HL INFLUENCERS: DIGITAL TRANSFORMATION

TRANSCRIPT

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Leo von Gerlach	Hello everybody and welcome to another edition of *The Influencers*, our podcast conversations on digital transformation and law. I'm Leo von Gerlach and with me today is Marcel Quennet, CEO and Co-Founder of Quantistry. Quantistry is an innovative powerhouse on the edge of chemistry, in particular material science, quantum technology and artificial intelligence. It uses quantum technology and artificial intelligence to boost the development of next generation materials for application in various industrial fields like energy generation and storage. So great to have you, Marcel.
Marcel Quennet	Thanks, Leo. Thank you for having us. It's a pleasure to be here today and tell you a bit more about what we are up to at Quantistry.
Leo von Gerlach	So Marcel, well, that sounds all very complicated. Quantum artificial intelligence. How to combine that with material science. All that alludes already that you have a strong scientific background. You just presented your PhD in quantum chemistry. You have significant research experience before just founding Quantistry. Perhaps you will tell us a little bit about your journey and what eventually triggered you to lay the foundation for Quantistry.
Marcel Quennet	There are actually multiple paths throughout my academic and professional journey which stem, basically, into Quantistry. So I've done a PhD in quantum chemistry, especially on the application in the field of solar cells. I worked for quite a while on novel solar cell material, and that's based on quantum chemistry. With the help of super computers, and also with the help of machine learning at the time. After my PhD, I worked in the industry in an innovation consultancy in in the IT field with companies like Volkswagen, Audi and and some German banks. Again, quite a lot of IT experience. Furthermore, afterwards I co-founded a deep-tech venture builder where we create deep-tech ventures for sustainable future. Throughout that process I had to look at many projects, both on the software side, but also the hardware side. At some point I was drawn to the idea of focusing on long ventures where I can really create the most impact, and also use my combined skill set from the scientific side, from the IT side, but also from business aspects. This resulted in

	creating Quantistry with the mission to really act strongly, accelerate the materials development for next gen materials, for example, as mentioned at the beginning application in energy storage and generation.
Leo von Gerlach	Wow, that's yeah, quite a journey and perhaps just digging a little bit deeper there. Just perhaps how did it dawn on you that you could boost research and development R&D in chemistry on the basis of quantum technology on the one side and artificial intelligence on the other side, combine it, and forge something new out of it?
Marcel Quennet	Through my PhD and my co-founders, we have seen that this technology is actually having a strong impact in the R&D, for example, of mobile batteries of solar cells. But at that time the technology was not fully there yet. So, we have grasped the initial stages basically and seen the initial benefits. But it took still quite a while to see the benefits of an industry, and I would say with the shifts, shift coming in end of the 2010, so 2016, 17, 18 with the advancement in quantum computing on the one side. But also, anything coming from from the field, we have seen that this is not exact right time but the technology is there, and the use cases are there where we can really solve them, industrial use cases with both technologies.
Leo von Gerlach	And how does this then translate into Quantistry offering and, in a way what makes you stand out? What you can bring to the table, that maybe nobody else has in that depth and specialty?
Marcel Quennet	That's a great question, Leo. What we offer with Quantistry is a holistic platform for chemical materials R&D, with which clients can, with a few simple clicks, optimize design and discover novel materials for various applications. So we are quite expert industry agnostic in what we do because the technology can really broadly be applied. What makes us stand out is that we develop and our platform in a quite customer-centric and use-case-centric way. That means for various use cases, industries, there are different routes to get to a solution. And to really map out the space and create a holistic experience on the one side but also holistic solutions for industrial problems, we combine on the one side, AI for specific use cases, but on the other side also upcoming quantum computing. And because they are different, the different paths can be met with either one or both technologies, and depending on what the problem of the client is, one is actually more applicable than the other one.

Leo von Gerlach	So staying for a second with the offering and how that translates into use cases, and just for me to understand it a little bit better … I understand it's about material science, new formulations and that may touch on next generation batteries, and that may touch on sustainable plastic. Could you elaborate on those use cases and where it really makes a particular difference?
Marcel Quennet	So, there are actually quite a lot of use cases in the fields of chemistry where our offering is applicable, and also the technology itself. Two of the most promising ones you already mentioned. For example, in the terms of battery development, which is I would say quite a hot topic in today's world, but also if you think about more sustainable materials in forms of plastics. In terms of batteries, you could, for example, think about, how can you create a battery with the same performance but way lower costs? Or, how can you create a battery of the same cost but a way better performance? One of the keys here is to really design and optimize and discover modern materials which then go into the battery, and which make the battery capacity happen. Another factor which is quite beneficial here is that you can also design these materials to get rid of issues. If you think about rare earth metals, which are geographically located in a few selected countries worldwide, and where we are seeing now step-by-step issues in the supply chain. These are some of the many possibilities. So really, designing and optimizing materials for various use cases, and then ideally, cutting out a lot of the value chain in terms of the traditional R&D pipeline - being as digital as possible up to a point where [you're] then going to the lab and produce the battery.
Leo von Gerlach	All right. I think now we should come to the hard part of the conversation and that's about the technology that underpins what you are doing. It's a little bit mind boggling that you have something complicated with quantum technology on the one side and equally, just deep and complex like artificial intelligence. Just on a surface before we dig a little bit deeper later on, how do you utilize these technologies and how do they interact to deliver your platform?
Marcel Quennet	So, we use both technologies in a top-level description for different use cases. So, in terms of quantum computing, this is something which for example, makes the description of materials, or can make description of materials way more accurate and better than on classical computing. So what we gain here on the platform is a more accurate, more precise description of, for example, material properties. If you have a look at the other side, artificial intelligence helps us and our clients to find novel materials. So these are basically great synergies between both technologies which span across the use case end-to-end. For example, with artificial intelligence, I can find another material or a more sustainable polymer for the application of the plastics, and with quantum computing, I can actually prove that the polymer has the

	properties I actually need and with that we can cut out way more of the lab work than ever before.
Leo von Gerlach	That makes sense. So quantum is a little bit more in terms of testing and analyzing and artificial intelligence to clear out the field and sets the focus on something specific. Let's stay for a minute with quantum. How does the specific properties of quantum technology then allow you to do this deeper level of testing and this perhaps faster and more elaborate way of testing materials.
Marcel Quennet	A lot of properties coming from materials or molecules in general are actually coming from the quantum level. That means you need to describe your material on the quantum mechanical level to extract the properties. Nowadays, we are all doing that on classical computers with a lot of approximations, which means the results are not highly accurate. They may actually be inaccurate too, or wrong, depending on what you do. Within quantum computing [there] is actually the perfect system to accurately describe these materials, because the quantum computer is a quantum system and your materials are quantum system and so you have basically a one-to-one mapping of the material you simulate, and the computer you use to simulate the material. What this will result in, in theory, is that you can accurately and precisely assimilate the material properties without approximations, which then gives you the benefits of doing even fewer lab experiments at the end of the day.
Leo von Gerlach	I love this because in a way it uses quantum technology for what it was designed for in the very very first place, in the early time, just simulating quantum mechanics by means of a quantum computer. So, this is really cool stuff. Perhaps just jumping to artificial intelligence and you said that this is more for just singling out certain use cases, certain materials for certain purposes. Can you also just explain how the mechanics work there and how you use that specifically?
Marcel Quennet	Of course, the lines will get more blurry when the coming years between quantum computing and artificial intelligence. But one of the most prominent cases for artificial intelligence is the fact that there's actually quite a lot of data companies have that is public, or we at Quantistry we have and produce, which are bit too much to analyze and build models on in a classical way. And for that, we use artificial intelligence to maybe to figure out a lot of the data that we have. What is the best material for certain application, for example, as a polymer? It's really quite a multidimensional and really really complex problem which we are solving on the basis of artificial intelligence. At the later stage, there is of course also a great synergy between artificial intelligence and quantum computing, which is basically quantum machine learning, but we'll also talk about this later.

Leo von Gerlach	That's extremely just helpful for my understanding, and perhaps now just translating this into what it means for people in an actual research and development department and the challenges these folks face there. Can you perhaps just tell us what you see as the biggest benefit that you know to all the challenges they have, to which you provide some response?
Marcel Quennet	Yeah, if you think about the traditional chemical and material science company, one of the many issues they have in R&D is that it's extremely cost intensive. On the one side, it can take billion of euros to get to a new material, or also a pharmaceutical ingredient, if you think about the pharmaceutical industry, and it can also take up to a decade of getting to that material if you go through the full pipeline from the initial R&D phases to the production. And this is quite a challenge for the top-level company of course. And if you think about the current times with high energy costs and a lot of innovation pressure and this get even more tricky. If you zoom in a little bit and have a look at the R&D departments, they, of course, have the same issues and they really need good help on hand to make their work more efficient, be faster, and also do less cumbersome work in terms of the lab experiments. And this is where quantum computing and AI is actually quite complementary to what they do in the lab. So instead of doing all the lab experiments manually, they could first use both technologies to get an initial prediction or direction coming from the computer. And then, only to target those lab experiments and where they are actually needed, we see this is a strong benefit for any company out there in both chemistry and material science and to use it on a really daily basis by people in the lab to speed up the R&D and also make it more cost efficient. At the end of the day, what we haven't talked about also make it more sustainable. With less lab experiments means also less chemical waste and less energy usage and so on.
Leo von Gerlach	So, in a sense enhancing digital simulations to drive down costs to make it more sustainable. Yeah, I think that that makes total sense, and kind of leading to the look ahead of what you think will be the trends for R&D departments in an industrial context going forward, will they remain the same? Will they shift? Will they change? So, where's the train heading?
Marcel Quennet	I think the direction is pretty clear. The train is strongly going into the direction of visualizing anything that's possible as much as we can. This starts of course in in the early R&D stages with employing more predictions of simulation based on quantum computing and AI, but goes then step by step along the value chain. If you think also about having a look at self-driving labs, for example, where the lab is fully automated, they are only robots that basically do the lab experiments. And then you have the computer doing the predictions and you have the self-fulfilling loop here. And, so what, what we see coming is that especially in the industry with our clients that get more and more

	automation coming in, more and more usage of AI and quantum computing, that you get to a fully automated stream in terms of R&D. And with that you can really drive down the cost and accelerate which is strongly needed, within Europe, but especially Germany nowadays.
Leo von Gerlach	Wow. So, kind of digital trends is only the beginning, but then a whole new world opens up to find really new ways, new materials to just incredibly and brutally speed up proceedings and come to better results. Marcel, I think that has been extremely enlightening, so thank you so much for the conversation. I thought that this was great and thank you everybody for tuning in and I hope you'll join us again when we have the next edition of *The* Influences. Until then, take care. Goodbye.
Marcel Quennet	Thank you very much Leo. Have a great day.