

Sue Nelson

Hello, I'm Sue Nelson and thanks for joining me on Create the Future, a podcast brought to you by the Queen Elizabeth Prize for Engineering. Two huge engineering achievements are being celebrated at the moment, because it's been 50 years since engineers saved the day by rescuing the Apollo 13 mission from sudden disaster. And it's also the 30th anniversary of the Hubble Space Telescope, which has changed our perception of the universe in terms of science and through its stunningly colourful astronomical images, art too. My guest this time is a brilliant combination of all of this because Nicole Stott is an astronaut, an engineer, and an artist. During her 27-year career at NASA, she had two spaceflights. One was a long duration mission on board the International Space Station, and the other was a shuttle mission. In total, she spent 104 days in space, performed a spacewalk for more than six hours, and was the first person to paint a watercolour while orbiting the Earth at 17 and a half thousand miles per hour. And Nicole is now founder of the Space for Art Foundation. Thanks for joining me on the podcast from Florida in the United States. And I'm going to begin by asking you, you know, Florida is a state that everyone associates with space because of Kennedy Space Center and Cape Canaveral. Does it have strong connections with art and engineering as well?

Nicole Stott

Yeah, I think Florida is one of these states that you tend to think about it from a tourist standpoint, you know, with all the destinations that are here and I would like to add Kennedy Space Center should be at the top of everyone's list, but I think that surrounding the space industry, surrounding aviation, medical tech, communications, I'm probably leaving a lot out, there's certainly an array of engineering expertise, not to mention the universities that are in Florida that support that education. And then from an art standpoint, oh my gosh, yeah, you have Ringling College of Art and Design, which is world known, I believe, and the city that we're living in right now, St. Petersburg has become like a focal point for the arts and Miami, of course. I don't think there's a place I've gone in Florida where I haven't had a sense of both of those things happening.

Sue Nelson

As a child, why are you interested in art, engineering, space, or all three?

Nicole Stott

You know, as a child I don't know if I really knew what I was interested in, I think, mostly I was really fortunate that I had, you know, parents who shared what they loved with me and my mom, a really creative person. She used to make all of our clothes growing up. And if I got to a ballet class or an art class, it was because of her and she shared what she was doing as well, as I was growing up as a kid, macramé and pottery and hooked rugs were the big thing, so to participate in that as well. And my dad was a businessman, but he loved flying he built and flew small airplanes. And it was just part of my life. And I think it's later when I discovered "Oh, I really like both of these things. I really enjoy art and science, art and space". And it just was just part of what I did and who I was and I'm very thankful for as well.

Sue Nelson

Now you went on to study Aeronautical Engineering at Embry-Riddle Aeronautical University, which I have actually been to so I know it's got its own runway. And there are a lot of military stuff there. So, did you sort of find yourself there because you wanted to learn to fly or had you all already sort of thought "Oh, no, this is the direction I want to go in because I, I like planes"?

Nicole Stott

One of the things that really attracted me to Embry-Riddle Aeronautical University is what you just mentioned, is the fact that it sits right on an airport an International Airport. And I was like, you know, if you want to learn how things fly, which is what else attracted me to it, too, is that this was a place where you could learn about

how things fly. And honestly, in high school I didn't even know what engineering was. All I knew when I graduated from high school was that I wanted to know how airplanes fly and I wanted to fly them myself too. So, I earned my private pilot's license. But as a career, I really wanted to know how things fly. And Embry-Riddle was the place and it sat on an airport and the people that were there, whether they were there for the engineering program or for the pilot curriculum, or the aviation business, or all of these other things that are associated with aviation, they all had this love of flying. And that was, I think that was really, really important to me from the standpoint of staying engaged with school too. You know, really wanting to study and to get to the point where I understood why I was there, and you know, honestly if you want to know how airplanes fly, why would you not want to know how rocket ships fly.

Sue Nelson

That's true. Had you already learned to fly then, had you already got your pilot's license before you went to university?

Nicole Stott

I did, before I went to university I already had earned my pilot's license. And I did that by, when I graduated from high school, I actually stayed local at the community college at the time, St. Petersburg Junior College is what it was called. And they had this amazing program called Aviation Administration where you could earn your private pilot's license. It was a very structured program established with one of the local airports and the curriculum was built out as part of your studies. And it was the perfect place for me as a person who, in hindsight, I really don't think I was at a maturity point to go off to university yet. And it helped me develop a study habit, it helped me get ready to do the engineering classes that I was going to take and I was able to earn my private pilot's license.

Sue Nelson

That's brilliant. And the course itself, did you come out of it thinking "This is what I want to be? Or did you come out thinking, well, this could be maybe my step towards a career in space?"

Nicole Stott

Well, when I left University, my goal at that point was to work for NASA at the Kennedy Space Center. And at the time, you know, the shuttle program was going on, but while I was at university, that's when we had sadly had the Challenger accident, which delayed NASA hiring people for quite a while, while they got the program back up and running and ready to fly again. And so it was about two years after graduating from university that NASA called me from Kennedy. And that started off what was just an amazing career for me, within the Space Shuttle program and the start of the International Space Station Program and getting to see not only how the engineering of all that was done, but how really effectively we can work together as human beings from all different places. And this introduction to a program the Space Station program where you know, 15 countries ultimately, we're going to come together to make that happen.

Sue Nelson

It's amazing that you had that goal so young, because you also did a master's didn't you in engineering, management. So, did you see yourself as managing projects then? Being involved in obviously in the international nature of NASA as well?

Nicole Stott

That that engineering management program, the master's program, that was interesting because when I graduated from university with my bachelor's degree in engineering, I knew at that point, there wasn't something that was like really exciting me that said "okay, Nikki, you need to go on and get your master's

degree and your PhD because you just have to study and figure this thing out". I knew if I did that, at that time, I'd really just be working on the project that was of interest to a professor. And I didn't feel strongly about doing that. So, I wanted to get out. I wanted to get my hands on the work. And while I was at the Kennedy Space Center, really after first starting probably within the first year and a half, that was when we were getting back to flight after Challenger. And the NASA management had hired this whole pool of young engineers, just straight out of college basically and what they saw in most of us was that we didn't really have a lot of project management experience, first of all, because none of us had really worked before, but through our education either. Now I was fortunate because Embry-Riddle, I think has always been very progressive that way in that they incorporated project management into the engineering curriculum too, so I felt like I had a little bit of an advantage. But, but our Director of Shuttle Operations saw this and, you know, largely across the pool of new engineers, and this was Jay Honeycutt, he worked with the University of Central Florida, to put together kind of a custom master's program for all of us. Really, it was like an industrial engineering program, you know, how do things work? What are the logistics of how you make an engineering project happen? And we all went through that and it was so cool, because it really did. It kind of completed the package of who we were and our ability to help get space shuttles from the runway and back to the launch pad and ready to go again. Very, very interesting.

Sue Nelson

At this point you were working as an engineer at Kennedy Space Center as an Operations Engineer, and this was this Orbiter Processing Facility. So, were you getting a huge insight into something that at that point, did you know you wanted to be an astronaut or were you just thinking I'm just enjoying what I'm doing and learning as much as I can?

Nicole Stott

I think I really was, I can say right off the bat, I really was enjoying what I was doing. I mean, imagine, you know, for somebody who loves flying, really wanted to know about rocket ships and how rocket ships fly. And now I was working in this hangar, at that point it is like a big hangar. The Orbiter Processing Facility is a big hangar where the orbiter part of the space shuttle, you know, the part that looks like the airplane, is taken care of, and where it's prepped and gotten ready to fly to space. And I was in this facility with all the other engineers and the technicians that were doing the hands-on work and the other managers that were making it happen, and literally, I could touch the thing. And that was awesome. And I wanted to know as much as I could about that vehicle and how we got it ready to go to space and what it did in space, all of those things. But it was a while, it was really a while before I thought about astronaut as something other than what other special people get to do. I mean, that's the way I always thought about astronaut. I was very excited about this job 'astronaut', I dreamed about it, but it really didn't seem real to me. I guess I second guessed myself or didn't have the confidence to think "Ooh, Nikki, you know, you could apply for that as well". And it took a while.

Sue Nelson

Because you've worked in in a number of different areas as well. I mean, they're fascinating just in their names, Shuttle Flow Director for Endeavour, Orbiter Project Engineer for Columbia, NASA Convoy Commander for Space Shuttle Landings. I mean, they're the most incredible titles. So how did each role differ?

Nicole Stott

The opportunity to work across all these different roles within the same program, the same Space Shuttle program was really, really important I think in the grand scheme of things for me. I enjoyed it while it was happening too, you know, I did, I had that job where I started out as a young engineer in the Orbiter Processing Facility as, I don't know what we called each other, Vehicle Engineers or something, and then moved on to have a role a little bit more in the management of it and then ultimately as Flow Director for Endeavor which, so I

work side by side with the Contractor Lead for making sure the space shuttle was ready to launch. And then Project Engineer, that was getting more into the actual engineering of what went into making that vehicle ready to launch. And then you mentioned the convoy commander. That was such a cool job because that was like physically out on the runway, with the whole convoy, or group of people that are waiting there for the space shuttle to land and then once it does, making sure that the crew is safe, that they get off the vehicle safely, that the vehicle itself is safe and ready to go back to the hangar to get ready to fly again. And I mean, for somebody who just wanted to know how things fly this was incredible. And I had friends who were engineers who, every couple years or so they actually changed jobs, moved to new companies to get new experience. And as NASA engineers, we felt really fortunate that within the same program, we could move across that program and see all the different aspects of what it took, you know, to get a shuttle ready to fly.

Sue Nelson

What do you think you learned most from that eight to ten years working as a NASA engineer in terms of life skills as well?

Nicole Stott

There were a few things, one certainly was, I mean, I cannot discount in any way the value of learning how the space shuttle works, of seeing the hardware up close and personal, that that certainly supported what I did later in life. I also learned that, and this was again through one of my directors there and dear friends Jay Honeycutt, had this motto and I'm looking at it right here on my desk as well of "here's how we can, not why we can't". And we employed that every step of the way with the Space Shuttle program. We did the same with the Space Station program. Based on what I've seen of everything NASA does, that's the philosophy embedded in how we do challenging things like go to space, like get ready to go back to The Moon like we are now, how we solve the Apollo 13 problems. Those all happen, those solutions came from believing in a here's how we can approach to things. And then the other thing which ultimately was very comforting when I was getting ready to fly to space too, to fly myself on one of those spacecraft was that I got to know the people that worked on these vehicles. And I came to understand that this was not just a job for people, this was a passion. This was a belief that they had the responsibility for the care and feeding of those spacecraft so that they could safely take the crew to space and bring them home safely again, and that's a that's a pretty reassuring thing to know when you're getting ready to fly on one too.

Sue Nelson

You moved from Florida and Cape Canaveral as an engineer still within NASA to the Johnson Center in Houston as a flight simulation engineer. I can't think of anybody more qualified to become an astronaut if you know the ins and outs of how the shuttle works already and now you get to do the flight simulation part as well.

Nicole Stott

You know, so I'll tell you, that whole transition from Kennedy Space Center to the Johnson Space Center was an interesting one for me because at that happened at point where I had interviewed for the astronaut job and wasn't selected. We could talk all day about why I totally understood I didn't expect to get selected, quite honestly. But in the time when they told me that I wasn't picked to be an astronaut they offered me this job as a flight simulation engineer on the Shuttle Training Aircraft. And the thing that was funny to me about it was, it was explained to me because they wanted me to get some operations experience. And I remember in my head, thankfully, I didn't laugh out loud, but I remember my head kind of laughing and thinking, well, I just worked for 10 years and Space Shuttle Operations, what do they mean? And the day I stepped foot out at Ellington Field in Houston, and really got a feel for what that job was going to be, I knew, I mean, this was about how's Nicole going to work as a crew member in a complex and environment like the Shuttle Training Aircraft. And it was kind of astounding you know, like them getting a feel for me in that kind of environment. And for a person who,

you know, loves flying to now be able to combine this love of space and the engineering role I had as a NASA engineer, and then be able to sit centre seat between an astronaut and an instructor as that astronaut learns how to land the space shuttle, I didn't think it could get any better.

Sue Nelson

It sounds as if you were being mentored as well, you know that they obviously saw all this potential in you and were sort of guiding you towards what you wanted to eventually do, is go on to become an astronaut.

Nicole Stott

I think that's exactly what they're doing. First of all, they want to get a little bit better just look at you, I think, in a particular environment, particular job. And secondly, I think there is certainly mentorship aspect of it, because everybody that I came into that job, who worked there already, who had the experience and was going to train me. They were absolutely mentoring me. They knew also that I was there as a person that the astronaut office was considering and there were people that were flying those airplanes that had been astronauts and now had come back to this job because it was so incredible. So, I think also was a platform that made it possible for astronauts to fly and get home safely. You know, they had to know how to land this vehicle that you couldn't go out and fly the space shuttle to learn how to fly the space shuttle, you had to do it in other ways. And to be part of that was just incredible. But yeah, I felt like everybody from my colleagues that were my peers, to the managers and the senior pilots in that office were mentoring me in some way and I actually felt that every step of the way with most of the people that I worked with and had, as you know, we call them bosses, as our bosses or supervisors along the way, there's very much that spirit within the NASA community.

Sue Nelson

So how did you feel when you got the astronaut job after having applied and not got through the first time?

Nicole Stott

Well, I had applied that first time and didn't get selected. I was very fortunate to have that Shuttle Training Aircraft job for two years. And I'll tell you, every step of the way with the jobs I had at NASA, I look back now and I'm like "Yeah, I could have done that one for a really long time. I could have been a flight engineer on that airplane for a really long time". It would have been something I've been having doing as a long-term career. When I got selected the second time around, again, it was a surprise to me, because honestly, the people that you show up at Johnson Space Center with, this group of people that they're interviewing at the same time. It's incredible. I looked around and I was like, basically "just enjoy it Nikki, you don't, you know, you don't really stand a chance against these people that are working on the cutting edge of these areas in science and technology. And enjoy meeting them enjoy the process of experiencing all this" and I think that's part of the attitude you have to have, is that that, that's part of the whole becoming an astronaut, is experiencing the selection process as well and getting a better understanding of how you're going to deal with that too. The disappointment the first time of not getting it was disappointment but was there was always kind of an expectation of that too. And not that I was talking myself out of believing I should be able to do it, but just knowing that it was a really, really slim chance. But it's not just other special people that get selected to do this. I sit here, pinch myself still that it happened. And for some reason they saw something in me. Maybe it was that job that I did as the flight engineer, but I'm very thankful that they did. And I think every one of the mentors along the way, when I see them now, that encouraged me to pick up that pen and fill out the application.

Sue Nelson

You had quite a wait for your first mission. Nine years. How did you cope with that period of waiting, obviously, there's amazing training going on. But there must come a point where the training must be more to keep your skills fresh rather than learn something new?

Nicole Stott

Well, in that nine years, sadly, the reason that my class and actually the class before me, why it took so much longer for us to get our first flights. Was that three years into being selected, we sadly had the Columbia accident. And, you know, that took us down for another couple of years. But you know, I felt like flying in space was always going to be this bonus, this thing that might happen, you know, there's never any guarantee that even if you're selected as an astronaut that you'll get to fly in space. It's very rare that people don't but, but there are reasons like having an accident that could keep you from doing that. And I had worked for NASA already. I really felt like what I was doing, and the job I had was, was this really cool extension of the engineering role I already had with NASA. And it allowed me again to see totally new and different aspects of how we get human beings to space. It allowed me to participate in that in a much more active way as a CAPCOM in Mission Control Center, speaking to and supporting the crew members that were in space, training myself in preparation to go but also training so that I could help develop procedures for the people that were already flying in space. And then working on programs that were beyond what we were already doing, you know, the future programs, how are we going to go back to the moon? When we go to Mars? What are we going to do? What do we need to be considering, you know, and primarily from the, you know, the human in the loop aspect, but that's a pretty cool thing to get to do. And on top of it, you know, astronaut training is, on its own in preparation for going to space really, really awesome. But the things you get to do as part of astronaut training, are I think about them every day still, you know, get in the big white suit and go into this ginormous swimming pool and prepare to do a spacewalk. Go into a dome with video all around you and a mock-up of the Cupola module of the of the Space Station and fly the robotic arm, fly in those T-38 jets to stay trained in a complex vehicle. I mean, that's, that's okay. And the nine years it was worth the wait.

Sue Nelson

I'd love to do that. Just listening to you describe that. I just think "oh!". I mean, when it came to your first flight was the fact that you had spent all this time as an engineer knowing the shuttle inside out, did that make the launch more comforting in terms of "I know this machine?" or did it make worse, in as much as a bit like a doctor, you sort of think "I know what could go wrong. I know this could happen".

Nicole Stott

Well, I think by the point, you know the time where you get to strap in and fly, regardless of whether you'd worked as an engineer at the Kennedy Space Center or not, you understand the risk associated with, you know, strapping into a vehicle that's gonna create 7 million pounds of thrust underneath you exploding thrust underneath you. You understand that, you also understand, though, that the people that have come together to make that happen, all want it to work, and they are doing their best to make it work. And you you've seen that, the kind of the inner workings of that going on too. So that's a good feeling. I think the thing that really was kind of additive in a positive way for me, was those personal relationships I had established through my time at Kennedy Space Center and Johnson Space Center with, and I would say across NASA actually, with the people who honestly feel like the care and feeding of those spacecraft is their responsibility. And that is a comforting feeling. And so, when I strapped in, it wasn't a it wasn't a fear. It was an anxiousness. It was "Okay, I've trained for so long for this, how's it going to feel? I'm so looking forward to getting to that space station to getting to space and doing the work that I know is ultimately about improving life on Earth". And I can tell you, I don't think you strap onto a rocket like that unless you believe in the work you're going to do when you get to space. And that was the big thing for me. And all of it, I think.

Sue Nelson

I'm sure you've been asked this load of times, but what for you is the thing that at night, when you're about to go to sleep and you have a memory of your time and space, what is that moment that flashes into your mind, a specific moment?

Nicole Stott

Well, that moment I would be floating first of all. And I think really, it's the glow of Earth out the window. The opportunity to appreciate who and where we all are in space together from that very special vantage point, you know, and then it doesn't stop there. It's a reflection on what that, you know, stunning planet really means and what I learned from it. It's like any story I think, the simple truths are the ones I think, are the most impactful. And for me, there were three simple lessons that came from experiencing that. And it was that, you know, we live on a planet. We don't think about that often. You know, we're all earthlings and the only border that matters is that thin blue line of atmosphere that blankets and protects us all. And every night I go to sleep when I think about that, I'm like "I am a crew member on spaceship Earth. I am not a passenger. I am a crew member and I want everyone else on this planet to feel the same way!"

Sue Nelson

And what were the other things that that the lessons that you sort of took from that?

Nicole Stott

Well I think based on this whole idea of planet Earth laying under a thin blue line, it's that you know, when you see the planet in space like that, and honestly, I don't think you have to go to a space to appreciate this same thing. I think a lot of what we're going through right now can get you feeling the same way, is that there is absolutely nothing that goes on down here that isn't connected in some way to everything else. And you see that, it's like the planet comes alive when you look at it through the window of a spaceship and you know, everything from the way lightning storms trickle across, you know, from one place and completely wrap around the Earth looking like neurons firing in the brain of the planet. I mean that that was kind of the signal to me that wow, everything about everything down here is connected in some way. Honestly, there's not a day goes by that I don't think about that now, that I don't consider this idea of us all together on this planet in space, and how we need to behave not only to protect it, so we survive, you know, the life support system is Earth. And how we care about each other.

Sue Nelson

That's very true considering that the pandemic, at the moment as well, has the experience of being in space, I know you were with your crew, but you were effectively doing what a lot of people are having to do now, which is sort of self-isolate in a confined space with a set number of people and they are the only people that you might see at close quarters for a long period of time. Has sort of, does this make self-isolation during a pandemic a piece of cake for you?

Nicole Stott

I don't know if self-isolation during a pandemic is a piece of cake for anyone, honestly. And, you know, we're all struggling with this in one way or another and I feel very fortunate, you know the situation that I'm in, but I know that is not the same for everyone and I really appreciate that. I do think, I find myself reflecting on the spaceflight experience though and trying to employ perhaps some of those ways that we worked there together in, you know, in a spaceship to how we're living, I say "we're", my husband and my son and I are living together now in much closer quarters than we had before, you know, everything from establishing some kind of structure for your day, you know, NASA does that very nicely for us. We have our day managed down to five-minute increments. I'm not doing that here. But a structure is good. Getting out of my pyjamas is kind of a key starting point where, you know, I could very easily stay in them all day long. But in, I think psychologically that

doesn't allow us to, you know, recognize these different parts of our day and how we should kind of be sectioning that off too and paying attention to not just working, but living as well. And you know, I had the opportunity to paint in space. If you weren't a photographer before you got to space you become one. And I think that it's really important to incorporate those kinds of things you love or learning something new into this time as well. And really and truly the big thing for me, just like it was in space, was taking advantage of looking at my surroundings in a whole new way. And I look through the window now of my home and the place where I work. And I appreciate the hibiscus bush outside a bit differently and the way the bees and the butterflies are there and I think all of us have the opportunity to do that and we should get out in it as much as we can. But just a view out the window or looking at the potted plant on your porch or your balcony, I think it's important for us to connect that way.

Sue Nelson

Absolutely, totally agree with you on that. And you brought up about you know, the opportunity to paint in space. What made you take, particularly watercolours, which you would think well if you have to add water to watercolours and everything floating, that wouldn't be my first choice of paint.

Nicole Stott

You know, that's funny because yeah, watercolours, I think, and everything does float and that's the that's the challenge in everything in space, is that everything including you does float, so you've got to keep really good track of your stuff. In the end though watercolours was more about what I was allowed to take. If I wanted to paint in space versus whether I was better at painting with watercolours than another medium. And it's because the watercolours were not toxic and they would be really easy to clean up. And imagine if you had acrylic paints in whatever form, you'd have to have multiple brushes, it would be really difficult to clean things up. In the end it was so much fun. I don't think I would have thought to bring it on my own though. I was encouraged by one of my ground support people who, Mary Jane Anderson, who is the person who was helping me get all of the stuff that I'm allowed to take to space together. And she reminded me that I'd be living there not just working there, and that I should consider bringing something that I enjoy doing down here on Earth with me. And when I think about that now, I am so thankful to her because it's really like putting the human in human spaceflight, right? It's living in this place, and I mean, astronauts have been playing music and doing art and photographers for the entire time we've flown in space. And so why shouldn't I have something like that too? And, oh, it was one of the most wonderful experiences up there, personal experiences that I had in space. It allowed me to kind of put my own interpretation on these views, I was seeing out the window, and bring that back and share it. And it's honestly been the inspiration for everything that I've done since retiring from NASA.

Sue Nelson

And that's what's so wonderful, isn't it? Because you set up this Space for Art Foundation, and it is, it's like a second career, but it does sort of combine some of the space as well, particularly with the spacesuit, explain how that actually works?

Nicole Stott

I feel like I'm on a new mission, right? And I'll tell you Sue, there's been a lot of times where people have said "Oh, you've done this astronaut thing. How could anything be better, you know, you flew to space!". And that makes me so sad. Because I think about it and I'm like, "shouldn't I be using this experience that I had, this really wonderful kind of blessed experience that I had and apply that in some way for, you know, some greater good still". And I feel that's really what I've been given the opportunity to do now with the Space for Art Foundation, is combine in this really kind of magical, wonderful way, my love of art, my love of space, you know, my love of science and of working with kids. And in the simplest terms, the Space for Art Foundation is really about space-themed art therapy projects. We work with kids in hospitals and refugee centres around the world

and bring them this inspiration of space exploration, which allows them, I mean, it's really cool to watch and this isn't just with kids, adults have this happened too, but watch them just transcend a not so good experience, and think about their futures. And imagine themselves in space, or imagine what that would be like and how they could do something creative and meaningful with their future. And that's all while they're painting some space-themed thing that's going to get incorporated into an art-spacesuit or other, you know, global community art project. And it's been very, very therapeutic for me as well to see how this this can happen. And it makes me believe that we really can behave like Earthlings, like crew members on Spaceship Earth and all come together for some greater good mission.

Sue Nelson

And I've been following on Twitter, looking at some of the artwork that children across the world are contributing, and you often get their artwork put onto fabrics that's made as part of the suit and I love the fact that when we worked together for a radio program and we met for the first time in Florida, I got to see one of your art spacesuits. And they're glorious things. And they're made by the same company that made the Apollo spacesuits and made your spacesuits I assume, as well. So, it's a lovely combination of where we started really isn't it. Space, engineering, and art and you love STEAM, you always think you put the A into STEM?

Nicole Stott

You know, I am so thankful you got to see one of these suits too, and I hope you'll see another because the project we have going on now, our partner ILC Dover, who, as you mentioned, yes, an incredible company that has been creating our spacesuits, engineering, new designs and upgrades to these suits since the Apollo days. And yes I did my spacewalk and one too, very thankful to them. They have, every step of the way, volunteered with us and quilted together these children's artwork into these, I love the word that you use, glorious suits. And they bring joy. It's so cool to see people's reactions to these suits. And that includes astronauts who all of us wish that IOC could build our suits that we use in space this way too. There are technical engineering reasons why that can't happen right now. But we're all hopeful. But they are, the suit that you saw, oh my gosh, children from 45 countries participated in the creation of that suit. And the project, the artwork that you see on Twitter and other social media now that's coming in from kids around the world. We've invited children from all over the world now, not just in hospitals and refugee centres, because we're all isolated in a way now, we all, I think, need to understand our connection to everyone else. And so, we have kids from all over the world, we're hoping for every country, that we'll get to every country and kids will get to participate in a spacesuit called 'Beyond'. And the whole theme is just to get kids thinking about Earth, our home as a planet in space and that we're part of something bigger. So, I look forward to that happening too.

Sue Nelson

So do I. So maybe the future that you would encourage more engineers to not let go of their interest in in art, or whatever it might be?

Nicole Stott

I would absolutely, I think in fact, I honestly believe that more than not, within the engineering community, within the technical community, quite honestly, as a whole. There are very creative people there, most of whom have some artistic outlet. I look across my astronaut colleagues and my mission control team colleagues and all of the technical support that we have as part of the space community. And the majority of those people, it might be hidden, they might not be bringing it out in the open often, and I don't know why, I encourage them to do that. And we've actually done some art exhibits where we've brought these technical people together and display their artwork. Most have something going on. And I think it's, I really think it's the way an engineer's brain works. You're wanting to solve problems; you're wanting to get creative about that. And an art is just another way. Art in the kind of true sense of art is another way of communicating complex things. And we've

been doing that in science forever. The Hubble Space Telescope, a really beautiful example of how this intersection between science and art helps best tell the story of the science that we're finding.

Sue Nelson

Absolutely. And it actually bridges that perfectly, doesn't it? The artistic interpretation of something that couldn't happen without engineering and science and space.

Nicole Stott

Yeah, absolutely.

Sue Nelson

Nicole Stott, thank you so much for joining me on the Queen Elizabeth Prize for Engineering's Create the Future podcast.

Nicole Stott

Thank you Sue.