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Hi, everyone. Welcome to another episode of For Your Innovation by Arc Invest, a podcast on all things related to disruptive technologies. I'm Andrew Kim, research associate covering consumer internet and fintech, and I'm joined by Nick Groose, associate portfolio manager. Today, we have the great privilege of speaking with Daniel Diaz, chief transformation officer at Magic Leap. Hi, Daniel. Thanks so much for your time today. Thanks, Andrew. Thanks, Nicholas. Good to be here. And for our listeners, we think it'd be great if you can introduce yourself and let us know how you ended up where you are today. Okay, sure. So, as you said, Daniel Diaz, chief transformation officer of Magic Leap. I've been with Magic Leap since 2018. I was originally brought in as chief marketing officer after the launch of Magic Leap 1 and when the company realized that it didn't need to make a pivot between the consumer market and the enterprise market. And so, did a lot of that work along with Peggy Johnson, our CEO, to really transform the company from one focus to the other. It took a lot on both the brand side, the reputational side, and then, of course, on the technology side, and then how the company operates. But that's the work that I've been doing along with Peggy and the leadership team over the last, especially the last two years, as we retooled this company to be a true enterprise provider. Got it. And before we delve any deeper, can you just tell us what does Magic Leap do in the nutshell? Sure. That would help. So, Magic Leap is the designer and builder of an augmented reality headset. Our headset, the Magic Leap 2, is the most, I would say, the most advanced and performative augmented reality headset out there in the market. And it is 100% focused on the enterprise market. We're focused on applications that really give new meaning to training, to visualization of data, and to remote assistance. Those are the things that we really feel that AR at this moment in time can deliver the most value. And even more specifically, we look at the manufacturer and industrial sector. We look at healthcare. We look at the public sector, specifically first responders and defense, as well as architecture, engineering, and construction. And so, for us, those are the verticals where AR can have an immediate impact. Right now, with the current ecosystem of solutions that are available, those three verticals, and then using those three use cases, training, 3D visualization of data, and remote assistance, those are things in the places where we can deliver immediate value. And so, it's no longer this conversation about, oh, in five years time AR will be able to deliver X, Y, and Z. It is about, right now, AR can do this for your company. And we're seeing great response, not only to the hardware platform that we've built, but also from the ecosystem of solution builders. And then on the customer side, really understanding exactly

what it is they can do with this technology today. Daniel, I want to dive a little further into the development of Magic Leap 2. What were some of the primary hardware challenges you face making this

leap for, no pun intended, but this leap from Magic Leap 1, Magic Leap 2. And what did you see in the market that forced the company to pivot away from consumer and into enterprise? It sounds like you just gave us the rundown on what you saw in enterprise that's leading to why you would want

to be in that market. But what was it that was lacking in the consumer market that forced you away from it? So, I think with the consumer market, it was early. It was really early days, right? So, with Magic Leap 1, we built the most advanced headset on the market, right? I would argue to say that we bested everyone, including Microsoft's HoloLens, when Magic Leap 1 came out. The problem is that the ecosystem of content available for consumers really wasn't that great. It was small. And so, you know, customers had a hard time justifying that price tag for something that really couldn't beat a cell phone when it came to how performant it was. There were more apps you could do more on your cell phone than you could do than with the Magic Leap 1. It doesn't mean it wasn't incredible technology. It just was pointed at the wrong market or pointed at a market too soon in the sort of lifespan of AR. So, the interesting thing is that a bunch of customers for Magic Leap 1 were enterprise customers in medical, in retail, in the industrial manufacturing space, in the defense space. And we got a huge amount of feedback from them on what needed to change for this device to truly be an enterprise device. Now, we'll start with the physical part of the hardware, right? It had to be lighter. It had to be smaller. The field of view needed to be bigger. So, those were all things that we heard from doctors, especially. I need to be able to keep this thing on my head for eight hours. It's got to be light. It's got to be comfortable. It can't be hot. And so, all those things were things that we took into consideration when building Magic Leap 2 on the hardware side. The other piece of it is things like we have a very specific way we deal with prescription lenses. So, other headsets, you put them on, you have the shield, right? And it comes down. You can put them over a pair of glasses, which is great when it comes to just being able to slip it on. The problem is that the way those work, the images are further away from the eyes, what you're trying to project. And therefore, you don't get the clarity you want on those images, the color uniformity is off, and the text legibility is really off. Magic Leap, because of the way we put prescription insert, they pop right into the lenses and we're able to bring them super close to your face. We're able to accomplish bigger fields of view, better text legibility, more color uniformity, better clarity of those images. And when you think about where we're going in medical use cases, architecture, engineering, construction, defense, all those things, they require that fidelity in order for these things to truly be performative, especially on the text legibility side. The other thing that we found was that the device needed to be more dynamic in the environments that you could use it in. This is a light additive device. Our augmented reality is a light additive technology. We are shooting light into your eyes and it is basically making you believe that there are objects in the physical world. There are digital objects and they look and feel real. Well, if you're in a brightly lit environment like a operating room or a brightly lit factory floor, it's really hard for that device to compete with that other light, that ambient light. We created something called dynamic dimming, which allows someone to either

darken the entire field of view. So you can go from fully seeing your world, actually seeing it, to darkening it and only seeing digital content, or you can put darkness behind just the digital objects you're putting in the world. And so those become super high contrast. So all those things were necessary. And then, of course, on the software side, we had to put in security protocols. We had to be cloud agnostic. We had to have MDM in the device, all the things you need in order to integrate into an IT technology stack. None of that was in Magic Leap 1 because it was aimed at the consumer market. And so all those things had to also be integrated into the platform. And we did all those things. I think it's pretty remarkable. The team did it. We did it during COVID. So that was also a pretty remarkable feat. But what we launched last year was the most performative enterprise AR device out there with all those features, with great, great feedback from the customers, the enterprise customers from Magic Leap 1.

And I guess in terms of iterating on the form factor, what part of it is the most difficult to improve? Hands down, the optics are the most difficult thing to do. We have, I don't know, somewhere around 4,000 patents and a great majority of them cover the optics in Magic Leap. The waveguides that we create are truly unique. I just was given a refresher on just how incredibly precise the manufacturing process needs to be. We've invented so much of it. Even down to the machinery that creates the waveguides for our optics, we had to invent those things, because they just didn't exist at the time when this company was developing. And what we ended up with, on top of having all this incredible IP around the hardware, there's a big chunk of IP at Magic Leap that really deals with the manufacturing process and machinery that manufactures the waveguides for us. And it's put us in a very interesting position, so much so that we're having now technology companies approach Magic Leap and sign licensing and manufacturing deals, because they simply can't figure out the design part of the optics or the manufacturing part of the optics. Magic Leap, we've got capacity in our factory, because we're built in the US, so our factory is in South Florida. We've got capacity to make about three million devices a year, and our yield rate is somewhere around 93%. And so that process is pretty valuable, and it's definitely attracting a lot of attention from the tech industry as they start to either want to get into the game or speed up their own roadmap for AR. Now, AR is much, much more difficult to do than VR. It's much more difficult than pass through VR, which is what you're seeing Meta and Apple come out with. The ability to actually see your world with your eyes, not through a camera, and then place that digital content there, and make that digital content feel and look real is really difficult. Now, you have to be able to stick a digital object in the world, and then walk around it, and have it change as you walk around it. The device has to know where you are. It has to know exactly where your eyes are. It's got to be able to stick that object in the world without moving and jittering. And then it has to take into account light, shadow, glare, and it recreates all of that. The compute power necessary and the optical precision necessary for that is incredible. I'm always surprised at this company, Magic Leap, with 1,100 people has been able to continue to drive the innovation forward and continues to best some of the biggest technology firms in the world with this device. It's a true feat.

Got it. And I guess as investors or tech enthusiasts, as we're trying to track the progress of AR

devices over time, I think we like to look at different proxies for this advancement. We can feel the view, we can look at refresh rates, we can look at resolution per eye. You did say that optics as a whole is the most difficult aspect to solve. How do you think someone outside of the industry should be viewing these advancements? How can they track it best? Some of those metrics, I think, are really more, they pertain more to the VR side of the world. The resolution of those screens, because you put on a pass through VR device, they've got cameras going out in the world and they're recreating that image on those screens. I haven't seen it myself, but the 4K screens that the Apple Vision Pro seems to have would give you unbelievable resolution. The problem

with it is that if you're in motion, you the user or your world is in motion, then there's a lag between those cameras capturing that image of the world and recreating it on those screens. And so if you put on something like a MetaQuest Pro and I throw a handball to you or a tennis ball to you, you won't catch that ball because the lag is just long enough. And so that's a problem for those types of devices. If you're talking about AR, I would look at a couple of things. If you want us to begin to track the progress. One, you should see how quickly the hardware is actually progressing. How big is the field of view? Are they able to expand that? Are they able to increase the compute power on those devices? Right now a lot of the AR solutions that are out there are really more heads up display and they use mobile chip technology. We've got a semi-custom

chip built by AMD. Our compute pack is as powerful as an Apple MacBook Pro. So you need serious compute. And so not only should you be tracking the field of view, but you should be tracking the size and weight of this device because putting that much compute power into a device is difficult. It's why we've removed the compute and the battery to a tethered pack that you use. So you should be looking at the ability of the industry to integrate that into a single headset that has a form factor that you can see driving more and more mass adoption. Right now AR is perfect for the enterprise space. It is highly functional. The form factor I think is not a deterrent at this point. At least Magic Leaps form factor is not a deterrent. If you want to start to go mass market, you're going to be looking at a few things. You're going to be looking at the size and weight of that device. You're going to be looking at the price point coming down and as technology ages, it'll do that. And the third thing you're going to look at is the content ecosystem growing within a specific area. Right now you'll see a lot of enterprise applications, especially training, 3D visualization. You see a lot of remote assistance and we're seeing those begin to bubble up more and more and we're seeing more and more end users or customers really trying to really gravitating toward that or even creating their own custom applications that are specific to those use cases. You're going to want to look for the enterprise ISV or solution ecosystem to grow. You're also going to want to see, are you starting to see solutions come out that are geared toward a larger portion of the population, whether that be more of an enterprise or a personal use case, that those three things combined, form factor, the price point and then the ecosystem of solutions available, are all the three things you should be tracking to see when these devices can become more and more mass in their scale?

I want to focus in on the software side of the equation and you mentioned something that really just, you know, I want to hone in on which is this content creation and focusing on building a developer community and so I'm curious how Magic Leap goes about fostering that developer

community because something we've always noted about the AR and VR space and I think it's getting
much better on the enterprise side, but you have this chicken and the egg problem where you need software to entice people to use these devices, but you need to put enough devices out there into the world that developers feel that they're creating for a large enough body of users.
So I'm curious how Magic Leap goes about fostering the software side of the equation.
Are you working with developers? Are you putting them in touch with certain companies?
How exactly are you going about it?
Sure. Well, we have a great stable of developers who've created some really wonderful solutions for Magic Leap. So we of course provide them with a lot of help on, you know, helping refine those solutions so they truly take advantage of what's in the platform and so we have a whole team of folks who do that. We also go so far as really connecting them commercially with folks that we know need those applications and whether that be on the public sector side or on the commercial side or the private sector, we do a lot of that work because we hear from so many folks what they're looking for, what needs they have and as we survey the library of solutions available we can match make and we do, we make those connections. There's a huge amount of tools that are available for developers. I think we're probably one of the most developer friendly platforms out there. We support a whole host of engines, everything from MRTK, Unity and Reel, all of it. We're partnered with NVIDIA very, very closely. We've got, you know, customers deploying solutions at a very, very large scale. Cisco's WebEx hologram is a great example of, you know, large company really looking to the Magic Leap platform to deliver the best experience for what, you know, what they're developing and how they're evolving their offerings to include AR. Those are all great signals that I would look at, right? How many big companies are they partnered with? You know, NVIDIA, I don't think it gets much bigger than NVIDIA when it comes to this
space and what they're doing, right? And the number of engines, the ability to be cloud agnostic, there's a big difference between a company like Magic Leap and others who are in the space.
You know, we're a pure player, right? And so we're looking at how do we advance the technology and
make it as performative as possible? We're not looking to drive you into our cloud business.
We're not looking to figure out how to capture as much data as possible to drive our advertising business. We are simply trying to make the most performative platform out there for AR.
And those are the things that we're doing to make sure that the developer ecosystem has everything they need, and it provides them with as large of a market as possible.
And then just a follow-up question, because you mentioned a few segments within the enterprise space that you are starting to see adoption in. Of those that you've mentioned or that you're working in, which one seems to really have begun to start to gain a lot of traction,
whether it's defense, whether it's, you know, some of these operating room solutions,
which one has really started to come on here? And then which one are you most excited for,
or is the company most excited for, going forward?
Yeah. I think training is the number one thing we see over and over again.
And it's not simply sort of curriculum-based training where you're replacing a screen and you're doing it, you know, you just happen to be wearing a headset and it's, you know,

you're looking at multiple screens. It's training in situ, right? So think about industrial and manufacturing training scenarios where you need to see what you're doing, your hands need to be free, and you are training in the same environment, using the same machinery, doing the same thing.
So you're learning much, much faster. It's not like you're learning in a classroom,
and then you're trying to convert that learning into something in the actual field.
You're learning in the field. What we found is that the training time goes down by 80%,
which is incredible, but the amount of waste in the training and the manufacturing process
goes down by about 25%. So you're training them faster and they're better at their job.
The interesting thing is in the training applications, what we're finding is that
employees are about 30% more engaged in their job. And that's pretty remarkable. Engaged employees
stay longer. The other thing that was interesting is that when you introduce magic leap into the
into the recruiting process, the recruiting time goes down because the job is seen as much more
high tech and future facing than a traditional manufacturing job. So we not only can train them
better and make them better at their job and do it faster, we also can recruit them faster and hold
on to them longer. And you think about manufacturing, the manufacturing industry, that is addressing
some of the biggest, biggest concerns they have, getting people onto the job, getting them working
faster and more efficiently and keeping them longer. So for those reasons, we're seeing a huge,
huge amount of interest from training in the manufacturing space. The redevisualization and
guided assistance in the in the healthcare field is another really big one. I think the combination
of all the cameras and sensors, which can give a great deal of diagnostics for a patient and the
ability to then superimpose imagery onto a patient and guide a surgeon through a surgical plan that
she or he is has developed themselves is incredible. The the idea being that you can truly increase
accuracy and safety of procedures and thus create better outcomes for the patient. That is the other
area where we're seeing a massive uptick in in applications that are being developed. And we're
seeing some great clinical reviews come through the FDA as well as those solutions come come to
market.
Remote assistance is the other one. And I think that especially in the public sector side when
you think about the ability to bring in an expert and not having to fly someone into repair large
machinery is has been another really big, big one. Those are the three things that I think we're
seeing the most interest in. I think training would probably be the largest one that we see as a
company and the one that we see the most immediate promise in personally. Because I have a medical
background, I can't help but be super enamored with with the health care applications. I think that
this device in particular and future ones that come from other companies as well, because of all
the sensors they have on them and the ability to deliver diagnostics almost anywhere. And then the
ability to go as far as like surgical intervention, these devices are going to really radically change
the delivery of health care. They're going to do it at a much smaller cost. So what that means is
you get more and more patients being able to get access to care. And you're going to be able to do
that at a lower price point. And that again means more and more people can get access to care. So
for me, that is truly one of the most exciting things that is going to that isn't a common

personally, it's something that I get the most excited about. And what are some use cases or verticals that seem so obvious to you or like no brainers for AR adoption, but the market just hasn't realized it yet or are too stubborn at the moment to adapt. I don't think it's that they don't they don't recognize that I think a lot of people don't yet understand that the technology is in a place right now where they can actually implement it and receive an ROI immediately. Right. And so architecture engineering instruction is one that that we're definitely keeping a very, very close eye on and we see some great solutions coming out for pre visualization of buildings both interior and exterior. We've got one solution in our in our portfolio called Argyle and they do BIM data visualization and also the visualization of construction data so that it's layered appropriately linearly and how it needs to be implemented. One of the great figures that I was told recently is that the construction industry wastes about 500 billion dollars a year doing rework things that have been built or installed that then have to be uninstalled or taken apart again because something wasn't done in the right order and solutions like Argyles can actually do an incredible job of making sure that people follow along the instructions and you don't you don't put a pipe where something else has to go behind and you have to do all that rework. And so I think that's an industry that is ripe for great transformation with the use of digital data and one that I think is yet to really pick up on just how much cost savings there can be in the implementation of this type of tech. Can you describe the go to market motion like I guess with respect to like various customers, potential customers not understanding that immediate ROI can be recognized like just trying to better understand what the selling process actually looks like and how long it is etc. Sure. Right now we do a lot of time we spend a lot of time educating the market I think especially on the use cases and within the verticals that we talked about. So there is a lot of education that goes on content that we have to develop and push out there. We have a number of channel partners across the U.S. in Europe in the Middle East that are that are selling and there's a lot of time that goes into making sure that they're well trained enough and truly understand the full ecosystem of solutions available as they take this product to market. The enterprise sales process is a longer process than the consumer one. It is typically done through big sort of channel partners on the reseller side and that's how they that's how they purchase right and so that is a lot of what we have to spend our time doing. We create a lot of first party content at Magic Leap and we do a lot of media and a lot of educating the market but it is it is not a short sales cycle. I think it's nascent technology. We have a lot of customers who know immediately that this is something they want to do. They might not be sure they might not be sure which platform or how and we spend a lot of time making sure that they're they're well versed in that. The other piece of it is you know system integrators are a big a big part of the push going forward. A lot of them are pushing their clients into this area and we're lucky to have a really solid position and a very solid reputation both on the technology front and also just as a company now so that we are a partner that keeps getting tapped over and over again by those large system integrators to bring us into those projects with their clients. I have a question just on the market dynamics and we have a large number of players now some of them very large companies in this world. Most notably you had Apple's entrance into this space. Obviously they're not doing AR and they're not building a solution like what Magic Leap has out there but was there any renewed sense of interest into the full mixed virtual augmented after this announcement and

how do you view these larger companies like Microsoft out there with HoloLens. It must be pretty daunting to go up against these companies with unlimited cash. How are you positioning? How is the company positioning itself to customers out there when they when you have these new entrants and again there's obviously and I'd love you to point out the differences between some of these solutions. Sure I think there's a lot of questions there so I'll start on the technology front so I think what we've seen come out of the industry so far and at least most recently are past through VR devices. I think they have great great use cases for screen replacement. I'm not sure they're able to tackle the same market that Magic Leap is going after and to be very clear the enterprise market is the market that is going to deliver the most amount of revenue in the near future. I would say in the next you know at least the next five to eight years. I think enterprise is where the most amount of investment will happen and so I don't know if they can deliver on that need in the near term. I don't think past through VR is going to be a technology that is going to win the day. I think at the end of the day most people are going to want to see the physical world with their own eyes and have that digital content integrated into that experience. I don't think they want to wear something that is recreating the physical world for them and looking at a screen all day long. There are real physical limitations for a lot of folks on how comfortable those devices are to wear and the side effects they get from wearing them especially long term. So at the end of the day I think AR is going to be the technology that that is really going to be the standard bearer for this type of experience and I think most of the companies have said that but that that is where they're going. The truth of it is that we haven't seen a lot of devices that have entered the market. Definitely none that are as performative as Magic Leap and it goes back to what I was saying earlier. This optics technology is incredibly difficult to design and to manufacture and so I think a lot of folks are struggling on on that end. So as far as you know what I think about those devices I think they have great use cases. I think Apple did a great job showing how screen replacement is a great a great use case for the Apple Vision Pro. But for the market that we're going after it's really not not something that I think they can tackle at this moment in time. That was so that was your first question. How do you go up against these these large behemoths of technology with unlimited budgets? I think if Magic Leap has proven anything you don't need an unlimited budget to produce the best technology on the market. I think we spend the company in its total lifetime has not spent what Meta spends in one year in this in this area and we still manage to produce this incredible device and and the manufacturing you know sort of capabilities around it. And so I think that says a lot about what's truly needed here in order to produce the type of tech necessary to really deliver performance for the enterprise space at least and that that goes for the consumer space too. These you know our roadmap for technology is not geared toward just only doing consumer doing enterprise. You know our roadmap includes making the device more performative you know increasing compute power shrinking the size of the device. Obviously wanting to bring the cost down as we can and all those things will open up a larger and larger market for Magic Leap. We have technology plans that give us the ability to do that. And so I think that we're in a very very good position when it comes to the tech. The other thing is we don't go at it alone right. We've got incredible partners that are massive in scale. I mean I mentioned Nvidia before they're they're an incredible partner to Magic Leap. They're a big part of you know why people see value in

us especially as we begin to do more and more connections with the omniverse. You know we've got big partners like VMware and Cisco and we've got every engine that you you need to create content

is certified for Magic Leap. So it is daunting of course you know when you're going up against the biggest tech companies in the world. But I think that we've managed to create a partnership strategy for Magic Leap that allows us to compete at that level. We've been able to produce technology

that bests what is out there and do it ahead of the curve. And so at this moment in time I'm really happy with where we are and I don't I don't find that to be a challenge that that is really affecting our our own go-to-market. Before I forget I would love to get a high level overview of micro LED versus liquid crystal as it pertains to I guess optics as you've mentioned it's extremely difficult. I believe Vuzix uses micro LED. Magic Leap uses like a custom liquid crystal architecture would be great to understand what's better what's working what's not. Yeah I think for at this moment in time liquid crystal on silicon L-cost which is what we use is I think the best the best solution out there. I don't think anybody has figured out how to do it at scale and at a cost that is going to make sense is what my my guess is. We have our plans for micro LED. We continue to investigate and and go down that path. Our wave guides obviously will be more than happy to take a light source from wherever we wherever we

bring it in from. But at this moment in time I think micro LED is a bit further away than most folks would like to believe it is. And L-cost is I still think the best the best possible solution especially if you're trying to scale a device and keep it at a certain level of cost to keep the battery consumption at a certain level. I think you're still dealing with best in class with L-cost. Daniel it's been an absolute pleasure to have you on. This has been amazing. Before we wrap we just have one more question. What are you most excited about within the enterprise space regarding AR technology over the next five years? I think retail is probably one of the areas that we're going to start to see more and more progress and integrating that into both the retail employee and the shopper experience I think is something that is really interesting. And I think the other one that is bubbling up are these location-based experiences. So Tim Drum did an incredible one at the shed in in New York over in Hudson Yards and they did another one

in Brooklyn of these multi-person art installations. And I say multi-person I mean you're 50 to 80 people at a time seeing a simultaneous experience using Magicly Petsets which is incredible. It's an incredible feat that you have all these devices synced to a single piece of content. I think it's a great proof point for enterprise that you can have these mass experiences multiple employees seeing the same exact thing at the same time. But it shows that there's a true interest in these consumer-facing experiences that are entertainment-based. I mean you can look at the sphere over in

Las Vegas. There's definitely a bubbling interest in people seeing and experiencing these types of things. I think as far as a B2B2C play I think that opens up huge opportunities for Magicly Petsets as we begin to talk with more and more companies who are looking to create these types of experiences. The automotive side is the other one that I think is really, really interesting. Both from a design perspective and replacing clay models and really being able

to have a collaborative design process that is based on digital models and not a physical model is really interesting. And even this goes beyond automotive but the factory of the future and really thinking about how you integrate this technology into designing a factory, training employees, and then having them wear it as part of the fabrication process. The manufacturing process is another area that I'm really excited because I'm starting to see more and more interest and more and more people experimenting with that. And I think it's going to be one of the big game changers that you're going to see in the next few years. Alright Daniel, well thank you so much for that. This has been an amazing call and thank you so much for coming on. This is very exciting opportunity here in the AR space and very exciting what you all are building at Magicly. Thank you so much. Well thanks, thanks for having me. ARC believes that the information presented is accurate and was obtained from sources that ARC believes to be reliable. However, ARC does not guarantee the accuracy or completeness of any information and such information may be subject to change without notice from ARC. Historical results are not indications of future results. Certain of the statements contained in this podcast may be statements of future expectations and other forward-looking statements that are based on ARC's current views and assumptions and involve known unknown risks and uncertainties that could cause actual results, performance, or events that differ materially from those expressed or implied in such statements.