

[SLICE OF MIT THEME MUSIC]

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SUZANNE FREY: No is a very, very important word. Using it selectively is essential. And obviously we all know. We've all been in situations where no was powerful and essential. But no does little to advance innovation. It does little to say, I can do this, to be a change maker, an impact maker. In fact, no basically almost always gets you nowhere.

HOST: That piece of advice was from Suzanne Frey, a 2006 graduate of the MIT Sloan Fellows MBA program who spoke at the MIT Women's unConference. The conference took place on MIT'S campus in March, bringing together hundreds of women in the MIT community. 350 alumni and students registered for the event from 29 states, six countries, and 31 courses, spanning seven decades. At the event, attendees made meaningful connections, shared stories, and heard inspirational talks from fellow alumni, like Suzanne.

During this podcast, you'll hear three lightning talks given by MIT alumni at the Women's unConference, all with valuable nuggets of advice and thoughtful stories on topics like how to build a supercomputer out of a PlayStation 3, and how storage at Google is like *Tetris*. Up first, we return to Suzanne Frey. Let's hear how a project at Google taught her the power of saying yes.

SUZANNE FREY: I'm here to talk about two simple words that we take for granted. In fact, they're two of the first words we learn to say. We first learned to say no. And there's evolutionary reasons for why we first learn to say no in our lives. And then we learn to say yes, no and yes.

And about 22 years ago, I attended a career panel, seeking advice from the elders. And unfortunately, I can't give credit to this individual, but I'm riffing off her today. She was asked, what made a difference in your career? And her answer was simple. She said, I simply said yes. I said yes when others said no. And that has resonated with me throughout my career.

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innovation. It does little to say, I can do this, to be a change maker, an impact maker. In fact, no basically almost always gets you nowhere.

So I'm going to talk about a situation. I'm going to geek out a little bit, riff off some further hardware themes here at Google and talk about a situation at Google where I said yes and everyone else was saying no and talk a little bit about what that experience was like. So is everybody familiar with the game *Tetris*? I might be dating myself a little bit, but OK, lots of different shapes, all made of four squares, Ls, long lines, squares, Zs.

Infrastructure at Google and doing it right is a lot like playing the game of *Tetris*. Take two of our products, Google Search and YouTube. From an infrastructure perspective, these are dramatically different products. Search is very CPU-intensive. It's always out there crawling the index, needs to be fresh, auto complete when you type, CPU-intensive, obviously some network involved.

YouTube, on the other hand, is very storage-intensive and very network bandwidth-intensive. And certainly there's CPU involved with it, but not nearly to the degree of Search. Now, what does this mean?

This means that, actually, in our infrastructure at any given time, we're getting very, very heterogeneous infrastructure needs. And they all drop into that infrastructure in a wide variety of ways. And if you don't play *Tetris* right, you end up with a lot of stranded resource.

So Search has got something like 40,000 queries per second going on right now. YouTube has 400 hours every single minute uploaded. You take that, you take that times all of our other products and you get, again, a very, very diverse footprint. And at the base of that footprint is this big bottleneck called power. And we actually have to plan power years and years and years in advance. We build our own servers, source all of our own network. And if we don't do that right and we don't plan in advance correctly, we end up, again, not being able to serve our very mission of the company.

So what was my charter? My charter was to go away from the loudest and biggest whims in terms of who gets what infrastructure at Google. And it was a grand operations research, quantitative analytics problem to say, how do we go about giving software engineers the right tools to build the right software in the most optimal way? And how do we democratize infrastructure, access such that other great ideas that Google can flourish?

Now, take an example like Google Play. When I started this project, Google Play was just this fledgling product. It's not one of our largest. Google Cloud was just emerging, again, very fledgling, but they were competing against Search and YouTube and others to try to get infrastructure and to plan their future and to build a low-cost, highly effective infrastructure.

What was behind all of this was a grand power dynamic. You know, there were two great giants, three great giants, at the time at Google; YouTube, Search, and Ads. They all believed they had a right to this infrastructure. And by my coming in and saying, actually, we want to democratize this, make it fair for everybody and actually give you tools, and you have to plan in advance so that you can play *Tetris* in the best way for you, but we can all play *Tetris* together well, well, let me just say that there were some very, very interesting dynamics that I had to tackle. It was a different way of thinking. And I was running and saying yes.

And for three years I was like, we can do this. But that tenacity involved with actually continuing to do that day in and day out when you had some very powerful people saying, I think this is a bad idea, well, I definitely grew some strength during that time. And I'm proud to say today, right, that we are able to now launch new products and do so effectively largely because we've given software engineers, each and every IC at the company, the tools and powers to say, build the thing you need to build and build it efficiently so that we can all play well together.

So I said yes. And that's one of the many, many, many examples. And I stuck with it. And I stuck with it for my team. And they're all doing really well today, and I'm really happy for them. But I want to say, don't be afraid to say yes. It's one of the most important words you will use in your career. And thank you all very much.

HOST:

Next up is Catherine Crawford, a mechanical engineer graduate from the class of 1991. Catherine describes her house as the nerdiest house on the planet. She works in AI and machine learning at IBM, and her husband is a roboticist, so they have robots all over their house. Hear her advice on being able to pivot when your industry changes.

**CATHERINE
CRAWFORD:**

So I was part of the team that built the first petaflop computer in the world. I had to write most of the software. I had to do a lot of the design. It was an amazing experience.

I got to meet senators. I got to be in the congressional record for these accomplishments. It was equivalent to the four-minute mile being run. People thought this was an amazing, amazing experiment. We did it. It was in the national news. I got to be on the TV. It was great.

However, someone in IBM-- not me-- decided this is not our business. So after having all these technical accomplishments-- I was the coolest mom on the block at that point because we built a supercomputer out of PS3s. So I had PS3s all in my basement. Kids loved it.

But I loved it because it was just so much fun. It was the most collaborative experience I had ever had in my life. We were working with national labs. We were working with IBM product development, IBM researchers. I just learned a lot about how to deal with people. It was amazing, but it got canceled.

So I had to sit back and say, well, do I leave, right? Because that's always an option for you. If you really want to pursue your dreams and your company doesn't, get out. So I could leave, or I could stay and say, maybe I want to try something different. Because, at that time, I still had younger kids. And IBM research, by the way-- nice plug here-- it's a great place for moms. So I said, I'll stay and I'll decide something else to do.

So then what do I want to do? I have this expertise in embedded systems and algorithms and things like that. And I found a project that was about building a high-speed networking card to do very, very fast analysis on security, on just using very, very low latency processing, all those kinds of things. That was phenomenal, because the first time in my life I got introduced to this thing called the FPGA. So all you core six people out there know what I'm talking about. And I learned to do hardware simulation, which was, for me, totally amazing, cool.

Now, you may be say, wait a minute. You're an algorithm person and you really were software. Why did you get involved in hardware? Because if you think of it, I was actually taking a step down, right? I was now the low person on the totem pole.

But I looked at it as a way to continue to develop skills, right? And I also wanted to just understand, soup to nuts, the way building a product works. So I went in. We had, once again, Best Paper awards for all of our hardware simulation, all these kinds of things.

We built a global team. We were working across Germany, China, all over. We won internal research awards, everything like that. The sad truth is this chip never made it out of our fabs. So after years of working on this, Best Paper awards, all those things, it's killed.

So again, you have to make the decision. If I really want to go work on network processing, high-speed things, low power embedded systems, I can leave the company, or I can stay and

find a way to do it, or move on to something else.

I ended up applying for my own funding internally, and I got money to work on something called the low power storage node. So I worked with a partner, Freescale. They're now NXP. So again, I had to learn how to reach outside, build my network, all those kinds of things. And we built a very, very high-speed user space network card for almost no cost on the IBM site.

Again, we won the HPEC IEEE Best Paper award. People were amazed at everything we did. I actually helped, through this project, build the research lab for IBM in Krakow, Poland, so I got a lot of travel to that part of the world. That was kind of fun. But I ran out of money. In 2015, I did a big corporate presentation about how we could make money there, and IBM killed the project.

So around this time, you're saying, why the heck are you still on IBM? You've done three projects that have won awards. You're in the congressional record. You know, you're now a distinguished engineer, which, by the way, the common language now is I'm an IC. So I do my own thing. But why are you still there?

And what I did was I took this as an opportunity to step back for a minute, look at my kids, look at where everything was going in my life, and look at also what was happening around us. And I said, you know, now's the time, because I'm an IC and I did work hard technically to give to this point, where I think I'm going to work on problems that really impact people, that I've decided that maybe my place is not to just make money for IBM, because I guess IBM doesn't think that either. But I do have a lot of cool people to work with who are smarter than me, who energize me, things like that. So I'm going to work on problems for social good.

So my background is all in algorithms. I did simulations of dynamical systems in Monte Carlo and all different kinds of things. And what I said was, I'm going to go learn machine learning, and I'm going to go find problems for machine learning that other people who want to make money off machine learning, like driverless cars and voice recognition and things like that-- I'm going to go apply that to problems that have to relate to social good.

Just an example of that, one of the projects I work on now-- actually, I am blessed to continue to have deep relationships here at MIT. So I work with David Newman and Leia Stirling on problems around human activity recognition and urban safety. And what we're trying to do is say, how can we use Android phones to basically track human activity and understand if someone is under duress, so a problem that is near and dear to my heart?

Like I said, I do have a Penngineer right now on an urban campus. I want to know if I can use her phone and all the accelerometer data under there to understand when she's impaired, for instance, going out with someone to a bar and when she needs help and may not be able to make the right decisions. That's kind of the problem that I'm addressing right now.

So people always say, how would you summarize your career? And I'm like, oh, god. Well, it's been back and forth and weaving and bobbing and all those things. So first thing people say, have you found your landing spot?

Where I am right now, I think I found my landing spot, that I'm going to work on social good problems. If I had to come up with my dream job, I kind of have right now. So I'm writing software for societal impact, but I also spend quite a bit of time hacking around on robots, and that's a lot of fun, too.

HOST:

As a double major in engineering and computer science and management, Bel Pesce, class of 2010, thought her future would revolve around great technological advances. But it was something else that ended up giving her fame in her home country of Brazil. That's coming up after this short break.

This podcast is produced in conjunction with the MIT Alumni Advisors Hub, the one-stop shop for getting advice from MIT alumni about anything from what to do with your major to how to prepare for a job interview. The platform has almost 2,000 alumni registered, all willing to give their time to either students or their fellow alums to give advice on things they wish they knew as students or as they began their careers. Visit alumniadvisors.mit.edu and sign up for the Advisers Hub today to give or get advice.

Before the break, I mentioned Bel Pesce, class of 2010, and her talk about something unexpected that made her famous in Brazil. Let's hear what happened.

BEL PESCE:

Since I was a little kid, like many of you, I was in love with technology. And I thought that my whole journey would have been based in technology. I made it into MIT, I looked for internships like Google and Microsoft while I was in school, but I was also one of the crazy ones who are, of course, trying to break records and take in many lessons, so I was all over the place.

Every semester I tried to take one more class. The last semester, I took 13 classes. So you

can imagine I was a crazy one, hundreds of units in the same one. But even though I was doing really, really well in technology, since I was all over the place, I got to experience other things as well.

So in my course 15 lessons, I was doing some of these exercises that you had to write articles or write papers about your experiences. So my experiences at Microsoft, Google became papers here. And it was interesting because people really liked those papers. They were telling me that I was really good at that, that somehow they were reading those papers and they liked what I talked about.

But for me, this was nothing. I had this idea that technology is right here, that's what matters. Writing communication, nah, that doesn't really matter. I'm the good one. I'm the technology person.

And why am I bringing this story to you today? Because all of us have preconceptions on what is truly success. And I want to go through what truly happened to my journey after that.

While in college, I loved MIT and I found out that my main worth in life was not even an engineer. It wasn't entrepreneurship. I didn't know what that was when I was a kid, but all my passion for building things or for creating things was, yes, engineer love but also entrepreneur love. I moved to Silicon Valley after I graduated. I was having these great experiences there. And I was always in love with doing experiments.

2011, the app store came in, social media was growing, and, like always, I was trying to do some experiments around it. One of the things I decided to do, and I thought this would be my way of trying new technology, not really to be a communicator, I decided to write an ebook, a free ebook on things I learned in Silicon Valley and how that potentially could be good to people in my country. I'm from Brazil.

So I was living in Silicon Valley. I wrote that in Portuguese, very neatly done. I did it with a lot of passion and a lot of love, 200 pages, all free, and I launched in Brazil. For my surprise, even though I had done a good job, I thought maybe a couple hundred, a couple thousand people would read it. So this book goes viral, right, one million downloads, two million downloads, three million downloads. And I'm like, oh, my god. I'm a writer.

And these crazy things are starting to happen. I land in Brazil. Everyone knows me. I can't walk on the streets. I'm like, I'm an engineer. What's happening? So every single crazy thing

that may happen to someone who becomes famous became.

So I turned into one of the 100 most influential people in my country at age 24. And the crazy thing is no one knew even that I went to MIT. You know, the things that I was most proud of, the things I thought that defined me suddenly weren't necessarily the things that were making me touch lives.

And I was the biggest critic to my own work because I had prejudice against it. Come on, I'm a great coder. I've been coding since I'm 10. And a book is what's touching people's lives?

So I went a bit nuts. But then I realized that there is this one skill that I knew how to do. And this was present while I was here. And I call it reality translation. It's the ability to be able to get something you're part of. Because we're all part of bubbles, right? But if somehow you can get that experience that is so unique to you and share to other people in the sense that they can learn from that, even though they didn't pass through that, but make them act around it, that's a very valuable skill.

So I got convinced that that was a very, very good skill. I moved back to my country five years ago and I opened a school called FazINOVA. And that was my second big surprise. I thought that my readers were 18 to 22-year-old kids, people that were just like me. They were a couple of years younger than me and were looking for inspiration from me, because I was much older than them, two years older.

But for my surprise, it wasn't this. Most of my public were 35 to 50-year-olds who are very successful but they are humble enough to realize that the world is changing really fast and they don't want to fall behind. That's a super cool public, by the way. They're open-minded. They have great experiences. They are willing to learn from each other.

And then I decided to go on an expedition to understand, what are the things that most need reality translation? If we need to translate reality and that can help people understand challenges, what can we do? So over the past five years, through my work, I ended up going to over 50 countries. My clients go from small companies to large companies that realize that they're close to dying, even though they used to be the biggest ones 50 years ago, to people who are high executives and suddenly now they want to become artists-- so we have these amazing people that, for 50 years, were executives and now they want to be singers-- and even governments.

And through that, I became obsessed with trying to well-define problems and trying to solve problems. And I realized that the one word that is key to this, and we don't talk a lot about it, is empathy. So we talk a lot about leadership, a lot about innovation, a lot about collaboration. But if you look at the world through an empathetic point of view, if you observe the world from an empathetic point of view, you become a better innovator. If you talk to people, if you communicate, if you listen to other people through empathetic lenses, you become better collaborators. And if you act and look at other people's actions through empathetic lenses you become a better leader.

So we realize that empathy was the key to solving many things. But empathy is really hard. Empathy is really hard. So what can we do? And why did I decide to bring this to you today?

All of us have our own preconceptions on what is success, on things that we believe people should be doing. And being with your kids or with your employees or with your colleagues, you have expectations on people. The world is changing really fast. And some of the biggest challenges we have there, from big polarization on social media to refugee crisis, if we don't take upon ourselves to, one, try to translate our reality to other people in a way that they can understand a little better, and if we don't take upon ourselves to try to understand other people's reality without prejudice and without judging, without knowing, the world's going to get even worse.

We're in the world right now, and social media is doing a lot to us in which we're only fed things that retrofeed the things we already believe we're right about. And that's not easy. I realize that maybe the biggest key you can have in your hand is empathy. And it's not easy.

So let's try to start with translating reality, which is a little easier than empathy. And I hope that that can be a good tool for you to see the world through different eyes, understand how things are changing fast, and allow people to create their own journeys and their own successes, not necessarily being judged by your expectations.

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HOST:

We hope you enjoyed the advice of these alumni, just three of the amazing speakers at the MIT Women's unConference. We'd love to hear from you. Tweet us your thoughts on this episode to @mit_alumni. Thanks to Suzanne, Catherine and Bel for sharing their words of wisdom.

Don't forget to check out the MIT Alumni Advisors Hub at alumniadvisors.mit.edu. If you want to hear more surprising, insightful, and quirky stories from the MIT community, subscribe to the Slice of MIT Podcast on iTunes. Let us know what you think. Please rate the podcast and leave us a review. Also, check out our website at slice.mit.edu. Thanks for listening.

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