Something Extra EP 055 – Nalini Polavarapu

Lisa Nichols: I'm thrilled to have Nalini Polavarapu on the show today, Nalini is the enterprise data science strategy lead for Bayer. I am so excited to have you with me today. We've been trying to make this happen now for several months and both of our schedules have been so crazy, but the very first time I met you, Jim Swanson had introduced me to you and the very first time I met you, I thought Wow, I've got to get you on our show because you've just got such a great and interesting background.

Nalini Polavarapu: It's a pleasure to be here, Lisa, excited to be here and talk to you about the AI and all the new technologies

Nichols: Absolutely. Well, I just know that our listeners are going to really enjoy this episode. So, let's just jump right in because we've got more to talk about then we probably have the time to do today, but I want to just talk a little bit about how you grew up.

Polavarapu: I grew up in India, my father is a farmer, my mother is a housewife, multigenerational household. Parents, grandparents, and I had a normal happy childhood. No big expectations, no big aspirations. My parents gave me the freedom to do what I wanted to do. I was just going through the school and that's pretty much I remember. But farming was a big part of our family and it's very much integrated into the lives that we had, and it was kind of a day-to-day business on taking care of the farming and taking care of the community as a result of being farming's because it's very much integrated in the community.

Nichols: So did you grow up having the milk cows or was it crops that your dad was growing?

Polavarapu: Not really, as much as I grew up in a family where farming was the main thing. We had so much help in their house, so I was lucky that I didn't have to do much work at the house at all, many of the things we're taking care of, and for me it's more of just going to school, coming back, having fun with friends. So that might be one thing that I would say it's different. Growing up in my family was as the perception that people have with other farming households also we are lucky that my ancestors come from an area where it's primarily progress of farmers, the farmers are very hard working, and very progressive. As a result of that departments were

able to provide a certain standard of living for their families. So I'm lucky to be coming from such a background.

Nichols: So you went to school in India and then you decided that you wanted to come to the States and there was a reason why you wanted to come to the States and there was a university that you had chosen. So what got you interested in that?

Polavarapu: I finished my undergrad and I was looking for coming to us to do graduate school and this was around 2001. Human genome was sequenced in 2000, so there was a lot of buzz about there is Human genome by now if we apply technology to it we can solve very much, many of the health problems that humans were facing and so there was this emerging filed by informatics, and it showed a lot of promise. I always had an interest for computer science and mathematics so I was looking for an area where I could integrate computer science, mathematics, to life sciences and bioinformatics, was really attractive, as I was looking for schools, which offered by bioinformatics degree during that time, not many did and Georgia Tech was one of those premier universities, which offered that because of its reputation, in computer science and engineering and mathematics.
That's the right University, to go applied. Got in there. That is so fortunate that I got in there. Now if I look back, I think, "Oh what were they're thinking to get me in there when I went to the university, I was totally blown away the amount of intellectual capital that was there and how good the people were it's unbelievable, and I was nowhere close to that. My job was just to learn and develop myself, so I took on any opportunity of many opportunities that were coming along the way, took many classes and build myself in the foundational skills of math, computer science, and engineering.

As this was going in the first year of my grad school, I got introduced to AI... I had no idea about AI, anything before that through another student of mine, I got introduced into it and I got put on a project to work with AI to help with the CDC, Center for Disease Control in Atlanta to help them with the epidemiological research. When I go into, when I was on that project, something intuitively came to me that this is... I was drawn to AI is what I would say, and I could see the potential of what it can do. So, worked on that project along the same realized that I need to build more foundational skills. So I took some classes along that way and in my grad school, my professor was primarily working on cancer research, so there was micro-era technology was also new during that time. And what micro-era technology did was providing large data, same with the human genome. So we were looking for how do you analyze all the data and then how

do you combine that with the genetic information? And there is no way you could do it one-by-one. You have to leverage big data technologies, which was one of those was AI.

So, everything came together and since from the first year I got to work on projects related to analyzing large data sets to draw insights from them, ultimately at the end, impacting people's lives. That's pretty much how my grad school was spent as I was graduating. I got introduced to Monsanto. I have to tell a story there too. So as I said, I was primarily focusing on AI and also doing more work in humans and cancer. My thesis was a human chimpanzee genome comparisons, and I had other projects in cancer research so I was thinking maybe I'll go to technological companies, like Google or Amazon or go to pharma industry and I wasn't that much thinking about AG. And usually, Monsanto does not usually come to Georgia Tech because we are way in the South and this is a mid-west company, but there were a couple of years where they came to Georgia tech affair because there was one individual in the HR who was working remotely in that area, so she took advantage of that and came over. I got connected with her, and I was fascinated with the opportunities they were talking about working at the interface of the engineer, scientist, and computer scientist and that really fascinated me and which made me take on the job that I took.

Nichols: Right, and it's kind of funny to me because you kinda came full circle, right? Monsanto, Bayer serves the farmer yeah right, yeah, yeah, yeah.

Polavarapu: That's how it feels like AG background growing up then, totally moved away from it and went to engineering, computer science and more in humans then to get job in Ag applying those skills that I learned in grad school. And now, we Bayer everything coming together.

Nichols: What a story. And so, you ended up getting two master's degrees, right and then you went on to get your PhD in bioinformatics systems.

Polavarapu: As I said, Lisa, when I went to school, I felt like I didn't have anything and everyone was so smarter than me, so I needed to develop myself. And one of that is taking classes and educating myself because I took those classes that led to those degrees that you're talking about.

Nichols: Well, clearly Georgia Tech saw something in you even if you didn't see it in yourself, they saw it in you because they don't take just everyone, right? I know they are a top school for technology. So you talked about Monsanto so you ended up coming to Monsanto upon

graduation, and I want you to talk about, I know you've done, you've had many roles at Monsanto but the one that I really want you to focus on is you were one of the very first, if not the first data scientist at Monsanto and help build that whole group there, and I know the predictive analytics and data science has been radically transformed. They're a different company than they were when you started to talk a little bit about that journey building that team or helping build that team. And what was it like for you as a woman? I'm not sure how many women were in that group, but talk a little bit about that journey, if you would.

Polavarapu: Yeah, definitely not many women at all. So this was back in 2007. as I graduated, I got connected with Monsanto and took it all there initially during the conversation, it felt like a role which is the interface of all these different disciplines but a couple of months into the role, I realized that I could do more and we could really do something with data science, that AI... So I went to my boss until he is there away that we could make it more research-oriented, and come up with the role that can have a bigger impact. My boss and his boss they heard about AI. But when in to really show what AI can be doing for the company, they were in that experimental phase and then when they learned that I had a background in that they asked me. Can we test here to see if there is any applicability that we have at Monsanto?

So we started with an experimental project, and that was quite successful and that gave us reasons to believe that there is applicability here. So then the second project, we moved on is to change the way the advance our products in our pipeline. That was the second experiment, and I worked on that too, and we were getting promising results, and very soon we realized that we need to build a team, because this is going to grow big. So I was in charge of hiding the team as well and hiring that time. We were not known in the industry and they were not that many data scientists out there too, and those data scientists were looking for the Amazon, Netflix, Google, for the potential opportunities, so we really had to work through to grab the attention of these good engineers, a good scientist, and we took a totally unconventional approach. Usually when you hire people into Monsanto to do some kind of research work, you hire people with the life sciences background. We took an unconventional approach of bringing in electrical engineers and mathematicians because we thought those are the people who can build a sophisticated algorithms, and at the same time we can train them in the life sciences discipline.

It was hard to hire people but also I would say when things are hard and when you work on it, it has a lot of opportunities in there... So really the initial people that we hired now, if I look at them, they are excellent and they are doing amazing things in their careers leading teams, either at Monsanto or other companies. So fast forward in five years, we build a team, we were

able to show that innovations have quite a bit of promise and have the ability to transform their product development pipeline at the same time, we encountered quite a bit of cultural resistance because the product that we were working on is, how do we enable better decision making in order research pipeline and research pipeline was a very sacred for Monsanto and it's a bread and butter and the pipeline is being managed by really strong scientists and breeders massive experience, super smart, and they really no one cared for what they are doing. Many times the experiences were 20-30 years and they have delivered quite a number of good products for the company. So there is huge experience and huge knowledge there.
Many of us were in the initial stages of the careers we did not have life sciences background, we were coming with the technical background, and we were telling that we could build algorithms that can help with better decision-making. And because AI was not known outside during that time, what it can do for the outside world, it was seen as a threat and many times it was seen as human versus AI. Elimination of jobs. So then it was first these algorithms any good second are these algorithms going to come and now eliminate my job? And so that was a huge push back that we received and we had to work quite a bit through that. It's not the algorithms that will replace the humans, its algorithms are there to assist the humans, it's human plus AI. And the second aspect of that is these algorithms are not working on their own or we are not just spelling the algorithms, it's the partnership and the scientists are the people who are giving the knowledge that goes into the algorithms, at the end of the day, it's their algorithms and these algorithms are there to help them perform better.

Nichols: Well, I want to dive more into that because I can only imagine how difficult that was, but I want to dive into that.

AD: We're going to take a quick break and then we'll be right back with Nalini.

Nichols: Nalini, welcome back. There may be people in our audience that say this all sounds so fascinating. I'm really interested in this, but I don't really understand what is a data scientist, and what data scientists do? What's a day in the life like for a data scientist can you talk a little bit about that?

Polavarapu: Definitely, data science is a combination of 4 disciplines I would say. Usually you see 3 in the in the web but I will add one more to it. So it's a combination of strong computer science skills strong mathematical skills. There is domain in that, which is very important and which is often ignored that is really the third leg. And the fourth one is leadership, leadership, collaboration, how do you work in teams? That's an important 4th component and adding one

thing to that leadership, it's more of taking initiative and having that entrepreneurial skills. It's a combination of all those for that makes the true data scientist.

Many people think that they have strong math or computer science background, and they tend to ignore the other two aspects of the domain or leadership, there is only so much you could do for them. At the end of the day, it's how you're applying the technology to a business problem enhancing that business decision and generating impact. That is where it comes and you need a lot of leadership and initiative because many people do not know what data science can do for them, they're still in that learning mode. So you have to have enough of that entrepreneurial spirit to be able to see new ideas and also the influencer skills to be able to bring people along the journey.

Nichols: And what I'm thinking, as you're talking is, that domain knowledge is so important, to understand the business. I don't think people in technology today can just be people that are coding right the business acumen and understand what exactly is it that we do and why do we do that? And then you look at the challenges and then say how can technology help solve this challenge that we have, right, yeah, it's really what it is. Yeah, so never before have we gathered so much data? Yes, but data that is just sitting there is of no use, right? It's like how do you use that data to learn better insights

Polavarapu: Business acumen and leadership are two critical components of becoming a really good data scientist or data science leader.

Nichols: So I'm thinking, Bayer Crop Science. The customer is the farmer. Okay, so how has this really practically applied at Bayer now with what you're doing with predictive analytics and that sort of thing,

Polavarapu: We use predictive analytics and data science in 2 ways at Bayer. We have internal customers where we are trying to transform an operations transform how the way we do product development, that's one aspect of it. Transforming the code of our business. So our customers are more of the internal employees and we have external customers, which are farmers. And in terms of farmers, the main application of predictive analytics is providing them advisory services, you might have heard about or seed advisor. We are looking for how do we provide better disease adviser or irrigation adviser. So at the end of the day the farmer is looking for how can he increase the revenue of his farm or increased the profits.

So the more we can help them by having a good understanding of the seed the farmer is going to put on the field, provide recommendations and of the seed that the farmer needs to put on the form by having the knowledge of the soil characteristics by having the knowledge of the weather information and looking at what are the management practices that he can go through bringing all that together analyzing it and providing a good recommendation on what seed to plant what density to plan when to plant how to manage that seed, how to harvest that seed to maximize the returns, those are all the things where predictive analytics come in play in enhancing the 40 plus the so-called decisions that department make during a season to enhance all those decisions that they are making.

Nichols: And at the end of the day, it is improving lives, your yield is so much greater when you can take all these pieces and put them together and help them manage that.

Polavarapu: It's increasing their income and improving the quality of life for their family

Nichols: I love the mission to feed the world. It's a big why.

Polavarapu: That is what drew several of us and we have almost 400 plus people in our company who are in data sciences associated. That are doing data science, data science-related work, and any of these people can go out and get jobs in any other industry, and it is the skills that they have a very transferable and I'm sure many of those people are getting called several times a week from headhunters and the reason they chose to be with us, with the company like Bayer, it's because of our mission, for improving lives, the people feed the world and our promise for the planet. The sustainability goal that we have, so at the end of the day, it's that mission that is keeping all together. Never a dull day.

Nichols: Yeah, well, I know that you are leading the women and data science at Bayer. Tell me about that, how many... How have you grown that group? How many are in that group?

Polavarapu: Data science is a new primarily from computer science and engineering, and math as such, they're few women in STEM disciplines and since data sciences, new there, a few women here as well, over all they are only 10 to 15% women in this field. And if you look at the promise that the field has it is there to improve the lives of people it is there to provide them a new way of living. That was not there before, so it's pretty much all over and all this being developed by only one segment of the population provides a challenge. You need this diversity of tar and taking input from all different kinds of people who come from all walks of life. So we

need, obviously, one of that is gender diversity, and so we need more women to come to this field and we have a women in data science Bayer. A primary goal is: how can we inspire more women to coming to this field, how can we empower them, how can we grow them and skills certain areas where they need to develop and it and how do we celebrate their successes? They are creating amazing, amazing things and amazing impact is coming from there. How do we recognize them and celebrate them. So that's the main mission for us.

Nichols: And I know you speak a lot, and so that's one of the ways, right to spread the message about how exciting this is how important this work is so that's wonderful. Well, this is called Something Extra. I really like for you to talk about what is it something extra that you see embodied in one of your current or one of your former team members?

Polavarapu: One thing that I have seen Lisa in my team or in people who went on to do big things, it's that passion. They truly believe that they're doing something extra, something back. It's passion for what they do, it's passion for improving lives and particularly the STEM field. It's passion for how do you use technology to improve lives for the better? That's the main thing many people, my team, several people who worked in other ideas they embodied this.

Nichols: Well, let me answer this is kind of a little bit... A little tangent here, but like you talk about passion, and I am so I believe that so much, you have to have passion for what you do. What kinds of things do you do when you feel like your passion may be being diminished what you do to keep that fire fueled in your gut?

Polavarapu: It does happen late time stuff that I was in situations where I didn't feel as much passionate. It's taking a step back, reminding myself of what I am there for. Then taking a quick break. I'm into yoga, so I do yoga, and I just decompress, myself and the inspiration. If you look for it, it's everywhere, I read. I read quite a bit. I watch people who have done amazing things, who have come with very little resources, but have done amazing things and just hearing their stories or looking at them brings back my passion, but... And I tell and we have to do something to.

Nichols: Is there a leadership misstep where you sell something extra missing that you can talk about a little bit?

Polavarapu: Yeah, they are quite a number of missteps and quite a number of failures. It was a fabulous 10 year journey along the way. We had quite a number of failures as you can imagine,

AI has done massive transformations in our company, but at the same time, it required quite an amount of change leadership and we have underestimated how much changed leadership that was required to move huge employees population to steer them in different directions. You have to help them in several different ways, in upgrading the skills and thinking differently in providing them resources on how they can apply in new ways, constant communication engagement. It's required quite a massive amount of bad. Many times, we underestimated and we learn from those mistakes and we changed and we adapted...

Nichols: I say even those things that you go through like that, those hard things, it's all part of your growth journey, right? Yeah, that's definitely a growth journey.

Polavarapu: I learned quite a bit from that and I grew quite a bit. Because of that

Nichols: And change is never easy but I know that Monsanto has done it very well. And I learned a long time ago that you guys don't really call it change management, you're saying, You're not managing people through change, you're leading them through the change, which means they're watching you do the change as well.

Polavarapu: Exactly, it's the leadership behavior, and how leaders process through it right..

Nichols: And they're watching that, yes. So what do you believe? No line is the something extra that every leader needs?

Polavarapu: Truly caring for their people. One thing that inspired me to do more than I was capable of doing my PhD adviser is a professor at Georgia Tech, John McDonald, and he was always believing in me more than I did myself, he saw a potential in me that I didn't see myself that really inspired me to do more and to stretch more. I thought that was true leadership people come to you and you are the leader. They may not be seeing what they are capable of, but it's your job to know them really wel and to identify those hidden talents, to help them see what they are and then providing them opportunities to grow in that area. That I would say every leader has to take it. If you have a title as a leader, it's your responsibility to know the person and to develop the person, to where they can grow.

Nichols: You could not have said that more beautifully. I so believe that and have heard that so many times. It's a common thread, where so many times leaders have said somebody saw

something in me that I did not see in myself, and I just love that. But there's a lot of responsibility on that leader to do that.

Polavarapu: Yes, right, it is it.

Nichols: To have their eyes open.

Polavarapu: Also to be more open and not just seeing all the faults they have or the developments they need but seeing more on where they can go.

Nichols: I love that you could not have said that more beautifully. I wanted to give you the opportunity. I know like I said you speak all the time, you're everywhere speaking but yeah, I think you may have something coming up that you might be... want to tell our listeners about, if they're in Chicago, or talk a little bit about that and how can they connect with you

Polavarapu: Yeah, I speak at conferences. And one thing that is upcoming, is I'm speaking at CDO Chicago in November, that's the chief data officer summit and I'm doing a session on leveraging AI to transform the core business and I have other speaking engagements coming in December, January, I pose those on LinkedIn. So if you want to know more information about this connect with me on LinkedIn and that's where you can get the information and happy to have the listeners on the audience of listeners can just reach out to me on LinkedIn, and ask questions and I'm happy to provide any suggestions or guidance.

Nichols: Well, thank you so much it has just been my pleasure to have you today, this has been so much fun for me and I just know our listeners are going to enjoy hearing your story. Learning a lot about data science, and what data science can do for our world. So thank you for being here.

Polavarapu: Thanks Lisa enjoy the conversation and it's always a pleasure to talk to you. You have such a good positive energy and vibe I'm always thrilled to be in your space.