

## Summary: "Future Sound Tech Solutions" – Meeting #05

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Meeting # 05 in the working Group "Future Sound Tech Solutions" took place on January 26, 2026. The meeting agenda was:

1. Webinars:
  - a. Follow-up on proposals and ideas from meeting # 04 including additional comments and proposals.
  - b. Proposals for possible speakers
  - c. New themes?
2. Physical events during 2022
  - a. Meetings? Workshops? Others?
3. Collaborative projects, update of proposals, indication of possible project consortia
4. Other ideas for Danish Sound Cluster activities
5. A.O.B.

The meeting summary also includes some follow-up status info delivered by WG members shortly after the meeting.

Nick Zacharov, FORCE Technology has resigned from the group due to change of job, now working primarily in the USA. Instead Tore Stegenborg-Andersen has signed up as group member. Welcome Tore 😊

## Ad 1a & 1b: Proposals for Webinars

#	Subject	Background	Proposer
1a	AI/Machine learning (ML)	<p>Two workshops from 'Edge Impulse' in planning:</p> <ol style="list-style-type: none"> <li>1. Consumer products Planned for February or March 2022</li> <li>2. Medical products (2-3 months later)</li> </ol> <p>Hybrid event. Some can attend in person and try different hardware that Edge Impulse will supply (Raspberry PI), others can collect hardware from us in advance, if they want, and yet others can simply use their own cell phones and laptops without a need for additional hardware. Everything in the Edge platform can be simulated.</p> <p>Possibility for people with limited background in machine learning to obtain a good understanding of how to use the technology. Afterwards people can scale up to use other types of hardware</p>	Niels Pontoppidan Shelley Uprichard
1b	AI in signal processing (4-5 short presentations)	Completed	Niels Pontoppidan Clément Laroche
1c	AI in signal processing at Sound Day 2021	Completed	Mads G. Christensen
2	Innovation in SME organizations (webinar)	<p>Present business stories for start-up companies and other selected companies. Goal to have 3-4 SME companies to present their business and goals. DSC already held a networking event with SMEs. Some of these companies could form a nucleus for the event. Companies that participated in the networking event include:</p> <ul style="list-style-type: none"> <li>• IDUN Audio</li> <li>• Alvenir</li> <li>• Midwife VR</li> <li>• Auricle</li> <li>• Dive.fm</li> <li>• Enkl Sound</li> <li>• Augmented Hearing IO</li> <li>• Platingate</li> <li>• N-Ear</li> <li>• SOWA sound</li> </ul> <p>The participating SME companies at this point in time were looking for assistance in e.g. sales and funding. Surprisingly not: IP, supply chain challenges, etc. We believe that will come.</p> <p>The SMEs are keen to establish contact to larger companies in the area. WG members open to serve a role of mentoring in this process, but on a personal level, since corporate level interaction may slow down progress.</p> <p>To be successful, DSC secretariat should make and circulate a catalog on each SME (contact details, interest, company focus, etc.) ½ to 1 page per SME.</p>	Torben Vilsgaard

#	Subject	Background	Proposer
3	Redress the great achievements of audio – and address the reality of unsolved audio challenges.	<p>Very interesting theme. However, for now it is not yet mature. Nick Zacharov no longer available for support.</p> <p>Possibly Geoff Martin could offer assistance.</p> <p>The WG still sees events in the area as essential, not sales pitches from selected companies on products, but rather a broader, higher-level type of promotion.</p> <p>Info including market data and importance on industrial importance (job creation, market leads, high tech position) is important to assist in:</p> <ul style="list-style-type: none"> <li>• Industry policy direction and focus</li> <li>• Support to our industry segment in relation to Innovation Foundation R&amp;D funding (we compete against Novo, Lundbeck, others).</li> <li>• Help universities in attracting students to our industry segment (and to Denmark).</li> <li>• SME start-up success</li> <li>• Etc.</li> </ul> <p>We should also include some historic context: why is the audio industry, where it is today? How did high quality in solutions help grow the industry? In fact, high-tech is also a hallmark for several Danish sound-based companies.</p> <p>DC is in the process of updating the previous 2017 industry paper, will be available late spring 2022.</p> <p>In addition to a webinar theme, the focus area here could also include broader promotion in ‘Ingeniøren’, in “Børsen” and other press activities.</p> <p>Torben, Birger and Shelley to assess other options.</p>	<p>Nick Zacharov Niels Pontoppidan Efren Fernandez Torben Vilsgaard Birger Schneider</p>
4	Audio and ‘privacy’	<p>Lars Thinggaard presentation completed at SoundDay.</p> <p>“Topic of audio and privacy” to be included in half-day conference, Spring 2022.</p> <p>“Datalogic Institute” interested to assist in the theme and to host event.</p>	<p>Shelley Livingstone</p>
5	Digital meetings and audio	<p>As a results of a sub-committee meeting, Niels, Mads and Birger generated and delivered a proposal for a ‘guiding star’ or reference paper to be used as:</p> <ul style="list-style-type: none"> <li>• Inspiration paper (people in R&amp;D, students)</li> <li>• Background paper for companies and universities applying for R&amp;D funding (public sources, funds, crow sourcing, etc.)</li> <li>• Reference paper for backtracking importance of the area 2-3 years down the line</li> </ul> <p>More themes for such papers are envisaged. In the first instance, focus will be “Sound quality in digital meetings”. Poor audio quality in digital meetings leads to stress, fatigue, cognitive challenges, etc.</p>	<p>Niels Pontoppidan Mads G. Christensen Birger Schneider</p>

#	Subject	Background	Proposer
5	Digital meetings and audio (continued from previous page)	<p>A small task force is proposed, aiming at generating the ‘guidance star’ paper/reference document. The review process will be handled by the working group and by other members of DSC. Members of the task force:</p> <ul style="list-style-type: none"> <li>• Clement Laroche, Jabra,</li> <li>• Torben Christiansen, Epos</li> <li>• Tore Stegenborg-Andersen, FORCE Technology</li> <li>• Birger Schneider, CHAMAJ Consult</li> </ul> <p>See also Appendix 2</p>	
6	Multisensory processing	Completed	Jeremy Marozeau
7	Green footprint of audio streaming	<p>Webinar: “Sustainable Transformation in Audio Companies”</p> <p>Completed: January 25, 2022</p>	
8	“Emerging Acoustic Sensor Technologies and Applications”	<p>The webinar/seminar is dedicated to acoustic sensors and new sensing technologies. The scope spans solutions leveraging on e.g., energy harvesting and self-powered sensors, sensate media, sensor networks, acoustic array technology, as well as solutions that make use of recent advances in signal processing and artificial intelligence, to go beyond the conventional limits of acoustic transduction.</p> <p>The scope and applications can be broad, yet the underlying common thread consists of technologies that exploit new paradigms in acoustic sensing and audio signal processing, with potential to transform the established capabilities of acoustic sensors and audio devices.</p> <p>In the future sensors will be integrated into all kinds of products. Influence on the traditional sensor market?</p> <p>Possible speaker candidates:</p> <ul style="list-style-type: none"> <li>• Bin Liu (HBK)</li> <li>• G.R.A.S. (Niels Kjærgaard/others)?</li> <li>• Sergei Rotger Griful (Eriksholm)</li> <li>• Auricle-Pedro Costa</li> <li>• Ryan L. Harne (Penn state)</li> <li>• Ji-Ho Chang (Former DTU postdoc, now in KRISS Korea)</li> <li>• Bionic Systems Solutions (Odense, IoT, Robotics, source localization as part of their portfolio)</li> <li>• Claus Blaabjerg, innovation manager at HBK.</li> <li>• The folks from Georgia Tech</li> </ul> <p>Efren helps to shape up the event.</p>	Efren Fernandez Grande

#	Subject	Background	Proposer
9	'Personalization' of user needs	Theme is still immature after Nick Zacharov and Oliver Townsend changed jobs and no longer are available Potential speakers: <ul style="list-style-type: none"> <li>• Bert de Vries (GN Hearing)</li> <li>• Alessandro Pasta (ALPT) <a href="mailto:alpt@demant.com">alpt@demant.com</a> .Senior data scientist at Oticon customer insights group at HQ.</li> </ul> Topic still need more refinement before SHellay can take over.	Morten Kroman Niels Pontoppidan Clément Laroche Jonas Raun Hansen
10	Use of pre-simulated data	Neural networks can be trained using synthetic data to push the use in audio neural network applications. This is cheaper, more efficient and do not require e.g. the Google codec.  For now, focus on pre-simulated data for acoustic simulation of speaker phones for AI applications. Train neural networks using synthetic data.  Potential speaker: <ul style="list-style-type: none"> <li>• Toon van Waterschoot, ESAT, Leuven</li> </ul> Clément will check if Jabra is willing to give a presentation on the topic.  In addition, another presentation from Academia may be useful. Clément will check with Mads.	Clément Laroche Mads G. Christensen
11	Perceptual audio evaluation one-o-one	Completed	Nick Zacahrov Mads G. Christensen
12	'Sound Day 2021 keynote	Completed	Jeremy Marozeau

## Ad 1c: Some ideas for future presentations

Subject	Background
Acoustics and signal processing	<b>Laurent Daudet:</b> Institut Langevin, Paris & . CTO, cofounder of LightOn. They use random optical media to accelerate ML computations physically.  <a href="https://scholar.google.com/citations?user=PCIAcfUAAAAJ">https://scholar.google.com/citations?user=PCIAcfUAAAAJ</a> <a href="https://lighton.ai/team/">https://lighton.ai/team/</a>
Energy harvesting	<b>Ryan L. Harne:</b> Energy harvesting (@ Penn State)  <a href="https://scholar.google.com/citations?hl=en&amp;user=IPCjPOoAAAAJ">https://scholar.google.com/citations?hl=en&amp;user=IPCjPOoAAAAJ</a>
Self-powered Audio Triboelectric Ultra-thin Rollable Nanogenerator (SATURN)	<b>Thad Starner or Gregory D. Abowd @Georgia Tech:</b> Cool prototype  <a href="https://cacm.acm.org/magazines/2020/12/248790-saturn/fulltext">https://cacm.acm.org/magazines/2020/12/248790-saturn/fulltext</a>

## Ad 2: Physical Events

Half day physical events are planned for Copenhagen and Aarhus, Spring 2022

#	Proposal for physical events	Details
1	Event in Copenhagen	<ol style="list-style-type: none"> <li>1. Datalogic Institute – Privacy &amp; Data</li> <li>2. Niels Pontoppidan: What cochlear implants tells us about privacy (and sharing of synthetic hearing-aid usage data).</li> <li>3. Audio experience in the metaverse (local VR companies) – possible panel discussion</li> <li>4. CASPR-II – Zhang-Hua and Jan Østergaard to assist on identifying speakers: Possible topics for talks: <ul style="list-style-type: none"> <li>- DNN based speech enhancement and separation.</li> <li>- Joint far and near-end speech enhancement for headsets</li> <li>- EEG-based perceived SNR of noisy speech</li> </ul> </li> <li>5. Efren – measuring sound remotely with optical sensors. <a href="https://journals.aps.org/prapplied/abstract/10.1103/PhysRevApplied.16.044033">https://journals.aps.org/prapplied/abstract/10.1103/PhysRevApplied.16.044033</a></li> </ol>
2	Event in Aarhus	Details not yet available

### Ad 3: Collaborative projects

DSC is planning to table a new call for collaborative projects around early March of 2022. Now is a good time to start building consortia for upcoming collaborative projects. Experience show that it takes time to form consortia. Often the knowledge institutions are the ones to take the initiative, since they can in contrast to companies obtain funding and thus have the greater incentive. However, a consortium should focus on projects that will be essential for the participating private enterprises.

If seed funding from DSC is seen as important, time is now to get started.

It is recommended to contact the DSC secretariat early on, partly to obtain counselling on what is possible and what needs to be included in an application, partly to obtain assistance in finding partners for a consortium, if that is an issue for establishing a project application.

### Next meeting

**Tuesday March 16, 2022**

**13:00 to 14:00**

## Appendix 1: Participants in the meeting

Clément Laroche	GN Audio - Jabra	Senior Research Scientist
Morten Kroman	WS Audiology	VP R&D Electronics
Efren Fernandez Grande	DTU Electro, Dept. E.E.	Assistant professor
Niels Pontoppidan	Eriksholm Research Centre	Research Manager, Ph.D./MSc
Birger Schneider	CHAMAJ Consult ApS	Director
Torben Vilsgaard	Danish Sound Cluster	Director
Shelley Uprichard	Danish Sound Cluster	Project Manager



## Appendix 2: "Guiding star" note

Danish Sound Cluster  
WG "Future Sound Tech Solutions"



"Guiding star" note:

### "Sound quality in digital meetings"

"Guiding star" paper, i.e. reference note for focus areas within the sound area.

- Purpose: A 1-2 page paper to describe: 1) The background, 2) the situation today, 3) what needs to be done, 4) what it means for Danish companies, 5) expected future development in the market and 6) what it means for Danish companies and knowledge institutions. Topic is defined based on general interest in relation to DSC and SoundDenmark.
- Future use: The reference paper may find application, for example, in connection with fund application for projects as well as for general inspiration, e.g. in connection with creating interest in the area for companies, educational institutions, student recruitment, etc.
- Activity: A small Ad Hoc working group prepares the focus paper.

Current case: "Sound quality in digital meetings" is important. In an era, where video meetings have become common, it is essential to improve sound quality to a level where participants are not affected negatively as a result of joining in video meetings.

Many, who frequently participate in Zoom and Team's video meetings, experience fatigue and stress caused by poor sound quality. For several Danish companies, it is a core area of competence to ensure high sound quality with their products. It is known that to have a strong position in the market, a company's audio products must be better than that of competitors in the market:

Danish global players in the field include:

- Jabra (GN Audio)
- Epos (Demant)
- Bang & Olufsen

Marketing of "sound quality in digital meetings" as focus area on its own right for research is considered a poor approach to success. The subject does not have great opportunities to obtain support in Danish research councils, at EU project funding, etc. Competition from other R&D areas is fierce. However, if the subject can be coupled with stress, cognitive challenges, etc., one stands much stronger.

Many people do not understand why they often feel tired after video meetings. The fact is that sound quality is generally poor in video conferencing, and here much of the explanation of fatigue and stress must be found.

We want a perspective paper on the subject, not least including articulation of future impact.

For the present topic, a small ad hoc working group is proposed with the participation of:

- Clement Laroche, Jabra,
- Torben Christiansen, Epos
- Tore Stegenborg-Andersen, FORCE Technology
- Birger Schneider, CHAMAJ Consult

We envision that the perspective paper can be utilized well in connection with e.g. project applications, as it can serve as a common framework that can be referenced, when needs are to be identified.

Furthermore, we think that a similar approach can be used to put into perspective other significant areas under the DSC.

When proposal of the sub-group is presented, it will be discussed in the working group and possibly also with one or more of the other working groups. The finalized reference paper is published.

Niels Pontoppidan  
Mads Græsbøll Christensen  
Birger Schneider