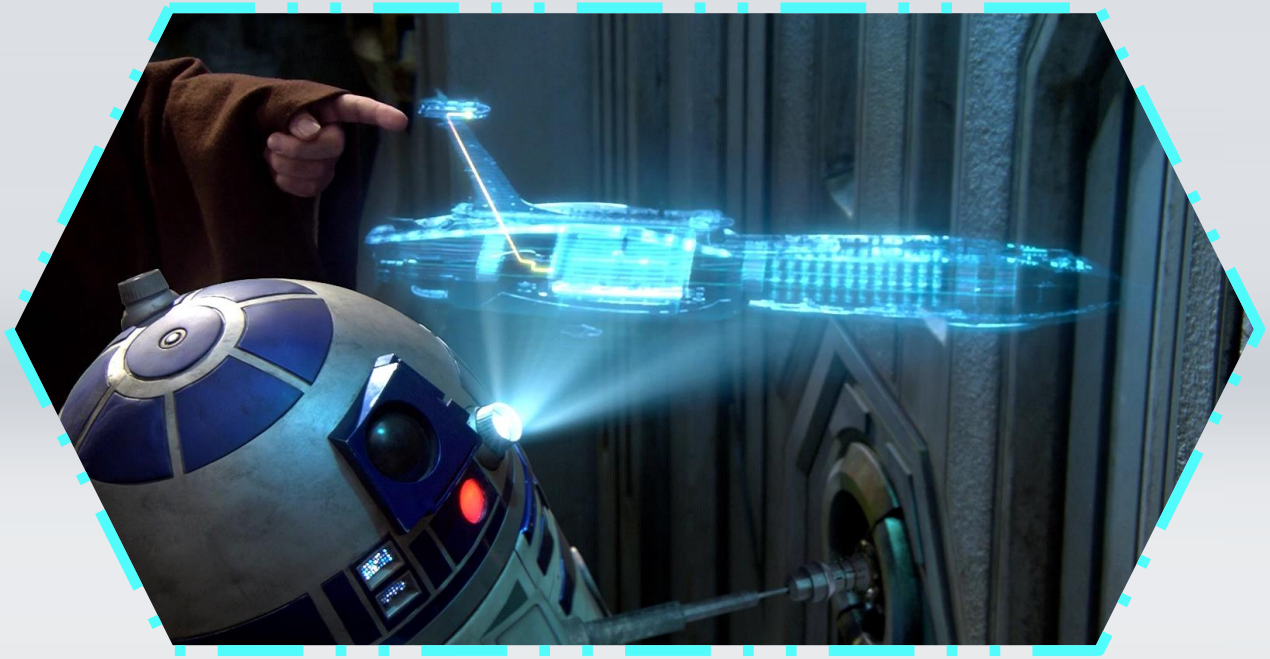
# Holographic 5G Communication

Jingyi Yu

# STAR WARS



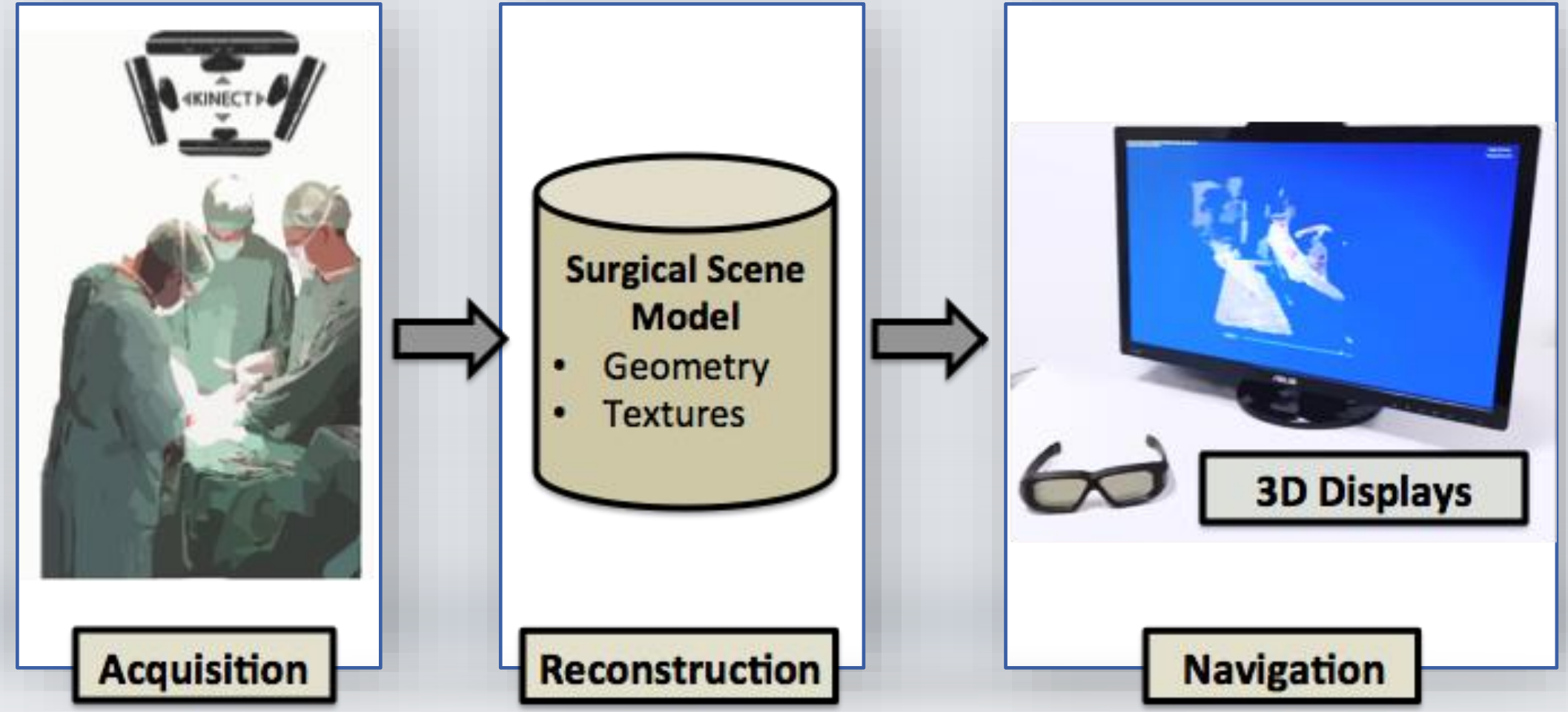
# STAR WARS

– A Story without 5G –

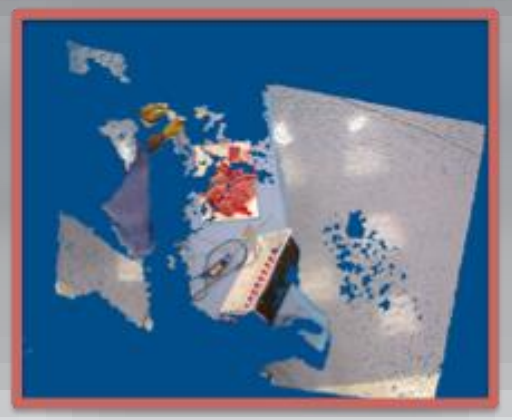
# Challenges & Solutions

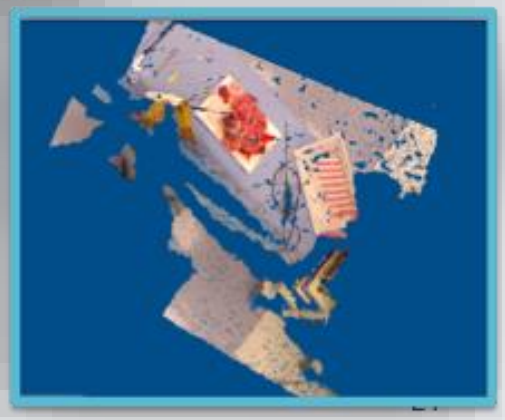
## 3D Capture

# Kinect Fusion – Yu et al, 2010



# Based on Active 3D Sensing



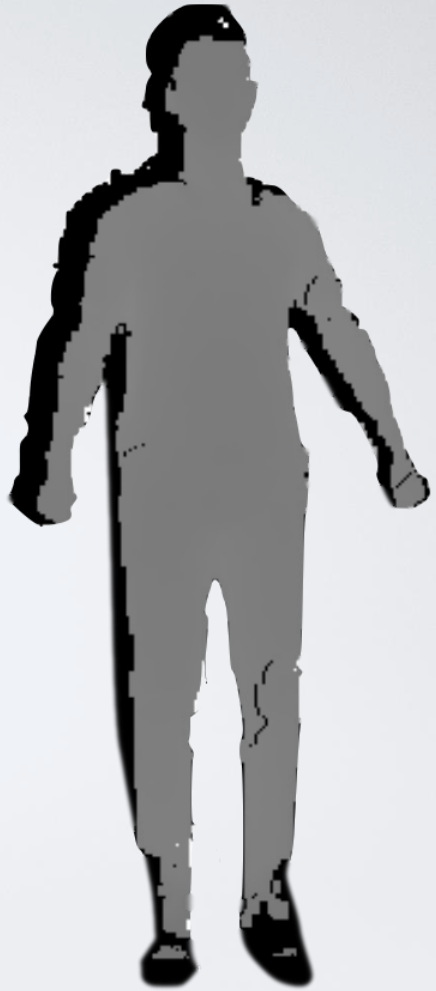


# Real-time Stereo

Depth Resolution
1280 x 720

Depth Resolution
512 x 424

Real-sense



Kinect

# Light Field Dome – ShanghaiTech

# Computer Vision | Multi-view Stereo

**Agisoft**

*High quality*

*> 30min*

CapturingReality

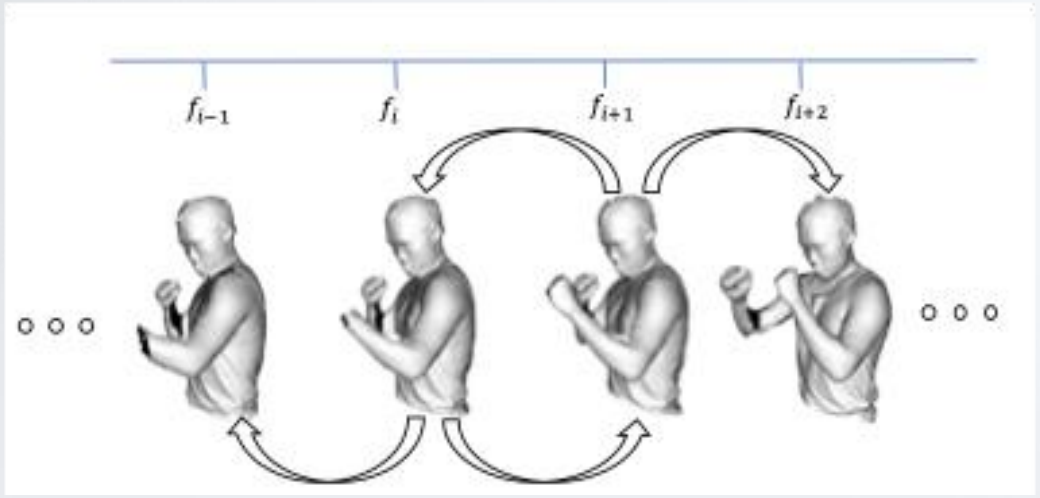
*High quality*

*> 10min*

# Deep Learning 3D Human Scan

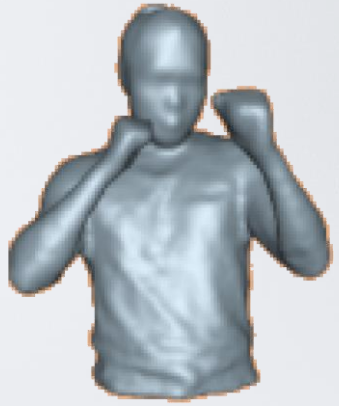
Initial Scans

Refined Results

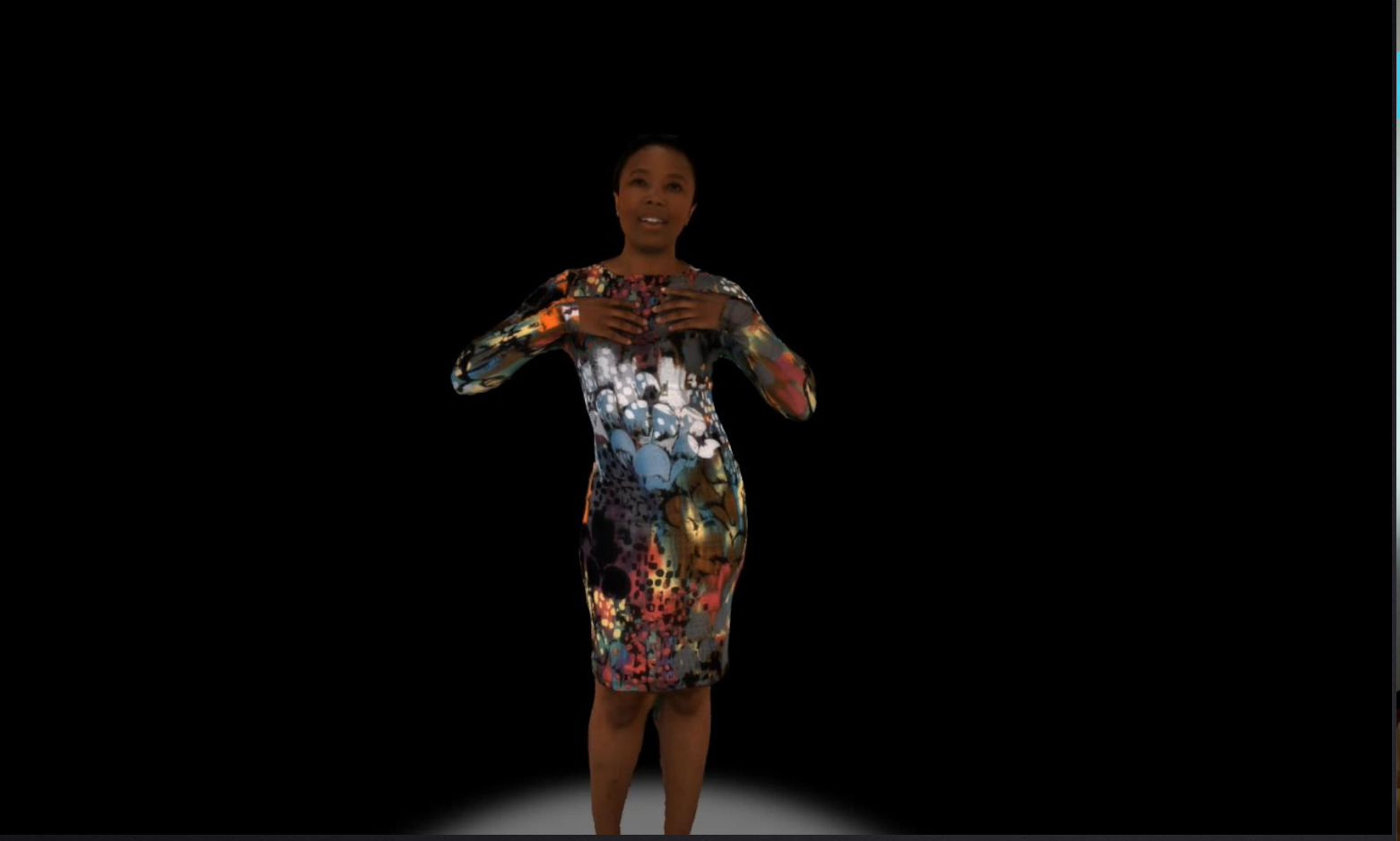


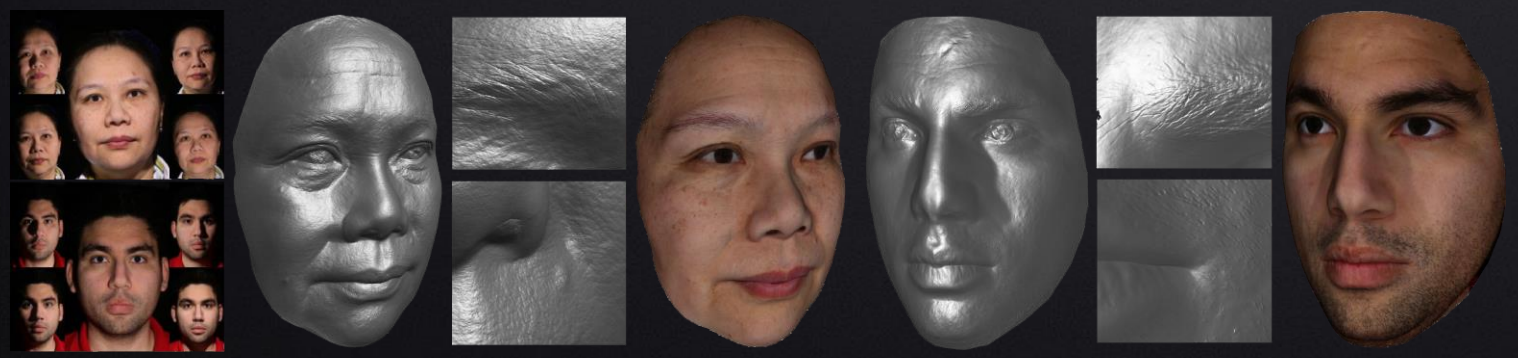

Temporal Matching/Warping

Stitching



Smoothing



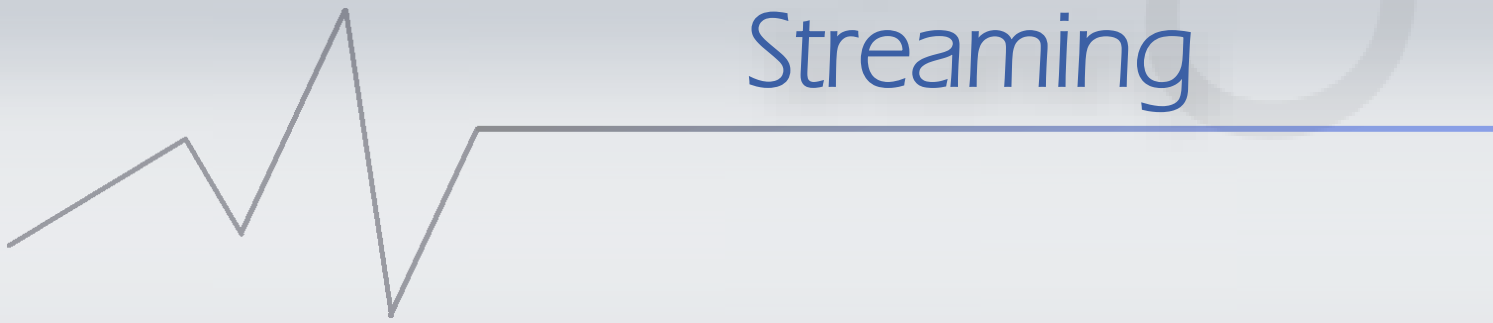


3D face & Body

# Holographic Social Network

# Challenges & Solutions

## Compression & Streaming



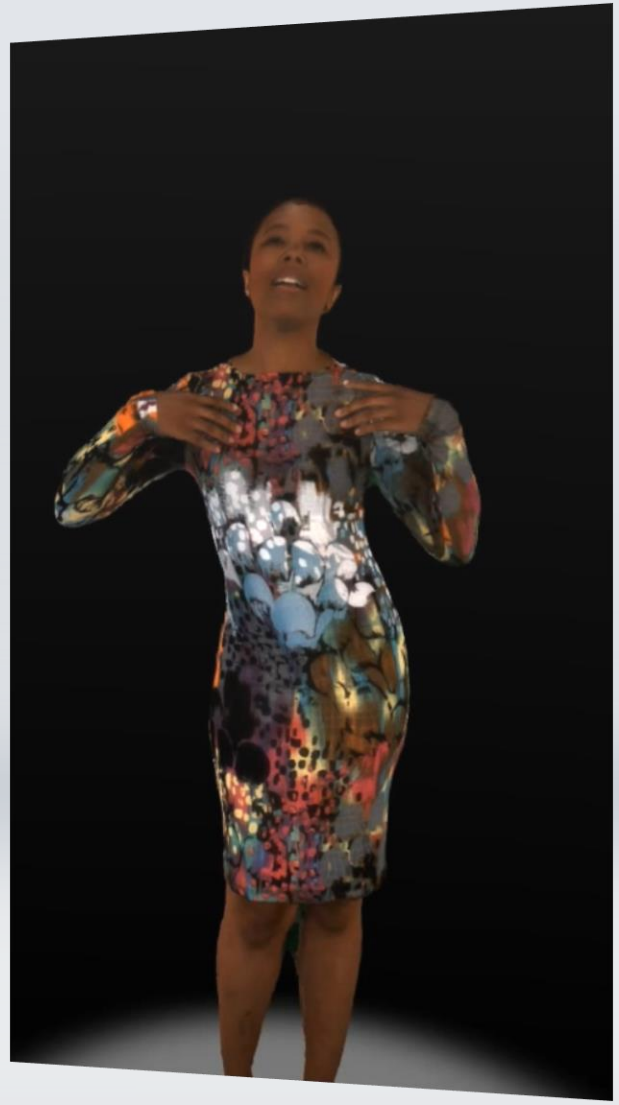
# Hologram Streaming

## Requirement

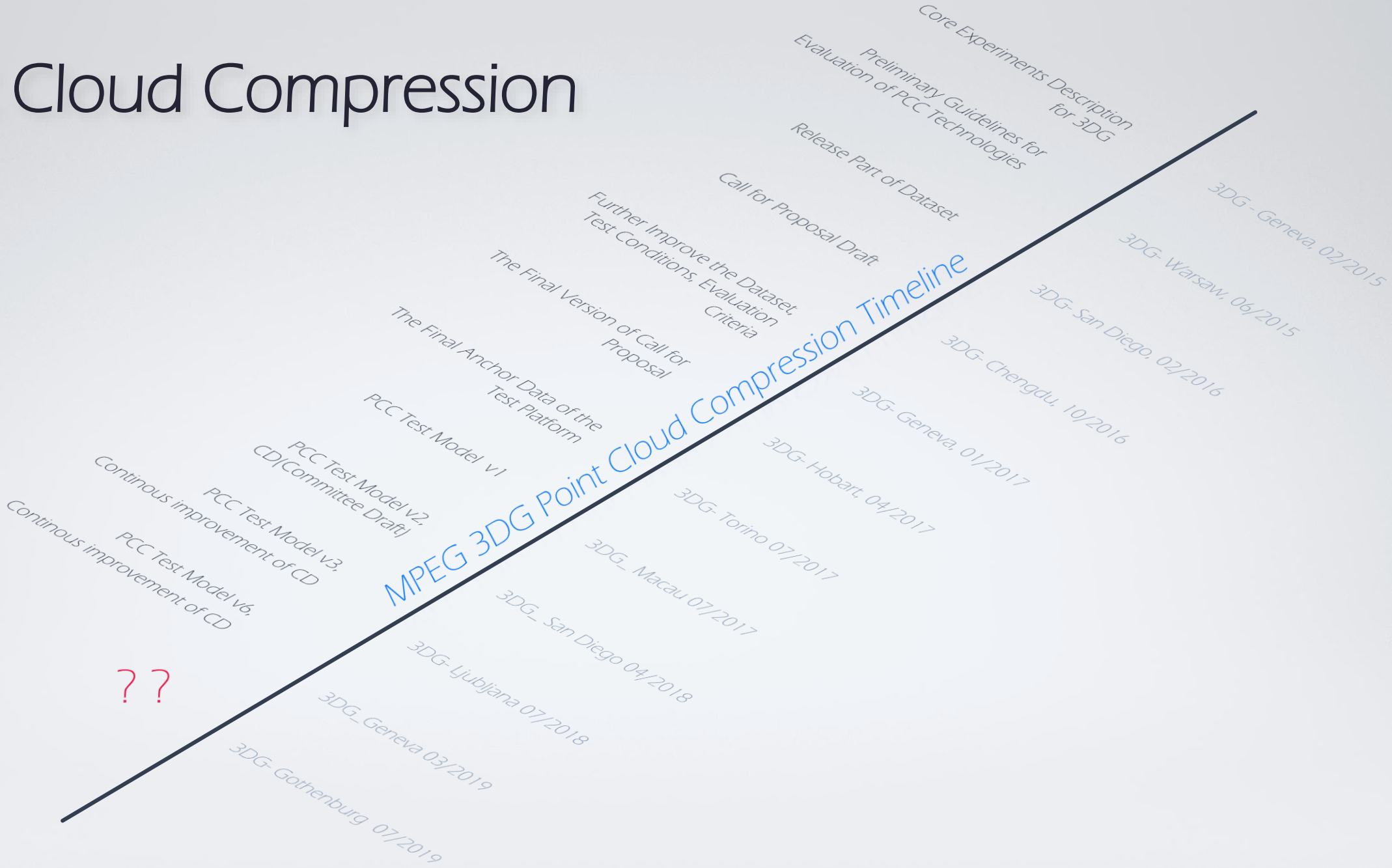
Network adaptivity
Fast startup
High bandwidth
Low latency
High-quality

DASH-PC
A dynamic adaptive bandwidth-efficient and view-aware point cloud streaming system

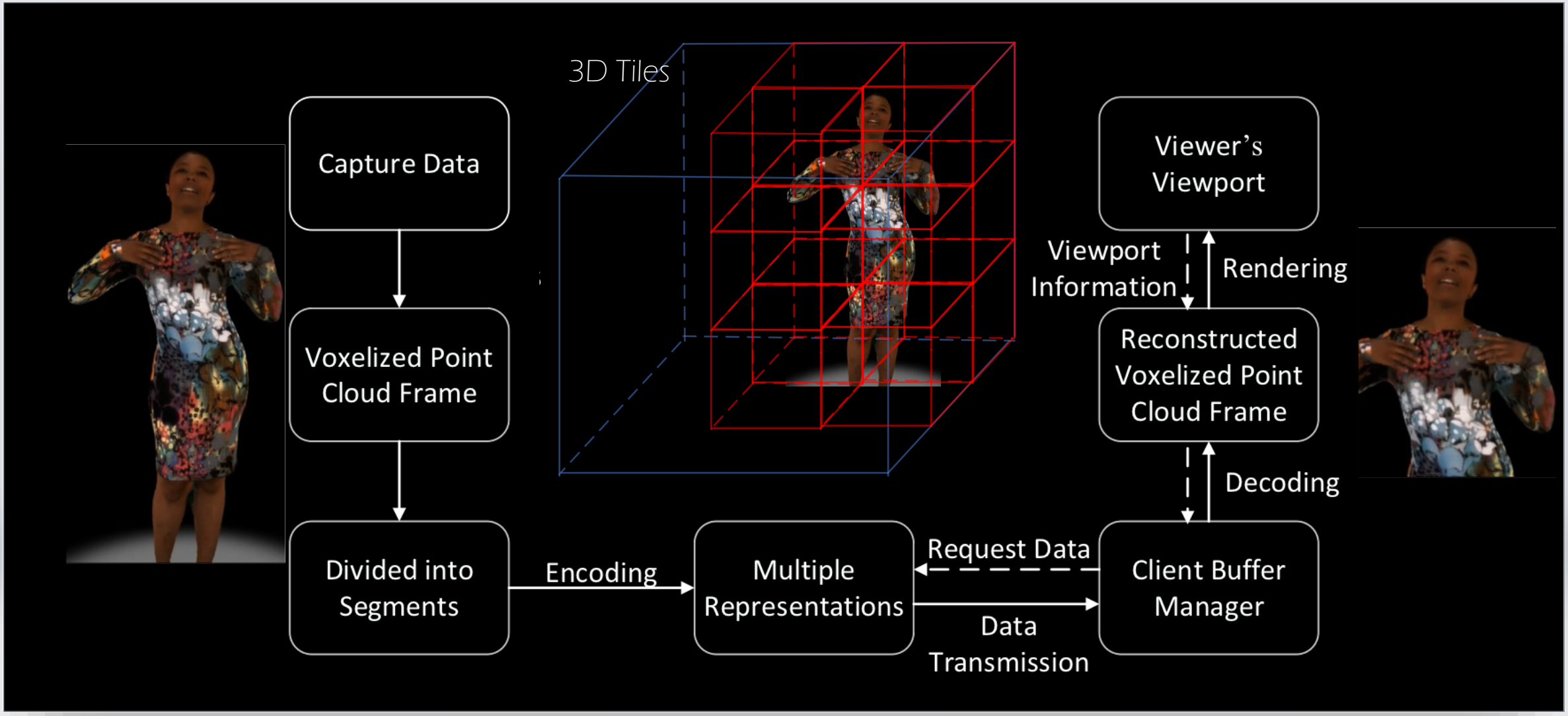
5(+)G
Faster speed
Shorter delays
Increased connectivity



# Point Cloud Compression

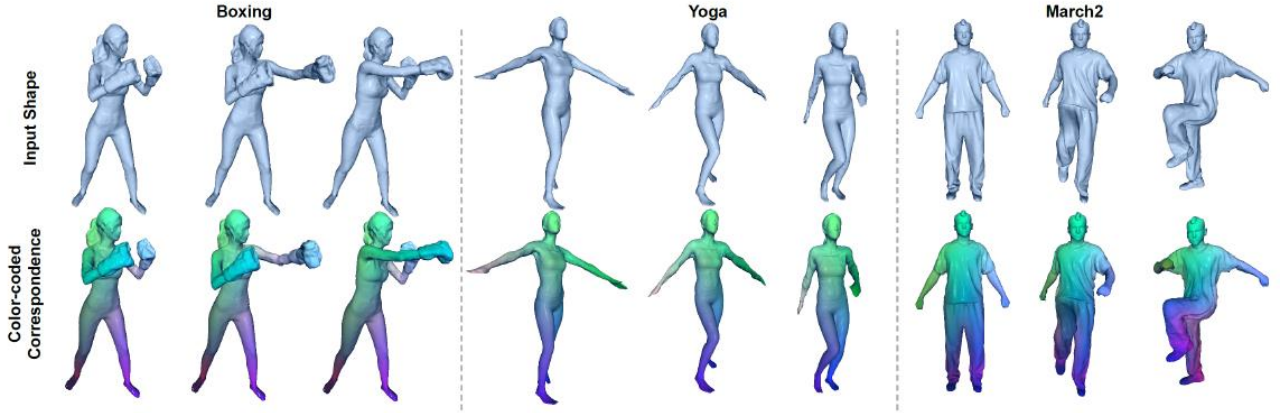


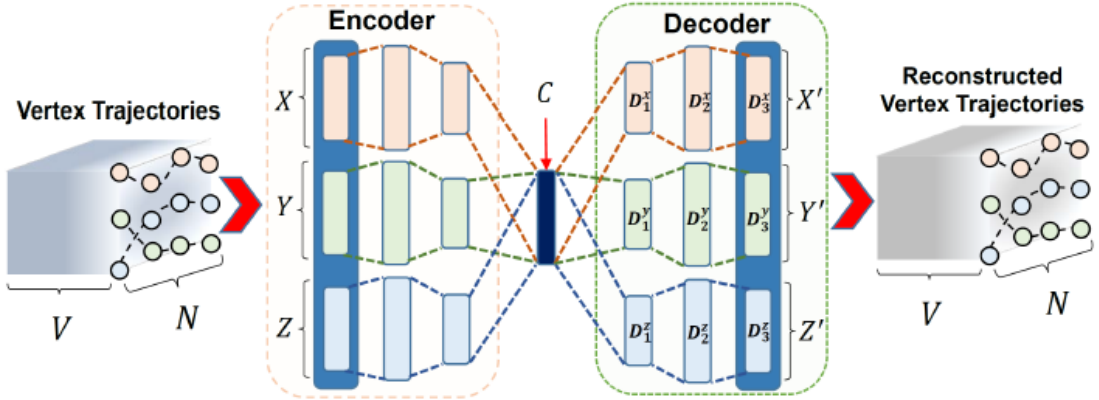
# Hologram Streaming
# Color vs. Position



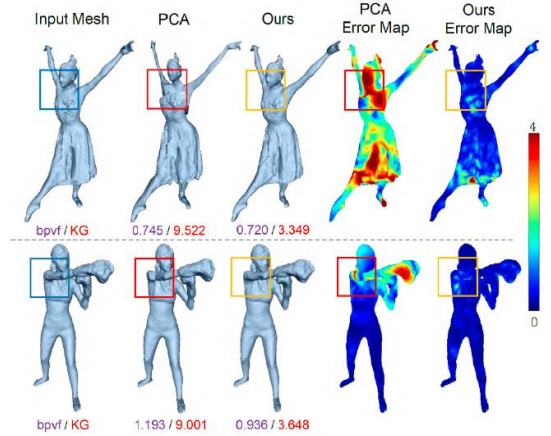
# Deep Encoder/Decoder

$$\boldsymbol{A} = \begin{pmatrix} c_1^1 & c_1^2 & \dots & c_1^N \\ c_2^1 & c_2^2 & \dots & c_2^N \\ \dots & \dots & \dots & \dots \\ c_V^1 & c_V^2 & \dots & c_V^N \end{pmatrix} = \begin{pmatrix} T_1 \\ T_2 \\ \dots \\ T_V \end{pmatrix}$$




Autoencoder Framework




Results

Correspondence Mesh

PCA Decompressed Mesh

Our Decompressed Mesh

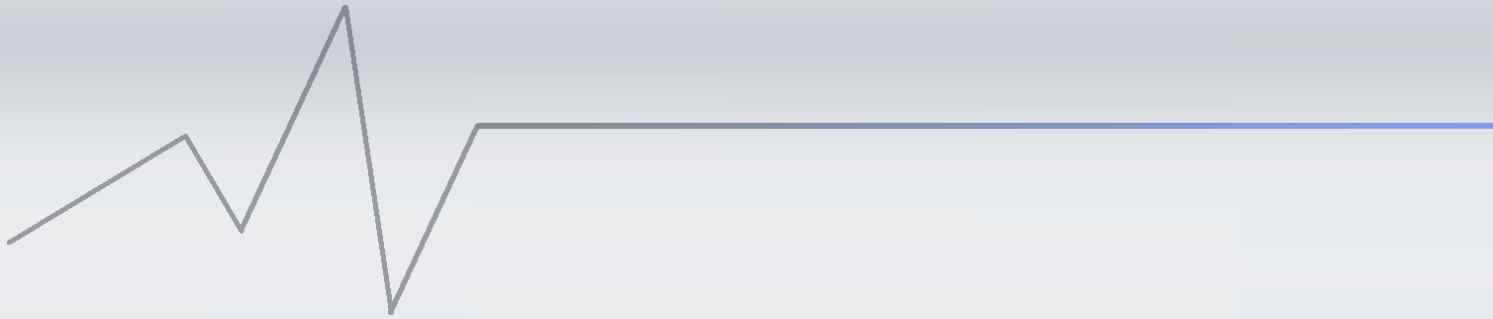
Waking Up Scene

bpvf: 0.7450

bpvf: 0.7198

# Results

# The Future

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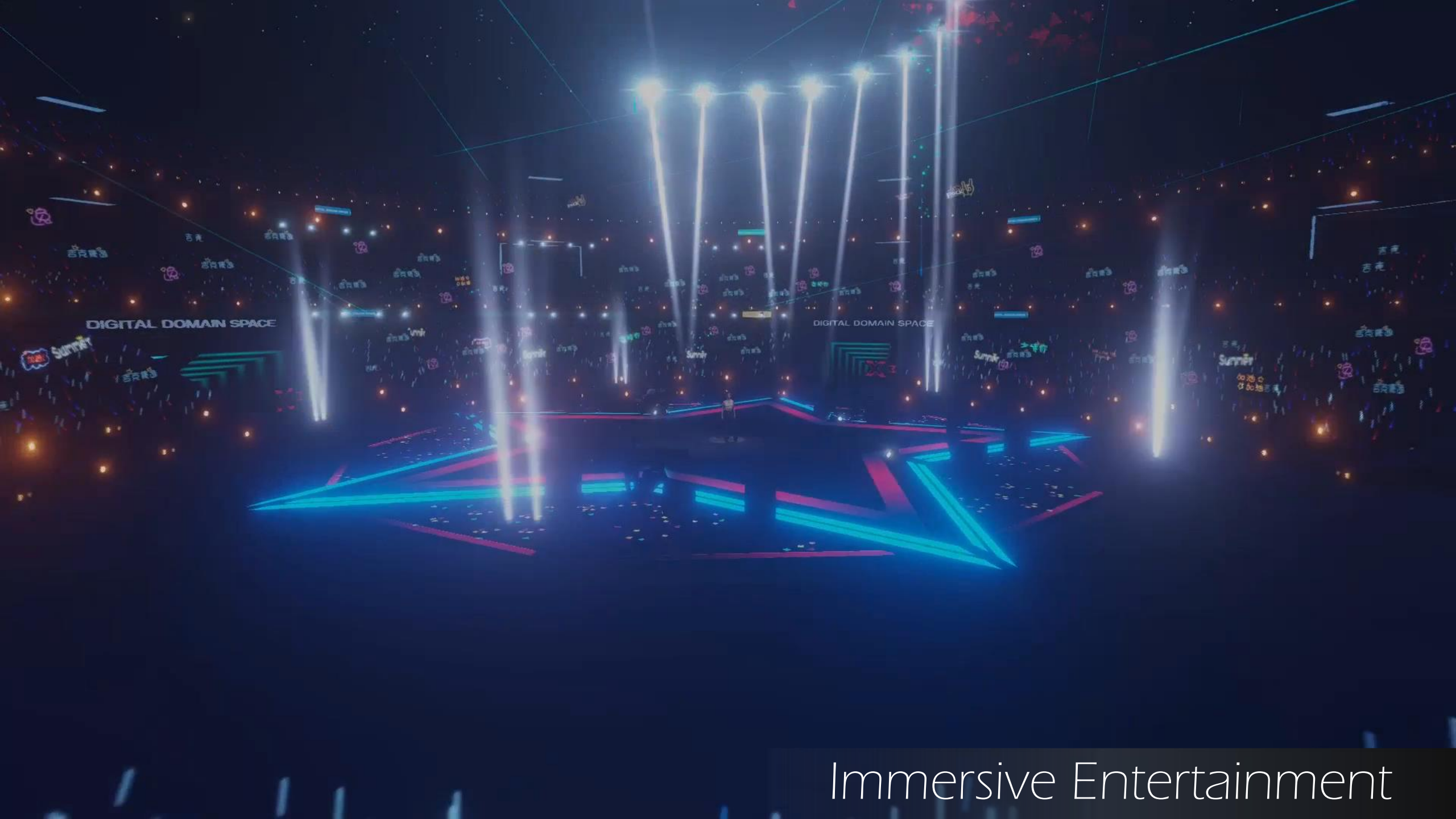
动态对象快速建模




# Immersive Entertainment

# THANKS

## The Future
### – A Story with XG –