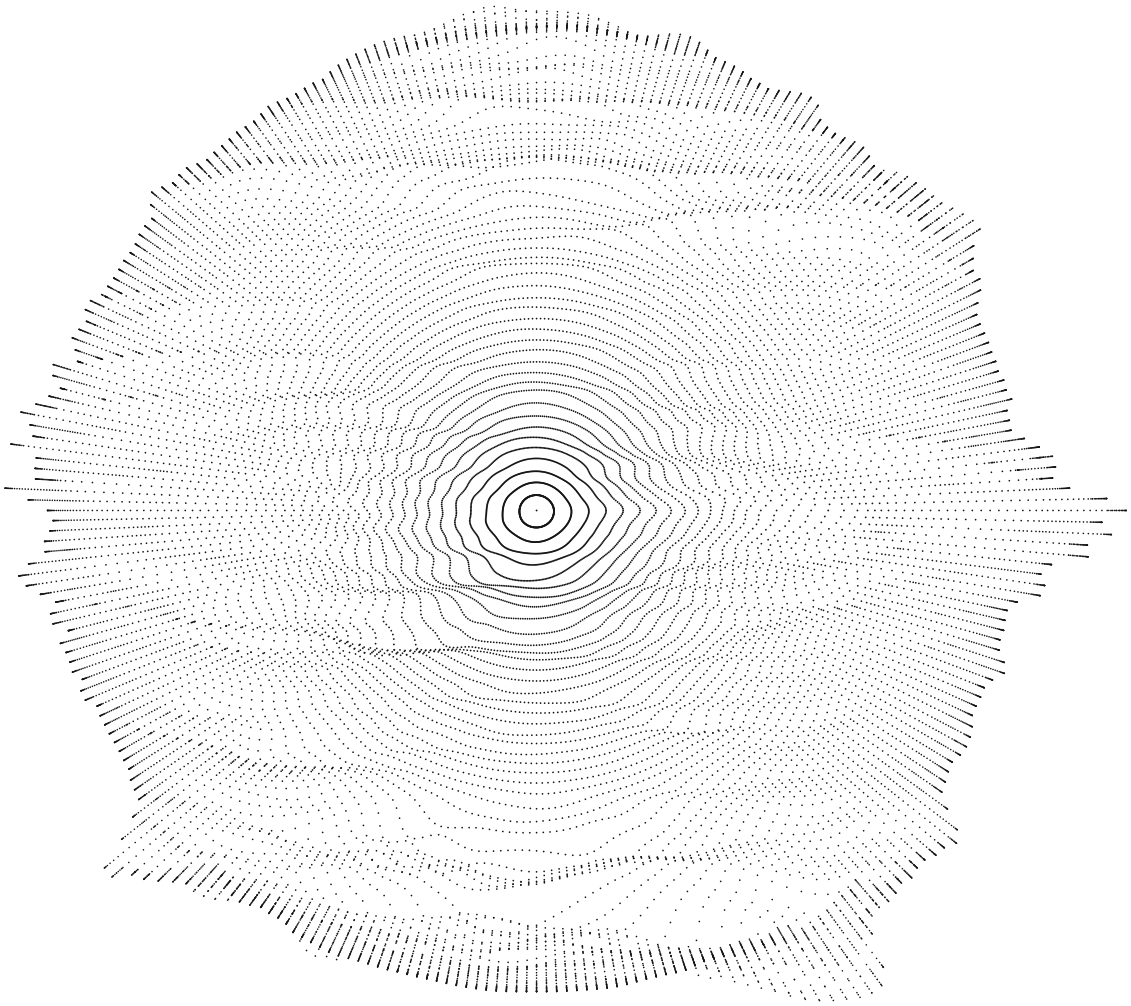

VIRTUALLY THERE

DOCUMENTARY MEETS VIRTUAL REALITY

MAY 6 & 7, 2016

A CONFERENCE PRESENTED BY THE MIT OPEN DOCUMENTARY LAB,
THE JOHN D. AND CATHERINE T. MACARTHUR FOUNDATION AND
THE PHI CENTRE

MIT OPEN DOCUMENTARY LAB · MacArthur Foundation · phi. · FUSION · JustFilms FORDFOUNDATION · Wyncote Foundation *Public Media & Journalism*

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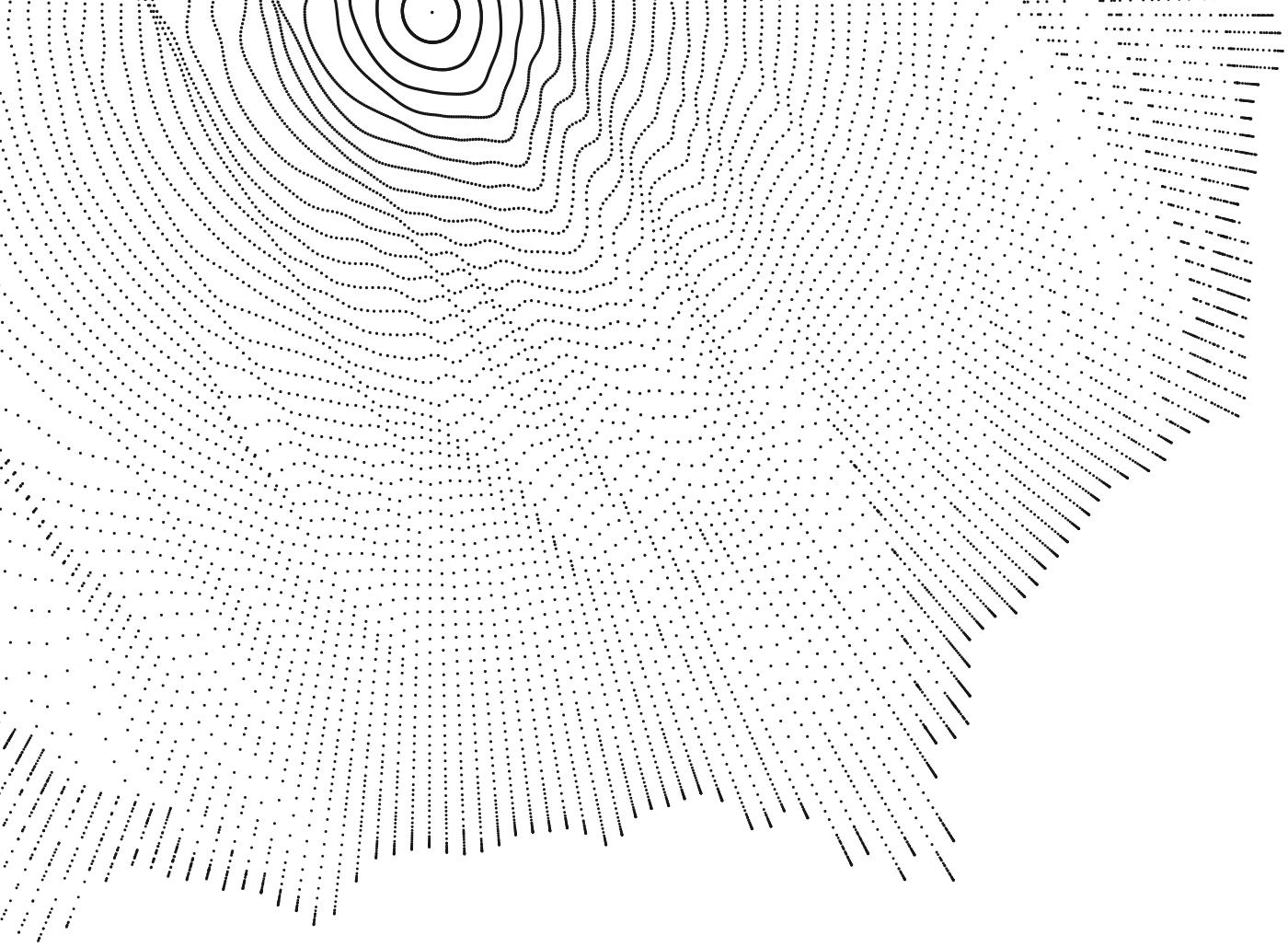

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EXECUTIVE SUMMARY

The words 'Virtually There' suggest several meanings. Like the virtual reality at the center of this conference report, they refer to an elusive condition, a state of almost palpable presence of something that is, in fact, not actually there. But they also refer to the long-term condition of technological solutions designed to achieve this goal. Historically speaking, each new breakthrough has been greeted as a sign that we have almost achieved our goal of creating the ultimate simulation machine … that we are virtually there.

As a conference, Virtually There gathered together leading makers, technologists, academics, curators, and critics for two days of intensive demonstrations and discussions regarding the possibilities and implications of using VR for documentary. In these still early days, when competing consumer-grade VR systems together with massive capital investment and still-evolving user scenarios all generate a lot of noise, VR is in a state of interpretive flexibility. The conference sought to make use of that malleability, discussing strategies of working with various stakeholders in order to make the most of VR's creative, critical, and civic potentials. Speakers addressed the challenges of the new medium's aesthetics, ethics, and issues of access, while interrogating the medium's added value to the documentary tradition. Some speakers drew upon historical precedent for their insights, while others drew on their experiments as creators, and still others on various forms of field and laboratory work. Together, they mapped the contours of VR as a desire, as a technological ensemble, and as a set of possibilities for the documentary form.

This conference report summarizes the main threads of the discussion, linking where appropriate to the event's online recording and to external reports.

The main takeaways included:

- Virtual reality has been a long time coming. And we should remember that we're not there yet. Technologies, like investors, come and go. We would do well to interrogate the underlying desires and expectations that will allow this latest technological iteration to thrive, while helping us to imagine what might come next.

- Language matters. We need to become far more specific at a moment when the term VR encompasses quite different technologies and experiences. It ranges from 360 video to 3D capture techniques (3d scanning, videogrammetry and photogrammetry) to CGI, all of which can be used to create pre-rendered experiences—while real-time interaction is currently limited to 3D capture and CGI. Notions of ethics, aesthetics, immersion, and interaction each have different meanings and implications in these very different manifestations of VR.

- Embrace the medium's potentials. Like media before it, VR has unique characteristics and potentials. It requires a stylistic grammar of its own, rather than simply repurposing storytelling techniques borrowed from older media. This admonition also applies to 'reality': are we fated to pursue ever-more accurate illusions of the real, or can we use VR to see and understand the world in new and critical ways?

- Who will have access to VR, and with what effect? Access to new technologies brings with it the possibility of self-representation, which is fundamental to an equitable society. How might we encourage widespread fluency with, and access to, real-time VR? How can a VR experience such as co-presence be leveraged as a civic asset? And what distribution channels will enable widespread sharing of VR, rather than top-down marketing?

- Research! Research! Research! VR poses a host of new and previously underexplored questions. Neuroscientists suspect that we process VR as experience rather than as representation, lending support to the 'empathy machine' argument and raising questions about related cognitive development. Our ideas regarding narrative, point-of-view, presence, and even subjectivity have been fundamentally challenged by VR. And as pupil-tracking technologies and responsive texts loom on the horizon, investigation into the mechanics, aesthetics, and ethics of the medium is essential if we are to understand its implications and possibilities.

- Brace for some unexpected developments. Real-time VR, slippage across the boundaries of VR and AR, and even ongoing experiments in direct stimulation of the brain, all suggest that the long term agenda of 'being there' first mentioned in Robert Barker's 1787 patent for the panorama is still finding new expressions. Stepping back from the cutting-edge of the latest 'next big thing' may enable us to draw from our experiences of the past, and bring perspective to bear on these developments.

INTRODUCTION

In 2016, venture capitalists and corporations invested two billion dollars in virtual and augmented reality technologies. Thirty billion in VR investments is predicted for 2020[1]. In the case of virtual reality (VR), the need for content to sell the hardware (mainly headsets) is driving the gold rush. But at the same time, VR has captured the imagination of storytellers, journalists, activists, NGOs, and technologists around the world who see its potential for bold and impactful storytelling, as well as attracting audiences. They are eager to seize—and don't want to miss out on—the opportunity to be part of a community of experimenters and explorers who are creating the language of a new medium. VR documentaries have become a regular feature at major film festivals and a standard offering of many online journalistic organizations. The United Nations has produced VR content, and VR projects have been showcased at global convenings such as The World Economic Forum. Today, new VR companies, labs, and projects crop up regularly, and the Oculus Story Studio is seeding VR training programs at universities across the country.

1 http://www.digi-capital.com/news/2016/07/record-2-billion-arvr-investment-in-last-12-months/
2 https://killscreen.com/articles/failure-launch/

Yet no one knows if virtual reality will evolve into a stable storytelling medium or if it is just a fad. VR has come and gone before. Will augmented reality become more popular as Pokemon Go suggests? Will VR end up in medical offices, or as a tool for pornography? Are the headsets too awkward for any lasting impact? Will VR morph into something that doesn't require a headset? Is it truly the birth of a new medium? Does it have the potential to make people empathize more than past experiences and technologies? Regardless of all the unknowns, the fervor in the tech world to invent affordable distribution and exhibition technology, and in the storytelling world to find a VR language that has the power to create social change, suggests that the interest in VR is not slowing down anytime soon.

In May 2016, the MIT Open Documentary Lab, in partnership with the John D. and Catherine T. MacArthur Foundation and Phi Centre of Montreal, hosted a conference to address some of these questions. Virtually There: Documentary Meets Virtual Reality brought together leading storytellers, technologists, funders, critics, festival curators, and academics at MIT to discuss the aesthetics and ethics of documentary VR, chart its potential, and shape the ongoing research agenda for the field.

"Virtual Reality is 'virtually there', which is to say, still in the process of becoming."

As noted in the conference's title, virtual reality is 'virtually there', which is to say, still in the process of becoming. The current mix of technological flux, well-funded hype, and ample possibility renders VR a natural fit for documentary makers eager to use new tools to explore and represent the world, and in so doing, create new ways of seeing and knowing. The Virtually There conference charted the state of our understanding of where documentary meets this medium in 2016. What follows is a detailed report of the ideas that emerged from the conference and accompanying roundtable discussions.

The conference began with a keynote from the lab's Principal Investigator, William Uricchio, who put the discussion of the day into historical and cultural context by

showing how immersive uses of image technology have persisted since the earliest panoramas in 1787; analyzing the role of massive investments in creating this latest wave of interest; and looking at the future of pupil-tracking technologies for both navigation and information harvesting purposes. Uricchio argued that we need to be far more scrupulous about distinguishing VR's various technologies (360 video, real-time, computer-generated animation), since they have different affordances and ethical and aesthetic implications. He also suggested that our dreams could be understood as immersive experiences, both posing a high bar for technological interventions like VR and raising the question of whether neuroscience might provide a compelling research direction in the future as media move from 'in front of the eyes' to 'behind the eyes'.

The keynote set the stage for the rest of the conference as well as a dynamic and probing discussion about VR craft and ethics.

Janet Murray at Virtually There Conference
by Dan Archer

VR TECHNIQUES AND TERMINOLOGY

VR techniques and terminologies are in constant flux, reflecting the transitory state of the medium itself. But for the purposes of this case study, we attempt to classify and define current VR techniques in order to clarify their distinctions and lay out their affordances. We undertake this challenge by looking at VR from two perspectives: how VR imagery is created, and how VR is experienced. VR image creation methods include 360 video, 3D capture, and CGI (computer-generated imagery). These techniques can all generate pre-rendered experiences, but only some of them can create real-time interaction (although limited interactivity, like hot spots on a pre-rendered VR image, is possible with all three techniques).

360 Video

In 360 video a scene is recorded in all directions in order to create a seamless spherical image. Such images can be shot using an omnidirectional camera or a configuration of several cameras. The image may be stereoscopic, which creates the illusion of depth, or monoscopic, which is 'flat'. The captured video is stitched together either in-camera, or in post-production.

360 video is pre-rendered; what we see is what was recorded on the field. The user's interaction is limited to choosing which direction to look; in his Medium article 'VR Interactivity' Michael Naimark calls this 'rotational navigation' (looking around). In some VR experiences, the user's gaze may trigger hotspots embedded within the pre-rendered image, causing new video clips to appear. Even though this is an 'interactive' 360 video, it does not qualify as 'real-time' VR, which is explained in the following paragraphs.

Examples: *Nomads: Sea Gypsies* by Felix & Paul, *Black Rock* by Rus Gant

3D Capture

The term '3D capture' encapsulates several techniques that collect data from the real world in order to create models of spaces, people, and objects in VR that may be rendered in 'real time' as the user experiences the VR piece. Popular 3D capture methods for VR include 3D scanning (with a laser scanner or Kinect), photogrammetry and videogrammetry.

- 3D Scanning

It's possible to create 3D models of objects and people in the real world by using 3D scanners such as LIDAR and Microsoft Kinect. Both laser scanners and Kinect use a similar technique in which the devices emit lasers/infrared light into the space and gather information about the surrounding surfaces. A 3D laser scanner collects the spatial coordinates of each point the laser hits; the result is a very detailed point cloud map of the space and any immobile objects and people within that space. In addition, the laser scanner takes photos of its surroundings in order to gather RGB (color) information, which can be assigned to individual coordinate data. The point cloud data is later algorithmically processed to create a reconstruction of the space. Similarly, Kinect sends a pattern of infrared light into a room. As the light hits objects, the pattern is distorted. This distortion is read by Kinect's depth sensor, which then builds a 3D map of the room and the objects and people within it.

Data collected via laser scanners and Kinect offer positional navigation (the user can walk into and through the image, rather than just looking around from a fixed position) and are programmable in game engines like Unity. In these real-time VR experiences, objects, environments, and the user experience are programmed, making the VR image a rule set that responds to

user interaction. Spaces and interaction in real-time VR can be realistic (following real-world rules of physics, perspective, etc.) or completely imaginary, depending on the algorithmic instructions.

Examples: *In the Eyes of the Animal* by Marshmallow Laser Feast, *Assent* by VRTOV

- Photogrammetry / Videogrammetry

Photogrammetry uses photographs taken from many different positions and angles in order to algorithmically model a 3D space. Videogrammetry uses the same principle to model 3D objects and people, but uses video instead of photographs. This method allows the image to have both volume and photographic texture. Photogrammetry and videogrammetry can also respond in real time based on the user's position in space (positional navigation).

Examples: *RecoVR: Mosul* by Ziv Schneider & Laura Chen, *The Enemy* by Karim Ben Khelifa

Computer-Generated Imagery (CGI)

CGI for VR creates images from computer graphics rather than capturing data from the real world. These modeled spaces, objects, and people may take the physical world as their basis as exampled by Nonny de la Peña's *Project Syria*, which uses documentary footage as a reference. Like 3D capture VR, CGI can also be real time and allow positional navigation (the user can move around in space). Since a CGI world is created from scratch in a 3D modeling program, these VR experiences can take any shape the author desires. For instance, *Notes on Blindness* enacts a blind man's vision of the world through an imaginary CGI environment.

Examples: *Notes on Blindness* by Arnaud Colinart, Amaury Laburthe, Peter Middleton & James Spinney, *Project Syria* by Nonny de la Peña

THE LANGUAGE OF DOCUMENTARY VR

In both creating and discussing VR, we tend to fall back on what we know: techniques and experiences derived from film and gaming. This is a natural first step in creating the language of a new medium, but we need to move forward and create a more medium-specific mode of expression. At Virtually There, attendees discussed looking to fields like installation art, animation, computer science, and theater for inspiration, and thinking about VR genres. Framing the discussion of craft, Ford Foundation JustFilms Director Cara Mertes asked, "What happens to narrative structure as we understand it and have been practicing it for the last century as we move into this new world? [...] What is the relationship between the body and story?" From there, speakers wrestled with other questions including what different kinds of interaction are possible in VR, and how important is interactivity to VR? How will creators and audiences negotiate authorship and agency? And how can we experiment with alternatives to the observational mode in documentary VR?

3 In 360 video, limited interactivity can be created through adding hotspots within the video that allow for multi-sequential narratives. These hotspots can be activated by the user's gaze or headset/game controllers.

INTERACTIVITY IS KEY

"I hate to say this to people with a background in film, but [VR] really is not a filmic medium. Although film is one of the contributors, it is an interactive medium and if there isn't interaction, you're not using the digital. That is, we're in a space that's defined by bits, we want to do something, we want it to respond to us."

"...it [VR] really is not a filmic medium. Although film is one of the contributors, it is an interactive medium and if there isn't interaction, you're not using the digital."

This warning by Georgia Tech Associate Dean and Professor Janet Murray reverberated throughout the day's discussions. Interactivity emerged as a key attribute of VR, distinguishing it from filmed documentary. "What you do is what you get," said Oscar Raby, Co-founder and Creative Director of the digital production studio VRTOV, explaining his philosophy on creating VR. "You understand the character, you understand the story, by doing things."

Also focusing on interactivity, Professor and MIT Open Doc Lab Principal Investigator William Uricchio argued that 360 video is ultimately just that—video. Like panorama technology for painting and photography, 360 video presents new possibilities, but is inseparable from its source media. Users can look in any direction, but they are still relatively passive observers: they can't move around in the space, and interactivity (if any[2]) is limited.

Many other conference speakers situated 360 video as a transitional technology. They imagined a future in which real-time VR created through 3D capture and CGI, utilizing emerging haptic technology, will dominate the field. In this scenario, users will have much more control over, and engagement with, their environment. Creators discussed the potential of kinematic VR, multi-user experiences, videogrammetry, and live and social VR—all offering greater degrees of interaction.

Assent
VRTOV, 2014

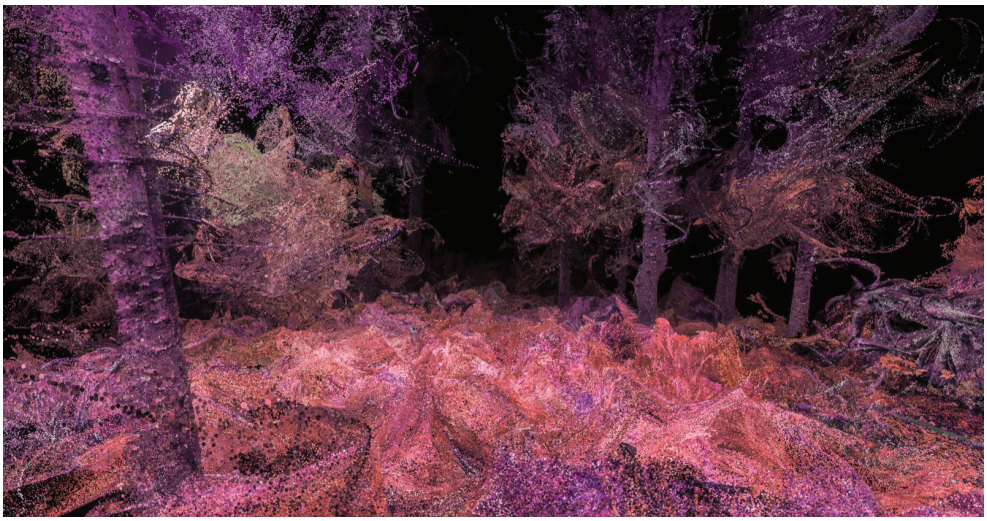
In an industry roundtable after the conference, creators and scholars hypothesized that immersive projects could soon give users the power to "edit" an experience themselves, by toggling between different streams or perspectives. At the same time, next-generation pupil tracking systems will enable real-time VR systems to track users' gazes, offering new opportunities for gaze-based interactivity (in which looking at something triggers a response, such as movement or audio cues). But the potential to track biometric data in VR experiences, from eye movements to heart rate, is also generating new concerns about data privacy. Clearly, we have only begun to explore the possibilities of interaction in immersive works.

Graduate student and conference co-organizer Deniz Tortum noted the tension between photorealism and interactivity, and took the audience through various alternatives to photorealism currently being investigated in real-time VR. These algorithms can as easily mimic real-world behaviors as defy them. As a result, 3D capture techniques and real-time VR allow creators to construct sometimes 'impossible' spaces, spaces that do not exist in the real world, which the user can inhabit and navigate with his or her body. Tortum proposed a new concept that he called embodied montage:

> Embodied montage is an expressive technique for virtual reality. Similarly to montage in film, it allows creators to construct narrative meanings by juxtaposing unexpected actions and perceptions [...] The body can act on environmental perception, creating a new pairing, such as the act of staring causing the illumination of objects [Notes on Blindness] or movement of the body causing a change in time [time scrubbing]. Alternatively, a preexisting relationship between the body and the environment can be effaced; a user can move through the trees [Phantom] or a virtual human [The Enemy], breaking the rule of physics of the real world [...] With the use of embodied montage, a virtual reality experience can be interactive but also structurally convey a narrative.

This concept offers an assembly strategy unique to real-time VR. By allowing interactivity, rather than repurposing pre-rendered and static techniques developed for

"Like panorama technology for painting and photography, 360 video presents new possibilities but is inseparable from its source media."



In the Eyes of the Animal
Marshmallow Laser Feast, 2015

film, it has significant implications for VR documentary makers and journalists. As creators continue to experiment with new techniques and technologies, this type of critical discourse is essential in order to understand the new aesthetic and narrative paradigms arising in the field.

NEW APPROACHES TO REALITY

Alternative ways of capturing and portraying reality represent key differences between VR and film. Several speakers discussed their approaches to capturing reality beyond photorealism.

"The image is no longer a passive and fixed representational form, it is no longer a stable representation of the world, but instead can respond to viewers' input in realtime."

In his presentation, Tortum described how real-time VR techniques such as laser scanning create datasets that present a programmable view of the world. He explained, "the image is no longer a passive and fixed representational form, a stable representation of the world, but instead can respond to viewers' input in real time."

VRTOV's Oscar Raby discussed the current state of gaze-based interaction in his work, in which looking at an object or area triggers activity in the environment. The 3D capture technologies and software needed to create these works offer new perceptual frameworks and narrative potentials for a different type of reality-based storytelling. "The photorealistic approach to reality is the reality of the camera, the photographic camera that captures light. With our approach, we are capturing the reality of another machine [...] I wouldn't say that it's not photorealistic, it's just a reality of another set of devices, another set of factors."

Ersin Han Ersin, Creative Director for the design firm Marshmallow Laser Feast, talked about his interest in capturing "What is the beyond?" He investigates "what we can do beyond the limits of our senses [...] how we can make the invisible visible." In their work, Marshmallow Laser Feast often use a laser scanning process known as

Notes on Blindness
Arte France, Ex Nihilo, Archer's Mark, 2016

LIDAR, which uses pulsed laser beams to measure distances to objects and surfaces. This data can then be used to construct accurate three-dimensional models which can be manipulated to create interactive environments for VR.

Ford Foundation JustFilms Director Cara Mertes suggested that there are two strands in VR. One is trying to recreate reality and "the experience of the body in space," she said, while another is "exploring how you trigger the imagination and create a new reality that has something to do with real lived experience. But it is an extrapolation of it—an extension of it—and it's almost that dream world that Professor Uricchio was talking about, if we could reproduce the dream world."

In our search for a VR grammar, some speakers also argued that less realistic environments create more immersive experiences. IDFA DocLab Curator Caspar Sonnen stated that "true immersion is not about creating the perfect illusion of reality. Our brains are perfectly capable of suspending disbelief on their own. Well-orchestrated forms of sensory deprivation [like putting blindfolds on users before they navigate a space] instead of catering to every sense at once is actually a great way to create immersion."

Professor Janet Murray suggested that "what works is not the real. It's wrong to think that this is reality. In fact what immerses people, so that they can get over their fear of heights, for instance, or their PTSD from being in a war situation, is to make it not completely real. It has to be reassuringly unreal enough that they can surrender to it, and that they can act within it, and feel that immersion."

"true immersion is not about creating the perfect illusion of reality. Our brains are perfectly capable of suspending disbelief on their own."

SHAPING STORIES IN SPACES

Many speakers discussed the challenge of balancing storytelling with user agency and immersion. In both 360 video and real-time VR pieces, audiences can unintentionally miss what the creator considers to be an important story element, or intentionally

Waves of Grace
Imraan Ismail, 2015

decide that they are more interested in something else happening within their surroundings. In order to preserve control over the narrative, creators can provide visual and audio cues and limit the actions available to users—but the more obvious the signposting and the more restricted a user's actions, the less immersive the experience.

Several conference attendees proposed moving away from the idea of editing a scene—linked to filmic conceptions of space and time that have limited application within VR—and toward an approach of designing spaces and situations. Jessica Brillhart, Principal Filmmaker for VR at Google, emphasized the importance of thinking about a world, rather than a (film) frame, and thinking about a visitor in a space, rather than a viewer. Brillhart realized the question wasn't "How do I get them to look where I want them to look," which she describes as a filmmaker's dilemma, but rather, "What's the potential of experience? The fact that they have the agency to look anywhere, they can engage with whatever they want [...]" changes how she thinks about creating VR content. This perspective is helpful in rethinking audience agency and attempting to understand how people both engage with a VR space and push against the intentions of the maker.

Other speakers saw no conflict between the storyteller's intentions and user agency. Filmmaker and founder of Felix & Paul Studios, Felix LaJeunesse, explained, "the question of the viewer's attention is honestly not one we ask ourselves a lot. We try to first bring the viewer into a state of mind where it's going to be fine wherever he looks."

Yelena Rachitsky, Creative Producer and Head of Education at Oculus Story Studio, suggested that if people are motivated emotionally to move through the story, user interaction could enhance the storytelling rather than conflict with it. She asks, "Can you make it where the interactivity is really fluid and part of it? Can you motivate with the emotional agency versus the strategic agency? [...] Games motivate people through a kind of level-up system or points. I think storytelling will get to a point that's interactive and will work if it's motivated emotionally. If you can make someone go somewhere, pick up an object or interact because they're drawn to it in some emotional capacity, that's really what stories are, emotional."

So how can creators craft effective stories and spaces? While acknowledging the importance of user agency, speakers also shared techniques for guiding audiences without taking them out of the story. Lajeunesse stressed the importance of positioning the camera "in a way that makes sense from an anthropomorphic perspective." If the camera's height, angle, and distance from people and objects don't fit this logic, users will not experience physical immersion in a space. Conversely, used effectively, these factors can guide users in relating to characters and environments.

During our roundtable discussion, people exchanged ideas on how to onboard users - introduce them to an environment—akin to weapons training in a video game, albeit ideally more creatively or narratively motivated. Since VR experiences present users with very different degrees and modes of interaction, creators and scholars agreed on the importance of orienting users in a space and communicating what types of actions are possible. Many current VR works neglect opportunities to do so: IDFA curator Caspar Sonnen remarked, “I'm amazed that so few VR pieces have opening credits,” and Google’s Jessica Brillhart added that “[load screens are] such a wasted thing right now.” Onboarding experiences that are entertaining in and of themselves are an underexplored way to strengthen VR narratives.

REFLEXIVITY AND TRANSPARENCY

While creators are slowly making progress in moving beyond the language of cinema to describe and imagine VR, many familiar tensions are emerging. Throughout the conference, the specters of direct cinema and cinéma vérité loomed large. Many current VR works—particularly 360 videos—reflect the mode of observational documentary and direct cinema, striving to provide an objective view of events via a fly-on-the-wall perspective. This is largely due to technical limitations, like the cumbersome filming equipment, but is also the result of unexamined orthodoxies in the field that prioritize polished production values over transparency and experimentation.

In our roundtable discussion, a question about how creators can hide themselves during 360 video production and post-production quickly shifted to a debate about whether or not they should do so in the first place. It is currently common practice to use editing software to eliminate all traces of the camera operator and the shooting apparatus from a finished product, including editing out filmmakers in the scene and masking visible tripod legs. This echoes the direct cinema filmmaker's strategy of attempting to disappear, both from the production process and the final product.

“I think storytelling will get to a point that’s interactive and work if it’s motivated emotionally.”

Rather than hiding themselves, creators could choose to occupy a more visible role in VR works. In our industry roundtable, filmmaker Gary Hustwit noted that "I don't think there's been enough formal experimentation with including the filmmaker in the process, letting the apparatus show and the process show a little bit more." Other

Ebola Outbreak: A Virtual Journey, production still, FRONTLINE, 2015

attendees agreed on the necessity of documentary experimentation that is not only more transparent, but potentially also more performative, in the spirit of cinéma vérité films that provoked new forms of interaction between creators, users and subjects.

At a time when this medium is so new, the need to experiment with craft and share ideas is paramount. New ways of representing reality, evolving relationships between authors and users in interactive works, and problems around telling stories in spatial environments represent tremendous challenges for documentarians who are used to working in film. But they also provide an opportunity to advance documentaries in light of generational changes in media consumption that favor interaction and participation along with viewing and reading. The conversation about craft at the conference was rich and probing, and only the beginning of a long journey of experimentation, iteration and feedback.

ETHICS IN DOCUMENTARY VR

Ethical issues were front and center in many of the conversations at Virtually There. Artists, technologists and scholars were all eager to discuss questions like: How do we define empathy, and how do we generate it in VR—and more importantly, should we? How can we ensure that depictions of suffering in this new medium are not exploitative? And how do we expand access to VR technology to include diverse creators and communities? These issues are complex, and there are no easy answers. But it is crucial to engage with these questions now, in these nascent moments, while we are in a position to establish best practices and determine how ethical issues are framed.

CHALLENGING EMPATHY

Mainstream discussion of VR frequently lauds the medium's capacity to engender empathy in users. Many of our conference speakers and attendees were interested in complicating this discourse, and challenging the assumptions that VR technology inherently creates empathy, that experiencing trauma will have a positive impact on users, and even that empathy should be the goal of VR in the first place.

Professor Marcos Novak, Director of transLAB at UCSB, and researcher Michael Madary both pointed out that empathy has so many different definitions that current discussions about empathy and VR are reductive.

Dan Archer, Empathetic Media founder and Columbia University Tow Center of Digital Journalism Research Fellow, aimed to dismantle "this umbrella term," pointing out that there are different degrees of empathy. He stressed the importance of choosing an approach appropriate for a project's subject matter and narrative style. Sometimes, for example, it may be more effective to maintain emotional space between the audience and subject: too much empathy can cause distress or even terror in users, leading them to distance themselves from both an experience and the people depicted in it.

Several presenters noted the potential ramifications of attempting to cultivate empathy in users, particularly through exposure to traumatic situations. Robert Overweg, lead concept and innovation designer at Triple, suggested that experiments designed to activate empathy or reduce racial bias could instead accomplish the opposite. He asked, “What if *Clouds Over Sidra*, a story about a girl in a Syrian refugee camp, was a little bit more intense? What if [...] I went into that experience and created my own tragic memory because I was in a bad place in my life? [...] I enter this Syrian refugee camp, and I get my own traumatic experience?”

“...empathy has so many different definitions that current discussions about empathy and VR are reductive.”

Researcher Michael Madary also highlighted the potential for psychological manipulation in VR, noting that users must be alerted to the fact that "we do not yet know the effects of long-term immersion," and that there is evidence that VR experiences can

The Enemy, production still
Karim Ben Khelifa, 2015

have a lasting effect on users' behavior. Lacking extensive research on the psychological effects of VR, what responsibilities do creators have in shaping potentially upsetting experiences?[4]

"Critical thinking around these issues is what we should be going for, rather than the idea that we can actually walk in somebody's shoes without the potential of physical repurcussions or violence of the real world."

Sam Gregory, WITNESS Program Director, challenged the idea that VR creators should strive to create empathy at all. He argued that empathy does not necessarily motivate people to take action, and suggested that VR has a great deal of potential for activism, but only if we shift our focus from empathy to solidarity and compassion. Gregory made a strong case for the power of live witnessing: rather than presence, "the sense of being somewhere," he suggested thinking about co-presence, "the sense of being somewhere together with other people"—for example, frontline activists broadcasting via live 360 video. By allowing users to interact with an experience in real time, co-presence could help people move beyond denial and disengagement, and serve as an effective route to user mobilization.

REPRESENTATION AND EXPLOITATION

Like traditional film documentaries, VR documentaries dealing with marginalized communities risk presenting narratives inflected with voyeurism and the colonial gaze—poverty and trauma tourism, essentially. But the rhetoric around VR can complicate and exacerbate this dynamic. For example, empathy often serves as an all-encompassing (but misleading) rejoinder to any criticisms of voyeurism or exploitation.

With regards to media portrayals of human suffering, Sam Gregory drew a contrast between passive observation and witnessing in solidarity. And during the panel "Looking Ahead: The Virtual Documentary," MIT Professor Fox Harrell cautioned that

4 While speakers warned audiences to exercise caution, they also mentioned many positive uses of VR in the medical and scientific communities.

Conference attendees experiencing *The Enemy* by Karim Ben Khelifa

VR experiences cannot recreate the lived context, physical reality, and personal history of their subjects. Instead, they reduce the complexity of the real world in order to express ideas and perspectives for users to engage with. Harrell refuted the idea that users can actually experience subjects' lives, saying that "Critical thinking around these issues is what we should be going for, rather than the idea that we can actually walk in somebody's shoes without the potential of physical repercussions or violence of the real world."

VR discourse sometimes also masks issues of representation by presenting VR works as transparent and objective, since audiences have a 360-degree field of vision and creators are limited in the frequency and types of edits they can make. But just as with traditional documentaries, VR projects are created by people whose subjectivities influence every decision they make, from selecting subjects to choosing camera angles to writing dialogue.

Moreover, Fox Harrell noted that even computational systems have built-in biases that often remain unexamined. Sam Gregory elaborated on this point: “I think there's a real question here now that Oculus, Google, YouTube, are all in this space. How do we make sure that the systems they build reflect some of our ethics questions, some of our representation questions?”

At a time when new VR hardware and software are constantly emerging, it is crucial to investigate the subjectivities hidden in these technologies, particularly on the algorithmic level—what kinds of interaction are permitted, how are user avatars represented, what kind of context is provided, which characters and story elements are prioritized, what assumptions are made about the race, gender, and socioeconomic background of the user—and to find ways to monitor them.

“...increasing the agency of the people in a VR experience. We’re neglecting the agency of the people we have filmed, the people who are the subjects of the VR experience”

While recognizing the role technology plays in bias, moderator Sandra Rodriguez, a Visiting Scholar at the MIT Open Doc Lab, reminded us of another angle on representation: how creators choose to represent human stories. “After all, we are here as storytellers. This is [...] about documentary. As storytellers, maybe we need to believe more in the stories.”

Another issue of concern is whose agency is prioritized in VR work. Filmmaker Lisa Jackson questioned whether VR inherently "takes away agency from the subject in order to give it to the user," and suggested that creators look for VR co-creation opportunities. Sam Gregory noted that much of the discussion of agency has been oriented around "increasing the agency of the people in a VR experience. We're neglecting the agency of the people we have filmed, the people who are the subjects of the VR experience.”

ACCESS

Of course, one way to address potentially exploitative depictions of marginalized communities is to make sure that these communities have the technology and skills to tell their own stories. Currently, there are many constraints on who can participate in this new medium, due to the cost of the equipment, the relatively small and concentrated community of knowledge, and the newness and constant flux of equipment, software, and distribution platforms. During the panel "A Story In Search of a Language," conference fellow and interdisciplinary artist Damon Davis asked, "How does this technology get to normal people, or to communities of color, poor people? [...] How does the technology get into the hands of the people that are living the stories?"

“How does the technology get into the hands of the people that are living the stories?”

While some VR makers contended that as the field develops, the technology will naturally become more affordable and accessible, others stressed that more direct action is required. Access to equipment alone cannot effectively address issues of structural racism and funding barriers, among other things. Ford Foundation JustFilms Director and panel moderator Cara Mertes emphasized the importance of creating "corridors of experimentation" in VR for marginalized voices. Throughout the conference, attendees echoed the need to open up VR to wider audiences in general, beyond the film, gaming, and tech industries.

Brian Chirls, Chief Technology Officer at Datavized, pointed out the "broken assumptions" of native VR (VR accessed on VR-specific devices, i.e. headsets), including the expectation that all users will have access to fast and reliable internet to download large video files. Chirls contended that web VR (VR viewable via a web browser) is an inclusive and accessible arena for both creators and consumers. Developer tools are free and open source code is widely available. While video playback and graphics tools are limited at present, working in web VR has minimal costs and allows creators to bypass app approval processes and potential censorship, among other advantages.

For people who simply want to experience VR in order to learn about the medium, access is also limited. While there is currently a great deal of free VR content via YouTube, Facebook 360, NYT VR, and other apps and platforms (almost all relating to 360 video), many VR pieces, and especially real-time VR projects, have very limited distribution. Even when the projects themselves are freely distributed, the hardware is a limiting factor—setups like the Oculus Rift and HTC Vive are relatively expensive. And while major film festivals have begun to add immersive programming, these VR showcases are frequently plagued with long lines, and lacking in necessary exhibition space. There is still a long way to go before VR production and consumption are widely accessible.

CRITICAL LITERACY AND DIALOGUE

As VR rapidly gains prominence and begins to enter the mainstream, it is vital that we build critical literacy and a robust conversation around the new and old ethical issues we encounter in this evolving medium. Rus Gant, VR pioneer and director of Harvard University's VR Lab, discussed the need for "intuitions" about how we can be manipulated in VR—intuitions that we already have for media such as television and film. Michael Madary's Code of Ethics for Research and Personal Use of VR is one effort to begin establishing ethical standards for the field, from the psychological effects of VR to possible privacy violations.

Meanwhile, William Uricchio and Janet Murray pointed out that fear of VR is to be expected, as it mirrors the reactions to the birth of each new medium—film, television, etc.—over the course of history. On the level of critical reflection, during the "Implications of VR Documentary" panel, Sam Gregory noted that as a field, we must be cautious about which works we praise in these early stages, since these successful projects will become the models for future works. Virtually There raised many questions about ethics in documentary VR—many of which are equally applicable to fiction VR—and we hope these conversations will continue both within the industry and among the wider public.

CONCLUSION

New media enable fresh ways of exploring and giving order to the world. As we've seen with earlier forms such as photography and film, media offer ways to express, to connect, and to document. The technologies lumped together under the label of virtual reality are no different, despite their great variety. If the histories of previous media are anything to go by, we can expect a process of closure, and soon. Investors, regulators, insurance companies, marketers, and users resolve their often competing ideas of a medium into a broadly held consensus, and then pass it down through the ages as simple fact.

As we experience a moment of competing visions, of yet un-researched horizons, of multiple creative appropriations by the many claimants to the term virtual reality, the stakes of the present are very high indeed. And if any one message resounded throughout Virtually There, it is that we should embrace the moment creatively and critically, and make the most of the openness we still enjoy while widening the pool of creators to include people who normally don't have access to new technologies.

Documentary has long served as the test-bed for emerging media technologies. The film medium is a great example. Its first decade was dominated by documentary rather than fiction. The earliest experiments with color and sound were deployed with non-fiction subjects. And we are seeing history repeat itself in the interactive domain. Why? Because documentary has no need to create the rules of a fictional universe; it can immediately explore a medium's expressive capacities, since the basic working of the world is known and doesn't first have to be invented. Little wonder that the bundle of technologies gathered together under the term virtual reality has generated so much interest in the documentary community. And little wonder that developments in documentary VR are being so carefully watched by the larger creative community.

In a broad sense, VR touches upon a core aspect of what we take to be the media. The word 'medium' has many meanings in English, most going back to classical Latin. But by an odd chance, at least according to the Oxford English Dictionary, two 'new' meanings first appeared around 1851: medium as a channel for communications ('the photographic medium') and medium as a link or bridge between the living and the 'spirit world' ('the medium organized a séance'). One transmits information from point 'a' to point 'b', and the other 'makes present' that which is impossibly distant. VR bridges the gap, and that is a very new and quite powerful condition.

Virtual reality has a long legacy as a desire, as a changing set of technologies, and as a way of relating to the world. But that doesn't mean we've seen it all before. Continuities help to anticipate predictable behaviors as much as they help to distinguish truly new and innovative aspects of this latest media form. VR's case is complicated by the fact that a single descriptor includes quite different technologies (360 video, 3D capture, and computer-generated imagery), each with their own precedents, backers and implications. It is complicated by a huge influx of investment capital, which has 'pushed' the medium with an urgency and hype unmatched by previous media developments. And it is complicated by the fast-evolving technological scene. For example, next-generation eye tracking technologies will enable a radically new conception of interface, navigation, and user data harvesting, requiring significant reconsideration of inherited aesthetic and ethical norms. These conditions combine to make VR compelling both for its possibilities and for its implications in an already heavily mediated world.

If Virtually There showed us anything, it is the importance of working across disciplines and across theory and practice in order to explore VR's full array of potentials. Cross-disciplinary research with colleagues in such areas as neurobiology, architecture, and ethics will only enhance the important work being carried out by media scholars, technologists, and makers. Although our media may be fated to remain in a perpetually elusive state of 'virtually there', our insights and actions will shape the expectations and uses of those media for generations to come.

TAKE-AWAYS

- Virtual reality has been a long time coming. And we should remember that we're not there yet. Technologies, like investors, come and go. We would do well to interrogate the underlying desires and expectations that will allow this latest technological iteration to thrive, while helping us to imagine what might come next.

- Language matters. We need to become far more specific at a moment when the term VR masks quite different technologies and experiences. It ranges from 360 video to 3D capture techniques (3d scanning, videogrammetry, and photogrammetry) to CGI, all of which can be used to create pre-rendered experiences—while real-time interaction is currently limited to 3D capture and CGI. Notions of ethics, aesthetics, immersion and interaction each have different meanings and implications in these very different manifestations of VR.

- Embrace the medium's potentials. Like media before it, VR has unique characteristics and potentials. It requires a stylistic grammar of its own, rather than simply repurposing storytelling techniques borrowed from older media. This admonition also applies to 'reality': are we fated to pursue ever-more accurate illusions of the real, or can we use VR to see and understand the world in new and critical ways?

- Who will have access to VR, and with what effect? Access to new technologies brings with it the possibility of self-representation, which is fundamental to an equitable society. How might we encourage widespread fluency with, and access to, real-time VR? How can a VR experience such as co-presence be leveraged as a civic asset? And what distribution channels will enable widespread sharing of VR, rather than top-down marketing?

- Research! Research! Research! VR poses a host of new and previously underexplored questions. Neuroscientists suspect that we process VR as experience rather than representation, lending support to the 'empathy machine' argument and raising questions about related cognitive development. Our ideas regarding narrative, point-of-view, presence and even subjectivity have been fundamentally challenged by VR. And as pupil-tracking technologies and responsive texts loom on the horizon, investigation into the mechanics, aesthetics and ethics of the medium is essential if we are to understand its implications and possibilities.

- Brace for some unexpected developments. Real-time VR, slippage across the boundaries of VR and AR, and even ongoing experiments in direct stimulation of the brain, all suggest that the long term agenda of 'being there' first mentioned in Robert Barker's 1787 patent for the panorama is still finding new expressions. Stepping back from the cutting-edge of the latest 'next big thing' may enable us to draw from our experiences of the past, and bring perspective to bear on these developments.

CONFERENCE SCHEDULE* - MAY 6, 2016

9:00 AM
OPENING REMARKS BY SARAH WOLOZIN

9:10 AM
KEYNOTE BY WILLIAM URICCHIO - PUTTING VR IN PERSPECTIVE

9:30 AM

PANEL - A STORY IN SEARCH OF A LANGUAGE*

Cara Mertes - Presentation
Jessica Brillhart - Presentation
Oscar Raby - Presentation
Felix LaJeunesse - Presentation
Ersinhan Ersin - Presentation
Panel Discussion moderated by Cara Mertes

11:00 AM
DENIZ TORTUM - EMBODIED MONTAGE

11:20 AM
ZIV SCHNEIDER - VIRTUAL GLUE: THE MANY FUTURES OF OUR PAST

11:40 AM
BRIAN CHIRLS - WEBVR: ACCESSIBILITY, DEMOCRATIZATION AND THE FUTURE OF THE IMMERSIVE WEB

12:45 PM
HIVE PONG EXPERIMENT

1:00 PM
CASPAR SONNEN - WHAT VR CAN LEARN FROM INTERACTIVE STORYTELLING AND COLLABORATIVE ART

1:20 PM
RUS GANT - ``BLACK ROCK`` AN EXPERIMENT IN LONG-FORM DOCUMENTARY VR

1:40 PM
FOX HARRELL & KARIM KHELIFA - THE ENEMY PROJECT: USING VIRTUAL REALITY FOR CONFLICT JOURNALISM AND ENGENDERING EMPATHY

2:00 PM
PANEL - LOOKING AHEAD: THE VIRTUAL DOCUMENTARY*

Nonny De La Peña - Presentation
Marcos Novak - Presentation
Robert Overweg - Presentation
Panel Discussion moderated by Raney Aronson-Rath

3:40 PM
DEBRA ANDERSON - REAL DATA IN VIRTUAL WORLDS

4:00 PM
MICHAEL MADARY - EXPLORING THE ETHICS OF VR

4:20 PM
AMY STERLING - BRAINVR: EXPLORING THE MIND'S COMPLEXITY IN NEW DIMENSIONS

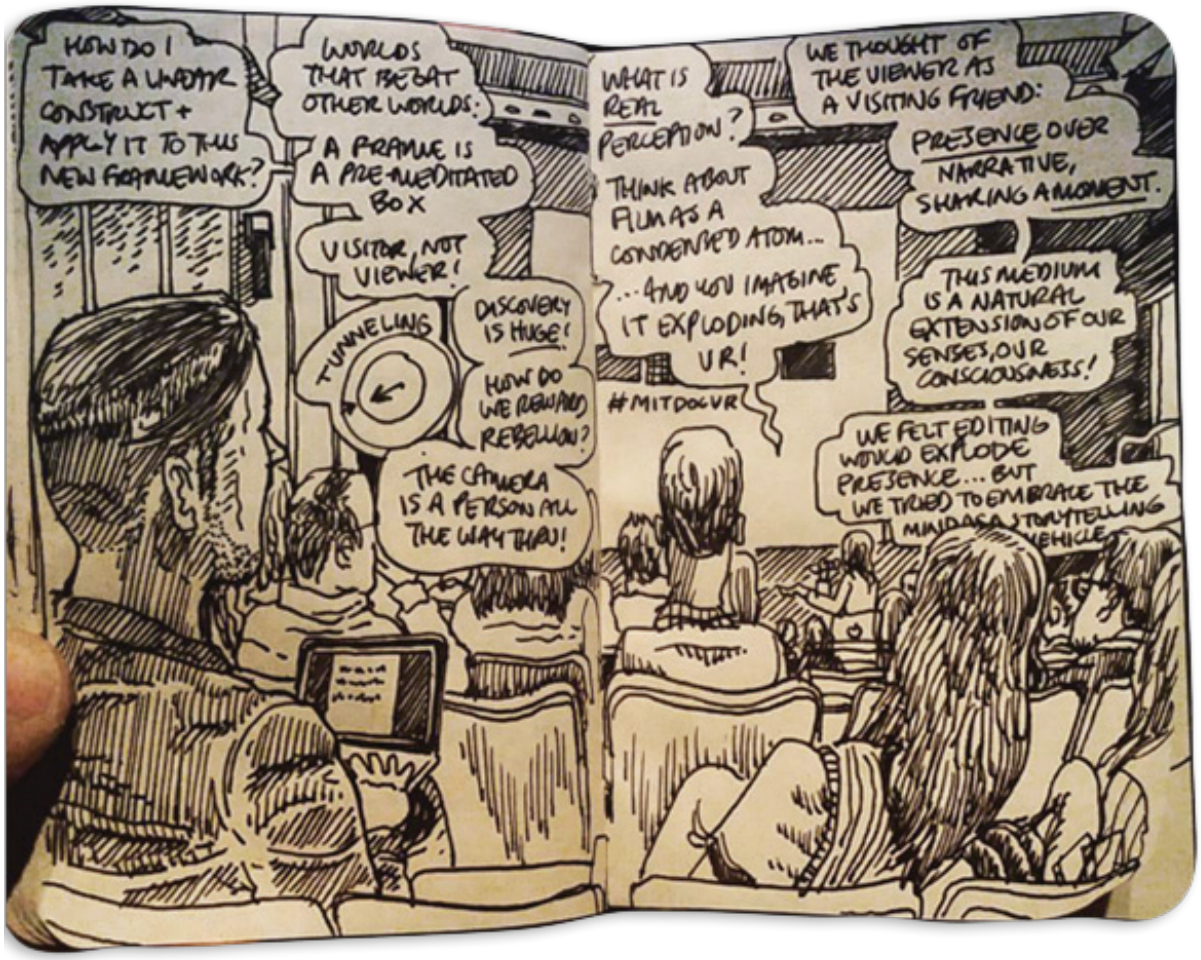
4:30 PM
YELENA RACHITSKY - SEEDING THE VIRTUAL FUTURE

4:40 PM
PANEL - IMPLICATIONS OF VR DOCUMENTARY: THE ETHICS, NEUROSCIENCE, AND IMPACT OF VIRTUAL REALITY EXPERIENCES*

Dan Archer - Presentation
Janet Murray - Presentation
Sam Gregory - Presentation
Panel Discusssion moderated by Sandra Rodriguez

6.00 PM
CLOSING REMARKS BY WILLIAM URICCHIO

*For a description of the panels, please visit http://opendoclab.mit.edu/virtuallythere/



Virtually There Conference
by Dan Archer

SPEAKERS*

DEBRA ANDERSON
CSO & Founder,
Datavized

DAN ARCHER
Research Fellow,
Columbia Tow Center of
Digital Journalism

RANEY ARONSON-RATH
Executive Producer,
Frontline

JESSICA BRILLHART
Principal VR Filmmaker,
Google

BRIAN CHIRLS
CTO,
Datavized

KATERINA CIZEK
Documentary Director,
MIT Visiting Scholar

NONNY DE LA PEÑA
CEO,
Emblematic Group

ERSIN HAN ERSIN
Creative Director,
Marshmallow Laser Feast

RUS GANT
Director,
VR Lab at Harvard

SCOTT GREENWALD
Researcher,
MIT Media Lab

SAM GREGORY
Program Director,
WITNESS

FOX HARRELL
Professor,
MIT

KARIM BEN KHELIFA
Author,
The Enemy

FÉLIX LAJEUNESSE
Founder,
Felix & Paul Studios

MICHAEL MADARY
Post Doc,
Universität Mainz

CARA MERTES
Director,
Ford JustFilms

KATY MORRISON
Co-Founder & Producer,
VRTOV

JANET MURRAY
Assoc. Dean & Professor
Georgia Tech

MARCOS NOVAK
Director,
transLAB at UCSB

ROBERT OVERWEG
Designer,
Triple

*For speaker bios, please visit http://opendoclab.mit.edu/virtuallythere/

SPEAKERS

OSCAR RABY
Co-Founder & Creative Director,
VRTOV

YELENA RACHITSKY
Oculus Story Studio

SANDRA RODRIGUEZ
Doc Director, MIT
Visiting Scholar

CASPAR SONNEN
Curator,
IDFA DocLab

ZIV SCHNEIDER
Creator, Research Fellow
NYU Tisch ITP

BARNABY STEEL
Creative Director,
Marshmallow Laser Feast

AMY STERLING
Executive Director,
EyeWire

AINSLEY SUTHERLAND
Open Lab Fellow,
Buzzfeed

DENIZ TORTUM
Researcher,
MIT OpenDocLab

WILLIAM URICCHIO
Professor & Principal Investigator,
MIT OpenDocLab

SARAH WOLOZIN
Director, MIT OpenDocLab

FELLOWS*

DAMON DAVIS

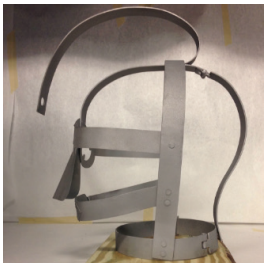
JESSICA EDWARDS

LISA JACKSON

TRACY HEATHER STRAIN

*For fellow bios, please visit http://opendoclab.mit.edu/virtuallythere/

EXHIBITED WORKS



#THISISEGYPT

HEARING POETRY IN MOTION

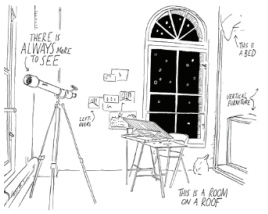
ASSENT

BB-8

BLACK ROCK

CARDBOARD CRASH

DEEPDREAM VR



DRAWING ROOM

EBOLA OUTBREAK: A VIRTUAL JOURNEY

IN\FORMATION

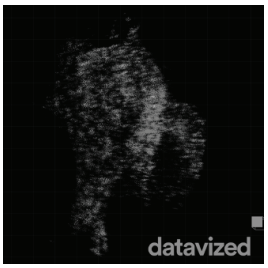
INSIDE IMPACT

IN THE EYES OF THE ANIMAL

KIYA

LoVR

MARS 2030



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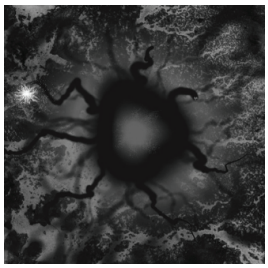
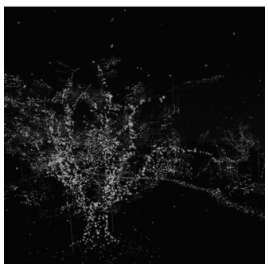


MINOTAUR

NOMADS: SEA GYPSIES

NOMADS: MAASAI



NOTES ON BLINDNESS

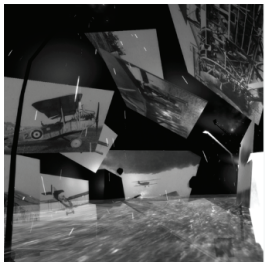
*For a description of the works, please visit http://opendoclab.mit.edu/virtuallythere/

ON THE BRINK OF FAMINE

PROJECT SYRIA

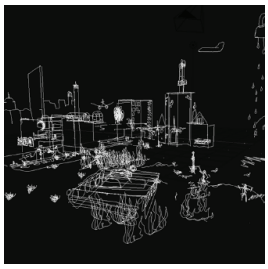
RecoVR: MOSUL

THE ENEMY



THE UNKNOWN PHOTOGRAPHER

VIENS!



VR DOODLER / HAVEN

WAVES OF GRACE

WAY TO GO

WITNESS 360

*For a description of the works, please visit http://opendoclab.mit.edu/virtuallythere/

GLOSSARY

- Augmented Reality (AR): In AR, a live view of the physical world is supplemented by computer generated elements including video, graphics, sound, and/or GPS data, creating a composite perception of reality.
- 360 video: In 360 video, a scene is recorded in all directions in order to create a seamless spherical image. 360 videos may be 'flat' and monoscopic, or stereoscopic with a further illusion of depth.
- 3D capture: 3D capture encapsulates several techniques that collect data from real life in order to create models of spaces, people and objects in VR, that may be rendered in real time as the user experiences the VR piece.
- Real-time VR: Real-time VR is rendered during the user's experience of the VR piece, and it reacts to their position and bodily movements. Elements in real-time VR may be programmable, opening up new avenues for interaction.
- Photogrammetry (VR): The use of high-resolution photography taken from different positions and angles in order to model a three-dimensional space.
- Videogrammetry (VR): The use of two or more video images taken from different angles in order to model three-dimensional objects and people.
- Kinematic VR: Virtual reality pieces that offer positional navigation in which the user can walk into and move around in the VR image.
- Live VR: Live streaming 360 video.
- Web VR: A JavaScript API that allows the user to experience VR in browsers.
- Haptics: Any form of interaction involving touch.
- Social VR: A VR experience in which users occupy and interact with each other in the same VR environment.

VR RESOURCES

- Ainsley Sutherland thesis Staged Empathy: Empathy and Visual Perception in Virtual Reality Systems
- Awesome VR - List of resources
- Brian Chirls' Virtually There conference presentation slides
- Docubase by MIT Open Documentary Lab
- EleVR VR Resources
- Deniz Tortum thesis Embodied Montage: Reconsidering Immediacy in Virtual Reality
- Haptical - Real news on VR
- Immerse Creative discussion of emerging nonfiction storytelling
- Janet Murray Virtually There presentation slides
- Jessica Brillhart In the Blink of a Mind on editing VR
- Katy Newton and Karin Soukup The Storyteller's Guide to the Virtual Reality Audience
- Michael Madary and Thomas K. Metzinger Real Virtuality: A Code of Ethical Conduct
- Oculus Story Studio blog
- POV VR Toolkit
- Road to VR - VR News
- There is Only R - Digital magazine about VR
- Upload VR - VR News, Events, and Talent
- Versions - Essential guide to VR
- The Tow Center for Digital Journalism Virtual Reality Journalism
- WebVR - Bringing VR to the web

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