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BUILT FOR CHANGE: THE TECH TRENDS SHAPING OUR COLLECTIVE FUTURE EPISODE

AUDIO TRANSCRIPT

GREG: When I was in middle school, you know, as an art project, we made mouse pads and mine, I drew me sitting at a big computer and said that I wanted to have the biggest computer in the world.

MUSIC

JOSH: This is Dr. Greg Bowman.

GREG: And it turns out, mission accomplished.

ELISE: Greg is the director of Folding@home, a lab that, back in 2020, operated the most powerful supercomputer on the planet. They're using it to solve one of the most difficult biological problems we've ever tried to crack: protein folding.

GREG: I got really excited about protein folding really early in life, actually, uh, eight or nine was when I learned then that I have a inherited form of macular degeneration.

And so over the course of about a year, I went from having 20/20 vision to having about 20/200 vision.

JOSH: Greg's form of macular degeneration is caused by a single protein in the retina, which didn't fold properly. The proteins

01:00

JOSH: in our bodies are key to every part of us, folding into the structures that make up our organs. But sometimes mutations in our bodies mean that our proteins don’t fold like they're supposed to, and that can lead to diseases like Alzheimer's, Cystic Fibrosis, or Parkinson's. But here's the thing — protein folding is famously one of the most daunting problems in biology, because while we know that so many diseases are caused by malfunctioning protein folding, we actually know very little about how proteins fold.

MUSIC OUT

ELISE: Proteins can fold so unbelievably fast into an unthinkable number of shapes. The best we can do is capture occasional moments in the proteins' fast-moving dance.

GREG: If you've never seen a car before, you don't know what it does, and you want to understand it, and all you have to go on is a picture of a car in its most likely state — sitting in your driveway — and based on that, you have no idea what parts move, what parts don't, you have no idea which parts are more important for which functions GREG: And so, really what you want to do is be able to see that machine in operation.

JOSH: In order to understand diseases like Alzheimer's or macular degeneration, scientists need to be able to predict how proteins will fold. That's like trying to predict how a car is going to move without ever seeing the brakes, the steering wheel, or the gas pedal. Except it's infinitely more complicated.

ELISE: And that's where computer modeling comes in. The computer model can take these snapshots of what a protein typically looks like and simulate how the moving parts operate, how they talk to each other and how they may function or malfunction when you introduce mutations.

MUSIC

GREG: The ability to go in and see what's happening, you know, using computer simulations, instead of groping around in the dark. Our easy problems, even now, would take like a hundred years on a powerful desktop computer and that's just not going to work.

ELISE: But what about the power of say tens of thousands of computers? Enter Folding@home.

03:00

GREG: We provide the simulation engine, the client software, and you can see a description of what your computer is doing. And you can see a visualization of the protein. You accrue points in proportion to how much compute power you donate to the project.

MUSIC OUT

JOSH: Think of it like crowdsourced computing power, or even like a big multiplayer game.

GREG: You can form teams and see whose team can accumulate points the most, and people get really into it.

GREG: And the beautiful thing about this is that, in principle, is infinitely scalable, right? The more computers, the better.

THEME

JOSH: Distributed supercomputing allows research organizations like Folding@Home to solve previously unsolvable problems. They're using technology to reshape the world around us.

GREG: There's so much computing power on the planet, and so much of it is underutilized. And at the same time, there are so many important problems that basically have an insatiable thirst for computing power.

ELISE: I'm Elise Hu.

04:00

JOSH: And I'm Josh Klein.

ELISE: And this is Built For Change, a podcast from Accenture.

ELISE: Stories like Folding@Home kind of remind you how fast technology is changing, and that these new increases in computing power can suddenly make problems that were unsolvable… solvable.

JOSH: Yeah, it's exciting.

ELISE: Yeah.

JOSH: But when these new technologies change things so quickly - it also means that businesses need to change just as quickly to keep up, right?

ELISE: Right. And that's a huge challenge.

JOSH: It is, it is. So in this episode we're going to talk about that, about how new technology is expanding the boundaries of what's possible in business, while new digital environments are reshaping the spaces where we work.

ELISE: We'll explore how technologies cross paths with each other and with our physical world on a continuum of technology and experience. It's changing the way people and data move through this new, mixed reality.

JOSH: For starters, the technologies we're building today are tackling exponentially complex problems. And that was true for Greg Bowman and the team

5:00

JOSH at Folding@home when they engaged one of the most terrifying and complex problems we've faced: COVID-19.

THEME OUT

GREG: Literally the day before the stay at home orders, I like, called an emergency meeting of my group and our lab space.

JOSH: It was time to send up a flare and see who was ready to help. Fortunately for Greg, and for all of us, there were a lot of people waiting in the wings.

GREG: Because Folding@home has been running for 20 years and there's a lot of people that have participated at some time or the other. There was like family reunion aspects to it. Where all of a sudden, all these people that had been graduate students or had been like running Folding@home in the early years, or had been a active volunteer on our forum for awhile, all of them came running back to see how they could help.

JOSH: The lab immediately got to work on setting up the simulation software that volunteers could run on their personal computers.

GREG: And so it was quite the sprint to figure out this new area of biology in parallel with

06:00

GREG: trying to scale Folding@home up on a extremely rapid timescale, hoping we could keep it from crumbling in our hands, under the load of so many people looking to help us out with the science.

JOSH: Folding@home offered a way to help. And volunteers didn't need special expertise to pitch in.

GREG: The bulk of our volunteers are gamers actually, because they invest in desktops that are pretty powerful still, but there's a lot of people running on their laptops. So there's a lot of ways to contribute compute power. And there's a lot of ways beyond the compute power,

JOSH: Even businesses were getting in on the effort.

GREG: There's a European soccer league that has some significant compute power. And of course there were no soccer games. So they turned their computers loose

MUSIC

JOSH: Soon Folding@home was operating on over 400,000 independent machines and together they hit a computational milestone.

GREG: I guess it really came to my attention when someone tweeted that Folding@home had more computing power than the top 500 supercomputers on

07:00

GREG: the planet combined. And I saw this and was like, Oh, man, I hope that's true. [CHUCKLE] The Folding@home community, not just me in my lab, for example, but everyone involved like together, we built the world's most powerful supercomputer.

JOSH: This amounted to enough power to surpass what's called the excess scale threshold. When Folding@home was able to process an exaflop.

GREG: An exaflop means performing a billion billion operations per second.

JOSH: Just to put that in perspective, the world's fastest supercomputer at the time was only doing a fifth of that.

It was an incredible milestone. No computing project had ever processed so much data so fast.

GREG: And we were still just working on 20 different proteins that are important for this virus and not exhaustively seeing everything that's going on with these.

JOSH: As more volunteers added the power of their computers to the system, Folding@home, did a remarkable thing. They mapped the virus.

GREG: The payoff has been huge, so we have learned some really

8:00

GREG: cool things about coronaviruses and, you know, have a simple model that turns out to be surprisingly predictive of the severity of new variants.

JOSH: Of course, once a model of the protein has been mapped, the next goal picks up that data. And it looks towards the next target: treatment.

GREG: We participated in a project called the COVID moonshots, and we played a really active role in helping to computationally screen large libraries of chemical compounds, hunting for potential inhibitors of one of the viral proteins. And this has gone amazingly well.

MUSIC OUT

JOSH: The project is a collaboration between academic and industrial groups from around the world. And as Folding@home went searching for chemical compounds that could block the proteins of the virus, they came up with a number of very good candidates.

GREG: If this keeps going as well as it has, there will be a drug that can be produced cheaply anywhere, then distributed to parts of the world that have not benefited from the vaccines.

JOSH: Many of the volunteers who joined up to fight

9:00

JOSH: COVID saw the power of their collective effort and decided to stay on board. Today over 200,000 devices are still running Folding@home software and contributing to a variety of efforts, enabling the team to run calculations that would be impossible by any other means.

MUSIC

JOSH: Today, Folding@home is moving forward with projects on Ebola, Alzheimer's, cancer and more, and it's inviting volunteers to join in on all of them.

GREG: There was this vibrant community that's grown up around this and it involves people who really get into the, you know, computing side or who have a passion for one of the diseases we're working in.

You can, like, set a priority. So if you really care about Alzheimer's disease, because you have a family member who's afflicted, or you really care about cancer because your childhood best friend fought with cancer, you can prioritize that.

JOSH: For decades, computers that could efficiently solve the world's grand challenges have been a dream for later days, but with Folding@home and other super computing challenges coming online, those dreams are coming true.

10:00

GREG: Sometimes people will say like, “oh, do you have enough computers yet?” And the answer is always no. You know the real question is always, what else can you do if you give me more computers?

ELISE: I love the Folding@home story. And I love how expansive it is, you know?

MUSIC OUT

JOSH: Yeah. Yeah. It's incredible to see a very elegant solution to something like computing thresholds, just bust wide open what's possible.

ELISE: And I love that the foundation for this major breakthrough is collaboration. Getting people and systems to work together. And the things we're accomplishing now, Accenture calls that trend computing the impossible.

JOSH: Mhm. But supercomputing isn't the only technology that we're going to talk about. There's a lot of these elegant developments happening and they're creating a totally different world for us. So next, we're going to dive into some of the most exciting new technologies we're seeing and talk about how it's changing our world and the world of business.

MARC: We have evolved

11:00

MARC: into looking at not only the business of our clients, but looking at the world overall, how, how basically this technology is going to change deeply in everything we do, as a consumer or as an employee.

JOSH: This is Marc Carrel-Billiard, the Global Senior Managing Director of Accenture Labs.

MARC: That's where we incubate the new business of Accenture. As of today, we have robotics, we have quantum computing, we have multi-party systems and blockchain, and we have metaverse and extended reality.

JOSH: So if you want to talk technology and innovation, Marc is your guy. He leads the team behind the Tech Vision Report, an annual forecast of the emerging tech trends that will redefine business over the next few years, or in the case of this year's report: the next decade.

The “Computing the Impossible” trend explores some truly amazing developments. Take the way that computer-powered matchmaking is saving lives. And I don't mean supercomputers running dating apps. I mean, the way that new forms of computing are changing the life and death challenge of organ transplants.

MARC: When you transport an organ from a receiver

12:00

MARC: to a donor, it's all about matchmaking. The thing is that when you have the organ that you have to transplant, it takes a timeframe, a few hours to transplant it. Or the organ is no good anymore.

JOSH: That can spell disaster when the need is urgent, but a bad match can be a catastrophe too. It's literally a life and death issue. And the key is to balance matching all the criteria, but at an incredible speed.

MARC: So it's, it's a race, it's a race against an algorithm that you need to run, over multiple parameters that can take ages.

JOSH: But the new field of quantum computing promises to optimize the matching process faster than has ever been possible.

MUSIC

MARC: So what we tried to do is that we try to reinvent this uh, optimism problem using quantum computers, where are you going to be able to have much more parameters on the organ side, much more parameters on the receiver side. And then the medication that you take is minimum. And that's, that's the solution.

JOSH: Quantum computing for organ transplants and the breakthroughs of Folding@Home, are just some of the projects taking shape using advanced computing.

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JOSH: What used to seem impossible might just be coming over the horizon. Marc says that advanced computing is just one example of new technologies that will completely transform nearly every environment in which companies do business.

MARC: This year it's clear that we, we see a combinatorial effect of technology. It's going to create, like, a new reality for people.

JOSH: Marc is talking about the metaverse, which is the overarching theme of this year’s Tech Vision report. The new reality that merges elements we know, the physical and virtual worlds, in ways that we haven't seen before.

MARC: Everything that you do today in the real world. Eventually you'd like to do that in the virtual world or in the metaverse.

JOSH: Today, we work online, play games online and shop online, but all of those experiences are currently siloed from each other. We hop from one website to another, one app to another. And Marc says the technology shaping our next chapter will connect those experiences together into a seamless, single experience.

MARC: So we don't believe that, for example, metaverse is purely virtual. It could be a mixed world.

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JOSH: So imagine this, you start a new job at a manufacturing company. And on the first day, you'll put on your AV headset and walk out onto the shop floor. You could fix a physical machine, while looking at instructions in your AR headset. Or, you could even operate on a physical machine without touching the machine at all, by using a digital twin.

MUSIC OUT

MARC: Themselves will be connected using edge computing and the cloud to the real machine and through IOT connection and everything, everything that you'll be doing on the digital twin will be replicated on the real machine. So you will be remotely operate a real machine through a digital twin that will be in this environment.

JOSH: You'd even be able to do simulations to see what would happen if the machine breaks down or look up other critical analytics, like current supply chain data.

MARC: You'll be able to simulate supply chain, simulate breakdown and stuff like that. And, and you can anticipate failure.

JOSH: Back in 2020, the global digital twin market was valued at just over $3 billion. By 2030 it's expected to be 60 times that. So, as we move towards a world where the physical and digital

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JOSH: are inextricably linked, Marc says we can expect aspects of our physical world to be increasingly programmable. This is the trend that Marc's team calls "The Programmable World." It's about making our physical world customizable or automated. Even if you're familiar with the idea of "the internet of things," Marc says there are still some surprises to discover.

MARC: We even work on seeds.

JOSH: You heard him. Seeds.

MARC: ... and those seeds are smart enough to understand that based on the conditions, like weather conditions, they know the weather and the humidity, they drill a hole in the soil and they plant themselves. They're smart seeds.

JOSH: As our physical world becomes increasingly digital, and our digital worlds are expanding, businesses need to make sure everything is connected into one seamless and harmonious experience.

MARC: We call that a digital thread, okay, where you have all digital twins that work seamlessly together. Well, the problem is. All this digital thread and digital twins and everything,most of them are

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MARC: implemented in different types of platforms that are coming from sometimes very different industries and have different type of purpose in life. I mean, for what type of product they want to create. And there are no interoperability between the different platform, or not enough. It's like a lot of effort that is done in the industry where different consortiums are putting their heads together. I mean, to really solve that and work this out.

JOSH: This technology is pretty new and there's still kinks being worked out. So, where to start?

MARC: So the first thing that we say is that you need to get educated.

MUSIC

JOSH: Businesses should find ways to upgrade their tools. The cloud, artificial intelligence, augmented reality — they're already becoming the building blocks of our collective future.

Ignoring these tools means being left behind and abandoning the chance we have now to determine how these technologies will operate. For instance, consider the evolution of the internet. Today, more and more of our information systems are adopting distributed ledgers and blockchain technologies, a development 17:00

called Web3.

MARC: Web3, which is providing, like, a decentralized concept of ownership of assets, of identity, or the control that you have around the web that you don't have today.

JOSH: We'll explore Web3 more in a minute, but as Marc says, one way that it's significant for the way information moves on the internet is that it allows for coordination between platforms.

MARC: Today we use single sign-on type of things. I mean, to go from one website to another website with sharing an identity and stuff like that. Tomorrow, we need to make it like easier. And so we need to provide interoperability of platforms, but as well as interoperability of universes.

JOSH: So for instance, when you're in the metaverse, you want to carry what you buy from place to place: tokens, avatars, personal data, and more. With all your digital assets stored on the blockchain, you'll be able to carry your digital outfit with you from one environment to another.

MARC: Our view is that all these things together needs to, to work simultaneously and well-integrated to make the

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vision happen.

JOSH: At the moment, a future where all of our systems are well integrated and working together in parallel may seem far away. But the truth is, these systems are already being developed.

MARC: There is no way you can stop it. You need to adopt it and you need to leverage it in the best way possible for you and for your community.

MUSIC OUT

ELISE: So, Josh, where have you seen the digital and physical kind of blend in your life?

JOSH: Oh man, lots of places. Although, although, one thing that recently struck me is, um, one of my kids has a robot and you can use your phone to look at virtual objects that the robot then interacts with, which I thought was pretty cool.

ELISE: In augmented reality.

JOSH: Right.

ELISE: Yeah, that's awesome. I'm seeing more and more AR when it comes to entertainment, like I was at a conference and there were presentations going on on stage, and then they passed out tablets to everybody in the audience where you were enhanced. The stage experience was enhanced when you held up the tablet. So if somebody was talking about deep space, you could hold up your tablet and feel like you were there.

JOSH: Cool!

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ELISE: Um, based on what was projected on the tablets. So we're seeing that more. Though, I'm not sure it's really quite there yet. The potential is fully realized.

JOSH: Yeah, It often leaves a little bit to be desired. Right.

ELISE: Yeah, we joked how my metaverse was different than the metaverse of the person next to me because his tablet was broken. Right? But there's lots of examples of poor interoperability between systems.

JOSH: Like, one of the things that always gets me is that all these different technologies are so segmented that they don't always work across platforms, like Marc was saying.

ELISE: Yeah. And forget about AR experiences. There's poor interoperability, just in simple programs, like trying to open a spreadsheet that was made in one operating system,

in a different operating system. Like you're losing formatting, you're losing formulas.

JOSH: Yes! Right, right. Like, you know, we're now living in a reality where we can produce, you know, world changing vaccines in record time, but I can't export a spreadsheet from my computer to yours? Why is that dark magic?

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JOSH: That doesn't make any sense… So next, we're going to dive into the trend that the Tech Vision report calls “Web Me,” a reimagining of the internet that clears some of the roadblocks in the way that our systems connect. It’s about taking control out of the hands of just a few big internet behemoths, and finally putting people over platforms. The Web Me trend is about the metaverse, sure, but it’s also about the technologies we’re calling “Web3.”

SANDRA: Web3, as a lot of people call this, this next wave of innovation, we have now digitized value in the form of data. And now we're trying to build systems that move it around frictionlessly.

MUSIC

JOSH: This is Sandra Ro, the CEO of the Global Blockchain Business Council, the leading global industry association for the blockchain technology ecosystem.

JOSH: To really get at what makes Web3 new and powerful, it helps to get a sense of what came before: Web2.

SANDRA: Web2 was really the, the internet where you could send around information via email. So it became frictionless for

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anyone and everyone to essentially open an email account and send information along.

JOSH: Sandra says that operating our modern world on Web2 is creating a lot of needless friction in our everyday lives. It's just not efficient.

SANDRA: It sounds very simple, but today, especially in financial services or pretty much any business, that real-time data access across silos is actually non-existent. Most people don't have cross-institution or cross-organization updating of data. It tends to be very manual. Like I physically have to download a bunch of data and then I have to send it to you.

JOSH: The promise of Web3 is that this can change.

SANDRA: When people refer to blockchain, they could be referring to the technology where you are taking a number of databases and in a distributed peer-to-peer exchange of information that is then verified and then locked into essentially a real time audit

22:00

SANDRA: trail, which is a ledger. It doesn't matter where we are sitting in the world. And every time a transaction gets done, whether it's between you and I, or myself and another person or

an institution, it would get recorded and it would be updated for every single one of us. So now we all have real-time data.

MUSIC OUT

JOSH: Our current systems are designed for constraints that the next generation of internet won't have. Constraints like siloed platforms, lack of interoperability, and generally the challenge of moving data from one place in the internet to another. And because of the backbone of Web3 is what's called read-only ledgers, where information stored online is entered into a permanent record that everyone can see, it would be a big shift in how businesses interact online.

SANDRA: So the real time ledger system might seem like a very boring concept, but actually it is profound in its potential applications. Immutability. Transparency, you know, very difficult to cook the books now. So these

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SANDRA: have implications for reducing fraud, increasing transparency and trust, and these are all very good things. And further to that reducing costs for many businesses.

JOSH: The metaverse is evolving hand in hand with Web3, the reinvention of how data moves through the internet. And a major component of this new reality will be companies adopting distributed ledgers, and benefiting from instant access to verified data. So blockchain technology is changing how quickly and easily information is shared, but it may even change how people move in the real world too.

SANDRA: This might sound farfetched, but actually it is happening. The island of Barbados has actually passed a law that they are creating a digital twin in the metaverse, uh, of their ministry, uh, that issues like visas and passports. And the idea of this is that instead of, this kind of online process where you have to fill out forms and you might even have to go somewhere to get your passport, and it takes like six to eight weeks. These digital

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twin consulates would effectively do a lot of this processing very quickly.

MUSIC

JOSH: Joining metaverse interactions to the transparency of distributed ledgers means that the visa application process could become faster and more personal, that’s what the “Web Me” trend is all about.

SANDRA: A Web3 version of the blockchain infrastructure is one where maybe I'm interacting with an avatar representative

and actually can have a conversation. And the entire process of my visa, or let's say my COVID test results information—that all is tracked in real time for me to see.

JOSH: And not only that, Sandra views it as potentially a more secure way of processing data.

SANDRA: And also on the other side, the government side, they can see a tracking mechanism for that, which is blockchain based. Would be very difficult for me to tamper with it and vice versa. I think those kind of like layering of securing the data and verification will be important for those who care about the fact that their data is not being used in a,

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hopefully, a nefarious way.

JOSH: Of course, there've been plenty of reasons to be concerned about blockchain infrastructure and not least because of how unstable cryptocurrencies have been.

MUSIC OUT

SANDRA: As you see with most new technologies, there was a huge hype cycle. There was a absolute avalanche of bad actors who came into the space, all around the world. And unfortunately, without the guardrails of regulation and enforcement, it really became a free for all in 2017, and then of course you saw the crash in 2018.

I wish we could exist in a world where new technologies come in and everyone would just not try to scam people, but we do. And that's why we have to have some guardrails.

JOSH: Sandra is working with regulators around the world to make sure that blockchain technologies are being implemented according to their best potential, not their worst.

SANDRA: There's still a bit of wild west occurring out in different parts of the world where let's say regulation, hasn't quite come in in a, in a more um clarified way, but it's cleaned up a

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bit. I don't think it's cleaned up enough. When, uh, regulatory guardrails are you know defined and allow for innovation, good things can happen.

MUSIC

JOSH: And of course, as blockchain technologies develop according to clear standards, the groundwork is being laid for a new wave of innovation across industries. This will lead to a more seamlessly integrated digital and physical world. If businesses fully utilize Web3, a user can

carry different digital assets into different virtual worlds—to create one seamless experience. But it can be so much bigger than an avatar being able to wear last night’s virtual concert tee at virtual work the next day.

SANDRA: So one of the most promising areas that we're spending a lot of time is the tokenization of digital assets. And the one that I'm most excited about the moment which has progressed the most was voluntary carbon credit markets.

JOSH: Even though carbon credits are a super promising tool for fighting climate change, Sandra says, there are a lot of problems with carbon credits in their current form.

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SANDRA: It is fragmented. There is no common taxonomy, even in the United States of America, there are every state has different rules and different sort of metrics for how they look at carbon credits. It is definitely a market that needs the common definitions, common language and infrastructure.

MUSIC OUT

SANDRA: One of the biggest issues we're having is the fraud-trust-verification. There have been instances of mass phantom credit issues, meaning: a bunch of corporations, Fortune 500s, bought credits, thinking that, “Hey, I'm doing the right thing as a business” and then declaring themselves carbon neutral. But the reality is if you're buying phantom credits, you didn't buy anything. And your carbon footprint is actually pretty bad.

JOSH: With clear regulations, clever implementation of distributed ledgers could solve some difficult problems and create new opportunities too.

SANDRA: If we could start with a clean slate — in this case, we can — in a market that really

28:00

needs many different connections and information sharing beyond the common data and framework, we can do this with blockchain tech.

ELISE: It feels like with people getting a better understanding of these technologies, and some smart regulation that protects consumers... we are on the verge of some pretty interesting innovations.

JOSH: And if businesses get it right, they can help to build this world that really blends the digital and physical in a seamless way.

THEME

ELISE: In today’s episode, we’ve explored two of the trends identified in Accenture’s Tech Vision report, “Computing the Impossible” and “Web Me.”

JOSH: But there’s so much more to dig into. Like the way that our environments and business are increasingly filled with machines that really feel human in increasingly sophisticated ways—take a look at the trend Accenture is calling “The Unreal.” You can find all of that more in the 2022 Tech Vision report

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at accenture.com slash builtforchange.

ELISE: Big thanks to Accenture's Marc Carrel-Billiard.

JOSH: And to Gregory Bowman and Sondra Ro for talking to us.

ELISE: Built for Change is a podcast from Accenture.

JOSH: More episodes are coming soon. Follow, subscribe, and if you like what you hear, leave us a review.

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