

OUTLIERS PODCAST || SEASON 6 | EPISODE 7

Co-Founder & CTO of Axelera AI | Evangelos Eleftheriou

Evangelos: Hello Panagiotis.

Panagiotis: Thank you very much for being with us today. A very interesting story. You founded Axelera AI a few years ago in the Netherlands. You are based in Switzerland. Not many people know this story in Greece. And it's a very big, very successful, and very interesting story.

Evangelos: I'm also glad for the invitation and happy to be here with Endeavor, which has done an amazing job. And I'm glad that I will at least be able to share the story of how it all began and where we have reached with your audience.

Panagiotis: And where are we going? Because artificial intelligence is something that now concerns all of us very much in terms of where it's headed. Before we dive deep into your company and your story, give us a general definition of what Axelera AI is.

Evangelos: Axelera AI is a startup company that focuses on building what we call acceleration, accelerators, in computer vision, but also in generative AI. In other words, we build the system on which all neural networks run, whether that's computer vision or language models. We started with computer vision and we're moving towards generative AI. The company and its focus have always been on computer vision from the beginning. We wanted to provide a solution to this problem, which we call edge. Edge includes many things. Edge is autonomous driving, edge is medical diagnostics, edge is industrial automation, edge is drones, edge is robotics.

Panagiotis: Whatever makes a lot of decisions quickly, with massive amounts of data, but it has to be within milliseconds.

Evangelos: Exactly. Yes. And it processes images. It processes image after image.

Panagiotis: Yes. Computer vision.

Evangelos: Computer vision.

Panagiotis: Actual hardware is being built. That is, physical material, chips.

Evangelos: We build the hardware, the chip, we build the software, the entire application—in other words, we provide the whole platform. We provide the complete solution: from the hardware, to the software that controls the hardware, up to the application that will run on the hardware through the software.

Panagiotis: I want us to take a step back and learn a little more about you. Let's start a bit from the beginning.

Evangelos: Alright.

Panagiotis: Where were you born?

Evangelos: I grew up in Evia, in a small place called Aliveri. I spent my childhood years there. My family moved to Athens. I finished elementary school in Athens, and I also finished the six-grade gymnasium, because when I attended gymnasium, it lasted six years. My family is a simple, middle-class family. My mother had her own shop. And my father was a foreman in a technical office.

Panagiotis: Okay. There's a bit of entrepreneurship in the family.

Evangelos: On my mother's side.

Panagiotis: Exactly.

Evangelos: Yes, my mother was an entrepreneur. There was love in the family, I had a lot of support during my childhood. Basically, they helped me fulfill my dreams, starting with getting into university. At the School of Engineering at the University of Patras, in the Department of Electrical Engineering.

Panagiotis: And that's where the journey begins that brings you up to this point. First of all, are you an only child?

Evangelos: No, there are two of us. I have a brother.

Panagiotis: One brother. Your brother?

Evangelos: My brother is a pharmacist. He still lives in Evia, in Aliveri. He has stayed there. He returned to his roots. He remains there.

Panagiotis: Is it something you've also thought about at some point in your life? Are you connected to this city in a way that makes you feel it could be a destination for you someday?

Evangelos: When I come to Greece, I always visit Aliveri. I have a house there, I have relatives, many relatives, I want to see them, but my home is in Switzerland. I've been living in Switzerland for 35 years. Before Switzerland, I was in Canada, because I was studying in Canada. My children were born, one in Canada, the other in Switzerland. Both my daughters speak Greek fluently, you wouldn't guess it, they've never lived in Greece, they speak perfect Greek and I'm proud of that.

Panagiotis: As a student, how was your performance? Because to get into Patras, first of all, Electrical Engineering, you must be a good student.

Evangelos: Yes.

Panagiotis: You write very well, from what I understand.

Evangelos: In the first years I was, I had no problem passing the courses, as we used to say in our student lingo—at least I don't know if students use the same terms today—passing the courses.

Panagiotis: Of course.

Evangelos: I didn't have a problem, but I wasn't a top student either. Until the third year. In the third year, when the more specialized courses started—because the first two years are general—and since I was always moved by electromagnetism, it was that subject, which is considered one of the most difficult, where I performed exceptionally well and the professor invited me to meet him. And there he told me that if you continue like this and get good grades in all your courses, I'll help you get a scholarship to go to Canada.

Panagiotis: Okay. Canada—is that some top university?

Evangelos: Yes. He was in Canada as a professor before coming to Greece.

Panagiotis: Okay. Okay. And he knew that very serious work was being done there.

Evangelos: He could help me get a scholarship. It was important. Because without a scholarship it would be incredibly difficult to cope financially in North America.

Panagiotis: Of course. First of all, I see here a professor who sees a student who deserves his attention and to open up for him... which I find very beautiful. And it was also decisive.

Evangelos: It was decisive. Vasilis Makeos was a unique personality. He had come from Canada, he was one of the first to come to Greece, he repatriated, he had a big reputation, he had done amazing studies in Germany, and he wanted to push students to go abroad, to create new horizons. He tried to find talent and help it develop.

Panagiotis: And to go study abroad.

Evangelos: And to go study abroad. Because the opportunities to pursue postgraduate studies in Greece back then were not that great. There wasn't a solid program to do a PhD in Greece. There were, but it wasn't the same. But of course, you needed financial support. And financial support would only come through a scholarship.

Panagiotis: Do you finish in five years? Do you graduate on time?

Evangelos: Of course. I was among the top two or three students in my class and I left. Searching for a house in Canada.

Panagiotis: And you go to Ottawa.

Evangelos: Yes, I go to Ottawa.

Panagiotis: Tell us a bit about your postgraduate studies and your experience there. How does it compare to Greece and how has it influenced your career path?

Evangelos: Carleton University, where I graduated, is a very good university. It is in the capital of Canada. There are two universities there. There is Ottawa University and Carleton University. And at the time when I went to Canada, these two institutions merged so they could receive more funding from the federal government. Because Ottawa, uniquely, is located right on the border between Ontario and

Quebec. Ottawa University, since it was French-speaking, and Carleton University, which was English-speaking, could combine, had different financial support, and could merge their programs. It became a truly large institution that offered a great deal both in terms of courses and options for specializations. I started with a master's, even though I had completed a five-year university program, and many times American universities consider our program, because it is five years, as equivalent to a master's, and in fact there was a requirement, if you want to do a Ph.D., you have to write a thesis. Which lasted two years. And I decided then that I would continue. And beyond the master's, I would also do a Ph.D., so I took that two-year program. It was challenging, it was not easy. It was mostly about systems, or again, more algorithmic. There is an entire field called adaptive systems, and at the time there was a lot of interest in a category of algorithms known as recursive least squares algorithms, which have a lot to do with machine learning nowadays, because essentially, they are adaptive. My PhD was on such topics. I completed both my master's and my PhD.

Panagiotis: On time.

Evangelos: On time. And there I was influenced by another professor, especially during my PhD, who was also my thesis advisor. He had just arrived from Bell Labs, the famous Bell Labs. His name is David Falconer, a famous Canadian, who was in New Jersey, in America, and spent many years at Bell Labs before deciding to pursue an academic career, and I was his first student.

Panagiotis: To write your dissertation.

Evangelos: To do my doctoral dissertation. And honestly, it was the best thing that could have happened to me. He had literally fallen onto me.

Panagiotis: Because you're probably his first one.

Evangelos: I was his first student. And he wanted to prove, first and foremost, that he could supervise someone through a PhD dissertation, but he was also interested in the subject.

Panagiotis: Yes, yes.

Evangelos: So...

Panagiotis: And surely afterwards you also got along, so many other things too.

Evangelos: Exactly. Yes, we had a very good relationship, and he was relatively young. He paid great attention to me. I'd write something, give it to him, and it would come back red. Literally. He checked everything, from language corrections to equation corrections, so to speak. I mean, we truly worked as if we were working together. And I managed to complete a very good doctoral dissertation, with several publications. And basically, he was also the one who, in a way, inspired me to pursue research, not in an academic environment, but in an industrial one. He had told me then, and I remember it like it was yesterday, on graduation day, he said: "My advice is to go to a research center, to broaden your research horizons as much as possible, and if afterwards you decide to return to academic life, then you'll have all the tools to do it." And he helped me to come to the famous research center in Switzerland.

Panagiotis: Tell us a bit about Switzerland and the research center, and how that evolved into IBM and your brilliant career at IBM.

Evangelos: Basically, it is the IBM Research Center in Zurich, which, after a while, was already famous, everyone knew about it, it's a small lab, not very big, when I went to Switzerland there were about 300 researchers, mainly in three areas, pure physics, computer science, and systems. I was in the systems department, an environment that was somewhat dominated by Germans—basically, the majority of employees were from Germany—I was the first Greek, and in fact there's a story: I was looking to find another Greek, you know, I come into the office on my first day, my supervisor introduced himself, the lab director, and I met all these people, and there was a list with names, phone numbers, and office numbers, and I was trying to find a Greek name.

Panagiotis: Yes, 300 people anyway, you scroll through them slowly.

Evangelos: I scanned it. And I see a long name, but it didn't have an 's' at the end, it was Zafeiropoulo, not Zafeiropoulos. And I thought, since it's so long, it must have been cut off.

Panagiotis: Yes, yes.

Evangelos: I found the office, went to his office, knocked on the door, went in, and started speaking Greek. He looks at me and says, “ I'm sorry, Evangelos, I don't speak a single word of Greek.' My father was Greek, but my mother was British. And unfortunately, I never got to know Greek.” So, it's an environment that's quite interesting, challenging, and demanding. The second line manager, who was quite famous, was already an IBM fellow. IBM fellow is the highest distinction you can achieve at IBM. Among 300,000 employees at the time, there were around 50-60 IBM fellows.

Panagiotis: And what does that mean? Because we want to know. What does IBM fellow mean?

Evangelos: It's an honor, you automatically become an executive, you have the ability to focus on any technical topic you want. People listen to you.

Panagiotis: Yes, exactly.

Evangelos: Your voice is heard.

Panagiotis: It carries weight.

Evangelos: It carries weight, you have no problem approaching even the company's CEO and talking to him.

Panagiotis: How many people have become IBM fellows?

Evangelos: When I became a fellow—because I also became a fellow—when I became an IBM fellow, there were around 85, I became a fellow in 2005, and I was the fifth fellow in the entire history of the lab at the time. The first was Gottfried Ungerberg, who was also my second line manager; the other four were Nobel Prize winners, two and two, and I was the fifth.

Panagiotis: And I am starting to understand why Axelera is also one of the top companies in the world. The work you do in this lab, how exactly?

Evangelos: My first job had to do with magnetic recording. Have you heard of hard drives?

Panagiotis: Yes.

Evangelos: Have you heard of tape drives? Tape, magnetic storage? My first job was to increase the linear density of data storage. When you record on a magnetic medium, what really matters is the areal density. How much information can you store in a square inch? And since it's a surface, there are two dimensions.

Panagiotis: Yes, of course.

Evangelos: One is linear, which has to do with the magnetic transitions, and the other has to do with the track on which the head moves. One is called linear density and the other is called track density. Initially, I worked on techniques, algorithmic approaches, to increase linear density. Because as the magnetic lines come close to each other, they start to interact. And this interaction creates a problem in correctly detecting the information. And I developed a technique, which became the de facto industry standard at the time, using noise prediction techniques. And I worked on that, it became the de facto standard, IBM had some of the best magnetic recording systems, but in 2002 sold the whole business to Hitachi. And suddenly I had to change fields. I mean, because for years I had been working on magnetic recording, my entire career, all my research was on magnetic recording, and suddenly that whole organization, IBM, decided to exit the hard disk drive business. They sold everything to Hitachi.

Panagiotis: And you didn't think about continuing the same research at Hitachi? Was that not an option?

Evangelos: No, there was an option, because even the people were sold to Hitachi. Except for my group in Zurich. We stayed in Zurich and focused on tape, because there's also tape storage, which nobody may know about, but it still exists in the

cloud for cold data. So, all the technology that had been developed for hard disk drives, we transferred to tape.

Panagiotis: They sound similar to me; it doesn't sound like night and day.

Evangelos: No, it's not night and day. It's a different medium. One is flexible and the other is hard. This is the difference.

Panagiotis: So, did you continue then?

Evangelos: I continued with that, gave directions, created a large group, but then I wanted to do something different and I focused on memories. Memories, as we usually know them, are what we call charge-based memories. We call them charge-based memories, like flash, which we use in solid-state drives, or like RAM, which we use in laptops, desktops, anywhere. All of these are charge-based, but there was a new category of memories called resistive memories, which have to do with resistance. So, we understood the physics behind these memories and then, together with my team, I realized that you can use these memories not only to store data but also to perform operations. And gradually, this idea of in-memory computing began to emerge. This started around 2015, 10 years ago. I was already an IBM Fellow and had strong support from IBM; I created a very large project, which expanded beyond Zurich, with groups in America, in Germany, in Böblingen, which was the development lab, and we built the first chip, called Hermes, which was based on phase change memory. These memories, the memory I used back then, is phase change memory. We built a whole chip, 144 square millimeters. It was the largest chip ever built within the entire research division of IBM, which was still research-focused.

Panagiotis: Research-focused.

Evangelos: There was a major publication in Nature journals, etc. But I couldn't, because IBM went through various transitions related to entrepreneurship, related to the cloud, I was never able to turn this into a product. Meanwhile, I also started to realize that, since everything was done in analog, it might be possible to find something better than analog processing in terms of noise, information fidelity, and

all that. And I had a student from ETH, together with a professor, Luca Benini, and we looked into more compatible memories, using a different technique. SRAM is a compatible memory, which is used everywhere in all chips, and a different approach to the whole field of in-memory computing. Using conventional memories, the student, Ridouan, did an excellent doctoral thesis. We published the results and that's when I began to realize that this could reach the market with certain adjustments. Because I saw that I wouldn't be able to do commercialization within IBM, as IBM had other issues to resolve, I started talking with people about whether we could do something outside of IBM.

Panagiotis: Yours.

Evangelos: Something of our own. I also spoke to the supervisors within IBM. I asked them, would you support me in starting a company, to have it spin-off from IBM?

Panagiotis: And from their lab.

Evangelos: The lab, yes. And to give us the assets.

Panagiotis: Theoretically, they would.

Evangelos: And to give us the assets.

Panagiotis: Exactly.

Evangelos: To become investors.

Panagiotis: Exactly.

Evangelos: And to create... There was, in a way, reluctance. So, I looked in other directions, and then this professor from ETH put me in touch with Fabrizio. Fabrizio had already gone to a company called BitFury, in August 2019, and he wanted to set up a department there. He came from the business world. He came from a company called ION and was trying to set up a department more focused on accelerators for artificial intelligence, that kind of thing. They introduced me, and we had our first discussions.

Panagiotis: Why did they connect you? What did the ETH professor see as an opportunity to connect the two of you?

Evangelos: The fact that I wanted to create something outside of IBM, independently of IBM, and Fabrizio was trying to find students to set up a department inside BitFury where he had been hired to move in that direction, but he was more on the management side, trying to find technical people. There was a big opportunity.

Panagiotis: So, he was looking for great ideas and people.

Evangelos: Exactly. Exactly. People with technical expertise who would create something.

Panagiotis: And who would also have good ideas.

Evangelos: Exactly. And he brought us into contact. So, we started talking in 2019. He visited me at IBM, we had our first discussion, I explained to him what we do, he started to get interested because it was truly something new. Meanwhile, there were other groups as well, because in-memory computing was starting to gain favor among various scientific teams at other research centers. There was another team at IMEC, in Leuven, Belgium, who were also looking into different architectures. So, I started the discussion. I started to get interested as well, but then the pandemic struck. The pandemic stopped everything. 2019, early 2020, there was no way we could find the capital needed to get started.

Panagiotis: Funding.

Evangelos: Funding was almost impossible. So, the whole project stopped. Obviously, I didn't resign from IBM. So, we waited for the crisis to pass somewhat...

Panagiotis: And for things to pick up again.

Evangelos: Exactly. And for us to be able to find capital. In January 2021, we started talking to investors and in February, if I remember correctly, we had the famous due diligence. The due diligence with the first investors. And that's where you have to explain to them what is novel, what the business plan is, who the

competitors are, and why you'll be able to bring something to the market that will truly succeed.

Panagiotis: It will succeed. These investors, who are the first investors you are talking to and who are conducting the due diligence?

Evangelos: The first investors are Innovation Industries, which is a Dutch venture capital fund, and the venture capital branch of IMEC, called IMEC Expand. Those were the two main investors. BitFury, which had decided to spin out the team, and Fabrizio had started to bring in some people at BitFury.

Panagiotis: So BitFury supports Fabrizio.

Evangelos: Of course, they support him 100%.

Panagiotis: And they are doing the spin-out for him. And they are even looking to invest in him.

Evangelos: Exactly.

Panagiotis: IBM has not changed yet.

Evangelos: No, not at all. Not at all. However, I have spoken to people inside IBM who follow me. And that's how the first nucleus is created.

Panagiotis: You haven't left IBM yet.

Evangelos: No. For months, we would meet on Fridays with the others from IBM at various cafes in Zurich. Good times. How are we going to leave, what are we going to do.

Panagiotis: I suppose it's a decision. When do you press the button and truly leave something behind?

Evangelos: It's not easy. For me, it's okay.

Panagiotis: And especially a celebrated researcher. That is, you are in a place that has really given you a lot.

Evangelos: I have no problem with IBM myself.

Panagiotis: Of course. It could maybe be a little more, perhaps... What is missing here from IBM is that it's a research laboratory which should perhaps have better reflexes regarding the fact that, out of all these researchers—the 300 I have here, who could even reach 400 or 500 at that moment—some will have fantastic ideas, which will not always be a priority for IBM. Let's make an accelerator, put in some money, and keep going.

Evangelos: Exactly.

Panagiotis: To strengthen entrepreneurship. When do you press the button? When and what is the process for making this decision?

Evangelos: I've already made the decision. I'm waiting for the investors to sign the famous term sheet.

Panagiotis: So, the button for you is very obvious. When I have the term sheet.

Evangelos: Yes.

Panagiotis: And I'm sure I will get the funds and.

Evangelos: Yes.

Panagiotis: Okay.

Evangelos: Fabrizio was already inside BitFury. BitFury had already agreed to the spin-out. For me, I would have to resign. And not only would I have to resign, I couldn't leave the next morning either. I had to resign and then negotiate how much time until I could leave.

Panagiotis: Well, of course.

Evangelos: There are various such small problems that you have to solve.

Panagiotis: Naturally.

Evangelos: I had already made the decision. There was no way I would stop. From the moment we definitely had the capital to start, the seed funding, for me it was settled. The decision had been made.

Panagiotis: How much was the seed funding?

Evangelos: It was 10 million.

Panagiotis: 10 million. Did you get it to build your own small research center? What did you do with that money?

Evangelos: Our immediate decision was, well obviously to hire people, but we also wanted right away to show that this new idea of digital in-memory computing—because eventually we moved away from analog and switched to digital—was real. We switched from analog to digital because we realized that digital has certain advantages regarding the reliability of information. We still use SRAM memory, it's just that the approach is now more digital. It is in-memory computing. We decided within a short period of time to show that the idea works. In 5 months, we make the first small chip, 10 square millimeters. We designed it. In our language, it's called tape out. Tape out means you have designed everything and you give the files to the foundry to start the fabrication process. The company was founded in early July, and in early December we did the tape out of the first chip.

Panagiotis: Incredibly fast.

Evangelos: Incredibly fast. 5 months. It's amazing. Of course, it's not the complexity of a large system; it's a small demonstrator. But you have to understand that it's a team that was just formed, no one knows each other. There are 30 of us in the company altogether.

Panagiotis: 30?

Evangelos: Yes, at the beginning. 25, somewhere around there, I don't know. We're quickly trying to find whatever skills we need to do this tape out. Which happens, we get the chip in April and it works. And we see that the idea really works and now it can help us get to market. This gave us the impetus to start, first to go for a Series A and second to begin manufacturing the chip. So, already from January 2022, the big chip begins—this is the one we now have on the market, called Metis.

Panagiotis: Metis.

Evangelos: The Metis. We do the design and deliver the final design, which you have verified externally, at the Fab, at the Foundry, to manufacture the chip.

Panagiotis: How large is the Series A you are raising and who are the investors coming in?

Evangelos: We begin to receive funds from new investors; apart from VCs, we start receiving funds from sovereign funds. The Dutch sovereign fund begins to support us. We receive funds from the Belgian sovereign fund. We gradually receive funds from the Italian sovereign fund. We are supported by the European Investment Council, which to some extent is also a sovereign fund.

Panagiotis: Yes. These are major institutional players that are national funds dedicated to investments.

Evangelos: For technology investments. We are starting the design of the second major chip, the big one, what we call the big chip, Metis, and we finish the design in about a year. So, we do another tape out in December 2022, and March is the big moment. We see that the chip works. At the same time, we begin designing the software, because it's not just about designing a chip. You have to develop what we call the whole software stack, from device drivers, low-level software, compilers, everything. Once we see that the chip works, and there are a few minor issues, we start talking to the first customers.

Panagiotis: Exactly.

Evangelos: We create an early access program, to give them the opportunity to get familiar with the technology, and for us to get feedback.

Panagiotis: Exactly.

Evangelos: What we need to fix, not just in the hardware but also in the software. How can we make it more easily manageable, because when you build a computer vision application, it's not just the neural network, it's the whole image pre- and post-processing.

Panagiotis: Yes, yes.

Evangelos: There are various neural networks that, in a way, create a chain of processes.

Panagiotis: So, you raise 21.7 million in your Series A and you start moving into commercialization, as we say, that is, you start talking to customers.

Evangelos: We start talking to customers, exactly.

Panagiotis: How does the company start to develop? I mean, this sounds to me like a growth wave that is very difficult.

Evangelos: Obviously it's very difficult, because up until this point, until the introduction of the early access program, the company was basically mainly focused on development.

Panagiotis: Research-based. Exactly.

Evangelos: Product development.

Panagiotis: Development.

Evangelos: Yes, development. Of course, we had realized the need for salesforce, we had realized the need for—I'll use the terms we use in the company, in English—customer supporting, we had realized the need for field application engineers, the engineers that support the product.

Panagiotis: In the field.

Evangelos: In the field, when there is a problem. Of course, we're not fully in the field yet.

Panagiotis: No.

Evangelos: Because we are still in the early access phase, but you still come into contact with customers. And the customer may have difficulty setting up an application.

Panagiotis: Yes, of course.

Evangelos: You have to help the customer set up the application. And the applications are not the same, it's not just one application.

Panagiotis: Yes, yes, yes.

Evangelos: Many applications and different ones.

Panagiotis: It depends on the customer.

Evangelos: It depends on the customer. Some customers are able to set it up more easily than others. They have machine learning skills within the company. There are others who do not have them. Therefore, we obviously realize that this is a big challenge, and we start to create...

Panagiotis: Such teams.

Evangelos: These support teams. And that's why we want the Series C now, so we can develop salesforce in North America and the Far East. Because those are the big markets.

Panagiotis: Yes, of course.

Evangelos: So right now, all hiring is focused on this.

Panagiotis: Customer support, sales.

Evangelos: Customer support, sales worldwide. Because otherwise you cannot support your product. We have four products and it's important to mention them.

Panagiotis: Of course.

Evangelos: Which are related to different form factors, as we call them. One product is a small card, very small. The width is 22 millimeters, which fits into the slot where solid-state drives go. It has particularities regarding how much power consumption, the power supply you can get from this form factor. We have a PCI Express card, we have a single board computer, we have a PCI Express card, which has four chips on it. It depends on what exactly the customer wants, how they want to use this technology, computer vision, and what kind of environment they will utilize this card in.

Panagiotis: Could you give us some application examples so we can better imagine it?

Evangelos: One application is, for example, a cashier-less checkout.

Panagiotis: Okay.

Evangelos: Imagine being in a large department store or supermarket, buying products, placing them in your basket, and crossing a line—the system reads them, it already knows what's in your basket, what isn't, whether you add or remove items. It doesn't matter what exactly you do; you cross a line and your credit card is charged. You don't need to check anything.

Panagiotis: So how does the X supermarket, which couldn't do this before you, now manages to do it with your technology? How exactly is your technology implemented? Did they purchase processing capabilities from your software and use your processors to make it work?

Evangelos: There are systems, embedded systems, which can be a processor. In this system, you can get inputs from video streams, from cameras installed in the store, in the supermarket, and these provide information to our system, which analyzes it.

Panagiotis: On its behalf.

Evangelos: Yes, exactly. So, you integrate this embedded system with our card, into a complete solution that can analyze the video feeds, the video streams it receives from the various cameras, which are scattered throughout the store.

Panagiotis: Commercially at this point, because other funding rounds have taken place, you've also done a Series B, you've received an amazing European grant, which I would love for you to tell us exactly why you got this grant, but now we're talking about amounts where each of those I mentioned is 60 plus million, a total sum of money and investments that have been given, dedicated, and invested in the company is about 200 million, correct?

Evangelos: At the moment we have 200 million dollars, of which around 60 are from grants, they are subsidies.

Panagiotis: And the 140 are...

Evangelos: And the 140 are the three categories: venture capital, sovereign funds, and strategic funds.

Panagiotis: Those amounts are very impressive. Commercially at this point, can you help us understand the picture a bit?

Evangelos: We entered mass production in February. Now. This year.

Panagiotis: Now?

Evangelos: Yes, in mass production. Where we mainly focus is security, industrial automation, smart retail. These are the areas we are focusing on right now. Industrial automation is many things. For example, it's about monitoring spaces where workers operate various machines, and those workers have all the required protective gear; the suit they have to wear, the helmet, the gloves, all that. Because it's important for their safety.

Panagiotis: So, anything that uses image.

Evangelos: Anything that uses image.

Panagiotis: To automate the processes of a factory.

Evangelos: Exactly.

Panagiotis: Because Series B includes some very strong investors, meaning you have Samsung on board. How was this process? How did you manage to bring all these people in, and what impact does this round have, this 60-million round from world-class investors? The previous rounds too, but this is a breakthrough round.

Evangelos: It doesn't change the picture much, because all these investors, basically before investing in us, analyze what our strategy is, where we want to grow, what the next business plans are, what the next product after Metis is, what the next product does after Metis, how competitive we'll be in these new markets. So, we go through this process, which is another due diligence, and based on the data we have at the moment the decision is made, they also decide. That is, it's not something... It's standard practice with all these investors.

Panagiotis: You are two founders.

Evangelos: Yes, two founders.

Panagiotis: And how many people does the company employ at the moment?

Evangelos: 220-230.

Panagiotis: Do we have a stock option plan? Are the company's people also shareholders?

Evangelos: Yes. Obviously.

Panagiotis: How did you think about this? How did you structure it?

Evangelos: We give employees, even those we are hiring now, a small number of stock options. This is a characteristic of our company. All employees have a small percentage of stock options. Obviously, it's challenging to have such a large number of employees, especially since we were founded during the pandemic and therefore learned to work using various platforms like Zoom and Teams, and we kept that.

Panagiotis: Did you keep it?

Evangelos: Yes, and we are distributed all across Europe. We don't force anyone to relocate or move from country to country. We try to find talent wherever it is, wherever it may be, and hire them. All of the development takes place in Europe. The development, the developmental part of the company, is entirely in Europe.

Panagiotis: Is it part of a strategy? Has this simply happened naturally?

Evangelos: It is part of the strategy. We say that we are a European company. We don't say that we are Dutch, we don't say that we are Greek, we don't say that we are Swiss. We say that we are a European company.

Panagiotis: You have received a very nice, significant grant from the European Union, 60 plus million. Explain it to us a bit, first of all it's very interesting and I think it's also a moment of pride for the company. And if nothing else, it also shows how important the research being conducted is. Explain to us a bit why you received it and what you are going to do with this grant?

Evangelos: The grant involves a large project in which, apart from us, two other technology companies are participating: Codasip and Open Chip. Codasip is a German-Czech company, Open Chip is Spanish. ULICH is also participating. ULICH in Germany is one of the renowned supercomputing centers in Europe, as is IMEC.

IMEC is in semiconductor. The purpose of DARE is to create sovereign technology for HPC. HPC stands for High Performance Computing; sovereign technology around the RISC-V architecture. RISC-V is an open architecture, it specifies what we call an instruction set—these are the commands, in a very simplistic way—and from there, the design, the way you build the computing unit, it belongs to you, but at least it is open source, which means there is interoperability and so on and so forth.

Panagiotis: And access.

Evangelos: And access. And a shared ecosystem. The ecosystem, and especially in software development, is very important. So, the European Union is trying to achieve sovereign technology in the computing sector, with a particular focus on high performance computing, with the idea of creating a European supercomputer around 2030-2031, which will be based on RISC-V technology.

Panagiotis: You will be an important, serious part of this supercomputer.

Evangelos: We are trying. Yes, we are trying to develop technology. Now, these three companies, each one will manufacture a chiplet, and these chiplets must be interoperable. Each chiplet has a different mission. We are trying to create a chiplet that will be for AI inferencing, to run neural networks very efficiently. Within the same package, the same system-in-a-package as it is called, there will also be the Cudasip with a general-purpose RISC-V processor system, and we will try to demonstrate some applications that pertain to workloads in high performance computing. We are looking to solve these problems through AI, while Cudasip will focus more on the classical way of solving these problems. So, we combine the two approaches, the classical and the AI way of solving such problems.

Panagiotis: And I maintain that it is very important; Europe is trying to build a supercomputer by 2030. How optimistic are you that we will succeed?

Evangelos: Quite. It always depends on the funding. It depends on the funding.

Panagiotis: Which so far has been bold, because if only you have received 60 and there are three companies, we can at least get a sense of the scale.

Evangelos: The scale of 240 million.

Panagiotis: Another thing that fills me with optimism is that in this project, which is of European significance—perhaps even a matter of life and death for the future of Europe—it's very important for us to have independence in our technology. In this project, we have a Greek researcher and a company that's connected to Greece and is perhaps even half Greek, at least on her father's side. That's very important. Do you employ people in Greece?

Evangelos: We do.

Panagiotis: In R&D, I think.

Evangelos: Yes, in development, we have around 7 people in Greece, in Athens.

Panagiotis: How does the experience compare? Because the work you do is deeply research-oriented, and I wonder if you have some feedback and some insights on Greeks versus other Europeans in terms of research, quality, cost.

Evangelos: Yes, Greeks are excellent scientists, there's no doubt, they are excellent engineers. It's obvious that there are many Greeks living abroad, who have left Greece. It would be very good for Greece if they came back and worked here. Various incentives are needed. Some tax reform is necessary for them to be able to relocate into this sector. In any case, there is great talent that could be put to use. Certainly, the universities produce very good engineers and we are also trying to operate in the Greek market and find this talent and recruit them into the company.

Panagiotis: We're going to play a little game. Each card has a word; you'll choose one and we'd like to hear your definition of it. Alright, then. Innovation.

Evangelos: Great word.

Panagiotis: What does innovation mean to you?

Evangelos: Innovation is exactly what we brought to the market. It was and still is innovative. We are the first company in the world to introduce production in-memory computing. And that is very important.

Panagiotis: Up to today, you've had an incredible journey, you've raised 200 million in funding, you've entered mass production. What do the next five years look like? What does 2030 look like?

Evangelos: Nice, interesting and good question. I will say a few words about the next product. As I mentioned to you, the first product focused on edge, high-end edge. The reason was that we saw an area where, as I said earlier, we could bring a solution that is highly competitive compared to Nvidia, to Nvidia's products in this space. Nvidia is top-tier as a company.

Panagiotis: Of course.

Evangelos: In this edge space, we believe that with our own innovation we can compete. And I think we have achieved that, at least in terms of performance, cost, energy efficiency, according to various analysts who got our product in their hands, measured it, ran tests, and the results show it. What we want to do is move towards the area of workstations, towards the area of enterprise servers. To create a structure that has even greater efficiency and performance. To be able to process larger multilingual neural networks. Neural networks can have from trillions of coefficients, weights, up to several billions. Therefore, the range is large.

Panagiotis: It is large.

Evangelos: And when you want to move towards larger neural networks, you also need a more powerful system to process them.

Panagiotis: You want to scale up your systems and you want to look at a wider field.

Evangelos: Exactly. Enterprise servers are a wider field.

Panagiotis: We are entering the last part of our very interesting conversation, which is quick questions to see if there is any other aspect we haven't understood yet.

Evangelos: So, it's a quiz.

Panagiotis: It's a quiz and I want us to learn the latest things about you, which are always equally interesting. Book or podcast?

Evangelos: Book.

Panagiotis: Book. Are you a morning or a night person?

Evangelos: Night.

Panagiotis: Night.

Evangelos: Midnight.

Panagiotis: You don't sleep; you are...

Evangelos: I wake up later.

Panagiotis: Are you a coffee or tea person?

Evangelos: Coffee.

Panagiotis: Coffee. If you could have dinner with a historical figure, who would you dine with?

Evangelos: Aristotle. I would ask him what his opinion is about artificial intelligence.

Panagiotis: And I'm sure he would have the most impressive answer out of all of us.

Evangelos: Yes.

Panagiotis: How wonderful it was to be at the Herodeion and maybe we connected.

Evangelos: Exactly.

Panagiotis: At least we connected the eras. We managed to connect the eras. What technology can you not live without?

Evangelos: The smartphone.

Panagiotis: The smartphone. What is your favorite city to travel to for work?

Evangelos: New York.

Panagiotis: Is there a book that has changed your life? One that is top of mind for you?

Evangelos: Yes, it's by Oscar Wilde, The Picture of Dorian Gray.

Panagiotis: Why?

Evangelos: Because it gives you the ethics of things, you see things a bit differently.

Panagiotis: If you weren't working on your current activity, which is being the founder of Axelera, what would you do?

Evangelos: That was always my weakness, to become a neurosurgeon. I have a fascination with the brain. I read, I try to understand. I would become a neurosurgeon, I don't know, because you want to do...

Panagiotis: And the last question we ask all our guests since the first episode. What do you think makes an entrepreneur an outlier?

Evangelos: What makes an entrepreneur an outlier?

Panagiotis: To be in the 0.001% of performance and success. To stand out.

Evangelos: Perseverance. To have ideas and not stop at any obstacle in order to achieve what you have in mind. That's what perseverance is.

Panagiotis: Vangelis, thank you very much.

Evangelos: You're welcome.