

## DEBATE

### **Paul Boudre, Silian Partner, former CEO of Soitec**

Is Europe slowing down on innovations? Max, what is the situation when it comes to this semiconductor industry? What do you think about innovation? You are the right person to talk about it.

### **Max Mirgoli, Executive Vice President of worldwide strategic partnerships at Imec**

I think Paul is referring to the fact that I am fortunate enough to represent an organization that has been the driving force behind innovation in the semiconductor industry. Our organization is called Imec, it is located in Belgium and we are truly global with over 5 500 of the brightest minds from 95 nationalities, and they use an infrastructure that is excess of USD 4.5 billion. We are fortunate enough to collaborate with any company that is successful, including Volkswagen and other car companies, DNA sequencing companies, besides the semiconductor industry.

The semiconductor industry has different segments, with the logic, memory, and the sensing and actuate segments. Europe has been a prominent player in the sensing and actuate segment, which as you can see is driving the autonomous driving segment and Helmut was on the Board of the company that was a pioneer in creating chips for the automotive industry, Infineon, a German company. If you look at innovation in Europe, honestly speaking I would have to be forgiven because I am part of Imec and it gives me a pay check so I have to defend it. However, if you look at the talent the universities in Europe create, innovation is what has created the semiconductor industry and driven it forward to the point that a chip today has 150 billion transistors on it. Every aspect of the industry has been innovating and the ecosystem has worked together, and the driving force of the ecosystem is the talent, the innovation behind the industry. Europe has played a significant role because if you look at the universities in Europe and the access to them, there is a wealth of universities where they can still continue the innovation in the semiconductor industry. For us to continue to grow in the semiconductor industry, if you look at AI for example or many of the applications, if AI grows at the rate it is growing, the world does not have enough power for the computer platform and the power required for it. We need to continue to innovate in order to reduce the power consumption of the chip and to increase the performance. I think each region needs to bring something to the table. Underlying part of the participation and the price for participation is to create workforce and talent that can innovate on at least part of this value chain.

### **Paul Boudre**

Thanks, Max. I think it is clear that this is a new era and as part of it, if you think about post-Covid and the current China-US tensions, this industry is thinking about regionalization. We have been building this industry for the last 30 years thinking about globalization and we are now thinking about regionalization. If you think about the footprint, every single region in the world is really trying to get into this industry, to attract and build on this industry. Handel, I



have a question for you, is it a good time, is it the time, is it the moment in life where collaborations between Europe and the Gulf region should materialize and is it possible?

### **Handel Jones, Founder and CEO of International Business Strategies (IBS)**

The semiconductor industry has different levels. There is the foundry level and Mubadala has made a significant investment in GlobalFoundries and it took a while but now the situation is very positive. Manufacturing at the foundry and also for memory, is one level and that is very capital intensive and it also requires a lot of skills. The next level up is that of products and of course, products need markets and smartphones represent 35% of the market. The other level though is the applications, the software and the solutions that can be brought to the market.

If you look at generative AI and where growth opportunities exist, as I mentioned earlier, digital health is one of those areas. If the Middle East is going to build up its own industries related to AI, for me digital health is one of the key areas. Europe has leadership in sensors. The sensor developed by Imec, CEA-Leti, Bosch, Infineon, ST, these are leadership on a global basis, so there could be collaboration in terms of these sensors that you can get from Europe. European companies also have some reasonably good processors and you can build industries like digital health based on collaboration. You can utilize the infrastructure that is being built, you can utilize the billions of dollars of capacity that is being built, but then develop new industries. Agriculture is another one, and pharmaceuticals too. For me, the collaboration should be based on applications that benefit society and where the benefits are tangible and of course, there may be significant investment but the payback will be huge. I see significant synergy between Europe and the Middle East and frankly, I think the emergence of generative AI, like ChatGPT, makes this perfect time to build new industries. As has been said and Paul mentioned, we need to collaborate because no country can do everything by themselves. In the end, I think right now is perfect timing to look at generative AI and then look at who the preferential partners can be. Of course, they do involve political stability in relationships as well as economic factors and innovation, as well of course, the need for end-markets. To me, this is the perfect time to focus on generative AI because it is at the early stages of emergence but the applications and opportunities are very clear.

### **Paul Boudre**

What is your view, Helmut? Maybe you would like to go into what can also be done to get to win-win situations? I think it is an opportunity but the train is moving and this is an industry that does not stop. It is clearly about speed and long-term visions, so what do you think about potential collaborations? How do you see that as someone who has built this industry in Europe? I may open that question to Max and Handel as well: what can be done to create these win-win situations with this part of the world?

### **Helmut Gassel, former Management board member of Infineon**

I think Max already described it very well, innovation is the core DNA of this industry and to create an innovative environment is what you need to have in mind if you want to be successful in the longer-term in this industry. There is always the chicken and egg question of how you create an innovative ecosystem, how does it begin? Does it start with an institute, a research facility, or with manufacturing? In my experience and what I have seen many times, when you want it or somebody ventured into setting up a semiconductor activity in a new country or place, it usually starts with real business. You have to start with somebody who has all the ingredients to bring business to a marketplace. Once you have that, the ecosystem grows around it. It does not grow overnight. You can do a lot of things to accelerate it and you

probably have to do that, but once you do, the ecosystem is going to grow. It begins with one company that starts and is willing to set foot on new ground.

The question is how to attract that. In my experience and from what I have seen lately, subsidies are no longer differentiating, and have probably never been. Now, every region wants to bring semiconductors to their region, to participate in the fact that you must have semiconductors to have a future, no matter their economy. It is no longer compute and consumer but automotive and industrial, everywhere. If you want to participate in the oil of the next era, then you want to have semiconductors. So you have to attract somebody. What does a semiconductor company need to be attracted to a region? When manufacturing is involved it needs infrastructure, stable, cost-effective electricity and water; you can provide that but you have to provide it at competitive levels. Second, you want to have political and other societal stability. You will be planning this factory to be there for at least two decades so you need to have a vision of a high likelihood of stability in the region. Third, which is increasingly critical, is a skilled workforce and talent, and can you attract it to the region. That is critical and something a lot of areas are struggling with right now. There is a lot of talk about it in Germany because of Intel and TSMC coming, and heavy investment from Infineon and others, and we are getting short of talent and creating it is essential. For that, you probably need to invest early in building research facilities and making an attractive workplace. When you have done all this, then you need a partner, and we might be a partner to help with that. We have just founded Silian Partners, and we are working very closely with Ardian on the first ever private equity semiconductor fund completely dedicated to the semiconductor industry. That is to help with finding those companies and building the bridges necessary to bring a company here. When you do that I think the rest can fall into place if there is the vision and entrepreneurial spirit among the leaders in that region to drive the necessary environment.

Therefore, it is possible and it is a good time because there is a lot of movement in the industry, but there is also a lot of competition so it is not a given that you can bring this industry to any country in the world where it does not yet exist.

### **Max Mirgoli**

If I may, since this is the World Policy Conference, and frankly I am not qualified to be making any policies, but I think that President Macron has a forum called Tech For Good. If you look at the positive aspects, our industry can create and solve so many challenges in the society we are going to be facing, from climate change to food shortages to challenges in curing cancer and disease. I am the ambassador for the semiconductor industry so I should say good things about it but I think it is incumbent on all the leaders gathered here to have a semiconductor policy because of the good they can bring to their societies. Beside the economic and sovereignty issues, the value it can bring by educating the workforce to have a stake in their future, because increasingly the future is being mapped by technology and the way that semiconductors are changing, different applications from agri-food to life sciences Handel quite rightly mentioned. Between genomics and proteomics we are getting a complete map of the human body and honestly, without semiconductors that would never have been possible. I think it is incumbent on all leaders to think about and craft a holistic policy for innovation and semiconductors. Not too many people in venture and financing are as versed in semiconductors as the two of you, so I am glad that we are loaning some of our talent to the finance industry to help.

### **Paul Boudre**

Thanks, Max. I think that is a very good transition to open the door for questions from the floor. I would like to stop and see if you have questions we can take.

**Stanislas Cozon, Executive Vice President of Capgemini**

Yesterday we heard about China and Taiwan, this morning we heard that TSMC is an important player in this industry. What would be the potential consequences on this industry if China took control of Taiwan? What is being done to anticipate that potential scenario?

**Paul Boudre**

Handel, would you like to start?

**Handel Jones**

The reality is that if something negative happens to the supply chain from Taiwan, the consequences will be dramatic and drastic. That is because if you look at the advanced technologies, TSMC has 90% of the market. We do have attempts right now by Intel and Samsung to build capacity, but if you look at the total capacity of TSMC in 5 nanometers and below, it is 300 000 wafers a month. The Chips Act will not solve that problem and the activities in Europe will not either. There is really nothing significant being done today if there is a drastic reduction in the supply chain from Taiwan in the next three to five years. That is a problem and we think that the cost of addressing that could be up to USD 200 billion but again, we think it is important to prevent it from happening. This requires diplomacy and unfortunately we have seen a lack of that in many areas at the present. Since this is a world policy council, maybe there are some smart people who can actually address this problem and provide diplomatic solutions because there are really no solid economic solutions currently in place.

**Helmut Gassel**

I want to add to that. When it comes to so-called leading-edge technology, 15 years ago there were 10+ companies competing to be the first on leading-edge, semiconductor technology develops in so-called nodes, it takes steps. Every step of the way, two to three of the companies fell off the wagon and were unable to keep up with the speed of development in the semiconductor industry. That has led to the point where there are two and a half or three companies left that are really fighting for leading-edge and TSMC is clearly leading the pack. I say that because if somebody had wanted to prevent the current situation, they would have needed to step in at least 20 years ago and because we did not do that we are where we are. Much is being done and probably the most effective one is bringing TSMC's capabilities into several other places, but it takes at least three to five years to be somewhat less dependent in comparison to the current situation. That is just a matter of fact and all we can do is do whatever we can to really grow our independence, or become less dependent than in the current situation. Tremendous efforts are being made and I would probably not formulate it as drastically as Handel, but I agree about the Chips Act not cutting it, they will be a contribution but they will not be sufficient and it needs a lot more than that to really grow that independence. Or you can formulate it more positively, to strengthen the capability of the rest of the world in comparison to Taiwan.

**Max Mirgoli**

First, I encourage you to believe in the good of people. I am a naturally optimistic person and even though bad news sells better commercials, I hope you can focus on the good. If you are going to scenario plan for the worst case, if there is a disruption in supply from Taiwan on the most advanced nodes, which amounts to more than 80%, then we will have a problem globally. That said, I agree with Helmut that the Chips Act's intention is to remedy that. Let us hope that remote possibility does do that. Furthermore, you have to realize how we got here. The semiconductor industry was maximizing costs for the last 40 years and as a result you

wake up in the United States, I live in San Francisco the birthplace of integrated circuits, and we found ourselves with absolutely zero manufacturing in California. It was because we wanted to optimize for costs and today the optimization needs to be based on other factors and the industry, with veterans like you guys, is working on shifting it again without really sacrificing the cost and the benefits those have brought. We are working very diligently in the industry. Handel and I were in Honolulu two days ago at a conference of CEO, and as an industry we are focusing on planning for the worst case scenario but we are also conscious that some of the geopolitical tensions are outside our control.

### **Paul Boudre**

Is there another question?

**Jean-Pierre Cabestan, Senior Researcher Emeritus at the French National Centre for Scientific Research (CNRS) attached to the French Research Institute on East Asia (IFRAE) of the National Institute of Oriental Languages and Civilisations, Professor Emeritus at Hong Kong Baptist University**

I have a question for the whole panel but maybe more for Handel. Do you think the restrictions introduced by the Biden administration in terms of semiconductor transfers to China will help the US to keep an edge over China? The second part of the question is about the European manufacturers or designers of semiconductors. How far can Europe stay outside these restrictions? And what is the EU doing to prevent China from catching up?

### **Handel Jones**

The US Chips Act has some positives. It does now recognize the importance of semiconductors. The amount of funding for manufacturing is something like 39 billion but there are 500 applicants for it. I think it is really good that the leaders understand the importance of semiconductors and we see the same thing in Europe, understanding the importance of semiconductors. What China is doing is accelerating development of mature technologies and trying to do what companies do in advanced technologies with them. For example, the Huawei Mate 60, which was done pretty much with full China technology, which is 7 nanometers compared to 3 nanometers for Apple right now, so it is two or three generations behind. China is putting a big emphasis on trying to be as self-sufficient as possible and we think that is going to work over the next three or four years, but there will be problems in the longer-term. I think it is really good that the world really understands the importance of semiconductors and what we do see in Europe, and we do work with some European companies, is a high-level of innovation. Right now STMicro is a leader in silicon carbide for autonomous vehicles, and they are actually a leader by a significant amount. The difference between the number two and number one is pretty big. Infineon might dispute that but that is our opinion.

As I said, Europe is also very strong in sensors which are really important in terms of applications. I think it is really good that we are getting this political attention but the costs of participating in advanced technologies are so high. For example, to put into capacity for 50 000 wafers a month in 2 nanometers cost USD 30 billion, it was USD 3 billion for 28 nanometers 10 years ago, so 10 times. The costs of participation are going up, but so are the rewards because of course you get big revenues. I am very positive about the fact that we are recognizing the problems and there are specialty areas that do not require advanced technologies but basically have very high growth. In addition to silicon carbide we see Gallium nitride having high growth, and the sensors I mentioned have high growth potential. I agree we should have looked at this problem 20 years ago but we are looking at it now and hopefully we will not have significant political supply chain disruptions because frankly, if there is

disruption from Taiwan it would be bad for China as well as the US and Europe, so it would be bad globally. Hopefully, sane minds will not lead to catastrophe but when you plan certain things you have to look at different options, the optimistic, realistic, pessimistic and very pessimistic. Hopefully we will not have catastrophe but, as Helmut said, we should have planned this 10 years or maybe 20 years ago. We are now doing things so maybe in the future we will be in better shape.

**Paul Boudre**

The last question.

**Song-Nim Kwon, Executive Director of the World Policy Conference**

We are talking about semiconductors, but where are we with superconductors? Are we still a long way from that or almost there?

**Max Mirgoli**

First, as was mentioned before, this industry should get the Nobel prize for genius inventions over the last four years, so we are diligently working on new materials. I was with the CEO of Intel two weeks ago and he was not joking when he said that we are only using one-third of the periodic table, we still have two-thirds to go and we will definitely go there. I think supercomputers goes as Francois Barrault is working on the quantum computing platform. Right now the latest and the greatest being produced is about 100 cubits. Honestly, I think Francois' team is counting on 50 to 100 cubits and Sandbox is one of the best out there. We are working as an industry to produce supercomputers because right now what Sandbox is doing on drug discovery is doing in less than four hours what would have taken years, with that number of cubits. The industry is making humungous progress but what is needed for that is an environment where innovation can happen and the geopolitics are getting in the middle of it, creating redundancies across the globe, making it difficult to collaborate with the best minds. However, as an industry since I am an optimist, I would say stay tuned to this channel.

**Paul Boudre**

As a quick conclusion, I think you all understand that this industry is supporting the next 20, 30, 40 years in terms of applications that will be around us. We have all these verticals that are really supported by semiconductors and innovation is at the bottom of it. Innovation brings leadership and there are new parameters today. This leadership is also equivalent to sovereignty so even if you want to play in the policy world, it is very important to be very active in this industry. There is room because this industry is now, as we said, transforming itself. We are moving from globalization to regionalization and we believe that the Gulf region has a big role to play in this race.

That is the end of it, thank you very much for attending.