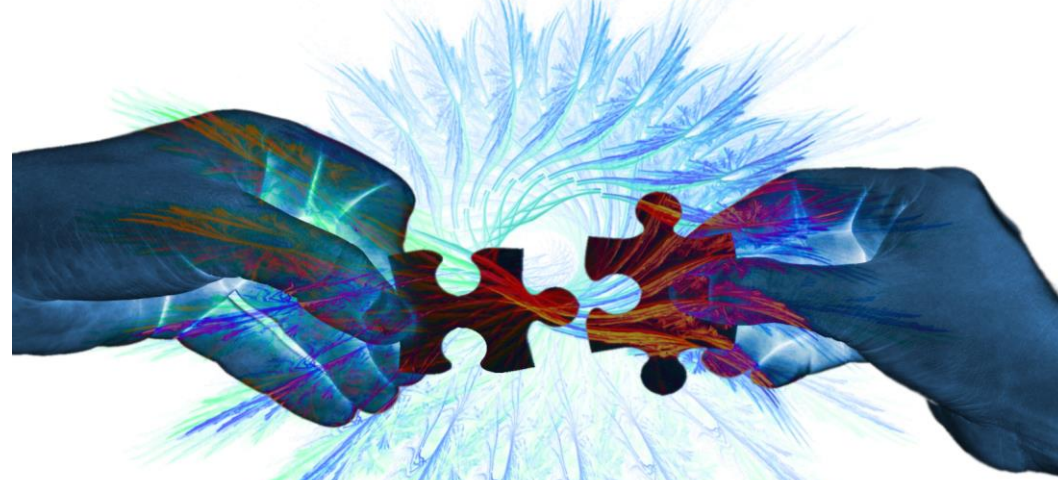


**3GPP, VR-IF & AIS Present**

***The 2nd Workshop on VR Ecosystems and Standards***

**Immersive Media Meets 5G**



***15-16 April 2019***

***Sony Studios, Culver City, CA, US***



Welcome Address  
Don Eklund  
CTO, Sony Pictures Entertainment



# Workshop Goals



- Examine next-generation immersive formats and services, including **Virtual, Augmented & Mixed Reality**, and investigate **5G business opportunities** brought by immersive services
- Look at their requirements
- And see if these are met by available / emerging standards and formats
- Having useful, informative and fun discussions

# 1<sup>st</sup> Workshop, Santa Clara, 12/13 Dec '17



# Conclusions 1<sup>st</sup> Workshop



- VR Quality needs better quality
- VR needs to be more interactive
- VR needs to be more social

# What Has Happened Since Then?



- XR is the new VR
- VR came back to earth
- 5G is here
  
- Quality is indeed improving
- VR is indeed getting social
- Interactivity is increasing?

# Outline



- 4 Sessions, each a half day
  - A few questions after talk; discussion at end of Session;
  - Discussion is the goal!
- 
- First day ends with reception
  - Demos during the lunches, reception and two breaks

# Program



- A few last-minute updates; latest Program is online

## Events

### 2ND VR ECOSYSTEMS & STANDARDS WORKSHOP

April 15 - 16, 2019

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15 and 16 April 2019, Sony Studios, Culver City, CA, USA  
3GPP, VRIF & AIS Present:  
The 2nd Workshop on VR Ecosystems and Standards

[Final Program Now Available for Download \(PDF\)](#)

[Speaker List and Speaker Bios](#)


### Immersive Media Meets 5G



# Logistics

- WiFi
  - Don't use it :-)
  - If you insist:
- Bathrooms
  - In the back across the alley
  - In the front behind the screen
- Emergency Evacuation
- Presentations will be made available!
  - In PDF, may be sanitized a bit




 Sony Pictures Entertainment  
GS-Guest Wireless Network

CAUTION: This is an open, unencrypted network. You should avoid transferring sensitive data or use a VPN or other encryption system.

**VISITOR WIRELESS NETWORK TERMS AND CONDITIONS**

The SPE Visitor Internet wireless network ("Visitor Wireless Network") is provided as a courtesy Internet access for SPE visitors' personal devices. Access to the Visitor Wireless Network is offered at the discretion of Sony Pictures Entertainment Inc. It is a privilege that may be revoked without notice.

Start Over Powered by Ruckus

 Sony Pictures Entertainment  
GS-Guest Wireless Network

To access the network, you must pass a verification process. After entering your email address or phone number and clicking Send, a verification code will be sent to you. You must enter the verification code on the next screen.

Send To Email:

Send TXT Message:

Country:


Phone Number:   
e.g. 3105551234

Service Provider:

[Service provider charges may apply]

I already have a verification code:

Start Over Powered by Ruckus

 Sony Pictures Entertainment  
GS-Guest Wireless Network

A verification code was sent to 6505801731. Retrieve the verification code and enter it below.

Verification Code:

[Send Again](#)

---

# Location Host



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# Reception Host

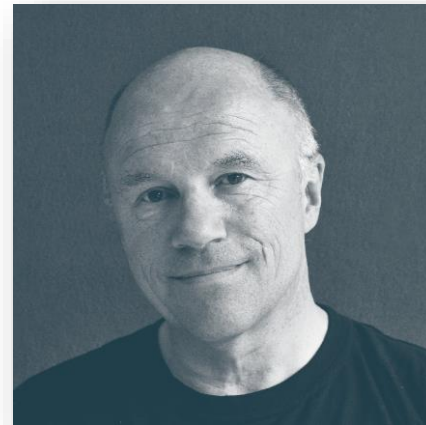


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# Demonstrations

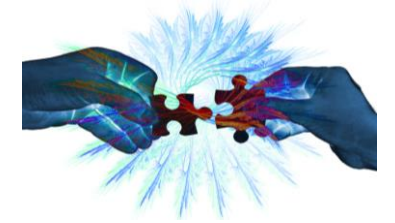


# Enjoy!



# Hardware Ecosystem

- Martin Renschler Qualcomm
- Gregory Jones NVIDIA
- Jan Söderström Ericsson
- Jeff Solari Intel



# Hardware and Ecosystem panel



**MARTIN RENSCHLER**  
**QUALCOMM**



**GREGORY JONES**  
**NVIDIA**



**JAN SÖDERSTRÖM**  
**ERICSSON**



**JEFF SOLARI**  
**INTEL**

# The CHALLENGE



- Ferhan Özkan XR First



# Demo Pitches



imeve

QUALCOMM®

ERICSSON 

 kpn

NOKIA

  
ATLAS · V

 **Fraunhofer**  
Heinrich Hertz Institute

INTERDIGITAL®



# AIS Keynote



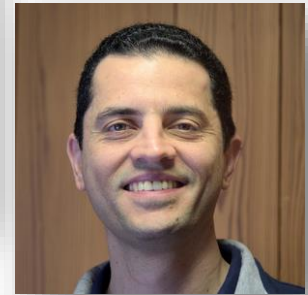
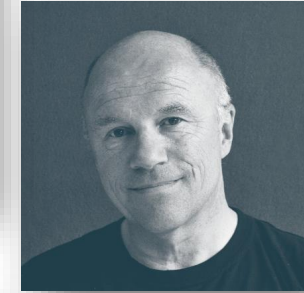
- Gary Radburn – Advanced Imaging Society / Dell





# Standards Ecosystem

- Gilles Teniou 3GPP / Orange
- Rob Koenen MPEG / Tiledmedia
- Danillo Graziosi MPEG / Sony US
- Brent Insko Khronos / Intel
- Paul Higgs VRIF / Huawei
- Ludovic Noblet ETSI ARF / b<>com
- Jyrki Penttinen GSMA



# Standardization panel



**GILLES TENIOU**  
**3GPP**



**DANILLO GRAZIOSI**  
**MPEG PCC**



**PAUL HIGGS**  
**VRIF**



**JYRKI PENTTINEN**  
**GSMA**



**ROB KOENEN**  
**MPEG-I**



**BRENT INSKO**  
**KHRONOS**

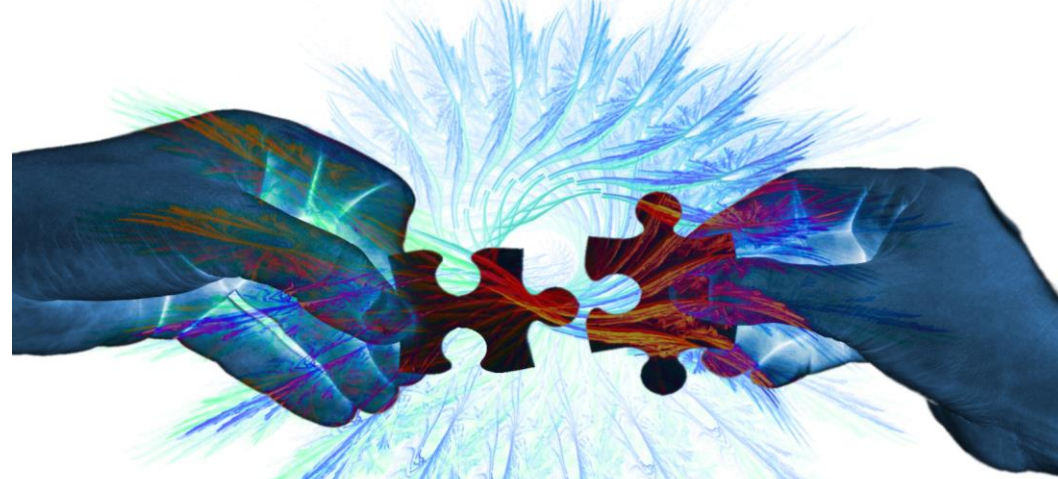


**LUDOVIC NOBLET**  
**ETSI ISG ARF**

**3GPP, VR-IF & AIS Present**

***The 2<sup>nd</sup> Workshop on VR Ecosystems and Standards***

**Immersive Media Meets 5G**



***Day 2 - 16 April 2019***

***Sony Studios, Culver City, CA, US***



# Logistics Day 2



- Updated Program available online
  - Alethea Avramis replaces Antoine Cayrol (Atlas V)
  - Demos during first break and lunch
  - Lunch vouchers: get one from the registration table!
  - WiFi: GS-Guest – follow instructions
- 
- Lunch from 12:50 to 13:50
  - End between 17:30 and 17:45

# Morning Keynote



- Scot Barbour, V.P. Production & Innovation at Innovation Studios, Sony



# Recap - What Did We Learn?



- Hype Curves ...
  - VR is real, despite the deep trough it went through
  - 5G is here – almost. Is it going to be as good as we all hope?
- HW keeps advancing
  - Functionality moving from SW to HW (e.g., computer Vision on the chip)
  - advances in rendering power are levelling off ☹️
  - Cloud (Edge) rendering may help. And “split computer vision”!
- Still need more quality
  - 8K nice but need to keep moving
  - Power and bandwidth challenges will remain
  - Latency crucial
    - Not just determined by visual but also motor cortex (10 ms!)
  - Need to be smart on what to send in which quality
- Headset wire moves from PC to Mobile device

# Recap - What Did We Learn?



- Lots of efforts on moving beyond 3 DoF
- Industrial applications robust market;
  - Consumer more slowly but still growing
  - Cloud/Edge with thin client enables new business models – but, still trying to understand which exactly
- Yes, Video is important. But we always hear in 360 ...

# Recap - What Did We Learn?



- Restating the obvious ... standards still matter. A lot.
- Fragmentation hurts us all.
- Khronos 0.9 is out for feedback !
- Point Clouds are coming and leverage video coding
- Cloud rendering may alleviate differences in devices and help interoperability
- Need new low-latency codecs?
  - Do codecs need to be faster than framerates??
- Can't standards just work together better?
  - that's why we are here ...:-)
- What is the best approach for Volumetric?



# A Sneak Preview



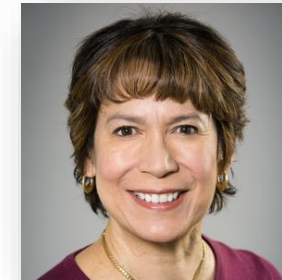
- Mauricio Aracena on behalf of Reception Host Ericsson



# Service Providers / Operators



- Morgan Bouchet Orange
- Armen Filipetyan Iconic Engine
- Simon Gunkel KPN
- Rolf Muralt MobileedgeX
- Arianne Hinds Cablelabs
- Serhad Doken Verizon



# Service providers & Operators panel



**MORGAN BOUCHET**  
**ORANGE**



**AMIT CHOPRA**  
**ICONIC ENGINE**



**SIMON GUNKEL**  
**KPN**



**ROLF MURALT**  
**MOBILEEDGE X**



**ARIANNE HINDS**  
**CABLELABS**



**SERHAD DOKEN**  
**VERIZON**

# Afternoon Keynote



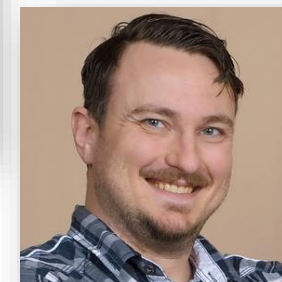
- Amy Peck, CEO, Endeavor VR
- What Exactly Is the AR Cloud and Why Should We Care?



# Content Providers



- Alethea Avramis Atlas V
- Tim Porter Underminer Studios
- Christina Heller Metastage
- Esta Chiang 8i
- Sebastian Sylwan Felix & Paul Studios



# Content providers panel



**ALETHEA AVRAMIS**  
**ATLAS V**



**TIM PORTER**  
**UNDERMINER STUDIOS**



**CHRISTINA HELLER**  
**METASTAGE**



**ESTA CHIANG**  
**8I**



**SEBASTIAN SYLWAN**  
**FELIX & PAUL**

# Recap/Day 2: What Did We Learn?



- Hollywood and Silicon Valley are merging
  - Inventing new storytelling, set your audience engagement levels.
- Standardize mezzanine format (point clouds and meshes), compression, streaming, APIs, conformance, and platforms. Open source is nice to bootstrap but standards offer long term convergence.
- Users expect that smartphones will still exist, but we will all be wearing AR glasses
- Live events are very important
- Moving from one-off productions to mainstay/mainstream through partnerships and innovations
  - Across platforms and channels

# Recap/Day 2: What Did We Learn?



- Exploring social/co-presence and High-immersion experiences
- Edge compute is key for AR/VR/XR. It will happen anyways. Comes in addition to the central cloud.
- Mobile Network Operators and Cable Operators looking to leverage their infrastructures and monetize AR/VR/XR communication and content consumption services over 5G. Collaboration levels and type of SLAs are yet to be defined.
- Application developers do not care about networking. Secondary considerations. They want reliable and consistent experience.



# Recap/Day 2: What Did We Learn?



- Cable '10G' (G is for Gigabit/s) standards to provide high bandwidth and low latency.
- Ad agencies now directly go to immersive content creators.
- Build for how users will live tomorrow.
- Edge computes and 500Mbps allows location based experiences without computer backpacks. Also consider city-wide games, shared in-venue experience, real-time and non-real-time enterprise applications.

# Recap/Day 2: What Did We Learn?



- Creating project with different versions (AR / VR / MR). Re-use assets across VR/AR/MR.
- We are past the uncanny valley (or not!). Volumetric is here to stay!
  - But what format?
  - Point cloud all the way?
  - Meshes?
- Beware of standardization timing ! Don't be early, don't be late. Figure it out.

# Conclusions ...



- Standards are important
  - Mezzanine format (point clouds), compression, streaming, APIs, conformance, platforms and... security.
- It's great to work with real people !
- See you next year?

# 3<sup>rd</sup> Workshop?



- Do it?
- Will you come?
- A year from now, 18 months?
- Theme?

# Survey



- A short survey will be sent out now
  - <https://forms.gle/6EJJ3MRb3LPPmQh88>
- Please complete it!
- May do it anonymously or may leave email if you want to be contacted.

# Thanks!



- Sony Pictures Entertainment
  - Tomoko Kamimoto
  - Nicole Leonetti
  - Pam Byrne
  - Daniel De La Rosa
  - Junior
- VR Industry Forum
  - Christine Corby
  - Natasha Ragler
- All Speakers
- You, the Audience

# On behalf of the Workshop organizing committee



**ROB KOENEN**  
**TILEDMEDIA**



**FRÉDÉRIC GABIN**  
**ERICSSON**



**PAUL HIGGS**  
**HUAWEI**



**PAUL SZUCS**  
**SONY**



**GILLES TENIOU**  
**ORANGE**



**THOMAS STOCKHAMMER**  
**QUALCOMM**



**MAURICIO ARACENA**  
**ERICSSON**

# THANK YOU !!!