Oral History of Drew Angleoff

Interviewed by **Michael J. Halvorson** for the Microsoft Alumni Network

August 17, 2024

Preface

The following oral history is the result of a recorded interview with Drew Angleoff as conducted by Michael J. Halvorson on August 17, 2024, at Microsoft Studios in Redmond, Washington. This interview is part of the Microsoft Alumni Network's Microsoft Alumni Voices initiative. The goal of this project is to record the institutional history of Microsoft through the recollections of its former employees, so that the information may inform and inspire future generations.

Readers are asked to bear in mind that they are reading a transcript of the spoken word captured through video rather than written prose. The content reflects the recollections of the interviewee. The following transcript was edited by the Microsoft Alumni Network, which holds the copyright to this work.

Interview

Michael Halvorson Today I am interviewing Drew Angeloff for the Microsoft Alumni Oral Histories project, and it's Thursday, August 17, 2023. My name is Michael Halvorson. I'll be exploring Drew's entire career at Microsoft, including his work with Xbox and the Forza initiatives. So, hello and welcome.

Drew Angeloff Hello!

Michael Halvorson It's nice to have you here, Drew. Can we begin by [learning] where you grew up, when you were born, and the kind of childhood experiences you had?

Drew Angeloff Oh! We're going way back. Yeah, I was born in New York City. On the city of Manhattan. I mean, actually, on Manhattan Island. My parents quickly got divorced, and... it was maybe a year and a half in. So, my dad and my mom were separated, and my dad lived in New York some of the time. They were both originally from Seattle. My mom moved back [to Seattle] and I lived with my mom for the most part. But [I] also would spend summers with my dad. My dad was in publishing. He was a newspaper guy--a newsprint guy, I guess you could say--a magazine guy in New York, and a writer.

My mom was an artist, and a very well-educated artist, let's put it that way. I grew up in Seattle until about second grade, and I moved with my mom and my step father to Saudi Arabia. I was in Riyadh, in Saudi Arabia, for seven years... starting in third grade [and going] all the way through ninth grade. After that, because my mother was not a fan of the local schools, and you're not allowed to go to high school in Saudi Arabia, unless you're going to the local schools (there's no American school that goes [through] high school in Saudi), I went to boarding school in Switzerland.

I spent three years in a wonderful school called Leysin American School. That taught me all sorts of things. A lot of bad behavior

that probably I wouldn't have picked up on my own if I'd been in the United States. [But] a lot of good things... I had all the independence of an adult by the time I was [in high school]... and all the freedoms that came with that. It was a little bit of *Lord of the Flies*, but you know, much nicer. It's a school with some very nice people. But we were very independent.

Michael Halvorson So, then you went to the University of Washington for college, is that right?

Drew Angeloff Well, that's part of the story. Being a child of divorced [parents], if anybody listens to this, and they are the child of divorced parents, sometimes your parents don't have any idea what's going on with you, because they think that the other parent [is] paying attention to that.

So, college was one of those cases. My mom went to Harvard. She got her master's at Harvard, and she found education to be very important. And my dad, of course, was like President of *US* magazine. He [also] found education to be very important, and worked for *Life* [magazine] and did other things [like that]... So, both of them found education to be very important. [But] neither one of them happened to check in on whether I was applying for colleges, and they just assumed that all that was happening, and I had no idea what I was doing.

So, I applied for two colleges that seemed inconsequential, that were as far geographically from my parents as possible, because [I] was at that age. And when I told them that I got accepted to [the] University of New Mexico and [the] University of Alaska, two places I couldn't imagine my parents would ever go, they were like, "We're definitely not going to pay for that." And I'm like, "Oh, yeah, we got to pay for college." That seems like kind of a bummer. I guess that's how that works.

So, my dad [said], "Well, what are you going to do? You can maybe get a job." [But] that doesn't sound like a very good idea, either. I had worked [in] my first job... for the US Army, during the end of the Gulf War. I [was] in Saudi--this is right after I graduated high school--and I'd been working for the Commissary, so I'm basically stocking meats and vegetables and stuff like that. (I mostly worked in produce.) And I got to feel like, "I just don't want to do that for the rest of my life." I want to do something more fun than stocking vegetables. Okay, I guess I'll go to college. I had no real direction at that point.

I thought, "Well, what about community college?" I didn't even know what a community college was. [But] I show up to community college [in Seattle], and the first day I'm instantly in love with community college. It is the best environment for learning. You can't really experience it unless you [are] actually there. But everybody at community college wants to be in community college. 100% of the people want to be there. There's no "parents are paying for them to go someplace," or whatever. The average demographic for a person in Seattle Central Community College was 28 years old woman, female,

with one kid. And so, you would have these situations in classes where if the teacher was covering something already covered, people would stand up and say, "You've already taught us this. I'm here to learn. My time is valuable. What are you doing?"

So, people demanded to learn and it was such a great environment for me. I took basically 20 credits a quarter. I was taking a lot of classes because I love, love learning. And [I was] doing pretty well at that. This is back when, at Seattle Central, when you're registering for classes, whoever had the most credits would be the person who would register first. It was sort of like a tenure thing. And I realized that I was the first person of the first hour of the first day [to register].

That was about three years in... And the advisor was like, "Why are you even here?" I said, "What are my options?" And they [answered], "You can just go to the UW [University of Washington]. You just have to sign some paperwork." And again, I was like, "Oh, nobody told me, I had no idea..."

So again, I just don't know what's happening. I don't understand the system. But I signed the paperwork. And then I ended up going to the UW. And that was a very dramatic shift, going from a place where people really, really wanted to learn to a place where... I got the feeling, maybe people were just there circumstantially. Maybe they were interested in learning, maybe not.

You know, I have ADHD. I didn't know that until I was much older, but it makes more sense now. (Basically, last year I got diagnosed.) So, my grades basically looked like, going to college... if it was an interesting subject, I was A+ all the way. [But] if it was a boring subject, or something I didn't find terribly interesting, I would come out with a D-. It was just terrible. I couldn't motivate to wake up, couldn't really do that. [But] I didn't know I had ADHD at this point. I didn't even know what ADHD was, probably.

So, I tended to gravitate toward classes that were really interesting; things like thermodynamics, and coding, and the political economy of India, and other things. At some point, they sent me a 'nasty gram' from the college, which said, "Okay, if you're at UW, the state can't fund you to be here forever. You're going to have to declare a major." And when I got that, I was like, well, what's the easiest major I can do? I have no direction in my life. I don't know what I want to do. I looked around and thought, "I could try for computer science, but that seems awfully competitive." I was at the age where I wanted to be around other females. And there weren't a lot of female members of class in the computer science department at that point in time. I'm half here for the social reason... I guess I'll just go with a major where I know that [there] is a good mix of genders, and we can hang out, and I can make friends, and do all that kind of thing.

So, I picked political science because I [thought], it's really interesting, it's a super interesting thing. Economics was another one where I thought, "Maybe that's interesting, but the math seemed a little boring." [I spoke with] some of the graduate students and they were all working on math papers. [And I thought], "That's cool that you built a cool model, [but] that's not reality. That doesn't sound that interesting to me..." But political science was great. It's really about people... how people think, and how that affects the rest of the world. It's actually a lot like product management, to be perfectly honest. A lot of those skills, I think that I learned there, [and] I kind of applied here.

So, I got my political science degree, and I didn't quite know what I was going to do. But my mom, who is now living in Singapore, had called the US Embassy... and [in a] classic, motherly moment, called the ambassador and asked to get me a job. My mom was very charming in a lot of ways. So, somehow, she got the ambassador to say that he wanted me on a project that was in the US Embassy for the State Department. I said, "That's really weird, mom. What has to happen?" Then I had to go through a background check. This was during college. I did all my background checks, then I went to Singapore, and ended up with a job in the State Department, basically making sure that bad people don't put things in our in our materials as we're building a new embassy. Basically, that's it.

So, I finished that job and [began to] hangout in Singapore... eventually overstayed my welcome. And the Singaporean government's like, "Okay, dude, you can't be here, unemployed,

just sort of hanging out in your parent's basement (effectively). We didn't have a basement but you know what I mean...

So, I [returned] to the US and lived with my dad. He asked, "What are you gonna do?" I'm like, "I have no idea. I'm just gonna go work at the video store in West Seattle." So, I went to a video store in West Seattle, called Crazy Mike's... I met a good percentage of my friends that are very close to me right now at Crazy Mike's.

It was just great, right? The application for the interview was 16-pages long, [asking you to describe] all your favorite [movie] characters and why. They were suffering no fools on movies. You had to know what you were talking about, or at least have some point of view. What that meant was that all the people working there would have great points of view. There was nobody working there that didn't have stories and things that they were thinking about.

I'm like, "Okay, well, this is cool." I'm making $6 an hour, or whatever it was. But I kind of need money. And then, one of the people that worked at the store had a boyfriend who was working at Microsoft, as a contract tester. And I remember thinking, "I would rather die than work as a contractor at Microsoft... These [are] sort of pale faced people in business suits, and they're typing on computers... just drones typing on computers, doing the world's most boring business software. Maybe I'd work in games, but even that doesn't sound that like

much fun because you're just typing on a computer [and] that just sounds awful.

[But] I thought, "Okay, well, I guess I'm gonna give up. I'll go interview at Volt," which was the contract testing agency. I went in, and [they said,] "You don't have a lot of coding experience, but maybe we can find you a black-box testing job." And I said, "Oh, I can code." They said, "What do you mean?" I answered, "Coding isn't that hard, right? I grew up in Saudi Arabia. There's not a lot to do. I had a Commodore 64 and an 8088 [microprocessor]. My friends and I would code basically all the time."

They said, "We'll give you a little coding test." So, they gave me a little coding test. And it was like trivial level. Okay, I passed that. Then I went in for my actual Microsoft interview, and they said, "Oh, you can code!" And I said, "Yes, I can code." So, I got a job in Testing, and [that contracting job] seemed like an eternity. But it turns out I was only under contract there for eight months. The only reason I know that was because there was a Microsoft [law]suit at one point between the contractors and the non-contractors. I think it was a class action suit. They said, "Okay, we're gonna do a payout." I [thought] I was there for like 10 years as a contractor [but records indicated], no, its eight months.

[After that], I moved to full time and worked on Visual Studio, and we worked on a Visual Studio environment project called

HTML Help. Even today, there are still some [programs] where you hit F1 and a Help dialog box appears. And, "Hey, what do you want to do?" You can search for words [and so on]...

That entire system was built by the HTML Help team. It was an acquisition from a guy named Ralph, who had written the entire code base, as far as I could tell, on his own. We had acquired the code base, and it was what happens when one person works on things [alone]. It was not structured in the perfect way for Microsoft to absorb, so it's like the world's best testing job for anybody, ever, I think, because there were bugs galore, and all sorts of interesting bits of the code and all sorts of hacks that people have forgotten about. And so, you find these... hidden features and other things.

I love software testing, because to be a good software tester, you have to kind of think sneaky. It's like being a security person or a red team. You have to think, "Well, if I really want to break this thing, how am I going to do it?" It's a very creative outlet. I find software testing, especially the white box and black box testing, to just be one of the more creative endeavors that we have in computing and computer science.

Michael Halvorson Drew, can I just jump in and ask you what year you're talking about? Is it 1999?

Drew Angeloff

I think this is probably 1996, where I'm a contractor, and then I moved over to be a full timer in 1998 or 1997 (or something like that).

At that time, perhaps unwisely, we used a framework that was based on Perl. If anybody's ever tried to code something complicated in Perl, it's basically undebuggable, which turns out to be the greatest thing if you're a very junior tester. It means you're like, "Oh, yeah, there's a bug somewhere in here. I guess I'll just rewrite it." So, we wrote and rewrote a lot of code over and over again, which kind of helped build the skill set.

This was a very interesting [time of] transition for Microsoft and for coding, in general... The industry was moving from [a philosophy of], "We're gonna hire a bunch of people to poke buttons to see if they break something." (You know, poke buttons as if a user would poke them.) To, "I'm gonna build a piece of code that's gonna poke the buttons as if the user [did it]." So, basically, a lot of automated testing. In that transition, people had built the beginnings of frameworks, and so we were starting to build automated tests. That gave me a little more exposure to writing a lot of code...

Then, at some point [in 1999], I heard through the grapevine that some people in DirectX we're going to work on a game console. I found out about that [indirectly] from a person, from a person, from a person. But that is the project that I want to be on. So, I think you can summarize this as I kind of became

insufferable to the very few people that were there, saying, "Okay, I don't care what happens. I'm willing to go work on Xbox."

I'm probably 24 years old at this point, maybe 23. I'm willing to go work on Xbox and do whatever it takes. And there just happened to be a person from the outside [of Microsoft] named Seamus Blackley, who was working on Xbox. He didn't know what it was to be at Microsoft. He didn't have a lot of old school Microsoft experiences. For him, it was like, well, I need somebody to--maybe he would object to this, but--I need somebody to push around a little bit and get them to do things, [like] my minion. And he was like, "Yeah, I'll work on that."

If you catch Seamus at the right time, he is brilliant and he has a ton of energy. So, he put a ton of energy into trying to get me over. That was, you know--I super appreciate it and I still owe him for that, I think. Then, I worked for Seamus and basically, I was the first PM on the on the job. You can think of that as the first PM on Xbox. I think that you could say that, at least for our era.

Michael Halvorson How many people were on the team, at that point? A very small number?

Drew Angeloff Five, maybe? It was Otto Berkes. Kevin [Bachus], who was one of the business guys. Seamus Blackley. J Allard, I think, had just shown up, or it was before J, I think. And then they had just gotten very close to approval with Bill Gates. And then they got approval from Bill Gates to go and build the Xbox, and I was there for that piece. Oh, Rob Wyatt was another person who was there, who was an engineer and a game industry veteran, a brilliant game industry veteran. And so, that's when that whole thing kicked off.

Just to go back to Visual Studio, it was a very interesting time for Microsoft, actually, because one of the things that had happened is... a lot of the people that started Microsoft had made a tremendous amount of money. And so, there were these situations where it kind of separated the wheat from the chaff on talent and ego. Some people were absolutely convinced, [those who] had been there a long time, that they were why the company made so much money.

Then there were other people, and I really think of Mike Colet--one of the people that I really enjoyed working with--and he had many many millions to rub together. But you know, he was pragmatic, and he hated it when the cable bill got so high. He was that kind of guy, even though he had millions to deal with, because there was just a sense of injustice. And he always kept it very humble. He was very smart and very humble. And that was a weird time, where you could see [that] some people were building giant houses, and [they] were convinced that they were God's gift. And other people were maybe spending their money but they were also very thankful for what they had. Not wasting

it and realizing there was an unusual opportunity, and sort of moving forward with that kind of attitude.

And of course, for me, I had never been exposed to any of that kind of wealth or that kind of, you know, thing before ever, you know. It's not like my--I didn't come from a broken background--but, I'd certainly, yeah, of course, I'd go to boarding school. There's plenty of rich kids that I knew, but nothing really like that where it was like a group of people that had never been rich before that somehow got wealth and then you're seeing sort of like, boy, this can go really wrong, or it can go really right. You know, people can sort of restructure their life to absorb the lessons from that. Anyway, was an interesting time.

Michael Halvorson Totally. So, you were coming into [this work] in the late '90s, when the Internet was really taking shape, and these tools were all becoming Internet-aware, Internet-based. Do you want to talk about that a little bit? I mean, you learned about computers before that. And then, here suddenly, is a global network.

Drew Angeloff Well, this might be an unusual story for Microsoft, but I had always just assumed that the Internet was happening, to some extent. And the reason why is my uncle and my aunt ran this small company that they started with a guy named Mark DeSmet. It was called C-Ware. They made a C compiler that was used by JPL, [and it was a] very lightweight C compiler. They did

fairly well in the '70s and '80s. They were basically building a small compiler company and selling selling licenses.

But one of the benefits of having an uncle in Silicon Valley is that, I would ask him, "Well, if you're not going to use your 1200 baud modem, or your 300 baud modem, can you send that to me?" And he'd say, "Oh, yeah, we just upgraded to the 1200 baud modem. I'll send that to you." And so, I'd get the disk readers that were the size of dinner plates. I'd get the small hard drives. I get basically the leftovers [and] the things that they didn't need, including other competitive C compilers and things like that.

And that was great, right? Because it means that you have sort of this influx of new technology you have to figure out. And at that point in my life, especially going to college--as much as I talked about being social--I was perfectly fine just being by myself for hours on end, trying to figure out some piece of technology, especially the first modem, the 300 baud modem. And we had this thing, which you're probably familiar with, but not everybody's familiar with, called bulletin boards. So, you would dial into somebody else's computer, and maybe they'd have multiple modems. Then that would transfer information from your computer to their computer, basically using your modem, and then at some point people would put dedicated lines between those different computers.

Pretty soon you had what was basically a small network of computers that were [available]. And when I got to college, [at] the UW, I'd go to the computer lab, and they had Next machines, and all these other things, and we would play networked games, which were very rudimentary at that point in time. But you look at it and say, "Okay, the experiences that the Internet can give you are so vastly different and wonderful... The era of you sitting alone and having your machine in your complete control... that seems a little antiquated in my mind." The Internet is basically inevitable.

What I didn't quite realize at that point in time was, "What does the Internet mean for Microsoft?" I actually found that to be kind of brilliant... Working at Microsoft at that point in time, we're making money hand over fist just doing the thing we're doing. So, of all the companies I've ever seen that [have] dealt with the Innovators Dilemma head on, they [took the opportunity] and really challenged people. The moment that Bill ended up sending this [Internet Tidal Wave] email, that was basically like, "Okay, everybody, pencils down... You're gonna come into the office and you're going to be working on something totally different next week. The reason is because there's this thing called the Internet, and it's going to be a big deal."

I didn't know enough at that point in time to analyze what that meant. But in retrospect, he turned the entire company off and back on again, in a different configuration, in a week. I don't think that can happen, basically, in any other modern company I can think of today, in the same way, and it worked. The next

few months we were thinking about, "What does it mean to be connected, right?"

And then for the first Xbox, we [wondered] are we going to add a dial-up port to it? Or are we going to add an Ethernet port? And the marketing people [said] there's only a 0.001% penetration of this. It'll never happen, right? But then, you extrapolate out, and you think, "Well, what is the experience you can get for those things?" If there's one thing you ever learned in gaming, it's that people will pay through the nose for an amazing experience... If you go and ask them, "Would you pay $500 to play the latest game, people would say, "No way." But if you give them the opportunity to buy a console, so that they can play *GTA* [*Grand Theft Auto*] *3*--like a [Sony] PlayStation 2 and *GTA 3*? You know, *GTA 3* sold 30 million units effectively overnight.

So, what are people doing? Were they trying to buy the console? Or were they trying to buy a game? They're trying to buy the experience or they're trying to buy experience with the game. And all their other friends are playing it and everyone's talking about it. "God, I really want to play that! How much is that worth to me? Well, would I work an extra seven shifts at Arby's to buy a PS2? Yes, I would." Because it's because the trade is so good. So, on the Internet side, I just think that you can't [overestimate] the level of difference [in] game play and everything else that the Internet turned on. Somehow Bill figured that out. When he was thinking about the health of the company and what Windows would look like, and somehow that was able to be calculated at that point. You could have given me 100 years to think my thoughts at that point in my

career, and I would have never thought any of those thoughts. So, I don't think it was a matter of time. I just think we had brilliant people working at the company at that point.

Michael Halvorson Drew, can I follow up a bit with your background in gaming because you said, "I need to be on this Xbox unit." And you hinted that you played games, but what kind of games did you play? What were you interested in?

Drew Angeloff Going back to the video store, I played basically every game that my machine could run. When we were coding with our friends, we were coding chat bots and other things that were very rudimentary. Kind of the If...Then...Else chat bots and dungeon crawlers. But I'd also [written] multiuser dungeon code. Multiuser dungeons were things where you'd have a piece of code and somebody would log into your machine, and they would basically experience a text stream. They could make decisions within the text stream, and then those decisions would [control] a character, and the character would do things. That gave me exposure to things like object-oriented code, and how hard it was to understand human language, and how screwed up English is. I think you could probably say that English is not a very easy language to parse. I'm sure there are probably easier languages to get grammatically correct on the output. I was like half playing and half coding games. When I wasn't coding games and I wasn't playing games, I was often hacking games.

There would sometimes be copy protection. If I wanted to edit a file, especially with the Commodore 64, being able to hex edit across different pieces of a file would be fun. What do you think this piece of this code does? Well, we know that this is a graphic. We know that they probably didn't pack this. What will happen if I change this value in this piece of code? Pretty soon, I was writing programs to be able to change values and pieces of code, at least the ones with data files that were well structured.

I guess you could that I was pretty deep in by the time I got to the video store and said to my manager, "You know, we're missing a huge opportunity here. We should probably be renting games and here's a financial plan for [this idea]... And he's like, "Okay, this is way too much. All you needed to say was let's rent some video games." We actually did make money on the video game section. We rented cartridges as well. That started making me think, "We've got these genres of games. There is a huge library of games that I could play."

I would take home a cartridge basically every night and try to play. [Sometimes, I thought] the game design stinks because of these things. This stuff is terrible. They've made three terrible games in a row. How are they making money from this? And I basically investigated all the things that happened within the games industry. Pretty soon, I knew before even talking to Seamus, who the players were, who was publishing, who was developing, and what their challenges were. By the time I got [to Microsoft] I knew a baseline of the [players in the industry].

But the genres that I really loved? I loved *Skyrim* and *Red Dead Redemption*. I love the big open worlds. I think I'm gonna love *Starfield*. (We'll find out with *Starfield*, I might regret saying that.) But... anything that sort of pushes the boundaries of gameplay... or stories that could never have been told any other way... Sometimes, it's technical, like graphics or things like that... *Elden Ring* blew my mind. It blew my mind because somehow... they made a love letter to game designers and artists by having this incredibly intricate story and very unique items, and it's just incredibly rich. The entire world is telling you some incredible story. *Red Dead Redemption* is also a genuine masterpiece, [and so is] *Brotato* on Steam.

That is a great answer. Can you talk about what you did on the Xbox team when you got going? What were your roles there with the project?

If you start a pizza shop yourself, and you're just one person in a pizza shop, you're waiting tables and being the cashier and back there cooking. At some point the pizza shop grows and you need to start specializing, and then it grows more, and you're gonna [need to] make choices about [what] you want to do.

Xbox was hypergrowth, right? So, you have to specialize. At one point, I think it was Kevin and Seamus [that] came to me and

[said], "Okay, we're going to add a bunch of headcount. You should tell us what you want to do." The thing I really wanted to do was the intersection between the business and the technology side. Since I could code, [which] wasn't true for all PMs, and I did know the developers fairly well at that point, and our publishers--I want to make their dreams come true--I [requested a] portfolio of my own external third parties to be able to manage... I picked the relationships with third-party tools and middleware providers.

Why was that important? It turns out that when you're making any piece of software now, you're using all sorts of third-party stuff. You're going to GitHub and you're assembling things. In that day and age... games would be made out of a hodgepodge of different vendor's stuff depending on solving particular problems. So, probably the most successful tools or middleware provider was in Bellevue called RAD Game Tools. Mike Abrash worked there, with a whole bunch of other people that I really respected. Their model was to find an important problem, what Google calls "a toothbrush problem." It's something that people use every day. If you're an individual engineer, and you could solve the problem, you're gonna make a library, and then we'll all share revenue together. They were fabulously successful because they just made things that were really, really useful.

Look at RAD Game Tools and their video decoder. It was used in 90% of all console games or something like that. It's an enormous percentage. The reason is because it solved it really well. It wasn't terribly expensive. Nobody wanted to write that thing, anyway. So, they would pay them that, and it would span across every console game. I found that very interesting. It also

turned out, the more I was thinking about it (as I started getting the program going), I thought, "Oh, shit, this is also a place where there's going to be a lot of liability." What happens if you're about ready to ship a AAA title, and then your middleware provider goes belly up? Or what happens if they decide they're not going to be quite as nice as they used to be, and withhold source code? Or break something intentionally? Or go bankrupt? Anything could happen in that particular scope. This turns out to be more important than anything.

The reaction I had to that was, "We're going to be really careful about the selection of the people that we put on our platform." They have to be serious individuals. They need to really be doing something. I made a controversial call at that point to make it more expensive for tools and middleware providers to do things than for game developers to do things. The reason was to ensure that they were more serious. [But], of course, as soon as I left that [decision] got immediately unwound because it was a very unpopular decision. But for that point in time, you have to take this seriously. You can't just sort of show up and shovel bad software to our developers. Our developers are very important. Our publishers are very important. This is how we make money on the platform. So, that's what I did.

It was great. [It was also] global, so I'd go to Japan and talk to all the Japanese game developers, as the customers of the tools and middleware providers. But I also talked to the tools and middleware providers there. And often, those are one and the same, so a studio will make a game engine plus also a console game at the same time. Sometimes they were going to get revenue from both angles. And I would try to figure out, this

tool is going to hit at this particular point in time, so I'd give the tools and middleware providers an idea of [when] and I'd ask Microsoft not to work in that space because they'll be the solution and we [can] go put our effort in somewhere else.

We weren't trying to compete directly, pound for pound, on the tool sets. But more we're trying to collaborate among other people, because I tend not to think of anything as sort of a zero-sum game. I didn't want to compete directly with the people that were helping our ecosystem.

Michael Halvorson What were some of the names, Drew, of those companies?

Drew Angeloff Oh, the biggest one at that point in time was Criterion, probably. Havok, which is still around, [was also one]. Criterion is a game engine. It was used in a huge number of titles. Almost a third of the titles used Criterion--maybe even half of the titles. Havok was one of the first physics engines I got. These things all got sort of acquired and acquired by other people. Then there's all the artistic tools, so like Maya, Softimage, Max--all those were different. Sweet, sweet artists would use those to create geometry, textures, and eventually pixel shaders, and other things, to be able to make game assets for their game.

Internally, I would work on internal tools. I worked with people internally to build the basic tool sets that would map to other

third-party tool sets. We did a thing called "preview pipeline"; it was the first time we ever saw shaders on anything. It was an easy way for artists to play with shaders, and we knew it was going to be a temporary thing until shaders became sort of ubiquitous. But at the very beginning, artists didn't really have an idea of [how to do it]. They would look at it this round sphere, and they'd imagine it's shiny. And they're like, well, "Shiny with what, right?" So... they could preview what the pixel shader would look like. Nowadays, of course, I don't think you can build a material without a pixel shader somewhere in the pipeline and be a real game. Even if you're just doing a hobby project, I use shaders all the time...

All of these techniques were being developed [at that time]. I was in this advanced technology group... and people were really at the absolute pinnacle of their field. They had joined Xbox to work on these types of graphics problems and effectively research and then productize that researcher out to the rest of the world. I worked with Mike Abrash. I worked with Jed Lengyel. He's the guy who invented fur shading, so all the fur you see today [in games] use the same technique that he had come up with. I mean, these are people that I really, really, really respect.

Michael Halvorson Yeah, so the Xbox is being specked out and produced, and you're kind of downstream from some of those original designs, right? Give me a sense for the timing of when you started to do that work, and how you relied on other teams so that you could go work with these vendors and these partners.

Drew Angeloff

Yeah, so the console business... is a strange business. I've worked at both Microsoft and ATI. (And since ATI was acquired by AMD, I guess also AMD.) So, when you're building hardware, the one thing is, you can't really change your mind, right? You are trying to figure out--when we're designing the first Xbox, and Xbox 360, and basically any other piece of hardware--you're trying to figure out, four years from now, or two years from now... what do we think people are going to want to play? And then, how does that decompose into the hardware that we could build? And, of course, all those conversations are very complicated because you have to go and talk to Nvidia, or ATI, or AMD.

If you're building a console today, you have to think to yourself, "What experiences do I want? What are the differentiators?" And then you're gonna go talk to AMD and they're gonna be like, "Well, what kind of experiences do you want? Here's roughly the chips that we're planning. We can add or take away from those chips based on the thing that you want." So, all those things have to live on some timeline, and you have to be making choices.

So, starting on the tools and middleware, it's roughly in the same space, where you're like, "Okay, we know we're going to have shaders, so we need to have some sort of shading technology." Here are the problems... Cost expansion is happening in games, and definitely on the art side. In 1980, you could have two artists and everybody was fine. But in 1993,

you've got a team of 20 artists. What happens in the future [when] there will be 500 artists or something like that?

You're looking at what [the] developer problems are, [what] the financial problems are, [and] then you're trying to decompose that into [hardware]. There were a lot of things we did on Xbox that helped the overall industry. You help the industry and you help everybody, and all boats rise, and people play more games... The day that we decided to [build the first game console] was the day I started talking to... game developers [to] find out what they think is important. You're building relationships first, and then you get a better idea of what the hardware is going to be like...

The other part of this was, if you look at the competition on Xbox, mainly Japanese companies that focused on hardware, I feel like there was some level of bravado of [among] console developers, where they'd be like, "Just give me the register specs, and I'll build you a game, right?" At Microsoft, we [had the] advantage of [being a] software company. We could build a tool chain that no one's ever seen before [to] make game development easier, which was going to raise the level of quality of all the games we put out and maybe raise all boats at the same time. I think that hypothesis roughly worked out... Software is the key to making games and game development pipelines, [not simply] writing to register specs...

Michael Halvorson I love that. Can you do a little Microsoft insider talk in this way: We know that the Xbox group will eventually [move] to its own space [the Millenium campus] when the team grows big. But when you first started, where were you within the Microsoft buildings? Was it just sort a little fort somewhere [laughs] where a few dozen of you were hanging out? What was it like, culturally, being a startup group within the company?

Drew Angeloff The first office [location] I remember was with the Microsoft Money team. Culturally, the Microsoft Money team was very different than the game industry people, for sure. Partially, we were just a rowdy group of people. As you can tell, I don't have a hard time talking. So, I would talk and be, like, poking people. How does that work and what's this thing? But the Microsoft Money people felt like accountants, and so they would look at us [and wonder] what's going on with this group? On top of that, we had people that were very loud. Certainly, people could get very angry. This is not a Microsoft where we worried about people's feelings, too much. During that point at Microsoft, I'm not sure I worried about people's feelings all that much, either. Nobody was intentionally trying to be an asshole. That just wasn't the thing that you were worried about, right? It was more that you were trying to get something done. When you're disagreeing, you would sometimes be very loud. Occasionally, people would throw things, I guess. So, [there was] dissonance between the Microsoft Money guys and [our] people...

Drew Angeloff I can't remember if this is when Seamus got his electric skateboard [going], but he would be hauling around in the hallways, like going probably 30 miles an hour, and, you know, he crashes [the] electric skateboard into the side of somebody's

office, and [he] screwed up the side of the office. For him, that wasn't even like [a problem]. If you didn't call it out, he would never even realize that he kind of did that. He would just sort of recover and then keep talking about the thing he was talking about. But I think the chaos being caused down the hall [created] a lot of stress. I got the feeling that Seamus got a lot of calls from HR and elsewhere. He would go from sort of brash to a more mousy "yes, sir" tone when the HR people would call, and say, "Yeah, that won't happen again." And then we [would] just go right back to doing the same thing we were doing before. I think he was sort of mollifying them, so we could have our space and do things in our way.

The other thing is that there wasn't a lot of time for the Money people to recover, because I would show up to work at seven o'clock [in the morning], and I would go home at eleven at night. We were basically there all the time, you know, probably making their life hell... So, we were there for a while, and then we rotated through a bunch of different offices. But you know, I don't think any of that really mattered, right? Eventually, we ended up at the Microsoft Millennium campus. Before that, [though,] we had a group of sound booths. This is where I... taught Seamus a lesson about Microsoft culture. We had a whole collection of sound booth offices. Every office was like a sound booth. They were gorgeous offices with perfect sound isolation. You could be playing music, full volume, and nobody's gonna hear you anywhere else. Seamus says, "I'm sitting in this one, [and] you're sitting out in the common area over there." And I said, "Dude, I believe I have more seniority than you do at Microsoft. So, I am sitting in this [one] and don't tell me that I'm not sitting in this. You're gonna out yourself as the least [senior] Microsoft person that's ever been here. Seniority dictates who gets the offices, not title." So, he says, "Yeah, Drew, you're right.

You know, I will attempt to help you out. It's good to have people that will tell you, culturally, what the right thing to do is." So, I took the office. And for like a year, poor Seamus had the world's worst office [laughs]...

That's a great story. Can you tell me a little bit about the launch of the first Xbox and what you did related to that?

I'll start with pre-launch... Game developers need to know what the console is capable of, so they can envision what they could build. Publishers have to know what the game developers are going to build, so they can know how excited [people will be] and how much money [they should] put behind that. And consumers have to know a game is coming that they really want... Our team needed to sell the system to a lot of groups. People like Seamus Blackley had to go out and convince people that the Xbox would be amazing.

So, Seamus said, "We need some demos... and you're gonna produce the demos. I'll be the executive producer. I'll check in on you and make sure that things are going well... We're gonna spend a couple million dollars. We'll go to a bunch of different game companies."

Some of the demos were [based on] Seamus's ideas. Some of them were generated by game developers themselves. We did

this tour, and we asked [developers] to demonstrate [specific] Xbox features. Sometimes, we didn't have the hardware but we had similar chips they could use... We worked with Pipeworks Software the most... It started off with getting a triangle to work. Then we got a sphere with shading on it. Pretty soon, we built a pool with caustics underneath. It looks like ray tracing of a pool. Because I was producing it... at stand ups with the team they would show me a build and I'd be like, "Oh, shit, this looks great! I gotta go get Seamus." And he'd say, like, "Oh my God!" (He's a very passionate person.) "Oh, this is the best fucking thing." He'd go crazy. And I'd go crazy. And then we would immediately get back down to business, and be like, "Okay, well, how can we make this even better?" We just moved from one thing to another, trying to figure out how to make each one of these demos better. And some of them didn't make it, right? Some of them were god-awful from the beginning. We had at least one partner that tried to do a demo and got pissed and took a baseball bat to the demo units, and sent them back to us. A whole bunch of drama happens in the games industry when people just were not happy. But the ones we did get were great.

We had ping pong balls on mousetraps, demonstrating physics. We had things that had to do with complicated geometry. Especially for developers, when you're trying to tell them something, [you need to] tell them a story. How are we going to demonstrate that you can do maths or physics? Well, ping pong balls on mousetraps. [How can we communicate that] lots of objects in the scene can have shading all at the same time? Seamus [suggested] we zoom in and out showing shaded objects. What we need to do is zoom out and [show] four objects, then zoom out again [and show] 25 objects. The final capper was always that we're showing this on a machine that

has 30% or 10% or 50% of the final power of the Xbox. We go to developers and convince them, then we'd show publishers, and we eventually ended up showing consumers (in secret). They were like, "That's the coolest thing I've ever seen..." The idea is, we'd have this giant portfolio of demos that would show how things were supposed to work.

Michael Halvorson You're not emphasizing sound, but you could, right? There's were some sound features that the Xbox probably had.

Drew Angeloff Yeah, we had a bunch of sound features. Probably at that point in time, one of the most important sound features was this concept of higher-level music. The software [technology] was DirectMusic, which [allowed you] to do on the fly composition. So, as opposed to stitching clips together, as a mood increases, or a value increases somewhere in the RPG, you [can add] a little bit more snare drum or a little bit more bass... I don't think DirectMusic caught on in the same way that we thought it would catch on... [There was] a cost to figuring it out... But it was one of the first times that you'd seen truly interactive music where the state of something could change (like the state of an emotion) and then the music parts, instruments [or] orchestra would drop out, or come back. I just don't think I've heard the same dynamism in other games in quite the same way. Some of the more recent *Zeldas* have aspects to that. But was [DirectMusic] worth the effort for every game developer who's struggling to make ends meet? Maybe not. Maybe that's not the first thing that they were thinking about.

Michael Halvorson This was also the time of the rich, living room, 7.1 Surround Sound system, encouraging a really immersive experience. Was that a vision of this original console? Or was that something that came in a little bit later? When people imagined a richer sort of multimedia?

Drew Angeloff I think you're always trying to [create a rich] experience on so many different axes. How much do we labor over the controller? Was the board size way too big? This was a labor of love for [everyone]. There's a designer [named] Denise Love, who's a friend of mine, and was also instrumental in making the controller. There's no doubt that she was in it to win it on controller design, plus all the other things she worked on. That's kind of the spirit of everybody there. If you were in audio, like Scott Selfon [senior audio specialist], another person who's a magical audio guy, he's a fantastic human being and just fantastic at his job. All day long he was thinking, "Well, how do I make this sound better?" Chanel Summers was also representing DirectMusic. There's no doubt in my mind that she was deeply committed to audio.

People that were on the game side or who were helping me with demos, like Kristofor Mellroth--he absolutely killed it killed it on audio. He's now an executive producer at Microsoft, working on gaming titles, but when he was in audio--you know, especially audio people, they're all about audio, right? There are very few audio people that get distracted by anything else other than audio, because that's what they love.

I think that any axis of the experience had their own dedicated staff and people that really cared about those things. That's true with graphics too, right? It's true with typography and every aspect... interaction design... for everything in the original Xbox, and also all the redesigns that have happened since then. You know, it's somebody's labor of love to do those things. So, audio is one of them, yes.

Michael Halvorson Fantastic. Can you tell me what you did for the Xbox 360? What role did you play in that?

Drew Angeloff So, we shipped the original Xbox and then we thought, "Okay, that was a good first try, right? But what would we do differently there?" And it was almost immediately obvious. Maybe we shouldn't produce a square board first, before we do the industrial design. Maybe we should do industrial design and then figure out how the electronics fit in that [concept], as opposed to giving the designer a gigantic board.

Michael Halvorson "Here's your board!" [laughs]

Drew Angeloff [laughs] Horace Luke was the designer on Xbox, and the sheer visceral disappointment he had when he learned that he had to wrap something around the [first] board. You could see him try his very best not to hate his job and hate his world. I remember him saying, "What do you do in fashion when something's big

and you want [it to look good]? You wrap it in black." Maybe the color black will somehow save us from the original Xbox. I was like, "Good luck, dude. I'm not sure that's gonna work."

But the 360 was the [opportunity to] do this for real. So, we rethought a bunch of the hardware. That was the time when I started paying attention very, very closely to graphics, like the graphics chip and all the things I [mentioned] before. I established a relationship with the ATI folks and we talked about tool chains, and [discussed how] to make these tradeoffs really early. [We said,] "Here's roughly how this ATI chip would work in certain circumstances..."

One of the key pieces of Xbox 360 was unified memory, which means that the CPU and the GPU can talk to the same piece of memory. That was very important in the overall architecture of 360. You had to have coordination between all of the different vendors, all of the different pieces in there. My work [required us to] know what the hardware [would be] way ahead of launch, teeing up all the vendors that we need... and getting all the demos ready by the time we had to launch. [Since it was done early,] I didn't really need to be there for the launch. Because all of my work done... [We had done it] before, but now I really know how to ship a console.

At that point in my life, when my work was waning... I [started to wonder], what am I gonna do after 360 launch? I started thinking, "I don't know if there's gonna be a console anymore."

[I had learned] from ATI that they can make chips that can do pixel shading, it's theoretically possible. It seemed to me that phones [could really do this]. This was the era of Motorola flip phones, not the iPhone. (We never saw something that was like, a big bar.) And I thought, "I bet someday there's gonna be [something] like a phone, a device, and it's gonna be like this bar, just a screen. You're gonna have these soft touch points. You're gonna put a point on the screen, and it will do something when you point on the screen.

So, I had these kinds of thoughts, and then I [figured], maybe I'm right about some of this. Maybe there just won't be any console anymore, right? Maybe it'll just be handhelds from this point on, once you get to that level of fidelity. And there will be no console. So, I started thinking about the consoles like old-timey radios. You don't have the old-timey radios everywhere, which are taking up half of a room, like a Marconi. That's not how it works.

But I just happened to have a conversation with a guy named Bob Feldstein over at ATI. And I told him what [I believed] was going to happen: it's all going to be handheld. And I could tell that Bob was interested. He's a lot like me, where he can talk, you know, and talk, but then he was laser focused on what I'm saying. He said, "Why do you think that?" And I ran him through all the theories about why handhelds are gonna be big. [For example,] no phone providers are in the handheld space, [even though] they own the networks that phone providers could have. It seems like there's this intersection between phones and consoles that might happen.

But... it just happened that at that very moment, [he was] closing a deal with Nokia. Part of the deal with Nokia was giving them advice about how to build a handheld console that had never been built before. And after this they built this handheld flop which was called the N Gauge. They were trying to reboot and build an actual handheld console that [provided] a gaming experience that wasn't [just] a repurposed phone, which the N Gauge was.

[In 2004, I left Microsoft and worked with Nokia to design a new mobile game console.] That was one of the best gigs of my entire life. It didn't result in anything because we never built it. Because our job was to come up with a plan for a handheld console that we could pitch back to the CEO. We got [the plan] ready, in the division that Nokia was working on, and we produced this plan. [But] the upfront costs for the console were, of course, enormous. And the CEO looked at it and (the way I understand it), the CEO said, "Why the hell would we ever do this? I can keep making bar phones and flip phones for the rest of my life. I don't need to do any of this stuff. You're just asking me to throw money down a hole for something that a maybe? I'm making tons of money on these things."

So that didn't go. Eventually, I ended up working in the same building, going and making this pitch to other people. And they said roughly the same thing at Motorola. They were like, "I've got the Razor and it's the number one phone in America. Why

the hell would we ever try to put graphics into our phone?" I replied, "No, someday there's going to be this bar phone...."

Michael Halvorson Wow, this is totally *The Innovator's Dilemma*, you're right. [Ed. A theory about resistance to innovation popularized by Clayton Christiansen.]

Yes! So, you left Microsoft in 2004. That's the time you're talking about now?

Drew Angeloff Yeah, totally *Innovator's Dilemma*. And then later--I should have saved this email... but my head got seven times bigger that day--I received an email from somebody at Motorola. The title of the email was "You were right." (It was after the iPhone launched [in 2007].) And they wrote, "You were 100% right. You were pitching the iPhone to us, and we didn't listen. And now our business (basically) stinks." (It was some executive there.) They only sent it to me. And I thought, "That must have taken a lot of bravery for that person to send that." You know, we were right. But my God, I've been wrong so many other times. Maybe I just got lucky this one time, right?

Yep. After I left Microsoft, I left basically to go work on this handheld thing. And J Allard had attempted, at one point, to get the company interested in handheld, and [Microsoft] was like, "Nah, not gonna do it." This was in the height of the [Steve]

Ballmer era... I thought, "How would you know? You have to try these things." But my message wasn't landing... [At Microsoft], I think the handheld [devices] probably became victim of [being] early... like the courier and all those other sort of device-oriented things where [people are trying to] establish a new category... If somebody's asking you to make a billion dollars, like, guarantee it's a billion dollars, you don't really know. You try things out that are expensive and have high upfront costs... That's part of the benefit of having a huge wallet [as a company]...

At ATI, we had a hard time making hardware. My team was full of software people, working on SDKs and software demos for new chips. But at some point, it became very difficult to tape out a chip. We probably spent a year trying to make a piece of hardware. We ended up selling that division to Qualcomm. That chip--which you are using in your phone right now, if it is a Snapdragon--was basically the Xbox 360 chip, scaled down to a single pixel pipeline, with a bunch of power and voltage technology wrapped around it to make sure that it was using power. A lot of phones actually have Xbox-style guts in them. People just don't realize that. It powers basically almost any chip had a Qualcomm chip.

Michael Halvorson Drew, I want to make sure we get this in, but you came back to Microsoft in 2008. Can you tell me a little bit about your career when you come back to the company?

Drew Angeloff

Yeah, so we sold to Qualcomm, and I think there was probably an opportunity for me to go to Qualcomm, but I'm not leaving the Seattle area... but I heard via the grapevine that there was an XNA [Game Studios] project for Xbox... [where] they created a marketplace and a developer framework for indie game developers, who could basically produce code on Xbox in a safe environment. Then consumers could buy those things from indie game [publishers] through a marketplace... They had just started getting off the ground with this. I thought that looked like a cool gig. They happened to be hiring a group program manager for that role. I interviewed and everybody said, "Yeah, you know a lot about the space and you like indie games. What's not to like on the candidate side?"

So we worked on that and we added a whole hell of a lot of features, and enabled game developers to sell games. One of the more interesting stories with that is... to sort of prime the pump for the marketplace, we [allowed] everybody internally to post games, [even] moonlighting Microsoft employees. We needed to need disambiguate that with the Microsoft lawyers, and [clarify things] related to intellectual property, but Microsoft was extremely reasonable on all legal fronts... This is one of those cases where I went back to our executives and legal and said, "I think we should clarify this... We should just let them keep all the revenue for everything that they have [made], even if they work on it during work time... up to the first million dollars." And you could hear the record scratch a little bit there, [but the company agreed and said], "How about [proceeds] up to the first million dollars, but if there's a runaway hit, we want the option to buy the IP for the thing." That'll incentivize people to do it. And nobody's gonna look at a million dollars and be like, "Oh, my God, that's a terrible deal." So, Microsoft looks generous and [the Xbox group] looks generous...

I'll be damned if there isn't this guy, Jace [Sangco] on our team. And maybe I'll get the million dollars thing wrong. So, if Jace ever hears any of this, maybe he'll dispute what the actual numbers are. But Jace does this thing called *Avatar Drop*, and it was when we were introducing avatars. It is basically avatars falling through little rings, and the rings get concentrically smaller and you're controlling the avatar, and the avatar is falling. "Ahhhhh!" Through the little rings and you're going down, and you get some sort of high score. Then eventually, the rings get too small, or the avatar is going too fast, and you can't do it.

I remember at one point, he hit half-million dollars. I'm like, "Oh shit, this might actually happen. He might make a million dollars on our platform." And we're gonna have to do it. Eventually, we did have to go to the lawyers. And we [asked them], "Okay, do you want to take the option on this?" And they said, "For Avatar drop? No." And I'm like, "Okay, well, I guess he just keeps making the revenue that comes out of these things." We must have paid off his student loans like six times over, right? For that game, which he put together, partially on Microsoft time, and partially not on Microsoft's time.

Michael Halvorson That's fantastic. What a great, great story. Now, you worked with Ray Ozzie a little bit and I'd like to ask about that. What projects were you working on? And for the listeners and readers, just explain who Ray Ozzie is.

Drew Angeloff

Ray Ozzie had the official title of CTO [Chief Technical Officer] for Microsoft at that particular point. He had had a very successful career by the time he got to Microsoft in tech. Both on business software plus a bunch of other things. I put him in the deep-thinker realm of people. If you wanted to know, organizationally, what the greatest thing to do was... maybe he was not the first person you go to. But my God, if you wanted to know where humanity was going, and what influence technology would have on humanity...

One of the things [he] would talk about is the World's Fair [in Seattle]... these moments in history where things changed perceptions of how technology could affect humans, and what it meant for people to have hope... And the connection [between]... technology and humanity... He's always 25 years in the future or 100 years...

[At the World's Fair,] technology was disclosed in Seattle in a concentrated forum, and [it] changed how the city looked at technology in the future. It permanently changed how we thought about things. [Another example] would be [the technology showcase in] Disneyland, in the area called Tomorrowland. It changed the public's perception and created demand for technology... and also inspired people to think about things they have never even thought of. And [now] we use this stuff all the time.

Michael Halvorson That's a great summary. So, as chief software architect, Ray Ozzie is driving Microsoft to do cloud-based services and architectures. Were you part of that?

Drew Angeloff No. So here's the mission. I get a call from Otto [Berkes], who I'd worked [with] on Xbox. At that point, XNA had been horribly distracted by Windows Phone. I was the biggest downer for anyone that was working on Windows Phone. I would say, "Well, we can use XNA for this... But we should probably just use C++, right? And the reason is because XNA has a very thick layer for security and privacy on the bottom. So, you're gonna have to ship 2X the transistors. So, you're gonna have a permanent cost disadvantage compared to every other handset, where cost really matters. Strategically, the Windows Phone project to me [had] so many things wrong... I just hated it. I hated that project. I'm trading my time in my life, which is very finite, for money... The Windows Phone thing [had] very lovely people. I enjoyed working with it, but I didn't see how that was ever going to pan out...

So, I'm talking to Otto one day and he said, "I think I'm gonna go work for Ray Ozzie." What are you doing? And he [mentioned] that there's this problem that [Steve] Ballmer has. Every time that he goes for an investor review, everybody wants to know what's happening with iPad... It seems like it's gonna take over the entire world. And [it was true], back then it was a new form factor. [Apple] was smart. They decided they were going to do something new. They were going to spend a half billion dollars to try something new out. They were going to create an entire [new] category, and it's going to come in and eat our lunch (and Windows Phone) at this point.

I'd already been absolutely convinced that [Windows Phone] was the dumbest thing we've ever done, so I said, "Windows Phone is going to fall on its face and now Apple is going to own this iPad market. They're going to own the phone market and like it is game over... it's going to be the end times. (One of the best strengths of Microsoft is our concern about what our competitors are doing, the paranoia... I've never lost that. It's one of the biggest gifts that Microsoft has ever given me, total paranoia.) So, I'm pining with Otto and he said, "Oh my God, yeah, we're screwing this thing up." And he said, "Hey, I got a job for you over in over here working for Ray if you want." [Otto is] basically coming up with a plan to not wait around for Windows 8 [but] disrupt the market and try to take some of that market share back from Apple." Ballmer is [also] getting killed by questions in every press interview he has... Imagine that this is the answer to the $500 million problem...

The job largely was coming up with cool ideas that could build new businesses, and a financial plan for those ideas, and coming up with pitches that we could sell to the senior executives... It was a very broad range of ideas ranging from should we use open source for Windows Phone (because the Apple phone was closed source), all the way to what became Surface tablets. This was a broad range of ideas, so it was it was great. It was one of the best times of my career, and Ray is incredibly supportive, because he's already thinking way, way ahead. He [was always thinking], "Well, what would you do in this case? And what would you do in that case? Is there money there? Does the hardware support that?" It gave us a reason to go talk to the different architects in the company, so I would

regularly go across the company and talk to people in Word--basically, all across the company.

A good example of that would be when we're trying to figure out could we open source a code base for making it a free operating system? The concept required us to talk to every other person and ask, for the Windows CE code base, "What proprietary technologies are in there?" And then they would say, "Oh, it's all proprietary." "Okay, well, what would make you uncomfortable if we open source that code base?" And to be able to come from Ray Ozzie's office was great, because people had to take you seriously enough to be able to answer the question, because they know that there's something financial on the line. It was a source of great discussions and exploration.

What did we ship at the end of that? Not much, because this was at the time of [Steven] Sinofsky [President of the Windows Division] and Windows 8, and so there were a lot of ideas that we came up with, which we felt were a home run, but somebody in the executive circle would find a way to not say "yes" to. It was definitely a time of "no" at the company. So, at some point, Ray decided he was leaving, and when he did that... I [decided] to go work on *Forza Motorsport*.

Michael Halvorson You know, we're gonna wind up here in a bit, but do tell me about *Forza*. You came into that business when it was already running? I think you had worked on maybe version 4 of

Motorsport [2011], which was pretty cool? What was it like to work on that project?

Drew Angeloff

Oh, Turn 10 is a machine. It is probably the best functioning group I ever worked in at Microsoft, period. And really, this is all Alan Hartman, like from the beginning. At one point, I called Alan one of the best business people I've ever known, and he was super offended. I don't think he liked [being] called a business person. He likes to think of [himself] as a game developer, not an executive. As a studio that he built, and that the team built--as an operational group of people doing something focused and knowing what their vision is--[it is a] masterpiece.

If I'm very generous with myself, because I was head of production (part of the studio leads), and [I ask], "What influence did I have? How much did things get better?" I maybe had like 4% influence on things, because, you know, everything was working so well. I think I hired really well. The people I hired into Turn 10 have turned out to be magical people. I already knew they were kind of magical, but they're [amazing]...

Turn 10 is always raising the bar all the time on everything... The level of honing the system to make the game work incredibly well- Nobody's ever really happy with the thing that they actually produced. At the end, when we shipped and produced *Forza Motorsport 4*, and produced a 91-rated game (that's a preposterously good rating for a AAA game), what are we

talking about? "Congratulations for us. You know, we kind of screwed up a bunch of things on that whole project. Let's go back and let's really think about all the things we screwed up." I think Shannon Loftis put it really well: "The years working for Alan are some of the hardest years you'll have, but you will never learn more from anybody else." It is a place to learn how to make games and how to do it right. And just learn how to make software. I mean, everybody should go to the Alan School for the beginning of their career, for at least two or three years. Because you learn a lot.

That is fantastic. We have Alan on our list to talk to. I actually worked with him a long time ago. So, I'm going to remember you to him with that quote.

Of all the people at Microsoft, he's probably in my top-five most respected people, just for the thing he's built. Look at who he's surrounded himself with. It's people that are willing to really commit and do things. He built a team [that] is really great.

Michael Halvorson Drew, it has been fantastic talking with you. Can I ask you about some takeaways, now? You're not at Microsoft now. But are there some things that you took from Microsoft that you continue to use in your work and your life? Are there some takeaways that have helped you think about your approach to technology? Being a corporate citizen? Would you want to talk about that a bit?

Drew Angeloff

You're your own worst psychologist. So, it's hard for me to say all the ways in which Microsoft influenced me, but because it was my first tech job, and I spent a decade, on and off, in aggregate, at Microsoft, [they were] all formative experiences [thinking] about customers and everything else... I think probably the biggest influence is customers. I don't think anybody treats customers quite like Microsoft treats customers... Everyone really thinks about, "What are we doing here? Why are we doing this thing? Are we doing the right thing for the customers? Are doing the right thing for technology?"

It's not the blind obsession for customers where you have to take verbatim something from the customer, [because sometimes] the customer doesn't know any better. In the era of metrics, that's an incredibly attractive thing to do. (Nobody got fired for listening to the customer...) But it's actually thinking deeply. What should we build that is going to make the customer incredibly delighted? And then working back from that. And if you tell the customer and they hate it, but you believe in yourself, you're able to do it. And that, you know, I've taken with me.

Like I said before, it's [also] the paranoia of getting scooped by things. That I've definitely taken with me into every job. I think the respect for people to do stuff. That I've taken with me. In some roles in other companies that I've been at, it's like showing up for work is the most important thing, and punching

the time clock. But not necessarily getting something completed. I'm kind of allergic to that because of my time at the State Department.

I don't like tenure, meaning that you're more senior than somebody else. I do like more of a meritocracy in some way. Finding a group of people that wants to come to work and wants to be a group--that's really what a company is, right? Managing to hold on to a group of people that are really interested in doing stuff, not [just] collecting a paycheck, but doing something. That's really important to me, because, like I said, I don't want to waste the time in my life. I don't want to waste anybody else's time. Doing stuff is really rewarding, right?

I think recognizing that and doing that really stuck with me. A couple more... We were a very very developer-centric company. If you try to figure out things like, 'Why are we spending so much money on Visual Studio?" (That question would raise itself up every couple of years...) I mean, eventually there was some revenue, but it's like, this is what our strength is, appealing to developers. They're going to make the ecosystem great. You didn't need any more proof than that. It wasn't some sales metric thing. It's just like the company understood that developers are really important, and I find that's missing from a lot of different places.

When GitHub was acquired by Microsoft, I was working at someplace that could be considered a competitor. (I'm working

at Google.) I was very unhappy about that [acquisition] from the perspective of Google... but it's hard to argue that they would land in a bad place. Because Microsoft really does think about development. They think about developers and spend time thinking about computation, [and] what it means to have compilers and computation at a low level, the layers of stack, and what the experience looks like. I was like, "Okay, I'll keep giving my money to GitHub, because I know it's not gonna get worse." Microsoft is not going to neuter it for some selfish reason. You're trying to appeal to the developers across the planet with this great thing. So, I guess that maybe that's the last one. It's, you know, sort of that focus on developers.

Michael Halvorson Well, that's a great place to end. I just want to thank you so much for this fascinating conversation. You have had a fascinating career, and done so many interesting things. I know we're just kind of sampling the tip of the iceberg, in a way, but I really appreciate it and your time. And with that, I'll close the interview. I hope we get a chance to talk again someday.

Drew Angeloff I hope so to! Thank you. Cheers!