**Transcript: Risks and Opportunities of AI, Smart Systems and Automation for Employment of Persons with Disabilities**

**Future of Work and Disability webinar originally recorded on November 3, 2020.**

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**Vera Roberts:** Today will be presentations from our panelists, followed by some discussions between panelists and audience members, and at that time you’ll have opportunity to participate. Normally we have a way to ask questions in webinars, but for this meeting there is a hand-raising tool that you can use. You can also put your message in the chat, and you may have the possibility of unmuting and asking in person, which is quite nice. So I’d like to take a moment just to introduce our panelists, and I’m going to keep this super brief because we are already running short on time.

So first I’d like to introduce Anhong Guo. He’s a professor at U Michigan and has worked in the Ability and Intelligent User Experiences group at Microsoft Research, the HCI group of Snap Research, the Accessibility Engineering team at Google, and the Mobile Innovation Center of South America (SAP).

Also with us is Shari Trewin. She’s an accessibility researcher who has made contributions to many areas of inclusive information and communication technology, including AI fairness. Shari manages the IBM Accessibility Leadership team.

Ben Tamblyn is here today, he’s the Director of Inclusive Design at Microsoft. He tells stories about Microsoft and the human impact of our technology. And Ben has worked in a wide range of marketing, design, technical roles, always with a passion for design inclusion and its potential impact on the world.

Finally, I’d like to introduce Chancey Fleet. Chancey is the Assistive Technology Coordinator at the New York Public Library. She was a 2018–19 Fellow at Data & Society and is currently an Affiliate-in-Residence, whose writing, organizing and advocacy aims to catalyze critical inquiry into how cloud-connected accessibility tools benefit and harm, empower and expose communities of disabilities.

Welcome, everyone. Also with us today are sixteen panelists who are part of the Future of Work and Disability study group, and of course all of our other participants today. Thank you for being here. So I’d like to start with Anhong. Are you here? Did we lose Anhong?

**Anhong Guo:** Yeah, I’m here.

**Vera:** Oh great. Please start us off on our very interesting technology problematic journey today.

**Anhong:** Cool. Thank you very much for the introduction and for inviting me today. Let me share my screen right now. Can you all see my slides okay?

**Vera:** Yes.

**Anhong:** Okay, great. Thank you, everybody. Good afternoon. My name is Anhong Guo. I’m an incoming assistant professor at the University of Michigan. So today I’m going to talk about my work toward fairness for AI for people with disabilities. And I started this work when I was a PhD student at Carnegie Mellon University and as a research intern at Microsoft Research. So this work was done with my collaborators: Meredith Ringel Morris, Ece Kamar, Jennifer Wortman Vaughan and Hannah Wallach from Microsoft Research, and Shaun came from University of Colorado Boulder, and many others of projects that I will mention.

**[Fairness in AI for People with Disabilities]**

So AI technologies have huge potential to dramatically impact the lives of people with disabilities, and indeed this is a key motivator for many of the state-of-the-art AI systems, such as automated speech recognition tools can help people who are deaf and hard of hearing to caption videos or language prediction algorithms can augment communication for people with speech or cognitive disabilities. However, widely deployed AI systems may not work properly for people with disabilities; for example, if a smart speaker does not recognize input from people with speech disabilities, then the population is locked out of this key technology. Or worse, AI systems may inadvertently amplify existing stereotypes, such as if a chatbot learned to mimic someone with a disability or if a self-driving car are not trained to recognize pedestrians using wheelchairs, they may actively endanger their safety. And these considerations have received relatively little attention.

**[Research Roadmap]**

In our work, we first proposed a research roadmap to identify and remedy these problems. So the position paper for this is available at aka.ms/AIa11y. This roadmap includes four stages. One is to identify potential inclusion issues of AI systems and methods, and then to test these hypotheses to understand failure scenarios, and then to create benchmarking data sets potentially to support replication and inclusion, and finally to innovate new methods and techniques to address these problems.

For the first step, we focused on performing risk assessments of existing AI systems. The way we think about these AI capabilities include the different modalities, such as vision, audio, or text, etc. So for vision systems, one example is to recognize and analyze faces. For each of these modalities, the system can perform recognition or generation tasks. For recognition, it can be further broken down into detection, verification, identification and analysis. By combining capabilities together, there are also these integrative AI systems. For example, conversational agents often use a combination of speech recognition, text analysis, text generation, speech synthesis, etc.

Using these dimensions, there is a large space of AI systems, and many of them are already widely deployed in the real world. We specifically focus on those, but you can imagine, by mix-matching all these different capabilities, there’s a growing and a much bigger space for the years to come. The ones that we discussed more specifically in that position paper included vision-based recognition systems for face, body, object, scene or text recognition, speech-based systems, such as speech recognition generation or speaker analysis, as well as analyzing text or these integral AI systems, such as search engines and conversational agents. For each one of them, we identified how the system could first positively impact the lives of people with disabilities and also, more importantly, what are the potential risks if they’re not done correctly, like the examples I mentioned earlier about speech recognition system chatbots or self-driving cars.

In addition to accessing particular classes of AI applications, there is also importance to understand many techniques or practices that power these AI systems design in the first place, such as the building blocks of such AI systems. They may lead to bias against people with disabilities, such as how outlier detection techniques often think and ignore the data generated from people with disabilities are outliers, and also that using aggregated metrics to evaluate systems, definition of objective functions in the first play of what you are trying to optimize for. Also, using training data that do not capture the real use cases or the true complexity of the real world.

We also categorized five different types of potential harm that can be caused by unfair AI. So many of the problems are related to quality of service; for example, voice-activated speakers that may not recognize input from people with speech disabilities. Others can be related to harms of allocation like using an incorrect prediction of emotion state or personality of someone with autism as input into an automatic hiring system can be very problematic.

Another type of harm is denigration, such as erroneously flagging input from people with disabilities as invalid outliers. There are also harms related to stereotyping or over and underrepresentation, such as information retrieval systems, such as search engines, can inadvertently amplify this existing bias against people with disabilities by returning stereotype or poorly represented content in search results. To review bias, different methods can be applicable for these different types of harm. For example, some might be more suitable to use quantitative benchmarking, or others can be more suitable for qualitative methods.

Then, moving on to the second step of the research roadmap, is to systematically test hypothesis to better and deeply understand failure scenarios. We have done some work in this area; as an example, we conducted a study with forty adults with physical disabilities, such as limb differences or limited mobility, in order to understand their experiences with smart-sensing systems in order to identify issues and kind of work that needs to be done to make these devices more fair and inclusive for people with different body types or various mobility capabilities.

Another approach to reveal bias that can also support replication and inclusion is to create benchmarking data sets to test this hypothesis. So this is another area for future of work because there are complex ethical issues involved in creating these data sets for vulnerable groups, such as around consent around the privacy and sensitivity of the population, coverage and quality of data, etc. So there can be two kinds of ways of collecting data. One is to use online data, and there are many questions around that. I won’t go into details here.

Also, if curating data from scratch, there are also questions about how to encourage participation from a diverse range of population. And what about for people who have intellectual disabilities? How do you ensure consent in data collection? Is the collection process itself fair and inclusive?

An example of some of the work we have been doing is I have collaborated with researchers in developing the business data set for visual questions, answering and privacy, and now it has been expanded for image captioning and many other tasks. So most current vision and language algorithms that are trained in the AI community are using images taken by sighted people, which is not really the same distribution as images taken by blind people. So this business data set is collected through a deployment of a — a long-term deployment of the application to provide visual question answering for blind people. The data collected from this is much more realistic. So there’s a lot of work in the community to deploy a powered system in order to collect data that can be further used to, kind of, create these benchmarking data sets.

Finally, the last step of our research roadmap is to evaluate how much existing bias mitigation techniques work. Because of the uniqueness of disability, many problems might not be solvable using a general model and can never collect sufficient balanced training data; therefore, designing new modelling bias mitigation or error measurement techniques is very important, such as building personalized models or a tiered system.

If you’re interested in reading more about this group of work, please check out these projects and upcoming ones on my website at guoanhong.com. As I start the new position at University of Michigan, I’m also creating technologies and looking at these fairness issues and techniques that uses crowdsourcing AI augmented reality to tackle problems in this area. I look forward to talking to all of you in this panel. Thanks.

**Vera:** Thank you very much for that introduction around your techniques for establishing inclusion and inclusion barriers and data sets and in AI systems. That was really interesting for me, and I think probably for our participants today as well. And we look forward to talking more about that with you shortly. So, Shari, now you can go ahead. If possible, speak slowly so that the captioner is able to keep up with you. And we’re ready to go.

**Shari Trewin:** All righty, thank you. Thank you very much for inviting me here, and I’m looking forward to the conversation too. I am Shari Trewin. I’m Accessibility Manager at IBM. IBM is a cloud and AI company and I actually have a background in AI in computer science with my undergraduate. I’ve been doing accessibility research for more than twenty years, and so I’m really interested in this intersection between AI and accessibility and diversity and what the impact is on inclusion and fairness in society.

So I’m going to post some links to articles and some websites in the chat after I finish. Sorry I don’t have any slides. But I wanted to complement what Anhong was saying and talk a little bit about employment and AI in relation to employment, because I think that was one of the topics that we wanted to cover today.

So I think there’s no question that artificial intelligence is opening up a lot of really great opportunities for better inclusion in the workplace and new assistive technologies that can improve employment. An obvious example is that deaf employees at IBM have started to really use speech recognition apps for kind of ad-hoc workplace interactions as a supplement to interpreters that are available and captioners that are available in more formal meetings. Object recognition can fill in some gaps where people have failed to provide descriptions for images or for real scenes. A lot of people are looking forward to when we have self-driving cars and everybody is able to get around independently and get to work independently.

I saw an article the other day that was a robot waiting staff in a restaurant and the robot was controlled by a person with a disability who was in a remote location. So they were working by controlling a robot in the restaurant, so I thought that was another interesting example of how the semi-autonomous robot in collaboration with a person was opening up an employment opportunity. So I think there’s lots of ways that artificial intelligence solutions can make workplace accommodations maybe faster, more convenient, can support greater independence.

And another thing on the positive side is the potential to begin to try to overcome some human prejudices and biases that people experience. Research shows that even just mentioning a disability in a job application could reduce your chances of being called for interview, even if the disability is not relevant to the actual work. So there’s evidence that human-powered hiring processes can be biased and that people underestimate the abilities of people. So could AI reduce some of this prejudice and allow people to be judged more on their merits? I think that’s one of the reasons why a lot of people have looked at incorporating AI methods in recruitment, but I’ll come back to that in just a minute.

On the negative side, so those were some potential advantages, what might be some barriers or challenges that AI might introduce? I think some people might worry that automation by using AI might displace jobs from people. One thing I would say on that is that historically when new technologies have come in and changed the workplace, in the end, jobs haven’t so much disappeared but changed. Ultimately, historically, that eventually can lead to gains in employment, redesign of tasks and new skills become important, but it doesn’t necessarily mean that there won’t be jobs, there will just be different kinds of jobs, I think. So that example about the human-machine partnership where a robot is working with human guidance is one example of how that could go: a robot could be trained to do part of a job that might be physically difficult or to provide visual information, while maybe the person has a bigger picture of the overall goal, all the subtle issues and could reason about the best course of action better than a robot can.

I want to go back to recruitment a little bit because AI has really become pervasive in recruitment. Two-thirds of recruiters believe that AI has changed recruiting forever, and 69 percent of recruiters believe that using AI as a tool to help them find candidates gets them higher quality candidates.

So there’s a situation arising where more and more an AI method might decide what opportunities are shown to you and what jobs you are proposed for to the employers. There are AI tools out there to assess people’s suitability for a job using all sorts of methods and sometimes they have the ability to control whether your application is ever seen by a person. So I think we need to be very careful with this kind of application where the risk of discrimination is high and consider very carefully who might be excluded. Is the data that is being used truly reflective of a person’s ability to do a job, and their ability to do a job with accommodations too, which is also hard to incorporate into some of these methods.

You know, there are some tools out there that record a video of you answering questions and there’s all sorts of information they can extract from that video. Your facial affect and your eye gaze patterns and all sorts of things like that, but of course not everyone has typical eye gaze patterns, typical facial affect. And does that really influence whether or not they can do the job? Probably not.

So the fairness of recruitment and hiring processes and the fairness of AI methods in general that are making decisions about people really needs to be paid close attention to. There’s already been plenty examples of evidence of bias against women, bias against people of colour, and sometimes I think the ability dimension can be forgotten when addressing bias in AI. But there is growing interest in the fairness of this process. The Institute for Ethical AI recently put out a white paper. The title was “Recruitment AI Has a Disability Problem.” I’ll put a link for that in the chat if you haven’t seen that.

I think there are reasons why we should tread very carefully because AI-based decision-making, for one, is dependent on the training data and training data may itself contain bias. The data used might not reflect your ability, and so trust is really key in applying AI.

So at IBM our approach to AI ethics is based around this principle, that the purpose of AI is to augment and not replace human intelligence. There’s certain things that are really important if you’re going to be able to trust an AI method and know that it’s reliable and won’t cause any harm. Some of the essential features of AI are that it should be transparent, explainable and fair, and support privacy. Let me say a little bit about some of these. Transparent means that there’s information available about how this model was trained, what kind of data was used, what kind of training was used, what kind of testing was used. Explainable is an important one, so oftentimes some machine learning algorithms are a bit of a black box, really. You can put in some data, it spits out a decision, “No you’re not a great candidate for this job,” and of course you want to know why. I think AI needs to be able to answer that question “Why?” with some kind of an explanation.

One of the things that IBM has is an open source toolkit. It’s called AI Explainability 360. And this contains, sort of, methods that can be applied to provide explanations for AI decisions, to understand why they were made, what factors were important so that a person has the opportunity to challenge or question or test a model. And then fairness, similarly, we have an AI Fairness 360 Toolkit, which is another open source project with dozens of metrics and different ways of measuring fairness. Different measures are appropriate in different situations and different kinds of projects so that’s a toolkit that anybody can add to, anybody can draw from to look at bias, report on bias and try to mitigate bias.

One thing that came out of a couple of workshops that I’ve run on AI fairness and disability is this Seven Steps to Fairness framework. What we’re emphasizing is the involvement of the groups that are going to be most impacted. So the idea is that right from the beginning of an AI project, there should be some phase there where people sit down and they think about who is going to be impacted by this proposed method. If it uses human data, what kinds of people might not be able to provide that data or what kind of people may have data that looks different? And let’s include those people in the project, in the testing and in our understanding of the potential impact of the solution. So mitigating bias, offering explanations of decision and including people who are likely to be most affected as stakeholders throughout the process or some of those principles.

So I think I’ll stop there. There’s a lot to unpack in this overlap of AI access and employment, and I’m looking forward to our conversation.

**Vera:** Thanks so much, Shari, for that great overview of some of the balance of the benefits and the risks. It’s interesting to hear about some of those open source toolkits that you have available too. I think that lots of people will find those useful. And now I’m just going to move over to … Ben, you’re next, so if you could go ahead and start that would be wonderful.

**Ben Tamblyn:** Yeah, you bet. I’m going to share my screen also. Hopefully everyone can hear me okay.

**Vera:** Yes, we hear you fine, thanks.

**Ben:** Fabulous, okay. It was great to hear from both Anhong and also Shari. Anhong in particular did a really great job of teeing up a whole bunch of things that I wanted to kind of cover this morning, which is actually a perfect segue. This is a relatively short presentation; I’ve got five slides and precisely zero bullet points. I’m just going to share three short stories for how we think about artificial intelligence and ultimately its role in building inclusive technology. I think we know that exclusion typically happens when we try and solve problems using our own biases, and we also know that human beings for the most part are truly the real experts in adapting to diversity. We have got to a place where we are relatively sophisticated in terms of our ability to recognize exclusion, learn from diversity. One of the things that I’ll often ask the teams that I work with every day at Microsoft is, let’s really think about who we’re unintentionally excluding from participating, either as part of a particular design process, as part of a particular product or service that we’re hoping to bring to market, or even as part of a sort of a regular brainstorming meeting. I’m going to talk a little bit about meetings in just a minute, but when we focus on you know ultimately what I think is universally important to human beings, ultimately, it is only then we can begin to start to solve for 1 and then extend to many which I think is an important thing. Now all of this stuff is frankly great in principle, in reality it’s a hell of a lot more challenging in essence when we’re building inclusive products or refining business processes to become more inclusive or even bringing in diverse talent. It does not actually necessarily solve I think the biggest barrier that we have, and that is ultimately culture. I think one of the things that Microsoft has learned over the last 10 to 15 years in particular is, and I think it’s defined very neatly in this quote from Peter Drucker, which is the culture eats strategy for breakfast. In this slide on the left, you can see a picture of Pac-Man chasing one of the ghosts Pac-man, represents culture and the ghost obviously represents strategy. I think one of the things that we’ve learned especially over the last six years is having a very clear top-down approach, both a top-down and also a bottom-up approach to how we sort of think about creating a culture that’s going to support the kind of inclusive technology. The role that AI will ultimately play in making that a reality has become increasingly important.

In the case of driving this top down, a lot of the work that Microsoft has done in essence was driven by a fairly public mistake that we made almost six years ago. And at the same time, it was driven from the bottom up, by I guess a willingness to embrace the developer and build a mindset that was established by Bill Gates going back 45 years ago. So let me talk a little bit about what happened about six years ago, it was almost six years ago to the day. It was October 9, 2014. I remember this day unfortunately very, very well. I was actually working very closely helping shape the communication, Satya Nadella’s communication strategy. This is a picture of him on this particular slide and on the 9th of October 2014. He was sat on stage at an event called the Grace Hopper Conference which was down in Houston. He was sat on stage with a woman by the name of Marie Klawe, who was a Microsoft board member at the time and such was asked a very simple question, which is should women ask for a pay raise? He didn’t answer this question particularly well. He suggested that women should rely on good karma and trust that the system will eventually reward their incredibly good work and it was flat out wrong and he apologized right away. But this error in judgment in essence formed the catalyst I think for helping reframe the entire company it forced us to look at a number of our flaws in ways that we’ve probably never done before. It actually forced us to examine you know what was really important to us as a company and whether we had a culture that would ultimately support the kind of growth that was required to make that shift. Now six years on it is still very much a work in progress but I think the difference within the company has been quite significant. It’s a good reminder I think for us and for frankly any company that you know mistakes are often the portals of discovery. At a bottom-up level, this is something that I think has been fairly important for Microsoft. For many years, this hacking or growth mindset that Microsoft has allowed us to, at a very developed grassroots level culture, that warrants experimentation. And just two really quick stories that sort of I think emphasized that experimentation. The first one involves a guy by the name of Steve Gleason who was a former footballer, for the New Orleans Saints about seven or eight years ago. He was diagnosed with ALS and as his condition deteriorated, he worked very closely with Microsoft and asked us two very simple questions. One he wanted to be able to tweet using just his eyes as a mechanism of input. He wanted to be able to read to his relatively newborn son at the time, Rivers. And three, he wanted to be able to move the wheelchair that he sat in with simply using his eyes and so after three or four days of very hard work, we came up with a very rough prototype that is now ultimately being embedded into the Windows Operating System. The combination of artificial intelligence along with eye gaze technology to be able to allow him to perform all three of those tasks and it’s given him a greater level of independence than he probably ever could have expected. The second example I want to share is an application called Seeing AI, which Microsoft has been working on for probably five or six years now. I think of it as a suite of applications. It does everything from being able to recognize text to be able to recognize people and their emotions in any given room, all the way down to understanding or being able to recognize currency which for those from the U.S. you’ll know that all of our banknotes are not only the same color but they’re also the same size which makes it very difficult to recognize things when you’re doing a very simple task that we often take for granted like paying for goods and services. So these are just a couple of examples that have AI infused into the technology that are enabled by the culture that ultimately we’ve begun to establish at Microsoft and are ultimately important applications that I think can be applied beyond even people that have ALS or helps people that are blind. The last example I want to share with you is something that has come up certainly as we’ve gone through the pandemic over the last sort of seven to eight months. I think COVID-19 has proven to be a pretty fascinating example for us and helped us recognize some really important products and service gaps that we have and the role that AI can actually play to help solve some of these. So if we take meetings, as an example, you know when everyone is dialing into a meeting it actually forces us to begin to communicate differently and it also forces us to listen differently as well. You know on one hand we are able to almost deconstruct this sort of in-group, out group dynamics that are created when half the people are typically in a meeting room as they were nine months ago and perhaps the other half are joining remotely. It creates this environment now where I think everyone can begin to be heard on the other hand it creates this incredibly incredible cognitive load that comes from listening and communicating in new ways and that’s actually created a brand new set of challenges around meeting fatigue. And so, for people with disabilities in particular, these challenges are often even more acute but I think this sort of shows the spectrum of personas and mismatched human interactions that we’re looking for both inclusive design and I think also artificial intelligence to help us solve. So just a month or so back we created or launched a thing that we refer to as, Together Mode, which you can see on the screen at the moment. It has a number of people sort of sitting in an auditorium and it might sort of seem relatively simplistic and maybe even a little bit crude on the surface but what we observed as part of this design is that the brain is actually less sensitive to the errors of false eye contact or missed eye contact or gaze mismatch. And so what Together Mode does, is it spares people from the feeling of being constantly stared at by a room of people. The other thing that’s super interesting is that when we look at a screen that’s full of people, like the one we’re on right now, we often search for the most attractive person on that screen which in many cases by default, we look for ourselves because we are predisposed to thinking that we are the most attractive person in any given room. And what that does is it forces this notion that you are actually presenting to yourself which also creates an additional level of cognitive load. So these are just a couple of examples of how we’re beginning to start to apply AI in ways that will ultimately allow not only people with disabilities but you know entire populations of people who are perhaps underrepresented through technology, ways to be able to participate in a far more full and effective way. So with that I’ll hand back to the next speaker.

**Vera:** Oh thanks very much Ben. You know what really struck me about what you spoke about in part was that idea of cognitive load and how in the workplace now that is really quite different in the way that we are engaging with each other. And I think that was that’s a really interesting aspect to be thinking about in terms of how we can relieve that and the tools that are there to do that. That was fascinating and also the idea that we all think we’re the best looking I found that amusing as well. So now, Chancey you’re here, I see you great and are you ready to go ahead?

**Chancey Fleet:** I am ready, all right thank you. So I’m going to touch on some things that have already been covered. We have some overlap but they bear repeating and I’m going to deviate from that path in some other ways. As a blind person and then as an, that’s a great way to start a Zoom. So let me just first say that my position is as an Affiliate-in-Residence at Data & Society, listening to community stories and learning from the wisdom of the community and how we’re being impacted by AI in the real world when it comes to employment. Then in my role at New York Public Library, I coordinate technology education so folks come in with real world problems and I think I have the privilege of really being on the ground with users. I am also somebody that’s impacted by algorithmically biased AI and by advances in AI, so that’s where I situate myself in this conversation. I’m not an academic and I’m not a researcher but I am a community catalyst and community organizer and that’s where I’m adjusting you from today. So as a blind person and an ally in the broader disability community I worry a lot about the potential for AI and machine learning models when they are granted the ability to influence or to even perform judgments about our fitness to work, based on algorithms that are trained on data sets where disabled people aren’t adequately represented or may be trained on what developers consider to be models of normative or desirable behavior in employment contexts in either instance. Our non-normative ways of presenting and performing, although our ways of being may be as valuable in the employment context, or more so as normative behavior can cause us to be unfavorably flagged or screened out during the process of recruitment interviewing and even retention. So automated workflows of any kind, whether they’re AI or not, when they aren’t supervised by a human being or when they’re supervised by a human being that trusts the workflow more than the applicant or hire have the ability to calcify disability discrimination in a way that creates liability from employers legal liability and ethical liability and inequity for disabled applicants and hires. Consider the case of JobFlare, this is a mobile app which feels kind of gamified and it invites potential applicants to sign up and participate in a series of aptitude tests. High scores on those aptitude tests translate to an algorithmic recommendation to employers to consider an applicant. Some of the games such as a rapid-fire series of small math problems are accessible with a voice-over screen reader even so the timed nature of the math game conflates mathematical aptitude with an applicant’s speed at processing math as text-to-speech and responding on the touch screen keyboard which we all know can be very slow although many available positions in the real world might call for mostly mental math or math at a full-sized keyboard or math with proper accommodations. There is no way for the applicant to communicate a need for accommodation before algorithmic judgment about their time occurs. There is no human in the loop and no way to bypass the normativity of the test. Other games inside JobFlare feature graphics which don’t have alt text that are used to judge an applicant’s attention to detail ability to recognize patterns as well as their working memory, although many blind applicants would excel in a real world position where they could recognize patterns based on touch and sound. And although the working memory that many blind people have is excellent, blind applicants will always completely fail this test because it’s inaccessible. The algorithm is unsupervised. From the perspective of an applicant, there’s no “let me talk to a human being”, there’s no recourse and no way to ask for a more accessible test. Increasingly AI is being incorporated into the processes of testing, interviewing and even employee retention. Recent news has focused on AI proctors for exams. I know you guys have all heard about this news coverage, primarily focuses right now on the post secondary and K-12 context. But as more vocational processes go virtual, first we can expect this kind of testing to show up in remote context such as professional certifications and civil service exams, beyond being a fundamentally invasive technology that surveils test takers and causes anxiety and discomfort for people of all abilities. This tech may represent a distraction and source of extra anxiety for people who have disabilities related to attention, focus and anxiety itself. Proctoring software alerts the test taker when suspicious behavior is detected and that can mean a background noise in the room, your child, your husband, your tea kettle, your personal care attendant, the appearance of someone else in the frame. Again maybe your personal care attendant if you have a physical disability, the disappearance of the test takers face from the frame responding to these cues with calm and compliance and avoiding necessary actions like taking a break to move around or take medication creates an inequitable test beyond the intended test for people with disabilities and lots of people with disabilities who can’t stay in the frame the whole time or who move around in non-normative ways who have a legitimate support person with them are going to fail that test beyond the test and that means they fail the test itself. Increasingly, AI-powered tools are being used to screen behavior during job interviews, so look at me look at me closely as a blind woman whose eyes move continuously. I rely on my posture, tone of voice, and the content of what I say to convey what I hope is interest, attention, and motivation. Blind people like me as well as many with autism or with non-normative facial features may be screened out as inattentive or evasive when AI privileges normative eye contact. Emerging technologies for sentiment analysis pose a similar threat. Disabled people’s speech, eye gaze, and movement may register as undesirable, anxious, nervous and cause an employee to be flagged for their behavior either before they’re hired or during retention. Although sentiment analysis tools beyond eye gaze are still novel, I do expect their adoption to accelerate rapidly as more companies move virtual first and conduct their business increasingly online on platforms where sentiment analysis can be adopted without too much friction or reflection. Unchecked algorithmic bias as I said calcifies disability discrimination in employment in ways that may not be obvious, transparent or discoverable to an applicant or employee. We may also experience that there’s no path toward accommodation or reconsideration when algorithms are unleashed without supervision or when supervision is there, but it grants algorithms more trust than potential and current hires. AI though also has the potential to chip away at calcified barriers in the digital domain. Consider Apple iOS 14’s recent introduction of screen recognition. When an app is inaccessible because of improperly labeled and classed elements, this feature uses machine learning to automatically assign a label description and element type to inaccessible screen elements. Although the feature in its current iteration is only moderately useful correcting some but not all on-screen elements, its deployment is an indication that the screen reader of the future may leverage machine learning to create direct access to inaccessible content. As development in this area continues, it’s going to be exciting and liberating in some ways but it will be important to hold firm on the need for baked in accessibility which will provide more consistent and flexible access than an AI mediated interaction layer. For some years to come, I also see tremendous opportunity for growth in AI’s ability to help blind people render and explore spatial information, which is a core school skill in many employment fields. Google Chrome and [Apple’s] iOS 14 among others now offer automatically generated image descriptions that continue to be refined over time. Human-in-the-loop systems are still necessary in most cases, including for descriptions of complex images with emotional content and images with contextual content. For example, a description of a product that pulls out the features that you would most need to know when deciding whether your business should stock that product. However, AI can perhaps assist in providing a more granular real-time description for charts, infographics, and other images that follow a consistent controlled vocabulary with limited encoded use of color lines and text. I’m excited about AI’s potential for unlocking image content and rendering it as a textual description, series of tables, audio graph, or scaled up layer by layer, or braille labeled tactile graphic. Currently the expertise and labor required for translating infographics and charts to non-visual formats is a chronic high barrier to blind people’s access to this content. I believe that AI tools that gather salient content from these semi-routinized images and then give us control over how we’d like to explore it have a largely unexplored potential to unlock access for us particularly for maps and images that aren’t based on underlying CSV or other data sets that we can readily use in accessible formats. As end users as we confront barriers and pursue opportunities, it remains critical that communities of disability be consulted, centered and included as new AI tools are developed. We need more disabled people in the developer pipeline. We also need direct channels of recourse when we discover algorithmic bias so that we can flag the bias, receive transparent communication about how it’s being addressed and receive near-term accommodations to avoid algorithmic harm during the employment applications interview and career process.

Lastly I think that we need transparency in the algorithms that are used for applications, interviews, and retention so that we know what judgments are being made, how algorithms perform and we can spot as end users and as a community of allies and activists when algorithmic bias is being deployed at scale. That’s all that I’ve got, thank you.

**Vera:** Well I have to say that “all I got” is an understatement. Thank you very much for that Chancey you know that was really interesting and I’m seeing comments when everyone is speaking and people have really enjoyed all of the talks. Chancey you certainly received some wows, and this talk is amazing as well. I wanted to let you know that you were getting that kind of reaction. You know it struck me as you were talking that in a way, the spector of AI is something that we can’t question and we don’t always understand why decisions are being made. It kind of reminds me of when we first had to deal with automated call attendance and that sort of punching every button you could to get a human and that frustration of not being able to get to a human. I thought “wow”, in a way there’s some aspects of this here in AI decision making when we don’t understand why it’s happening and you know I heard this address by others. Shari you sort of talked about that with the transparency aspect so we don’t have a lot of time left so I wanted to give the opportunity for everybody to speak. But first for our four panelists, did anyone want to address or have a comment on anything that was said or want an opportunity to say something more before we open up to our participants?

I’m just going to give you a moment. Okay I’m going to assume that we’re ready to engage with the other people who are here today and I want to now extend also to our study group participants who are here today. Some of you have been putting questions in the chat and I think also some participants who are here as general audience members have questions or comments and so I’m going to just address some that were in the chat earlier and then I’ll ask others to give their questions. So Sybil, I see that you have a question. For example, I’ll make sure I add you to that list and although it’s hard for me today to tell who’s a panelist and who’s a general audience member, so I’m going to treat you all the same. So Errol you asked about the IBM tools that Shari had introduced and I see Shari’s put some links in the chat to them. But you weren’t aware of them, found them really interesting. Has your question around that been addressed or would you like to ask it?

**Errol Cerros [Audience]:** My name is Errol Cerros. I’m a Employment Specialist with Spinal Cord Injury Ontario. I’m part of your general audience and I do have some of my job seekers participating as participants in the research, so you know thanks to the opportunity. My background is in business and I’ve kind of like moved over to education and now working in this space with people with disabilities and employment and I found it very interesting and because of my background in business. It has helped me to kind of speak to employers and what I call corporate Canada. You know in every day or each day that I start to connect with them, just looking for opportunities for my job seekers and what I find is some companies really want to do well. They want to employ people with disabilities but sometimes they don’t know where they can get that support for that accommodation piece and I’m personally fascinated by the technology and all the stuff that has been shared here, I’m like a child in a candy shop with all of this because I see all the wonderful opportunities and how it can empower people with disabilities and certainly some of my job seekers. So after saying all of this I am putting it out there, I’m asking how can we get more of this information out to companies and businesses? To say here’s a technology, it can help to assist or to provide that accommodation that may be needed by a job seeker and I do get that accommodation most stands is sort of unique to the individual. But I also think that there needs to be more building of awareness around some of the products and the great work so many of your panel have been doing.

**Chancey:** I could potentially speak to that if you like.

**Vera:** Please do, Chancey.

**Chancey:** So in the states we have a non-profit organization called JAN, the Job Accommodation Network, and you could definitely do a web search for that and although it’s based in the United States, the website has a lot of information about the accommodations that people with varying disabilities do have. I would recommend that as a solid jumping off point, the Job Accommodation Network. What I would also say though is that most organized disability groups and civil rights organizations are a great place to start. So I’m a member of the National Federation of the Blind; there’s also another one called the American Council of the Blind and we are kind of support collectives among other things and we have a lot of wisdom including how to connect your applicant or your hire or with somebody who has a disability and maybe works in the same field. If you reach out to your local organizations of people with disabilities, you can probably find people who are doing the type of work that you’re curious about, how to accommodate and somebody that’s been in a job for five years working with a similar disability in a similar role is going to have a lot of wisdom to impart. Lastly, most people with disabilities that need significant technology accommodations have some kind of governmental support to go through a technology assessment process. That’s where the assessment center gets to know the person. The person gets to know all the different technologies that are possible and try them hands-on just like you would. Never buy a new car or new mattress or a major appliance without testing it out and making sure that it actually fits you. It’s really important for employees with disabilities to get some hands-on experience with different tech so that they can make an informed choice and be the most productive that they can be.

**Vera:** Thank you, Chancey. Ushnish you had a couple of questions in the chat would you like to say them or would you like me to ask them for you?

**Ushnish** **[Audience]**: Sure I can try and go soon quickly. So the question for Shari and employment being one of those areas where the people being rejected have no idea why they are rejected. So in that area, how would people even go the courts or argue about fairness of AI when you don’t know what you don’t know? And the other question for Chancey was specifically about the AI-based proctoring systems you mentioned. Has there been any court cases in the U.S. by people with disabilities or other advocates against them? Because we also know about them in Canada but it’s my assumption is that the Canadian legal protections against these things are much weaker than the Americans if there are court cases.

**Chancey:** I’m unaware of them and I think that’s because the pandemic has just accelerated the use of these tools so rapidly I wouldn’t be surprised if there are cases making their way through the courts now. When we hang up, I’m going to be doing some digging on Google News to see if I can find anything excellent.

**Vera:** Shari did you want to address the sort of the fairness question? I know IBM’s taking some steps towards that. Can you respond?

**Shari:** Yeah, hi, Ushnish, thanks for the question. It’s a very good question. How can you even take a company to court if you have no way to see into the decision-making process that an algorithm has made? But I think you know ultimately though in most countries, the law is clear right that that people need to be treated fairly on their own merits and if a company is using AI-based recruitment, that company is responsible for how that tool operates and if something were to go to court, if a complaint goes to court then what the court would be looking to do is to try to make a decision on whether that person was being treated on their own merits. So in practice what’s really needed is a way of demonstrating, from the company’s point of view, they need to demonstrate that their tool or their whole process allowed people to be included. So that’s one of the reasons why I think explainability is really important because the court needs something to go on to adjudicate whether or not there was a discrimination or an unfair decision. Right if it’s completely opaque, the court can do that so this might be one of the areas where we see legislation focusing on where it might become required or essential to be able to offer some kind of explanation for decisions. Maybe completely opaque decisions are just not going to be acceptable in future because if the court is completely in the dark, they can’t do their role either so I think that’s just another reason why we shouldn’t be designing technologies that are complete black boxes. They should be able to offer some kind of explanation. Yeah I see Ben nodding about that sort of black box issue, as well you know this is definitely that transparency is so important.

**Vera:** Sybil, you had a question.

**Sybil [Audience]:** Yes, but I think my video has been blocked by the host so I don’t know if you want to keep me up.

**Vera:** Do you want me to try?

**Sybil [Audience]:** I had it on but oh okay, there we go.

**Vera:** There you go.

**Sybil [Audience]:** Thanks so much. My question is about the customer user problem in this. I’m going to reframe it as the candidate issue rather than the employer creating the AI issue. There are specific areas where AI could be problematic for people with disabilities or in general hiring processes even before AI are problematic. I’ll give a couple of brief examples. There’s the gap in employment history and how that can be used in discriminatory ways. The organization of job tasks, whether these five tasks go together to create one job or these three and then these three over. There’s the lived experiences as a strength and having it recognized as strength, issue the capacity for problem solving around barriers that many people with disabilities have acquired and that is frequently undervalued. So I wonder how AI may be shifted, the development of AI can be shifted in a way that actually values the strengths that people with disabilities have and their experiences of these kinds of discriminatory barriers in ways that transforms these kind of hiring systems beyond the current approach. Thanks and that’s for anybody. But let’s start with Shari.

**Vera:** Did you catch that Shari?

**Shari:** I think so but I probably will miss some pieces off but let me try to rephrase what you were saying Sybil. Was that many of the strengths of an applicant with a disability are kind of rooted in their lived experience and an automated system? Like how could an automated system understand, acknowledge, take that into account? I think part of that.

**Sybil [Audience]:** That is certainly a component of what I’m saying so both that those strengths that are rooted in their experience and then also the barriers that are rooted in their experience like gaps in employment history, which could be time off or related to disability. So it’s just sort of shifting it from really seeing the user as the customer, the employer, to more of an employee-based person with disability applicant based approach.

**Shari:** Yeah so, I think this is one of the situations where let’s say I was thinking of using some AI system for screening people then if I involved people with disabilities in that decision process, those are probably the kinds of questions that they would bring to the table that we could then ask. The vendor that we were trying to decide, how would you handle this situation? Can you handle this? Is there another way around? I think that’s one of the things where there were like to me, it brings up the importance of thinking really carefully before you introduce any kind of automated system about whether it’s really achieving what you wanted to achieve right. So I mean it’s not just ability but diversity in general. If your hiring process is going to encourage diversity or is it going to work against diversity by helping you find more people who are like the people you’ve already got, for example. I think that that conversation needs to happen very clearly in organizations that are considering using some of these technologies. I think that the advocacy groups, the legal and policy makers also have a role to play in this whole ecosystem of holding these organizations accountable. To be able to say that, yeah we’ve considered this and we can accommodate that. I don’t have a fantastic magic solution.

Definitely a challenge you’ve raised Sybil and hopefully together we’ll be able to in our study group move towards some approaches for that as well. Now David had a question, I don’t have your last name David so I’m just saying David. You’re asking about AI having a great potential to help and then you’re sort of wanting large corporations like Microsoft and IBM to commit to not only generate accessible policies but ensure that all future customer products are fully accessible. You ask the question I think many have asked. Why is it taking so long to reach this goal after decades of standards being in place? Is there anything you want to add to that question David, before I throw it out of hydrothermal? Ben we’re gonna let you go for it.

**Ben:** I’m so happy to take this question. This is a great one, thank you David. Anything you want to add to that?

**David [Audience]:** It’s just that I’ve had a lot of experience especially with IBM but everybody’s using Microsoft products and it’s always frustrating that they say, “yes here’s the standards we’ve helped create the standards”. But they continually put out products like Microsoft Teams, that when I went to install a week a couple of weeks ago, this was not accessible. I had to get a Microsoft Specialist to help get past a step in the installation process on a PC. You know some there, they do well on maybe the iOS apps but they miss the ball. I have a problem just installing the tools and IBM and other companies have the same problems they don’t have a complete end-to-end accessible solution so those of us with disabilities end up getting frustrated and can’t be totally independent in doing the job.

**Ben:** Yeah let me give you a sense of what the ideal world should look like and should look like every single time. That we apply sort of a human-centered design process that ensures that every single part of that product development supply chain has people with disabilities, has a diverse team in its own right helping design and create the kinds of software and hardware experiences that ensure that they are as inclusive and as diverse as the customers that we are. We aim to serve, the reality is that we don’t always get that 100. And I think if we were to, I think the challenge we always have, is how do we balance this idea of getting products to market and at the same time ensuring that they are completely inclusive? There’s another layer which I’ll throw over there which a lot of technology companies I think kind of run into, which is trying to balance this idea of what is compliant by law and policy? And what is actually accessible?

Because the two things are not the same thing as we all know and so I think there’s this element of can we ensure that our ultimate goal is to ensure that we can create and ensure that every single product is accessible as possible and we want to be able to do that as early as we possibly can when products are released, ideally at the same time. So use Teams as a good example I think. And I reference Teams in the in the presentation that talked about earlier, but I think that one of the challenges I think we’ve had with Teams is, and I’ll use the experience of someone who is deaf or hard of hearing as an example. Once you create an environment that is completely virtual, like we’ve seen over the last eight to nine months, the impact that has on someone who is deaf or hard of hearing is absolutely out of control. I guess I have the luxury of being able to see this up close and the work that Jenny now has to do to be able to lip read someone that’s talking, have another screen that is set up to ensure that she can see a sign language interpreter, and then also focus on the captioning that’s at the bottom of the screen, becomes increase on a huge cognitive load for her. So the net is I haven’t got a great answer for why we’re not faster, other than to know that part of what we’re trying to do is ensure that we are embedding people with disabilities into every part of that design and development process. We’re not going to get it right perfectly every single time but know that that’s our goal and that’s our intention.

**Vera:** Thank you very much.

**Ben:** Do you want to add on to that?

**Vera:** Go ahead Shari.

**Shari:** Do we do we have time for me to add to that? Yeah as a manager of the IBM Accessibility team, whose job it is to help the rest of IBM to put out accessible products the first time. Every time, as much as possible, we ask ourselves the same question. Why is it so hard? Why does it take so long? Why aren’t we making progress faster? We actually did a study last year. We did a longitudinal study of teams within IBM because IBM has 3,000 different products so we have software teams working on things that are 20-30 years old and brand new and all sorts of different technologies in between them. We did a bit of a deep dive to try to understand, what are the pain points? What’s holding the teams back? We know what we’ve got to do, we’ve got all sorts of guidance and requirements and measurements and training and all sorts. We have a corporate mandate, everything has to be accessible. What’s painful and what’s holding teams back, so we really were looking into that. One of the things that was interesting to me, that came out of that work that we did, was the change in the way that software has developed these days to a much more agile process is something that I think accessibility work needs to catch up with a little bit, at least that’s what we found. So things are developed at IBM, most teams are using an agile methodology which means that you work in kind of short intense bursts and you pick one small thing. We’re going to add this thing and that’s our goal for the next three weeks. You know until people work really hard to finish this sprint and they put things out, and there’s this sort of mantra of move fast and break things and it’s better just to get something out. All of this and we in accessibility are what we came up with was that we need to make the work of doing accessibility more approachable, more easy, to break down into pieces so that every time a team is doing a sprint, they can do accessibility as part of their sprint. Designers are the key to accessibility. Almost everything can be can be kind of traced back to design decisions in products and so we’re really putting a lot of effort into providing guidance that’s targeted at designers. Developers, although developers have an important role to play too but it’s really designers and building knowledge of accessibility and thought about accessibility into design that I think is going to be the key. Accessibility is a big topic, I think our automation tools for testing the basics of accessibility. Then they can’t test everything, there’s a lot of human work involved in even testing to the standards level, never mind testing that something’s really truly usable on top of it. There’s a lot of scope for research, any researchers out there I would love to see more research on accessibility testing that can be built into those really fast development cycles that teams are using these days where things are going out in a week and two weeks and you release every month. The proper testing is just harder to squeeze into those fast cycles.

**Vera:** Great point. Anhong you have your hand up and I actually had a question for you too so why don’t you go ahead.

**Anhong:** Yeah I totally agree with that, Shari and Ben just said so. I think building products with accessibility first perspective is super important rather than as an afterthought. Kind of like I think what Shari just suggested, of creating automated accessibility testing tools that kind of fit into the existing product lifecycle. If there is user testing being done, their accessibility testing should also be done at the same time and I want to mention something else, which is that there are a lot of emerging technologies such as AR, VR or smart environments etc. that are kind of still growing and they are not entering into the mass market and used by a lot of people yet. I think there are a lot of opportunities to shape that experience and make sure they are accessible from the beginning, so like I’ve been and many other researchers in the field have been doing research on how to create tools that are kind of accessible to help developers can very easily create AR/VR experiences that are accessible from the beginning. I think academia working with industry and also potentially other non-profit organizations to set up auditing processes on AI models is also very important aspect.

**Vera:** Thanks very much for that and I know I said I was going to ask you a question around the building of accessible data sets and whatnot, but the fact is we’ve already gone a little over time and I wanted to spend a bit of time talking just to our 16 study group participants. So I’m going to hold on to my question and maybe send it to you later, Anhong. Thank you to everyone who was here today and especially to our panelists who just gave an introduction to our topics and the various aspects that I didn’t even imagine could happen in the 40 minutes that we allotted. To that, really super job, thank you so much. People are asking and hoping that maybe once in a while we can still contact you as we do our own studying in the area. So you can expect to hear from me but we promise not to over exceed ourselves in your time but much appreciate your efforts on our behalf today. Thank you very much.