

Sue Nelson

Hello, I'm Sue Nelson and thanks for joining me on the Create the Future podcast, brought to you by the Queen Elizabeth Prize for Engineering. Even if you've not grown up in America, many people have heard of Bill Nye, the Science Guy, the writer and presenter of a 100-episode educational TV series that only ran for five years in the 90s but it won 19 Emmy Awards, and is still watched today. Since then, he's continued hosting shows as well as writing books, presenting the Science Rules podcast, and doing the odd cameo in a Disney film. But perhaps what's less well known is that this science guy is a mechanical engineer. He's an ideas guy and inventor with an easily recognisable dress code, too, and it's a bow tie. So, Bill, I'm gonna have to ask you even though we're doing a podcast and we're 6000 miles apart and we can't see each other, you're gonna have to tell me... are you wearing your bow tie?

Bill Nye

No comment. However, I just want to point out that when I wear a bow tie, I also – it's my policy – I also wear a shirt. I think it would just be it would be frightening for people.

Sue Nelson

I can't imagine anyone wearing a bow tie would have to shirt though to be honest.

Bill Nye

No, come on. There's a whole business of guys in Las Vegas, the ladies show up and scream at the dancers. What's the name of... Chippendales!

Sue Nelson

Oh, well, there you go. That's an opportunity missed then on my part.

Bill Nye

Well, when the pandemic is over, you can make the trip you'd be very welcome.

Sue Nelson

When did you start wearing that bow tie?

Bill Nye

In high school, so, there was a there is a thing in my high school where the boys are the waiters, the servers at the girls athletic banquet. This is where the young women received their awards for gymnastics, lacrosse, which we play in the States. Soccer, soccer football. And so, the boys are the waiters. And I said to my colleagues, you know if we're going to be waiters, let's dress like waiters. So, my father was very skilled with knots. He showed me how to tie a bow tie. And you'll find if you've ever worked in a restaurant, or served ladies at the girls athletic banquet, bow ties are very practical. They don't they don't slide onto the serving tray. They don't slip into your soup. They don't flop into your flask in the laboratory. And so it just that just became a thing. That's just all I wear.

Sue Nelson 2:57

It's interesting that something just clicks with somebody and you bring that through and has sort of made it into something that's always associated with you now, what was your first memory of enjoying something that either you realised at the time or when you look back on it, you think, "ha, there was a potential engineer there because that that I loved was all about engineering".

Bill Nye

Well, I made a boat, a very small boat. Let's see, in US units would be a little over a foot long, it'd be 35–40 centimetres long. And it floated. I mean, this is fantastic. And I also had a sense that it had to do with displacement. This is to say, the boat weighs as the amount of water displaced pushed out of the way is exactly the same as the weight of the boat. It's just really a heck of an insight. That was moving you know, to me, engineering is using science to solve problems and make things, engineers make things. That's what it's really appealing to me.

Sue Nelson

And did you go on then from making a model boat to making other things,

Bill Nye

I became fascinated with bicycles, spent a lot of time on bicycles and all the mechanisms, how they fit together, the ultimate look of them, you know, it's important to me in the world of bicycles that they look good as well as function. And so, I took my bicycle apart, had a little trouble getting it back together, but eventually, with the help of a neighbour who worked at a bike shop, I got it back together. And then the whole thing just became fascinating. And if you don't think aeroplanes are fascinating, I don't know what you're doing. I mean, aeroplanes are just fantastic.

Sue Nelson

I'm a big fan, actually a big fan where I used to be taken to airports, a local airport in Liverpool when I was young, because it was considered a treat because we liked it. So much to watch the planes.

Bill Nye

It's just amazing, these things weigh tonnes, they weigh dozens of tonnes and they don't fall down, they fly. It's just fantastic. Now with the pandemic, this business of fluid mechanics, the motion of air, anything that flows in physics or engineering is a fluid – air is a fluid water is a fluid. Mercury, quicksilver is a fluid, anyway, the motion of air turns out to be very, very important in understanding this pandemic and dealing with it.

Sue Nelson

Were you encouraged by your parents when you were younger to sort of go with this natural curiosity because I was interested to read that, in separate ways, your parents have a fascinating background that crosses over with what you do now?

Bill Nye

Well, sure, so my father referred to himself as an 'Ned Nye boy scientist' that was one, self-titled, because he liked astronomy, especially he was quite the amateur astronomer. And he got involved with finding and restoring what are called the boundary stones around Washington DC. So, I grew up in the city of Washington, DC. I didn't grow up in the Maryland or Virginia suburbs – I grew up in in the city limits. And my father did as well. And so, it turns out that a freed man, he was not a slave. He had bought his own freedom, a guy named Benjamin Banneker was hired by the famous US statesman George Washington, to survey the city of Washington. And every mile Benjamin Banneker arranged for this boundary stone to be placed and the precision with which he did it is really impressive. Even to the day if you ever go to Washington, the whole thing is reckoned from something called the zero-boundary stone, which is between the White House and the Washington Monument, right along Constitution Avenue is really an insightful thing. Every machined part, you get you use today, whether it be a coffee cup or an aeroplane, is reckoned, for generally from a single point nowadays. And that was Banneker's insight. Anyway, I grew up with this. My father was really into the science of astronomy and surveying and mathematics. And then my mother, as I think you're alluding to graduated from college in 1942. So all the men in the US at that time were being conscripted, drafted to go fight World

War Two. And simultaneously apparently the army and the US Army in the US Navy realised that there's a tremendous resource in women. And my mother was recruited – the family myth is because she was good at math and science. And so, I was brought up with this tradition of science. Her father, my grandfather was a chemist, professional chemist. He had a couple patents on a couple adhesives. And so, I was brought up with all that stuff. And, of course, now I'm very proud of my mother. I mean, she just did amazing things back in the day, as we say.

Sue Nelson

And it's a wonderful history. It's like we have in Britain as well with the code breakers that women were involved in that too.

Bill Nye

Yeah, the US phrase is my mom was one of the 'code girls'. And so I purchased two bricks at Bletchley Park. You can see my mom's name on it. And they show I went out there two years ago, and everybody showed me around and it was, you know, I'm like, Hey, your mom wants to go, Wow, you're cool. I had nothing to do with it. Look at this, look at this. So it's really a really a very moving thing for me.

Sue Nelson

And also what I found moving when I read it was that your father had been in a Japanese prisoner of war camp?

Bill Nye

Yeah, that sounds like fun. But it was sounds like it really was a drag.

Sue Nelson

And that he was really into sundials?

Bill Nye

So yeah, so the family myth, well, this is pretty reasonable. The Japanese military confiscated every all the jewellery, which included everybody's wristwatch. And so, my father, in order to record time and to kind of, I guess, to kind of keep from going crazy, became fascinated with the motion of the sun, the, what's called the analemma, the path of the sun as reckoned from the Earth's surface. And there's some mythical things, like apparently he would tell people when it was lunchtime by looking at the shadow of a shovel handle. And the myth, which is unsubstantiated, is he reckoned their latitude, which enabled these two guys to escape from a train – a railroad car. And one guy injured his ankle jumping off the car. The other guy made it back to the British Councilate in Shanghai and then from there, back to Britain and this was quite a thing, the first time anybody knew what happened to these guys so they were on Wake Island which you may not have ever heard of, you go from California. You go 5000 nautical miles to Hawaii and then you go another 5000 nautical miles to Wake. And the reason it is still is of interest is the Boeing clipper aeroplane. This is the flying boat would leave, if you are a business person and doing business in Asia, you'd fly from San Francisco to Pearl Harbour in Hawaii and then from Hawaii to Wake and refuel on Wake and then on to destinations in the east. And so they were all captured on Christmas Eve 1941. So, he was a prisoner of war longer than anybody else from the US, which is, you know, it's not, it's not really a record you want to set but it had a great effect on him. And then I was brought up with the sundial culture. And, you know, United Arab Emirates launched its hope spacecraft en route to Mars and Chinese Space Administration launched its rocket en route to Mars, and NASA's perseverance rover, that will be fitted with another sundial, and I claim... you can evaluate this claim, but I was in a meeting in the early 2000s, where we had this a vertical post of metal about as big as a, what we might call a golf pencil or a short cigarette, that casts a shadow. And when you look at the shadow, you can infer the

colour of the sky. It's something that a lot of people haven't thought about. Anyway, I was in this meeting, "you guys, we got to make that into a sundial. Come on, this will be great". So, Steve Squyres, the principal investigator thought about it for a couple days and went "Okay", so we will electronically put our lines on and engaged generally students around the world in reckoning time on Mars.

Sue Nelson

So when did the sundial first go up to Mars, then?

Bill Nye

2003, landed in 2004 on the on the Spirit rover.

Sue Nelson

The rather lovely then, isn't it. To know that you've got an influence on something on another planet.

Bill Nye

Oh, I can't tell you. And this is the thing about space exploration I talk about all the time. You think of the dramatic discoveries in the history of science generally, you know, when we talk about it in the Western Hemisphere, we talk about the extraordinary accomplishments of European people. Name somebody, Isaac Newton, Copernicus, Galileo, these are guys that were working by themselves, generally, or with one assistant and they make some amazing discovery changed the course of human history. Well, in space exploration, it's a team – no one person has the capability of building a rover on Mars and a rocket big enough to get it there. There's just not, you can't do it. So it's teams of hundreds and often thousands of people that come together, and not just scientists and engineers, but bean counters, you know, accountants, and politicians. It's just everybody is involved to make these things happen. And so to be part of that, you just have this wonderful feeling that you're part of something bigger than yourself. Absolutely. And I remind everybody, if these spacecraft, Arab Emirates, Chinese European Space Agency, US NASA Space Agency, find evidence of life on Mars, it will change the course of human history. Everybody will feel differently about being a living thing on this planet, every everybody will be affected. And these discoveries or this discovery has the potential being made for just a tiny fraction of any government's budget. It's really an amazing time to be alive in that regard.

Sue Nelson

Oh, yeah, you're preaching to the converted here. I absolutely agree on that one. To me, it's not surprising then considering you're surrounded by family or surrounded by people who are encouraging or interested in science and engineering and building things and you like making things yourself. Mechanical Engineering, then, which you studied at Cornell seems the perfect choice for you.

Bill Nye

I didn't realise you could be an engineer till I got a job in a bike shop, a bicycle shop. I was, you know, 15 my hands weren't very big and wasn't very strong. I wasn't a great mechanic. But I was there. And there was an older guy who was going to college at Lehigh University in Pennsylvania here in the US. And he just talked all about engineering about how great engineering was and I were in the shop and the radio was on and there was an ad for, for pianos. And how well engineered these pianos were and the word engineering came up in a radio ad about pianos. I went "wow it's everywhere, it's everywhere" and so that's when I that was that summer was when I really decided – after I was aware there was such a thing – this was what I wanted to do. Engineering school for me was challenging. But I got through, I kept pushing myself I just looked back I should have taken some more mess-around courses. I took a lot of mathematics, I got you know, I took as much as they you could do as an undergraduate and it was okay. I had one very good professor and control systems I gotta say, and then my senior year I got on the Dean's list, but sophomore year was rough academically, but neither here nor

there when you're at this big university. Carl Sagan was teaching there as a professor. So, I completed my engineering requirements. And I took a freshman level astronomy course, as a senior. And it changed my life. That guy just changed my life, you know. He was very thoughtful, and he had just had a way of speaking a way of constructing arguments that was just fantastic. And if anybody's out there, somebody has my paper, about kirlian photography. I lent it to somebody at Boeing who lent it to somebody who lent it to somebody and it's out in the ether. So if you're out there, I would love to get that – I'll reward you. I'll pay you US dollars for that thing.

Sue Nelson

Well, I think the offer of money is always a great incentive. So hopefully, you never know what will come then of listening to this podcast, and taking part in it. You mentioned Boeing there, and that was where you went after university to work there as an engineer.

Bill Nye

Yeah, yeah, I was recruited, because I think largely because of this professor and control system. So in mechanical engineering by long tradition, this business of control theory, it's called a thermostat for an oven, a cruise control for a car, an autopilot for an aeroplane. These have fallen to mechanical engineering. You might think it originally be electrical engineering and it is, to be sure, but control systems is a niche within a niche, a niche within a niche. And so I had a boss at Boeing who was looking for some control systems guys, and he hired me and I moved to Seattle, Washington. And it was just fantastic. I mean, I all these opportunities presented themselves. You've probably heard the expression go west young man and that's still largely true in the States, you know, you think about Google and Microsoft and Apple, these are generally businesses that were started in the west of the US.

Sue Nelson

And you designed or invented something called a hydraulic pressure resonance suppressor. Yeah, what does that do? What is it?

Bill Nye

Speaking British people that there is a very well-known beloved little bit honorary test pilot at Boeing. So, you may not have thought of but you might think a test pilots, fighter pilots flying around upside down under bridges. No, but the big aeroplane companies have test pilots as well. And there was this little vibration in the yoke, the steering wheel of the 747 and the 747, for you aviation historians, was the first large transport plane that was all fly by cable that is to say there was no there was no manual revert there is no manual reversion on a 747. This this next thing still amazes me, you know, a 737 or a 319, A320, Airbus, you can fly those planes just with your strength. If all the hydraulics go out, you can steer those aeroplanes just with your strength because of these extraordinary and just cool mechanisms in the control surfaces, the ailerons rudder that use the energy of the plane moving through the air to steer it, it's very cool. Anyway, the 747 was the first plane that wasn't like that, and had this vibration in the yoke. And this it didn't bother most of the pilots. They didn't notice it, but this one guy – it just really bugged him. And so, my boss decided to fix the problem and it's the kind of thing they give to the young guy. It's an old trick everybody, what you do is you make a length of hydraulic tubing. So that the pressure wave that's going through the tube, destructively interferes it. While, one wave is going high, you make another wave go low, and you cancel it. You cancel it out at certain frequencies, you make it go largely away. And we did it's the whole thing though is it adds weight. Oh my goodness, you must never add weight to the aeroplane. Oh my gosh. So you know this is a piece of tubing less than a metre long and does the job as far as I know it's still flying. But with all the advancements in active control systems, I wouldn't be surprised if it's been eliminated. And these guys were doing a documentary about me and we tried to track that fact down, but it just got too busy. And we didn't. Someday I'll find out.

Sue Nelson

So when did this transition happen, between being an obviously a successful engineer at Boeing, and then thinking more towards the sort of media entertainment side of things?

Bill Nye

Well, ma'am. So you got everybody in English speaking world, I think is heard of Steve Martin, the comedian. Yeah. And so Warner Brothers Records, which was his, his company or rather the company distributing his comedy albums, sponsored a Steve Martin lookalike contest. Because I claim that Steve Martin was so influential. He showed up at this one moment in human history where his type of humour, his absurd outlook, which just struck a nerve with everybody. And anyway, so they sponsored this contest. And I won. I mean with respect to the other contestants. I won in Seattle in the, in the Pacific Northwest here in the US, I did not advance beyond that. And then I will say the guy who ultimately won the whole thing really kind of looked like Steve Martin. And the other thing, he played the banjo, he's quite a musician. So that aside, after that, I started trying to do stand up comedy. I would work at my engineering job on a big drawing board. I've worked there all day and I go home and take a nap. And then I'd go to comedy clubs and try to be funny. And that one thing led to another and I met these two guys who were being hired by NBC in Seattle to do a comedy show. So they invited me to start writing jokes or submitting jokes, and I did, and eventually I quit my day job, October 3 1986 roughly. And I wanted to try it I realised if I left engineering for even six months, that was a, that was the most time I could leave. I mean now it's all think it's of technology is just changing every five minutes, you need a new iPhone every two weeks and the connector doesn't fit and so on and so on. But in the 1980s, computers were just becoming affordable for big companies, not for individuals, but for big companies. And I realised if I left, even for six months, I wouldn't make it so I gave myself six months to try working in television and it worked out.

Sue Nelson

It certainly did. I mean, that's, that's a huge shift. Had you always been into comedy and I assume you had to write your own material.

Bill Nye

Oh, yeah, sure. I claim, humour was valued in my family like you're expected to accept the funny side of things. And I claim this is how my father got through prisoner of war camp, was having a sense of humour about it, because it sounds like it was pretty stressful. And then my mother was funny, you know. And then so they would they would sit around and write limericks. Does that seem like a regular thing to do? On a Sunday evening writing limericks together and so I grew up with that being important. I have a huge advantage over many people who are trying to be funny. Why? Because why? Because I'm funny looking.

Sue Nelson

So I must admit, I have looked at pictures of you when young on the internet, and there's a little bit around the eyes that you do look a bit like Steve Martin.

Bill Nye

He got to meet me a few years ago. But

Sue Nelson

The rest of it I didn't quite see. I suppose you had to be I have a sense of humour to go in for that.

Bill Nye

Well, the idea that Steve Martin lookalike contest was to tell his jokes. Very popular even now is to do an Elvis Presley impersonation. Yeah, it's not about looking like Elvis so much as sounding like him, right. And any Beatles tribute band better be able to play guitar, you know?

Sue Nelson

And so you then had this, you know, change of career. But did it automatically include science and engineering? I mean, what was your material like in those early days, did you stay away from your day job for material?

Bill Nye

I tried all sorts of hilarious engineering jokes that didn't go very well. The thing was, mechanical engineers, you know, I was born in the US, it's your it's your home country are loyal. But can you do this is where you're from. And I got really discouraged. The United States decided to stop teaching the metric system, in school in elementary schools, primary schools, and it was decided arbitrarily with sort of the arrogance that the US was better at everything anyway. And you know, we put people on the moon and this and that. And then we created the US automobile companies created two of the worst vehicles ever thought of the Ford Pinto and the Chevy Vega. And I got discouraged. I was very concerned. I'm not joking. I was very concerned about the future of the United States. I was a young guy, and I was living in a new town. So I was what we call a Big Brother. This is where you hang out with a kid who doesn't have a father for some reason is through a charitable organisation United Way I did that. And then the other thing I did, I volunteered at the Pacific Science Centre in Seattle, which is very much like a much, much smaller scale thing compared with the London Science Museum. And I would pour liquid nitrogen around and lift pickup trucks, big trucks with a system of ropes and pulleys on a big long beam and talk to visitors about what they were seeing in the exhibits at the Science Centre. And that was a lot of fun for me and I realised also that young people are the future. I mean, this sounds like some sort of commencement speech trope, but it's a true thing. We got to get kids excited about science and math. If we're going to have a future as a species, let alone as a country. So I did a couple video jobs for in this is in the US, the Washington State Department of Ecology. And so Washington State being one of the Western most states doesn't just have a Department of Fish and Wildlife or fish and game. No, no, it's got a Department of Ecology. It's so hip. And so we did a thing called fabulous wetlands about the importance of wetlands in Washington State if you're familiar, it rains all the time. Turns out you actually save money by not building on wetlands because they soak up floods, big sponges actually preserve drier land around them. And so anyway, I realise this was really a cool thing to be doing a fun thing to be doing, the thing about boating safety. Washington State also had a problem where the water is very cold and so there's an enormous number of boats, in fact that the name of the baseball team is the Mariners, you know, the sailors. And anyway, people fall off boats and the water is cold and you take a deep breath, but instead of being air, it's a breath of cold water. And then there was this trouble. And so my colleagues and I did a video about that, and it was cool. So then, we had in the US in a different era, we had something called the children's television act. And this was national legislation to require three hours of educational programming every week on television, and I just got to tell you, in Britain, where you have the BBC and civilization and liberal democracy and so on, this would be obvious. But in the US, in those days, if you owned a station group as it was called. It was just a licence to print money. I mean, you were just, it was just a great business to be in to take three hours every week to educate. This is an outrage. I won't be printing money for three hours every week. Okay, so Jim and Aaron – the producers I worked with, and I just had this the right idea at the right time. And when I was working on the comedy show, there was a week where a guest did not show up. You know, when you have a talk show, well, if you have a podcast, what makes it go is the guest, you've got to have guests or is just you talking to yourself every week. And so that story is lost in antiquity was at Eddie Vetter, that lead singer from the band Pearl Jam a Seattle band, or was it Geraldo Rivera, this notorious reporter, television reporter. Anyway, this person didn't show up. So, we had to fill six minutes, which on televisions long time.

Sue Nelson

A long time. Yeah.

Bill Nye

And so "Oh Bill, why don't you do that stuff you're always talking about you could do some sort of science thing, you could be Bill Nye the Science Guy or something". That's a good idea. So anyway, the first the first week I did the household uses of liquid nitrogen. Because we've all got liquid nitrogen around. It was funny. I mean, you have celery that's gone limp. You get it frozen. It's like celery again, you hit an onion, a frozen onion with a carving knife and it makes a sound just like breaking glass. And then the payoff is where you roast marshmallows in liquid nitrogen the word roast being a charming turn of phrase. And when you chew, with practice because I was working at the Science Centre every weekend, you can get steam to come out of your nose. Which is, come on, it's fantastic. And so that one thing led to another and then eventually we were approached by here in the US the National Science Foundation and another very large organisation you may have heard of called the Department of Energy. And both of these government entities have the problem of getting young scientists and engineers in the pipeline, as it's called recruiting young people to come work at the Department of Energy and National Science Foundation. And so, we were just in the right place at the right time with some very creative people, Jim and Aaron, just have this gift of being able to hire the right people, man. And so, we did this show in a warehouse in Seattle, and people still watch it. This is a third generation of people watching this show. It's amazing. It's amazing.

Sue Nelson

It's great. But that's the power, isn't it of, of seeing and being enthused by somebody who obviously enjoys what they're doing, which you do, and knows the science and background. It's not just an actor. It's somebody who actually does show it. I think there's a difference there.

Bill Nye

Well, you know, I don't know if you ever look at Twitter, but some people are very opinionated. If you notice that, but a big thing is, "Bill Nye is not a scientist. He's just an engineer". What do you mean? Hey, just a minute. I took eight semesters of calculus. What do you want from me, man? I took, you know, design and mechanical components. It's all physics. It's all classical physics for four years. What do you want for me? Anyway, at my 10th College reunion, I claim this as relevant, I went to my 10th College reunion and Carl Sagan, this very well-known astronomy astronomer agreed to meet with me for five minutes. I wrote him a paper letter. Some of your listeners may remember this technology. It's plant-based information storage. And he, he said, I understand what you're doing is sounds good Bill, but focus on pure science.

Sue Nelson

Do you think it's a shame, though, that you didn't or that there wasn't also a parallel Bill Nye the engineering guy?

Bill Nye

We did a show called structures, which is about structures and tension, compression and neutral access and sort of things that are true whether you're a mechanical engineer or a physicist. And then we did do one show about computers, which really I like to describe as a show about what nowadays might be called computer science, where it's all based on switches and binary arithmetic. And the faster the switches the better and a way to store all sorts of information, including alphabets and words using just ones and zeros or ons and offs. And so I think doing an engineering show is not going to stand the test of time the way a science show would.

Sue Nelson

But you never left it behind, though, did you?

Bill Nye

Oh no I'm still a dinker'er around'er of engineering'er, yeah.

Sue Nelson

And I'd read that you'd actually invented, or taken out a patent on a particular type of ballet pointe?

Bill Nye

Yeah. So, you guys, this was just something that occurred to me. And I think the patent will be superseded by better technology. But here's how it goes. We did a show on bones and muscles on the Science Guy show, bones and muscles, bones and muscles. And so we went to shooting a piece, a video piece at the Pacific Northwest ballet, the Seattle ballet, which is very well respected ballet, and they're all these young women with these crazy injuries. People are 19 years old, 20 years old, with you know, I won't say crippled, but two or three surgeries before they're 23 or 24? And I realized that the toe shoe had not changed in centuries. So, this was in the Pacific Northwest is also where Nike is from the shoe company. And I just realized that you could make a better pointe shoe by putting some features under your phalanges as it's called the, the opposite side from your knuckles and it would work and everything. But it has to be custom fitted and there's so much tradition that it never really got embraced. And I think now what will happen is dancers' feet will be scanned, and then through additive manufacturing or 3D printing, ballet or pointe shoes will be made for each dancer. I think that technology is coming very rapidly. And the other thing about pointe shoes is they're literally put together with flour and water, they're paste. And for those of you who are dancers out there, you know this, but for the rest of us, you know they a woman only wears her shoes for one performance. And then they're broken down, the shoe is broken down, it can't support a pointe as readily. And so this will all change. The problem is the quantity sold is really small. If you go to the shoe room at the New York City Ballet. I mean, it's just packed with shoes, shoes and shoes and shoes. But compared to the number of shoes sold to people around the world, it's very small. But it still fascinates me the whole thing that this thing, the toe shoe hasn't changed in 200 years. And it's a real, even now, with all the emphasis on women's athletics and stuff, even now, many, many of the sons of the daughters of my neighbors really go through a ballet phase. They really like it and many of these teenage girls can get up on point, and that's just like it's a rite of passage. It's something they learned to do. And so there's still a market for it. I guess is all I'm saying.

Sue Nelson

I've wondered whether, you know, your mind sounds as though it's constantly, always is working. I mean, during this pandemic, particularly within the UK, there had been a call out to engineers to think in terms of coming up with inventing a new type of ventilator, because there was a shortage of ventilators. There's a lot going on in terms of engineering and making vaccines at a much faster pace than the you would normally. I mean, do you see this as a time where adversity in a way, that science and engineering sort of comes to the fore and people start to realize the role that it plays in society.

Bill Nye

Well, as we say, yes, of course, people realize the importance of science everything like we're able to have this this podcast across a continent and an ocean. My goodness. It's like a day at the office.

Sue Nelson

That's right, 6000 miles away.

Bill Nye

Along this line I am involved with this company that's making what we believe will be a better facemask and it's through Nick Graham if you know the brand 'Joe Boxer' Do you remember Joe Boxer? It was men's underwear. I don't know you very well, but I bet you don't wear a lot of men's underwear. Not there's anything wrong with it. Anyway. He did very well I guess with his Joe Boxer line of clothing and he retired, then he got tired of being retired. And now he's back making clothes and he and I have worked on a mask and so I'm doing my own podcast called Science Rules. And then every two weeks we do a special edition Science Rules Coronavirus Edition and we had Michael Ocerholme who's very big in the US. He's on television all the time. He's at the University of Minnesota, he's an epidemiologist. And he said what we need is, in Britain, do we use the expression N95?

Sue Nelson

Oh, yes, yes, sort of medical. Yeah. Quality masks.

Bill Nye

So it's something that blocks particles, no particles, 95% of particles 300 microns and bigger are blocked. And you know, the coronavirus is tiny, tiny, tiny, tiny, tiny, but it travels on droplets of water in the air in your sneeze and cough and so on. And so, he said "What we need, dammit, we need we need a mask that is N95 capable that can be washed 100 times". Well, we've got a mask we can wash 50 times. So it's a start. It's using this material that was developed in Czechia formally Czech Republic and then it's integrated in Nick Graham's skill with fabrics and textiles. And you know, cutting on the bias as it's called putting angles. And when you're an engineering school, by the way, one of the things you compute is the optimum angle for fibers to make a hose have the maximum strength and flexibility and Nick Graham is very skilled with this and so we're working together on this and they should be available by what I will call the middle of August, you know, two, two and a half weeks from now.

Sue Nelson

That's amazing.

Bill Nye

If people like them and people may not like them.

Sue Nelson

Washing these masks on it on a regular basis. I think that's a great idea.

Bill Nye

What you want to do is just be able to throw it in the laundry with everything else. And then you'd have a stack of these masks and it would just be something you put on.

Sue Nelson

As you as you say, it's that having that protecting against those particular particle size. It's important because so many people are wearing masks that you look at and you just think, it's not actually doing much in terms of the material. So for you know, any young budding engineers that are listening to this interview, and they hear this lovely mix that you've done, you've obviously kept your engineering throughout your career as you've made a very successful media career. What would you say to somebody who's doing engineering and does have this performance side to them this arts side, which a lot of engineers do have because they are very creative? Well, that's a follow what dream do they follow?

Bill Nye

Well, that's the thing. Everybody you look around the room or the car or the park, or wherever it is, you are right now, everything you see in what we call the built environment, came out of somebody's head, everybody, everything. Somebody thought of, somebody thought of that shape and size and colour and material. And those people are almost universally engineers. So I claim engineers are very creative inherently. And you can make jokes about their clothes quite reasonable. But everything you see came out as somebody said, and that is a worthy thing. And you know, it's a big thing. Now, you know, we have in the states everybody's talking about Talking about STEM, science, technology, engineering and math. And there's a big emphasis, you'll hear all the time STEAM, science, technology, engineering, art and math. And my feeling is well, yeah, yes, I hope so. Not only do you make something, I hope you make it look good. And so called user friendly. Anyway, what I tell everybody is follow your passion. If you like building things and making things follow your passion, that's where you bring out the best in people, is when they're passionate about what they're doing. And so, I mean, if you're making airplanes, and don't think airplanes are cool, I don't know what you're doing. I mean, on the other hand, having art without science behind it, without intent is good. I mean, but the only intent is to influence people make them feel a certain way, that's very valuable, and we need that to be sure. But my claim is that engineering is where you combine your passions to evoke an emotion in somebody and solve a problem and make something. And you know, we all take it for granted. I mean, we have just having running water and sewers is just an extraordinary idea. You pull off to get something to get a water main that falls just a few centimetres over a few kilometres, and which is quite common. It's really difficult. And yet, we do it all the time in engineering.

Sue Nelson

Well, Bill Nye, science and engineering guy as far as I'm concerned, and inventor, of course, thank you very much for sharing your, I don't think I've ever heard a career like it's quite frankly. It's crazy, but in a good way.

Bill Nye

So, everybody, look, this pandemic is so closely analogous to the Spanish flu of 1918, and the reason we're all here, and having this conversation is because our ancestors lived through the pandemic of 1918. And so if you want to live through it again, you've got to keep yourself safe. We all have to take care of ourselves. So wear a mask and wash your hands, people. Don't make me come over there.

Sue Nelson

Thank you Bill.