difficulties for a large proportion of the listeners.

In recent years, and in recognition of the general intelligibility issue with many entertainment programmes, a group of broadcasting and media companies initiated a research programme to look into ways to make it easier for 'hearing-impaired' listeners to adjust the relative levels of the dialogue, music, and effects 'stems' of their programmes, so that people experiencing difficulties with the intelligibility could render the dialogue more exposed. I participated in some tests in 2019, and the benefits of such a system were obvious. The general outline of the project is described in reference[4], but upon arrival, each person taking part in the intelligibility experiments was subjected to quite a complex set of wide-ranging tests of their hearing acuity.

The people taking part in the experiments were either over 65, or younger if they suffered from any significant hearing loss. After passing through the whole process myself, I asked the people performing the audiometry if they, personally, had ever measured anyone over 60 without any seemingly age-related losses, but after some deliberation, they said that they had not. Of course, this does not mean that none exist, but the finding did chime with the 'extra-terrestrial' comment made earlier in this article. Effectively, my situation was still 'normal for my age', so in spite of me having worked in the music industry for most of my life, the normality of my own situation would suggest that the loss had no particular link to my work. Surely therefore, this whole subject of hearing loss amongst audio and acoustics professionals needs to become far more openly discussable, because beyond a certain age, the problems seem to be far more common than they are exceptional.

Another thing that I have noticed with my own hearing degradation is that I need to put more concentration into listening to anything which is *marginal* in terms of intelligibility. As a result of this, it becomes difficult to listen to a programme and simultaneously respond to comments from whosoever I may be watching it with, because the effort going into concentrating on either one seems to leave insufficient capacity to fully concentrate on the other. What is more, I also miss a lot of 'throw-away', or 'off the cuff' comments, whether they be in the programmes themselves, or from the people alongside me. Subtitles often don't help much with the intelligibility of dialogue, either, because I cannot concentrate on the subtitles while both watching the action on the screen *and* listening. Granted, I was never the fastest reader, but it does now seem that the subtitles often remain on the screens for nowhere near long enough for me to read them, so missing a few casual comments often seems to be a better option than missing most of the action on the screen whilst trying to read only the first half of a subtitle. P30

A request

During the presentation of the paper on which this article is based, I asked the audience of 60 or 70 audio and acoustics professionals if any of them were previously aware of *all* the symptoms that I had discussed, but none of them apparently were. Some were aware of some aspects, and some were aware of others. Some people had also experienced some of the symptoms themselves, but during subsequent conversations, it seemed that others were only beginning to recognise their problems after I had mentioned them. So why, we wondered, was the acoustics press so sparse in its discussion of incipient phases of progressive hearing loss. To know more about the likely symptoms would not only help people to recognise them early, but it could also take away much of the dread of them occurring. Sharing an awareness of the breadth and depth of the problems of others would clearly benefit many professionals, even if they did not (yet) suffer from the problems themselves, and particularly if they are involved in the provision of sound at events which are to be comprehensively enjoyed by more general audiences.

It would surely be beneficial if various specialists in audiology could be encouraged to contribute articles to journals such as *Acoustics Bulletin*, or to make presentations at acoustics conferences, to explain not only the mechanisms behind the individual changes in audible perception with age, but also to discuss the expected ramifications. And here, I am not referring to articles relating to the usual 'health and safety' aspects of hearing loss, or of 'clinically significant' hearing loss, but more to the subtle aspects of the otologically 'light' hearing loss which might have a significant bearing on the daily work of audio and acoustic professionals. In the aforementioned presentation in Bristol, many of the audience seemed to think that such presentations would be very welcome indeed. and indeed, it is somewhat ironic that the beginnings of the typical age-related losses will often start to become noticeable just around the age when many audio specialists are reaching their peak professional potential.

References

1 **https://tinnitus.org.uk/**
2 Floyd E. Toole, 'Sound Reproduction – the acoustics and psychoacoustics of loudspeakers and rooms, Third Edition', Focal Press (Routledge) (2018).
3 Glenn Leembruggen, 'Another look at the relationships between frequency response and the speech transmission index, with respect to word scores and road tunnels – part 2', Acoustics Bulletin, Institute of Acoustics (Vol 48, no 5 (September/October 2022).
4 Lauren Ward, Ben Shirley, Bill Davies, 'Development and preliminary results of the University of Salford media accessibility and hearing impairment database (U-SAID)', Proceedings of the Institute of Acoustics, Vol 40, part 4 (November 2018) [Footer incorrectly shows Vol. 39. Pt.1 2017].

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Researching the complexity of people's sound exposure

Charlotte Clark says that the UK is overdue a large-scale study assessing mental health, wellbeing and quality of life impacts for different noise sources to inform policy, assessments, and mitigation.

By Charlotte Clark, Institute Director and Professor of Environmental Epidemiology, Population Health Research Institute at St George's, University of London

Nearly every research presentation will, near the end, include the phrase 'more research is needed'. The intention is often a plea for 'further funding'.

Having returned to academia from consultancy two years ago, I've been reflecting on how the research community can best support policy-makers, stakeholders, communities and consultants dealing with noise effects on health. Imagining, unlimited funding, oh, ok, let's be realistic then, just a little bit of cash, what do I think are the key research needs regarding noise effects on health?

The Noise Policy Statement for England sets out the vision to *"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"*. In this context, primary research evidence is used in various ways including:

- to set adverse effect levels for assessments;
- to estimate noise and health impacts on affected populations;
- to monetise noise impacts on health using the Government's Transport Analysis Guidance; and
- to inform the provision of mitigation (e.g. noise barriers; home insulation).

Key limitations to the existing evidence includes the lack of studies for the UK context; the lack of studies on some specific noise sources (e.g. railway noise, wind turbine noise), which means evidence has to be 'borrowed' from a different noise source or is based on older evidence; the lack of studies for some specific health outcomes (e.g. mental health; wellbeing; quality of life; birth outcomes, neurological outcomes; metabolic outcomes; cancer); and the lack of studies able to track the effect of noise on the development of ill-health or across longer periods of the life course.

Where evidence is unavailable it may mean that important health outcomes are not included in an assessment; that out-of-date exposure-response functions or functions from other countries may be used to estimate the effects of noise on the health outcome; and that vulnerabilities across settings (e.g. home, school, neighbourhood) P34

Top: Annoyance and sleep disturbance are often the most prevalent community response in a population exposed to transportation noise

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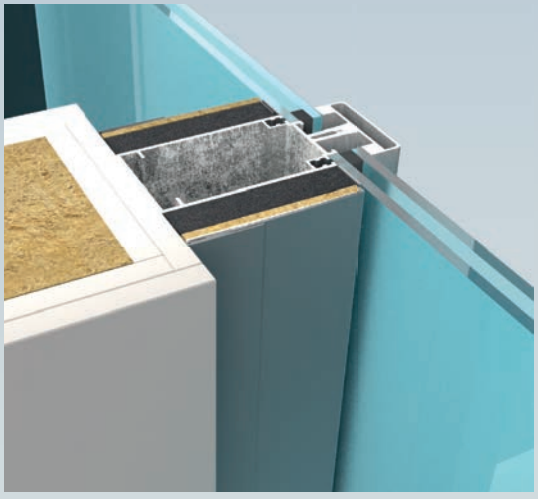

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and groups within the population are not considered. This means that the public health impacts of noise are not being robustly, accurately or equitably estimated.

Regular, repeated population surveys needed

Annoyance and sleep disturbance are often the most prevalent community response in a population exposed to transportation noise. However, the UK has no up-to-date exposure-response functions estimating the effect of road traffic noise and railway noise on annoyance or sleep disturbance. Given the trend to build residential dwellings on land near to railways and roads, and the high prevalence of road traffic noise exposure in the general population, there is a need to establish these relationships to inform the government's TAG, infrastructure development and other UK policy. The UK also needs to track trends in these relationships over time by running regular, repeated population surveys and understand the role of non-acoustic factors: that is factors such as interference with activities, ability to cope, noise sensitivity, expectations, anger, perceived fairness, attitudes to the source which potentially influence the effects of noise on health.

> "The public health impacts of noise are not being robustly, accurately or equitably estimated."

Another health outcome that has been overlooked, are the effects of transportation noise (aircraft, road traffic, railway) on mental health, wellbeing and quality of life. Whilst the Noise Policy Statement for England mentions 'quality of life' few studies examine quality of life as an outcome. Alongside annoyance, these types of effects are of key concern to local communities exposed to noise. The lack of evidence means that these outcomes are not included in assessments. The UK is overdue a large-scale study assessing mental health, wellbeing and quality of life impacts for different noise sources to inform policy, assessments, and mitigation.

Recognising the health effects of combined exposures

Two types of studies of 'change' in noise exposure are needed. We need studies examining the effect of a change in noise exposure on a range of health outcome to inform infrastructure development and, for example, airspace change. P36

Below: Neighbour noise remains an under-researched and challenging field

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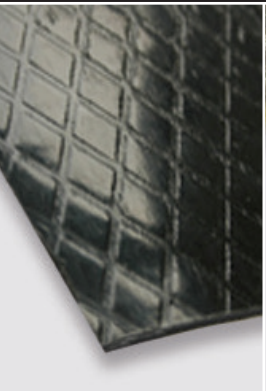
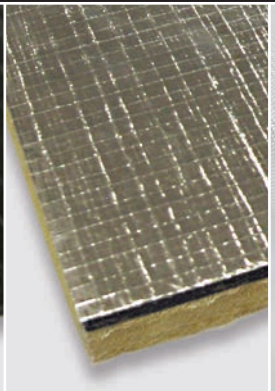

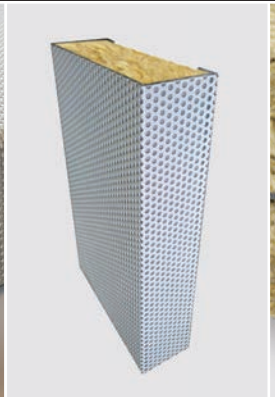

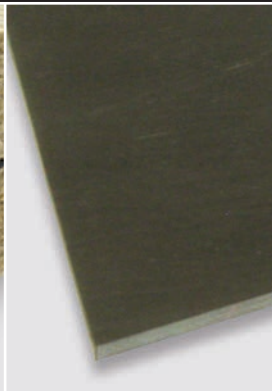

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This should include populations who are also 'newly exposed to noise'. Studies from other countries suggest that health effects can be larger than estimated from standard 'steady-state' exposure-response functions. We need to develop understanding of these effects for the UK context for all types of transportation noise to ensure we are offering communities the correct mitigation. Secondly, we need intervention studies that quantify the health effects of interventions to reduce noise exposure. We need to develop evidence about how mitigation measures reduce the adverse effects of noise on health and quality of life. Society needs to know if the money invested is being spent on mitigation that reduces the health effects of noise. Hopefully, in the next decade these types of studies will be funded across a range of noise sources using comparable methods, so that we can build up knowledge across studies in a timely manner.

Internationally, most evidence still relates to single noise sources, which does not reflect the complexity of many people's sound exposure. We need to build knowledge about the health effects of combined exposures, quantifying health effects beyond single sources. There is also increasing interest on how ambient noise might alter the effect of a single noise source on health and quality of life. There is also a need for the health community to work more closely with economists to examine the cost-benefits of health effects of noise alongside economic assessment of the noise source. The health and economic arguments for protecting public health need to be brought together. There is also a need for noise and health researchers to work alongside colleagues to develop further knowledge about the health effects of positive soundscapes.

Maintain pressure on funders to develop knowledge for the UK

We should also not forget other noise sources which are currently under the radar. Research is developing examining the potential effects of noise from drones and urban air mobility on health, wellbeing and quality of life. This is a key opportunity to build in knowledge about potential effects on wellbeing into the design process. Neighbour noise remains an under-researched and challenging field given the wide variation in housing quality, age of housing, building regulations, age of residents and activity patterns within the UK population. The research community needs to come together with government and stakeholders to develop a road map for developing research to inform policy in this area. Neighbour noise is perceived to be a large source of stress for some individuals.

Above:
We need to build knowledge about the health effects of combined exposures, quantifying health effects beyond single sources

Existing funding for research in noise and health, whilst limited, comes from various agencies including government, research councils, and industry. However, a sea-change in approach would be required to deliver the research needs described above, particularly in a timely manner. We need to keep up pressure on funders to develop knowledge for the UK. In particular, cross-research council funding initiatives would be a great benefit, as noise and health research falls across the environmental, health, economic, and social remits of UK Research and Innovation (UKRI).

About the author:
Charlotte is a psychologist and environmental epidemiologist with more than 20 years' experience of researching the effects of environmental noise on health in academia and consultancy. She is Secretary of the International Commission on Biological Effects of Noise and a member of the Environmental Sustainability Panel for the Civil Aviation Authority. She has advised the World Health Organization, DEFRA and the UK Airport Commission, as well as large infrastructure projects (Heathrow Expansion) on the effects of noise on health.

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WAVing or drowning?

A history of audio recording for measurement.

By John Shelton, AcSoft Group, Chair of IOA M&I Committee

Sometimes it's difficult to keep up with the innovations in noise and vibration technology, and over the past 50 years or so, we have moved from van-sized analogue analysers to hand-held multi-function digital devices.

A large part of these developments has been down to parallel developments in much larger markets such as computing and studio recording, but our specialised manufacturers have been happy to hitch a ride.

In the early days, if a detailed analysis of the sound or vibration was required, it often meant using a magnetic tape recording to save the signal from the transducer, which could then be replayed through a laboratory-based analysis system. Basic measurements could be done live, using the ubiquitous green sound level meters with moving coil metering, but the AC output of the meter was always put to good use.

A commonly used recorder was the Nagra IV-SJ, which in later incarnations could actually be used as a Type 1 sound level meter with the included life support for a condenser microphone and cathode follower.

The application of the recording was to make frequency analyses of the signal, using serial filter analysis, either in 1/3 octaves or narrow band. If the measured signal was stationary, then it was simply a case of recording enough tape to allow the analyser to run through its filters, linked to a paper chart recorder.

However, if analysis of transients was required (sonic booms and other big bangs were of great interest at the time!), then it became necessary to record the event, and then create a tape loop so the signal could be fed through again and again until the analysis was complete.

Newer recorders were based on FM techniques, which extended the frequency response down to DC, essential for correct phase measurement in transients and low frequency vibration.

Ultimately, the digital world arrived with the possibility of a solid state digital recorders, acquiring up to a mighty 10,000 samples with 8bit resolution to RAM memory, which could then be output to the same analogue analysers, or even the new-fangled FFT analysers.

Tape recorders also found a large application in local authorities, where it became commonplace to record noise nuisances as well as measurement data, so the signal could be played back for evidential purposes. A popular machine at the time was the affordable Uher 4000, which was also a staple of the newspaper reporters of the time.

Calibration (1)

If sensible analysis is to be done from a tape recording, it's essential to have some method of calibrating the subsequent analysis. Then, as now, the process is simply recording a signal from a portable calibrator attached to the recording front end, so the analysis can be set up when the signal is replayed.

This opened up many gotchas, such as what happens when the gain of the sound level meter is changed after calibration? Is the dynamic range of the tape recorder optimised to the measuring range of the sound level meter? Is the dynamic range of the analysis system adequately aligned to the range of the tape recorder?

Nothing changes, and we still have to be aware of what can go wrong when recording/analysis is done. We will come back to the calibration issue later.

Digital recording

With the advent of analogue to digital conversion, the studio recording market quickly adopted new techniques offering more stability, performance and convenience to the recording process. It now became possible to record audio signals with high sample rates (e.g. 48kHz), and large bit depths (e.g. 16bit) on to (initially) magnetic tape, and ultimately computer hard drives. In order to cope with the high throughput of data, special interfaces were developed, such as SCSI, and hard drives were rated as suitable for audio according to their write speeds.

The digital recorders of the time often used their own proprietary operating systems, software and file formats, reducing the interoperability of hardware and portability of files.

At around the same time, the personal computer was born, resulting in wider use of open file formats for signal recording. The progenitors of the PC, IBM, and the hot-shot software developers at Microsoft agreed on a P40

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standard file format for computer based recordings – enter the WAV file format, based on an existing open RIFF format. We were at last being exposed to the bings and bongs of PCs, as we made errors or stored data, all generated by short 8bit, 22kHz WAV files.

The advent of Windows made PCs ubiquitous, although being interrupt driven, they weren't best suited to recording and playback of signals without drop-outs or glitches, so any software had to be written to include careful buffering of data.

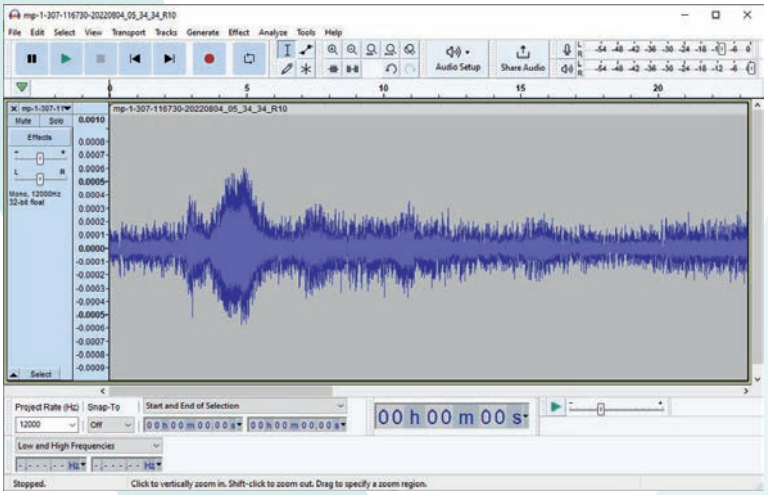
Audio recording in measurements

Digital recording for measurements started to become a reality with portable digital recorders such as Digital Audio Tape (DAT) and portable notebook PCs. The DAT recorder, such as the Sony D7, was almost ubiquitous in the local authority market, replacing the Uhers, and a side shoot of this was the rise of the noise nuisance recorder, with a variety of droll names such as Matron, Marvin, Night Nurse, etc. The idea was to install a DAT recorder (with a suitable SLM or front end) in a complainant's premises, and give them a push button to start the recording when the annoyance occurred. Some amusing moments were also recorded, but essentially the date/time stamping of the digital recording made excellent evidence before the magistrate.

The use of portable computers for noise measurements was also developed, where, as well as noise measurements often to Type 1 accuracy (IEC 651/804), recordings could be made to disk in WAV format, as a function of trigger or manual control. The file could then be played back, or analysed through digital post-processing using filters or FFT. The only downside was portability, battery life and potential storage limit, with hard drives being considered 'large' at 270MB!

In the laboratory, some systems were developed purely for recording and analysis, where signals were recorded for later real-time editing and playback for sound quality purposes, sometimes along with RPM-related analyses. This is now standard stuff in the automotive sector for example.

Right:
Recording opened in Audacity software



Whither WAV?

The WAV file format has endured as a very flexible container for audio data and now can handle multiple channels, various bit depths (24bit now being common) and many sample rates. The format is essentially a string of binary values, with levels ranging from 1 to 2^{24} across the dynamic range of the system. There is also a header 'chunk' which contains information about the string, as well as plenty of opportunity to insert additional data, often referred to as metadata.

In the multimedia/studio sector, this is now used for music files, so the INFO chunk can contain details of the artist, year, track name, album, etc – you will see these if you ever open a music file on a computer, or play them back on your music system.

Keeping this data in the header chunk means that the file is also usable for any application that has no use for it, and can be ignored. However, it also means that it can be used by an instrumentation manufacturer to add the all-important calibration data and other information as necessary.

Unfortunately, there is no real standardisation of where this information is stored, so calibration data stored by one system may not be readable by downstream software from another maker. We don't want to make it too easy!

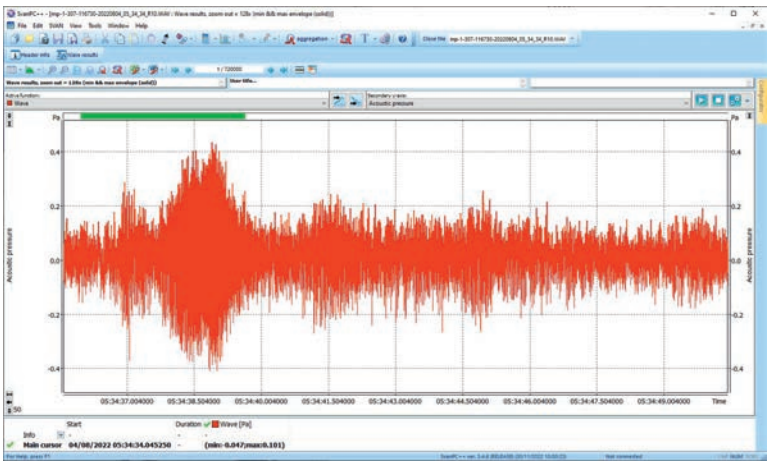
To illustrate this, we can see a recording opened in the popular free software 'Audacity', and we can see the waveform (some traffic noise) recorded in one channel, with a sample rate of 12kHz and 24bit.

The vertical scale has been expanded so we can see the signal has a range of about +/-0.0005 'things'. The full scale level of the file is +/-1 'thing', which has been subdivided into 2^{24} levels.

The software allows users to tweak the signal with a variety of tools, and even do a frequency analysis, as well as playback of course.

However, because the calibration field in the header is not readable by Audacity (and why should it be?), we can't scale the signal with physical units.

If we open the file in some sound and vibration analysis software, then we have the following: P42



Right:
File opened in sound and vibration analysis software

Note that the Y-axis is now calibrated in physical units (Pa), so the header knows what the full scale level is, and what units are being used. Additionally in the header, you will also find the instrument type, the serial number, the recording settings, and measurement range. In short, everything you need to make a correct downstream analysis.

One downside of the WAV format at present is the file size limitation of around 4GB owing to the 32bit container, but you can play tricks and break up the recording if needed.

Compression

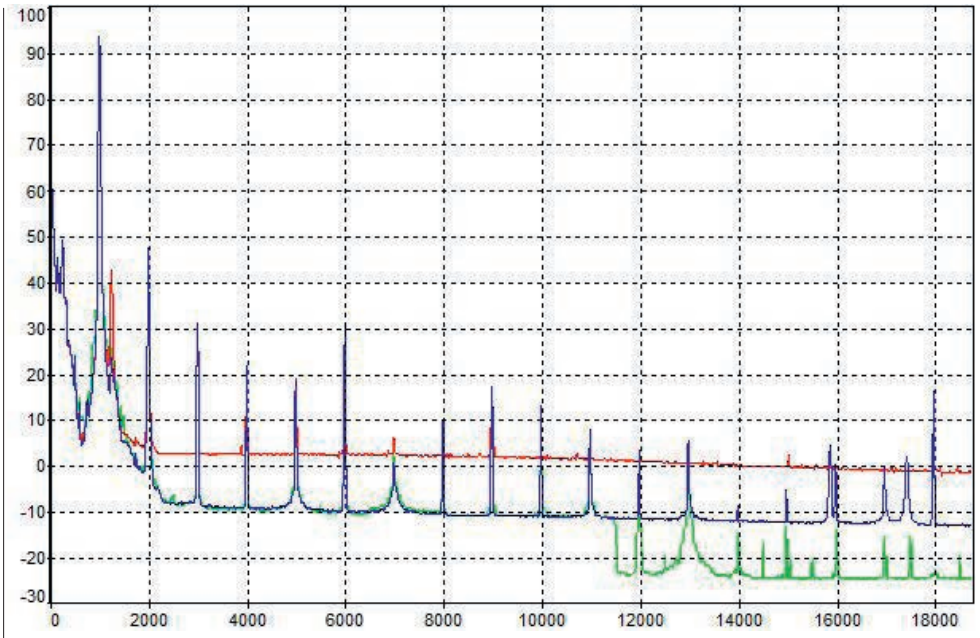
WAV recording is uncompressed, so the output of the A/D converter is written directly into the binary stream with no change. This is ideal for downstream analysis, but can be rather wasteful on storage space. This was certainly a problem in the early days of both PCs and the internet, so compression techniques were developed to reduce the file size. There are lossy and lossless methods, the former includes MP3 format, the latter includes FLAC format.

MP3 was developed as a way of removing all the features of the signal that we can't hear anyway, due to masking and psychoacoustic effects, so it makes it ideal for music playback, where, depending on the amount of compression (bitrate), the music can be practically indistinguishable from the uncompressed version (being a dyed in the wool audiophile, I would disagree of course). But the drastically reduced file size makes the music more portable and downloadable. Again, the metadata is included, as with the WAV file.

FLAC is an open source format which compresses the file without losses, similar to ZIP compression. This means the original file can be reconstructed without loss, with a little bit of processing overhead when playing back. The header also has additional fields for e.g. album covers and the like.

Clearly for instrumentation purposes, lossy compression is not acceptable, although an IOA paper I presented back in 1999 illustrated that the errors depend on the type of signal, the level of compression and the type of analysis.

For example, if we take a 1kHz calibration tone, and compress it to MP3 with two bitrates of 64 and 128, the FFT spectra look as follows:

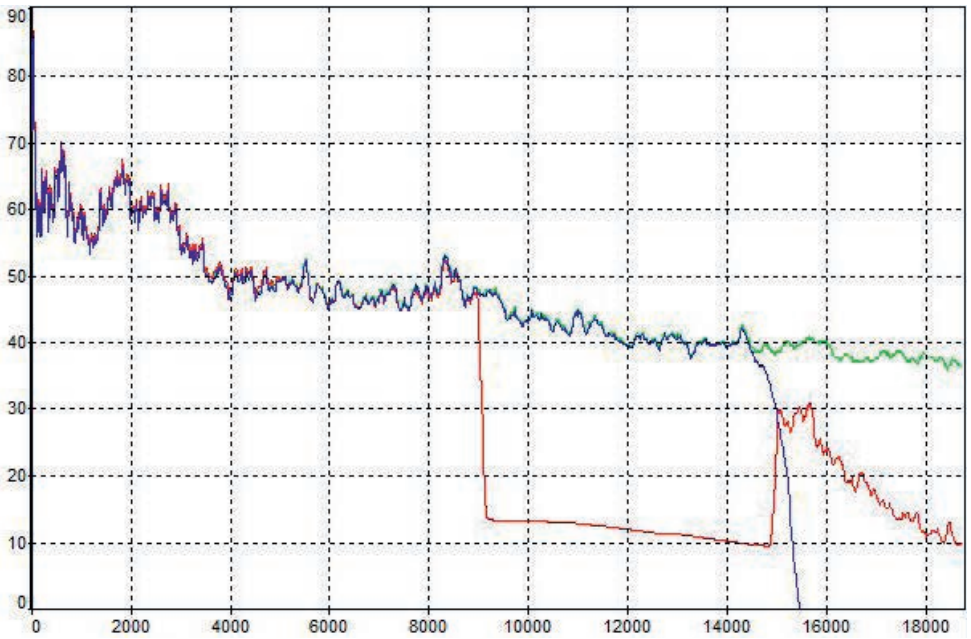


You can see that in the 'pass-band', the agreement is quite good, but where there are signals masked out, then the compression comes into play.

For a real signal such as a diesel engine, the results are similar

Again the agreement at low frequencies is quite good, but there are some strange effects higher up.

For measurement purposes, we can't use a format which modifies the data in an unpredictable way, so lossless is essential.



All is not lost for MP3 however. It's very portable, smaller, and excellent for source identification and evidential purposes. After all, if it sounds like a plane, it probably is not Superman.

You can find more information on this subject in Steve Cawser's 2013 Instrumentation Corner article, downloadable at **https://bit.ly/3zrNq3y**

WAV files and standards

These days, WAV files are created and stored in the same device you are using for measurements – many sound level meters have an audio recording function. In this case, the digital audio stream is tapped off just after the A/D converter and stored to a file. This means the data is coming through the same measurement front end that is being used for your sound level data.

Many assume this is good enough to be able to say that any subsequent analysis will 'meet Class 1 to IEC 61672'.

Be very careful with this. IEC 61672 is a standard which defines the performance of a sound level meter and must be considered in its entirety. Recording a WAV file, and analysing it is not strictly a sound level meter. Yes, with a lot of care, you could run the process through the IEC 61672-3 tests, and maybe get the same result, but it's not a sound level meter.

This was one of the reasons for the revision of the SLM standard from IEC 651/804. Too many were picking and choosing parts of the standard to claim compliance. The phrase 'meets the relevant parts of IEC651/804 to Type 1' was becoming commonplace. The current standard is a catch all. Your system either meets all of the standard or nothing.

WAV file playback

These days, WAV is so ubiquitous that playback is trivial. However, there are some catches. If the file has been created on a sound level meter, which may have a 24bit resolution, the meter will have been designed to cover the total range of, say, 25-135dB. When we record a WAV file, we are probably interested in low level noise, say around 40dBA or so. Bear in mind that this is a long way down the range of samples in the file. If we then play the signal through your PC, we may hear nothing at all!

Therefore digital gain can be a useful thing, i.e. the samples can be 'moved' to a more compatible range for playback. Take the example of Audacity above where the highest samples are 0.5 millithings. Some software can do this correction automatically.

Calibration

What happens if we don't have calibration information? The same applies for the tape recorders above. Unless you know what physical level the most significant bit in the file corresponds to, you will need to record a calibration tone as a file and make a note of any subsequent range changes.

What sample rate do I need?

The Nyquist criterion applies here. The sample rate should be at least 2.56 times the highest frequency of interest. In practice, if you want to analyse the 20kHz 1/3 octave band (including its upper skirt), then 51.2kHz sampling is ideal, 48kHz acceptable.

How long a signal do I need?

As Montgomery Scott was wont to say, 'I cannae break the laws of physics'. The length of file will depend on how low in frequency you wish to go, and the bandwidth of any frequency analysis. The law is that the product of bandwidth and time cannot be less than unity (BT>1), and that's for specific deterministic signals. For real-world signals, the BT product needs to be around 400 for a reasonable measurement uncertainty. Let's say I need the 20Hz 1/3 octave band. The bandwidth of this filter is around 4.6Hz, so you'll need a good length of recording, and a stationary signal to get close to the right value. The same also applies to constant bandwidth analysis such as DFT. The more resolution, the longer the signal required.

Applications

We have seen that the main applications of WAV recording are to augment, rather than replace, fundamental measurements. They can be used for further downstream analysis, to provide data which was unavailable at the time of measurement, or requires more intensive processing, such as psychoacoustic or tonal/AM calculations. It also becomes possible to re-analyse the file with different time and frequency weightings, outwith the constraints of the SLM standards.

There is also an application for compressed files, where noise sources can be illustrated by listening, or, more recently, 'Shazam' type applications are evolving to allow automatic identification of noise sources using AI for example. The reduced file size makes MP3 ideal for fast upload to online servers for identification. This is discussed in another Instrumentation Corner 2022 article from Paul McDonald at **https://bit.ly/42StBQx** in the context of machine learning.

Conclusion

Hopefully, I have illustrated some of the history and technologies in audio recording technology for measurement purposes, and shown that with care, good acquisition and post-processing is possible and useful.

Current parliamentary and policy news

The IOA Parliamentary Liaison Group (PLG) is continuing to work to raise the profile of the importance of acousticians with politicians and policy makers.

With the House of Lords taking evidence on noise and health, the Welsh Government introducing ground-breaking measures on soundscape, and the launch of Gym Acoustics Guidance, IOA has had plenty of opportunities to promote the work of acousticians in recent weeks.

IOA gives evidence at House of Lords noise inquiry

The House of Lords Science and Technology Committee enquiry into the effects of noise on human health has given acousticians an opportunity to give in-person evidence in the House of Lords. At an hour long evidence session in March that focused on policy, a panel comprising Stephen Turner, Immediate Past President; Peter Rogers, Chair of the Parliamentary Liaison Group; and Paul McCullough and Somayya Yaqub, both members of CIEH, answered questions from the committee. When asked how they thought noise is currently prioritised in policy – answers ranged from five to seven out of 10. Stephen Turner expressed the view that environmental noise impacts are well accounted for in transport planning, however, all panel members identified gaps in the planning process when it comes to housing. They explained to the committee that current policy tackles noise through insulation, rather using good design to reduce the likelihood of noise problems arising in the first place. Peter Rogers spoke about the importance of acoustic design interventions at planning stage to create vibrant, sustainable and liveable spaces. The CIEH representatives raised the need for more research on balancing noise impacts of renewable technologies like air source heat pumps, and for all disciplines to work together to find sensitive solutions in developing sustainable housing.

When asked to summarise policy needs, CIEH representatives asked for more specialist noise practitioners in local authorities, a rethink of permitted development rights which are causing problems between neighbours, and a quicker method for resolving noise complaints.

IOA representatives raised the current omission of noise from overarching government environmental policy like the 25 year Environment Plan. They suggested that a sound and noise management strategy should be developed, which would raise the profile of noise across government and make acoustics more likely to be considered at early stages of policy development. In addition; an All Party Parliamentary Group covering noise and health, would enable noise practitioners to more effectively bring emerging issues to the attention of government.

Watch the full session on Parliament TV here: **https://www.parliamentlive.tv/Event/Index/c518f605-9151-41a8-a8a0-19f87e8b5a78**

Welsh Parliament acknowledges IOA input to draft soundscape strategy

The Environment (Air Quality and Soundscapes) (Wales) Bill 2023 has now been introduced in the Welsh Parliament. The Bill proposes an obligation to introduce a national soundscapes strategy, making Wales the first UK nation to do this. The strategy, when introduced, must include policies for assessing and reducing levels of noise pollution. By including soundscapes within this Bill, the Welsh Government is following their objective to work to align noise, soundscape and air quality policy.

The IOA had responded to the consultation on the Bill, welcoming the recognition by Wales of the importance of considering the quality of soundscapes in the places we live, work and play as part of the need to continue efforts to control noise pollution. Alongside air pollution, noise is an important environmental factor impacting human health and wellbeing. This reflects an awareness of the growing evidence that sound affects people's connection to place, how we benefit from the sounds of the nature around us and how acoustics needs to be considered in creating and maintaining healthy urban and rural environments.

The Welsh Parliament's Climate Change, Environment and Infrastructure Committee launched a call for written evidence on the general principles of the Bill and the need for legislation to deliver the stated policy intention. Soundscape was the subject of discussion at an evidence session on 29 March, during which the contribution of IOA during drafting of the Bill is mentioned, and the concept of soundscape explored by committee members.

Watch the session here **https://business.senedd.wales/ieListDocuments.aspx?CId=741&MId=13235&Ver=4**

(The soundscape discussion starts at 1h 42 minutes).

Track progress of the Bill here **https://business.senedd.wales/mgIssueHistoryHome.aspx?IId=40984**

Professional practice guidance on gym acoustics launched

New guidance providing practitioners, developers, operators and local authorities with guidance on a recommended approach for the location of gyms, fitness and exercise spaces to avoid noise and vibration impacts is now available to download.

The Working Group believes the approach encouraged by this ProPG will offer suitable guidance in most situations. Guidance is also included for developers and local authorities to help identify where such development should generally be avoided, unless there are extensive design considerations. (See page 8 of this issue for our full report).

Noise testing in MOTs consultation

The IOA is pleased to see the Department for Transport (DfT) considering measures to tackle excessively noisy vehicles, and consulting on potentially introducing an exhaust noise test into the MOT. In responding to their consultation *Changes to the date of the first MOT test and research into other MOT enhancements*, IOA raised a number of points, including that data from trials of measuring exhaust noise in an MOT centre should be compared to equivalent data recorded in a quiet free-field environment, which will enable the impact of background sound and reflecting surfaces on the measured levels to be understood. In addition, although the loud part of the test only lasts a few seconds, it is acknowledged that neighbourhood disturbance could be an issue in some situations, especially if such tests are undertaken outside. It was also pointed out that loud exhaust systems could be removed before the MOT and replaced afterwards. In addition, there is little correlation between exhaust noise levels and the noise levels recorded in tests designed to be more representative of real world driving and typical exposure to traffic noise. Any such test would also have to consider how to address modern exhaust systems and electric cars with added sound, where the amount of noise they make is often linked to software defining the mode the vehicle is in. A number of factors would need to be considered when deciding on an appropriate limit value for passing or failing the MOT.

Read the consultation here: **https://tinyurl.com/4r5yt54c**

And the IOA response here: **https://www.ioa.org.uk/sites/default/files/ioa_response_dftmot_march23.pdf**

Planning for large energy projects – consultation

In March Government ministers published an action plan for speeding up Nationally Significant Infrastructure Projects (NSIP) including energy and transport infrastructure. The announcement – applying to England and Wales – was made in the context of the need to improve energy security and achieve net zero. Energy National Policy Statements (NPS-1 – NPS-5) were reviewed in 2021, and now further amendments have been made. Government say this strengthens the process for delivering major new energy infrastructure, reinforcing national priorities regarding energy security, reducing costs, delivering net zero, and creating green jobs. The updates are expected to speed up planning, whilst protecting and enhancing the environment and ensuring local views are accounted for. EN-3 (renewables) and EN-5(electricity networks), both have detailed sections covering noise and vibration impacts. For Offshore Wind Environmental Standards, EN-3 states that in 2023 Defra will consult on the design, construction, operation and decommissioning of offshore wind farms. The consultation closes 25 May.

See the NPS consultation here: **https://tinyurl.com/2p9f8h6s**

Aviation

The UK Government issued a consultation on night flights, looking at noise objectives for Heathrow, Gatwick and Stansted airports. The six week consultation is intended to inform objectives for setting the groundwork for future measures on how to manage aviation noise at night from October 2025. This announcement was accompanied by a revised overarching aviation policy statement, which reaffirms the foundation for noise policy for the entirety of the aviation sector, covering flights at all times of day or night. In addition, guidance for allowing dispensation for operators to fly night flights will be looked at. The summer of 2022 proved challenging from an international air traffic control perspective resulting in late running flights and a corresponding higher number of night flight dispensations. Updating the dispensation guidance will form part of the main night flight regime consultation, which is anticipated to be published in late 2023.

The consultation – night-time noise abatement objectives – closed 9 May but you can read it here: **https://www.gov.uk/government/consultations/night-time-noise-abatement-objectives-for-the-designated-airports**

Read the aviation noise policy statement here: **https://www.gov.uk/government/publications/aviation-noise-policy-statement**

Call for evidence on aviation environmental information

The Civil Aviation Authority (CAA) is seeking views on what environmental information should be provided to people when they are looking for and booking flights. While CAA acknowledges that noise is an environmental impact, the call for evidence excluded noise. In responding to the 2021 Jet Zero consultation, IOA supported the provision of environmental information to consumers, adding that the principle of providing environmental information at the time of booking could be expanded to include noise. Given adverse health impacts of noise from aviation are well documented, and CAA acknowledges that noise has an impact, IOA responded that it seems an anomaly that noise is omitted from this consultation.

Read the consultation here: **https://tinyurl.com/2ppy5c7y**

IOA response: **https://tinyurl.com/4tt6tf8j**

About the author:
Mary Stevens supports the IOA to bring acoustics to the attention of policy makers.

IOA Code of Conduct Rules updated

The Membership Committee has the responsibility to keep the IOA Code of Conduct Rules up-to-date and in line with the Engineering Council recommendations.

By the IOA Membership Committee

A new version is now on the IOA website having been approved by IOA Council at the December 2022 meeting.

The Code of Conduct Rules update have applied since 8 March 2023 when the website was changed. See **www.ioa.org.uk/membership/code-conduct**

Additions to the Code of Conduct Rules relate to the Engineering Council and these are shown below in bold and italics. The update also includes a change to Rule A1.4 regarding the availability of primary data for independent scrutiny which arose from a recent code of conduct case. Many complaints from the public relate to Rules A1.1 and A1.4 and it is the job of Committee members who form the review panel to interpret the rules accordingly. It should be noted that the IOA Code of Conduct relates to complaints about the conduct of an individual IOA member and not a company. In the interpretation of Rule A1.4 there is often an issue about who owns the data, the member or the client. A complaint will not be investigated if it is about resolving a dispute.

Note there were eight Code of Conduct complaints against members in 2022.

Earlier versions of the Rules can be found in the Acoustics Bulletin Vol 26 No 3 May/June 2001 with interesting feedback in Vol 26 No5 Sept/Oct 2001. In 2016 there were further changes to incorporate recommendations of the Engineering Council.

Any comments should be emailed to **membership@ioa.org.uk**

Updates to Code of Conduct Rules agreed at Council December 2022

A1. Professional competence and integrity

A1.1 Members shall avoid undertaking work which is beyond their capabilities. Therefore members shall undertake to:

a) upgrade their professional knowledge and skills.

b) ***encourage others to advance their learning and competence.***

c) maintain adequate awareness of technological developments, procedures, standards, laws and statutory regulations which are relevant to their field either by involvement in the Institute's Continuing Professional Development Scheme or by any other appropriate means.

A1.4 Members shall show proper regard for the sanctity of data. In particular, members will:

a) not knowingly alter, manipulate, fabricate or misrepresent data.

b) ***ensure, as far as is reasonably practicable, within any publication or report that sufficient details of any method by which the data were derived, are available for independent scrutiny or to allow others to replicate such experiments.***

A2.6 Members shall notify the Institute if they have had membership of another professional body terminated as the result of a disciplinary procedure.

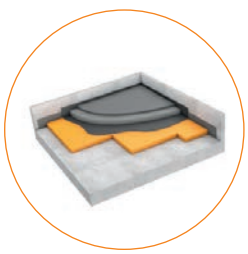
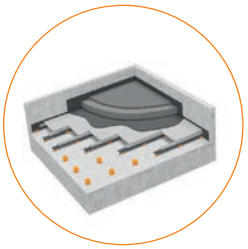
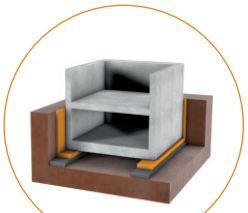
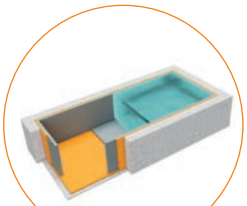
A3. Duty to Employers and Clients

A3.1 When discharging their professional duties members shall: (additions only)

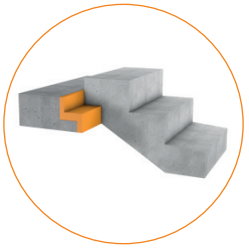
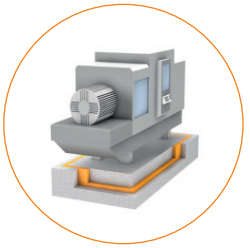
e) ***observe the proper duties of confidentiality owed to appropriate parties.***

h) ***reject bribery and all forms of corrupt behaviour, and make positive efforts to ensure others do likewise.***

j) ***assess and manage relevant risks and communicate these appropriately.***

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Ian Sharland FIOA

Ian Sharland FIOA passed away peacefully in hospital on 17 March 2023, leaving his wife, Margaret, and four children.

By Richard Sharland

Ian was born in Devon in September 1934. His career began with a short commission in the RAF, flying Harvards and Gloucester Meteors in the UK and Africa. He then worked as a technical draughtsman with Vickers near Winchester. This brought him into contact with the aeronautics department at Southampton University, and ultimately the Institute of Sound and Vibration Research. He joined the University in the mid-1950s, both teaching and studying for his Masters Degree and PhD.

In 1967 he left the University and went to work at Woods of Colchester, now part of the Flakt Woods Group, and was instrumental in setting up their acoustic division. He wrote the *Woods Practical Guide to Noise Control*, which was first published in 1972. There have been one or two minor revisions but it remains largely as originally conceived – a simple, yet quietly sophisticated introduction to the subject of acoustics, and how the physical theories might be applied in the real world. It is a compliment to Ian's clarity that many designers, both within the industry and beyond, still keep a copy in the top drawer of their desk.

In 1975, Ian left Woods to work as an acoustic consultant – firstly at Sharland Acoustics alongside Bob Irwin and Frank Tucker, and then Ian Sharland Limited, a solo enterprise.

Ian was a committed member of the IOA, being awarded a Fellowship in 1976 He served on a number of Institute committees, particularly those related to the engineering noise control. Despite working alone, he became known to many people through lecturing both IOA Diploma and MSc courses at various universities across the south of England.

Ian was highly respected by colleagues within the industry and his wider clients. He provided expert technical advice, always with a light touch and sense of humour. The profession has lost one of its elder statesmen, and he will be greatly missed.

Rght:
Woods Practical Guide to Noise Control, by Ian Sharland, was published in 1972

Below:
Margaret and Ian Sharland

Richard Cowell

We have received the very sad news of the death of Richard Cowell, on 23 December 2022, aged 78.

By Raj Patel

Richard studied architecture and building science at Strathclyde University.

He began with a degree in architecture then completed a Masters in acoustics, before completing his architecture degree including a year of practice in the offices of Mies van der Rohe in Toronto and Chicago. He was influenced by his experiences in North America regarding the importance for emerging architects to incorporate more specialist skills into their practice, and by Ove Arup, who gave a visiting lecture in Glasgow during that time. Richard joined Sound Research Laboratories (SRL) in the UK in 1970, where he undertook a wide range of projects at the intersection of architecture and acoustics.

Through this he developed a range of trusted relationships with architects, acoustic consultants and engineering firms, most pivotal of which were his interactions with Derek Sugden, who was then leading Arup Associates, most notably on the design of Snape Maltings Concert Hall. Richard joined Arup in 1980 founding Arup Acoustics with Derek and John Martin, the first of the Arup specialist practices.

Richard then led and worked with colleagues to build Arup Acoustics for 25 years, from the first office in London to five in the UK and 11 offices world-wide, expanding the offering to include audio-visual and theatre consulting. Richard's wide-ranging international project portfolio included HSBC HQ, ABC Sydney, reviews of acoustic modifications for the Royal Albert Hall, Royal Festival Hall and the Concertgebouw Amsterdam, isolation of the Symphony Hall Birmingham, M42 environmental noise studies, Jubilee Line Extension, Hong Kong MTRC Lantau Airport Line, Airport Express Link and Kwai Tsing Bridge, Sadler's Wells Theatre, Wigmore Hall, Plymouth Theatre Royal, the Anvil Concert Hall Basingstoke, English National Opera, London Coliseum, and the refurbishment of Snape Maltings.

Richard was an Arup Group board member from 1998-2006. In 2000 he was appointed a Non-Executive Director of the Building Engineering Board and became Chairman of the Design and Technical Executive, placing particular emphasis in Arup on design and value.

He was appointed Chair of Specialist Practices Board in 2002 to develop and grow more specialist skills and practices in Arup, which later became the consulting practice. In 2004 he became Deputy Chairman of the Consulting Sector Board, responsible for consulting in Europe and a member of the Europe Region Board. Richard 'retired' in 2006, having worked consistently on projects through his time in executive roles, culminating shortly before his retirement with the opening of Glasgow City Halls' successful refurbishment and relaunch as an orchestral performance and recording venue, which had been the subject of his final architecture thesis in 1969. Following 'retirement', Richard continued to provide consulting and advice in an organisational and project capacity to Arup Acoustics, AV, Theatre, Arup Associates, and Arup Advanced Technology & Research.

Richard taught widely on acoustics, integrated design, sustainability, how to be a good consultant, and was an active member of the IOA, joining the Building Acoustic Group while Peter Rogers was Chair, who reflects that Richard shared his wisdom with acousticians with sustainability being one of his main focuses. He encouraged members to integrate sustainability into their work and he represented the IOA at Madrid ICA. Richard and Peter's partnership continued as they formed the Sustainable Design Task Force, they also established the IOA Parliamentary Liaison Group, which is making solid headway and despite Richard's illness he continued contributing remotely right up to his death. Peter said: "Richard made it his mission to give back to his profession and he did so in a way that will help generations to come to integrate sustainability and acoustics. He certainly inspired me." He led by example through regular submission of technical papers, to spread knowledge, stimulate debate, and encourage constant progress. He also worked closely with Bridget Shield at LSBU to support the development of the acoustics course there in its early years. He influenced many who he worked with over the years, and for many who worked at Arup and decided to start their own practices, he provided them projects to get them off the ground and support where they needed it along the way.

Richard was an inspirational leader, designer, teacher, and mentor to many. A true proponent of integrated design and sustainability, and highly influential both inside and outside Arup.

He will be very much missed and remembered with fondness and deep gratitude. Richard's hobbies included music, theatre, golf and history of architecture.

We send our sincere condolences to his wife, Vivian, son Jason, daughter Tracey, and four grandchildren.

Sanford A Fidell

Sanford (Sandy) Fidell, Fellow of the Acoustical Society of America and associate editor of JASA, passed away in his home on 27 February 2023 at the age of 77 of a massive MRSA infection.

Sandy was born in New York City on 11 May 1945, to Oscar and Jeanette Fidell. He graduated from Trinity College in Connecticut and completed his PhD from the University of Michigan Experimental Psychology programme in 1968, under the supervision of Wilson P. "Spike" Tanner, John Swets and David Green. He left Michigan in August of 1968 to begin his career at Bolt Beranek & Newman, then in Van Nuys, California.

Sandy was simultaneously active in the areas of experimental and applied psychoacoustics and community response to noise. As former head of BBN's psychoacoustic department and then his own company (Fidell Associates, Inc.), he pursued both these areas with equal vigor. His guidance in developing the psychoacoustics laboratory at BBN for conducting efficient cutting-edge research on annoyance, the detection of low-frequency signals, the noticeability of emergency warning signals and reactions to simulated sonic booms was invaluable.

Sandy's broad range of clients came from both the public and private sectors. Public sector clients included the United States Federal Aviation Administration, National Aeronautics and Space Administration, Environmental Protection Agency, Department of the Interior (Bureau of Mines and National Park Service), Department of Agriculture (Forest Service), Department of Defense (US Army, Navy and Air Force) and the California Department of Transportation. Private sector clients included the Electric Power Research Institute, and many community groups seeking expert witness testimony. His retentive memory (and recall) was a source of amazement (and envy) to family, friends and clients alike.

Professional interests

Sandy's professional interests lay primarily in community noise exposure response investigations and auditory signal detection. For 24 years he was a presenter at the annual University of California at Berkeley short course on airport systems planning and design. Over the time that he gave this lecture, more than 800 airport professionals have had their understanding of the science behind aircraft noise measurement and community response to that noise enriched by his careful explanations, and their appreciation of what airport managers can do to mitigate aircraft noise impacts on neighbouring communities has been deepened by his insightful suggestions, based on his broad experience studying aircraft noise impacts and noise management actions at many airports across the US.

He long argued that there is structure to a community's growth of annoyance with sound level and that annoyance grows with increasing loudness, as embodied in the Community Tolerance Level model, with the CTL metric becoming part of ISO 1996-1:2016.

Most recently, he was providing guidance to NASA for their upcoming field investigation of community reaction to low-boom supersonic overflights as well as for their ongoing research related to the detectability of low-frequency emissions from heavy rotary wing aircraft. Over the years he made numerous contributions to ANSI and ISO standards committees and the Committee on Hearing, Bioacoustics, and Biomechanics (CHABA).

To those who received regular telephone calls, emails and text messages from Sandy the silence has been deafening. His contributions to the world of acoustics will be sorely missed, but he leaves behind an enduring legacy.

A fuller version of this obituary will be published in *Acoustics Today* (**www.acousticstoday.org**) the magazine of the Acoustical Society of America, and possibly in the Journal of the Acoustical Society of America. That version will cover more of the many and varied facets of Sandy's long creative career, as well as recollections of his broader interests, including his penchant for reinforced concrete structures.

This summary has been prepared by Bernard Berry, Past President of the IOA, based on contributions from a number of colleagues in the USA, including Richard D. Horonjeff, Vincent Mestre, Geoff Gosling and Kevin Shepherd.

Permitting vs. Planning:

The EA's role, dual regulation and how proposed residential developments affect EA-regulated facilities

The Environment Agency's Acoustics and Air Quality Modelling Assessment Unit (AQMAU) assesses noise impact assessments (NIAs) submitted in support of environmental permit applications. AQMAU's team of acousticians regularly engage with applicants and the acoustics industry, in relation to the EA's regulation process, guidance, or site-specific queries.

By Stephen Jay, BSc MSc MIEnvSc MIOA Technical Advisor, AQMAU and Paul Doyle, BSc MSc MIOA Technical Advisor and Acoustics Lead AQMAU

This article explains the differences between the permitting and planning regimes and clarifies the EA's position on issues such as perceived 'dual regulation' and the impact proposed residential developments have on EA-regulated sites.

The EA's position is supported by internal legal advice. We hope acoustic consultants find this article informative and that it clarifies why we may ask for certain information as part of our role in protecting people and the environment.

Environmental permitting

Since the early 2000s, environmental permitting and regulation by the EA covers noise from major industry. It is now included in the Environmental Permitting (England and Wales) Regulations 2016 (EPR)[1]. Under EPR, the EA has powers to prevent serious pollution and the operator has the responsibility to ensure their regulated facility does not cause pollution to the environment or cause harm to human health.

The environmental permitting framework determines if an operation can be managed on an ongoing basis to prevent or minimise pollution. Unlike planning, the permitting framework ensures compliance in an ongoing manner, with the environmental permit itself being a live document which is updated regularly. The EA is required to review permits regularly, to check whether permit conditions continue to reflect appropriate standards and remain adequate in light of experience and new knowledge. The EA can request changes at any time once a permit has been issued, for example to deal with changes to the location of human receptors, or a change in the sensitivity of non-human ecological receptors, etc.

The EA's guidance for NIAs requires sound emissions from most regulated industrial processes to be assessed in terms of BS 4142:2014+A1:2019[2], in relation to the existing background sound climate, in the absence of the site being assessed. Noise limits or guidance such as BS8223:2014[3] or BS5228-1: 2009+A1:2014[4] cannot be used for the assessment of EA-regulated facilities.

The EA's standard noise permit condition states:

"Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including but not limited to, those specified in any approved noise and vibration management plan, to prevent or where that is not practicable, to minimise, the noise and vibration."

The requirements to "prevent" or "minimise" noise and vibration ensures the EA's regulation process for permitted facilities is consistent with the aims of the Noise Policy Statement for England (NPSE, 2010)[5].

The relationship between permitting and planning

Understanding the relationship between permitting and planning, and how this may affect operators is an important part of being an P54

References

1 **https://www.legislation.gov.uk/uksi/2016/1154/contents/made**
2 BS 4142:2014+A1:2019. Methods for Rating and Assessing Industrial and commercial Sound. British Standards Institute.
3 BS 8233:2014 Guidance on sound insulation and noise reduction for buildings, British Standards Institute.
4 BS 5228-1: 2009 + A1: 2014. Code of practice for noise and vibration control on construction and open sites. Noise. British Standards Institute.
5 Noise Policy Statement for England (2010), DEFRA. **https://www.gov.uk/government/publications/noise-policy-statement-for-england**

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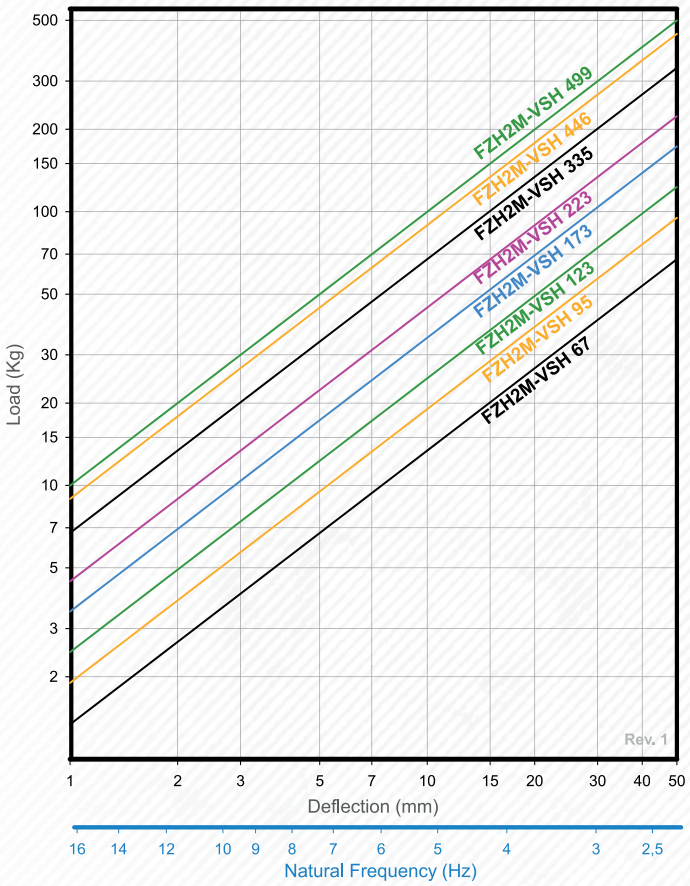

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acoustician. The National Planning Policy Framework (NPPF, 2021)[6] sets out this relationship, with paragraph 188 stating:

"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively…"

The EA is considered the 'separate pollution control regime', and local planning authorities (LPAs) should assume the permitting regime 'will operate effectively'.

Above:
The EA requires the operator to consider proposed residential properties as noise sensitive receptors in NIAs, for new bespoke applications or variations to existing environmental permits

Dual regulation

Sometimes a site requires planning permission, *and* an environmental permit to operate specific plant or installations. The LPA may ask an applicant for information to help them decide appropriate use of land. The LPA may impose limits on certain aspects (e.g. noise) in the planning permission to ensure this.

Environmental permit applications are often submitted after the planning application, so applicants perceive this as 'dual-regulation', and question why the EA are asking for another NIA with (often) different requirements. As the EA is required to control noise for permitted activities via the relevant Schedules and paragraphs in EPR (2016), the EA is responsible for controlling noise emissions from the installation in these specific circumstances. In accordance with the NPPF, it is outside of an LPA's remit to set a noise limit for an industrial installation to control noise pollution, where that facility will (subsequently) be regulated by the EA under an environmental permit, yet this regularly occurs.

Implications of new residential developments on EA-regulated facilities

Since 1998 the Government has put significant importance on the redevelopment of brownfield sites

References

6 **https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf**

with additional powers given to LPAs to fast track the planning process. The White Paper: Planning for the Future (2020)[7] sets out the UK Government's plans to maximise the use of brownfield sites to protect the countryside and preserve biodiversity. However, these plans can bring new residential developments into conflict with existing industrial facilities, many of which are regulated by the EA.

For example, where a permitted facility exists and a proposed residential development would result in properties closer to the permitted facility than existing properties, the operator will still be required to comply with the conditions of their environmental permit under EPR, i.e. prevent significant adverse impacts and minimise adverse impacts. The EA, in accordance with its powers as a regulator under EPR cannot allow the operator to be in breach of the Environmental Permitting Regulations and may take enforcement action against operators who do not take preventative action.

The EA and AQMAU typically encounter this issue when:

- an applicant applies for a bespoke environmental permit but has not included a proposed residential development in their BS 4142 assessment;
- an operator of a permitted facility applies for a variation to an existing environmental permit;
- an operator of a permitted facility updates their noise management plan (NMP) – as is required every 12 months – and identifies new residential receptors associated with a planning application; and
- the operator does not acknowledge the new residential receptors, and the EA receives noise complaints from occupants of the new development.

NPPF paragraph 187: agent of change

The EA regularly sees the 'agent of change principle' cited as a reason that the impact on a residential development can be disregarded, as mitigation has been designed into the new development. These mitigation schemes typically rely on controlling noise levels to the requirements of BS 8233 using glazing schemes, façade constructions and localised acoustic barriers, which are outside of the permitted facility's control.

Crucially, provision of mitigation measures at the residential development to achieve LPA requirements will not control the operational sound emissions from the permitted facility ensuring that the operator can comply with the conditions of their environmental permit. The argument that the operator was there first does not negate the fact that they could be causing unacceptable noise pollution at the new properties, as a result of planning decisions.

What the EA requires in this situation

The EA requires the operator to consider proposed residential properties as noise sensitive receptors in NIAs, for new bespoke applications or variations to existing environmental permits. This applies to any proposed residential development with an outline or full planning application submitted in the planning system, and for developments which have obtained outline or full planning permission. Where adverse or significant adverse impacts are predicted at the proposed development, the EA requires the consideration of mitigation in the BS 4142 assessment which could be managed through permit conditions, where appropriate.

How the EA engages with planning

The EA is a statutory consultee of the planning system and engages with LPAs in relation to planning applications through our Sustainable Places team. Through this interface, the EA can highlight the potential implications a proposed residential development may have on the operator of a permitted facility through standardised responses. Such developments do not automatically trigger a review of an existing environmental permit. The onus is on the operator to be aware of any potential new receptors which may affect their ability to comply with their environmental permit and plan accordingly.

Conclusion

We hope this article has clarified the EA's role as a regulator and how this contrasts with that of Local Planning Authorities. We hope consultants come away with a greater understanding of the issues that the EA faces in terms of perceived 'dual regulation', the impact of planning decisions on operators of EA-regulated facilities, and why we request certain information in support of environmental permit applications.

As acousticians our goal is to provide objective and unbiased advice to clients and safeguard the public interest in matters of safety, health and environment[8]. As such we should consider the burden this may place on existing industry. Should consultants be considering that noise impacts should be assessed beyond the scope of BS 8223 when providing a report for a planning application for a residential development adjacent to an industrial facility? When proposing mitigation, as acousticians, should we look beyond our own developments and work with site operators to help reduce noise emissions at the source rather than just at the receiver and transmission path?

About the authors:
Stephen and **Paul** work within the Acoustics and Air Quality Modelling and Assessment Unit (AQMAU) team at the Environment Agency. Their roles involve auditing noise impact assessments, providing acoustics advice to the National Permitting Service, and engaging with external bodies from the acoustics industry and waste and installations sectors, to highlight EA requirements and improve application quality.

Stephen studied for his MSc in Environmental and Architectural Acoustics at London South Bank University. Having previously worked as part of a successful acoustic consultancy, he moved to the Environment Agency in 2022 as part of AQMAU's expansion, to focus on the regulation and control of noise pollution within our environment

Paul has a BSc in Music Systems Engineering from the University of the West of England and an MSc in Sound & Vibration Studies from the University of Southampton. Prior to joining the EA, Paul worked for independent and multi-disciplinary acoustic consultancies for nine years, gaining hands-on experience in environmental and architectural acoustics.

References

7 **https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/958421/Planning_for_the_Future_web_accessible_version.pdf#page=27**
8 IOA Code of Conduct

We must all act to help minimise the impact of climate change

Practical and easy ways to make a difference.

By James Healey, Director, Peninsular Acoustics

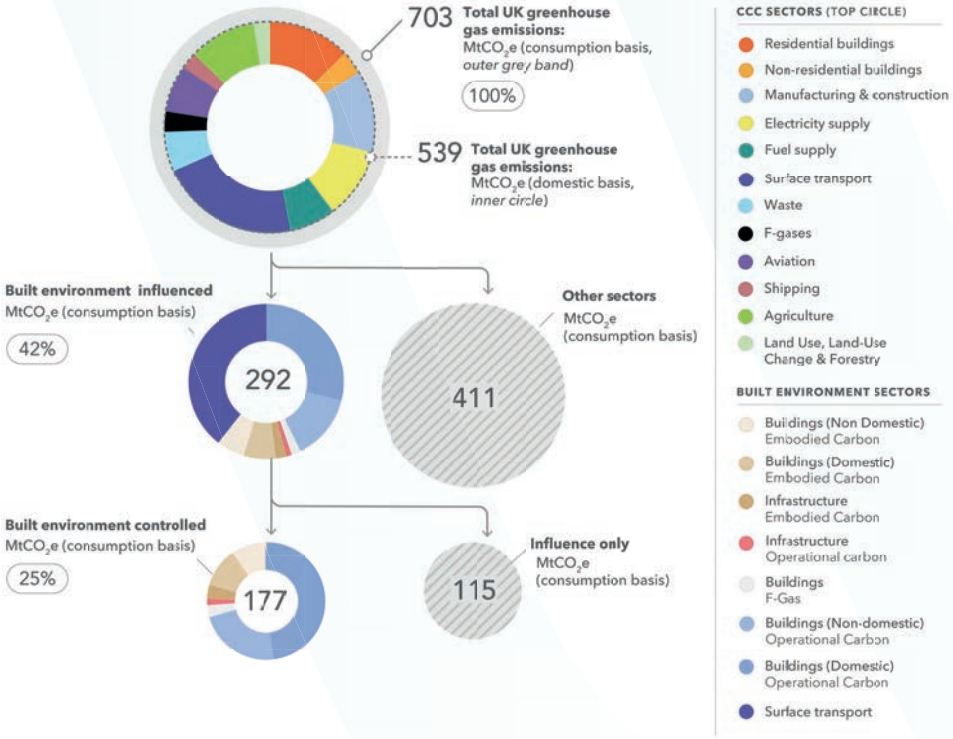
According to the UK Green Building Council (Net Zero Whole Life Carbon Roadmap, Nov 2021): ***'the UK Built Environment is currently responsible for (i.e. has direct control over) 25% of total UK greenhouse gas emissions (buildings and infrastructure). If surface transport (vehicle emissions) is included within the scope of the built environment, the total share of UK emissions increases to 42%.'***

Over the last two decades, built environment emissions (excluding surface transport) have reduced by c.30%. Most of this decrease occurred after 2010 and is largely due to a reduction in operational emissions, most of which are attributable to rapid decarbonisation of the electricity grid rather than improvements in the energy efficiency of buildings.

While we have witnessed design measures that help minimise climate change, many acousticians involved in the design of the built environment perhaps view their role as a secondary or even tertiary element. There is also a level of complexity around how to make a change that can affect how we influence a design. Some acousticians may be guilty of either hiding behind the 'black art' perception or of adopting an overly cautious approach to cover uncertainty by over-specifying constructions needing to achieve in-situ performances. Furthermore, there is often a formulaic approach to design when consultants don't question whether the adopted criteria are really needed.

The Sustainable Design Task Force has already produced guidance to steer consultants, but we have not seen the P58

Figure 1: Total UK GHG emissions 2018 CCC Data showing proportion of Built Environment emissions



Above: Figure 1: UK Green Building Council, 'Net Zero Whole Life Carbon Roadmap', Nov 2021

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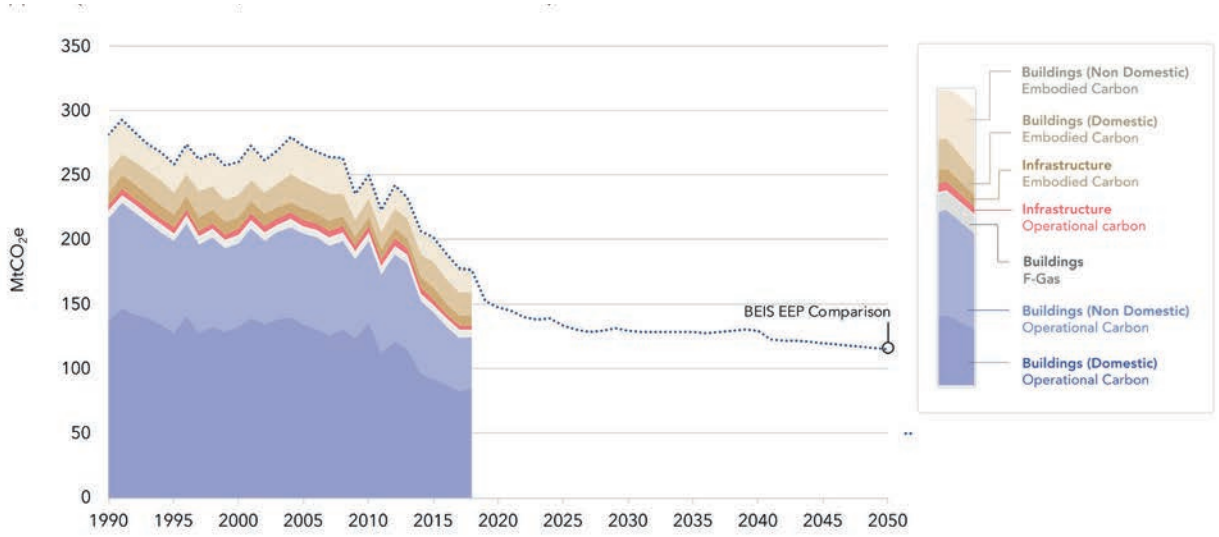
Figure 2: Historic (1990-2018) Built Environment emissions (excluding transport), with business as usual projections applied (BEIS EEP to 2040, with trendline extended to 2050)



widespread change in the way in which we go about our designs that is needed to respond to this crisis.

Guidance

The IOA Building Acoustics Group (BAG) has responded to this gap by producing a framework for building designers to implement sustainable design. *Sustainable Building Acoustic Design – a Practical Framework* was drafted by Ben Burgess (Buro Happold) and the committee, and it provides a simple framework to influence the sustainability of the designs in which we are involved. It also provides a checklist to demonstrate to the industry that we are proactively considering sustainability in our designs.

We can promote sustainable measures and waste reduction by thinking beyond code compliance rather than blocking designs due to rigidity in sticking to what the guidance states. We should be considering whether we can provide spaces that still meet the acoustic brief but with criteria that flex to enable sustainable design or construction methods.

We should also be asking for an Environmental Product Declaration (a document that quantifiably demonstrates the environmental impacts of a product) for each material that we recommend or specify.

Above: Figure 2: UK Green Building Council, 'Net Zero Whole Life Carbon Roadmap', Nov 2021

Specific areas of focus

Embodied carbon is the total CO_2 emitted in producing materials. When developing designs, can we specify locally sourced materials or use less material to achieve the performance requirement? When we're considering room acoustic treatments, can we use an exposed soffit with discrete absorbent panels rather than covering the entire ceiling?

Operational carbon is the carbon emitted during the operational or in-use phase of the building. Can we use natural rather than a mechanical ventilation? Can we recommend designs that enable a reduction in heat gains, e.g. balconies to provide solar shading and noise reduction?

Sustainable wellbeing is achieved when improvements to individual wellbeing are correlated with improving the wellbeing of other members of society and the natural environment. Can we enable designs for people inside a building that provide connections to the outdoors, e.g. promoting avoidance of combustion engine transport directly outside combined with north or east facing openable windows?

The **circular economy** is the reuse and regeneration of materials or products. Can we identify and specify designs that reuse materials in a building to be refurbished and provide designs that are 'layered' so they can be adapted to suit different future needs?

Structures that are **designed for manufacture and assembly** reduce energy demand of a building during the construction phase. Can we spend time understanding the needs of the project to set criteria that can be easily achieved with modular systems?

Lists of acoustic-related factors that relate to these topics are provided to guide the thought process. We also provide a checklist to be contained in reports such that acoustic designers can demonstrate that they have considered these factors in their advice to clients and design teams.

We invite feedback on the document, which is currently out for consultation until 31 July 2023. Please put 'Sustainable Building Acoustic Design – A Practical Framework' in the subject line. Email: **BAG@ioa.org.uk**

All-in-one acoustic and technical flooring for gyms

Pavigym has launched BigJag, acoustic flooring which is installed in independent 1m^2 modules to achieve maximum insulation of the vibration and noise caused by falling weights in gyms.

Pavigym's technical sports flooring comprises polyurethane micro-cells that offer extraordinary insulation capacity mainly at low frequencies. The result is a technical flooring solution for free-weight areas with unique acoustic properties that absorb vibration and sound before they propagate through the building structure, while ensuring a high protection of the subfloor.

BigJag comes in a single compact tile of 100x100cm, avoiding the installation of several layers and allowing for fast installation. It protects the subfloor and structure of the building and is CFL certified for fire protection flooring and is hygienic, antibacterial and anti fungicidal. This is an all-in-one technical flooring with high stability and firmness.

BigJag is available in three different thicknesses, 50mm, 70mm and 90mm, and also offers three types of finishes and six different colours.

Peter Attwood, Acoustic South East

The team at Acoustic South East, formerly Acoustic Associates Sussex, would like to thank Peter Attwood for the past 30 plus years that he has committed to acoustics and for building Acoustic South East to the company it is today. Peter is stepping back from his Managing Director role and will now work two days per month in an advisory role.

Acoustic South East's Peter Attwood

Peter's dedication has been second to none. Over the years he has supported and encouraged many fledgling acousticians through diplomas and master's degrees and then continued to nurture them to become fully developed acousticians. In addition to this he also found time to run a manufacturing company that builds tapping machines used by many acoustic consultants around the world.

Two years ago he decided to transition Acoustic Associates Sussex into an employee owned company. This was a testament to his ability to plan ahead and to his nurturing character as it meant that he could plan to step back while ensuring the continuance of the company and securing the future of his employees.

Although Peter is going to still be with us it feels as if it is the end of an era and so we wanted to take this opportunity to thank him for his strength, commitment, kindness and for everything he has brought to the company over the years.

Peter's reduced working arrangements means that he can take the time to enjoy his hobbies, spend time with his grandchildren and perhaps do some travelling with Barbs in his beloved VW Transporter.

Peter is succeeded by both Directors, George Orton and Scott Castle who continue to run Acoustic South East.

HEAD acoustics test solution integrates with Rohde & Schwarz 5G NR voice service testing

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Rohde & Schwarz combines the HEAD acoustics voice and audio quality analysis solution with its 5G test platform, R&S CMX500, for verifying 5G mobile device voice and audio services.

The modular labCORE hardware and the ACQUA software, combined with the comprehensive testing toolset of the R&S CMX500 from Rohde & Schwarz, allow voice services testing in 5G (VoNR) and 4G (VoLTE) networks. The combination enables manufacturers of 5G-capable devices to reliably test voice quality early before market introduction.

HEAD acoustics has fully integrated the latest releases of all relevant standards bodies, such as 3GPP, GSMA, and PTCRB for testing and verifying the speech performance of 5G VoNR terminals. The HEAD acoustics solution includes testing with all speech codecs and standardised performance testing under packet loss and jitter conditions. The HEAD acoustics labCORE system connects to the R&S CMX500 through wired Ethernet using its internal IMS server's integrated IP forward mode, allowing users to forward the voice data of a call established to the labCORE system for detailed voice quality analysis.

The combination with the Rohde & Schwarz solution allows 5G NR device testing in standalone (SA) and non-standalone (NSA) TDD and FDD modes. The R&S CMX500 supports 5G FR1 and mmWave (FR2) frequency bands and provides the required features for VoLTE and VoNR calls. The Bearer and Flow Monitor enables users to see various Quality of Service (QoS) flows and visualizes all audio properties, including bitrate and codec, within the flow stream.

New subsidiary in India

HEAD acoustics has opened its new subsidiary, HEAD acoustics India. The four-member team, led by President Manjula Srinivas, provides comprehensive customer support from the new offices in Chennai.

Soundscape approach for managing acoustic environments of UK National Parks

The notion of a National Park usually evokes the idea of a pristine natural area of scenic beauty. But is there an auditory counterpart to that concept of a picturesque setting, one that's equally captivating?

By Tin Oberman, Simone Torresin, Pete Stollery, Charlotte Swain, Francesco Aletta and Jian Kang

Some 110 million visitors come to UK National Parks each year, yet they are usually unaware that acoustic environments in Parks are fragile systems – ones they not-knowingly influence. Mass tourism represents a threat to Park's ecosystems but also to the visitors' experience. Acoustic environments in Parks are a resource that we need a better understanding of, so we can properly preserve and manage it.

Background

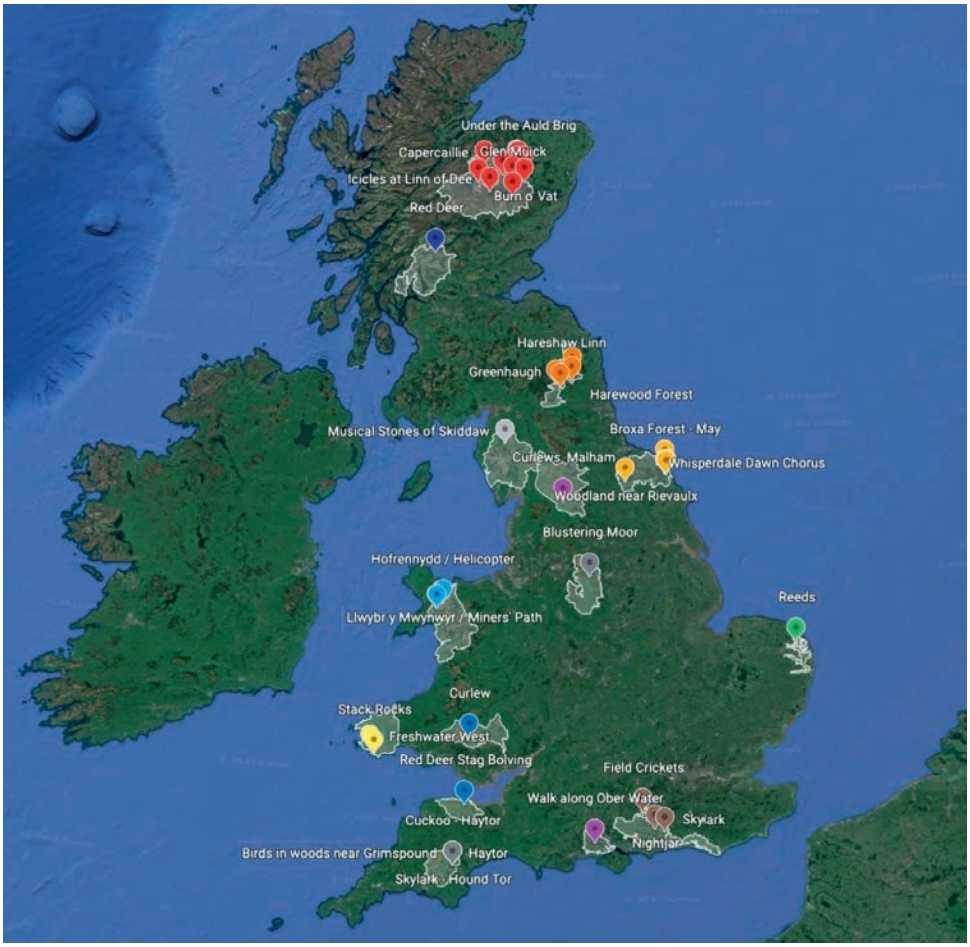
The research on soundscapes in Europe has been driven by the European Noise Directive (2002), asking for noise action plans and management of quiet areas in cities, while there was no common understanding of how a quiet area should be defined. While the EEA Technical report No 4/2014 Good Practice on Quiet Areas (2014) has set different 'quiet targets' for urban and exurban areas, most research that fed into the ISO 12913 Acoustics – Soundscape series was conducted on urban environments, with urban setting in mind where a tolerance to certain noise sources is perhaps an integral part of the urban soundscape aesthetics. This has, in a way, set up soundscape research as human perception-focused, mixed methods based discipline, developed around questionnaire tools, interviews and environmental acoustics measurements.

Above:
Dr Simone Torresin (University of Trento) conducting a binaural measurement during a soundwalk, while the participants are filling in the questionnaire. Image credit: *Silenzi in Quota (by permission)*

Aims

A research initiative was formed in 2022 and supported by UKAN+, aiming to explore how the ISO 12913 series methods translate to environments of outstanding natural beauty, and to understand which potential improvements would effectively characterise soundscapes in such areas, where an ideal perceptual outcome doesn't necessarily match pleasantness and calmness constructs ('positive' and 'quiet' soundscapes) in the same way as would be the case in cities. This initiative, brought together by Tin Oberman, Francesco Aletta and Jian Kang from the University College London's Institute for Environmental Design and Engineering, Peter Stollery from University of Aberdeen, Charlotte Swain from University of Sheffield, and Simone Torresin from University of Trento (formerly at EURAC Research and honorary at UCL), resulted in two short term projects:

- UK National Parks Sound Map; and
- Silenzi in Scotland.



Above:
UK National Parks Sound Map, as published on Google Earth. Each entry to the map is represented by a pin that leads visitors to the specific location in a Park where a recording was taken

Works underway

The research team conducted focus group discussions with staff from UK National Parks, considering them to represent ideal stakeholders – having an immediate experience and expert knowledge of their Park, usually from both living and working within it. The rich subjective data collected revealed stories about a myriad of exciting natural sounds of animal and geomorphic origin, positive aspects of human sounds related to activities that can be connected to heritage and tradition, but also the drawbacks of administrative park borders that sometimes don't fully consider acoustic impacts of the neighbouring zones of industrial or military character.

Parks' staff were encouraged to contribute further to the project by recording environmental sounds they find emblematic of their Park and submit them together with a short contextual description to the Google Earth Map. The map features materials from all the 15 UK National Parks, it is publically available and it is still growing (**https://www.petestollery.com/nplandingpagepublic**).

In the same period, an on-site campaign in the Italian Dolomites, within the Silenzi in Quota initiative, started applying the ISO 12913 methodology through a series of soundwalks. Silenzi in Scotland, is a UCL Global Engagement project, also supported by UKAN+, bringing Silenzi in Quota to the Scottish Highlands to explore and record soundscapes of Cairngorms during a soundwalk in May 2023 (28 May 2023, info and registration **https://silenziinquota.mypixieset.com/silenzi-in-scotland/**).

Due to the fact that UK National Parks cover areas which, in addition to scenic natural landscapes, tend to include villages and towns with associated rich layers of cultural heritage, acoustic environments in UK National Parks are therefore composed of both human and natural sound sources, so soundscape management in these areas needs to be inclusive, considering not only the visitor's experience and wildlife, but also positive auditory contributions from the local communities, sometimes recognised as intangible cultural heritage.

The project team hopes that areas with an occurrence of emblematic sound, could be included in Park's documents and soundscape routes can be planned. Raising visitors' awareness of soundscape will also be likely to help manage and control acoustic environments in Parks by encouraging visitors to behave more considerately. Identification of positive natural and cultural sound sources could promote a more sustainable way of living/operating daily activities within National Parks.

Resources:

- Silenzi in Scotland with Silenzi in Quota, **https://silenziinquota.mypixieset.com/silenzi-in-scotland/**
- Soundscape Indices **https://www.ucl.ac.uk/bartlett/environmental-design/research-projects/2022/jun/soundscape-indices-ssid#:~:text=Providing%20new%20perception%2Doriented%20indices,and%20management%20of%20urban%20soundscapes**
- UK National Park Sound Map **https://www.petestollery.com/nplandingpagepublic**
- Collecting and Mapping Soundscape Data Across the 15 UK National Parks **https://www.researchgate.net/publication/362906249_Collecting_and_mapping_soundscape_data_across_the_15_UK_National_Parks**

BRANCH NEWS

Central Branch

By Matt Torjussen, Central Branch Secretary

This April, the Central Branch played host to two industry experts: Richard Collman and Mike Hewett. The topic of the evening was *Setting Acoustic Conditions for Sustainable Developments*, a timely and pressing concern for architects, planners and developers who want to balance the need for industrial and commercial development with the importance of preserving acoustic quality.

Richard and Mike are well-known figures in the field of acoustics, with decades of experience between them. They urged practitioners to take a more holistic approach when seeking to assess the acoustic impact of industrial and commercial sound sources, rather than simply relying on numerical estimates from BS 4142. In certain contexts, they argued, absolute levels may be a more appropriate consideration.

To illustrate their point, they offered real-world examples from their extensive experience. They showed how a rigid application of BS 4142's numerical 'initial estimate' might overlook important contextual factors that could affect the appropriate level of acoustic mitigation. For example, conditions that require the rating level to be several decibels below the background sound level might result in significantly more material being used to reduce the specific sound to an acceptable level, while also increasing the energy consumption of the system to overcome any increased resistance to airflow placed on the system by the attenuation.

One particularly striking illustration of this point was a bank of air handling units that were made quieter, not by applying acoustic attenuation, but by putting them in the shade so that they didn't need to work as hard. This example highlights the importance of taking a more nuanced approach to acoustic design, one that takes into account the unique environmental conditions of each site and considers a range of possible solutions beyond simply adding more acoustic attenuation to chase a lower rating level.

The lively conversation continued after the meeting at a local restaurant, demonstrating the value of in-person Branch meetings as a forum for technical and professional discussion.

The Central Branch encourages all members to attend in-person meetings whenever possible. These meetings offer a unique opportunity to learn from and network with peers in the field, and to engage in meaningful conversations about the future of acoustics and sustainable development.

London Branch

IOA Diploma best final project course 2021-22 at London South Bank University, receives NTI-audio award

By Dr Luis Gomez-Agustina, Course Director of IOA courses at LSBU

Above: (L-R) An events team member with Matt Hayes, Daniel Hagan, Dr Luis Gomez-Agustina, Leo Fernandez and Charles Greene

Some of the best IOA Diploma student final projects undertaken at the London South Bank University (LSBU), were presented by their authors at the January 2023 London Branch meeting.

In addition, the NTI-Audio LSBU IOA Diploma Student Final Project award competition also takes place during the January London Branch meeting. I set this award up in 2019 as LSBU Diploma course director in collaboration with NTI-Audio, the sponsor of the award.

Leo Fernandez presented first and his final project report was entitled *An investigation into building vibration caused by music festival activity*. The study noted initially that there is disagreement over the cause of buildings swaying during music festivals. Hence the aim was to investigate the relationship between sound pressure levels, crowd movement during artist performances, and the vibration measured in buildings neighbouring the festival site. Accelerometers were placed by the crowd and at ground, middle and top floor locations in neighbouring buildings, microphones were placed both on and off site, and crowd movement was captured using a camera. Leo reported that periods of high activity were characterised by detection of a circa 2Hz jumping wave simultaneously at the crowd and in a minimum of two apartments per building.

Crowds would jump in response to more energetic music, especially when there were high levels of artist/audience engagement as well as visuals synchronised with the musical beat. His talk concluded with the recommendation of changing the shape and orientation of the crowd as potential management/ engineering solution to protect tall buildings susceptible to shaking in response to the crowd jumping induced surface wave.

Daniel Hagan presented his work, *A critical investigation into the BS 4142:2014+A1:2019 reflection correction*. His study rationale was based on the potential unsuitability of providing 'blanket' reflection correction rule figure for outdoor noise surveys for a multitude of potential different environmental and acoustics scenarios. Experimental tests were conducted outdoors to gather behaviours of different source types at different angles in the presence of reflective surfaces. The data gathered were then analysed to explore the suitability of 3dB banket rule figure and whether an alternative correction value was detected when under certain conditions. Daniel showed that behaviours in sound pressure levels were detected for specific single octave frequencies, alongside simultaneous measurements not always presenting the expected 3dB increase due to sound reflection over large surfaces. He remarked that the preliminary results indicated the possibility that unnecessary corrections may have been applied across previous surveys towards a BS 4142 assessment, shifting the required criterion to a possibly expensive or unachievable value to be attained.

Matt Hance introduced his work entitled *An acoustic analysis of Edith Borthwick School: does a functioning school still adhere to current acoustic guidance and is said guidance fit for purpose?* He started off by appraising the current design and performance guidance for special schools and introduced the Edith Borthwick School as the basis of his case study (it is a school for students aged three-19 with severe and complex learning disabilities including autism). The research aimed to establish the acoustic performance of various spaces in the school after being in operation for seven years, and investigating the acoustic performance of some spaces that staff have raised as being unsatisfactory to find the root cause and quantify the issues. The project also evaluated the practical application of design and performance of relevant Building Bulletin 93 (BB93) guidance. Results from interviews with teaching staff and on-site testing showed inadequate levels of reverberation time, sound insulation and internal ambient noise in several special areas of the school. Matt provided practical recommendations to achieve the optimal performance. He commented that there is no apparent evidence in the literature justifying several allowances in performance criteria for special hearing or communication needs. He suggested that BB93 should include consideration and even minimum performance criteria for ancillary spaces often used as teaching spaces. Matt finished his talk by remarking that given the overwhelming lack of inclusion of anyone except people with hearing impairments, it is clear that additional work is needed on inclusivity within Building Bulletin 93 as well as wider and targeted acoustic research.

Charles Greene, General Manager of NTI-Audio UK and I, presented the award trophy and prize to the winner of the competition, Leo Fernandez. On announcing the winner, Charles commented on the high quality of the three finalist projects and the consistent high standard of projects presented for the annual award.

Congratulations Leo, Daniel and Matt. P64

London Branch

February meeting

By John Sails

On the evening of the 8 February, Richard Collman and Mike Hewett from Acoustical Control Consultants Ltd gave an excellent talk at the London Branch meeting at AECOM's London office on *Setting Acoustic Conditions for Sustainable Developments*.

The subject of the talk was recently covered in the technical section of the November/December 2022 Bulletin, but during the talk, questions and discussions really brought it to life and left us all with a lot to think about.

Following the talk, many of those in attendance continued the conversations at the local pub, also providing a great opportunity to catch up. The London Branch would like to once again extend its thanks to Richard and Mike for the presentation and encourage others to join in person for presentations over the coming months.

Our next talk on 8 March was by Dr Antonio J Torija Martinez from the University of Salford, who spoke on the topic of *Measurement and Assessment of UAV Noise*, at AECOM's London office.

He said that one of the main concerns for regulators and local authorities with proposed drone use, is how the public will react to numerous UAV operations with unconventional noise signatures. Unquestionably, what is certain is that, if not tackled appropriately, the noise generated by UAV operations might become one of the main sources of noise annoyance in urbanised areas. There are specific questions that should be addressed for a wider deployment of UAV operations without compromising communities' health and well-being due to noise exposure: (i) how will communities respond to the unconventional noise signatures of UAVs? and (ii) what measurement procedures and metrics can ensure an accurate assessment of UAV noise impact? This presentation described both the state-of-the-art and the efforts currently being done at the University of Salford for the measurement and assessment of UAV noise. The discussions and questions following the talk really opened up possible ideas and thoughts on how the noise may impact future developments, and how different metrics may be more suitable for quantifying the noise.

Following the talk, most of the people attending made their way down to the local pub to continue discussions and catch up over the past months' events. We would like to again extend our thanks to Antonio for his presentation and look forward to seeing where the research at the University of Salford leads.

Midlands Branch

By Phil Hainsworth

On 8th March, Dr Aglaia Foteinou presented her work for *The Past Has Ears Project* on the acoustic reconstruction of the UK House of Commons in the 1820s. This meeting was the first Midlands Branch hybrid event for 2023, with a great turnout in-person at the University of Derby and online via Zoom.

Aglaia explained the history of the House of Commons chamber and the multiple design changes since its conversion from St Stephen's Chapel in the mid-sixteenth century. Aglaia's work focused on the last stage before the chamber was severely damaged by a fire in Westminster Palace in 1834 and demolished in 1837. Considering the importance of this building in shaping the history of the UK, and the political speeches and decisions that took place within it, Aglaia's research considered the acoustic characteristics of the space and aimed to understand more about its impact on history.

Commercial acoustic modelling software (CATT Acoustic and ODEON) was utilised for creating acoustic simulations to investigate the impact that reverberation time and speech transmission index would have had on the audibility of speeches and debates. The acoustic models were built based on available historical records to inform the materials and dimensions of the chamber. A range of simulations and measurements of comparable spaces, including the current House of Commons chamber were presented for comparison with the 1820s chamber.

Aglaia's presentation was followed by the Midlands Branch AGM, where two long standing Midlands Branch committee members, Mike Swanwick and Heather Billin, stood down from the Committee after an impressive 18 and 13 years' service respectively. As per Midlands Branch tradition, the meeting and AGM was concluded with a meal at a local curry house.

The IOA Midlands Branch would like to thank Aglaia for her presentation and to the University of Derby for hosting us. We would also like to again thank Mike and Heather for their valued contributions to the Midlands Branch for a great number of years.

Joint Midlands and Yorkshire and North East Branch meeting 20 March 2023

By C J Biggs

Jack Harvie-Clark of Apex Acoustics and James Healey of Peninsular Acoustics and UK Overheating gave a fascinating and informative joint presentation between the Midlands Branch and Yorkshire & North East Branch of the IOA on the *How–to of Acoustics in Approved Document O*. This presentation was well attended both online and in-person.

As both speakers have been key contributors to the subject of overheating, they shared their knowledge on not only the acoustics aspects but also the thermal modelling. Jack started the presentation with the acoustic considerations followed by James who talked about modelling.

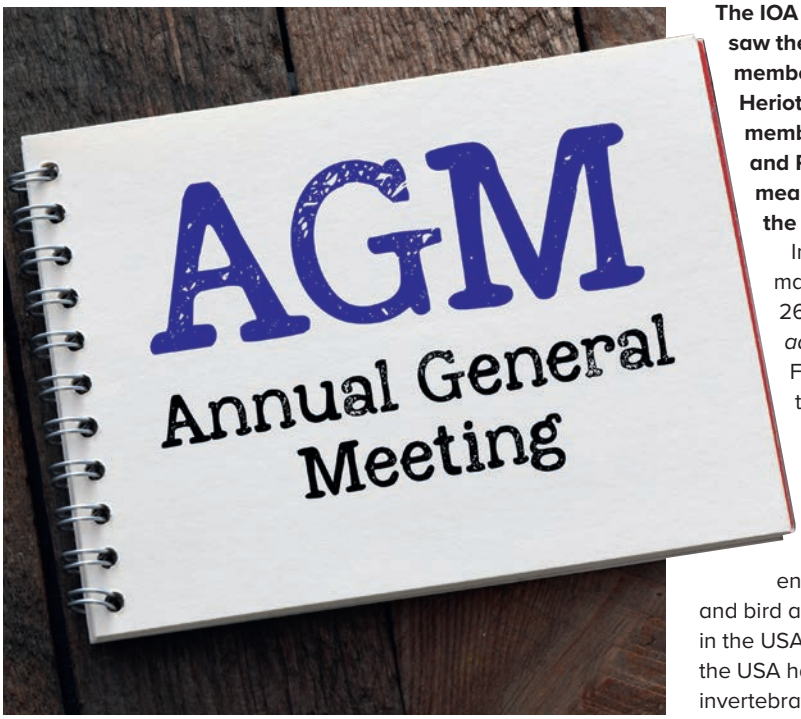
The presentation started with how the ADO fits chronologically with other related acoustics and overheating guidance. Jack also raised an interesting question; "should local authorities be making planning conditions regarding overheating, if there are now covered in building regulations"? Jack's half of the presentation was full of useful acoustic guidance such as how the document 'ADO frequently asked questions' changes the way ADO is interpreted. Additionally, how BS 12354-3 is used with ADO.

James' half of the presentation was equally engaging and informative and went on to talk about dynamic thermal modelling, which was defined in the presentation as the internal and external heating gains and removing it to meet certain criteria set out within TM59. The presentation highlighted the main criteria of TM59 needed for acoustics, and how constraints set out in ADO affect the modelling software. It also covered what needs addressing in dynamic thermal modelling such as pollution and noise, protection from falling and security, and showed how the building is modelled for TM59.

The Midlands Branch and Yorkshire and North East Branch would like to thank Jack Harvie-Clark and James Healey for a very well received and informative presentation. Thanks also to Birmingham City University and Apex Acoustics for hosting and to Linda Canty for setting up the Zoom meeting.

Scottish Branch

By Anne Budd



The IOA Scottish Branch had a great start to 2023. Our AGM saw the re-election of two of our long-standing committee members; Cesar Bustos of Arup and Laurent Galbrun of Heriot Watt University, as well as the co-option of a new member, Elena Prokofieva, of Edinburgh Napier University and RMP whose involvement with the AES in Scotland means she is well placed to be the main link for the IOA to the Scottish Audio and Acoustics Network (SAAN).

In March we welcomed Dr Louise Roberts, lecturer in marine biology at the University of Liverpool to present to 26 Scottish Branch members her talk titled, *Shaking up aquatic substrates: Taking lessons from biotremology*. For many of those attending the presentation this was the first time hearing the term "biotremology" and Louise helpfully started at the beginning with a little of the history of the subject, presenting the ways in which many ground and aquatic species sense through vibrational stimulus, the diversity of vibration users and the function of vibrations. We were particularly entertained with videos of the cane toad 'toe trembling' and bird and human worm 'charming' or 'grunting' as it is known in the USA. Louise's postdoctoral work at Cornell University in the USA had focused on the passive monitoring of below-ground invertebrates and she explained how her current work here in the UK and that of others is taking this work to the aquatic environment, analysing sensitivities and responses to vibration in the aquatic species, measuring substrate-borne vibration, waterborne particle motion and pressure. Louise finished her presentation by covering some of the human impacts both on aquatic and terrestrial systems and on highlighting the large body of research still to be completed. The presentation was recorded and is available on the IOA website. We thank Dr Roberts for giving up her time to present to us and look forward to seeing how the work progresses.

In April, Scottish Branch members took the opportunity to attend the Edinburgh Science Family Extravaganza at the Edinburgh City Arts Centre. As part of the 2023 Edinburgh Science Festival the IOA was given 30 free tickets for members and children to attend what is billed as a 'science playground for families' packed with workshops, shows and interactive activities. Every year the IOA Scottish Branch and other members of the IOA volunteer at the Edinburgh Science Careers Hive over six days at the Museum of Scotland, working to inform and enthuse those young people attending to pick subjects in their National Qualifications (equivalent to GCSE level qualifications) which will allow them to continue into a STEM career and opening their eyes to the wide range of careers that might entail (including acoustics of course!). The IOA once again sponsored the Edinburgh Science Careers Hive and the Generation Science Show which tours Scottish Primary Schools and the tickets for the Science Festival are a thank you for this and for all our volunteers who give up their time to attend.

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IOA Medals and Awards

The IOA Medals and Awards lunch was held on Wednesday 19 April 2023 at the Kennington Oval, London. It gave us an opportunity to catch up on all the awards that we couldn't present during the pandemic.

List of awards presented:

Best IOA Diploma Performance 2019
Irene Rodriques

Best IOA Diploma Performance 2022
Daniel Robinson

The Award for Distinguished Services to the Institute
2020 – Hilary Notley
2023 – Chris Barlow
2023 – Jim Griffiths

Award for Promoting Acoustics to the Public 2022
Matt Muirhead

The Peter Lord Award
Brimelow McSweeney Architects, Sound Advice and Cahill Design Consultants

Tyndall Medal 2023
Joshua Meggitt

Rayleigh Medal 2022
Jian Kang

Rayleigh Medal 2023
Stephen Stansfeld

Above: (L-R) Stephen Turner, IOA President (2020 to 2022); Fiona Pizzey, Admin Officer IOA; Alistair Somerville, IOA President; Allan Chesney, Chief Executive IOA and Alex Shaida, Head of Marketing IOA

A full report will be published in the next issue of Acoustics Bulletin

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Acoustic Engineer

About the Role – An opportunity has arisen for a creative and innovative individual to support our pre-construction and sales team. Reporting to a director, you will be responsible for undertaking noise assessments and reports, typically relating to BS4142, creating practical designs that reduce noise and vibration to specified levels, preparation of detailed noise and vibration control proposals, researching, developing and testing new products; developing relationships with new customers, providing a service to existing key customers that exceeds their expectations.

About You – Candidates should ideally possess four or more years' professional experience within Acoustic Consulting or Noise Control Engineering, have a relevant degree and be a member of the Institute of Acoustics. Excellent communication skills are required, as is the ability to write clear and concise reports and prepare practical and innovative engineering proposals. Industry knowledge including the latest Codes of Practice and British Standards is important, and experience of using acoustic modelling software will enhance your appeal to us. The ability to illustrate designs using the standard suite of Autodesk software is also beneficial – if necessary we will provide training to improve your CAD capabilities. The nature of this role means that a full driving license is essential.

About the Package – Salary up to £45k commensurate with your experience, plus electric car and benefits package.

Trainee Acoustic Engineer

About the Role – An opportunity has arisen for an ambitious individual to support our pre-construction and sales team. Reporting to a director, you will be assisting with noise assessments and reports, typically relating to BS4142, creation of practical designs that reduce noise and vibration to specified levels, preparation of noise and vibration control proposals, developing and testing new products, building relationships with new and existing customers.

About You – Candidates should ideally possess a relevant degree and IOA Diploma, and be a member of the Institute of Acoustics. Excellent communication skills are required, as is the ability to write clear and concise reports. You will be the sort of person who enjoys collaborating with others, and have a naturally curious mind. Some experience in noise/vibration monitoring is important, and experience of using acoustic modelling software will enhance your appeal to us. The ability to illustrate designs using the standard suite of Autodesk software is also beneficial – if necessary we will provide training to improve your CAD capabilities. A full driving license is essential.

About the Package – Salary up to £26k commensurate with your experience, along with an attractive benefits package. When you are ready to progress to the next stage of your development within the company, an electric company car will be provided to enable you to carry out your role effectively.

Next Steps

If either of the above roles sounds intriguing then we'd like to meet you. Please email a covering letter for the attention of our Sales Director James Tait, which explains why you'd be suitable for the position. Include your CV too. The best email address to use is our office manager, **caroline.wright@emtecproducts.co.uk**

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Members are reminded that **ONLY** Sponsor Members are entitled to use the **Sponsor IOA logo** in their publications, whether paper or electronic (including web pages).

Committee meetings 2023

DAY	DATE	TIME	MEETING
Thursday	4 May	11.00	Publications
Tuesday	9 May	10.30	Meetings
Thursday	11 May	10.30	CCHAV Examiners
Thursday	11 May	13.30	CCHAV Committee
Thursday	22 May	10.30	Executive
Tuesday	23 May	10.30	Research Co-ordination (London)
Wednesday	**7 June**	**10.30**	**Council**
Wednesday	14 June	10.30	Engineering
Thursday	15 June	10.30	Engineering
Tuesday	20 June	10.30	ASBA (Edinburgh)
Tuesday	11 July	10.30	Distance Learning Tutors WG
Tuesday	11 July	13.30	Education
Wednesday	12 July	09.30	CCBAM
Wednesday	12 July	10.30	CCENM Examiners
Wednesday	12 July	13.30	CCENM Committee
Thursday	20 July	10.30	Meetings
Thursday	27 July	10.30	Membership
Thursday	3 August	10.30	Diploma Moderators Meeting
Thursday	24 August	11:00	Publications
Thursday	7 September	10.30	Executive
Wednesday	**13 September**	**10.30**	**Council**
Tuesday	26 September	11.00	CPD Committee
Wednesday	11 October	10.30	Engineering
Thursday	12 October	11.00	Publications
Thursday	12 October	10.30	Engineering
Tuesday	31 October	10.30	Research Co-ordination
Thursday	2 November	10.30	Meetings

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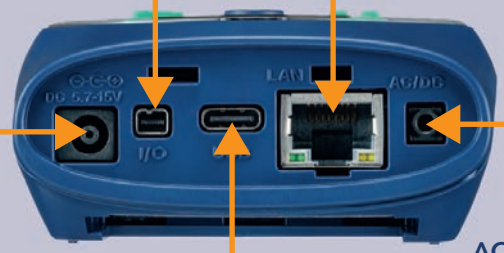

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