NOISE/NEWS INTERNATIONAL

Volume 30, Number 4
2022 December

A quarterly news magazine and online digital blog published by I-INCE and INCE-USA

- 85th anniversary of the first international noise policy
- INTER-NOISE 2022 Report
- INTER-NOISE 2023

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FEATURES

DEPARTMENTS

Cover image courtesy of the INTER-NOISE 2022 Team.

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NOISE/NEWS INTERNATIONAL

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I-INCE

The International Institute of Noise Control Engineering (I-INCE) is a worldwide consortium of societies concerned with noise control and acoustics. I-INCE, chartered in Zürich, Switzerland, is the sponsor of the INTER-NOISE Series of International Congresses on Noise Control Engineering, and, with the Institute of Noise Control Engineering of the USA, publishes this quarterly magazine and its blog. I-INCE has an active program of technical initiatives. It currently has fifty-one member societies in forty-six countries.

INCE-USA

The Institute of Noise Control Engineering of the USA (INCE-USA) is a nonprofit professional organization incorporated in Washington, DC, USA. The primary purpose of the Institute is to promote engineering solutions to environmental noise problems. INCE-USA publishes the technical journal *Noise Control Engineering Journal* and with I-INCE publishes this quarterly magazine and its blog. INCE-USA sponsors the NOISE-CON series of national conferences on noise control engineering and the INTER-NOISE Congress when it is held in North America. INCE-USA members are professionals in the field of noise control engineering, and many offer consulting services in noise control. Any persons interested in noise control may become an associate of INCE-USA and receive both this magazine and *Noise Control Engineering Journal*.

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From the Desk of I-INCE President

Bob Bernhard

With the calendar turning to 2023, my term as the President of I-INCE has come to conclusion. It has been an eventful 3-year period term. I have been referring to myself as the "virtual" President. For most of my tenure, the world, including I-INCE, has been affected by the coronavirus pandemic. I only had the opportunity to preside over one INTER-NOISE congress in person. But as I've told my colleagues, I was probably the right person for the time. The circumstances, challenges and decisions I-INCE experienced were very much aligned with similar experiences from my "day" job as Vice President for Research at the University of Notre Dame. I was actively involved in decision-making for the University that was highly relevant to I-INCE. In many ways, I believe we've come out of the pandemic a stronger and more flexible organization that is ready for a world that has been changed by the pandemic.

I want to particularly thank the Organizing Committees of the three INTER-NOISE congresses that occurred in 2020-2022 for their significant and unprecedented efforts during my tenure. They were the heroes of I-INCE during my tenure. The INTER-NOISE 2020 team was forced to make the switch to a virtual congress at essentially the last minute. The congress in August 2020 was a blessing for all of us who had been so preoccupied with other things and were grateful to be able to have a global technical exchange at this difficult time. The INTER-NOISE 2021 team put together a full-blown, high-quality virtual congress with both synchronous (live) components as well as asynchronous (archived) material. This format involved considerable financial expense and significant organizational time and challenge. It was very well received and welcome at a time when international travel was still next to impossible. The INTER-NOISE 2022 team was the first to put together a hybrid program so that delegates that were not able to travel had access to the technical program of the congress. Because the hybrid format of an international congress is relatively new, the team dealt with considerable challenges. This was a first-of-a-kind INTER-NOISE that we think will be a model for the future. To all three Organizing Committees, I want to pass along my most sincere gratitude for your extraordinary efforts to adapt and provide us with much-needed technical connection in a time of extraordinary challenges.

As I mentioned in my "Getting to Know You" feature in the 4th volume of NNI in 2019 and my first President's column in 2020, the theme of my tenure as I-INCE President was intended to be "inclusion and renewal." As I said at the time, "My focus will be raising the profile of I-INCE with the members of the member societies. I'm hopeful that more of them will see I-INCE, particularly its congresses, newsletters, and technical activities, as an added benefit of their membership in their local society." At the time I was hoping to travel to visit Member Societies and to increase the number of new faces in the governance of I-INCE. Of course, the pandemic changed those plans. But I believe we still made significant progress on the "inclusion and renewal" front. The pandemic taught us all how to do virtual meetings. I was able to have several meetings with Member Society leadership and each of these meetings resulted in an increased understanding of I-INCE and increased interaction of that society with I-INCE. Under Past President Marion Burgess' leadership of the Nominating Committee, we made progress on both diversity and demographics of the Board of Directors and the Congress Selection Committee. And lastly, I believe that our successful and well-organized virtual and hybrid congresses have shown our value to the global noise control engineering community and have brought on board new professionals that will continually renew I-INCE in the future. All in all, I believe we made significant progress on this theme.

Looking forward, I am pleased to announce that INTER-NOISE 2025 will be hosted by ProAcustica in Sao Paulo Brazil on 2025 August 24-27. I hope you are all planning to attend INTER-NOISE 2023 in Chiba, Japan on 2023 August 20–23. Abstracts are due 2023 February 10. And mark your calendar for INTER-NOISE 2024 in Nantes France on 2024 August 25-28.

Lastly, I want to offer a complement to our colleagues at the Polish Academy of Sciences (PAN) for their support of Ukrainian scientists that have been displaced by the war in the Ukraine. Details of their program are shown at https://pan.pl/en/long-term-program-to-support-ukrainian-research-teams/.

I wish you all a happy and blessed 2023.

Bob Bernhard
President, I-INCE

NNI INCE-USA President's Message

By Judy Rochat, Ph.D., December 2022

Hello! As the new INCE-USA President, I'd like to introduce myself: I have been involved with INCE-USA since 1995, when I gave my first presentation at INTER-NOISE as a graduate student at Penn State. I have since served on the Board of Directors, as the Vice President for Technical Activities, as co-chair of the Transportation Committee, and as the Noise Control Engineering Journal Associate Editor for Transportation. I live in California, and I have worked in both the public and private sectors – I'm thrilled to be coming up on five years at Cross-Spectrum Acoustics, Inc. I am an acoustics nerd, and transportation-related noise and vibration are my passion! It's an honor to serve as the INCE-USA President, and I sincerely appreciate the opportunity.

First order of business: **thank you Mike Bahtiarian**, for your leadership and for helping us through a difficult time as the Pandemic President! Mike is now serving as Past President and is still heavily involved. Contact Mike (mbahtiarian@acentech.com) if you are interested in serving as an INCE-USA director.

Speaking of serving, thank you to all officers, directors, and staff who served in 2022. It is the dedication of these individuals who allow INCE-USA to provide conferences, training, board certification, publications, and more. Joe Cuschieri continues to provide valuable leadership as the Executive Director, and we welcomed a new Vice President of Honors and Awards, Andrew Barnard. We also welcomed some new Directors this year: Ethan Bourdeau, Ahmed El-Aassar, Andrea Frey, and Sarah Taubitz, along with two Directors At Large: Charlie Moritz and Pranab Saha.

As for conferences, 2022 saw the return to in-person participation at **NOISE-CON 2022**, June 12-14 in Lexington, Kentucky. The General Chair, David Herrin, and Technical Chairs, David Copley, Patricia Davies, and Yangfan Liu, planned and executed a successful conference with 300+ registrants and 105 technical papers. Thanks to them, and others who helped, including the INCE-USA business office, Virtual, Inc., for all their hard work for the conference and other tasks throughout the year.

Organizers are working hard to deliver a successful NOISE-CON 2023, May 15-18 in Grand Rapids, Michigan. This as a joint conference with the Transportation Research Board Noise & Vibration Committee (through May 19) and is co-located with the SAE Noise & Vibration Conference. With these three organizations, there will be numerous technical sessions, exhibitors, and networking opportunities. Thanks to the General Chair, Jim Thompson, for planning such a fantastic program! You don't want to miss this – register now! And submit an abstract right away if you want to present. Later in the year (plenty of time to recover from NOISE-CON), join us at INTER-NOISE 2023, August 20–23 in Chiba (Greater Tokyo), Japan!

INCE-USA Board of Directors meeting, June 12, 2022, Lexington, KY: Judy Rochat & Mike Bahtiarian

Awards this year presented at NOISE-CON 2022 included the following:

- Martin Hirschorn / IAC Prize Best Paper Award: Michael T. Rose, B. Dagan Pielstick, Zach T. Jones, Scott D. Sommerfeldt
- The William W. Lang Award for the Distinguished Noise Control Engineer: Felicia Doggett to receive this award.
- Laymon N. Miller Award for Excellence in Acoustical Consulting: Arno Bommer
- INCE Scholarship: Sam Underwood. (Please consider donating to the INCE Foundation, who help to support this scholarship and other great causes related to noise control)
- INCE-USA Members' Choice Project Award: The project "Technology for a Quieter America Workshops and Reports" – Eric Wood, George Maling, Bob Hellweg, Adnan Akay, and Gregg Fleming

We are sad to have lost **George Maling** this year who served INCE from its inception until his passing. *Please see the tribute to George in the September 2022 issue of NNI, honoring his work and contributions – he is greatly missed!*

For publications, we want to again thank Jim Thompson for his continued efforts as editor of the Noise Control Engineering Journal (NCEJ). Thinking about submitting? Don't wait! Take advantage of the dedicated editors and reviewers to help get your work published. Please think about expanding your successful and interesting past or future NOISE-CON or INTER-NOISE article into a journal-quality transcript. Also thank you to Eoin King who continues to be the Noise News International (NNI) editor, bringing interesting and informative noise news from around the world.

INCE-USA offerings ... here's what's happening in 2023, beyond the conferences:

Noise Control Engineering Courses – 2022 had 80+ students enrolled! Will you enroll in 2023? Tyler Dare, Ph.D. is leading a team of instructors for the three distance education courses – learn the fundamentals of sound and vibration and progress through noise control engineering. Successful completion of all three courses will be accepted by INCE-USA in lieu of sitting for the Board Certification Examination! Note that the enthusiastic response to the self-paced, one-on-one instructed enhanced Course I has led to INCE-USA investing in expanding content for Courses II and III in 2023.

Webinars – INCE-USA held its first free webinar in July 2022 with roaring success! There were 300+ live attendees and 600+ registrants for "Building Acoustics: Sound Isolation," sponsored by National Gypsum and presented by Felicia Doggett and Benjamin Davenny. Thanks to Kristin Cody, our Vice President of Public Relations for organizing! Two more Building Acoustics webinars are being planned for Spring 2023. Stay tuned for upcoming announcements ... look for emails and follow INCE-USA on Linked-In!

Also stay tuned for INCE-USA's developing **Sound Technician Certificate Program**, which is currently being developed. Jeff Fullerton and Matt Golden co-chaired a committee to build the concept and RFP and are overseeing the development.

Although there is much more to say, I want to close with one last topic, INCE-USA finances: Although INCE-USA has very healthy investments, we have been operating at a loss in recent years, which we cannot sustain. In 2022, after many discussions, leadership has decided to return INCE-USA to its roots, depending more on volunteers. Please be patient with us as we navigate these increased responsibilities to help keep our organization strong and continue to offer exciting (and new!) content to our members and other participants. Thank you!

Wishing everyone a Happy New Year and all the best in 2023!
Hope to see you soon!

85th Anniversary of the First International Noise Policy

Walter A. Montano, Tech Director, ARQUICUST Acoustic in situ Measurement Laboratory, Gualeguaychu, Argentina; Member of the Committee on Archives and History of the ASA

Abstract

The directions, written by acousticians and hygienists, given by the Committee on Noise and Housing (within the League of Nations) in June 1937, intended to protect the health, are not well known in the 21st century. The meeting which took place in Geneva, was the first of its kind and the outcome from the scientists and researchers involved was the pioneer work for global noise policies many years before the WHO existence. This article presents a summary of the discussion during that meeting and is intended as a contribution to the history of the Acoustics and a tribute to the acousticians who took the first step for limits to noise levels 85 years ago.

Introduction

Acousticians of the 21st century are accustomed to mentioning the reports issued on environmental noise by the WHO; from the 1980 the first guidance with Environmental Health Criteria for Noise (WHO, 1980), through to the most recent guidelines for the European Region (WHO, 2019). But it is less well known that there was a first attempt in 1937 to have an international reference of healthy noise levels inside dwellings but as a consequence of World War II could not be further discussed and was subsequently forgotten. This article first gives a brief history of how this meeting, in Geneva in 1937, came about and summarizes the report published by that group of experts who

worked on the problem of noise in cities and people's health. This summary has been extracted from the archive of the meeting, which contains over two thousand pages.

On December 9, 1907, the Office International d'Hygiene Publique (OIHP) was created to oversee international rules regarding the quarantining of ships and ports to prevent the spread of plague and cholera, among others public health conventions. On January 10, 1920, the League of Nations was founded with: *"The idea of the League was grounded in the broad, international revulsion against the unprecedented destruction of the First World War and the contemporary understanding of its origins"* (OHFSI, 2020), and the International Health Organization of the League of Nations (LNHO), was set up in 1923, inheriting the duties of OIHP and *"was given a broad mandate under its constitution to promote the attainment of 'the highest possible level of health' by all peoples"* (WHO, 1958) and this organization became the World Health Organization after World War II.

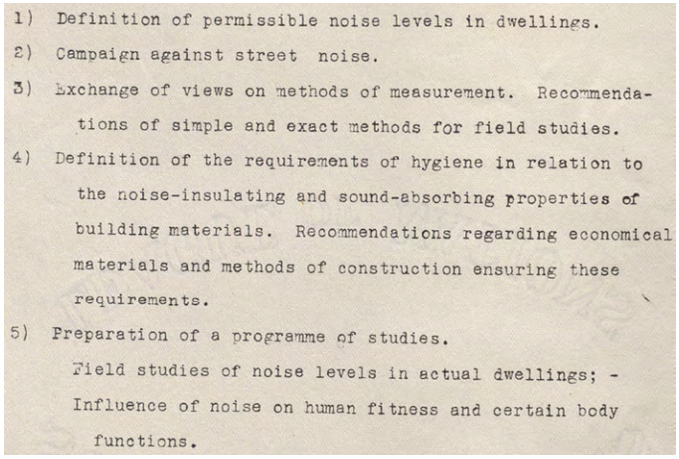
In 1929 the Italian Dr. Luigi Carozzi presented to the League of Nations a report on the harmfulness and control of noise in offices or factories about *"the harmful effects of noise on human beings are complex and are not measurable by the mere intensity of the noise. Monotonous noise may do harm, he believes, by its deadening effect on the persons who work in it,"* his report is the first of its kind presented internationally at the International Labour Office (ILO) for discussion (Montano, 2021).

In 1935 the LNHO started to work on housing issues, promoted by Charles Winslow from US and Jacques Parisot form France, so the LNHO took a lead in promoting a Housing Committee to study the benefits of sunlight, warmth, water-supply, sewage disposal and reduction of smoke, noise, and vibration. It was not until 1937 that it began its work when on February 9 *"The Committee decides to reappoint this Commission, which will consist of the representatives of the various national committees set up to study housing,"* (LNHO, 1937–a), and seven people from different countries agreed to meet for working in three groups (heat, noise, lighting).

This article presents a summary of that international meeting in 1937, based on the documents available from the United Nations (UN) archives (that are public only under direct request), where noise problems were analyzed, and is dedicated to the memory of the pioneering work of a group of acousticians 85 years ago.

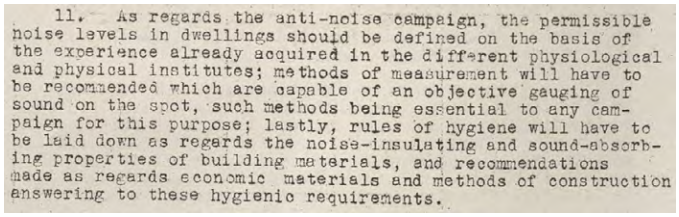
1. The Housing Committee meetings in 1937

According to the documents at UN archives, Dr. Grützmacher from Germany was sent the working drafts, unfortunately he did not participate (LNHO, 1937–6, p.166). The Housing Committee started to work on February 1937 and considered that a special commission should meet the same year and *"three groups of experts should be consulted on the following questions: air conditioning of the dwelling, campaign against noise and vibration in dwellings, sunshine and light conditions"* (LNHO, 1937–b). Those involved in this committee were: Chair Jacques Parisot (France); Johan Axel Höjer (Sweeden); William Wilson Jameson (England); Herman Van der Kaa (The Nederlands); Brunon Antoni Nowakosky (Poland), Hynek Pelc (Czechoslovakia); C. E. A. Winslow (US). In the May meeting, they agreed to consult to a group of experts about the noise abatement (or "Lutte contre le bruit") and the definition of allowable noise levels in dwellings. They considered the levels should be based on experience gained in physiological and physical research institutes, that the methods for sound measurement should be identified and that the transmission and absorption of noise by building materials should be part of the study. Fig. 1 is a copy of the memorandum sent to the expert group on March 8th, 1937.



1) Definition of permissible noise levels in dwellings.
2) Campaign against street noise.
3) Exchange of views on methods of measurement. Recommendations of simple and exact methods for field studies.
4) Definition of the requirements of hygiene in relation to the noise-insulating and sound-absorbing properties of building materials. Recommendations regarding economical materials and methods of construction ensuring these requirements.
5) Preparation of a programme of studies.
Field studies of noise levels in actual dwellings; - Influence of noise on human fitness and certain body functions.

Figure 1: Memorandum agenda on noise of March 1937

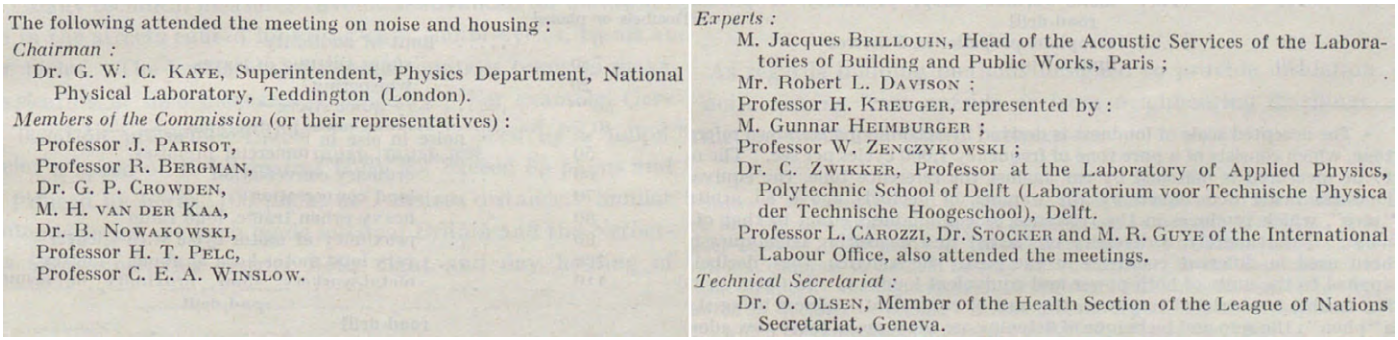


11. As regards the anti-noise campaign, the permissible noise levels in dwellings should be defined on the basis of the experience already acquired in the different physiological and physical institutes; methods of measurement will have to be recommended which are capable of an objective gauging of sound on the spot, such methods being essential to any campaign for this purpose; lastly, rules of hygiene will have to be laid down as regards the noise-insulating and sound-absorbing properties of building materials, and recommendations made as regards economic materials and methods of construction answering to these hygienic requirements.

Figure 2: Issue about noise discussion on the Note of May 1937

2. The arrangements for the official meeting.

It is important to note that in all letters and telegrams during the organization before the official meeting, it is referred to as "the forthcoming meeting on noise abatement." So, it appears that the original spirit was of having an international noise abatement conference, in order to discuss this problem in cities. On May 10th, 1937, a Note on the Commission's work (LNHO, 1937–a) mentioned all the fields to be discussed during the meeting and Fig. 2, including the specific matter about noise.



The following attended the meeting on noise and housing :

Chairman :

Dr. G. W. C. KAYE, Superintendent, Physics Department, National Physical Laboratory, Teddington (London).

Members of the Commission (or their representatives) :

Professor J. PARISOT,
Professor R. BERGMAN,
Dr. G. P. CROWDEN,
M. H. VAN DER KAA,
Dr. B. NOWAKOWSKI,
Professor H. T. PELC,
Professor C. E. A. WINSLOW.

Experts :

M. Jacques BRILLOUIN, Head of the Acoustic Services of the Laboratories of Building and Public Works, Paris ;
Mr. Robert L. DAVISON ;
Professor H. KREUGER, represented by :
M. Gunnar HEIMBURGER ;
Professor W. ZENCZYKOWSKI ;
Dr. C. ZWIKKER, Professor at the Laboratory of Applied Physics, Polytechnic School of Delft (Laboratorium voor Technische Physica der Technische Hoogeschool), Delft.
Professor L. CAROZZI, Dr. STOCKER and M. R. GUYE of the International Labour Office, also attended the meetings.

Technical Secretariat :

Dr. O. OLSEN, Member of the Health Section of the League of Nations Secretariat, Geneva.

Figure 3: Extract from documents of UN archives listing the participants in the acoustics meeting

One interesting link between this 1937 summit and the year 2022, is that some of those invited to participate at the Noise and Housing meeting were in recovery following the worst influenza B epidemic (Wijdicks, 2020) and according to the Polish commission: *"The other reports are not read, as you remember through the misunderstanding as to the financial help we started to work really in autumn 1936, later an epidemic of influenza disorganised our work. I myself am not quite healthy yet"* (LNHO, 1937–d); situation similar for the 2022 Meetings after COVID-19 pandemic.

The Secretariat of the LNHO received all the documents and reports to translate into French and English and after that, they sent back by mail to all participants. According to the internal communications, they organized some private reunions to adjust their ideas some days before the official meeting. It is important to note that the commissions from France and Sweden presented a discussion about the vibrations problems in dwellings, but this issue was not included in the official draft nor in the memorandum (Aide-mémoire), so vibration was not discussed during the meeting. The reports on noise presented by the countries' participants were (LNHO, 1937–e):

a. The campaign against noise (Czechoslovakian Committee)
b. Report of the Sub-Commission of the French Commission on noise and vibration control.
c. Notes to the Draft Agenda on noise control in France.
d. Reduction of noise in houses (Dutch Committee)
e. Report on sound insulation (Swedish Committee)
f. The fight against street noise in Poland, from the work of the Committee for the study of noise organized in Poland in 1934. Definition of limits of noise admissible in the habitated rooms (SIC).

With these reports and selected books on acoustics, the secretary Dr. Olsen wrote a Draft Report of 16 paragraphs to discuss during the meeting, and one memorandum (Aide-mémoire) titled "The anti-noise campaign," both were delivery to all participants.

3. The Commission on Noise and Housing meeting

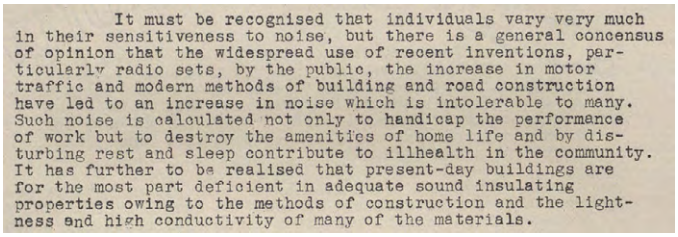
The first workshop of the LNHO Housing Commission was held from June 23rd to 29th, 1937, in Geneva and an interdisciplinary group of experts in acoustics participated on 28th and 29th. Fig. 3 shows the people who attended the general meeting on Noise and Housing.

These experts who worked on the documents included:

- **George William Clarkson Kaye** (April 8th, 1880–April 16th, 1941): Superintendent, Physics Department, National Physical Laboratory, Teddington, London.
- **Jacques Brillouin** (1892–1971). Head of the acoustic services of the laboratories of building and public works Paris. He wrote several books into acoustics being an important French acoustician and co-founder in 1932 of the Revue d'Acoustique Journal, and in 1948 of the Groupement des Acousticiens de Langue Française.
- **Robert L. Davison** (?): As an architect he was part of "The League of Less Noise" (LLN) formed in May 1934, the LLN did many anti-noise campaign in New York City because this League was a continuation of the 1929 "Noise Abatement Council."
- **Gunnar Heimbürger** (September 19th, 1897–June 18th, 1968): Acoustical Architect and the first president of the Swedish Acoustical Society.
- **Wacław Żenczykowski** (November 26th, 1897–February 18th, 1957): Structural engineer and member of the Poland Academic of Sciences. Eng. Fudakowski wrote the report on the Polish anti-noise campaign.
- **Cornelis Zwikker** (August 19th, 1900–April 20th, 1985): Acoustician and one of the initiators of the Dutch Sound Foundation (association before Acoustical Society of the Netherlands).
- **M. R. L'Hermite**: (Not present) Deputy Director of the Building and Public Works Laboratories of the Ministry of National Education of France.
- **Henrik Kreüger** (1882–1953): (Not present) Rector of the Royal School of Higher Technical Studies, Stockholm.

4. The most important issues presented on the Draft and the memorandum

The Draft makes clear that the noise problem is a matter of the condition of the dwellings, and there is no difference among countries: *"In noise, we are faced with an environmental problem which has markedly increased in significance in recent years with the development of a mechanized civilization,"* and *"The nature of sound and noise is usually extremely complex, and their effects on the human organism depend on numerous physiological and psychological factors"* (LNHO, 1937-b); the last statement is important because it defines the instruments to measure the noise level (the draft is referred as 'power or energy') or the noise loudness and refers to a noise meter specially modified to simulate the acoustic characteristics of the ear. Figure 4 refers to the common noise problems of the time which are not very different from those of today.



It must be recognised that individuals vary very much in their sensitiveness to noise, but there is a general concensus of opinion that the widespread use of recent inventions, particularly radio sets, by the public, the increase in motor traffic and modern methods of building and road construction have led to an increase in noise which is intolerable to many. Such noise is calculated not only to handicap the performance of work but to destroy the amenities of home life and by disturbing rest and sleep contribute to illhealth in the community. It has further to be realised that present-day buildings are for the most part deficient in adequate sound insulating properties owing to the methods of construction and the lightness and high conductivity of many of the materials.

Figure 4: Extract from UN archives

This was written by people from eight different countries, and it is obvious that the radio noise was a global problem inside buildings. Modern loudspeakers were common from 1932, a date coinciding with the end of the great global economic depression, so a time when there became the opportunity to enjoy entertainment at home and there are hundreds of media articles from around the world about problems of loud radio noise (Montano, 2022).

4.1. Noise as matter of public health

The concept of noise as a health problem, ie from a physiological viewpoint, was advanced in 1937 as demonstrated by the inclusion of hygienist doctors who were aware of the living conditions inside dwellings and the problems derived of a 'mechanized civilization': *"It pointed out that the problems of hygiene, comfort and fitness and health which arise in dwellings vary in degree rather than in kind from country to country in noise;"* and all the commission agreed on *"the present day buildings are for the most part deficient in adequate sound-insulating properties, owing to the methods of construction and the lightness and high conductivity of many of the materials"* – this same text could be written in 2022!

4.2. The first intention for noise level limits and urban zoning

The Draft mentions that a range between 20 and 40 phons (decibels) as desirable inside dwellings, depending on the circumstances and the character of the noise, such as traffic and industrial noises, as well as noise within the building itself by neighbors. Figure 5 emphasizes the importance of careful town planning.

About the maximum noise levels of horns, the Draft mentions the legislation of some countries tends to make the application of such measures compulsory. For example, in Germany the noise produced by a motor vehicle at a speed of 40 kilometers must not exceed 85 phons (decibels) and horns, 100 phons (decibels) at 7 meters; similar recommendations applied in Great Britain and The Netherlands in 1937.

4.3. The phenomena of the sound waves propagation and the noise isolation

The group of experts pointed out that although the noise problem cannot be regarded as completely solved from the scientific point of view, practical results already achieved suggest certain principles which can be recommended for general application, because *"certain differences of great practical significance exist between 'air-borne', 'structure-borne' and 'impact' noises;"* They also were aware not only of the noise energy inside rooms which depend on its reverberation time, but also the noise transmission by pipes through the building structure.

5. The discussion during the meeting

The provisional minutes of the first meeting on June 28th are in French only and some aspects of the discussion are summarized below.

Dr. Olsen (the secretary) and the experts tried to offer measurable standards expressed in decibels, and for noise absorption the performance of the building materials depended on frequency. He also stated that that it was difficult to relate the objective data from laboratory research, because these results revealed little about its subjective effect on people, in particular what noise was considered annoying.

The meeting was only one year after the inception of the American tentative standards for sound level meters (ASA, 1936), so the concept of the term "loudness" was not yet widely understood, and French acousticians said that the word "loudness" does not have a direct translation into a French word, so they recommended continuing with the use of "loudness" in their language.

They also discussed the unit of measurement of noise, as some countries used the decibel and others the phon and suggested

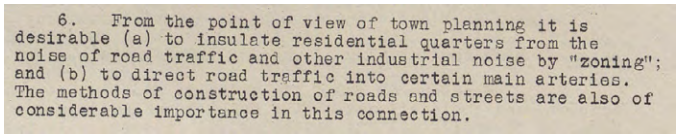

6. From the point of view of town planning it is desirable (a) to insulate residential quarters from the noise of road traffic and other industrial noise by "zoning"; and (b) to direct road traffic into certain main arteries. The methods of construction of roads and streets are also of considerable importance in this connection.

Figure 5: The importance of the urban zoning according to noisy activities

"setting up a standard reference tone which consists of a pure tone of frequency 1000 cycles per second" at a sound pressure of 0.0002 dyne per sq.cm. But they agreed not to introduce metrology issues in the Report as in July of that same year an International Meeting of Acoustics would be held in Paris (see Montano, 2022).

In regard to honking noise, they all agreed on its prohibition during night hours, but the representative of France also suggested that daytime use could also be banned.

There was a suggestion to incorporate the measurement of reverberation time as an acoustic measurement method, in addition to those of isolation.

The experts had a long discussion about the importance of the composition of materials to reduce acoustic transmission through building elements, and that speech intelligibility should be considered in the noise level that would be recommended. They commented on the practical measures they use in each of their countries for acoustic treatment (carpets, insulation, acoustics ceiling, plaster, etc.) but that special parameters are required for hospitals; the latter was left to be addressed as an issue at future meetings of the Commission.

As a result of the difference between field results and laboratory measurements, and that comparing the isolation curves of different countries was not possible, they discussed the need to reach an agreement so that all laboratories adapt their measurements to a common international parameter. Brillouin suggested measuring not only the sound level but also its frequency, which varies greatly depending on the construction materials, because *"it is the same for the damping of the noise, it is enough that the frequency decreases without there being a modification of the energy so that the 'loudness' decreases much"*.

Another point of discussion was the issue of double-glazed windows, which should be suitable for ventilation, thus they should not be fixed and that their use requires a thermal study of the rooms. Other important points of conversation were that not all noises from the outside are important; in most situations, noises from inside the building or from adjacent ones can be more annoying than external noise.

A curious suggestion was made to reduce the problem of the high volume of radio sets, which was to ask the manufacturers of sound equipment to incorporate a power limiter, but it was discarded because, although it was interesting, it would be impossible to put into practice.

6. The final "Report on noise and housing"

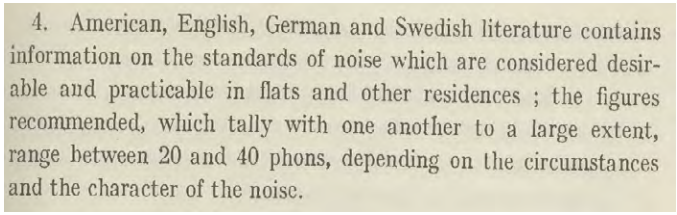
The final document was published with the title "Report on noise and housing" in the Bulletin N° 4 of August 1937, Vol. VI pp. 541-550, (LNHO, 1937–g), and it includes the observations that took place during the discussion of the draft, and the final proposition (see Fig. 6) to considerer a range of desirable sound levels between 20 and 40 phons:

The Report presents the following Plan of Future Studies (LNHO, 1937–g, p.546):

a. Determination of acceptable noise levels in different types of erected buildings.
b. Study of inexpensive and novel methods and materials, particularly of light weight, for nullifying the transmission of internal noises in buildings and reducing the entry of external noise. The question of durability and general properties of materials should also be studied in this connection.
c. Comparing "mass curves" from different countries for partitions and translating, even if empirically, into "loudness ratios," in the case of common noises—e.g., speech and music from loudspeakers.
d. The association, of laboratory measurements with tests on floors and walls.
e. Adoption of standard methods of testing floors and analysis of sound transmitted. The type of test blow needs further study.
f. Comparison of methods of measuring absorption coefficients in different countries. The situation as regards hygienic requirements of absorptive materials should be studied.

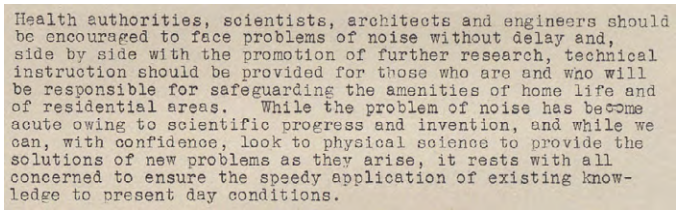
To provide some possible practical measures *"to safeguard the individual, the family and the community against the nuisance of harmful effects of noise,"* a summary list of measures to reduce the annoyance produced by the noise *"to indicate the palliative and preventive measures which may be taken in view of the present state of knowledge and experience in various countries."* The most important of these measures are briefly indicated under two titles: **I)** Measures involving minor expenditure, in 9 items. **II)** Measures involving appreciable expenditure by individuals or public authorities, in 15 items (LNHO, 1937–g).

The last paragraph of the Report is a call for help not only for the acousticians but also for the authorities (see Fig. 7).



4. American, English, German and Swedish literature contains information on the standards of noise which are considered desirable and practicable in flats and other residences ; the figures recommended, which tally with one another to a large extent, range between 20 and 40 phons, depending on the circumstances and the character of the noise.

Figure 6: The 1937 proposition of desirable sound levels inside dwellings



Health authorities, scientists, architects and engineers should be encouraged to face problems of noise without delay and, side by side with the promotion of further research, technical instruction should be provided for those who are and who will be responsible for safeguarding the amenities of home life and of residential areas. While the problem of noise has become acute owing to scientific progress and invention, and while we can, with confidence, look to physical science to provide the solutions of new problems as they arise, it rests with all concerned to ensure the speedy application of existing knowledge to present day conditions.

Figure 7: Last paragraph of the "Report on noise and housing," 1937

5. Conclusions

It is hard to imagine the extent of organizing and preparation for that meeting at Geneva, especially as the Secretary first received the technical documents in different languages, translate into French and English, and delivered them again to all participants by mail. Also consider that the US expert they had to cross the ocean by ship and the rest travel by train to Geneva for five days of discussion (in six different languages). This meeting was a remarkable effort of all the acousticians and administrators involved.

The documents and reports at the UN archives are important, because they express the situation about noise problems until 1937 in eight different countries. Unfortunately, that work could not advance because of the War World II, and all meetings after 1939 were deferred. The WHO was created in 1948, but it was not until the 70's that noise concerns were again put on the international agenda.

This article is an opportunity to divulge the first intention of having "desirable" international noise levels for dwellings in 1937, before the establishment of WHO. The final Report from the group of acousticians is not well-known but has become available on the Internet since 2020 (LNHO, 1937–g).

This article is a contribution to the history of the Acoustics of the 20th century and a tribute to the acousticians who participated in the first step of having international healthy noise levels 85 years ago.

Acknowledgements

The author wishes to thank to Nikolay Prensilevich of the United Nations Archives at Geneva, to provide the original working documents; to Marion Burgess for assisting with the English expression, and to Eoin A. King and the Board of Noise/News International magazine for the opportunity to publish this article.

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LISTEN - FEEL - SOLVE

Canadian Aeronautics and Space Institute (CASI) Alouette Award Winner

Spacecraft Reverberant Acoustic Chamber Facility Team, National Research Council

CASI created the Alouette Award to recognize an outstanding contribution to advancement in Canadian space technology, application, science or engineering. This year the winners were the **Spacecraft Reverberant Acoustic Chamber Facility Team, NRC.**

Random vibration of spacecraft which is induced by acoustic emissions from the launch vehicle at lift-off is a prime structural design driver. In order to qualify the design for launch, spacecraft are subjected to acoustic environment loading to simulate the launch condition which is generally of the order of 140 dB or higher inside a payload fairing. This acoustic environment is most commonly generated in an acoustic reverberant chamber designed to simulate the noise environment of launch which is random in nature. However, since this noise environment is difficult to generate accurately, large tolerances on octave band component amplitude are generally allowed. As a result, the spacecraft must be designed to higher structural safety margins than might be necessary to accommodate this wide tolerance, which increases launch mass and complexity of the spacecraft to sustain the environment.

The National Research Council's (NRC) Aerospace Research Centre maintains and operates a large (26 x 23 x 32 ft) high-intensity reverberant acoustic chamber test facility for the development, qualification, and acceptance testing of full-scale spacecraft hardware. This is the only acoustic chamber facility in Canada capable of testing full-scale space structures in an intense noise environment representative of that found within a rocket fairing during the launch. Most spacecraft and components manufactured by the Canadian space industry for commercial and government needs are tested at the NRC acoustic chamber facility, which has been in operation since 1982 and provides a crucial Assembly, Integration, and Test capability to complement other test facilities at the David Florida Laboratory operated by the Canadian Space Agency.

As mentioned above, it is difficult to accurately simulate the random noise environment which can also be influenced in a non-linear manner by the damping of the test article. Furthermore, the noise generators also are fundamentally nonlinear with respect to their input-output characteristics. Initial testing was done using manual adjustment and scaling factors on the noise environment which was not only difficult but required large tolerances to achieve the required acoustic environment. To overcome this difficulty, a hardware- and software-based real-time Acoustic Spectrum Control System (ASCS) was designed and implemented in the early 1990s which greatly improved the capability. But after 25+ years of service, the ASCS hardware had become obsolete.

The NRC's Spacecraft Reverberant Acoustic Chamber Facility Team, consisting of the nominees, addressed the challenge by developing a newer generation of Acoustic Spectrum Control System (ASCS) in-house to enhance the capability of the NRC large spacecraft reverberant chamber facility. Compared with other commercial ASCS software, the NRC proprietary software enabled quicker convergence and higher accuracy of the acoustic field in the chamber, which minimizes the unnecessary exposure of high levels of acoustic loading of the spacecraft during test set-up. In addition, it also introduced new safety features such as automatic elimination of faulty control microphones and energy limits on critical control bands.

This new ASCS system enables efficient operation of the facility by automating sensor calibration and automatically generating required reports at the end of the test sequence, allowing for quick turnaround for tests to meet strict schedules in the space industry. Since its commissioning in 2015, the new ASCS has advanced Canadian AIT capability, successfully completing more than 50 acoustic qualification tests for clients.

The enhanced control accuracy and safety of the new ACSC of the NRC Spacecraft Reverberant Acoustic Chamber Facility enables Canadian spacecraft manufacturers to design more optimal spacecraft structures to meet launch environment specifications and to offer superior spacecraft designs for Canadian and international space programs.

Since its commissioning, successful acoustic qualification tests have been completed on three RADARSAT Constellation Mission (RCM) spacecraft and many large satellite antennae and reflector assemblies for clients. The new system is able to achieve the tightest tolerance among the major acoustic facilities worldwide, enabling customers to design lighter structures while meeting or exceeding other tight specifications demanded by their users within the global spacecraft market. Furthermore, these new enhancements have also contributed to the success of their space projects by reducing the turnaround time for tests and providing flexibility to accommodate changes in schedule due to unforeseen technical challenges. The NRC's Spacecraft Reverberant Acoustic Chamber Facility has proven to be a critical advantage for Canadian companies to maintain their lead in the space industry and continue to provide superior products in order to win competitions for international space programs.

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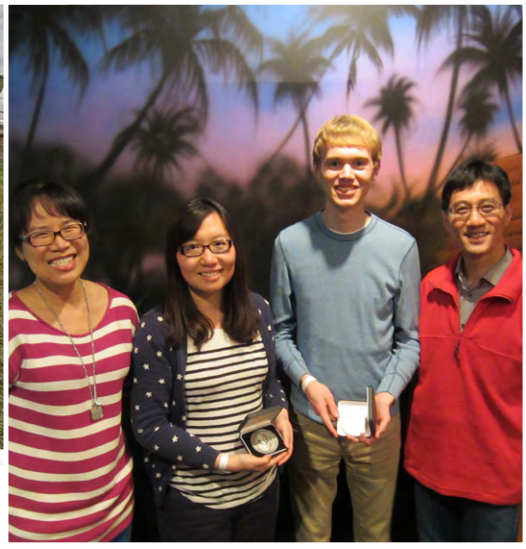
Some photos courtesy of Sound & Vibration Magazine: www.sandv.com



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Remembering Alberto Behar

Alberto Behar has been the "go-to" person when it comes to noise exposure, standards, and noise control. Sadly, Alberto passed away on November 29, 2022. What follows is a celebration of Alberto and his life's work.

I first met Alberto when he was with Ontario Hydro and was responsible for hearing conservation and noise control. Before that, he worked at the Ontario Ministry of Transportation to design highway noise barriers. At that time, we worked together, with others, on the development of noise standards for the province of Ontario. And Alberto, Meg Cheesman, and I published *Noise Control: a primer* (Singular Publishing Group, now Plural Publishing Group, in 2000).

Alberto was a professional engineer and Certified Industrial Hygienist and, as an acoustical consultant, had been active for over 55 years in hearing conservation, noise and vibration measurement, assessment, and control. In 1966 he was the Director of the Department of Acoustics at the Instituto Nacional de Tecnologia Industrial in Argentina, and in 1977, as a result of an Argentinian coup, he came to Canada.

He has contributed significantly to Canadian standards and helped develop national and provincial standards, and along the way, he has been the recipient of many awards (such as the Canadian Standards Association Award of Merit in 2013 and Hugh Nelson Award of OHAO in 2001, as well as a Fulbright scholarship). And up until quite recently was a researcher at the Toronto Metropolitan University (previously Ryerson University) in Toronto, dealing mainly with hearing conservation and musicians and the prevention of hearing loss. Acoustics Today, the official journal of the Acoustical Society of America, published an interview with Alberto Behar where he talked about his life- both personal and professional. This can be found at https://acousticstoday.org/interview-professor-alberto-behar/

Tristan (a former Ryerson student), Dr. Frank Russo, and Alberto in Banff at Acoustics Week in Canada (AWC)

When told of his passing, some of his colleagues asked to submit something about their association with Alberto:

Frank Russo, PhD., Department of Psychology, Toronto Metropolitan University: I first met Alberto as a student attending Acoustics Week in Canada (AWC). He was a regular fixture of these meetings. His questions were always animated, and he seemed to be curious about pretty much everything. In 2007, I became reacquainted with Alberto through our work together on the Board of Directors of the Canadian Acoustical Association. In 2010, I delivered a presentation to the lab he was volunteering in at the time, at the Institute of Biomedical Engineering, University of Toronto. For various reasons, Alberto was looking for a change of scenery and we had some discussions shortly thereafter that led to him joining my lab.

For 12 years we worked together on various projects including comfort in hearing protectors, noise-exposure in orchestra musicians, noise attenuation from earplugs, and listening effort. The work resulted in 5 peer-reviewed publications, 5 proceedings papers, and 12 conference presentations. I never paid him. His only request was that I subsidize his annual attendance at AWC. He showed up to the lab like clockwork on Tuesday and Thursday mornings every week outside of holidays. He offered an annual tutorial on acoustics, and he took great pleasure in talking up the students, learning about their projects that were often very far removed from his own interests and training. In 2012 Alberto, Tristan (a former student), and I were all attending AWC in Banff. We took a road trip to Lake Louise. Along the way we came upon a giant Grizzly at the side of the road. We rolled down the windows and quietly started taking some photos. Before I knew it, I heard the door slam and Alberto appeared in the middle of the road, situated between the Grizzly and the safety of our rental car. He was out there, of course he was, trying to get a closer look. We whispered and motioned for him to get back inside. He waived our concerns away and proceeded to do what he was doing. Fearless, in the moment, and in the happy pursuit of curiosity.

Kathy Pichora-Fuller, PhD, FCAHS, Professor Emerita, Psychology, University of Toronto: Alberto's unstoppable enthusiasm and love of acoustics was highly contagious. I remember his warm welcome when I attended my first meeting of the Toronto Chapter of the Canadian Acoustical Association at the Ontario Hydro building in the early 1980s. Over the next four decades, I saw him warmly welcome hundreds of new students at yearly meetings of the Canadian Acoustical Association, listening thoughtfully to their presentations, engaging them in conversation, and encouraging them in their studies and as they embarked on new careers. His passion for acoustics will continue to live on in so many of those whom he inspired.

Christian Giguere, PhD., University of Ottawa: It was my pleasure to have known Alberto since the mid-1980s. I will remember his lovely smile, great humor, and unfailing enthusiasm. He generously shared his time and expertise with students and young professionals, and contributed to the development of methods in acoustics, hearing protection and hearing loss prevention for over 40 years with the Canadian Standards Association and other organizations. His eagerness to help and get involved was remarkable. His focus on keeping things simple rather than complicated and difficult to use for little added benefit is something that he cherished and wisely reminded us of at key moments. He will be dearly missed, but many good memories will remain.

Why do millions of workers still suffer from hearing loss?

Jim Thompson

Whenever I hear people talking about the progress made in reducing noise, I am reminded that around the world millions of people are experiencing hearing damage every day at work. While much work has been done and the working environments for many have been improved significantly, there is much yet to do. The latest estimates are that 22 million people in the USA and 13 million people in Europe are overexposed every day. It is not a stretch to estimate over 50 million people are overexposed worldwide each day.

How do we prevent occupational hearing loss? We have been working on this problem for a long time and have not eliminated its health consequence. As noted above, there are still millions around the world over exposed to noise in their working environment.

While we have reduced the problem for some, there are still many people working in environments that will lead to significant permanent hearing damage as well as potentially other health problems. It is important to remember that we are not just talking about factory workers. Overexposure cases include those working in retail sales, warehouses, entertainment, construction, and many other environments. The point is that we have much to do to protect workers from this unnecessary hearing loss.

When I ask colleagues why this continues to occur, there are many answers. Unfortunately, they are not consistent and vary with the role of the individual responding. The employer's noise control engineers often cite the lack of sufficient investment or priority from the employer or the resistance from employees who do not use hearing protection, improper use of protection, removal of controls when they hinder equipment maintenance, etc. There is a bit of truth with all these answers. To balance the perspective, many companies have been aggressive in control of the noise exposure of their workers and have implemented controls to reduce noise levels to below 85 dB(A) for exposures of 8 hours. Unfortunately, this is not universal.

Talking with company management, a common response is that there is no applicable technology or that noise control solutions will have too much impact on productivity or the bottom line. There still may be cases where these responses are accurate, but with modern noise control technology, this is seldom the case. More often there was some attempt made decades ago that failed, and any further efforts to implement controls have been prevented by this past failure. Modern analysis and control measures have eliminated many of the limitations that prevented effective solutions from even a few years ago.

Talking to engineering consultants, I often hear excellent solutions were recommended but never implemented. When pressed for a reason why controls were not implemented, the response is that the employees did not like the solutions, management did not have funding, and other items got budget priority. I am sure all are real possibilities. However, one of the lessons I learned working with NIOSH was that often the best solution is the least likely to be implemented. At first, I thought NIOSH was too concerned with employee reactions to potential controls and the impact of a control on the standard work cycles. In the end, I learned that the best solution provides sufficient control while not adversely impacting the operator and his work. The best solution is what is practical for all parties-, not the most elegant engineering solution.

Clearly, there are many perspectives on why noise controls are not protecting every potentially overexposed worker. I think we need to do a better job educating workers and employers about the solutions available and the benefits of controls. I would like to hear from you:

- How can we do a better job protecting workers?
- What are the problems/issues that must be overcome?
- How can we change the status quo? Certainly, millions of workers being overexposed every day is not acceptable.

Call For Submissions – Special Issue on Acoustics and Sustainable Energy

Dear subscribers of NNI,

Controlling climate change is not just turning down the dial on your temperature controller in your house, but implies the installation of extensive energy generating and energy saving systems. It is almost certain that these systems will change the acoustic environment for better or for worse. The shift in vehicle propulsion from internal combustion to electric might improve city noise but may worsen motorway noise because of the larger and rolling resistance optimized tires. Wind turbines have problems generating electricity without disturbing the neighbors; heat pumps will have a problem working as quietly as a conventional gas stove. Large fields with solar panels may improve acoustic propagation conditions when organized as barriers, or worsen it because of the reflective surfaces.

Improving the energy efficiency of aircraft did correlate with lower noise emissions, but the open-rotor engines might spoil this relation.

We dedicate the special issue of NNI next spring to the acoustic aspects of energy transformation. Our readers will be most interested in learning what noise consequences are to be expected and what mitigation measures can be taken. We invite everybody to submit papers with their ideas, experiences, concerns, solutions and other developments in this area.

We look forward to an exciting special issue that presents possibilities to fight climate change and save our acoustic environment.

INTER-NOISE 2022 Report

INTER-NOISE 2022, the 51st International Congress and Exposition on Noise Control Engineering, was held August 21–24, 2022, at the Scottish Event Campus, Glasgow – the same venue for the recent conference on climate change COP 26. It was co-hosted by the Institute of Acoustics (IOA) and the UK Acoustics Network (UKAN), on behalf of the International Institute of Noise Control Engineering (I-INCE).

As part of the technical program, approximately 800 technical papers were presented in 19 main topics across (at times) 15 parallel sessions. The conference theme was *Noise Control in a More Sustainable Future*. Of particular note were two new sessions titled "Noise Control in a More Sustainable Future" (reflecting the conference theme) and "Profession, Education Training and Outreach", which was of special interest to young researchers, and early-career engineers and consultants. This was all the more appropriate given that 35% of delegates were research students or early career professionals!

It was a wonderful return to a full-scale post COVID conference, attracting close to 1,000 in-person delegates from 60 different countries. However, lessons of the past have not been forgotten, and an additional 300 delegates attended and presented papers online. The organizers embraced the hybrid nature of the post-COVID world, and introduced a number of online features throughout the conference. The conference was paperless with delegates free to access the conference timetable, along with all papers, online throughout the conference. Further, all paper presentations were recorded and made available to all delegates to view within two months of the conference, and the opening and closing ceremonies, six keynote presentations and several sessions were live-streamed.

While organizing a conference of this size requires time and help from many individuals, the principal congress organizers were Prof. Barry Marshall Gibbs (Congress President), Prof. Chris Barlow and Alistair Somerville (Technical Program Chairs), Prof. Robert Craik (Proceedings Editor), Dr Martin Lester (IOA Technical Programming Liaison), Tomasz Galikowski (Early Careers Group), and Patricia Davies and Taha Sen (Young Professionals Grants and Practice School for Students). The Congress Secretariat was *In Conference*, and Linda Canty served as the IOA Liaison.

Sunday August 21st – The Congress Opens

While Sunday would see the official opening of the congress, the day began with the Practice of Noise Control School. Young Professional Grant Awardees are invited to participate in this School, and other students can attend if spaces are available. This is a five-hour School that includes a number of presentations from leading exerts across various aspects of Noise Control Practice.

The opening events for the conference were then held on Sunday afternoon, August 21st. In the opening ceremony Congress President Prof Barry Gibbs, welcomed all the attendees to the congress and to the city of Glasgow. He was joined on stage by Stephen Turner, President of the Institute of Acoustics, and

INTER-NOISE 2022 Opening Ceremony

Professor Maria Heckl delivers Opening Keynote Lecture

Over 45 Exhibitors were represented in the Exposition

Keynote Lecture from Prof Jin Yong Jeon

Robert Bernhard, President of I-INCE, who in his opening remarks, said it was "dead brilliant" to be back to an in-person and hybrid conference, and declared INTER-NOISE 2022 officially open.

The opening Plenary Keynote Lecture was delivered by Professor Maria Heckl (Keele University) who convincingly made the case that sustainable combustion technologies need more research in acoustics. Her research focusses on the interaction of acoustic waves with flames (thermoacoustics), vortices (aeroacoustics), and structures (vibroacoustics). She has been leading major European research consortia to understand such interactions in combustion systems and hence to underpin the development of clean combustion technologies, in particular hydrogen combustion.

After this lecture delegates were invited to the INTER-NOISE welcome reception where old friends could gather and chat about old times, as well as learn about the latest product news from the many exhibitors present.

Monday August 22nd

The technical program began on Monday, August 22. The day began with 15 parallel sessions covering a wide array of topics, from smart cities and noise monitoring to active and passive noise control.

There were two separate keynote lectures throughout the day. The first was from Professor Jin Yong Jeon (Hanyang University in Seoul, Korea), titled *"Soundscape and Digital Therapeutics: Psycho-physiological Restoration"*. Prof Jeon's main teaching and research interests are architectural acoustics and soundscapes, and he is involved in working groups of relevant ISOs in both

Keynote Lecture from Prof Lily Wang

fields. Later in the evening we saw Professor Lily Wang (Durham School of Architectural Engineering and Construction, College of Engineering, University of Nebraska-Lincoln) deliver the second keynote lecture of the day, titled *"Linking Indoor Acoustic Conditions to Human Well-Being and Performance"*. Here we learned that acoustic conditions can have significant impacts on human comfort and performance and Prof Wang outlined three separate research studies to illustrate the point (related to K-12 classrooms, Speech comprehension for non-native English language talkers and listeners, and Restaurants).

The encouragement of young professionals is vitally important and in recognition of this I-INCE funds a number of Young Scientists Grants to assist with participation at each Congress. In parallel with these grants, there were a number of events arranged for early career professionals throughout the conference. On Monday morning the Early Careers Breakfast was held and was followed by the presentation of I-INCE travel

Participants at the Early Careers Breakfast getting valuable lessons from I-INCE VP for Technical Activities Prof Patricia Davies

I-INCE President Bob Bernhard with several winners of the Young Scientists Grant

awards later in the day (including a social networking event in downtown Glasgow). The goals of theses events are to provide mentorship via case studies and professional issues presented by world-renowned experts and to hold informal discussions between young professionals I-INCE leaders and senior noise control engineers.

This conference also saw the roll-out of a novel 'Buddy Scheme', which was organized by the IOA EDI Working Group and Early Careers Group for INTER-NOISE 2022. The idea was to partner someone new to the industry with an established expert to help them navigate the conference. Two buddies were assigned to each mentor so that buddies could get to know each other and explore the conference together if they wanted to. By all accounts the Buddy Scheme was a great success and it is hoped that similar schemes will be rolled out at future conferences.

Over 800 technical presentations were delivered throughout the conference

Tuesday August 23rd

The congress continued on Tuesday and opened with 15 parallel technical sessions covering a wide range of topics. Both the technical sessions and the exhibition continued through this day. There was active participation in both with many excellent papers.

Tuesday also saw two more keynote lectures. The first was delivered remotely by Dr Yu Liu (Department of Mechanics and Aerospace Engineering, Southern University of Science and Technology, China), titled *"Acoustic Beamforming Array Design for Source Imaging"*. Dr Liu's main research interested include aeroacoustics, flow and noise control, and acoustic testing techniques, and he has been featured amongst the "World's Top 2% Scientists 2020" by Stanford University in the field of Aerospace and Aeronautics. The second keynote lecture saw delegates treated to a presentation from The Salford Group (Professor Andy Moorhouse, Dr Andy Elliott And Dr Josh Meggitt), who presented on *"Virtual Acoustic Prototypes – a story of four decades"*. The Salford Group is based in the Acoustics Research Centre, University of Salford, UK, and has been involved in structure-borne sound prediction methods since, in Andy Moorhouse's case, the early 1980s. Recently, the group turned its attention to transfer path analysis (TPA), developing it from a purely diagnostic method into a range of approaches allowing the construction of accurate and sophisticated virtual acoustic prototypes.

Tuesday evening saw the annual Conference Social Event return with quite a bang at Merchant's Square in Glasgow city center – one of Glasgow's most vibrant and historic venue. Delegates were greeted at the entrance by a bagpipe plate, and entertainment and dancing continued throughout the night. There was a traditional Scottish ceilidh (a Gaelic word for a casual party with music, dancing and entertainment).

Keynote Lecture from Dr Yu Liu

Keynote Lecture from The Salford Group

Delegates being welcomed to the INTER-NOISE Social Event

Music and entertainment at Merchant's Square

Wednesday August 24th

Technical sessions continued until lunch time on Wednesday and ended with the final plenary lecture from Professor Bridget Shield MBE who gave a lecture titled *"A Sound Environment for Schools: Sixty years of Research into the Impact of the Acoustic Design of Schools – A Review"*. Prof Shield is Professor Emerita at London South Bank University, where she spent 30 years in teaching and research in environmental and architectural acoustics. Her research areas included modelling of sound and subjective responses to noise, focusing on the effects of noise in schools. In 2021, she was awarded the MBE (Member of the Order of the British Empire) for services to acoustic science and to inclusion in science and engineering. It was a real treat to see her speak.

The Closing ceremony was held after this talk on Wednesday afternoon. Barry Gibbs thanked all those present for attending the congress, and congratulated all on the quality of the papers presented. I-INCE President Bob Bernhard declared the closing of INTER-NOISE 2022, and the ceremony concluded with an invitation to Chiba (in the Greater Tokyo area), Japan for INTER-NOISE 2023!

100s of Noise Control professionals participated in the Ceilidh at the Social Event

Final Thoughts from the Editor

It seems like there were so many additional features and satellite events taking place that there was something for everyone. It was particularly interesting to sample some of the soundscape entries as part of the Scottish Soundscape Prize. For this, UK based students were invited to enter submissions into a soundscape competition to create an experience that makes a difficult acoustic space in the SEC more pleasant, engaging, relaxing and restorative. A shortlist of submissions were exhibited throughout the conference, and a winner and runner up were chosen by a panel following judging its performance from within the space. The winner was Carmen Rosas-Perez from Herriot-Watt University.

Overall the conference was a complete success. It was a great return to a full-scale in-person conference, with the added benefit of several hybrid features, that will hopefully become commonplace amongst conferences going forward. It was particularly nice to see such large engagement and participation from Young Professionals and I hope this continues in future years.

See you all in Japan!

All photos courtesy of the INTER-NOISE 2022 Team.

Keynote Lecture from Prof Bridget Shield MBE

A full house for the INTER-NOISE Opening Ceremony

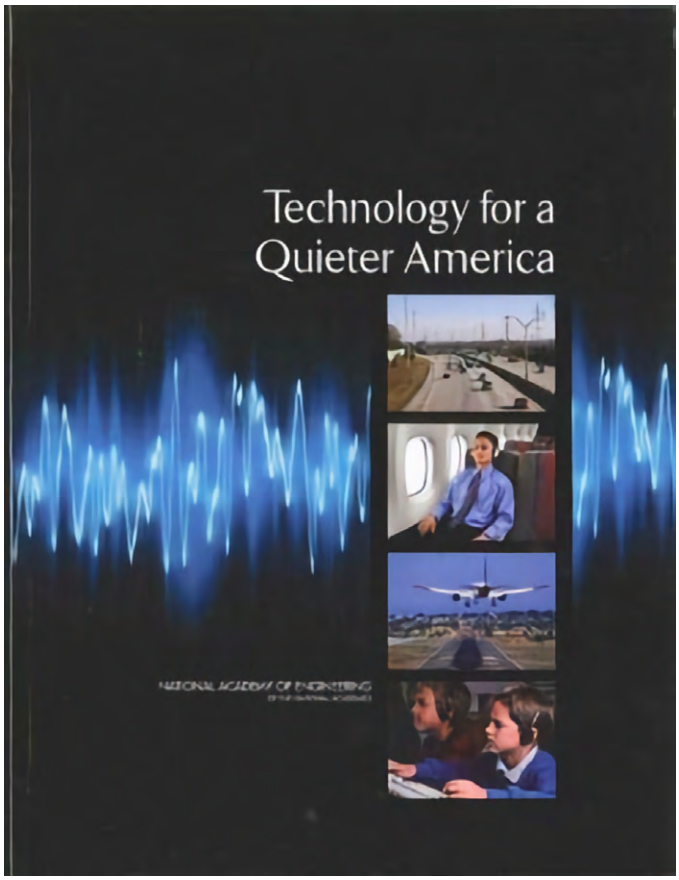
Looking forward to INTER-NOISE 2023 in Japan

Technology for a Quieter America Workshop Reports

Since 2012, there have been a series of workshops held by the Technology for a Quieter America (TQA) Working Group. The reports from these workshops provide valuable insights to major noise control issues.

These reports are available at no charge on the INCE-USA Website: Technology for a Quieter America – Institute of Noise Control Engineering (inceusa.org).

- Noisy Motorcycles - An Environmental Quality of Life Issue
- Noise Barriers and Quieter Pavements: A Cost-Benefit Analysis
- Reducing Employee Noise Exposure in Manufacturing: Best Practices, Innovative Techniques, and the Workplace of the Future
- Engineering a Quieter America: Progress on Consumer and Industrial Product Noise Reduction
- Engineering Technology Transfer: Research and Development for Engineering a Quieter America
- Commercial Aviation: A New Era
- UAS and UAV (Drone) Noise Emissions and Noise Control Engineering Technology
- Noise Control Engineering Education: The TQA Final Report
- Noise Control Engineering Education: Special Session at NOISE-CON 2019
- Engineering a Quieter America | Aerial Mobility: Noise Issues and Technology
- Advances in Noise Control Engineering
- Protecting National Park Soundscapes



New reports are added each year as the workshops are completed. You may want to check back to see the latest reports.

inter-noise 2023
CHIBA,GREATER TOKYO 20-23 AUGUST

Dear Our Colleagues,

INTER-NOISE 2023, the 52nd International Congress and Exposition on Noise Control Engineering, is held in Chiba, Japan from 2023 August 20 through August 23. The Congress is sponsored by the International Institute of Noise Control Engineering (I-INCE) and co-organized by the Institute of Noise Control Engineering of Japan (INCE/J) and the Acoustical Society of Japan (ASJ). The organizers and the Organizing Committee of the Congress extend a warm welcome to all prospective participants world-wide and invite all to join us in Chiba to discuss and share the latest advances on noise and vibration control engineering and technology, focusing on our Congress Theme of "Quieter Society with Diversity & Inclusion."

INTER-NOISE 2023 will feature a broad range of invited and contributed papers, together with plenary lectures by distinguished speakers. Technical papers related to the congress theme will be accepted with a special acknowledgement. Research papers in all other fields of noise and vibration control are welcome too. There will be extensive exhibitions of noise and vibration control technology, measuring instruments, equipment and systems from all over the world.

INTER-NOISE 2023 is held at the International Conference Hall of Makuhari Messe, where is very close from two international airports, Narita and Haneda. It takes only 30-40 minutes by express buses from each international airport to the Makuhari Messe. It will be helpful especially for foreign participants because of less physical loads after the long flights.

It is our pleasure to welcome you to INTER-NOISE 2023 and Chiba. We are sure you will enjoy all aspects of the Congress and Chiba. We look forward to meeting you soon in Chiba. Tokyo is just in 30 minutes range as well as the beautiful countryside is also in 30 minutes. The ocean, Tokyo Disney Resort, traditional Japan, and many great destinations are easy to reach from Makuhari. Please visit https://www.visitchiba.jp/ and https://www.visitchiba.jp/things/makuhari/.

Sincerely yours,
Shinichi Sakamoto
Inter-Noise 2023 Congress President

Registration

You can register at https://internoise2023.org/registration-2/. The registration fees apply whether an on-site or online delegate.

For On-site delegates, Registration Fee includes the following items:

- All conference materials,
- Access to all scientific sessions, exhibition,
- Refreshment breaks,
- Access to online livestreams and recorded presentations.

For Online delegates, registration fee includes the following items:

- Access to 8 live streams (opening and closing ceremony, 2 plenary and 4 keynote presentations) directly from Inter-Noise 2023 from the International Conference Room,
- Access to the recordings of the presentations of the technical sessions. (Recordings will be available within approximately 24 hours after the congress has taken place).

Registration Fees are in JPY and include VAT @ 10%.

	Up to May 19	Up to July 21	After July 22
Regular Participant	81,200	86,800	92,400
Student	16,800		22,400
Accompanying person	16,800		
Additional paper	8,400		

Abstract Submission

Papers related to the Technical Areas listed below as Structured Sessions and technical program topics are especially welcome for presentation at the Inter-Noise 2023 Congress, but technical papers in all areas of noise and vibration control can be submitted for inclusion in the technical program. List of Structured Sessions is also shown at https://internoise2023.org/wp-content/uploads/2022/11/IN23_Session.pdf.

Technical Areas

1. Flow Induced Noise & Vibration
2. Vibro-Acoustics
3. Signal Processing & Measurements
4. Modeling & Numerical Simulation
5. Active Control of Sound & Vibration
6. Transportation Noise
7. Aircraft Noise
8. Vehicle Noise & Vibration
9. Industrial Noise
10. Underwater & Maritime Acoustics
11. Acoustic Materials
12. Building & Architectural Acoustics
13. Environmental Noise
14. Perception & Health
15. Sound Quality & Product Noise
16. Soundscapes
17. Noise Policy & Management
18. Theme-related & Novel Approaches

Abstracts must be submitted in English, which is the official language of all matters relating to Inter-Noise 2023. The corresponding author will be required to certify that the content of the proposed papers has not been presented at an engineering or scientific conference (with copyright held by the conference organizer) or published in an archival refereed journal; a statement by the authors shall be required at the time of paper submission. Please note that upon submission the copyright is transferred the publishing organization, I-INCE. Also note that all oral presentations will be recorded and available online for conference registrants for several weeks post the conference. By submitting an abstract you are agreeing to your presentation being recorded and available to delegates online.

Abstract submission will be submitted on Abstract/Paper management system, named as "Confit", which has both functions Registration and Payment.

Please follow below:

1. Create a new account or log in to an existing account. (See https://internoise2023.org/registration-2/)
2. After logging in, click on "New Submission" in "Abstract Submission" and follow the instruction on the system.
3. After completing the abstract submission, you will receive an email confirmation.
4. In case of submission more than one abstract, an extra fee of 8,400 JPY will be applied to each additional abstract.

Abstract acceptance notice will be sent via email in March 2023. All presenters are required to finish payment of their registration fee before the paper submission.

The abstract shall contain at least 100 words and at most 200 words. Hyperlinks, special characters, equations, images, and drawings should NOT be put in the abstract, and avoid the use of acronyms.

Paper titles should be in sentence case: only the first word and proper nouns are capitalized.

The submitted abstracts and author information will be included in the program list, booklet, and so on without being modified and will be distributed at the conference.

Authors may edit and modify submitted information until the submission deadline. It is the responsibility of the authors to ensure the accuracy of the abstracts. Authors may choose their intention of presentation type (Onsite-Oral, Onsite-Poster, or Online Pre-recorded) at present. See https://internoise2023.org/authors/ in detail.

Technical Papers

Technical papers must be submitted as PDF files. The paper templates for both Microsoft Word and LaTeX formats are available at https://internoise2023.org/authors/. These templates are to ensure the uniformity of the publication. Please follow the instructions in the templates carefully.

Some authors have requested in the past Inter-Noise congresses that their papers should be assessed in order to seek funding for congress registration and travel expenses. This practice will continue for Inter-Noise 2023 congress by free of charge. The paper will be assessed (if requested when abstract is submitted) to judge its suitability for presentation at the congress and inclusion in the Inter-Noise proceedings and database. Note that the full paper submission deadline is earlier and anonymous referees, as selected by the technical program co-chairs, may be asked to provide quick comments regarding the scope and substance of assessed papers as well as suggestions that will lead to improved manuscripts. The authors will then be asked to upload revised papers by the deadline provided by the technical program co-chairs.

Presentation Format

Inter-Noise 2023 will be held as a live/in-person congress. The presentation format will be oral or poster style at the venue. In order to accept the diverse needs of participants, Inter-Noise 2023 will accept the alternative presentation format using pre-recorded video presentation. Details of each format is described below. Regardless of the presentation format, all submitted manuscript except no-show papers will be published in the proceedings and the INCE-USA digital library (https://www.inceusa.org/publications/ince-digital-library/).

(1) Onsite oral

Shall be scheduled in the technical session program onsite. The oral presentation will be allocated in 20-minute slot: 15 minutes for presentations, 3 minutes for Q&A, and 2 minutes break for transition to next presentation. A PPT template for Inter-Noise 2023 will be available to be downloaded from https://internoise2023.org/ at a later date.

All onsite live presentations will be recorded and made available to all participants via the online congress platform after approximately 24 hours. All participants can watch the video at any time. The authors can have interactive text-based discussions with participants on the platform.

(2) Onsite poster

Shall be included in poster session that will be scheduled in the technical session program onsite. We are planning to emphasize the on-site poster session as an opportunity for building networking among congress participants. Posters and videos will not be posted on the online congress platform.

(3) Online pre-recorded

Shall be available on the online congress platform after the first day of this congress. All participants can watch the video at any time. The authors can have interactive text-based discussions with participants on the platform. Recording format and the method how to submit the pre-recorded presentation will be announced later. A PPT template for Inter-Noise 2023 will be available to be downloaded from this website at a later.

	Onsite Oral	Onsite Poster	Online Pre-recorded
Included in proceedings	YES[1]	YES	YES
Presentation videos will be available in online congress platform	YES *Recorded video of onsite live presentation	No	YES *Pre-recorded presentation video
Proceeding pdf will be available in online congress platform	YES	YES	YES
Realtime discussion and networking at congress site	YES	YES[2]	No
On-site congress kit (name tag, congress bag, booklet, etc.)	YES	YES	No
Attending social programs	YES	YES	No

1 In case of no-shows, the papers will not be included in the INCE-USA digital library, and the registration fees will not be refunded.
2 We are planning to emphasize the onsite poster session as an opportunity for building networking among congress participants.

Key dates

Key dates are shown below:

- Call for abstracts: 2022 December 1
- Registration opens: 2022 December 1
- Abstract submission deadline: 2023 February 10
- Abstract notification: 2023 March 24
- Paper submission deadline (requiring assessment): 2023 April 21
- Paper submission deadline: 2023 May 19
- Early registration deadline: 2023 May 19

Exposition and Sponsorship

Please see https://internoise2023.org/registration-2/. If you have any inquiries or questions regarding Exposition and Sponsorship, please don't hesitate to contact inter-noise2023@ig-online.jp.

Young Professionals

Young professionals are students and also people who are early in their careers (a few years after graduation). Below are the preliminary plans for Young Professional at Inter-Noise 2023.

Things may change but changes will be posted on https://internoise2023.org/young-professionals/.

- Sunday, August 20th, 10:00am-3:30pm, I-INCE Practice School (Case Studies on Noise Control). Please indicate interest when you register and confirm in response to an email sent just before the Congress.
- Monday, August 21st, 7:00am-8:00am, Students/Young Professionals Breakfast.
- Monday, August 21st, 3:00pm-5:00pm, I-INCE Young Professionals Workshop.
- Monday, August 21st, 5:00pm-5:30pm, I-INCE Young Professionals Awards Presentations.
- Monday, August 21st, 5:30pm-6:30pm, Social Networking Reception (by invitation).

Afterwards join Inter-Noise Attendees at the Exposition Opening Reception. If you need further information, please contact to the I-INCE Vice President for Technical Activities (daviesp@purdue.edu and senos@itu.edu.tr).

Visas

From 2022 October 11th, pre COVID-19 visa exemption arrangements have been resumed. Please refer to MOFA website for more details.

If you require a letter to confirm your registration, please complete the online registration form and make payment. Please email inter-noise2023@ig-online.jp to request a letter after you have registered and made payment. If your visa is declined, we are only able to offer refunds in line with our cancellation terms and conditions.

COVID-19

All entrants must get either a valid vaccination certificate or a COVID-19 negative test certificate before departure. A COVID-19 test must be conducted within 72 hours prior to your scheduled departure time. Note that the 72-hour window is counted from the time your sample is taken, not from the time you receive your results. For more information, please refer to the following pages.

Valid COVID-19 Vaccination Certificate:
https://www.mhlw.go.jp/stf/covid-19/border_vaccine.html

Covid-19 Negative Test Certificate:
https://www.mhlw.go.jp/stf/covid-19/border_test.html

For more detail information, please visit the following website: https://www.japan.travel/en/practical-coronavirus-information/travelers/

Congress Secretariat

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Secretary General: Hiroyuki Imaizumi
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Abstract/Proceedings: Tatsuya Morishita, Masahiro Toyoda
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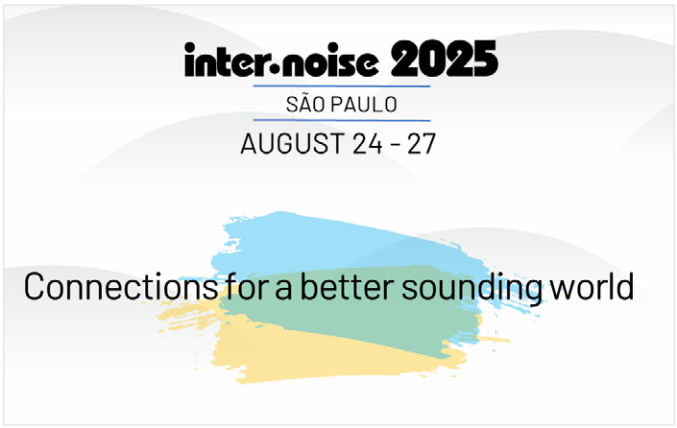
NOISE/NOTES

Eoin A. King, NNI Editor

NNI is on Facebook and Twitter – we try to keep our readers informed with noise news from all across the globe by highlighting interesting research and projects. Here is a roundup of some of the stories that have been making headlines. Follow @NNIEditor to stay up to date with all noise related news.

INTER-NOISE 2025 Confirmed for Brazil!



After Brazil successfully headed the 1st Latin American Symposium (during INTER-NOISE 2021), it has been announced that the bid from ProAcústica to host INTER-NOISE 2025 in the city of São Paulo, Brazil, has been successful! We look forward to seeing you all in Brazil in 2025!

Acoustics and Hybrid Work

The International WELL Building Institute (https://www.wellcertified.com/) recently hosted a webcast titled 'Acoustics in the world of hybrid work', looking at the current trends and research around health, performance and the new workplace. It was agreed at the outset that acoustics in the world of hybrid work is a critical topic to consider as more and more people are working from home.

The Lancet says Noise Pollution needs more attention

A recent Editorial in the Lancet notes that noise pollution receives far less attention than air or water pollution because "it cannot be seen, tasted, or smelled." It also recalls a quote from Nobel Prize winner Rober Kock who in 1910, predicted that "One day man will have to fight noise as fiercely as cholera and pest", and argues that this prediction acts as a warning for today: action is needed now before noise pollution reaches epidemic proportions.

Noise Pollution identified as a 'menace to humanity – and a deadly threat to animals'

Karen Bakker (Director of the University of British Columbia's Program on Water Governance) writes in The Guardian (UK) to describe the adverse impacts of noise on marine life. The article identifies noise pollution as "one of the gravest yet least recognized health threats of our time", and focuses on the threat that marine noise pollution poses to our oceans. The threat is significant – the article reports that a single shot from a seismic survey air-gun can kill zooplankton – the foundation of the marine food chain – up to a mile away from the detonation site.

The Toxic Effects of Noise

Leaps.org (a non-profit, editorially independent media platform) recently published an extensive feature describing the effects of noise. The article features contributions from many people working in the field of Noise Control, including the Quiet Coalition, the Community Noise Lab (Brown University School of Public Health), and regular NNI contributor, Jim Thompson. It is well worth a read.

Switching Perspectives – Sounds can be Good For You

Here at NNI we are often caught up with the negative aspects of exposure to noise, but it is often worthwhile to consider the positive aspects of a healthy acoustic environment. Time magazine recently reported on how sound can improve happiness. It notes that ears, unlike eyes, have no on/off switch, and this makes it different to manage today's world. However, it turns to some studies to show how sound can help make us happy – for example, a study in South Korea found that forest sounds led to not only self-reported feelings of comfort, but also decreased heart rates and other physiological indicators of relaxation. Elsewhere, meditation or mindfulness sessions with singing bowls have been shown to help slow heart rate and lower blood pressure more effectively than practices involving silence. This is well worth a read for those of you who might be exhausted by constant reporting on the negative aspects of noise.

International Representatives

Below is a list of international contacts for the advertisers in this issue. The telephone number is followed by the fax number where available. In cases where there are two or more telephone numbers per location, or several locations within a country, a semicolon (;) separates the telephone number(s) from the respective fax number. Advertisers are asked to send updated information by email to jlessard@virtualinc.com.

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