



MUSEUMS AND THE WEB

MW18 Opening Plenary with Vicki Dobbs Beck, Executive in Charge at ILMxLab, Lucasfilm, Ltd.
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Vicki Dobbs Beck: 00:00

... so much Rich and Nancy and everyone for having me here. It's really a privilege. I'm particularly excited to be among so many people who create, dream and aspire each and every day. You all bring worlds, histories, and areas of studies to life. So again, it's a true honor for me to be here.

I hope that our journey, that of ILMxLAB can offer some interesting lessons and insights into the new frontiers of storytelling that are made possible by emerging technology such as virtual reality and augmented reality. To that end, I'd like to talk a little bit about how ILMxLAB got here, why we think immersive story-telling is unique, what we've done and learned, where we're going, and for fun, what wisdom can we learn from Star Wars.

So for context, I think it helps to know a little bit about me. Rich told you some of my background, but I have been with Lucasfilm for more than 26 years over a 30-year span. I started at ILMxLAB when we had just finished "Willow", and we were in-production on "Indiana Jones: The Last Crusades."

At that time, I was on the same hall as all of the CG artists. There were six of them. Now we have more than 1200 in four studios world-wide, one of those studios here in Vancouver.

Early in my career, and Rich and I had a lovely conversation about this last night, I did run that small team called Lucasfilm Learning. It was inside of LucasArts, which was the games division. We were seeking to apply interactivity, high-quality media, and story-telling to multi-disciplinary educational experiences. And as he said, we did this with computer-driven LaserDisc players. Some of you may not even know what those are.

But the snapshot above it is a screenshot from a prototype that we created as part of that effort. It was called "Paul Park Ranger & the Mystery of the Disappearing Ducks." This was a prototype designed for middle-schoolers that we did in collaboration with the Audubon Society, and to this day, I feel like we were about 25 years ahead of our time because it is an actually perfect application for VR. So I'm hoping one day to see if we can make that happen.

But I've always had this passion for cross-platform storytelling. And I've watched with great interest as the gap between interactivity and linear media production has closed because it offers us some really exciting new opportunities.

Finally, I wanted to say that I'm not a technologist. I do have a deep appreciation for what technology enables, but this is important for when we get to the Q&A section. What I strive to be is a catalyst for innovation and creation.

Because we're in Canada, I wanted you to know that my mother has never really understood what I do, and now is no exception. But I did manage to unduly impress her last year when I spoke in Vancouver at the YPO conference and serendipitously appeared on the same screen as Justin Trudeau.

But back to business, so how did ILMxLAB get here in the first place? Well, as most of you know, our story began more than four decades ago with George Lucas, who created one of the richest and deepest narrative universes ever brought to life.

But equally importantly, he instilled a culture of innovation, a pioneering spirit core to his vision with the establishment of Industrial Light and Magic and Skywalker Sound. So this collectively are our roots and our legacy.

I really never tire of reflecting on where we've come from. So I want to take a look at ILM's reel. I call this reel "40 years in 60 seconds."

(Plays reel. Drumbeat soundtrack. No speaking).

But as the entertainment industry has continued to mature, a number of years ago, we had to ask ourselves, "What's next?" And around that same time, I was introduced to a book that had a profound impact on my thinking. It was called "The Blue Ocean Strategy" by W. Chan Kim and Renée Mauborgne. The premise of this book is that we're not striving to outperform the

competition in the existing industry, but rather to create new market space, a blue ocean.

After all, the film business is more than 125 years old. It was on Dec. 28 in 1895 at the Grand Café in Paris that the Lumière brothers effectively opened the first cinema box office. Think how far filmmaking has come. As a craft, as an industry, as a cultural phenom. Even video games are more than 40 years old. It is so rare that we get to experience a true pivot point, or a transformational moment in history.

But with the advent of VR and other forms of immersive storytelling, every one of us has a unique opportunity to pioneer. These disruptive technologies are new platforms for expression. They allow us to convey emotion and establish deep and intimate connections to story and place. While we have always been about storytelling at Lucasfilm, we wondered, "Could we use these technologies to tell new kinds of stories?" Immersive stories. And we began doing R&D in high-fidelity, real-time graphics that laid the foundation for what was yet to come.

We believed innovation in storytelling mattered. I love this quote from Ursula K. Le Guin. "There have been great societies that did not use the wheel, but there have been no societies that did not tell stories." Stories are as much a part of us as life itself, and so when there are new ways to tell stories, we should be there.

Our goal for immersive entertainment was quite simply for people to step inside our stories as never before. We launched ILMxLAB on June 14, 2015, just a little over two and a half years ago. We wanted to be pioneers. We were extremely conscious in our naming, and we defined the space broadly. Immersive entertainment, a lot of people at the time were just adding words "VR" or "AR" after their names. We used the word "lab" because we wanted acknowledge that we were in the infancy of this industry, and that we knew we were going to have to learn and discover. And the x, well, that stands for many things, in addition to evoking an X-wing fighter. Experience, experiment, excite, explore, expand.

We have three broad areas of focus at ILMxLAB. The first is location-based immersive adventures. These offer us the opportunity to deliver scope and scale and in both senses, and this is really going to be the focus of my talk today.

But in addition, we also were doing original, immersive, eposcotics (sp?). And here we see the opportunity for a deeper narrative through extended engagement.

Then we do the innovation experiments that allow us to push the state of the art and hopefully support the other two areas, or even possibly open up a new area of focus as well. We believe that the world of tomorrow will surely be connected. That our experiences will not start and stop at the door, but will fluidly transform from one media to the next. The whole will surely be greater than the sum of the parts.

What is always at the forefront of our minds is that creativity leads and technology enables. It might sound obvious to many, but it can become blurred when you're creating content for emerging technologies. Nonetheless, that idea is core to our mission.

So let's talk a little bit about why we think immersive storytelling, VR in particular, is unique from other storytelling mediums.

Aside from its newness, it's that idea of the power of being there. You'll often hear it described as the power of presence.

One of our first innovation experiments was called "Trials on Tatooine." It was an experiment in understanding the balance between light story and interactivity in a first-person point-of-view. And we introduced this experiment at the game developer conference in 2016 when we were all in the earliest days of exploration. We wanted to share our learnings with others who were doing exploration in the same space.

In our case, we were able to put you on Tatooine. We built a world, and we allowed you to step inside.

Now imagine you're in a VR headset, you could hear the rumble, and see the scale as the Millennium Falcon descended from overhead.

(Rumble sound). So taking a play card from our colleagues at Walt Disney Imagineering, we introduced what many referred to as Core DFX. So unbeknownst to the user, who remained ensconced in of course the VR headset with the help of a fan, he or she could also feel the jet exhaust.

At Star Wars Celebration in London in 2016, we set up 20 booths to showcase "Trials on Tatooine." And this was a little reel we put together afterward, and I think helps convey the power of this kind of experience. For those of you who are Star Wars fans, be on the look-out for Ray Park, who played Darth Maul in Episode I. However, here he's minus the red and black make-up.

(Plays video)

- Video: Man: 11:40 Here we are. Day 2 of Star Wars Celebration here in London. Y'all having a great time?
- Video: Woman 2: 11:53 I've had the privilege of actually watching probably close to 2,000 people do "Trials on Tatooine."
- Video: Man: 11:59 When you put somebody that hadn't done a lot of Virtual Reality, and you land the Millennium Falcon on their head, they get scared.
- Video: Woman 2: 11:59 There's nothing better than ... that's a sight that we want to see more of.
- Video: Man: 11:59 We're releasing "Trials on Tatooine" for free on SteamVR on Monday.
- Video: Man 2: 11:59 Yeah, that's good.
- Video: Man 3: 12:23 That was very unique [inaudible 00:12:23]
- Video: Man 4: 12:31 [inaudible 00:12:31] It's like all you dream of. It's something else. [inaudible 00:12:35]
- Video: Woman 3: 12:40 Since I was eight years old, this was exactly what I always [inaudible 00:12:40] in my life.
- Female Speaker: 12:48 So this was just an early step toward the projects that I'm going to share with you today. So in addition to the power of being there, which is really about world-building and place-making, there's the power of connection. Immersion provides a unique opportunity to interact with characters. If they respond to you in a compelling and meaningful way, it opens up entirely new possibilities. Now you're in a world, and you're interacting with a character. Rather than storytelling, it becomes storyliving.

The piece I'm going to show you next we call Meet K-2SO is some work we did as we were trying to better understand how

to craft these kinds of experiences that allow you to develop a relationship with a character that actually matures as you spend more time together.

(Plays video)

K-2SO:

13:40

Excuse me.

Congratulations, you are being rescued.

Please do not visit.

Quiet.

I think it's time you moved on.

Vicki Dobbs Beck:

14:14

With all that as context, I'd like to share some of the things we've done and learned in the world of location-based experiences. I'll talk about three recent projects. Carne y Arena, Star Wars Secrets and the Empire, and Steven Tai London Fashion Presentation. ILMxLAB had the distinct privilege of collaborating with Alejandro Iñárritu, Legendary Entertainment, and Fondazione Prada to create Carne y Arena. It is an art installation that puts you at the center of a harrowing quest of immigrants to cross the border from Mexico into the United States to seek a better life.

Much has been written about this experience, but one of my favorite quotes is that from the Toronto Star: " It's an experience that last just six and a half minutes but creates a memory that will last a lifetime. That's the potential power of VR."

This piece was recently posted on social media and provides a rare glimpse into the making of the experience.

(Plays video. A few inaudible words at end of video.) Not only was Carne y Arena chosen as the first ever VR Official Selection at Cannes Film Festival in 2017, but as Rich said to you, it was awarded a special Oscar by the Academy of Motion Picture Arts and Sciences in recognition of a visionary and powerful experience in storytelling. This was the first such award in 19 years, the previous one went to John Lasseter and Toy Story. So what did we learn? Well, this is going to come as no surprise to any of you. Authenticity is critical. And whether it's authentic to the people, the setting, or the emotional journey.

These are images from Casa Libre, which is a nonprofit that helps immigrants get their footing and deal with the difficulties of crossing the border. They've collected thousands of artifacts from the desert, a reminder of the challenges. And these artifacts, coupled with many, many interviews, that Alejandro did with immigrants provided the foundation, the threads of the tapestry from which he wove his story.

And in service of authenticity, there was actually a live-action shoot that became the ground truth for the design and execution, which is 100 percent in computer graphics.

Part of the authenticity was that sense of scale. Alejandro wanted a wide-ranging experience and this indeed took place in a 50 foot by 50 foot space. It required special hardware, computers, headsets, and trucking.

Authenticity also depends on the visual fidelity, the believability of the world and the people in it. And because this was a location-based experience, we weren't beholden to consumer specs. Our lead engineer, Lutz Latta, figured out a way to successfully schedule and render against four GPU's. That was necessary in order to get as close as we could to the reference footage. So bear in mind that we had 16 key characters, six more secondary characters, plus two vehicles and a helicopter, all created in computer graphics, all running in real-time.

To give you a little bit of perspective, on the ILM side, on the film side, they render one frame, usually takes between 10 minutes and eight hours. In VR, we have to render at 90 frames per second, which means we have 11 milliseconds to render.

The great thing is that technology has advanced at such a pace that we're able to create these high quality imagery even in that short period of time. The customized hardware also allowed us to add volumetric lights, shadows and dust in order to create that sense of atmosphere and deeper immersion.

The issue of control actually comes up in a variety of ways when producing immersive experiences. The process of creation and direction is quite different in VR than in film. And this clip will give you a sense of what it was like to direct and receive direction in VR.

So by using a witness camera and capturing the feed from the headset in sync, our team could later review what Alejandro was saying and seeing.

(Plays clip)

Video: Alejandro: 19:59

[inaudible 00:19:59]

Vicki Dobbs Beck: 20:04

Another challenge you cannot control the camera as you can in film or television. Each person is a camera unto him or herself. To underscore this, what you're seeing is playtest data from 25 visitors. The blue dots are the visitors, the blue lines are where they're looking, and the green are the actually characters in the experience. So as you can tell, everyone is looking everywhere.

So you can use a lot of tricks -- lighting, sound, action -- to draw people's attention, but you cannot control it. The good news is there is no one way to experience the narrative. While the narrative doesn't change, your personal journey does. Where you looked, who you followed.

Location-based VR also requires space to test and iterate. This was the VR warehouse that Legendary established so that there was a full working version. It simulated the ultimate installation, including the lighting and the sand on the ground.

Carne y Arena is truly inspiring, but the process of creation was in many ways equally inspiring. VR has a unique ability to allow us to explore and experience the human condition. And in so doing, its emotional and social impact could be truly transformational. So now for something a bit lighter, but no less immersive. Star Wars Secrets of the Empire. This is a hyper-reality experience ILMxLAB created in collaboration with The Void. Now in contrast to Carne y Arena, which is a solo experience, this is an experience you do with your family and friends four people at a time. And it blends the physical and virtual worlds. It evokes all of the senses, or most of the senses. What you see, hear, feel, smell, and maybe one day what you taste.

So this is a trailer from the experience.

(Plays trailer).

Mon Mothma: 23:11

This is Mon Mothma. I have an assignment for you. The rebellion needs you, and we don't have much time. You must work together. You must not fail.

In disguise, your team's mission is to recover imperial intelligence critical to our survival.

Video: Man:	23:11	You're with me, and the rest of you get on that skiff. Do your best to act imperial.
Video: Man 2:	23:11	Looks like you'll have to fight your way out.
Video: Man:	23:11	What is that?
Mon Mothma:	23:11	This could be a threat to our entire existence.
Vicki Dobbs Beck:	23:20	<p>So in approaching this experience, we acknowledged there was something unique. It was not a film, it was not a game, and it was not a theme park attraction. But we could learn from all of those.</p> <p>One of the challenges is actually communicating what people will experience. Many people walked up to the locations and have no idea what to expect once inside. So we recently created these motion graphics that are displayed outside the building that highlights that transition from the real world to the world of Star Wars.</p> <p>These are some testimonials from people who visited the Downtown Disney location that opened in early January.</p>
Video: Man:	23:59	I've been wanting to step into a Star Wars movie for as long as I can remember, and I think getting to see that and touch that ... It was a dream come true.
Video: Man 2:	24:11	If you ever really want to be in Star Wars, The Void is where you gonna go to do that.
Video: Woman 2:	24:20	We got to meet characters in the movie. You can't get there anywhere else.
Video: Man 3:	24:21	From the minute you walked in and had the briefing from Captain Cassian, it's like you're in Rogue One. I mean you are walking right there and it then became Darth Vader, and it was incredible. He's 6'1".
Video: Man 4:	24:29	Well, when we picked up our [inaudible 00:24:34], and then they got in there and accidentally [inaudible 00:24:35] and so [inaudible 00:24:35] and you're like, "Oh my ..."
Video: Man 5:	24:35	[inaudible 00:24:35] really cool is you reach out and you can actually touch the walls around you.

Video: Woman 2:	24:35	Okay, but if you want to feel like you're actually in a Star Wars movie, you need to come do this.
Video: Man 4:	24:35	If you've never experienced it, it's indescribable, so it's like I don't know how to describe this to you. You just have to go, you know. You just got to do it.
Vicki Dobbs Beck:	25:13	So another thing we learned is what I call the classic react structure works, and it works well with location-based design. Now in film, a script generally follows a three-act structure. And in theme park attraction design, they also use a three-act structure, although it's a little bit different. So it's pre-show, show, post-show. And this was actually true of Carne y Arena as well.

In the case of Secrets of the Empire, in Act I, Cassian was played by Diego Luna, as he was Rogue One, introduces us to our mission. Disguised as stormtroopers, we must recover imperial intelligence that's vital to the rebellion's survival.

Our ability to use Diego contributed to the authenticity and strengthened that connective tissue to the cinematic universe. In Act II, that was the actual hyper-reality experience itself, and then Act III was essentially sharing the success of your mission.

Invoking the senses is a core pillar to The Void experiences. The first is the marriage of the physical world with the virtual world. So in this case, when you see a wall in the virtual world, if you reached out and touched it, there's a physical wall. And that one-to-one mapping causes your brain to immediately buy into the reality.

Realism helps with the immersion. As with Carne y Arena, our goal was to push forward cinematic quality imagery, in spite of having to run in real-time at 90 frames per second.

World-building was important. Not only the environments, costumes, sounds, and visuals, but also in the details, like the background chatter amongst the stormtroopers and the addition of bounce droids, as well as shoot-able video cameras.

Finally the transducers in the floor that were driven by the audio created by Skywalker Sound made the floors rumble. It really felt as if you were moving on that skiff. And then fans, heaters and scent generators further enhanced the world. You really believed that you were in the hot, windy lava fields of Mustafar.

Experience flow is a challenge in almost any location-based experience, and this was no exception. In our case, we used K-2SO to help us with crowd control. As with all things, he does it with a sense of humor and attitude thanks to Alan Tudyk.

So here we actually recorded some different dialogue lines, so they switch up depending on how slow you are and where you are in the experience. We wanted to motivate guests to press forward.

(Plays clip)

K-2SO: 27:54 Follow me. Sit down. Over here. Stormtroopers usually move faster than that?

All of you, even you.

Vicki Dobbs Beck: 28:10 So ideally VR is for everyone, but you have to design accordingly. Members of our ILMxLAB team undertook some pioneering design work in this area. They considered things like height, mobility, range of motion, use of sound. Because VR is really a spatial art, we are drawing upon lessons from architecture. And we're actually currently working with an architecture class at UC-Berkeley to find out what other insights we can glean in order to improve our designs for the future.

We're committed to sharing what we learned, as we believe this is truly important for all.

This was a Facebook post by Cliff Plumer, who is the CEO of The Void. This was on the first day when Secrets of the Empire opened in London. They had a guest go through in a wheelchair. She had never been able to walk, and she was nervous for the experience. When she came out, she was teary-eyed, and of course they were concerned. She said, "My friends just got to see me walk. I may have been in another world and dressed as a stormtrooper, but for the first time, my friends just got to walk beside me."

And as Cliff said, this is why we do this.

As you can tell these two experiences had a lot of learnings in common, but what I'd like you to most take away is that story matters. It's story that propels the action, story that triggers emotions, and it's story that gives us a sense of fulfillment.

In addition to VR storytelling, we're also very interested in mixed reality storytelling. As someone said, and I really liked this, is that augmented or mixed reality lets you see the world differently. Virtual reality lets you see a different world.

As a part of our innovation experiments track, we entered into a strategic collaboration with Magic Leap to explore storytelling in a mixed reality space. When we announced that collaboration at the Wired conference in New York two years ago, we released a small experiment to help highlight the nature of our exploration. This was piece was shot through the Magic Leap glasses. There was no post-production. So the goal here is a seamless blending of the real world with the physical world.

(Plays clip)

C-P30: 30:29 Oh! Might I have a word with you, please? I regret to report that due to unforeseen circumstances, we have not yet reached the desired arrangement with Jabba the Hutt regarding Captain Solo's debt. An army of stormtroopers is searching for ... It can only be a matter of time before we are blasted into spare parts. I told you it was dangerous here. We have not yet completed the mission. How did we get into this mess? I really don't know.

Vicki Dobbs Beck: 31:12 So one of the interesting things was when I went out into the lobby after we showed this, I heard this woman say, "So C-P30 and R2-D2 were real, and the hologram was in mixed reality," and I realized that's like the magic is when you can actually deliver characters of real size as well as something's that's a holographic image that is clearly not real.

In another mixed reality story-telling experiment, we recently embarked on a very unusual collaboration with the London College of Fashion's Innovation Agency, Designer Steven Tai, and the Great Britain Campaign during London Fashion Week this past February. We were trying to apply some new technology we had developed called Live CGX. Live CGX essentially enables real-time performance-driven digital augmentation. I'll get into what that means.

Whenever we create, we're always asking ourselves why. Why this story, why this medium, and to make sure that there's a good match. And we didn't want to do anything that took away in any way from Steven's collection.

But one of the things that we learned about the fashion industry is oftentimes while people can see there's a thematic

connection between the different pieces, they don't really understand what the inspiration behind the collection is. So we thought that is an interesting opportunity for mixed reality.

In addition, the other reason we wanted to pursue this is because we wanted to take a first step toward a live actor driving an improvised character performance in real-time. Because we knew that was ultimately going to be important to our story-telling endeavors, and we needed a setting that was somewhat controllable. So alternatives were things like a concert or theatrical production, but it was a little too advanced for where the technology was. This actually was quite perfect.

This is a short piece that we released just hours after the presentation.

(Plays clip. No speaking.) So one of our learnings on this project was actually that this was a journey of discovery for the audience. As they watched, they began to understand what was happening. The live, composite, but real and virtual models in a Macau-inspired environment.

Historically, much has been done with very sophisticated projection in highly-choreographed performances. But what makes this presentation unique is that rather than the presentation controlling the performance, now the performer could drive the presentation.

So Live CGX was used to both digitally transform the venue, which was Durbar Court, but on the screen it was from jungle Macau to urban Macau, but also to present a virtual model wearing virtual garments.

With this evolution, we're given a glimpse into the future, not only of storytelling, but potentially of fashion, where garments have both physical and digital designs that are ultimately worn in perfect coordination.

We learned that details matter. Everything associated with the experience tied back to the Macau-inspired theme. These were the invitations. All of the set pieces and props were drawn from Steven's childhood memories of the food, popper(?) stands and Mahjong players who gave life to the streets. Even the models carried produce rather than purses.

And if I've learned one thing over my career, it's that collaboration magnifies. We can do so much more together

than alone. As an engine, this experience was a collaboration, more like a shared leap of faith by the London College of Fashion's Innovation Agency, Designer Steven Tai, and the Great Britain Campaign and ILMxLAB.

It takes a lot of courageous people think to tackle a live, never-done-before event. And most courageous of all was the designer Steven Tai, who essentially put his collection in our hands.

But this is what innovation looks like. It's people joining together with a bold vision. We see this as a step in a long number of steps toward a greater moonshot. So where are going? Well, first where are we vis-à-vis the industry's evolution. For those of you that aren't familiar with this, this is called the Gartner-Hype cycle. And when we launched ILMxLAB, we were at the peak of inflated ... trough of disillusionment [inaudible 00:36:14] disappointment. But were pushing toward the slope of enlightenment.

I tend to look at the near-term industry evolution in three phases with each phase offering a somewhat different strategy and each offering new opportunities. I set this out about two years ago, and I generally find that it still holds true.

So 2017 and 2018 for us was the learn-and-survive period. This was when we took on whatever projects we could in order to begin to develop and hone our craft. But we had to do it in a way where we could survive, so we had to remain financially viable.

2019 and 2020, I think things are going to start to change and open up, and we will have the opportunity to undertake more ambitious endeavors. Part of this is tied to a number of headsets that are gonna be released that are all-in-one headsets. You're no longer tethered to a computer. And I think once it becomes more accessible, that is really going to be a game-changer.

And then lastly, beyond 2020, I think this is when we can excel and thrive.

But regardless of where we are in the cycle, we at ILMxLAB believe in the future. We seek to be pioneers in all shades of reality. Someday, 10, 20 years from now, we may have a single device, such as glasses or contact lenses or maybe even an implant. But think about it like having a dial. So when the dial's

all the way to the left, at zero, you see the real world. As you turn the dial to the right, you begin introducing digital elements into the real world in increasing proportion. And as you turn the dial all the way to the right, then you are in a fully-virtual world.

As we look toward the future, we believe compelling immersive experiences will not be adaptations of other mediums, but be wholly unique, designed for the strengths. It's about world-building and place-making. It's about intimate, meaningful interactions with characters. Cinematic imagery and compelling use of spatial audio invoking the senses. Someday it will be a living world where stories unfold. Story-living. It's dynamic, it's personal, and it's social. And maybe even transformational.

Experiences will extend across platforms, leveraging each one's unique strengths. You might have a virtual character companion that can join you on your daily journey and who can recognize not only your friends, but their virtual companions as well. Imagine mixed reality overlays to theme parks, public locations, your home. Self-driving cars will become an entertainment hub and platform, so while you're in the car, you can be transported to other places, adventures, or social interactions.

Mapped cities and buildings will allow us to take mixed reality to the streets. There will be an opportunity for augmented reality social events. Perhaps it's the culmination of an ongoing adventure. What previously you had experienced alone, the finale is experienced together.

I borrowed these images from a colleague who thought 8-bit images were the best way to reflect the fact that we can only begin to imagine the future's true manifestation. This future may seem far away, and indeed, huge technical advances are required. Advances that are not only beyond our studio, but beyond our industry as well. That meant architecture, improved sensing in mapping, faster connectivity, plausible AI characters, and so on. The future is evolving quickly, and we will surely go beyond our current speculation and imagination.

That said, the tools to begin mixing real and virtual worlds are already available now, so it's time to experiment and innovate.

I want to close with what we as pioneers can learn from Star Wars. We all aspire great new ground, to push the state of the art, but that's hard work. It requires perseverance and courage. As you know, there are many enemies of innovation. The first is complacency. It's indeed a trap. And then there's the risk of

thinking you know more than you do in a rapidly-changing industry. Or losing focus.

True pioneers and innovators must take risks. We're trying to do what's never been done before, and we won't always win, but we will definitely learn, and this makes us better and smarter.

And how do you respond when you're faced with a skeptical, or worse, cynical audience? Well, as you might imagine, this is one of those images and lessons that I think that I do not say aloud.

Finally, when you feel as if you may have reached the end of your rope, remember the words of Master Yoda. Do or do not. There is no try.

Thank you very much.