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Thank you for offering me the opportunity to give you my personal point of view on the audio industry in the *Loudspeaker Industry Sourcebook*. As always, my perspective is based on classical (relatively high-end) loudspeakers; most of the time working with transducers.

Question 1: How did your current business evolve in the past 12 months? What were the main trends and macroeconomic factors affecting your business (good and bad)? What are the perspectives for the next 12 months?
Futtrup: SEAS experienced a very successful first half of 2018, with a long slowdown period in the second half. We expect a dip in the fall, because it's normal for us, but the length was unusual and probably because SEAS products are used in luxury items—a market that slows down when people are nervous about the future. I think this bump in the road is a result of the political climate. Here at the end of Q1, it looks like business is picking up again. We spent the available time on developing new products and have made additional investments in production, in preparation for the future. SEAS is at all, neither positive or negative. We have analyzed a product and see how it pushes the physical limits, but not in a good way from a sound quality perspective.
For the smart speaker business to become relevant for our customers (and hence, SEAS), the focus must change from features to fundamental sonic qualities, and features become a natural but unobtrusive extension. We are waiting for the initial fascination of smart features to decay and find its natural place. Basic concerns about the hackability of the products and privacy concerns needs to be addressed.

Question 7: Do you think any of the smart speaker abilities (digital signal processing, beam-forming, acoustic compensation, self-calibration, sensors, etc.) could make sense in other speaker and audio product categories?

Futtrup: With our market segment in mind, and the associated speaker products, the weakest link seems to be the speaker-room interaction, and indeed there are several products in the market, which addresses this. Early on we have the Bang & Olufsen Beolab 5 (launched into the market in 2003), which is an active speaker that includes a measurement microphone for self-calibration/room adaptation. Later we have the Grimm Audio LS1, then the Kii Audio Three, then Dutch-Dutch (e.g., 8c) and it seems to me that especially in the Netherlands there is a great amount of attention to the speaker-room interface, sometimes implemented with passive technology and sometimes utilizing active technology. We also have the Linkwitz LX521 kit, which as a dipole attempts to address the room interaction for better stereo imaging.
For faithful reproduction at low frequencies, a good DSP room correction remains a viable option, even for a good room because any room affects the sound, if not by room modes, then by anechoic behavior. You just cannot get around it. Some would go as far as to say that DSP room-correction is mandatory for faithful reproduction of low frequencies, below the Schröder frequency, in any room.
We also have the Bang & Olufsen Beolab 90, where beam-forming can be adapted at will. I think Beolab 90 is a very early indication of something that can evolve over the next 25 years in our industry, potentially.
If we look at the object-based audio technology as it is outlined today, then each loudspeaker in your setup communicates certain objects. A rendering engine defines what each object should become in your specific setup. Actually, none of these technologies or any of the mentioned loudspeakers solve the fundamental problem, which is that each instrument has their own radiation characteristic. It raises the question, should the speaker attempt to disperse the sound into the room in a similar way to what the recorded instrument did on the recording site? If so, could the concept of object-based audio be utilized to define instruments and could a rendering engine be capable of sending instructions to a loudspeaker to imitate such instruments (multiple instruments, simultaneously)?

If our industry decides to follow this path, then loudspeakers will convert from using a few larger drivers into using a very large number of small drivers. DSP, beam-forming, and so forth, could all be tricks in the bag for such a transformation. As mentioned previously, to be successful at the higher-end of the market, the focus shall be on the acoustic performance, not playful features, and besides the speaker-room interaction I think there's sonic improvements to be gained in basic qualities, like timbre and lower distortion for high-res reproduction.

Personal Question: Did your music listening habits change in the last 12 months? Which speakers/headphones do you use more often to listen to music?

Futtrup: My listening habits are essentially unchanged. I purchased an apartment in Norway at the end of 2017 and have improved on the overall audio performance of my living room/listening environment. The speakers I designed and made 10 years ago are a basic two-way design with a 6.5" woofer and a 1" tweeter. In 2018, I built a music streamer based on a Raspberry Pi and experimented with digital upsample filters. Overall, I have played more music the last six months than the previous years, and I enjoy listening to all sorts of different styles of music. I never listen to headphones and although the technology to improve on the stereophonic quality is evolving, so far, I haven't found pleasure in listening to music this way. *LIS*