

## Summary WG 03, "Future Sound Tech Solutions" – Meeting #01

First meeting in the working group, **May 5, 2021**, resulted in several proposals for webinars and collaborative projects, see below:

### Proposals for Webinars

#	Subject	Background
1	AI/Machine learning (ML)	<p>Proposes the use of a webinar from 'Edge Impulse' on machine learning, e.g. in relation to audio (<a href="http://www.edgeimpulse.com">www.edgeimpulse.com</a>)</p> <p>For science, the current ML based signal processing have migrated to a level of less interest. People often do not understand, what is going on. However, certainly the 'data driven' future will result in significant changes.</p> <p>For industry, AI even today offers significant opportunities of new business opportunities in use cases. To major companies like the hearing aid manufacturers, AI currently influences the business potential, and it is essential that we also share this knowledge with SMEs to allow such companies to benefit the full potential of the current state of AI/ML. For example, Malcom Slaney, Google, showed at a conference recently, how questions addressed in German were well translated successfully to English, real time. Essential to the success of 'Danish Sound Cluster' to support the current level of such knowledge.</p>
2	'Futurist' session	<p>A session engaging futurists, e.g. Liselotte Lyngsøe to paint the possible future of our domain – a 'future navigator'.</p> <p>Another candidate, e.g. Peter Leyden, Silicon Valley</p>
3	Redress the great achievements of audio – and address the reality of unsolved audio challenges	<p>Audio seems to have a poor reputation in recent years, despite major progress in coding, hearables, hearing aids, smart loudspeakers, etc. Current talk is only on "vinyl is better than MP3".</p> <p>Should also address all the things, we still need to solve in audio. Define what we need to obtain and could do in the future. Currently difficult to attract funding to audio domain.</p> <p>When audio got out of the living room, challenges started to erupt, difficult to meet the requirements of a dynamic, noisy world. Need for audio improvements in the virtual reality of 'Zoom' meetings, e.g. when will it be possible to go jogging and simultaneously join a 'Zoom' meeting, etc..</p>
4	Audio and 'privacy'	<p>Audio recording in your bedroom is a challenging issue. Where do we want audio presence - and where not?</p>
5	Digital meetings and audio	<p>Currently poor performance of audio in digital meetings. 'Denoising' in 'Teams' helps improve understanding of speech, but creates problems, not well for music. 16-bit limitation a challenge, when such media are employed for education in music. Also, a strong need for augmented and virtual reality support (AR/VR) in digital meetings to ensure better acceptance and usefulness.</p>
6	Multisensory processing	<p>Include all senses in use. However, emphasis of enhancing audio quality for not least hearing-impaired people is essential.</p>

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7	Green footprint of audio streaming	<p>People are using streaming like 'Spotify' in the extreme for obtaining e.g. music content. However, is streaming of audio the right way ahead? The digital carbon footprint seems a challenge in streaming.</p> <p>Microsoft and other providers of streaming services are currently focusing a lot on digital carbon footprint.</p>
8	Sensors of the future	<p>Today audio sensors are mostly stand-alone solutions. However, in the future sensors will be integrated into all kinds of products. How will that influence the traditional sensor market?</p> <p>Possibly part of the proposal for 'technology roadmap'</p>
9	Personalization of user needs	<p>Projects today are focused on the 'average hearing person'. However, there is a multitude of different scenarios due to nature of the user:</p> <ul style="list-style-type: none"> <li>• Expert user</li> <li>• Vanilla type of ordinary user</li> <li>• Hearing impaired listener</li> <li>• Etc.</li> </ul> <p>For example, what is the optimal MP3 codec for a hearing-impaired person (and what is the characteristics of an average listening impaired person?)</p> <p>Webinar theme or project.</p>
10	Use of pre-simulated data	<p>Although AI is essential, focus should shift to use of pre-simulated data for neural networks. For now, we should focus on use cases. Microsoft ('Lyon') and Google ('Satin') have released low bandwidth codecs for AI applications. However, neural networks can be trained using synthetic data to push the use in audio neural network applications. This is cheaper and do not require e.g. the Google codec.</p>

## Proposals for collaboration projects

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A	Technology roadmap for audio	<p>Music productions have in recent years focused on compression, enhancing transfer bandwidth, but sacrificing quality ('old dynamic bandwidth lost'). How can we improve on streaming and other quality aspects?</p> <p>Generations of audio solutions, and how do we disseminate the results to a wider audience?</p> <p>Should not focus on technology on its own right, but rather on use cases, and possibly on the issue of data collection for AI. Technology itself is not the prime focus for Danish companies, instead focus should be on how to optimally use the available technology, i.e. on the problems that need to be solved.</p> <p>In addition to Jonas's proposal, we should address all possible dimensions, e.g.:</p> <ul style="list-style-type: none"> <li>• Products</li> <li>• Product experiences</li> <li>• Services</li> <li>• Etc.</li> </ul>
B	Data collection in conjunction with AI and use of pre-simulated data	Data collection for use in AI applications and training in conjunction with training using pre-simulated data could be shared among several companies, like previous projects between DTU, B&O, Harman, B&K, etc. that led to several publications.
C	Tutorials on AI etc. for students and PhDs	AI, data collection, training of neural networks etc. could be an interesting area to develop tutorials for.

## Appendix 1: Attendees in the WG meeting

Mads G. Christensen	AAU	Professor
Efren Fernandez Grande	DTU Electro, Electrotechnology	Assistant professor
Jeremy Marozeau	DTU, Hearing Systems, Health technology	Assistant professor r
Nick Zacharov	FORCE Technology	Senior Consultant
Jens Kaas Benner	Alexandra Institute	Head of AI and Data Analytics Lab
Niels Pontoppidan	Eriksholm Research Centre	
Clément Laroche	GN Audio - Jabra	Senior Research Scientist
Morten Kroman	WS Audiology	VP R&D Electronics
Birger Schneider	CHAMAJ Consult	Director
Stefania Serafin	AAU-CPH	Professor
Torben Vilsgaard	Danish Sound Cluster	CEO
Shelley Uprichard	Danish Sound Cluster	Project manager