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DDIB TECH TRENDS SERIES: NATASHA KELLY

AUDIO TRANSCRIPT

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STINGER: You're listening to Driving Digital in Biopharma. A podcast from Accenture. Your host is Tom Lehmann.

TOM LEHMANN: Welcome to Driving Digital in Biopharma. In this bite-sized episode focused on Accenture's 2022 Technology Vision through a supply chain lens. For more than 20 years, Accenture has developed the Technology Vision report as a systematic review across the enterprise landscape to identify emerging technology trends that will have the greatest impact on companies in the coming years. This year, the trends look further out into the future than ever before, while still remaining relevant across industries and also remaining actionable for businesses today.

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In today's conversation, I talk with Accenture's Natasha Kelly. As a data scientist within Accenture's Applied Intelligence Group, Natasha is focused on advanced analytic solutions in life sciences manufacturing and supply chain. Before Accenture, Natasha was a biological researcher with a specialization in animal behavior and evolutionary theory from Yale University.

Welcome Natasha to Driving Digital in Biopharma. It's great to have you here today.

01:04

NATASHA KELLY: Thanks, Tom. Delighted to be here.

TOM LEHMANN: I'm looking forward to continuing the series of discussions we've been having about Accenture's 2022 Technology Vision, with a focus in this particular episode on supply chain and operations in life sciences. It's a topic we haven't had a chance to talk about yet. So perhaps we can start with your view of the metaverse continuum trends from that supply chain operations perspective. Any more specifically, which trend do you see is most relevant for supply chain?

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NATASHA KELLY: Sure. So I'm going to assume that your audience is familiar with some of the trends as you've already been talking about them. So let me just start with one, a little bit of flip that question on its head. The least relevant for supply chain is WebMe. And the reason it's the least relevant is because a supply chain is a little bit removed from the direct interaction with the customer that direct interaction with the patient. But that's not to say that it isn't going to become more relevant in the future.

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And particularly as we see the rise of cell therapy and cell therapeutics, where the patient is both the raw material and the end consumer,

we're going to see WebMe become more important and more applicable in the future, but right now, it's not quite there for us. It's actually difficult to separate out the other three trends when we get into a supply chain—that Programmable Worlds, The Unreal and Computing the Impossible.

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And that's because they actually marry together very nicely, and that's what gives them their greatest power within the supply chain. So, for example, you might have something like digital twins, which are built using synthetic data, so that's your computable world and your programmable world and your unreal. And then you can use quantum computing to really make real time simulation possible and achievable there.

And can I just nerd out for a moment?

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TOM LEHMANN: So you mention digital twins in there and that's not a new concept, I would say, for a lot of organizations. So are we already seeing these tech vision trends broadly in use within life sciences supply chain and manufacturing or is this still in the early days?

NATASHA KELLY: The answer is yes, we're already seeing it. Or the other answer is yes, it's already in its early days. But it's certainly the most mature trend that we see within the life sciences industry.

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And this is very much reflected in the fact that we have about, I think it's 89% of biopharma executives believe that programming the physical environment will emerge as a competitive differentiator for their industry. And the reasons that we see such a focus on that programmable world is because it has the potential to address many of the industry wide challenges that our clients are facing.

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So COVID-19 turned the industry on its head. It was a real disruptor, but it also demonstrated a lot of the possibilities that could be realized and which the industry are not realizing. So you have Moderna, which brought a vaccine from drug discovery all the way to commercial manufacturing at scale in about nine months' time period, whereas for most of our clients they think they're doing well if they can do that in nine years.

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So we now have a lot of our executives going, "Hang on, this is possible; why aren't we doing that and what do we need to do in order to be able to realize that?" And that is a trickle-down problem that we see across the industry. And it isn't just drug discovery to commercial manufacturing.

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It's not just that accelerating product launch and scaling that we see, but we also see all of the other things that Covid brought to light, which was we need to enable a better, more responsive, agile operations—and we can do that through advanced analytics and digital technology. The supply chain needs to be more resilient.

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We saw so much disruption of supply chain over the last couple of years—and it wasn't just that the global economy was shut down and that people weren't able to get to work or get to the places that they needed to be—but it was also that critical resources were being diverted to different parts of the industry.

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So medical supplies and drug manufacturing equipment is being diverted to vaccine manufacturing, away from, say, cancer drug

manufacture. And the supply chain needs to be resilient to that disruption in the future. We also, because we're seeing, this drive to accelerate your product launch and your scaling, you're also seeing that you can't let product integrity and quality slip during that.

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And with these new technologies coming online and coming online so fast, you need to be able to upskill and retain your talent and your workforce, so that you don't have—even if your capabilities are there within your equipment—you need to have the people who know how to take best advantage of that equipment. And so those Programmable World trends all provide the ability for our clients to address those problems.

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And so, to give a concrete example, one of the things that we are talking to clients increasingly about are digital twins—but digital twins not of equipment, which is how I think a lot of people think of digital twins—but digital twins of the actual biology and the physics of what is happening inside of the equipment.

So the team that I have here in Ireland, we have a collaboration with the National Institute for Bio Processing Research and Training here. It's a government funded research institution here.

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And together with them, we have developed out a biology digital twin, which actually uses metabolic equations and transcriptomics in order to optimize what is happening within the cells and how you're growing your cells in order to increase your yield of active ingredients for your drug product inside of the bioreactor.

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And that wasn't possible a couple of years ago. And now this is pushing the boundaries, but it's not pushing them that far. This is an area that is really a huge interest for our clients—and it is what they see is the natural next step. It's not far in the future. It's “my next thing that I do.” It's the next two to five years. And so it's really interesting to see what our clients are already pushing and moving the boundaries on what was “here's what you'll do in the future,” to, “Here's what you can do now.”

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TOM LEHMANN: When you see digital twins, as you mentioned in there, as part of this programmable world and beginning to push the boundaries, but as you said, in closing there maybe not too far, right? Maybe the perspective on how far the boundary is going is being readjusted. What do we see then as the biggest impact or biggest potential for some of the other tech vision trends to also push the boundaries?

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NATASHA KELLY: So I'm going to be biased on this one. I am a data scientist, and so anything that gets me more data makes me very, very happy. So for me, I think the biggest impact and the biggest potential is that Unreal. Synthetic data is really going to be a game changer, especially for our ability to embed advanced analytics and artificial intelligence throughout the end-to-end supply chain and manufacturing process.

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It has multiple applications. But one of the big challenges we face within the biopharma industry is that it is a risk-averse industry and advanced analytics is built on historical data. You look at what happened in the past in order to be able to predict what's going to happen in the future.

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But in a risk-averse industry, you don't have a lot of the bad historical events—you don't have

catastrophic failures, you don't have the edge events. And so synthetic data allows you to create those events in a safe environment and to explore them, so that if these “black swan,” these once-in-a-lifetime events do happen in the future, you actually have models that already take that into account.

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And the thing to bear in mind is that synthetic data has to be based on real-world data. So you have to have a starting point within the real world that you then extrapolate out from. You are not just creating random data sets of what might happen. It has to be based in reality. But in order to have that real data as a starting point, you have to mine data from within the biopharma industry—and in the manufacturing space that's relatively easy.

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But if you think about being able to say, predict adverse effects of drug manufacturer, or be able to predict adverse reactions in patients, which then may filter down into the supply chain, then you are talking about that personal data. And so there is a real potential within the biopharma industry to monetize the data that is being collected.

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But if they do this, they have to do it in a way which is transparent and which involves patient-centric digital trust. I actually had a call today with some of my colleagues in Barcelona and they're already working on doing this type of synthetic data generation, using historical patient record data, in order to really expand the capabilities and the possible avenues that you can build advanced analytics on.

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TOM LEHMANN: So it sounds like good progress is being made in the industry, right. Significant potential as you just described around what could be out there and perhaps what some of the historical limitations have been. As you look across the industry, who are some of the frontrunners that are already breaking new ground with these trends?

NATASHA KELLY: So we're seeing them in places you might not necessarily expect. So for example, we're seeing regulators like the FDA starting to explore things like blockchain and NFTs in order to expand and speed up the regulatory approval and regulatory filing process.

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We're also seeing companies like Medable and Science 37 who are expanding passive data collection and capture through monitoring and diagnostic devices. So again, that's building up that baseline data in order to be able to do synthetic data. If we look at the big biopharma companies.

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So we have companies like Sanofi, who have their Framingham Lighthouse facility, which is a digitally enabled continuous manufacturing facility, which is focused on achieving high sustainability. Like I said earlier, Accenture has been pushing the envelope on this, especially with what can be achieved using biology-based digital twins. And within supply chain, most of the synthetic data generation companies and partnerships are more focused on clinical trial data.

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So we don't have very good examples within supply chain for companies that are doing that. But we are going to see that gap close as cell therapy becomes more of a larger part of the industry and a larger part of our clients’ portfolios, where they need to figure out the supply chain for that. And so what we'll be seeing there are anonymized patient data sets, like that generated by the NIH for COVID-19,

and which can be used as a foundation and to help predict side effects during process development.

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And then if we think about the quantum computing and that computing the impossible space, manufacturing itself is an incredibly data rich environment and dealing with all of that data is a challenge in and of itself.

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And so we see partnerships between Western Digital, Microsoft, Twist Bioscience and Alumina, and they're looking to see if we can expand our ability to store more data, using less energy and being more cost efficient—which would be hugely beneficial, because the amount of data you need to really build these models is actually a challenge in and of itself and storing them is difficult.

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And then we also see companies like AstraZeneca and GSK who have a partnership called Cambridge One, who are working with Deep Mind in order to push the boundaries in order to solve biochemical structure problems. You may have seen it earlier this year, there were headlines about having cracked some of the problems around protein folding.

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And that's really important in the biopharma industry because proteins can fold in different ways prost transcription. And so what you're manufacturing, if it folds the wrong way during manufacturing, that protein is no longer an active ingredient for your drug. So we actually see loss of yield because of post transcriptomic modifications.

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And if you can understand more about protein folding, you can start to predict those modifications and actually see the knock-on effect in terms of optimization of yield and drug manufacture—and the ability to get more drugs to your patients quicker. So I think there's a really interesting number of applications which we're seeing a lot of investment into and high profile partnerships to try and achieve that.

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TOM LEHMANN: Those are some great examples, right? And very much a view of what's happening here and now, which is wonderful. So part of this is the future view of these trends. but the reality is we've been talking about is this is occurring in today's business. What's next? If you start to look to the next horizon, particularly in supply chain manufacturing, what are some examples that you'd see around what's on the next horizon?

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NATASH KELLY: I think the biggest changes we're going to see and they're going to be real changes, they're going to be changes in people's ways of working and the way that they interact with their colleagues and with their day-to-day tasks in their jobs. So if you think about more and more virtual and extended reality applications—and I know I've talked about digital twins a fair bit—but digital twins in all of their forms as a virtual representation of the physical world, you're going to see it impacting a supply chain worker in all different areas of their responsibilities.

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So for example, if you have a greenfield site, you'll see the use of those technologies in the design and commission of infrastructure in order to have the most efficient plant, in order to have the best structure and infrastructure, the best set up for your supply chain, and the real optimization of people's times and energy. You'll see training move into the virtual world rather than the real world.

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And a lot of this is both because it is safer for workers and because it's going to reduce waste. So a lot of the hands on training that you would see within the biopharma industry involves materials which are really quite costly and techniques which are quite sensitive to mistakes. And so you can move that into the virtual space.

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You can make it a safe environment for people to learn within and you can also reduce waste and costs as you do so. It also gives you the opportunity to actually have more experienced workers, help the more inexperienced even when they're not in the same place. If you're doing that virtually, you can bring collaboration, you can bring knowledge sharing into a space and really improve that human experience and that connectedness between your workforces so that they can—even if they're in different continents producing the same drug—they can share their learnings.

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We'll also see a huge amount of “what if” scenario analysis and planning all the way through a drugs life cycle—its end-to-end lifecycle through kind of the development and then from clinical trial to commercial manufacturing. That big step up, which we will see with the programmable worlds, the ability to game out scenarios in order to have smooth transfers.

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But also to improve the understanding of potential issues that may arise in the future and improve and streamline the investigation of root cause analysis and rare events before they can happen. So I think what you'll find is that the interaction between worker and technology is going to become even a larger part of most workers’ day-to-day than it already is. But what they can do within that space the technology space is going to be a lot more flexible to their needs and have a more direct impact on their day-to-day tasks.

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TOM LEHMANN: So let's close with one final question. So just given what you just talked about as far as the range of potential that's there plus the examples of what's already happening, what's your advice for supply chain manufacturing professionals and leaders to think about as they look to incorporate these trends into their business?

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NATASHA KELLY: So the big one is invest in the technology. Right? Invest in IoT. The continued sensorization of the supply chain brings with it huge amounts of data and with that data you open up huge possibilities for yourself. So invest in IoT, invest in digital Twin.

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The next one that I would recommend, it may be a real profound change in thinking and a change in culture. As I mentioned earlier, a lot of biopharma companies are risk averse. Whereas in order to bring in the types of benefits that the metaverse can realize for you, you are going to have to embrace a culture of innovation. You are going to have to try new things and some of those new things will not work for whatever reason, but unless you try them, you won't know why they didn't work for you.

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And so you have to bring in this culture of innovation, this culture that allows failures because you learn from failures rather than punishes failures. And then one of the things that leaders in this area need to embrace is new avenues of connection between the different parts of their supply chain.

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So supply chain is one of those classics siloed industries. You have planners who don't talk to plants and site manufacturers. You have process developers that don't talk to commercial manufacturing engineers, your sales teams that don't talk to the manufacturing sites. And what the things like the virtual world are going to allow you to do is to break down those silos.

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And so as a leader you need to encourage and create those avenues of connection. Otherwise you just repeat the same silos again and again.

And then the last one is invest in the future of computing. I talked about quantum computing earlier, but one of the things I didn't mention so much is that actually biopharma companies may become the computer manufacturers at some point in the future.

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There are research going on at the moment that looks at things like DNA as a seed and as an inspiration for how we might store data in the future, rather than in bits, but instead using DNA as our blueprint.

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And I think there is this real potential to be at the start of a new computer kind of expansion and innovation and revolution within the industry which the biopharma industry is uniquely placed to take advantage of.

So those would be my main tips: invest in digital twin and IoT, invest in a culture of innovation, breakdown your silos, invest in your avenues of connection and be open to being the future of computing.

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TOM LEHMANN: I think it's a very helpful way to close out the discussion. I appreciate the insights. Again, not only what's happening today, look a little bit into the future, what the potential is, and then as we just closed around what needs to happen in order to really make this a reality and to make it successful—and as you say, a little bit of courage to try some new things. This has got to be part of the process here.

So I thank you for joining. This has been really helpful and an interesting discussion and again, do appreciate you joining.

NATASHA KELLY: Thanks Tom. Great to be here, really enjoyed it.

22:49

TOM LEHMANN: Thank you for listening to this episode. Please be sure to listen to our other episodes focused on Accenture's 2022 Tech Vision. We explore topics including the impact of the Metaverse continuum in life sciences overall and within other functional areas within biopharma.

Join us for those discussions to hear how those trends apply and what's on the horizon. Also be sure to subscribe to our leading podcast Driving Digital in Biopharma, with more than 15 episodes now available and thousands of downloads around the world. It's available on your favorite podcast platform.

Until next time, this is Tom Lehmann with Driving Digital in Biopharma.

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