

Thursday, 4 March 2010
UKCoD and The Ear Foundation conference.
Advancing technologies: Opening new communication opportunities.

SUE ARCHBOLD: Good morning, ladies and gentlemen. Are we on? Are we on now? That's a good start to a day about technology! It gives me huge pleasure to welcome you to this day about advancing technologies and moving forward with communication. Before we start, and before I introduce everybody and say anymore, can I just mention the fire exits and do the domestic bits. The fire exits, there's one at the back and there's one here and, as far as I know, we are not expecting a fire drill. So if you do hear the fire alarm or see the fire alarm, then we need to move out as quickly as possible. So thank you for that.

This morning we've got a lot of speakers for you and one of them was suggested first by Susan Daniels and I'm delighted to share the day with Susan who is going to be chairing the afternoon. This is a joint conference between UKCoD, the UK Council on Deafness, and UKCoD represent 100 membership organisations, large and small, with a variety of interests and that's why UKCoD is so important and UKCoD, of course, represents all those interests at the All Party Parliamentary Group on Deafness.

The Ear Foundation in Nottingham, where I work, is about making all of those exciting technologies that we have today to help hearing, to help communication, but to make them work in the community: at home, at school and at work.

Now, in the audience we have a range of people with a range of backgrounds and a range of interests. But all of us live in exciting times. We have new technologies everywhere in our lives. We've just had a new television at home, with a new DVD player attached to it, and actually I have no idea how it works, nor have I got any interest in reading the manual. I just actually want to put it on and off, loud and quiet, and to change the programme. That's quite enough for me. So we have new technologies everywhere in our lives. Sometimes we benefit from them, sometimes they add to our frustrations -- and I won't tell you about the new washing machine that Brian recently bought! But we have new technologies in hearing and communication too in our lives, with a lot going on there and in a comparatively short time we have had huge changes. Do we know what these are? Do we know what these new technologies are? Do we use them fully in everyday life? I'm quite sure that the capacity of this computer is only used to about this much (indicates). What about the technologies that we have to make our lives easier in communication? Are we using them? And does the technology help our communication or does it

sometimes hinder it and get in the way? And sometimes, do we forget the people that are so important?

Now, that old picture is not me, but it could have been, as a teacher of the deaf many years ago, and then we thought the technology that we were using was really exciting and doing something useful. But, comparing that technology with what we've got today -- in hearing aids, in implants, in all the technology we have -- it's like actually comparing a really old-fashioned typewriter with the power that we have in this computer and which I could Google now and I could get to anywhere in the world, or I could go on Skype and talk to somebody in Australia, if we woke them up. So things have changed in what seems to me a comparatively short time. Maybe to somebody younger it seems a long time.

So today is an opportunity for us all to learn a little bit more, or maybe a lot. There's a lot of people in the audience with a huge amount of knowledge, but all of us come from different backgrounds. To ask questions, or not, because we've got a packed programme and we will be moving ahead fast and for some of our speakers we may even have to cut them off! [laughter].

So you may have time to ask questions or not but can I say that these days are about a two-way street and you have some responsibility too. So there are coffee breaks, there is lunch time and there is a coffee break in the afternoon and if you've got a question of a speaker and you didn't have chance to ask it because we didn't give you time, then nobody will mind if you go up to them and ask the question again. So you have a responsibility -- don't go home and complain that you didn't get a chance to ask the question: perhaps that was because you didn't take your opportunity.

We've got time, perhaps, to think about the implications of this technology for us all. But at the end of the day, as Lorraine Gailey is going to complete with, it's the people that matter: it's not just about hearing, about our ears or just about the technology. It may be an opportunity to complain, and I'm sure you will. It might be too hot, too cold, too loud, too quiet, too much information, too little information, you will go away perhaps with more questions than answers. But as somebody once said to me, if you take away one new thing and you have an interesting conversation, you've had a good day. So let's hope you manage that today.

So this morning, we are going to start with Professor Adrian Davis, who doesn't need a welcome and an explanation to many people here, but we will in a moment, Adrian. We are going to introduce Gordon and Calum Spence who are over there and Gordon and Calum are going to come up and they are prepared to answer any questions that you throw at them after Adrian. Hi, I'm sorry I didn't have a chance to say hello

before. We've had email contact, so it's nice to put a face to a name. Then we will have Yvonne James talking about understanding cochlear implants. Chris Durst is going to talk about hearing implants -- sometimes people think there are only cochlear implants and there are many different types of implants and Chris will go on to those. Tim Jones is going to talk about his bone anchored hearing aids and Paula Greenham is going to look at the future. Then this afternoon we are going to go on and Susan will be introducing the afternoon and chairing the afternoon, and we are going to be talking in the afternoon about the implications of all of this technology for us. So that's the plan for the day and first I'm going to introduce Adrian Davis.

Professor Adrian Davis -- OBE, we need to say -- Adrian was responsible and remains responsible for the newborn hearing screening in the UK, which is held up internationally as an example of how things should be done, how things should be introduced and how quality should be managed, maintained and inspired I have to say by Adrian, and Adrian certainly doesn't only focus on the ears but sees the whole person and drives forward his team to think about quality for all.

Actually when you talk to Adrian, that's only one small part of that. He is professor of hearing and communication at Manchester University, but soon to be on the move, which is why he may have to pop off to make sure moving is going okay, but Adrian is going to talk to us this morning about some of the changes that have taken place in hearing technology over the years including hearing aid technology and he was one of the drivers to make hearing aids so widely available for adults in this country too. So he has a wide range of interests and Susan and I were really delighted when Adrian accepted the invitation to be here and to open our conference this morning. So, Adrian, we just need to find your presentation, which will be down here somewhere. There we go.

Okay. Is that okay? I'm sorry, this room is not ideal for having the screens and the -- before we go any further -- while we are doing this, before we go any further, this isn't an ideal room. You need to be able to see the screen, that's the palantypists' screen, and the speakers will be here. Don't go home at 4 o'clock and say, "Well, I couldn't possibly see anything during the whole course of the day". Now is your opportunity to make sure that you can see. Is that okay? Okay? There's the matter of the coffee cups. Right, okay. Adrian? All yours.

ADRIAN DAVIS: Is it alright if I stand up like this? The microphone seems to work better. Is everybody okay?

Thank you very much for the kind introduction, Sue, I'm sure that, after that, my talk will be a complete disappointment because what I'm going to say is really that technology can't do anything unless we engage with

people. And I know that this is like closing the circle around Lorraine Gailey before we get there, but technology without people, technology without the right services, technology without the right needs, is just somebody's profit margin trying to find a market and what we've got to do, I think, is think cleverly about how we can use the technology to meet people's needs.

In terms of the vision for audiology services in the UK, clearly the operating environment for the NHS in 2010/11 is really to sustain a low wait environment across all diagnostics but particularly in audiology. We've come a long way from people waiting for three years for their hearing aids. We've come so far that in some places people are saying to me the major problem is to get the patient in tomorrow, or the person in next week, who wants their assessment for their hearing aid. So we've moved a long way in parts of the country, and in other parts we need to make sure that people get those services that are readily available in other parts of the country.

In terms of trying to meet that sustainable low wait service, really we need to be clever about how we innovate both in terms of the technology that we use, the people that use the technology from the NHS and from the independent sector, and the way in which we approach the task of sustaining and supporting people who have got hearing problems with their technologies.

I think, for instance, The Ear Foundation has found quite an interesting niche about how it can show the NHS the different sorts of quality and availability of services, and similarly NDCS and RNID have been an incredible stimulus in bringing forward a modernised service for audiology for those people who have hearing and balance problems. But we need to be able to quantify those outcomes. We can't just be happy with providing a service that's quick, a service that's cheap, a service that uses people's skills, we need to make sure that people really benefit and that's one thing that we are fairly bad at doing.

So I just want to summarise what I have been saying in terms of really trying to put the patient at the centre and sometimes I believe this is a good thing and sometimes I think it's a bad thing. I think, actually, the patient should be -- or the people who need services should be at the forefront, saying, "Come on, you guys, come and help us, we want to be over there", and push away from the centre into a leading role. But technology there really is a key in terms of the innovation, when we are talking about the way we assess people, the way we diagnose people, whether it is imaging people, whether it is behavioural testing, whether it is testing children, screening children, we have a lovely range of technologies, but the way in which we sort of, in a way, don't really mastermind the implementation of that technology, so it's available to people. It might be available in Maidstone, it might be available in

Winchester, but it's not necessarily available in Clapham or Newcastle, and we need to make sure it is there when people need it so that we don't get a huge distortion in what's available to people.

The workforce I think has been incredibly important. There has been a lot of debate over the workforce in the last ten years and what we need to do. In terms of the professionalism within the workforce, it has improved incredibly over the last ten years, but I believe that we've got a real big step to make in terms of making this really the best workforce in the world and being able to use the best systems and processes to provide an efficient system, but not one that drives efficiency at the cost of quality, because that is really a short-term solution that doesn't help anyone.

So we have technologies, whether they are screening technologies, diagnostic technologies, hearing aid technologies, but really I think that we need to liberate ourselves and say, you know, "What are the technologies that help us?". It doesn't have to be hearing aids, it doesn't have to be cochlear implants, and I've seen -- well, I've seen and heard some incredible things, actually. I'm just thinking in the 30 odd years I have been around, I saw one of the first multi-channel implants being implanted in Iowa and it was unbelievable at that time in the 1980s. I've seen a hearing aid that is the size of a -- well, smaller than a contact lens being put into somebody's ear, that is a very simple device but it needs one to put it in once a month, and those sorts of things. Now they are not necessarily going to be available on the health service tomorrow but we need to take a cue from where these marvellous innovations come from and think, is this something that we can use and how does it fit in with what we do?

I still think that one of the -- somebody asked me, what gives me the greatest joy in terms of the work that I do, and I think really it's seeing people smile at the end of the day, when they've done a good job and they know they have done a good job.

SUE ARCHBOLD: How often do you see that!

ADRIAN DAVIS: Well, I think quite often. Really, really it's about having an enthusiastic workforce, because technology without the workforce is really a disaster waiting to happen. If you haven't got a clued-in workforce that understands what innovation is and has an inspiration, a vision, for where they want to go to, but above all has the systems that can deliver it. I talked yesterday with one of my bosses -- you can guess I have lots of bosses who try to tell me what to do -- and she said to me, "Well, the problem with that chief executive is that they think too much about the patients". I said, "What do you mean?" She said, "Well, they just don't understand that if you haven't got a good system, you can think all you like about the patient, but you are never going to deliver them anything and it's just a mask to say

well I haven't got on top of the system". I almost laughed, I suppose, because I can think of so many chief executives who think about the system but never the patient. So we do need that balance around us so that we can achieve a safe system, effective, that treats and works for patients with respect and which really takes forward the really great innovations that are out there. They may not be around about hearing, they may be from totally different fields, and one of the major problems I've found across the world is that people have such a narrow view of where they are looking for the benefits, and where they come from, and we must really think, yes, we want good hearing aids, we want good implants, we want the genetic cure that says we can zap this, that and the other, but also think more wisely about what helps people in their every day lives and education and development.

The Department of Health across the four different countries has thought about the workforce, used the science workforce used in healthcare and particularly in terms of audiology as well, and they've published a document last Friday about their view about how we are going to develop the workforce in the future. You know, it's sort of summed up in this slide here and I won't try -- so over on the left hand side here, we are looking at the graduate and foundation degree levels that might be required within that system and then the Masters level workforce and then here, really, if you think about this slide here as being trying to fast-track new leaders for the hearing and healthcare sciences, and at the moment we have very few people who are at the equivalent of consultant level, who manage departments in the NHS, and part of this is really to make sure that we do have a first-rate science workforce that can use innovation but that competes at the same level as doctors and nurses and other people in the health service for the resources that are needed, I think this is going to be one incredible way forward. There's a lot of things that needed to be fixed about it, but in terms of the safety, the effectiveness and the patient experience, my experience has taught me that really, whilst the system is working relatively well, for instance with children or for people with complex needs and implant services, actually, it isn't well-governanced, it isn't well-regulated and that we really do need a great sea change in what we do, to get really world-class people into science in the UK and into audiology.

So what I want to do next is talk a little bit about, as I see it, some of the major issues. Now, I'm a public health person by nature, and I thought, well, you know, how does hearing relate to other things that people have got in terms of problems they have with age? Now, there are round about, I don't know, 10 million people who have problems with hearing in the UK, and the problems manifest themselves in lots of different ways. Some of those can be helped by technology, some of

them can be helped by other sorts of interventions. But in terms of the seeing problems that people have, the communication, the walking, the using stairs, those sorts of things, you know, somebody -- around about one in four people aged 65 to 69 and 60 per cent of those aged 85 have some sort of functional limitation and it does increase with age.

What I thought was I would look at some of these other conditions that people have as a function of age and if you look at the top here, that top line is about arthritis, and the bright blue line here is about dementia and those are the most common problems that older people have in the UK. But what about hearing? When I put on here those people who have got -- the arrows show those people who have 50 decibels' loss of hearing, you can see that at older ages it completely outweighs those people with arthritis, with dementia, with falls, and then the green line shows those people who have a 35 dB hearing loss, so from the age of around about 70 to 75, the hearing problems that people have -- and these are huge, great big functional limitations that people have, they are not minor issues -- and in terms of the effect that intervention has, we can see from here that if you plot the degree of hearing loss along here and the difference between the red and the blue shows you the benefit that at 35 decibels --

INTERPRETER: Sorry can you refer to the colours?

ADRIAN DAVIS: Yes. So the red line shows the quality of life if you use hearing aids and the blue line shows what would happen if you don't use hearing aids and the difference between them is the benefit you get from using hearing aids and that shows, on a standardised quality of life measure, the huge benefit that you get at 35 decibels using hearing aids. This is standard digital hearing aid technology, it's nothing fancy. So the impact you can have on people's quality of life by making them aware of what hearing aids can do, making them overcome the stigma that they might feel about wearing the hearing aid -- and that, from the Department of Health's point of view, is the major issue in terms of they feel that the public don't really support the use of hearing aids because they feel it's a stigma and interferes with issues, and so that's why they've held back, I think, from some much more wide-ranging things like screening people.

If we look here in terms of those people who say they have a slight or worse problem with hearing, you see that it's almost 20 per cent in that top corner there. If we say that that is moderate or worse problems, that is 6.5 per cent. But only a small proportion of those people have seen their GP or seen an audiologist; similarly, with tinnitus or balance. What I've got here is a table that shows the degree of hearing loss that individuals might have and what I think are the sorts of technologies that might really benefit them. You can see that at the bottom end here, in terms of mild hearing loss, I think the major contribution we

can make is in terms of education and tactics. Hearing aids may or may not be helpful for individuals, but there's no overwhelming evidence at the moment about the quality of life changes for that group as a whole, although some individuals will benefit greatly. So that 35 dB through to 50 dB we have had a huge, huge benefit from innovation, because we can now use really quite small hearing aids with an open fit that you can supply in a one-stop-shop, so you can assess and fit somebody with a hearing aid with a mild to moderate hearing loss almost there and then. The advantage from this is you have no occlusion because the feedback management systems are so improved that you can have these very light open moulds but you can turn up the gain and not get any feedback and that means that you can hear your own voice much better and that the low frequencies travel through much better and people have much better environmental awareness and you can see as we go through then the potential interventions but also the potential scope for innovation.

I think, as people get used to using hearing aids, initially a hearing aid means that people can improve the ability to hear sounds, they can maybe communicate a bit better, but translating that into benefits about their day-to-day lives takes much longer and that's why this curve takes much longer to get there. I think particularly when people have been suffering in silence, or with tinnitus, for a long time, it takes people a long time to get used to hearing aids. But if we intervene earlier maybe we can make sure those benefits translate to being able to hear to being able to communicate to being able to do things much more rapidly. One of the major problems we have in improving the improvement in outcomes, whether it is implants or hearing aids, is the long time it takes for people really to adapt to using their devices and we need to think how we can improve that.

So I just wanted to take you through a picture trip here, really through the past, about what innovation looks like and how we can stimulate it and some of you may remember with trepidation or with some form of ways that Alexander Graham Bell here, who invented the telephone, didn't invent this one (indicates), but at the end of this he thought, my gosh, it's the worse thing I could have done, I think sometimes, when people see all the devices you've got they think that's not necessarily an advantage.

Obviously, Aneurin Bevan inspired the universalism of the NHS and without that we couldn't make technology available to people. Jack Ashley inspired, I think, the movement towards better facilities for audiology research in the UK, and was aided and abetted by Barbara Castle in taking forward the Institute of Hearing Research, and they are places where that innovation can thrive.

Archie Cochrane may not be so familiar to you, but he is the bedrock

really of the current health system in terms of the evidence, so Cochrane distills evidence for different interventions. He was a difficult patient. I encountered him in the corridors in Cardiff and he had a moderate to severe hearing loss steeply sloping and with the old analogue hearing aids he struggled as they were always getting dirty and the ear moulds were incredibly difficult and his book contains the first randomised controlled trial for hearing aids.

I think we owe a lot to Archie really, he taught me a lot about doing epidemiological work and he taught me a lot about what a difficult patient can be sometimes, and how you live with that, but once he knew where to go, he was always there when we needed him and we need to personalise that care.

Dave Kemp started building a system to do modern diagnosis of hearing and this is what the equipment looked like and today it's handheld equipment like that, which enables us to do the newborn hearing screen.

Here is -- he sort of says, well, it takes 20 years to get to that innovation moment, to people thinking, oh that's a jolly good idea and for it actually to be made available to everyone. So that's 20 years. That's far too long. We need to be able to take advantage of things that really work. So how can we improve that? How can we improve sound quality in the future and the individualisation of hearing aids and other things that people need?

I think that we need to think again about that workflow and the workforce.

So this is the sort of model that I've got in terms of the innovation, the honesty, the digital signal processing hearing aids, the open ear moulds, the trained workforce, so we have enabling technology there, but the governance and leadership I think is something that we really really, really need to work on and I look towards NDCS and I look towards The Ear Foundation, to RNID and other organisations, to show some real leadership and partnership here so that we can build capacity and go forward with much better quality services.

This is something that I worked on as a hearing screening device. This is the open ear hearing aid and together -- partly the waiting list here, introducing the technology, but also we have a lot of talk about how we will do it, and we have produced a very low waiting time within the services and now what we need to do is make use of that.

In the future, there will be much more about self-diagnosis and self-management. There is going to be a lot more about taking advantage of what patients and users can do. I think that's the really important thing for me.

If I can just skip over some of this, I will maybe just mention this.

I think the key for me is really about how you improve the mental

capital of the country and people's wellbeing and hearing isn't being talked about and I think it should be and it needs to be. I'm going to skip over a few things here.

In terms of how decisions are made about what's available in the health service, we have a very difficult system, I think. At the moment, for those with severe and profound deafness we are saying that we evaluate devices and the technology counts for 50 per cent and what patients tell us are 10 per cent in terms of the look and feel of the hearing aid and the price is 40 per cent. The same for children. But for those with mild and moderate hearing impairments, we've got much more volume, there is much more emphasis on price. We haven't really got any standards and one of the ways that we need to sort of think about it is driving up those standards because if we can buy a basic hearing aid that gives you -- if we can buy a basic hearing aid that gives you that quality of life improvement, you know, how much more should we pay for other enhancements to meet people's wants as well as their needs? Hearing aids evolve very fast, over a two to three year cycle, we buy about a million a year and we need to think about this more strategically. If you ask patients what they want, quite often they say they want something that's waterproof, that has less environmental impact, they want more control. But the key to this is really more knowledge really about what can be done. So if we think about how can this organisation help people, I think really what we need to think about is in terms of that basic cost, in terms of that basic quality, what needs to be provided by the NHS? In terms of the major thing that's coming to us in terms of wireless enablement -- so Sue's TV and using your hearing aids really quite seamlessly to be able to control the washing machine quite seamlessly with your hearing aids, and so on, all these wireless interfaces are coming towards us. We need to think, is this something the NHS should be doing? Is this something social services should be doing? Is this something the individual should be doing? I think the role that you can play is really about how do we take the knowledge that we've got into action? How do we take the importance of hearing loss into that wellbeing of the country? How do we disseminate about what we can do with the current innovations and what innovations are needed in the future? How can you stimulate relevant research, relevant service development? How can you influence the leadership, both the political, the social, the scientific, and the medical leadership within the country?

So really, the key to sustainable services -- you can't stop where you are, innovation is going to hit us and we need to choose the right innovations and we need the right leadership, we need the right organisations to support the patients and I wish you good luck with the rest of your conference because I'm going to have to go before I get

booted off the stage! [laughter].

SUE ARCHBOLD: Thank you very much, Adrian. [applause].

Thank you very much, Adrian, indeed, and I think we should thank him on behalf the patients and user services and for the passion which he takes to the government and NHS and fights on everybody's behalf and over the years he has done some amazing work to help the technology be available. As you can see, he puts the users and patients at the centre of what he does. So thank you, Adrian, and good luck with the moving -- moving office is more traumatic than moving house, I think! So thank you very much for your time.

So he said he puts the users at the centre and now we are going to put them at the centre here and we are going to ask Gordon and Calum -- who is not at school today!

GORDON SPENCE: And I'm not at work either!

SUE ARCHBOLD: You've got a day off with daddy! So hi, Calum, here you go. Do you want to come here?

GORDON SPENCE: Say good morning.

CALUM SPENCE: Good morning.

SUE ARCHBOLD: Do you want to say good morning again?

CALUM SPENCE: Good morning everyone!

SUE ARCHBOLD: Are they smiling at you? Good!

GORDON SPENCE: I'm off then.

SUE ARCHBOLD: Right Gordon, here, would you like a seat as well?

GORDON SPENCE: Thank you.

SUE ARCHBOLD: Alright. You have that one. And I will take this one out of your way. And we will leave you to introduce yourselves.

GORDON SPENCE: Thank you. Thank you very much, Sue.

SUE ARCHBOLD: Thank you.

GORDON SPENCE: Right, good morning, everybody. This is my son Calum, and I'm his dad Gordon. My wife Nicky is also here in the audience and although Calum and I have to shoot off afterwards, me to work and Calum to school, Nicky will be around for the rest of the day, so if you want to ask any questions about cochlear implants, bilateral implants, from a user's perspective, Nicky will be here for the rest of the day. So this is our son Calum who was born in April 2003, and he is coming up then for seven years old. When Calum was born at Whipps Cross hospital in east London the neo-natal screening -- sorry, are you speaking? Nothing, okay.

He failed repeated hearing screening tests at Whipps Cross, and further tests were carried out and a diagnosis was revised to profound hearing loss after about five to six weeks. Hearing aids were fitted around eight weeks but these proved very, very ineffective and eventually at just over two years old, Calum was fitted with his first cochlear implant at Great Ormond Street and this was switched on the same July.

Calum made very slow progress to begin with, it has to be said, but then he started to make real advances after about six to eight months. In the autumn of 2008, Calum's mum Nicky started to look into the possibility of a second implant. Now we would have to own up here to having been really reluctant at first because I had always had this notion that we would preserve his second ear for technological advances in the future, but I began to come around to the idea and with Nicky's support and also with the support and the information provided by Trisha Kemp who is here somewhere and her organisation CICS, which provides lots of information about bilateral implants, once we have come around to the idea we applied for funding and to our surprise we were given this on the first application and this was before the NICE guidelines came out.

So anyway Calum's second implant was carried out last July, 2009, and you were switched on in September.

Calum didn't like the first implant to begin with, did you? Oh you are listening! Did you like the first implant at first?

CALUM SPENCE: No.

GORDON SPENCE: No, he didn't like the first implant to begin with. Complaining that the sound was too loud and he wasn't used to the second piece of apparatus, but he soon got used to it and the tuning was modified during routine mapping sessions at Great Ormond Street. Because Calum made great progress with his first implant there wasn't any kind of wow factor with the second, but his directional hearing has definitely improved. He doesn't spin around 360-degrees to see where the sound is coming from, for example.

The one thing he doesn't like is for the second implant to be on first thing in the morning -- you don't like it first thing in the morning, do you? Because the sound is a bit too loud for him first thing and he needs to be eased into it. But his initial objections have been overcome very easily and he likes being the same essentially as some of his friends at school who have had two implants. His speech and recovery as I hope you are about to discover have continued to improve and his ability to hear whispers and to distinguish between different sounds, loud and soft and men and women and so on, has definitely improved with the second implant. Finally, after five months, Calum says his second implant sounds the same as his first and the only rehabilitation that he has had to have with the second is one-to-one speech therapy lessons at his school, which just happens to be Laycock Primary which is just up the road and where he is going immediately after here.

So that is a very potted history of Calum and his first and second implant. So if anybody has any questions to ask Calum or me, please feel free.

NEW SPEAKER: Can I ask you why -- when your implant was first switched on why did you not like it?

NEW SPEAKER: Because it made loud noises and stuff like that.

NEW SPEAKER: What did people at Great Ormond Street do with the buzzing noises.

NEW SPEAKER: They turned the sound down, up or down to help it. And then it just suddenly got better.

THE CHAIRMAN: Any more questions?

NEW SPEAKER: Hello. Welcome Callum and it is nice to see you. Do you enjoy music with your cochlear implant?

NEW SPEAKER: Yes. Of course.

{Laughter}

NEW SPEAKER: I have to say it is his favourite two words "of course".

NEW SPEAKER: What sort of music do you like to listen to. Who do you like to listen to?

NEW SPEAKER: Did you hear? Did you hear the question. Are you thinking.

THE CHAIRMAN: Are you thinking.

NEW SPEAKER: What music do you like? You.

NEW SPEAKER: Michael Jackson

{Laughter}

THE CHAIRMAN: Michael Jackson has some fans here.

NEW SPEAKER: The man in the mirror, you enjoyed at Christmas when we went to Trafalgar Square you like the Christmas Carole do you remember the favourite one.

NEW SPEAKER: The 5 gold rings one.

NEW SPEAKER: Yes and what was the other one, do you remember?

NEW SPEAKER: Away in a Manger.

NEW SPEAKER: This is a question for Callum's father. What form of communication did you choose from the start for Callum? Was it oral, TC.

NEW SPEAKER: When Callum was borne we used sign language for the first two year until he had his first implant so it was very much because the hearing aids didn't do anything for him it was signing and he became very very proficient in signing from the first implant from there after it was the oral approach, very much.

NEW SPEAKER: Thank you.

NEW SPEAKER: Hello at the back?

NEW SPEAKER: This is a question for Callum, can.

NEW SPEAKER: Can you hear.

NEW SPEAKER: If another little boy said to you they were thinking about having a cochlear implant what would you say to him?

NEW SPEAKER: Um, don't know.

NEW SPEAKER: If one of your - if you met a boy who was thinking about having an implant to do it would you say to do it or not to do it?

NEW SPEAKER: To do it.

NEW SPEAKER: Why would you say it is a good idea to do it.

NEW SPEAKER: Because then you won't hear it so that you won't - so you will have to try and learn all these signs.

NEW SPEAKER: What if you don't do it.

NEW SPEAKER: If you don't do it you'll have to sign, learn all the signs so it is better to have an implant to hear.

NEW SPEAKER: Okay.

NEW SPEAKER: Thank you.

NEW SPEAKER: Hello a lady here at the front.

THE CHAIRMAN: I am coming.

NEW SPEAKER: Hello Callum, nice to see you here as well. I have a question to you. Hopefully you can answer it. When you go to your got your first implant, how did you feel at school about it? And how did you feel when you got the second implant? Was it big difference for you?

NEW SPEAKER: Yes it was really really different.

NEW SPEAKER: It was a big difference after I had the two implants.

NEW SPEAKER: Go on how did it feel to have the second, can you remember what the first one felt like. I think it is too long ago to remember the first he was only two. I don't know there you go. How did the second implant feel.

NEW SPEAKER: Um, funny. Things like that.

NEW SPEAKER: And how does it feel now?

NEW SPEAKER: Okay. I think that is quite a vote of confidence from Callum.

NEW SPEAKER: Hello. I am down here. Hi. Callum can you ask me - can you tell me how you find it at school with both your implants do you find it easy to hear when it is noisy or is it still really hard.

NEW SPEAKER: Really hard. Probably.

NEW SPEAKER: Has it been better with your new implant is it better with two then it is before?

NEW SPEAKER: Yes.

NEW SPEAKER: And sometimes when it is hard to hear, do you sometimes use signing to help you then as well?

NEW SPEAKER: Yes.

ANDREW: Do you sign with your friends at school.

NEW SPEAKER: Yes.

NEW SPEAKER: Sometimes yeah so you still use that to help you but you can talk really obviously talk really well too.

NEW SPEAKER: Yes.

NEW SPEAKER: Thank you. Sorry about the noise.

NEW SPEAKER: We try to encourage him to use sign, if I take him swimming when he is in the bath or sleep at night the equipment comes all off, so we try to do a little bit of signing. Don't we. We still sign.

THE CHAIRMAN: There is research with the NDCS which is showing very much that many come cochlear implant signing and speaking move into speaking most of the time but value the roll of signed support on many occasions.

NEW SPEAKER: I think it is very important for us to remember to always be at mind that Callum remain a profoundly deaf young man and very much part of the deaf community so as he gets older we would encourage him to resume actively learning to sign with that in mind.

THE CHAIRMAN: The research we did with the NDCS the young people with cochlear implant seeing both deaf but I can hear with my implant, what is your problem?

NEW SPEAKER: Definitely.

THE CHAIRMAN: And you have got a question here.

NEW SPEAKER: Does Callum still rely on lip reading? And similarly, therefore face to face communication? Or can Callum now use things like the telephone? Would need together see lips.

NEW SPEAKER: He is becoming increasingly proficient using the telephone with the speakerphone. He can't use a regular telephone but put it on loud, do you know what I mean the speakerphone and Callum and I think that has improved since the second implant but it may well be he is getting better using it any way. Do you still lip radical LUM?

NEW SPEAKER: Um, yes. Yes.

NEW SPEAKER: He does that and we notice I think we notice he does that a lot when I take him swimming and his implants are off, he much more see his eye looking towards the mouth he probably doesn't realise he is doing it.

NEW SPEAKER: Thank you.

THE CHAIRMAN: One more question?

NEW SPEAKER: May I just say, Gordon that I admire you and your wife Nicky for the courage in committing both to the first and to a bilateral implant and I have to admire and congratulate you both of having a lovable and wonderful son.

NEW SPEAKER: Thank you.

{Applause}

NEW SPEAKER And you. Have a good day. Thank you.

NEW SPEAKER: Thank you very much.

{Applause}

THE CHAIRMAN: I don't think we with put it any better then you did,

thank you Richard very much indeed and congratulation to you and you have a good day. You are going back to school now.

NEW SPEAKER: Yes.

THE CHAIRMAN: Oh dear. I am sure you will love it really we know Laycock school.

NEW SPEAKER: I was there two or three weeks ago and had a lovely day. It is a good school.

THE CHAIRMAN: It is a great school. What are you going to do today? Do you know?

NEW SPEAKER: No.

THE CHAIRMAN: Not yet. Okay.

NEW SPEAKER: What happens on Friday though.

NEW SPEAKER: Golden time.

THE CHAIRMAN: What happens at golden time.

NEW SPEAKER: Whatever he wants.

{Laughter}

THE CHAIRMAN: Are you going to say something else before you go.

NEW SPEAKER: No.

NEW SPEAKER: Anything else to say.

NEW SPEAKER: Yes.

NEW SPEAKER: What.

NEW SPEAKER: For golden time I always want to do cup stacking. Do you know what cup stacking is?

NEW SPEAKER: No.

NEW SPEAKER: You need to Google it. You like cup stacking.

NEW SPEAKER: Yes I am an expert.

{Laughter}

.

THE CHAIRMAN: Well we will say good-bye to the expert and his dad. Thank you very much indeed.

Follow that they say you shouldn't perform with animals and children and we.

NEW SPEAKER: Did we have an animal?

THE CHAIRMAN: I was going to say I didn't bring the dog but how do we beat Callum thank you very much for the start to the day and an example of how the technology has just changed so much in a comparatively short time with hearing aids, changing cochlear implants. Bye and we will catch up with you another day. Nicky is staying and you will be happy to talk to anybody who wanted to talk to you over coffee or lunchtime. Yes thank you

Right we move on now with Yvonne James. She is an audiologist who I work a long time in Nottingham when she was with adult hearing service. Yvonne with the hearing aid user for many years for not too many years, yes. She worked with hearing aid users for a long time and then work when the adult programme start with cochlear implant in Nottingham and is working as a clinical specialist with the company advance bionics. One of our sponsors for today.

When you get her computer fitted in and it worked before and we hope the technology works again for us, is going to move us on to thinking then about cochlear implants. Many know a lot about cochlear implant and some of us not so much. But here with go. It still searching for it. It was found quickly before hopefully it will leap into action again.

(Sorry I was late and wasn't able to check)

THE CHAIRMAN: If not we have another plan. No. We are still searching.

NEW SPEAKER: You should have added technology.

THE CHAIRMAN: Managing the technology. We tried before and we will - -.

NEW SPEAKER: Try shift F 5.

NEW SPEAKER: Yes we tried that. Do you want to try it again. If not Susan suggested we will give it one more go and not move on to the next. Do what we do with the children stand up sit down, turn around. It is doing something. Okay. It is back to the people and communication and to communicate as Callum did and just talk to the people as opposed to the technology as I said at the beginning sometimes get you away but with a bit of nations we get there. Well done.

YVONNE JAMES: Thank you for being patient. I would like to talk you through cochlear implantation. Thank you Sue we have worked together many many years it is always nice when we get to meet up at these various events.

Just to give you a reminder of the audiogram I am sure you are familiar with it. Across the top, not dB for normal hearing and as you can see going down to 120 dB for the loudest sounds that we can hear. And as you can see 0-120 that is the range for the human ear. Across the top you can see low frequency at 125 then up to high frequency sounds and in the middle area, here (indicating) that is the speech banana and you can see where the speech sounds are recorded or where we hear them around about 35 dB to 75 dB. So who is eligible for the cochlear implant. The criteria is change and is constantly changing. Both Sue and I worked in this area for sometime and seen the many changing over the years and I just listed here for you just some of the very quick

reference guides from the NICE guidelines. The criteria of around about 90 dB for hearing loss for adults and those also with a sloping hearing loss where you may still have some residual at the low frequencies but there is poor hearing at high frequencies that also falls into the range of cochlear implants. With children it is different and you have to look at age appropriate development and age appropriate listening skills and then also with adults there is the dread perception tests and the score on the speech perception tests. Many years ago people with speech reception tests of greater than 10% weren't eligible for cochlear implant it has changed greatly. And now the speech perception criteria is at 50%.

So you can see how the work that the companies have been doing and people like Adrian have looking at the benefit from cochlear implantation has manage to shape the way they are offered. The other things that have remained the same throughout the year social security the assessment process by a multi-disciplinary team and that is really important. Is it just the audiologist that makes the decision? There is a key team of people that you have to see to be able to assess the candidacy. It is still also very very important that you have the trial of a hearing aid and that there is no benefit from the hearing aid. And that is still a factor that should not be forgotten.

Just to put it into slightly visual format for you you can see here across the bottom where 90 dB is represented so if you fall into that catchment area you will go for an implant and this just very vaguely illustrates the sensory neural type of hearing low or the ski slope hearing loss where you may have hearing at the low frequencies but still be eligible for a cochlear implant.

So how is the cochlear implant different from a hearing aid? Hearing aids acoustically amplify speech where cochlear implant converts the speech information into an electrical signal. Hearing aids rely on healthy inner - sorry healthy sensory cells in the inner ear where the cochlear implant bypasses the sensory cell and stimulates the hearing nerve directly.

So how does it work? There are two main part to the implant which I would like to go through. You have the internal equipment which is implanted the cochlear implant itself and then you have the external equipment the processors whether they be with behind the ear processor or body worn processes.

To look a little more detail into the internal equipment you can see the implant here and hopefully, you can see the various parts labelled. The electrode array that is where the channels that are inserted actually do the work there. So with our particular device we have 16 individual channels that have their own current source which can stimulant the

hearing nerve. The electronics you can see are held in the gold section here and then removal magnet is also there to allow for MRI.

The external equipment, we still use the body worn processor with our device with the body worn processor president the headpiece has own build in microphone that means nothing on the ear at all but most people know are using behind the ear type speech processor and as you can see with with this speech processor as with all the companies, they are made up of many different parts. There is the built in microphone, there is an LED status light the volume control, your programming switching the headpiece connected but hopefully take sometime later on and have a look and get some hand on with the equipment that is there.

So how does it actually work? So the sound processor itself captures the sound, processes that digital information and transmits it through to the implant.

The implant then takes that electrical signal and delivers that to the hearing nerve which transmits the sound to the brain or the impulses to the brain. And I would like now to try and play you just a demonstration of how that works. It is a little easier then explaining it. Excuse the sound. Sorry. (Feedback)

I know I am going going. (Video being played)

Sorry. Thank you.

Okay what you can see here is how the implants themselves have changed over time. Cochlear implants have been available for quite sometime and like any technology they do evolve and our original implant was a ceramic the 1.0 and we are now with the hires 90 K using titanium and silicon type materials.

The sound processes themselves of course have evolved overtime originally they were quite large body worn processors as I said earlier the body worn processors are still available but the size now is greatly reduced and you can see also the behind the ear process how they evolved over time too.

What is really important to any cochlear implant system is the sound that is going to be delivered to the ear and every cochlear implant system has it's own different listening strategies and again these have also evolved overtime. The slide here, just shows the first type of strategies that were available and you can see how the changes have developed over time and as a company we have now come up with clear voice which is our latest strategy and that is a speech enhancement strategy which will be available to all the advance mixed user. What I would like to illustrate here is just how the technology does develop and improve over time.

With our cochlear implant we are only using a small amount of the implant itself so upgradeability is really important factor and upgradeability will be possible by external software and hardware. the harmony bionic ear system which makes up the whole cochlear implant system. It consists of the implant the HiRes 90K you have to have the programming software which is what the clinicians use that is the sound wave professional suite and of course the AURIA sound processor. The harmony advantage. We use it T-MIC which is use this places the microphone in the contour of the ear so it means things like using the telephone, listening with headphones are in a much more natural and user friendly position. The Auto sound which is the input dynamic range the amount of sound to be captured by the implant is also very very wide. Right at the beginning I showed that the human ear can capture up to 0-120 dB with the implant a window of up to 80 dB wide. Again it is automatically it is important that it is easy and simple to use for the user. Hire fidelity is the latest strategy. And that gives more spectral resolution and information about the sound. As I said before up to 5 times more resolution then any other sound processing strategy. And it is available to all our users. I would like again just to try and play you another sound demonstration, just to illustrate the differences between the conventional strategies and the hires 120.

(Noise)

This is high res 120.

This is what it used to sound like before we developed the latest strategies. So hopefully it just illustrates for you that technology is advancing and the strategies are really important.

(Noise)

Being able to connect various thing to the sound processor to make everyday life easier for the user is also important. The ear hooks that we use come in standard format available in the paediatric size or small ear size as well as standard ear side. We have direct connect which mean you can connect to your FM system or MP 3 systems quite easily. There is the o iConnect if you are using FM systems and as I explain there is the T-MIC available in both sides the standard and the small ear hook size. The harmony BTE and the PSP both support the hire resolution strategy including clear voice. And I would briefly like to highlight some of the web resource that are available all of the manufactures not just ourselves produce materials that are available but to point you in the right direction where to get some information. We have the WWW.BIONICEAR.EU. So you maybe working with someone that needs information in a different language go on the website here, and you will be able to down-load information in the language that is appropriate.

Other website include the USA website we are an America based company and their website is very very comprehensive. When you first log into the website you are usually pointed into the BEA direction which is where users can get direct access to other candidate that have a cochlear implant and can post questions to them and get a reply within 4 hours.

The hearing journey is more of a chapter but the real reason I am highlighting this one to you because part of the hearing journey you have the listening room. In the listening room there are great down-loadable for professionals, for parents and for users anybody who wants to expand how they learned to listen with a cochlear implant if they want to improve their own listening skills there is is lots of down-loadable resources here.

We do have a dedicate teens website there is an older teens website it was created by teenage for teenagers and the questions that are there are still very very relevant.

We work a lot with other charities and organisations including the ear foundation and the ear foundation runs the soundingboard which is another brilliant resources for both professionals and users to get your questions answered about cochlear implants from all the manufactures. And last but not least I just like to highlight musical atmospheres which is a music base web resource which I got some leaflets on and if you like to come and speak to me about that later on then we can do. And I am aware of the time so I am skipping through.

We do like to make things nice and colourful as pretty as possible so there is the option now to go into yet another website and customize the implants to suit whatever you like. That isn't provided by the clinics people have to go on and pay for it for themselves but it depends if you have a young child they can customize it with whatever their favour cartoon character or whatever is it.

So just like to say thank you please come have a chat with me later on a few people have said they have some specific questions for me, so I will be here and that is it thank you.

{Applause}

THE CHAIRMAN: Thank you for illustrating how it has moved on in hearing aid use and in cochlear implant and now enjoying music too. Without the support from our sponsor and exhibitors we wouldn't be able to run such a day so it is now time for your coffee and you know where it is where it was served as it was, when you came in and can I ask you A to take the opportunity, have a coffee and a comfort break but also to go to the exhibitors and ask questions Evyonne is great

expert and many of our exhibitors will be happy to answer any of your questions but can I ask you to be back here at quarter to 11 - - sorry quarter to 12. At 11:45 and quarter to 12 for the second part of the morning. Thank you.

(Refreshment break)

SUE ARCHBOLD: Hi everybody, we are back in action again. I hope you enjoyed your coffee, it sounded as if you all had a good opportunity to have a chat too and I hope you had useful discussions. If you have had your one interesting discussion, don't switch off for the rest of the day because I'm sure there's plenty more to come.

Now it gives me great pleasure to introduce Chris Durst. Chris is going to talk again about developments in hearing implants. We had a talk before the break about cochlear implants. There are many different varieties of implants, not just cochlear implants, and he is going to take us through some of those developments that have taken place. And now Chris is actually passionate about acoustics, getting it right, getting sound levels right, thank heavens and we should have had him hear at 8.30 am this morning, so he has disappeared behind the screen and gone into technician mode.

NEW SPEAKER: That's much better.

SUE ARCHBOLD: Is that much better? Every home should have one! [laughter].

Thanks. Thanks, Chris. So, yes, here is somebody who is an outstanding audiologist, outstanding clinician, but also actually cares about the communication and making it comfortable and right for everybody. So here is Chris and I'm sure he is going to get his message across. Thanks very much, Chris.

CHRIS DURST: Okay, thanks very much, Sue. So I'm Chris, I work for MED-EL UK and I look after things clinical and technical for them. I was asked today to do a talk covering some of the new developments in hearing implants that have gone on.

So there are lots of developments and limited time so I've tried to focus things, and I had better get on with it before I overrun the intro section. So just to give you an outline of what I will cover, first of all I will talk about one type of hearing implant called a middle ear implant. Then I will talk a little bit about bilateral cochlear implants. We know two hearing ears are better than one so are two cochlear implants better than one? Then about a development which is still not quite mainstream but getting there and that's called combined electric and acoustic stimulation -- or EAS for short -- and that's the use of a hearing aid and cochlear implant technology in the same ear. If I have time I will conclude and just look at one or two other new directions for implants and hearing systems.

So middle ear implants. Just to recap, what happens in normal hearing

sound is picked up by the outer ear and it travels down the ear canal and causes the ear drum to vibrate. This is passed across the middle ear by the ossicles to the inner ear, the cochlear, where they cause pressure changes in the fluid there and hair cells in the cochlear pick up those changes and convert it into a nerve signal that goes on up to the brain. So how a middle ear implant works, in the case of a sensory neural hearing loss -- that's where you've got permanent damage within the cochlear causing the hearing difficulty -- sound is picked up by an external processor, it's converted into a special signal with radio waves, which are then picked up by the internal implant and that sends an electrical signal down to a vibrating device that is clipped on the ossicles in the middle ear. That causes the vibrations that go into the cochlear, the inner ear, and just like in normal hearing the remaining hair cells pick up those vibrations and turn them into a nerve signal that goes up to the brain.

There are some alternative uses of middle ear implants and one is where you have some potential damage to the ossicles, to the middle ear system, and that's known as a conductive hearing loss, and for this particular system the vibrating device can be fitted to the entrance of the cochlear directly, causing pressure changes in the cochlear which activate the remaining hair cells which cause a signal to go up to the brain. So just to remember that middle ear implants are for those whose cochlear, whose inner ear, has enough function remaining to receive and convert the pressure changes.

Okay, here are some components of the middle ear implant system. You can see they are rather similar to a cochlear implant. So there is an external bit, an audio processor that's worn attached via the magnetic attraction to the internal implant. This particular model has a microphone built into that system. This is the internal part. There is a coil in there that picks up the radio signal, there is a magnet which helps the external bit stick on. There's some electronics that convert the radio signal back into a suitable signal to send to the active vibrating part of the device and for this system it is called a floating mass transducer and for that that is the clip that will be used to fix it on to those little bones in the middle ear.

There are some potential advantages of middle ear implants over conventional hearing aids. One is that they can provide for high frequency amplification. There is a limit to the frequency range a conventional behind-the-ear hearing aid can provide. They are not subject to feedback or whistling problems. They don't require the person to tolerate an ear mould in the ear, so they are effective in cases of atresia -- that's where you are born without a formed ear canal -- and they can be useful for people who suffer chronic external ear infections due to wearing an ear mould. It's important for some

that there can be an improved cosmetic appearance, some people like the neat small processor versus a behind-the-ear hearing aid and, as I mentioned earlier, for hearing losses where there is involvement of the middle ear they can replace the function of the ossicles, the small bones, as well as providing amplification.

Okay, so I will move on to bilateral cochlear implants -- and what I was going to say right before I started this talk is that all my slides will be on MED-EL backgrounds and headings, because that's what I've got available, but generally the concepts are applicable across any type of system.

Okay, a little bit to recap on some of the advantages of hearing with two normal hearing ears, and that's often referred to as binaural advantages. A sound that comes from off the midline, so off to one side in space, it's partially blocked by the head, so this ear is in what's called a shadow, whereas this ear isn't, and that means there is a level difference between the two ears for that type of sound. Additionally, the sound has slightly further to travel on this side, as indicated by the red arrow and that means it takes a bit longer to get there and therefore there is a time difference between the ears, as well. Your brain has got systems that can analyse and interpret these differences and it helps you to do several things and these include, one, finding the direction that a sound arrives from in space; it can allow the listener to focus on the ear that's better-placed to pick up a signal of interest, that's called the head shadow effect; and it also helps in separating out two sounds arriving from different directions in space, and that is sometimes referred to, quite oddly, as the squelch effect. I don't know about yourselves, but I very rarely have any time without background noise.

So let's come on to some really basic reasons of why we might want to provide two cochlear implants rather than just one. Well obviously if we provide a single implant to one ear there's no question of being able to get binaural benefit, there's no question of being able to use two ears together. Another thing we know is if we leave an ear without stimulation it is probably going undergo neural degeneration, so its ability to transmit signals will be reduced.

Additionally, lack of early input to an ear might result in missing a sensitive period for hearing development and a sensitive period in simple terms is the age range where the brain is ready to develop certain structures or pathways, given that the correct input is present and being applied, and if the input is only being provided later, after a sensitive period, it might be that it is much more difficult to develop those structures and that could lead to certain problems.

It might be that the lack of early input to both ears might result in the missing of a sensitive period for binaural hearing development, so it

might be that you need input to both ears early on in life. Another very practical point is that the better ear will always be assisted if we give two implants. You can't always predict on paper what is going to be the best ear for an implant.

Another practical by important point is redundancy. So you've got two devices and if one breaks down, so for example if it has a flat battery, it breaks down or in the worst case you have a device failure, you have the other one to use in the meantime.

Okay, what about some of the benefits that have been demonstrated in research studies for two implants? Sound direction abilities are better with two implants compared to one. With one implant, finding sound direction is normally only a chance level in these studies and with two implants it is much improved. The ability to focus on the ear with the best listening situation, the head shadow effect, is also demonstrated quite strongly in research studies and additionally, looking at more recent studies, the squelch effect, the benefit of separating sounds arriving from different locations in space, is also demonstrated.

But an important point is some of these skills can take quite some time to develop after providing the second side implantation. If you look for a squelch effect in adult users of two implants and you look at it six months after giving them an implant, you probably won't find that squelch effect. You would have to wait a year, and for children, for them to be able to show good localisation abilities, you might have to wait two, three or even more years for this to develop. So it is important to notice these aren't magically provided by a second implant: they might take quite a bit of exposure and listening effort. So challenges for bilateral implants, well, of course, two implants are more costly than having one, although all the manufacturers, as I understand it, offer some discounting scheme for the second side. I don't know if you've heard of NICE, but this is a body that decides if healthcare systems and provisions are cost effective in our NHS system and currently they allow bilateral implantation for children but not for adults within the NHS provision and that's due to be reviewed again in 2011, so it might change.

Another challenge is that some people might get at least some binaural and potentially some other forms of benefit from using an implant on one side and a hearing aid on the other side and that's sometimes referred to as a bi-modal set up. As yet there is no easy way to test and predict who will do well in that beforehand and of course the NICE recommendation is to only give bilateral implants simultaneously, ie in one surgery, so there's not really scope to evaluate that in an individual. Personally I think there's probably going to be small numbers that will benefit from bi-modal to bilateral implants but the research hasn't sufficiently been done to answer that question

definitively yet.

Again, just to look at the emerging consensus that's coming out from bilateral implantation, there's now at least 14 years' experience at providing bilateral implants with the idea of restoring binaural abilities and we know that those implants can have that benefit, such as the squelch effect and localisation. The consensus is emerging that bilateral implants should be provided as early as possible after losing hearing or being born without hearing. If the systems aren't provided simultaneously it seems to make sense that the second side should be provided fairly soon after the first side, but that's not an all-or-nothing type effect, it's kind of reducing the chances of getting a long outcome, the longer that you leave it.

The other thing which is interesting, I think it came up in the discussions today with Calum and his father, it does seem to be that waiting for a new treatment like genetic or stem cell therapy, whatever you want to call it, for the second ear is probably not valid because just leaving an ear isn't a safe or zero sum game, because you might miss the sensitive period, there might be neural degeneration and there might be degeneration of binaural capabilities.

Moving on to the last section of the talk, that's the combined electric and acoustic stimulation, or EAS, the concept behind EAS is actually fairly simple and that is that a high frequency or ski slope hearing loss where the high frequencies are very, very poor and the low frequencies are relatively good, represents an ear that is part cochlear implant candidate and part EAS hearing candidate in the mid and low frequencies. That was programmed by (inaudible) in Frankfurt over ten years ago and that group pioneered special surgical techniques where you could have an implant electrode inserted partly into the cochlear and at the same time preserve that low frequency hearing, and early on this was thought to be impossible but actually now there is plenty of results that demonstrate that it is possible.

Okay, just to demonstrate that hearing can be preserved, I will just concentrate on one point in this slide. This is for a group of people who underwent the EAS surgical procedure and before the operation they scored on average 24 per cent using their hearing aid alone, and again if you measure after the operation, twelve months, their speech scores, using the hearing aid component alone, so just using their hearing, not using the EAS type system, then there was no difference in their scores, so the hearing was preserved sufficiently to maintain their speech recognition abilities.

Okay, in summing up some results, currently the likelihood of hearing preservation is improving all the time but it's currently something like 90 to 95 per cent, so there is still risk with this, it's not risk-free, but the hearing preservation is very good. The results of people who

combine the hearing aid and implant stimulation, the same here, show some advantages above traditional cochlear implant candidates. So this is for speech and particularly speech in noisy backgrounds and for some aspects of music appreciation. It seems that atraumatic, ie non-damaging, implant electrodes and the surgical techniques used are crucial in this application and in the early days of cochlear implants it was thought, well, the electrode is going into an ear with no function, therefore we don't have to be careful about how we do it, let's just get the electrode in, but now the consensus is concluding that it should be done with the minimum amount of trauma as possible. Currently reported to us at MED-EL we have cases of full insertion of the electrode, covering the entire cochlear, yet at the same time preserving original hearing, so it shows that these systems can be implanted with very minimal trauma.

I have some listening demonstrations, we've got a couple of minutes to go through them. Always take listening demonstrations with a hefty pinch of salt, they are an artist's painting of reality, not a photograph of reality. What I will do here is play a speech sample gone through a simulation of traditional implant coding and it's probably a worst case example. (audio played).

So I'm not sure if you could hear that but it's relatively intelligible, it said "It's a sunny day and the children are going to the park". Could anybody tell if it was a male or female talker? Hands up for male? Hand up for female? Hands up for don't know? I think "don't know" is the best answer there.

But what I will do now is play a simulation where it is the combined electric and acoustic stimulation with hearing working up to about 700 hertz or so. (audio).

I don't know if you will agree or not but to me it's much easier in that situation to be certain it is a female talker and you can also tell some of the other aspects of speech other than the words coming through, like she is not terribly excited that it is a sunny day and the children are going to the park, she is rather neutral about that.

So I have just been given my one minute warning so I will move on to conclusions. Middle ear implants are similar to hearing aids in that they require some function of the cochlear but they assist by amplifying the vibrations in the middle ear rather than producing amplified sound. Bilateral implants can restore the benefits of normal hearing, so things like localisation, head shadow and squelch. Combined electric and acoustic stimulation can lead to good hearing and lead to (inaudible) cochlear implants, and a quick mention of some of the ongoing things we are looking at. One is a treatment for ongoing tinnitus and the other is for unilateral deafness, so if you have one hearing on one side using a cochlear implant in a completely deaf ear. Another thing that

might become important in the future is the ability to deliver types of drugs directly into the inner ear using a cochlear implant and electrodes. Okay thank you very much. [applause].

THE CHAIRMAN: Thank you very much Chris. Thank you very much indeed. Chris is one of the clearest explanation of difficult topics and when I listen I understand that at last. Are you around at lunchtime.

CHRIS DURST: Yes I will be.

NEW SPEAKER: There is a comment or question from the back.

NEW SPEAKER: Can we have a print out of what you have done up there, is that from the screen?

THE CHAIRMAN: Yes.

NEW SPEAKER: You -- (inaudible).

NEW SPEAKER: In a weeks time.

THE CHAIRMAN: Chris's slides we will ask all the speakers, some will agree. Adrian agreed that he is happy for some of the slides to put up and not all of them and they are on the website in a weeks time. Thank you very much Chris he will be around to answer any questions over lunchtime.

Bone anchored there are, I only realised a year ago about 8,000 years bone anchored with 100 centres providing them. It is a growing area. I met Tim a long time ago we are both teachers of the deaf and working together to support a child in Doncaster. Tim is here as a bone anchored user and teacher of the deaf too to take about his own experience and tell us about bone anchored hearing aids so thank you Tim.

TIM JONES: Good morning. I am here because I have a screw in my head not just because I am a teacher for the deaf. What I want to do is talk about the BAHA about the 165 that actually use a BAHA and it is a very very we have an implant that I will go there and the BAHA fits on the side my fits neatly like that one there.

If you have a look at my audiogram in my better ear you can see why I find bone better than air. The top line is bone conduction and the bottom is air connection and there is a similar difference with the two going across what you see is how level the hearing loss is, it is very easy to use the residual hearing very very well you avoid the ski slope. My own from the air connection it is a mixed loss mainly conductive but there is a sensory loss there as well.

Right the reason why I like my BAHA is like an essay, isn't it. What did you do in the holidays well how do you like your BAHA is when you go deaf your confidence level goes down and the quality of life goes down as you get older you feel isolated and you

(?)Meet come I am advocate under Kate king cochlear and what we

tried to do is help people who are going into the scary operation there. What you do find as they go through life not only do they become isolated but their partners become isolated and their family is isolated as well. That is because you become jumpy basically. The more isolated you are the more bad temper you become, you argue with the wife and refuse to go out and go to parties because you have the background noise and also, the more you believe that you are stupid. I went through school and my hearing loss wasn't diagnosed straight away and I spent all my teenage year thinking I was stupid. I had two math teachers that changed my life and as a result you see this extremely intelligent person in front of you know.

{Laughter}

There is also a reluctance to do new things if you are losing hearing I had a BAHA fitted and have been using it for 9 years because of that it sounds like Oprah Winfrey because it is true. It is change I taken on new challenges I had two post- hearing air before I had hearing infection I had constant feedback (indicating)) and you lose your confidence but since I got this it gives you confidence. It gives you confidence, you want to take up new challenges. I started doing public speaking so blame the BAHA if you are bored. I started playing music I took up the saxophone if you have conductive because you teeth are on the mouthpiece, I am not good but I enjoy it and not only do I enjoy it my listening has improved.

What my teachers say to me - he is a bully - you have to sing before you play and I say I can't sing and he says yes you can. I found I can sing. There is over tones on the saxophone and you have to go up a tone and get up a tone and he played it and I matched it straight away wasn't thinking about it it was immediate match and that was an eye opening moment for me because my BAHA was using well.

Also no disrespect at that I don't get identified about being a deaf person. If I go around with two postorals in there, immediately I get this effect where people look at you look at your hearing aids and then they start talking very, very, slowly to you and very precisely to you and what I tend to do is to start talking very slowly and precisely back to them.

{Laughter}

And this you are not identify. I don't want to be identify as a deaf person because I am not truly deaf, I was born hearing I don't want to be identified as a deaf person because I want people in the grey area in the middle. My main communication is oral. I have teammates I play for Sheffield deaf team. We are the bottom of the 4th division in Sheffield not good but getting there. All the people there are by choice and they use signing as the first means of communication. But that is not me and I am not true to myself my signing as a hearing person using sign

supported English.

Okay. So you change over. What is a BAHA if you look at the diagram you see 1, 2 and 3. It bypasses the outer ear and bypasses the middle ear and it stimulates the cochlear. You get this similar effect if you tap your teeth like that and you can hear?

The BAHA consists of three different parts what you do is -- I have this here to show, that part is the implant there. You have an abutment and a processor up there. The implant is titanium it fuses with the bone the abutment is on the outside and the processor goes on there.

In terms of comparing this to a cochlear implant this is very very simple technology. So what they do in the operation? This is where the volunteers come in it looks scary but it is not they take a skin flap and 55 mm from the top of the ear and scrape away the flesh and get the drill there and drill in like that (indicating)

{Laughter}

But it is very comfortable. When I had mine done under local anesthetic and there is a nice nurse and could you lay your head on my chest while we do this? And I went through the operation a very very happy person.

{Laughter}

So the implant is placed and the skin flap is sutured and a dressing is put on the top and you wait for the fusion to take part and you go back in 3 months to have your processor fitted. Now, if you Google and you see the images there you will see an image like that which is after the operation is done you have the hearing cup across there that will scare anybody if you look at it three months later you can see it is not so bad you do have a shaved area but the hair grows across it like that.

Right so who it is for? Three main groups of people like me with middle ear dysfunction. People that can't wear the conventional hearing aids. The conventional prostheses are the best they really are but if you have ear mold stuck in your ear you will increase the medium for growing infection I used to have loads of infections. It affects your quality of life. You are moving around your mold like that and worried about it. With this your ear is ventilated your confidence level goes up and your life improving.

The second group those born without outer ear without **AE** canals or various different pieces for example with Treacher Collins syndrome and there it is placed in case it is put on there and they are find it useful.

And the third group those single sided deafness sensory loss. With acoustic neuroma. It is a tumor when it is removed the hearing is lost. So many think is what happens. On the side with the cross across there you fit the BAHA and the sound is communicated this diagram right the

way through the brain it is not it goes through the bone it is bone connection there and antidotal evidence from other people who I work with say it is very very effective. It is effective because you can get a sense of direction where the sound is coming from and also effective because you can have more confidence about your hearing. It is all the reasons that Chris pointed out. I thought your talk was very good and given me a lot of ammunition.

NEW SPEAKER: So the product this is the sales pitch because cochlear sponsor my train journey here you have these thing that you might come across. The first one is DIVINO. Conductive earring lose bone anchored up to 40 dB that is replace by BP 120 and I want to mention that briefly. How am I doing for time. Good. This is a better sound to noise ratio and they are working on they are lethal out in the rain. I like your term squelch you get squelched out you have to put it away. That is more resistant to water damage. The nest one is intense so which is the one I wear it is VR verifies comfortable BAHA and three settings the first one for around and the second for focus and the third for the MP 3 player. The last one is the Cordell old fashion technology you wear it on there and the sound is very very harsh. You might come across the analog compact travel if you are a teacher of the deaf.

You get the soft ban on this one you can introduce young children who very active and have thin skull the BAHA and wear it as a head band and get a degree of how to use it. They get use to it it does occasionally slip but you get reasonable impact and get some idea whether the BR are BAHA will be useful. Before there are challengeses about using the BAHA and it require Surrey and that is scary. Up in Newcastle the procedure taking half an hour. In and out.

There is also the mention of the area about the abutment you freed to keep the area around the abutment. I do it daily routine if you are teachers with the deaf, that does become a problem because the tissue builds up there and becomes infected you try to get them to use it regularly because it become sore and effected and they loss it. It can drop off. It needs to be flexible. You need to be be able to put it on easily but if you are turning around in the car with the headrest. The other times that will drop off most alarmingly is when you have a cuddle. You have someone who you are attracted is holding you around the head first of all you get the feedback and the BAHA get lost and you take you off your focus of what you intend to do.

And the last one which upsets me a lot is provision varies all the way over around the country. There are only three areas that will provide by laterals that is Newcastle Birmingham and Bristol. Doncaster were only given one. They will give someone who has single sided deafness making bilateral but they won't make me bilateral. I think that is stupid

and absurd why do we need bilateral you covered better than me Chris. There is anecdotal two being better than one you can turn the sound down on both of them and if you turn the volume down you cut out more the background noise for example if you are wearing a hearing aid you turn the volume up and turn down the hearing aid and that cuts out the outside noise. You can get a sense of direction I went to a show last night and sitting facing there I have to get my wife there and if someone talk to you that side you become paralyze with fear your confidence level goes down and effect the enjoyment of the occasion. You can localise which hear is better. This is suppose to be my better and recently I went up my worse side gets betting word tests using my conductive tearing my bone hearing which which surprised me.

The other thing is you will able have a spare they drop off and break if you break and run out of them your live goes you nowhere the a cochlear implant when their implant breaks down they get a good sufficient Nottingham are great you have return in post. But it varies mine went down and gave me an analog compact as replacement and it will take three weeks back to me. That is no use, I need to get on with my life and get on with the sax playing you always have a spare. Also if you have infection one side which you can get and transfer it on the other side and wait for that infection to heel up. If you have infection you are not you laterally carry on using and using it and maybe aggravate it

So it is a postcode fitting is a postcode position

Now the positive stuff. The stuff where I earn my travel and my lunch allowance from last night. It is plug and play. I have 5 minutes I am okay. It is plug and play it works straight away. There is a rumour going around that this kind of hearing is not as good as through hearing aids I disagree. And as these hearing aids improve the BP 100 has different programme for hearing loss the quality is very very good. At least it is for me.

My ears are now healthy. If you suffered ear infections you know how depressing and how awful that it is. Less feedback. I had mast -- not that I had operation that enlarge my ear canal and it is difficult to get a good fitting plug there so you always get feedback and get feedback and frequencies that you can't hear so you are getting the feedback everyone else can hear it you can't. They are very very comfortable and fit it on in the morning and go around without it switch on and I am still looking for it it is that comfortable. You walk into a shower and realise you have your BAHA on it gives you confidence.

I mean I am an old man retired but I am enjoying my new confidence it

is lovely. It is easily reverse this can come out any time you want. Right. There is one other reason why I like it. And that is because - well I was at lunch one time in Vancouver we had a nice lunch in the last holiday and the beautiful view of English back bay it was great and this really nice waitress came up and being Canadian they always ask you what is that is that a mobile phone so I said no it is not. It is a BAHA my usual spiel and then she said "cool". Now I have waited 58 years to be cool. And for that reason alone I like my BAHA.

SUE ARCHBOLD: Thank you very much. Tim has said he has waited 58 years to be cool and you can see how Tim as a teacher in front of a group of stropky teenagers -- how brilliant he was and it was great to see how he changed the lives of lots of deaf people in Doncaster over the years. Thanks, Tim, I'm sure you will be happy to talk to anybody over the lunch time break about your experiences with bone anchored hearing aids.

Now we move on to the last slot before lunch time -- and they look as if they are still awake for you, Paula! Paula will take us up to lunch time with looking at future implant technologies, taking us to the future, and you've got 20 minutes to do it in Paula, so no pressure here!

PAULA GREENHAM: Okay, well, first of all I would like to thank Sue very much for inviting us here to talk to you and I'm going to give you a very broad-brush presentation on what might be coming in the future for cochlear implants.

I've worked for Cochlear now for the past twelve years, I'm a scientist by training and I focus now on their clinical research.

So what do we think the future will look like? Will it involve advances in cosmetics and practicality? Might there be advances in programming and processing? How about delivery of the signal to the nerve, how are we delivering it to those neurones? Or what about indications?

Whole loads of new people who could benefit from cochlear implantation? I think the reality is we are going to see advances in all of these and I'm going to give you a little flavour in each of those topics of what might be coming.

So starting with cosmetics and practicality. Well, already, we are at the point where we have the thinnest and slimmest, most reliable processers and implants than ever before. But how could we improve? Well, we have been looking for quite some time now at a totally implantable cochlear implants, or the Tiki. You can see here on the left hand side a conventional cochlear implant, so you have the electronics implanted here with the magnet which then attaches the speech processer on the outside, but in this internal part is the processing chip and the electrode, but the external part has the microphone and picks up the signal.

Well, with the totally implantable device, everything is under the skin. So that's the Tiki there on that side. So in that implant that's implanted into the mastoid bone is the microphone, a rechargeable battery and a digital processor. It is recharged here, you can see there is a charger on the bottom, but for our first group of patients -- and we've actually done three recipients with the Tiki so far -- they also have the ability to use a behind-the-ear speech processor so it would function completely like a normal cochlear implant. We have had some success in that they are getting benefit from the invisible hearing mode, but it's nothing like what they get from using their behind-the-ear processor at the moment and the main complication with that is body noise. They are picking up a lot of body noise from that internally implanted microphone.

Now, the benefits of this are clearly cosmetic, because you can't see it. But also other benefits are that you could wear it all day, all night, you could sleep with it on, it's just there. The other thing we get asked about a lot is waterproof. People want to be able to swim with it and whilst current speech processors, you can drop them in the bath or probably have a shower with them on and not really do it any damage, you can't actually swim with it. And maybe this will take us forward in that direction.

So we've had a little look at what might be coming on the cosmetic side, but what about on the more technical side, on the processing and the programming? So this is the job that the speech processor that is currently worn externally does.

Well, we also have another trial device, which we use to test new speech processing strategies. So this is the way the speech processor codes the sound into the electrical signal. This is what is called a percutaneous implant, so this is where there is almost no electronics at all, so almost the opposite to the Tiki, there are no electronics planted under the skin, everything is external, the only thing that is implanted is the electrode array into the cochlear. This allows us to experiment with a huge range of very complicated speech processing strategies that would never fit into a normal behind-the-ear processor: a lot of them have to be driven from large desktop computers. But it means that we can really research some of what may be coming in the future.

But how, when you go to a clinic as a recipient, you have a session with your clinician and they try different map parameters, or different settings for your map to try and help you get the best from your implant, and we are also looking at ways of how can you improve that process. One thing that we've looked at is using something that's called a genetic algorithm and all that really means is that only the clearest sentences survive. So you change the parameters, you

present a sentence, and if you hear it clearly those parameters go forward to the next stage. They are then adjusted again and so on, and so on, with the weakest parameters being weeded out at each point and then you end up then hopefully with your optimum map.

Another approach, again a similar theme, is where again a computer system selects a set of parameters, you then are asked to perform a speech test, probably slightly more complicated than the sentence tests which tend to be used now, so things looking at phonemes and the types of errors you are making, and if an error is made you then repeat the test and so on and so on, so it happens automatically.

So we've got automatic programming, but what about when you come to take your speech processor home? Now, we are really already at this point with an automatic sound processor. So this is where the sound comes in and the speech processor auto-adjusts itself with the right parameters for your microphone and maybe some of you have heard of things like ADRO, things that the clinicians put on to your speech processor in the clinic. The processor would decide which of those you needed, depending on the signal that was coming in. But wouldn't it be nice if we were able to read minds? I don't think we are quite there yet, but ideally you want to adjust the processor depending on what is actually being heard by the brain. So we are a little way off this yet, but hopefully we are not too far off this (indicates), where this auto-adjust would happen depending on your performance, rather than depending on the sound that was coming into the processor.

So here is you, sitting at home, currently you have to go all the way into your implant centre whenever you need a remap or an adjustment. But we can connect you to your laptop at home and for us at Cochlear we can do that via our remote assistance and I'm sure the other companies have their ways of doing it too.

So once you are connected to your laptop, you can then be connected to the internet. That internet connection could be connected to your clinician at home and even to other specialists at Cochlear. So possibly the future lies in not having to spend so much time having to travel to a centre and having more done at home, controlled by you.

So that was the programming and the processing.

Now possibly the most exciting area of development is the delivery. So this is how the signal is delivered to the nerve and to the neurones in that nerve. This is in the area of electro-design. So at the moment we all use fairly similar electrodes that might be slightly different lengths, slightly different numbers of contacts but largely they are the same design. But where we are moving towards is high density electrode arrays. So this would give us the opportunity to provide significantly more contacts. So at the moment, you know, we are in the tens and twenties -- 22 for us at Cochlear is the number of

contacts -- but if we really want to make that next leap forward to the next generation of coding strategy, we need more contacts. Something that's often talked about that we are working towards is this preserving the fine timing of the signal and this might be the key to giving better music perception, for instance. But to really make that stride forward, we need 150 electrode contacts.

The use of technologies like this thin film technology here is the direction in which we would go to try and achieve this. This is something here that has been developed with the University of Michigan and this is currently in animal studies, so it is at a very early stage in terms of this new type of electrodes.

But even further in the future, there are tremendous opportunities with nano-technology which is really just the science of the very small. Types of electrodes which are certainly possible, and I'm sure we will go into looking at these in the years to come -- here you have an example (indicates) where the electrode is actually either growing towards the tissue, or indeed is stimulating the tissue to grow towards the electrode. This example here (indicates) is where you would possibly insert an electrode array only 5 millimetres into the cochlear and then the electrode would self-assemble itself into the cochlear, so the ultimate in atraumatic electrode insertion, and these are molecules that have a memory, you can programme them to know what shape they have to build themselves into. So that sort of technology is out there and available and is being investigated. You can just see it growing there, into your lovely electrode.

Again, more immediate now and in animal studies, is using the electrodes to deliver drugs. Now why would we want to deliver drugs into the cochlear? Well, this is to do with auditory nerve regeneration and the delivery of drugs called neurotrophins and these are drugs which can stimulate cell regrowth and have been demonstrated to. Here in this example, you can see this is a guinea pig and here on this side is what the hair cells would look like in a normally hearing guinea pig, so down here you have the inner hair cells and up here you have the outer hair cells. When you become deafened, you can see here the total loss of the outer hair cells and loss here also and damage to the inner hair cells. And on the far right hand side here, this is where the guinea pig has been treated with these neurotrophins and you can see the regrowth here of the cells. Now, if you compare the two slides, this is very nice and neat and ordered and this all looks a bit messy and here, there and everywhere. So there is still a bit of distance to go before this technology really reaches a point where it is usable, but we are at the early stages. But I think, as Chris said earlier, the important thing about not waiting for this is really we don't know how long it's going to take to be at the point where it is being used in people, and

also there are key things about making sure that that ear is stimulated that probably outweigh the potential benefits of this in the future at the moment.

So we've looked at the cosmetics, the programming and the delivery and finally I would just like to look at some new indications and new types of stimulation that we are looking at.

So Chris has talked about moving towards preserving that residual hearing as much as you can, and this is so that people can access both electric stimulation in an ear and auditory stimulation in an ear. But also we are looking more and more at people with asymmetrical hearing loss, so that's when you have perhaps a profoundly deaf ear on one side but maybe a mild to moderate loss on the other side and you would give them an implant in the profoundly deaf ear. Initially, and these are studies that are going forward now, it's people really with severe tinnitus -- the main cause of their disability in that unilateral ear is very debilitating tinnitus, and maybe the implant can help with the tinnitus as well as the hearing.

But another group which is often forgotten are the seniors. Sorry, it's a horrible American word! We are an aging population. A lot of implants go into children and you will see that from the stats in a minute, but we are an aging population in the Western world and, as you get older, the incidents of severe to profound hearing loss increases. But, when you have a look here, and these again are statistics from the States, but here the pale yellow are the percentage incidents of population in the hearing loss and the darker yellow is the percentage of implants versus hearing loss that these groups get. So you can see here, when you are very young, you know, a high percentage of people are being implanted. By the time you get to 65, you are probably evening up, half-way there. But older than that, a tiny fraction, 17 per cent of people are being implanted and over 80, only 5 per cent, with the highest incidents, and this is the same picture certainly across Europe. So do we need to be looking at designing implants for this older population more and be less focused on the paediatric population the whole time?

So just to round off finally, we have some implants also looking at non-cochlear stimulation. So here when you are stimulating the cochlear you are stimulating down here, but for some people the cause of their hearing loss is more centrally in the brain stem so that's where the auditory brain stem implant, which you can see here, comes into play. But even further up the brain stem we are also looking at mid-brain implants too, so further up here. And just finally, vestibular implants, very early in its infancy, but you could stimulate this system in the same way that you stimulate the hearing system. So what else are we missing? There are bound to be some things out there that we

are still missing, but the research and development arms of the companies spread far and wide into all sorts of different technologies and we have a lot of contacts with a huge range of research partners across the globe and across Europe. So hopefully we are not missing much and you will be able to soon see some of these new developments coming forward into products that you can use yourselves.

Thank you for listening. [applause].

SUE ARCHBOLD: Thank you, Paula, very much for sticking to time and, Paula, you will be on the stand over lunch time --

PAULA GREENHAM: Yes, I will.

SUE ARCHBOLD: -- with your colleagues --

PAULA GREENHAM: Yes.

SUE ARCHBOLD: -- and more than happy to answer any questions on the technology you talked about?

PAULA GREENHAM: Absolutely.

SUE ARCHBOLD: Thank you very much, Paula, and thanks to all our morning speakers and thanks to our excellent palantypists and interpreters. I said at the beginning of the morning that I'm sure people would have complaints. We have a packed programme but I'm sure that many of you might say, "Well, why didn't they include this, or why didn't they include that", and I'm sorry, it was simply impossible to do so, but we have had an exciting morning thinking about the exciting technology developments, started off by Adrian, who has driven forward access to these technologies in the UK.

We are stopping now for lunch, and you will have time to go to the stands and talk to our speakers, talk to each other, and enjoy your lunch, we hope, and we will be back at quarter to two when Susan will be chairing the afternoon session where we will be looking, with more exciting speakers too, at how we are using these technologies at home, at school, at work and what real life is like and finishing with Lorraine Gailey who is going to bring us where back to where Adrian started, which is that it is the people and communication that matters when we are using this technology. So thanks very much everybody and enjoy your lunch. Thank you.

(Lunch break)

THE CHAIRMAN: Good afternoon ladies and gentlemen, thank you very much for coming back on time. I am going to carry on the excellent work done by Sue and make sure everybody this afternoon keeps bang on time so I hope that our speakers will excuse me if we are Ruthless to bring together an end because it is very important that we keep our programme going.

Just to talk you through what we will do this afternoon, just going back to adrains presentation this morning it suspect about technology it is an important part it is actually technology is for people, so our final

speaker, Lorraine Galely is going to talk about why people matter, and why we need work force which is fit for purpose. We need leadership, and we need people who really understand the need for deaf patients. Where I think all of our organisations have got a role to play.

I probably should have introduced myself. I am Susan Daniels I am Chief Executive of NDCS and that is my day job but I am also chair of UKCoD. At the end of the afternoon I will take about our programme going forward for the rest of this year.

Any way to this afternoon we will start off with Bencie who will talk about language and the brain followed by Graham Hilton who will talk about technology and schools and in the work place.

And then we will have to tab that from stage text and then mark from RNID on communication technology and Anna Herriman who will talk about the experience of cochlear implants users. And finally because you are here Lorraine Gailey will square our circle or -- or do something miraculous to our circle and just finish it off about why it is so important that we think about the needs of people not just the technology itself. Moving on you have all got the speaker biographies in your pack so I won't go into a very long spiel about Prof Woll. She is a research around language and communication so without further adieu thank you for joining us and over to you.

Prof BENICE WOLL: Thank you.

Well thanks very much to the conferences organisers for the invitation. This is actually a sort of briefer version of a talk I gave last summer at the ear foundation. And those of you who are going to the bat today conferences on the 13 will get to hear yet another version of it. Once I done it three time I think people will either be fed up or they will have really good questions.

So what I am going to talk about is research that we have been doing actually for a number of years now, plus I will be taking about some other research that begun to look at language actively processed in the brain and it provides very important evidence to underpin ideas of interventions for particularly for deaf children because it enables us to think about whether the evidence is there, that we could use to decide what approaches to take in terms of communication, in terms of understanding how language works in the brain.

So, I am going to very - very long outline probably longer then the talk but I will talk a little bit about human language. I will say a little bit about how sign language is process ed in the brain and then I will talk a bit about spoken language in the brain both in term of aspect of speech reading and of auditory processing. I will say a little bit about research that we have done on phonological processing since that is not just an important part of language but is important in relation to reading I will talk about finger spelling if there is time and wrap it up with some idea

of how this kind of esoteric research can be applied to deaf children. In case I run out of time, I will put the general things right here. So I want to really get people thinking about early language experience and what is called the brain plasticity and that is the issue of how well can the brain adapt and change to different experiences.

I will say a little by bilingualism which of course is the case of having two language in one brain and I will talk a little bit about the evidence base for practice. Bilingualism. And I think the thing to start with is so obvious you that we forget about it, but human were designed for face to face communication. That is, I know it is possible for people to talk to each other in the dark, but, clearly when we have a chance we like to be face to face with people we are speaking too even if our hearing is perfect. So almost all - ordinary human communication involves both auditory and visual input, that is the norm. Of course that includes information about the face, information about emotions, it also includes jester although I am not talking about sign language it is multi-channel sign language may not use sound but it certainly uses facial information and hand information. Non-linguistic gesture body information and I am only mentioning that to remind people that human communication is intrinsically multi channel and even in speech of course there is tone of voice, intonation all of those sort of things that go on the same time as articulated words. All of these things are part of human communication. Let me tell you about research that has been done in London but not by me on audiovisual processing. So this is on speech process by normally hearing people. So, just watching someone talk, not even hearing them but watching them talking for two minutes improves your arable to understand their speech without any vision. So there is information that we get from looking at people's speaking that actually helps us process the sound that we hear them produce later. If you do functional images study, so studies looking at the brain, you discover that when you see which areas of the brain are activated, when people listen to speech, those areas include areas involved in analyzing movements of the face. So there isn't - it isn't the case that when you hear speech the only areas of the brain to do with perception, I mean not of the language part but of the perception auditory area, face areas are also involved. And I think increasing the Von Kreigstein because it challenges speech processes unit sensory purely auditory. The brain uses both visual and auditory areas when it processes the spoken language in the auditory condition only.

I will come back to issues of audiovisual processing in a bit but let me say a little bit about sign language. For people here who don't know about brains, I have provided you with a picture of a brain laugh of the left hemisphere because that is where most language is processed.

There is always some right sided activation in the brain, but primarily we talk about language being lateralized to the left. The left is more important for virtually all right hand people and even for the majority of left-handed people. There are go really important language area classical language area in the brain there is a bit in the left frontal area which is the BROCA's area and a bit in the back with the temporal lobe called WERNICKE's area and there are other bits that aren't relevant, HESCHL's which is primary auditory cortex this is the bit that takes the information transmitted from the auditory nerve that is the first area of the brain that handles it. The SYLVIAN fissure where two lobes and a lot of processing takes place.

I won't test you on brains but you will see some more brain pictures so you need to remember what you saw. So a study we did a long time ago now back in 2002 compared the processing of BSL with the processing of audiovisual English, so people saw someone signing or they saw and heard someone speaking.

Right so deaf people who new sign language looked at the sign language conditions hearing people who didn't know hearing language looked at the spoken conditions. I will show you a picture in a minute but just to say these studies and others that we have done show that sign language is as LEFT or BSL is left lateralize as spoken English. There are difference in the area of the brain that are involved partly because they are areas which have to do with processing visual movement and clearly even if you see someone talking, they don't move around as much as someone signing. So, on the left side - these are not picture of an individual brain these are group pictures, so there is data from about 9 or so signers on the left and on the right about 10 speakers of English.

And someone once asked me if the brain turns yellow when you think and the answer is no. This is just so that you can see.

{Laughter}

The areas of the greatest blood flow because what this technique is doing is measuring how much blood is in different parts of the brain when your brain work it needs oxygen and fMRI measures that.

The thing that is striking is how similar these two set of pictures are. There are some differences if you look at the top left one you will see more activation in the back of the brain that is the area on the right side of that top picture and that is - what I said about greater movement - but you can clearly see Weicker area, you can see Wieker's area and you can see most of the activation is in the same - is on the left in both kinds of language and a little bit of right sided activation but not much. And you will also see that I mentioned the temporal lobe you will see that both BSL and English activate what is called secondary auditory cortex that is the area of the brain, that processes the

underlying sound structure the phonology of language whether it is sign language or spoken language.

Okay where in the brain then is silent speech process we had ordinary language and BSL what if you are relying on speech reading. So in this study we compared speech, so spoken words that people could hear, silence speech no sound track and signs we were trying to get at the question of where you actually have a close comparison with speech and sign, are there differences and what is added when you have an auditory channel to speech as well as just - instead of just having silent speech.

So the picture at the bottom is actually the picture you saw in the previous slide so that is sentence data for audiovisual speech. What you see at the top, is on the left is silent speech so this is people watching words spoken but there is no sound track and on the right is perception of single signs, so signs produce but no sound. And again note how very similar these images are and I will draw you're attention again to the fact that the auditory cortex is activated when speech is silent, when speech has sound and also in signs from BSL. The same auditory associated areas of the brain are used.

So the areas that are activated are those which have been traditionally thought to be those used for processing auditory information. So even without sound, and I think even more interestingly there is actually evidence that primary auditory cortex is activated so this is the bit of the brain where people tend to think only responds to auditory information, the evidence is that it actually responds to spoken information in the absence of sound.

Okay. Third study. I think actually go through very briefly just to say we compared signs and written words and pictures and finger spelling to look at various types of verbal information, so do signs look like non-linguistic material. I kind of suggested they look like spoken language but maybe we were just kidding.

So here you've got the pictures for the four conditions and again you can see relative striking similarities between finger spelling and BSL. You can also see there are fewer similarities and again, auditory cortex is the difference. The **TEM RORL** lobe. In text and pictures where there isn't this direct moving and changing language input. Okay.

So text **LKs** less like either spoken language or finger spelling and BSL then it looks like these kind of still images of pictures and that is because they are still they are static they are not moving, changing dynamic stimulant.

Right. This is a really complex study, so your forget if I rush through so much you condition get all of the points. This is a study that we did talking about auditory cortex and I have been mentioning the word

phonology so the question is is there anything real about saying that sign language have a phonology, are that processed when you are doing phone logical task in spoken language if you try to create similar task in sign language do you use the same part of the brain.

And so it is a complicated design but we had participants who were asked to do two different things. They were shown pictures and they were asked to say if the words that the pictures represented rhymed. I will show you a picture? At the top you can see there is a picture of a chair and a bear. And okay they rhyme, if you say the words to yourself. So there is no words in the stimulus you are looking at pictures but you have to say yes or not.

And same condition people will ask if the two sign that the picture represent share the same vocation so there is a picture of a pig and a witch and the sign in BSL are both located at the nose so the answer is yes. Now I will go back and explain.

And the idea behind the experiment is that if making location judgments about signs are phonological then you should use the same part of the brain in making those judgment as you do making phonological judgments and English. And I won't make you learn all of these words for speck area. The question is :Is it the same area?

And I didn't actually recruit the participants but it was a very carefully balanced group they were all good readers the deaf people with all born profoundly deaf and they were all good speech readers and matched for age and IQ.

But there are two kind of deaf participant many this study. 12 of them were native signers and had deaf parents the other 8 had hearing parents and the - all have gone to oral schools because they are adults by the time we got to them and the majority of them had learned of the nonnative signers had learned signing relatively late I mean late after exposed to English because the parents used English with them at home.

You have two group one are native signers who learned English at school and the other group are people who are growing up had an oral only up bringing but they did learn signing somewhere along the way. And you have scene the **STIM**ly.

Okay the results because I aware of time. You have a very similar areas of the brain used when making these phonological judgments in English and what they call phonological result in BSL. So this technology seem to be multi modal or super modal it is nothing to do whether something comes through as sound or comes through visually.

So the representations in the brain are - some how transcend sound. Of course the brain can't hear so they can only deal with electrical impulses that come into it from somewhere else.

So this is just to show you very briefly, A that is the two pictures the one above and below under A so there are two vertical under A when people are doing location tasks and B is when deaf people are doing rhyme tasks and C is when hearing people do the running task if you don't know any sign language and there is extra picture of a brain for the hearing people for some reason have slightly more activation and there is more activation in the verbal area of the brain but it is not really significant for the results.

Oops. We got to the end and didn't mean to.

Okay one other thing about the study is that everybody did the task equally well, I mean of the deaf people, that is the people who had grown up with English as first language, how successful in making judgment about

BSL phonology where deaf people grown up with sign language first but the task is harder in both English and BSL for people who had been brought up with English only as a first language. Okay. So, the graph there shows you that the native signers needed less of their brains to work on making judgments about rhyme that is the white the light gray block and judgments about whether two locations were the same then the people who were not native signers. So for some reason although they had English earlier, they actually found it harder to make decisions about phonology in both English and BSL. And this probably has something to do with the impact of age of first language acquisition. Because these people who took part in the experiment although they have been exposed to English as a first language they clearly had developed English at a slower rate than the children who had been exposed to sign language, learned sign language because obviously BSL is easy to learn if you are deaf and English is harder to learn. So that probably accounts for the difference that they were slower in learning a first language, and therefore they had greater problems with tasks relating to phonology in both their first language and in their second language.

Okay. I know I am down for two minutes so let's just say, do we know whether people will benefit from various types of input. We know when I showed you earlier when we don't have acoustic and auditory processing the auditory cortex is activated by silence speech.

So we know that both primary and social associative auditory cortex can be activated and look identically activated in people whether or not they have early experience of heard speech. And I think that raises some question for current practice in which there is often an emphasis on auditory processing as opposed to audioverbal processing. There has been a suggestion that the cortex get cornified and there is less available to subsequent auditory input and I don't want to say there are, you know that is the only reason to do early implantation. I think there are

lots of other arguments to be advanced but I think the evidence is actually against that view. The evidence seems to suggest that whether linguistic information for spoken language is perceived visually or audiovisually or auditorily actually the same regions of the brain are used an equally accessible.

So, I think from this research I think one has to think about views that suggest that seeing speech would some how effect sensitivity in the auditory cortex. Since, as I have said, speech activate auditory region regardless of hearing status and that activation is very specific to speech. Which is spoken language with or without sound. In other words speech gets to those parts whether you have sound or not. And there is some very interesting research about bar ROEN EL AL which show people that had cochlear implant these are not study with children implanted at 12 months these are adult who have been studied. But this group clearly have specific skills in visual and auditory integration and so they make particular use of visual compensation which is some of the auditory spectrum which is absent with implants.

So there seems to be evidence that audiovisual integration is actually a very powerful tool for individuals within implant or at least for this group. I am always conscious one has to be very careful when talking about research results because it is really the evidence because that we need.

So, I know speech reading and lip reading is the world most old fashioned term but to be honest the evidence, and there is a very nice review of this by Ruth Campbell speech reading gives access to spoken language structure and can compliment and I think what is the important issue, auditory processing an we know infants are really sensitive to seeing speech they are very attracted by seeing speech even in the absence of sound normally hearing infants so speech reading can have the potentially to have a positive effect on auditory speech processing following implantation and also of course the hearing aid user.

Speech reading is a big part of general speech processing. Speech reading abilities are positively associated with subsequent development of literacy, not just in deaf children but in hearing children if you test hearing children when they are about age 4, actually the better speech readers after age four end up the better readers later on.

And of course speech reading interacts with acoustic speech processing skills to the abilities are correlated with predicting speech processing outcomes for individuals with implants, again I am saying not with - we don't have data with children implanted extremely young because they are not old enough to test yes and also speech reading continue to be important again the work with R O U G E R is still an important part of successful speech processing.

So, my take home points - the last couple of slides -- Areas of the brain that are used for processing visual speech, are adaptable to perceiving speech multi-modally and you have to think in terms of preimplant strategies, intervention strategies for children who are going to receive implants. That is seeing language, should actually have a positive effect on subsequent implants.

And take home point on sign language. Really just to say age of acquisition is crucial this applies to spoken language as well it is very important that children learn our first language early in life, there is no such thing as catching up some how when a child is much further down the line. The BRAB brain's plasticity has reduced and just to say that those children who learn sign language early in the study that we did of native signers does show that their phonological processing abilities in sign language have been applied to phonological processing in the spoken language.

So I just like to thank many collaborators because these brain images studies tend to be very labour intensive and thank you again for letting me have a chance to speak to you.

{Applause}

SUSAN DANIELS: Bencie, thank you very much, I think that was a fascinating presentation. As a deaf person, and as many of us will know, we actually use everything in terms of understanding and discriminating speech and it was very interesting to hear how important auditory visual information is and I hope that you will be able to present this research in wider fora, because it seems to me that it is incredibly valuable that this message gets out beyond us and into as many different places as possible. So thank you very much indeed.

I'm going to move straight on -- I'm sorry we haven't got time for questions -- straight on to our next speaker, who is Graham Hilton who is going to talk about technology in the workplace and also in schools. Graham, thank you.

GRAHAM HILTON: Okay, good afternoon, ladies and gentlemen. My name is Graham Hilton, I am the audiology manager at Phonak UK. For those of you who don't know, Phonak conduct research, develop and manufacture a variety of hearing solutions such as hearing instruments, FM systems and recently what we call wireless digital accessories, which I will talk about in this presentation.

First of all, a nice quote from Professor Mark Ross, an eminent audiologist many of you I'm sure will know. Professor Ross has a severe/profound hearing loss himself, so actively uses hearing instruments and FM systems, and he simply states that if all conversations took place in quiet, non-reverberant rooms over a distance of no more than 3 feet, assistive listening devices, FM systems and so on, simply would not be necessary. I'm talking to you

here, and there's not one person who is within three feet of me. On one side of the room we have a low ceiling with absorbent material. If I look directly above me, we have the absolute complete opposite: a very high ceiling, and I can hear my own voice echoing, reverberating quite a lot, so we do need solutions to actually help in this type of environment.

It wouldn't be unreasonable for the layperson to suggest, well now we have digital, surely that's the panacea, why do we need to look at anything else? But if we look at the studies over the duration of the digital era, about twelve years now -- early days -- Crandell & Smaldino, early 2000, concluded that digital technology was pretty much ineffective in reverberant echoey environments and when communicating over larger distances. That was pretty much in the early days of digital which started around 1997, so we would hope in the intervening years, where are we now, 2010, things would have improved. Unfortunately, however, a recent Marke Trak survey in the US concluded that since 2004 the only area that has actually improved in terms of user satisfaction is use with a telephone. All other areas remain pretty stable. Most hearing impaired hearing instrument wearers do complain that communication in noise lets them down the most. So it is plain to see that hearing instruments alone are not adequate.

I would just like to spend a few minutes exploring why that is the case before I go on to talk about what is available in the school, the classroom, and of course also the workplace.

Okay, we are looking at three factors, just to reiterate. A typical listening social situation here. In very few social environments are we completely free of background noise. There's always extraneous noise occurring from various places.

Another issue, of course, something that we can't really see as such, is reverberation, echos, a signal bouncing around the room.

A third factor we look at of course is distance. The further away from who or what you are listening to, obviously the more listening effort and the quieter the signal actually is.

So if we break the factors down, first of all background noise. It can be generated from within the room, so if it was a classroom, for example, with a hard floor, it could be inattentive children shuffling on their chair, it could be noise from an air conditioning system, it could be a noise from adjacent classrooms, from traffic outside, from aeroplanes going past.

Now, with reference to the education and building bulletin in 1993, which specified ideal build standards for new classrooms, it is possible to control a lot of background noise factors through appropriate insulation and absorption techniques and so on. However, in

an existing build it is generally quite expensive and would take quite a lot of work. So in practical terms, management of background noise is not that simple.

We also have to look at the effect of distance in conjunction with background noise. Here we have a graphic showing a teacher at the front. The black line, as it is slowly going down, represents the teacher's voice as a function of distance. The pinky shaded area represents the noise floor at 50 decibels sound pressure level. This worked perfectly in rehearsal, so you will have to excuse me if it doesn't now. So at a distance of about 5 feet. (audio). You can just about get it but it's not perfect. (audio). I hope that will shut up in a moment, just excuse me.

So we can see that over distance and in not a particularly demanding background noise, 50 dB SPL, we would expect that to be quite typical, for somebody sitting not that far away from the primary talker it's not very easy to listen without any assistive devices.

If we reference that to hearing loss, it's well recognised that people with an increasing level of hearing loss require a more favourable signal.

Typically we talk about the "signal to noise ratio" which is the level of the desired signal relative to the level of the ambient noise floor. On the graphic here, somebody with a severe hearing loss of 90 dB HL would typically require a 18-decibel positive signal to noise ratio, so the signal to consistently be about 18 dB louder than the noise floor to ensure effective communication in noisy environments. Hearing instruments alone simply cannot do that because of the other factors -- background noise, reverberation and distance -- in play.

Very briefly, echo is the unseen enemy, as it were. Echo is just of course the signal bouncing off various hard surfaces and we typically look at two forms of echo or reverberation. Early reverberation with a short duration for somebody with normal hearing it is a good thing because it merges up with the original signal represented in this written analogy here and you get a slight ringing, a slight overlay and that to some people with normal hearing signals its liveliness, its brilliance, it makes the most of the acoustics of the room for that person, if you like. However, for somebody with even a mild to moderate degree of hearing loss, they are unavailable to integrate the reverb and echoey signal with the original signal. So ideally for somebody with a hearing loss you want the reverberation to last no longer than 0.4 of a second. Any longer than that and it will have a detrimental effect on their ability to hear clearly. The graphic at the bottom shows that quite well, and the written analogy. You get a blurring of the signal, the impaired auditory signal, the system is unable to integrate the reverberant components with the component coming out of the speaker's mouth.

The graphic shows the effective reverberation times and how long the

echo -- or the duration of the echo, and the effect it has on the person's ability to hear clearly. Somebody with normal hearing or near-normal hearing can tolerate an echo time of over 1 second, so for those fortunate enough to have normal hearing, not a problem. For those with even a mild hearing loss, a great problem. The vast majority of buildings we frequent, typically public buildings, have high reverberation times. So that's the problem.

Modern hearing instruments are not suitable because the signal from leaving the desired talker's mouth to hitting the microphones on the hearing instruments, they are effectively conditioned, they are spoiled if you like, by background noise, distance and reverberation. So what can we do to improve the situation?

We all know about assistive listening devices. In this context I will use it as an umbrella term to cover the whole spectrum of assistive listening devices. As a subset, we could look at personal FM systems, which I'm sure a lot, if not all of you, are familiar with. Bringing us up to the here and now, we now have a range of what we call digital wireless accessories to further enhance the function of a hearing instrument in a typical listening environment.

So just very briefly, I won't dwell on this, we are all familiar with the various assistive listening devices, particularly available through the RNID catalogue and so on, to assist with the television, the radio, personal and hard-wired loop systems around the room, for telephone conversations we of course have textphones and with the advent of mobile telephones various manufacturers introduced neck loops, in this example it is a Nokia neck loop which would allow the hearing instrument wearer to use a Nokia telephone via the neck loop and telecoil position of their hearing instrument.

Moving on to alternative systems, FM systems, nothing new, developed in the late 60s for use within education, however there has been steady progress over recent years. Mostly in miniaturisation, so instead of having these big boxes that looked like parachute harnesses around the chest and wired up to clumsy moulds and so on, they are obviously very, very small nowadays. However, recently with the benefit of digital technology, the FM systems have become a lot cleverer. They can respond and react to the noise level within the classroom.

So quickly back to the previous slide. One of the downfalls of an FM system is that it does require proactive use by the hearing instrument wearer. A FM system, for those of you that don't know, relies on a remote microphone. A microphone could be something like this, which picks up the signal close to the desired source, modulates it on to an FM carrier signal, hence the term "radio aid" that's often used, sends it through the air waves to a little receiver on the base of the person's hearing instrument, converts it back into an electrical signal, processed

through the hearing instruments and fed into the listener's ear. By picking it up close at source you've got no distance, you've got no reverberation because it hasn't had time to bounce off anything, and background noise, because the microphone is close to the mouth, is not an issue. The desired signal is highly dominant. The downside is the wearer has to be proactive and say, "Can I put that in front of your mouth, do you mind running that around your neck?" in meetings, on tables, spinning round and so on. It is effective but it does require this proactive management.

So, with the transmitter, or the remote microphone, it has various microphone modes so you can have what we call omni-directional, so it picks up everything in the room. You can have zoom, so if you are just listening to a particular area, or you can have super-zoom which is also a pencil beam of activity. So you can suit it to various work and social environments.

Now, with -- oops. (audio). Sorry. Benefiting from digital technology, FM systems have improved recently. So a new adaptive system available from Phonak actually monitors the noise flow. In the pauses of speech, the system measures the noise level. If the noise level is low, the amount of amplification applied to the FM input relative to the hearing instrument input is increased. So the hearing instrument input is dominant. If the noise floor increases, the amplification applied to the FM input also increases. So very rarely do we operate in a constant noise floor, we can move from one environment to another -- people talking loudly, quietly, group conversations, one-on-one conversations. The FM system has to be able to react to the changing environment to be effective. The sound bite here shows a situation where the noise floor is fluctuating, so the level of amplification applied to the FM input is modulated accordingly. Hopefully I can get that back to life now. (audio). No FM in this instance. (audio). Traditional FM but the noise floor is still apparent. (audio). Back to traditional. (audio).

I think the dynamic FM speaks for itself there. It has responded to the increasing noise level and increased the amplification applied to the teacher's voice, so the noise floor in effect becomes irrelevant.

Now, a number of studies have now been conducted on this new technology, one of which was by Linda Fibbido(?) in America, a very well-respected researcher over there in Dallas, Texas. She conducted a study on twelve subjects between the ages of 11 and 59 with moderate to severe hearing impairment, nine out of ten of whom were experienced FM wearers. It was a four week trial using constructed speech tests and also practical tests in four different listening environments. At the end of the trial, on the screen here, there's a number of comments from the test subjects. A good one here:

"It had a good sound on it and it was easier to hear anybody else talk. In a noisy situation the difference was pretty significant."

I won't recite them all now, the presentation will be available on the website. Significantly, ten out of ten wearers, both adult and children, this was in a variety of environments, preferred adaptive over traditional.

The move from static FM to this adaptive FM is significant. Standard FM we've had for 30 odd years now and we've now embraced digital technology, merged it with conventional FM technology, to provide something that is significantly more beneficial in these hostile environments. As I say, the only downside of FM is this proactive management, "Can I put this remote microphone in front of your face?", it does take the guts, if you like, for the FM user to do that.

Moving on now to digital wireless accessories. This refers to blue tooth technology. There is a steady but definite convergence between hearing instrument technology and blue tooth technology. The benefit of, say, a digital wireless accessory utilising blue tooth is that it doesn't require this proactive management. At the moment, blue tooth technology is restricted to placing a blue tooth transmitter, affectionately known as a dongle -- it looks like a memory stick in effect -- to any electrical output, say, of a computer, a television, a multitude of audio devices, that captures the audio output, conveys it via blue tooth, it is then picked up by a blue tooth receiver and fed into the hearing instrument. As I say, it doesn't require that proactive management but at the moment it's not something that you can use in this type of situation, me talking into a blue tooth transmitter, and so on. As the slide demonstrates here, functional in a multitude of environments both social and work, across all age groups.

From a Phonak perspective -- however, similar devices are available from other companies -- within our latest generation of hearing instruments we have what we call a body area network created within the hearing instruments and that's analogous to a local area network you may set up a wireless network within your home or office. So in effect a person wearing these hearing instruments is a walking network site. So if you use in this case what we call our iCom -- it is a blue tooth communication hub -- you wear it around the neck, it can be worn over or under the clothing and any blue tooth signal that is received at the heart of this hub is transduced into an inductive signal, it is a digitalised inductive signal, digitally encrypted so it doesn't buzz when you walk past the fridge or something like that, and sends the signal to both hearing instruments. Now if the signal is received in stereo, the system works in stereo, so the person actually hears the signal in stereo.

The next slide just shows the multitude of systems it can operate with,

so televisions, for example, computers, telephones, either mobile or landline telephones, even satellite navigation systems. So the functionality of the hearing instrument is increased vastly by virtue of this blue tooth interface.

You can also use the iCom hub in conjunction with a little FM receiver. So you may have someone who has tiny little hearing instruments that may not accommodate standard FM receivers, so in the base of the iCom you stick one little receiver and it is conveyed wirelessly to the hearing instrument. So if you have someone who is more conscious of wearing various bits and pieces of equipment, this is an ideal solution. As I mentioned, it's not just a Phonak thing, other major hearing instrument manufacturers have now introduced similar systems and this is certainly the way forward. For the foreseeable future we will still have FM systems but blue tooth is coming up on the inside, as it were, very quickly.

We also have a device called click and talk. Now at the moment this is only compatible with Sony Ericsson mobile telephones, but it literally is a plug and go. You place the click and talk unit into the base of the mobile telephone and nothing else is required, no paring, no battery charging or anything. So it is for Phonak hearing instruments users at the moment, they place the telephone to their ear, it switches the hearing instruments into a telephone mode automatically and they hear the telephone signal in both ears. So you get a summation effect of approximately 3 dB, it's louder and it is clearer: effortless conversation through the telephone.

There was a recent field study conducted by Phonak and one situation was walking along a noisy street. Over 60 per cent of respondents said they could hear everything or mostly everything using the click and talk. Even for people with normal hearing walking along a noisy road with a mobile telephone it is quite bad.

Another situation, a restaurant, again in excess of over 70 per cent of people reported that they could hear well in a restaurant situation. So this new technology is certainly breaking down significant traditional communication barriers for the hearing impaired. So in summary, the school/work/social communication environment is often very challenging. Very rarely do we have the ideal communication environment. Even with normal hearing, let alone various degrees of hearing loss.

Despite very clever hearing instruments, digital technology is only really effective over listening distances of less than six feet and with reverberation times of less than about half a second, and very, very rarely does that occur.

So the use of assistive listening devices will certainly enhance communication for the foreseeable future. Looking to the future,

I attended a lecture in Chicago just before Christmas and one of the presentations was actively looking at integrating blue tooth communication systems into the fabric of buildings, so a person will walk in with their blue tooth enabled hearing instruments and as soon as they walk into any public arena, it will automatically interface with their hearing instruments and communication should be effortless. That is hopefully the not-too-distant future. But as I hope you can acknowledge from this presentation, you know, great strides are being made, certainly by virtue of blue tooth technology, which is absolutely everywhere, and in the medium, certainly to long-term, that will have great benefit to hearing instrument wearers. Okay, thank you for your attention. [applause].

THE CHAIRMAN: Thank you very much indeed. I will move straight into the next speaker Tabitha from Stagetext and then we will break for lunch - tea we will see where we are in terms of timing so straight over to you and thank you very much.

TABITHA ALLUM: Thank you, For inviting me to come and talk to you today. I am sorry that I can't stay all day, we are running a conferences today as well, so I come from that one and I have to go back. I don't know how many of you know about the work with Stagetech so I will provide a sort overview before I talk about the technology that we use to have access to cultural events. This year we will celebrate our 10th anniversary and we estimate somewhere we are founded there are 2,000 captioned theater performances capturing in the UK or we have worked in the theater to facilitate our own in-house capturing, which is by far the economical way for a theater to provide captioning. Alongside the provision of captioning something else that we have been quite concern with is constantly revisiting the technology that we use to ensure that the audience has the best possible experience. This very very short presentation will kind of update you where we are with that and perhaps give you some of the pros and cons of all the various solutions because nothing is perfect. I want to give you a demonstration that we use when we go to talk to theater why captioning is so important but I apologise for those who have seen this before. Hopefully it will work.
(Video being played)

That is a piece of audio with the high frequencies taken out and we use it because we will go and talk to people who know little about hearing loss and assume it is an issue to do with volume and what we try to demonstrate it is not volume so much as inability to differentiate one word from another so during a play if you miss one word you actually lose the meaning of an entire sentence and theaters, even though they

should be pretty good in terms of acoustic, are pretty dreadful. Either you can't hear what is going on stage at all or so over amplified that you can't even hearing people or can't work out what each word is. (Video being played)

This is that piece of audio again but with captioning.

I just leave that running in the background while I continue talking. The aim with captioning is for the audience leaving the event talking about the event and not talking about the access. What we are trying to do is help people with some hearing to hear what is being said so the timing is pretty crucial.

Every time I do that presentation I think it is too long it is too long. So once - - the choice then has to be about how the text is presented and really there are two options and the option are open captioning, and close captioning on this top picture here you can see open captioning where the screens are situated on or next to the stage. Here you have got LED units which is what we typically use we find that they provide the best visibility especially in a very, very large spaces and then below that you have closed captioning you have the air script device which is a new thing which has been introduced at the moment in one west end theater which is Hairspray which is hand held device where the captions role on it.

With open captioning the audience it is in the auditorium and watches the caption scroll as the actors are talking they don't have to self-declare and they don't have to feel any different by actually given something that they have to hold which everyone else can see they are holding. We think this is particularly important for the majority of caption users who would never define as being deaf or Hard of Hearing. They are people who find it more and more difficult to follow what is being said as they get older but they would never call themselves Hard of Hearing. If the screens are situation at the same difference dance from the user as the action on stage then the user doesn't have to change their focus between reading something close up and then looking at what is happening in the distance.

One of the cons of open captioning is that we are unlikely to ever be in a position where the access is provided at every performance which means that deaf people don't get the choice they deserve on when they can go. A very interesting flip to that is that I was just - the event we are running the Birmingham Hippodrome are there and had the Calendar Girls in for a week. So Monday night, Tuesday and Wednesday night. Hundreds of complaint about no one being able to hear what is being said Thursday night the caption not one complaint from the entire audience and about 15-1800 seats in that theater so they decided they would do the captioning on the Friday the Saturday and the matinees and it all went well so that is very good news for us.

But on the other side, while choice is good and deaf people should have the ability to go to a show whenever. They want to some of the feedback we received is that many people who go to caption performances like going and knowing that other people are going to be there and using the captioning as well they tend to use it as an opportunity to catch up with old friends and see people that they saw at a show three or four months ago that perhaps they wouldn't have the opportunity to do.

We are conscious in order for the audience to have a good experience of open captioning the displace need to be absolutely the right place so not moving side to side or look up and down which is really uncomfortable and this is quite difficult to achieve. Theater staff are reluctant to allow anything on or near the stage which might upset the actors, or the beauty of what is happening on the stage. And so we are constantly having to think of new ways to get around this and some of the things we started doing is talking to technical student before they start work in theaters about why captioning is so important. So that they can actually see it is part of their job they should be doing it and that they can respond creatively to it. There are fantastic places the box could go which give excellent access for the audience and doesn't disturb anyone or any of the actors.

With closed captioning because it is invisible to people who don't use it there is a better chance that captioning could be available every single night which does mean greater choice for deaf audience and this is currently the situation with the air script unit at Hairspray. But feedback from close caption events in New York and the air stripe joint at Hairspray shown the experience is not that comfortable because the change of focus which I talked about before but also having to read something means you are not looking at the stage and people have described it as reading script, looking up, taking a snapshot picture of what is happening on stage and going back to reading the script, which isn't the reason you go to theater. You want to be sucked into what is happening on the stage.

The worry for us is that theaters will see hand held captioning as the easy way out because it puts it back into the audience something they have to deal with. The displace all next to the stage don't look that great but we believe they provide the best access for deaf audiences and it is that that the theater should be thinking about not making their lives easier.

If the even **SBT** a theater or pre- prepared lecture then the text has to be generated on the fly. Up to now we booked Speech-to-text-reporter to provide for pre-and post-show talks but as the technology moves on speech recognition is an interesting alternative.

Using the speech to text reporters mean there is a very high level of

accuracy there is a highly skilled human being working the machine which means that each word is immediately determined within the context of what is being said so the delay between the word being said and it coming up on the screen is really minimal as we have seen today. But because speech to text reporters are so highly skilled they are quite scarce especially outside of London. And can command relatively high fees which will make it difficult for cultural venue to employ them to provide access to live talk which might be frequent but quite short. Speech recognition are improving all the time and the technology works best if a train voicer is used to respeak what is being said by the lecture or the presenter. If potential revoice is a selective properly then the training - and by that I mean they have a natural ability to listen, remember, edit and then speak while listening remembering and speaking it is quite a tricky thing to do. Then the training can will relatively short maybe around 3 months. The hardware which is required really is only a laptop and some software so the cost in setting up a revoicer are less then perhaps they would be for a speech to text reporter. The problems with speech recognition is the way that the software works is that the computer needs to hear the entire sentence or the entire phrase before it knows exactly what each word is. So unless the revoicing is being done in such a way as maybe three or four word at a time a short pause and again and again and again you might have to wait for a really long sentence to finish before it decides what that entire sentence is and puts it up. Which doesn't help the deaf audience hear what is going on. Further speech recognition are needed and we are fortunate to receive a sizable grant from a couple of trusts that mean that we can really explore it to see if it is worth investing in the future.

And we hope that the next time you host a technology be event that we will have more concrete to present and show to everyone. I hope that this slightly whistle stop tour of captioning have been interesting grab me afterwards I have to leave quickly or send me e-mail and leaflets for captioning if you are interested just on the front for you to grab but thank you.

{Applause}

THE CHAIRMAN: Okay thank you very much for speeding through that. We are supposed to have a 10 minute break, so I actually going to keep to that. But if you would humour me and as soon as I shout at you come straight back in so we will break now just a few minutes before 3 if I could have everybody back here please by 8 minutes past 3. That would be brilliant thank you very much..

(Short Adjournment)

SUSAN DANIELS: Okay, ladies and gentlemen, you are a wonderful audience, thank you very much for coming back on time and gulping back your tea and coffee and biscuits. I know we want to finish at 4 o'clock on the dot, so thank you. Our next speaker is Mark Catling from the RNID and he is going to talk about communication generally. Welcome, Mark.

MARK CATLING: Good afternoon, everybody, my name is Mark Catling. I work for RNID products and, for those of you who don't know, RNID products are the equipment department of the RNID and we are very much a department of the RNID, rather than a commercial outpost, so I suppose what makes us different to other organisations that sell or provide equipment is that the profits we make go back into the charity to help deaf and hard of hearing people in other ways. About eight or nine years ago, I went to an Access to Work assessment to help out with particular pieces of equipment and it was a really interesting and engaging day. I had only been with RNID a matter of twelve months and it was very much sort of office-based with visits out to events and things like that. I met this chap who was a hearing aid wearer and we needed a couple of pieces of equipment, mostly around listening and the telephone, for him to be able to do his job. I was chatting to him and we tried out various pieces of equipment and it all worked very well and he got a couple of items that he was going to be able to use going forward. He came up to me afterwards and he said, "Mark, that's great, but what about at home, what am I supposed to do at home because I can't hear things, I can't hear the door, I can't hear the television at all?" So I gave him a catalogue and he was looking through it and he said to me, "This is great, but why didn't I know about it six years ago when I first lost my hearing? Because I can't tell you how useful this would have been had I known if all this equipment was available, it would have made life so much easier". So I went away from that meeting thinking, "Great, this guy has a couple of items of equipment that will help him in work, he now knows about the type of equipment that's available", but I had this terrible sense that I had really let that guy down because I had been working for a year in that area and perhaps unrealistically I thought to myself, "I can reach these people", I can reach lots of people and let them know about the types of equipment that is available. And it brought it home just what a massive undertaking it is. We've got 9 million people -- that's the figure that's often quoted, isn't it -- that have some form of hearing loss, and that's pretty old data now so we can all estimate that it is quite a bit higher than that now, 4 million of which could benefit from a hearing aid, and that's an awfully large amount of people to reach.

So I'm going to just tell you about a few items and different product ranges that are available, but I'm also going to appeal to you to try and help me and lots of other professionals reach out and spread the word. So I would love you to be evangelists for the equipment and the difference it can make.

So what can we do? Graham mentioned earlier, and you all know about listeners and that sort of stuff, and if that's the case you have my permission to turn off for the next ten minutes because I'm going to be telling you about those things again. So the first of the product ranges we do are home equipment, so that includes things like flashing door bells, very simple technology, the sort of thing you could probably get from any DIY places if you knew they were there; amplify, often with vibration as well, so if you go outside and clip one on to your waistband you can be alerted if you are away in the garage, or in your greenhouse, or at the bottom of your garden. Always have a flashing light, always amplify, as I say, and really handy just to be able to take around wherever you go, so the sound is close to you. They run on batteries -- so as an alternative you can also have ones that plug into the mains power and you can have additional ones of those as well, so you have one door chime and perhaps two or three different receivers of the flashing type. So very useful to have, it means you don't miss people at the door anymore.

I've had just a very temporary experience in about the last three months of having hearing loss in both ears owing to an infection and I've missed people at the door all the time, so I've just had a snapshot of what it's like for you here in the audience today and I know that's exactly what the experience is, and the fact that I have been told that probably 1,000 times at least just recently -- you would think would be obvious to me by now, but as I say there's nothing like personal experience.

Alarm clocks. Waking up in the morning. I've got a son of 18 so I know all about the problems of getting people up in the morning -- and in the afternoon in some cases! [laughter]. The alarm clocks that we provide have flashing lights, in some instances a louder ring, but nearly always a vibrating pad that goes under the pillow or under the mattress. Again, all very useful and don't forget you can also, with most of these models, switch between the three options so you don't have to have all of them. If you don't want the flashing light you can switch that bit off and if you don't want the sound you can turn that down and just have the vibration.

Watches and timers for timed events. I suppose people use watches for waking up in the morning as well, but if you have a chicken in the oven and you can't hear your timer ring, you can use your watch for that, but you can also buy a little timer, about £8 or something like

that, that you can clip on your waist, which vibrates, has lights, to alert you either by second or by minute. So just a small item that can actually take some of the hardship out of some of the listening that's necessary.

By the way, you are going to hear a lot of repetition by the way: everything vibrates, everything lights and everything is a little bit louder. So it's great when I've got a smaller audience and I've got products I can pass around, because nobody sleeps during my presentations because if anybody is dropping off the bell gets pushed and something will flash or vibrate and everyone jumps! I haven't got that today so you will just have to stay awake.

Smoke alarms, very, very serious, important part of alerting. The first thing I'm going to say about that is that certainly in England you should be able to get free smoke alarms, specialist smoke alarms, from your local fire service. There is ringfenced money for that. So if you've got clients or people you know or you've got an experience of hearing loss yourself and require equipment, I would definitely say go to your local fire service first to see if you can get that equipment free of charge. Again, very often now, there are portable ones you can clip on to a waistband so wherever you go in your home you are protected and indeed if you are outside you are protected. Very useful and, as I say, at night time you are also covered because your pager, your device, will clip into a recharger and then the vibrating pad will wake you to tell you what you are being alerted to.

A lot of people with smoke alarms think, well, actually I can hear my smoke alarm so it's not really a big issue. What you need to take into account, of course, is can you hear your smoke alarm in your bedroom and can you hear it at night when you take your hearing aids out? Because everyone thinks, "Well, I can hear it during the day". Fine, but what about at night and what about when you are asleep as well? Baby alarms. The cheekiest baby ever, I think, unless you've got a candidate, the picture there in the illustration. Obviously just to alert you if your baby wakes.

Telephone alerts. Some of the telephones have lights built in and ringers and that can be very useful but sometimes you need the sound closer to you. It's fine having a light flashing in the hall but if you are upstairs in the bedroom that's not going to help you very much.

Paging systems, as a catch-all if you like. Alerting all on one device so you can include smoke alarm, baby alarm, door, telephone, all on one small pager which are really, really useful and increasingly popular as well.

Equipment to help you to listen to conversation. Graham mentioned earlier about personal amplifiers, very easy to use, very quick to use. He also mentioned wireless microphone systems so I'm not going to

expand on that because he gave plenty of information on that. Equipment to help you on the telephone. Lots of stuff here. Plug in telephone amplifiers to convert your standard phone into an amplified phone, £15 or something like that. Amplified corded and department phones on either stand alone ones or ones you can wander around it, all are compatible with hearing aids and with the sort of features you would expect: amplification, tone control so you can not just get amplification but the tone you need as well, because it's not just about volume.

The text phones, of course, to help people who either want to speak their part of the call and the receiver texts back through the screen phone or a standard text phone where you are typing out and receiving typed texts back.

And mobile phones. Big area for us now. Lots of people use mobile phones, they've got nice and straightforward, easy to use bigger buttons, particularly if you are elderly, but something they can use with a hearing aid, so that's hearing aid compatible that has volume and again tone control. All of those items or features, rather, are now available in lots of mobile phones, we are inundated with them at the moment, so there's lots of choice there. And blue tooth neck loops to work with them and of course standard neck loops.

Hearing the television. I've put there without inconveniencing others. It's that thing where you've got the volume up and everybody else is going, I'm sorry but this is really very, very loud and you are saying, well I actually can't hear it. So with something like a loop system you can control the volume so you can hear it at the level that you want without inconveniencing other people.

To enjoy music, we all like to -- well, most of us like music. And the standard headsets, stereo headsets, that allow you to be able to hear your music more clearly with additional volume and balance between the ears if you need that. Also, as an illustration here, the lady is using a neck loop into her MP3 player.

Not everybody knows that we also provide equipment to alleviate the symptoms of tinnitus. These are mostly soothing noises, invariably water-based so when I'm demonstrate ago number of products you end up crossing your legs by the time you have finished doing so!

[laughter]. But things like surf on a beach, rain, thunderstorm, that sort of thing.

And something fairly new to RNID products but an area that RNID has been greatly involved in, equipment to prevent future hearing loss. We know that people who have lost their hearing certainly don't want that to be something that perhaps their peers have and their grandchildren and children, so we are providing lots of equipment now to help with that, including things like ear protectors for children but also ones for

people that go to clubs and other noisy environments.

I just wanted to pick out a couple of things very, very quickly, because I can sense the trapdoor opening underneath me! We are working with Sennheiser now on some really interesting TV listeners. They have been around doing this for some time but it is something we are pleased and very excited about because they do have quality behind all of their equipment.

A couple of items, just to flag up to you, the very catchy named BDP400 -- that will live in your memory for about ten seconds -- a phone for people with hearing and sight loss announces all the numbers and the menu functions and has a nice feature to be able to alert you when somebody is phoning in, it will actually announce who is phoning.

Radio microphone system, I'm not going to touch on this too much because Graham mentioned quite a lot about that earlier.

And all I would say to you is if you need more information, then you can call us on that telephone number and that's our catalogue, it currently has 300 products but it seems to be expanding all the time, so if you want a catalogue or you want multiple catalogues, please get in contact with us, we are very keen to reach out to people and spread the word. They are all free of charge and there's also the opportunity to look at what RNID has got online at the website shop, but I would also add of course that this equipment is also available from other commercial suppliers. So I leave you to reiterate please go out and tell people about this equipment that is available because it really does make a lot of difference. Thank you, thank you very much. [applause].

THE CHAIRMAN: Thank you Mark, that was a whistle stop tour of the equipment so thank you for doing that and keeping to time. Our next speaker is Anna Herriman who is going to talk about the experience of being an implant user herself. She is also a sign language user and is going to take us through her presentation. Thank you very much for joining us.

ANNA HERRIMAN: Okay can you see me okay? Hi thank you for inviting me here today. I am going to be talking about my experience of a cochlear implant. I was grown up and born as a profoundly deaf person. I was born profoundly deaf more than 30 years ago.

Hay - - and I grew up orally to begin with, until I suppose I was about 13 and then I realised that I couldn't manage as a normal person so I learned sign language and that has enhanced my life considerably. Because of sign language meant I got more involved with the deaf world just to say I went to a hearing school which had a deaf unit. But I was able to mix with deaf people after learning sign language.

Hay that is me at 2. And this is me age six.

Now I am going to talk about my experience of having a cochlear

implant as I said I grew up as a sign language using person, um my experience made me different from that of someone who is born hearing who became deaf or someone who is totally oral because there are cultural implications to having a cochlear implant for me.

Two people using sign language here on the screen. You may wonder why I decided to have a cochlear implant. Well I work in the hearing world I also live alone, I had hearing aids but I couldn't really benefit from them. I wanted to be able to get promotion at work. I am estate planner, I should say so I wanted promotion in work, also I had to go to different sites, where this is lots of machinery, and lorries and was at risk just wearing a hearing aid. Often I would have an interpreter with me but I can't expect for them to take responsibility for everything so I had to take responsibility myself.

I had my implant done two years ago. And a switch on was actually two years ago yesterday.

Right the switch on. Really I didn't know what to expect. I have heard lots of stories from various people most of them said that when it was switched on they just heard a series of beeps I thought maybe I will have the same experience. I arrived at the hospital and my parent went we with me and my sister was with me as well and they stuck the magnetic processor on and there was a lot of waiting. And I was wondering what was going on and nothing was happening. And I was anxious and I thought maybe the system has failed and not working and there are big problems. And then, I kind of felt something inside almost like a vibration. It wasn't really a noise it was an intermittent pulse almost. I found that puzzling and asked the audiologist is that vibrations I can feel, does it mean it is working?

And they confirmed it was. So I thought why am I feeling vibrations rather than sound? Now my mother thinks it is because I was born deaf grew up deaf that perhaps I didn't have any memory of sound so, you know perhaps the auditory neural pathways had never functioned. Really the first sound that I perceived was a week after switch on. Now, I had only planned to book three days off work, I should say and I thought was very tired after switch on I realise that I need more time but I still couldn't hear anything and I was thinking why am I so tired? And I was told, well that is because it is all new to you it is a new thing for the brain to have to deal with it. It has to work harder but that which tiring me out.

The first sound I heard happened one day I was out shopping doing food shopping standing in the super market pushing my trolley and got to the drinks area, well you know the wine the beer you know, and I was thinking about what wine I should buy and I just became aware that I could hear something and kind of bit like a tapping sound.

Rhythmic sound like I couldn't make out what it was. I turned around and tried to see what the source of the sound was and I realised that it was a woman walking with stilettos, making this noise. So I was able to make that linkage between what I heard and what I could see.

So the woman that walked further and further away and the sound diminished as well.

And gradually I went through different phases of learning how to use the cochlear implant.

I perceived three stages, at least that was my experience. The first one was I became aware of environmental sounds I found I was having to learn having to identify those sound. The second stage was about dealing with language, trying to make sense of language. And the third one, was about culture. Because I grown up in a deaf world, and I was picking up more and more of what people were saying, I realising there were things that I had to learn about hearing culture and that caused some confusion.

If in the first year, as I said I was focusing very much on environmental information you wonder why Donald duck is up there, any.

NEW SPEAKER: People sound like the duck quacking.

NEW SPEAKER:.

ANNA HERRIMAN: Speech sound like a duck quacking. Men, woman children they all sounded like ducks it was terrible. Well, maybe that is the way people do speak.

Now we turn to music. I tried listening to music and thought I can't hear anything but I could pick up one sound and it happened to be one frequency which I seemed to be able to hear. Not the other frequencies though and then there is another frequency I could hear and the ones in between and I found it hard to make sense of music but then as time went on things built up, and I heard more and more and more and now music makes sense.

And that is something that I didn't expect. Birds. I grew up thinking well hey, birds I don't hear them but then on Easter Sunday, a month after the switch on, I was with my family walking in the woodlands near my family home and I was with my mum, sister and father were elsewhere.

And my mum said, can you hear that? And I thought hear what?

And she said well there is a bird. And I thought well I can't hear anything. And then my mother tried to describe what the sound was like. So I thought concentrated and then I heard it it was like a very rapid set of sounds. At a high frequency. And I said is that a bird?

And mum said, yeah that is right. So I never thought that birds sound like songs. Well, I was expecting it to be more like music.

Now I will turn to talking about the deaf community. As I said I grew up in the deaf community and I had been in the deaf community and at that time I was opposed to cochlear implants but then as I got older my

attitude changed. You know, people would talk about having a cochlear implant and so on and I was very opposed to it. But then when I thought about it, help about with my job and talked to various deaf friends talking in sign language and I found them to be quite positive about it. They say it doesn't matter because you are still deaf at heart and you have a deaf identity, and you know the cochlear implant is just an extra strong hearing aid. And since having the cochlear implant done I have been out and about in deaf community and I have been accepted. Also, it has influenced some of my friends and a few of my friends who are very much sign language users and now cochlear implant wearers. And I think where you are in your life, is how it depends.

Now in the second year which I have just completed and I am still acquiring new sounds. And it is almost as though I make a lot of progress in learning new sounds and then this is a plateau when I don't see to learn more and then I will go up to another plateau and it has been another series of plateaus, do you know what this is that you can see on the screen in do you know what bird it is?

NEW SPEAKER: Jay.

NEW SPEAKER: Jay no it is not a Jay. It is a black bird. But, my mum and dad were insistent that I should hear the black bird and then finally last year I heard the black bird after a year. And I thought oh, ah that is more like a song.

Now I will talk about spoken communication which still remains a problem. Excuse me but I think that when, you know groups of woman when they are talking sound to me might like a group of chickens. I apologise for saying that.

{Laughter}

NEW SPEAKER: It is true.

ANNA HERRIMAN: The other issue that I had to deal with is how do use interpreters in a different way. Before I focused on the signing from the interpreter? Now, when I am having meetings one to one meetings because I am aware of some of the hearing of some of the words, I am having to sort of switch between the interpreter and listening and that is causing some confusion because I can't hear anything people say.

And it depends on who I am with. I will go into a bit more detail about this now. As I say it depends who I am with. If the person is easy to lip read, I won't use the interpreters so much and the interpreter will be there almost to monitor the situation. They will see if I am beginning to get lost and they will chip in a bit. And get me back on track.

Rescue me, yeah.

The cochlear implant works best in a quiet environment in one to one conversations and particularly when the person is deaf aware. It is useful hearing environmental sound like doorbell, the timer on the oven, hearing the phone ring and I have come to love music. You know, seeing U2 in concert last year was fantastic.

It is still very difficult for me to understand speech. Background noise is a problem, communicating with people that aren't deaf aware is difficult, listening to TV and radio is still difficult, and also being able to identify where sound are coming from.

Now I will talk about hearing culture about the way in which hearing people behave and interact which is different to the way that sign language user use - are.

Also, I think, you know hearing people have a quick fix attitude they think because I had a cochlear implant they thinking everything is okay they don't realise adjustments need to be made and I still use sign language. If you imagine someone who is born without legs and have no use of legs and they say go run, they couldn't. And it is the same with me I have the cochlear implant business it doesn't mean I have full access to the hearing world.

To conclude. The benefits are that I am much more aware of environmental sounds, I have grown to love music I can lip read better in one to one situations and the down side is, that if there are more than two people talking it passes me by where you said about problems with background noise, and also adjusting to hearing culture and coping with the attitudes I get from hearing people. And I feel that more support is needed and I think we need more social group support because it is a massive life change (inaudible) and we need training on what to expect from the hearing world. I mean I grew up in the deaf world and I don't know enough about the hearing world.

And we need more regular speech and listening training. And I think it is more difficult when you live alone and we need information to be given out to the world generally to make more aware of our needs. Also training for interpreters on how to work with deaf people who have a cochlear implant. Now if someone came to me asking for advice, about a cochlear implant I think it will be important for them to speak to someone from a similar background so they can get the pros and cons and get a full picture of what might happen.

And finally I am still deaf. I still need people to be deaf aware and to talk to me directly. I still use sign language but now, you know I can use interpreters to help me with what I miss and I am still proud of my deaf identity and still very much a sign language user so that remains unchanged.

And the cochlear implant is not a cure, it is an extra powerful hearing aid. Thank you.

SUSAN DANIELS: Thank you, that was brilliant. Again, another presentation I think we need to take out to a wider audience, so thank you very much.

Our final speaker of the afternoon is Lorraine Gailey who is going to carry on our theme of why people matter. Lorraine.

NEW SPEAKER: Is that microphone okay? I think they should provide a screen for people who hide behind while they get themselves all kitted up!

Is that better?

I think at this time of the afternoon I want to start by thanking you for staying here and I also want to say that if I were you, I would be sitting there thinking not "I wonder what pearls of wisdom she is going to produce for us", but "God, I hope she is going to be quick!". So I will attempt to be very brief and catch up some lost time.

Thank you, Anna, for a very inspiring presentation and thank you also for producing a very nice lead, having said at the end of your slide "at the end of the day", which is where I start mine. But I think Anna and indeed Tim earlier this afternoon and Calum right at the beginning have given us an absolutely brilliant insight into the only point we really need to take away from here today, which is that it is the people who matter and each of those three people that we saw use technology in a very different way, their needs were very different, their outcomes have been very different, their support and onward use of the technology is going to be very different and if we forget that we will be doing both those people and the technology an injustice.

It is certainly the case that technology has offered us a massive potential for improvement in quality of life and indeed in hearing performance. We've seen some absolutely astonishing outcomes and if I had a little more time I would love to have shown some photographs I have of the very, very earliest hearing improvement devices, including a chair that was used by Prince Ferdinand of Austria once with empty arms that you could speak into when you were kneeling in front of him that had tubes that went right up to his ears. Fantastic, hundreds of years ago.

I know the technology has improved terrifically since then; I don't know whether the management of people has changed that much. My questions from today, and once I've asked these questions you can then go to sleep because the answers are fairly self-evident is, first of all, did the advances we've seen in technology always result in better hearing? Rhetorical question, isn't it really?

The second question is, even when it does, does better hearing always result in better communication? Actually, the answer to that one is also no. So there are two points at which this terrific technology can let us down.

Better hearing comes from better technology and also using that technology better. That is more about helping and supporting people to learn to use it often than it is about the technology itself.

Secondly, I'm married to a man who has got perfect hearing and shockingly poor receptive communication skills! [laughter]. So better hearing is not necessarily the same as better communication.

Adrian, when he started this morning, made frequent reference to the fact that I was going to wind up today and close the circle, or even indeed square the circle, which is going to be a terrific achievement if I manage that! So I suppose to him after he gave his presentation and got his permission to borrow a few of his slides. So I've slipped them in at lunch time and I want to bring our attention back to this one.

I apologise for those of you at that end of the room because I know you can't really see the bottom of the screen terribly easily, but Adrian showed us a lovely demonstration of the improvement in the quality of life that hearing aid technology can bring people. Well-evidenced, well-demonstrated and so forth. If you've got a hearing loss, your quality of life is at the blue line and if you've got a good hearing aid it's at the red line. That's all very comforting. I've added a little bit to this (indicates).

That's only if two things happen: one, you've got the hearing aid in your ear and it's turned on and, two, you actually know how to use it to the best of its potential for you in your listening environments and in your listening situations and the hearing aid in the drawer syndrome is one that has been with us ever since the first hearing aids have been produced. If technological advance in its own right took care of that, we would have no more hearing aids not being used or not being used well, and we all know that hasn't happened yet.

Another slide Adrian showed us which I found very interesting and that is the patient at the centre. He talked also about the patient being at the forefront. However you look at it, I think one of my queries would be: how can having a hearing loss makes you a patient and not simply a person who has a hearing loss? But I don't want to go into that one at the moment. What I want to say is that, whilst Adrian and those who work with him have taken tremendous strides in putting the patient at the centre of their debates and discussions and so forth, again, I would amend his slide a little. Please none of us tell Adrian what I've done to his slides! But I think Adrian's slide should look rather more like that (indicates).

Today, in the Department of Health, there is a huge focus on the hearing that people are receiving and the outcomes that are used to establish whether a service is improving or not tend to be about the person's hearing, not about the person. And I think there is a big gulf there.

The third slide I've borrowed from Adrian, and I'm not actually going to change what he's got up on there because I think it speaks for itself, when the NHS is thinking about selection, let's say, of hearing aids, they look at the technology because of course the bits of kit have to deliver what they say they are going to do, they have to look at the price, that's the world we live in, they've begun however also -- and this is really encouraging -- to include the user, to include the patient, the person who is going to use the equipment and incorporate their views and feedback and their thoughts and opinions and so forth. That's terrific and that's a huge advance.

But the addition I would make to Adrian's slide is this. (indicates). You know, you've just got to stop and wonder a little bit. It's 50: 50 price and technology, depending on whether you are looking at profound and mild hearing loss, that's okay. It's 10 per cent what the person who is going to use it thinks of it? I think we've got a way to go to improve that part of the equation. I am not into statistical formulas and if I had had time I would have made a lovely little graph on adjusting the proportion insist there, I just want to leave that with you, though.

However, we are on the way. The Department of Health is involving users of hearing aids in their selection process. That's terrific, and long may it continue and much may it grow.

Just a very few words then, which I will skip through very quickly, because we really are looking at catching trains now. We do want from hearing technology to get better hearing, of course. Some of you have seen this diagram before. I will go through it quite quickly. We only want the better hearing so that we can communicate better. Why do we want to communicate better? Because as the speaker Tim, I think, made particularly strongly the point, because that's where our confidence comes from. That's how we acquire our independence, it's how we build our relationships.

When we do those, that's who we are, it's where we are going, it's our life, that is us. That red line to me defines where the technology can take us. It can take us to better hearing, but there's a heck of a lot above that line which is additional to the technology and we need to make sure we don't lose sight of that.

The risk today, and this is the last thing I want to say, is that we see technology as the answer just precisely because it is so good. It really is. If you compare implants 25 years ago and their outcomes with implants today, it's a mile apart. So, yes, it's part of the answer, it's an essential part of the answer, but of course it's not going to be enough in its own right. We will end up with -- and I won't go through this in any detail -- we will end up with people who expect more from it than it can deliver and we will end up with clinicians that will focus on

that exclusively to the detriment of the personal using the technology and making sure it is appropriate for them.

In other words, taking me back to the beginning, we are looking at the person's hearing and not on their ability and their confidence to communicate with people in the world around them. I will just literally read this final slide of mine:

"If we forget to focus on the person rather than on their ears and the technology that's around to help their ears function better and to help the signed process better then we are actually going to let down not just the person but we are going to sell technology short, because the technology will not be able to deliver to its full potential either. Thank you. [applause].

SUSAN DANIELS: Lorraine, thank you very much indeed and thank you, it's four o'clock precisely so I'm going to wind up with a few words. I have a dream, and that dream I think is a simple one. I think most hearing aid users want to be able to discriminate speech in quiet situations, but also in noisy environments, that's really what we want. But also we want to be able to be treated -- seen by people who understand what it means to be deaf, understand the implication of the use of the technology, understand how to fit with the technology, thinking all the time about the person on the receiving end of the service. It's not much to wish for, is it?

So can I now thank Sue Archbold and her team from The Ear Foundation for putting the programme together. I think it has been a great day, so thank you very much for your support.

I also want to thank all our speakers today and to UKCoD staff, we have one member of staff, Claire Long, who has worked continuously to put this together, despite the computer problems that we have had. Please will you fill in your evaluation forms. I can see that some of you have already started that and that's brilliant, thank you.

Our next conference will be on 30 June and it will be related to educational quality, so it will be a three quarter day conference and in the evening for UKCoD members only -- so if you are not a member of UKCoD please sign up if you want to come to the Parliamentary reception, which will take place in the House of Commons in the evening but you have to be a member of UKCoD to come. But the daytime conference will be education related.

Then we have another conference on 3 November which is sponsored by British telecom at the BT centre on telecommunications.

So that's everything I have to say, thank you very much for joining us today, have a safe journey home and thank you to everybody for their input for today. See you at our next conference, thank you.

[applause].

(4.00 pm)

(The conference concluded)

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