David:	Welcome to the Microsoft Industry Experiences Team podcast. I'm your host, David Starr. In this series, you'll hear from leaders across various industries discussing the impact of digital disruption and innovation, sharing how they've used Azure to transform their business. You can find our team online at aka.ms/indxp or on Twitter, @IndustryXP. Hi. This is your host, David Starr. Today, we have a couple of guests who are going to be talking about blockchain and manufacturing with us. First, we have Joel Neidig who is the director of research and development for ITAMCO and the CEO of SIMBA Chain and blockchain is a service platform that runs on Microsoft Azure. Welcome, Joel.
Joel Neidig:	Thank you, David.
David:	Diego Tamburini is the principal industry lead for Azure Manufacturing in the Microsoft industry experience team where he focuses on developing technical content to help manufacturing companies and software developers deliver their solutions on Azure at scale. Thanks for being here, Diego.
Diego:	Thank you, David.
David:	In this episode, we will be discussing blockchain in manufacturing including blockchain as a service, the applicability of blockchain for manufacturing, how to get started with such a complex technology and how blockchain can help with compliance. First of all, I'll ask you, Joel, can you tell us about your organizations, ITAMCO and SIMBA Chain?
Joel Neidig:	Sure. SIMBA Chain specifically is a startup. It was sprung out of a research and development grant that we received from DARPA when ITAMCO and Notre Dame joined forces to develop blockchain secure messaging application. Since then, we've developed it into a blockchain as a service platform that anybody, regardless of your skillset, developer or brand new to blockchain can basically easily deploy distributed applications. ITAMCO specifically is a manufacturer, we're an OEM that we work mostly in the gear manufacturing industry and we develop products for companies like General Electric and Caterpillar.
David:	As you mentioned, you got a blockchain product as a service and what do customers get from that model?
Joel Neidig:	The business model regarding the service that we're providing is that they don't have to worry about the backend connectivity or different things with how blockchain operates. They're able to harness the power of maybe an application that they've already developed, and they don't have to rewire it to use blockchains. If they're looking for things that are like a trusted network, things that go outside their four walls, they want to have control of that there's not a central authority, that's where blockchain really has that power. We're looking more in just supply chain and manufacturing networks that may not be integrated with their supplier networks or their customer networks and that's

the service we provide. It's a very easily implemented backend and they don't have to know about the internal networking of blockchain.`

David:	Do you obstruct that with APIs or how do you provide that access?

Joel Neidig:	Yeah. Basically, they enter in their business model, so they put in their assets and transactions and define those. We basically create a workflow diagram. Then, on the extraction layers and API that we bring to them that they can easily plug and play into their legacy applications. This makes it really easy from as we get talking into smart contracts and different things like that, it's a really easy way to implement that to their current business processes.

Diego:	I wanted to add to what Joel just said that the model that SIMBA is following, which is kind of adding use case specific APIs on top of the blockchain infrastructure is actually a model that we're seeing more and more, as the blockchain hype is starting to settle down. Customers in a manufacturing company will rarely interact with the blockchain directly. They'll most likely do it through some partner application like Joel's SIMBA chain that starts or hides the details of the specific blockchain implementation in a more business orientated fashion.

David:	Yeah. To expand on that just a little bit, there is a lot of hype and noise around blockchain in general. Can you help us see the applicability in manufacturing, Joel?

Joel Neidig:	Yeah. Sure. Manufacturing, for the most part, we operate off of trusted networks. I know who my customers, I know who my suppliers are. We exchange emails and documentation whether it be in a shared network that we're secure file sharing or whatever, but I think where it comes into is highly regulated manufacturing processes. I'm talking about aerospace, the medical industry. We're thinking about people that are doing additive manufacturing that they need to validate. Where did I get this material? How was quality of the material? Is it to specification? The different industries like aerospace industry or the FDA regarding the medical industry, they need to know and be able to present in a ledger format, which is basically blockchain that it is validated and that it has not been compromised, and it's trusted. That's where not only the security layer but really focusing on that trusted layer in blockchain and that's what it actually presents.

We can have different operators that aren't in our trusted network, and we can trust them and that's really where blockchain is proficient. It's not needed in an area where you're ... Maybe it's just one or two suppliers, and you're done. These are more for complex supply chains that I don't always know where my second, third, fourth tier supplier got their raw materials. Blockchain, it sounds scary and it sounds like ... It's kind of like how the internet first came out, but it really is going to revolutionize how even from mortgages and title companies and even our identities, healthcare, it's really going to revolutionize everything

	and specifically, I think manufacturing is really going to benefit from the utilization of blockchain.
David:	It sounds like you're in a closed rather than an open consortium. Is that correct or no?
Joel Neidig:	Yeah. These are being more of a closed consortium that you're looking to formulate. It could be from a customer viewpoint where he's just looking into all these different supplier networks. I'm talking like a large OEM, or it could be a consortium like a bunch of small businesses that are working on related manufacturing processes that are supplying multiple under shoes. I'm thinking about the automotive industry where they have multiple supplier networks that aren't completely focused just on their product but they might supply other automotive OEM trying to track those.
Diego:	That's where we are seeing blockchain applications for manufacturing started to gravitate. In contrast to the first killer application for blockchain which was cryptocurrency, blockchains for manufacturing tend to make more sense in closed consortium instead of just open applications like Bitcoin. Still, where distributed trust is critical. It's still closed but you still need the trust, so you're seeing the early adopter use cases in manufacturing around supply chains, security, disability, transactions, recording, and also other big one is providence and traceability. If you have a material, a raw material or a spare part, how do you ensure that this is a legitimate part or raw material that is not a conflict material? Then, other use cases like issues, investigations, audits, asset management, they're still in closed consortium but where distributed trust is critical. That is, in my opinion, the sweet spot for blockchain and manufacturing.
David:	Is that how you see it, Joel?
Joel Neidig:	Yeah. I think, and especially in the intellectual property protecting that because if you look at ... The future will be where a supply store, let's say, it's a farm supply store, they're able to additively or 3D print an object that's in a catalog that's essentially stored on the blockchain and everybody's paid along that way. Whether it's back to the OEM or distributors or what have you, but that way that IP is protected and there's not counterfeit parts and things like that being printed. As you can imagine in a highly regulated area like an aerospace or in medical, that would be especially important.
David:	We've talked a little bit about how blockchain can be addressed, but it's usually got a pretty good learning curve for people who are getting started. Is there a way for them to get started more easily with the obstruction layer that you've built over it?
Joel Neidig:	Yeah, exactly. We have open sourced Android and iOS in web app, so people that know objective C or they've been able to develop their own mobile applications or Android applications, they can use our open sourced tools that

connect with our API. Literally, it's a few clicks on our platform to develop the back end network so they can develop their whole distributed network. Ethereum and Hyperledger is their choice. Then, they can deploy that very rapidly. We're hosted on Microsoft Azure, so there's a whole nother suite of tools that Microsoft Azure allows them to implement. I think there's a good synergy there that we're able to present to beginners.

Diego: Adding to that, one of the tools that Joel is referring to that I encourage our listeners to take a look at is the new Azure blockchain workbench which is basically ... Think of it as a development environment to develop and test and deploy business applications built on top of a blockchain infrastructure.

David: Well, you mentioned Azure there. What's your relationship with Microsoft and what have you gotten out of that?

Joel Neidig: It's been a very big benefit because Microsoft has given us a lot of support and just implementing our backend and presenting, giving us the ability to easily spin up our storage network and do some things like that because we not only offer the blockchain network or different nodes that we're spinning up, but we also offer off chain storage which is the interplanetary file system and SEF, and these are just distributed file storage systems to keep the blockchain ... As you probably heard, blockchain has the scalability issue. This is to keep the transactions minimal on the blockchain. Then, really where you're storing the files and other things are in trusted storage that you have encrypted hash codes that relate back to the blockchain too. Those addresses are linked and secured and encrypted. Microsoft's really, we've benefited from that and having that scalability as a platform.

David: It sounds like what a best practice might be here is keep as little data in the blockchain node as possible and have it point elsewhere to some secure data source.

Joel Neidig: Right. Yeah. You're trying to secure the transactions and you can secure the transactions [inaudible 00:12:12], but that is ... When you think about accounting or ledger or even a lawyer, we're just trying to validate that that was the right text file or whatever that was located or the program file or whatever and what we're really trying to do is keep that. You can have centralized storage or distributed storage ability, so not only can you store an [inaudible 00:12:35] database, you could store it in ... Like I mentioned, these other distributed file storage systems that were developed for blockchains. We're talking about ITFS and there's storage A, I think we installed and some other blockchain networks that allow you to store files that are off chain related.

Diego: Is that off chain storage address, some of the criticism about blockchain that is "slow," is is that people are trying to store too much stuff in the blockchain and slowing down the processing? Can you say more about that because I think it's important regarding the criticism of some people about the performance of blockchains and its relationship with storage.

Joel Neidig: Ethereum has this problem. On the main test network, not the main test network, just the main Ethereum network, it costs ... For one megabyte of storage, it costs $10,000. That's quite expensive, so lots of ether just to store in that. What they're trying to do is charting, where they're actually only maintaining ... There's these parent nodes and then child nodes that only store the most recent data, so it's like a first in first out. Once again, we keep on going back to accounting terms.

I think the guy that invented blockchain had to have been some accounting background. Where we've looked at it is like, "Well, let's store ... Yeah. Exactly. Let's speed up those transactions by having that off chain storage," and that's the answer that we're bringing forth to do that, and we're not the only ones that are implementing that. I think we just have a very simple way of doing it and a novel way of implementing that. It's not a new theory, but it is what people are moving towards and also it depends on what your redundancy is too. Do you want to have a lot of nodes out there, so you have thousands of nodes or is it better just to have private consortium just have five or 10 nodes and those are the ones that are gaining consensus? Along with that, we're harnessing the power of that off chain storage that's secure as well.

David: You talked about working in Azure. Are you guys using primarily past services or platform as a service or are you using VM's and such through IAS?

Joel Neidig: Yeah. It's a combination of both, but yes. We have VM spun up their services that are spun up as well. We have a combination of things that basically makeup our platform and make it very user friendly. Yeah. It's a good combination.

David: Sometimes this is a little difficult in talking it through without being able to draw, but could you talk us through your solution just a little bit and how it's organized?

Joel Neidig: I'll talk about it from Ethereum standpoint. What you have to do is you have to have a wallet and the reason why you have to have a wallet, and this isn't a wallet that's stored, it's really a wallet on the blockchain. It's a public address, so this is your public email address and you have a private key that's associated at that, which is basically your password and that's only something that you know. You don't want to share that with anybody because then they'll have access of all your transactions on the blockchain and have access to your wallet.

What they need to do is sign up. We have a really easy way to do a wallet. It'll generate the wallet right away for you, give you a public address with a private key and on the test network, you get some ether to begin with. It's really easy. We have a quick walkthrough to get started with that. The reason why you have to have that is because you have to sign these transactions. You're putting a transaction on the blockchain, you have to sign that transaction. The other part of what we do is there's a wizard, so you get your wallet. Now, you're able to develop your smart contract and that smart contract is an executable contract

that's basically coded contract that can execute when certain conditions are made. Then, the person will program.

Actually, they just select, "Okay. I'm going to track this container and it's going to go to this supplier. Next, it's going to go to that supplier." They build their whole business flow diagram and then what happens is once they hit the next button, it'll generate their API that they connect their applications to. Then, they can choose their off chain storage if they want to do on chain or off chain storage, however they want to do it. We suggest the off chain because it keeps it a lot lighter that way. Then, they just hit deploy. Right then, they deploy their entire blockchain smart contract and network right onto the Ethereum network and whether they're using a test network or private nose as being spun up on Azure, that's their choice. It walks them through it, so it's a four-step process. You can't get to number two until you've done number one and you can't get to three until you've done one and two. It just steps them right through and then have you have a deploy button right at the end. There's actually no coding involved in the whole process.

David: It also sounds like they don't have to talk to Azure directly or they don't have to go to the portal directly. You're obstructing that in your product?

Joel Neidig: That's correct, but they get to harness the power of Azure. That's the beauty of it. All done on Microsoft Azure. If there's more high end work that they want to do, they can go to Microsoft Azure workbench and do more distributed application blockchain programming.

David: You mentioned in an earlier conversation that we had that you guys have a freemium model even though you work with these really big organizations. Can you tell us a little bit about why you went that direction?

Joel Neidig: Yeah. You can sign up to our platform for just one application and it's $99. It's very inexpensive and then there's this transaction fee that go on with that to use our API. We did that because developers are really where blockchain is going to take off, so it's even the indie developers and they're going to be programming for small and medium sized business. It's very much an app store model where you can see how Apple and Google Play and even Microsoft marketplace where they've developed this whole suite of applications that harness their backend power and that's where we think we'll get critical mass to build out and get more people interested in doing blockchain and distributor applications.

Then, the focus obviously on enterprise side is government enterprise. Those are a lot longer lead time contracts, but they also have a need to implement and we want to get their developers also developing on our platform. That's how we've approached the freemium model to get interest in minimal support and then enterprise and government have a higher end support from our organization.

David:	You've mentioned your government business a couple of times now, and I've got one last question for you and that is every time the word "DARPA" comes up or the acronym DARPA comes up, nerds' ears perk right up because they do such interesting things with technology. If possible, could you tell us a bit about what you guys did with DARPA?
Joel Neidig:	Sure. Yeah. That's what kick started our company. We submitted on a grant that they were wanting a secure ledger for communications for being also DFAR, and don't ask me what the acronym is but it has to do with federal regulations and making sure that things are compliant. You'll hear about non-repudiation or immutability. Those are blockchain buzzwords for being decentralized in trust. That was a very exciting project that we were able to participate in and that continues on, so we're doing work with the Navy and Air Force, the Department of Energy. We just won a grant on for secure solar transactions, so we're harnessing our SIMBA platform to allow for all these instances when these government entities or people need a distributed secure ledger that needs to be able to be audited and that's really what blockchain allows for.
David:	That's fascinating. I've definitely learned a few things today but we've come to our time. I want to say thank you so much to Joel for joining us and Diego.
Joel Neidig:	Thank you, David. Thanks for having us.
Diego:	Yeah. Thank you, David and thank you, Joel.
David:	Thank you for joining us for this episode of the Microsoft Industry Experiences Team podcasts that showed that explores how industry experts are transforming businesses with Azure. Visit our team at aka.ms/indxp and don't forget to join us for our next episode.