All Around Infinio Sphere

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Let's go ahead and get started with all around Infiniti sphere. I'm Chrissy Gabler. Just a quick little intro just to make sure that we know I am an employee of Phonak. So financial disclosure, I work for Phonak. I have no other financial or or non-financial disclosures, but there's that little risk benefits there for you.

Our learning objectives today, we're excited to have you with us, but we have a very important topic we're covering. Over this next hour, we're going to discuss the relationships between hearing loss and cognition, recent evidence, and how we can put those pieces together when talking with patients.

We're going to talk about AI and DNN in your hearing aids. We're going to unlock revolutionary separation of speech and noise. We're going to take a walk in the park. That's our Phonak Audiological Research Center. And then we're going to hear a little sphere in action.

In the interest of bandwidth, I am going to turn my video off. But again, if you have questions, go ahead and put it in that Q&A.; Starting off with the AI and DNN and hearing aids, it's really everything you need to know, but maybe we're a little afraid to ask.

Starting off, do you feel like the world has just exploded with phrases like artificial intelligence, language learning models, deep neural networks, machine learning, Things like this? Well, you are not wrong. While much of this technology has existed for years, the recent launches of AI tools that can do everything from writing an essay to finding cancer in MRI scans really has the news, governments, companies, everyday people, we are enthralled with the possibilities. Maybe a little concerned about how fast things are changing. This kind of technology can get extremely sophisticated, but once you have a handle on the basic definitions and concepts, you'll be able to confidently discuss these topics and explain them to your patients in everyday terms.

Starting off with, excuse me, what is a DNN? A deep neural network, or DNN, is an artificial node network. or ANN. It's similar to individual neurons in the human brain. Nodes in an ANN work together

to learn and solve problems based on data inputs.

A DNN has one or more hidden node layers between those input and output layers, meaning that with every right training, or with the right training, it has greater capability to learn and recognize patterns and solve complex problems like we do every day with our brains. The way a DNN learns is through training on data inputs and machine learning, which is the process a neural network uses to program or in other words, teach itself. DNNs can be trained on all different types of data, including images, text, videos, sound, so much more. To train a DNN, the algorithm is shown many pairs of inputs and labeled outputs. The algorithm then must learn for itself what rules can be used to arrive at the correct output for any given input through repeated attempts and continuous feedback about those attempts.

By having a large dataset with plenty of variability, the DNN will eventually be able to generalize. So in other words, to accurately handle data it has never seen in training.

For example, if the dataset includes 10 pictures of horses, the DNN might correctly identify a new picture of a horse 5% of the time. The other 95% of the time, it might think it's looking at a dog or a table.

If the training data set contains 10,000 pictures of horses, then the DNN is likely to identify a new picture of a horse almost 100% of the time. So just like the human brain, the more information the DNN has to has been trained on, the better it is able to recognize patterns and make decisions. Okay, still with us? Not too complicated? All right, those are the basics.

Now let's get into the fun stuff.

Remember when we learned that a DNN has three types of node layers? It's got that input layer, that output layer, and then the hidden layers in between. Those hidden layers are where the magic

happens. The more layers and nodes per layer, the more calculations or let's call it thinking the DNN can do between the input and output layers. This means the DNN can handle more and more complex tasks.

The specific way the hidden layers in a DNN are structured and connected with each other also plays a crucial role in how it functions. Because of this, DNN structures can be optimized to perform certain tasks better than others.

You could think of it like the brains of animals. The larger the brain, the more densely packed the neurons, the smarter the creature is. A small DNN with only a single layer might equate to the brain of a small frog, whereas a large DNN with many layers would be more like a human's brain. So which is more equipped to figure out the intent of a listener, the frog or the human. Higher level thinking and problem solving in a DNN is pretty much a mathematical outcome of more nodes doing more calculations for better results.

Additionally, we can train larger DNNs on larger data sets. They can access larger amounts of information to make better decisions. so that frog from earlier won't do nearly as well learning the alphabet as one of us human brained folks. A large DNN with an optimal architecture will have the ability to leverage far more data for its calculations than a small DNN with limited capacity.

Now there are currently three ways hearing aids are using DNNs. The first and most common way A hearing aid can use a DNN is to classify the sound scene. Now the manufacturer trains the sound scene classifier using different sounds to teach the hearing aid when to activate or deactivate features. To use the example from above, this is teaching the hearing aid to know that a horse is a horse and not a table. Or in a more apt hearing aid example, teaching the hearing aid to know what is speech in noise versus just noise.

Another way hearing aids can use a DNN is for the light noise reduction. Now, this is not too much different from traditional noise reduction technology. They teach the hearing aid which of the sounds are unwanted noise and try to reduce it by selectively decreasing gain. The third and most unique way hearing aids use DNN is to instantly separate the speech from noise. Now, this type of DNN frees the hearing aid from using narrow directionality and allows the listener to hear multiple speakers from any direction.

This is accomplished by identifying and isolating the speech so it can be preserved and then reinforced. Now, this is important. Not all DNNs are the same. Small DNNs that are used primarily to classify sound scenes need to be always on because this is how they determine which programs and features to switch to when the user's environment changes. The large, uniquely structured DNN in InfiniO Sphere is activated as needed to do real-time sound cleaning, like when the user enters a noisy environment.

such as walking into a busy restaurant. Other brands also use their small DNNs to help with noise management, but with pretty limited patient benefits due to the limited number of nodes doing that thinking.

AI in hearing aids isn't a feature that you can directly measure, but you can look at how AI-powered features offer patient benefits. Anyone can say they have AI and use it in their hearing aids, but the real question to ask is, what kind of benefits does it offer the provider and the patient? The answer can be very different among different brands. So remember, some brands use AI for sound scene classification or that feature steering. So they're listening to the environment, detecting when speech is present.

DNNs are one tool to accomplish this task, but they aren't necessarily better than other approaches. Others are for traditional noise reduction. So driving those digital noise reduction programs and algorithms. In this application, the DNN helps the hearing aid to apply channel-specific gain reduction to make listening more comfortable. But this approach cannot effectively isolate speech from noise.

Now how Phonak uses AI, it's a little bit different. AutoSense OS, our operating system, uses AI and machine learning to accurately capture and analyze the sound environment, then precisely blends feature elements from multiple programs in real time to provide a seamless listening experience. That's that sound scene classification and feature steering. Phonak hearing aids began using AutoSense OS in 2016, and with each passing year, this technology has been further developed and refined. AutoSense OS 6.0 came to market with the Infinio platform in August of 2024 and leverages the incredibly powerful ERA chip to scan the user's environment 700 times per second for real-time adjustments.

Instant separation of speech and noise in all directions happens thanks to that deep sonic AI chip. It uses a large and highly trained DNN to separate and remove background noise from speech for a listening experience that can truly wow users. This is how Infineon's SPH3A handles noise in a unique and groundbreaking way. To understand just how fast DeepSonic is making calculations and processing data, it can perform 7.7 billion operations every single second, and that is billion with a B. This powerful technology represents a leap forward in hearing solutions, putting Infineon's Sphere with Spheric Speech Clarity into an entirely new category of hearing solutions beyond anything else available on that market today.

Now with that background, let's go deeper into the details. All of our wireless Infiniio AIDS utilize that AERA chip. It has 552 million operations per second and a whopping 74% more RAM for faster processing compared to our Lumity chip. This is all to provide exceptional sound quality with highly rated adaptive Phonak digital flexible smart speech technology, and unrivaled wireless connectivity. So, ERA utilizes machine learning AI for environmental classification and program steering.

These are functions that all digital hearing aids need to perform. It also powers that wireless connectivity.

continued

One product that goes further is that Audeo SpherIneo We know that most patients struggle to hear in background noise, and we now have a hearing aid that revolutionizes hearing in these challenging environments. For the first time ever, we have hearing aids with an additional dedicated sound processing chip that specifically uses sophisticated artificial intelligence to analyze and separate speech from background noise like never before. This is a world's first that is very exciting.

Why are we confident that using a deep neural network is the future? Well, as we discussed, neural networks are a specific kind of machine learning model known to be good at modeling perception-like tasks. Like most other machine learning approaches, they are trained with large numbers of examples of inputs and expected outputs. Their model structure is inspired by neurons in biological brains. Deep neural networks are particularly complex neural networks that have the ability to model very complex relationships of inputs and outputs and still generalize correctly from them.

Now, this generalization is what makes this approach so useful. There are virtually infinite possible combinations of noises and human voices saying different things out there. Even with the largest possible data set, one could never hope to encounter all of them during training. So we need a model that can work well with situations that it has never seen before. We need a model that can generalize.

Training a neural network model is an optimization process. Given a number of examples, input and expected output, we optimize the parameters such that the model learns to produce the expected output for all given inputs. For a denoising model, the example inputs refer to snippets of noisy audio and an expected output to clean speech. If this is done correctly, the network will also work well on inputs that it's never experienced before. But how do we know how well a model generalizes?

How do we determine that a model has been trained enough and that the output is better than the noisy speech in the input, how can we compare different models with each other?

To answer this question or these questions, we must understand how a DNN is trained. So this figure illustrates the general workflow of an evaluation procedure. After creating a data set of examples of noisy and clean speech, we split off a small portion, which we call the evaluation data set. The rest is the training data set. Then we train several models using that training data set.

Whenever we want to know how well one of these models performs, we evaluate it. More precisely, we take some noisy speech samples from the evaluation data set and see what output the model produces on them. Since it's never seen the evaluation data set before in training, we can understand how well this model is generalizing. The output is meant to be clean speech. We compute on a metric on an output resulting in a score that informs us just how good each model sounds.

So based on the score, we can decide how to proceed and whether a certain model is worth pursuing. Without this, we would have very little chance of finding a good DNN for any use case in which generalization is important. So let's break this into portions and apply this training workflow specifically to DeepSonic.

DeepSonic's training and evaluation data sets consists of 22 million sound samples. That's equal to three years of data.

This is including different genders, different age groups, different languages, language disorders, emotional voices, background noises, all to consider variations of speech and listening environments.

The training goal was to identify speech and separate it from noise. Additionally, the hardware that we use to train the DNN is very different from the chip in the hearing aid, that will eventually execute it. We took some extra work to account for the effects of executing the DNN on a tiny chip in a hearing aid. To address this, we took measures to ensure the model is trained with these differences in mind. Already

during training, we ensure that the model we develop is an energy efficient or is as energy efficient as possible and is able to deliver an output without a noticeable latency.

the result of the requirements of latency, speed and energy efficiency is a chip technology that the industry has never seen before. And that's deep Sonic. It is 53 times more powerful compared to competitive chip technology. It performs at that outstanding 7.7 billion operations per second. It is so powerful, it enables a DNN with 4.5 million neural connections to truly separate speech from noise, regardless of the direction.

With 420 million transistors and 50 megahertz processing speed, DeepSonic is truly one of a kind.

Now it's time to evaluate the different models, which speech and noise separation works best. For evaluation, we created a second dedicated DNN model that can predict human ratings for any piece of audio data more accurately than any other available estimator. The foundation of the second DNN was about 350 million, I'm sorry, yeah, 350 human listeners rating noise, sound quality, and overall preference of 30,000 files resulting in a total of almost 1 million human ratings. Lots of numbers were thrown out here. The goal of the evaluation was a high score in all three dimensions: in noise, overall quality, and sound quality.

Now, noise reduction received a high rating if there was no background noise at all. Overall quality was rated high when speech was easy to understand, with no background noise. Sound quality scored high when voices sound crisp and clear, or the audio quality was high when no speech was present.

Ultimately, we've chosen the best model. It runs on the DeepSonic chip, and the feature that DeepSonic is enabling in the hearing aid is called Spheric Speech Clarity.

The two chips work in tandem. So when the AutoSense operating system determines the situation is speech in loud noise, it sends the signal over to DeepSonic, so spare of speech clarity can perform its enhancement. Then it comes back and is sent out to the patient. And it's so fast, it is practically instantaneous. In the real world, using spheric speech clarity means that speech and noise can be separated like never before.

And the sound quality is truly amazing. Some companies try to fit this type of processing into their main chip that's managing everything else, but they face the limits of space, of size, and of power needs. It took the power of Phonak to make something completely new, and different, and the proof is in the hearing and how patients are doing. Only by having a separate chip can we achieve the breadth and depth of function to give this level of benefit. Let's listen to it ourselves.

I'm glad we can find time to go shopping. I appreciate you helping me find the perfect down things. After this, let's grab a coffee. So that was no spheric speech Clarity, no noise management, and then with spheric speech Clarity turned on.

I'm glad we could find time to go shopping. I appreciate you helping me find the perfect outfit. After this, let's grab a coffee. Big difference there. If you're like me, your jaw just drops when I hear that.

Let's move on and take a walk in the park. And again, this is Phonak's Audiological Research Center. At Phonak, incorporating feedback from real users is absolutely essential to ensuring that our innovations are both impactful and effective. Our latest hearing aid platform, the Infino platform, has benefited greatly from this approach. The Phonak Audiology Research Center is one of our four global centers dedicated to evaluating new hearing technologies like Infino.

It's dedicated to conducting human subject testing to ensure that it delivers the reliability and patient benefit expected of Phonak technology. Now, PARC, alongside our global team, is dedicated to

rigorous testing of new products before they reach our customers. Now, while Park leads research in Chicago, additional testing is also conducted at sites in Shanghai, in Toronto, and at our headquarters in Staefa, Switzerland. This global collaboration helps us learn firsthand from participants and continuously refine our products to better meet patient needs.

Phonak is committed to purposeful, scientifically-backed innovation. And this dedication shows. According to an independent analysis, Phonak has more freely accessible evidence than other major hearing aid brands. Over a time frame of three years, we published 78 freely available papers, which significantly exceeds the other five primary hearing aid brands, who published between 22 and 37 papers in that same time frame. And we continue to generate high quality studies.

Even more importantly, we have more peer reviewed research than other manufacturers. This shows Phonak's strong commitment to evidence and the scientific rigor of our work. Now, we do have a reputation for publishing high quality evidence. When interpreting evidence, Published across manufacturers, it is important to consider their setup and if the testing reflects real world scenarios.

At Phonak, we do pride ourselves in leading the industry in our claims substantiation and research standards. And we are committed to delivering results that are genuine and meaningful to your clinical decision making. So let's take a minute to address a couple misconceptions about performance studies. So let's look at number one. Hearing aid performance studies are standardized.

True or false?

That is wrong. It's reasonable to assume that this might be true, but the reality is that no formal industry standard exists, and manufacturers are free to design their own experiments. The result is that comparing studies and evidence can become a major game of apples to oranges. Number two, all sound setups are the same. True or false?

Well, that would make life a lot easier if we could understand the results if it was all the same, right? But in reality, each study can use its own unique setup. And the results have to be taken within the context of that setup. Number three, background noise is background noise. There's no difference between it.

True or false? Yeah, you guessed it. Not all sounds, all sound same noise is the same. Some studies actually add white or pink noise in the lab to demonstrate noise management technology. you're really unlikely to find that kind of listening environment in the real world.

So let's see how these factors can make a difference.

Phonak's evidence labs are set up to demonstrate our commitment to reflecting realistic situations because we want you to provide, or we want to provide you with the evidence that is based on real world scenarios that your patients are actually likely to encounter in their day-to-day lives. So the chosen loudspeaker array in a study design is critical in relation to the objective of that study. So for example, if we're using a loudspeaker or a single loudspeaker with co-located speech and noise placed at zero degrees, it's required for some clinical tests, right? But would not be representative for assessing real-world complex noise situations. In the case of investigating the expected benefit of directional microphone technology and maybe some noise reduction algorithms, the number and position of the loudspeaker array is absolutely critical in creating a realistic scene.

It's known that directional microphone technology can significantly improve signal-to-noise ratio, especially for noise sources coming from the back. So let's take a look at Figure 1A and 1B, showing two very different approaches to loudspeaker arrays. N is indicating noise, S indicating a speech signal. If we look at Figure 1A, this is our Phonak setup used to measure the signal-to-noise ratio benefit from the DNN-based speech separation feature of Spheric Speech Clarity. This is a realistic, complex, challenging communication situation.

It was simulated using a 12 loudspeaker array, speech and noise co-located at zero degrees, and noise all the way around. If we look at Figure 1B, this is the technical setup described in publications from two other manufacturers. Now this setup used two speakers at approximately 240 and 120 degrees, and the noise and speech at zero degrees. Oh, I'm sorry, no noise, just speech at zero degrees.

Looking at that gray shaded area, in both of these figures, it shows the polar sensitivity plot for a supercardioid directional microphone. The further the gray shaded area is from the circumference, the more noise is attenuated by the directional microphone. The maximum noise attenuation for this type of directional microphone is in the back hemisphere, around 240 and 120 degrees, as indicated by that nice little notch behind the ears.

In figure 1B, the location of the noise sources coincides directly with the location of maximum attenuation of that directional microphone. So this results in an overestimation of the signal-to-noise ratio benefit achieved by the directional microphone. In real-world environments, we're exposed to noise not just from 120 and 240, but from many directions, often including reflections and reverberations. So the reproduction in a 12-channel loudspeaker setup shown in Figure 1A reflects a far more realistic listening situation. Adiosphere and Finio with our Spherix speech clarity suppresses the background noise from any direction, leading to remarkable speech intelligibility improvements for individuals using our hearing aids.

Objective technical measures are an integral part of determining audiological benefit of a feature or a hearing aid, but also an important precursor to clinical studies. To examine how Phonak Audeo SpherInFinio with SpheriC speech clarity performs in realistic and challenging listening environments, we used this 12-speaker setup. We played background noise from all 12 loudspeakers, including the direction of the speech at zero degrees. This technical measurement setup simulates a complex communication scenario. This is going to be like a cocktail party.

Noise is present in all directions, including behind the person that you're talking to. This greatly differs from other publications that utilize only a few noise sources on the back of the hemisphere. For Phonak, we're committed to using a realistic loudspeaker setup.

Next is background noise. Conventional single-channel noise reduction algorithms are most effective when targeting static broadband noise. That's going to be your vacuum cleaners, your air conditioners. Now, while a spatial noise reduction algorithm can be applied in conjunction with these directional microphone mode to reduce background noise source from behind, real life complex speech and noise environments are rarely made up of static broadband noise, but instead are a combination of modulated noise such as speech babble and transient sounds like cutlery noise. Phonak's Spherix Speech Clarity is a DNN-based signal processing feature that has been trained with over 22 million sound samples.

to separate the speech from the noise. That means that spheric speech clarity is able to effectively reduce complex types of background noise, which conventional single channel noise reduction algorithms cannot do. To account for this, the benchmarking of spheric speech clarity was conducted using realistic and publicly available noise scenes from the Ambisonic recordings of typical environments. We call that the RD database. Specifically, the measurements used, cafe, dinner party, food court scene, all three scenes are at an SPL level above 70 dB SPL, which represents levels at which spheric speech and loud noise program would be active.

Other current industry white papers use static noise sources. So you want to watch for phrases that say mixed with pink noise. which can be handled well by conventional noise reduction algorithms, but really doesn't reflect the type of background noise that our patients are encountering in their social settings and really might overestimate their benefit in the real world. Phonak is committed to using realistic and publicly available background noise stimuli.

That means that when we put our Infinio technology to the test against other brands, The results are in a realistic speaker or sound speaker setup with realistic noise. So we see some results here. We compared the signal-to-noise ratio performance of the Spheric Speech and Loud Noise program in the Phonak Audeo I90 Spheres with speech and loud noise, and that has StereoZoom 2.0. In the Phonak Audeo I90 R, and we compared that to three other brands of hearing aids. These were all premium level technology.

Some had AI, some didn't, and these technologies were all available on the market as of March 26th of 2024. Phonak Audeo I90 Spheri provides a staggering SNR improvement of 5.9 dB in realistic noise scenes, followed very closely by our I90 rechargeable, with a signal-to-noise ratio improvement of 4.8 dB. So, spheric speech clarity and stereo zoom 2.0, respectively, outperformed the other three devices. Who only show an SNR improvement of 2.2 to 3.3 dB.

Test results also indicated that with spheric speech clarity on, participants could withstand 2.9 dB poorer signal-to-noise ratio without a corresponding increase in subjective listening effort compared to that spheric speech clarity being turned off. This means that noise can become almost 3 dB louder before a user reports an increase in their subjective listening effort. What would this mean for your patients? It may mean that they can keep doing more Resume activities that they've pulled away from due to the challenges of hearing in that noisy situation.

Talk about quality of life. We also feel it's important to put the aids to the test out in the real world. So what better place to test spheriC speech clarity than in a coffee shop? And not one of those quaint little quiet coffee shops, but One of the large coffee chains that is often busy, customers sitting around, having conversations, coming and going. You know there's music, you can hear what's going on behind the counter.

In this setting, the participants wore three pairs of devices while at the coffee shop. Infineo Sphere and two key competitor devices. All three devices were placed in their automatic program. and the participant had no idea which devices they were wearing at which time. You can see that there is a clear preference for Audeo SpheriQ Infino over the other two competitor products, with 50% preferring SpheriQ, which is more than the other two competitors combined.

Now, the stories and experiences we're hearing in the field further support what was uncovered during testing. and patients prefer Sphere and do very well with it. Phonak is truly committed to unbiased, accurate testing so you can be confident that you are presenting solutions with real-world benefit to your patients.

Let's take Sphere into action.

Spear is part of the Infinio family. It uses the Charger Go RIC Sphere Infinio. It has an internal battery for on-the-go charging. So this charger has two charges. That's because that battery is a little bit larger.

And I will say this charge takes about three and a half hours to go from 0% to the full 100% charge.

We'll go back real quick. Our Infinio devices come with the Phonak charger, Rick Infinio, but you can get the accessory, which is the charger go Rick Infinio for our Infinio devices.

When we launched Infinio, we also launched the new sound delivery system, SDS 6.0 or SDS 6.0, and it builds upon proven receiver technology and earpiece portfolio, setting the foundation for future enhancements and improved reliability. Now, many of these updates were driven by requests that we're hearing from our providers in the field. So continue to tell your clinical trainers and your reps things that you are liking or requests or wishes for the future. Here are the highlights of the new SDS 6.0. We have a fantastic new double zero receiver length, so now we can help even those most petite of ears.

SeroStop is our chosen wax filter. We learned, we heard, yes, we are no longer using the SeroShield. It is SeroStop. only from here on out. This has an 8 pin tool free receiver port for easier replacement.

So there is no pin locking pin that you have to move out of the way. It is a snap in and snap out. And the STS 6.0 continues to use our same domes that we've been using since Marvel. So I call them the bubble domes, those gray bubbly domes. had lots of success with those.

We do take reliability seriously and we've really put these devices to the test, lots of tests, put them through the ringer because we want to make sure that these devices are enduring a life well lived.

These devices now have contact charging, It is more reliable and more stable charging experiences for our patients and for providers, which is important for the day-to-day hearing experience. We've also made other reliability improvements with Infineon. We have changed the microphone inlet placement. So this is like the microphone placement for the life devices. So we don't have Infineon life anymore.

So we have that four microphone placement. It was much more protective over that back microphone. We have a new housing protection. It is a hydrophobic plasma coating on the housing. We have internal component plasma coating, and that is with the parylene coating.

That's the same coating that is utilized on pacemakers and cochlear implants. We also have a brand new increased battery protection, so that fully encapsulated battery. And then we have a gasket re-added to the eight pin coated receiver. We do continue to test beyond standards for an IP68 rating.

Infineon should not be worn in the shower or in the pool, but accidental exposure is really not an issue and care should be taken to dry the hearing aid off. We can advise against regular or continuous shower use to really ensure the longevity of the device. If it happens once, really not a big deal, but

again, we don't want your patients showering while wearing the device throughout the entire shower. With this ecosystem truly built for reliability, the new design, the stringent testing that we're doing, you can be sure that your recommendation will give your patients really a peace of mind to just live their life without being limited by their hearing aids.

Now we also have our first fit in five. Now this is five easy steps to fit our Phonak devices. If you wanted to fit your Infiniti sphere, super easy. And these steps are to connect, to calibrate, to customize, to configure, and to close. These are the five C's.

Super easy. When we do get into the target software, underneath our fine-tuning and our program options, this is where we're going to see our spheric speech in loud noise sliders. So with challenging listening situations up to -6 dB SNR, our spheric speech Spheric Speech Clarity provides an unprecedented SNR improvement of up to 10 dB when that Spheric Speech Clarity slider is at max strength, which is at seven for your Infiniti Sphere 90 devices. And keep in mind our 70 devices do go up to four on that Spheric Speech Clarity slider. Now, according to the Speech Intelligibility Index calculation, It is predicted that Spheric Speech Clarity at max is predicted to provide up to 150% more access to speech cues.

Absolutely, wow.

Now, I do have a great visualization here to help you understand what the Spheric Speech Clarity slider is doing in respect to strength of noise reduction from that DNN algorithm. So if we look at the green, it's indicating the directionality of the microphone. So yes, it does say fixed directional, but truly your patients are hearing spherically. We do put on here a directional microphone because still 80% of conversations generally come from the front.

The level of noise is visualized by the little icons, the little vacuum cleaner, the motorbike, extraneous conversation, and by the number of lines, which is repelling the noise. So as we move from weak to strong, we see that the noise reduction becomes stronger with the increase in lines and the fading of those little noise icons. But speech is still maintained regardless of that slider string.

Now, how do we know where that defaulted spheric speech clarity is going to be on these devices? And there's two ways that our target software identifies where it's going to be. Firstly, is your acoustic coupling. Once you decide which dome you're going to use or how occluded the device is in the ear, the more occluded, the less strength we need from that spherically speech clarity. The more open the fitting, the more compensation that we need.

You can see here with an open dome, it'll default higher to strong in the 90 and then as we become more occluded, it goes down to moderate for that power dome. That's the first step in the defaulting of our spheroid speech clarity. The second step is going to be once you run the feedback test, we can see how well that dome is actually fitting and sitting in the ear. Is it a tight fit or is it a little bit floating? Is it loose?

So if we take the example of vented dome, we put the vented dome, the device target will default to six, which is strong for spheroid speech clarity. Once we run that feedback test, maybe that dome is actually a little small for that patient's ear and it's floating around a little bit. So there's a lot of openings acoustically that's going to be fitting more like an open dome. So Target will in the background go from 6 to 7 up to strong once that feedback test is run. So it's really a personalization based on how the dome is behaving in that person's ear.

As with other features, patients do have the opportunity to adjust the settings for their Spera speech clarity in real time if they need. By going to adjust setting, they will see the noise reduction and speech focus sliders. The noise reduction slider maps to Spera speech clarity in target, and the speech focus

slider maps to hearing aid microphone in target. Just keep in mind that ultimately the start position of the sliders in the MyPhonak app is determined by how it's set in Target. So if these two sliders are maxed out in Target, once the patient opens the app, they will also be maxed out.

So I do want to give you a little bonus tip today for the advanced adjustments that you can make. When you come into fine-tuning screen and click that header for AutoSense and choose the program options at the bottom. When you do this, it kind of takes you behind the scenes and gives you some additional controls. You'll see a slider for speech in loud noise or spheric speech in loud noise. This is the activation level.

So depending on where it is, it'll default in the middle. This is actually 69 dB SPL. You can move that slider to the left. So it's at a more moderate level of noise to trigger the aid to switching into those speech-in-noise modes. Or you can move it to the right and that'll be a higher level, so not quite as sensitive.

With Infiniti Sphere, we have exceeded the more traditional uses of AI, really to provide an incredible improvement in SNR. So remember that up to 10 dB SNR improvement. We also have the ultra-responsive chip with improved power management system allowing at least 16 hours of use in our sphere hearing aids. That will include three hours of spheric speech and loud noise classification. Now, for the vast majority of your patients, every hours in an extremely challenging situation far exceeds their needs.

But you might have some patients who are in very noisy conditions for many hours during their day, where their hearing aids will classify the environments as spher speech and loud noise. For these patients, the DNN processing will be active more often than other patients who are not in those environments as often. Now, in order to allow these patients to get a full day's use from their sphere devices, We can set the maximum amount of time in the SpheriC Speech and Loud Noise program how

long it's used throughout the day. So either classified automatically in the AutoSense or with a manual SpheriC Speech and Loud Noise program. The default setting is a maximum of three hours per day, and this is set in target in the AutoSense program options tab.

It can be deselected by you, the provider for consumers who do want to maximize their use of their Spera speech and loud noise program. But they will need to manage their battery consumption on their own to ensure that they're getting a full day's use. Now, I did mention that 16 hours on average with sphere hearing aids. That does include, again, that three hours of Spera speech and loud noise. It also includes five hours of streaming and then the remaining time in AutoSense.

so they're still getting that is a massive day. There's a lot going on in that dynamic day.

Now, if that box is checked, the spheric speech and loud noise that's been classified for three hours, the hearing aids will no longer go into spheric speech and loud noise as part of that auto sense, but it'll actually go to speech and noise. So it'll bump them out, go into speech and noise, and they get to take advantage of our Ultra Zoom directional microphone. with the dynamic noise cancellation. So alternatively, the provider, you can create either that manual spheriC speech and loud noise program using spheriC speech clarity, but you can also get or also utilize a speech in loud noise program, and that uses our next best level of noise management with the stereo zoom 2.0. This does not use the deep sonic chip, so it doesn't use quite as much battery.

But this will really help your patient's listening needs in those noisy environments. And it really allows your patient to view the remaining battery life when using the program continuously with the MyPhonak app, which of course can be helpful in their managing of their battery life throughout the day.

For those patients with manual programs, the MyPhonak app assists with keeping your patient informed about that battery level in a number of ways. First of all, whenever the manual program is

entered, MyPhonak will calculate an approximate amount of time remaining that they can stay in that manual program. So there's a little hour indicator below that battery percentage. Now when the manual program for spheric speech and loud noise is when they're in that program, that info icon appears. So it'll say, hey, you have about eight hours left.

You have about six hours left. Makes it much easier for managing their battery life. Also, if notifications are enabled, the app will also alert the patient when less than one hour of life is remaining. This gives the patient an opportunity to either do a quick charge on their aids or they can just switch into a less power demanding program.

We have a couple more myths because when we're introducing something revolutionary, it's not uncommon that myths start circulating. And we've heard a lot of static about battery power. So let's kick in this year by kicking out some of those myths on battery life. Starting with myth number one, technology with a dedicated DNN chip doesn't last all day. Well, if you remember what I just said about batteries, it is false.

Now, a dedicated DNM chip, it does take more power to run than those with small DNN integrated chips, but these devices do last a full day for patients. In fact, our data is showing that on average, our sphere wearers are using their hearing aids even longer each than people wearing our previous platform. So let's be clear, the benefits of powerful AI driven technology made possible by that dedicated DNN chip, it's simply not possible with any other existing hearing aid technology. Myth number two, on demand DNN is a concession to save battery life. You might have guessed it, that is false.

Hearing aids use DNNs for different reasons. Remember, when we use to identify the listening situation, so that DNN needs to always be on when it's program steering or scene classifying. Phonak devices use AutoSense OS for that. That's driven by machine learning. With Sphere, the dedicated AI

chip uses that large DNN to instantly separate speech from noise.

So this is only active when there's background noise. Imagine you had a task light that was really helping you focus on working on a specific task. Would you rather have it on dimly all the time or switch it on at full brightness when you really need it? Myth number three, using the DNN in InfiniVision Sphere will completely drain the battery. Well, that would really not be a great experience for our patients, would it?

At default settings, there's enough battery for a full day of multi-use listening for your patients. So when we tested the aids, we used a combination of environments that program and program activations to ensure that our patients would get a full day's use. And we just discussed, you and your patient can control the limits of how long that spherically speech clarity can be active. from a single charge by using the MyPhonak app, by using manual programs, and, you know, changing whatever it is they need. So here's the facts.

Battery life is a function of how the hearing aid is designed and the available features of the technology and how heavily the advanced features are used. Another fact, not all dnn's are the same. Small dnn's that classify sound scenes can and need to be always on, whereas the large DNN using AI driven technology to do sound cleaning in Sphere is only activated when needed. And then lastly, Sphere users are on average wearing their hearing aids even longer than those with our previous technologies. So consistently providing a full day of use.

Okay, I'm going to speed up just a little bit. Demoing, super important when it comes to getting patients buy-in with these devices and hearing the difference. So if you've got your phone with you, we've got a little QR code with an easy guide, but just to run through this to let you know, we're going to start off with like, what is our setup? What is the patient orientation to you as the provider? Where are you putting the noise?

How many noise sources do you have? Where is the patient's companion when it comes to this little setup? So things to think about. But first we like to start off in a calm situation. So no noise management and no noise in the environment, giving them a nice calm, clear situation.

And then we turn on the noise, staying in that calm situation. When we tell them this is similar to how it might feel in a restaurant, as you are now during the course of a meal. But luckily, hearing aid technologies automatically adapt with noise cleaning features. At that point is when we go ahead and we turn the devices to SpheriC Speech and Loud Noise, and they can truly hear the difference. You can walk around, they can walk around, be in the same direction as noise, I often pick up the speaker if I'm by myself and there is no companion and I bring the speaker right next to my face and I continue to talk because with a directional microphone, you could never do that only with sphere.

After this, we go ahead and take them back to calm remind them where you started this whole demo and then you'll see their face scrunch because that noise is really obnoxious. go ahead and turn off the noise at that point. And they're going to feel so much more at ease. But it truly does give them a personalized experience.

We can even show that there's a difference in ASP. A higher average selling price can really improve your office KPIs. So benefits really everybody, not as many follow-ups because it's a higher technology level. all the benefits. Now I do have a little testimonial.

This is Diane. Let's hear what she has to say about her SPHIRE devices.

I have had a wonderful experience with Phonak and VideO. I have actually worn hearing aids for about 40 years. Long time. I remember when my audiologist first suggested that I really try the hearing aids. She said, you, don't want to miss what those grandchildren tell you, and that's so true.

Phonak and Finio has unlocked a world of possibilities for me because I would avoid situations where I knew it was going to be difficult to hear.

When you are hearing well, you can relax. Otherwise, you're straining and trying to hear, turning your head to try to get the sound. It's exhausting. It can be very exhausting. And so, because I have that assurance with Phonak and Finial hearing aids that they're going to work, I don't think about, do I have to be careful here?

Will I be able to hear? It means a lot to me to be able to have a good hearing aid that I can depend on.

Beautiful little testimonial from Diane.

Phonak's hearing Finio really gives proven benefit and it's based on these five pillars: exceptional sound quality from the first moment, connectivity you can count on, tested reliable proven Swiss engineering, and Finio really allows personalization for you and your patients, and then of course of course, our clear speech from any direction with spher speech Clarity. These are groundbreaking developments in AI. And finally, sphere Target software, the myPhone app, it really allows you the flexibility to meet your patient needs, especially in those most difficult, noisy situations. So I know I rushed it a little bit at the end, but thank you so much for joining us today. I am going to get to those questions.

Right now.