PREDICTING THE NEXT BIG THING(S)

[00:00:00] Lee Feldman: If I were to put a single definition on it, I would say Web3 is the next generation of a decentralized internet, which is open source and centered around identity. Web3 applications run on decentralized computing platforms and public blockchains. It's really an all encompassing topic that includes crypto, NFTs, the metaverse, the blockchain.

Things within that, like decentralized identities. These are all really important trends that, as investors, we need to keep an eye on. And I think as technologists and as enterprises, we also need to be aware as well. These things are either going to disrupt business models or they're going to be opportunity areas for you.

[00:00:44] Eoghan Jennings: Today we're talking about the technologies driving the biggest growth opportunities in Smart Systems, and we're joined by Lee Feldman, senior strategist for Microsoft's venture arm, M12.

Lee is responsible for technology trend and opportunity analysis, influencing their investment activities in national security technology, brain-computer interface, cybersecurity, data, and AI, IoT, and enterprise IT. He joined M12 from Microsoft's corporate strategy team where he advised Microsoft senior leadership.

[00:01:17] Announcer: Welcome to Future Perfect Tech, a webinar and podcast series by Harbor Research. Each month, we'll be having discussions with the leading experts in Smart Systems and the Internet of Things on innovations in markets, technologies, and ecosystems that are working together to build a better future.

[00:01:47] Eoghan Jennings: Lee, I went through your impressive bio and, it's just an amazing story. Perhaps you could just tell us a little bit more about the key challenges that you faced and that you encountered over the course of your, a really, quite illustrious career.

[00:02:01] Lee Feldman: Yeah, thanks for having me on the podcast and good to be here. In terms of challenges that I faced, when I was figuring out what I wanted to do, post-college I did a couple internships at the big banks and I was studying portfolio analysis and asset management and really was into stocks and trading.

And one of the areas that I focused on and that I spent a lot of time reading about was technology. And when it came time to really figuring out what it was I wanted to do in life, I realized finance wasn't exactly the route that I wanted to go, traditional investment banking or trading, but rather wanted to go into technology .

So combining those two passions, I landed at a boutique management consulting firm for technology companies. Basically we advised traditional on-prem software providers on how to transition to cloud-based businesses. Or as you mentioned earlier, anything as a service type business models . It was really interesting at that time to see how difficult it was to move these legacy businesses and simply transform the operating model around it.

The emergence of customer success organizations, the reshuffling of the sales organizations, support looked completely different, tiered offerings. It was a

really new time. Even the metrics to measure success were different. So during that role, I spent a lot of time studying, what do best practices look like?

I looked at companies like Workday at that time that were gaining a lot of prominence and, how are they setting up their SaaS model? How are they setting up their support model? I think that really one of the important aspects of that is how do you measure yourself? What do these metrics look like? And we went through years of iterations on, how do you measure customer success? It was an interesting time.

One of the things that got me excited during that role was packaging this up in more of a low touch model, being able to deliver these workshops to many more than just one client. So we started doing it for startups and that's really when I realized that I loved working in the startup ecosystem, I loved working with these fast moving innovative companies that were also just trying to figure it out.

So at that time I was once again in a little bit of a limbo where it's, what do I do next? Do I go work at a startup? Do I work at a VC or do I go somewhere else? And so I was looking for venture capital jobs. And had actually had a couple offers, but then there was an opportunity that came my way to go work for a small team at Microsoft. It was actually called the SWAT team at the time. But it was the corporate strategy and development team. And the reason it was called the SWAT team is basically we were called in to go do special projects for the senior leaders of the company.

Satya had just joined Microsoft CEO. There was a lot of transformation of Microsoft itself. We went from being this sort of slower moving kind of stagnant company to entering the cloud era where I think Satya and those senior leaders really took it to the next level. And it was an exciting time to have a seat at the table and to be able to see that transformation firsthand and also to be able to advise on it.

The first project that I actually worked on was an IoT project. Figuring out what is the business model around the IoT? How do you monetize off it? How do we even do it? What does the offering look like? What do our customers need? And I had the opportunity to work on a specific vertical, which was our smart spaces platform.

So basically I worked with Azure engineering on building the business case and product strategy for what we named Azure smart spaces. I saw the challenge of siloed data firsthand. You're in a smart building or trying to create a smart building, but you have 5, 6, 7, 8 different systems, all speaking, proprietary languages, all spitting out a ton of important data that you could use to optimize your operations, to optimize your space, to optimize your energy efficiency.

But none of them are talking to each other. Also the roles were fragmented that we're facing each of these different systems. So how do you gather the insights together to really make use of this data to really harness it? So that was a really interesting project and seeing the challenge of IoT and siloed data firsthand.

One of the other projects that I was really proud to work on, and it still remains a personal passion of mine was setting up our first brain computer interface research division. At this time we had Facebook and Neuralink and Brian Johnson's kernel and all these big announcements of brain computer interfaces.

And we're sitting here looking at the market, what is this? What is this brain computer interface thing? And what are the implications on Microsoft? And after months and months of research and leveraging some of the most brilliant scientists and engineers on the planet and Microsoft, we came up with a proposal for, how can we start moving the needle in this space? And we ended up standing up a research division.

One of the things that came from that, that I was really excited about was we formed a partnership with air force research labs, AFRL, in order to take some first steps to bringing brain computer interface to the air force. That was a really cool first step in my Microsoft career.

My role at M12 is unique in the sense that it's a new function, it's called the strategy and research function. And what our role is, is to basically look out into the market, to look at where the puck is going. Where are the big trends, the big frontier technologies, the big innovations.

Reconcile that with where we're currently investing and to identify a couple areas that we should build a thesis in and an investment strategy around, and then to go execute in that particular ecosystem.

[00:07:54] Eoghan Jennings: So, Lee, that's fascinating. And I know that pre show we were just discussing how you had a role to play in Microsoft's own transformation. Could you tell us a little bit about those particular challenges that you faced?

[00:08:08] Lee Feldman: Yeah, definitely. When I was on the corporate strategy team, a leader of the team at that time was a long time Microsoft veteran and technology legend named Kurt DelBene. So he came back to Microsoft after saving healthcare.gov, actually, for the Obama administration. And he was tasked with taking over this team a couple months into that he ended up with a much broader charter and that was to take over the entire IT and Ops organization. So he went from about a 35 person organization of corporate strategists and M&A folks to about a 15,000 person global organization pretty much overnight. And this was a big undertaking.

How do we transform 40 years of technical debt and operations and processes to really excel in the modern cloud-based era? And what he wanted to do was really take a consulting approach to this. So he asked if I could start helping him with that and to create the vision for what a best-in-class, digitally transformed org would look like.

How can we be Microsoft's first and best customers leveraging the cutting edge technology that we create and acting as a test bed to further improve those products for the customers?

So there was, a lot of different challenges that we incurred during that time. One of the bigger takeaways for me was that you can't just throw tech at the problem. You need to transform the org, you need to transform the skills, you need to transform the entire model of interactions with each other and overall the culture to support it as well.

So traditionally we had more of a outsourced IT model, which is, I think what we see a lot of folks in the industry with as well. But we wanted to shift to more of an insource model. We wanted to bring that technology development in house and really make it more efficient. So we shift the balance. We went from being majority outsourced to majority insource, which meant upscaling. It meant training some of those existing engineers to become software engineers.

And it also meant a lot of hiring of these skillsets that we needed. And we also needed to have a culture that supported all of this. This was a hard change, right? This is a big shift of skills and it created a lot of discomfort, but I think getting everybody to march towards the vision and really articulating it over and over again, so that people could understand why this north star was so important.

I think that was a critical enabler of the success there. I think we also needed to create a culture that was inclusive and had a growth minded. These are all critical enablers of this transformation. And ultimately the goal was to mirror any modern cloud-based product. So this meant that we had to implement processes and new methodology such as DevOps and agile.

And one of the things that I think is pretty cool, that was perhaps a little bit ahead of its time and something that we're seeing a little more of now, is things like a shared service model, shared data science teams. We had a team that was responsible for cataloging all the data sources, all the ML and AI across the organization and to house all those initiatives in one area to ensure their synergies across the different data sources and to really build better and cleaner models across the organization.

[00:11:29] Eoghan Jennings: Would you consider that to be the precursor to what people now call MLOps?

[00:11:34] Lee Feldman: I would consider that to be the customer of a MLOps platform. I think right now we're in a pretty interesting stage of MLOps, where we're seeing hundreds and hundreds of different tools popping up every year. And it's a little bit confusing. I actually saw an interesting stat at some point recently about how many organizations attempt to build a model or to build ML or AI.

And then eventually it fails by the end of the year because of no way of really operationalizing it with any sustainability. And I think part of the problem is the way these orgs are organized, frankly. You need specific skill sets and you need specific models that are interfacing with these tools to be able to do it efficiently.

And I think this is the same thing that we saw when DevOps was really becoming prominent as well. I do think that we'll see more and more organizations shifting to this model with the centralized data team. And I do think that is probably one

of the critical enablers of successfully building and running ML op applications at your organization.

[00:12:49] **Eoghan Jennings:** So talk to us a little bit about the role data plays within the organization. What kind of systems you're seeing to capture and clean data, is this a rejuvenation of ETL processes or is there additional value being created there?

[00:13:05] **Lee Feldman:** Yeah it's a really good point. And one of the things that was really eye opening to me, and one of the better experiences I think that I had while in this role supporting the transformation at Microsoft was speaking to customers about their own transformations, learning about what are some of the biggest challenges that they're facing.

And one of the things that I learned from that was finding data or generating data is certainly not an issue. There is so much data being generated from every system, from every IOT device, from every application, from all the telemetry. There's so much data. The question is how do you actually harness it?

How do you organize to be able to harness it? What are the tools that you need to be able to do it? How do you get the data cleaned up to be able to effectively get the insight or the application that you're trying to do? And I think one of the things that frankly we see a little bit of is people just wanting to throw ML or AI at a problem without really defining a business outcome that is associated with, why do you need MLAI?

Do you really need it? Is this just data analytics? Is it just big data or is it really an ML and AI problem? And if it is, what is the data that you need to be able to get that insight? Do you have the right skills to be able to analyze it? And then do you have the right tools? The tools aren't going to do it for you.

And I think that's why we see so many projects failing, honestly, and just, I digress a little bit, but one of the things that I find really interesting, and I think it was a little more prevalent last year than we're hearing this year. But, AI taking over the world and all the media attention about who's the biggest bull on AI or who thinks AI is going to ruin society.

The reality is, there's not a lot of AI being built today. A lot of it is just ML. And if you look at enterprises that are doing this, they're doing it for financial forecasting, they're doing it for sales predictions, for churn risk prediction. They're doing it for very operational things. Of course, there's AI in the hands of bad actors and that can cause issues.

And of course we want to see it used in a fair and ethical and proper way. But I think ringing the alarm bells at this point is a little bit premature in my opinion. That's a little bit of a digression, but taking a step back, you mentioned about cleaning the data and really being close to the data.

I think in my role right now, at M12, I'm looking out into the landscape and I'm looking at how many startups are popping up and where are they popping up? And which ones are the ones that are achieving really big valuations or which ones are struggling to raise. And I think what we're seeing at this point is the companies that are closest to the data that are more at the infrastructure level are the ones that are seeing the most success.

You're seeing companies like ScaleAI or Label Box, or one of our portfolio companies at M12, Pachyderm, and these companies are really successful. And the reason is because they're helping organizations harness that data. You have a lot of other companies that are, I would say more at the top of the stack, which are doing monitoring and explainability and observability and orchestration.

And I think that's all great. And I think it's going to be a really important part of the landscape of the toolset over time. But at this point, the first step is cleaning up your data and finding the right data and labeling that data. And I think that is evidenced through the valuations that we're starting to see in the industry as well.

[00:16:46] Eoghan Jennings: And is that really what's meant by productization and deployment of ML and data application.

[00:16:53] Lee Feldman: I think that there's different ways that we're seeing productization of ML or AI. A lot of these companies that I would consider MLOps companies that are closer to the data, they're not really selling an ML or AI product, they're selling a data product. I think eventually as ML and AI becomes a more and more prominent use case that eventually some of these companies

will start consolidating and moving up the stack to offer a more ML, AI focused tools to their customer.

I don't think we were quite there at the level of maturity in the industry to see that yet where we're seeing that consolidation occur. But I think we will see it eventually. If you move up a little bit, you are seeing productization of ML and AI in a couple of different ways. I think you're seeing a lot of managed services around it.

You can go to companies, whether it's your system integrator that you work closely with or a dedicated shop and ask them to help you build the model that you need, and I think that's okay. In many cases, if you don't have the data scientists or the ML engineers in house, or you don't know exactly how you want to build it or what you want to build.

Other ways I'm seeing it productized is it's actually becoming part of the product, of course. You're seeing more and more companies that are leveraging ML and AI as part of discovery or searchability or recommendation engines. And I wouldn't say it's being sold though. I think of these things more as feature enhancements or tool enhancers than I do products.

And I think that's why it's hard to really say, here's how much ML or AI costs. How do you price for an ML or AI service? I think it's difficult because really, again, it's an enabler, not necessarily a product itself.

[00:18:44] Eoghan Jennings: And that's an interesting point itself is the monetization of all this, is it going to be data- there's has been many attempts to turn data itself into a business model? Is it going to be the tool set? Where is the money going to be made?

[00:18:59] Lee Feldman: I think there's risks to not being able to organize around ML or AI for industry businesses, for non technology provider companies. So if you fail to transform yourself, to modernize your infrastructure stack, to harness the data that you're creating, you're going to fall behind your modern competitors that are in an era where they're born to be able to harness that data.

They build the products from the ground up to extract the data and insights that they need. They organize their teams. According to that, without some of the

corporate bloat that you might see at larger organization, those are the companies that you need to be scared of if you are an incumbent provider and are not hopping on this wave. So there's a risk associated with it. On the other hand, you have providers of tools that enable organizations to provide ML and AI. And that's this broader MLOps landscape that we were talking about. It's also the big tech providers, right? The big cloud platform provider. Naturally it makes sense for companies like Microsoft, for AWS, for Google to provide services on top of their infrastructure that allow you to extract the data or the insights from your environment.

And that's why I think you're seeing more and more enhancements of platforms within these ecosystems. For example, at Microsoft, we have Azure ML. I think you're going to start to see that product over time become more and more feature enhanced. And I think a lot of the MLOps features, a lot of these new innovative features and tools that we're seeing pop up, I think a lot of those are going to become consolidated and you're going to see these fold into some of these broader platforms. I'm not saying that necessarily, it's a one-stop shop, that you're going to use one cloud provider for everything, but you will definitely see the cloud providers want to start offering those services more and more.

[00:21:03] **Eoghan Jennings:** And Lee, we've seen a lot of technologies moving towards increasing levels of autonomy and platforms related with that. So whether it's autonomous vehicles other types of things like drones, construction equipment, all sorts of different autonomy out there. How is data enhancing or playing a role or enabling this?

[00:21:27] **Lee Feldman:** Yeah, it's a great question. And this is a, this is an area I can go on for hours about that I get really excited about. I think it's exciting to look out and see that autonomy or autonomous things are not that far out. We can see autonomous vehicles. They're getting there. There's of course issues. There's of course regulations as well and safety concerns, but we're getting there.

And I think we're seeing it also in robotics, right? We're seeing more and more robots popping up in industrial settings and warehouses. We're starting to see warehouses become darker and darker. And I think if you look out to China you can see what the future could look like a little bit more because they've done a really good job of harnessing data and of accepting robots in different ways.

And I think that it's a flywheel type scenario here where you need to accept these things. We need to accept the form factors. We need to accept that autonomy is here. And the only way to start making those things better and safer is by putting them out there, by getting them to collect data, by getting them to understand their environments more and to have the models improve over time in that way.

Where this becomes a challenge though, is that it's not one size fits all. For example, even within autonomous vehicles, you have different models for every different type of car, right? You have different variations of the cars, different types of sensors, some are using LIDAR, some are using something else.

The road types differ from region to region. You can't just have one single platform to do all that different work. And I think the same goes for any other category of autonomous things as well. For example, a home, right? No one home for the most part is exactly the same. So if you have a robot in your home, that's cleaning or maybe security, or, whatever you have a robot for, it needs to be able to move around in that unique environment and to be able to sense things and map out the indoor space.

I think that's where there's an exciting opportunity with synthetic data. And that's something that we're seeing more and more of. Right now, without access to constant streams of data in every single environment, you need to somehow be able to simulate that out. You need to be able to train the models for different types of scenarios that may occur.

And the only way to do that is with good quality synthetic data. I think this is an exciting opportunity area. When we look out a couple of years into the future. I think we're going to see a lot more companies that create automated and efficient ways of generating that synthetic data to train the models. And it's going to be a big business opportunity.

Right now, I think we're in a little bit of figuring it out mode. And I think that synthetic data generation is custom and not as widely used as we'll see in the future. But I do see it being a big opportunity. I also see the simulation platforms themselves becoming a really interesting opportunity.

We've seen some really big and successful companies like another M 12 portfolio company, Applied Intuition, in the auto space. What about in some of these other

spaces? What about in robotics? What about in air traffic? What about in boats and vessels? As I mentioned earlier, each of these different environments generate different types of data and the things that need to operate in those environments are all different.

So we're going to see platforms I think that are more vertical oriented that continue to pop up for simulation and for training autonomous things in each of these different areas.

[00:25:23] Eoghan Jennings: Yeah, I totally know what you mean about about that. I'm just trying to imagine a robot coming in to clean my office and I'm thinking, how are they ever going to navigate around the stacks and piles of papers I got around here? That the heterogeneity of that is, is a problem. And I think will take a long time to solve.

[00:25:38] Lee Feldman: That might be something that's common across many offices actually.

[00:25:41] Eoghan Jennings: I would say so. Yeah. And the limit of my screen or my camera does not capture the level of chaos in here, that's for sure.

So Lee, could you give a definition, perhaps a broader description of Web3 for those of our listeners who might not be as familiar with it?

[00:26:00] Lee Feldman: Yeah. I mean, it is very broad, but if I were to put a single definition on it, I would say Web3 is the next generation of a decentralized internet, which is open source and centered around identity. Web3 applications run on decentralized computing platforms and public blockchains. It's really an all encompassing topic that includes crypto, NFTs, the metaverse, the blockchain.

But I think breaking down the general concept, not the technology, but the concept of Web3 is really important. And it's the broad concept of decentralization. What I think is cool about this and to put it in an analogy, back to Web2 is we had all these platforms pop up at one point. We had Facebook and Twitter and whatever else. At that time, it was an opportunity to build a developer ecosystem around it. These companies wanted to build engagement and bring more and more users to their platform so that they can centralize so that they can

be the aggregators. So they opened up, they created, they put APIs out there. They allowed access into their platforms so the platforms themselves would get better and better over time. And over time, what we saw is those platforms became more and more centralized. They created their own sort of empires, their own ecosystems. You were a developer for Facebook, you were developer for Twitter, whatever it may be. But then API access got shut down in some cases. And Facebook then, or other companies like that- I don't want to make this aFacebook bashing because I'm actually a huge fan - became the centralized aggregator of what is posted and they monetized off of creators' work. You're a Creator, you wanted to go get your work out there. You post it to Facebook. You can't easily just monetize off of that.

I think we're seeing similar things with app stores and some of the drama that we've had there. And I think it also goes back to the concept that I mentioned to you before in gaming companies, for example, right? So if I'm a player in Fortnite, I go in there and I'm spending a ton of money renting objects from the game. And when I turn the game off, I don't own those objects anymore. Web3 is going to offer the promise of if you're a creator, being able to monetize off your creations in a much more efficient way, without the aggregator in the middle.

So in this new world and the world of Web3, in theory, you can make more money being a personal blogger or a personal writer than you could from working at the Wall Street Journal or The New York Times, for example. And I think a lot of people saw that and have been seeing that in the Web2 world with Substack. It's a way for you to leave your corporate job and to go monetize off your following via a platform like Substack. But still, Substack's sitting in the middle and taking a fee from it.

In the future, in a Web3 world, you're no longer going to have that aggregator anymore. And you can monetize directly off your audience. You can sell your work, you can sell your brand and you can take a hundred percent of the profits from it. Of course, you might want to have some services if it gives you the scale that you need, but you might not want doing it elsewhere. Or if you're a creator now, of NFTs for example, if you're a creator, you create some amazing digital art and you want to sell that and you want to take all the commission that you deserve from your work and from your popularity, you can do that. You can sell your work on either your own website with a, a NFT backbone or you can list it on

OpenSea and you can mint your own. And that's an exciting opportunity for creators.

Of course not everyone is going to become a famous, you know, creator selling their NFTs for millions and millions of dollars, but a lot of them will, and a lot of them will be able to monetize off of it. And I think that's really exciting.

[00:30:14] Eoghan Jennings: And as a consumer, I think it's great because the realization is slowly setting in that we're paying all this money to, without naming names, the major music aggregators essentially, right? And we think we're either buying these tracks or we're getting access to this music, but actually we're not, we're just renting.

And in the old days we would buy a piece of vinyl or we'd buy a CD, that was ownership. I could take that anywhere and go play it on any machine. But now, we're discovering actually, if you don't keep continuing to pay money to these aggregators, then you lose access because you're just a renter. So I think as a consumer, it's also an exciting new world.

[00:30:51] Lee Feldman: I think that's exactly right. As many people would probably seen Andreessen Horowitz's a16z [specifically, Chris Dixon's blog at https://a16z.com] has been on a hiring frenzy for crypto and NFTs and Web3, but he does a really nice job of actually summarizing those six succinct benefits for creators in Web3. And one of those is it removes rent-seeking intermediaries.

It also shifts the economics for creators by enabling more granular and unique pricing. It makes users or consumers owners and reduces customer acquisition costs essentially down to zero. The community now has ownership within the platforms and can market it peer to peer. So in addition, what that does is it creates a huge disruption to the ad supported business model that so many of these massive tech companies have built their businesses around. it becomes less important In this new Web3 world.

And that's why I think it's important for everyone. It's exciting for consumers, but it's also really important to continue tracking this if your a business, because this is going to fundamentally shift behaviors. And I think if we look at this next generation, the younger generation of folks out there, they're seeing it, you're seeing more and more people wanting to be YouTube creators. Well eventually

they won't even need YouTube to be able to do this. They can have community driven engagement.

And that's where the idea of tokens also comes into play, right? How do you get rewarded for contributing and building an ecosystem? There's a lot of lucrative opportunity to doing that. And I think social tokens is almost like the modern Amex rewards, right? Amex rewards, you get rewarded for using their credit card and you get points that you can use within the Amex or their partner ecosystem.

What about now, if you're a creator, what if you're trying to build a community you need people to hype it up, you need people to reach out to others. To, as, as some in the crypto world would call, you need people to shell it, or you need people to create memes or assets or whatever, to help build up your awareness and presence. You can be rewarded for doing so by having a stake in the game, maybe that's by owning one of the pieces of work, the NFT, or maybe that's by being rewarded in social tokens that are unique to that community.

So anyone can actually go out and create a social token right now. It's just a matter of how many you want, how much float you want, and you can give out those social tokens based on whatever you feel that others should be awarded for. And what's interesting is, so if I own a token from you, a social token and your community gets so big and so prominent that everybody wants in, these tokens now have monetary value actually. They can be traded for one thing or another. Or eventually maybe even listed on a secondary exchange. And you could convert it to Fiat dollars if you wanted to.

[00:33:59] **Eoghan Jennings:** What are the other areas that M 12 is paying attention to right now? Where are you finding some interest and excitement from the investor community?

[00:34:08] **Lee Feldman:** So as a fund, M12, we're invested across many of the areas that, that you would expect, right? Like cyber security and business applications, day-to-day AI. And, things like that.

I'm looking at a couple of different areas that I think are really exciting. And I have a colleague who's looking at healthcare and life sciences. There's a ton of innovation happening there. Me personally, I'm really excited right now about a simulation software, as we talked about earlier and data generation,

autonomous systems more broadly. I think that one thing that we hear a lot about, and it's really important not to overlook it is this broad space of Web3 blockchain NFT and crypto. Things within that, like decentralized identities. These are all really important trends that, as investors, we need to keep an eye on. And I think as technologists and as enterprises, we also need to be aware as well. These things are either going to disrupt business models or they're going to be opportunity areas for you.

And then the last thing putting a lot of this stuff together that I'm pretty excited about is the combination of things like gaming and simulation software and synthetic data and AI and art generation into this broad concept of the metaverse.

[00:35:30] **Eoghan Jennings:** I love it. Love it. And here at Harbor, we've been researching the metaverse for a long time, actually going back to 2017. And so we've been following this very closely and now it's so interesting for us to see Facebook, recent name change.

How has the metaverse now going to fit into all of this?

[00:35:52] **Lee Feldman:** Yeah, it's a really good question. And it is also a complicated topic and I would encourage people to go check out Matthew Ball's website [https://www.matthewball.vc/all/themetaverse]. He's been talking about this for years, has been writing articles. He has a nine part series about this. And a lot of my inspiration has actually come from his work. So, you know, I would definitely encourage you to go check that out.

We heard Facebook recently rebranded to Meta and we're seeing a lot of hype around this. I think it's a really important one to not just laugh at and to really start to think about. What are the implications for you? And one thing that I'll say, and that I find myself having to say often for better or worse, is that metaverse, isn't this big, Ready Player One thing necessarily, it's going to be a step function. It's going to be a bunch of different steps in to the metaverse.

And I think a good example of that is, Satya recently, Microsoft CEO, talked about the enterprise metaverse and what that's gonna look like. That's not this, living in a VR world and sitting there doing everything there. It's about having a single environment which is interoperable and it's continuous and you can pick up

where you left off and you can access the information that you want and meet with the people you want. And I think it's a really important trend. It's not going to go away.

[00:37:22] Eoghan Jennings: Oh, I totally concur with that. And I had this light bulb moment, a few years ago when my son was 10 and we were building a tree house. And so there I am, you know, real old school. I got out a piece of paper and a pencil, and I'm like designing this thing on paper. And he goes, dad, I could do that a lot quicker and Minecraft, another great Microsoft product. And I was going, yeah, I bet you could. And that was several years ago. And that was for me kind of a light bulb moment saying, yeah, actually we are barreling towards this metaverse with very little resistance from the generations that are much younger. My nine year olds are now playing Roblocks games and building their own stuff.

And that is the start of it. So, it's just going to continue on from there. And we learned, very painfully that when Facebook first came out. We all kind of laughed because, I don't know if you remember this, but you could one of the big apps, was you could throw virtual sheep at each other and everybody just thought it was a big joke and a game and okay. But nobody took it seriously and now look, right? So I think we we're at least, hopefully, able to view it like you do. That gaming is the forefront of everything that is going to permeate throughout, including enterprise.

[00:38:43] Lee Feldman: I think that's exactly right. You know, I think there's a couple of other anecdotes that I would leave you with on this topic. A year ago or two years ago, who would have thought that concerts would be a big hit in a game like Fortnite? I think contrary to what a lot of us believed, including myself, a lot of people really liked that. It also democratized the access to it. It provided you an opportunity to see this concert where otherwise you may not have been able to. We're seeing tons of money, billions and billions of dollars, pouring into people building up their digital identities via in game skins or new weapons or vehicles or whatever it may be. But they're all paying rent for those items, right?

I think what becomes really interesting in a world with NFTs and with blockchain is people being able to own these items now, for these things to become assets. For their digital identities, to go with them across different games, across different environments, and to really build up your digital persona through ownership and assets and the economy that comes with it. And, you know, I'm throwing a lot of

things out at you, but I think these are really interesting concepts and we're seeing that evolution.

But one of the things that is interesting here, putting together a lot of the different topics that we've talked about is one of the core components is interoperability. Right? We've talked about this in the context of IOT. We've talked about this in the context of software development and in data storage.

It's really important to think of the metaverse as a fully interoperable environment, also a persistent environment, one where it never sleeps, right? Just because you've shut your laptop. Doesn't mean the metaverse shuts down. It'll be awake when you awake and you access your device. And I also bring in some of the other topics that we were talking about is it's also a culmination of a lot of mature technology hardware.

You can access the metaverse via a VR headset. But, like I said before, it's not just VR. You can also access it on mobile or on your desktop or whatever 2D environment. I think that's important to realize is that the metaverse can take place on existing hardware. There's other hardware that needs to be involved in this too -cameras, computer

[00:41:11] **Eoghan Jennings:** Graphic cards.

[00:41:13] **Lee Feldman:** Graphic cards.

Yeah. Industrial cameras. So there's a lot of different existing components that will be enablers of this. Of course you need the networking, you need the compute. One of the things that we've seen, and we talked about earlier, is the virtual platforms themselves.

So having Fortnite or Minecraft, or I think one of the coolest ones that's actually in the metaverse is Decentraland. You need all these different things to come together, but none of these technologies are new, like I was saying before. These are all existing things that are now just coming together.

And I think now with the acceptance of the blockchain and of cryptocurrency and of NFTs, now you can create economies in the metaverse. You can create ways

for people to actually make money in the metaverse, which is incentive for you to spend time in the metaverse.

Another example of that is Axie Infinity. It's a gaming company, kind of like a Pokemon type game. But it's also an economy of its own, generating billions and billions of dollars and also wealth for those who participate in the ecosystem. The idea is you buy entry into this. Metaverse via a Axie. You have to buy a couple of them. You grow it, you fight them, they earn rewards for you, and you're monetizing off of how good your axies actually are. Well, there's really innovative business models that have popped up around that. Now you have people who own tons and tons of axies and pay people to farm those axies or to grow them within that environment.

And oftentimes these players are making more money by playing this game than they would be at their nine to five desk job. And thinking about that in the terms of developing nations where your native currency may be super volatile or opportunities are more sparse. This is an incredible opportunity that really democratizes access to a decentralized economy that's borderless.

I'll throw one other example out there. I have a brilliant analyst on my team now. And during COVID, she mentioned that their college graduation at Berkeley was a hybrid environment where some of it was actually done in Minecraft. What an amazing world, right? Where, because of a global pandemic or because of distance constraints or natural disasters or whatever it may be, that you can have the same type of experience connecting with one another, with your fellow classmates, with your parents, with your grandparents, via a technology platform, via a game like Minecraft, as you were talking about earlier. And I think that's just really exciting and cool.

[00:44:09] Eoghan Jennings: So do I.

Switching to another area that I think we've done battle with a lot over the years and that we're still getting our heads around. And that is cybersecurity.

It's been top of mind recently with lots of large scale and high profile attacks. How does cybersecurity impact cloud deployments for say intelligent infrastructure and the kinds of things that we've been talking about just now?

[00:44:34] Lee Feldman: Yeah, it's a great question. I'm glad you're bringing up cyber security. I think that over what I've seen just over the last five years say is that cybersecurity continues to evolve in terms of its prominence and importance. I think that during the transformation at Microsoft, we saw an elevation of cybersecurity and of the topic and of the roles that are there to manage it.

And I think in my M 12 role as well, looking out into the cyber landscape, we're really starting to see that materialize with huge valuations to cybersecurity companies and a ton of unicorns as well. I think, just last year we had 20 or so new cybersecurity unicorns emerge particularly in Israel where there's so much innovation happening.

And I think it's a really important and exciting time to be in that industry. And also it's an existential threat, honestly, if you're not thinking about it and it's an afterthought. At Microsoft during our transformation, we elevated the role of the CSO Brett Arsenault. He was the CSO for Microsoft and he was responsible for reporting directly to the SLT and to the board on a pretty frequent basis.

I think we've also seen that in it budgets. I think we're starting to see cybersecurity budgets expand. What unfortunately seems to happen often is it doesn't become a big enough issue until you are hacked until you have a ransomware issue, and until it costs you and your company a lot of money. And there's all these figures out there about how expensive it's becoming to have a breach in your own company. And really, we need to change when it's being talked about and when it's being implemented into this broader modernization effort. So that actually goes well into one of the key themes that we're seeing, which is this broad concept of shift left.

Basically the idea of integrating cybersecurity early into the development pipeline, early into the DevOps process, versus it being its own function after the development occurs. And I think that's a really important trend that we're going to see more and more. I think the other thing that we're seeing a lot of and hearing a lot about is the concept of zero trust networking or zero trust architecture, which at its fundamental level means not allowing any bit of trust into your network.

One of the analogies I like for zero trust architectures is an apartment complex. There's many different entry points that somebody could get into the building that shouldn't, maybe it's a key card. Maybe the key card gives access to too many people and they can just bob right in, maybe it's a window is left unlocked.

If a windows left unlocked in the lobby, somebody can get in and it could infiltrate anybody's apartment. Or maybe the door is left unlocked, or maybe they come in through an actual apartment window. These are all just examples. And you can extract out into the enterprise world where you have many different endpoints.

You have everyone on their laptops, working from home with different wifi. You have printers that are connected to wifi. You have people that may be able to access documents that they shouldn't be able to access and to leak those documents. You have applications that are running in your network and touching your sensitive data. Protecting all those different end points to ensure nothing can get in.

One of the things that's encouraging to me and that I've been seeing a lot of activity on is the work coming out of the government. And this is a huge step forward, in my opinion, in securing the nation, but also individual companies that control our critical infrastructure is making sure that there's actual regulations or recommendations from the government on how to set up a zero trust architecture and for the government themselves to implement it as well.

And one other thing touching on that topic a little bit more that I think is really important is the broad concept of supply chain security. I think we've seen firsthand over the past couple of years, some very high profile attacks that have, either shut down our critical infrastructure or that have cost corporations billions and billions of dollars or that have costs people their data privacy. I've been hacked. I think probably a lot of your listeners have been hacked or have had their PII stolen and we need to be careful of that. And so with supply chain security, basically, it's the concept that across the entire supply chain, software development supply chain, I should be specific, that each component is protected.

So for example, we know that any piece of hardware coming from a third-party vendor that, that does not have any bugs in it. We know that, one of the 500 components that goes into a laptop or a phone or any wifi connected device that

each of those things are secure. So now, if you're the company responsible for delivering a product, how do you ensure that?

How do you make sure that every step of the supply chain, that it is secure across the entire chain. We're going to see more and more companies pop up that are offering services to give you insights and to protect against that. And I think that's going to be a really exciting space for startups. And I think we're going to see a lot more of that on the venture side.

And naturally over time, I think we're going to start to see some of the larger incumbent cybersecurity providers start to offer those services as well.

[00:50:22] **Eoghan Jennings:** And sticking with cybersecurity just for another moment. Just personally, I know a couple of my friend's companies, these would be industrial mid-market companies, not big, smaller employers and they've both been hacked in very recent times.

Part of the problem I think, was that a lot of companies in that size range, they have a centralized data storage, which makes them very vulnerable for ransomware attacks. Do you see any technology on the horizon? Is there something that maybe is being implemented at larger companies that could be brought down to their level?

That makes, perhaps even distributed data management easier to handle, easier to across a distributed infrasture.

[00:51:03] **Lee Feldman:** Yeah, I would argue, this is exactly where zero trust comes into play and every organization is different in terms of what those different access points are, right. Just like any house or apartment building or whatever else is different. And really coming up with a framework. There's not a one size fits all, but coming up with a framework, mapping out, what are all the different vulnerabilities?

What are all those different endpoints and how do we protect against somebody getting into those? And then what is our backup plan? If somebody does, how do we, quickly enough identify the attack and be able to shut down so that they're unable to access all the data that they need to. So a lot of these attacks, a lot of

these ransomware attacks, they occur from somebody getting in through someone's email, right?

A simple phishing attack. So you need to protect your end points. You need to make sure that you have the right protection. Does that person, do all the employees at your organization, need that level of access to the centralized database? Do they need to have all this access where if they do get phished that the hacker or attacker can get in and see all the company's data?

I think that's why really thinking about this holistically and mapping it out and having the right technology as well to manage it is critical. And I think it's important that we continue to see an elevation of the role of cybersecurity. Now that's easier said than done, right? A lot of companies are facing financial pressures.

Maybe they can increase their IT budget. Cybersecurity should be a top priority. When we're thinking about cybersecurity versus the other initiatives, it's not really a, well, we're for sure getting attacked, but if you do, it's going to cost you a lot of money. So that's one thing I would say. The other big challenge in cybersecurity is there's a big skill shortage. It might be hard to actually hire cybersecurity talent and it's also expensive. So that's something that I'm hoping as a community, as a technology community, we start to see change. I know Microsoft's on the cutting edge of that. There was an announcement at the white house a couple of weeks ago where there's a commitment to up-skilling. I think that's really important and I think that's something that's critical to really ensuring that these attacks don't happen.

And now the last thing I'll say is I think, unfortunately the government needs to help here a little bit as well. A lot of these attacks are coming from overseas. Assuming we're talking about US-based companies here, a lot of these attacks are actually coming from nation states and from foreign actors that are highly coordinated or organized.

And we need to, as a country, figure out how to crack down on that and how to protect the citizens that, in many cases are most vulnerable by these attacks for the good of, for the good of all of our people.

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[00:53:59] Eoghan Jennings: And are you seeing this as a good hunting ground for investment opportunities? When are we going to see like something like Salesforce for cybersecurity that makes it a lot easier and more affordable for, the small to medium size companies who may not be able to, or have the wherewithal to, go out and hire that cybersecurity talent?

[00:54:19] Lee Feldman: Yeah, I do think we're starting to see it more and more. There are a lot of managed cyber security providers that are popping up. You have companies like Arctic Wolf is a good example of that. But I do think that we're going to see more and more of the cybersecurity talent, also move in-house to be able to manage these systems and the tooling will make it easier for them to do it.

So to your point the Salesforce of it, Salesforce is in a managed service, but it's a very easy to use tool. You don't need to be a developer to be able to use that tool. I think the cybersecurity tools are going in a similar direction where they're going to become easier and easier to use. And you're going to need operators of those tools and systems at your organization. I don't think there's any way around that, but the tools are going to get better. And again, we have all these unicorns that are popping up and they're reaching pretty significant scale. I think you have companies like Sentinel One for endpoint, right, who had a very successful IPO earlier this year. In M12's portfolio we have Aqua Security, which has been doing really well. We have Contrast Security. So I do think that we're going to see these tools become easier to use and also more integrated into the overall DevOps life cycle.

[00:55:30] Eoghan Jennings: And while we're on the issue of investment opportunities, pre-show, we were talking a little bit about some frontier areas that you really liked, and I think you mentioned space tech? Could you tell us a little bit more about that?

[00:55:44] Lee Feldman: Yeah, no pun intended, but the space space is an area that I've been excited about for a while. And we've seen, frankly, a huge transformation. It's a massive technology opportunity now. Arguably, you could say that launches are now becoming democratized. What once was a huge prop challenge, a huge bottleneck, which is actually launching something into space. The barriers have come down. We're seeing more and more things that are being launched up there in with that becomes a lot of different opportunities, right?

We have more ways of collecting geospatial data. We have more ways of monitoring what's happening in the atmosphere. We have more ways of communicating down to connected vehicles. I find it to be a fascinating opportunity for technology companies as well as enterprises to harness.

So breaking that down a little bit, if you're an enterprise, what is it that you can gain value from from having some geospatial data or from having satellites and using that data to predict something or to provide connectivity somewhere. So for example, maybe you are an insurance provider or maybe you are a real estate provider, and you want to predict out the long-term implications of climate change on a particular building or space. You can start to use this data, which is getting better and better in order to predict out what the change will be and make an assessment on your willingness to insure or to invest in a property.

Another thing on the technology side is with all this stuff, these connected devices going up into space, there's a lot of data being transmitted.

There's a lot of data that needs to be processed up at the edge in space. Or down back on earth and like any consumption-based business, that data is going to equal a lot of money for technology providers and those who create the systems that are good at capturing it.

But it can't just be a box, right? It's not just a server. You need to have services that lower the latency that makes sure that the right data is being sent down. And I think that's a big opportunity. Also though, I will say with all these things being shot up into space, with the democratization, with the ability for every enterprise to have some satellite or payload up there, there's a big consequence of that: space debris. And that's something that I'm personally pretty worried about. And I don't think it's being talked about enough. You have all these manufactured things from earth being shot up into space, and sometimes they crash into each other. And when they crash, there's a lot of debris. There's a lot of things that stay up in orbit and that eventually will come down and those things might come down in urban or populated areas. And there was an incident of that last year, I believe it was. Some Chinese space debris that ended up landing off the coast of India. Thankfully it didn't hit a major population area, but if it did, the consequences could be pretty grave. So that is something I think is both an opportunity, but also a big concern of mine.

[00:59:04] **Eoghan Jennings:** I think we may be the only non-specific space podcast that has covered space debris in two separate episodes. That's so funny. That's great. I mean, I think personally we missed a big opportunity as a human race, when William Shatner was just set up in space, why was he not in his Captain Kirk uniform? I mean, that just would've been so much better.

I've just been completely inspired by this conversation. I thought it was just amazing to hear the amazing breadth and depth of the things you've covered. Just one of my absolute personal favorites so, Lee thank you so much for this time.

[00:59:40] **Lee Feldman:** Awesome. Thanks for having me.

[00:59:42] **Eoghan Jennings:** Don't forget to checkout HarborResearch.com for more insights on smart systems. This podcast was edited and produced by Christy Szoke and moderated by Eoghan Jennings.

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