

Rashmi Mohan: This is ACM Bytecast, a podcast series from the Association for Computing Machinery, the world's largest education and scientific computing society. We talk to researchers, practitioners, and innovators who are at the intersection of computing research and practice. They share their experiences, the lessons they've learned, and their visions for the future of computing. I am your host, Rashmi Mohan.

The world of artificial intelligence and machine learning is having its moment in the sun. Every organization worth its soul is finding avenues to weave the magic of AI into their way of work and grow their business. And yet, what good is artificial intelligence if it doesn't benefit the larger population? Our next guest has been answering that very question for the last 25 years. Nuria Oliver is the first Chief Scientist Advisor in Data Science at Vodafone, the Chief Data Scientist at Data-Pop Alliance and the co-founder of ELLIS, the European Laboratory for Learning and Intelligent Systems.

Her work involves building computational models of human behavior, studying human computer interactions, and using data for social good. She has over 40 patents, a slew of awards with the most recent ones being the Abie Technology Leadership Award, and the King James I Award in New Technologies. She led the team Valencia IA for COVID-19 that won the most recent XPRIZE Pandemic Response Challenge. She has the honor of being the first woman computer scientist from Spain to be named an ACM fellow, and with over 21,000 citations, is one of the most prolific female computer scientists in the country. Nuria, welcome to ACM Bytecast.

Nuria Oliver: Thank you. Pleasure to be here.

Rashmi Mohan: Entirely our honor as well. I'd love to lead with a question that I ask all my guests Nuria, if you could please introduce yourself and talk about what you currently do and give us some insight into what led you into this field of work.

Nuria Oliver: Yeah, so I'm Nuria Oliver. I'm a computer scientist. I'm an expert on artificial intelligence, and I actually wear a lot of hats right now and I do a lot of things. But what I'm investing the most time on is launching and sort of making grow a new nonprofit foundation that I've created called the Institute of Humanity Centric AI, which is the only ELLIS unit that there is in Spain. ELLIS means the European Laboratory for Learning and Intelligent Systems and is European association of scientific excellence in artificial intelligence. I also advise a lot of governments, universities, foundations, research centers, companies. I'm also involved with Data-Pop Alliance, which is an NGO devoted to the use of data and AI for social good, and I invest a fair amount of time in outreach activities to communicate both to technical and non-technical audiences, so findings in my research area which is human-centric, artificial intelligence.

In terms of what brought me to computing, since I was very, very small, I've always been fascinated by the idea of an inventor or a scientist. I love mysteries,

I love unsolved problems, I love questions that no one knows the answer for or inventions that no one thought about so I was fascinated by figures like Leonardo da Vinci or Marie Curie or Albert Einstein, but of course all these prominent scientists were dead when I was growing up so I couldn't really ask them how they got where they were and what they did so I wasn't sure what to study.

I chose the scientific technology track in high school, and when I was in my last year of high school and I had to figure out what to study in university, I had a chance to talk to one of my brother's best friends who had started telecommunications engineering in Madrid in Spain. I met with him and he told me what engineering was about. He told me what technology was for and what kind of classes he had, and I basically came back from that meeting very inspired, convinced that telecommunications engineering was where I wanted to study so that's what I did. I went to Madrid and I did a six year program, telecommunications engineering, it's like a bachelor's and master's program together, and maybe since third year, I fell in love with artificial intelligence. I discovered what artificial intelligence was and I decided that that's what I wanted to do for the rest of my life I guess.

Rashmi Mohan: That's really inspiring. I mean, I think what you bring about is so critical as well. I mean, as young students, a lot of the times we're confused about what we want to do and how do we discover these new areas and having those mentors are so critical for us to make those decisions. And like you said, it's also that process of discovery and sort of get into a field, but as you go deeper, there's one class or one teacher that really sort of inspires you and then you sort of pursue that path so it's really fascinating to hear about your journey in that manner. But your work around HCI and intelligent user interfaces, Nuria, has been prolific since then. Would you care to talk about some of the highlights that you feel across your career, I know a lot of your work now is in the nonprofit area, but in terms of your research, some highlights from your journey that you would love to share with our audience?

Nuria Oliver: Yeah, definitely. So my sort of vague idea or my aspiration since I started studying engineering was to invent technology that would help people. To invent technology that would somehow help us have a better quality of life or would help us tackle the problems, the big problems, the big challenges that we face. So I started working on computer vision which is one field with an artificial intelligence to make computers understand videos and images. And for a master's thesis, I did project on detecting cars in highways back in 1994 to have better, safer driving and more sort of accurate models of traffic and so forth.

Then I went to do my PhD at MIT and I continued working on what is called perceptual computing which is not only computer vision, but also analyzing data coming from other kinds of sensors to help computers have an understanding of what is happening around them so I worked on building smart rooms, for example, I did one of the first systems in the world to do facial expression

recognition in real time so the computers could understand our emotions, for example. I also worked on a gesture recognition system so we could interact with the computer using our own gestures, and I built a smart car, a car that was able to predict the next maneuver that drivers would do so we could have a safer driver driving.

And I also had the opportunity to work on smart clothes, which was a concept that was being defined at the time back in 1996. And basically smart clothes are clothes that have technology embedded in them and do something useful for people, the people that wear them. So in '96, we organized the first smart clothes fashion show in the world at the Media Lab and I collaborated with some design schools in the world, some of the best design schools and the designs that I worked on were a female and a male version of a system to help people who had a hearing disability, and also, they were mute, they couldn't speak, communicate with other people.

So the design had a little camera that was pointing at the hands of the person. So when the person was talking using American Sign Language, the camera would capture the hands and the outfits had a backpack where there was a computer so the computer would recognize using artificial intelligence, the signs that people were signing and would interpret where they were trying to say, and then using voice, sort of like a text to speech synthesizer, the clothes would talk for the person so there were some speakers also embedded in the designs and then you would do your gestures and then the clothes would talk for you so it would be assisted to help people communicate with people who didn't know American Sign Language.

When I finished my PhD, I moved to Microsoft Research and I continued working on this concept of building smart anything so I built a smart rooms, a number of smart offices and rooms, an office that would know what you were doing so it could help you avoid interruptions, so it would help other people know better when to call you or when to reach out to you. I also build with a colleague a system to manipulate the windows on your computer just using your gestures, something that today has become sort of commonplace. But back in the year 2000 or 2001 was really very novel.

And in 2005, I realized that if I wanted to build technology that understood us, and that helped us, probably the most personal computer even back at the time was the mobile phone. So I decided to shift my attention almost exclusively to the mobile phone, and I built some of the early works on using the phone as a computer, not as a phone. So I built a system to detect the sleep apnea, I build another system to help people achieve their exercise goals using persuasive computing.

In 2007, they offered me the opportunity to come back to Spain, I'm originally from Spain, to create and lead a research team and the entire research area of data science and AI within a very large telco in Spain, Telefonica so we took on

that challenge. We moved back to Spain from the US and since then, joining a big telecommunications company opened up an entire world of opportunity in terms of analyzing large scale human behavioral data captured by the mobile network infrastructure and using that data for social good. So one of the areas that I worked on since 2008 is how we can use this large scale human behavioral data for social good, for example, to help us better respond to natural disasters because we can understand how many people have been affected by the disaster and where they are, to help us force their financial inclusion because we can automatically infer the socioeconomic status of our region for example. To help us have safer cities, we did a system to predict crime hotspots, for example, in cities, and also to help us better respond to pandemics and infectious diseases.

So these are some of the, I guess, topics that I've worked on over the years. And as I mentioned earlier, since for the past few months, I have been the director of this new institute, and the main focus of the institute is to do scientific research on artificial intelligence for social good. I think that today more than ever, we really need to invest in intellectually free research on understanding the societal implications of artificial intelligence and on inventing and developing artificial intelligence algorithms and methods and systems that actually have people's wellbeing at the core and as the main goal for the systems as opposed to having other interests like maximizing the amount of time that we spend using the systems or maximizing the amount of money that companies make as a result of that.

Rashmi Mohan: Yeah, that's amazing. Thank you for sharing that because that's one of the things that I also gathered as I was studying your work and preparation for this conversation was the fact that you've been harnessing the power of mobile data for so many years and the applications that you've been working on have such relevance in our lives even today. And you were obviously working on these many, many years ago, but I'd love to tap into this idea that you were talking about was really, I mean, this is something that has, I think, guided your career from what I can tell which is the using of data science for social good.

Almost as if you kind of had a crystal ball when you were, I know you were talking, I mean, many of your very, very early interviews were looking at the impact of people moving and the spread of the pandemic. I know you were looking at the H1N1 outbreak way back when, and the value that you may have gotten from those studies and I was wondering if you could talk about how has it helped you respond to the COVID pandemic and help guide the governments or the organizations that you work with.

Nuria Oliver: Yeah, so there is a world movement that I belong to on leveraging these large scale data that there is to support better public policies and better decisions, decisions that impact the lives of millions of people. The idea is to move into what is called evidence driven policy making, or even evidence driven decision making. So as opposed to coming up with policies that are based on intuitions or

obsolete knowledge or political interests, to transition to a situation where those policies are actually informed by evidence and by scientific sort of results. So in this context, and having worked on the use of data analyzed using machine learning methods in the context of pandemics since 2000 and basically '09, 2010 where my team at Telefonica, we did a project on the H1N1 flu outbreak, and then with my team at Vodafone, I did a project on the Ebola outbreak that took place in DRC.

And at the time when back in February of 2020, when the COVID-19 was starting to exist and spread, actually, I was working with my former team at Vodafone on a project on modeling the spread of malaria in Mozambique, leveraging large scale mobile data. So as I saw that the pandemic was going to happen, I really felt compelled to reach out to the government in Spain and the government in the Valencian region of Spain, which is sort, so the equivalent would be the state where I'm in, Spain has a federal model like the US and we have 17 autonomous regions which would be equivalent to the states in the US, to reach out to them and offer them this idea of creating a team of scientists and experts working very closely with the policy makers so they could leverage all this knowledge and all these methods that we have today to support their decision making.

So my proposal was very well received by the presidency of the Valencian government in Spain, and immediately they said, "Yes, we think this a great idea, let's create data science for COVID-19 team that you would be leading." So they reached out to all the scientists in the region, in all the universities and centers that had any kind of background that was relevant, they organized a meeting. I explained my vision for what we could do and the different areas that we would work on, from modeling large scale human mobility to building computational epidemiological models, building predictive models of hospital occupancy and intensive care occupancy. Also, to infer the prevalence of the disease because at the time there were no tests and also reaching out to people in a very large scale citizen survey that we launch in March of 2020, and it's still active called COVID-19 Impact Survey.

So based on my description, and I guess my enthusiasm, more than 20 scientists said that they wanted to join the team, and we created this virtual team. This was March of 2020. We were in lockdown at the time, was the very beginning of the pandemic so I organized meetings every day with a team that I had never seen in person and that I had actually never worked with before, and I didn't have a chance to actually meet them in person until over a year later. We saw each other every day and we worked really well together, very intensely for many, many, many months so I wrote reports every day with predictions of the day on the number of cases, number of hospitalizations, number of deceased, number of intensive care unit occupancies, reports on relevant topics, reports on summarizing the results of the survey and I felt that we were really listened to and that our results was a result and our recommendations were really considered.

And I think one of the key elements for the success of our team is that a policymaker, the director general for public policymaking is actually a member of our team, even though she's a politician and she works for the president of the region. So having this multi-institutional, multi-disciplinary team where the policymakers are committed, active members of the team, I think is absolutely necessary. She came to every single meeting every day. She made a huge effort in understanding the results of our work, understanding what we were doing, helping us prioritize our work, providing questions for us to answer, and translating all these technical results into actionable insights that they could use to support their policy making.

Yeah, so that's the experience that we've had in the Valencia region of Spain. Because of the uniqueness of this initiative, we've received some international recognition so we've been featured in different international media like Wired or Politico or MSNBC, and we've also got some internationals of validation of our work when we participated in the XPRIZE Pandemic Response Challenge competition and we actually won it, which was really amazing.

Rashmi Mohan: Truly, truly amazing. Congratulations for that. There's so many things in your answer that struck me as so amazing. I mean, one thing is just the fact that you had the vision to actually reach out and be proactive about the help that you could provide to the government. I mean, that's a significant sort of, I would say, a factor in the success of this entire project. The fact that the government was progressive enough to be able to recognize the value that you could bring and the commitment.

Like you said, bringing that policy maker in and being an integral part of that team shows a level of commitment that you're going to use this work and use it in a meaningful way which is very encouraging I'm sure to the entire team. But what is amazing to me Nuria, is also oftentimes when we are working on a really critical project, especially as a leader of that project, you like to assemble your team because you kind of have a vision of hey, these are the skills that I need in order for me to take this vision into reality. In your case, it almost felt like somebody else assembled that team for you, how did that work and how did you make that sort be successful in the initiative that you were driving?

Nuria Oliver: Yeah, so that's a good question. I mean, everyone volunteered so there were a lot more people in this original meeting. And out of this, I don't know, maybe there were 40 people or something. So 20 plus, I don't know, 20, I don't know. I don't remember the exact number, 22, 25 decided to volunteer. I had a vision for the different work streams that we were going to have and the different sort of expertises that we were going to need so we tried to find the best match between the different people that wanted to help and wanted to volunteer, and then what we needed and what we wanted to do. To me, as much as scientifically, also societally, we have had impact. I have to say that at a personal level, it has been an extremely fulfilling, enriching, unique experience because I've really thoroughly enjoyed working with this team.

If there is something that we are proud of, is that we've worked really, really well together. We've never had a single conflict or argument or fight among anyone, and it's a pretty large team and I think one of the reasons is because we were all joined and united for a common purpose, and that purpose was really drove us to be working for so many, many month. Well, I mean for two years now on that particular topic. And we worked day and night and weekends and holidays. No one was asking anyone to do it, but we all had this really strong drive to try to help and we felt that we could help so I don't know how that happened. I think it partly is because of this common purpose that really brought a lot of meaning to everyone.

And I think also partly is because it was a refreshing experience in the sense that we didn't have any hierarchy, we didn't have any bureaucracy. Everyone could help, you didn't have to ask permission to anyone. There was no boss really so we had both from undergraduate students to full professors, we had the whole range of seniority. So it was very diverse team, and it was really a meritocracy, was a really a flat structure. It didn't matter who you were, everyone wanted to join, everyone wanted to help, we allocated tasks that needed to be done and people took on our responsibilities that they were accountable for. And because we met every day, we could actually be very dynamic in responding to new needs or new analysis. But also there was no... No one had to ask permission to anyone. No one had to fill out any forms, no one had to apply for any grant. We were just really hands on, let's do this because we can help and we feel there is nothing more important to do right now.

So I think everyone felt it was a great way of working compared to the, I guess normal way which particularly in Europe, in academia is very bureaucratic and it's very hierarchical so it's very rare to have an opportunity where you can just be free to work on whatever you want. Usually, you need to ask for funding, you need to apply for grants, you have to teach, all this hierarchy. If you are a post-doc or if you're a student, you really don't have a lot of autonomy. And I think the fact that this team was the opposite to that was very motivating to people. And the same happened with the express competition we had from students to professors all working together.

And I think it was very inspiring to everyone, including to me, because I realized that there is talent everywhere, and many times it's not a lack of talent, it's a lack of an environment that enables that talent to flourish and to grow and to realize its potential. And many times the environment doesn't allow that it's too restrictive or it's too bureaucratic or it's too hierarchical and it demotivates people. So for me, it was also very inspiring because having lived outside of Spain for a long time, realizing that there's this amazing talent anywhere that we can not only have local impact, but also win a world international competition was really a surprise, a very positive surprise that I felt it was very inspiring because I realized, "Wow, anyone can do anything if they send themselves to it."

Rashmi Mohan: What an incredibly valuable lesson you bring up Nuria, which is really about when a team gets together with a common purpose, and that purpose is really in solving a problem for the greater good, it definitely inspires us. And the fact that I think having this sort of flat structure empowers everybody to really participate in a way where they're bringing their best ideas. You're not sort of intimidated, you don't feel like there are any repercussions, and you're really all gunning for the same goal so it's really inspiring to even hear about the way you describe it.

Nuria Oliver: Thank you.

Rashmi Mohan: I would also love to know, as a result of this work, how did you all measure the efficacy of your work? What were the sort of metrics you used to constantly guide you and say, "Yes, we're moving in the right direction," or maybe, "Hey, we need to change course?"

Nuria Oliver: Well, I mean, we had daily feedback and constant feedback because we were having daily meetings. I was writing daily reports with predictions so we had this constant feedback on whether we were doing well or not and whether our analysis were being valuable or not. So it was fairly immediate, and that also gave us the opportunity to react, to do new analysis if they were needed, to adjust things. So we did have a very close interaction in a very short cycle, which was just daily, maximum daily, sometimes more than once a day. So yeah, I mean, I guess there were a few moments where maybe we felt proud of our work. One was after Christmas of 2020, 2021. So January 2021, right after Christmas. That was the third wave of infections, and that was the worst wave of infections, particularly in the Valencian region of Spain. Our model worked really, really well.

That was the model that we had developed for the XPRIZE. I was a very stressful moment where there was a lot of concern about a potential collapse of the healthcare system because the number of cases was growing exponentially, the number of hospitalizations, the number of intensive care units occupied, and there was a lot of pressure and need to have good predictions to really prepare and to really order ventilators and to really free hospital rooms and so forth. But the need to have somewhat accurate predictions to be able to prepare. And our model worked really well. I mean, at some point, I even warned the government, "Well, maybe you shouldn't put too much faith in this model because at the end of the day, it's just a model that we built," we haven't really test, I mean no one knew with this pandemic, right? The virus was also mutating.

And yeah, it worked very well, and we felt really happy and relieved that our predictions were so accurate and we could really help. Something similar happened just recently with the sixth wave, with the Omicron wave, where our model also worked really, really well. And in both cases, it predicted very accurately the day of the peak of the infection and the number of cases at the



peak of the infection. We could see how we helped. We also helped in changing the perception of the pandemic so I remember back in beginning of April of 2020, the president wanted to give a speech to tell citizens when they wouldn't be anymore cases, when somehow the pandemic would be over. And we told them that that was not possible to tell that the virus was going to continue to exist and the virus was going to continue to infect people. And moreover, that we hadn't reached herd immunity and that with very high likelihood there was going to be a second wave of infections.

And he listened to us and he never said anything related to, "Oh, we've defeated the virus," or, "This is over," when the first wave of infections finished. So I felt happy to have been able to bring maybe a little bit more realism to the speech and the discourse. And then finally, probably the longest lasting impact has been on the digital transformation that the public administrations and the governments need to undergo, but they hadn't undergone yet before the pandemic. And I think our experience and seeing the value of being a data driven organization and a digital organization has really inspired the government into transforming itself and even thinking of creating a data science unit within the government so they can have more evidence driven policy making as the status quo, as the normal way of operating and working.

So to me, having contributed to this, I guess, long term lasting impact of changing the way that the government works is probably one of the, I guess, most impressive outcomes from my perspective, because most large companies had already undergone many, many years ago this digital transformation, but many governments hadn't, and I think we've paid the price with this pandemic in terms of the lack of data, it's been a complete chaos in many cases. And I think seeing the value through our project has really inspired them into realizing that they need to become more detailed and they need to become more data driven.

Rashmi Mohan: Yeah, no, absolutely. I'm sure that that must be an incredibly rewarding sort of outcome simply because you demonstrated the value of actually being digital first. And to see that change happen as a part of the government, as a part of the region that you're in the country is very inspiring, and that's incredibly impactful work so amazing to hear about that.

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Nuria, I wanted to talk a little bit about one of the other initiatives that you work on. I mean, I was again, reading through your bio, I'm amazed at the amount of varied interests that you have and the impact that you drive in so many different arenas. But one of the things that stood out was the Data-Pop Alliance and the work you do in that organization. I'm wondering if you could

take us through that journey. How did you hear about it? How did you get involved? What is it that you do for them?

Nuria Oliver:

Yeah, so as I mentioned earlier, since 2008, I've been working on the topic of data science and AI for social good. And Data-Pop, I think maybe was created in 2014, maybe I can't remember exactly the date. It is an initiative created by the MIT Media Lab, the Harvard Humanitarian Initiative, the Overseas Development Institute and Flowminder. So I did my PhD at the MIT Media Lab, and the main professor behind Data-Pop Alliance from MIT is Sandy Pentland, who was my PhD advisor. So I think I got probably to know about it through him and Emmanuel or Emmanuel Letouzé who is a co-founder and director of Data-Pop Alliance so I guess we started kind of collaborating.

Initially, I was, can't remember the title, some kind of, I don't know, research affiliate or something like that. But since 2016 I think, I am the Chief Data Scientist, and basically I just help in whatever way I can in whatever project I can. So Data-Pop has a different areas of activity from doing data driven research projects in developing economies to doing public policy making and helping draft up policies and writing sort of thought leadership articles in the area of data AI and social good and development to doing education and outreach and data literacy programs. And basically I'm available to help in whatever way depending on the project and depending on the timing. Today, for example, I just had a meeting with Emmanuel just a little bit earlier today so it's sort of a flexible arrangement where I help as much as I can in whatever capacity I can, depending on the project. Yeah.

Rashmi Mohan:

I got it, yeah. Looking at the Alliance team itself Nuria, seem to be incredibly geographically diverse team. And so is it that each member brings the sets of challenges as well as the ideas that have worked for them to the Alliance and of helps in knowledge sharing. Is that a part of the work that you do? Also, I know that you've always been a huge proponent of diversity in all of the teams and all of the efforts that you've worked with. What is the greatest value that you see from this cohort of people that you work with?

Nuria Oliver:

Well, I mean, Data Pop is a very special initiative. It's extremely multidisciplinary and diverse. And as you can see on the website, I'm also very proud that in terms of gender diversity it's also very balanced, to be an initiative that is about data and AI and social good. And basically, depending on the project, depending on the geography, different members of the team work on the project. Data-Pop has a lot of different funding agencies from the Rockefeller Foundation to United Nations, different institutions in United Nations, to the French Agency for Development, the Inter-American Development Bank so there's many different foundations and organizations that fund the work that Data-Pop Alliance does.

And the scope of the work geographically is mostly developing economies in Latin America, in South Saharan Africa, and also in some Asian countries. And as

I mentioned, in terms of the nature of the work, we do both work in terms of using data to better understand issues. For example, inequality, discrimination, migrations, violence, crime, and so forth. We also do projects and actions in terms of education, a lot of workshops and courses. And then we also do projects in terms of supporting policy makers and governments, draft strategies, or really impactful projects that would enable them to become more data-centric, always with the goal of having positive societal impact. So when a project is defined, then a team is created and different people from Data-Pop join the project and then the project is sort of executed and carried out.

Rashmi Mohan: Great. I mean, that sounds like an incredible opportunity. Is it mostly volunteer driven Nuria? Can anybody join it or how does this work?

Nuria Oliver: No, there are employees on Data-Pop, and then there is also volunteers so it could be both, depending on the project. Probably if anyone is interested, the best is if they could just email either the director Emmanuel Letouzé or someone. I mean, there's a lot of information on the website on also how to contact. The Institute of Humanity Centric AI that has created, which is also a nonprofit. Obviously we have a lot of collaborations also with Data-Pop Alliance, but the focus on the Institute of Humanity Centric AI is a scientific research. So we do outreach activities as well, but it's less, I guess, less broad than Data-Pop, which covers a lot of, maybe not so much scientific research as more working directly with countries and organizations to have impact. And in the Institute of Humanity Centric AI, we focus more on inventing new algorithms or carrying out research projects that reveal the impact that AI is having on our society and on our lives and in many cases, they're not so positive impact that that is having.

Rashmi Mohan: Got it. Yeah, no, and then I think it's important to actually be aware, and then I think that's the only way to make the impact. So I think sometimes the results may not always be the greatest that we want to hear of, but I think awareness is so crucial in order to be able to tackle those problems.

Nuria Oliver: I mean, exactly. If you don't know, it's very difficult, you're going to change it so the first thing is to know. Yeah.

Rashmi Mohan: Yeah. And I want to go back to something that you said earlier around the team itself at Data Pop, and both in terms of geo, I know I brought up geographic diversity, but you brought up gender diversity. I know that's something that you are very passionate about Nuria, about really starting early in terms of inspiring and educating young girls into the world of technology as well as data science and AI in particular. Would you like to talk a little bit more about that?

Nuria Oliver: About gender diversity, you mean?

Rashmi Mohan: And just your sort of interest and the work that you've done, your thoughts around how we can improve and inspire young girls to be in data science?

Nuria Oliver: So we have a big societal challenge here, particularly in Western Europe and North America which is the progressive loss of female talents into computer science. This wasn't always like this. In fact, up to the mid '80s, the percentage of women in computer science was actually increasing, but then since the mid '80s has been decreasing, and right now there are a lot of degrees, for example, in Spain that have less than 10% of girls, they are within computer science. So I don't know, robotics or I mean different kind of branches of computer science. This is obviously undesirable because we live in a technological world, we need technology to survive as a species. And however, this technology that we all use, no matter who we are and where we are, has been designed by non-diverse teams. And we know that this has severe implications in terms of how innovative that technology is in terms of how inclusive that technology is, and also economically in terms of how much money one could make with those results.

Only in Europe, for example, the lack of gender diversity in the technology sector is attributed to cost in the sort of billions of euros. So that's something that has worried me for many years. And I have lived also the difficulties because I have created research teams, and it's been extremely difficult to find female scientists with a PhD in computer science that could join the teams. Even now, I'm trying to recruit a lot of scientists for the Institute of Humanity Centric AI, it's very hard to find female PhDs in artificial intelligence so if anyone is listening that could be interested, please reach out to me. So I've done everything I've could to try to inspire, in general young people, because we don't have enough young people, but particularly girls and female adolescents like teenagers, to pursue careers in computer science and in technology.

I have also joined different initiatives that have as an objective to increase gender diversity in the tech sector. So I am a fellow, I'm a member of the Spanish Royal Academy of Engineering. The Spanish Royal Academy of Engineering has a project called Women in Engineering, and I am the fellow, I guess director of the program. So the program has an executive director, but who is not a member of the Royal Academy, and it has to have a director who is a member of the Royal Academy so I'm that person. I'm also a member of initiative called Woman at the Table that aims to have more women at the table, I guess, at the decision table. And then it has an initiative on algorithms, algorithm discrimination, like gender discrimination on algorithms, I'm also a member of that so I have actually helped create and organized very large conferences for students so they can learn about technology and they can see role models that are female and that are not the stereotypes that the TV series or the movies or the books show to us. So they realize that computing is also for girls and well, is the best profession that you could have.

So yeah. So I think the main message is we have really a societal challenge here that we need to tackle because we should not as a society accept that the technology that we all use hasn't been designed by diverse teams. We should not accept that, I guess the richest sector right now in the world doesn't have a

good representation of women. And we are failing as a society to inspire the next generation of girls, and boys, but particularly girls to pursue careers in a field and a sector that has the lowest levels of unemployment and the largest levels of opportunities.

We do need to act. If we don't do anything, the situation is not going to get resolved by itself. And that's why we need to implement many, many actions from transformations in the education system to creation of role models, to giving greater visibility and recognition to women, removing the pay gap to supporting the women that are in the field. As you probably know, certain sectors in the computing field actually have cultures that are very aggressive against women, and that is completely unacceptable so there are many different actions that we can take at different levels and targeting women and people of different ages. But yeah, I think we definitely need to do something if we want to reverse the situation.

Rashmi Mohan: Yeah. No, thank you for sharing that. You covered so many of the challenges we face today, and I'm really grateful that you actually shared many of the actions that you are taking that could possibly inspire our listeners to also pursue those opportunities in the areas of the organizations that they're in. One thing I've always believed is that you can't be what you don't see, and I know for a fact that the diverse set of opportunities that you have taken on, and the fact that you share so much of your work and your journey with students and women across the world is inspiring in and of itself because I think as a young girl, anybody looking at what can be achieved looking at your journey will certainly feel more empowered to go and pursue that herself. This has been an amazing conversation Nuria. For our final bite, I'd love to understand what are you most excited about in the field of data science and AI over the next few years?

Nuria Oliver: Well, I guess I'm really excited about what I've always been excited about, which is the huge power and the huge potential that we have to have positive societal impact through AI to really help people, all people, not just some people have a better quality of life to really tackle the big challenges that we face from climate change, to the energy crisis, to the aging of the population thanks to artificial intelligence or with the help of artificial intelligence. So I'm really motivated by all these opportunities, but I'm also cognizant and very much aware of the fact that that potential is not going to be realized if we don't work for it and if we don't make sure that it will happen because there is also a dark side and a negative side in the use of AI. And that's what has moved me into creating this nonprofit research foundation, to make sure that I do everything I can in contributing to making sure that AI is the best thing that happened to us and not the worst thing that happened to us.

Rashmi Mohan: Wonderful. Thank you so much for sharing that and for the very inspiring conversation. We really are appreciative that you took the time to spend with us at ACM Bytecast.

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Nuria Oliver: No problem, it's been really a pleasure. Thank you for your interest and congratulations on your podcast.

Rashmi Mohan: Thank you.

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