Juan Vivas (00:00):

But to me, based on my experience so far, I think the best way to put it: An engineer is a technical problem-solver.

Eric Cross (00:28):

Welcome to Science Connections. I'm your host, Eric Cross. My guest today is Juan Vivas. Juan is a supply chain engineer for SpaceX. His career in STEM has pivoted from chemical engineering to working on foods like Cinnamon Toast Crunch to his current role at SpaceX, where he's responsible for his work on Starlink, a technology that uses low-orbit satellites to provide internet access across the world. In this episode, Juan shares his story of how he became an engineer and how a thoughtful teacher used robotics to inspire him. I hope you enjoy this great conversation with Juan Vivas. Juan, thanks for being here.

Juan Vivas (01:14):

Yeah, yeah, of course! Super-excited to be here.

Eric Cross (01:19):

Hey, and starting off, I kind of like to ask your origin story. We were talking earlier about Marvel, and your journey of one working for...what I consider the closest thing that we have to SHIELD in the Marvel stories is SpaceX. Like with my own students, we talk about SpaceX like it's a fictional thing, and we watch the rocket launches together and we watch the recovery and it's so cool.

Juan Vivas (01:45):

Yeah.

Eric Cross (01:46):

And so when I knew that we were gonna be able to talk to you, I was excited. Like, I felt like I was a kid.

Juan Vivas (01:51):

<Laugh>

Eric Cross (01:51):

So I'd love to hear your origin story of you ultimately landing at SpaceX. And begin wherever kind of seems most natural to you.

Juan Vivas (01:59):

Yeah, yeah, of course. You know, I wasn't one of those kids at from a young age I said "Oh, I'm gonna be an engineer." Right? "I want to go and build all these things." Where I grew up, and the social circle that I had, a lot of people were like doctors or lawyers. Just figured, you know, I'll go to med school and go down the same path that 90% of like everyone else was gonna take. But in high school, I actually got into robotics. And, kind of like I mentioned, I wanted to do med school, that is what I figured I would end up doing. And then I got into robotics in high school. And I think that was what really kind of like changed my perspective of what I wanted to do, because basically these competitions were just—it was full-on driven by students. So we designed, programmed, and manufactured, like, the entire robot itself. And so through that I ended up doing a summer engineering program at the University of Maryland, the summer before going into my senior year in high school. And there we worked on a competition with underwater robots. And so we spent the entire summer, kind of similar scenario, designing a robot, manufacturing it, programming it. And then in the end it was like a competition in the buoyancy tank with different teams. And, you know, I think one thing that was really neat about that experience is that I got to hear Dr. John C. Mathers, who is a Nobel Prize physicist, speak to us in a room with, like, only 10 high school students. And just hearing his experience of where he started and the accomplishment that he's been able to do, down in the STEM path, was really neat. And that summer was my final decision that I'm "OK, I know I want to be an engineer." What's interesting is I ended up choosing chemical engineering, instead of mechanical, which a lot of people, you know, based on all the experience that led me up to be an engineer, they asked me why I didn't choose mechanical engineering. And I think one of the reasons why I chose chemical engineering is it's very process-based. So one thing needs to happen, and there's different inputs to that one step, and that step has an end-to-end reaction to it, right? So certain things need to happen in step one in order for step two to occur. And however the inputs happen in step one, it's gonna affect the rest of the process. Honestly, very different than what I thought it was really gonna be. But what's neat about chemical engineering is that it's one of the most versatile engineering majors that you can have. Chemical engineering, because you work with a lot of process bases. Everything has a process, right? Everything needs to start with step one, and with, you know, step 10, whatever. And it's all about optimization and improvement along those processes. So you can really take chemical engineering principles and apply 'em to different areas of a career, which is essentially the experience that I had in college. I had three internships with Dow Chemical where I did environmental health and safety, production, and supply-chain improvement. I then did research and development with Clorox. And then I did manufacturing engineering with General Mills. So really different job roles, different aspects, but same methodology applied.

Eric Cross (05:36):

I feel like there's so much that you just said, <laugh> and I was trying to always, "I wanna ask him about that!" And in there, what I heard was there was a real pivotable, pivot moment in your life. Was the club...or was it a club, the robotics program? Or was that a class?

Juan Vivas (05:53):

You know, it was actually...it was VEX Robotics, specifically.

Eric Cross (05:56):

It was VEX! OK. Yeah, yeah. Really popular. And they still have it; I think we actually have some downstairs. So it was a club, and not necessarily a formal environment, where you were able to build. And it's both collaborative and competitive, right? Like, there's both aspects.

Juan Vivas (06:11):

Yep. Yep.

Eric Cross (06:11):

And, and then you had access to one of the only two facilities in the country that have these...were they buoyancy tanks?

Juan Vivas (06:20):

Buoyancy tanks, yep.

Eric Cross (06:21):

And there's this book, Malcolm Gladwell's Outliers, and then another similar book called Balance. It talks about how some of these innovators, like Steve Jobs and, and Bill Gates, they had access to things that other people didn't. So, like, Bill Gates, I think at the University of Washington, had a computer that, you know, no one else did. And Jobs had one at, like, Hewlett-Packard. So it gave you this awesome headstart, where you're able to test things in a real-life environment that kind of transfers into real-world skills. And then a few internships, so like, internships and mentors. So you had these people in the industry or people who were front-runners that were able to pour into you and give you these opportunities. And so it's really neat to see how a program that starts as a club, kind of a competitive thing that introduced you to it and hooked you, then led to unfolding all of these opportunities that ultimately led you up to being here. And there's one part—in looking at your LinkedIn profile, there's a couple of really cool things that stand out. There's a lot of cool things, but there's two that really stood out. So one, working at SpaceX, and we'll talk more about that, but I wanna go to General Mills and Cinnamon Toast Crunch. Because Cinnamon Toast Crunch is amazing.

Juan Vivas (07:39):

Yeah.

Eric Cross (07:39):

And you were part of the supply chain for that. In my head, I'm thinking, OK, like, what is he like responsible for? Like, getting the cinnamon and sugar?

Juan Vivas (07:51):

<Laugh>

Eric Cross (07:51):

What was, what did your job entail, when you were running that?

Juan Vivas (07:55):

There, I didn't even know what I was gonna be doing until my first day. It was just, whatever the business need is, that's where you're gonna be put. So this was actually a high-priority plan for General Mills. And the production line that made Cinnamon Toast Crunch was split up into processes. So you have, they call it the process-process side, which is like literally raw materials, like making the cereal from scratch, baking it, adding the sugar, and then sending it to be packaged. And then you have the packaging-process side. so I was then placed as a packaging process lead, for the packaging side of that production line. So I was accountable for two packaging lines that packed out Cinnamon Toast Crunch. And that is where—that was actually my first real, you know, call it "real job," like graduated college, going straight into the industry. I was a process lead for the packaging side of Cinnamon Toast Crunch.

Eric Cross (08:54):

So you went from cereal to rockets, <laugh>, which which is an amazing trajectory to have.

Juan Vivas (09:03):

Yeah. Yeah.

Eric Cross (09:04):

And when you kind of mentioned, back in your story about medical school, and, you know, it's kinda like, what you see people doing, and you're "OK, this is what I think I wanna do." And then we have a perception in our mind about what a certain job's gonna be like. And then reality hits. I think a lot of—when I ask my students, "What do you wanna do?" They think, like, "lawyer!" and when they think "lawyer!" they're like, "I'm good at arguing!" Right? And until they find—until they talk to some lawyers and they find out like what that career can look like.

Juan Vivas (09:28):

Yeah.

Eric Cross (09:28):

You're not just in the courtroom showing off your arguing skills. But, like, an engineer, when I talk to my students about what does it mean to be an engineer, often it's very linear. It's "I build bridges," or, you know, maybe cars, but you're a supply chain engineer. And, and that's something that I think, now more than ever, it's probably an incredibly critical role, especially considering that all of these supply

constraints. Can you—what is a supply chain engineer? And what does it look like in your day-to-day? How is engineering rolled into that?

Juan Vivas (10:03):

Yeah, yeah. I think that's an excellent question. I, too, once thought that engineering was just "I'm gonna be actually making something physical," and like being super engineer-y about it. But, to me, based on my experience so far, I think the best way to put it: An engineer is a technical problem solver. As a supply chain engineer, specifically right now in my role at SpaceX...you know, as you can guess, the supply chain in the entire world is crazy. There's no raw materials anywhere, and nothing can ever get on time. And so what I work on is I help our suppliers develop processes to meet the design criteria that we set up for like a specific part. As my job as a supply chain engineer, it's "Can I take this design and make it manufacturable?" Right? "Can I go to any supplier and can they actually make this to the tolerance that the design engineer set them to be?" Nine out of 10 cases, the answer is no, essentially, is the best high-level way to put it.

Eric Cross (11:10):

When you're solving these problems, is it this iterative process of going back and forth? Or is it just this aha-moment when you finally figure things out? 'Cause I imagine they're coming up with a design; you're going back and saying, "Can this be manufactured?" or "Can it be done?" They're saying no 90% of the time. And then are you the one responsible for kind of iterating on this, or changing it and then going back to them and telling them, asking them, until you get a yes? Is that—

Juan Vivas (11:33):

Yep. Yep, yep. Exactly. So we go through a process called Design for Manufacturing, DFMing. And where I essentially take, you know, the design engineer's proposal, and then I have conversations with the suppliers, and then, that's where the iteration begins. Where we go back and forth, back and forth, until we kind of meet in the middle to have something that can be manufacturable. Most of the times, in my experience, suppliers will always tell you no, just because they always want something that is manufactured really easily. And so you just gotta learn through experience. Like, when are they actually telling you something that's a fact, versus when they're just trying to you know, get out of a tolerance, or that "all right, all right, they mentioned that would just like make their jobs a little bit more difficult."

Eric Cross (12:17):

So I'm hearing like there's soft skills that are woven into the technical skills that you also need to be able to have.

Juan Vivas (12:23):

Oh, yes, absolutely. Yeah. I think, you know, as an engineer—and this is something, again, that I feel like you can only learn through experience—you're gonna see that it's not just you working to solve this one

problem. Especially for a supply chain engineer. You're talking with marketing; you're talking with an industrial design team; you're talking with logistics; you're talking with procurement, materials management—just a whole set of people that don't necessarily have technical background. Right? So sometimes, depending on the audience that I'm targeting, I'm always very, very peculiar on what is my target audience, right? How can I—how deep in my technical knowledge do I need to go? Because if I just, you know, talk straight Engineer, they either don't care or they're gonna be really confused about what I'm saying. So there is a stronghold of soft skills that definitely go into engineering, which I think are really important to communicate, you know, to, let's say, students that are really interested in engineering. So you can be extremely smart and intelligent and really good at problem-solving, but if you don't have those soft skills that you apply in the real world—'cause in the real world, you're never only gonna be working with engineers, no matter like where you're at—so having those soft skills to be able to manage with different backgrounds and different sort of people and different ways of thinking, it's, I feel, really critical, for, for an engineer in the real world.

Eric Cross (13:50):

No, I think that's a great point. It reminds me of teaching! And so many other professions where your ultimate goal is to really pour into this person in front of you and help develop them and create a sense of inquiry and wonder and personal growth and inspiration. But you're also working within constraints and people and relationships. You know, you have your other teachers, you have parents, you have administrators, you have a district, you have communities, stakeholders. You have all of these different dynamics that you have to kind of navigate in order to ultimately help this child thrive. Versus just, like, being in the classroom: "OK, I just got <laugh>, the hundred or 200 students, just you and me. That's it." But that's not the real world. And there's this report that came out, I think Google ran it, Project Oxygen and Project Aristotle, and they asked the question, "What are the most effective traits of a good team and a manager?" And the top seven skills were all soft skills. So it is like exactly what you're saying, where, yeah, it's great that you have this technical aptitude, but if you're not able to work with other people, problem-solve together, work with people of different backgrounds and perspectives, then you're gonna run into some roadblocks. And that kind of dovetails, like, looking at things like if you looked at education from the perspective of an engineer. So you're all about optimizing, right? Optimizing, working with what you got. When you look at education, are there any things that you would optimize to help improve the experience of students? Like, looking back, that you would fine-tune, that you think could provide better outcomes in the classroom?

Juan Vivas (15:28):

You know, I feel...I don't know. Obviously I'm not a teacher. And I'm sure teachers just have so much stuff going on. But I think just like, finding...giving a chance to those students that you see a lot of potential in and really taking the time to mold them. You know, I did have a teacher who was able to mold me and give me that kind of one-on-one personal experience, right? I think honestly to me it just comes down to mentorship, and motivating students on what, you know, they're passionate for. Like, putting them in front of engineers, right? Like finding engineers to come volunteer and explain to them. I genuinely

believe it just takes one spark to really get a student on a trajectory where they can make an impact in the future. So to me, it comes down to, really, exposure. How much are you really exposing your students to...you know what, something I've learned, when I joined SpaceX, is that Elon doesn't believe—well, you know, there there's a lot of things that Elon believes and not believes in; there's a whole different type of conversation!—but he doesn't think that you can just take a curriculum, let's say, and just apply it massively to everyone and expect like everyone to be it. That's just naturally not how it works, right? Students learn at different paces; they have different sort of interests. This is actually why he created his own school for his kids in LA, called Ad Astra. You know, if you take that mentality, what that school is doing is that they're working at the students' pace and at the student's interests, right? And I actually have a coworker who has his kids in that school. And I mean, these are one of the most brilliant kids I've ever known. Like, they are taking differential equations in the eighth grade. And I didn't know what differential equations was until I was in college already and they told me, "This is a class you have to take." <Laugh>. But it's finding that crossway where, where is the curiosity of the student? What are they really interested in? and exposing them to that.

Eric Cross (17:51):

Yeah. And what I'm hearing of that is, in teacher-speak, a lot of personalized learning. Like you were talking about...is it Ad Astra?

Juan Vivas (17:59):

Ad Astra? Yep.

Eric Cross (18:01):

Ad Astra. You know, every student learns in their own way and they develop knowledge in their own way. And being able to personalize learning according to the students' abilities and needs, and then accelerate or slow down, really produces some amazing effects. I know this is something that we as teachers try to do with the classroom. Scaling it is the challenge. But it's great because even with people who are in charge of policy or people who have decision-making ability, hearing people from the top down saying, "Hey, look, this is what worked for me. This is how I was able to become successful. I had a teacher that was able to be a mentor to me because they knew me, they had a relationship with me, they were able to tap into my passions and use those passions to drive me to do or put me in programs that I might not have known about because they, they knew who I was." And it's not one-size-fits-all for everyone. So having—maybe it's curriculum or learning experiences that are kind of modular, where students are able to maybe try on different things and get that exposure, I'm a big, big believer, like you are, in mentorship. That was a huge, huge thing in my life. Having mentors. It's the reason why I became a science teacher. In seventh grade, I had a mentor who had us doing college-level science, you know, at UC San Diego. And it completely changed the trajectory of my life, in a direction that I wouldn't have had without him. So I think that's great. And it's something that we as teachers would appreciate hearing. Going back to what you said...earlier you said your wife is a supply chain engineer as well. And so that means that there's

two people who are process-minded in the household. And this is kind of a lighter question, but I gotta wonder, do you have the most optimized flow for grocery shopping? <Laugh> Because...

Juan Vivas (19:49):

Yeah, I think we don't spend more than like 20 minutes at a grocery store. Mind you, we only shop at Trader Joe's and we have a very specific list before going in. And if you ever shop at Trader Joe's, you just know where everything is 'cause it's always there and it's small, right? But yeah, like we're, we're in and out in like 15, 20 minutes. It's great.

Eric Cross (20:11):

I love it. I love it. I feel like I'm that way by design. I go in with a purpose and this is exactly what I want. I know where the cookie butter is, <laugh>, I know where my coffee is, and then, OK, I'm in and out. Apple Pay or whatever I'm using. And then we're good to go. Do you think...so as someone listening to this or some people even just becoming aware of supply chain engineering, what advice would you give someone that's interested in pursuing this career path? If you maybe reverse-engineered your process, knowing what you know now, you were gonna give advice, you were that mentor, what are just some kind of tips or ideas or thoughts or trajectories that you'd think that they should aim for? I'm assuming like robotics....

Juan Vivas (20:56):

Yeah. You know, I think I would say definitely finding some sort of program that exposes you to a lot of things that you won't be exposed to, like on a day-to-day basis, or something that you just can't be exposed to naturally at school. And mentorship, honestly. I was born in Colombia and my parents were both—they're still both professionals, but they were both professionals in Colombia. And when we moved to this country, this was like December of 1999. My parents started from scratch, and so they didn't really grow up in the States, right? So when it was my time to go to college and do all of this stuff, it was just like me on my own figuring this stuff out. And, you know, they definitely made some mistakes when it came to college applications and whatnot. But once I was in college, I knew that the best way for my success was gonna be through mentorship. And that's when I joined the, Society of Hispanic Professional Engineers, which is a nationwide organization. And each college, well, most college campuses, have their own chapter. In joining that, I was exposed to resume workshops, mock interviews—basically how do you even talk to a recruiter? Which is so critical, right? And personally that that organization was really what molded my actual professional career.

Eric Cross (22:19):

There's this theme that I'm hearing, kind of weaving through this. And in addition to—as we're talking about STEM and technical skills, in addition to that, there's this thread that I'm receiving of...being able to form relationships with other people, for our students, is an important skill to teach and should be taught explicitly. Which isn't...it's not really a curriculum, right? Like, you don't get tested on your ability

to....conflict resolution or how to write an email or how to develop a relationship. And then the other part in I think what you just said is the aspect of community. Through this organization, you learned kind of some of these hidden rules, maybe I would call it.

Juan Vivas (23:04):

Yep.

Eric Cross (23:04):

It's not that you didn't have the...you had the aptitude. You had the drive. But there were these kind of hidden rules, and from moving to the US, you needed a community to be able to show you, so that you can kind of go through the proper steps.

Juan Vivas (23:16):

Exactly.

Eric Cross (23:17):

And so that created a lot of value for you.

Juan Vivas (23:19):

Yep.

Eric Cross (23:20):

Well, the last question that I have is, is just kind of a wondering. You have this awesome story, and the story continues to unfold. I gotta say, <laugh> I'm gonna be following your LinkedIn profile, because I think you just have kind of the coolest trajectory of going from, you know, General Mills, working in chemical engineering, and then ultimately it's SpaceX. And every time I see the rocket taking off and landing, I'm gonna be thinking, thinking about you. So cool!

Juan Vivas (23:47):

Yeah. Yeah.

Eric Cross (23:49):

And personally, I have a hope that one day, one of my students will be at a company, you know, like SpaceX or Tesla or wherever, and one day I get to interview them and talk to them and see what they say. But the last question I want to ask is, is there, is there a teacher who inspired you, or a memorable experience that you have that made an impact on you?

Juan Vivas (24:16):

Yeah, yeah, of course. It was kind of you know, middle school going into high school. The way my school worked, everything was divided from pre-kindergarten, whatever, first to sixth grade, and then seventh grade to 12th grade. So I had a high school science teacher, Ms. Brown, Ms. Velda Brown, who, came from a small little island town on the east coast of Canada. Somehow landed, in the high school that I went to, to teach science. Going back to the beginning of the story where I mentioned that I figured whatever, I'll go to med school. I played soccer, basketball, and, you know, I said, "I'll figure it out once I graduate." It might have been like life science in the eighth grade or something like that. But then she went on to teach me chemistry and physics as well. And when I was in the 10th grade, she approached me and she asked me if I wanted to join the robotics club. And I remember saying robotics? I don't know. You know, naturally, in school, it's different sorts of crowds: people that play sports and people that are like in like STEM clubs or whatever. And I was, "Ah, I don't know; I don't know how I feel about robotics; not really my thing...." But somehow she convinced me to join robotics. It's me, coming into this group of kids that already knew each other, and they were all working on robotics. And I'm, "Yeah, I mean, I guess I'm just here to try this thing out." It was a thing where we met every single Saturday at like seven in the morning. And there were times where I literally had to choose, "Do I go to like a soccer game or do I go to you help my team with robotics?" And I completely loved it. Like, I fell in love with the aspect of building something from scratch, and just making it operative. And she ended up just being a huge mentor for me in high school, actually. With her, with the help of her, I ended up opening the robotics club at my school. And before I left, we opened it up to middle schoolers. And then, you know, later, years later down the road when I was in college, I found out that it was now a whole-school thing. So there was an elementary robotics club at the school, the middle school one, and then the high school one were still a thing like years after I left. And that was like just so amazing to hear. But yeah, it was Ms. Velda Brown, my high school science teacher, that really took her time to mold me and get me into robotics, and really mentor me. And honestly, I'm sure you as teachers, you guys probably hear about it a lot, but you can have a lot of power in shaping a kid by just telling—believing in them, right? She believed in me so much that I would go on to be a successful engineer. And I'm. "OK, yeah, yeah, you're just saying it." But she spoke life into her students up to this day. I still speak about it with my wife, and when I'm in conversations about this, that if it wasn't for my high school science teacher, I would not—well, no, I would probably not be an engineer right now.

Eric Cross (27:38):

Wow. Shout out to Ms. Velda Brown <laugh>. Would you say she spoke...I think one thing that just resonated with me is when you said she "spoke life" into you.

Juan Vivas (27:46):

Yeah.

Eric Cross (27:46):

That was really powerful. And I think we as teachers have that power and we don't realize it. Because, you know, we get so we're so familiar and living day-to-day, but we do have the power of life, speaking life, into our young people. And, yeah, that was—

Juan Vivas (28:03):

Absolutely, yeah. You know, I think obviously people grew up with different backgrounds, different communities, life situations, right? So imagine having like a student that is similar in that environment and then they just hear someone at their school, like, "Hey, you're really good at this. why don't you consider doing this?" And that's when I feel teachers have that power. Where like they don't necessarily know the background, but they can make that opportunity, or make that decision in the moment, to really shape a student's life.

Eric Cross (28:37):

And we need to hear that. And I think, I hope that other teachers listening to this will be reminded that many times we don't get to reap the harvest. We don't get to see the <laugh> Juan Vivases at SpaceX. They just kind of go, and they disappear, and we hope for the best, and we get a new group. But every once in a while they come back, and we get to see what our watering or seed-planting was able to produce. And so, just know that you sharing your story for educators, and for definitely Ms. Brown, makes a huge difference and is a huge encouragement. So.

Juan Vivas (29:11):

You know, I think we touched on earlier, you know, how do I end up going from cereal to rockets, right? And I think it ties along with what I mentioned earlier of just taking—as an engineer, you're really a critical problem solver, right? And you think that methodology. And if you find a way, you can apply it to different sectors. When I was doing a lot of like the packaging process stuff at General Mills, being a lead on a high-volume manufacturing line, what I do for SpaceX specifically, right now, I'm actually on the Starlink project. So if you're up to date with Starlink, it's, it's essentially high reliable, fast internet that we're providing to areas where usually people don't have access to internet, right? Or maybe they do, but it's extremely expensive. Because to an internet provider company, the benefit is not there, if they extend an entire internet fiber line out to their place because it's only directed to them, right? So that's, that's essentially what Starlink is trying to solve. And this is the first time that SpaceX is facing a consumer packaging scenario. Before it was just rockets. And now they're selling a product to consumers. They had never done that before, especially in a high-volume manufacturing setting. And so I am the supplier development engineer for all the consumer-facing packaging for the Starlink product itself. And that's essentially how all those thoughts connected, where I had this experience coming from General Mills and packaging high-volume manufacturing. And then when Starlink started, they're all, "Right, well, who knows anything about packaging?" Right? "We know so much about rockets, we need someone with this technical background." And that's essentially how I bridge over to SpaceX.

Eric Cross (31:11):

And so while you're working at SpaceX, you're working on Starlink, which I know you mentioned that—you said that it's providing internet globally, which in and of itself, we—especially those of us that live in major cities—we kind of take for granted. Internet is like a utility. But we don't maybe realize that in many parts of the world, internet is not reliable or even accessible.

Juan Vivas (31:33):

Right. Right.

Eric Cross (31:34):

I see every once in a while, I think, the StarlinK satellites sometimes are visible?

Juan Vivas (31:38):

Yep.

Eric Cross (31:39):

Low orbit?

Juan Vivas (31:39):

Yeah. Yeah. You can go—they'll kind of be like a little train of bright stars that move along together. Yep.

Eric Cross (31:46):

And that must—that must feel...I mean, we all have jobs and we're all doing different things, but you're working on a project and you're engineering something that actually can provide a lot of opportunities or close a gap in some parts of the world where they don't have access to internet. They're gonna be able to have access and be connected all over. I dunno, the word would be "existential." Existential value. Like, what you're doing is actually providing a service for people. Humanity. Like, addressing a critical need in many, many places around the world.

Juan Vivas (32:26):

Yeah. We've had stories where we have sent Starlink kids to a small school in a village in rural Chile, right in South America. And for the first time ever, they've had internet. We have supported disaster relief in Europe. I think this past summer, Europe had really bad floods. We sent Starlink kits out there. You know, the vision of working at an Elon Musk company and SpaceX and Starlink—this is all stuff that is being done for the first time in history. We have never, ever done anything like this before until now. And to be able to provide those that don't have the access to—to your point, it's kind of wild, right? Like we, we just take it for granted. "Oh yeah, I just have internet. Let me log on." There are people on Earth right now that have never been on the internet. Or don't even know what the internet is. And that's essentially the, the gap that Startlink is starting to close.

Eric Cross (33:26):

Yeah. We think about that while my students are doing TikTok dances. <Laugh> And there are people who, you know, never, never been connected. And, it kind of makes me more like, just inside, if I can ask: What's it like working at SpaceX? I showed my students what it's like working at some of the Silicon Valley companies. 'Cause just to show them there's slides and food and, you know, they kind developed this ecosystem inside so that it's really kind of homey to kind of keep you there, you know. When you're working and there's bikes and things like that. And that's a very Silicon Valley type of thing. But, you know, in listening to you talk about SpaceX and Elon, you know, you're with a really visionary kind of company, and when I hear you talk about it, there's I can hear this passion, this, "we're doing something." Is that culture, like, pervasive everywhere? Are you around folks that kind of are on that same wavelength? Because I definitely get it from you as you talk about what you do.

Juan Vivas (34:28):

Yeah, yeah. Definitely. I think, as an engineer, you know, going to SpaceX and working at SpaceX, it's essentially—personally, I believe right now in the US it's like the mecca of engineering, right? Like, it is where engineering in this most, you know, shape and manner, it's being applied. I think what's really interesting is that the way that Elon looks at it is just iterate, and iterate fast, right? Like, fail and fail fast. I think as an engineer, you always want to have things perfect, right? And so you spend a lot of time in making a decision or investigating something or whatever. And working at SpaceX is the complete opposite. It's just you know, "Assume, state your assumptions—like, what are you assuming right now? What are the risk at it? And just make a decision and then see what the result is." You know, so it's an environment where you learn, really quick.

Eric Cross (35:28):

You said something that I think was powerful and I hope, I think <laugh>, this is definitely, I'm gonna get a clip of this <laugh> of you saying it. Because it speaks directly to, I think, what a lot of students struggle with in the classroom, is there's this competition or feeling that you always need to be right. And you need to be right the first try, on the first time. And a lot of times it's because students will compare themselves to each other, or there's a tremendous amount of pressure to be successful. But you said, "Fail and fail fast, iterate, state your assumptions." And it sounds like this critical part of being an engineer or in what you do, like there's no room for ego or attaching your identity or your sense of value or worth or ability to whether you're able to solve a problem in the first try.

Juan Vivas (36:13):

Yep.

Eric Cross (36:14):

Like, you have to be OK with the cycle, is kind of what I'm hearing from you. Is that, is that right?

Juan Vivas (36:19):

Yep. Exactly. It only took six months to develop the product from scratch and launch it to the public, which is insane. Nowhere in the world will any company ever iterate that fast and come up with a brand-new project. But it's because of that mentality—like you're saying, it's not about like just trying to make it perfect and have all this information. And I think Elon has learned this personally, you know, through Tesla and the beginning of SpaceX. It's, "I can wait to have all this information, and most likely I'm still gonna be wrong after I make the decision." So it's, "Might as well take the risk, do the decision, and then just see where you learn from it, right?" And then you keep applying that, applying that. So it's like you iterate, iterate, iterate, iterate until you get what you want.

Eric Cross (37:00):

I think this is even, like, great advice. I'm taking this personally because I get paralysis by analysis <laugh>.

Juan Vivas (37:06):

Yep.

Eric Cross (37:07):

You know, I'll research something to death but then not actually execute. Like, I need to make a decision and do it and then course-correct along the way. Somebody once told me it's a lot easier to turn a moving car than it is a car that's sitting still. And so as you're kind of flowing, you're just making these adjustments along the way until you end up on the path that you want to be. So I think that there's so many gems in the things that you're saying right now. What I'm thinking through the lens of my seventh graders that want to work in any STEM field—I mean, really, any field in general, but especially engineering, especially the STEM fields—knowing that, pick it, make a decision, move forward, and then course-correct along the way. That's what science looks like in the real world.

Juan Vivas (37:49):

Yep. Exactly. Yep. And definitely most important—and I feel like this is sometimes where, not necessarily education in general, but it's just, we want students to, "OK, you need to get it right the perfect time, right?" But it's like, every student is gonna think differently. A student is gonna take a different assumption based on their background and experiences. And I mean, you know, we can go a lot deeper in that, but the way a student is shaped, they're gonna take certain assumptions. So that's where it gets interesting. OK, why are you assuming that? Where's your thought process in this?

Eric Cross (38:25):

And we all come from different backgrounds and mindsets and filters and biases that cause us to look at something a certain way. And it's not just like calling it out, just going, "Hey look, this is what it is." Like

autopsy without blame, this is what I'm working with. Let's discuss it openly. Right? And if we started that process earlier, you know, younger, in classrooms, we can de-stigmatize the right answer being the best answer more, as opposed to focusing on process as opposed to outcome. And then you kinda get used to wanting to go through the process. I look at it like video games and I talk to my students. I say, "You know, you don't pick up a video game that's brand-new and then play it and then you die once and you're 'Ah, I'm never gonna play this game again.' You know, it just doesn't work that way. You're going through this iterative process, and no matter what you play, you're trying things differently. You're data collecting. And then you're making new decisions based on the data that you collected." And for some of my kids, they'll just raise their hands, say, "No, I just get mad and throw the controller across the room." <Laugh> But I go, "Yeah, and then you'll try it again."

Juan Vivas (39:33):

The best way to know how not to do something is to fail. And so you already...I mean, what is that famous quote? I think that's why Thomas Edison's, "Oh, I, did not fail 99 times. Right? I only found 99 times..." I mean, that is that is true. And I feel like at work in a SpaceX, that is something that probably the core of it comes from there. It's you know, any failure, quote unquote, that you may take it as a failure, it's really not. You're just "OK, we, we tried that. It didn't work. Like what are we gonna do next?" So it's just like taking that learning and like moving off with it quickly.

Eric Cross (40:09):

I heard a couple of teachers say, "Things fail: First Attempt In Learning: F A I L." And then another teacher, one of my mentor teachers, she said, "There's no such thing as failure, just data, in science."

Juan Vivas (40:20):

Mm-hmm. <affirmative>. Exactly. Yep.

Eric Cross (40:23):

And so I've always taken that to heart. And I share that with my own students, just, "A 'no,' a lot of times, will tell you more information than a 'yes.'" 'Cause if something works in the first try, you may not exactly know why it worked. It just did.

Juan Vivas (40:34):

Yeah. Yep.

Eric Cross (40:37):

So yeah. Well, I went on your time, brother. Dude. <laugh>. The time flew. It was...

Juan Vivas (40:46):

Yeah.

Eric Cross (40:47):

There were so many things I was trying to write out as you were talking, that I just felt like, "This guy is sharing so many gems!" But yeah, I want to thank you for taking time outta your day and for sharing that information for your passion for what you do. And, I don't know, I think that students and teachers that listen to this will get an insight from a perspective that really matters. 'Cause ultimately we're, we're trying to really prepare our students for real life. Maybe I'll email you privately if I order a Tesla, if you can move me higher up the Cybertruck line. <laugh>

Juan Vivas (41:22):

Yeah. No promises.

Eric Cross (41:24):

<laugh>

Juan Vivas (41:25):

Yeah. No, I appreciate you guys having me, having me here, and be able to speak on my experience. And hopefully it sparks a couple, one, even if it's just one teacher that will spark another student, that is already success there. So.

Eric Cross (41:42):

Well I know, I know what you said resonates with me and it fills my cup. And I'm excited. So I'm already thinking of some ideas of things that I can do, just because of this conversation, and I know other people will as well. And, again, this is Juan Vivas, who's a supply development engineer at SpaceX. He's worked at some amazing places. And someone who believes deeply in not only the power of the technical skills, but the heart skills, and how community makes a huge impact in his life. It made a huge impact in him ultimately becoming a scientist, and now working on a project at SpaceX, Starlink, that is going to provide access to the world, to the web. And that'll ultimately help us solve more problems and innovate and create some solutions that will benefit everybody. Thank you, sir. Appreciate you.

Juan Vivas (42:30):

Yeah, thank you. Thank you so much, Eric. Appreciate it.