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Is Virtual Reality a Serious Option for a Filmmaker?

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REILHAC: I know you're all together here to work on your films, documentaries or fiction. Taking an hour and a half of your time out of your schedule in a development workshop to talk about virtual reality, which may seem a waste of time to most of you… but, okay, they scheduled this talk about VR; let's go and see what it is. But you probably do not feel that there is a necessary connection between VR and what you're doing now. And you're right. If you do movies, like I have been involved in as head of cinema for ARTE for ten years, yes, there's no need for virtual reality.

The reason why I'm here to talk about this as part of this film development workshop, I think, is that VR is at least something that you've started hearing about, and it is something that is going to happen in a very, very big way. You can't see it yet. You can't feel it. You can't experience it in any way yet, but it is going to happen. Because it's going to be an upsetting mode of relating to stories, and to media in general, Marion and I felt it's never too early to at least know what it is.

I am not here to convince you that VR is the coolest thing and you have to give up everything you do and do your films in VR. I'm here to tell you about this as an option. This is something that is coming in a much, much bigger way than 3-D. You can really compare it to the advancement of the Internet. Some people predict that the impact VR will have on our lives – and not just on the leisure side of it in terms of films we're watching – but in all aspects, is going to be absolutely major.

For instance, one of the predictions is to say that in three to five years from now, we will no longer use smart phones. Everything will be done on the glasses we will all be wearing, the medium that will give us access to augmented reality and virtual reality. So we will discuss why you, me, all of us, need to know about this as filmmakers because this is now becoming an option for you. But, like everything, film is about stories, isn't it? I mean you're here in this development workshop to write the best possible stories to transform them into movies. VR is not going to magically transform a bad story into a good story with images and sound. The story is the base and you will have the option whether or not you want to make your story in a traditional 2-D film, which will call "flatties" in the VR world, [laughter], or whether you want to make it a full, immersive experience. It's the same way you might choose to do a silent movie or a black and white or color film. It works the same.

This is about introducing you to the option that VR is going to start representing, and let me say right from the beginning, having worked a lot as a dancer, then in theatre and then working in films as head of cinema for ARTE, and now having transitioned to virtual reality, I see myself as a bridge. I know from experience that everything you know about film is good for VR. The only thing you need to know about, if you're interested in playing with virtual reality, are a few notions that we will review and that you need to learn. I'm not only talking about the technical aspects of filming with fourteen or twenty different cameras at the same time. I'm not talking about the post-production that comes with making a film in VR. I'm mostly talking here with you about the conceptual dimension, which is specific to VR, about writing for VR. We're going to cover a few of these aspects. So please take it as a moment where I'm sharing my experience with you: coming from film, having transitioned to VR, and saying that there's nothing you need to forget about what you do today to move into VR.

The name virtual reality: what's interesting is that we live in a moment where all the development of digital technologies is challenging the very notion of reality. We used to consider that when we used the word reality, it meant what we see, what we can touch, what we share, what we can physically apprehend. Now we need to qualify the different realities that we're dealing with. Physical reality is called real reality. IRL is an acronym that you will start finding, which means "in real life". In events that mix real life with digital or media dimensions, we always need to qualify what belongs to the physical dimension of reality. There's another kind of reality that is augmented reality, which is something you may have already experienced where you point your phone at an image and the image comes alive. It's used a lot in marketing and advertising where a fixed printed image comes alive. This is something that will grow a lot, but I'm not going to dwell on this now because it would be a whole topic in itself.

Mixed reality is the next step, which is being experimented and played with now. This is what we call mixed reality. [He plays a video.] This is the slow motion version. Notice the people in the audience don't wear any gear, glasses or any kind of device. Here it will play in real time now. This is mixed reality – when an object or 3-D hologram, if you will, is inserted into the physical world. You can walk around it and you can work with it. This is a very cheesy promotion done by Microsoft on their new technology called HoloLens. [He plays it.] Okay, I think you got the picture. This will never be that fluid. It will never be that perfect. It will never be that realistic. But that's the idea, and Microsoft is working on this project that we will see the first prototype for by the end of this year.

Then there is VR. There is RR, AR, MR and VR – VR for virtual reality, which is what we're talking about. What is it exactly? There is already confusion on what is 360-degree video – which is this, which you probably have already seen. It is a film that is filmed with a camera 360 degrees and that allows you to move. This is a documentary on Alaska. It starts with a flat screen, but then it moves to a full 360-degree video. It's been shot with a system of a certain number of cameras that register everything 360 degrees at the same time. But my experience of this remains a flatty experience. It remains something I'm watching on a flat screen. ARTE, a pioneer in doing virtual reality and 360-degree video, is posting the VR material that we have on our website as 360-degree video. This is easily understandable. You can navigate the image wherever you want with the option to look wherever you want within the 360-degree recording of the world that has been created.

But this is not VR. VR is something that completely changes your relationship to what you see because you're no longer watching a "flatty". You are inside the world. In order to do this, you have to use gears like this one. It's a bit of a jungle but if you Google "VR head gear", you get a wide variety of choices of the kinds of gears that are available. It ranges from the Google Cardboard like this one that costs virtually nothing, to very fancy new gears. This is from Samsung, one of the most popular ones and there's the Oculus Rift and other different kinds up to Sony PlayStation's gears. There are many different kinds of prototypes and gears that are the new generation of VR gears that do not have a screen anymore. The pixels of the images are projected directly onto your retina. The image composes itself on your retina. So any vision or focus issues you have with your eyes is bypassed.

When we talk about virtual reality, we talk about the immersive experience of being inside surrounded by a 360-degree image, not in front of the rendering on the flat screen of a 360-degree image. Why all the fuss right now about virtual reality? Why are so many people getting excited? I'm talking about billions and billions of dollars and euros invested in virtual reality. Two years ago, it all started with Facebook acquiring Oculus Rift, a start-up company that decided to reinvent virtual reality. Virtual reality has been around for forty years, but it never made it because the technology was not ready. Oculus Rift changed that, and Facebook acquired that company for two billion dollars while it was a start-up, founded in Palmer Luckey's garage when he was sixteen. He's now twenty-five years old and has two billion dollars in his pocket.

People are getting so excited and Hollywood and the film industry and the TV industry and education, science and health industries are all getting involved. It's a radical paradigm change. Opponents to virtual reality are always saying, "Well, we've gone through all this excitement with 3-D and it didn't really happen." There was a lot of fuss and it appears as nothing but a gadget. The people who believe in VR believe that it has nothing to do with technical improvement in the technology of media. Virtual reality breaks the paradigm of the spectator. If you look at the field of representation of the world that has gone from the prehistoric paintings of hands on cave walls to cinema today, it's all been about a representation of the world in front of us that has moved to a 2-D screen from paintings to photographs to cinema to television to video – it's all about a flat rendering of the world. In front of this frame, we have been the spectator. What separates us from the world represented is the famous fourth wall. In VR, the position of the spectator is cancelled. It's destroyed. There's no longer any fourth wall between you and what you represent. You are immersed in a sphere, at the centre of the sphere with gears like this and everything happens all around you. There's no longer any distance between you and what you are watching because you're not watching it any longer; you are experiencing it. That's the main difference. That difference is huge. Have you all experienced VR before? Who has experienced it? Almost everyone – not everyone, but almost. I think you would agree that you can't really understand what VR is until you actually test it or try it. The nature of the experience is the immersive experience that you have. Once again, you are no longer in front of a representation. You are at the heart of that built representation.

The direct consequence of being immersed in a reconstructed world is a sense of presence. When you are close to a character in VR, you're no longer just watching an image at a distance. You feel like you are empathising with this person because of the presence. This notion of empathy is the powerful effect that you get through VR. In film, the empathy effect is done through imagination. Of course when we watch films, we cry, we laugh, we're moved – it's an incredibly powerful way of representing the world. But we do this by projecting ourselves. Our brain has been trained to involve ourselves and to take off through the window that the book or the film or the painting represents. We escape through that window into the world that is being offered to us and our imagination makes the work.

In VR, imagination is triggered, but it's not just imagination. It's a physical phenomenon. Why? In VR, the brain receives the sound and visual information transmitted by our eyes and ears instead of reality. The brain is tricked into believing what it hears and what it sees because there's nothing else. When we are watching the screen here, you may find my sentence incredibly poetic and you'll travel with this haiku that I created. But your brain remains very much aware that this is just a window into the physical world that is around us. It's the same thing in a cinema. I am aware that I am sitting in a movie theatre and I'm watching something that does not belong to my physical reality. My brain accepts the vehicle of imagination as a way to escape, but the physical, neurological perception of the brain still remains present in the physical world. In this case, there is almost no longer any information transmitted to the brain that belongs to the physical world. So the brain takes for granted the visual and aural information it receives from the reconstructed world of the film that it's watching and experiencing. The brain, therefore, considers that it's true.

I don't know if you've all seen this video. I can show it to you at the end. It's gone viral. It's a Russian guy in a mall who is being equipped with a head set and he's being shown a rollercoaster from the perspective of someone who is sitting in a car on the rollercoaster. The rollercoaster starts coming down and the guy falls down. He can no longer stand on the floor. The brain overpowers, in a way, the physical signals that he's standing still and there's nothing moving. But the visual information says that it's moving like crazy. The brain is tricked in such a powerful way that it manages to short-circuit the physical information of the body.

How does virtual reality work today? We're pretty much at the same stage as we were at the end of the 19th century when the Lumière brothers played with the very first cinema experiments. Everything we use in virtual reality today, as cool as it may sound, will look so incredibly silly in a year when we watch things like we're watching here. We'll laugh at its clumsiness, at how primitive it is. But that's what we have and that's where we stand for the moment. It's improving almost daily. Week after week, there's new equipment, new technology, new devices that allow us to have a progressively better and better experience. The image is better. The feeling of the g is better. They're getting smaller, etcetera. In a couple of years, we will no longer use this. We will use this. We will have glasses for those of us who need them to correct our vision. It'll be similar to our smart phones where we can even make phone calls with our smart phones today. It's designed to do so many other things. The glasses we'll be wearing in a couple of years will correct our vision, but there will be a small touchpad on the side where we will be able to enable augmented reality and virtual reality. They won't be custom made but designers will make them so that they can stick to our faces so that when we activate the VR mode, it will go dark and we won't see anything from the outside world. This is what we will be wearing in a couple of years. [nervous laughter] Are you scared? [laughter]

I know the role that I'm playing here and I embrace it. I know a lot of the things we will talk about – the future, the singularity, interconnectivity everywhere – have incredibly scary elements. In this field, we do discuss a lot the dangers of incredible addiction that will come with this, as well as the isolation. A lot of the resistance that film people feel against virtual reality is that it cancels the collective experience of cinema. It doesn't. It's a different collective experience. But yes, there are dangers to this. When we talk about the future in this way, it *is* scary, in a way, because we don't know where we will be as humans. But if you think back to just three years ago, it would have been so scary to see a projection of ourselves today totally addicted to our phones. The way we have to have our phones is something we did not predict three or four years ago. So I'll keep playing my role of being the enthusiastic, positive fan of VR and our bright techno-future! It's much more complex and we don't have the time to go into so many nuances, but I'll play that role for the moment. But I love to discuss, also, the scary sides of this.

We need to bear in mind that, as a primitive phase it's just like what happened when video started. There are a lot of different systems that are competing to become the dominant system. Oculus Rift is the company that started everything when Facebook bought it. HTC Vive is becoming the leader now because they're the first to experiment with movement tracking. They reproduce your movement in the physical world. Samsung was the first to sell the gear, and now that they're releasing their first smart phone 7, they are offering, in certain markets, a Samsung gear headset for free to go with it. The optimised VR features of the Galaxy 7 are what they promote to sell it. Versatile is the generic name given to Google cardboards – all of these enable you to access a film on your phone. You insert your phone in the gear and you're good to go.

It's just a plastic toy. It's like those View-Masters we used when we were children. So it's very chaotic right now with all kinds of brands trying to push themselves as the dominant brand. It's similar to shooting equipment. In order to make a VR film, you need several cameras. This is the current camera that I'm using for location scouting or rehearsals. This is a VR camera. It has two cameras, one on each side. Each fisheye does 197 degrees so the images overlap. The border between the two cameras is here on this side. This is what is called the stitchline. In this case, there's only one stitchline and two cameras.

This is not a professional camera, but it does a good enough job that you can scout. There are many different kinds of cameras. These are the most popular rigs. The rigs are the boxes in which you can place the cameras and these are made with GoPros. GoPro has done a really good job at adapting its cameras to be fitted into rigs for filming and their latest model the GoPro HERO 4

Black is the camera that is most used because it's cheap and it does a very good job, particularly in natural light. You have much more sophisticated rigs like these. There's Nokia that has tried to resurrect itself with a brand new VR positioning. They have released a camera that costs $60.000 and it's called the OZO. There is sound and camera included under one cover. You can see it better here. You have an incredible range of possibilities, including gear like this one that allows you to film with five or six RED cameras at the same time. You can get the quality of definition of a RED camera but it's rather clumsy. You have all kinds of systems. So you have the cardboard headset and extremely complex gear like this. You have tiny ones – all kinds of options.

The principle is very basic. In order to watch a film in VR, it needs to be done in a split image. If you download a film on your iPhone, when you look at the phone in a vertical way, you can then watch the film in a 360-degree fashion. You can swipe it to see it. When you turn it horizontally, the screen splits in two and you have a split image that you then insert in the gear to watch it. Technically, it's not that sophisticated.

You will hear people talking a lot about the stitching problems. In VR, this remains one of the greatest difficulties. When you film with, let's say, fourteen cameras, you then need to literally stitch. If you have two cameras filming at two different angles, they need to overlap so you can stitch the images together so that there's a seamless connection between all the cameras around you. Ideally, you do not want to see the stitching, just like in a garment or a dress, you don't want to see the lines or seams. It still is very, very difficult. There are still constraints and limits. For instance, if you want to do a close-up, you need to make sure the close-up is not straddling the stitchline, otherwise the face will look weird. If you watch carefully, chances are that you will see, at some moments, the stitchlines. This is a problem that belongs to the primitive, early nature of VR today and it will solve itself. This is the Theta S. With this camera, the stitching is done automatically. Once I'm done filming, I transfer it to my phone or my tablet and the stitching is done. I can't see it. So when you have just one stitchline, this problem is almost solved.

Another primitive sign of VR is that when you are surrounded by a world that you feel inside of, you want to be able to have agency within that world. Meaning, you want to be able to walk forward in the real world and do the same in the virtual reality world. Right now, this is not possible with all systems. There are some that allow it, but it's still quite primitive. When we do that, we don't see our body. We have avatar bodies, digital hands or digital feet. It's a very powerful sensation nevertheless when you start feeling like you can move in the virtual world and reproduce your physical movements. It's something you really need to experience.

I want to show you a very funny prototype of what it means when you are in a virtual world and you can act with your physical presence. This is a teaser that has been done for a game. Games are going to be the main content published with VR. The game is called *Skyrim*, and I think you will understand how it works very easily. This guy is a fan and is made up as his hero in the game as you can see. He's ready to play. [He plays the video.] So notice that he has two handles, and here we can see what he's seeing. He's activating the bow with his hands. He has full agency. He's wearing special socks with sensors where he can slide on the floor but the floor doesn't move. That allows him, without moving from his spot, to go wherever he wants in the game world. You can have this in your living room and move miles in the game world. This, by the way, is going to become the norm. When we can reproduce our movements in the VR dimension, the agency will be complete and the illusion will also be complete. It's very powerful.

There's a show going around Europe right now called *Virtually Dead*. I did it the day before yesterday in Paris. You basically are hired as a soldier in an army to go fight zombies in Arizona because Arizona has been decimated by zombies. You go into a training camp. It's a live show where you have to train. In the training, you do a session with Vive headgear. They put it on you to

see if you're good at shooting zombies. What you hold in your hands transforms into guns, and then you are sent into the desert and the zombies attack you. You have to fight for your life and kill as many as you can. You can only kill zombies by shooting them in the head. So you have to aim correctly. I'm not a zombie fan or into war games or anything of the sort. But I have to say that the experience of being in that world with those guns and having to reload them and fight for my life was incredibly stressful [laughter] and incredibly real. Zombies are literally jumping at you to bite you. You don't want zombies to bite you. You are *in* the situation completely.

Something I want to allude to in a minute, but I'll say it now: the mix between real reality and virtual reality is really interesting. While we were training to shoot zombies, each in a different room, there was an alarm and we had to escape because the base was contaminated and zombies were attacking. We had to run. There was a moment in which we were caught in a locked room and the zombies were pushing at the door. We had to hide and figure out what to do. Our sergeant told us that there were trash bags. He told us to get in one and lay on the floor because they could not smell us through the plastic. So we rushed into those bags and lay down on the floor. The door opened and seven zombies entered the room. We couldn't see them but they walked on us, trying to smell us. It was really scary. We knew what they looked like from the training video and that impacted our perception. It was really stressful to have those zombies walk over us.

This is something that is also going to happen: location-based VR is going to develop. One of the first manifestations is going to be *The Void*. *The Void* is going to be the first theme park for VR-based experiences. It will open in Salt Lake City in the summer. This is what *The Void* is. [He plays the video.] One of the most significant slogans that they use, as you saw, is: Why play a game when you can live it? That really says a lot about this experiential nature of VR, being there and feeling like I am *in* the action. This is, of course, Hollywood language. It's all about special effects. It's all about the wow effect, a Disney kind of experience.

I'm sorry I don't have anything to show you from the independent worlds that have more delicacy. But we are starting to see things. This is one of them. This is from Denmark – you may know the piece. It was done a little over a year ago. This is a concept that was done by an independent film production company. They developed this idea of interactive fiction within virtual reality.

In this case, five people at a time sit around a dinner table. You put on the VR masks and become one of the five characters at this dinner party. [He plays the video.] The idea of this that makes it very interesting is that each of the spectators has experienced the same dinner, but from the point of view of a different character. They then share the experience by asking one another things like, "What did you do when you left the table? You left and then reappeared and you seemed strange." If you're the character, you know you went to the restroom to do drugs. The kid spies on his father as his father is kissing the other woman, etc. The whole story becomes one as each character shares his or her experience.

I was saying earlier that everything you know about filmmaking applies to storytelling in VR, but there are a few things that you need to know about. One of them is the most exciting and challenging aspect of writing a story in VR. It's called 'presence design'. By this I mean that if the spectator is no longer someone in front of a screen watching the film later when it's finished but is at the heart of the situation, who is that person? Who is that person going to represent? There are many different options that are given. What's interesting is that for you, as a scriptwriter, you get to decide in VR who your viewer is going to be.

I'm studying this at the moment and it's a bit too early to completely share it but it's part of some research I'm doing with the students at Scuola Holden in Torino, where I'm teaching. We're working on a project called something like "God, Me, or Someone Else" because these are the three

categories that you can briefly identify. You are watching the sphere as God. This is the diegetic presence that you have in film where you can be anywhere and everywhere. You're almighty in the sense that you don't need to justify your point of view or where you are situated. This is a very traditional point of view in cinema. You're God and that can work. But there are situations in VR where you want to be "me," meaning the spectator. If I am Michel watching a piece, can I be made aware that the characters, the performers are seeing me as a viewer from the real world?

The last VR piece I did that was at Sundance and will be at Cannes – we are doing a whole VR program at Cannes – was the basis of my experiment, where the performers are watching the viewer as the viewer and acknowledging the presence of the viewer in the piece. Or someone else, like in the piece we just saw. You can be a character, someone who is integrated into the story, in which case you are a character. If you are a character, you need to decide if you have a body or not. If I have a body, it's not my body because there's no system to represent either the gender or the clothes I'm wearing in real life, so I have someone else's body. Who is that person that I represent? Or can I be someone else without a body? There are films that show that that is possible. It's an exciting new challenge in story writing.

Spatial writing is also a very specific challenge in VR, which you need to be aware of if you decide to bring your *savoir faire*, your expertise, your filmmaking and scriptwriting knowledge into the VR world. Spatial writing is about the fact that because you are writing a story from the point of view of the viewer in a 360-degree sphere, things will happen in your story in front of your viewer, behind him or her, or to the side. You start needing to write multiple stories at the same time, making the reader understand where the action is happening. You need to make some decisions at the writing stage that traditionally belong to the director. You need to indicate the spatial distribution of the different stories that you're telling that happen at the same time knowing – which is very difficult at times to accept – that your viewer will miss some aspects of the story. The viewer is entirely free to decide where he or she wants to look. Even if you make a really strong special effect here on my left side, if I prefer to watch the view through the window on the right side, I will miss that beautiful special effect, maybe a crucial moment in the thriller that I'm writing. There is something about negotiating a story that makes sense that happens in multiple locations around you at the same time when you know that some of it will be missed.

I tried for a while to come up with a system that would be a standardised system for writing a VR script, taking into account the spatial dimension of the writing. I have failed so far. But I decided I was going to share one of my steps in doing this. I've since given that system up but it was a transition. I wondered if I could print a blank VR script page that anyone can use so that we could represent both the story and the spatial dimension. In this attempt, the white centre is the position of the camera. It's the position of the viewer and is supposed to have all the indications of who the viewer is at that moment, the point of view. It's always central. In this case, it was a scene from a film I made that took place inside a minivan with six characters. We are inside the van and the camera is in the centre of the middle space. The blue ring represents the inside of the van, and the white space all around is what is outside of the first location. In this case, it would be the view all around us. In that space, I distribute where the different characters are and what they do, more or less. It's not shown here, but on the right side of the page would be the dialogues in chronological order in the traditional way. The hope was that in this way, I could see the chronological side of things and I could refer to who was doing what at the same time. In this case, there were actions happening all around, plus actions going on outside, something crucial like a fox crossing the street and coming alongside the van. I gave that up because it's not clear enough.

I've tried a system that is much easier but it's not a standard form. It's a drawing a rough sketch of the floor plan of the set and describing the action. That works much better, but it's not a standard

page because that means I have to roughly draw the floor plan of each set. So far, I haven't found a system that works well and I haven't seen anyone who has.

The play between virtual and physical realities is something I find very exciting. The last film I did called *Viens!* is going to be transformed into an installation, where the viewers will be viewing the film in a mini-representation of the set. They will be physically in the same environment as the players in the film to increase the immersive nature of the experience.

I'd like to share an example with you of a different way of playing, which I think is really funny. This is a recent event that was done by an Irish beer brand to play with the virtual dimension and the physical dimension of an experience. [He plays the video.] You get the idea. I really like this notion that you are in a virtual world. When they begin watching, they're just standing in the middle of an empty square. They end up in the reality they've experienced virtually. We're just beginning to touch on the possibilities of that play between the two worlds that I find really, really interesting.

Just one note on this also that is specific to virtual reality as a director – you cannot direct your actors the same way you would on a set because you can't be on the set. You can't be there as you shoot, unless you are an extra. I did a film like this that was in an emergency room at a hospital, and I was able to sit on a chair in the heart of the action because there were patients waiting. So I could be positioned as one of the patients, enabling me to check what the actors were doing. But otherwise, you can't see it. You have to trust them in very much the same way as you do in the theatre, since the director cannot be with his or her actors on stage with them when they perform. Now there's a system that allows you to watch the take live through a gear as you are filming so that it allows you to see more of what the actors are doing.

VR is also an amazing working tool. This is just an example of what Disney has started testing. This system is now being made available mostly for animators. This was a film that was done around Glen Keane, a senior animator at Disney. He did *The Little Mermaid,* among others. He's one of the first who tried working in animation with this new tool that Disney is licensing. This is Glen. There's a whole section where he's just drawing and showing what he does. [He plays the video.] This is the tool that does movement tracking. Right now the technology that is being used that is inspired by HCT Vive consists of having two sensors in diagonal corners of a room that track what you're doing and can reproduce it into the VR world. [He restarts the video.]

This kind of technique will apply to surgery. A couple of days ago, there was the first screening of a surgical VR operation on a real patient. In health, in science, tutoring in education – these kinds of techniques are starting to be polished and made available. This will change a lot of things. Virtual presence is the reason why Facebook bought Oculus Rift in the first place. They want to transfer everything we do on Facebook into virtual reality in how we meet over social networks. Very soon, Skype will become a virtual reality application, where we will be able to either transport ourselves to the same beach on Hawaii, if we want, where we can have our conversation, or to my house or your house, the same way as in real life. Virtual presence is something that definitely will be one of the driving factors of VR success. There are all kinds of strange innovations in the world of VR. This is just a Kickstarter project for a VR chair. [He plays the video.] The field is very, very prolific.

To close this overview, when is this going to happen? It's happening now. 2016 is considered to be the year of the birth of VR. This month, the month of April, the main gear and platforms are going to start being sold on the Internet first and soon in stores. PlayStation is releasing its PlayStation VR headset that only works with its own device, which is a game platform. Games are the content that will start driving the VR world. HCT Vive is now for sale. They started about a month ago. They sold 15,000 headgears in five minutes. They're out of stock already. Samsung Galaxy 7 is offering its VR headset for free when you buy the device. Glyph is one of the things I find most exciting. It's

already the new generation. I'll show you the release video. [He plays the video.] They talk about the retinal display technology, where you don't have a screen like this that creates a great loss of image quality when you watch it. The image is sent directly onto your retina. I know it's scary to say that but it is the technology of the future.

In 2016, Apple and Google, two leading companies that have done nothing so far in VR except for the Google Cardboard, are going to announce at the end of this year their new gear and their new systems. Games are going to be the main industry, as I said. It's predicted that for Christmas 2016, the cool toy to offer will be a VR headset. All the Hollywood studios have all started VR departments. Steven Spielberg has announced recently that his next project as a director is going to be a VR-only feature film. There will be no theatrical release. Brands are getting involved in creating adverts and different promotional systems. The International Basketball Federation has started making a live transmission available of their major games in VR. Fashion is going to be a big mover because they are now going to be able to sell virtual prime seats at the fashion shows live-streamed throughout the world. Real estate is already pushing the field. With some of the leading real estate companies, you can now visit apartments and houses for sale without leaving your place. And, of course, the porn industry is already the only field making money with VR. It's starting to happen everywhere.

The field of cinema is slow to move into this because by tradition, cinema does not like change. When the digital culture started impacting the technical fields of cinema, when the editors had to learn how to switch from analog to digital editing, it was quite a revolution. They went through it. DoPs started to have to learn to use digital cameras as opposed to analog, and that was a major revolution. Scriptwriters and directors, so far, haven't had to make any changes to what we do. We haven't been confronted with any kind of revolution or evolution for the last hundred years. We still make movies, write movies and direct movies exactly the same way. I think VR is going to be our revolution where we're going to have to confront all this. This is why I'm talking about it now, not as an obligation, but as an option. More and more people will start using this as an option.

My prediction is that there's a chance that VR may overtake the field of media quite rapidly in the next 3-5 years. It won't happen overnight but it is going to happen. One of the reasons why it's going to happen is that it's almost too late for it to fail. Why? Because there's so much money that has been invested in VR, unlike 3-D, unlike anything else before. All the companies that are investing in VR are expecting a recoupment on their investments. In the past few months, we've started seeing major banking organisations studying the potential return on investment for their private investors in VR. They've all come up with strong predictions on return of investments. This is one of the first predictions that have been made: It's predicted that by 2020 – in four years – the business of VR, everything included, will surpass the business of television. This is not to be considered lightly. VR will have an impact on what we do.

My feeling is that what's going to happen to cinema is the same thing that is happening to music or to books. We can read books on our tablets and on our smartphones but the publishing industry is doing okay. We love reading books on paper in the traditional way. Why? Because it's reassuring. Because it makes us connect with the past. It gives us a sense of continuity with time. It allows us to reassure ourselves that things are not shifting all the time and that things are not de-materialising all the time. Cinema is going to be the same way. It's going to become vintage in a way, in this wonderful, reassuring way. Cinema can remain the way stories can be told to me as a spectator in a passive way. I can still remain passive. I don't have to do anything but just receive a story. Being told a story is the beauty of cinema. Going to a movie theatre to watch a film will remain because it will be a vintage pleasure, the same way that printed books are.

There's a chance that through games and all kinds of different content, VR will become the norm. There are lots of platforms that are being started around this. These are just a few names that you can download and put on your phone right now and access all these thousands of types of VR content, which you can watch on versatile gear like this. Netflix and Amazon have not yet made any official announcement, but it's expected that in the next two months they will start announcing the opening of their VR channels. YouTube has opened a 360-degree channel, and has announced that they will soon have a 360-degree VR option channel.

Festivals are all jumping on VR. I am closing the program for the Cannes Film Festival, where we'll be showing about thirty VR films by different filmmakers. Sundance and Tribeca have become the major festivals for VR. Right now, as we speak, Tribeca in New York is happening. Their whole digital section is about VR, where there's nothing else but VR films. I'm also working with the Venice festival on a project commissioning traditional filmmakers to make their first VR short films. This will happen with this coming edition at Venice. The World VR Forum is the first VR-only European festival that will take place 6 – 8 May in Crans Montana, Switzerland. Kaleidoscope is a traveling VR festival that started in the US and is now on its world tour with about twenty-five VR films. VR theatres are staring to open. The first one opened in Amsterdam three months ago. Another one opened in Paris a couple of months ago. Berlin now has its first VR-only theatre.

Referring to the collective experience that I was mentioning before, in Cannes for instance, the VR program that you can see if you're there will be done by screenings just like traditional film screenings. People will enter a room and sit on swivel chairs – because this is the best way to watch VR. There will be thirty seats with thirty Samsung headgears and the selection of films for each screening will be beamed to the headgear simultaneously so everyone will be watching the same thing at the same time during those screenings. There will be an hour-long discussion afterwards between spectators and the directors and producers. As I said, *The Void* is about to open in Salt Lake City, and there are already five cities, mostly in Asia, that are scheduled to open. There will be *Void Asia* in Seoul, in Shanghai, and Beijing.

Who is getting involved? Basically all the big names in Hollywood have announced that they will do a VR project, but very recently, independent directors are starting to do it. In France, you may know Céline Sciamma, one of the most interesting female directors in France. She's working on her first feature in VR. Bruno Dumont is also going to be showing a VR making-of of his film in competition in Cannes called *Ma Loute*. He has expressed interest in making VR films now. I could go on with a list of names. So the bridging of the world between traditional cinema and the world of VR is already happening.

As a conclusion, I have played the part of the enthusiast, as I said, and the advocate for this. It is about sharing an option. It's not about saying you need to do it. I find it tremendously exciting creatively. Some of the challenges that we have touched upon here are very exciting as a filmmaker and as a scriptwriter and for the sake of enjoying that wave that is happening now. In a couple of years, VR will be the norm. Now is the time to play and experiment in a moment where there are no rules and no codes. We don't know what we're doing basically, but we're playing with it and we're learning as we go. That particular moment, where you can contribute to inventing a form, to invent a new way of telling stories I find, personally, very exciting. That's why I'm so involved in it. We'll see what happens. There will be a lot of shit, a lot of crap films being made. That's already happening – a lot of commercial stuff and stupid games with which we will have to deal. But, through this, I think the chance for independent filmmakers and scriptwriters to explore the medium and try to transform it into a true art form is here now for the taking. I would strongly suggest that you also try it even if it's only to decide if you like it or not. But now is the time.

Thank you very much. [APPLAUSE]