Bruke Kifle: This is ACM ByteCast, a podcast series from the Association for Computing Machinery, the world's largest education and scientific computing society. We talk to researchers, practitioners, and innovators who are at the intersection of computing research and practice. They share their experiences, the lessons they've learned, and their own visions for the future of computing. I'm your host, Bruke Kifle.

In a world where technology and computer intelligence are rapidly evolving, the imperative of our time lies in designing technologies that empower rather than diminish human agency. The accelerating pace of technological advancements can oftentimes be seen as a double-edged sword, offering tremendous benefits, but also posing the risk of disempowering individuals and communities. Today's guest, Dr. Jacki O'Neill is dedicated to ensuring that the technologies we create enhance rather than remove agency and create sustainable futures. Dr. O'Neill's research is not solely driven by innovation for its own sake.

It's deeply rooted in a commitment to serving underserved communities. Across Africa and other similar regions, the challenges are as diverse as they are pressing access to fundamental necessities like healthcare and education can be limited and financial services and infrastructure may be lacking. However, there's immense potential in leveraging multidisciplinary approaches that combine research, engineering, and design to address these local challenges effectively.

By working collaboratively in co-designing solutions, we can harness the power of technology to bring about positive change in these vital areas across healthcare, education and financial inclusion. The promise of this approach is to uplift communities, enhance their quality of life, and create sustainable solutions for a brighter future. Dr. Jacki O'Neill is the director of MARI, the Microsoft Africa Research Institute, where she's building a multidisciplinary team combining research, engineering and design to solve local problems globally. An ethnographer by trade, she focused her research career on technologies for work with the aim of making work better and technologies for societal impact with the aim of supporting underserved communities.

Before leading the MARI, she was a principal researcher in the technologies for emerging markets area at Microsoft Research India. She has led major research projects in the future of work for new labor platforms to workplace AI and chat, digital currencies and financial inclusion and global healthcare. Dr. Jacki. O'Neill, welcome to ByteCast.

Dr. Jacki O'Nei...: Thank you so much. I'm delighted to be here.

Bruke Kifle: Well, super excited to have you. I'd love to start off with a question that I really like asking a lot of people, which is can you tell us about your personal background and perhaps call out some key inflection points throughout your

personal, academic and professional career that have led you to the field of computing and what you do today?

Dr. Jacki O'Nei...: Yep, absolutely. So I come from your typical lower middle class background in the UK. I was born and bought up in Plymouth, which is a port town. I was quite academic, but I absolutely hated school. All the pointless rules and the outdated worldviews made me quite miserable. So why am I bringing up my childhood? Well, there were two formative events I think in my childhood that influenced who I am today and the research I do. So Plymouth was deeply impacted by the deindustrialization of the UK in the 1980s. It was a dockyard town, it's a dockyard town and a naval port, and the dockyard was the main source of employment for young working class men. Men in those days because it's a long time ago. Things were a bit different to now, but that's where most of the boys in my street were likely to get a job when they grew up.

Yet during my childhood, that completely changed because of the deindustrialization and that had a devastating effect on Plymouth like many working class communities across the country. So that was one major important point in my childhood. And secondly, and quite separately, in secondary school, a new subject was introduced, which was computer science. We all got one lesson of computer science, which absolutely intrigued me and I really, really wanted to take it as a subject, but as there was only one computer in the school, then we could only take it if we had a computer at home, which of course we didn't have a computer at home. But somehow, programming Hello World into that blank screen, which I'm sure we've all been there, planted a seed that came back later, grew later. So I didn't do computer science at school. I went off and did a psychology degree at Manchester University.

I finished in the middle of an economic crisis where jobs were super scarce, and I worked my first part-time job when I was 14, and I've done probably over the years, everything you could imagine from stacking shelves to bar work, to cooking. I was a cook in a small café. I did a lot of cooking for squash clubs and cricket clubs and things like that. I worked in a bookmakers, if you know what that is. It's a betting shop in Moss Side, which is one of the more interesting areas in Manchester. And I eventually found a job in libraries in Manchester. And again, I was working in some of the most deprived areas of the cities and at the same time watching those vital services, libraries, sport and community centers being closed down and the impact that had on already deeply impacted communities. But when I was working in the library, they were doing digitization and my boss then said to me, "Well, we'll fund you to do a master's if you'd like to do a master's in library and information studies."

And I was suddenly like, "Ah, this is my chance to get into computing." But I realized if I did that master's, I will be stuck in libraries forever, which I didn't really want much as I enjoyed my job. And so I was inspired to apply for computing-related masters on my own independently. And I got a funded place at Manchester University on a research, if you can imagine coming from a social

science background. So there were very few masters that would accept, like social science students on the computing program. I had to work insanely hard that first term to get up to speed on all the terminology and everything, but I really, really loved it. But during my master's thesis, I was working on GRAIL, which is a medical modeling language which came out of Manchester University.

And I realized that I didn't want to sit in front of the computer all day, and I actually wanted to do something that combined the social science and the computer science aspect. And so I did a PhD, which is what enabled me to get into human-computer interaction and also really revealed my love of research. And the rest, as they say, is history.

Bruke Kifle: What a very interesting background from your childhood in Plymouth, Manchester, to the diverse work experiences. I'm sure all of that has greatly informed what you do today in the focus area that you take as a technologist. One thing that I found interesting is you described your initial academic background in psychology, right? And you're an ethnographer by trade, which is a very interesting foundation, especially when you think about technology development. So combining both your personal experiences growing up and some of the things that you've observed with your local communities, but also your academic background and your foundation as an ethnographer, how has this influenced your approach in the design of technology?

Dr. Jacki O'Nei...:   Yeah, it's really, really influential. I learned about ethnography in the context of my PhD. So I was already doing computer science, and that's when I learned at that time there was a lot of ethnomethodologically-informed ethnography, which is my background, and it was being applied to human-computer interaction and CSCW computer-supported cooperative work. I mean, this was the heyday of those things. There were so many industrial labs and academic labs that were creating really cool collaborative technologies, different ways of doing interfaces. Everything seemed like you could do anything, if that makes sense. It was such an exciting time, and that's also why I went to work in industry. I knew that I wanted to be designing these new core interfaces, these new ways of working. So that ethnography just seems like a way to really understand what people need and what questions you should be looking at.

Too often when we design technology, it's about a technology looking for a solution. And it seemed to me that actually what you want to know is, well, what are the challenges that people actually have that technology could help solve? And furthermore, what I like about ethnomethodological ethnography is it teaches you to look very closely at the mundane. So you are not looking at the big things in sociology often you're looking at the really big things like power and gender and things like that. And those things are important, but actually, if you're designing technology to support people at work. You want to understand how they do their jobs and you want to understand how they do their jobs in great detail. And that's one of the things that close looking really gives you If we

want to design computer systems which support people rather than control and constrain them.

So often what's wrong with our computer systems is they embody outdated management theories about how you should control workers and how you need to make sure they do the right thing, instead of thinking about how can you support those workers, how can you enable them to do the best job possible? And that was in the early days of workflow technology, which was when I was doing my PhD, there was a lot of that about that was a real challenge. That's why it often wasn't used. It goes right through to now with the crowdsourcing, with the platform economy. These technologies are designed from the organizational perspective. They're not designed from the perspective of the people who will use them. And one of the things you get with ethnography is you actually have to take the perspective of the people doing the work, and that automatically means you're going to design technologies for them that enable them to do their job well rather than for the organization or what the managers think workers do.

Bruke Kifle: I see. So in terms of the actual research methods, so does this involve joining folks in the workplace? Does it involve interviews? What are the primary methodologies in which you can effectively design technologies for people?

Dr. Jacki O'Nei...:   For design, I really think you need observation. You can certainly do interviews and you get a sense of maybe what their biggest challenges are. And interviews, we do lots of interviews, don't get me wrong. They're very useful. But when I think about ethnography, I'm really thinking about following people around while they're doing their work, trying to understand what they care about, what's their orientation? What do they actually do, where do they have challenges? Often the challenges you have are so routine and regular that you would never report them in an interview. Only if somebody's looking and seeing what you're doing, do they see that there's a challenge there. And that's the way to really get into a problem at depth. So if I can give you an example from my previous work at Xerox, which was one of my first jobs, we looked at print shops perhaps unsurprisingly, and there was a problem with this very expensive color printer that was a production printer.

And so we went into the print shops and we looked at the print shops. It wasn't doing very good color management and nobody knew why. The company had lots of complaints from customer. Voice of customer said, "We need to improve this," but nobody knew what was going wrong. So when we went in, we looked at what the printers were doing, and then we actually went to the graphic design houses that are sending the jobs to the print shop, and we looked at what they're doing. And what we found is that color management's this technical system, but printers and graphic designers think about color visually. So can't work around color management an infrastructure, so you have to use it. But they were not able to use it in the way that it had been designed.

And we actually took some color management technologists out into the field with us. And one of the most gratifying things, one of them says, "I've just spent 10 years working on how to get a better color management algorithm, but actually that's the wrong thing because if nobody can use the things I'm creating, it doesn't matter how good my algorithm was." And then they moved to trying to enable people to adjust color management using natural language. So I don't know if that gives you an insight into how you can see the how and the what of problems, if that makes sense.

Bruke Kifle: No, I think that's super compelling. I was sort of in parallel relating to my personal experiences as well. I worked for some time in a discipline of what we call product management. And a big idea or big key principle is not just designing or shipping products and features for the sake of doing them, but at its core, trying to understand what is the user need or the pain point that you're trying to solve. And I think especially nowadays, where we're seeing the emergence of very impressive and fancy technology, there's the natural instinct to just want to slap on a new capability or a new feature without actually being driven or motivated by a real user need or a user pain point.

And so I think this is an important principle for the success of a business and an organization, but also for ensuring that the products that you produce are in fact adding value or addressing the true issues that users are facing. So 100% aligned with the ideas. In addition to some of your background as an ethnographer, I think one thing that I found interesting is your diverse geographical experiences, right? So you said you were at Xerox previously. I believe your career has taken you to MSR India in Bangalore. Is that correct?

Dr. Jacki O'Nei...: Yes.

Bruke Kifle: And so your career having taken you to various parts of the world working on diverse projects. I find that to be a very interesting experience in terms of shaping how you think about the world. So what initially motivated you to seek these international experiences and how has that exposure ultimately shaped your interest in designing technologies at a global scale and thinking about impact at a societal scale?

Dr. Jacki O'Nei...: Yeah, absolutely. I don't think I was particularly motivated to seek international experiences honestly. Although I had friends who traveled to places like India and South America on big trips when I was in my late teens and early 20s, I was never able to do that. I never had the money. So I wonder if it's a bit not being able to take computer science at school. The seed was maybe planted but didn't germinate for some time. I would've loved to have gone on those trips, but it was way out of my budget and probably also a little bit out of my vision. It would seem big and scary to do that sort of travel. But when I got my first job, it was at Xerox Labs in Cambridge, just as I was finishing my PhD with... the amazing Graham Button was lab director, and he's a very, very well-known

ethnomethodological ethnographer in computer science, so I was just excited to be working there.

But the labs closed very quickly after I joined. I promise it wasn't me. And I was offered a position at Xerox in France. So I took it and I moved to France, and I think that sort of opened my eyes to the possibility that you can actually go and work in another country. It's not this big impossible dream and that people can actually go and do it. And whilst at Xerox, they opened a research center in India in 2009, I just went to my boss when I heard they were opening it and I said, "Well, if there's anything I can do to help, I don't really know what." And my boss said, "Sure." So I went to Chennai for a couple of months in 2009. I went to Bangalore for five months in 2011, and I ended up setting up the ethnographic research team for Xerox in the India lab.

And that was just the most amazing experience. The food, the culture, everything. And most importantly from a work side is I did not have to justify why I would want to build technologies that made work better for the people there. Whereas when I was doing call centers, so I was often working with the sort of... I'm going to use inverted commas, "lower skill" because actually there's a lot of skill in call center and BPO work, but it's considered lower skill when it's paid like that as well. I was always having to justify why do you want to make work better for those people? It should be about making it more efficient or not really thinking about the worker and taking their concerns. Whereas obviously when you are working with lower income communities, nobody questions why you would want to make life better for them or make work better for them.

So that was quite nice as well, that you weren't always having to argue your case. And the case is obvious anyway, which is if you make work better for the workers, they will do better work and they will be happier and more motivated and everybody wins. And that's such a basic argument, but often it's sort of forgotten. But not having to fight for everything that I wanted to do was a big pleasure of working with those communities. And I also started doing my work around the platform economy there. I was looking at crowdsourcing in 2011, and then I was also ready for a change. And so I was like, okay, I'm enjoying this work. I'm enjoying India. I'm looking for a change. So Microsoft's technology and emerging markets group is pretty much the best in the world for research in the ICT4D space.

So after having my first son, so there was a little bit of a gap. I knew that I wanted to do it, but I also was having my son. So I went into the maternity leave and everything that I had with my existing job. I got a job in India with the Microsoft and moved my family to India. But I have to say I worked in the ICT4D space for a little bit. And again, just coming back to my argument about why you should have to argue about making work better for people, it did lead me to wonder what's the difference between the work I was doing in Europe and the US and the work that I was then doing in India, which was somehow now TEM. And I came to the conclusion that the main difference was I was now designing

technologies for lower paid workers in India, whereas previously I was designing technologies for lower paid workers in the US and Europe.

And if one of them is ICT4D and the other isn't, that gave me some problems philosophically, I guess. And so over the years I was there, I sort of shifted away from an ICT4D perspective and moved back into my workplace technologies perspective with just like I'm building workplace technologies in India, and previously I was building workplace technologies in Europe and US. So that was a really interesting conceptual move that I made just whilst doing that work.

Bruke Kifle: Very interesting observation and what an interesting professional journey working in different practice areas, but also different geographic locations. I'm sure that lends itself to a very fulfilling life experience. After your time at MSR India with the technology for emerging markets group, I understand you've joined or helped with and lead the Microsoft Africa Research Institute, which is something that I found super, super exciting. So can you help me understand what exactly was the driving motivation behind the establishment of the MARI? And now in your role as the director of MARI, could you share some insights into some of the mission and goals of the group and how you think about addressing local problems?

Dr. Jacki O'Nei...:   Yeah, absolutely. So Microsoft has a really well-established research presence across the globe. US, UK, India, China, and now more recently we have more labs in other places as well. But we had very little research presence in Africa. And in 2019, Microsoft was setting up two software engineering centers in Africa. The ADC is the Africa Development Centers, but that's software engineering development, not HCI4D type development in Lagos and Nairobi. And I think it was the combination of this gap in Microsoft's research portfolio and family motivations for wanting to come to the continent led me to pitch the idea for MARI, when I heard that the ADCs were opening. I'd long thought this was a gap in Microsoft's research portfolio. And so when I had the ADCs were opening, I was like, okay, now's the time to suggest that we set up some research centers there. And a long and complicated story, but I got funding in March 2020 and moved to Nairobi in September 2020 to set up the MARI.

So it's no coincidence that we're within a software engineering center. We're an applied research center. So that's something that's important to know. And our aim is to bring research closer to engineering, and so we're closer to product. So we co-located with the ADC. I'm sitting in an ADC office, a MARI office, we're right together and we work on both immediate product needs and that sort of one to five year opportunity and challenges space. We primarily work on cloud and AI. Of course, that's probably no surprise and even less surprised that generative AI is right at the forefront now of our research. And we have a multidisciplinary team.

And all of these that are being close to engineering, being applied, having a multidisciplinary team, we're all... by design, they're the fundamentals of MARI.

If we want to build technology that people can use right now then or within a couple of years that really take the advances of computer science that might be coming out of other longer term research labs and apply them to real problems that we see in the world, that's the space we need to be working on.

It's also really important, like the geographical diversity of the research centers is really, really important and it can't be underestimated. I think by doing research in different settings, you see new challenges and opportunities and you see known challenges and opportunities differently. It gives you a different perspective on the world. And if we are thinking about innovation, innovation's always creative. So it comes out of seeing the world in different ways. So I think that's really important. And another thing I want to stress is MARI is not an ICT4D research center, but an applied research center really addressing the opportunities and challenges at the intersection of what's important for Africa and what's important for Microsoft. And again, that was very much by design, because making work better for the workers should have a positive impact on everyone. And that can be healthcare workers. That's how you address healthcare issues.

Typically, one of the big things that I found working in India was that, and it's a principle of the technology for emerging markets team is something that the way to have impact with technology, technology doesn't solve anything but put useful technology that enables people on the ground solving things to solve things better, or more efficiently or more at scale. That's where you really affect change. That's where you really address people's lives. So even whether you're thinking about sustainability or you are thinking about healthcare, these are actually workplace situations because typically, you are designing technologies for healthcare workers or you're designing technologies for people on the ground who are doing sustainability work. Does that make sense?

Bruke Kifle: Mm-hmm. Very interesting. I think one thing that I find pretty compelling or interesting is you described this idea of being very applied, right? And this is reflected in the design of the team at MARI. It's a very multidisciplinary team combining engineering, research design. And you even mentioned that you co-locate with the actual ADC. So I feel like that's a very important principle to ensuring that you're not just developing technology, but you're actually ensuring that it's used and relevant and applicable to the local context. So when you think about this idea of a multidisciplinary team, one, can you provide some insights into some of the challenges and benefits of collaborating across what might be deemed as different silos?

Research is very different from engineering, which is very different from design. And what exactly is the experience of working on a very practical applied research organization or team? Folks have great experience working in research and maybe folks may have great experience working on product development, but being able to blend that into a full end-to-end experience where you drive product development or the foundation is really core research. What exactly is

that experience like? And again, what are some of the challenges with working across a multidisciplinary team?

Dr. Jacki O'Nei...:   Yeah, absolutely. It's not easy first of all, but I believe that it's worth it. And it's not even just that we have research and design and engineering. We have different research disciplines. So we have AIML researchers, and we have HCI human computer interaction researchers with a more social science background. And we often view the world from completely different perspectives. You can say that we often talk different languages, technical languages, but that's where the value lies, because by having those different perspectives that each discipline brings to the table, as long as you are willing and open to learn from one another, then that's where the magic happens.

When I was doing the interviews for Mari, that was one of my big questions was about how can you work with other disciplines? Are you open to having people criticize and misunderstand and challenge your ideas? And it can be really painful. We can be really sensitive about our research ideas or our design ideas, but actually by being able to have forthright discussions to disagree, to get frustrated, to retire, to think things through, think about what someone else said, try and understand why are they misunderstanding me? Why don't they understand what I'm saying?

And then you come back, you get a sense of why you might need to talk to them again, and then you can come back with a solution that actually balances different viewpoints. And it's just the whole is so much greater than the sum of its parts there. And it's so important to do that. That's what I think if we are trying to build technology that people really can use and that addresses real problems. You need to have the algorithms, you need to have the technical innovations. You need to have a deep understanding of what people need. You need a lovely design and you need somebody to build it and to specify it and to tell you that you need to specify those requirements. Those are all really important.

I wonder if I can give you an example. Okay, so one of the places where we are working right now is we want to build workplace technologies, which everyone can use. So a big area for us is around multilingual AI, and large language models have bought us much, much closer to achieving real multilingual AI. It's a massive leap closer in a wide range of languages, but English still does outperform pretty much every other language, because of the training data. So the training data is largely from the English-speaking global North. And so you end up having a data divide in that data and language is just one of the ways it plays out.

But if we want to address this data divide, if we want to make really equitable large language models that can democratize AI for everyone, then you need HCI and the social sciences to understand how does the data divide actually play out in people's everyday work? What does it look like? What are the everyday

problems that say small businesses in Africa using generative AI face? And actually we found that many of the problems that they face, they loving using generative AI's really great, but all of their challenges are caused by the data divide. And these are SMBs that work in English, this isn't even getting down the language line. But given this, when we understand how they experience it, we can really think about how to best to address it. But you can't address the data divide with a social solution. You need your AIML people to be really thinking about what does this mean to be running experiments, to be trying different things.

You need systems and engineering to try and create different solutions. Is it a training set solution? Is it something you build on top of the generative AI, and you need design to implement these solutions in a usable way? And it's like only by having those disciplines, knowing one another, and the advantage of being on a team is that you are really working closely together so you learn one another's language, so you don't have quite so many misunderstandings. Over time working together very closely, you come to understand one another, but you have to want to, if that makes sense. I'm not sure I answered all of your question there, but [inaudible 00:31:32].

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And ultimately it seems like it's this combination of all these disciplines that are necessary to actually deliver meaningful value. And it seems like the biggest challenge, at least initially, one of the biggest hurdles is how do we ensure that these different practices or disciplines speak the same language? How do we make sure designers can understand engineering? How do we make sure engineers can understand the thought process or framing of researchers? But I think once you're able to ultimately bypass that sort of communication gap, that's when you start reaping the benefits of a truly multidisciplinary team. One thing-

Dr. Jacki O'Nei...:   Can I just hop in just before-

Bruke Kifle: Yeah, of course.

Dr. Jacki O'Nei...:   ... just because I suddenly remembered something that... so Richard Banks, who's a designer in MSR Cambridge, has been doing some really interesting work. Because you're right. It is about understanding one another's languages and ways of thinking. And the only way you can do that is working closely with people. And what HCI, including myself used to do a lot before is we were always calling for the technical people to be listening to us and understanding us and taking us seriously. But one thing that's really interesting with AI and what Richard has been doing is Richard has been fully integrating himself into machine learning teams who are working on the newest AI. Because he's like, "I

need to understand them." Many of the important design decisions when we're thinking about designing models get taken way before anything would ever come to an HCI person or a design person.

But once those decisions have been made, they're consequential for how you can use the thing and it's too far down the line. So he's done, and I think we all need to do this, and that's what we try and do in our team. We all try and understand what one another does, just taking those color scientists out into the field many years ago, and we're running a field study right now of a small LLM-powered app that we're testing, and the engineers have been going out into the field as well as everyone's going out into the field. And that I think really helps. That's something we've been calling for a long time, but at the same time, what we're realizing now is actually HCI people design. People have to get into the mix and really try and understand what's the fundamental things that these machine learning people are doing, and where are those key inflection points and key decision points about model design that we need to be intervening in, if that makes sense?

Bruke Kifle: No, certainly.

Dr. Jacki O'Nei...:   Which is challenging.

Bruke Kifle: Without a doubt. Without a doubt. And I think even with the emergence of a lot of these AI capabilities now, disciplines that you would've otherwise never thought being involved in AI, for instance, whether it be philosophy or psychology or ethics, are becoming very, very important topics. And so I think as we're continuing to see the involvement of advanced technologies, I think we will certainly benefit more and more from having folks with different backgrounds and different perspectives, part of the conversation and part of the early stages of design, not just sort of after the fact and the implementation stages of technology.

So I think that's a very, very solid point and really presses on the importance of integrating multidisciplinary perspectives throughout the technology development pipeline and process. One thing that I find very exciting is, like you said, the choice to have a presence in Africa, because I think there are a lot of interesting statistics about Africa as an emerging market, exciting potential with the growing population, the youthful population, the potential for economic growth and economic impact.

So considering that you do lead Maori, the Microsoft Africa Research Institute, clearly Africa is an emerging market with many unique challenges and opportunities. And of course Africa is a very diverse continent. But how do you see, or how do you think about technology... and I specifically am interested when the latest emergence with AI or regenerative AI, but how do you see these technologies playing a role in addressing some of the local problems? And what

are some of the exciting areas that you're looking into or your team is looking into in terms of addressing local problems?

Dr. Jacki O'Nei...: I mean, as you know, Africa's a group of very diverse emerging markets, if we want to use that terminology. Although I'm not sure if we are talking about true sustainable development, we may want to move away from viewing everything as a market. But let's put that aside for now. I think the new generation of generative AI goes some way democratizing AI in that anyone can use it because of the conversational interfaces and the free or very low-cost solutions that are currently available. And we're seeing that it's really interesting. We've just done a study of small businesses using generative AI in their business, and they are finding massive productivity gains.

They are really, really enjoying using it. And we looked at businesses from creatives to legal to frontline workers who are using generative AI, and it's really is so interesting to see, whereas previously they would've been largely excluded from using AI because they would've needed a specialist team and often quite a lot of money to be able to deploy AI in their business. But now they're able to just deploy it because of the conversational interfaces. And even the legal services team, which actually they have proprietary AI software, but they can only use it for big cases and they have lots of small cases where it could help save them time.

They obviously can't use the current set of free tools for their legal cases, but that's where they would like to arrive at being able to have tools that you can use for the small cases that save you an equal amount of time for the big cases. So I think there's so much opportunity there. It's such an exciting space and we are just at the beginning of it. How do we really ensure that we have conversational interfaces that enable us to do all the things that we want to do in a much more joined up way? At the moment, we tend to be working in this app or that app. And often to do a task, we're working in several different apps and interfaces.

And if you are a mobile first, which many SMBs are, that makes it really quite complicated and clunky and there's a real opportunity to revolutionize. It's as big as the graphical user interface, I think. And if really designed well, it could really democratize the use of AI and empower us to do many, many more things. But then you have big challenges such as the data divide. And if we want to create equitable systems, then we do need to overcome the data divide and think about how we're going to do that. So I don't know, for me, I think it's a really exciting time. It's also a very uncertain time. The world is changing quite rapidly globally, and I have to say there's a real opportunity for African countries to be at the forefront of that change.

And that's a really big opportunity. It's as big an opportunity as Africa also has to think about building green economies and just skipping all that, just like with skipping the plugged-in phone and moving straight to mobile, there's a real

opportunity to just create green economies. And I think there's so much. Yeah, it's a very exciting time.

Bruke Kifle:

Are there particular sectors or industries where you think tremendous value could be provided, whether it be improving quality of care in the context of healthcare or enhancing education and skill development? Are there areas where maybe the value or true promise of some of these technologies may not be as big in the west or certain developed economies, but could have tremendous opportunity in terms of shaping Africa's future? And if so, what are some of the biggest opportunities and challenges that you see?

Dr. Jacki O'Nei...:

Yeah, that's a really good question. I'm always very hesitant about some of the discussions around generative AI in healthcare, for example, even though we do work in generative AI in healthcare. So it definitely has its uses, but my hesitation comes from some of the ways the visions play out. So if the vision is to amplify the work of healthcare workers, that seems like a good vision to me. And there aren't enough healthcare workers pretty much in any country anywhere in the world.

What you don't want to end up is an inequality where people in the global north could get to see a doctor, but people in the global south have to rely on generative AI. That doesn't seem like progress to me. So I think we have to do it very carefully. And that's again where that thread of amplifying using technology to support the people who are doing the work, and there are so many great uses of AI technology, but also augmented reality.

There's a great project that came from Microsoft in Ghana, where there's a team of specialist plastic surgeons who fly out for a couple of weeks a year to a hospital in Ghana. It's a collaboration between University of Edinburgh and the hospital in Ghana. And they do the really difficult cases. And what they're using augmented reality for, they've set up an augmented reality room in Ghana is they can now do all the pre-op stuff before they go. And they can do all the post-op stuff when they come back. And so they just arrive and they just do all the surgeries assisted by people... the really complicated ones. So they save their complicated cases. And then they're assisted by the people in Ghana who are learning the skills as well. But they've also found some knock-on benefits of this system, which is now the patient when they're in the augmented reality room, often didn't know what was going to happen.

Even though they're signing forms and they're getting it explained, they often didn't know what the actual operation was going to be. But because it's now visually represented on screens, they can see it themselves when they're talking to the doctor. So you are actually getting this knock-on benefit that patients are not coming round and going, "Oh my goodness, what's happened to my leg?" Or something like that. Because they actually understand what's happening because they could visually see it. Because obviously explaining an operation and visually understanding what's going to happen are two completely different

things. So I think there's a lot of opportunities for healthcare. I just think we have to be very careful how we do it. And then one of the things we've seen in our studies that's really very important is the value of the social and relationships, for example, to doing business like in small businesses.

And we call this thing Social Texture, we made up a name for it. Basically where human relationships and people are prioritized, and it's the bedrock of business, particularly SMBs in Africa. And we actually saw that it helped them survive the shocks of the pandemic. Now if you're thinking about how do you apply technology, it's like how do you enable businesses to be data-driven? And many of the businesses that digitized during COVID were very excited by the data they have, but they also recognize that need to balance being data-driven and relationship-driven. And we can really think about how do you do that? This is an example of a question which came from a local setting, but has global relevance. If we truly want to create the best world, then we need to be very careful how we use technology and recognize disadvantages of technology as well as its benefits. So in the global north, there's a rush to automate.

So you've got assistant-less shops, in the UK now they're doing a massive program of getting rid of the people in ticket offices in train stations. And there's been a big outcry of this because those types of innovations, they affect vulnerable people disproportionately, certainly. So that's what a lot of the outcry has been. If you are disabled, visually impaired, if you are elderly, you might need someone to help you buy your ticket. If you are new, if you're just visiting and so on. But not only do they accept vulnerable populations, they also actually make everybody's day-to-day life worse.

There's increasing evidence in research that micro-interactions, like just saying, "Hi, thank you," to the bus driver, making eye contact with somebody on the street, having a small chat with the cashier at the local shop. These are really positive for our wellbeing. Really, really positive for our wellbeing, because they're hard to measure. It's quite hard to understand that. And so if we overly automate our world, we risk impoverishing it. And so really thinking about... I can see that you can have these advances where you are really designing from the beginning to include the social relationships here in Africa, and that's going to provide massive benefit, but that will also have a benefit globally, I would hope.

Bruke Kifle: I see. So I think there are two main points that I understood. One around the use cases in healthcare. I think you emphasized the importance of how do we ensure that we're augmenting capabilities and not necessarily replacing and further introducing more gap between different parts of the world in terms of delivery of healthcare services. And then I think the second point actually touches on a next question which I was going to ask, which is understanding the local context. So emphasized the importance of social relationships being the bedrock of business in Africa, and how many SMBs have to balance both being data-driven, but also relationships-driven.

So when you think about technology implementation in new contexts or new sort of communities, there's this importance of being able to adapt to the cultural context. So the data divide issue that you described is a key use case or case study where simply taking an existing technology and just popping it in a new environment. May not necessarily work, right? Because there are inherent limitations, there are cultural contexts that have to be considered. So how do you ultimately approach addressing some of these cross-cultural differences or challenges in your research and projects, and how important does it then become to integrate local expertise and local perspectives into design and development?

Dr. Jacki O'Nei...: Yeah, it's really important. We tend to do it partly through the ethnographic study. So partly through trying to understand the world through the perspectives of the people who you building with. But then there's a whole question of local and indigenous knowledge, and there's a lot of people who've written lots of really interesting work on the value of this knowledge. And this is something which again plays into the data divide, that local and indigenous knowledge is typically not part of the training data for these models. It's not included in these models. And so a really big question is which knowledge do you want to include? How do you want to include it and how do you include it, given that the training data for large language models is internet-based, digitally accessible, written data, and the training data for image models is obviously digitally accessible images.

And there's some great people at MSR Cambridge doing some really interesting work about images for people with visual impairment and how those images tend to be less well-recognized by these image systems than the sort of standard images you get online. So I think there's so many questions then it's a really massive challenge. And I think really building with communities at the heart of what you're doing is really, really important. And not building things in one place. Everything shouldn't just be built in the global north. And there's certainly criticism already about the types of biases these systems can embody about gender, occupation bias and so on. But well-known if you talk to people in Africa, but much less discussed academically is the regional biases, the fact that these systems do not embody the local knowledge, do not embody knowledge about cultures and practices and ways of living in Africa.

And that's something really, really important. I don't have an easy solution to it, but one of my team was saying, "Well, if you can have models that are trained for call centers or models that are trained for different settings, healthcare, maybe you can could imagine having African models at some point." But it's a really, really interesting area. But we are so early. There's a whole set of really interesting challenges and opportunities, but that's why research comes in, of course. Because it's like what should these things look like and how do we make them happen? And that's so exciting.

Bruke Kifle:	Yeah, I think that's an excellent point beyond just the well-studied or well-understood biases that you mentioned. I think even thinking about the regional gaps that these models fail to understand around local context and sort of local knowledge and history. Like you said, I think this is where the role of research comes in, so I'll be excited to see what the future directions in this space look like. But I think that ties nicely to sort of my next question, which is looking ahead, what exactly are some exciting future directions or areas that you think are compelling and what exactly are your visions for computing, especially in the context of the African continent, but also more broadly emerging markets?
Dr. Jacki O'Nei...:	Yeah, I think this is a time of rapid change and how we interact with computers is going to just completely transform. And for people in HDI, it's very exciting because a lot of the things that we've wanted for many years and been discussing since the 90s in CSCW now seem like they could be possible. We're not quite there yet. Some things are there, but a lot of what we're going to do is going to change. So I mean, my vision sort of remains the same, which is building systems to support workers to do their work. Enabling them to do their best work, add real value to society, to enjoy their work, to be valued for their work, and to remove any sort of misguided management theory which ends up in poor workplace technologies, workplace surveillance, things like that.

Whether we are designing for Africa or for the UK or for the US, I think that's the sort of basic fundamental vision. And what's so exciting now, there are obviously problems that you are more likely to address because you're here, such as the data divide and the regional divides, and that's really exciting. And multilingual AI. And thinking about speech interfaces as well. There's a lot of work that needs to be done on African languages for the speech interfaces. There's quite a lot of work that needs to be done, even on English for really good speech interfaces to be able to really do the things we want. But then that could transform frontline work in a really positive way. Because at the moment, if you're a frontline worker and you need to use digital technology, you have to stop what you're doing. So when we were looking at nurses in India, their ask was, "Please, can I just spend less time doing this documentation stuff? I want to spend more time nursing."

And now you could imagine the different ways that you might have to record vitals or things like that, that you could actually potentially transform their work and enable them to spend more time doing what they really want to do. So that I think is the real opportunity. But we just have to design technology so it complements human skills and ensure that those skills are recognized and valued. And it's like that's everything from whether you're conducting complex surgery or you're nursing a patient, or you are designing a product or you're writing a contract, or whether you are composing a symphony or you're driving a boda-boda. It's like we need to recognize the human skills, the human value that people bring, and then design technology to support people. And there's a real opportunity with these conversational interfaces. I think there's a real |

opportunity to do that, but many, many research challenges to overcome to really get to that amazing world where work is fun.

Bruke Kifle: Yeah, I think that's everyone's goal. And I think that's certainly a noble vision, and it's for the betterment of, all right, if we enjoy our work and we're able to leverage technology in a way that can augment aspects of work where technology can actually excel and provide value, then I think that's a win-win for society at large. So excited to see all the future work and areas of research and development in this space. I'd love to end with one closing question.

Clearly, you have such a remarkable personal and professional journey, right? With your experience spanning both research and industry with such a wide-ranging of exposure to different parts of the world and designing technologies with this emphasis or sort of focus on social impact and helping individuals. So what advice do you have for young researchers or professionals looking to make an impact in the field of computing and technology and really think about this idea of technology for social impact?

Dr. Jacki O'Nei...: I think first of all, they're thinking about it, go for it. Go and do it. The more people who do it, and the more people who bring that perspective to design your technology, the better for society as a whole. Choices to be made include, should you go into academia or should you go into industry, or even if research is the right path at all for you, if you want to have social impact with technology? At MSR India, there's a great research fellow program and many of the technology for emerging markets research fellows. So basically people came onto the research fellow program for one to two years. Pre-doc. So it was before doing a PhD. But many of those research fellows were trying to decide, "Do I want to do a PhD?" And the TEM ones in particular, the technology for emerging markets, ones because they were all driven by strong desire to have societal impact and use technology typically in doing that because they were tech engineers often.

But a question that many of them ask is research the best approach for social impact? Should I work in a social enterprise instead? And some went off and worked in social enterprise, some moved into industry straight away, some went to academia and did their PhD, and then either stayed in academia or moved out into industry or did a startup. So there's lots of different paths, and I think you have to listen to your heart. What does impact mean for you? Is it about changing our thinking, in which case academia might be a great place? It's about influencing products which reach millions, but where you necessarily have less control about what goes into them and what the final thing looks like, in which case industry could be a great place. Is it about directly impacting lives with the great startup solution?

Those are all different types of impact, and they all have impact in different ways. So don't be afraid to experiment. That's what I think I would say. Think things through. Many people have a day job and a start-up on the side. Try and

find opportunities where you can experiment, do a little bit of research maybe see if... for me, my heart is in research, I love research. So there's a personal motivation to be doing research as well as I hope that it has some impact. But you have to choose the path that works for you. And reflecting on my own career, I think there's four things that have enabled me to have a career I love. So that's the other thing I would say. Remember, you spend the vast majority of your life at work. So if you are one of the people who is lucky enough to find a career you love and you have that opportunity, grab it with both hands.

So many people don't. So for me, it's like I know what I want, but I'm also really happy with what I have. So I've been happy to wait some time. The idea of setting up a research center in Africa, actually, I think I told some people at Xerox that when I was leaving that that's what I was going to do. And it was quite a long... I had no idea how or whether I really would, but that was just, it was already an idea because of my family connections to the continent. And then I know how to make the best of things, perhaps a little bit because of that lower middle class background. I don't have any sort of expectations about what might happen in my life. And then I'm willing to take leaps of faith into the unknown.

And finally, I'm really passionate about people. I mean, that's one of the things that's came through all the way from working in growing up in Plymouth and seeing the deprivation that came from the loss of jobs. And the same in Manchester. That's driven me to think about how there shouldn't just be a few privileged people who get to do great work. So my basic advice is do what you love. Don't be afraid to follow your dreams. It's a very boring road, which doesn't have any curves in it and ups and downs, and I've had a very windy path. So yeah.

Bruke Kifle: I think amazing nuggets from your personal experience. And I think emphasizing the two points that you made, one self reflecting what impact means to you. Like you said, there are different forms or ways in which social impact or societal impact can manifest, and then recognizing that there are actually different paths to achieving that, whether that be research or industry or the list goes on. So I think those are all wonderful nuggets and great pieces of advice. So thank you so much, Dr. Jacki O'Neill. It's been a pleasure speaking with you, and we appreciate having you join us here at ACM ByteCast.

Dr. Jacki O'Nei...:   Thank you so much for having me. I've enjoyed it.

Bruke Kifle: ACM ByteCast is a production of the Association for Computing Machinery's Practitioner Board. To learn more about ACM and its activities, visit acm.org. For more information about this and other episodes, please visit our website at learning.acm.org/bytecast. That's learning.acm.org/bytecast.