

## Summary: "Future Sound Tech Solutions" – Meeting #17

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Meeting # 17 in the working group "Future Sound Tech Solutions" took place on April 16, 2024.

### Agenda

1. Short presentation of new WG members
2. Discussion on:
  - a. Other initiative than webinars and physical events?
3. Webinars & Physical events during 2024:
  - a. Follow-up on proposals and ideas from meeting # 15 including additional comments and proposals.
  - b. Proposals for possible speakers
  - c. New themes?
4. Collaborative projects, update of proposals, indication of possible project consortia.
5. News from DSC secretariate
6. A.O.B.

### Presentation of new Work Group Member

Two new members have joined the working group.

#### Torben Christiansen,

Torben Christiansen is Director of Technology, Technology Development at EPOS Group A/S. EPOS is a headset company making headsets, video bars for conferencing, etc. EPOS is a medium sized company, and Torben gets involved in most of the activities related to technology in the company. The EPOS company is currently owned by Demant but is up for sale. New owners have not yet been revealed.

Torben is a well-known contributor to Danish Sound Cluster activities over the years and has taken active part in several sound activities.

#### Miikka Tikander

Miikka Tikander, Director, Head of Acoustics, Bang & Olufsen A/S, joined Bang & Olufsen in 2022 as a Program Management Director. He has in addition been Head of Acoustics in B&O for about 1 year, serving on two major functions. Miika studied acoustics and audio at Helsinki University. Stayed at the university for about 9 years doing research on augmented reality audio and related topics. Then worked a few years at Nokia, subsequently took a job at Apple in the USA. Returning to Finland Miika joined Huawei, still in the domain of audio technology. Most of his activities in engineering have been related to wearable products for audio applications and he has been involved in a broad spectrum of R&D activities. Miika currently has his main office in Helsinki, although spending almost 50% of his working time in Struer with Bang & Olufsen.

### Working Group retirement

Jeremy Marozeau, assistant professor at DTU, Department of Health Technology, Hearing Systems Section, has obtained a new job assignment in Switzerland and will shortly be moving to Geneva. For that reason, he has decided to retire from the working group, as he will no longer have an active role in Danish sound activities.

## Ad 2.a: Other initiative than webinars and physical events?

Can we do more to support our focus on ideas for Future Sound Tech?

Some ideas:

1. Competition among Students at Universities to come up with advanced solutions, novel ideas, for Future Sound Tech Solutions.  
Best idea/concept/solution wins a prize of e.g. 25.000 DKK. Event for Prize Award, where e.g. DR1 and TV2 are invited to broadcast winners and ideas in the news.
2. Have schools throughout Denmark be involved in creating ideas/proposals for smart sound solutions, even have them create solutions. Run as a competition.
3. Others?

During the discussions the WG endorsed the idea of running a competition among students at universities. It has been included as a new theme, No. 29, that we aim to discuss in more detail at the next meeting.

## Ad 3: Proposals for Webinars & Physical Events

#	Subject	Background
15	Speech Prediction	<p><b>Background:</b></p> <p>Speech Prediction is a topic in its own right - and interests seem high. The aim is to find an approach to overcome the middle frequency range challenge, where existing solutions (see below) appear to fail.</p> <p>Active noise cancellation, ANC, can remove low frequency noise and passive noise cancellation can remove high frequency elements.</p> <p>Some research on speech Prediction exists, but in general it is today still a tiny R&amp;D domain.</p> <p><b>Potential speakers:</b></p> <ul style="list-style-type: none"> <li>• Johannes Sars ? (check with Niels Pontoppidan)</li> <li>• Yurii lotov, Ph.D. Student, AAU in collaboration with Jabra (contact e.g. Jesper Rindom, AAU)</li> <li>• Ivan ?, Microsoft (see: <a href="#">Microsoft's new AI can simulate anyone's voice with 3 seconds of audio   Ars Technica</a> )</li> </ul> <p>Facundo has been in contact Yurii lotov on the topic. Yuri is currently very busy completing his Ph.D., and some of his work addresses sensitive patent applications, so he is at the moment not able to take active part in a webinar. He appears willing at a later point in time, most likely early 2025, to assist in a webinar.</p> <p>The topic is interesting, and we decided to keep it on the list and then try early 2025, if we can set up a webinar.</p>

#	Subject	Background
21a	<p>Augmented sound in future society</p> <p>Focus on Auracast</p> <p><b>(Webinar 2024)</b></p> <p><b>Follow-up to the SoundDay panel discussion</b></p>	<p><b>Timing:</b></p> <ul style="list-style-type: none"> <li>• Q2, 2024</li> </ul> <p><b>Industrial perspective.</b> The Hearing Aid industry is promoting Bluetooth Auracast, and some companies are investing significantly in Bluetooth Auracast.</p> <p><b>Moderator:</b></p> <ul style="list-style-type: none"> <li>• <b>Nick Hunn</b> should moderate and give an overview presentation.</li> </ul> <p><b>Potential other candidates for industry case presentations:</b></p> <ul style="list-style-type: none"> <li>• <b>Bjarne Klemmensen</b>, Oticon (confirmed by Niels, mail 11 May 2023)</li> <li>• <b>Søren Møllskov Larsen</b>, WS-Audiology (Morten has checked with Søren Møllskov Larsen and he is willing to take an active role)</li> <li>• Thomas Olsgaard, to focus on Auracast applications in hearing aids (<b>Facundo has contacted Thomas Olsgaard, and he is very willing to take part in a webinar. GN now also have products in the market employing Bluetooth Auracast.</b>)</li> <li>• Chuck Sabin from Bluetooth (<b>proposed by Thomas Olsgaard, and can be contacted through him</b>)</li> </ul> <p>Auracast (focus on broadcast) applications.</p> <p>Auracast is an extension to Bluetooth LE (peer-to-peer communication). The WG agrees that the topic is highly relevant, especially with the focus on real applications of Auracast – we are past the point of just telling about a promising new technology in its infancy. Now the focus is on real world applications. The hearing aid industry seems to be ahead of the consumer industry in use of Auracast for now, and that is where we can learn about first real applications.</p> <p>New Laptops appear to be supporting Bluetooth LE, and it is envisioned that consumer companies by the end of 2024 will launch e.g. headset products supporting Auracast. One product supporting Auracast, Google Pixel phone, is already on the market.</p> <p>For the webinar it is the broadcast version of Bluetooth LE, i.e. Auracast, that should be in focus in view of its use in augmented sound and augmented situations.</p> <p><b>We agreed that it is now time to hand over the practical set-up of the webinar til Jeppe Lindegaard.</b></p> <p><b>Timing for event: Q3 or Q4 of 2024</b></p>

#	Subject	Background
21b	Augmented sound in a Metaverse society	<p>The aim of this topic is also to look for general trends in augmented sound that could pivot the Danish sound Industry into a future leading technologically position in sound – rather than just wait for trends to come to us from the outside.</p> <p>Directions to investigate could be:</p> <ul style="list-style-type: none"> <li>• <b>System devices</b></li> <li>• <b>Metaverse, virtual/augmented audio</b> (<i>Metaverse: Improved digital environment where it is possible to move seamlessly between work, play, shopping, socializing and creativity in one digital landscape</i>).</li> </ul> <p>Professor Damian Murphy, University of York and results from his Lab seems to be quite interesting</p> <p>WG members envision that a real breakthrough will happen, if, and most likely, when large companies, e.g. Apple, bring applications to the market. Then other industries will follow.</p> <p><i>For now, it is a bit difficult to set up a webinar on the theme, but we expect that in the foreseeable future, things will change. For that reason, we keep the theme, and once we can get more substance, we reactivate the planning of an event.</i></p>
23	Better tools for ensuring good audio quality in e.g. field recordings, hence reducing the need for dubbing	<p>The theme is interesting, but we need to scope it better. Highly relevant to have inputs from some of the people that originally have addressed the issue (Birger will try to get Morten Brandstrup, TV2 Danmark A/S involved in a future discussion)</p> <p>Discussion focused on what type of application we would try to focus on. Is it the professional segment, or semiprofessional, e.g. podcasters, or even the consumer community of ‘Youtubers*’ to support better professional audio solutions in terms of recording quality? It was stressed that a future development towards “living in streaming” will eventually involve a huge group of people as well as market opportunities and hence create interest in many audio companies.</p> <p>A major issue is that many users typically lack the understanding of fundamentals of audio. Already now there are good microphone solutions, but a certain understanding of the audio fundamentals is still required. For the more professional users, i.e. journalists in TV broadcasts, a challenge may in addition be the trade-off between cosmetic appearance in a transmission and good audio quality. Boom-arm microphones are certainly the preferred solution, but cosmetic interests seem to dictate use of airpods</p> <p>Can we obtain a list of the 5 top priorities from professional solutions providers in the field, or should we in our own right define the strategy to be pursued?</p> <p>We have not yet reached a conclusion on whether it is possible to launch a highly relevant webinar on the topic, or if we are trying to solve problems that do not need solutions.</p> <p><i>For the next meeting, we will try to obtain better focus on what we can and should do in relation to the topic.</i></p> <p><i>Jeppe has in a previous meeting indicated that he has some ideas on what could be done in this context. He will try to present an updated strategy for discussion of the theme at the next meeting.</i></p> <p><i>All WG members are also encouraged to give the topic some consideration before the next meeting.</i></p>

#	Subject	Background
25	<p><b>Immersive Audio &amp; Quality Development in Digital Meetings</b></p> <p>Reshaped from the original themes: 'Sound Quality in Digital Meetings (#18) and 'Quality of sound in cell phone communication' (#25)</p>	<p>Webinar event planned:</p> <ul style="list-style-type: none"> <li>13 June, 2024, 15:00 – 16:30</li> </ul> <p><b>Background:</b> Transmission of sound quality in communication systems (i.e. digital meetings”) depends on several factors in the individual devices (headsets, speakerphones), echo cancellation, CODECS, compression algorithms, transmission solutions, etc. Even placement of the microphone close to the mouth of the speaker and the acoustic performance of the speaker/listener environments are essential. Add to that that products are getting more complex. E.g. employing several microphones per unit to ensure better performance. 'AI' in various implementations is part of this in part of the entire chain of transmission. Success in a quality transmission of sound depends on the fact that basically all elements in a cascaded effort are performing in an optimal manner. The current webinar theme tries to address some of these vital elements.</p> <p><b>Audience:</b></p> <ul style="list-style-type: none"> <li>Electronic Engineers</li> <li>Machine Learning / AI Engineers</li> <li>DSP Engineers</li> <li>Acoustics Engineers</li> </ul> <p><b>Speakers and topics:</b></p> <ul style="list-style-type: none"> <li>Markus Multrus, Fraunhofer Institute for Integrated Circuits IIS</li> <li>Stefan Bruhn, Dolby Laboratories</li> </ul> <p>See also: <a href="https://danishsoundcluster.dk/immersive-audio-quality-development-in-digital-meetings/">https://danishsoundcluster.dk/immersive-audio-quality-development-in-digital-meetings/</a></p> <p>This event was created in collaboration with IDA – The Danish Association of Engineers. The participant list of this event will be shared with IDA for statistical use only.</p>
26	<p>Autonomous Response to Audio</p>	<p>Some companies, e.g. hearing aid companies, are highly interested in how sound influences human bodies, i.e. human nerve systems. In the past, these companies frequently sent students to Roskilde Festival with equipment to measure and indicate the effects that sound had on the human body. Today, some companies instead send students to New York, so that students can experience on their own body how the surrounding sound and noise are influencing them.</p> <p>Some companies also work closely with schools on the topic. However, there are ethical aspects related to this as well, when techniques are transformed into use in other contexts, e.g. the office, at political events, etc.</p> <p><b>Potential speaker:</b></p> <ul style="list-style-type: none"> <li>Dorothea Wendt, Eriksholm Research Lab</li> <li>Jens Hjortkær, DTU (group of Jeremy)</li> </ul> <p>The topic is about physiological response to different stimuli. Noise is well known to create a lot of issues in that context.</p> <p>The WG agrees that the topic is highly interesting. Torben Ch. will contact the two persons above to acquire more details and Miika will investigate, if the Ph.D. student his company has been involved with on the topic, or anyone she can point to, could contribute to a webinar.</p>

#	Subject	Background
28	Cultural, ethical, and social consequences of new use of sound	<p>How will the way we consume music/sound in the future affect the way we interact?                      What are the social consequences?                      As audio producers how do we take this into account?</p> <p>For example, future use of Auracast may also have an undesired effect of isolation people socially, since the sound transmitted directly into earbud may counteract social contact to people around. Similar effect when people use artificial vision solutions. When developing an augmented world, it is important that we make it distinctable, so that people can realize the differences.</p> <p>Important that we also understand how to handle the negative effects of new sound solutions. It is probably difficult to get people to give formal presentations on the topic, so a panel debate may prove a more efficient way to structure the theme.</p> <p>A new book "Kig op" (Danish) by Jakob Sorgenfri Kjær has been published. He addresses how people cannot find rest, cannot focus, because they are overloaded by massive information streams. Although his focus is on video content rather than audio, a similar effect is likely to influence humans due to massive audio info. May be Jakob Sorgenfri Kjær could contribute to a webinar, offering an "audio angle"?.</p> <p>In general, it may be important not just to fill our lives up with audio but ensure quality and relevant purpose of surrounding audio. Augmenting audio should be as natural as possible.</p> <p>The theme had originally been proposed by Lotte M. Klixbüll, previously Senior UX designer, Jabra. She is now working for Novo Nordisk. May be we can get her involved.</p> <p><b>We will continue the discussion on the theme at our next meeting.</b></p>
29	Competition for students at universities	<p>Competition among Students at Universities to come up with advanced solutions, novel ideas, for Future Sound Tech Solutions.</p> <p>Best idea/concept/solution wins a prize of e.g. 25.000 DKK. Event for Prize Award, where e.g. DR1 and TV2 are invited to broadcast winners and ideas in the news.</p> <p>The WG endorsed the idea. In our next meeting, we will try to frame how such an event can be activated and how we can find sponsorships for the price.</p>

## Next meeting

The next meeting in the working group on “Future Sound Tech Solutions” will take place:

- **Thursday, June 6, 2024, 14:00 – 15:00**

## Appendix 1: Participants in the meeting

Facundo Ramón	GN Hearing	Senior Research Scientist
Miikka Tikander	Bang & Olufsen A/S	Director, Head of Acoustics
Morten Kroman	WS Audiology	VP R&D Electronics
Birger Schneider	CHAMAJ Consult ApS	Director
Torben Vilsgaard	Danish Sound Cluster	CEO



## Appendix 2: Events proposed and promoted by the working group

#	Title	Comments	Event type	Date
1.a	AI/Machine Learning	Workshop (Edge)	On-line	5 April, 2022
1.c	AI in signal processing		Webinar	
2	"Demant Discovery"	Start-up in dialogue with Demant	Networking event	17 March, 2022
4	Audio & privacy	Part of physical conference	Panel discussion	4 May, 2022
5	Sound Quality in Digital Meetings	<ul style="list-style-type: none"> <li>• Position paper</li> <li>• Conference session</li> </ul>	Conference	4 May, 2022
6	Multisensory Processing		Webinar	7 December 2021
7	Sustainable transformation in Audio Companies	Green footprint in sound	Webinar	25 January, 2022
9	Personalization of User Needs		Webinar	1 June, 2022
10	Data Simulation for AI		Webinar	7 June, 2002
11	Perceptual Audio Evaluation		Webinar	13 October, 2021
12	Key Note, Sound Day 2021 "The Sound of Metal"	Oscar Winning Mikkel E.G: Nielsen, Film editor & Nicolas Becker, Sound Designer	Conference, Sound Day 2021	17 November, 2021
	AI in Audio Applications	Conference event at Digital Hi-Tech Summit, Bella Center	Conference	26 October, 2022
19	AI in Audio Applications		Webinar	13 December, 2022
8	Emerging Acoustic Sensor Technologies and Applications		Webinar	14 March, 2023
14	Feedback and noise cancellation		Webinar	9 May, 2023
17	Use of sound with robotics		Webinar	23 May, 2023
27	AI in Music & Sound		Webinar	26 October 2023

## Appendix 3: List of potential Themes

Addressed or proposed in previous meetings but for the time being put on the list of potential topics until the topics are better matured - or the need better identified.

#	Subject	Background	Proposers
13	Hearables, OTC	<p>Theme is rather interesting.</p> <p>However, it is difficult to find speakers. Hearing aid companies are reluctant to contribute since the topic is too close to current business interests. It is not the products themselves but where and how such products are placed in the competitive landscape.</p> <p>University contribution is also not so likely since it is a topic mostly in the business domain.</p> <p>A discussion on what type of products is included under the term "hearables". The product term "hearables" was originally coined for a hybrid of the terms: wearable and headphone.</p> <ul style="list-style-type: none"> <li>• OTC ("over the counter" products) belongs to the category of medical products, i.e. hearing aids. The WG feels that this is a separate domain and does not fit into the general term "hearables".</li> <li>• Instead, most of the "hearables" seen to date are Bluetooth devices that use phones or PCs as the central computing unit. Focus seems to be on mobile communication, real time information services, activity tracking including biometric data, e.g. temperature, heart rate or oxygen saturation.</li> </ul> <p>Although "hearables" is a business domain for many consumer technology manufacturers, several SME's and start-ups also have managed to obtain crowdfunding and soft funding from e.g. EU R&amp;D funding and are active in the area.</p>	<p>Niels Pontoppidan Jonas Raun Hansen Morten Kroman Clément Laroche Tobias Neher Peder Costa</p>