Trish Williams (00:01):

Good morning. My name is Trish Williams. I'm a professor of digital health at Flinders university, distinguished guests and friends and colleagues. We are gathered today on the traditional lands of the garner people, and we pay our respects to the elders past and present. Thank you very much for attending this presentation this morning. This is the second public lecture for Flinders university under the brave research and innovation series program and combined here today with the official program for the very exciting 2018 Adelaide festival ideas, brave is not just a reflection of the extraordinary research that Flinders university pursues today. It's a call to action that links back to our earliest days as an institution in 1966, Flinders university took its name from the Intrepid captain, Matthew Flinders, the first person to circumnavigate Australia and in doing so, it established a new university as a place where exploration and discovery would triumph.

Trish Williams (01:05):

As we at Flinders make inroads into our mission and to change lives and to train the world, we're focused on making a difference by extending the boundaries of knowledge and by addressing the big challenges and by changing lives for better through our research, our founding vice chancellor professor Peter Carmel explained his ambitions in the Flinders now famous quote. We want to experiment and we want to experiment bravely. It's a concept that captured the imagination of successive generations of Flinders researchers, and continues to inspire all of us today. This bravery, this idea of bravery in our researchers and our research discoveries or what we are doing to share with the world for the greater good such people as professor Colin Rustin, who pioneered green chemistry in Australia and develop the ingenious vortex fluid device, which is transforming the way we manufacture everything from lifesaving medicines to biofuels and to Silicon chips and the courage of associate professor Damien Riggs, who fearlessly investigated the fields of race and whiteness and gender fluidity. Flinders has many, many more researchers who are equally persistent and fearless in their first for new knowledge and the desire to make a difference in the world this morning. We're aiming to give you fresh insights into how artificial intelligence is being used in the health sector and what this means for healthy aging moving forward. It is my great pleasure this morning to introduce professor Alison Kitson, the vice president executive Dean for the college of nursing and health science at Flinders university and your presenter for this morning. Stalk, please welcome Alison.

Alison Kitson (03:01):

I think it's the notion of bravery is certainly appropriate because as you heard that Trisha is the professor of digital health and Flinders, and I actually thought it was an accident when I was asked to do this lecture on artificial intelligence and health, because I thought, well, what do I know about that? But I certainly know a lot now after having thought about it and realizing that possibly the best thing about doing lecture like this is that you've got someone like me. Who's not an expert talking to what I assume is a group of people who are not experts either. So I just want to check hands up in the audience who is an expert in artificial intelligence...

Alison Kitson (03:48):

Nobody. Oh, there's one. Okay. So I'm going to ask you at the end of the presentation, did I do okay? Is that okay? Right. Okay. So also, so bravery is about briefly saying yes to the invitation, to do the talk brave new world, thinking about the future of what is going to be happening to us in the next 5, 10, 15, 20 years and brave heart, because emotions do play a part in the whole idea of artificial intelligence. So I would like also to acknowledge Michael lawless Jan Tiedemann and Anthony matter, who are all

colleagues of mine and who have helped navigate me through understanding what artificial intelligence is and how it affects health. Anybody know what this is. Okay. This is called Colossus. Does anybody know which computer was Colossus? Is anybody heard of the enigma code? Yeah, so, okay. So this was, this is a picture of the actual computer that was responsible for helping the British to crack the code the German code in the second world war.

Alison Kitson ([05:11](#)):

And this is a very fetching picture of two young women trying to manage the machine now that is only like 70 years ago. And some people in the audience, you know, would, would remember that possibly but also would be born around that time. This is not the, the more typical understanding of how we use technology, which started off not so long ago, maybe two generations ago that you had to have a whole house, a whole sort of sort of big plant to hold it. And no probably there may only be 10% of us in this room who would not have some sort of a gadget. And in fact, many of us would be pride, pride owners of multiple gadgets that all talk to each other. So again, in possibly 20 years time, we'll probably have them implanted inside us rather than having to carry them around.

Alison Kitson ([06:12](#)):

So it's a bit crazy. So in I'm a nurse by background. So I want to sort of get you to think about in the future, which is going to be the more likely scenario. Does anybody know the nurse this one hair, nurse ratchet. Okay. So I want to this is a little sort of reflection on, on some of the ways that we think about artificial intelligence, because a lot of us think that there's something possibly scary or wrong about it, but I just want to remind you that human beings can be a bit scary and wrong as well. So I'll read this nurse ratchet is the head administrative nurse at the Salem, Oregon state hospital, a mental institution where she exercises near absolute power over the patient's access to medications, privileges and basic necessities, such as food and toiletries. She could preciously books, these privileges whenever a patient displeases her, has anybody met nurses like that?

Alison Kitson ([07:21](#)):

All right. Okay. Unfortunately there's several nods in the audience, her superiors turn blind eyes because she maintains order keeping the patients from acting out, either through anti-psychotic or anticonvulsant drugs, our own brand of psychotherapy, which consists mostly of humiliating patients into doing her bedding. Okay. So these are the sorts of people we don't really like to attract into nursing, but they get in there and sometimes they're rewarded perversely by the status code. Now, I want you to keep that, that sort of idea in your head, because we're going to come back to that. So what are the wicked problems that we face in health that we think that artificial intelligence can help us solve? So the first wicked problem is that in every society, in every country, in every health system, around the world, the cost of healthcare is just skyrocketing, exponentially growing.

Alison Kitson ([08:27](#)):

It's, it's both, it's strange that we call it a wicked problem, but the fact that we can all live longer is seen definitely a benefit, but because it's never happened in our society before we're sort of lost to know how we do that effectively. Enabling people to live long, productive, healthy lives added to the longevity. We've got issues of multiple comorbid morbidities, or multiple illnesses that people gather. But like sort of dust, you know, you sort of gather them as you go along. And that is determined by our lifestyle choices. And we just heard Carmen Lawrence talking about the importance of, you know, the things that we would think possibly our common sense, but not so common. Walking, eating well sort of

being out in the open air and enjoying ourselves. And then one that I want to add as well into this list is, is the potential loss of the ability to care for each other.

Alison Kitson (09:35):

So this notion of how do we care, how do we learn to care for each other? And what does caring mean in the context of artificial intelligence and health? So just to check that we all are on the same page and understanding what AI is, it's basically it's intelligence demonstrated by machines. So then you have to think, well, what is intelligence? Well, it's something that happens in that part of our body called the brain. So what is human intelligence? Well certainly most would agree that intelligence is related to problem solving, analyzing data and pattern recognition. So those are the sorts of aspects of our ability to interpret the world. Also human intelligence is related to the ability to communicate through speech and language and other aspects such as creativity, emotional intelligence, and morality and values. There's a little more debate about those dimensions of our understanding.

Alison Kitson (10:49):

Now you can see that the all of the issues on the left-hand is it no, your right-hand side, these would be the things that we would commonly know that artificial intelligence has grasped. So problem solving data analysis, pattern recognition, speech, and language, whereas the aspects of creativity, emotional intelligence the morality and values. These are things that the science fiction, you know, the people who do Terminator two, where you have the robots becoming the level, and that's the stuff in the future that we're going to have to think, but, but at the minute we were getting it our, an intelligence to do the the sort of data analytics. So what are the five promising applications of artificial intelligence and health? Well, certainly there's data science and machine learning. So coming from Colossus we have now got the capability to harvest huge of data.

Alison Kitson (11:54):

Secondly, we've also got artificial intelligence helping us to embrace clinical decision support systems, better management of health and wellness, advanced assist of technologies and remote health service delivery. So these are the five major dimensions, and I'm going to go through each of them in turn. But before I do that, if you look at all of the, put all of those things together a review by Accenture, which used to be called Arthur Anderson consulting again, a very prestigious consultancy have identified hi, some of this artificial intelligence applications could change health care, and you can see that they've looked at the application, they've addressed the first wicked problem, which has cost. And then they have identified the things that might change the way that we behave. Isn't it interesting that the very first one that would save $40 billion in us is robot assisted surgery, no hands up, who, if you were going for surgery and the doctor who, who asked you to sign your consent form said, oh, by the way, it's going to be a robot.

Alison Kitson (13:25):

Who's going to who's going to do the surgery because robots do it more reliably. Would you believe them? Yes, you would. Okay. Yeah, well done. So we're a very sort of advanced group. So again, you can see that there's lots of big, big sort of social cultural trust issues in this whole way that we are going to embrace artificial intelligence. The first one is around big data sets. Now, again, it's, again, going back to the, the example of the enigma code, has anybody seen the imitation game? That's the movie and I didn't realize, and I don't actually know whether it's true or not, but it said it in the movie. So it must be

that how Alan Turing first his first big break and that's not a pun into breaking the code. Was he overheard two people talking and one of the two leftists who talked to a German telephonist.

Alison Kitson ([14:43](#)):

They, they all were said, hi, hi, Hitler was the very first two words that they said. So he then realized every time he got a code, hard Hitler was going to be the first two words in it. So he worked out from those letters, how each time that pattern came, that these would be the edges or the GS. And then I was thinking, that's a bit like doing crossword or, you know, the sort of numbers, games that people do on TV. And you have got 10 constants and that valves, and you have to make words. So there's something intrinsically hardwired into our heads where we actually like solving those sorts of problems. So think about that and then think about the way that organizations can collect data about diseases. So most countries have registers, you've got a cancer register, you've got an orthopedic register.

Alison Kitson ([15:44](#)):

You've got all sorts of registers that describe what has happened to people. Who've got certain illnesses. In fact, I heard a talk recently about and computing from that has just recruited 20 million cancer patients onto their cancer registry across the United States. And that's because they know that if they have that volume of data about people's individual cancer journeys, they will be able to do the deep analytical work on it, to help look at the patterns, to help think about how they can understand both how to give better support, how to have more targeted at care and high to solve some of the patients glimpse. So it's the reality is that the country borders no longer exist in these sorts of large datasets equally given that we know like an Iceland, every one of the population has had their DNA analyzed, and that is sitting on a large data bank, think of that across the world.

Alison Kitson ([17:01](#)):

So, and that is what personalized medicines all about the biological insights and the targeted therapies that will be possible because we have these huge datasets. No, you know, that's, that's amazing, isn't it. But think of all of the positive things that could happen, but think of all of the unintended are scary things that could happen because we've got these large data sets. The second area around is clinical decision support systems, no medicine, nursing physiotherapy, anything in health is about analyzing data, looking for patterns and being able to make a good judgment. If you are clinician you may have 3000 different cases of X, Y, or Zed that you're looking at, and you will be able to make a decision. If you are a physician, a nurse, a physiotherapist with an iPad in front of you, and you have access to these large data sets you no longer have 3000 possible cases that you can, your mind can sift through.

Alison Kitson ([18:17](#)):

You can have 3 million or 300 million because the ability of those machines potentially, and in reality to do that is quite significant. So this is the way that health professionals are taught analytical gathering data. We also have gotten diagnostic decision support tools. So anyone who is a health professional in, in the audience will have the joy of discovering a pass that electronic patient record that the site Australia has embraced. Now that is the sort of first step to trying to modernize and improve and connect lots of information. Other systems are much more advanced and again the health record people are probably familiar with that. That again is another step to starting to enable us to be able to share data more effectively, equally in the area of diagnostics. You will know that again, research shows that certain computer artificial intelligence systems can more accurately identify and interpret sort of pathological slides are x-rays.

Alison Kitson (19:49):

So again, we will be seeing that things that require a lot of analytical pattern recognition. This is the sort of capability that our artificial intelligence has now. Again, there's probably most of the people in the audience are familiar with the healthcare app, just like you've got your taxi app, you've got your health care app. My husband and I have just been competing with each other as to who can sort of sort of do more steps until I realized that he said, well, if you do this, you can increase the number of your steps. I wasn't terribly impressed the fact also not only can you do it for health benefits, but are for exercise, but equally there's work done in the U S where you could actually, your telephone could tell you whether you're having a heart attack or not.

Alison Kitson (20:53):

That could be could be lifesaving. And I was in the UK recently, or just last week, and I picked up a Vogue magazine and I, so this is what they said in Vogue magazine, the apps, no clue, track your mail and stroll cycle and its associated symptoms such as energy and appetite levels, as well as skin and mood changes. Good glow gain insight into your reproductive health with this popular ovulation tracker that highlights your most fertile days. So these are things that, and apparently there's something like 17 million users of this app. Now I want a nap call to Manoa.

Alison Kitson (21:39):

Yeah. Sisters let's go for the men lap. Yeah. And then I think there should be one called the bird should her up as well, because that would be very, very helpful. And, and another app called hi to avoid boring people at parties. So there's no limit to these apps. Okay. So what about advance to assist of technologies? Well, does anybody, has anybody heard of the, these so in, I was in Bergen in Norway, like a couple of years ago and actually was in a clinical simulation unit, which is training nurses and allied health. And they had one of these robots, robotics seals, and these are for people with dementia and they've actually been doing research showing that they, they, the sort of the big eyes and the shape of the face has a very soothing effect on people who have dementia.

Alison Kitson (22:45):

And the reason why they used seals. I don't know if you know, but it was because they, they, they reckon that nobody would have a pet sale because if you did a pet dog or a pet cat, someone who had dementia might mistake a rail dog, or a rail cap for the, for the, the sort of the robot that they were playing with. So even though it's looks a bit in Congress we know that these things work and that there's a lot of research being done to help people who have behavioral disorders and problems with association actually using these things. And you know, the, the robot that you saw in the beginning, slides has now advanced to an avatar and Molly has been produced by apple, the apple organization, and in Stanford university. And Molly can actually talk to you and talk to you about your blood pressure and all the rest of it.

Alison Kitson (23:47):

So she has been programmed to have an interactive dialogue with people online who needs some sort of support. So that just gives you a taste taster of some of the things that are happening around the world equally in remote health service delivery. We have we're pretty familiar with tele medicine, tele health and if our broadband would work in Australia, it would be great, wouldn't it? But equally it isn't just remote because again, from the research that I do, I know that one of the biggest problems that patients have is that they actually, you know, it feels like a continence between being discharged from

hospital and then going home and then going to the general practitioner, because somehow in that huge space that you have to travel information doesn't get through. So basically what we need to do is understand how we make systems talk to each other, both in a microcosm and in a macrocosm.

Alison Kitson (24:57):

So this is an example of what's happening in London with the Royal one of the hospital systems. And again, if it's, if it can be done in the small, it can be done in the big, and this is what is happening. So in terms of all of what I've been telling you you're thinking of that script, sign me up for the automatons because I there'll be nicer. There'll be no nurse ratchets. There'll be more reliable. There'll be analyzing more data. They'll smile, and I'll get somebody who, who, who won't have to use the, the the menstruation app, because, so they'll always be, you know, in a good mood so far as the catch. Well, I suppose these are some of the things, how much do we know about human intelligence? So if artificial intelligence is based on what we know about human intelligence, then where are the gaps?

Alison Kitson (25:58):

And it's quite interesting that the understanding the mind, the mind and the brand are, is, are the last sort of bastions of exploration and science. So it means that there's a lot. We don't still don't know there's a huge lot. We don't know about human caring. And again that is because unlike clinical medicine caring is not recorded. So we don't have large data sets about the multiple ways that Caring's happens. And therefore we don't understand the patterns, the pattern recognition, how we do it. And we don't have a lot of evidence. There's an issue of like personal security and privacy and issues around getting the workforce society ready to embrace changes and dealing with unintended costs. Wences so this is I don't know why caring for a human has fish and bananas on the head, but this was the closest I could get to explaining the complexity of caring.

Alison Kitson (27:01):

So that's the business that I'm in. And certainly some of the theoretical work that we're doing is about the importance of the relationship, the importance of integrating physical, relational, and psychosocial aspects of care within positive contexts. Now, again, if you think of artificial intelligence and trying to produce a nurse who would our carer, who is able to connect all of those things, you begin to see that there's a lot of stuff that we don't know, and this is what our research program is doing. We've all heard about the day Barkla with Facebook and the fact that there has been a lot of security breaches. So I don't really mind if someone knows what I spend in Woolworths, but I wouldn't mind if they were able to access my health records. So we need that. And this is where this woman here is a cybersecurity expert, aren't you?

Alison Kitson (28:03):

Yes, isn't that amazing. I have no idea what she does, but impressed our kids, you know, coding in primary school now. So that's getting them ready for the, the brave new world. They will have no problem. Just embracing all that. We are still slightly scared of. We also need to really the things that we cannot compromise are the trust. So the trust in terms of the frontline staff, doctors, nurses, allied health administers traders need to be able to trust the data that they will be using to make decisions, but equally we, we need to be able to trust the human interaction. And I don't ever know how many people have put their heads in the lines might, but I just thought that was a very good illustration of trust. Some concluding thoughts. So artificial intelligence should be developed for the common good and benefit of humanity.

Alison Kitson (29:08):

These are five principles that have come from documents from the house of Lords and the United Kingdom. And they have developed a sort of a policy for artificial intelligence. Artificial intelligence should operate in principles of intelligibility and fairness and artificial intelligence should not be used to diminish the data rights or privacy of individuals, families, or communities. All citizens should have the right to be educated, to enable them to flourish mentally, emotionally, and economically alongside artificial intelligence. A very important statement, which is not, we're not being substituted by artificial intelligence. We are working together and did it's enhancing our experience and the autonomous part to hurt destroy or deceive human beings should never be vested in artificial intelligence. If you want to read more about this, then this is just go on the internet. And it's ethical artificial intelligence. It's an incredibly insightful and excellent piece of work.

Alison Kitson (30:23):

And I think you know, given the Cambridge Analytica you know, it bites the, the sort of issues about the possibility that a data analytics company in Cambridge was asked to analyze the voting habits of a Republican. So they didn't change how they voted, but they looked at the language and the patterns of response to the speeches that were being made by Donald Trump. And they were able to reinforce some of this. Now that that is just incredible. But when I looked up Cambridge Analytica to locate, this is what I got. So that means that on the internet, that internet of things that reflects the, you know, how people are, are sort of connecting language to visuals, this is what people are connecting. Now. I think that example whether it's true or not, we don't know which is the trust thing, but it does reinforce the importance of the ethical principles that have been identified by the house of Lords.

Alison Kitson (31:42):

I think though it's better to finish off looking at someone who we would all recognize Stephen Hawkin, Hawkings. Now this guy took motor neuron disease in his early twenties, Mo motor neurone disease usually kills you within five years. It is a total miracle that he has lived such a long and impressive life. But think of all of the artificial intelligence that has helped him survive this to me is the this is the real nemesis of, of what artificial intelligence can do and how we can use it in constructive, positive ways. If you want to know more about what we're doing at Flinders, and especially what Trish does in her cyber cyber warrior mode then come to Tansley health tech precinct. We run a whole series of open days and you can interact. You can even get involved in, in some of the really fascinating research. And I think, again, it reflects that the digital health research center of which Trisha is a co-leader we're working together with my college, the college of nursing and health science, the college of science and engineering and the college of medicine and public health. So we would love to, if, if your appetite has been wetted, we'd love to invite you to come and see what we're doing. Thank you.