

Sue Nelson

Hello, I'm Sue Nelson and welcome to the Create the Future podcast, brought to you by the Queen Elizabeth Prize for Engineering. Celebrating engineering visionaries and inspiring creative minds.

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Naadiya Moosajee is an engineer who thinks big. In 2017, several years after being named one of the 'Top 20 Young Power Women' in Africa by Forbes Magazine, she launched the 1 Million Girls in STEM programme. It was part of Women in Engineering (WomEng), a non-profit social enterprise, she co-founded across several countries to encourage more girls and women into engineering. And as we'll hear later, it's been incredibly successful. Naadiya, who is also a serial entrepreneur, studied Civil Engineering at the University of Cape Town, and did a master's in transport engineering. So, my first question was about how her career began.

Naadiya Moosajee

I used to say by complete accident, but now I feel like it was probably a divine intervention. I grew up during apartheid, right? Where access for people of colour to universities was limited. And so, you know, my mum didn't finish school because they were at school during the 1976 riots where high school students were protesting against learning Afrikaans language. And my dad also, you know, finished school and he went on to, you know, work his way up in a retail environment. And so, they never had the opportunities to go to university, to go and become engineers. I actually don't know, I didn't know anybody who was an engineer. I didn't know what this was. Literally, it was Google that helped me make this career choice. I said, you know, I mean "I like geography. And I like learning about, you know, volcanic eruptions and all sorts of tectonic plates. What career path is that?" And I put in "people who like geography, what do they do?" Google, spit out "become a geologist". And I said to my mum, you know, "I'm gonna become a geologist", and she said, "You can't become a geologist, because geologist work down in the mines. And so that's not a career choice for a girl". And so, I went back to Google, and I said, "Okay, what's a somebody who likes geography, not a geologist, like a geologist, but not in the mines". Something called geotechnical engineering is what Google found for me, which was in the Department of Civil Engineering. And so, you know, I learned a lot about it online. And I said, "Okay, that's it. I'm going to become a civil engineer".

Sue Nelson

Your mum, though, must have seen that you had a lot of the skills then to be in a some sort of STEM field, be it the maths or the sciences? Or were you practically very good? Were you always building things at home?

Naadiya Moosajee

I mean, not really. I was always the human rights defender at home and actually the gender rights defender at home. One day, you know, and I was little and I said to my dad, "I feel that it's completely unfair that boys get to wash the car and girls have to do the dishes in my house because dishes an everyday thing and a cars are a once a week thing, and so it's kind of an unequal distribution of labour". And then my dad then changed the rules in the house to say that, you know, girls and boys both do the dishes. And my brother has been upset with me ever since.

Sue Nelson

Yes, I've always railed about that, as well, I absolutely agree with you there. It's interesting how, in a way, your mum was both an enabler of this freedom of thinking and feminist thinking to think beyond traditional careers at the time, particularly from her generation of what women should be. And you did this master's in transport, engineering. So, what made you switch from stationary construction to sort of thinking about transport engineering?

Naadiya Moosajee

In South Africa, our degrees are holistic. So, we do all kinds of engineering, not just structural. So civil engineers are generalists in South Africa. And there were two things, I really loved the professor, she was one of my few female professors at university. And so, I chose that component. But then I also think about, I really love the idea of enabling people to be the best that they can be. And if you don't have transport and you don't have access, and I mean, I would even argue in our Constitution, access to education, and water and sanitation, and housing, and access to basic human rights. Access requires transport. And when you don't have that transport, you have gross inequality and you actually start to see that kind of degradation in society. And so now when I look back on it, you know, I think that, you know, as a transport engineer, we have such an impactful role that we can play in society, to be able to kind of bring in the forgotten who live in the peripheries into our cities, to be able to fully participate in the economy.

Sue Nelson

Was your first job then, when you finished your education, I mean, you also got an MBA from Edinburgh. So you can start to see immediately how you ended up doing what you're doing with this variety of skills, both in engineering and business leading towards being an entrepreneur. Was Arcus Gibb your first job. Was that how you got to work on the 2010 World Cup?

Naadiya Moosajee

Yes, and I guess it was such a glorious time to become a graduate engineer. Because, you know, South Africa had been awarded the 2010 World Cup I went to work for Arcus Gibb, they now call Gibb as a junior transport engineer, and I had an absolutely phenomenal senior engineer who was my mentor, I absolutely love Andrew. Andrew, he took me under his wing and really taught me the trade you know, and gave me all the kind of insider info and then when the World Cup operations rolled in, I applied for a job and Andrew actually, he left Gibb to run the via the entire transport operation for Cape Town. At the time, I always say I had a split career because I was working as a junior engineer but I also had my non-profit WomEng which I had been working and growing on the side and with WomEng we'd worked with dignitaries with worked with all sorts of interesting and wonderful people. And Andrew said, "Naadiya, we need somebody who can both understand the transport needs but also understand how to deal with kind of very important people and dignitaries etc". And so there was a VIP transport operator role within the FIFA team. And he was like, "I think you'd be perfect for it". He literally took me with him when he when he joined the FIFA Local Organising Committee. And, you know, it was such an interesting transition because it was kind of event logistics, but it was transport engineering. I got to deal with so many. I had to deal with security and I had to do with presidential protection services, and all sorts of characters. And I think it was the hardest job that I'd had at the time because it was you know, you were on your feet for probably 18 hours a day and I had very little sleep for the month of the World Cup when it ran. But it was the most exciting thing that a 20 something year old engineer could do.

Sue Nelson

It sounds like you learned a skill that's valuable in so many professions, not just engineering, which is people skills, because you're always, as engineers, you're always with people, you're always working with clients. And you don't always see eye to eye maybe, or they might suggest something that you think 'eeh'. So, you have to learn to be quite tactful, which obviously, you nailed.

Naadiya Moosajee

And I always think about this, right. I feel like more engineers need to get into government and to become politicians. And I loathe to say this, the reason being is that we actually need a better-quality politician. In my country, and I can't speak for the rest of the world. But you know, just looking at global politics, I really do think a lot more engineers need to get in and navigate the space, because a lot of our projects as engineers are politically driven, right. So, you know, the government decides that they're going to go on a massive

infrastructure boost, and they then decide what gets rolled out and on what the priorities are. And then engineers become, you know, implementers, and advisors, right. And sometimes you start to see a massive waste of resources when infrastructure projects are not designed in the way in which it can benefit, all right, because a lot of it is politically motivated. And I always think about, you know, we've been running programmes to support girls, to get into engineering, and we work with university students. We were running a programme in the US and I made a political joke during the programme. And one of the feedbacks we got was, you know, "please keep politics out of engineering". And I said, "the fundamental thing that people don't understand is that engineering is usually political". And the fact that we are not driving the conversation means that the wrong people are driving the conversation, we need to have better skills in this area. And so yeah, that's my new push to try and get more people into places of power and positions where we can actually make positive change.

Sue Nelson

And what sort of issues can come up. If engineering designs haven't taken 50% of the population into account?

Naadiya Moosajee

I always use this example. You know, when we design public transport, we always design the most direct routes, and you know, the ones that are most efficient. But when you study behaviour of people actually using public transport over time, you actually start to see gender disparities. So you'll see that men typically will take the most direct route, which is quick and efficient, because that's how the engineers designed it. And women who take a much longer route to walk to access the same services. And usually it's because it's the most well-lit route and it's the safer route, right. And so, women are spending way much more time, energy and effort to access the same basic things that their male counterparts are accessing. And that's just because we haven't really thought about the user and from a gender perspective, how women use infrastructure. They've done studies on accident rates and injuries during accidents on airbags deploying. And when airbags deploy, women and children get injured more than men do. And that's just because when they do crash test, crash test dummies, typically are made on the average man, and not on the average woman. And I think that's really important is, as engineers, we have you know, we actually have such high risk in terms of the world because we literally designing the world that we live in. And so, when we're not designing an inclusive world, it means that half the population is having to really adapt and work so much harder to just do the basics.

Sue Nelson

Yes, there's a marvellous book as well by Caroline Criado-Perez, yes. Invisible women, which lists so many different aspects of life. And, and some like the crash test dummies being potentially lifesaving, if only designers and engineers had considered that the male body or the male experience shouldn't be the default one because there's all kinds of difference in terms of height, and body weight. And when did you decide to set up these organisations, the Women in Engineering and the WomHub?

Naadiya Moosajee

WomEng we actually started while we were at university. So, I started it in my third year, it was actually born out of frustration, and the worst that the engineering industry had to offer. And so as young engineering students, we all have to do vacation work at engineering companies. And so, you know, I went off, you know, very happily to go into my vacation work at a steel fabrication plant. And two things happened there. So as a young intern, I brought up the issue around pay, and the owner of the company said, "We don't pay our interns". And I said, "Okay, that's fine, I'll work for free because it's, you know, it's around the getting the knowledge", and I had to do it, it was part of my degree requirements, I wouldn't be able to pass my degree without having the work experience. And so that was the first thing and I've, you know, so not getting paid, and that was fine. And then when I was on the fabrication plant, I'm just naturally happy person, I smile at everybody, I greet

everybody, I feel like every person has, you know, a dignity and respect that is associated with just being human being right. And so, we should just treat everybody like that. And so that's how I usually go through life, just smiling and being happy with everybody. So on the fabrication plant, that I was one of very, very few females in the plant, I think we were about three females in the factory floor. And then when I got back to university, after my vacation work, two things happened to me. One was that I found out that the other interns at the same company all got paid, that all happened to be men.

Sue Nelson

What?

Naadiya Moosajee

And then I started getting emails from the construction foreman, the site foreman on the plant, and it started being, you know, very flattering, and, you know, trying to make advances and you know, I shut it down because I wasn't interested. And then it started to become rude, aggressive, verbally abusive. I didn't tell anybody, because he made it like, it was my fault, because I smiled at him. And I apparently led him on through my smiling. And so I the embarrassment and the shame, and all of this around, I brought this on myself, you start to change your own behaviour as a woman because you think that it's your fault, right? And so I never even told my parents. I was going to leave engineering, and I was going to go and join, you know, a management consultancy, or you know, any other, you know, bank, you know, everybody wants engineers and so they come to this recruitment drives at university. And then I started speaking to some of the female engineers in my class, and in the faculty, and we all had similar stories. And so, we realised that if we all left, nothing will change. And so, we then started WomEng and at the time, it was called SA WomEng because it was supposed to be, you know, just for South African students, and to support them around, you know, the challenges going into engineering, and helping to actually get the industry on board around understanding the needs of women. And then the third kind of piece there, which was so interesting to me was we were living in a world and at a time where everybody said, "Oh, we need female engineers, we just can't find female engineers", but the majority of female engineers that I knew, were struggling to find jobs. And so, there was a real mismatch there as well. And so, we created this entire organisation, and were kind of bold and bright eyed and bushy tailed. And we said, we're gonna do this for 10 years and in 10 years we'll solve the gender challenges within engineering. So we were exceptionally naive. And that's how a WomEng started. So, over the last few years we've been building an entire ecosystem by both bringing young girls and creating awareness of engineering and engineering careers, so that people make an active choice around engineering, we support university students around entrepreneurship, employability and innovation skills so that they can thrive in industry, we work with industry a lot around diversity, equity and inclusion and reimagining what an engineering culture could look like that is inclusive. And then the recession hit because engineering goes through ebbs and flows in terms of recessions. And so there we were, you know, we had put, you know, all of this into this organisation, and people were cutting our budgets, not because we weren't doing amazing work, but because engineering was struggling. And we said, well, you know, "what we doing so important for the industry, but also for it to really shift the needle here and create structural change, we can't just leave it as it is". And so, we pivoted WomEng, and formed WomHub, which is a company, and we focused on kind of the revenue generation pieces of the organisation, we started to become very business savvy. And we started in consulting and advisory and then we started building it out. And so, you know, we've landed, now it can have been very much a boutique incubator to support female led innovators in STEM, we've always been really first movers in terms of understanding the industry needs, and then creating programmatic approaches to support diversity and inclusion, whether it's, you know, at a high school level or primary school level, an industry level, or within the entrepreneurship ecosystem. Weirdly enough, the issues that entrepreneurs are facing women entrepreneurs are facing is what female engineers and what we faced, you know, 15 years ago.

Sue Nelson

Have you been successful in persuading companies to hire more women?

Naadiya Moosajee

Yes, you know, we've worked with some incredible companies who get this. Over the last, I would say, last two to three years, and we've been pushing this narrative, you know, very clearly, especially with companies who have a consumer facing brand to them, is that diversity and inclusion is not just a nice to have, it's not a tick box exercise. But actually, it's an economic imperative. Because when you have a diverse team, you've got better solutions, you've got more effective solutions, you understand your market needs better. And so you're going to create high profitability. And so we've gone in speaking to executives around using diversity and inclusion and hiring more women to make more money. And it's been interesting, because, you know, for a long time we used the narrative that we need to hire more women because it's the right thing to do we need the numbers in industry to reflect our population. And that that argument has been, you know, we've been driving that argument and we didn't get as much traction, but suddenly, if you take a bottom line to a company and go, "Hey, you can make more money, all you need to do is hire a woman" and suddenly they go, "Okay, fine. Where can we hire more from?"

Sue Nelson

You're a member of Global Future Council at the World Economic Forum. Are you seeing the percentages change worldwide? And are you seeing a mindset change because it's not just about as you say, it's not just about tick boxes, it's about culture, and worth I suppose, as well, and women feeling appreciated.

Naadiya Moosajee

Within the World Economic Forum they've driven the narrative around this fourth industrial revolution, which countries and governments have really taken up in a way that has been so interesting, because I said to a colleague the other day, I said if I had \$1 for every time, a government representative mentioned a fourth industrial revolution I'd be rich, I could retire. And I could just start handing out cash to grassroots organisations to support STEM for girls. But there's an understanding now that it's becoming an economic imperative at a country level to make sure that your population has the right STEM skills. So beside the World Economic Forum, I was the co-chair last year for the B20 taskforce on the future of work and education, you know it provides policy papers for the G20 discussions and ratification. This year I'm on the B20 of Italy. STEM and women in STEM has become a priority like never before. It's literally written into every policy piece to say "how do we enable women to get into STEM careers because we understand that STEM is a future skill, it's a current skill, we're living in a more virtual world, or kind of this hybrid worlds of physical and virtual spaces. How do we make sure that we leave no woman behind in this new world?" And then, you know, coupled with that is an understanding that we've taken a couple of steps back in terms of gender parity and equality, based on you know, COVID, and the implications it has had a woman specifically.

Sue Nelson

Yes, you're right, because I've been quite a few studies and reports saying that the percentage of job losses has been far greater on women than men that more women have lost their jobs as a result of the pandemic. So it sounds like you've got, you know, it's a tough battle ahead?

Naadiya Moosajee

There's some really interesting studies that are coming out that are showing that the number of women engineers in developing countries are rising. And the minute they move into a developed country category, you actually have the number of women in, you know, wanting to apply and study engineering falling. So, you know, the first time I went to the Middle East, I found it fascinating. I was actually in Iran in 2009 for a conference, and

they had more female engineering students in their classes than men. And so Iran had the opposite problem, they were having too many female engineers, and not enough male engineers. And you started to see a lot, in Kuwait, in the Middle East, you start to see a lot more girls going to study engineering, because it becomes a point of pride for a family that their daughter is an engineer, they're not necessarily working and practising and so that, you know, whether they get jobs in the industry is a different discussion entirely. And you're starting to see the same, you know, same thing in on the continent, where, if the child has an aptitude for maths and science, you know, the parents are pushing them into, you know, these industries, because they want to guarantee jobs and secure incomes. It's slow, though. And I mean, the work that we're doing at WomEng has been interesting to move the needle on. I mean, when I started in engineering, my class was 20% girls. Now, the civil engineering classes are around 40%. Right? So, it does take time. There's a 15-year process and my lofty 10-year vision, you know, it's just it's just gonna take much longer.

Sue Nelson

And if this why you've partnered with the Royal Academy of Engineering's Africa prize for engineering and innovation?

Naadiya Moosajee

That's exactly right. So WomHub, we've we had this vision to run a pan-African female founder accelerator for women in STEM businesses, and we ran a number of projects with the Royal Academy of Engineering on building capacity for engineering institutions around diversity, equity and inclusion. And we've become, you know, trusted partners and allies in our in our fight for gender parity within STEM industries. And the Academy, you know, they're running the Africa Prize for a number of years, and they had never had a female winner. And also, the number of female applicants was really low. And so, we approached them, and they said, "Look, we've got this idea to run this pan African female font accelerator, would you fund it?". And the idea would be, we would then, you know, support these female businesses to apply for the Africa Prize, and we'd help strengthen the businesses would help them grow. And in the first year, we had around 147 applications of female founders across the continent who had STEM businesses. And so that year, the Africa prize, the number of female Africans, obviously, you know, quadrupled. And in the in the 16, finalists for the Africa prize, four finalists came out of the women's programme. And the winner was announced as one of our fellows. So you're starting to see on the continent as being able to raise the profile of female entrepreneurs, put them to support and leapfrog some of the gender challenges and the challenges for female entrepreneurs or access to capital. So we get 0.02% of venture capital, compared to you know, what Silicon Valley is getting. So you know, female entrepreneurs. So I mean, we're getting minute amount of money to be able to raise companies. And so there's a huge funding gap. We've done a lot of work around kind of sexual harassment in the entrepreneurship space. And every female founder has a me-too story, you know, where they went into go and raise capital. And they were harassed in some way, or they were asked to not just, you know, get equity in the company, but their bodies as well. So, we're starting to kind of understand and speak around the dynamics that female founders space.

Sue Nelson

Well, good luck with that you've had some tremendous successes. But as you say, there are still some challenges to overcome. But if there aren't people like you doing it, then that progress would be an awful lot slower. So thank you very much, Naadiya Moosajee, for joining me and explaining about your work on the Create the Future podcast.

Naadiya Moosajee

It's an absolute pleasure. Thank you so much for having me.

Sue Nelson

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