We want to talk about artificial intelligence. I saw a talk in February about this and I realised that there's a very broad picture we need to paint of what's happening with artificial intelligence as the next generation technologies. Things are already happening but it is clearly growing in terms of how it is used. But also, in particular, some of the thorny questions inside how it is going to be implemented and who is doing what. We have got a great panel here. I would like to invite Abi, Reema, Sarah, Anja and Christopher. Would you like to join me on stage? We are going to learn more about what machine learning is but also some of the challenges about how it will bring bias against disabled people if we don't understand and use it properly.

Over to Abi. Are you happy doing the Slido?

ABI: This is a really interesting panel to host. I'm sure there will be lots of interesting questions today. We all know, we all hear about AI in our mainstream technology and those of you in the assistive technology world, we know there have been great products and innovations using assistive technology. But there have been a few murmurings in the mainstream press, when we hear fake news about the potential down sides of AI. What we are going to do is to look at what that means for accessibility. How to ensure -- after hearing the great talk, about inclusive design, how do we ensure that with this runaway train of AI, potentially taking over employment opportunities and technology, that we ensure it is inclusive from day one. I will ask the panel, who I know have lots of ideas and thoughts. I know you will have questions, for them to introduce themselves. Reema?

REEMA: I'm Reema Patel from the Ada Lovelace Institute. Ada is a relatively new organisation. We are established in order to ensure that data and AI work for people and society. We are very interested in the social and the ethical implications of the use of data and AI. I'm the Head of Public Engagement at the Ada Lovelace Institute. So, as part of that inclusion, it is essential for a conversation about ethics.

ABI: When you say ethics, what are the general areas of ethics, talking about AI?

REEMA: If I come to the conversation about ethics as part of my response but I think there is a really important point, which is the term "ethics" has become contested this year. It is really important, so one of the things that I think is really important is that we move beyond what has been described as ethics washing by academics and thinkers and ethics shopping with a list of perhaps. For me it is about the responsiveness and the inclusiveness perspective, and I like to see ethics as a muscle, that practices behaviours that are embedded in the way that companies and organisations operate.

ABI: That is moving on, now to the companies. Sarah, can you introduce yourself?

SARAH: I'm Sarah Herrlinger, the Director of Global Policy and Initiatives at Apple. I look at accessibility across all we do as a company from the 30,000-feet level. So in relevance to this, it is looking at how we as a company incorporate AI and ML into what we do and ensuring that as teams across Apple are working in the area, that there is a thoughtfulness in ensuring that accessibility is part of the conversation and we build in a way that supports all of our users.

CHRISTOPHER: I'm Christopher Patnoe, the Lead Programmes Developer at Google. Google is known for AI in the processing. We have been leaning in the past year in terms of bringing novel and unique tools to help people with disabilities. We recently released Live Transcribe to read 70 different languages to read real-time we have captions and languages, and the core is how to build accessibility into thing.

Chrome has the ability to create alt text for images, similar to iOS as well. So, leaning into the AI space it gives us the opportunity to help a lot of people but it opens up a bunch of questions, how is the best way to create the best experience, what is the most ethical way, how to you reduce biasness.

ANJA: I'm Anja Thieme. I am based in Cambridge. I have worked on inclusive technology design projects; one is a physical programming language for children who may be blind or with low vision so that they can learn how to code and do it together with other children so they are not excluded from learning. Also, on computer technology with people with a visual impairment, thinking how it can help them enlarge and understand their surroundings, which is similar to the features in IS, it is a popular app amongst the blind community. A lot of what we do is thinking about how to work closely with people were different communities and groups and abilities in designs of these types of technologies, if it is AI or any other technology, that is really at the heart of what we do.

ABI: Please post your questions on Slido but I will ask -- first of all, I will ask Sarah, can you think with accessibility and the potential going forward, we have heard of some of the applications already in accessibility but where from a technology development point of view of view there are benefits of AI before going into the ethical side?

SARAH: There are so many different ways to think about using AI, how it applies for individuals with disabilities and where it may be even more important in that case. In the simplest level if you think about a photo app as Christopher was saying, for those of us who are sighted who type in “show me photos of cats”, that can be one thing for someone reliant solely on the audible information that comes back about what is in the specific photo, that can be much more important. So, I think as we look at AI, how we continue to build on gathering data, and using that data in order to provide, hopefully, helpful information to people, it is important to make sure we are doing it in a way that is thoughtful in that approach.

ABI: In terms of talking there about data gathering, Reema can you talk about the ethical areas that can be inclusive, when talking about gathering data and AI?

REEMA: Sorry, I need to understand the question a bit better.

ABI: When we are talking about the need to gather data as part of AI, is there ethical considerations we need to look out for?

REEMA: Very much so, the key fundamental is that most AI machine learning systems are data driven. So, we think about the conditions for machine learning as effectively large data sets often gathered and used, interpreted and analysed in order to make decisions about people, groups of people or offer particular products or a particular service. That, of course, raises a range of ethical questions which are well-known but I will talk about them.

There is the age-old chestnut of privacy and the trade-offs and whether there are indeed any trade-offs. So, people often share information about themselves when accessing tools and apps, and may not necessarily realise the level and the granularity of the information that they are sharing in order to access a tool or an app. There is a particular concern.

To keep it concise, there is also a concern particularly around surveillance and the extent to which the data about them is being used for other purposes. In relation to disabled people in particular, to keep it concise, I think what is important is a particular concern that if one is disabled and you use technology more often or are more likely to use technology or interface with a public service that uses technology, there may be more data that is being gathered that may raise particular ethical concerns.

This is something that in the States, Virginia Eubanks has written about extensively, the nature of the relationship between people who use that technology and the data-driven world, there are challenges and considerations that need to be thought about.

ABI: It has touched on a question from the audience, should machine learning tools attempt to identify individuals who are using technology? Sarah and Christopher, do you have a view on that.

CHRISTOPHER: I can see both sides of the argument. If we were able to determine if someone had a need for assistive technology, and they don't know about, it would be helpful for us to disclose in real-time, did you know you could have a manage any fire in your operating system but we don't want people to be "tracked" or have people identified and then create a sort of situation where we are targeting you because of a disability. So being able to understand what someone needs and doing it in a private way to allow them to learn more about the technology, it gives an opportunity to have a better experience using the technology is useful. But you don't want them to have, or to have a browser tag, to say that this is a person using a screen reader, you are creating a separate experience for that, that is separate but an equal situation that we want to avoid.

ABI: That is a particular issue. I wanted to ask Anja in terms of experience with developing products and services with people with inclusive needs, do you see how we can take those methodologies and apply it to AI to improve AI in any way?

ANJA: Which kinds of methodologies are you thinking about?

ABI: The techniques used around, services for coding for blind children and such like?

ANJA: The coding application is not using AI but there is a lot of things that we are thinking about, and how we are addressing certain biases or risks around discrimination and exclusion. First and foremost, really hoping the development teams understand more that bias is an issue and helping to raise awareness of the potential implications it can have. If you don't consider it in the data sets you use for machine learning or AI applications how it helps people to understand or give them the tools to look for, to understand that maybe the data set is homogeneous and may not have the diversity of behaviours and the physical appearance that certain groups represent and can lead to issues.

Take a face recognition app that may not detect someone properly as they could have a condition of Down's Syndrome. If you have not included this diversity in the data sets you cannot provide the functionality. Risks come with it, two people with disabilities, there are many examples of failure cases that could be imagined or actual failure cases that we can learn a lot from. A good example may be the Uber self-driving car accident in Arizona. A woman was wheeling a bike to cross the street. Unfortunately, that self-driving car was unable to make sense of the unknown object that was there as it could not detect the person as there were wheels. That raises the question, well, you know, what if the person that was crossing there was a wheelchair-user?

Have these scenarios been considered in how the technology is developed, is that part of the training? So, raising awareness and thinking of the data sets and the construction of the data sets and having a representative sample is really important.

ABI: There are a couple of questions to do with policy and law, those of you who hear me talk, we get on to this, we have heard about the stick. It is interesting to hear from Google and Apple about the role of regulation in ensuring that AI is accessible. And one person said is there a need for legislation to compel people to make AI algorithms public, even.

SARAH: I think, part of what goes on with AI machine learning, it is an iterative process. So, I think there is, when you talk about regulations, regulations tend to be written once and stick that way for a very long time until, you know, potentially 20 years later a change is made to them. So I don't know that regulation, they may initially be a driving force for some people to do something over time, I think they could be less valuable as, because you and I were talking earlier about how in some ways AI is in its infancy but in other ways moving so fast we have to stay on top of these things around bias and such. So there is an initial reason for it but as time goes by, we have to do a lot more just based on our own, the iterative process of ensuring that we are doing right and what are the core values and ways that we look at all of this data and how we put it out to the world as our central focus.

ABI: Reema?

REEMA: It is interesting, what we are interested in at the Ada Lovelace Institute, is a governance ecosystem that people find trustworthy and they have trust in. I think that governance as a whole is complex, so it comprises of various layers but regulation as part of that, I think, it has a really important role to play in terms of articulating the standard that are expected for people who design and develop technology.

For instance, we're looking at data governance. We are launching a programme in the New Year looking specifically at data governance, of which changing regulation is a core part, but we're also looking at things like narratives and how we talk about data in a way that means that people can be part of a conversation and we are also looking at practice. What does it mean for practical intervention to strike the balance between innovation and rights, for instance, appropriately and in a trustworthy way?

Facial recognition is another issue. We produced a report called Face Value. We surveyed around 4,000 people across the country. One of the things we found from our survey in terms of attitudes to different applications of facial recognition technology is the extent to which people were concerned about how it is used and in particular people used the opportunity to tell us anonymously about their concerns that it might be used to discriminate against them if they have mental health conditions, i.e., it might make inferences about who they are as individuals that are not in line with their identity or their sense of personhood. I mean, this applies to mental health, but it also applies really interestingly to, you know, other cases, so for example, transgendered individuals and others.

I think it is a really important area. One of the things that we have recommended around that is around thinking about the application of a moratorium, i.e., a pause, on the use of facial recognition technology, until there has been time for adequate consultation, engagement and a proper public debate about it.

To get back to your point which was about regulation, it has its role but it is also about thinking what it does and making sure it does not have unintended harm (?).

ABI: It is also to consider the impacts of AI and how do we engage with the development of AI. I'm seeing questions specific to different types of technology.

CHRISTOPHER: Could I just add one thing to what has been said? There is a one woman from MIT Lab. She was a black woman. She found that unfortunately it didn't work for her but when she put on a white mask it did do much better. Having an inclusive data set is really, really important especially as these technologies get rolled out into more and more legislative services. We need proper data that is thoroughly vetted for real inclusion and it is not just ability, it is race and gender. All of it matters.

ABI: A couple of pointers have come up that AI are being used when benefits decisions are being made and what is the good enough quality when we're using automatic captions as such, are we having transparent conversations about this AI and the quality impact when we don't even see it happening in technology?

ANJA: It is a tricky one!

ABI: I'm sorry.

ANJA: I will give you a different example because you mentioned captioning. One of the things we have learned from some of the work is that, for example, people with visual impairments take images slightly differently to people who might have full sight. So there's a lot of databases that have images so image recognition is fairly robust but what if the image qualities are slightly different because something is blurred and it is not in focus and the kinds of things that are being photographed that somebody might want automatically captioned or described slightly unusual in the way you go for the first time into a hotel room and you try to find out with your camera or on the phone where the power hubs are to get power. It is different kinds of images and visual questions and answering them requires a different data set in order for the algorithms to be able to perform. One of the things that for example, the University of Washington is doing is starting to generate a data set, they have got close to 40,000 pictures now of people who have low vision or who are fully blind. They have captured these images to train algorithms. They say ‑‑ it comes back to an earlier question ‑‑ we need more data because some of the things you might want to ask are about things that perhaps a bit more sensitive, maybe you want to recognise somebody you know, a particular person in an image or you might have important documents you want to photograph and have context about. But processing the data that is personal and that could be valuable to have a context for, it is not the same, like, here is an image of a plant pot or a coffee mug, creating these data sets and making them publicly available is really tricky.

CHRISTOPHER: We could have a data set not just of people who are blind or low vision, but what they're taking pictures of because that would help train the algorithms.

ABI: The thing you are picking up is the context aspect. When we talk about the social model of disability, the context is so important when we are talking about accessibility. It is the context you are in of that image that you need to describe it and how do we get that context into AI. Ha‑ha!

ANJA: I wonder whether sometimes the AI has to do all of this, why can't it be a more collaborative relationship with people? Why does AI need to take over fully especially at the early stages where the AI is... there's a lot of prospect but we're still in the early days of developing these types of systems and make them more reliable and robust. Maybe the human could still take part in that.

REEMA: I think that's right. I think this is about recognising that technology addresses a need so it is about identifying and actually the social model of disability is a really useful way. We need to start with the fundamentals that is the social model of disability that we're thinking of creating a society and a world where, you know, where the barriers can be tackled by society in the same way that it is put up by society. If technology is something that we develop and define and it emerges not within a vacuum, it is not plucked out of the air, it emerges because groups of people somewhere identify there is a need for it. When we remember that, the question becomes, well, who gets to define the need? Who has got the power in that context? And how, if they've got the power that other people don't have, how do you create a context and a world where that power is more distributed? So, you don't have unequal power gradients or ever unequal power gradients between those who actually could benefit, use or need the technology and those who are designing and developing it?

One of the big challenges for AI and the systems is when you look at the people who are developing AI and data‑driven systems, you don't tend to find that they reflect the general population. In fact, it is widely criticised in context of gender and in terms of disability and just an issue more generally in terms of socioeconomic diversity as well.

ABI: Yes, it is a big challenge.

SARAH: There is a diligence that needs to happen in ensuring that it is not just one population that is driving the development of AI. To some degree, there is a question of whether there should be an overrepresentation of individuals who are marginalised individuals and whether it be around disability or gender or race or religion, or whatever it might be, in order to ensure that we create something that has the general population in mind that covers everyone.

REEMA: I think also the challenge is ‑‑ so again we had a very interesting conversation at coffee break about frictionless technology. One of the things that we spoke about was when we talk about frictionless technology or actually when someone talks about frictionless technology, in their mind they have an idea of the person who it is frictionless for. The reality is that, you know, that assumption, there is a whole set of assumptions from that mind of the general population. There are assumptions in the mind of a person that is doing the designing of that what the general population is. The challenge is maybe it is not the general population, maybe there is no such thing as frictionless technology, because we're making assumptions. So, I think there is something really important about just diversifying and broadening the range of perspectives involved.

ABI: I will bring it back around to a point that was made before. It is great, we need to be more inclusive and that our data sets are not biased and we need to include people with a wide range. But what about privacy and the ethics and the biometrics and AI and the images, how do we deal with the privacy issue? [Laughter]

ABI: Come on!

REEMA: What!

SARAH: I think one of the things that we try to do is by doing more and more of our machine learning and our AI work on device, so it is not going up to a cloud and being used in a bigger situation. It is just what is on your device and how that device learns you but it doesn't go out and get shared with anybody else.

CHRISTOPHER: There are technologies in federated learning where you take small data sets and make it private and you obfuscate it and create a larger data set and it helps create a private set of data that helps decisions get made. At Google we had Google Glass which caused some concern about the ability to take video. It is a real concern. You have the need of a light sensor, it is something that takes a sensor of what is around you, but it is not really taking a picture. We need, as a culture and as a society, to realise that because something is taking a picture, it doesn't mean it is recording you. It is actually using it for processing. I think if we can move the culture around it so it is not the concern, as much of a concern, it could really help a lot of people. You take a look at the Google glasses, it has a camera and it is recording people, but it is really, really useful. It seems to be helping broaden the abilities and people's willingness to have a camera on because it is serving a purpose as opposed to taking Snapchat pictures. I'm hoping the accessibility use case could help lead the charge in terms of using sensors to provide contextual awareness to these algorithms.

ABI: Exactly. Somebody has brought up the point that much of the data from AI tech is not open to people being profiled, do we need companies to be more transparent on what they hold and using? There is potential for people to self‑exclude because they don't feel they want to give out this information for making AI more inclusive.

CHRISTOPHER: It also impacts affordability. To have a phone powerful enough to do the kind of work, this AI work, you need an expensive phone and a powerful phone. There is a sacrifice here, if you could offload it to the Cloud you could do a lot more but there is a concern of privacy. So, it is a give and take in terms of how much benefit you want to the price of the device, to the ability of the user.

ANJA: I think that's an interesting example because here it is not so much infringing on the primary user who is wearing the glasses who might get the benefits, but every other person who might not understand what is going on in the technology and how we're then making sure whatever processing is happening is kind of done in a privacy preserving way as much as possible, where I'm giving other people a chance to opt in or opt out and how would those interactions look like in the real world, in public and private spaces and these sort of dynamics. Maybe one of the first steps ‑‑ Reema and I talked about this actually ‑‑ is to make privacy like a value that is really important and it is a constraint to pushes us to think more innovatively and innovate around it, if it is something that we really should kind of put at the forefront as a value.

ABI: Does privacy include using assistive technology? Does privacy using technologies that may identify somebody as disabled or not?

ANJA: I feel like we're getting back into ethics and judgement and where the trade‑offs are between creating benefit for a person in a way that might ‑‑ whereas the trade‑off between the functionality to really enable and would be desirable for somebody to have and what are the costs perhaps that come with that. It depends on the context, the judgement and society changing and perceptions changing. If we are responsibly designing AI technology, the kinds of things we might find acceptable will change as well. It is not an easy choice.

ABI: Another very popular question that has come up and something that is close to my heart is we have talked a lot in examples you have given about the impact on people with neurodiversity and we have talked about the positive impact in terms of people with sensory disabilities with captions and alt text. How can we apply AI to help the more neurodiversity population?

SARAH: Can you say that again?

ABI: So how can we use AI to help people with neurodiverse conditions? So mental health or cognitive disabilities and potentially elderly population, we have seen the benefits so far that have been in sensory disabilities and supporting those.

CHRISTOPHER: There is technology to help with dyslexia. If you are having a hard time reading you could have it really loud as someone is reading to you or you can run your finger along something and it can speak the words for you. There are ways that AI can help different folks. It is something that occurred to me now, it would be interesting, this is me just riffing, this is not a Google product in a way, but having something that allows you to sort of dial in or dial down the noise in a room, for example. I could certainly use that. And the more you use it, it could have some contextual awareness and do it for you, so you don't have to dial this thing up or down, but the inability to interact with your environment and dynamically adjust based on your preferences could be interesting.

REEMA: I think it is about that process of engagement and consultation again and sort of changing the way that the technology develops, so you have asked us those questions but actually as someone with a hearing impairment, I don't feel very equipped to answer a question that I think someone who experiences a mental health condition should actually answer. I think that we need to create ways of having those conversations. It goes back to this point about what the social technology is, which is if it is addressing a need then surely the person who has got the need should be articulating what it can and should do? There is a real gap there in terms of the way technology has been designed and developed. I actually speak from personal experience because, for example, as someone who has got a hearing impairment, there have been moments where I've felt incredibly involved and engaged in shaping what my support and my care looks like. Then, there have been moments where I've been told actually what that looks like. I can tell you right now that the stuff that I have benefited from is the stuff that I've been involved in shaping. The stuff that I don't use that is still kind of like lying on my window sill or the stuff that I used to hide when I was a kid and I didn't want to use it. It was the stuff my teachers said, "Reema, you really need this" or my parents told me, "Reema, you really need this." Yes, it is quite important.

ANJA: I can echo that with the CJI application, the company was driven entirely by people, to start with, who were applying programmers in the company and still today, it is driven by their ideas and lived experience. That is why this application has value and utility for people.

SARAH: I think there is a lot around that level of inclusion in getting people engaged on what are the things that you need. Certainly you can look at some of the more hidden disabilities and try to determine what AI could do around supporting individuals but until you have those individuals saying what are the pain points in their lives and then thinking through how technology could help solve that, you really can't get very far with it.

ABI: Somebody said here it is all about big data, that is all we hear about. We need more data but we are talking about involving users more but we are here as it is an accessibility conference, the interest is in accessible, how do engage to ensure that AI is engaging effectively and inclusively?

REEMA: When you say "we" who is the "we"?

ABI: The professionals, the ones with the experience of the non-AI technology?

REEMA: I think, so... I have to really think about this. Data, I mean, I think there is quite a lot in this. This is quite a complex question. One is actually about the social contract between the people to whom the data is about and the people who are using it. So, you know, if there is, you know a few powered hearing aids that have got, that have gathered information about the way that I am operating. We can imagine that, gathering all sorts of information about what I want to tune into or the conversations around me and be able to develop it effectively in order to block out something and tune into something, that is a huge potential benefit to me. But also, it has implications for the conversations that I am having, the people with whom I am having a dialogue with. There needs to be an important conversation about how and the extent to which that data is used.

This kind of pushes back again to the points we are talking about, it is privacy, surveillance, et cetera. It is not enough for a technology company to just say, "We need more data." They have to articulate what it is for, what they are using it for, and where are the boundaries. Otherwise we risk a break down, a tech lash loss over legitimacy.

CHRISTOPHER: I can speak to this. This company is asking for data! I would like to ask that we participate. There can be benefits to it, for example we have a project Euphonia designed to help create speech models for people with untypical speech accents for someone with a second language, the accent is not native to their language. So, this helps, the more you participate and in this, in all of our situations when gathering data, we do it in a privacy focused way but participating helps to make it more inclusive, the more inclusive then results can be. But it is up to the technology companies to state what it is for and not for, and to ensure in keeping this private.

SARAH: In terms of looking at the "we" as the professional, the people driving accessibility in our worlds for people in this room, it is about getting into the conversations, ensuring that you stay in those conversations with the people who are doing this.

I look at all of us on this stage, we are not necessarily the one single person driving you know, how Google gathers data, what are all of the projects going on, or for me at Apple but as we get into the conversations with other teams and ensure that they think this through.

I mean for example, for us with face ID, our team engaged really early when we were even talking about the idea of face ID to ensure that there were all different types of faces including individuals you know, it was whether someone may have their eyes closed all the time, whether they may have prosthetics, all different kinds of things that we looked at to help that algorithm.

It, once again, it is a continuing iterative process, it changes and it continues to get better all the time. We went to the Face ID team and said, "Let's think about the entire population of people who may not have the typical face that you would look at right off the bat. How to keep that process going?"

ABI: It is interesting to hear that great work going on inside but lots of comments about how to trust and how to trust the companies that they are doing the right thing. We have heard of the potential benefits of regulation and engagement, what can we do to engage trust when it comes to accessibility and AI, generally.

ANJA: I feel this adds to Christopher saying about the Euphoria Project, it is a good example. When creating transparencies and clarity about what it is that the voice samples are used for and it helps with the misconception that having more data is always better, like big data but big data is unorganised that we can't make sense of it, we don't understand, there is a risk of uncertainty, we have to keep asking what are the questions that we asking of the data, what is the purpose, how will it help? If we understand that, we can collect it.

In that process we can create clarity and transparency and then there are other ways in which people are happy to donate certain voice samples as they are understanding how it will ultimately come to benefit them again.

ABI: So about having that communication about AI, developing it further. Right, I think we have time for a few more questions. Let me have a look through. Mark, have you seen any?

MARK: There is one here about, I think it is picking up on the data: “How can we participate in that the other way around?” So, for the tech companies, if we are working -- so, AbilityNet works with disabled people in lots of ways, is there a method for us to get into the game? Like you said, Sarah, what are the routes in? We are interested, there is a gap. There is a bias that is created, unintentionally. What can us in the audience from the different perspectives get a route into that conversation? I don't know who holds it. How we speak to it, engage with it? Are there projects that we can contribute to that, generally, that demonstrate how the model can work?

SARAH: I guess there are a number of different ways that one can approach that. I think, speaking from the Apple side on a baseline, there are ways to readjust. You know accessibilityapple.com is the customer facing email address we have had for well over 15 years that we gather information from individuals to talk to us, to tell us what is important to them, to ask us questions and for us to be able to respond in those ways. Beyond that, we work with organisations regularly when there are questions that come in at a larger level. Then, you know, I think always trying to find that diligent way to speak to a company, to get to them through public or more private ways to ask those questions that you have.

MARK: Is there a repository, an ethical repository of data to contribute? Is such a thing existing that you could then access?

CHRISTOPHER: There is lots of Open Source databases and data sets that exist. If you find something that is missing, please, contribute to it, that benefits everyone. We all need the data to create the algorithms and the Open Source creations or where we can get our data.

ABI: Somebody made a comment about my data having a value. So how to make people to understand that you are going to use it right, correctly, and to take into account the value of me giving it to you?

ANJA: It is tricky. I'm aware there is a lot of funding streams out there that try to in an ethical way create new data sets. But I think there is still a lot of uncertainty about secondary data use. Originally, what has the data been designed for, you can describe but at the same time, having richer data that may have more information, what it can lead to, there is a dilemma. There is the intention to build the data set, what it is used for and the secondary, when you make them open, publicly, lots of companies, who have different moral compasses may ask question or use the data to generate algorithms that may not be considered ethical or people would not be happy for the data to be used but it is out there. So we are, at times… we are almost having more and more questions but setting more and more challenges but having the solutions, it is not that trivial. It is working through and understanding first and foremost that this is complicated.

CHRISTOPHER: It is a very deep onion, many, many layers!

ANJA: This is a tough question!

ABI: We have a couple of minutes left. I will ask you all to finish, to say briefly, where you think accessibility can have the next really big benefit in terms of accessibility? What is that next nut that is to be cracked due to AI, to help with the removing accessibility barriers? Anja?

ANJA: Can I come last?!

ABI: I will pick on Sarah.

REEMA: I have views!

SARAH: Where AI?

ABI: What is the next big great achievement for AI in an accessibility field?

SARAH: Gosh, I don't know that there is a single something that I would say, this is the next crown jewel to come. I think that a lot is looking at where there are ways that we are using AI in a more general sense in ensuring accessibility, in finding the way it is applies across for individuals with accessibility needs more than picking one single something.

ABI: Reema?

REEMA: I think there are interesting clusters. So, the language translation learning stuff is very interesting. At the moment most services and products are about translation. Again, they make a lot of assumptions about people's ability to access, so translate services.

I was having a really good chat yesterday, again, about somebody who was hard of hearing and found learning languages very difficult. I can see, I don't know if anyone here is thinking about language learning for deaf and hard of hearing people, using machine learning systems but I can really see a gap there. In terms of a lingo equivalent for people who are hard of hearing. There is something really interesting in the space of, as I say, and have been saying, there is no really one size fits all thing.

But the interesting thing about AI, is that given, I guess, the ability to use data about particular needs and groups of people, given that ability is there, if you, rightly, it could develop and personalise services, there is something, a potential to that, there are risks to that but a potential to that. It is important to acknowledge the potential.

CHRISTOPHER: Sarah's point is a really important one, we need to make sure that the AI that is generally created is inclusive for everyone. But doing the work that we've done with our lookout team, computer vision and recognition is really, really hard. A camera doesn't know the difference between a door and a fridge. It is the context that will help. For me, I think if we can sort of crack visual recognition and visual understanding, be it through contextual awareness of where you are, if I'm in a bathroom, it is not probably not a fridge. Maybe in a hotel, it could be! But the visual algorithms have a better ability to recognise items in the real world. If we crack that, it could really open up a lot of applications that just don't exist today.

ANJA: I think it is probably related to the context the way I'm thinking about it and the earlier point around collaboration. How are we to use AI technology that can provide functionality and it is a powerful resource that still can be developed much better to be more robustly working, but if I have these different resources that enable different information that I can use, how do I come to use them in different situations? And almost thinking more about how can we use the AI functionality that is being developed, whether that's speech recognition, or computer vision, how do we bring it into people's lives in way that is more fluid and dynamic and dependent on which context that we are in and we come to interact with AI technology in a way that really helps augment our own capabilities in meaningful ways and it would be nice to see some development around that.

CHRISTOPHER: But to do it in a way that it's not creepy! If it is too good, it's creepy! It has to be just bad enough so it is not creepy but useful enough that people want to use it!

ABI: I think that's a great point to end on there, particularly because it's lunchtime. I really want to ‑‑ I think we have raised more questions than answers! But I think it is probably because this is a new field and we'll be talking about it for years and years and we should be talking about it. It is just great to hear you. We want to thank our speakers. [Applause]

MARK: Thank you, Abi, for chairing that so brilliantly. As you rightly said, it's lunchtime. We have lunch being served outside. A reminder to those of you who are on a panel this afternoon, be here 10 or 15 minutes before to get miked up. Don't forget the Aladdin Sane room to check out the tech. Enjoy your lunchtime.

[LUNCH]

MARK: I will just watch everybody scurry back. Hopefully you have had plenty of chance to meet, chat and network. Plenty of chat later. At the end of the day we are going up to the Samsung KX store, which is just next door, which has lots of experimental stuff you can join in, and we will have a drink up there with light‑touch informal networking. We also have a performance by Digit Music. Those of you who were here last night will have seen that fantastic performance by some young people. They're using some technology that won the AbilityNet Tech 4 Good Accessibility Award.

Before then, we have another couple of sessions. So, we have got a bit of a rock star, I reckon, in our midst. Haben Girma is here to talk with Paul Walsh from Lenovo.

PAUL: I'm not the rock star! You've got to save that. I'm not the rock star. I'm Paul Walsh, the Chief Digital Officer at Lenovo. We're really excited to be partnering with AbilityNet. I'm trying to bring this whole venue and session together. It's extremely important to us as we think about, you know, disruption that is happening across the globe and as we think about the innovations that we have seen within technology. If you do think about that digital transformation that's happening, you will see it is happening across every sector that we can think of, whether it be retail, financial services, healthcare, all of these areas are being disrupted through the advancements in technology. It's important for us all to think about how do we ensure that we deliver, you know, much smarter technology for all, for everyone, to ensure that it is inclusive no matter what gender, ethnicity, or if there is disability that we are actually thinking about all when we're building our technologies, not just technology for technology's sake.

We have made many advancements. Think about all of the ways that you shop today or you bank today. How many of you carry your bank around in your pocket? I know I do. It allows me to be able to think in a different way, act in a different way.

What we have seen is just a growth in three areas specifically that we're really thinking about and looking at. We're going to talk a little bit about them. One of them is around a cognitive commerce and the growth of patterns or the growth of data. I heard in a session earlier on a lot about data and the impact that data is having. In 2020, there will be 44 zettabytes of data on the planet. One zettabyte is ten to the 21, or if anyone is as old as me, one zettabyte is the equivalent of 250 billion DVDs! 44 zettabytes date that is going to be on the planet in 2020. 90% of that data was generated in the last two years. The vast majority of the data is tied to an IP address. 44 zettabytes of data, because we're in London, 44 zettabytes of data are approximately 100 million printed copies of the British Library. There's a lot of data in there. It is not just about the amount of data, it is literally understanding the patterns within that data, the ability for us then to utilise those patterns and build great outcomes for all. What we have seen in those patterns or as we are building our AI systems we are thinking of mainstream and we have not been as inclusive as we need to across industries for everybody to ensure that all can benefit from this digital transformation that we're going through.

All of this data is being generated by a growth in connected devices. In 2020, there will be 25 billion connected devices. My wearable, my phone, all generating data, connecting to all of your wearables, connecting or generating data to the extent that it is really disrupting all of these industries we talked about. The ability to walk into a store, a cashier‑less store and pick up whatever it is, whatever product you're looking for and be able to walk out of that store is now a reality. When I was growing up in Dublin it was called stealing; now it's called a customer experience! About 13 years ago, however, when myself and a couple of my colleagues put the patent together for in essence a cashier‑less store, or as we called it "the ability to conclude a transaction based on a geographical location", we were thinking how do we make it work for everybody. How does it understand it is me? It is able to give me contextual relevance when I'm within the store and it allows me to pick up that good and I walk out. We have heard stories about facial recognition not working for many different parts of our world. We need to fix that. We need to make sure we deliver that for everybody. If we don't, we will see a digital divide. We are seeing elements of that digital divide already but that will be expanding.

The second area that people really have to think about is how do they move technology to the back? How do they make it invisible and take it out of the way to ensure we are delivering the real experience that we're all trying to achieve? If technology gets in the way, it hinders your customer, your user. The problem that that can actually lead to then is that those loyal customers today become your former customers tomorrow. As we're thinking about and partnering, we're always thinking about how do we remove technology and make it more seamless, put it in the background.

Let me give you an example. You know, I travelled over for this event like many of you. It's a long flight, I flew in from Seattle. It is a long flight. I just wanted to get to the hotel room but I walk into the hotel and there's approximately ten people deep all trying to check in. The question, I was asked was would I like a digital key. Would I like it? I am thinking this is fantastic, a digital key!

So, they send a digital key to my device. As I walked away, they said, "Wait there, let me give you a regular key just in case." This had been a long flight. They didn't know my patterns if they did, they would have put me closer to the elevator. So, I get on the 10th floor, I have two bags, I really want to get into my room. I take out my device and wave in front of the door expecting it to open. It fails. I tried it again, it failed again. I took out my plastic card and I tried to utilise that, that didn't work.

So, ten floors, back down again. Three more people in front trying to check in. I asked them what was going on, I really need to get into my room. I can't get into my room. They said, "If you use the digital key, it deactivates the plastic one. The only way to use the digital key is to connect it to the network.” No-one told me you had to connect to the network!

This is a prime example of if we don't think of the end-to-end experience for all, the impact it can have. The idea was a great idea but it was a really bad experience. That is just within a mainstream environment. When they are not thinking about the end-to-end experience for a disabled environment and then it gets worse. And we truly have to look at all of that end-to-end.

The third thing that we need to think about is really around co-creation, how can we build together? How do we ensure that together we can actually deliver the right experience? I think of this as an omnichannel across the brands, where the brands are working in order to deliver a true end-to-end experience.

An example is the partnership with Intel, building together a solution, some years back for Stephen Hawking, to ensure we could provide a richer experience for what he was looking for, trying to do. Imagine if we could not work together to deliver that experience, not giving Stephen Hawking everything he needed to educate us, it would have been a bad world. So, we are happy to do that. But as we are looking at it, we are thinking of the ecosystem in which we can work with many partners, many of you today, to ensure that we are building a solution and solutions for all, ensuring that we can actually deliver a more diverse and a dynamic world and a better human experience for all.

In doing that, we step back for a while and we thought about how can we deliver that, what do we need to do? I'm a part of the Lenovo diversity and inclusion board, we spent time thinking about it. The idea came out, why can't we partner with someone who is a true advocate, that can truly talk about and help us think about the solutions we are building, that can ensure that we are doing human design right from the initial thoughts of a product all the way through to bringing it to market and in-market.? I'm really excited to introduce Haben, who is our first Accessibility and Inclusion Adviser for Lenovo to really help us change how we think about inclusion and accessibility, to really ensure that we take the next step and deliver a much, as I said earlier on, a smarter technology for all. So, let me just introduce Haben and invite her up on to the stage here. Thank you.