Kristin Alford (00:00):

Welcome everyone to this next session as part of the Adelaide Festival of Ideas. My name is Dr. Kristin Alford, and I'll be chairing the panel with Dr. Fiona Kerr and David Hobbs this morning. A couple of bits of housekeeping as we start, please make sure your mobile phone is on silent. But you're very, very welcome to tweet Instagram, LinkedIn, Facebook, whatever you'd like to do. And the hashtag is hash ADL, FOI tweet handle is the same, and it's the same for Instagram. Unauthorised recordings of any kind are not permitted during the session though. So please don't video and today's session is being audio recorded by Radio Adelaide on behalf of the Adelaide Festival of Ideas for future broadcasts. So there's something to keep in mind. If you do ask any questions as well that you will be recorded. So I'm delighted to be joined by David and Fiona.

Kristin Alford (00:50):

David is a researcher at Flinders University. He has a long history in rehabilitation engineering, looking at assistive technologies. And when we were talking before some of the projects he was talking about where that's better, sorry, I can hear a squeal. Some of the projects we were talking about was his PhD thesis in particular on developing and testing gaming technologies for children with cerebral palsy and how you might use technologies to improve body function. Dr. Fiona Kerr is an industry professor at University of Adelaide. As a neuroscientist and systems engineer, she's been working a lot in that human technology interaction space, across many sectors, especially in defense and health. And when we, when we were talking earlier, she said, one of her other interests is building new brains. I had to check whether that was artificial brains or human brains, but it is about building the capacity of the human brain some of her other work. So we might actually start with you Fiona a little bit around. What, what particularly are you thinking about when you're looking at artificial intelligence in the moment at the moment, how does that relate to your current area of work with a range of indices?

Fionna Kerr (01:53):

Right. So one of the things I'm looking at is how do we shape each other, hence looking at how we build our own brains, how do we shape technology? How does technology shape us? And therefore, how should we be shaping the world that we want? Part of the thing that drives me is that we are technologized and we're going to be technologized. And instead of the conversation that very often starts to become very simplistic, which is, you know, it's going to be a terrible thing. It's going to be a wonderful thing. We tend to oversimplify and polarize that kind of whole discussion, instead of being able to say the question shapes the systems. So if we can be more clear about what we will want, sorry, what we want the world to look like, and then how can AI and technology enable that we can actually get much better and much different answers.

Fionna Kerr (02:45):

So a lot of my work is around understanding how humans neurophysiologically impact each other and are impacted by technology so that we have a much better understanding of how to design and the technology that therefore can make our lives better and enable what we want to do as humans who care and connect in the future. And now, instead of being driven, feeling like we're being driven by this, you know, runaway bus, which we just have to, to get used to. And so often I hear people saying, we just have to, you just have to learn to live with it and learn to work with it. No, we have to be clear about what we want, the way that we want to live and work. And then AI, because AI is quite neutral, although it is in its it favors those who control and design it. So how do we control it then? How do we design it?

Because it can be a fantastic enabler or it can be something which makes our life worse. It's very much up to us. So that's, that's what I deal with.

Kristin Alford (03:49):

Is there anything different in terms of that enabling technology around artificial intelligence specifically, or is this a common theme with many of the technologies that have hit us in the law? You know, like, like the internet or like a social media wave, is there something particularly different around that?

Fionna Kerr (04:07):

Yes. there's a few, well, there's lots, but there's a couple of major areas. One is that it is all pervasive. So AI is, is global. And we don't think globally as people, we tend to be quite regional. So I work in different countries and people think about the problems around AI quite differently in different countries. So I'm on the steering committee in Finland for designing their artificial intelligence program for the future. And the discussions are quite different in a country like that. Then I also work in the U S and then where AI will go in the U S so one of the things that's different is scope and size reach and speed. Another difference is humans are electrochemical bags. That's what we are. It's very romantic way of thinking about ourselves, but that's what we are. And AI once you become part of something that's quite immersive with AI, you know, gaming, VR, even AR it has a very significant effect impact on our brain and on our physiology, our neurophysiology.

Fionna Kerr (05:08):

So it's much stronger in impact than various other technologies because it's, it's, we are, well, we, all of the issues that you read about all the time, we become addicted much more easily. It's quite invasive. We get neural patterns and domain requirements and all that sort of thing that hooks us in with that. So there's that whole area of AI. So I guess it's, it's a few, it's a few of those things. It's, it's more immersive and more invasive than a lot of other types of technology. And the way we use it, because we have, most of us have a, you know, a multifunctional device in our pockets, which is the worst and the best of AI, it's, it's intimate and keeps us connected and, and gives us communication and information. It also keeps us isolated, gives us terrible information and sequesters data that we need and makes us think really superficially. And so we've, you know, we've got, we've got everything in that and we have to get much better at actually managing it.

Kristin Alford (06:08):

Thank you. That's my electric chemical bag is my new favorite insult. I'm going to use it when I go home and the girls haven't tied the house. I think what you said there around the size and scope and the strength of the impact is, is a really interesting one. And it leads me into talking, talking with you, David, a little bit more about your work to start with. Just, I mean, when we were talking earlier, it was around you know, the fact that the sort of work that you do often often leads the sector and technology does have the ability to be stronger and impact for people who may present a disability as well. Can you talk a little bit about the sort of things that you've been doing?

David Hobbs (06:42):

Absolutely. So I suppose the field of rehabilitation engineering and assistive technology is about developing technology to harness and to give people the empowerment that we have, if we do not have a disability. So it's about facilitating and giving them access and function and a conversation before. In fact, there's been a Twitter conversation in the last week is I don't think the general population actually

realize the benefit that the general population has from the disability sector. And to give you some concrete examples with that things like tax prediction. So actually predicting what you might be saying next comes from the AAC or the alternative or mental communication area where people with speech generating devices would like to type and hence speak a lot faster. So that technology has been around for a long, long time. And now we're benefiting it from where we send SMSs and emails, and even typing words to search engines, a text to speech and speech to text again from the community where people were nonverbal.

David Hobbs ([07:37](#)):

And so they're communicating in different media and that it's being spoken. And we're now seeing that come in Adobe, you can have Adobe read the document to you in the general population doors that open and close, you know, star Trek would have started that in the movies, science fiction, science fiction, crossing over into the technology that we benefit from every day. So there's a great paper actually out there from a guy called Chris law called the technology and your cell phone wasn't invented for you. And that paper actually plants, the seed for what's called universal design. Universal design is about considering the end user and all their capabilities on the whole spectrum and how you should be designing so everyone can access use, and actually get the best from that particular item, be in a space, so public space or a device or technology. And he outlined some fantastic examples of where that technology has come from with some of the examples I've given you to say, well, look, you know, we're all benefiting from this because it was designed correctly. The intended user or the spectrum of users was considered appropriately. So we can all benefit it from in a general sense. Hmm.

Kristin Alford ([08:36](#)):

That's really interesting. So, so in my, in my job, I am director of mode, which is just across the road and it's a space where we're trying to inspire young adults about the role that science and tech can play in their lives. And so we've been very conscious about trying to design a space that is inclusive, but I'm also reminded when you've been talking about texts to speeches. We have an animatronic head at mod called Josh. And Josh is modeled on a 17 year old boy, and he's kind of in a dreamlike state and we're going, oh, if only we could do this with him, if only we could do this. And when you, when you, when you're talking it's yes, he doesn't have the ability to speak on his own, but if we've got text to speech, we can make him speak. We've got, you know, we're using all of those technologies to animal to sort of animate this robot in very, in very interesting ways that rely on technologies that have come through that.

David Hobbs ([09:20](#)):

So technology is I think, brilliant and fantastic in that aspect. And just to give you some examples of where you might get some of this mismatch. So some of the first speech generating devices that came out and you hopefully are all familiar with say Stephen Hawkings, who used one of these devices to talk for him was when they first came out, you have to realize these devices came from the U S. And so if you use a speech generating device, it would have an American male adult voice. Now just think about that one system being plugged into any speech germane device you use young children, young females, older females. And so you get this mismatch between what's being said and the personality of the person, which is what you can. Oh,

Kristin Alford ([09:57](#)):

And I think one of the things that we've found with Josh is some people are really creeped out by him because he looks really human, even though he's a robot and some people are creeped out by him because he speaks with an Australian accent and they've never had texts. [inaudible] That's right, because

David Hobbs (10:09):

It's not Siri. And so there's a big push actually in Australia now to have an Australian language, but not just an Australian language, actually a young female, a young male, a teenage female. She's about to get that that closer connection between you and your device, because for the disability sector and for a set of tech leaders in general, there has to be this connection because, you know, people talk about their wheelchairs as an extension of themselves. It gives me the mobility. So you want all your devices to be like that. And I think the voice is an important one because then the voices, the connection to who you are and how you say things. So that's important.

Kristin Alford (10:41):

So I've had a little bit around, I guess, artificial intelligence and your interests, and are a little bit around tech leading in the disability sector, but how do we put them together? Which is my big question when I'm, when I suppose spoke to Fiona and David, well, what does AI mean when you put these things together in terms of design and technology and how it's shaping us? So how do we, how do we put those things

David Hobbs (11:02):

Together? I think that's a good question. I'll let Fiona answer it in just a moment. What I am finding, interesting. We talked about this before is the disability sector is, has been hamstrung in many areas because of size. And so your economies of scale are typically not there like their general population, which means the costs of devices and items, and sometimes exorbitant and unattainable. And so what I'm seeing now, and what is the, the big influence in the last couple of years is where AI and big data and other things I haven't been influenced such as Google home, for example, Google mini. So now that's taking all of those years of speech recognition, machine learning and your ability to take your voice to command 15 years ago, excuse me. When I was working at Novita, that's called environmental control units and they are very, very expensive, but now it's a lot more achievable and autonomous vehicles. So the ability hop into a vehicle, if you can not drive and then have that vehicle take you to where you want to go. I mean, where we're just entering that phase now with trials around Adelaide and things like that and overseas, but we're seeing what would I consider to be assisted devices or assistive features now coming into mainstream, but the cost is coming right down, which is fantastic.

Fionna Kerr (12:12):

I'll probably take a bit of a bigger picture then. So one of the main things that I spend time talking about and advising on is how you make sure that when you want to use any of the new technologies that the drivers for it align with, with what we actually wanted to do. So one of the main ways that you put them together is to, to try and think about what is the question. So, so your example, you're like, what you're doing, the work you're doing is, is asking a good human centric, positive question. Cause one of the things to keep thinking about is AI is, is it's a goal based optimizer. It will do everything to achieve the question that we ask and to create the goal path, the optimist, or sorry, the optimal goal path. So if you ask it a question which is positive and human centric, AI is fantastic at doing that and helping us get there.

Fionna Kerr ([13:14](#)):

If we ask it a question, which is for the benefit of some and often to the detriment of others, AI is just as good at doing that. And very often we were just kind of sleepwalking in letting the second happen. So, you know, if, if it's just profit driving it, then it's perfect at making profit for those people who ask the question. So what we, one of the things that always is in the back of my mind with how we put them together is how do we make sure that the question we're asking in the first place is for the benefit of humans. And then the other thing is how do we make sure, I guess it's because it's my, my middle area is how do we understand the neurophysiological impact on the human of the technology as well as the other way around? And if we're really clear about that, then whatever we build, we will be able to try and build it to maximize the benefits.

Fionna Kerr ([14:08](#)):

So for me, a couple of examples I'm directly involved in in the U S for example, are the design of a family bot, a family bots you'll see in a few years, there is something which are supposed to be in families to assist with the run around, will cook a teardrop with a kind of a screen on the top of the big eyes. And they're there to seemingly assist parents to communicate with their children and to help them to teach their children, you know, moral and ethical behavior. If you actually know what the brain needs around, that it is a lot of very direct interaction between the child and the parent. A lot of retinal eye lock, a lot of touch, a lot of amygdala and hippocampus stimulation through looking at gazing into people, you, the other child, the child's eyes and the parent's eyes.

Fionna Kerr ([14:53](#)):

So that really direct eye and gaze connectivity stimulates the parts of the brain that increase the capability for communication skills and, and understanding good behaviors. Whereas what the, the bop tends to do is decrease that because it either keeps you away from the child or it keeps everybody looking at a screen. So my way of trying to deal with that is not to say to the people that design it well, you're going to create a bunch of psychopaths who never look at each other. It's to say, let's have a look at what the brain actually needs in order to do that. And so how do you make your device increase direct eye-gaze touch and connection between the parent and the child instead of decreasing it, which is doing at the moment. And so often it's just that they haven't thought technologists are very technologically optimistic in general, and I'm a technologist, but, but many, many things that you can just technologize everything, you know, there were some things you can't technologize or there, when you technologize them, you have to take into account the interaction between the human in that technology station. So once they get that extra piece of information, then they, they usually very happy to go away and, and it's a terrific new puzzle. So one of the ways is to, is to have maximum information in trying to do those things so that you do get really good outcomes because you're coming off a base that understands what the technology does understands, what have the team, not the human works, and then understands how to put them together in a really positive, functional way.

Kristin Alford ([16:28](#)):

It reminds me of the the discussion often around artificial intelligence and jobs of the future and work, we, where we sort of hear these, these numbers, that 40% of the jobs that we currently have one exist. And you know, and, and that what makes us humans then starts to become really important. But when you interrogate that, that's the sort of things that we don't currently value like care work, or teaching work, or and so it's, it's that, it's that question about sort of saying, well, what can AI do that helps solve a lot of the problems of what humans really could be better off spending their time doing something

else. But then we also need to answer that question. I think, how have you said, well, what, what, where should they be spending their time? Because the example that you've just given me is that's parents gazing into children should be where they're spending their time, as opposed to doing the washing up or fiddling around, you know mowing the lawn or whatever else. You can probably get a boat to do more easily.

Fionna Kerr (17:20):

That also gets us to another question, which is around again, it's a choice. Do we want quality partnerships with AI, or do we want quantity partnerships with AI? And again, I see different trends in different countries. So the quality partnership is using AI to it's. Something like the surgeon who's got AI clipped on their glasses, it's operating the person's operating, sees something untoward can ask AI to give them the really good data. AI is fabulous, aggregating data really quickly and giving them, but the surgeon still decides because the surgeons got years and years of knowledge chunked up. So that's a beautiful partnership between the knowledge and wisdom of a human and the capacity of AI to give it really relevant information on the spot. Perfect. Quantity is your, you know, your mechanical Turk. You say, we can take this job and we can make 90% of it automated 10% left that we have to do for humans.

Fionna Kerr (18:16):

So we'll put that on and let you bid. And so you come in really cheaply to do that. You have to do it hundreds of times, hundreds of people are doing that hundreds of times. So we've got this kind of battery hens situation. And if you complain and feel like you haven't got a social system anymore and not sort of thing, tough, just get up and, and, you know, we'll have the next person in place. So that's the drive for profit and it's the quantity, sorry, I call it the quantity relationship. So those discussions are going on right now in different countries. And depending on how proactive we are, we can really change that discussion. You know, we can really get involved in driving quality relationships with AI.

Kristin Alford (18:56):

What, what does, what does quality or quantity look like in your sector, perhaps David, when you're thinking about the sorts of questions you want to be designing

David Hobbs (19:04):

So the first example you gave actually reminds me a lot of how I treat Google maps. Like I might ask Google maps to give me an indication of time and where I want to go, but then it's my input on top of that. Actually, I want to take this route because I know that's a better route, even though the time might be different because the optimizing engines within Google maps are probably doing it for time and less congestion and things like that. So I suppose what that highlights to me is the heterogeneity of the population that I work with. So even though there might be the umbrella of disability and the different populations within that the, the key thing is the person is always so intimate to that process. And so that could be the allied health professional, or whoever's working with the individual or groups of individuals.

David Hobbs (19:41):

And so you always need that discerning clinical based input because you can use the information you have. In fact, you will fall back on that information to many, many times, but it's going to be the association you have with that person. You've been working with them for 15 or 20 years, you know, their lifestyle, you know, their families, you know, how they interact, you know, their work environments or you know, that this person might be more susceptible to say a pressure injury. And so

you're going to nominate this pathway compared to that pathway. So I can't see those finite or those minutia details being taken away by AI, because I think it's that personal connectivity to that you have to have with clinical insight and knowledge, but it's the information around it. They just shape hopefully a narrow tunnel that you can go down. So you don't use this much of making you maybe use this much, but still use that personal insight and judgment. That's where I see the most effective.

Kristin Alford (20:29):

And Fanny, you sort of said, countries are doing this differently. Have you got some examples from, from where you've been, where you've been advising or where you've been looking at?

Fionna Kerr (20:38):

So in Finland, and in fact, the first question that I was asked when I briefed the steering committee was just starting when I was over there speaking on partnering with artificial intelligence for human centric future, and the, the very first question wasn't around any form of technology. I think they were interested in talking to me because I was originally an anthropologist. And so the very first question was, oh, great. So how do we align Eastern Western and middle Eastern values in order to be able to shape AI globally in a, you know, in a positive way. And I thought, oh, yes, I want to be here and do this. And, you know, because that was, that was the very first thing. So the questions were very often there are around how do we ensure that? So what are the drivers, what are the political drivers?

Fionna Kerr (21:27):

What are the economic drivers? Because we are going to lose 40, 50% of jobs. But what does that mean? But in that country, because they've already got a very strong understanding that the, the social capital is what creates the, you know, the very much the health of that society. They're already advertising money across there. They have very good social systems. They pay teachers and nurses really highly. So they actually understand the whole thing you were making the point about earlier. So the conversation's there, they've already got a global wage. And so what we were talking about was kind of, you're a few steps ahead because you're having discussions around, how do you ensure that people get a basic wage, but they still feel like, like positive humans. So humans need to feel worthwhile. They need to feel useful. They need to feel connected.

Fionna Kerr (22:17):

So you can't just give a global wage and let someone sit on a couch. Whereas in another country that I'm dealing with, I can already see some of the, the rules and some of the designs and the discussions are around. How do you, how do you basically, how do you use AI as a soporific so that people will just not get bored when they sitting on the couch? It's a totally different kind of discussion and depending on what's being designed. So there's a lovely example. Two examples. I just came because I just came back yesterday. Something that you were talking about, David Mount Sinai has got a beautiful example of people in the local area that are suffering levels of dementia and they, where they want to use various kinds of apps to be able to deal with that. But what they understand really well is that it's the, the direct human interaction that you have to loop into that all the time.

Fionna Kerr (23:10):

So there's a beautiful example of people come from their local area and every week they check in and they get their vital signs taken by one of four young local people that are taking the data to make a long lens, a longterm database. The fact that those people are coming and actually seeing a human being and

interacting with them and getting to know those four, and they're being looked at they're being touched, their C5 fibers are being stimulated in their skin. When that when the vital signs being taken is they, they have all sorts of really positive outcomes. Whereas when they just use the app, you don't get that nearly as much. So it's those sorts of things of being awake to those, you know, those, those things that are really important. When do you put the human in the loop? When do you need to reinforce what's going on technologically? And when do you have experts as well, that know exactly how to use the technology and when, and when not to use it. And it makes a gigantic difference.

Kristin Alford (24:09):

I most, I guess like my, my area is mostly around future future works and also reminded I was listening to Merita Chang speak at something last year where she was talking about an example of an AI that had been developed to work out the difference between hotdogs and legs. I don't know if you remember that mean from a couple of years ago, but somebody has had to fed the AI with pictures of hotdogs and legs, which means there's a human at the end of that, feeding the data in. And it's like, well, is that really what we want humans to be doing in this equation? Is there, is there a better role? And I think what you've just explained is that there are a bit of roles. And so if we're looking at the quantity, we can, we can have jobs for people where you're feeding AI pictures of hotdogs and links, or you can have jobs for people where they're actually providing a benefit for health or a benefit that, that moves beyond just the training of the, of the AI or the data. Yeah,

David Hobbs (24:57):

I think that's important to recognize where the expertise lay a couple years ago had Rodney Brooks give a presentation and obviously very famous person for robotics, the vacuum cleaners, et cetera. And he would say that they, their robotic devices can do many, many things. They're on production lines, but there's a group from the U S who got some research funding and they trained a robot. I think it was either default to fold a tablecloth or default of shirt. And it took something like five years to teach the robot, to do a task, which we can do in seconds. Yet it can assemble a BMW infractions of a second with high precision. And his was all about, well, where is the best application? Let's think about it. It's not a global paint tool. Here's where you do it, there's roles and those roles that would be considered for others.

Kristin Alford (25:37):

I dunno, folding a fitted sheet would be great though.

Fionna Kerr (25:41):

A lot of videos on that, but that's, that's a really critical thing is, is when is the human better? When is the technology better? And when is the combination better or when does it not matter? And there were things that we just don't look at enough. I guess a lot of my work is around when, when is the human more effective and efficient? You know, we, we, and we talk about examples of, of, of nursing of care, where especially if a child or a patient is either in pain or upset because of the way that your body changes in that situation, chemically five minutes, looking at a human, especially one, you know, and trust changes your physiology within that five minutes really quickly for the patient, your immune system changes, it downplays cognitive all sorts of cognitive stress markers. It increases your serotonin uptake.

Fionna Kerr (26:31):

It decreases cortisol. And yet what we do is either they just get tablets instead of have five minutes with a nurse who can just calm them down or we're starting to bring in technologies to kind of nicely restrained them. So those are the sorts of things where if we understand that, in fact humans know, we know that a cuddle and just looking at someone of color with your child or just looking at someone and spending the time with your hand on their arm quietly as reassuring them makes a big difference. Humans know that because that's how we work. So getting the signs to explain that that's really critical is an important part of then saying, so what is the role here of technology? And that's, that's all we really should be doing is saying what's the role of each in any given circumstance. So that we're really smart about using both.

David Hobbs ([27:20](#)):

If I could just add I met about 15, 20 years ago. I was part of a group that put an application in to try and really improve some access to funding for what we would have called environmental control units to control devices around the home. So you can be much more independent. You can do the doors, curtains, et cetera, et cetera. And one of my occupational therapist, colleagues just reminded me. It didn't really it wasn't a strong caution, but just reminded me, look, it's not Cara replacement. Okay. It's actually just providing that level of independence. The person can maybe have a greater self esteem, et cetera, et cetera, greater quality of life. And that means the care can be doing other things. So it's not changing the channel on TV or doing this. It's the conversation, making a cup of tea, doing the other things. And so we should be reminding funding bodies, particularly that they're not carer replacements, they're all mentoring aspects to that sort of thing. So it's not going down your balance sheet and going all right. I can put that person somewhere else. It's actually just saying, well, that person might be spending more quality time, but it's not a replacement device.

Kristin Alford ([28:19](#)):

That quality is a good one. And

Fionna Kerr ([28:20](#)):

That's the, that's the difference in discussions in different countries. Some don't even go to the, so how do we get the human out of the equation? They are having a look at the, how do we give them time to do the stuff that humans are really good at? And we, you know, I love technology. I mean, I've been a really I've been lucky to also be part of using it, to make things that let people do things they're never able to do. And David's my kind of, you know, like pin-up boy of how to do this. And, but as long as we just make sure that we, you know, we utilize both, then they're just, they're both quite miraculous.

Kristin Alford ([28:55](#)):

And, and I guess the, the feedback loop. So, you know, when you're, when you're talking about developing gaming to help children with cerebral palsy, it's, it's the, does the game make an improvement on various factors? Not just one or, you know, there, there was a reinforcing effect from, from doing that.

David Hobbs ([29:12](#)):

So as we're having a conversation before, so my PhD work was about developing an accessible gaming system to enable a child with a hand impairment due to cerebral palsy to play computer games. But that, wasn't the question. The question was, how can we engage children to use both their hands? Because a child with an impairment would typically use their dominant or strong hand and they'll ignore

their hand, which doesn't work as well. And through lots of conversations and conceptualization that ends up being a gaming system that we developed and the gaming system showed that it actually could improve hand functions. So the hand, which didn't perform as well, actually improved it. So it gave a better function better as we've talked about. We actually had other situations where that gaming system, because it was accessible when once it went into the families' homes, actually improved sibling interaction and participation.

David Hobbs (29:59):

So parents were commenting on sibling rivalry because they had a common platform they could play on now, which wasn't disadvantaging the child with an impairment. So, you know, everyone loves to beat their brother and sister. I know I did. So why not give everyone that opportunity? Parents were scared to hop on the system because their child was so good at it. So they don't want to be shown up that they couldn't be their own child. But one of the most profound experiences that came out of that was it created such a an interactive environment that we had one boy actually talk more during the trial. So he was non-verbal before the trial, or he was non-verbal and he was achieving so well in the gaming the system and getting through many of our games and many of the levels that when his sister who was able-bodied was playing the game assistance, she couldn't get to the same level.

David Hobbs (30:42):

So he was coaching her and telling her what to do, do this, go here. This is how you get, this is how you solve that particular puzzle. So he became more verbal. Now, if we all sat down nine years ago, when we started the system and said, how can we make a child with a disability talk more? We would not have arrived at a game in the system. So it's this, these ripple effects that came out of it. And it's about designing things, right? The beginning. So universal design, it's about asking the right questions. And it's about looking on the peripheral for these other effects, these edge effects that you can see as well.

Kristin Alford (31:09):

Thank you. I think that the value of this discussion really is around how do we, how do we shape artificial intelligence and social interaction in a way that gives us what we want? And I think there's two things that you can do. I'm inspired by the fact that every, you know, some of the technologies that we've seen develop means that a lot of these are decreasing the price input in like level for people to have interactions. So I'm thinking about 3d printing, and I'm thinking about being able to publish your own work online and all of those sorts of things. I think there is a low entry point for us to start to be involved in developing AI that we want. And so taking power as a citizen to, to develop that ourselves is, is one thing. And I'm going to pick up also what you said, Fiona, if everybody in levels of politics, economics, and lawyers, then they rely on us as non-economic economists and lawyers to give them input about some of those other diverse perspectives. So I guess there is a call for active citizenry so that you are informing the people who represent you, that there are things that we want and that we are things that we are expecting them to deliver. As we look at how we adopt the technology and those things matter to us because they are the things, the conversation, the care, the face-to-face contact that make us human. So with that, please join me in thanking David Hobbs, Fiona Kerr

Speaker 4 (32:26):

[Inaudible].