THE NATIONAL REHABILITATION HOSPITAL

CONFERENCE ON "ACCESSING THE WORLD THROUGH TECHNOLOGY"

NATIONAL REHABILITATION HOSPITAL, DUBLIN
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National Rehabilitation Hospital Conference, Wednesday 5th December 2012:
Accessing the World Through Technology:

MS HELD: Hello everybody, we're just going to get started now. Thanks everybody for coming. I'd firstly just like to welcome Arthur O'Daly, Arthur is a board member of the NRH.
MR O'DALY: Good morning everybody and welcome to the National Rehabilitation Hospital, I'm very pleased to be able to invite you here, to welcome you here on behalf of the Board of Management of the rehabilitation -- I think that I was asked to introduce all of this here today because many, many years ago, it seems a long time to me, I graduated from this hospital in about 1975, and access then was a very simple thing. It was really the name of a credit card and very little else going!

When I was leaving here I was told that I was being sent out, ready for the community, to deal with the community. And I had a wheelchair. So by coincidence, or a series of lucky events I ended up working for the National Rehabilitation Board. And the Rehabilitation Board had developed a whole lot of services for vocational services, to find employment for people with disabilities, and it was a new initiative organised by the Irish government, and access was a small, almost a voluntary effort on behalf of some of the staff in the National Rehabilitation Board, because there were a few wheelchair guys who were very, very noisy and demanding, people like Liam Maguire, who knew about rights and was a strong man, and made noise about it and had a lot of influence, because he was a very active, effective trade union leader.

So there were things developing then, which like the building design award scheme and got architects interested. And we were trying to make noises to the Department of Education about things like radio aids for children in schools, so that children with hearing loss in school.

So the amazing thing about today, why it's so important today, and why it's such a pleasure to introduce you is that we're now talking about assistive technology and universal design. And that's a huge major amount of progress to be made in approximately 30 years.

And still, there is so much work to be done still. Because there is still difficulties with taxis, in what I call the build environment, there is difficulties with taxis. And access in all sorts of areas, and the prospects for assistive technology and universal design are quite enormous.

And I'm very pleased to say that when a few years ago, the government were enquiring about what the National Disability Authority should be doing the rehabilitation hospital here were -- put forward a submission and included in the submission a recommendation that there should be a centre of excellence in universal design, because the ideas about what was needed for access and universal design actually started in this hospital, when, shortly after the hospital was set up for rehabilitation purposes.

So it is with great pleasure that I -- and I would like to congratulate all of the people who organised this and especially the OTs, the OTs have always been at the centre of developing access and access ideas.

And I look forward to a good discussion and laying the basis for the future, so that the work can continue into the future, much better than, or the progress can be made in the future built on what has been done in the past.

I'd just like to hand you over to Lisa now, because she knows everything!

MS HELD: Thanks for that Arthur. I have great pleasure in welcoming you here today, on behalf of the accessibility committee of the National Rehabilitation Hospital and we're here today to mark and celebrate international accessibility week, in collaboration between ourselves and Dun Laoghaire/Rathdown County Council, and other partners who are here today.

The committee chose the topic "Accessing the world through technology" when thinking about how we'd mark this event. And it's the theme for our first ever event in order to acknowledge the great impact that technologies of all kinds can have in enabling people to live in the way in which they choose.

When I was thinking about technology in the world, I was struggling to think of how the world we know today would function without it. Everyday use of the internet, e-mails, vehicles, automatic doors, to mention but a few.

Today we'll hear about many and varied ways in which technologies of all kinds can particularly help those with a disability to participate in a meaningful way through mainstream and specialised technology.

We have a very exciting and varied agenda, that I sincerely hope you will enjoy and learn from today. The aim of today's conference is to give an overview of how technology can be applied for those with cognitive, physical and sensory disabilities.

We also have an exhibition of information, equipment and ideas that will give you a hands on look at some of the technology available and an opportunity to ask questions.

Today is the starting point also in terms of learning and networking to promote and grow the area of assistive technology within the NRH and our links with other agencies.

I would like to thank our sponsor for today, Microsoft Ireland, who have kindly sponsored lunch and refreshments for the day.

And also to say all our presentations will be uploaded on NRH.ie for you to access after the conference.

Just in terms of housekeeping, can you just make sure your phones are turned to silent, the fire exits are at the end of the room here and to the immediate left of the room outside, and the toilets are just outside the room on your right and right again.

So just to welcome you all here today and we'll get started now with the first speaker.

So the first presentation is electronic assistive technology for spinal cord injury and brain injury, and the speakers are Michele Verdonck who is a senior OT in the NRH and she is a special interest in both every day and assistive technologies, and Michelle was recently the recipient of the Health Research Board Ireland research grant, which allowed her to complete her doctoral study entitled the meaning of environment and control systems for people with spinal cord injury and occupational therapist explores an intervention.

Also we have speaking Marie Cox, so it's a joint presentation, Marie is a senior speech and language therapist within the brain injury programme at NRH and she works with adults with acquired communication impairments and she is a graduate of Trinity College Dublin and Queen Margaret University Edinburgh.

So I'd like you to welcome Marie and Michelle.

MS VERDONCK: Good morning everyone. It was quite a challenge to do this presentation today because we're obviously looking at an audience of varied levels of knowledge, and I'm hoping that we're going to hit a little bit of the experienced market and a little bit of people at the beginners.

The topic today is electronic assistive technology, and while this is quite a wordy definition, it's effectively a subset of assistive technology, so we normally talk about assistive technology, we include things like toilet seats, the traditional type of hard devices, but today we're talking mainly about those that are electronic, so they comprise communication aids, environmental control systems, personal computers with integration into the wheelchair systems.

Sometimes electronic assistive technology also included powered wheelchairs and robotics; I have put the two pictures in there because those are the two exclusions of this talk, we won't talk about powered wheelchairs and robotics, robotics we consider that to be into the future and something we wouldn't have knowledge about, and powered mobility I would assume people in the audience would have more knowledge than I would, I'm not even going to dabble and pretend we know what we're talking about there.

So as Lisa mentioned one of my, at this stage, areas of interest is environmental control systems, and I obviously did my doctoral study on this area.

I think just to remind people about what environmental control systems are; they are effectively devices to help people turn on televisions, change channels, open front doors, possibly make phone calls, and the technologies themselves have changed significantly over the last couple of years.

This is one device people might be familiar with, a Gewa Prog, it's still one of the most popular devices in the community, anyone who is out there looking at environmental controls you will probably come across a device like this.

Now it's old fashioned, it's quite complicated looking, you need to know what all the little buttons do, but it's still a very reliable device and a piece of equipment a lot of our clients still

use, effectively every button sends an infrared signal and you can plug a switch into it.

This is a device we use in the hospital, it's a lot larger than the previous device, but every button only does one job, whereas the previous device would have done several different jobs depending how you have it set up.

This is a more modern device, which was one of the devices I used in my study called a Keo, it has a dynamic display, now we are moving more into the realm of technology familiar to all of us now, using mobile phones, where displays are a little more like computer displays, this gives more flexibility and we'll have one of these for people to have a look at during the lunch break out in the display to give it a try to see how it works.

This is a Scicair pilot, we are hoping to use it in the hospital here, we have recently had a renovation to one of the spinal wards and this means we have environmental control capacity up in the ward to use this device and it's voice activated, so you can train it up, with a few voice commands, which means you can effectively open the door and change the TV channel, things like that using this device, it's quite a bulky device and we haven't really much experience of its use just yet, but something we're looking towards the future.

While it seems a little more futuristic, it has now been around for nearly 7 years, we're not 100% sure how well it will work yet.

Now moving closer and closer to the realm of things we see every single day, this is an iPad, with an environmental control system running on top of it, called the Evo Assist, it effectively turns your iPad into a touch pad, which will then allow you to access your environment, turn on television, make a phone call, all these devices. The only problem about this particular application is it turns your iPad into an environmental control unit, therefore turns your iPad out of being an iPad, so you no longer have access to the iPad it is the environmental control, so if you want an iPad to send e-mails you need a second iPad or someone to logout of the one system and into the other. So there is going to be a presentation this afternoon by Universal Design, it really effectively negates some of the basic principles, if something is going to be accessible it really isn't, it's making the device not accessible, I just wanted to highlight that, that device also requires a separate network to be set up in someone's environment, this isn't transferable outside of the home, it only works in the home -- I'm highlighting this because this is one of the devices

that our clients see and think looks the best, and it might be the type of device that, we, as clinicians, may see in the community and then be frustrated with what it does in the future.

Marie will talk a little more about iPad type devices and possibly some of the limitations that they have, because we, as clinicians, are being given these devices as opposed to prescribing them, we have to keep our mind open about them.

This is moving onto the use of a mobile telephone, and the little box there which is "Call the house mate", this is an Irish designed product, related to the click to phone if people are familiar with that, it effectively gives switch access to a mobile phone, so through Bluetooth you can push a switch, and that switch will then enable you to control your phone. It may seem like a big thing but the biggest problem with modern technology these days is interface, it requires a finger or touch, so to try and turn on a phone or make a phone call with a finger if you have a physical disability, is very, very challenging, whereas you might be able to access a switch, but getting the switch to talk to the device is a lot more complicated, so this bridge gives us the opportunity to do that.

This device also has the capability of sending infrared, so basically bridges the gap between an environmental control and computer type system, so this means that this device is receiving the signal through the switch and then sends an infrared signal, so it means you can turn on a computer, you can turn on a television or device like that. We have just recently had success with this device, we have a new patient coming in, I will talk about that in one of our case studies later on, but this is an example of how human stream technology is becoming more accessible to the main assistive technology market.

I'm going to move on, Marie will take over here and talk a little bit about Alternative Augmented Communication.

MS COX: Thanks Michele. I'm going to talk about AAC, so that includes all forms of communication, other than oral speech, that are used to express thoughts, needs, wants and ideas. We all use AAC when we make facial expressions, gestures -- can you hear me now?

So AAC is defined as including all forms of communication other than oral speech that are used to express, thoughts, needs wants and ideas. We all use AAC when we make facial expressions, gestures, use symbols, pictures or write. So it's quite a broad definition and I guess the important

thing to remember about AAC is that in terms of communication, it's something that we want to look at in using to supplement or augment our communication, but not to replace any natural means that are there when we are looking at assistive technology.

So we're going to look at, there are a variety of different things, light-tech, hi-tech and also no-tech options as well, which obviously are outside the remit of this, but they would include facial expression, gesture, writing as mentioned above. Our light-tech options would traditionally look at single message buttons, and switches, sequential communicators and interchangeable overlay devices, so we'll just show you some pictures of some of these here. So you can see a selection of different switches, which can be programmed to just record a simple single spoken message, like the little Mac on the top left corner, we can also have talking photo albums, as you see in the centre there, which can be again used to record single messages or a sequential story message for a person. There are also simple individual messages like the Go Talk card as well, which you can see up there. There are sequential step-by-step communicators allowing sequential messages to be recorded as well, and there are also overlay devices such as the Go Talk, which you can see down in the bottom right corner there, we have a different variety of options for four, nine and 20 cells, so varying degrees of complexity for people to use. Again you can just record messages into those devices.

There is also the Message Mate, which is there in the centre bottom, again an interchangeable overlay device where you can record your messages and there is a go talk pocket, which is a simple hand-held device as well, a smaller version of the Go Talk.

Moving onto the hi-tech devices. They are traditionally broken up to dynamic display devices with recorded or synthesised speech and also text based systems.

So to look at some these here, we can see the Dynavox M3 in the top left corner, that's an example of a dynamic device with recorded speech, so it allows the person to record another person's voice to use for the messages. We also have some pictures of the V pen there, which is one that used synthesised speech and can use both an alphabet board style option, or you can also have pre-recorded picture messages as well.

We also have some text based options that you can see such as the Dyna Write or Light Writer, so they are based on a keyboard system, so the person would have to have some good literacy

skills to use the text based options. There are also a variety of other dynamic screen displays, such as the Smart Box, the Liberator, and these can be used with a variety of different access methods as well, so as you can see there they can be used by direct touch, or a person maybe using eye gaze to access these, or some might be switch accessible as well, as you can see in the bottom right-hand corner, a device that's switch accessible with the grid set up on it.

Moving on to some more hi-tech devices, and these are now ones that are coming on mainstream platforms, looking at our tablets and smartphones, and more and more apps are available now for communication.

So there have been a huge amount of apps that have come online onto the market in recent times, recently I think with the apps for AAC website they have listed approximately 250 apps that are developed specifically for communication purposes, so that's constantly growing, so to try and keep on top of it is quite a task.

There is a broad range of options available, some available for both platforms for IOS for Apple system and for the Android platform, some available in only one or the other. So as Michelle was saying, often what's happening now people are coming to us and they have a tablet they may have an Android or iPad and are looking for recommendations from us.

We can sometimes be limited in what we can actually offer given that in many cases switch accessibility might be an option. So that's something you might be talking about more later, Michelle, but many of the apps we're finding are not switch accessible, so it's quite a limited number that are actually switch accessible at present.

One of the switch accessible apps is the one on the top left, Seen And Heard, so it's a visual display, seen and it allows you to take pictures to add hot spots and you can have recorded material linked between one page and another, so it will be quite similar to some of the Dynavox devices, but might be a more affordable option, and they are, as such, accessible.

We have some simple apps as well like a "yes, no" App, it's very simple but still required direct touch, not switch accessible for patients who require that. There is also the tap speak button, which turns your iPad or iPhone into a little Mac switch, so you can record a single message, so very similar to the single message communicators I spoke about earlier.

There are also grid based systems, so the Grid Player, which is the App version of the grid, so once you have a licence for the grid for your PC you can actually create and customise your own grids and import to your iPad or tablet, unfortunately this is not switch accessible and cannot be edited on the device itself, it has to be edited on the PC.

There is also Proloco, another grid based system, again unfortunately not switch accessible, only allows direct touch options. We also have some text based systems like Predictable, which are switch accessible, they have a handwriting mode as well, which you can see up there, they actually recognise a person's handwriting on the screen, and they also have different keyboard layouts so you can have a Qwerty or A, B, C as well.

They are switch accessible and have made it available for the Android platform recently as well, so now looking at using it with a Tracker Pro-head mouse for access as well.

Just talking about the smartphones and apps as well, now we are using our apps more in therapy as well, so not just as AAC. So looking at therapeutic use of apps, so a lot of apps are now being developed specifically for communicate therapy, we have ones which are used for speech, so there is something like Speech Sounds On Queue App which provide our patients with an option to actually use their tablet, PC or iPad with this App, which allows them to do therapy themselves and guide themselves a bit.

There is also Tacktus therapy apps which allow programmes of therapy for Aphasia, and we also have some apps for cognitive communication disorders as well, memory training and attention training, and a lot of apps as well that are freely available and accessible can be adapted and used for speech therapy purposes as well, we are using some apps which provide visual feedback for patients when they are doing speech drills or Speech Sounds On Queue which records the patient when they are producing a word and provides them with feedback as well.

So more and more of our patients are coming to us with their devices and looking for options that they can use and we can provide them with to support their therapy as well as just using it as an AAC device.

So I'll hand back to Michele for that one.

MS VERDONCK: Right now just to talk about computers, I think this is a really, really kind of big ask to try and give a summary of what we mean by access to computers here, I'm going to do my best to try and give you a general overview. Obviously we could take the whole day talking about these things.

The first thing we need to look at is the hardware, and that's the bits and pieces we attach to the computers, obviously the most obvious thing would be keyboards, and I'd assume most of you are familiar with different types of keyboard, so buying a physical device that gives you access, this is kind of going back a few years not as fashionable as all the iPads other bits of technology, but these things still very, very useful. The big challenges now most of these devices might have the wrong cord on the end, so as a clinician you find someone has a really nice keyboard and I go to plug it into the iPad and that's just a no, no, or alternatively they might have a different little socket at the end, for those of you a little technophobic, it might be round with a few pins in it instead of nice and flat like the square that plugs into the computer, so you are automatically stuck at a hurdle, so there are some real challenges, there is an element of having to be techno savvy.

Sometimes there are these physical solutions out there, but I think they are quite challenging for us, as clinicians they are quite expensive and when you get the device you aren't sure it will plug in.

The left hand picture is a picture of a big keyboard which makes sense in the different colours helping people with visual difficulties, the one on the right-hand side is a very interesting device for people with difficulty with their, they might have difficulty in positioning of their hands, the bottom is one that's particularly interesting, a Frog Pad, a one-handed keyboard, it means you can type away by choosing the colour buttons on the bottom, you can't see it properly but the top, the second button would be an A or at, but effectively you can key stroke in different keys if you press one or the other, it's different combinations and that's just a USB device to plug into most devices that aren't tablets.

Right then there is the computer mice or mouses, I'm not 100% sure what the exact semantic correction of that is, I'm sure most of you are familiar with the variety of mice available. Some of the mainstream products are particularly encouraging, if you look at the bottom that's just a roller ball mouse and I'd like to say you can buy them in PC World, but I have to correct myself

and say you can sometimes buy them in PC World, finding these devices in the mainstream can be quite challenging there isn't a constant market out there, you almost have to keep your eyes open, I find that challenging, you are telling the client to go look mainstream and there is no guarantee they can get what they want. But the reason this mouse is so useful, instead of moving the mouse you move your hand over the mouse, which means you can probably use your elbow, or arm or forearm, so you don't need the small dexterity to grab the mouse and push it around, you can just push the ball around, that's fine, but you are then stuck having to do clicks, you need to take your hand off the mouse and manage to hit the clicking buttons, that's challenging, that's why the assistive devices such as those on the left are useful.

Again it's a ball system, but you can plug in switches, which means if you have poor dexterity and only gross movements you can move the mouse and engage the switches for your left click or right click, something along that line.

Obviously there is a variety of these things and we shouldn't forget about them and once again I don't mean to harbour on the compatibility issue, but again these things generally have a USB key in the back and they don't always fit into tablets, we have had some success with Android tablets particularly, I know of success with Android tablets likely, Motorola Zoom has a USB socket to plug them in, which means you can use some of these mice, but it depends on what device or tablet you are buying as the compatibility, that makes it tricky for us if we're trying to provide some form of advice, because we don't know what's going to work until you have -- we've given it a go.

So just on that line -- just go for a second, one of the encouraging things talking futuristically, I probably mean the next couple of months, it's moving so quickly, Microsoft are here outside with a really exciting, I get excited as I walked past and didn't get a good chance to look, but looking at the Windows tablets, and they supposedly have USB functionality and they are operating a full operating system on a nice tablet device, which means all these things I have been complaining about might actually be solvable, should be plug and play with these devices, so it's quite encouraging, we might actually take a step backward off the mainstream tablet market into the Microsoft market if it comes along with that, so there is definitely some interesting work to be done about that.

Other kind of mice, mouses, the sip and puff type mouse. Now this is a very specialised device,

because of that it costs in the region of €2,000, which makes it absolutely ridiculously priced, but incredibly enabling. So if someone doesn't have the ability to do anything other than move their head and perhaps even just move their lips they can use that little sip and puff mouse, put it in their lips and move the mouse by moving their mouth and click and drop and drag with a series of sips and puffs, this particular device; the one on the right-hand side, is plugged in, the one on the left-hand side is the new design and that's actually wireless now, so it works on Bluetooth, which makes it a lot easier to position for us as clinicians.

They have also increased the functionality, so what they have done is for the techie people out there, they have given it a joystick functionality, so it's no longer just a sip and puff mouse, it's actually a joystick, I don't do any computer gaming, but I have clients that would, so computer gaming does have complicated joystick movements, hitting buttons and firing and zapping and all strange things like that, and seemingly if you're a good user of this you can do a three sip, four puff, two sip kind of code, which switches from using just a general mouse to using a joystick, which means someone can open up their PC, find their computer programme game, load it up as if they were doing a normal thing, and then switch the mouse into joystick mode and play a game, that might seem like such a small thing, but that can be hugely enabling, even for us on a clinical basis, for some people they might not be into computer, but may be in computer games, it's not the same thing.

Being able to write a long e-mail or type a code, or understand how the internet works is not the same as gaming, we come across clients who are adept gamers, but couldn't use a PC, so that's encouraging, but still expensive and there is no precedent in terms of funding.

The head mice on the right-hand side, is a system where people control the mouse just by head movement; these two devices both Tracker Pro and Smart Nav require a reflective dot somewhere on your body or face, most of our clients would actually wear glasses and put the reflective dot on their glasses, you have now full control of the mouse, that's works particularly well, the only hang-up of that, anyone know what the problem with that would be? Take the glasses off, fatigue is a problem, just in terms of function, if you are moving the mouse around what do you need to do? Click. So then you're stuck, how do you the clicking? That's what sip is and puff is good because that's into it. The Tracker Pro has the option, I'm not sure about Smart Nav, but Tracker Pro has the option of attaching a switch physically, but then you are almost negating the freedom of using your head, you are now attached to a switch again to have

to click, so the answer is ... in terms of -- sorry that doesn't -- the answer is software and I'll come to that in a short while.

I didn't finish the hardware yet. Now the buzzword for the moment, eye gaze. Eye gaze, eye gaze ... even in this hospital there is a huge bit of excitement because we have a client coming in who has their own eye gaze system, and we are all very excited and panicked and anxious about how it's all going to work!

Eye gaze has come on a long, long way, I don't know if Marie should be giving this, she might know a little more than I do at this stage. Eye gaze systems have been around a long time, they were actually based, the reason they have come along is because of mainstream technology, it's not the disabled market that's pushing eye gaze, the reason it is being pushed forward is it has so many commercial possibilities; the latest one they are looking at is driver safety systems, so they are talking about integrating eye gaze systems into your car so that the car will be tracking your eyes all the time, if you fall asleep or look away from the road you have an option of an alarm or some way of cutting out that may seem like a small piece of work, but that has billions of billions of applications in the future, which will mean eye gaze technology will continue to get better and feedback to us.

So I think from us in the assistive technology side of things it's really encouraging, but we need to make sure that that doesn't go only mainstream, it still has the application back to eye gaze systems.

The device on the right-hand side, I think it's a Toby 6 or 10, not 100% sure, it's basically an integrated eye gaze system so a computer, effectively an old tablet, big fat old tablet with it's own integrated eye gaze system, so you can control the screen using your eyes much the same you would with the head mouse, but instead you're using pupil movements and it uses a dwell function, if you stop on a button it clicks that system.

The only problem about these devices is these computers are old and their compatibles are not great, so if you are using it for communication it might be okay, but for complicated computing it's a problem. I'm not 100% sure, but they were selling for a couple of thousand euro, more, more like in the 10s, roughly? 12, 14,000 for just this particular device, the device on the left-hand side is a normal computer screen, well PC eye, which is a plug in eye gaze system, this

effectively means we can start dabbling without having to buy the system, we can plug it into a computer, have the software to recognise eye gaze and work on controlling it.

The only problem we found on a pragmatic level is mounting, it's one thing to plug it into, but getting it in the right position for clients is tricky, we need to get it into the position instead of propping up clients and poke them around, we need the technology in a right place for them. But the exciting thing is that's retailing for around 3 and a half thousand euro, that's a little misleading you wouldn't just buy that, you have to buy, you need a computer and software and a mounting pack, it's going up, but not 14, so the functionality is pretty good.

The bottom picture saw different one Erica and they use slightly different types of technology, there is a variety out there. On a clinical basis they don't work that well for that many patients, but when they work they can be very, very empowering. The technology is improving and becoming easier for people like us to use.

In Stoke Mandeville in the UK, one of the mainly or spinal cord units as people are familiar with, they have started using this eye gaze technology predominantly with people ventilated and wouldn't have the ability to talk when they are first injured; they have started dabbling with head mouse users and sip and puff users and given them the chance, the feedback is they are starting to prefer the eye gaze, which I find surprising because eye gaze a couple of years back was exhausting and not easy to use, so it's interesting to hear that potentially there might be a wider application for eye gaze, it's coming along and it's something we need to look at.

The other thing, as a corollary of eye gaze, we don't have it here at Rehab yet, but it has great potential, it offers very good diagnostic and treatment potential, the same way Marie talked about using apps as therapy, eye gaze can be used not only as access method, we can use it as a way of seeing where the patients are looking and try and train them, if someone has an inability to look to the left-hand side of the screen, you might run a YouTube video with one of those funny bands, one direction, put the really good looking guy on the left-hand side and try and get the client to look over to the left, often if they have head movement or spasm, you can't see where they are looking, but if you can get the eye gaze calibrated you then have the ability to see where their eyes are going, you can encourage them to look left and right, you can do a different kind of therapy, likewise it's just good to diagnose where people's eyes are going.

Especially in the OT department, my brain injury colleagues spend a lot of time trying to work out what people are doing with their eyes because their eyes tell a lot about what's happening, even in assistive technology, using some of these devices as communication aids or perhaps even for environmental controls, we don't know if they are going to work unless we know how people can use their eyes, or attention, and how they are understanding what's going on. That's just a corollary for this, it's an interesting development.

So that's the hardware, that's a bit of a quick tour; I'm not sure if I missed anything out, if anyone wants to make suggestions we can talk about that after. We'll talk about software, the bits we put onto the computer and there is a variety of different things that are particularly useful for us, screen reader, word prediction, magnifier, speech recognition -- I'll start with speech recognition and this is one of the big buzzwords, when I did my doctoral study and I was, I rang focus groups of people and asked what they wanted for environmental controls; one of the main requirements was things would be speech activated, but they all thought it wasn't possible, so they said it is possible, but not good enough.

So there is a real interest in people, in the community to be able to use speech recognition, but there is not that much buy-in, in terms of the reliability, that is improving. So hopefully we are going to see speech recognition integrated with more devices, in terms of general computer control and computer input, speech recognition software is incredibly useful, just for putting in text, it's possible to control an entire computer using your voice, open Microsoft Office, open this device, send an e-mail, all of that stuff is possible and done relatively easy.

One of the important developments of late is the mainstream products that you don't pay for, and how they have come along, so Dragon Naturally Speaking would be the most common one, which costs over €100 normally to have and does work very effectively, is now being competed, there is competition from the mainstream Windows 8 and Windows 7 device, so Windows voice recognition facilities are actually comparable in terms of efficiency, so we are now starting to use that in the clinical practice, instead of introducing our clients to Dragon, we are introducing them to Windows and it's working well.

Dragon has a lot of complicated commands in it, whereas Windows actually simplifies things, it might not do very complicated things that well, but in the Windows version you can say "show numbers" and something you should all write down if you are going to think about writing this,

"show numbers" is the key to everything, if you are using voice recognition and say "show numbers", your computer screen will effectively show numbers and every single clickable button, so even if you have a website with hundreds and hundreds of links on it, every single link will be numbered, while you have the visual acuity to see what number it is, you can click on anything, you can literally say "show numbers, 44" and that will open up the YouTube video to One Direction again, sorry that's a dreadful example, I shouldn't use that!

Anyway that's speech recognition. This is particularly interesting, and this is called Camera Mouse. Free software, free download, it's a head mouse without a head mouse. So all do you is download the software and you then choose a part of your body, to tip of your nose, corner of your eye and then you can control the mouse through the web cam that's integrated into the computer. So this is something that a couple of years ago I was saying I would have said why isn't it possible, it really should be, lots of universities have gone out and done the research and different varieties of web cams and they have come together, it's a multinational conglomeration and made this software available. So if you look up Camera Mouse you can actually download it for free, give it a go, it also has links to clicking type software, they are not very pretty, but they are free software, which means you can then use the head mouse and click or drag something along those lines. I have one installed on my computer at the moment and I can't work out how to get it off yet, but it's there and useful and does actually work.

It might not be quite as efficient as the head mouse, but when you say free versus a couple of hundred quid, again it's good diagnostically, someone can use it and say I like it, but it's not good enough, then it might be worth looking at the hardware device. That's Camera Mouse.

This is the Grid 2, I'm not sure I put it on there -- I think Marie already talked about this. I don't want to sell one particular product over others, but this is a particularly useful piece of software we can use for our clients for both communication and for computer access, and I think the reason we like it, or we use it so much, is because it's easily switch accessible for our client group to access to computer generally, or often involves switch, if someone has a severe cognitive deficit they often have a physical one too, so it's difficult to use a mouse so Grid 2 is very useful.

This is an example of the dwell click, this is called Dwell Clicker 2, which is downloadable from sensory software website, you get limited access, access for 30-days then thereafter the free

version doesn't have all the bells and whistles, I'm not 100% sure what the bells and whistles are, I don't know what you call it when you click something -- it slipped my mind now, if you are looking at something it actually jumps to, so if you are looking at something it will jump to the next, the clickable margin, so it only costs, if I'm not mistaken, around 10 pounds or something, so it's not expensive as a piece of software, this is the interesting thing that the App market has done, is got developers like this to sell small bits relatively cheaply, so you would have normally had to get a free dwell clicker that might not do everything you need or have to buy the whole Grid, but sometimes that can be useful. That's a nice looking one, I should have put up a picture of the free ones, but it makes more sense. There is a left click, right, double click, drag and on-screen keyboard. So that's helpful.

Which brings me to the next bit, Windows accessibility, has anyone not tried Windows accessibility features? Go on, own up! Okay there are some honesty there, I was about to commend you and say what a fabulous audience you are, how great you are, anyway -- homework tonight, when people ask you what this talk was like, you need to say I've got to go home and do something, you need to open Windows accessibility and give it a try.

Put on the screen narrator, put it off again afterwards, you'll need to before you go mad! Put on the, have a look at the voice recognition system, and look at the different options for the mouse. The stuff is all there, it's very easy to look at. Microsoft also has a website; I haven't put the link up, and I admit I'm robbing this from a talk I was at on Monday at Enable Ireland, Microsoft/Enable has video links to all of these features, so the little YouTube videos that says if you want to make the mouse bigger here's how you do it, there is a whole bunch of stuff like that.

The other very useful help is good old Google. Google and Google video will often give you the videos on how to do it. So if there is something you think you want to do, just try the old fashioned simple way, can I make my mouse bigger? Can I make the mouse slower? I'm hitting keys too many times and you will actually find the solution out there.

One of the big movements, I'm curious -- I haven't had a chance to play with Windows 8, I'm curious to see how it improved the accessibility features, but it has a good buy-in with the disability market if anyone has experience it would be good to hear that, and it might be worth talking to our colleagues outside; the big difference is on-screen keyboard was small and you

couldn't change it, but now you can make it as big as you like, so if you have Camera Mouse, a nice on-screen keyboard and clicker you could pretty much control the computer with no physical ability, and that's really exciting that that's doable with no fancy technology, or no fancy technician, just a little bit of dabbling and also the awareness that you can get it wrong some of the time, but you get it right eventually.

Now obviously we can't not talk about tablets and smartphones, and there is a variety of them. Who doesn't have a tablet or smartphone? Okay, who does? Six months ago who had a tablet or smartphone? A year ago? So there are a few nerds in here anyway, I'm very glad to talk to some techno savvy people.

The thing we are finding is clients are coming in and don't know they have a smartphone. I have a phone, yeah, I think there might be e-mail, but they don't understand they have a smartphone. I think someone was saying iPad itself is only three years old, now the interesting adage to that is Archos tablet is probably 6 or 7 or 8 years old. Apple did not invent the tablet, they just sold it very well. That's just an aside.

But the important thing is that things have become so mainstream and we are seeing more, and it is generally providing access for people. The important thing to remember, particularly when it comes to smart phones, the primary function is telephone. So people coming in with a smartphone and wanting to do fancy things, as a clinician, number one can they make a phone call? It really does negate the purpose of it, if you can't make a phone call. So I just -- it's a simple clip call message, can you use it for what it's meant for, unless you bought it for another reason.

They are multi-media players, MP3 and video, they have computer capabilities, internet enabled, e-mail, social networking, GPS, cameras, organisers, games and therapy tools and Apps, there will be a talk at 4 o'clock which will go into more of the App type things and things you can do with smartphones and tablets. But again my main caution is how do you access these devices and I think I'll come on to that now.

Then there is the electronic books; who has a Kindle, go on? Who has read a book on an electronic device? Slowly but surely we're getting there. I wasn't sold on it, I like the idea, but I never thought I'd actually do it; one weekend I sat down and said I will read a book, I read it

much faster than any other book because there was there the whole time on the tablet, just in the kitchen it happened to be around, read a few pages and put it down, particularly with people who battle with dexterity being able to flick a page is encouraging.

The device on the bottom right is called a pagebot, it allows switch access to a Kindle and that involves two little motors going click, click and I haven't put one out yet, but I will, so people can have a look at it, it costs more than the Kindle. It allows you to turn the page, doesn't allow you change the book or anything along those lines, but for someone who doesn't like technology and just wants to read a book it's a good solution, you just want to turn the page. I wouldn't say it's a no-go but it has its cautions. Electronic books are the future.

The reason I'm so passionate, a lot of my clients, it's often we hear someone saying I'd love to read a book and reading is a solitary activity, not something you want to do with a PA or a nurse turning a page for you, it's something you want to do at your own pace, it's a being alone activity, so I'm optimistic about what electronic books could mean for the future, there is no research in this area yet, if there are students out there that would make an interesting project. Marie do you want to do this?

Access, access, access, our clients do not like this part of my talk. Why would I want to mount, why would I want something ugly? And while I hear that I know that success is the most important thing. Getting to use something is important, if you can't use it or only use it some of the time it really isn't that important, so we need to look at mounting, I'll spell out some of these details to you, because I think as clinicians we tend to rely on suppliers, and we can become convenience based and just go with one supplier and buy whatever is in their catalogue, I will spell out how they make up some of the devices, if you have someone with a little intuition they can put the bits and pieces together, you save money and get a better product at the end of the day.

I put my hand up and admit to say I work in an institution which says we can only use one supplier, because they have an account and I go ahead and do that, but I'd like to encourage you to think a little wider and maybe economy and the way things changed they are going to change as well.

So the Manfrotto mount, these are camera mounts, you can buy them from camera stores, a nice

elbow arm, you can loosen up the nuts and bolts, we'll have a series of them outside, please come and try and use them, loosen them, see how they go, don't be afraid to try, give it a go.

Ram mounting; this to me is one of the greatest inventions since sliced bread, because it's a Lego version of mounting, you buy all these little bits and pieces, ball joint balls and hook all these different bits and pieces together and effectively put a Kindle in, it's like a spider arm, a Kindle or a tablet, the one on the bottom is an iPad specific version, they all just fit together, so you can have one mount for your phone and then change the end and put your tablet in, so there is a putting together.

Now the commercial suppliers will use elements of these and sell them together. One of the main suppliers puts this together with a Manfrotto, with a really ugly horrible screw, they haven't gone and bothered to buy the ballbearing joint, it's really annoying when you know it's available.

I'm sure people here are familiar with Otter Box, they basically keep things dry and are useful particularly when you talk about health and safety and clients that have a bit of a gob issue, which some of us do, that's a picture of us using mounting on a wheelchair here.

Smartphone and tablet access, how is it done? Touch. Maybe stylus, maybe a Bluetooth keyboard and switches through Bluetooth, the most important thing is it's very tricky and the big thing we found in clinical bases smartphone involves two things, swipe and touch, my clients who are good at swiping are useless at touching and the clients good at touching are useless at switching, so and likewise some tablets are good for swiping and some for touching, it's really annoying getting the right balance.

Some people might swipe and use a stylus to touch, so there are ways to think it through. So these are just an example of a couple of stylus and splints we've tried to use, the good old fashioned feeding strap, as it's called, the universal strap on the bottom left.

Very important thing, who doesn't know about Apple assistive touch? Okay Apple, if you are using Apple devices, look for the assistive touch, it gives people who can't touch the button the ability to touch the button. What that basically means is you put a little overlay onto the device and there is a little button that sits, a little dot that sits on the end, you can touch it and it will give you an option to touch another button to bring you to the home screen, that's the biggest

problem, click, click, click, that is how you use it, push that button 4 million times, so if you have a dexterity problem and can't push that button you really are lucked out, so Apple had to design this, there was no way around it, it had to happen. It has a lot of other options, it also gives you the ability to do the squeezing, if you can't do that it gives you the ability to enable a touch and drag, so you can do squeezing with just one point, squeezing; I don't know what you call it zooming.

Bluetooth switches, on the Android platform there is the Click To Phone App, which uses a Bluetooth switch via Click To Phone device or Housemate device, I haven't got it on display, because I have a client using it at the moment, I just didn't really want to take it off the client, but there are lots of videos out there and it's well worth looking at it. Tecla shield and Tecla App are different versions, these are the two I'm aware of, to use switch accessibility on Android phone.

This is an example of the Tecla App, it gives a scanning toolbar along the bottom to open into a keypad if you need it, the great thing is it looks -- you look at every single thing on the tablet or smartphone, so you don't have to have a special App, as long as it's designed according to Google principles, which they are not always, you can basically scan through everything on the App, so for someone who is very techno savvy this App allows people to go through everything. If you had someone who was an IT designer, something like this would give them the option of doing all the bits and pieces. The Click To Phone in contrast simplifies things out, it gives you do you want to look at internet, make a phone call -- it just simplifies things, so people a little technologically challenged that works better. There is no right or wrong way.

Then on the Apple side of things, Tecla have then designed the same product different -- same company, different product, we have, Aspire has one outside, it gives you access to the home button so you can scroll through the tablet, you can do multiple clicks for different functions, it gives you really good access to the iPad. Then there is a series of devices that do Bluetooth switch and you can buy them at different levels, to just use one particular App, you buy them to work with a few apps or with infrared switch devices.

The important thing about this device is you will see this device resold to you by several different suppliers, they will brand them with their own name. They come from a company called Praetorian, that's the source, again you have the option of saving a little bit of money and just going a little back to the beginning, it just makes a little sense.

How are we doing for time? Five minutes, Marie will take over.

In five minutes we'll take a minute on all of the different case studies.

MS COX: Okay our first case study is Anne, a little about her medical background; sustained a spinal injury following a fall resulting in tetraplegia, C 5 Asia B, functional ability further compromised by severe bilateral contractures in upper limb joints. She is a lady in her 60s, well educated and worked as a teacher involving special needs and home education. She is a keen reader, and used her mobile phone and home PC prior to her accident.

Brief run through of presentation, there were no communication issues, or cognitive difficulties, physically she had some movement of her right-hand and fingers and in relation to mood and behaviour she felt overwhelmed at times by the extent of the injury and disability.

So the following things were trialled with her, Kindle Touch for reading, which was her own, a mounted tablet, both iPad and the Archos Android tablet. A mobile phone touch screen was trialled with stylus, keypad, the Dora phone, and standard mobile phone with keypad with small keys.

So here we have a picture of her using the splinting with the stylus, to access the Archos Android tablet, as you can see she is playing solitaire there.

And another image of her with splinting for the stylus for the Android tablet.

So I think she had success with the tablet, she also had success using Kindle with stylus for the Kindle and she was using her own phone with the small keypad.

Moving on to our next case study we have Sean. Sean had a C3 Asia A spinal cord injury, friendic nerve stimulator ventilated, no cognitive or communication issues, he had his own laptop with Grid 2 on it, and a buddy button switch mounted at the cheek for access. Following trials he was using Integra Mouse, the sip and puff mouse, Michelle described earlier, which was trialled with Aspire and Dragon Naturally Speaking software, but there were problems in using this.

You can see some of the pictures there, Sean was able to use the laptop computer to enable him to send e-mails, use Skype and read newspapers online. He preferred the Integra Mouse, it allowed him full and accurate access to and control of the computer. Switch access was particularly slow and laborious in comparison. But the high cost of the Integra Mouse, which is about €2,000, was obviously an issue.

You can see him using the sip and puff mouse there with his laptop, and that's him set up using the switch with the laptop.

Another case study we have is Catherina, a 13 year old girl, who suffered a traumatic brain injury following an RTA, and presented with severe dispartia and quadraparesia, Grid 2 on laptop with Buddy Button was trialled, this was quite laborious for her using the switch with the scanning method, so the Grid Player on the iPad was trialled and it was installed on the patient's own iPad as well, and a mount was loaned and splint was made for her to support her accessing it.

The outcomes of this were just integration of mainstream technology into her life, but with a non-use of mounting, which would have actually supported her access and in the end it was a preference for low tech solution for her.

The final one of our case studies is Paul, he is a 22 year old college graduate, who sustained a C4 Asia A spinal cord injury following an RTA, he had increased tone in his upper limbs, he was a laptop user and he had his own Sony Ericsson Android smartphone.

So, Michelle, you looked at using the switch access using Housemate Click To Phone for him using Bluetooth and infrared. The Click To Phone Android App mounted head switch with Buddy Button and mounting the phone and he is successfully using that now at the moment.

And that's just a picture of the Housemate there. Okay and that's the end.

MS HELD: Okay I think we'll take a couple of minutes to have a Q and A session if there is anyone, I know that's a very extensive presentation; thanks a lot girls, it's really -- I think very thorough for people to get a full overview of the area. Has anyone got any questions to ask?

SPEAKER: Hi I'm just wondering about funding -- if you identify what someone needs, about funding, do you have specialised funding or ... is that not working?

MS VERDONCK: No, any suggestions from anyone? No we have been dabbling with need, we are trying to create an awareness of what's needed and what people can benefit from, but in terms of actual funding we have no, I can't answer that question. If anyone has any ideas, I think perhaps what we really need to move onto the political platform and move these things out. There is a whole big piece of work that needs doing, but from us we are pragmatic therapists to look at how we do these things, but there is a bigger body of work to be done.

MS HELD: Whether Marie wants to say something about funding it through HSE as well?

MS COX: Yeah we've made applications in the past for funding through HSE and it has been passed from Billy to Jack and back again, so...

SPEAKER: I work in the community, I'm wondering, we have clients looking for something and we can't get it, I was wondering if Rehab had access to a special fund?

MS COX: No, we don't. HSE and education as well, in terms of paediatric patients here, going through education for that, I know that there are different lines that can be followed there, but I don't know if there have been any success from that.

MS VERDONCK: I need to acknowledge here charitable donations; the work I have done would not have been possible without support of Aspire, which is an English charity that has no responsibility to Ireland, but very generously supported us in our efforts to get out here and also charitable donations from previous patients and family members and friends of patients, who made monetary donations to us and our team leaders have helped us buy a few of these tablets and bits and pieces, but my basic premise is "knowledge is power", the more our clients know and the more they have experience with these things they might need to go out and look themselves, it's not the right answer, but it's the way forward.

Also with things becoming mainstream they are in people's houses; I would look at the model of people supplying technology and hopefully HSE helping to provide the interfaces, so we might be looking to try and supply switches and mounts, but not the iPad, that would be one of my visions for the future, I don't know where it will go.

MS COX: Or even purchasing the apps, some of them are expensive, there are trial versions, but if it's something we're recommending for somebody funding is the issue there.

MS HELD: Any other questions? Okay I think we'll...

SPEAKER: Will all of that information be on the website?

MS VERDONCK: This presentation is -- I'll put it up on the website, it's an open presentation so you can go through it like this, you can also download a copy and show it to someone else if you need to, with no problem with that, also they are pseudonyms, those people aren't really Paul

and Jack and Billy.

MS HELD: Also the transcript for today's presentation will be available on the website, people will be able to access some of the detail in terms of the girl's presentation. Okay. Thanks very much. Thank you. We'll move on now.

Our next presenter is Stuart Lawler, Stuart is the manager of NCBI's rehabilitation training centre based in the organisation's head office in Drumcondra, and over the past three years Stuart has overseen the redesign of the centre's rehabilitative training programme and work to build on the accredited training it offered through the centre.

He is also responsibility for research into and support of accessible mobile devices in NCBI, and is currently exploring a number of mainstream technology solutions on mobile devices, which are accessible for people with sight loss. And he has worked on a number of EU funded projects to enhance the potential of technology for blind and low vision users. Stuart is totally blind and describes himself as a tech geek, so welcome Stuart.

MR LAWLER: Thank you Lisa. Hi everybody, good morning, thank you Lisa and thank you for the invitation to speak here today. It was really interesting listening to the last presentation and just the amount of mainstreaming that's going on at the moment is really positive, and the idea that people with disabilities are seen now as people with spending power, we're seen as the, as every other consumer is seen and we're a market of people that these companies can tap into, and maybe I'll come back a little bit to, a bit on mainstreaming towards the end of my presentation.

Lisa has very kindly offer to change the slides because I was -- I'll tell you briefly my very first story of PowerPoint. Is that a fire alarm?

Just my luck the fire alarm starts! That wasn't set up.

So when I did a presentation six years ago somewhere, I had gone on a course to learn PowerPoint; you might say why would a blind person want to use PowerPoint? I find it gives me a structure around the presentation, it's also good for you guys and I'm using it today because my colleague Sharon put a lot of nice photographs into the presentation, but the first time I used PowerPoint I presented somewhere and there was a colleague of mine in the audience and I thought I was great, I had spent loads of time getting the presentation ready and I said afterwards

was it okay? He said yeah it was grand, I said how was the slides, was PowerPoint okay? He said we couldn't see it. I said why? He said because you were standing in front of the screen! After that I said if I'm standing in front of the screen let me know, so thank you anyway.

I'm going to do a whistle-stop tour of what NCBI does in the context of technology service, my colleague Sharon is outside at our stand and you are more than welcome to come and visit us at lunchtime; we have to go directly after lunch, but please come and play with the technology, it's quite difficult to go through all this in a short amount of time, but I will do as best I can and as I say come and have a look and there is lots more information on our website at NCBI.ie and if you are already linked in with us we have technology trainers based throughout the country who can give you further information, so please don't hesitate to ask, or if you want to talk to me after the presentation, please do so.

So the first, just a bit of introduction what we'll talk about, a bit about NCBI, types of technology used by people who are blind and vision impaired. And then I have a couple of slides towards the end on mainstreaming and is the future bright? We'll talk a little bit about that.

So our next slide, which talks just a little about NCBI, and who we are for those who do not know, we're a national organisation, founded in 1931 and we provide a range of services and supports to approximately 16,000 people in the Republic of Ireland, I should probably say I haven't written it on the slide, but the term "blind", if somebody is registered blind, or even blind in our title covers a whole spectrum of levels of sight loss. There are very, very few people who would, let's say, be totally blind within that 16,000 population that I mentioned.

So most people who present as being registered blind, or who have a vision impairment have some level of useful sight.

The next slide; a little about our technology service. So there is three strands, as I see it, to the technology services that we provide in NCBI. There is our assessment/testing or whatever you would call it, of products and that's where we just can show people what's available, and people in conjunction with our own professional staff, make an informed choice on what they want.

Technology training, so there are trainers based throughout the country, staff within NCBI who can provide support on a range of mainstream and specialist technology, and then also then there

is a five-day telephone tech support line that's available to anyone who needs to use our service.

So the next slide; I'm just going to summarise the types of technology that we could talk about a little bit, screen reading and Braille output for people who have low or no vision, screen magnification, CCTV magnifiers and OCR reading solutions.

So on the next slide we're talking about screen reading. Mostly when we mention screen-reading people say Jaws, has anyone heard of Jaws? Anyone have any experience with it good or bad? Jaws is probably the most widely known and used certainly in Ireland, it's a screen reader, so it takes information as it appears on the screen and it outputs it in synthetic speech or refreshable Braille. So I'm reading Braille notes here, but you can get a device that uses electronic Braille, little pins go up and down to give you Braille output.

There are options available for Windows, and I was interested to hear Michele talk about Windows 8 a little while ago, I'm very glad to be able to say accessibility in Windows 8 has improved quite a bit, and indeed it's a very good point, if you do nothing else after today go off and try the accessibility features in Windows, either 7 or 8 or Mac OS, it's very worthwhile to do that.

So the screen reading solutions available for Windows and also available on Mac OS and a range of mobile platforms and we'll talk a little bit about that in a while.

Our next slide; we're talking about screen magnification and this software magnifies text on the screen and can be used with or without speech, so with or without screen reading, and I suppose this is really useful for people who have some usable vision, but who may, if they have to use a computer for long periods who may suffer from eyestrain, so they can switch on speech and close their eyes for a while and continue with their work.

A range of screen magnification programmes available, and some of them can work with closed circuit televisions and that's on our next slide, a little bit about CCTV magnification.

This essentially is a camera that takes an image of the surroundings, it might be a printed text, it might be a photograph, it might be someone who uses it to do their knitting, all sorts of things you can use CCTV for. We have a range of them out on the stand, it's really worth going to see

them and play with them and have a look.

Our next slide we're talking a little bit about OCR, has anyone heard about OCR and the whole concept of OCR, optical character recognition? And it used to be that there would be a large scanner, flatbed scanner, a bit like a photocopier, and you put a page of text on it and press a key and maybe 90 seconds later it would reading the text. Now all this stuff is done with cameras, an image can be captured and recognised and text output within about 10 seconds. We have a device on the stand today called Clear Reader, come and play with it, I was amazed this morning at the clarity of the programme for today's conference actually, we were scanning and it reads really well.

OCR is available and used extensively at the moment on mobile apps in a mobile environment, and this is really useful, a really good example of this not so long ago I was in a restaurant and I don't know, when you are blind and you go into a restaurant on your own, I personally feel awful about having to get someone to go through the whole menu, it's nice to just flick through the headings sometimes, so with OCR I can take my iPhone and take a snapshot of the page and have it read back to me, very, very powerful technology, and well worth having a look at.

So next slide is the start of a couple where we're looking at is the future bright and what is available? And I'm conscious that Microsoft are buying us lunch, so we have to be very careful here! I'm conscious that Apple are not here, but I do have to say, and I think Michele mentioned it as well on the last talk, that there has been a lot done with Apple accessibility, Assistive Touch is one mentioned earlier today, in the blind, low vision realm there is screen reader built into Apple OS from I think 10.3 onwards, and from iPhone 3G S in mid 2009 screen reader is called Voiceover and magnification called Zoom.

Now another bit of homework for you today, take an iPhone, if you have one already do it at lunch time, or grab somebody else's and turn on, go into accessibility and turn on Speech, or turn on the magnification and just have a play with it. Some of the gestures change when you turn on the speech for example.

So if you point or if you touch an icon on screen, without speech turned on, it will open the application, but obviously a screen reader user, I need to hear for example what that option is before I open it, so I double tap to open an option, so it's really worth playing with that.

On the next slide; just a little bit about Blackberry and Research In Motion, I don't know if anyone is still using Blackberry in the room, but Research In Motion are going through a change, I suppose, but they have accessibility, a range of accessibility options, including a high contrast theme and screen reader in Blackberry OS 7 and Blackberry OS 10, which is promised in the first quarter of 2013, we're expecting a range of accessibility features, including screen reader and there are some features in Blackberry for hard of hearing as well, I'm not terribly familiar with them, but I know they are there.

Next slide; a couple of notes about Android accessibility, and there is a number of accessible functions in Android, Ice Cream Sandwich and Jelly Bean, more so Jelly Bean, a screen reader built in, a range of apps available to make the screen bigger and also a range of apps that you can download on the Android platform to make your on-screen keyboard larger as well.

The accessibility is, I think, they say themselves accessibility is a work in progress, and it's certainly not maybe as clean as Apple's, but it is certainly there and built into the device, which is really good.

And next slide is a little bit about Windows Mobile, I was interested to hear that Microsoft are here, I'm definitely going to have a look at one of those tablets at lunchtime, because in the mobile version of Windows 8 at present, certainly on the smartphone end, there is no accessibility for totally blind users built into Windows Mobile 8, I think that's probably going to change pretty quickly, and it's interesting because obviously there is, I suppose, a commercial interest from the manufacturers of the assistive technology already. So we're either going to see low cost screen readers being developed for Windows Mobile 8 or going to see Microsoft just go on and work on something themselves.

So for example they could port Windows Narrator over to Windows Mobile 8, there is Mobile Magnifier on Mobile 8 for people who are totally blind, sorry for those who have low vision.

Just the next slide; in summary, I think it's really important for us to lobby to maintain the level of access that we have and to improve it, especially on the mainstream platforms.

I was telling a colleague here earlier on, that when I go to conferences like this now I normally

just bring my phone, my keyboard and myself, you are not dragging around a laptop anymore. So the level of accessibility that we can enjoy has improved a lot, even in the last 18 or so months, the numbers of people using smartphones and indeed, as was outlined in the previous presentation, the numbers of people using smartphones who don't necessarily know they are using smartphones is interesting.

But I think there is a large piece of work to be done around lobbying, a piece of work to be done around making sure that there is adequate training and support, and that there is an adequate network through which people can try out this software and hardware and hopefully get to use it in a way that is most comfortable for them.

So that is really all I wanted to say, my presentation will be available if anyone wants a copy, Lisa has it, and if anyone wants to talk to me you are more than welcome, I am around until after lunch, please come by our stand if you'd like to chat and thank you so much again for having me to speak today. Thank you.

MS HELD: Okay, thank you very much for that Stuart, really interesting presentation. Are there any particular questions or any comments to be made? I just would like to say that I know the therapists here use the NCBI office in Dun Laoghaire extensively, and they have been fantastic in terms of giving us advice and allowing us to bring clients down and facilitate with trialling equipment, we have a bit of a toolkit now, but things are always changing and updating and to have that kind of up-to-date access on an advisor capacity has been fantastic for us, we seem to have had a year where we have had a lot of patients with dual diagnosis, whether it be brain injury and visual impairment, that's particularly the area that seems to be an issue for us and getting to grips with, and having that support has been really fantastic. So I just, I suppose to advertise that to people, that it is a fantastic facility there in terms of providing support. Thanks.

Any other questions or comments? No hands up anyway, you must have done a good job.

MR LAWLER: Or else they are asleep.

MS HELD: Our next speaker is Martin Perry; I see him outside at the Microsoft stand, I wonder can someone pop out to ask him to come in. Martin is an employee of Microsoft, but he has also been a recent inpatient here in the NRH in the brain injury programme, and he is currently an out-patient so we have been really grateful that Martin has agreed to make a presentation really around the user's perspective in relation to technology, so he is -- I'm just going to put up the

presentation, here he comes, good timing. I'm just introducing you there.

We're not doing very well with the mic today; will you be able to hold it?
MR PERRY: Okay I've been asked back to give a presentation on something that's quite, been very helpful for my recovery from having a TBI, it's also something that's very like my previous life, because I have worked in Microsoft, so I use technology quite a lot. I found I'm using a lot more of technology now to help me, I would; previously to my TBI would have, I think the northern phrase I would have winged it a lot! I don't have that luxury now, I have to have use technology to get me through the day, so I put together a few slides, I think I have about 15 minutes to run through this, so thank you for your time.

So to give you a bit of background to this, I was cycling home from work last September and I managed to collide with the Luas, which I think is quite difficult, because it doesn't go off road; it's on a track, but I managed to run into it, that was less than 15 months ago. Of course I knew nothing about it, all I had at the time I thought was sore ribs when I woke up two weeks later.

But you can see on the slide there was a very serious accident and I think my appreciation for the accident has really only come about one year after the accident, so when I was a patient in the NRH I was very much like, I had to learn to walk again, there was a lot of sick people here, why am I here? So I have got more of an appreciation now. But I think that's very typical of after traumatic brain injury. You subconsciously minimise the issues that you have, I suppose from a sense of survival.

If you read on this there was quite a number of significant issues that I had to deal with initially, and I am continuing to deal with, and probably will for a very long time to come.

Apart from the major acute stage of the incident, which was broken ribs, a blood bag behind my collapsed lung, etcetera, the significant issue was the damage to the frontal lobes, which has had very significant and profound changes especially to my family I would say, but certainly for myself.

There has been certain personality changes, I would have been very quiet and reserved beforehand, I was quite giddy and excitable, I get a very low tolerance to stress and I'm not very good at around some memory issues, and organising myself. This is a very, very common

occurrence with people who have suffered a TBI and what I want to do in this talk is explore some of the uses of technology that have just enabled me to really just get through the day, it's not a magic wand, it's just something to enable you to have the capacity to do other stuff as well.

So this is just a big laundry list of things that have changed, shall we say! But if we go on to around the areas of memory and organisation, these have taken a major impact here and I certainly am aware of reductions in my ability for working memory and short-term memory. I can give an example, yesterday I was looking after the kids and I knew my youngest, Jess, told me she didn't have any homework, and it was a very good reason at the time, my wife asked me at half six why Jess didn't do her homework? I said she had a reason for not doing it, I have no clue what that reason was, but ... so that's just an example where I'm not concentrating, but I know something makes sense, but I can't really -- the actual reason why she didn't do her homework. It was a legitimate reason thank God!

It's an example of every day this happens, I will not be able to recall something that at the time I have said it's not really important, subconsciously and therefore it can surprise me, so I have that short-term and working memory issue.

I also have an issue around my long-term memory in terms of prospective memories, in terms of how do I organise myself around events, tasks, deadlines for completing things, etcetera? It's very, very different.

What has remained intact is what they call episodic memory and semantic memory is -- semantic memory is interesting, things I learned in college, which have absolutely no relevance for the real world, my example here I know what the mantle of the Earth is made of, that's no benefit at all to my life currently, but I still know that and I probably will until I pass on!

Episodic memory, I feel my life memories are strongly intact, my wife would sometimes worry that they are not, but I certainly feel, 2011 was lazy, but enough about that, I have regained memories of my children and their lives, something I didn't have this time last year and it was very scary, the fact that 11 years of their life had gone at the time. So that's come back, but procedural memory here, that's a very good one here, this is how to do things, like give a talk, or drive a car -- things that are quite high level in terms of execution, I have the ability to still do that, I'm not -- initially last January when I realised I had memory problems I would have said

that I had lack of confidence in my abilities, that I was not as so-called clever as I was, or knowledgeable as I was, but really it's particularly around these areas that, how do I organise myself? How do I plan for things? How do I get through the day? And technology is actually very, very helpful in doing this, and will come on to that now.

So there is this, I have got some techniques that I use and after this we'll go on to how that actually lands in the world of technology, I've kept it very much like -- this is technology that's accessible to everyone and is not, there is no cost barrier to anyone using it, so I think that's very, very important to state.

So being organised in myself does help my memory. It means that in researching this talk I came across the statistic that the average person can keep 7 things in their head at one time, plus or minus two, so if you're very good you have probably nine things in your head, every additional thing that you remember something else has to leave your memory.

When you've suffered a TBI, I'm talking myself here, that capacity to remember 7 things at one thing is not there. It's very, very reduced. So I need to be more organised and I need to write everything down at one time, and I need to write it down once and use it very often.

I have to have it in one place so I know where it is, and this means that things are available for you to get things done. And I use a calendar for most things and the calendar has reminders that automatically come up.

It puts in my daily tasks like my daily chores, chores in the morning might be thing that have to happen in the house to make sure things go smoothly, things like are the beds made, are the windows opened, etcetera? If I was to be relied on for these things to happen, it just wouldn't happen. So I have a reminder that comes up as chores, so I can check okay that's been done and that's done. It means it's done, I'm not stressing about it, I'm not picking up cognitive energy in trying to recall it, I know it will remind me at the appropriate time.

The bins go out on a Thursday morning, I have a reminder that are comes up and tells me at half eight on a Thursday, "put the bins out", it's very, very simple. But it's very, very essential to get through the day, to an activity for a member of the family, which is what I'm trying to be.

Appoint, everything going in my own calendar, it isn't on bits of papers or a notice board, it goes on my own personal calendar on my smartphone, and if I have a larger task I can break down that task into smaller bits, so I'll actually be able to complete that task, chunk it and then move on. So in theory that does enable me to be fairly confident in terms of remembering things, I'm not saying I am at a level which is acceptable, but it's a lot better than not using it shall we say, it's just being realistic.

If I'm talking to someone about things that have to happen and they tell me verbally, it will disappear, so I ask for a text message or an e-mail to be -- so I can follow up on it. And this even comes for my children, they tell me about their day or if they are doing a party in a few days time, I ask them to send me an e-mail or text so I can capture it and put it in my calendar, they are understanding of this situation, they realise this is just, it doesn't define me as such, it's just something that dad needs to remember to do something, otherwise it will not happen, so everything has to be written down for me and captured in some sort of system with the technology.

I also, it says there I have a cheat sheet, I have a file of important numbers that live on my phone, it might be pin numbers, it might be the address for Paypal, which is very important coming up to Christmas, it might be the password for the Amazon account, everything I might need is in this one file, and it's not scattered around the place, so I have access to it. So someone can ask me a question and I can access the information, I haven't captured it in my head because that's reduced capacity, but I know where it is kept and I put it there, keep a journal to record your progress.

This is in the literature, a big recommendation for people recovering from TBIs, so I do suggest that people recovering from TBIs do keep a journal, it's very, very revealing in terms of a thought you might have in August and then you read about it again in say November, you are going Wow, things have moved on, because after the initial eight months to 12 months of progress, which is dramatic shall we say, it becomes very incremental, so a journal is very useful in keeping track of your progress.

So I found that very useful. So how do I do that? Well the key here is keep it all in one place, it needs to be accessible anywhere I am at a certain time. I certainly rely on having a smartphone at all times, but it is linked, the information is linked via a cloud based computing system to a

computer, I have my own PCs at home I can access, but if I'm ever away, say visiting a relative, I can access that important notes file and be able to have that information to hand, so I have all the information, it can be accessed from anywhere I am.

It has to be easy to use or it won't be done. There has to be a payback from the effort required in capturing that thought, that there is a payback that that information is there, it's reliably captured, and it is available whenever one needs it, otherwise you won't use it or only use it half the time, you won't go get that reinforcing payback. So it's got to be really easy to use.

And the information has to be everywhere, so it's not actually device centric, it's not just on the phone, which is a very, very good reason. Because since August I've managed to lose two phones! Which wasn't very good. But I was able to know that the information I had captured for the last year was there and was available and I could even survive without a phone for two days by accessing it from a PC, and knew that when I got a new phone I could quickly synch to the information and be up and running again, so two phones in three months is fairly good going I think myself!

So what we do -- as you can imagine being a Microsoft person, we got a schematic here of, we have a laptop, a tablet PC and phone all linked to the Cloud, and this information is actually freely available and easy to access, all you need in this situation is a Hotmail ID and you have access to the Cloud through a system called Sky Drive, you can capture all your notes and it's automatically linked to your PCs and your phones, etcetera.

I'm sure that my colleagues that are on the Microsoft desk will actually take you through that if you're very interested, and show you how to do that, but it's not just Microsoft centric, there is other technologies out there, there is Gmail, there is Evernote, there is multiple systems available that you can use, so it's not very -- I'm not saying you have to use Microsoft or it doesn't work, I'm just saying there is stuff available, it's all available and it's all free to be honest.

But that thing I was saying about making it easy to use. I find my experience of using it, all the Microsoft systems at the one time; it just synchs seamlessly and makes my life easier.

So that's what I wanted to say, just take you through the recognition that memory is a huge issue for TBI recoverers. It's not that their knowledge is diminished always, but short-term memory

and planning is immensely difficult, so if you have any system that can take that cognitive effort and store it somewhere and have it accessible when you need to do it, that means your mind is freed up to do whatever, and to be present wherever you are at the one time, because I don't have, and this is very generic, I don't have that ability to keep the five or seven things in my head at one time. It's very much one thing at a time, so if you have things to remember, have them stored in a system that is accessible, you can then concentrate on one thing to concentrate on at the time.

With that I want to thank you for your time and giving me the opportunity, and if there is questions I'll happily answer them. If not, if you want a technical demonstration Microsoft have a desk here as well. Thank you.

MS HELD: Thank you very much Martin, that was great presentation, does anyone have any questions for Martin or any comments to make? No people are probably getting hungry at this stage!

Q. SPEAKER: Can I just ask you about the involvement of your family with your regime, regime is the wrong word. The pattern...

MR PERRY: Regime is a very good word, it has to be that thorough to work.

Q. SPEAKER: But will they be quite involved in assisting you with that?

MR PERRY: Yes, again they see the payback of using that system, so they do realise that it does work and it makes it easier for me, if it's captured, I can relax about it and then I can concentrate on whatever is happening at that one time.

MS HELD: Thank you very much Martin, I think that presentation shows another area and the breadth of using technology for whatever it is that you need to use it for to make life easier, and allow you to function independently, so thank you very much, and I know the presentation took time and commitment for you to do, so I really appreciate you doing that today, thanks Martin. Thank you.

So now it's just after 20 past 12 so we're actually running on time, which is great. The exhibiter stands are there, I'd like people to take the opportunity to have a look at the stands that are there. There is going to be a light lunch available, so the idea is to have something to eat, look at the stands, or have a look and then have something to eat in between, so there will be food and sandwiches and coffee and fruit available from now until, we'll come back about quarter to two, so this is a really good opportunity to have a look and a touchy feely time with some of the equipment out there, and we'll see you back here at quarter to two. So thank you everybody.

Luncheon adjournment

MS HELD: Okay, hi everybody, we'll get started now for the afternoon session, I'd like to welcome Pat Coffey from Dun Laoghaire/Rathdown County Council, Pat agreed to chair the afternoon session, and I suppose it's great to have that collaboration between ourselves and the Council at an event like this, so Pat's just going to introduce Brendan.

MR COFFEY: Thank you Lisa. Volunteered, I thought I was shanghai-ed actually!

Anyway, honestly I'm very honoured and privileged to be chairing this afternoon session for you. And indeed Dun Laoghaire/Rathdown County Council is very much encouraged by the news that the National Rehabilitation Hospital is due to have a new wing in the not too distant future, we look forward to collaborating with the development of that.

Anyway, in the meantime it gives me now pleasure to introduce Brendan Lennon to you, the senior manager with responsibility for access and advocacy with DeafHear, Brendan has a background in teaching and social care, he joined DeafHear 17 years ago, as a family support worker, and he has completed an MBA, the same as me thank you, good for you! In health service management and is presently senior manager in DeafHear, his present responsibility includes leading on access advocacy policy and research, so enjoy Brendan's presentation.

MR LENNON: Thanks Pat and if it's okay with you I'll hold this, I prefer to do that usually.

When I agreed with Lisa, I think it was a couple of months ago, that I do this presentation, I thought I had 20 minutes, but I found out to my joy, on my return from holidays, that I had 40 minutes, this is now thankfully been shrunk a little bit, I'm glad you enjoyed your lunch, and I had a few great chats during lunch, I hope you did too!

The first thing I have to do is make something of a confession, you probably gathered from what Pat already said about me that I don't know a lot about technology and I'm not an expert in technology and I have been preceded by people who have all kinds of expertise in technology and I'll be anteceded with more people from the NDA.

However, that said, I do know a little about what the technology is supposed to do in terms of particular people with hearing loss, and I also am of the view and I hope I convince you as well,

that in terms of people with hearing loss anyway, the use of assistive technology is hugely under utilised, that's the first thing I hope to convince you of.

Secondly, that not only is it hugely under utilised, that the consequences of that is significant for a significant number of individuals, quite a lot of people in fact, I hope to convince you.

Thirdly, that healthcare professionals, people like OTs and Public Health Nurses are key people in addressing that.

So that's my agenda, and if I go somewhere towards that today I'll be very happy, and hopefully I will have given you some useful information in the meantime as well.

So without any further ado, I'll move along some of these slides, I can just about operate PowerPoint! That's the grandiose title of my presentation.

Just to say a little bit about, very briefly about DeafHear, you can find out more about it on our website www.deafhear.ie to summarise what we are about and I think this will fit with some of the things I'm talking about later on, firstly we develop and provide services and supports directly to deaf and hard of hearing people and their families. Which in some respects might be slightly contrary to mainstreaming, but some of the services like information and stuff like that isn't necessarily widely available, and some other things, like for example, complex and specialist services like mental health for people who are congenitally deaf, and sign language users is a specialist area that's quite difficult to give people the same service in the mainstream setting, so we provide as I say, things from as basic as information, assistive technology, right across to some things like mental health services and social work and so on.

The second thing we do is try to encourage other people to provide accessible services to deaf and hard of hearing people, I'll say a little about that as well, that's obviously connected to things like awareness, people using and stepping up to their responsibilities.

And thirdly, we strive to make public and private sector organisations, and at large, more deaf aware.

The other thing that might be involved in that is, for example, just to let you know, is that one of

our biggest campaigns for the last, let's say five or seven years, was to get Newborn Hearing Screening established by the HSE, some of you may be aware of that some not, but in fact it's three quarters rolled out nationally over the last 18 months, by somebody managing that process who works in this organisation, as well I think, and that's been a huge achievement over the last 18 months to get every baby born in Dublin and in the south of the country, just remains to be done in the west, checked for hearing loss at birth, instead of being checked around nine months at a distraction test and often not being diagnosed until much later.

That's been our major campaign, that's another thing we do and we believe that has major positive impacts for deaf and hard of hearing people going forward.

Just a couple of comments that I want to make in terms of deafness and hearing loss, is that particularly people who are born deaf and who are sign language users, they don't see deafness as necessarily a problem, particularly people from the cultural background of deafness. It doesn't stop you doing anything, it doesn't stop you becoming a Professor, there are some people in the deaf community with PhDs and so on. It doesn't stop you driving a car, it doesn't -- it really doesn't stop you achieving anything in life that you want to achieve.

But of course there is an issue that makes doing all those things more difficult, that is communication. But the deaf person would not see themselves -- that's not their issue, they've got communication, if they are sign language users, if they have developed their language or whichever, speech or sign language, the issue is communicating with other people and other services. That's the barrier.

So that's how deafness impacts, particularly for people who are born deaf. I should qualify, I think it is nuanced differently for the number of people who become hard of hearing or deaf in later life, that is different, because you have been living your life with your family and so on and so forth, and as you get older you start to lose your hearing, so it's more difficult to operate, you can't turn around and do something like learn sign language, because nobody else around you will know it, so that's not a solution.

So it does become, it is a barrier for people, but there is a solution for most people who acquire a hearing loss and the solution is assistive technology, for most of them it's almost like the full solution. And certainly it's a major part of improving the quality of life of people with hearing

loss in later life.

So the next thing I want to do before I get on to my assistive technology part is to say a little bit about some facts about deafness. Because I think this is important if people are going to feel yeah I really need to pay more attention to the issue of hearing loss, in my work with the public.

Just over one child per thousand is born with a bilateral hearing loss, in fact it's as low as -- the estimate is 19 children per annum will be born with a profound hearing loss, and 19 children with a severe hearing loss and over 100 children with moderate or mild hearing loss.

Then during childhood the numbers of children with hearing loss doubles, and by the time you get to the 50s and 60s, and if you include the whole population, one in 7 people believe it or not, have a significant hearing loss, and I hope to convince you of that or show you a little more about that in a minute.

The hearing loss may range from mild to profound in terms of the level, and at this point I'm just going to say it is bad for your health if you've got a hearing loss, I'll tell you about that in a moment.

Let me go through the figures, I don't know if you can read those figures from where you may be sitting, but the first column of numbers, the first number is 467,897 and that is the number of people that we estimated have some kind of hearing loss who are aged over 50, based on the 2006 census, because I was just back from my holidays I didn't get time to do the 2011!

Now the number is based on prevalence rates established by Professor Davis in a study in the UK in 1995 for the prevalence of hearing loss in the UK population, and I believe somebody told me that we have slightly higher prevalence rates, or we're believed to have, based on some studies, but they are not scientific. So I think it's safe to say that figure is a reliable figure. And it's where the one in seven comes from when we include the people under 50 who have hearing loss.

Half of the people roughly have what's called a mild hearing loss, 190,000 almost have a moderate hearing loss, 30,000 with a severe hearing loss and 6,700 with profound.

If you look at people over 70 we'll see the numbers, there is less people around, there is a reason for that! But we know more and more people are living longer and you can see that the rates, 70% of people as opposed to 40% at 50 years of age, 70% have some form of hearing loss, also at the moderate and severe side it's much more prevalent, 2.7% of people over 50 have severe but by the time you're over 70 it's 6.3% of the population with a severe hearing loss.

So just to say a little about what those hearing losses might mean, this is what's called an audiogram, everybody familiar with an audiogram? Or should I say a little bit about it?

On the left there is the thing called DBs or decibels, which measure the loudness of sound, and on the bottom you've got numbers, which are Hertz and correspond to the frequency of sound. Now the best way of explaining this is to imagine that the bottom is the keyboard on the piano, and that as you come down the louder the sound is, so silence is up at the top, silence is measured at zero in terms of decibels but you can have below zero apparently, you can go right up to 140 decibels on that chart and 140 decibels would be a jet engine right at your eardrum, and you wouldn't last very long because it would blow your eardrum away, because of the pressure of the sound at that intensity.

So imagine the notes of the piano across the bottom, things like "D" or "B" those sounds are the low frequency, "A" and "Oo" are up near the middle, "S" is bit higher and "Th" those sounds are at the top end.

So it's more difficult to see this on the chart but you see something that looks vaguely like a banana, everybody see that? And that corresponds to the speech banana, as it's called, sounds of speech are in there, and over on the left side of the chart are the low frequency sounds, the B and Ds that I talked to you about, in the middle are sounds like "ch" and "sh" and over on the right are "s" and "th" you will see where it is in terms of the loudness of speech, speech can be as low as 20 or 30 at the edges in terms of sound and it can go up as high as about 60 decibels at the loudest. If I spoke quite loudly it might be up at 60, but of course even in this room, depending how far you are from the speaker, the intensity would reduce over the distance, but 60 decibels would be speaking very loudly, practically shouting.

Now this is where I want to go back, so remember the mild, moderate, severe; the profound. So if you've got a mild hearing loss, you are just tipping into the speech banana, you're not taking

anyway too much of it and typically those people will find difficulty, starting to notice that at certain times they can't catch what people are saying, certain times will be if you're in a pub or a place where there is a lot of people chattering and there is background noise, you just can't catch what people are saying, what did you say there? And you find you might even be leaning in to hear it a little more clearly. Another example would be if you're listening to teenage girls or in my case a couple of teenage daughters, I can't catch what they are saying half the time!

Moderate hearing loss, now you are chunking right into the speech banana so you're going to ask people to speak up. People are going to ask you why have you got the TV so loud? Because you're getting right into that speech banana, where it's not easy to hear what people are saying at normal levels, and you're getting into the territory if you are over 35 decibels, where you probably need something like a hearing aid to help you to function well during the day.

You'll see there when you talk about severe and profound you're obviously above the speech banana, so you won't be able to manage without having some sort of amplification, some sort of assistive technology to help you. If I was just, the last thing I will say on the charts, if I was to tell you that if you get hearing aids, all other things being equal, it gives you a boost of about 40 decibels, that's the best way of looking at it. So four bars on the chart.

So if you've got a profound hearing loss, that's 95 decibels, or more typically, even with the 40 decibel jump of hearing aids you're still in big trouble, because you're not getting yourself into that speech banana, that's why people who have profound hearing loss if they are born with a hearing loss, typically they are sign language users, and also people who acquire profound hearing losses in old age, they usually have great difficulty in communicating and they can often, obviously say what they need to say, that's all there, but they will have huge difficulty receiving auditory information and understanding it.

So I'll say one more thing just here, which we'll allude to a little later on. Often people don't just get a straight across hearing loss, typically in older age a lot of people get a hearing loss that can be plotted like this (indicates) and it drops off at the high frequencies. What that means is if you ask somebody, can you hear me? They'll say yeah, but you'll find can they understand you? That's a different matter. Because they can hear the low frequencies, no problem, but the high frequencies are what gives speech its intelligibility, its meaning, that's also worth bearing in mind, particularly if you're working with somebody, an older person sitting across from you, you

are in ideal conditions, no background noise or anything like that, you ask can you hear me, they'll say yes and probably can, but you'll find they might have huge difficulty at other times or if you are asking them more complex information they're going yeah, yeah, but not actually understanding you.

That's the end of the audiology lesson!

So before I go onto the technology, one more thing, one more area I want to talk about, that was the impact of hearing loss. I can go into lots of small studies that will tell you the education attainment of children with hearing loss, for example, is below the norm, and it is. That the employment rates of deaf people is below the norm, and it is. But I want to concentrate on some recent research, health stuff that's, I think, particularly dramatic.

We do know that studies show that one of the things that particularly acquired hearing loss does to people is that it results in social withdrawal and lack, a lower social rate of social participation, that's an Irish study I've quoted there, that among a group of older people with disabilities, the people with hearing loss, the older people are hearing loss were the lowest in terms of social participation. I should also point out that the most important thing that the older people said was important to them, the thing they said was most important in older age was contact with friends and family, so hearing loss, communication, social participation, connecting to friends and family, it's pretty much connected up.

A study -- that's a Japanese study actually, the only one that's out there in terms of measuring older people with hearing loss vis-à-vis their peers, their older peers and the people with hearing loss had 2.45 almost two and a half times the rate of depression in that study. And in another study, a large study in the States reported last year people with mild hearing loss had twice, almost twice the rate of dementia in older age as compared to the controlled hearing peers of the same age, three times the rate of dementia for moderate hearing loss and five times for severe hearing loss.

Remember I said hearing loss is bad for your health? That's the kind of stuff I meant. Now we also know from other research that if somebody acquires a hearing loss it's very gradual process, and we know that they wait on average ten years before they do anything about it. Now you'll know if you're struggling to read the newspaper or something like that, people are much more

inclined to go along and get their eyes checked, if you want to drive you have to do it anyway. And it's socially acceptable to get glasses and so on, but it's not as socially acceptable to people, in general among the wider population, to go and get hearing checked and maybe to have to wear hearing aids or something like that, it's seen to be much more obtrusive and so on and so forth.

With the result that people wait ten years on average, that means some people probably go after five years and some people go after 15. And if you go after 15 or even ten, or even five, you've already habituated your brain to less sound and you've got used to things being quieter and maybe you've even start to withdraw from some of the things you used to do where people are mumbling around you and you don't know what they are saying, so it's better to stay at home than go down to the pub and not know what they are saying.

I used to love going to the comedy or something like that, now I can't catch the jokes I just don't bother going. And so you get used to the lack of sound and the lack of social activity and so on. And then if eventually you do come to some watershed or somebody drags you along to get your hearing checked and you get hearing aids, it's much more difficult to adjust back to sound, which is not the same as your natural hearing. Hearing aids amplify everything, including that guy out there throwing things, do you hear him? The scaffolding, the word wouldn't come to me! But most of you wouldn't have been aware of that until I said it, because we naturally tune into the hearing voice or whatever, hearing aids don't, they tune into everything.

Having said that there are software programmes and they are much better the digital ones and do try to concentrate on the human voice, but it's still not natural hearing.

Half of all hearing loss is preventable. Remember those figures I gave you, quarter of a million people with a mild hearing loss and quarter of a million with greater than that, half of all that is preventable according to the World Health Organisation. So it's things like in the past people in industry and so on, in workplaces not wearing hearing protection, and at the moment some people still don't wear hearing protection even when it's given to them, but I think the main areas where people will damage their hearing is where people go around with their ear buds and iPods and so on at very loud levels and there is lots of research to show that particularly young people, but plenty of adults as well, are playing music at levels that are damaging their hearing.

Now I was going to say something about -- let's move on to some technology, which is what I

was here to talk about!

Assistive technology, it is critical in overcoming the barriers that arise due to communication, hearing aids are the one single most important piece of assistive technology for most people in terms of managing hearing loss. And we know if we use UK figures, we sell slightly less hearing aids, approximately per head of population, than the UK, and in the UK a study has estimated that one in three people who need hearing aids or would benefit from them have them, which means two in three who need them don't. That's the first piece of evidence I want to say about people, the use of assistive technology and hearing loss, that's it's under utilised.

Only one in three people who have hearing loss about 35 DB have hearing aids. I should say as well, in terms of new technology and how it's blossomed for deaf people, and hard of hearing people, things like e-mail, text, video streaming is huge, the potential of it is huge. Texting has brought, particularly the deaf community, into realtime for information, they used to have to go to the deaf club once a month or whatever it was, to get the local news, because that was the only way to get it, now it's texting, and isn't it 20 years ago this week that the first text message was sent.

When I started in DeafHear, it was then known as NAD, National Association for Deaf people, 17 years ago, the cutting edge, the very exciting piece of technology on the go at the time was a thing called the Video Caption Reader. It probably doesn't mean a lot to you, but at that time it was a huge thing for the deaf community, it meant that the certain video cassettes or films, if they had a certain icon on them, usually they have been produced in the States, it meant they had subtitles on them, and that if you bought a Video Caption Reader, which went on top of the video players, cost you a couple of hundred quid, you could watch a video with subtitles, 17 years ago that was cutting edge technology.

And as I'm going to demonstrate now I hope, that assistive technology is for deaf and hard of hearing people from the point of view of health and safety, communication, independence at home, in the workplace and so on and the wider community. It's very important. And beneficial. Here we go.

Just some things about technology we say, you have to make it loud, shake, flash and so on.

Here's the first one, how does a deaf or hard of hearing person wake up in the morning? They are not going to hear the alarm clock are they? Even if they use hearing aids and they hear during the day, they take them out at night. So the alarm clock might be a really loud one that bangs off at 60 decibels, that's me shouting, you don't want me to start doing that now to show you. They take out their hearing aids, they might hear that alarm clock at 10 or 15 decibels, at a whisper, so a whisper is not going to wake you in the morning is it? So it's a vibrating pad under your pillow, so when the alarm clock goes off, it vibrates and jumps you into life. It's a basic piece of equipment, nothing startling, but if you want to hold on to a job and you're deaf or hard of hearing, you're going to need one of these.

If you're a parent, how are you going to know if your child is awake or crying? You're going to need something that wakes you up. Same kind of principle.

I didn't pick these pictures! I keep looking at this guy meant to be at your front door; it's like some NAMA property he is trying to get into! The traditional, you can have things that flash on the table or indeed deaf, congenitally deaf people typically would have had their lights in their house wired into the doorbell, so when somebody pressed the doorbell and it was nighttime, and you had the lights on, the lights went off, and if it was daytime the lights came on, that's how they were alerted when somebody was at the door.

Smoke alarms and fire alarms, very important, and I won't digress because time is going on. But one of the things to remember for people who wear hearing aids is you might hear the normal, the standard smoke alarm during the day in your home, but when you take the hearing aids out at night will you hear it in the middle of the night? I won't give you the statistics about older people and fires and stuff, it's not nice.

I'm going to skip over that, because time is against us. I want to go on to technology, assistive technology for deaf and hard of hearing people in the wider environment. This is an example of a counter loop system, anybody heard of induction loops? That was the spooky bit earlier on.

They can be something like this, good example is railway stations, most railway stations, Iarnrod Eireann have counter loops installed; I'll tell you how they work in a second, that's the typical iconic sign for them. And this is more or less explaining how a loop system works, they are also very useful in conference centres and theatres and cinemas.

So basically the sound goes into a microphone, PA system, the sound is then changed into an electro-magnetic signal, which connects to a loop running around the room, which could be your living room, or this room, or the cinema, and then if the person must be wearing a hearing aid and it must have a tele-coil and they must turn their hearing aid to that tele-coil, which turns off the normal sound and means that the tele-coil receives the signal that has been sent around the wire, the electro-magnetic one, these technical people here will know what I'm saying no problem. Then the tele-coil in the hearing aid changes it around back into sound and it's in your ear.

What it means is that all the reverberation that would happen in a room with the sound bouncing off walls and all that kind of stuff, I was talking to some people about how bad the sound would have been outside there, because of all the hard surfaces and everybody talking, whirling around in the corridor, loads of noise reverberation, all that's removed. Now why don't I see if I can show you how that might work?

When I said I wasn't technical, this is the first time I've ever tried this!

(video)

Okay, do people get the difference there? And that is essentially what I mean about cutting out the background noise and all that kind of stuff, that's what's happening, the sound is basically going into the person's ear directly from the microphone, the other one, all the train and whatever sound is mixed in.

I should say there on the slide, I'm running along because I'm actually running out of time, that loop systems are now part of the Part M building regulations for public buildings, so they are meant to be in there, but of course they are not always turned on, they need people to know how they work, switch them on and use them and operate them and so on, that's also pretty important.

They are just people who are using their loop system at home, one person on the right watching TV with his loop system and he doesn't have the TV blaring, so the other person can enjoy it as well.

Very briefly this is an example of what we call remote interpreting from people who are sign language users and we believe it can be a big way to get people proper public services, access to it, because we can use video streaming and modern technology like that to have the interpreter remotely and the person, the service providers provide the service as the person is there.

Another example of how technology has moved on is text access to emergency services, which the Minister and the department launched earlier this year, things like subtitling, things like captioning in education in particular, and in other areas, but that Michelle and Shane are presently at here with us, things like DDoc and so on are all examples of where text and video streaming and stuff like that can make services accessible to, in particular, deaf people who are sign language users, but also to people who acquired hearing loss.

And when you make services accessible and involve people, then you reduce the social isolation, you increase the social participation and hopefully you have some positive impact on some of the other outcomes that I was talking about earlier on, in terms of depression, dementia and so on.

I'm conscious I have run out of time, I had a few other things to say, I had another video to show, but I can't do that, I just want to go to the last slide and to emphasise what I was saying, just there on the last moment, that assistive technology, it doesn't equal access, that's what my speech was meant to say, but it does mean it makes access possible. But people need to be aware that it's there and how to use it and to put it in place.

I was going to say in terms of emphasising earlier on, that deafness is not prominent enough in our thinking when we're dealing with the public, and I didn't say it, but I think I need to say it before I finish, some of the evidence for that was for example I mentioned how many people; 70% of people over 70 have a hearing loss. We receive very few referrals from people like Public Health Nurses or whatever who work with older people around assistive technology, that's one piece of research, anecdotal evidence really, but if I was to talk about, for example, the inspection reports by HIQUA for nursing homes, there's lots of talk about the importance of HR protocols, having the right people there, having washrooms and hygiene and infection control, there isn't one word I can find in any of the reports about how the nursing homes are managing the hearing loss of the people in their homes.

A number of my colleagues in the midlands visited four nursing homes recently, because we know there is a lot of people in there who have hearing losses, they also some of them have other issues as well. In the four nursing homes they visited, one resident was a known hearing aid user and the hearing aid was broken.

Now what I'm saying is this kind of evidence, I mean about assistive technology, for people with hearing loss being under utilised. I think it's about awareness, particularly among the professionals and the carers providing services to those people.

So to finish off, that's not actually a sign to ask you to give me a round of applause! That's the logo from our, part of our logo, and the sign for access in sign language. So I'd like to you hold on to that and to hopefully, if you're dealing with any people that have hearing loss in the future to bear that in mind, if we can be of any support and give you any information that you might need, and if you need to talk to somebody who knows a little more about the assistive technology we'll be happy to do that, okay thank you.

MR COFFEY: Wonderful presentation by Brendan there, thank you so much for all of that. Just as a little addition, I can sadly say in reflection my poor dad, he was 85 when he died, and we used to constantly go in there and ask him to turn down the telly because it was absolutely heard at the bottom of the street, and he would refuse point blank and say, if you want to listen to the telly you come in here, if you want to go play a football match go elsewhere, but he'd refuse point blank to say that he was ever deaf, never acknowledged it, and that was the case, we were never speaking loud enough, it wasn't that he couldn't hear.

So just something to bear in mind from your own relative's point of view as well as anything else, to try and encourage them to have a test done at an early stage when you see it happening. And it can make everybody's life so much more comfortable.

Now Lisa's going to go some techie stuff while I'm talking about that, interestingly enough by the way just as a little plug for Dun Laoghaire/Rathdown; we still have loop systems in all of our publicly accessible offices now.

And we'd like to think we're demonstrating that type of technology. Just before we introduce the next speakers, has anybody got questions for Brendan?

SPEAKER: Just from my experience with older people, the difficulty with hearing aids that are

available to medical card holders is that they are very often substandard, they are not necessarily always suitable, I find the majority of clients I deal with don't use them, because they find them uncomfortable or not actually working properly and also for older people who very often have an accompanying visual impairment, it's very tricky to change the batteries, to see how to use the volume controls, I think that -- I'm a hearing aid user myself, I go privately and the standards of the hearing aid available to me is far superior, because I can afford to access them, but a lot of people can't. I think that's the difficulty, that if you can't afford to access the best that's available, you are left with a hearing aid that is really not very suitable to the majority of older people using them and they can't actually change the volume, or see what they are doing, to change the batteries, it's a very pernickety, I don't know if there is any solution to that, but I think for older people who can't afford it, if there was some better system available to them, where they can access better technology or better hearing aids, it would be great for them.

MR LENNON: Two things briefly to respond to what Pat said about his dad. I can remember my grandmother being just like this, saying she was bothered, as she used to put it, in her 50s and I can remember in her 80s struggling to try and use a hearing aid. Now my own mother, her daughter, has hearing aids and wears two of them, but she got them at a much earlier age and earlier stage, which makes it easier to manage and so on.

I do agree that historically with the HSE and health boards previously there was an issue in terms of there were only analogue aids available, but in the last two years or so, digital hearing aids and good quality digital hearing aids to be honest are available in the HSE service and it's on the back of the Newborn Hearing Screening, the audiology, both paediatric and adult, have for the first time in many years, is getting investment, believe it or not in the HSE they are appointing more audiologists next year to improve and grow that service. And it also includes the technology being improved, so it's actually one of the things that has been neglected for many years, you have somebody on staff here who is driving that forward, and we are obviously thrilled that that's happening, because for many years exactly what you are saying was happening, but hopefully in the future people will get better hearing aids, but they need to get the two issues, they need to get them earlier and if they don't, and the hearing aids aren't suitable, they are too tricky to manage, the person is too elderly, it's something like listening devices and things like that, like the TV listening devices, you can get personal listening devices that are easier to manage, but just don't work all the time.

Q. SPEAKER: Just with the DeafHear, your association, do you have shops that people can access different devices or?

MR LENNON: We have resource centres and within the resource centres we would have assistive technology that people can buy or occasionally in the past, more so in the present, sometimes there is grants or the HSE might make, under their age and appliances, certain equipment, such as health and safety smoke alarms and so on, available to people, but certainly information and equipment is there to try it out.

Q. SPEAKER: Do you do hearing tests in some of them?

MR LENNON: In some we do hearing tests and in some we sell hearing aids privately to people, that's another day's work, but in the main I'm talking here about the other assistive technologies that help people get their daily business done.

MR COFFEY: Can we move on, any more? That's great. Okay it now gives me great pleasure to introduce two friends at this stage, I've worked with James and Neil so often at this stage I dare call them friends, as well as colleagues, although they operate out of the National Disability Authority we collaborate on a very regular basis in the public service.

So firstly I think you're going to work as a team, guys, is that the plan? So without any preference on whom I'm introducing first, I'll introduce James first; James Hubbard and you'll get from a moment, on his accent, that he is not necessarily a Dub, he is a senior design advisor products and services at the Centre for Excellence in Universal Design at the National Disability Authority, James is a specialist in Technology Education and in safety and risk control. He is a certified assistive technology professional and rehabilitation engineering technologist, get that if you don't mind! He is a consultant with the rehabilitation engineering and assistive technology society of North America, his 20 years of work in the field of technology and disability programmes at University of Wisconsin USA involve design and delivery of courses and training on Technology Education and assistive technology, he has developed and managed specialised assistive technology product design and development services, and adaptive mobility services programme and patented designs for universal workstations. At the Centre for Excellence in Universal Design he works with awareness programmes curriculum development, research projects and standards initiatives to promote and apply the benefits of universal design in the public and private sectors in Ireland. And he does other things as well!

Then Neil, just to give you a little background on Neil as well, Neil Murphy took up a post in the senior built environment advisor at the Centre of Excellence in Universal Design in October 2008. Part of Neil's role in the centre involves providing technical advice on universal design and the built environment, project managing research and promotion of universal design for the

built environment in Ireland. He is a graduate of Dublin Institute of Technology, Bolton Street, and Trinity College Dublin with an honours degree in -- I was going say agriculture! -- architecture, he also is a registered architect with the Royal Institute Architects of Ireland, Neil has worked on a wide variety of projects and commercial architecture in various Berlin and Dublin firms, as both project and site architect for 12 years, including winning an award for a boardwalk and river front amenity in 2007.

So may I introduce James Hubbard and Neil Murphy. So, come on guys the floor is all yours.
MR HUBBARD: Thanks so much Pat, can everyone hear me okay? We'll try to tighten that and see if it holds position, Pat thank you so much, that was a fairly long introduction -- I can fix that, it should be good now.

My name is James, I'm on the list there with the introduction, and just to get started, everybody can hear all right and we're able to see the screen? I think first of all we wanted to give you, thank you and appreciation for the invitation to come and talk about universal design here today, as part of your event, and also to just mention what we're intending to do here in our 30 minute slot is run quickly through 40 slides, I have 10, mostly image based, I have 10 to start out with and Neil will come up and share some information on the built environment and how the mainstream solutions in the built environment are making a significant difference in embedding some of the solutions that work here for these types of goals, then I'll wrap up with about 10 more slides in the end so we'll trade off that way through this.

So just to get started, our main message here today has to do with good design, easy to use designs, and the main message is as we take these kind of designs into the mainstream that we'll be able to see a macroeconomic result from good design solutions that are in many times, in most cases, in my career inspired very strongly by assistive technology needs, functional limitation, impairment related design briefs, that are creating these kind of design solutions, and most of you know the Oxo good grip story, that's won numerous awards great income for the company that produces these more usable type of products, so there is a cost benefit on this.

What we're showing here today is just some examples of that and how we're doing the work in Dublin at the National Disability Authority to preparing some guidance and research on that and so we'll get into that now.

First of all of course we always have to start with our definition and it comes from our 2005 Disability Act starting a centre on universal design in '07, in the legislation the universal design is defined so that it's a composition of designs and environment that can be accessed, understood and used, I put the important text in red, underlined the word "used" and the whole idea is about use and usability and it's about the age, size and ability, and this kind of range of users is where our focus area is on that. We do that work in these categories of built environment products and services, and information and communication systems, so we're working on standards, education initiatives and awareness initiatives.

So we'll show quite a few slides today that will show examples of guidance and standards that are being developed, examples of curriculum, our centre is operating about four years now and taking us three and four-years to get some significant materials completed and produced, because we're very concerned that we're operating some research projects that are putting the evidence behind the recommendations, and the guidance that we're making, so some examples of that.

Neil will come up and show numerous significant excellent examples of the development of guidance in the built environment area and this slide shows six images of just some good practice, best practice design features that make built environments much more easy to use by all people, including those with, involved with disabilities.

I'll be talking a bit more about products and services and examples shown on the screen here just following on from our hearing loss presentation, a speaker phone example that's providing extremely high quality sound output, which can make that bit of a difference for all users, to just make it much easier to use.

An example of just a conventional light bulb or lamp that doesn't need to be changed for ten years, we would call that a universal design, because changing lamps and light bulbs is difficult for all of us. Another example there of an embedded software feature to be able to adjust for colourblindness or colour adjuster and any kind of systems that you're using online. So those are examples.

You may be aware of some of the materials that are on our website related to guidance as posed regarding accessible websites, public access terminal kiosks like ATMs, ticketing machines, software, Telecom systems, recent publications on digital television equipment, so there is a lot

of development and work going on that and this presentation is to introduce to you some of these areas and also to kind of discuss how the area products, services and environments all need to be integrated as a system, a system of solutions that are all complimenting each other, and here we prepared a slide on the Luas system and we recognise that as a good practice example of products, services, built environment with features that just make it much easier for everyone to use. We often say don't we that good design should be invisible, we shouldn't really notice it, it's the complaints that, the barriers that we seem to recognise.

I used to teach my students some 20 years ago when we were beginning to talk about this and teach it in the States, we would -- often times say we're designing for the worst day of the year, or an individual's most challenging day of the year, and we wanted to come up with solutions that can help us stay up on the blue line. I don't know if we can see here the yellow and blue line, the World Health Organisation maps what's displayed here is a disability threshold, related to functional capacity so on the X axis horizontal is depicted our age from birth to death and vertically on this graph is depicted our functional capacity, this is one of those us and them messages.

Because at birth I may as well be classified and categorised as disabled, when I was born I needed attending, care and assistance, special feeding and changing, and you can see by my grey hair I'm getting pretty close to needing all of that soon again, so in my latter years I may need all of those same services. We used to teach 20 year old students that to stay in the centre part of independent functional ability we would say we were temporarily abled, because essentially we all take our turns at being below the disability threshold and these types of assistive technologies and universal designs, by their very definition, the very definition of technology is that which extends the human potential. And sometimes assistive technology it's more about equalising human potential.

We used to come up with solutions week after week after week and put them out in the field and it was quite interesting, particularly in work environments that some of the assistive technology solutions like you are offering some of the people you're working with end up enabling them above and beyond the capabilities of their peers. So then we run into trouble, because we're no longer equalised that way, and so what we're trying to do is it to keep us as functional in the mainstream and economically feasible as long as we can.

I slipped in here three slides that talk about recent research done by the National Disability Authority I thought it would be of interest to let you know, all of the information we're showing is on our websites, this research project was recently posted and uploaded to our website about assistive technology with objectives regarding what guidance can we develop now for future rollout of assistive technology in Ireland, and what's really needed?

And the research project mapped the different types of provision that were going on around Ireland then cross match to six other countries. The settings and/or the categories that that was done in was in the home, the community, everyday life, employment and then education.

Just quickly on that, it was also substructured and based on the national physical and sensory disability database, with subcategories related to mobility, orthotics, vision, hearing, communication, in the home and computer related things.

It results in some significant recommendations and I'm not getting into them, but just to point out the issues that it addressed, and all across the country the analysis was done to address and look into policy related to AT, the crossing -- public and private mix of provision was crossing settings in the life cycle, standards for service delivery, quality, available of AT expertise and need for training, education and training, information and awareness and user involvement and consumer choice, these kind of things, we hear them all of the time, just to let you know that there was a 2011 significant -- published in 2012 now, a significant piece of research, very robust, that lays this all out, so it's of importance, I wanted to mention it to you folks.

Before I turn over to Neil as a last slide from myself here, until you get me back! Just to mention that we are going to talk a bit more now about this universal design based on 7 principles and I also mention that our universal design 7 principles are underpinned by 29 guidelines, these are called design guidelines, we're defining the design and what we want to do is say that the 7 principles are listed as such, equitable use, essentially our first principle is about accessibility, and equality and economic equality, economic viability, so it makes a good design, like the Oxo Good Grip tools I showed you in the first slide, make economic sense to all of the stakeholders, everybody who uses them.

The second principle "flexibility" in use is about how the design offers different features and modes for us to interact with it. The third principle "simple and intuitive" is about the types of

functional capabilities that we have, able to work with a particular design, mental function, sensory functions, these kind of things.

The fourth one is focusing on "perception" and how the design offers an opportunity for us to hopefully work with two different modalities or two different channels and sensory functions that we have -- I stop there for a second too, I usually like to break this up, it was something I was promoting recently, just a bit of a puzzle or quiz for the day, I just stop a second and ask you to think about; you are all trained about -- this is coming up in some of the international standards work, we were all trained to know about the five senses, weren't we, when we were younger in school we all learned the five senses and I just have to give you a bit of a quiz or puzzle today to say that one of those five works in two directions, only one out of the five. So four only work in one direction, when we talk about designing for and with, and about, this is important. How do we see our function for hearing, taste and smell one direction, but our touch function is actually two direction and it breaks down into subcategories they call haptic and tactical, you may have heard of those, I found it interesting, that's what principle four is about, perception and how we interact.

Then the last three of them really get into working with other fields of practice, relative to safety, ergonomics, ergonomics for efficiency and effective designs and the last one size and space for use has to do with human body size and how we fit to our environment and then also about how our environment is built and fit to us and the range of diverse sizes we present in, that gives me a segue to turnover to Neil and ask him to come up and tell you about the built environment.

MR MURPHY: Good afternoon everyone, thanks Pat and Lisa and James. I'm going to take you all through my work in the centre, so I deal with the built environment side of universal design, I'll take you through the 7 principles and there will be lots of images just to help you visualise what we are on about, so the 7 principles of universal design were developed in 1997 by a working group of architects, product designers, engineers and environmental design researchers, they were led by the late Ronald Mace, a design pioneer, an internationally recognised architect in North Carolina State University. Is there anyone here in the audience with any visual difficulties just need to explain any of the images?

So principle 1 is equitable use, as James took us through, so we've two images here the design is useful and marketable to people with diverse abilities, you have an image of someone in a wheelchair using a tram similar to the Luas, but we try and do in the short term, it's difficult to

communicate universal design principles to the design community, they are catching up, it's part of our role, to show a parent with a stroller -- it's very difficult for people who don't interact with someone with a disability, but everyone knows someone who has a child or has wheeled luggage, so we use those images, if you can design a building that someone using wheeled luggage or a stroller can get into, someone in a wheelchair should be able to get into as well, obviously taking on board the width of corridors and doors.

Marketable, this is, let's not kid ourselves, universal design can also be quite mercenary, the more people you can actually sell or provide your goods or service to, the more money there is there. And money talks in the market-place. So obviously we try and do the design in such a way that it's nice design.

Principle 2, flexibility in use, the design accommodates a wide range of individual preferences and abilities. So we have an image of a young man using a workstation, this workstation can raise and lower so you can stand at the workstation, you might be a person of smaller stature or someone who is very tall and the chairs in the office just do not suit you, so it's not rocket science, it's pretty simple design to provide furniture that can be adjusted easily, and again on the whole trying to gain as much of the population as possible, right and left-handed scissors, again if you're making a scissors how hard is it to make a left-handed one as part of your production line?

So principle 3 then, I got this image myself when I bought this table from Ikea and everybody knows them, it doesn't matter where you are, what country you live in or where you have travelled. Ikea are successful, and this is one of the reasons why, there is no text in the instructions. Now obviously with people with visual difficulties there is a problem here, but for the rest of us who are going to assemble the furniture, as it says, use of the design is easy to understand, regardless of the user's experience, knowledge, language skills or current concentration level. So this instruction manual goes to every country in the world that Ikea is in, that's serious marketing and serious thought process in the whole design area, hence why they are so successful.

Principle 4 is perceptible information, so the design communicates information effectively to the user regardless of the ambient conditions, or the user's sensory abilities. These are images from an underground in Japan, I've never been to Japan, I'd like to visit, but one of the things is that

people who don't speak Japanese find it very difficult to get around, so the image on the left shows symbols for the various train stations, so you just need to point at that to someone from the locality, or just follow the symbol of your station and you find where you need to go, way finding is a major part of universal design and again on the image on the right you see the platform, it's lit in such a way that the opening of the train is lit brighter than the other areas, the platform is well lit, but if you are running for a train or a stranger to the city, you can find where to get on the train easily. For someone with visual difficulties that helps enormously, it's very difficult to be in a new city or new country and you're lost, these small details and ways of thinking about design help people enormously and it's right from the start. So when you think about designing this rail line or this station, you have to talk to the people that will be using it, that's something we're trying to educate in a lot of our designers in Ireland.

There is no point in spending hundreds of thousands of euro and hundreds of thousands of hours designing something and it's of no use to the people who will be using it.

So principle 5, tolerance for error, this is a huge one in my background, certainly in computer aided drawings; you start thinking you can do it in real life, because you use the command in -- so many times can you design, minimise hazards, and can it avoid adverse consequences of accidental or unintended actions? All of these are very important when you design a product, service or building, or a website.

Principle 6, low physical effort, the design can be used efficiently and comfortably and with minimum fatigue. Who wants to use an ATM or product or service or building and it's difficult. Most people here have been on the London underground, their ticket machines are a joke, they actually need staff, you've all seen the staff standing at the ticket machine helping people to actually get a ticket.

Now I can speak English and communicate easily, I find it difficult, so if someone has a form of disability, whatever it is, how do they find getting ticket? Even if you are from a foreign country, you are already, you have a disability because you can't speak English, as your native tongue. We have two images, a woman with a radio frequency identifier, which can find out information -- now she would be using a smartphone, so if she is in the station or anywhere, she can get information sent to her phone giving her directions where is the ticket machine, etcetera. And then again speaking about the kind of ticket machines, you have an image here of a young

woman using the machine easily and beside her is a person standing use the ticket machine. So the designers, what they have done, is hit the people that they need to hit, the people that will be using the train system. And you can see on the ground they have tactile surface indicators leading you to the actual ticket machine, even if you don't need them, you would follow the yellow brick road, you're following a design feature on the floor surface, so again it's just thought really, that's all it is.

Maybe the designers of the ticket machine spoke to people who use wheelchairs and people of smaller stature and said look what exactly is it you need for this machine?

The last principle is size and space for approach and use, so the appropriate size and space is provided for approach, reach, manipulation and use, regardless of the user's body size, posture or mobility. So we have again another image from the Namakuma line in Japan, you have someone using a wheelchair and someone walking through a ticket gate and the gate is designed, we have all come across the small ticket gates, you are in a rush and trying to get your ticket through and you get jammed inside the gate, so what this gate does is it's long, so when you are approaching it you just slide your ticket or your card along, so it gives, you don't break your stride while you do it.

So if you're thinking of hundreds of thousands of people using this line every day, if you're creating traffic jams then the system doesn't work, so again it's thought. And then you have an image of a tram similar to the Luas, if you've used the Luas it is certainly in my opinion a huge success story in terms of transport in Dublin, obviously if they linked them up in the first place that would have been great but you know ... I don't need to say any more.

So when they do link up we'll have a fantastic transportation system in Dublin and it works, why did you say it works? Because as James said, three is the magic number, there is built environment, ICT, you have got the apps, you have information online, when is the train arriving? You have the signage, I'm assuming that the Luas has facilities and apps for people with visual difficulties and hearing difficulty, I'd be surprised if they didn't because they are, certainly the company running it are doing a very good job in my opinion. Then you have the trams themselves, easy access, level entry, the stops well maintained; the only thing I would say about the Luas it's very difficult to read the screens on ticket dispensers and I can see perfectly clear, but when it's sunny I can't, and when you lean down to get your ticket it shouts in your ear

that your change is there, so I definitely advise them to maybe look at that again, so I'll just -- I'm nearly finished, but there are simple principles to universal design which relate to the whole built environment, very quickly; ease of use, that applies to everything that you are designing, it should be for everyone, whatever age, sex, state of health, ability or disability. It should be flexible and adaptable, they should always be into -- in the design from the start.

Again universal thinking right from the start and right in the heart of the design process, and an overall design concept, as well as a set of technical standards. As James said, until we start getting universal design standards in Ireland, and certainly the centre is punching well above its weight, there is only five of us in the centre, and James will tell you about a very important piece of standards work that he project managed and brought through in six months earlier this year, so it's when we have the standards that that will give us the ammunition to stand up to government and to industry and say to them, look this is what you need to be working towards.

So very quickly regarding my end of things in terms of design, I was working in private practice, this is the sort of toilet we would design for people with disabilities, it's not great, it's known as a document M pack, actually they are quite expensive, they were always an afterthought, stuck underneath stairs, or off reception, because there wasn't much education in designers; again part of our role in the centre is changing that, a lot of good designers are trying their best, but the information isn't there. It's not great is this.

I don't really need to talk about this, obliging people to have things they do not like or about which they have reservations, this is just dreadful. I have a certain awareness, my mum has MS, I have seen her going from walking to using a wheelchair, so certainly that was always in the back of my mind when I was designing in private practice.

So very quickly, age related limitations and what are the universal design responses? This will be taken across the whole spectrum of designing for universal design for people with disabilities. Bending and stretching, we all have to do it, so why not put in adjustable height wall mounted products. Again it's not rocket science; I've seen kitchens designed with fantastic shelf mechanisms where you can pull down the microwave and toaster, it's done seamlessly and easily.

People have the issues with hand and wrist dexterity, regardless if you have a disability, you

might have a sports injury, so lever operated taps and controls, also handy if you are cooking, if your hands are dirty, you can turn on the tap and you think why isn't it in every kitchen?

Visual acuity, so colour contrast and control at correct height. And safety, again thermostatic controls and slip resistant flooring, these apply to everybody, not just people with disability, so if every kitchen and every house in Ireland had this it would certainly be a better place to live, that's for sure, and make it easier to do things.

Here's the image, on the left you have the traditional medicalised model, on the right this image is courtesy of a fantastic interior designer, Alison Wright, whose website is there, Easy Living Home, she came and presented in 2009, her presentation is on our website, her bathrooms and kitchen, that's a Part M toilet she designed, it's all off the shelf, I'd rather have her WC pan there than the one on the left.

Again these are both Part M compliant, the one on the right is Alison's, again I'd prefer that than the Part M pack one, which is not good. She just used her imagination, just used off the shelf products, this is a mix of Armitage Shanks and whatever other company you can think of.

Again here is a universal design home bathroom, she designed this bathroom for a family with three kids and a dog, it's a wet room, if the kids come in and are muddy and the dogs are muddy she doesn't put them in the bath, she showers them on the space, so you have the floor drain, a heated under floor, it dries quickly, you have the bath if you want it, there is a space for leaning in and picking someone up, it's all about the fine detail and at the end of the bath you have a small space for someone to sit and help someone in.

All the sanitary ware is off the floor, WC pan and the sink, so it's easier to clean, you can use the shower hose on the bath there, you can shower the floor and again it's just imagination and this is what we're working towards, this is the -- we're doing design guides, I'll get to in a second, I thought I was finished maybe a little more.

The final on this section is home not hospital. It's very important to us in the centre that people are able to live in their homes for as long as possible. It's very difficult when people have to spend time in hospitals and care homes, we believe that as much as possible we should be designing to keep people in their homes, I think, I don't have the stats, I'd rather be in my home

if I was unwell.

I'll take you through, as James mentioned, I project managed the revision to the Building for Everyone, you might have been aware of, it was about 180 pages, the original iterations, there have been two, so then it was revised, I had the great good fortune of taking over the project, so it changes from 200 pages to 900 pages and ten books.

So it ranges from the external environment and approach, all the way down to planning and we have an index and terminology to help people navigate, it's all available to download for free from the website, they are accessible PDFs, there is the covers, nice and bright and colourful.

We have also a thing in the centre, if we are going to appeal to designers and also our work is for general public and government, if we are going to appeal to designers we have to look good, otherwise they will just ignore us.

Very quickly I'll show you what some of the books look like if you haven't seen them before, so I wanted lots of photographs and images, and also let's not just have the standard photos of someone in a wheelchair, it's just not appealing for people looking at it, even people using wheelchairs they want to see something different. So we have the high flying businessman here pushing the child in the stroller on the busy urban street, so he is using that, but someone in a wheelchair can use the space, and the image of the family, the kids, and the footpath is designed in a way to keep it in.

Lots of technical drawings, useful to everyone. It goes beyond Part M, goes beyond the minimum.

Again another example, lots of photos and colours, indicating again just referring to my colleague from DeafHear, we have the induction loops and sign for induction loop with the split level reception desk, it shows someone using a wheelchair, but a child could be using this desk, so or someone of smaller stature, so if you have designed, when you design a building you don't have to retrofit, again that's part of universal design, let's design it correctly and prevent retrofitting, because that costs.

So some images of what the booklets look like, each have a different colour, so all the chapter

and section headings have a colour band reflecting that. We have check-lists in every section, the green boxes there, you have the tick box, if you don't have time to go through everything you just look very quickly at the check-list and it should help you.

We did our best, there is a lot of information and some stuff is missed, we hope in future we'll pick up on that. That's what it looks like. If you want a hard copy please contact me, we just don't have the money to post it out, because it's about this size and we just don't have the budget. So contact me, we're in Clyde Road so it's hopefully accessible for people to pick it up and let me know.

I'm finishing up now, some work that we have, further work I'm involved in is we've just completed this piece of work with Trinity Haus, it's part of Trinity College, a construction research centre. They are doing fantastic work looking at universal design and sustainable design, they have a mix in there of architects and engineers, we have just completed this; it's available to download for free from the website, it's "Shared Spaces, Shared Surfaces and Home Zones; research and recommendations for Ireland", shared space is where pedestrians share urban spaces with traffic, you might have seen when you visit Europe, it's very common in Spain and France and Germany, but in Ireland we provide space, and pedestrians are an afterthought, we decided to do this and from this we'll do pilot studies with various local authorities in the new year.

Another one you may be interested in, we're near the end of this, we're doing draft guidelines, universal design homes for Ireland, so the purpose in producing these guidelines was to inspire people to think differently about better quality homes for everyone and assist in the design and delivery of universal design homes through practical guidelines, so why are we living in small homes that just do not work? We're hoping it will get a good reaction; it won't be out until the new year, we are doing work hopefully with housing agencies on doing a cost benefit analysis, as soon as we do the cost benefit analysis we can stand behind our piece of work and say actually this saves money in the long-term and it's good design. So keep an eye the website, no doubt Lisa and Pat will be on our mailing list, so we'll keep them updated with that.

Final pieces of work I'm involved in; we're looking at research recommendations and design guidance for dementia and home design in Ireland, looking at new build and retrofit homes from a universal design approach, we've nominated contractors for that, Trinity Haus and DS IDC, the

Dementia School of Information, I can't remember, in Trinity College, they are experts in design for dementia, again we looked at it why do we want our loved ones and family members in care homes? We want to design homes so they can stay in their own homes right from the start, and also we're looking at the carers who get forgotten, part of this research and design guidance will be looking at family members and carers, so hopefully that -- that will be taken in the new year, finished mid 2013.

Then we're just starting research on universal design educational campuses across the lifecycle, so that is going to be something similar to what's happening in Grange Gorman, Grange Gorman is -- DIT will eventually move out to a brand new campus just behind Smithfield, a lot of people in Dublin don't know where it is. It's about 5 or 10-minute walk from Smithfield. They will have a crèche, a primary school, also third level, all the DIT schools will move there, they are going to have adult education, so a lot of the campuses and school buildings in Ireland are empty in the evenings, why are we doing this? Why are we not centralising a lot of these facilities in the one space, it makes sense, cuts down on carbon footprint and road design, makes use of buildings that are empty, so again keep an eye for that.

UD homes cost benefit analysis will start before Christmas and then myself and James are both, James' research project finished, but mine is ongoing, we have a candidate, architect, who is looking at universal design rating system for buildings similar to the BER rating, so what we're hoping is every building you go into there will be a universal design rating in the future. This will impact on so many aspects of buildings in terms of rent and insurance -- so we're hoping business will stand up and listen to us on that.

So that's me. Thank you. I'm going to pass you over to James to finish up.

MR HUBBARD: Thank you. I've got about four more minutes just to show you a few of the other projects, I see a few people taking some notes on some of these amazing bits of work that Neil is leading out on, some of these things, as you can see they are very well done and provided, so they are easier to use hopefully and attractive for designers and other people involved with them. One of the ones that I had a chance to be involved with, and thanks to some of the folks in the room we'll even get on some of our committees to advise the developments of some of this work, but the first ever standard on universal design in the world in Ireland this spring and that is developed in response to a commission for energy regulators adopting legislation that all energy suppliers in Ireland would be producing universal design customer

communications in 2012.

So there are 7 energy suppliers in the country and 1.6 million customers, and what we did was to publish the minimum design requirements for best practice in written, verbal and web based communications, so that's all packed into that now and we're now putting together a toolkit for, like a cookbook on how to do that and make that work for the suppliers.

I mentioned earlier another piece of research that's just getting completed, and going up to our website beginning of the year, if you recall when we did the definition of universal design, it was our focus areas according to the Irish legislation, age, size, ability and disability, and there was always a question how does human body size impact on design and particularly on procurement? Because I say that how universal design is, this facility and everything else in the country, has a lot to do with what shows up in the containers, down to the documents, and who is filling and ordering things for those containers and do they really fit people? So we in the room here really can't trade shoes can we, but we're all using the same chairs, so it raises the question about the diversity of body size and how do we fit.

Another one; we're proud to announce that on the 8th of November, the Institute of Designers of Ireland Awards evening, first universal design award, and actually the young designer won the first national universal design award for a product called the comfy seat, and it's essentially a design for a new specialised, almost rehabilitation type of chair that's designed for a child involved with a disability, I don't know a lot of the details as much as I'd like to, some of you may even have advised that project.

A couple more projects you'll see on our website related to education initiatives, another research going on, product development research going on at Trinity. It turns out that that particular piece of research, I was able to manage that one and that resulted in defining and some research and uncovering some peer research results that have to do with comfort and/or pressure sensing, pressure management, something I have been involved with for almost 20 years, some of you are familiar with pressure mats and pressure sensing bits.

This brand new pretty secretive stuff over in Trinity we're involved in has been patented by Trinity, recently supported by Enterprise Ireland now for development, and that's significant and it also has impacted on the engineering curriculum at Trinity and we followed that with a need to

knowledge-model product development research, and how does universal design cross-map to product development for industrial designers and product designers? And Neil has already mentioned some of the building research that's going on.

Up on screen is an image of some work with Cambridge on developing a module for transition year in second level, to introduce this kind of thinking, so assistive technology, universal design and a lot of information on diversity and equality and accessibility, these kinds of messages introduced to second level students.

Just finishing a third level curriculum development project, trialled by six schools this past year at third level. A module to introduce universal design at first year, for designers, for architecture and for engineering and so that is -- that's being uploaded and produced and one of the bases for that curriculum is to work from a set of personas, who are the people using universal design? So we want to introduce you to the normals, so that's a set of personas that the work is focused on, and we're just finishing up a little bit of five minute animation to introduce the normals, and how there are some skits and scenarios to draw the attention and embed the message for first year and third level students.

So where do you find all of this stuff? Just hopefully default to common sense, universaldesign.ie, and you'll find information there of most all of the things we've presented here today, and we leave you with the last slide and challenge you with this food for thought message.

It took us 30,000 years to put wheels on our luggage, it means we can do this stuff, it's finally time to get around to it, the age of information is here, we can make these products go mainstream and build on assistive technology influence, so we'll stop with this and thanks for the time and the attention.

MR COFFEY: Okay, thanks James and thanks Neil, they are a great act together; I've worked with them before on this stuff, it's familiar to me, but in the same instance I'm always blown away with the stuff they are at, that website if you haven't had a look at it, universaldesign.ie is full of really interesting stuff. I could become nerdy about accessibility when it comes to this sort of stuff.

Anyway enough about that, just we're running a little bit tight on time, but we'd like to invite you

for a few questions before we break for a well deserved cup of tea or coffee or drink of water, has anybody got any questions for either Neil, James myself or anybody else? You're all struck dumb by the want for a drink of tay!

Okay, well Lisa is cracking the whip, I'm only verbalising what she is saying, it's not my rule but Lisa, you have five minutes for the cup of tea apparently. I tell you what that's better, bring it back then we can get cracking, that's a better plan altogether.

Coffee break

MR COFFEY: All right folks, we're going to get cracking again, we've got places to go, people to see and songs to sing and all sorts of things!

So it gives me great pleasure again now at this point, now that you're all sufficiently replenished, and tea'd up and ready to go, aren't we? Just about anyway. My first accessibility issue for me is to pronounce a name, Dino has already given me a grind on it maybe, I'll get it right, Christodoulou, almost there. He is prosthetics manager with POLAR, clinical operations manager with Ability Matters. Dino is a prosthetics manager for the POLAR programme, he has held this position from December 2010, coming from a background in private prosthetic and orthotic practice and non-governmental organisation experience in central Africa and South East Asia, now! Previous to this he was actively involved in private practice in Pretoria, South Africa.

His experience includes clinical practice and development work in developing training for developing world orthotic and prosthetic technicians, he is actively engaged in clinical services of the POLAR prosthetic department, as well as managerial aspects. Dino is the first part of this presentation.

Then we have Joey Herriott, an occupational therapist here at the NRH. Josephine is currently the acting senior occupational therapist for the prosthetic, orthotic and limb absence POLAR programme at the NRH. This role involves working with individuals, both upper and lower limb amputations/limb absence on both an inpatient and outpatient capacity. Josephine has been a keen interest in the integration of prosthetic and mainstream technology into everyday occupational therapy and practice, to increase client's participation in meaningful occupations.

Josephine graduated from the University of Limerick with an MSc in Occupational Therapy. Her research project explored the use of the Nintendo Wii, already I'm a fan, I beg your pardon, her research project explored the Nintendo Wii, as a therapeutic tool for occupational therapists.

And then as the third part of this presentation there is Sharon Byrne, a previous patient of NRH, and Sharon has come here today to discuss her experiences of using prosthetic technology. So folks, it's all over to you three.

MR CHRISTODOULOU: Hi, as was said my name is Dino, I'll stand at the corner because I need to operate the slide show over here. Basically this is a three part show that we'll do, we'll try to keep it fairly short for you as well. I'm going to speak about prosthetics and the application of technology involved in current prosthetic design and how we manage nowadays.

Basically to clarify what a prosthesis is, how they have progressed. Previously and in the past prosthesis were anything from a wooden stick, we progressed to literally wooden limbs to metal limbs, nowadays the infamous wooden peg leg we're all familiar from...

MR COFFEY: Long John Silver!

MR CHRISTODOULOU: We've moved on a little bit from those days, believe it or not there are still some places where people like wooden legs, I admit it's a skill I don't possess.

Basically, prosthetics today is anything from a simple aid to restore mobility to state-of-the-art devices where we use microprocessors and all sort of relatively exotic materials from carbon fibres and Kevlar in the device.

Also we've moved on from having to drag the leg along, to where it comes an integrated part or everyday use for the user; Sharon will give a little more elaboration on how she integrated her prosthesis, so we've moved on a little bit where it was the concept to, let's see if we can replace it, but you drag it along and technology has moved along, where we can actually now get a device that is an integral part of the person's everyday being as well.

What is a prosthesis? The reason I mention this, often there is a bit of confusion about what's a prosthesis and orthosis. Prosthesis is defined as a mechanical device that is used to replace the function of a limb after amputation of a limb. We get two main types of prosthesis, one that is functional and will be used as a replacement for the activity and the other would be a cosmetic limb, where it's main function is, as the name says, purely for cosmetic appearances, it doesn't

have any structural function to it.

What I'll look at, as well, is I'll describe, I won't go through exactly all the nuts and bolts in the prosthesis, I want to look at how I would apply the technology that I'm involved with into the development of the rehab side for prosthetic fitting.

Basically this is a brief summary of the rehabilitation team, at its core is the patient and our focus, whether myself, I look at more the mechanical side, or the other team members whether it's physio, occupational therapy, the other disciplines involved, psychology and that, we all focus on one thing, our patient, I use the word patient and client interchangeably as well. Yes, most important part here is the patient.

Basically we work in a multidisciplinary team, or MDT approach, the reason is it helps us get better outcomes and also we can plan things more constructively, more input from various team members means we can generally offer a better service and our expected goals and outcomes are improved.

Each potential patient is assessed individually by the MDT. The concept of the prosthesis, no two are identical, we might use a similar foot or similar shin shoe or silicone sleeve type of system, but each prosthesis is individually prescribed at the expected activity level where they are at that given stage.

Basically like I said it's a comprehensive approach and gives us useful expectation that we can work towards.

It also has an objective, often when we do the assessments and that each member of the team will come up with slightly different ideas and input and it's valuable when you come to design the prosthesis that myself, purely from a mechanical point of view, but I do value the input from the occupational therapist, from the physio and that, as well on what their expectations or things they would see, that -- it's not my field of expertise, so I draw on that experience and that expertise in the design of the prosthesis.

Basically I keep repeating myself on this, this is what we keep emphasising to everybody else, we look at it as a holistic approach to developing the rehab programme.

Rehabilitation from my side, and when we look at the POLAR programme it is not just me fitting a prosthesis, it is the rehabilitation doesn't start and end with "there we go there's a leg," that is just one factor to it. Developing the -- fitting the prosthesis is one aspect; we worked further towards taking that prosthesis and making it a functional device, integrating it into patient or user's life.

Like I said each prescription is unique for the expected activity level of the wearer, and this can change. Somebody can be a primary amputee, the first time they are on a prosthesis we put them at a lower activity level expectation, that doesn't mean to say they stay there. We review it constantly, as the prosthesis wearer develops skills and becomes more mobile, we constantly review and play catch-up as well, and should we have a patient that goes from just walking to start running and show the potential, we'll adapt and we'll work with them and review the case as necessary.

Things we look at when we look at trying to predict an activity level, we look at the physical ability, medical co-morbidities or conditions are also taken into account. One of the biggest causes of amputation we see currently is diabetes related complications, and often we have a trend here at the moment that we see in the NRH that we've been tracking for the past year and a half or so, we see significantly more above knee amputees than below, which is the pretty much bucking a lot of international trends, the reason is limb surgery has progressed so when they go to amputation stage the co-morbidities tend to be more complex, which increase the complexity of the patient we see, that has all sorts of other effects on how we plan the rehabilitation, and how we would go about applying the prosthesis and developing a rehabilitation plan for the patient.

Once again, each prosthesis is custom made to suit the patient's current needs. Believe it or not I regularly get a phone call; I was explaining to Joey earlier on, I had one late last week, somebody phoned up and wanted to discuss something about prosthesis and I was happy to take the call, it ended up their auntie lost her leg and they wanted to come and buy a leg for her for Christmas! We still get those and that's why I say, I have to stress each prosthesis is custom made for each user at that given stage, it's not take it off the shelf and there we go, let's give your auntie a leg for Christmas, it's a concept or misconception that we often have to try and explain and quite a bit later in the phone call eventually I think her niece understood what I was trying to

say, we'll probably see her in the new year for a full team assessment, and at this time they might understand the concept a little better.

Basically applying prosthetic technology, when we talk about prosthesis I'll talk about global fitting of the prosthesis, that's the main part to it, essentially the interface that we have between the patient and the prosthesis is what we call the socket. Whether it's above knee or below knee, essentially the socket is where we transfer the weight or load from the body into the mechanical device itself.

What we try to do generally is we are taking areas of the body that weren't really designed to take weight and pressure and we are making them take weight and pressure. There are various different techniques and socket designs to use, that's the nitty-gritty of it, but often what we do is we have to lock bone in position and work through soft tissue, there is a bit of art and science to it, it's an interesting blend of getting the two right.

So when we start with the prosthesis in the beginning, one thing I will often say to most of my patients is it will be a little uncomfortable, it takes a bit of practice and a bit of work, Joey will elaborate a little more, where we develop the skills, I look from a mechanical side of things and the rest, Joey looks from a functional side of things, physiotherapists do building up the strength and control and learning how to use the prosthesis itself.

The components we use as part of the prescription we look at when we're looking at building the prosthesis, paramount is safety, I'm not going to give somebody that is an above knee amputee already having problems with balance and that, I'm not going to put them on to a sports prosthesis, it might be lightweight and look fantastic, but it's not safe or not going to work. So often what we do is we would look at safety first and from there we start looking at the functionality factors that we build in, bearing in mind we need to make sure this design is safe to use, that the patient will have the ability to control it and use it correctly.

The materials that we use with the prosthesis, like I said earlier, componentry nowadays we've moved on from the wooden leg, even from metal leg, which over here we still see a fair number of patients, old longstanding patients, we have applied modern technology if a patient has been on a leg for 40 or 50 years and it's a metal leg, we're in the -- successfully going to be able to transfer modern technology, carbon fibres and Kevlars and things like that, we have to

understand where the limitations of the technology is and apply it appropriately.

As a student, I'm pretty sure most prosthetic students, we all come out of university with bright wonderful ideas of how we'll re-invent the world, we meet our first patient who's been on a leg many years, and try and fit them on the latest greatest socket design, only to discover three months down the road that this was not a good idea, it's learning how to apply the technology appropriately as well, it's a really, really important thing to look at.

When we do the prosthetic fitting, basically getting this prosthesis to work, how do we go about it? From the prosthetic point of view I'll talk briefly about what I will do with a fitting of the prosthesis to make sure it's ready for the whole rehab programme. Generally we do a preliminary fitting of a socket if necessary, depending on the type we use, we might do what we call a diagnostic socket, basically to make sure the interface between the body and the rest of the prosthesis is as good as we can possibly get it at a given stage.

We then move on to what we call the definitive socket, which is essentially that's the basis for the prosthesis, the foundation. Then we start looking at things like alignment and things like that as well, when we did the prosthesis the components we put on underneath, I need to make sure that at least the feet are pointing in the right direction and when the patient is walking or using it they are going one way and the leg going the other way or put the arm on and you try and control it and it goes there when you want the hand to close, so we look at alignment and things like that. With -- once we have that done we start involving the rest of the team and that's where the team effort comes into it.

What we normally do is I would work with OTs and physio and we do a joint review, I would get the input in getting primary fitting sorted out, and we will all be happy with that and then do a handover session, this is where the rest of the team comes in. My role sort of, I take a step back slightly, it's now we start getting onto the prosthesis, we need occupational therapy, physiotherapy those skills more involved, we still work and communicate on a daily basis with each other to ensure everything is progressing well.

Once again, the patient is the most important member of the team. If at any stage there are any issues that come up, we are all in contact with each other and should there be a problem with the prosthesis or the socket, we would normally be notified quickly and try and resolve the issues as

quickly as possible.

All working together really, really important from our side, we work as a team, we develop the prescription from the start as a team and work through all the way as a team.

Basically this is where I'll handover to Joe from an occupational therapy point of view.

MS HERRIOTT: So as occupational therapists we focus on participation in meaningful occupations, it's important to consider that occupations are all of the active processes of looking after ourselves and others, enjoying life, being socially and economically productive over the lifespan and in various contexts, these include but are not limited to: Work, leisure, self care, domestic and community activities.

So research suggests that engagement in valued activities is a key to life satisfaction. And there's a relationship between engagement in valued occupations and well-being and happiness.

So as an occupational therapist we can use models of practice to help us consider a patient or person holistically, and also for that person to identify what occupations or what activities are meaningful to them in their lives, and what are the most important goals for them to work on as part of their prosthetic rehabilitation.

Occupational therapists are continually urged to keep up to date with technological advancements and current day meaningful activities, and working in the area of prosthetic rehabilitation; this means prosthetic technology and also mainstream technology.

This range of technology is available for self care; I picked a few photos; you see my electric limb you can use for peeling a banana, then there is the alternative Dyson, a hearing aid, and a dressing station, which is not very technologically advanced but can be very useful.

This technology for the home -- I am just showing bilateral amputee, above knee, who using sea legs this means he can ascend and descend stairs with minimum effort and -- but then there is also other options for people who aren't suitable for that type of technology, such as a stair lift.

So some technology for work, again there is multi-articulating "my electric hand", where you can use single finger joints, there is water resistant functional prosthesis and then there is

non-prosthetic options such as Dragon Naturally Speaking dictation, where you don't need to use your upper limbs for typing.

Then it's important to consider a prosthesis is not just functional for some people, but also a means to, I don't know, some people might see the main function of a prosthesis in terms of their appearances, others as a tool of expression, maybe in common case.

Then there is technology for community participation and again I've used the bilateral sea legs as an example, because they are especially good on varied terrain. My electric arm, which allows someone to grasp and release and shake hands with someone they meet for the first time, here I have a powered chair, a non-prosthetic option for varied terrain.

And then again technology for leisure participation and I think everyone saw the Paralympics, the blades were quite popular and then there is custom made prosthesis that you can make for musical instruments, and I put in the bottom photo just to highlight that sometimes when technology isn't available, people still find ways to participate in meaningful activities.

So just three cases really to describe how we work as a team, one is unilateral amputee, doing a goal setting document with this patient, we realised his main goal of participation was to walk on the beach and Dino came up with prosthetic solution focusing on the componentry of the foot that allowed him to do that.

MR CHRISTODOULOU: Basically what we did was on the feedback from the team, the solution I put forward was we looked at something -- that a prosthesis that would be able to tolerate sea water, able to tolerate getting wet and at the same time still provide the optimal performance, so when we looked at componentry and I put it forward, I looked at carbon fibre based systems of the foot, it could handle the water, it could handle sea salt and materials we looked at using, it's titanium based structure inside and the socket itself was also carbon fibre based, all of this was trying to find the appropriate components and technology available to best suit this particular patient's need and he has actually done really well on it too.

MS HERRIOTT: The next is upper limb amputee; his main goal of participation was to keep up with schoolwork and fit in in the classroom. There was non-prosthetic solution in this case, the use of iPad in school with eBooks and then for homework she would use Dragon Voice Activation software to avoid overuse injuries to her remaining limb and also be able to do her work speedily.

And then cases three and four, same diagnosis, different people with different technological interventions and outcomes, one was a bilateral amputee and return to accessing her world through powered mobility and driving, she had co-morbidities, including arthritis, so we discussed that even putting on and off the prosthesis would be difficult for her using the mobility aid, so she decided at her age she would prefer to pursue the option of powered mobility. And Sharon here has come to describe her experience as a bilateral amputee, and she has gone down the prosthetic route to access her world so I'd like to hand over to Sharon now.

SHARON: Hi I'm Sharon, I'm a bilateral amputee since May this year. I was here first in 2010 when I lost my first leg and then lost my second leg in May this year. The whole team has been absolutely wonderful and fantastic to me. It has enabled me to get my life back, to do things I always wanted to do, that I continue doing before I was an amputee, I was very much into hill walking, walking every day, out in the car driving, just being very, very active. All of a sudden all of that was taken away from me, so I was determined to get my life back, through the NRH and the hard work of the team I did, but a lot of hard work on my part and on the team.

I set myself goals and so far to date I have achieved all my goals, obviously one of them being walking, back driving now the past two weeks, I'm back at home, Joey will laugh at this, hoovering, I wanted to be able to hoover! I have the technology -- I have a foot that adjusts, because I wanted to be able to wear my heels again, because I was big into fashion years ago, I'm now doing that, now not the real high ones obviously, but a good couple of inches I can manage.

So I'm back doing that. Just to say that with that technology my feet, my limbs, are slightly heavier than normal, purely because of the mechanism that's in the foot, but that will improve with time and all of that. I don't mind it, I've got used to it and, now it's not easy, it is hard work, but I'm determined to - I want to be up and walking, I want to be as active as possible and I'm doing that so far.

But as I said, hard work from the team and from myself as well. But it's been a wonderful experience. I never thought this time last year I'd be here, where I am now and doing the things that I wanted to do and I've achieved it so far.

My aim when I was leaving here, I left here about four weeks ago, was to walk out and I did. And I went from walking with the rollator on to crutches and I'm now on sticks, hopefully by

Christmas Day, I don't know if it will happen, but I hope to be on one stick. But as I said, I've a lot of hard work to do in the next two weeks now.

MR CHRISTODOULOU: Okay, that's basically it from our side.

MR COFFEY: For a guy that doesn't work in the hospital this is awe inspiring stuff to me, I'm just blown away by the technology that's there and that's available and to see you using it is, Sharon, you're an inspiration really, the determination is just the key to all of this it seems to me, if you've got the willpower and you've got the support of the people and the professionals around you, it's just about anything is achievable. It makes me proud to be part of being a public servant and being part of what we're trying to offer to the people that are in need.

So what more can we say. Has anybody got any questions they'd like to put to any part of the people that were presenting? All dumb struck again! You're all very quiet.

Okay, again it just remains to say thank you so much for an inspiring and very interesting presentation and particularly for me as a jock from out on the street so to speak, so see this sort of stuff is really inspiring. Thank you again.

Okay we're coming to the last presentation of the evening, as far as I know that is, this is the last presentation of the evening. A double act again? SPEAKER: We have a third party who wanted to remain anonymous.

MR COFFEY: Well I'll introduce Fiona first, I think I have got bio on Ciara as well, that's pretty good. Talk amongst yourselves while I read my notes okay!

Okay, right in front of me -- if I had brains I'd be dangerous. Anyway Fiona and Ciara are going to make a presentation to you now on the use of Apps and Fiona firstly is acting senior occupational therapist at the spinal cord system of care programme, here in the NRH again. Fiona qualified from Trinity College Dublin with a BSc in Occupational Therapy in 2008. She has worked at the National Rehabilitation Hospital since June 2008 completing rotations in the spinal cord system of care, brain injury and prosthetic, orthotic and limb absence rehabilitation programmes. Fiona worked as a rehabilitation coach at the Laura Ferguson trust in Auckland New Zealand, cool! Did you play any All Blacks while you were there? From August 2011 to October 2011 she is currently acting senior OT in the SCSC programme.

A keen area of interest for Fiona is access to technology for people with spinal cord injuries and

the use of mainstream technology as part of rehabilitation programmes. That's cool.

Anyway, then backing her up is Ciara. Ciara is a speech and language therapist -- Ciara Jones, speech and language therapist in NRH, a speech and language therapist, works with the brain injury programme, she worked with individuals with a wide range of communication impairments and has experience using assistive technology, low and high tech, and to support people with disabilities in accessing information in their world. Ciara graduated from the National University of Ireland in Galway with a Bachelor of Science in speech and language therapy, so ladies, it's over to you two.

MS MAYE: I know it's the end of the day, our brains are like sponges, so they are at maximum capacity for the day you'll be glad to hear it's a short presentation and a lot of it is very visual, if you can't see let me know, I'm not sure about the sound.

But if there are any questions I'll be happy to take any afterwards, so our presentation today is about Apps. So some of you may be familiar with them, others maybe not so much so. I use them, you may use them, and I also look at how maybe our clients can use them as well.

So first of all what kind of technologies are now on the market that we are using and wondered how did I ever do without these things? We're looking at smartphones and tablets, so you have the iPads and Galaxy, you have iPhone, Android phones. How can we make the most of technology?

As I mentioned before, how can we use our smartphones, how can we use our tablets to help us in our everyday routines? And we're going to look at different ways, so we use them for internet access, we use them for looking through photographs, when was the last time we printed off photographs? We use them as GPS, as our phones, for music and then we have all the various apps that are available, it's not just us that use our phones and our tablets for those, clients that are here at the NRH use them, I'm sure other people in the community use them plenty as well.

So what is an App? App is a short-term for application. It's a programme or set of programmes that are created to either improve existing functions of our phones or tablets and give us either useful or sometimes silly functions on our phones, but sometimes those silly functions can be quite entertaining.

Where can we get applications? We can either download it from the likes of Google Play for Androids and for iPhones you have App Store and iTunes.

First we'll look at input apps, I'll hand you over to Ciara for this part.

MS JONES: So input apps, I suppose how we actually access the smartphones, the iPads, so the first one we're looking at is gestures, so you can actually just use your finger to draw on letters with both of these applications here, so literally just say for Ciara if you are looking up me in your phone book, you literally gesture C on the screen and it will search every word in the contact list with C and it means that it's very, very accessible to basically anyone.

So then we'll look at how you access the tablets and phones with your voice, so I suppose the voice commands have really come into play over the last few years and I suppose most notable one is Siri, everyone was amazed by the technology when it came along, but there are other applications and programmes out there, which also allow you to access your phone or your iPad with your voice.

Then I heard Dragon mentioned lots of times today, so Dragon is fantastic voice recognition software, but there are lots of different text to speech programmes and applications out there. I suppose the one thing that Ivana has over it is that it's available in more languages than Dragon. ISpeak is a useful one, it actually translates so you can translate from English to Polish and then speak it, so it might be very useful for anyone travelling, I've definitely found it useful with patients here. It's not a replacement for having a translator or interpreter in the session, but definitely very useful.

And then this is just a little video then that will show you how to use the very basic speak function on your iPhone.

(video)

So that's available on all the iPhones, I'm more familiar with the Apple technology, there are lots of really useful accessible functions on all of the phones and all of the tablets, so I suppose it's just about exploring what you have there.

Also if you go into the accessibility features there, there is the voiceover, I'm not sure if you

heard about that already today, you can switch on the voiceover and that will read out everything that's on your screen, so if you click on calendar it will tell you what calendar is, so really useful for anyone with difficulty with reading or also difficulties with vision, so just I suppose the key thing to take away from that is look at the accessibility functions that are there. I'll handover to Fiona again.

MS MAYE: Now I'll look at the different types of keyboards available to access the phones and tablets as well, most people are familiar with predictive text and that's where it predicts what you are about to write and you can choose perhaps the word or two words you are about to write before you have even finished what you are doing. Then the next thing we look at is swipe type characters.

(video)

This is just another type of keyboard and how you would use Swype using the keyboard. I think you have all seen a lot of Dragon today and you know how it works, this is the same thing, talking and it writing what you are saying.

Other types of keyboards are looking at cells, so if you have difficulty coordinating movements just to get more space between the letters so you can hit them and in the other letters, you can separate keyboards so you can have them on outer parts of the keyboard, two different versions, one up higher and lower, so you can still see the text in between. Then of course we have switch access, so this is just one version of switch access that we have here, and I know if you were walking around the exhibitions today you would have seen Andrew and Marie at the stand where are -- there were different types of mounts and switches where you could access different types of technology.

So I might talk through this video, it might be difficult it hear, she is going to show how she is accessing some of the books that she has on her phone using a switch and she is using a head switch.

(video)

So you can see along the bottom it's scanning through different functions and she clicked into the book. So she just uses the switch to hit when she wants to use the different functions, so at the

minute she is going to try and turn the page. So it's going over and back, if it disappears from the bottom of the screen she has to hit the switch again and it activates again. Okay.

So next type, the Housemate, I'm sure it was out there today, and it's Bluetooth activated and it basically changes, it's an App called Click To Phone and you can download Click To Phone and it changes how your phone, the screen on it, so you can scan down through various functions, you'll see it work now in a moment. And again it can be mounted in different ways. Basically you have to set it up for someone, so you have to choose, I don't know if you know input methods on the phone, it will ask input type, it says input type at the top you can see Click To Phone and you'll see how the phone changes, how the phone looks, so there is the various functions that are now available on your phone through Switch Access, so not only using different applications, but there is where it says Housemate you can actually, if you have -- it's possible to turn on and off lights, if you have Bluetooth activation or listening to music, turning off radio, TV and the rest of those.

So we'll go onto the next video and show it in use, again similar to what the girl was doing before with her book, you can pick out music, play music using the same type of scanning system. And in order -- you don't need to go and manually update, updates are sent to you and you just update it when the new version comes along, you don't have to pay for the updates or new technology, you get it through the update on your phone.

I can't be responsible for the music selection on the phone! But you can change the type of music you're listening to, the volume on the phone, you can look through pictures, you can go to websites, that's just looking through pictures -- and scanning, I don't know if it was talked about earlier, when someone starts out the scanning can be slow, as someone becomes familiar with it it can get faster, the more you become familiar with scanning the quicker you get at it, in the beginning it can be laborious and frustrating, but if you're determined you'll get there.

Okay we'll go onto the next one maybe. So now we'll look at the entertainment applications out there, so I think we're all familiar with e-mails and how we use those. There is lots of different types of messaging out there, the most popular at the moment is Viber. What's App, also a voice activated one Voxer, but it's personal choice really, you may know more than others when myself and Ciara sat down together she came up with Apps I knew nothing about, it's very good to go onto the applications stores and look at what's available and what really is useful for you.

So there we had Skype and Facetime for using the phone, we have social networking sites and again how did we ever do without these before, Twitter and Facebook, and Linked In is a very popular one at the minute, YouTube for videoing, different types of streaming for TV, a number of channels not only from our own country, but from other countries as well. We've got lots of different archives, so I don't know if people are familiar with Netflix, that's an archive of DVDs that you can use.

And then we have audio, so back to Ciara for this bit.

MS JONES: We'll make you dizzy switching over and back. So we'll look at different audio options, so search is familiar with digital radio and it means that you can listen to radio stations from all over the world, but also travel all over the world and listen to radio stations here in Ireland. So they are just some of the ones that are there. So again I think everyone is familiar with podcasts and that can be really useful, educationally if you're -- if there is something topical that you think a patient might be interested in.

Digital books I think have really come a long way in the last little while, you can now get digital books from libraries, so Dun Laoghaire/Rathdown is there. Then the Kindle; I think everyone is familiar with that word at this stage, that's very popular again at the minute, not alone the device itself, Kobo is another example, but you can also download Apps for the phone and again this is an example of all the different ways that you can access information now at the minute, so iPhone apps, but for all the phones and tablets you can get the recipes, there is the online stores, there is basically the papers, so it just means it's very easy to access information.

Audio books, here are two examples again, there are lots of free books out there, they are, particularly audio books, there were thousands of free books either to stream or download and audible as well. Again audio books might be just a little easier for people with difficulty reading, if you don't want to concentrate even it might be easier to listen.

So communication and memory then, so Marie talked earlier on about AAC, I won't go into it too much, these are some examples of the Apps out there and the ones we use quite often, so Grid Player, Predictable and then moving on to Proloquo 2 Go, there are also lots of free apps, not as good as the expensive ones, but they can be really useful in simple communication devices, yes/no ones just giving people choices more than anything else, so just worth playing

around with ones that are free and looking at the more expensive ones.

There are lots of therapy apps; I know Marie was going to cover that earlier on as well, I definitely found going onto the stores was really helpful and just Google exactly what you want and a range of things will come up, so some examples, Brain Challenge, so there are lots out there, it's just about playing what's right for your patient and what you enjoy.

Memory aids; it was great to hear Martin talking about how he uses technology to help with organisation and memory, he mentioned Evernote, but voice memos, a lot of these things are part and parcel of the devices, so it's about making use of them, some nice visual schedule planner, get the right one for the right person and that's what it's all about, it's only going to increase with time, there will be more and more. Calendars, we are all familiar with those and some of the medication remainders can be really useful, again there are lots of different ones, so it's just playing around with what suits the person you're working with and yourself.

MS MAYE: Apps are very, very useful and there is just a few others out there that you might consider, or ones that maybe we're using here at the minute, you have talked about diabetes management, looking at how you control what you're eating, when you take your test in the morning, maybe inputting them, you can show to the nurse rather than writing them down.

You've got emergency information, if anything happens to you, are you on medications? Is there precautions people need to take, to put on the phone? I know in our stress management service we are using the relaxation apps, we have Silver Relax and we have Relax Light as examples, but again it's very stressful times we are living in and something you can pop on for ten minutes and just take time out for yourself, very easily found on those app stores.

Then useful information as well, so we just found that this is an example of trying to find wheelchair accessible parking spots in certain areas, you can download apps for that and the name of one of them is Wheel Mate, it not only looks at wheelchair accessible parking spaces, but wheelchair accessible toilets and hotels, loads of different options once you go onto the application to just pick and choose the area you are in, what you're looking for.

And again finally we have games which can be lots of fun, and they can be used in a therapeutic way as well, people are probably very familiar with the Angry Birds and find sometimes they have taken over their lives what have I done for the last hour except play this game, but it can be

very useful, I've used it with people who have maybe difficulty with upper limb coordination and getting them to do that movement and it can be entertaining and motivating rather than sitting there and moving a peg from one point to another, it's functional, useful and entertaining, that's what we want to make, they are people as well.

That's pretty much the end of the presentation; I hope it was of some use for you. What I would encourage is that you look at what would be useful for you or the people that you're working with, by going on to the iStores or going onto the Google Play, look at the various apps, Ciara made a great suggestion of just Googling what it is you're looking for and they rate what you get, they rate how good it is, and there is also professional bodies that recommend certain things, so if you're not sure about whether it would be suitable or not. Right so that's it, all over.

MR COFFEY: Well done ladies, as they say there's an App for that!

Well we've come more or less to the end of your session, it's been a long day for you, I was only here for the afternoon session, but in the afternoon we started off with Brendan from DeafHear giving us some insights and useful tips on how to engage with and preparing for the options of hearing loss or hearing impairment, and how that can be identified and how you as carers or parents or siblings can introduce the concept that somebody might be going through a hearing loss experience. But it's not the end of the Earth, there are interventions that can be put in place to make a life very liveable indeed for somebody who might be suffering from a hearing loss.

Then we managed to have James and Neil from the NDA come in and talk to us about universal design and exciting stuff that's happening there and how they are driving the accessibility agenda, and the design agenda particularly that they are now considering the accessibility issue, it just doesn't have to look good, it has to function really, really well and it has to function really, really well for everybody that's going to use it, and for all types of users, so the accessibility agenda is really high on the design side of stuff.

Then after that we came with Dino and Josephine and Sharon, they gave us a fantastic demonstration about prosthetics and orthotics, forgive me I'm not a medical person so these words absolutely do not trip off my tongue the same way they do off you guys!

And then Ciara and Fiona came along and gave us detailed stuff with Apps. It's exciting times we're living in folks, in every respect, I know you are going to go home and want to watch the

news about all sorts of nonsense and budgets, hey, who cares, we're still going to be here tomorrow and you're going to still be doing the same stuff and people are still going to need yourself and if it's technology that's out there and getting more and more exciting, in every respect, the Apps respect, the prosthetics respect, the design respect, we're at the cutting edge and we can be really excited about and be motivated, because I think there is still lots to be done.

After that, Lisa do you want to just some final remarks?

MS HELD: I won't keep you, because it's late, I know and people are getting tired. Just to say thank you so much to everybody for coming and thank you to all the speakers as well, it's our first ever event as the accessibility committee, and I suppose working in terms of promoting accessibility, and I think the theme of technology has been a really interesting one for us, there is a lot out there and there is a lot more to do in terms of joining the dots together for service users, and I think we need to work together to promote the area of technology and accessing it, but also work with people like the NDA and with HSE to highlight the issue of technology, and really that's its there and it's growing and it's there to be used and it will make our job easier as providers, and it will obviously make service users lives easier. So try to really work in terms of how we're going to make assistive technology and providing a service for assistive technology accessible for people.

And that's I think going to be the challenge over the next few years. So thank you everybody for coming, I have some feedback forms for you to fill in, I'd be really grateful if you could do it, short and sweet, but we really want to get your feedback in terms of improving and hopefully we'll be able to host an event next year and your ideas would be really helpful for that.

So thanks again everybody, and thanks Pat for chairing the afternoon session. Safe home, thank you. Bye-bye.

Event concluded

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