Brillhart: Thanks for calling. My mom might like text and it might show up on the computer, so I'm sorry if that, if you see that. Um, so you all probably figured this was the case, but crafting immersive experiences can be very challenging and downright frustrating for a lot of reasons. And so there was a day that came along when I felt particularly frustrated as a creator. So I gave myself a design challenge. I would make something in a day. I would only make it by using assets from the web, so stuff that you could use and I would crafted using tools that were available to everybody. Um, for some reason that's still a little bit beyond me. This memory came to me. My mom was making dinner in the kitchen. I was in the family room sitting in the front of the TV watching the weather channel. Now, for those of you who don't know what the weather channel is, let me explain.

Brillhart: It's a, it's a channel devoted entirely to the weather, 24 hours a day, seven days a week. And I went on Youtube and discovered that there were others who also really love the weather channel. So much so that they recorded it off their TVs. And then at the advent of online video found it absolutely necessary and critical to upload these recordings to the Internet, which got me thinking what would it make or what would it be to make a 360 degree video experience about the weather channel? Uh, and here's the result. You can pump up the volume to view one. I mean that's pretty much it.

Speaker 2: [inaudible]

Brillhart: I mean that's really it. That's all it is. So worth noting that each video represents a different year. In the 90s there's 89, 92 96 and 99 so I placed even sort of on multi weather verse of sorts. Um, I call the experience conditions at Omaha because a lot of the folks, all right. Yeah, Omaha because a lot of the folks, maybe it was you, I don't know, made these recordings were made. These recordings are actually from Omaha, Nebraska and I'm not sure why. So maybe you can tell me. And then if you look down, so if you look down, you actually see a welcome to Omaha Postcard. And if you look up

Speaker 2: [inaudible]

Brillhart: okay, so I wasn't sure what I was like really expecting as a response. Probably nothing. But then the press started rolling in. A Google filmmaker makes VR video mash. I was at Google at the time. Google filmmaker makes VR video mashup of nineties weather channel footage and Kenny G, I can't think of a reason not to watch this. Um, the weather channel to Kenny g is the least necessary VR experience and we love it. Um, and then Kenny g himself, I spy someone's Saxy playing smooth jazz in VR, winky face. Um, I'm not saying this had anything to do with me, but not too long after I released conditions at Omaha, accuweather released their VR app and I'm not, you know, I'm not saying this is good or bad, but I can tell you that the press had a very different response.

Speaker 3: [inaudible]

Brillhart: so it turns out you don't need much design, a meaningful design, a meaningful experience. And though this isn't telling you the current weather per se, you could see how it could be functional in this capacity as well. It is unfortunately our want to do the most literal thing when we're clueless. We rely on lean on older systems, older mediums, to show us the way and while they can certainly provide inspiration, they are rarely the solution. I began my career as a traditional filmmakers, so when I started in the immersive space, I was met with this literal methodology pretty immediately. The belief was that out of all the mediums, filmmakers would figure out what to do with virtual reality, but there was a problem, which was the frame. Filmmakers are taught to care about the frame. Above all, that was how we are to tell our stories.

Brillhart: But your frame doesn't mean very much if someone can do this, and in virtual reality, especially if you don't acknowledge and celebrate this act, you've missed the point. And therein was another problem. Just as background, a virtual reality camera rig typically has multiple cameras attached to it. So at some point you need to combine that footage to make a seamless three 60 image. Now that wasn't the problem so much as the fact that the output we received looked exactly like frames, but bigger. So it made me scratch the filmmaker, which I've, I realized really quickly that this was the wrong way to see what I was working with because there were infinite amount of frames to consider. So instead of seeing it like this, I had to start thinking of it like this. A world of potential frames, a world teaming with possibilities with its own elements, energy and flow.

Brillhart: It was something have now understood to be very much alive and never truly set in stone. There was also a major shift in terms of how we would have to relate to our audiences. Filmmakers call their audiences or audience member viewers. A viewer watches a window into a world that immersive that involves bringing someone into that world. She doesn't just view it, she visits it, and as a result she becomes part of the chemical makeup of that world. The resulting experience really depends on her. So frames become worlds. Viewers become visitors and great things happen. Great. Immersive happens, great design happens when the world and the visitor connect, and it was at this point that a lot of filmmakers will raise their hands up and say, don't get it. Don't care. No thanks. Not For me. And I was not one of those filmmakers. I was very interested in how the shift in language changed a lot of what I thought I knew take traditional editing for a time.

Brillhart: It was thought that you couldn't edit in VR because of the ability for the of the visitor to turn away from your frame. And that was because folks were seeing it like this as a frame to frame construct, but because we're dealing with worlds of potential frames, it was clear to me that editing needed to be thought of as world's world. Each world extends from the one before it and transitions to the one following it. And as a result, our job as creators is to embrace the

possibilities of potential frames in order to provide a mental pathway through these universes we were creating. We are no longer storytellers. We are creating spaces from which great stories can emerge and in order to create these mental pathways we can talk about concepts like attention. Do I want you to watch this and tell me or if do I actually don't tell me think, think loudly about where your attention is going.

Brillhart: No, I would guess given that there's one person in the scene who is moving away from you that you'll place most of your attention here and we call this a one point of interest scene or one poi end scene. Now these types of scenes can be extremely useful by placing bets on a particular point of interest. We can more comfortably take a visitor from something she's paying attention to in one world and match that to something we'd like for her to pay attention to in the next. It's a lot like matching on action in traditional editing. This is a scene from a VR experience. I did call go hubs go about the Montreal Canadian ice hockey team. So is there something on fire, a torch in the middle of the rink and all the players are moving towards it. I took a bet that that's where you're going to be paid paying attention to the most. So here's what I did

Speaker 3: [inaudible]

Speaker 4: [inaudible]

Speaker 3: [inaudible]

Speaker 4: [inaudible]

Brillhart: no, I could have just matched that area of interest with the rink, but then you wouldn't have seen that guy and he's kind of the best part of the whole experience. So worth recognizing that of when his attention moves from you to the rink behaviors. Studies have actually shown that you'd actually follow suit. So I contacted them, the eye contact shifting. So you'd see the rank eventually. And there are cases where a visitor will do the exact opposite of what you would expect. And I learned this from game designers who would actually go into VR experiences, look in the direction that they assumed the creator wanted them to look at, and then turn in the opposite direction. And to be honest, a lot of times there wasn't much there. So this is a scene from a VR experience I did called residence. Kennedy is playing her violin and if that's what you pay attention to, fine a, that's actually the point, but what if you turn around

Speaker 3: [inaudible]?

Brillhart: No, I'd argue that if we want to talk about film, this is far more cinematic. As we record. We recorded the audio spatially. You still hear Kennedy behind. You contextualized her parents' reactions in front and now by leveraging where what and how's one may be engaging with your worlds, you can help her comfortably navigate the experience you've created. Your universe also

suddenly has cohesion. Also important to note that not all worlds are the same. Different worlds come with different energies as we've seen. It's not all one note, and so we have to think about engagement and disengagement, right? We always talk about trying to get people's attention and trying engage with them, but we live, most of our lives disengaged from a lot of things, so we do have to consider that as well as a big part of this and what results is an understanding of crafting worlds.

Brillhart: That correlates quite nicely with the intent behind frame composition. This world of rocks with no points of interests that really just sets the scene and allows you to be there. It could be considered a wide a scene like the tram in Japan where there are multiple distinct points of interests can be considered a medium. A scene like the glacier climber that you saw earlier can be considered a close up. You're paying attention to a very specific part. You're engaging with a very specific part of a world. So what we want is good experiential flow. It's a dance, it's music and what kind of dance and what type of music is entirely up to you. It's important that this kind of thinking applies to everything we've held true in traditional media. We need to remind ourselves that these sorts of systems came from a much deeper need than the process itself.

Brillhart: We don't edit just to edit. There is a specific reason we do this, so getting back to that reasoning, what it does for us and to us what it accomplishes. That's a big part of figuring this out and it seems counterintuitive, but there will be many instances where we must work backwards in order to move forwards. And this gets heavy pretty quickly. We can talk about perception, how our capacity to understand the world is fairly limited. This is a project I did that utilizes something called deep dream in VR. It experiments with using an intelligent system, trained on a large set of images to reimagine worlds. Uh, something I did, uh, that evolved thinking about hearing and on it's permeations Beethoven's fifth really thinks about not just the act of hearing but deafness as well. Um, so thinking about different layers of performance from the philharmonia orchestra in London playing Beethoven's fifth, Oliver Sacks, his idea of movement Parsing, uh, is, which is something, um, that uh, happens when we lose our ability to hear the Ah, the acuity of the of site goes up.

Brillhart: So sign language actually works better because of that. Um, the way that instrumentation in space actually records audio compressing time, how we can actually hear sound that way. And then Helen Keller who was deaf and blind, how she was actually able to hear Beethoven by placing her hand against the radio, haptics, how we can reimagine what hearing is through other perceptual abilities. Then what we had as a result or as people coming through this experience, deaf the deaf coming through this experience saying, oh my gosh, this is the first time anyone's made an experience for us where we weren't just an afterthought. And then we also had people coming through the experience who could hear just fine that took off their headphones and we had these subpac haptic backpacks on and people willingly made themselves deaf too because they thought that was the better way to experience this.

Brillhart: What a thought. Unprovoked people connecting in this way. I'm thinking about how we can encode culture, um, uh, within agency and interactive components. I made a piece with the Navajo Navajo community in Bluff, Utah and thought about cardinal directions, what they'd actually allow people to see, how comfortable they would be a color. Figuring that into the a entire spectrum of how people would actually be able to interact in coding culture through behavior. Um, and what may conditions of Omaha folks a really compelling was that you could go home and put a phone in a Co know cardboard back then and you had cardboard, a plug in your headphones and just experience it. Um, or it could be at a really loud bar and swing your phone around and it would be fun too. There really was no right way of doing it, but there was no wrong way to do it either.

Brillhart: Um, and so it was much about the state of the tech and a user's expectations as it was about the aesthetic and the construction of the work. But what I also find fascinating, fascinating, especially now is how we can design the tech ourselves too. Um, I was approached by the hardware company Bowes, which I'm sure you've heard of, who asked me what I would do with their augmented reality audio technology. So I went to that place where the weather channel probably came from. Um, and I said, wouldn't it be great if you could take your favorite song, break it apart, walk towards the lead singer, the guitars, the pianist. That could be neat. But then I realized if I could do that with one song, I could do that with a lot of songs. I can do that with podcast. You can do that with field recordings, documentaries, narratives.

Brillhart: So I looked around for a platform that did this and just so I could make this stuff and it, there wasn't any, there's no platform so I could wait around for a large tech company to build a platform so I can make this stuff or I could just make it my damn self. So, um, that's how traverse came to be. A traverse is a platform for spatial audio experiences that you can physically move through. It's like the vinyl compliment of our streaming age and bearing that the demo gods are kind to me. We're going to try to do a demo of that right now. That's why I'm not cool. I'm just, you know, these actually are pieces of tech. Let's see if it's wrong.

Speaker 2: [inaudible]

Brillhart: oh,

Speaker 5: I worked with Elvis's people, but you probably saw that at this point.

Speaker 6: [inaudible]

Brillhart: so Reggie is his guitarist. So we could actually take the stems from a 1969 recording, um, and separate them. So this is just orient people.

Speaker 2: [inaudible]

Brillhart: so technically,

Speaker 2: Whoa, whoa.

Brillhart: All of this is right

Speaker 5: because I'm here. [inaudible]

Brillhart: and if I want to know where anyone else is, I just press and hold on the phone just so we kind of like it when people just like, you know, walk around and just experience it. But if you really weren't curious about who's there, you can walk towards Tommy and Bobby over here.

Speaker 5: Whoa, whoa. Right, okay.

Brillhart: Closer to the strings over here. And then what's really cool or what's also cool, my lyrics for bumble, I'm not singing. Sorry. And then, uh, but you could, and what's interesting is you could add any sort of things to this, more information about the artists, um, images, anything. Anyway, thanks. So Elvis. Um, so that's a demo. And so what's interesting about this is we were able to create a lot of different, uh, awesome experiences around this as well. To, uh, pieces from Elvis and Memphis, uh, suspicious minds and pair of my love. Um, we also created an experience called the arm of insight, which lets you be a, the arm of insight on Mars. Oh, stop my sunglasses on. Sorry about that. Um, uh, which we use publicly available NASA JPL assets, um, to allow you to deploy. It's kind of like an educational game and while you deploy instrumentation, um, on Mars, um, this is what it looks like.

Brillhart: So you could actually scan that aura to look like whatever you'd like, whatever would be, um, useful for you to, to do. Uh, most recently we created a traverse experience with Yoyo mom, uh, called into the light for the Tribeca film festival. We've worked with artists who, Gwen Chong, who created markers for each movement of Yoyo Moz, performance of box cello, suite number two in d minor. And we placed these markers within the, um, the building, uh, spring studios in New York. Um, so as people moved to the roof of send it to the roof, they essentially moved through the movements of Bach and then they would ever be able to experience so Gwynn's work as well. So if they held their phone actually like this, they'd see where yoga is and they held it like this. They'd see her work. Um, in case if you are wondering how complicated it was, here you go.

Brillhart: Here you go. It involved a lot of, uh, you know, thinking around, you know, architecture space, spatial relationships, um, using volunteers like immersive theater was sort of a part of this that we didn't expect. Designing, you know, what the, the aesthetics of the thing looked like, how people would actually be moving through the space. Then we leveraged all sorts of experts and mediums. Um, so I want to end with this. It was so amazing. I cannot pronounce this word and I'm not going to try, but I love it because it's exactly the kind of thing that's

happening in the immersive space. Um, it's not just one medium that will solve this. It's a lot of mediums, a lot of experts, artists, engineers is this ability experts, scheme, designers, architects. It's almost ridiculous to even try to, you know, separate people in this medium because it's all in an effort to get to somewhere very profound and very new. Um, and the literal nature of the world will be pushed aside for deeper understandings here. Um, and it's unfortunate that we are within systems right now that make us have to do that cause like categorize ourselves, but those systems will be dismantled and then their place will be new and better systems created by a new group of incoming designers that won't fit into any box and who will create and design better for these modern times. So thank you very much.

Brillhart: Thank you.

Jon Wiley: Hello everyone. Um, all right, so I'm going to be talking computer interfaces and Oh, cool. That actually worked. All right. Exciting. Um, so there's gonna you're gonna hear this a lot today is a lot of different ways to think about ar and VR and everything in between. Um, one of the ways that I think about it is that augmented reality can bring anything to you. So this is actually a photo taken in my hotel room, but two hours ago, uh, and I invited detective Pekichu and we had a good chat and it was a lot of fun. Um, uh, and then virtual reality can take you anywhere. And the challenge with virtual reality is it's hard for me to show you what it's like. So I've got this like panning back and forth type of thing happening. Um, but virtual reality and augmented reality, they exist on a spectrum of capabilities, right?

Jon Wiley: And so there's lots of names for this. You'll hear like spatial computing and immersive computing and ambient computing and ubiquitous computing. I think it was something that was popular in the 90s. Um, but it's basically about taking software, uh, the mechanism with which we interact with computers and making it behave more like what's familiar to us, the physical world around us. So the information age, as we all know, started in the latter half of 20th century, hasn't stopped. Um, and what people can achieve with computers has grown enormously by leaps and bounds. Uh, many people readily credit, uh, Moore's law, right? Uh, and network storage and, and bandwidth and all of those types of things is kind of being the driving function of how computers have moved forward and, and really how people have become more capable of computers. But, um, just, just like raw computational power.

Jon Wiley: But the true heart of it, uh, the thing that really drives massive step changes in human productivity and capability and creativity with computers is the interface. The human computer interface says the interface designer. Uh, but it's true, the first computers required people in lab coats to operate them, right? Uh, we had folks at IBM, you know, and they had to, like, they had this specialized arcane knowledge. They don't go only be passed from one to the other. Um, and they, your interface for computers at that time was, was not on humans terms, right? It was on the computers terms. Uh, and, and then a bit

later we got, um, you know, like green screen and amber screen terminals and a keyboard. How many people use like Amber Greens contains a few of us. Okay, cool. Um, and, and that's actually closer to the human at this point.

Jon Wiley: It's got an alphabet and a rudimentary language, something we've been using for, for thousands of years. Uh, following that, uh, famously is the, is the computer mouse and the, the Gooey, the, the graphical user interface desktop and things like that. But each step along the way, what's happening is that the interface is getting closer and closer. The mechanisms of interaction get closer and closer to the ways that we as humans have evolved for, for punters of thousands. Or if you want to go back millions of years to just deal with the world, uh, and how that functions, and each time the computer gets closer to how we perceive and interact with the world, it unlocks massive amounts of creativity and potential. The smartphone is the most, uh, successful and widely adopted technology tool in existence. Um, it's no coincidence that the smartphone so far, uh, is the most human of interfaces to it.

Jon Wiley: Right? Uh, it fits in your hand. Uh, it's manipulated, uh, directly through touch. Your, you're using your physical, your hands to physically manipulate software. Um, and it goes where you go. It's mobile. Uh, and so you can see a clear trend in all this where computing is migrating from this monolithic thing, right to something that's more mobile than it goes with you to eventually. And, and you're starting to see the parts of this something that's more ambient, something that's there. And maybe I conversed with it, maybe it kind of understands me and understands gestures. Uh, this was announced at io, the nest of MACs. Um, we're actually can understand gestures like this is the number one thing that happens when people are playing music. They just wanna stop, right? And so you can actually gesture to it, which is something that's very natural for humans but hard for computers to understand.

Jon Wiley: And interfaces have been migrating from the computer east to the metaphorical, again, with the desktop, uh, to the literal. And it's because, um, this is how we as humans start to perceive the world. And but because it's software, it's malleable in ways that the physical world is not. And so that means that it eventually can transition to something magical. Something that we don't have. Kind of a, uh, you know, a current metaphor to understand except in the stories of, of magic and, and mythology. Uh, and it's this continuous push, uh, for computing to become evermore accessible, uh, legible, easier to understand, easier to use, evermore useful. Uh, this turns out to be important to Google. We care a lot about computing and we care a lot about the interface of computing and how we can make that computing more accessible to people. And we've been working in this space of immersive computing, ar and VR for a long time.

Jon Wiley: And so I'm gonna share with you a few examples of some of the things that our team has built over the last few years. This was announced at io. Uh, this is a Google Lens, uh, in Google goes. So Google Lens is, um, is one of the

manifestations that is key to ar and VR. So all of the things that go into making successful ar and VR products ultimately is perception. We take perception for granted. Um, the fact that I know that this is a flat surface, that I'm in a space with walls, that this is something that I can put on top of. There's a gravity vector. These are all things I'm explaining and I'm saying them out loud. And it feels weird because we all innately perceive these things, but to computers, to computers, it doesn't, they don't understand at all. We have to help them understand. And so we have things like we will lens to help, to help, um, the computer understand the world. But once we start to help the computer understand the world, we can turn that right back around and help people. Um, so here's a video about, uh, one of the things we've done. Google Lens, uh, that's present in Google. Go Google go is our software that we have that runs on a wide variety of phones in the world and not just the, like super awesome smart phones. And I'm going to see if I can get this to play.

Speaker 3: [inaudible]

Speaker 8: [inaudible]

Speaker 3: [inaudible]

Speaker 8: [inaudible]

Speaker 3: [inaudible]

Speaker 8: [inaudible].

Speaker 3: [inaudible]

Speaker 8: [inaudible]

Speaker 3: [inaudible]

Speaker 8: [inaudible]

Speaker 3: [inaudible]

Speaker 8: [inaudible]

Speaker 3: [inaudible]

Jon Wiley: um, so kind of a key there, right is that the computer has this perception, uh, and it's able to transfer. Using this perception is can transfer this knowledge to the user in a way that that can be really helpful. Um, the second one I want to show here is a, some of you may have used this. If you have a pixel phone, you can actually just go down downtown at Aspen and try it out. I mean, how it

works. Uh, it's Google maps. They are walking navigation. I'm gonna show a video here from a Wall Street Journal. They did a pretty good job of just kind of explaining it here.

Speaker 3: [inaudible]

Speaker 9: you've ever lived in a city with underground transit? You know the problem I'm about to have. You come out of the subway station, look at your maps app, then end up completely walking in the wrong direction until the little blue dot finally catches up. The Google maps team is working on a way to make that part of travel a lot easier, especially for pedestrians. It's working on a feature that can super impose your navigation on top of a live view of the real world. Forget the map. You just see the street and there's a big bunch of arrows saying go that way. Google went as a phone with a new version of mounts on it so we could test out the future. So let's go for a walk. Once you start navigating, if you hold your phone up or tap the right button, your phone will immediately open a camera and start scanning around.

Speaker 9: It's looking for familiar landmarks signs and more just to see exactly where you are. Then it'll give you super specific instructions on where to go. We're, you're not really supposed to walk with it on all the time. Maps will even prompt you to put your phone down until you need it again to save bandwidth and battery and probably your life. Just find your turn, put it down and move on. One maybe unexpected upside of navigating this way is it actually can make your location more accurate devices, use gps cell tower data and Wifi network to locate you. But by using your camera to actually see which direction you're pointing, what you're looking at and how far away it is, it can drop an even more accurate. And for exactly where you are, it's pretty obvious that this feature doesn't stop with smartphones. The tech that makes it work as similar to what makes self driving cars work. And you might be looking for restaurants on an ar windshield Sunday and whenever we all start sporting ar glasses, it's going to be only natural to put some of that stuff right in front of your face.

Speaker 2: Um,

Jon Wiley: so that one's an interesting one because in both of those, right, they deal with perception. But this one is actually a perception above what what people can normally do, right? A to be able to perceive your precise location in space and relative to the different points in the environment. Uh, some people are really good at that, but most of us are somewhat directionally challenged. And the ability to just know, press that precision, uh, you know, gives you a lot of confidence, um, and you can navigate through, through those spaces a lot easier. Um, and it doesn't have to be visual, right? Like we saw with just, um, you know, in the Bose glasses that they're there. There's the possibility there that could be, um, through audio. Uh, okay. So those were a couple of ar examples. I want to talk about one uh, VR example.

Jon Wiley: Um, and it's earth VR. I'm not going to show the video cause we're running a little short on time, but what I wanted to say was I also would like showing you a video of VR is just not going to be helpful cause just like camera spanning, right. And it's like trying to do, visualize it. It's hard. Um, Earth VR is something that we actually started building, um, many years ago. Um, even before Google cardboard existed. And we just basically take everything that you can see in, in Google Earth, uh, on your, on your phone or on your laptop. Uh, and we place it in an environment where it's a full walkable environment of VR. And the experience I would tell you is basically, um, I've walked through San Francisco like a giant with the buildings all around me, right? And to be able to like peer and look at the buildings and look at the car is down below.

Jon Wiley: Um, it's just kind of an, uh, a transformative, uh, magical experience. But the one thing I wanted to really kind of emphasize, um, is that, uh, these technologies Ar, VR, particularly when they, they're, they're, they're happening, you know, very close to your natural senses. They're happening, you know, either if it's visual, through your eyes, your ears, your sensory perception, they're very close to you. They're very intimate. They're very visceral. Um, and Google Earth VR is actually one of the only products, um, that I've ever worked on that regularly makes people cry, uh, in a good way. Um, that people have been able to be in earth, VR and transport themselves. And when we talked about VR and immersive computing, the one of the phrase we use is his presence. The sense that you've been transported to someplace entirely different people have visited their childhood homes. They visited places they aspire to go to.

Jon Wiley: Um, if they can't travel, if they, you know, for various reasons they may, they may not ever be able to get there, but they can visit it in Earth VR and they can see it. And it's a very, um, it's a very intimate experience. And this is a challenge that we have as designers because for every single thing that we're doing here, to bring this technology closer to you so that the interface is more natural, more connected to the way that you normally perceive the world, the stakes are much higher. All of the ways in which we think design can go wrong. If I make something on your phone and I've done a bad job, the design, you'll be annoyed. But if I do a bad job at the design in ar and VR, particularly when it's close, I can make you ill, I can make you sick, I can make you deeply frightened. There are a lot of ways in which things could go wrong. And so we as designers have to take everything that we normally care about and turn it up to 11. Really pay attention to it because it's a really sensitive, sensitive space. But then again, with that comes lots of different opportunities in a and creativity that we can deploy to make people, um, more capable with computers. Thanks.

Aaron Koblin: So I apologize in advance. I'm moving very quickly. Bear with me a, so I want to start off by actually moving back in time and broadening the definition of augmented and virtual reality just a bit. Um, I want to begin with the recognition to that varying degrees. We're already living in this hybrid world and have been for some time how the digital and analog coexisting and guiding our

lives and experiences. This is obvious with smartphones and Uber drivers and bird scooters, I, but in subtle ways. We're integrating digital world into our lives in ways we may not even be aware of. So I've been interested in the creative application of augmented and virtual reality for quite awhile. And I thought it'd begin with a few ancient projects, which kind of led me to my interest in what we're doing now. So from the abstract to the far more narrative and practical.

Aaron Koblin: So a decade ago, this is an installation that my collaborators and I put into the San Jose International Airport. This is, um, this is a, an installation. This is supposed to be a video that's not playing, but you get the sense of it. It's basically a collection of panels that are using real time data from across the planet to travel virtually from one location to another and use the ambient light of the space to show, uh, to show that what the other it goes to show actually the dynamism. So it'll show the weather conditions in a, in a more, uh, uh, a way that's a little bit more conductive to the environment. Not Another, uh, digital display, but one that is actually showing you, uh, it's, it's data-driven journey throughout the different, uh, throughout the planet. In 2014, I teamed up with Janet Eckelman to make, uh, a sculpture that was a much larger scale, 745 foot net, which was basically an interactive where people could use their connect to it through their mobile phones, hundreds at a time even had actually interacted a scale that was well outside of their normal scope of influence.

Aaron Koblin: There's a few different people at the Ted Conference interacting with it. So this is a different idea of augmenting reality in an interactive way and a physical with a physical and the digital combined. I'm more abstractly, I created the series of images with my friend Ben Trickle Bank for Doug Aiken station to station exhibition. So this was pushing the idea of scale even further. We painted landscapes with laser light that was attached to a train moving through the scene. And the topographic are actually painted onto the landscapes via the train, which were made visible by long exposure photography. So the images brought to brought the digital to the physical in a way that was massive yet beyond perception except via documentation and never to bring these artworks to more people. I started installing them in galleries. This is a at the Barbican in London where he painted a gallery again with laser light, which first to viewers appear to be more of a formal, uh, experiential installation.

Aaron Koblin: But as they move through the space, it was revealed to be a light painting which was created over time as an evolving time lapse film. So you could see yourself moving through the space, oblivious to what was happening around you. And the project was talking about the modern state of technology where we find ourselves surrounded by systems we can't see or understand with only glimpses into them. I was thinking about the hidden worlds and the extent to which we're creating increasingly dependent. We're increasingly dependent on them and designing them outside of our own tangible reality. I think it's valuable to use technology to shine a light on the necessity to question the technologies themselves and how they shape us. At the same time, my collaborator Chris Milk was doing installations and museums as well. Um, this is a, uh,

Speaker 2: hello.

Aaron Koblin: I don't know if we killed the volume just a little bit. This is an installation called treachery of sanctuary, which is basically a, an old school virtual reality where you can see a shadow of yourself. It's being augmented. Of course, this is a child who's about to experience flight as he engages with the installation. So Chris and I came together in 2012 for installation at the Tate modern. Um, W we created this project. It's a, it's a bit complicated, so I'll save the details for another talk, but it's called this exquisite for us that it basically allows people to create animated sequences with each other. Um, the Tate has more than 5 million visitors a year. So this is an incredible opportunity for us to create something at scale that was immersive and interactive, but could also be a little bit more democratized available to millions of people.

Aaron Koblin: This was something that was really intriguing to us and, and one of the major things that drove us to VR, the idea that we might be able to fuse these experiential installations. We were creating, uh, with the digital web-based works that were accessible to millions of people, but to have both of those attributes combined. So the first thing that really intrigued us about VR was this idea of presence, the ability to feel that you're actually somewhere else, that the idea that you could, uh, kind of suspend disbelief as opposed to suspend belief to participate in the medium. So in 2013, this happened, oculus created their development kit. This is the first almost practical VR headset. A by fall, the following year, Chris and I created a company to, to figure out what we could do with this medium. This is how within was born so that the app is alive and well and each month we add to curated collection of narrative VR, which puts you directly into the story.

Aaron Koblin: The idea was to produce and distribute the best immersive storytelling we could in an app that would exist in all VR headsets. So kind of be a trustworthy place to John's earlier point content that wouldn't make you sick and would actually be worth watching the term HBO of VR was thrown around more than once. This is a slide I stole from my partners, Chris, Chris's Ted talk. I also, as you've heard from the previous speakers, it's quite difficult to show virtual reality on a two d screen. So I'm actually just going to show you a very brief clip and then keep moving. You, you kind of bear with me. If you imagine unwrapping this world, uh, actual presence in it is quite a bit different. This was one of the first projects that was launched. Um, the app was originally called verse.

Aaron Koblin: This is an experience that I'm from was many people's first VR introduction to VR. And it's quite a visceral one. When the train does this, it explodes around you. And a, it's very much about presence and about being there. And we've had the opportunity to be and been fortunate enough to work with some of the world's top media companies, brands, uh, and others to bring incredible VR stories to life, especially a lot of musicians and kind of thinking about what music videos could be like in this medium. But here are a few other things we've worked on now on the app, you can visit North Korea with CNN. Uh, actually get

a sense of what it's like to be on the ground. There you can travel to Greenland with Al Gore and witness climate change unfolding real time, fly above the Congo with military, uh, platoons protecting elephants from poachers, explore the nitrogen cathedral and vantage points that are accessible to the public, uh, stand face to face with felons and maximum security prison and hear their stories or for, or if you're MTA, unwind with a private serenade from Bano.

Aaron Koblin: The second attribute we were really interested in was access. Uh, incredible attribute of this technology is that these things could be accessed from anywhere. You didn't have to travel to a conference or a special museum. If you had a device like this, you could combine it with one of these guys, uh, folks at Google where were pleasant enough to create a, and we teamed up with, with them in the New York Times to create the first piece of VR Journalism, which was this, uh, which was this, uh, documentary about the artist Jr. Um, so Google handed out, I think it was a million cardboards, um, and gave people with the New York Times magazine a great, great sense of what it's like to be present and experience a story together and get you into some incredible advantages as well. So the technology didn't stop there. I imagine we'll get more into this on the panel.

Aaron Koblin: I don't want to geek out on it too much, but it first started out with what we call three degree of freedom headsets, which allow you to look around. That's presence. And that's kind of the first important attribute. From there you get into what are called six off or six degree of freedom headsets, which allow you to actually move around in the physical space so you can actually see your hands, you can actually interact with physics and it feels far more immersive, uh, in a meaningful way. And when those headsets started to come out, this is the oculus rift, uh, we, we started get very interested in both embodiment and connection. How can you be in these physical places with other people interacting in an interesting and unique ways. So the first projects we created was called life of us. Um, this basically was a small story. It's the start off as a single cell Amoeba with you and your friends and you end up sprouting arms becoming a tadpole and going through the whole course of human evolution together. Um, I'll show you a very quick clip. This is from Sundance in 2017 and we've been running it imax experience centers where people can enter with their friends and family and uh, experience this unique story together.

Aaron Koblin: You kind of get a sense for what it's like. Again, when you're actually in it controlling things. This is you as a fire-breathing pterodactyl we took some scientific liberties on the narrative, but there's limited limitless potential. When you think about what you can do. We're now with our friend BRK angles, the incredible architect, thinking about what the museum itself could be inside virtual reality. Uh, we arc isn't having because he's not constrained by any of the usual challenges of physics budget time. Uh, you can rework space completely in a virtual context. So we're thinking we're inspired by ideas like the tesseract at Mc Asher where impossible spaces can exist but can still be inhabitable at a bottom bodily scale. So in VR components like this can exist like chaotic

functions where things from one way are, uh, your, your approach from one way and it's one thing and approach from another.

Aaron Koblin: It's another e there's all kinds of things you can do. This is, uh, a portal where, uh, at the entryway actually inverts space as you move through it, um, a little bit easier to experience than to describe it. You can get a sense for how it's an impossible reality. This is a mobius layout which reorients visitors based on your own body. So for each person, gravity is personalized. Uh, there are a few other ideas of how you can sort space and actually change. This is a figure eight configuration. You can imagine opportunities for new information architectures. We're dynamic collections of content evolve and change and vast criteria are personalized for each individual or for each group. So moving on to ar, apple really pushed the ar air and domain stream with the introduction of ar kit basically introduces this technology on your mobile phone, which now understands simple surfaces and plans.

Aaron Koblin: Uh, that was at least the first version one. It was fairly limited when it was first released, but it does give you the surfaces and we are thinking what can you do with stories that take place on your tabletop. If you want to have interaction, they're going to be animated. And if you want them to fit in the size of the screen, they're going to be about Yay big. That didn't feel like a, a medium that we were going to compete with game of Thrones or something where you're going to crack a beer and watch a game. It felt like it was way more for kids. It felt like it was the perfect opportunity. Take that playtime and turn it into something truly magical where characters could come to life. And this led us to create wonder scope. So this is an augmented reality children's storytelling app. Um, I'll, I'll let it explain what it is.

Speaker 2: [inaudible]

Aaron Koblin: so this is an app that exists on Ios today. You can download it or you get the sense of it. You basically use your voice I and a custom machine learning algorithm that we wrote. We'll basically, uh, work specifically to understand whether kids are reading the texts on the screen. It's almost the exact opposite of the challenges that Google voices is doing. Or there's a large corpus of, uh, language and we're, we're trying to figure out what you're saying. This is just our kids reading the words. Um, sound simple, not actually that simple. When they get excited and energetic. Um, we're, we're now taking this idea out quite a bit further. The first version was basically tell it, treating it like a book where kids would, would see the story take place in front of them and we actually gave it to kids and started realizing what they would want. They don't want a book, they want to interact, they want to make eye contact, they want to be a part of the story. So now we're working on a bunch of new stories where there's a lot more interaction and where the character that the child is actually the key key part.

Speaker 2: [inaudible]

Aaron Koblin: anyway, you get the idea there. The stories are not more advanced. Ar Kay has developed a bit better. So we have better plane detection, we can do more outdoors. And then we have lots of different kinds of stories which are combining learning and DQ skills, which are developmentally valuable narratives, but they're really fun as well. This is a our blob character that kind of leads you through set up and many of the onboarding challenges kind of explain to people what ar is and what it's good for, how it, how it works as well. So the goals of under scope are to create ar content that actively engages their users physically, emotionally, imaginatively encourages, critical thinking, makes easier integral story. They're the character, they play a role and educates with facts, but even more emotional intelligence skills. And so far parents love it. We've gotten a lot of really great reviews and the age of screentime, um, parents love that their kids are getting off the couch, they're reading out loud, uh, they can share with their, their siblings has become a pretty social experience.

Aaron Koblin: Um, this is, uh, an initiative we recently did with apple where we, uh, put on a series of events with la public libraries and Ellie's best and La based after school program. We get 500 kids at their first experience with VR, which was great for them. They loved it. And it was great for us cause we learned a lot about how people and especially kids think about this technology and what works and what doesn't. Uh, this is a nice little blurb from VR scout. Uh, there's a lot more to do about, uh, in the education space and we're working on that now. Um, thinking about how you can use spatial learning and interaction to connect with a different kind of person in a different kind of way. We're really excited about that. Uh, very quickly our principal questions, you know, things that we ask when we're thinking about should this even be an ar thing, uh, or you know, are we engaging the body?

Aaron Koblin: Is it spatial, uh, are the stories of the carer characters conscious of the user that using eye contact is really valuable and important thing? How's the story woven into the world? What are the steps that we're taking to adapt the concept to be uniquely Ar? Is the study a as a story intuitively guiding the user spatially similar to what justice talking about? How do you understand where they're looking? Potentially either a wait for them, change the narrative, or also use that as a, as a directorial, uh, piece. We don't have that frame. So it's a really different process of thinking about how to tell the story. Are we utilizing everything that makes sports spatial storytelling great scale. Um, the idea of playing with impossible and magical physics, uh, playing with time, you don't think about it, but you actually have control of the way things unfold and giving that to the user and that agency can be really powerful.

Aaron Koblin: Um, and ultimately if we convert this project to 2d what it worked, if it would work better on a screen, it probably should be on a flat screen because that's way more accessible. Um, so, so this really should be about thinking, you know, um, we're working with a bunch of partners. Uh, if you are interactive creators, please reach out to us. What we've done is we've built a toolkit, a reasonable technologies, so we're not reinventing the wheel every time. And also so we can

importantly get access to people who think differently, not just engineers and traditional developers, but people who might be animators, might be directors as storytellers. They can have access to these technologies and then build a, build a build upon those and, and release also through our platform. So this is one of the slides from kind of our framework. We are trying to work on a toolkit for them and for people to think about it, thinking about primary as the core story and the focal point.

Aaron Koblin: And then also secondary stories. He can satellite stories and character and world development that it can exist in the space. And finally the atmosphere and how we can also take advantage of the fact that this is a world building exercise and other things can be interactive, touchable, uh, kids really loved that even more than the main story. We find that they really love getting lost and, and then coming back to it. So branching off and exploring, but we're just getting started. This is, um, I think a brand new thought space. We are not experts. Like, we're, we're really just starting to learn. Um, so I think it's really important and valuable to get lots of different people into that conversation. I think the potential is enormous and I'm one minute over, so thank you.

Speaker 3: [inaudible]

Aaron Koblin: I can start. I think music is almost cheating in a way because it is a main line into a totally different piece of your brain. And Art. I think, um, there, there's, what I love about music is that it automatically changes the way that you're thinking about something. It shifts your mindset in a way that is, uh, it depending on what music you're using, obviously I think it can prompt people to be more open minded and to be, uh, to get lost in something experientially. So I think it is, I think we've all agreed that it's basically the, at least 50% of most of these experiences and, and you kind of don't realize that often as a viewer, which is a pretty powerful thing as well.

Brillhart: Yeah. I mean music is so important to us and I think actually creating immersive experiences is very musical. Um, and non, you know, I think talking, going back to the nonlinear lint literal kind of constructs, it allows, it gives you just enough to have your own dreams and memories and nostalgia to create your own stories. Um, but it still has some structure. It's still kind of pulls you along through something. So I think there's a lot we can learn from music. Um, and there's a lot we can do with music as well.

Jon Wiley: We're just say for Google Earth VR. Um, we actually built it without music and then we, uh, stopped, uh, the launch when we realized that it was kind of an, an empty space. Um, I think as we perceive and move through space, we have this sort of sense of ambient environment, but we wanted to do something that was gonna add some emotion to that. You know, there's kind of like the overview effect that you get from, you know, Apollo astronauts or, you know, talk about seeing the earth. And we realized that to treat the subject matter properly, our home, um, that we needed to add just, you know, something more to it. And so

we actually commissioned a bunch of, of music for the experiences and then we it,

Rob Giampietro: yeah, really, I mean my sense of it in, in experiencing some of these things is that it really gets like the kind of emotional juices flowing and also like sort of, I think Jessica you've talked about the welcome mat of like it kind of, it kind of makes you feel welcomed into a virtual world, uh, as you're getting acclimated and as you're kind of getting your bearings and things like that. So, um, and it can also really change the tone of a piece I think in a lot of, a lot of cases.

Brillhart: I think when I made world tour, we tried to use some kind of, that was not working at all. It was like some Phillip Class track. Cause we're like, it's like, you know, when you're going around the world and Philip Glass happens, it's like that's amazing and you did it and you're like, I can't, I need this to stop speaking. Which of you know of it just getting too close to your mind and like kind of drill. Just that it's just, you just got so nervous and anxiety ridden and it didn't work. Uh, so it doesn't, you know, it was one of those first tests like yeah, not all music works with VR because you still have to understand that music contributes energy and so all of those different layers of energy actually have to contribute to the experience. And so there is some coordination. There's some string pulling there to make sure it all feels holistic unless you're trying to go for anxiety, in which case, you know, do it I guess. But you know, most times we're not trying to go for that nice and sunlight.

Aaron Koblin: Yeah. You had said musics like can shift the tone. I would say it just completely sets the tone. It is, it can make something comical. Yeah. It that wasn't comical or, um, and I'm not a musician. My wife's a musician, but it's just like magic making. It's like it is the thing that defines the way you come into an enter an experience with a thing and not hit, not necessarily in the front part, but in the have this role.

Brillhart: It's a, it's kind of like the glue that binds everything. Right. Cause it's so it, it sort of, I mean I remember when actually when we did roll tour again when we did roll tour, I remember we were deciding whether or not we wanted spatial audio, uh, capabilities to be like a p zero. So like the most important thing. And I remember an engineer from the team at the time saying, are you sure you want spatial audio? And I didn't know very much about VR but I was like, yeah, cause it really changes how you connect with the space around you. You get a sense of how far objects are and in three 60 VR when you can't move and you can't know for yourself, it actually did enhance the, uh, the feeling of presence and immersion, uh, for that. Yeah.

Aaron Koblin: And tied to that is that the tonal aspect of sound, like I hadn't realized, you know, just pumping stereo music into something is you can actually change it using ambusonics and other audio filters. You can change the way you perceive the scale of the space or the textures of the space around you. And you kind of

don't even necessarily consciously realize it, but it has a huge impact on the way you feel about the space.

Brillhart: Yeah, I mean it's like wearing headphones in a crowded subway car. You can still be there but be somewhere else at the same time. You can kind of coexist in two spaces, which is fun to kind of play with.

Jon Wiley: This is actually one of the fascinating things I found out of being a designer to just a traditional designer and having moved into the immersive Ar VR space is that I suddenly had to like almost get a degree in, in human perception of, of environments and spaces and health and how of your actual senses, you know, both collaborate and sometimes, um, fight against you, right? Uh, in terms of, of what you, how you perceive the world and, and so like learning all these things, um, became necessary for us to, to actually create the experiences that we create.

Rob Giampietro: And you're all doing jobs, you're starting companies, you're starting experiences that didn't really exist when you all started working. And I'm, I guess I'm curious both, you know, what, as succinctly as you can, like what kind of flipped the switch for you and made this seem like a, a kind of a thing that you could do. And also, you know, things have obviously advanced quite a bit. What would you, what advice would you give to someone kind of starting out?

Speaker 2: No,

Brillhart: it's a lot of questions. [inaudible]

Aaron Koblin: well, let's start with how did you get started in it? I think my journey was similarly when I, I said I think Chris and I had been working, actually to Chris's credit, he made that the first, to my knowledge, first cinematic VR piece before there was a VR headset to play it on this back project. And this is a kind of specialized concert. And at the time I remember thinking like, wow, so everybody's going to watch this through a flash player on their web browser. And like that project I actually didn't like in that context, I didn't think it was successful. And then I got to see it in a headset. This is something completely different. This is amazing and it's a totally different thing. Um, so I, I think we've always been interested in looking at those technologies even a little bit before their practical to a certain extent.

Aaron Koblin: That's still the state state that we're in. The, one of the things we didn't talk about the oculus quest, that's that which is just been released, which is a very meaningful milestone in my opinion. Now whether, you know, who knows what the future will hold, but to me this outside is basically $399 and it no longer requires a computer, a mobile phone or cables or sensors or ready. Everything's in that headset and it's a full six degree of freedom experience that starts to check all the boxes for something that I think a consumer might actually want. And at a price point where it, you know, it's still an expensive device, but it's

more like a console or something that people are used to, uh, you know, integrating into their lives. So I think we're gonna see more of that, not less of that. Uh, and we've been Kinda, you know, looking future forward, but it hopefully now feels like that future is a reality that's upon off

Speaker 2: [inaudible].

Brillhart: I mean, we have, there's so many times where I was like, Yay. And then a lot of times where I'm like, no, this awful. Um, I, I think, um, the first thing I saw was when a, there's a group called Google jump at the time. Um, and the group of engineers had shown me what this jump camera was actually had captured. And, uh, they showed me a couple of things and they, you know, it's Kinda funny when engineers try to like die engineers try to be like, I made something and you're like, okay, and you watch it and you're like, yeah, okay. And it was, um, uh, there was a couple of real, you know, kind of benign things and uh, but then they showed me a footage of like, we don't really want to show you this, this is stupid. I'm like, no, let me see it.

Brillhart: And it's just a bunch of them hanging out, just hanging out. It was one of the first times the camera worked or the cameras worked. So there just like throwing balls and like give each other high fives and smiling and kind of waving at it. And it was so pure and wonderful. Like I actually got to meet a super emotional and they were like, why are you so sad? I'm like, I'm not sad. This is actually, you know, I've been a filmmaker. I was a filmmaker at Google before then for five years. And um, I made plenty of films around technology and it worked with lots of engineers trying to like get them to be human on camera. I mean not, it didn't take much, but you just had to kind of poke them in the right way. Um, and suddenly here was the purest version of them, you know, inventors, scientists that were just so happy that you worked and you were the rig, you're the rig that they loved so much and you felt it. And it just was like, it was so magical. And at that point, that's when I knew like, I don't know what I'm going to do. I don't know what this thing is, but I want to help you figure this out. And I'm still here trying to do that.

Jon Wiley: That's great. John. Yeah, well, I'm sorry, I worked on search for many years. Um, and uh, we, you know, on search we run into things where we're like, okay, well how do we answer this question? And so, uh, I, at the same time I was working on search, I had a kid, uh, he'll turn eight next month and I was like, oh, how do I install this car seat? I was like, hey, Google, how do I install this car seat? And um, today you'll get, you'll get some webpages back, you'll get, um, a lot of times you'll get a youtube videos actually. Um, uh, youtube has a whole lot of just like help, like you visualize to solve this problem, how to kind of content. Um, but immediately realized kind of the challenge of like getting a youtube video about how to install the car seat and then like, well, it's actually not this car seat.

Jon Wiley: It's the southern model. It's pretty close. Oh wait a second, my car's a little bit different. Well let me just play this. Oh, pause, let's go lips. Uh, like, right. And what I really wanted was just somebody who could see what I see and see the environment, perceive it and be able to say like, oh, well here, just, you know, let me just, I'll point it just like right here, cause it plugged in. Make that, you know, and pull that at me. And so I was like, oh wow, gosh, how would I do that if I said, oh, okay, I need to build augmented reality, augmented reality. Cool. What do we need to do that? Oh, like a thousand other things. Right. And so that really kinda connected me to the parts of the company that were working on, um, the seeds, the pieces of technology that we could weave together. Now, we still haven't delivered on this yet, right? This is a longterm problem about being able to actually see that, you know, and answer that question and perceive that. But uh, but with things like Google Lens, we're taking those like little baby steps forward.

Rob Giampietro: I have had that car seat problem where the irritated designer changes the world. Um, one, one thing I think is maybe people might be wondering about is like, we see a lot of representations of this kind of technology and in movies and you know, minority report is a classic example of Ironman to know what's easy, what's easy and what's hard. Like what's something that we could do tomorrow and what's something that we're probably not ever going to do. Can you think of a good example of something like that?

Brillhart: Sure.

Rob Giampietro: No. And do you have one? Sure, yeah. Easy would be placing things on surfaces doing a remarkably useful things like create a tape measure and it's just like I'm dealing with the physical space in a very simple way. A, what is hard is dealing with the physical space in an intelligent way. So I think what we're going to see is as artificial intelligence gets a lot better, we're going to have really meaningful

Aaron Koblin: interactions and understanding of the context that we're in. Um, that will be a game changer, especially for augmented reality because right now I'm, I mentioned with Ar Kit one, we got a single plan. Now we've got like some vertical plans as well as horizontal plans. We've got really, really cool and important things that are actually pretty hard like occlusion. So I can put my hand in there now and actually poke the thing that's pretty cool. Uh, not as easy as it may seem. Um, I'm putting my hand in there and then actually interacting with a virtual object that also understands the real world context actually going to be possible in the near future, but still really hard and not there yet for the most part, unless John knows something, I don't,

Brillhart: I actually find a lot of the Scifi future films really annoying. Um, they're rehashing very old. I mean like the, I haven't seen anything compelling or forward thinking recently. Um, and it's sad because I think there's a lot of ways we can reinvent the future now, but we're relying on old nostalgic preconceived like templates to sort of figure out what that stuff is. Everyone's the minority.

They think that's the future. But we've seen that it's, it's to, again, it's like that it's too literal. Those are the things we care about different things. Now we're different, now we have a different understanding of the world and each other. Now we connect differently. We've had some chances to evolve. So I think for me, the, what's limiting is that what I think is really interesting is how we represent bodies in a space representation in a space.

Brillhart: The idea that we know people are so obsessed with like we have hands, but like do we, I mean like we kind of do and we're moving our hands, but my hands clenched around these things and so they're not really my hands. So can hands be rethought? Like how do we still feel that our biological systems are present and they then represent a virtual thing or object in the space that represents us? Sorry. So how do we, like how do we do that? Reactive worlds, worlds that shift and change. It's really cool. The Bjarke has stuff to show that. It's like the idea that, you know, we don't have to recreate reality as it is and I think the future thought will won't be what these Scifi films have done because it's going to be something completely different and it's going to be a result of all these thoughts around, um, you know, again, intelligent systems, but also this idea of reactivity and catering to each user very differently.

Aaron Koblin: It's talking about the hands and arms in my art, my daughter part. We also talk about gorilla arm, which is totally a real thing. It turns out you don't actually want your hands out in front of you for hours on it unless you're like trying to weight train or something. Yeah. So some of the natural interfaces as well as you were talking about that we have to think about the interaction.

Brillhart: Yeah. Fatigue as well. It's like our bodies are still doing this stuff for now. So it's like thinking about how that actually plays a role in how we actually interact with these, these spaces.

Rob Giampietro: You feel like you look then to other sources for inspiration? I mean like I know I've, I know you've talked about educational software, there's obviously coming from the art world, there's things like installation art that have kind of a real sense of a body and space and surrounded by it and maybe an unfamiliar set of things. I mean, is there a other, do you look for other sources? Inspiration too?

Jon Wiley: Yeah, I looked to see sort of what people are doing, uh, in space or in their jobs and what they're using and how they're navigating space. We have, so like we have a bunch of screens around us right now. Many of you are holding screens, there's a screen here, there's to fear, you have signage everywhere, right? Like the mechanisms that we use to display information and navigate space and how do we do those things? And we, a lot of it's built into the physicality of the space. Right? Um, the whole thing with uh, yeah, go some cause Eric or whatever it was. Ah, right. Wagner was talking about like the, the, the totality of, of the disciplines architecture and the music and the in the stage and the set design and how all of these things can, can combine. And so I look at what are the best designed spaces, like what are the best design physicalities you think

about like a space where someone's actually got this amazing workshop where they're, you're working with Adam's working with you know, parts, they have specialized tools and you see that that starts to move into a metaphor, right?

Jon Wiley: Something like Photoshop or what have you, where you've got like lots of your scale. I've got a tool chest and we don't only think like that. Um, as we start moving to a domain in which computing can take advantage of that physicality could respond in that way. Um, what are the things that we should do? What are the through lines we need to bring with us? You know, I, I hesitate to say a skew morphism because that was a dirty word among designers, you know, with Ios and whatnot. But the truth is, is that the reason that exists is because it's legible. It's something that people can perceive. And so I try to find what are the legible things in the environment, the mechanisms that we use, again, naturally to Kinda interact and how do we put that into your computing space and then take advantage of what computing enables us to do.

Jon Wiley: Right. I can reconfigure and I can, I can make an infinite number of copies or what have you. Um, and that's why I was trying to get at like the magic. And so like, I spent a lot of time looking not at like science fiction movies, but, uh, the, the films about magic, uh, and television shows about magic and, and, and stories about magic, about how people, you know, and the superhero stuff kind of gets into it, but it's more quasi technical. It's more like, you know, grounded in sort of this like, you know, physics and, and what are the things that we'll be able to do when not only do we have superpowers, but we have these like magical powers, um, where we can transform and transmute and alchemy and all this other kind of fun stuff. And so that's where I, I tend to pay attention.

Brillhart: Yeah. I think game design is also quite compelling for me. I mean they're, the three things immediately came to mind. The Baltimore Aquarium is a beautiful space. Like if from a, from an intent perspective, like looking at spaces that make me feel a certain way and that space is actually designed to you. When you look at it, it's actually designed to be like you're breaching out of the water and coming back in. So you actually move up through the space and then when you get to the top, it's the rainforest and then you dive back in this like circular way back down. It's really beautiful feeling of movement. Um, that is really hard to tell when there's a crap ton of kids there. But you know, sometimes it's c you can sense it. Um, but game design is great. I was a big fan of missed growing up.

Brillhart: Um, so I actually, I have the fortune of working with CYA now on a couple of, a couple of things and I'm working with how they think and they're not completely understanding of this medium either. But what's great is that they've already thought about designing worlds and bringing people into those worlds. What's fundamentally different. Again, it's like the, my capacity to feel like I'm actually there. I think that's for them also a bit like trying to port a game with a gun into an immersive experience is it's a drastic difference between I have a controller with a character with a gun versus I'm actually holding that gun. So the responsibilities there like that, that kind of conversation, being

inspired by other people who have to also deal with that and really take responsibility. But how they create spaces I do is around inclusion as well. Kind of how different mediums are tackling that. And so, yeah, I think that there's, there's a lot we can learn from, from various folks. Um, but you have architecture, game design again, music. Yeah.

Rob Giampietro: And maybe even, I'm, I might suppose like exhibition design too. And I think there's, you know, if you haven't seen yet, there's a wonderful exhibition here on the campus about Herbert buyer who is a very, uh, who, who lived in Aspen but also was a, a very radical exhibition designer working on these kinds of environmental spaces in there. There are some of his kind of studies of, of very planar ways of looking at exhibitions that surround you over in the, uh, in one of the other buildings here. Um, just maybe a last question before we open it up for Q and. A. Um, and I, you know, Jesse, you kind of touched on it for a second, which is this idea, and we've talked about it before as well, about the word empathy. Um, which is, well, where did this get thrown around a lot in terms of, uh, in terms of these sorts of immersive technologies.

Rob Giampietro: Um, and I think with, with an asterisk with the star, like we want to be careful about, um, how we use it. But you know, there are, um, there are really interesting uses for this tech, for some of these technologies with audiences like kids. Some of the presentations touched on that, uh, for a deescalation of gang members for, um, illiteracy. Uh, so we've seen some really interesting, not necessarily that empathize with users or that engage users that are away from the typical, what we might think of as a typical gamer or something like that. So, um, I guess, you know, could you, you know, and, and even things like phantom limb pain and using mirrors to heal phantom limb pain as a kind of virtualization, you know, I'm really interested in these sorts of things. Is there any thing that you guys have seen that you feel like is an exciting use or potential use of some of these things that you might want to talk about? Well,

Jon Wiley: I can talk about a cautionary tale about empathy. So the Ar walking navigation, uh, that I did, I showed, and that we've talked about when we first talked about it, we actually talked about it with what we call, uh, an animal. So it was, uh, it was a creature that you could follow that were like, oh, take me to the drug store. And it would walk around, you know, on and on your phone and you could follow it around. And, uh, in the initial demos that we created, we had a nice little Fox that you could follow. And the challenge with that was that people fell in love with the Fox and they cared deeply about the fox. And we worked really hard to create, to craft this carrier character that people would, we would empathize with and that they would care about because they wanted to have a good experience.

Jon Wiley: We wanted to create delight and the experience of navigating the world. And people would follow it into traffic, uh, or they or, or they worry if it was going to get stepped on or things like that. And so it started like the, the, we, we did too much. The bond that they had food, this, this Fox started just basically

blanketing out all of the, just the task of trying to like, where do I go? Um, and so we actually, we, we still get, I mean, we're, what we, what we've said is like, we're working on it and we're trying to figure it out, but we have to work on a mechanism of doing it because it was just like there's right there in front of you and you were like, Oh, you'd forget that you're like trying to navigate through a city. Yeah. You, those put your phone down alerts I think becomes so important for the kind of, yeah, yeah.

Jon Wiley: Yeah. And, and so there's this like, I mean, we as designers, we want to, you know, create this like delightful, wonderful experience even in something as utilitarian as his navigation. But, um, but again, it's this like, the medium is, even if it's on your phone, it's just kinda like looking through a straw to a certain extent. But, but even in that, it was like, well, it's right there. I can see it. I can see the shadow cast from it. It's right there on the surface, I'll, okay. And you know, you, you kind of forget about it, that it's not real and, and that you should, you should care for the Fox. Yeah. But you should also get where you're going with that. Getting get by card.

Brillhart: I think empathy is just so much more difficult than people think it is. And I think it's usually said as a, as a buzzword by people who make films about other cultures that they of themselves are not a part of. Um, I don't think there's really ever going to be true empathy, empathy until these tools get into the hands of the cultures that have been either marginalized or represented without knowing or maybe represented with their knowing, but not in the way that they would like. Um, one of the challenges I had with the Navajo piece was the fact that they had no interests. The community had no interest in using the, the tech. Um, the kids did. The kids loved it. So they used it a couple of times. But the, it's one of those things where I actually found myself trying so hard, although it was really difficult to, to cry, to create, uh, an experience about them when, when in fact it was more about an experience about me trying to connect with them.

Brillhart: So I had almost embrace the fact that this is actually not about them. This is about me. And I think a lot of these pieces are really about the creator, that it has nothing to do with the culture around it. And I don't think that putting a rig in the middle of a refugee camp means that you've been to a refugee camp or that you're a refugee. So I think there's a lot that we need to think about in terms of, you know, experiences, memories and styles or like all those other, all those other layers that are really hard to, to, to pull out. Um, we can't pretend like if we just do the surface that we've, we've done it. Um, so I think we have a long way to go before we ever reached that point.

Jon Wiley: Think about like, is, is journalism a better metaphor? Compassion for those sorts of experiences. Is it, are you just setting the bar too high or I mean

Brillhart: familiarity, understanding that you know, that refugee camp actually exists and there are people that live there and it's not just, you know, having enough that

makes you feel that by being there, I now have an understanding. It's sort of like, so Boz had this idea that like they wanted it to be like phone's down, heads up. Like they want it to be like, we don't need you to have your phones up. So when we introduced traverse, you have to kind of have your phones up cause it's using the camera, the camera does map your space and calibrate it. Um, and I told them like, look, you can't expect users or anyone to just go from this to this. We always go like this, we do this all the time. But if you do this, if you can get something or get them to a point where they go from this to this where they questioned it, then you've done it. That's as much as we can expect. And I think those incremental changes, those like kind of a little bit of question marks the, the hesitations like okay, well maybe that's not, it's not like they're not, they're over there and I'm over here and I don't have to worry about that. They're over there and now I can remember if they're over there and maybe next time I'll have a conversation or do a certain thing that would be done because I know that,

Aaron Koblin: well I'll just speak very quickly too. And I think it's a very broad topic and empathy is, you know, it's a backbone of character driven narrative. Like you have to care about the characters so that there's kind of the broad empathy and then there's, I think the conversation that has come in large part because of my cofounders Ted talk around empathy, the machine of empathy and I think it's dangerous to over overhype and sensationalize the empathy machine. The idea that there is a device that can inject empathy into somebody that doesn't exist, have empathy happens here, is it? It's a human activity that that said, I think a lot of the age old conversations about books, radio, film, it's the same conversation we're having now. The volume is a little higher because the medium is more intense. Yeah. But I think there are attributes as the medium that lend itself to instigating an emotional reaction of various forms, uh, easier and more intensely because you actually have a physical, you have a visceral sense of danger.

Aaron Koblin: Um, which is a kind of a weird twist on it. But I think you become vulnerable because you fear the reality of the situation and that extends to eye contact. Just the presence of somebody looking at you. It's not the same as a screen. Somebody makes eye contact with the camera. Totally different in VR when, when there's somebody that's looking straight at you. Uh, I think part of this conversation, uh, was instigated by a project we did called clouds oversee draws. One of the first things we brought, uh, we brought a, a three 60 stereo camera to a Syrian refugee camp in Jordan. We captured what the life of this girl was there. We brought it to Davos, to the World Economic Forum, and we put these people who are making decisions about these people's lives into that place. That's not to say they went to Syria in refugee camp. They did not have that experience, but they did get a unique perspective I think. Um, and they, and I think it's actually we, we then of course gave this to some foundations who ran some studies and they were able to get much larger donations as a result of that piece. And now who's to say whether that's sustainable, whether that's a novelty, whether that, I don't have all the there, but there is something

real about turning up the volume on that age old conversation, which is one we have to keep having.

Brillhart: Can you tell me again, like just the reference point of like I them having gone through that and when they make these decisions, they remember that. Whether or not they'll admit that they remember they've been through, they'll, they'll think about that as they make these decisions. That's more priming, less empathy, right? Yeah, exactly. We have time, I think for one or two questions. I'm sorry if we cancer's going a little long. Um, maybe I'll start with, uh, the woman right here in the front. Yes.

Speaker 9: Hello everyone. Thank you so much for speaking to us. I think this was, it blew my mind, for lack of a better word. Um, but I'm very young, um, and even though I am excited about a lot of the possibilities that VR has to offer, I'm a little bit concerned, especially Erin. So this was kind of directed to you, but everyone can answer no, not like that. And I like that. Um, so I'm, the only point of concern that I will, that I see right now is like exposing VR to children, like when they're younger. Um, and so like the video, it seemed pretty promising and interesting. Of course, it seems like kids would be interactive with this because it's colorful and it allows them to, you know, be in different spaces. But what are your concerns or have you had any concerns creating this with isolation in terms of children? I have two little siblings, five and nine. They know how to open my phone. They know how to go on youtube and they're becoming more and more isolated and it's scaring me. So have you had those concerns and if so, do you have some type of group or panel or anybody within your business or that's helping create these products that is kind of like a checks and balances that kind of check whether or not these tools actually may be doing some type of damage?

Aaron Koblin: Yeah, it's hugely important and valuable points. So thanks for raising it. And I think the answer's a little bit different for ar than for VR, at least in my perspective. Um, so for the augmented reality side of things, which is what we're, we're doing with wonder scope, uh, I think first of all, there is an age that that is right or wrong for this. I think we're still trying to figure that out. Um, I think the conversation like the empathy one expands well beyond ar and VR, just screen time. I think the general use of technology as you're pointing out is probably pretty problematic. Um, and I don't, I think we're all moving faster than we might be comfortable with. We're trying to understand like unboxing videos on loop for three hours. Is that adequate parenting? Like absolutely not. Um, so it, to be honest, it's actually part of what made us lean into this.

Aaron Koblin: It feels like technology and access to technology is inevitable and it's happening. So are there ways that we can actually use that technology and hopefully I a healthier way as opposed to pretending it's not gonna happen cause it's already happened. And I think what we're trying to do is, first of all, we don't recommend wander scope young kids like this. This is not meant for five and below. We're not exactly sure how high it's probably in the nine, 10 ish range.

Figuring that part out and using reading more for uh, uh, not for learning reading but for reading. Uh, comfortable, comfortable, uh, kind of conversational reading, which is actually a, a big learning challenge. But I think the, I, the idea of using these technologies to get people off the couch, cause that's a huge problem and we're going to actually be doing more in VR later this year about getting people off the couch.

Aaron Koblin: I think it's super important, uh, getting people to interact in an active, engaged mindset, not a passive just ingest mindset and a social mindset. To your point, I think like the isolation thing is huge. If we can get people to be talking to each other, sharing things with each other, that's such a better use of this technology than just like closing off. That's the VR side or it gets really scary, right? Like if you, if you put now it's not right. VR is not recommended by most a headset manufacturers for kids under the age of 13 which I think makes total sense and there's physical reasons for that as well as developmental reasons, but a, I think people view VR today correctly as a pretty isolating medium. You go in and you're alone, you basically put on blinders to the world, but it doesn't have to be like that any more than any other connected technology.

Aaron Koblin: We patch people through the internet and you can have incredible social experiences with the fidelity of voice and presence and you can actually go beyond your physical body. So you can talk about trying to connect at a, uh, psychology's together without the burdens of the baggage that we have in reality. And I don't want to get too utopian, but I think there's really interesting opportunities there that if we just shy away from a ludite perspective, we won't investigate those and we won't grow together. But your point is super valid and is part of a hugely important conversation we have to keep having. Um, I just think if we can imbue that into the people who are making the designs and making the systems and we'll come up with some very interesting and worthwhile things. Um, we have to leave it there. The light is blinking at me. Thank you for your attention. Please join me in thanking these guys.