Inclusion and Technology Design
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Lecture - 02
Missing Women in Tech
Why lack of female technologists matters for technology design and development

I am Karin Verspoor from the University of Melbourne in Australia and I am here for a very brief visit, and basically just fly in fly out of Bangalore today. My call my 36 fly hour fly by just to come and join you. And as I reflect on why I am here and what I am going to be talking to you about - just for context, I am a computer scientist. I work at the School of Computing and Information Systems at the University of Melbourne. And I am used to giving technical talks, I am not used to talking about these sorts of issues.

And if I think about how I got to be standing in front of you a lot of what I am going to be sharing to you it is really my lived experience of being a woman in technology. And sort of reflecting on the students that I see in the classroom the experiences that I have had you know over my career. And importantly I think that is informed by the fact that I actually have a lot in common with you probably more than you realize. My father spent his career at the World Bank mostly at the headquarters in Washington DC. So, working in International Development and specifically working in education policy.

So, my framework from home was you know quite related to the themes that we will be talking about here. And in the mid 90's, he spent 4 years living in New Delhi working for the World Bank there. And so, actually I have, you know, heard through him, some of his experiences of working in India with on the education context and education policy. So, really I guess what you know I am coming here because I have this combination of my own personal experience. And it sort of informed by the lens that my father has given me and my mother, my mother is a very strong woman who set very good examples and high expectations for me.

So, I do not have maybe the social theoretical constructs that Bidisha has and you know she has this incredible depth of knowledge of the theoretical frameworks. But, I have my experience and so, what I like to talk to you about is why I think it matters that we need to talk about women in technology. So, let me further context I work in an area called

natural language processing. So, my research work is actually around trying to get computers to make sense of language. So, I love language so, what I have in my title here is a little bit of a kind of linguistic play on words.

So, I have called this Missing Women in tech and I am actually going to talk about three different interpretations of that phrase Missing Women in Techs in Tech. So, the first interpretation of missing women is that women are missing right that women are in fact, missing from the tech sector. And just to give some context around that I am going to talk you through some data because I am a computer scientist, I like data that comes out of Australia. Now, these numbers are not representative of India I am sure and they are not even representative of umm the western world kind of more broadly, but they are indicative of a problem.

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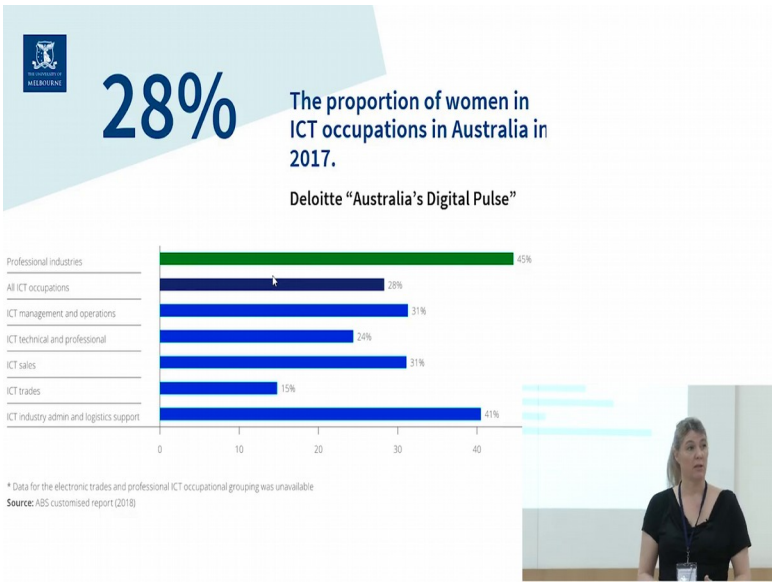

And if we look in Australia the number right now for female representation in the tech sector in ICT broadly is 28 percent. And if we dig into those numbers a little bit more deeply we actually see that the number of women who are in technical roles in the ICT sector is quite a bit smaller than that. So, we have technical and professional roles here at 24 percent, I have seen numbers out of the US that indicate that engineers at the big tech companies like Google and Facebook are less than 15 percent female.

So, women are in need tech companies, but not necessarily contributing directly to the development of technology. They might be in sales, they might be in human resources,

but they are not necessarily in customer service. They are not necessarily engaging directly in the technical work of the technology.

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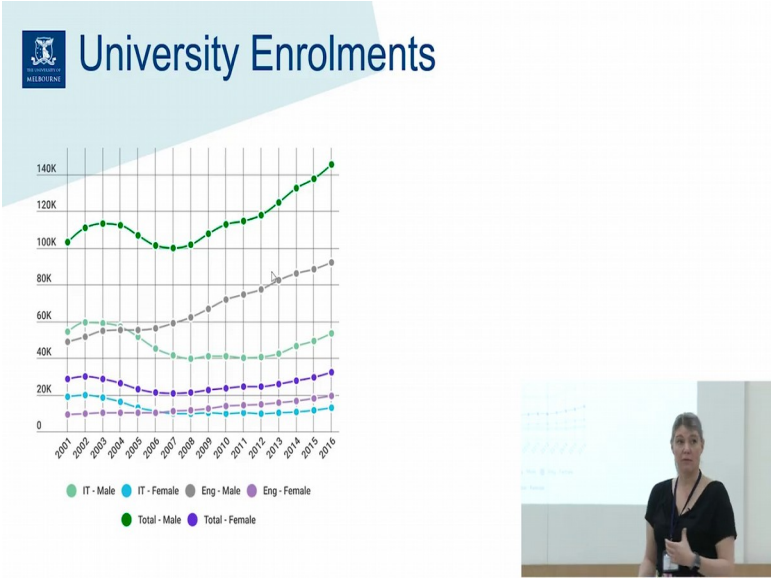

If I look at it from the perspective of student enrollments and that is obviously, important to me as an educator in the university context.

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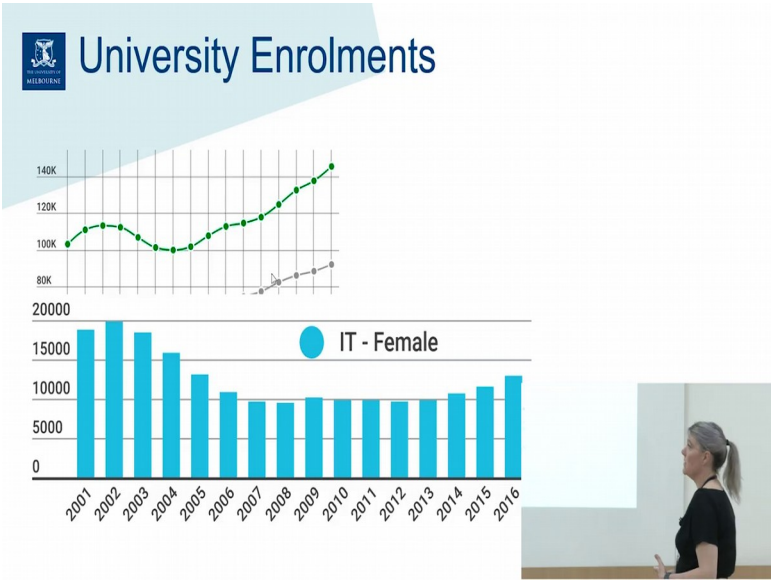

We have very large disparities in enrollments and if we look at the specifically female enrollment in IT again these numbers this data is from Australia across the board. And we find first of all that women are a very small proportion less than 20 percent about 18

percent of their overall IT enrollments in the country and worse those numbers have actually gone down.

So, while we see a peak here at around 2002 right arguably through the biggest growth period for technology as an industry women's enrollments in IT in Australia were declining. Now, they have started to come up just a little bit here recently and we are working hard to try to get those numbers up. But, I think this is a problem you know we just have clear evidence that women are not choosing to study IT.

Student: Karin are those absolute numbers on the where.

These are absolute numbers. Australia is a small country so.

Student: What is the male female ratios in the country and its (Refer Time: 05:53)?

I do not actually know that off the top of my head, but I imagine it is pretty balanced. I have no reason to think that there would be fewer women than men.

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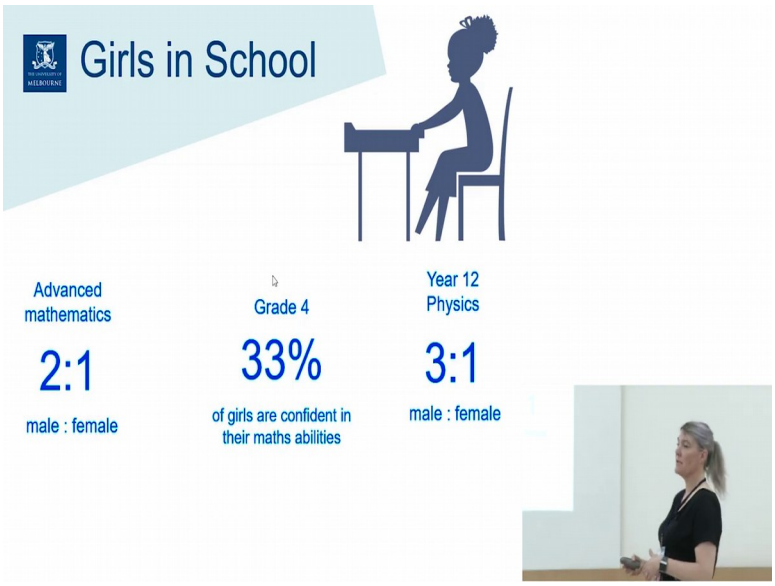

If we look at some other kind of statistics around how you know what women are doing before they make that decision about choosing IT or not, we see that at the high school level we have a 2 to 1 ratio of males to females in studying the advanced mathematics subjects in school. So, in school already girls are not choosing to study mathematics. Now mathematics is not ICT, but it is a precursor to studying ICT. In grade 4 which is 9-

10 year old children only 33 percent of the girls that were surveyed are confident in their mathematical abilities.

And I have seen this in my own children I had a child in grade 4 who was still counting on her fingers and it shocked me. And when I asked her why she did not want to do better at maths? She essentially told me it is for the boys and I thought we have a problem, Houston we have a problem.

So, I enrolled her in a Korean program called Kumon and she is really good at maths now, she is getting the top marks in her math test 2 years later of course, she hates me for making her do extra work outside of school but hey. Neutral physics again this even more imbalance than mathematics 3 to 1 male female. So, women or girls are not choosing to study these science and mathematical subjects that will give them the foundation for going on.

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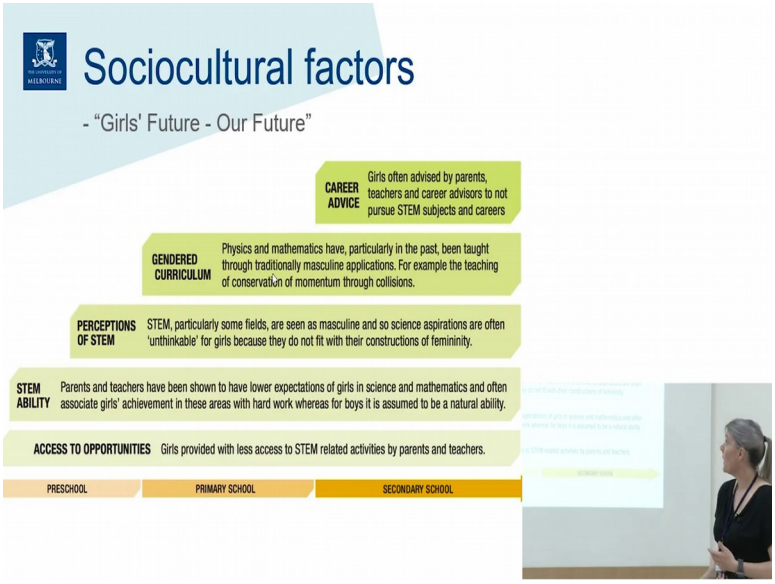

Why is the obvious question and so, there was a study that was done a few years ago that kind of came up with this sort of analysis of what is going on and they found that the problem starts right at preschool. So, overall girls are being offered less opportunities to develop their interest in mathematics and in science and in technology. Part of that is because the parents have lower expectations, the parents do not think that ICT or STEM in general is a good career path for their children and specifically for their daughters.

And so, they do not actually encourage their girls to do things like I do not know robotics club at school or any kind of extracurricular activities. It says here STEM particularly some fields and I would argue that ICT is one of those fields are seen as masculine. And so, the idea of a girl going into this discipline is unthinkable, the curriculum itself and some of your educators or training to be educators, the curriculum itself has gendered.

And they found that there were a very specific kinds of approaches to teaching that were simply not engaging the girls adequately. I will come back to that and finally, you know in high school when they are picking their subjects and they are picking the foundations of their career girls are often given advice to steer away from a potential interest in science and technology. So, we have these socio-cultural factors which are driving a lot of the choices in the behavior.

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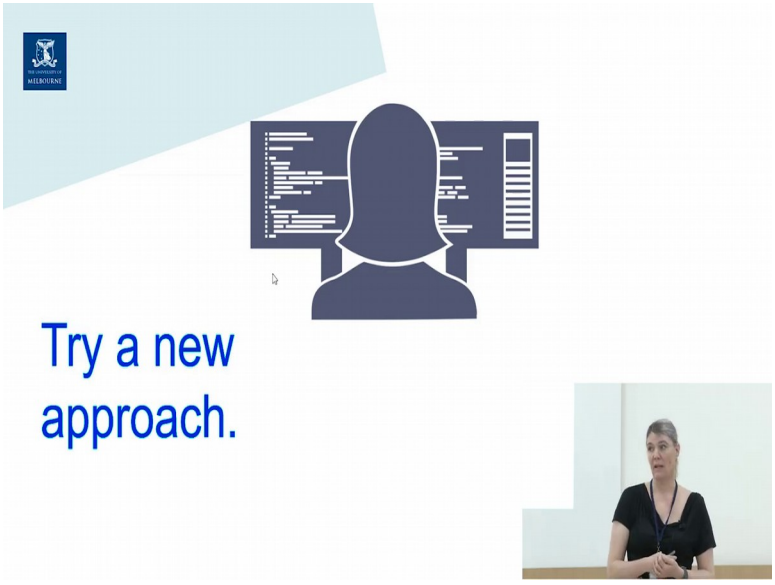

So, I just want to say that we have to step away from that right and you know again my lived experience. So, I finished my undergraduate degree in computer science 25 years ago, I just went actually back for my 25th reunion which in itself was a frightening experience. 25 years feels like a long time and the one thing that has not changed in 25 years is how many women are turning computer science. And you know when I did an undergraduate might that undergraduate degree I was one of us very small number; I think 3 or 4 women and that completed the course in computer science at my relatively small, but very science oriented kind of university.

And as I reflect on that you know I have really thought about why nothing has changed right. Why do we why are we still seeing only 18 percent of our undergraduate students being female at the university level. And I think it comes back to this issue of not supporting the women in the ways that appeal to them and having activities which really do not suit them and having expectations around ICT and what the what their career is going to be like that do not adequately engage them. So, we are trying a new approach at the University of Melbourne, this year I implemented in our first year programming class a female only tutorial.

And women can choose now to for one small group tutorial session a week, they can choose to be in a group of only women. We have had about 30 women in each semester choose to do that out of a cohort of about 600 students overall of which about 30 percent are women in that first year, first semester programming class and we are still crunching the numbers. So, I cannot tell you exactly what the outcome of that is going to be. But, it was really my attempt to acknowledge that the experience of the women in our first year programming classes is not always positive.

They comment that they often feel that they are starting behind, that the boys coming to these first year programming classes which is soon no background, they assume nothing. You have never, you do not have to have ever touched a computer before you take this class, but the girls feel that the boys have been spending their weekends teaching themselves; as you said kind of learning going online and learning. Maybe doing a bit of you know hacking in a darkroom and they did not, they were out doing other things. And so, they come to that first class and they already do not know as much as the boys.

And or at least that is their impression right; now I can tell you as an educator that very likely the boys have been teaching themselves badly because they have not had the educational framework within which to learn a structured and rigorous approach to programming. So, in a way we have to undo the learning that the boys have done, but the girls are left with this sense that they are going to be asking questions which are stupid. And they do not feel confident in asking those questions in front of boys who appear to know more than they do. So, this is one way we are trying to deal with that problem.

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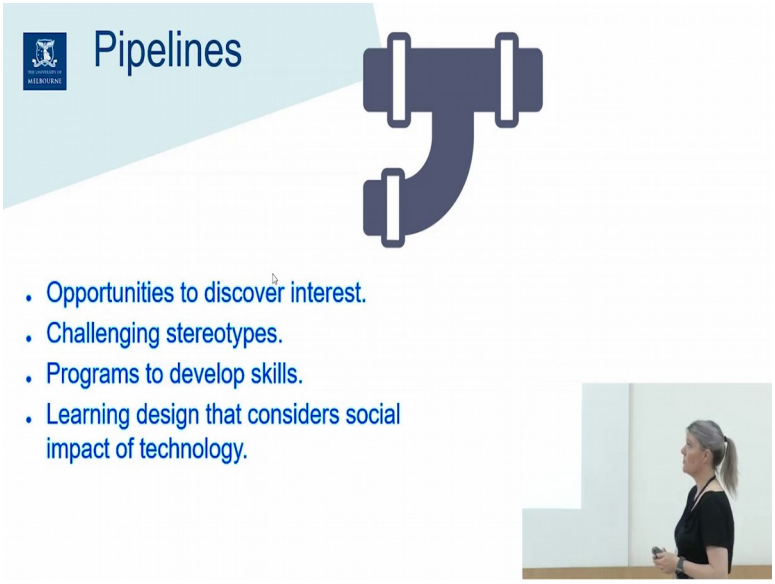

So, what we have is a problem of a pipeline right we are not getting the girls to go into studying computing or ICT in the first place. And so, ways we can chat we can deal with that or to provide them with opportunities to become engaged right. We need to build a pipeline, we need to challenge the stereotypes that are out there and we have to provide them with programs that allow them to develop their skills. So, that it is not such a big it is not so, confrontational I suppose and that it becomes an option for them. Now, I do not expect everybody to want to become a computer scientist that is not the objective here.

I expect that people will find their passion and what I want to do is provide everybody with effectively an equal opportunity to find their passion. And if their passion is technology fantastic, if not I hope they find something else that really you know drives them. But, without giving people the opportunity to explore these ideas they will not know whether or not they like these things right. And I think for technology in particular its different than maths and science because, maths and science are standard part of our curriculum from you know primary school all the way through secondary school and obviously into university.

And so, it just becomes part of life and in fact, if you look at our university enrollments in mathematics they are much more balanced. It is just in engineering and technology where we see a much bigger gap and I think it comes back to lack of exposure. I also think that we need to be thinking about our learning design and in particular there is

research that shows that with that girls or an women more broadly are engaged by the social impact of technology. And so, when we think about teaching our students and we give them a problem to solve with technology that first program they are going to write, we should not be asking them to write a program which is all about the nuts and bolts of programming.

We should be asking them to solve a problem which matters to them and that might be things like sustainability problems or other problems which require us again to solve a problem in a structured and technical way. But, have a broader sense of satisfaction that go along with it and this has been shown to improve the experience of women in their technical studies.

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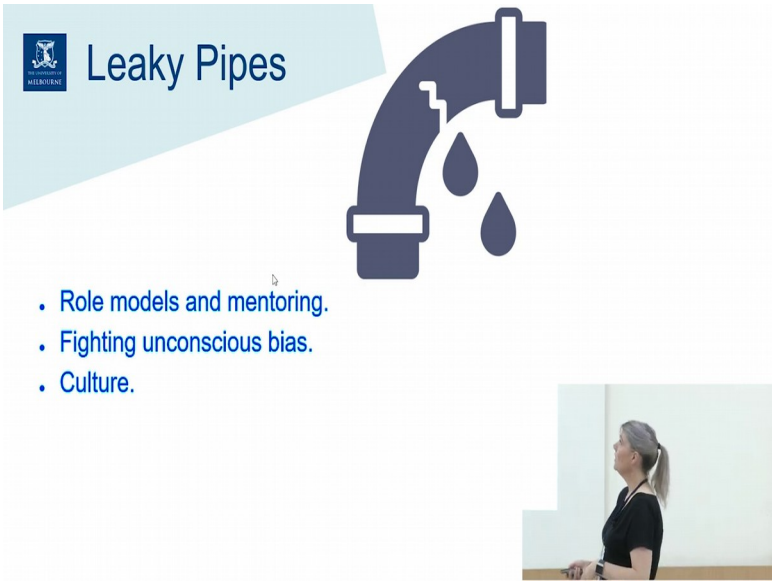

The other problem we have is the leaky pipe problem which I have not talked about at all yet and really the leaky pipe problem is the fact that, once women persevere make it through they come up through our pipe we train them to become technical and we put them into the workforce we then lose them. So, the number of women that is begin a degree in technology and end their degree in technology is actually quite small.

We lose I do not know with I do not have numbers for you, this is one place I do not have actual data. But we know anecdotally that a very large number of women for instance do not return from maternity leave, after they have had a child or adopted a child. And so, women in the tech sector are feeling that they cannot come back to work.

They also leave you probably heard a lot of discussion this year around the treatment of women in certain companies in the tech sector.

And women leave because the environment is not nice for them because, either there is explicit discrimination that is happening. Or because they just do not feel like they are part of the group, they do not get promotion opportunities at the same rate as the men do and essentially they are being constrained. So, we have to fix that problem if we want women to kind of continue on in engaging in the tech sector. And that means, providing role models and mentoring, I am doing a lot of that myself.

Fighting unconscious bias we have to make sure that we are aware of our unconscious bias and try to give people tools for recognizing their own unconscious bias. These are some of these things are really ingrained in us. There was a study that came out of Harvard, where they showed that hiring managers that are looking at CV's all you have to do is change the name from Harriet to Harry or from Harry to Harriet and you get a completely different outcome in terms of the likelihood of this person being selected for an interview.

And this applies not just to male hiring managers, but to female who are hiring managers. So, just because you are a woman does not mean you do not have this unconscious bias against women and sort of thinking that they are; that they are not good enough to do the job. Why is that? I could not tell you and we have to work on that culture in the workplace in order to support everybody to develop and contribute and grow their career.

Student: There is one base tenacity right it is there in (Refer Time: 18:43).

No, that is its everywhere. I think in ICT it is much more entrenched though so.

Student: There must (Refer Time: 18:48) I think primary that you know having the (Refer Time: 18:57) able to take responsibilities in (Refer Time: 19:00).

There are certain aspects to the tech sector which I think emphasize, overemphasize the issues that are present more broadly. So, you know you are talking about you are an entrepreneur, you are going to start a company. Startups have very very very bad record of treating people with let us say lives outside of work well and a lot of women you

know do not want to work a 14 hour day. But, there are many companies that implicitly expect that and I have seen job ads this year that essentially say, if you are not willing to work 14 hours a day do not bother applying for this job.

And you know that is not good for anybody, I would not recommend to anybody to work that those kinds of hours. But, it has a much bigger impact it sends a message. So, I think that you know while yes, it is true it is generally true it is kind of highlighted in the tech sector or it is a bigger problem even in the tech sector ok. So, the other another interpretation of missing women is what women are missing by not participating in the tech sector.

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So, the tech sector very simply is a massively growing sector and so, one of the; one of the biggest things that women miss out on by not participating is job opportunities; we know that there are massive growth in numbers.

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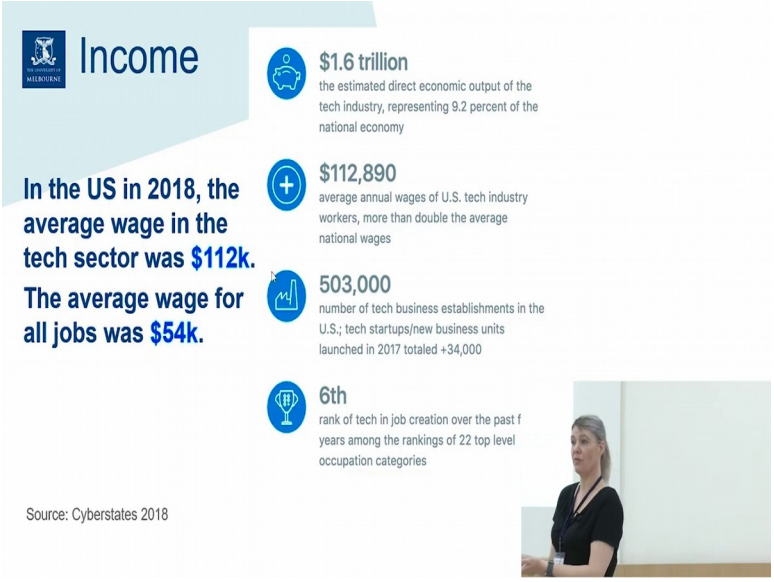

And if we look at some US data in 2018 the average wage in the tech sector was a 112000 dollars that is a pretty good income. The average wage for all jobs was 54000. So, just by being in the tech sector you can make more money right and that is a pretty that is almost that is double more than double.

Student: All jobs excluding in tech.

All jobs overall.

Student: Oh.

So, that already includes the 112000, you probably all like you know how go get a job in America now right. You know 1.6 trillion dollars is the estimated direct economic output of the techs industry, again in the US, 9.2 percent of the national economy in the tech sector, 503000 tech businesses. New ones launched in 2017 34000 new companies in the tech sector and its ranked 6th in job creation over the past 5 years across 22 different occupation categories. So, you know very simply there are jobs in tech and women, if they are not participating in tech do not have this as an option they are not able to do that.

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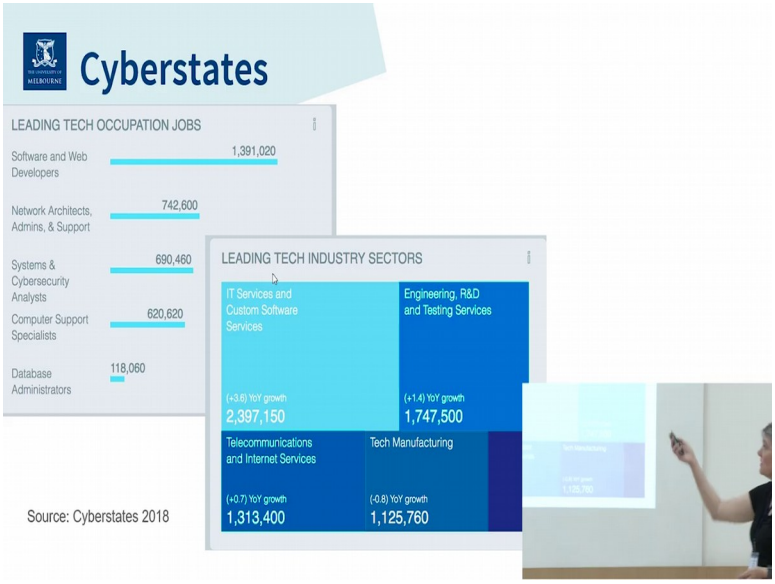

If we look specifically at some of the jobs that are in those numbers software and web developers are by far the biggest group. So, 1.4 million software development jobs available in the United States in 2018 or 2017 probably, these are a lot of jobs ok. So, that is just math.

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I think more importantly what women miss out on by not participating is that the technology does not actually see them and I mean that quite literally. So, there is its there

is research that has shown that the early voice recognition systems for instance could not hear the women.

Student: (Refer Time: 22:53).

Say again.

Student: In system there must women what I mean (Refer Time: 23:02).

I mean the computer, I mean the technology it literally does not see the women. So, here I meant here I have an example from hearing women. So, you know you have Google Google what is it called assistant and you have Siri. And the early systems the early systems that were developed for voice recognition could not understand a woman's voice. Why? Because, the engineers who were building these things were all guys, they were testing them in a room somewhere with their own voices, they were being developed with male voices.

And so, literally the systems could not hear the women and you think where the early voice recognition systems were being developed probably 20 years ago, 30 years ago you know you think all must have changed in the meantime. Well, there is an African American student at MIT, who I read about a couple of years ago who discovered that our face recognition systems could not see her. So, she is very dark skinned and the images that these systems were trained on only had white faces in them. And in order for the camera to recognize that she was there in the frame she actually had to put a white face mask on in front of her face.

So, this sort of its not nobody did this on purpose right nobody set about to ignore women in speech recognition systems or to ignore black people in facial recognition systems, but it is a product of an environment where those people do not exist. And so, that is really the problem with women not being there is that the technology is not developed at all with them in mind.

And kind of more broadly you know besides those kind of obvious physical differences it does not consider the use cases that matter most to women. I was giggling a little bit when you were talking about going online and accessing information, because actually as I was reading some background material for preparing this talk. One of the examples that

I came across was exactly, that men use the internet for finding stuff out. Who can guess what women use the internet for?

Student: Shopping.

Shopping is one thing, more important than shopping.

Student: Cooking recipes.

Cooking recipes ok, you are missing the big one guys; social communication.

Student: Connection with people.

Connecting with people exactly right. So, women use the internet social media right, we are the biggest users of social media. Men are using it too, but they are not using it for the same purposes as women. And so, when we design technology from the perspective of what do I want to do with the technology which is how most people develop technology and how most companies develop technology, if the eye is of one kind then we miss the other perspective.

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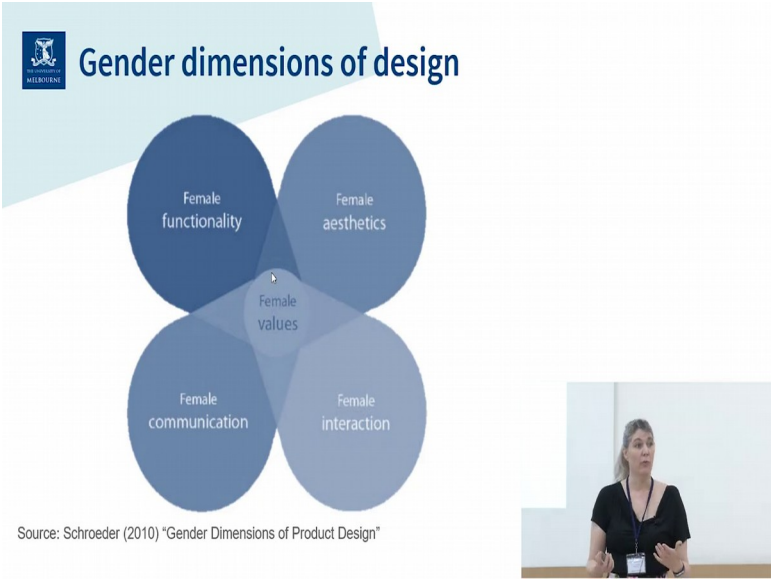

So, it is been argued that in order to have a kind of inclusive approach to technology design you have to consider the gender dimensions of that design. And that means, looking at the functionality, the aesthetics you can laugh at aesthetics, but aesthetics matters to women even the form can matter. So, there is some early smart phones that

women found extremely uncomfortable to use because their hands are smaller. And just simply holding the device was uncomfortable for them or trying to you know manipulate the device with one hand, while they had a baby in the other or stirring the pot in the other was not possible because of the size of their hand.

So, simple things like that taking the perspective of somebody who is a little bit different from the people developing the technology or at least including those people into the development of the technology is important. And then looking at the ways in which women want to interact the ways they want to communicate is important for informing how we might develop this technology.

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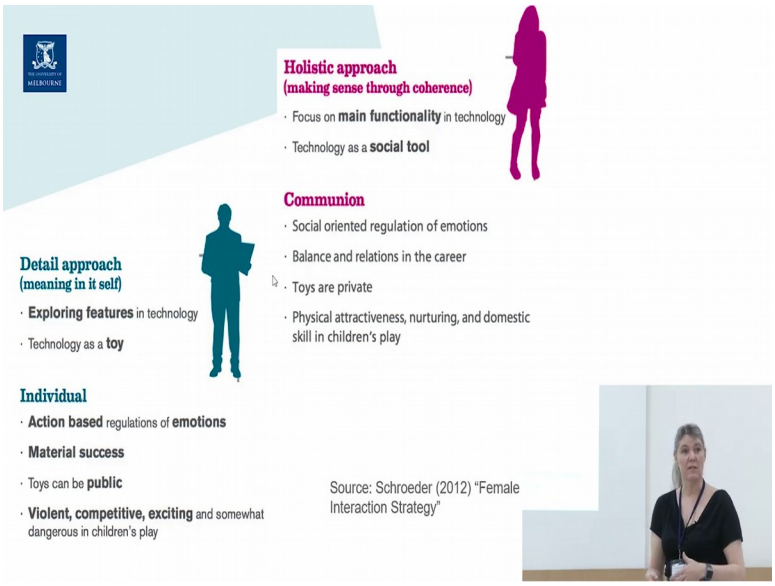

So, this I took from actually there is a kind of design consultancy online, where they are trying to encourage companies especially the tech companies to think about including women in their approach to design. And this I took from one of their presentations where they emphasize that men are very interested in details. So, exploring features in the technology a kind of view technology as a toy to have fun with whereas, women are much more focused on the functionality of the technology and using it as a social tool.

And there are a few other aspects to this, but and of course, there is a spectrum right we do not want to over stereotype. But, if we are not thinking about these differences then we are going to end up with technology which only serves the needs of a few.

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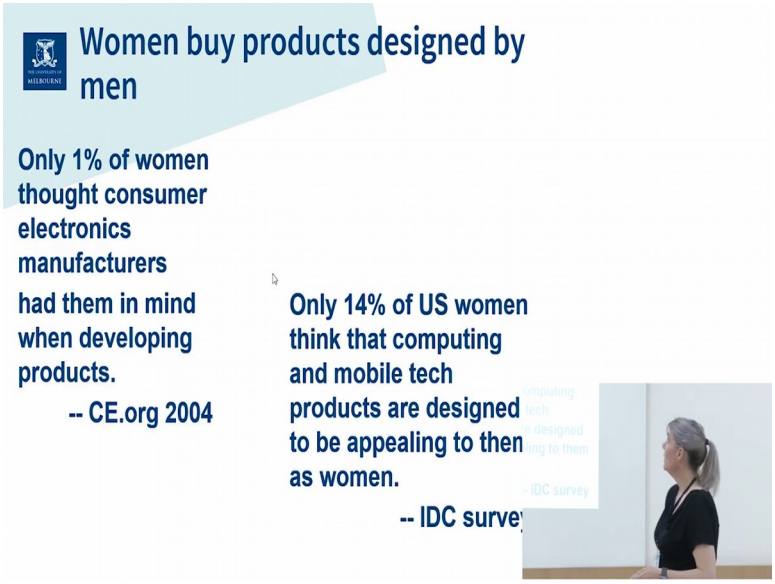

And I think you know one one sort of key summary of this is that women effectively buy products that are designed by men. And if you ask women you know do you think that these things were designed with you in mind and your needs in mind, they will tell you no. So, 2004 only 1 percent of women thought that consumer electronics manufacturers ever thought about their use cases when they were developing their products. And more recent IDC survey only 14 percent of women thought that computing and mobile tech products were designed to be appealing to them and I am not just talking you know making pink razors ok.

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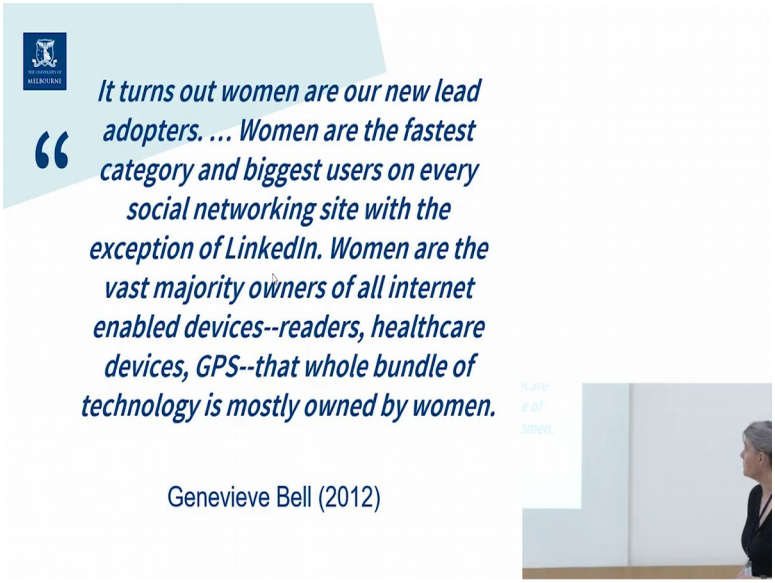

This is actually changing the way we think about the technology. So, Genevieve Bell who worked for many years at in Intel is a fascinating person, she is my probably my favorite Ozzie. She is an anthropologist and she spent her career you are like anthropologist at Intel. How does this work? She spent her career basically exploring how people use technology and she did she is done fascinating things like she will just ask people random people can I dig through the contents of your car and she did this in various different places around the world.

So, she is trying to understand how people use their cars and what they have in them and she would go in and she would you know literally excavate the car right and pull out every last little thing tissues and you know the spare, a lot of money that the Chinese people keep just in case they have to give a gift to somebody. She would pull all this stuff out and just put it on the; on the; on the ground and spread it out and look at how people, what people actually were carrying around with them. And you can you know you want to understand a woman find her purse and take it apart and look at what is inside, that is going to tell you what she thinks is important right because she is carrying the stuff around with her all day long.

So, Genevieve Bell does stuff like that and the conclusion that she came to is that you know women are our lead adopters. They are the fastest category in technology, the vast majority of owners of all internet enabled devices. So, that includes things like E-books, like Kindle readers, healthcare devices, GPS mostly women are buying these things; men buy them too, but they are toys for boys and they are tools for girls ok. Now so, we have talked about that the women are there in the first place and that they are losing out by not being there. But, I want to make a bigger point which is how we all miss out by not having these women there.

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There is some very interesting research that shows that actually group intelligence is correlated with the proportion of females in the group. Now, arguably there is an extreme maybe you do not want to have all women because, then we do not have diversity either. But, but generally speaking the collective intelligence of any group is improved by having more women.

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Women facilitate social interactions and working relationships in groups, this is what women are good at. They really like to develop those relationships and that is what then

leads to that group intelligence. Women contribute a different perspective on product design as I mentioned earlier and in research, that shows that women are more adaptive than men that they solve problems efficiently within a structured framework.

So, if you have constraints that you have to work within women actually are one standard deviation above the mean in terms of being able to work efficiently and effectively within that construct. And if you do not believe me you can look at the research.

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I picked out a few quotes “Drawing more women into design - the configuration of artefacts is not only an equal employment opportunities issue as I mentioned earlier, but is also crucially about how the world we live in is designed and for whom”. We are designing the world when we are designing this technology.

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If that is not enough motivation let us look at the economics. So, it turns out that when there are more women in these groups that have higher intelligence overall there is also higher employees satisfaction. So, if you are an employer just by having more women there you are going to have a happier workforce, that is pretty good. Most employers want their workforce to be happy because a happy workforce is a productive workforce.

And indeed there is evidence that shows the economic benefits of having women present in these contexts. The average venture backed company run by a woman has annual revenues 12 percent higher than those run by men using an average of one-third less capital. So, we are back to that efficiency issue women are making decisions I do not know why, but women are making decisions that are good for business. Maybe it comes back to those social relationships and their inherent need to address everybody.

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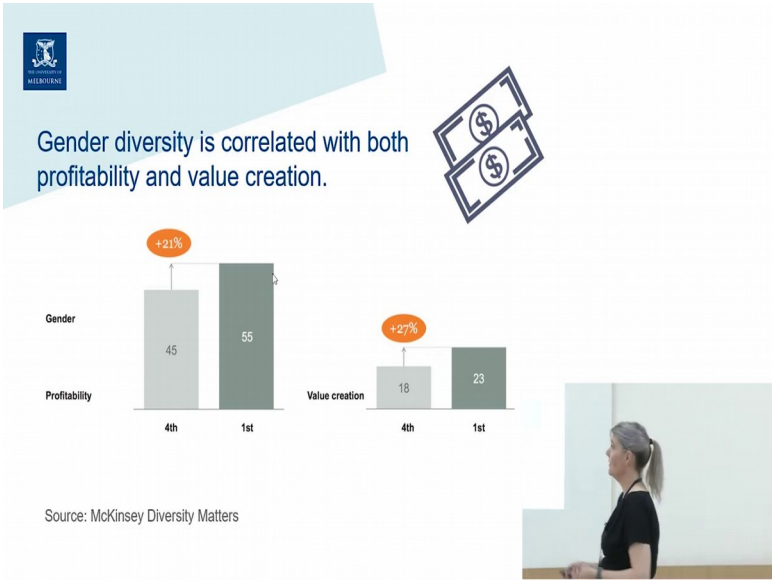

I do not know, I do not have the theoretical frameworks. And if we want to convince the men in our boardroom and yes unfortunately our boardrooms are predominantly men. We need to remind them of things like this gender diversity is correlated with both profitability and value creation. Companies that have more female leaders have much higher profitability than companies that do not.

So, you know with the gap between the first ranked companies in terms of; in terms of female representation and the fourth is 21 profitability margin, that is a pretty big difference and same similarly for value creation. So, you know if you are starting a tech company you might want to think about having some women represented in the leadership of that company ok.

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So, that brings me to the end and just to recap women are missing, they are missing from the tech sector in the first place. They are missing out by not participating in tech and yet women have distinct values, that need to be considered in technology design and if we do that they will bring value. So, hopefully I have provided you with some things to think about here and my watch has died. What time is it?

Student: 11:20.

Good. So, I can are there questions? I have another little thing I wanted to talk tell you about as well.

Student: (Refer Time: 36:47) have compresses of STD 4.7 times (Refer Time: 36:51) basically represents of education for P system in the company and what is the relationship. And the curriculum and education policy my part was to process and education that is TPSG and the economic text books (Refer Time: 37:06).

So, what I found out for India was that even the pictorial representations under economics textbooks were such that there was a chapter in class 8th NCERT book which was on people as a resource as basically on human capital. And there is a girl who is asking what is human capital and the guys like you do not even know that, it is kind of mansplaining.

Yes.

Student: And in next page there was a picture depicting different kinds of human capital; there was engineer, doctor, teacher, leader and ever, all of these were.

Were men.

Student: Men.

Yeah.

Student: Right.

Were man.

Student: Men right.

Yeah.

So, the representation varying in our imagery is.

Student: Probably the teacher or the professors who read the text book all are men. So, why is the text books more talking about you know this being sensitive to (Refer Time: 37:59) at the same time they were saying that you know.

They were projecting a different idea.

Student: Exactly all of the pictures were like women are fetching water and men are driving a car.

Yeah.

Student: So, they are trying to set general norms.

I got mad at the University of Melbourne them, you know if they somebody watches the video they will get mad at me. But, you know a few years ago we had developed collateral for the Melbourne School of Engineering which we were handing out to prospective students. And one of the key images that they had picked had you know men working in the foreground in clear image and a couple of women in the background fuzzy.

And that was one of the primary images that they; that they; that they used and I said and they were like Karin look we have men and women. I am like but the message you are sending is that the men are in focus and the women are in the background. And how do you think a woman is going to look at that, they are going to say I am not; I am not central to what your image of what an engineer is.

Student: Right.

They were mortified and of course, they went and changed they found a different picture right. And of course, that you know it was not at all intentional, there is no you know there is no explicit desire to discriminate. There may be contexts where that is true, but I think in most cases it is just they do not notice. And because they are not actually asking the people who is who are maybe is their target audience about this or maybe they do not even think of those women as their target audience. And so, they are not you know they are just not considering that perspective.

Student: And even especially school place out like what you say the embedding nature of it, like just setting up the sound system before the school assembly; its always the boys doing it. And, inside during the class now its the girls doing it and we are talking about high school girls so they are 7th, 8th grade.

So, (Refer Time: 39:38) more than a decade of conditioning, but this kind of a chicken and the egg argument. But, like I do feel like while we do not call into why do not we have that men and women are equally in their abilities are they sort of wired to maybe their preferences what they enjoy doing might be widely different. And I forget the day of the studying but ah, it was also around like what children the way they play when they are a year old, 2 years old, 3 years old they all distinct right, they its always gendered. So, what you said like.

Yeah, as I said (Refer Time: 40:37).

Student: Technology as a tool and a toy (Refer Time: 40:38).

I mean I think there are you know there are differences between men and women and when we talk about equality and equity it is not about making everything identical for everybody. It is actually about acknowledging the differences and you know essentially

allowing applying to everybody's strengths right. So, we can meet people where they want to be met rather than pushing them into some sort of average box. We do not want everybody to be the same, I mean actually that is exactly the point that diversity is positive, that there is benefit from having different perspectives and different motivations.

So, it is not about trying to make everything completely equal, it is really about having sensitivity to the differences. And I mean there are people who say that you know we should not let women into technology because, they are not suited to it right that, there is some sort of you know biological difference.

Student: (Refer Time: 41:46) Google manifesto.

Well exactly right Google manifesto, but you know everything's a distribution and I think acknowledging that there are you know within genders not everybody is the same, understanding that actually you know there are different use cases effectively. So, you know bringing it back to a design question you are even just saying, I am going to design for women and I designed for men it is too simplistic. Because, there are; because there are men who are social and there are women who love the nuts and bolts right. We cannot you know we have to be careful not to kind of over stereotype and certainly imposing definitely, I think is problematic ok.

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I wanted to share with you something which I am about to go to, it is relevant. So, in what is today the 10th in 16 days I leave for my Antarctica journey and you are probably thinking what?

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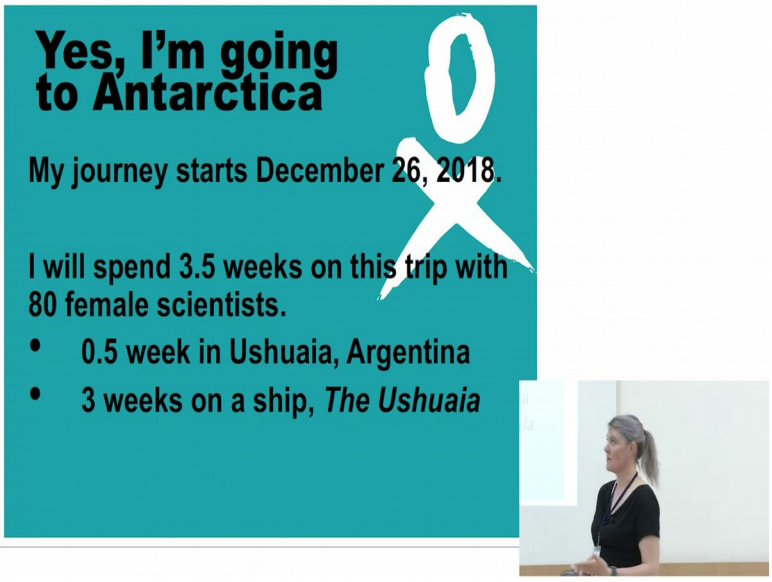

Yes, I am going to Antarctica and I leave on December 26 from Melbourne which is why I have to go back to Melbourne tonight, because I still have a lot of work to do before I can leave. And what I am going to be doing on this trip and why I am telling you about it is because I am going to be spending three and a half weeks on this trip with 80 female scientists. We are going to be spending half a week in a small town at the very bottom of Argentina called Ushuaia. And then we are going to be spending 3 weeks on a ship called the Ushuaia traveling around Antarctica.

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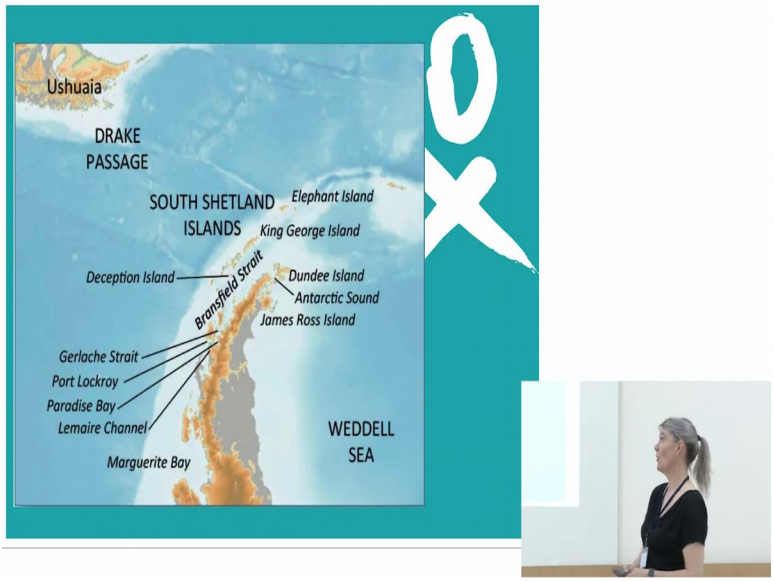

And specifically we are only going to see a tiny little piece of Antarctica even in those 3; weeks we are going to be coming out of your Ushuaia passing through the Drake passage and then visiting a number of different areas across the closest part of Antarctica.

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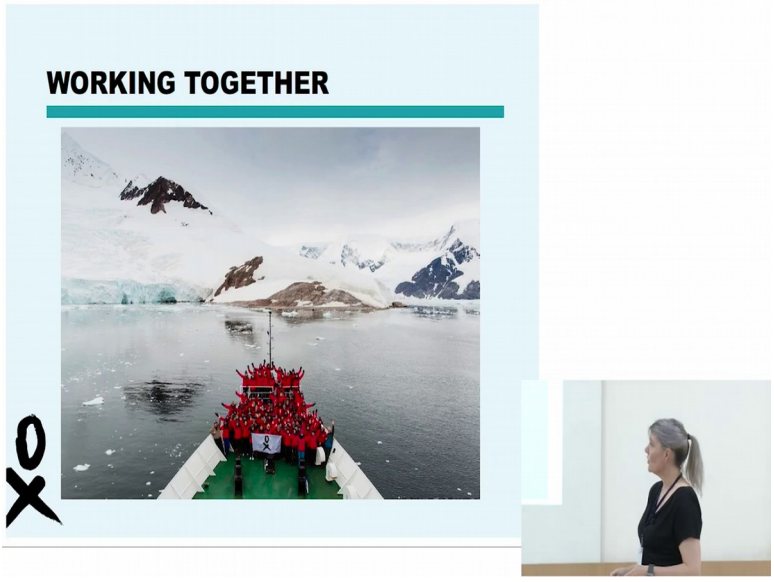

So, you are probably wondering what we are going to do there? One of the things that we are going to do is to build on our strengths and develop our social networks as scientists. The objective of the program is actually leadership development. So, we are trying to bring these women together to grow themselves as leaders and hopefully be the next

generation to start changing those statistics in the leadership profiles of our universities and our companies.

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A lot of the focus of the program is on personal development. So, for me it is really about trying to think about what I want from my life, maybe what personal characteristics I have that are holding me back from achieving some of my own personal objectives.

And really taking time for reflection and learning the tools to help me get from where, I am today to where I want to be in I do not know 5 years time or 10 years time. And for a lot of female scientists having this opportunity is really important because, we have not necessarily been given those tools by our education system and to really think about that. One of the key focuses of the program is actually climate change.

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And so, part of the rationale for going to Antarctica is actually because Antarctica is I sort of tongue and cheek say the coalface of climate change. So, it is a place where some of the biggest impacts of climate change are becoming obvious, the habitats for little penguins are changing, the weather events are becoming more extreme, the glaciers are melting. And so, this group of 80 women is going to be brought there to kind of experience firsthand what is going on there.

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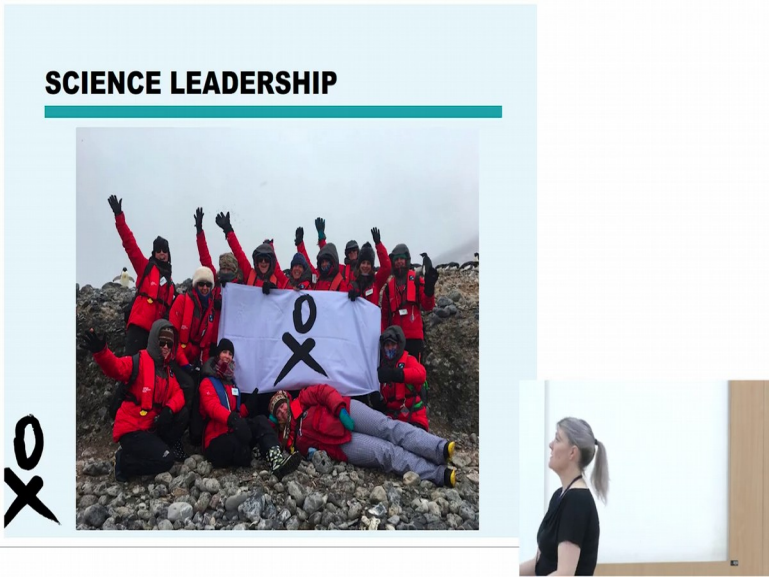

And as I said the emphasis is really on leadership and kind of you know developing our frameworks and our tools for being able to address some of these really kind of confronting global challenges. You are probably thinking why is a computer scientist doing this right, well my work is actually very interdisciplinary.

So, I use my data science and computer science tools in the context of biomedicine and I feel like in the context of global health climate change is actually a very important element of our global health. Things like pollution even are actually very important for health and so, I have been even working on things like the exposome, so, trying to characterize exposures.

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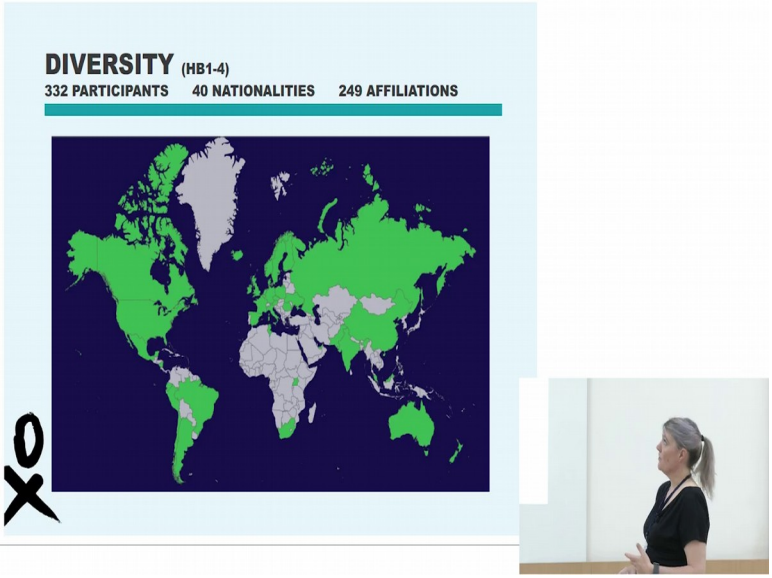

This program itself is increasingly diverse, there are 332 participants that have been doing this program we are I am in the third group and that fourth group has already been selected. 40 nationalities represented as some Indians as well with 249 different affiliations we have a big hole in Africa, that is partly because the program is very expensive. And so, one thing we are working on now is possibly diversity scholarships to help people from more disadvantaged places.

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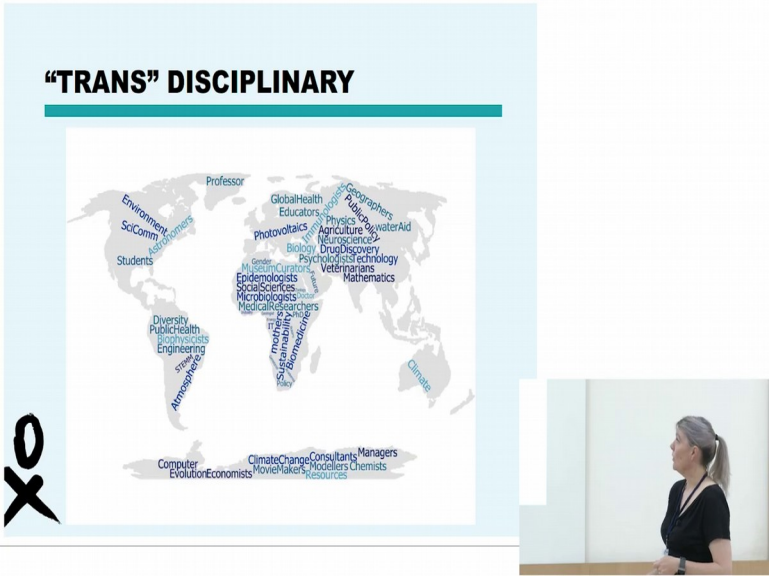

We have now the first program had mostly environmental scientists and now they realize that even in this context it is not just enough to have women diversity through gender, but to have diversity through scientific expertise and skills and arguably that is why I am there as well. So, this computer word there probably came from my profile as well as a few of my peers. But we have veterinarians and doctors and public health experts and climate scientists and medical researchers all coming together now.

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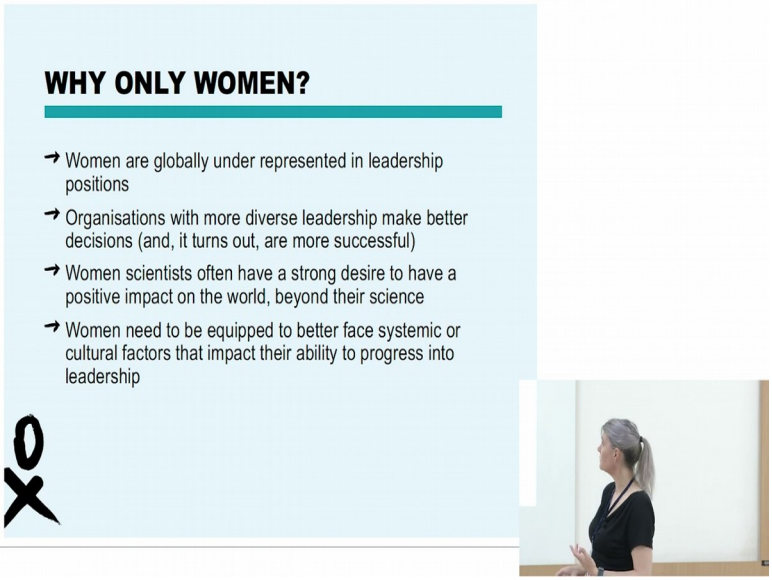

So, why only women? Women are globally underrepresented in these leadership positions in science. Organizations as I said with more diverse leadership make better decisions and as I also said it turns out or more successful. Women scientists often have a very strong desire to have a positive impact on the world beyond their science. It is not just about that next publication, it is about having an impact on the real world.

So, what better group of people to try to engage in one of our biggest problems and women need to be equipped to better face the systemic and the cultural factors, that we have just been talking through and that impact their ability to progress into leadership. And so, that is really the purpose of homeward bound.

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And why Antarctica which is the other question I get, I already answered this a little bit, but partly it is about being inspired alright. Can you imagine a more inspiring place? I cannot and I am sure when I get back I will be able to articulate that a little bit better, but right now, I am just sort of in awe of the whole idea. It is the one of the most remote places on our planet, it is extremely cold, cute little penguins not so, little actually big ones. We have little ones in Melbourne, but big ones in Antarctica and I think importantly it provides us with a quiet space.

And so, for me as I thinking about what is the whole point of this program, I have realized that for me actually removing myself from the day to day phone, internet all of this is an important part of being able to do really refocus on myself. I do not know how

general this characteristic is, but I suspect that many women do not really put themselves first. They tend to put their obligations first, their family first, their bosses, their my case my students. I put other people's needs first before mine and I get sucked into it you know every day. And so, by being away and having 3 weeks, three and a half weeks where I am only thinking about myself and my science and my peers and my leadership development is a time for me to reflect.

And hopefully grow in a way that I cannot with the demands of day to day life, it seems really extreme go on a ship which is off grid, only satellite phone for emergencies with 80 women for 3 weeks. But, maybe that is what it takes to get us to actually take that step back. We will also have coaches, we are going to have visibility coaches, we are going to have people helping us understand how to do science communication better and to get our messages out there.

So, that when we come back we know how to start that kind of process of engaging other people in the things that matter for this planet, we will also be sharing science with each other. So, we are preparing for something called symposium at sea where, we are actually going to have a little science exchange happening.

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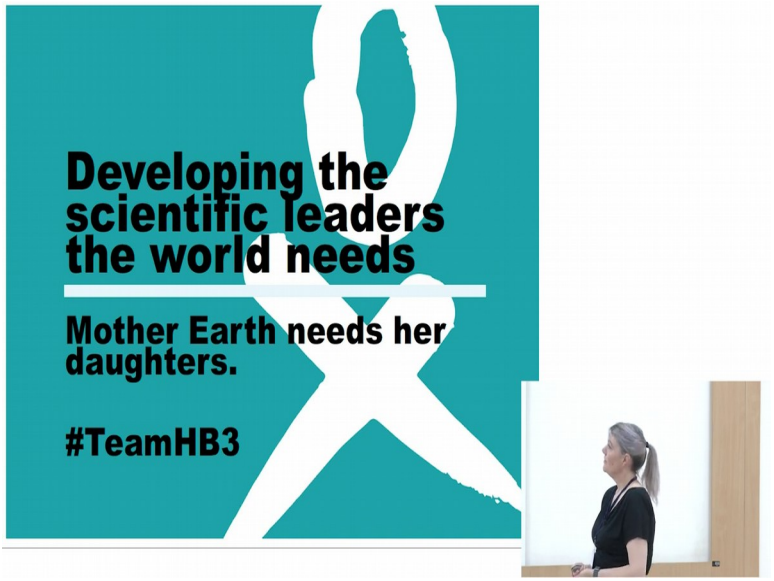

So, homeward bound is really all about developing the scientific leaders of the world needs and they say mother earth needs her daughters. And so, I will just leave that there and if you want to ask me question about that I am happy to talk about it.

Student: Is this topic by the institution or.

We also the it is quite an expensive program, the funding for it depends on your personal situation. So, I have got an sponsorship from the University of Melbourne because, they are investing in me as a future leader of the university, many of my peers in this group have to do their own personal fundraising. So, I have gone to so, many fundraisers this year to help my fellow team mates out.

And so, it is sort of you know that is part of the process for a lot of them as well it was part of the process for me asking my institution to support me. It is a lot of money, it was a big ask and I explained to them why I felt that they should do that. And that was you know part of me kind of saying why it was a worthwhile investment for them and for the women who are crowd sourcing the funding right, basically trying to get their friends and their families just and their workplaces to support their effort. It is about telling that story of why it matters, why you should support me in this journey. So, it is part of the process.