

How instrumentation specification standards can contribute to the United Nations Sustainable Development Goals

This article discusses the alignment of the work of the international standardisation committee, IEC/TC29 'Electroacoustics', with the United Nations Sustainable Development Goals (SDGs), which are part of the UN Agenda for Sustainable Development.

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Sustainability is very much a topic of interest at present, and indeed 'Noise control in a more sustainable future' was the subject of Inter-Noise 2022, but how does sustainability relate to international standards written to specify the performance of commonly used acoustical instruments?

While some authors apparently estimate there are over 300 definitions of 'sustainability' and 'sustainable development', the Oxford English Dictionary defines sustainability as *'The property of being environmentally sustainable; the degree to which a process or enterprise is able to be maintained or continued while avoiding the long-term depletion of natural resources'*, but how does, or can this definition, relate to specification standards?

Fortunately, the UN has provided more detail on their SDGs (see below) and recently IEC/TC29 has been exploring how the work of the committee fits with these.

IEC/TC29's technical work is related to sound-in-air and the standardisation of associated instrumentation for acoustic and audiometric measurements. The committee has Working Groups (WGs, who usually write new standards) and Maintenance Teams (MTs, who revise and maintain existing standards) looking at performance requirements, calibration and test methods for items such as microphones, sound calibrators, sound level meters, filters, equipment used

for measurement of aircraft noise, audiometric measurement systems and related instruments and equipment, including transducers (earphones and bone vibrators), ear simulators, hearing aids and induction loop systems. Standards concerned with methods of measurement are covered by ISO/TC43 'Acoustics'.

United Nations Sustainable Development Goals

The UN 2030 Agenda for Sustainable Development adopted by all United Nations member states in 2015, provides 'a shared blueprint for peace and prosperity for people and the planet, now and into the future'. To assist with this it details 17 SDGs as shown in Table 1.

Looking at the titles of these SDGs it is apparent acoustics and acoustical instrument specification does not fit with all of these goals but the number of areas where acoustics and standardisation can contribute, either directly or indirectly, is actually quite surprising. While this article does not cover work on ultrasonics or underwater acoustics (which are performed under IEC/TC87 'Ultrasonics' and ISO/TC43 'Acoustics') it is clear that those areas also make key contributions to the SDGs. Taking a wider view and considering all the work across the many topic areas both within IEC and ISO it can be appreciated that standards bodies can play an important role in the vast majority, if not all, of the SDGs.

UN SDG no.-Title	
15	No poverty
255555555555555555	Zero hunger
35	Good health and wellbeing
45	Quality education
55	Gender equality
65	Clean water and sanitation
75	Affordable and clean energy
85	Decent work and economic growth
95	Industry, innovation and infrastructure
105	Reduced inequalities
115	Sustainable cities and communities
125	Responsible consumption and production
135	Climate action
145	Life below water
155	Life on land
165	Peace, justice and strong institutions
175	Partnerships for the goals

Right:
Table 1:
United Nations
Sustainable
Development Goals

The Convenors of the IEC/TC29 WGs and MTs have been considering links to the key SDGs where TC29 can make a strong contribution now and over future years, and these are shown in Table 2. It is also likely that smaller contributions are made to some of the other SDGs.

Below:
Table 2:
United Nations Sustainable Development Goals with key contributions from IEC/TC29

UN SDG no.	Title
3	Good health and wellbeing
8	Decent work and economic growth
9	Industry, innovation and infrastructure
10	Reduced inequalities
11	Sustainable cities and communities
13	Climate action

Contributions of IEC/TC29 to DGs

Each IEC/TC29 WG/MT has provided more detail on current and likely future contributions to the SDGs which can be summarised as follows:

SDG 3: Good health and wellbeing

It is quickly apparent this is an SDG where TC29 can make a major contribution.

It is well known that noise provides a risk to human health and the World Health Organization states that *'excessive noise seriously harms human health and interferes with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour'*. Noise is a major pollutant and vies with air pollution in having the greatest impact on health and wellbeing. It is therefore vital that the instruments used to measure environmental noise – whether it be industrial noise, transportation noise, windfarm noise etc – are specified internationally in IEC standards and there are testing protocols available to show that the *model* of an instrument such as a sound level meter, sound calibrator or filter set, for example, meets the full specifications of the standard (known as pattern evaluation testing), and that *individual specimens* of instrument still meet the requirements on an ongoing basis (known as periodic tests), and that these tests are included in the relevant

IEC/TC29 standards. Applying for pattern evaluation tests to nominated institutes is usually the responsibility of the device manufacturer or supplier, whereas applying for periodic testing of a specific device is the responsibility of the user. These periodic tests will often be performed by an accredited laboratory – in the UK, the accreditation body is the United Kingdom Accreditation Service (UKAS). As an example, more details on the variety of testing available for sound level meters can be found in Ian Campbell's Instrumentation Corner articles in the March/April 2022 and May/June 2022 issues of Acoustics Bulletin.



Noise impact of aircraft take-offs, arrivals and overflights also constitutes a significant environmental impact and TC29 produces specific standards for the instruments used in aircraft noise type certification, with the aim of ensuring comparability around the world.

In an increasing number of applications acoustic measurements are no longer made with stand-alone sound level meters, but with modular (often computer-based and multichannel) systems that are user configurable. TC29 is therefore now working on a new standard for modular instrumentation systems, recognising the need for standardisation in this area.

Specifications for instruments to measure hearing and instruments to characterise the hearing aids required to help with hearing loss are a major topic for TC29. Hearing is one of our key senses and it is well known that hearing loss can be detrimental to human quality of life in various ways.

TC29 ensures hearing loss can be reliably and consistently diagnosed at all stages of life by providing standards for ear simulators and audiometers. With modern day electronics and software, hearing aids can now be adapted very specifically for individuals to ensure they obtain maximum benefit from their device, but of course their performance needs to be well-defined and verified and TC29 also provides specification standards for hearing aids.

Once a user has a suitable hearing aid it is important that they can use it as effectively as possible and in as many different situations as possible. TC29 again plays a part here by providing standards for hearing loop systems and system components for assisted hearing. Standardisation is required because magnetic field strength, signal-to-magnetic noise ratio and frequency response are key in securing usable communication with hearing aids. [P42](#)





SDG 8: Decent work and economic growth

Although this initially seems a rather more tenuous link to TC29 the standards written clearly have an impact on the instrumentation that is used in everyday work in acoustics, to help ensure reliable and reproducible results, particularly in safety critical environments with consequential impact on economic growth. For many years the IOA has been very much at the forefront of training and education in acoustics and for acousticians, via the IOA Diploma, training courses and Certificates of Competency, although numerous other examples could have been mentioned. The IOA is now looking to take this offering further by seeking a Royal Charter and the associated grant of Chartered Status, as well as developing other new training materials.

A further key example is the primary and secondary schools' competitions following on from the success of the secondary schools' competition last year. As part of this wide IOA remit, training in the use of acoustical instruments is a prerequisite to acousticians learning the trade in many sectors including consultancy, government, health,

and academia. Use of international standards also means skills can more easily be transferred between countries, and this is also true for manufacturers selling their acoustical products around the world – so there are definite links to this SDG.

SDG 9: Industry, innovation and infrastructure

Over recent years the approach to building new infrastructure has changed with new innovations, for example in buildings or related to transportation. Industry places much more accent on remote management, monitoring and operation – the term 'Smart cities' is often used – and this, in turn, requires a new approach to measurement, including of noise. This will necessitate development of appropriate standards to ensure reliable measurements at the required level of accuracy. Innovation in terms of modular instrumentation is already being addressed by TC29. Wider use of cheap integrated sensors such as MEMS microphones are another example, with TC29 already having those on their radar of future topics to be addressed by the committee.

SDG 10: Reduced inequalities

This SDG looks at worldwide impacts and benefits and much has been written on health and wellbeing inequalities in different continents. An example of this is testing of hearing and dealing with any resultant hearing loss as mentioned in SDG 3 'Good health and wellbeing', where the ability to test and treat hearing disorders varies widely around the world.

TC29 aims to ensure that its specification standards are as simple as possible to implement, so they can be used readily in less developed areas, and has also been active in specifying equipment for neonatal screening programmes especially for use in developing areas around the world.

This SDG also overlaps with SDG 8 'Decent work and economic growth' above, particularly in terms of training and provision of transferable skills around the world.

SDG 11: Sustainable cities and communities

Populations are growing in many areas of the world, and often this means more people are living in cities with the consequent pressure on city infrastructure. Indeed, the UN estimates that more than half of us live in cities and, by 2050, two-thirds of all humanity – 6.5 billion people – will be urban.

Considerations of sustainability e.g. for infrastructure, buildings, transport, health and safety often have unwanted side effects and a key example of this is noise. As well as transport noise, changes in energy delivery including more accent on windfarms at the expense of fossil fuels and the more recent suggestion of heavier use of heat pumps, particularly in domestic situations, will lead to other noise challenges. Here again standardisation of the instrumentation used to measure

the noise plays a vital role, and can be useful in improving future environmental quality, for example within buildings.

Infrasound, such as from windfarms, is becoming of increasing importance and TC29 has just started developing standards for calibration methods at infrasound frequencies, to improve the quality of data obtained from microphones and other acoustic sensors. Distributed, embedded sensors used as part of environmental management solutions will also require TC29 to continue to consider what new specification standards are required. Creating career and business opportunities through these routes and SDG8 will also benefit communities.

SDG 13: Climate action

Climate change and actions required is a major factor in many

key decisions for countries going forward and not many days pass without this topic being mentioned in the news. For TC29 this SDG links very closely to the actions outlined in SDG8 and SDG11 above, so they are not repeated here. Nevertheless; it is again clear that provision of good, relevant specifications standards is vital to work on climate change.

Conclusions

Examination by IEC/TC29 'Electroacoustics' of the UN Sustainable Development Goals has shown many clear links to the international standardisation of acoustical instruments, although at first glance these may not be obvious. Looking more widely across IEC and ISO as a whole it can be appreciated that standards bodies can play an important role in the vast majority, if not all, of the SDGs. ©



Further information on the SDGs can be found at <https://www.un.org/sustainabledevelopment/sustainable-development-goals/> and further information on IEC/T29 at <https://tc29.iec.ch/>