



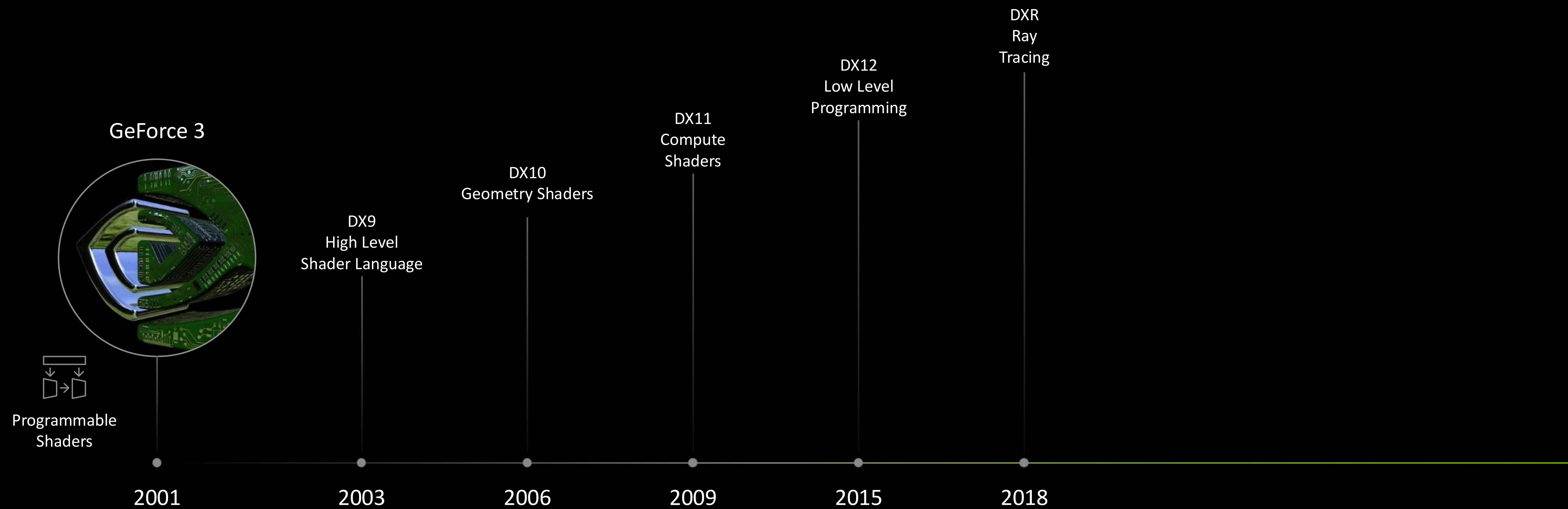
RTX Neural Rendering

CES Editor's Day 2025 Session 1

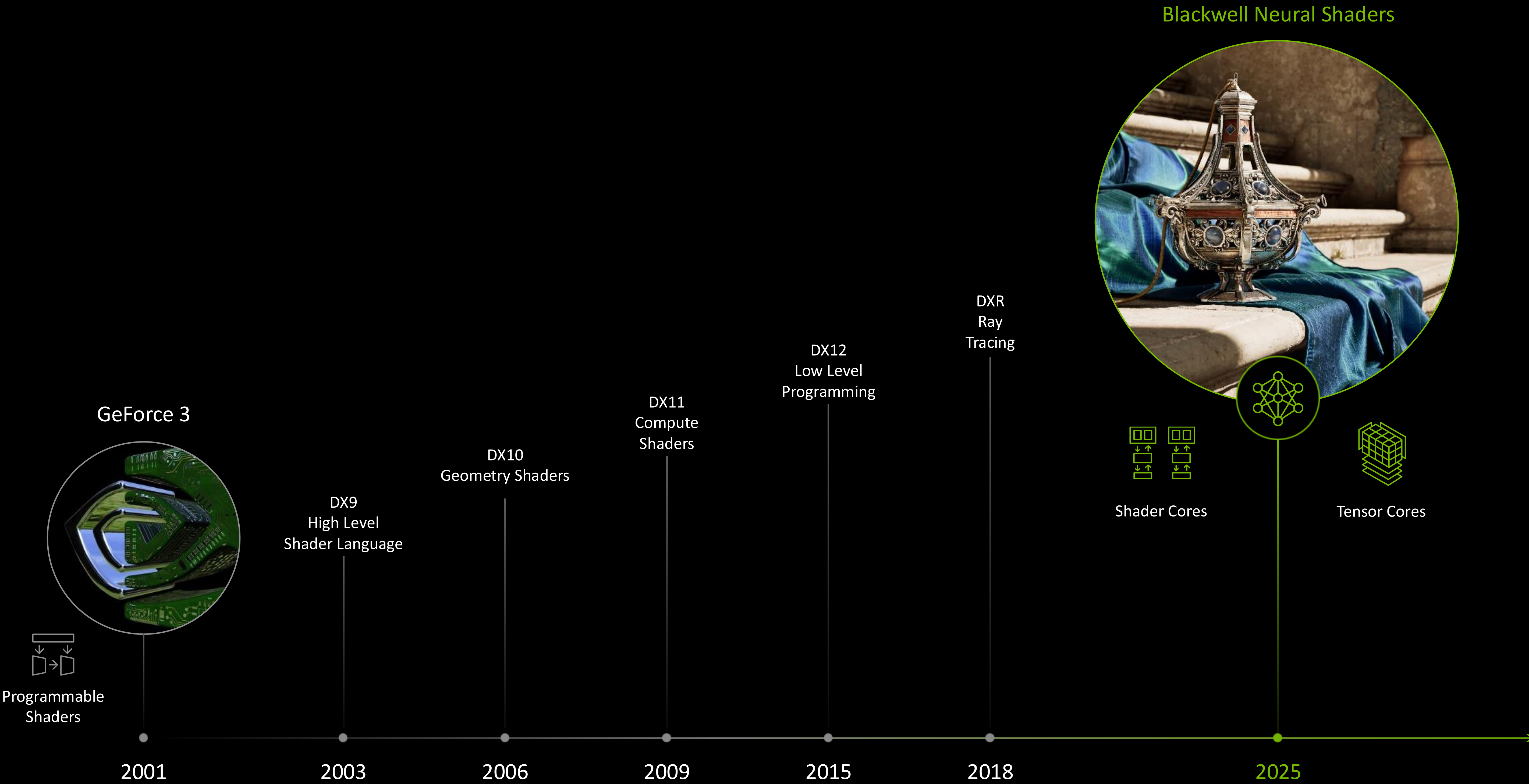
John Spitzer | VP of Developer and Performance Technology, NVIDIA

Programmable Shaders

Igniting two decades of graphics innovation

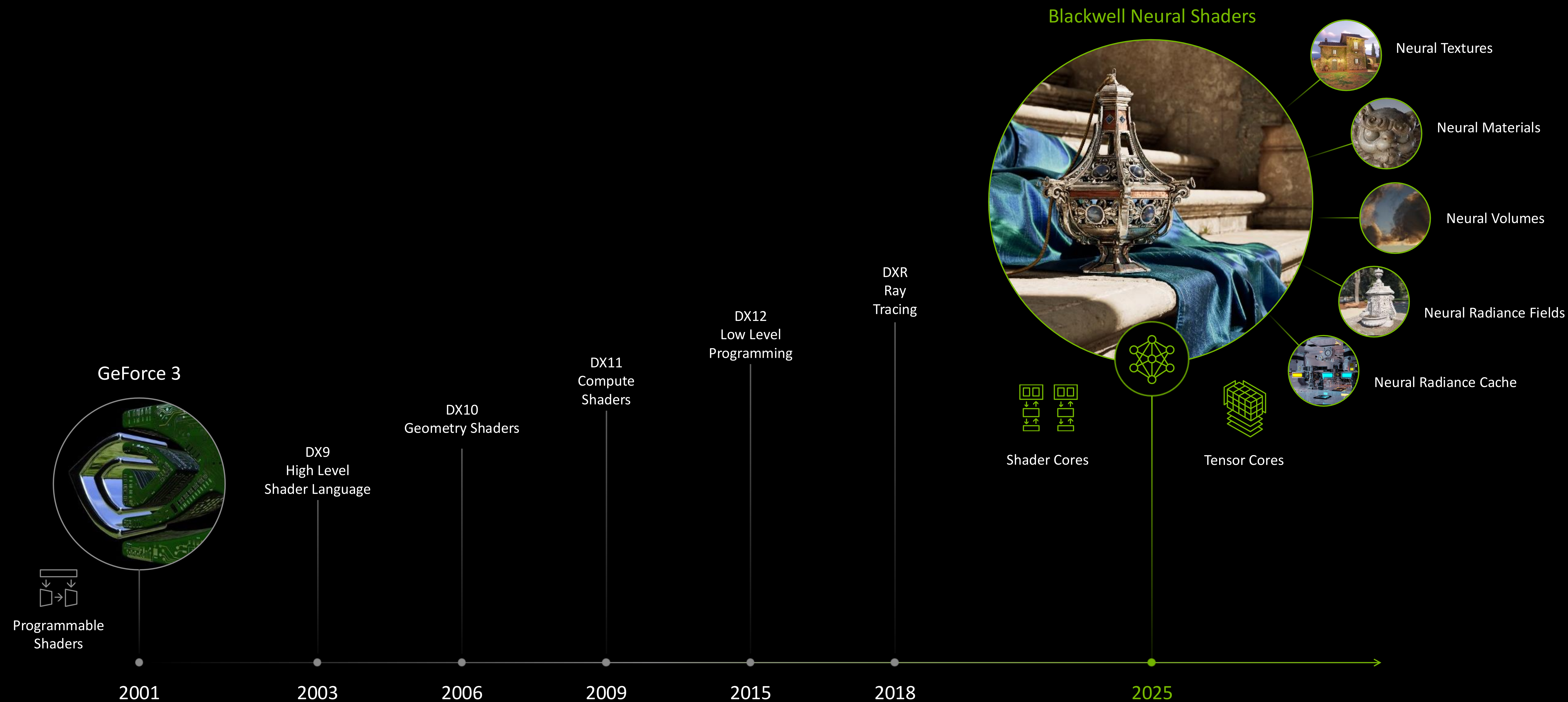


Blackwell Brings AI to Shaders



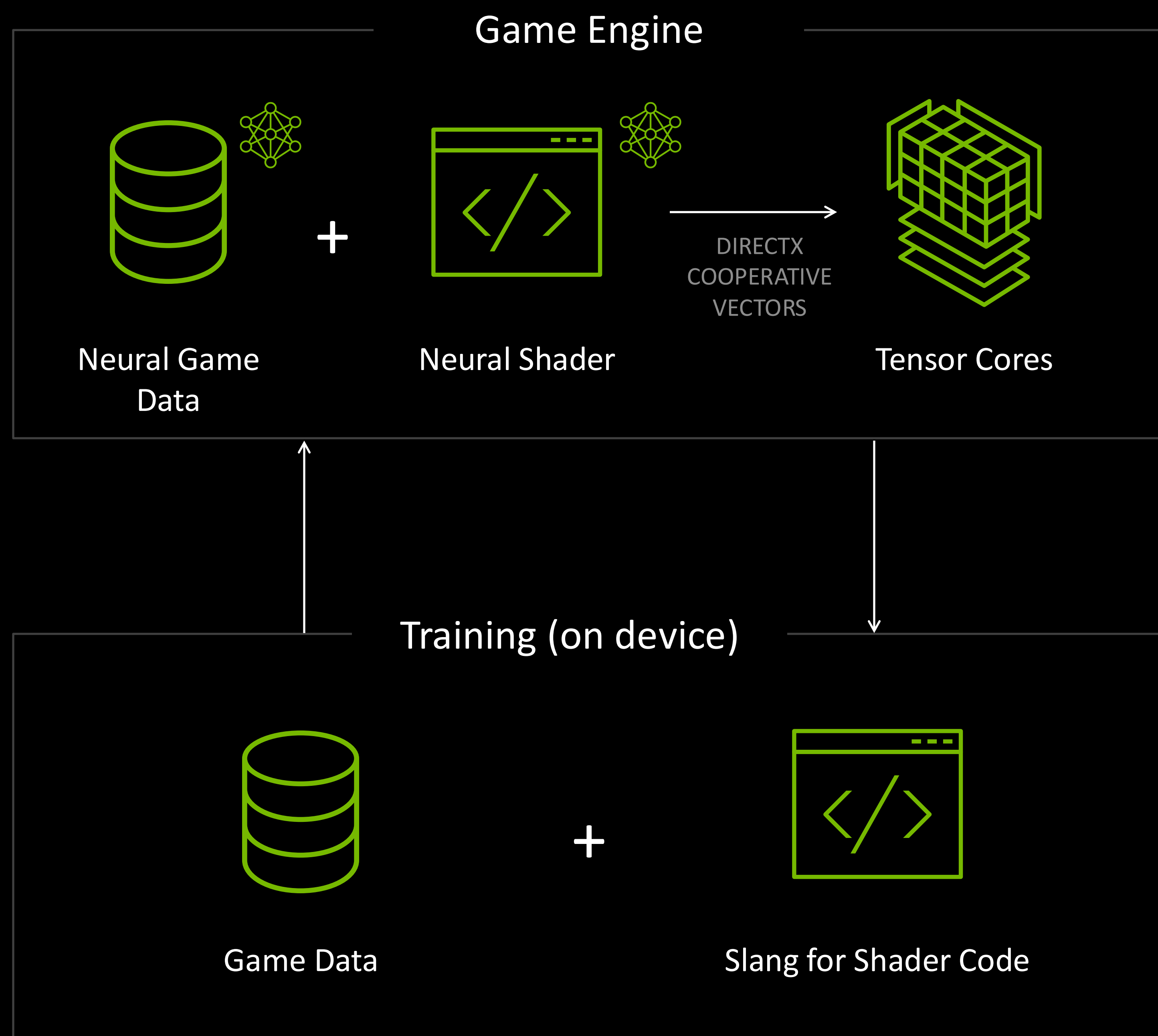
Blackwell Brings AI to Shaders

Unlocking the next two decades of graphics innovation



RTX Neural Shaders

Reinventing how shaders are programmed



“ DirectX will soon support Cooperative Vectors, which will unlock the power of Tensor Cores on NVIDIA’s GeForce RTX hardware and enable game developers to fully accelerate neural shaders on Windows.

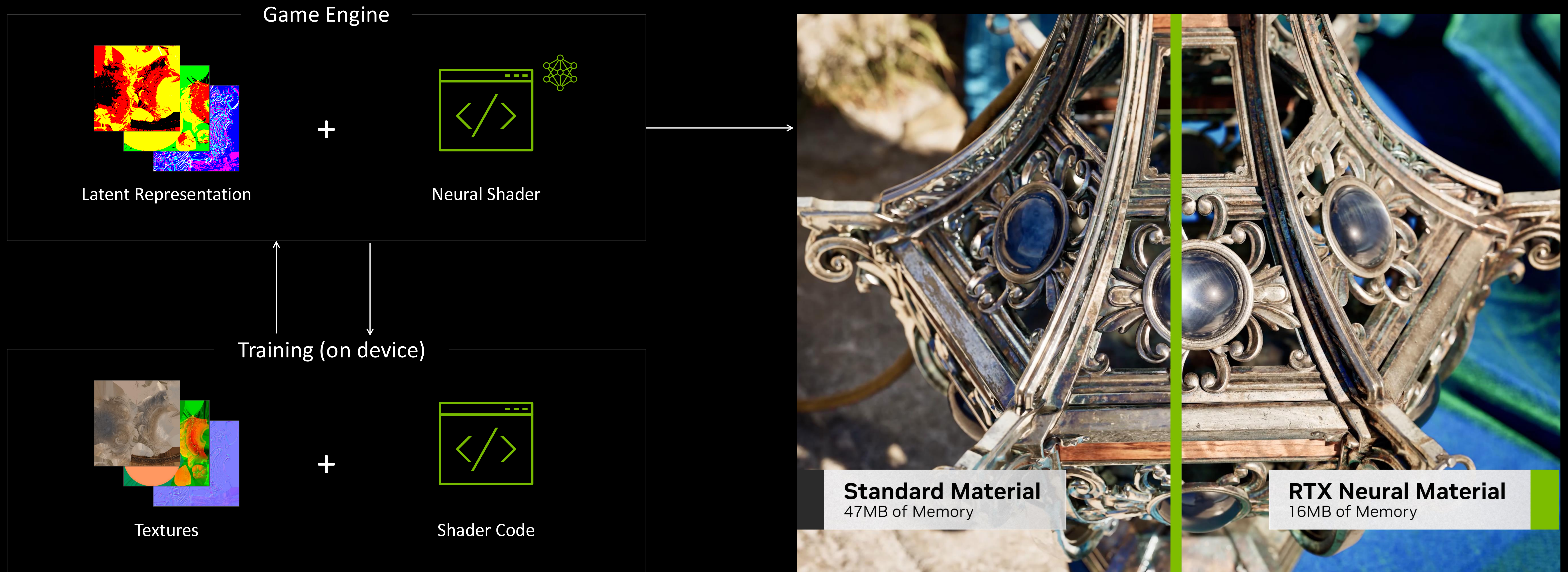
— Bryan Langley

Partner Group Program Manager of Silicon, Media, and Graphics at Microsoft



RTX Neural Materials

Film quality assets in real-time



Live Demo: RTX Neural Materials

RTX Neural Radiance Cache

A Neural Shader for path traced indirect lighting and performance



Trace 1 bounce per pixel | Infer many more bounces



Original

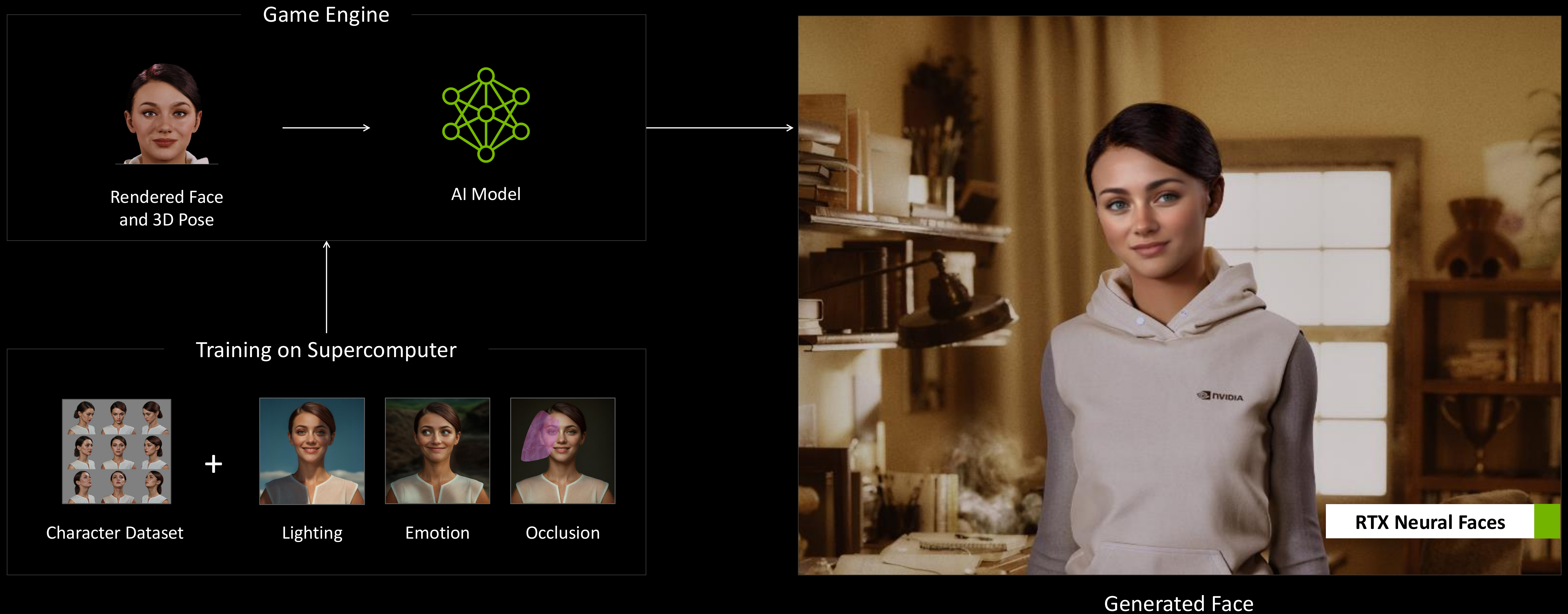


RTX Skin

Live Demo: NRC + RTX Skin

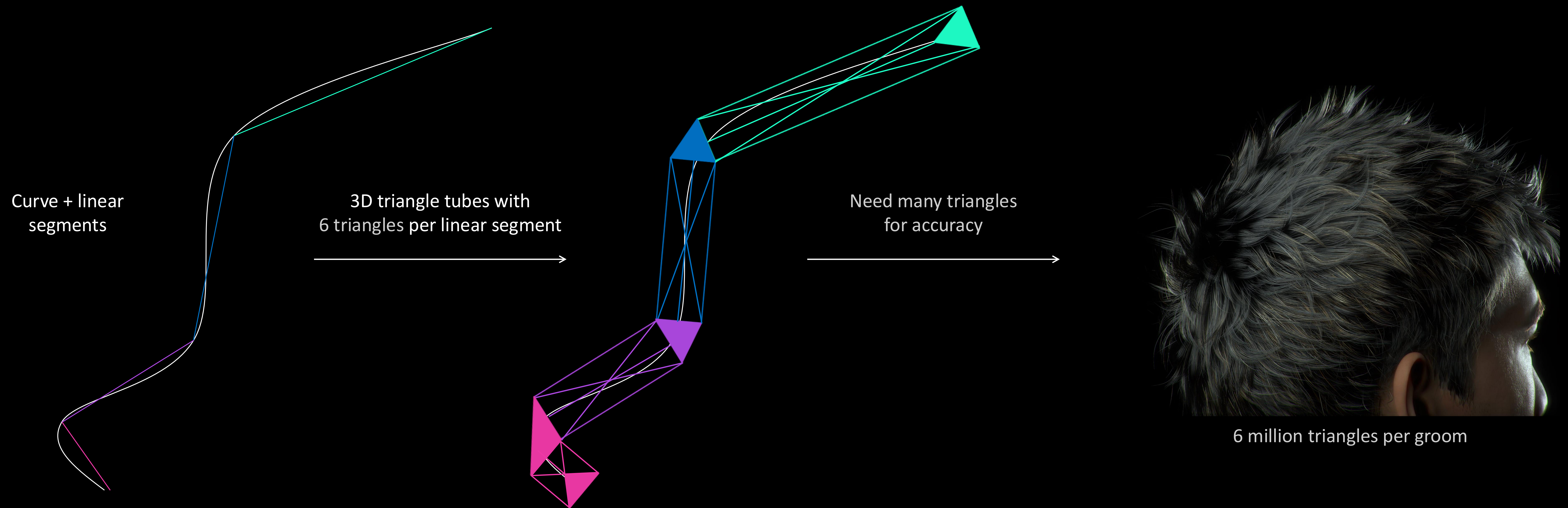
RTX Neural Faces

Generative AI Faces

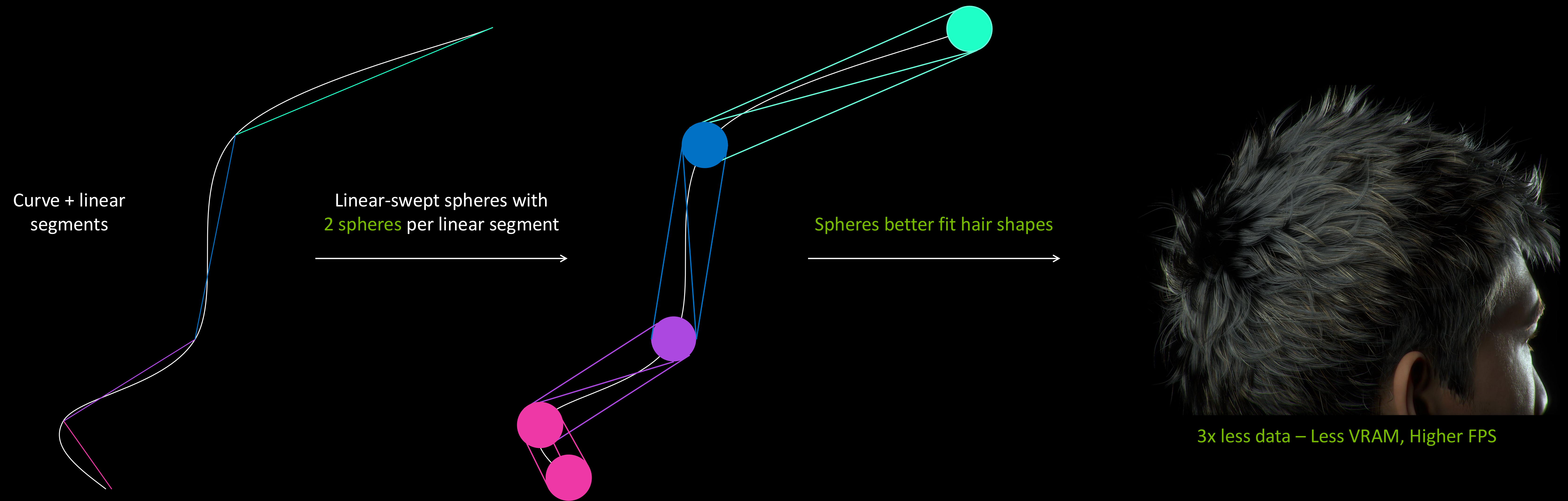


Live Demo: RTX Neural Faces

Ray Traced Strand Based Hair is Expensive



Blackwell-Accelerated Ray Traced Hair

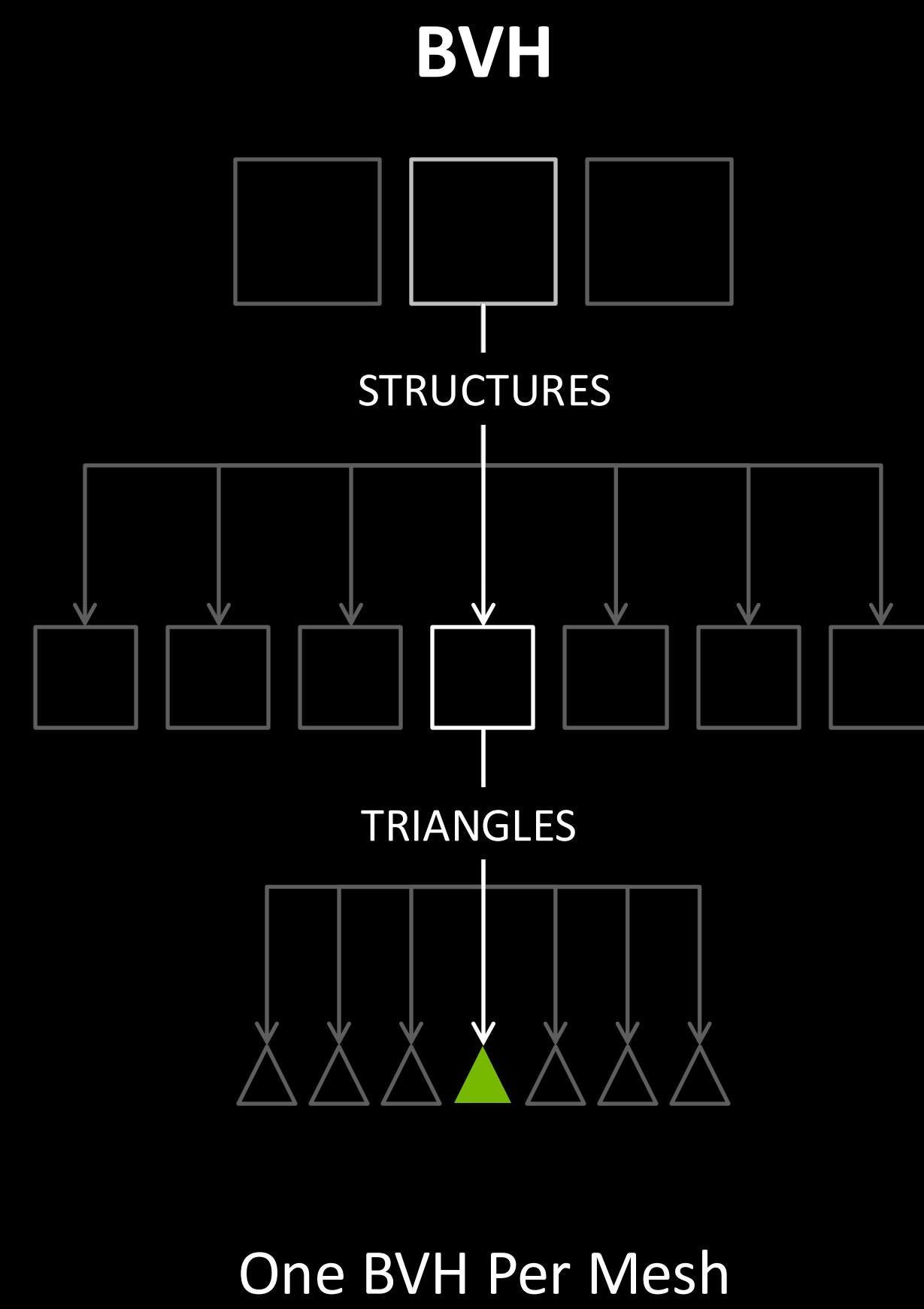


3x less data – Less VRAM, Higher FPS

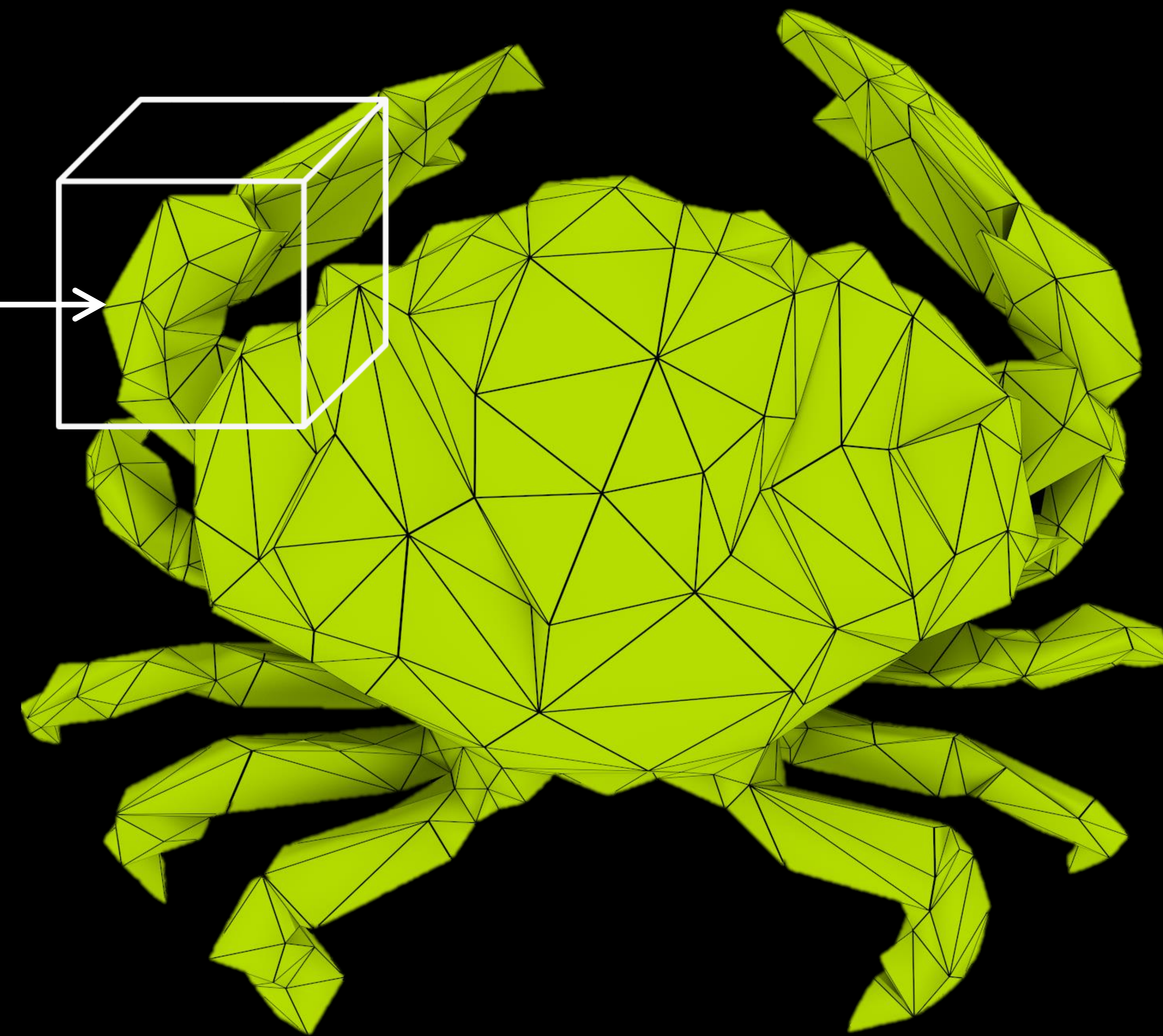
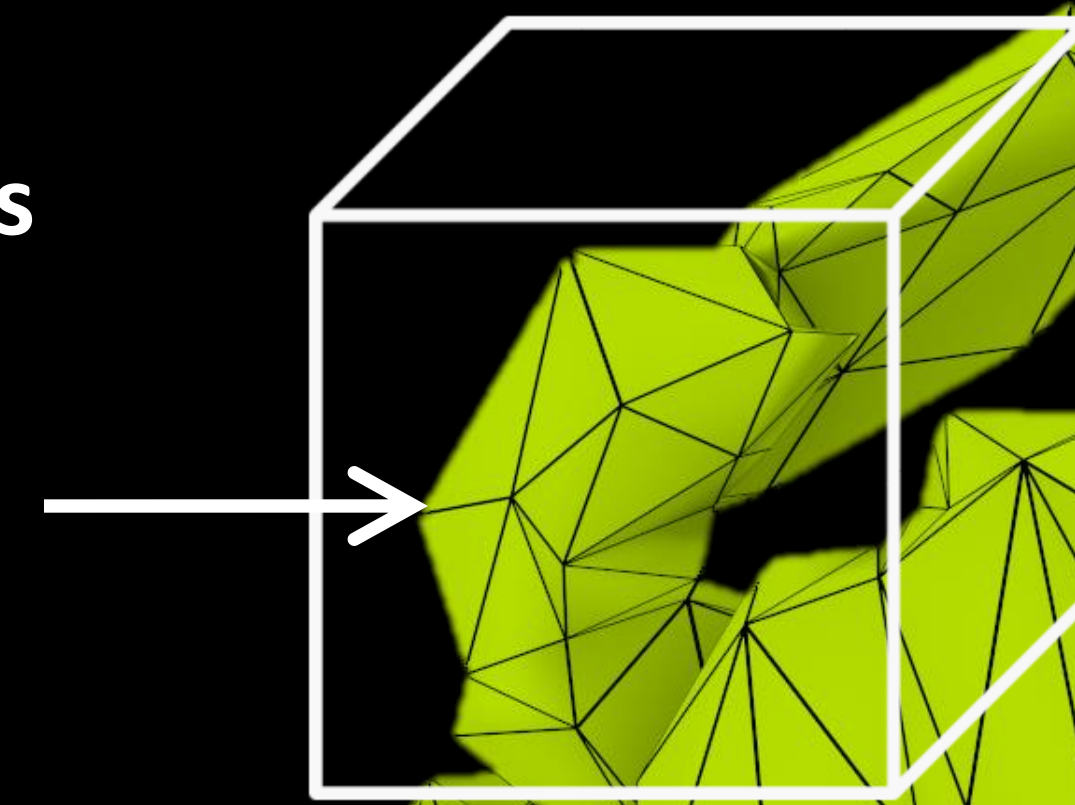
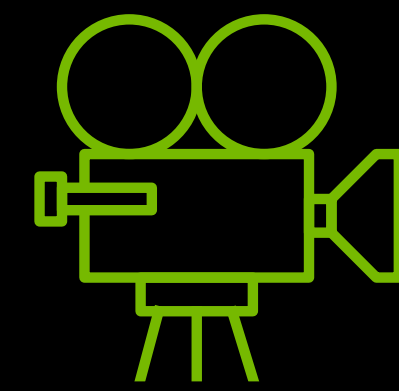
30 Years of Increasing Geometry



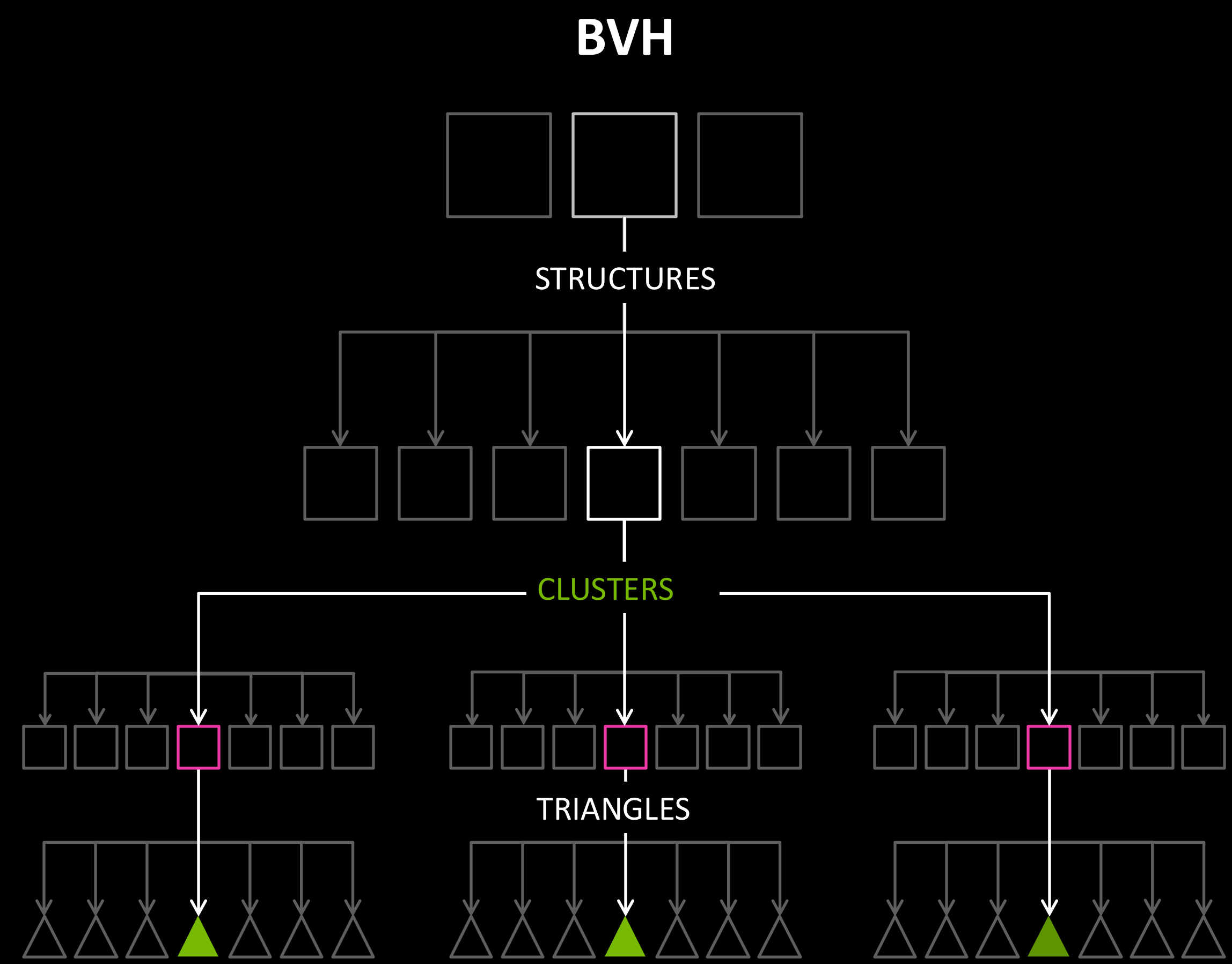
Ray Tracing 101



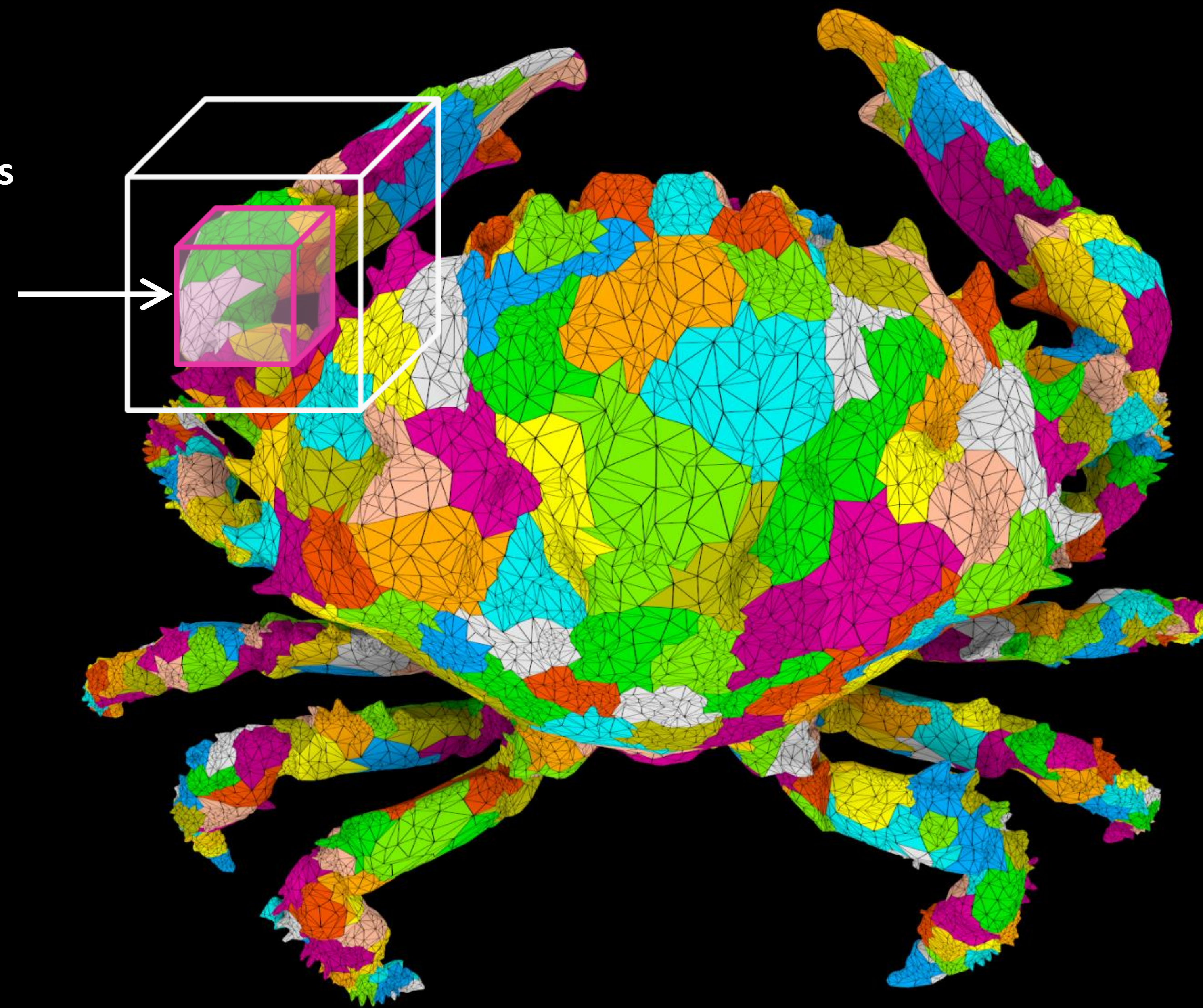
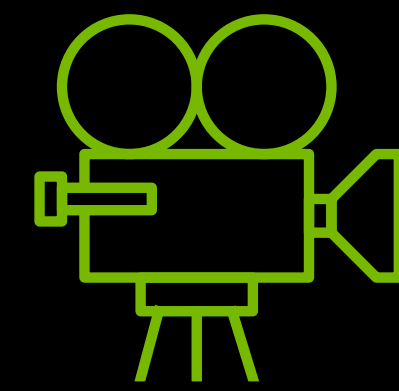
Trace Rays



Cluster Based Geometry 101

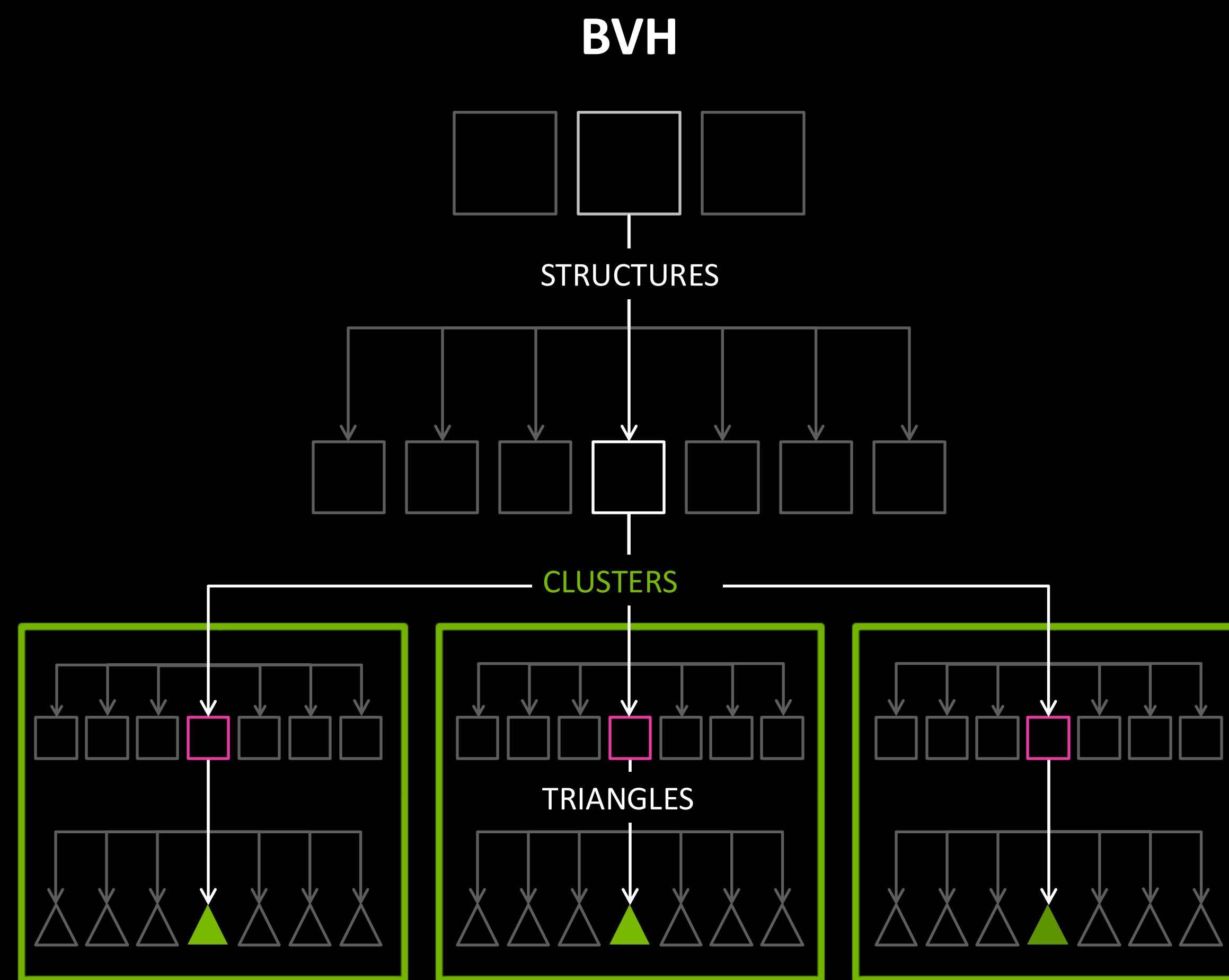


Trace Rays



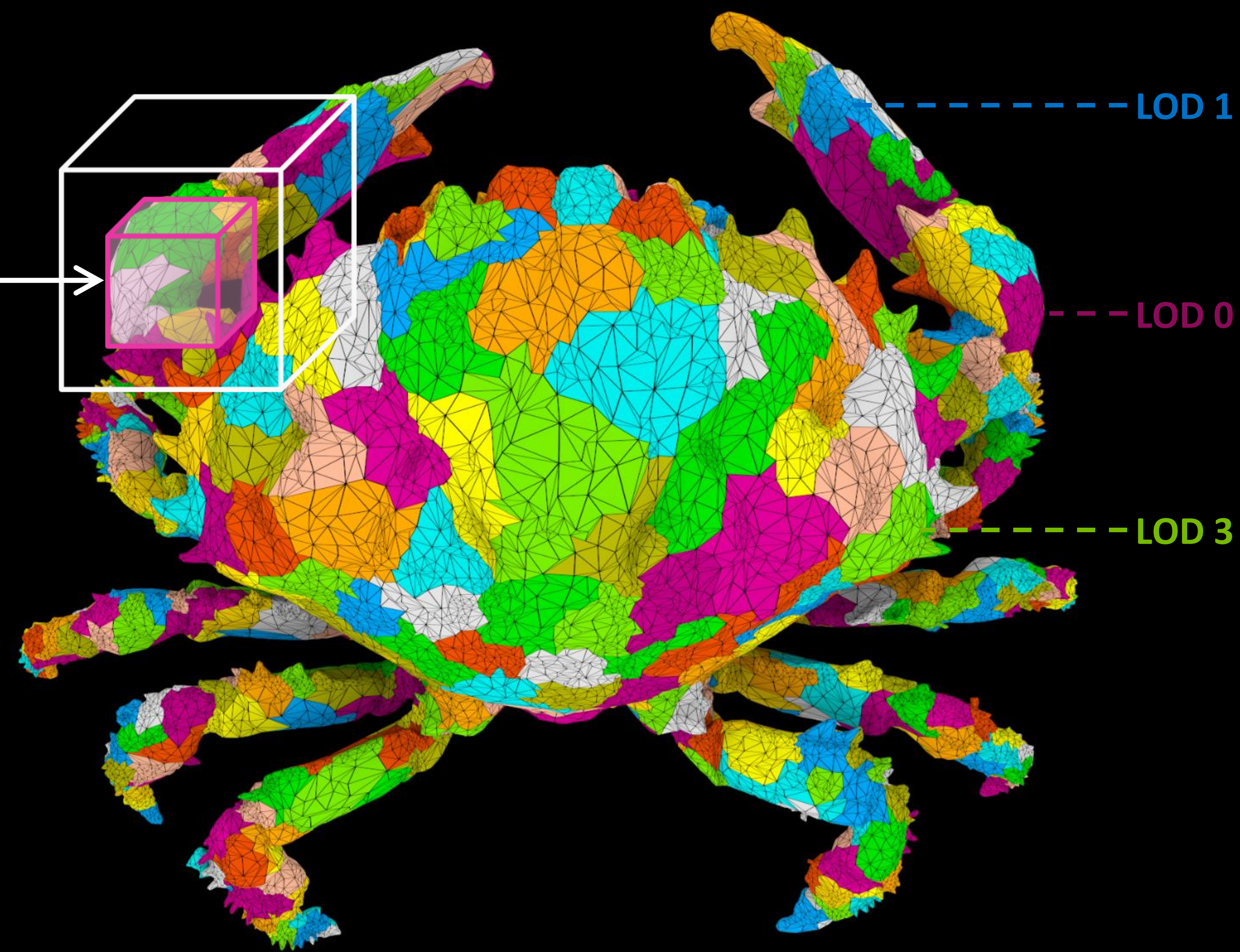
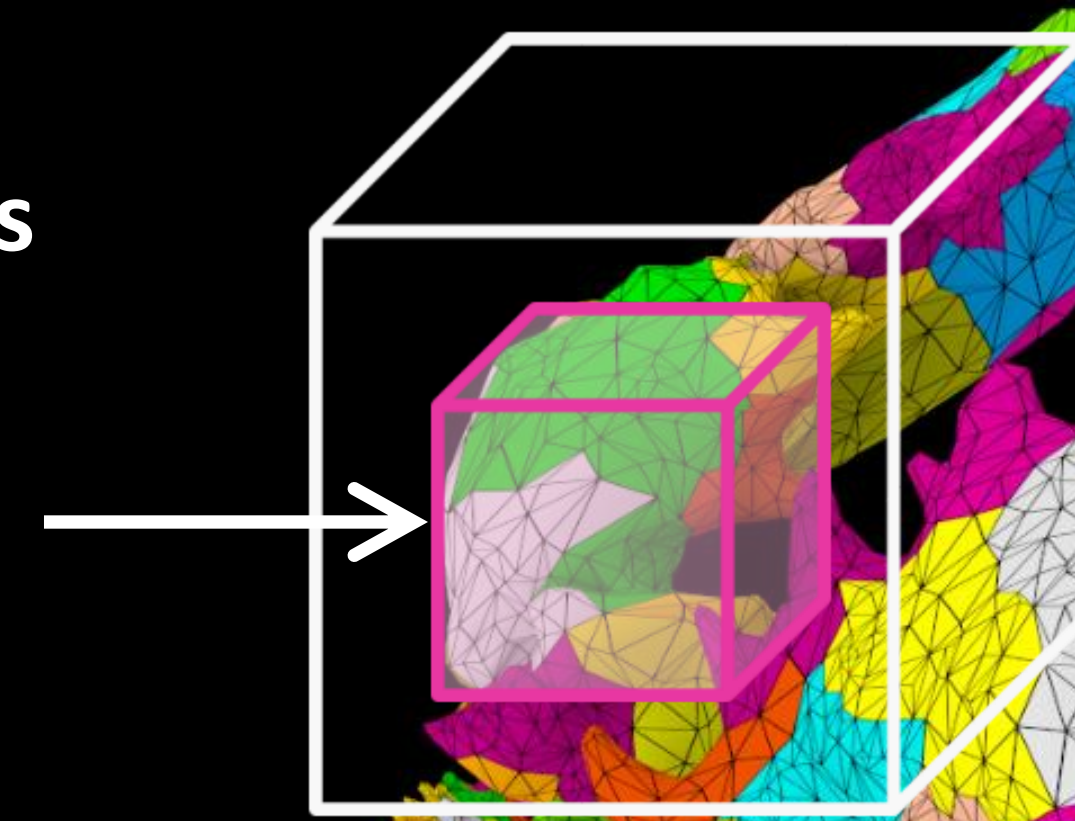
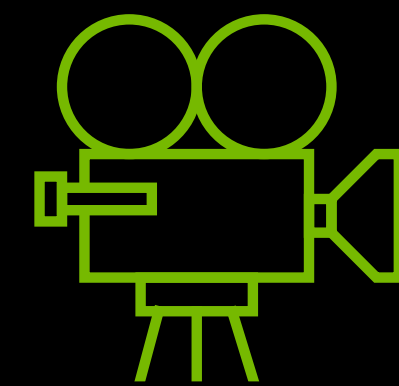
RTX Mega Geometry

Accelerate BVH updates for cluster-based systems like Nanite



Compress and Cache Clusters Over Many Frames

Trace Rays

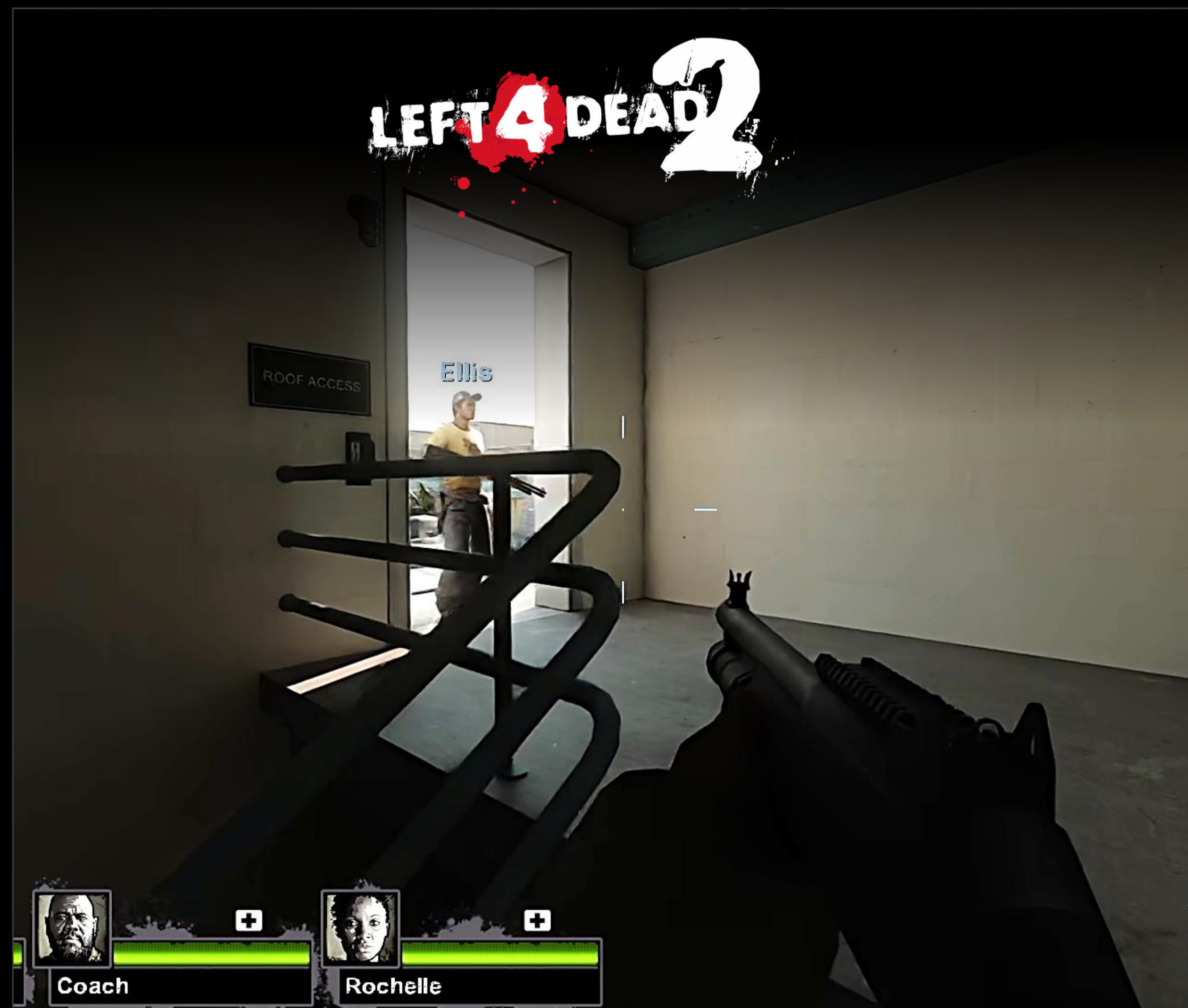


Mesh Composed of Clusters at Different LOD Levels

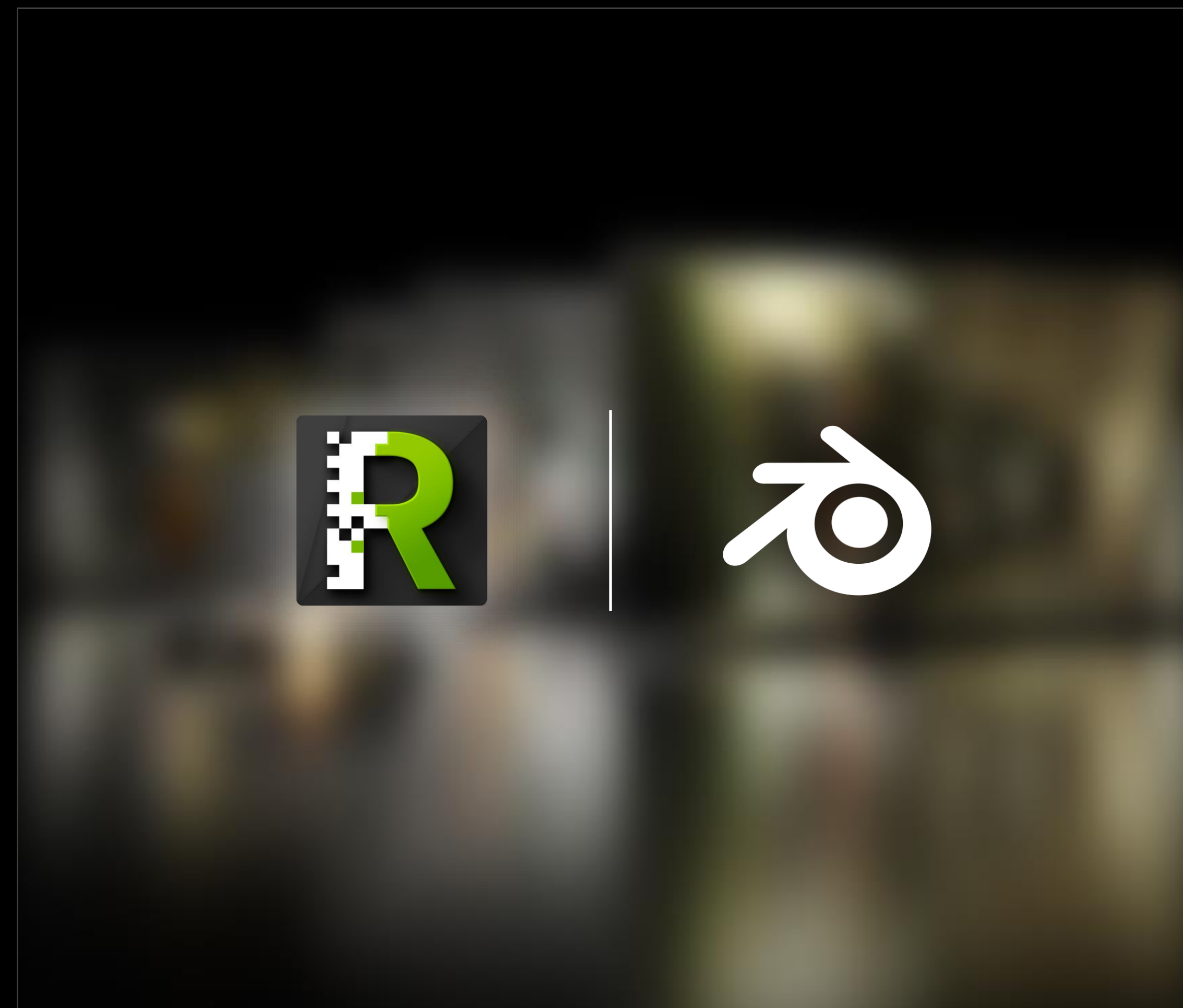
Live Demo: Zorah

Live Demo: Dragons

RTX Remix: One Year Anniversary



145+ Compatible Games



Enhanced RTX Remix Tools



Community Gen AI Models

32,000

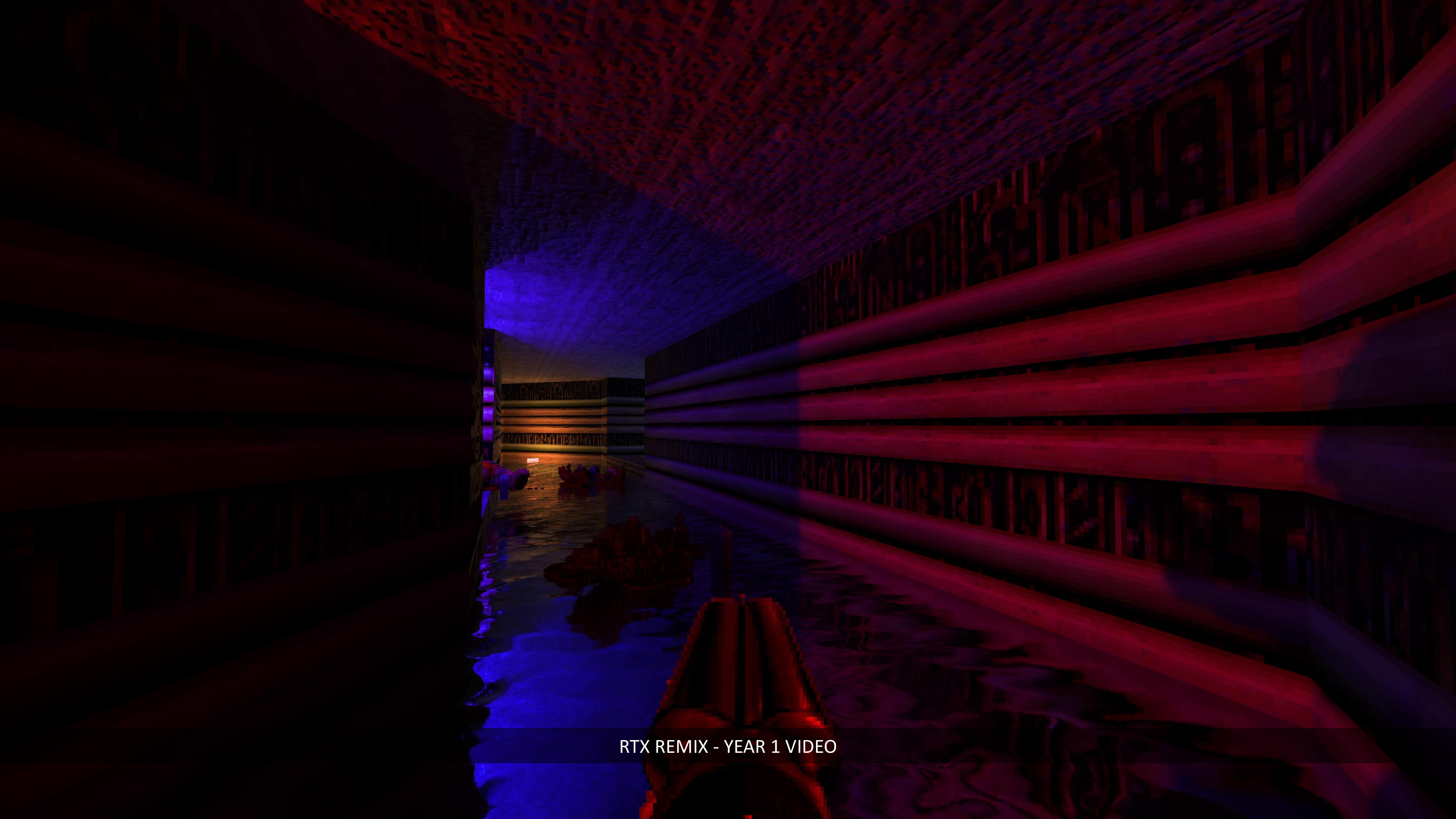
RTX Remix Modders

350

RTX Remix Mod Projects

90

Published Mods



RTX REMIX - YEAR 1 VIDEO

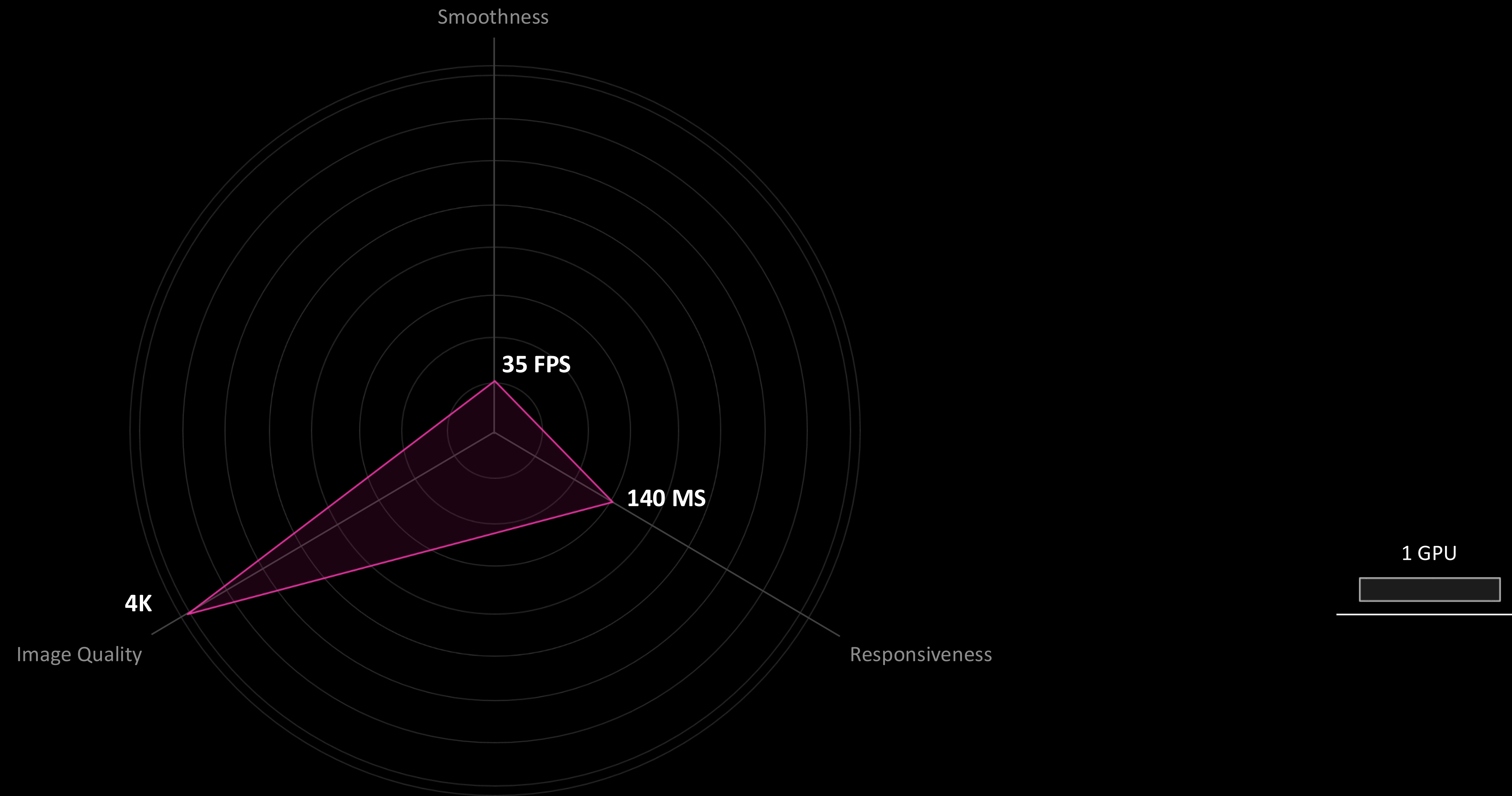


RTX Neural Rendering

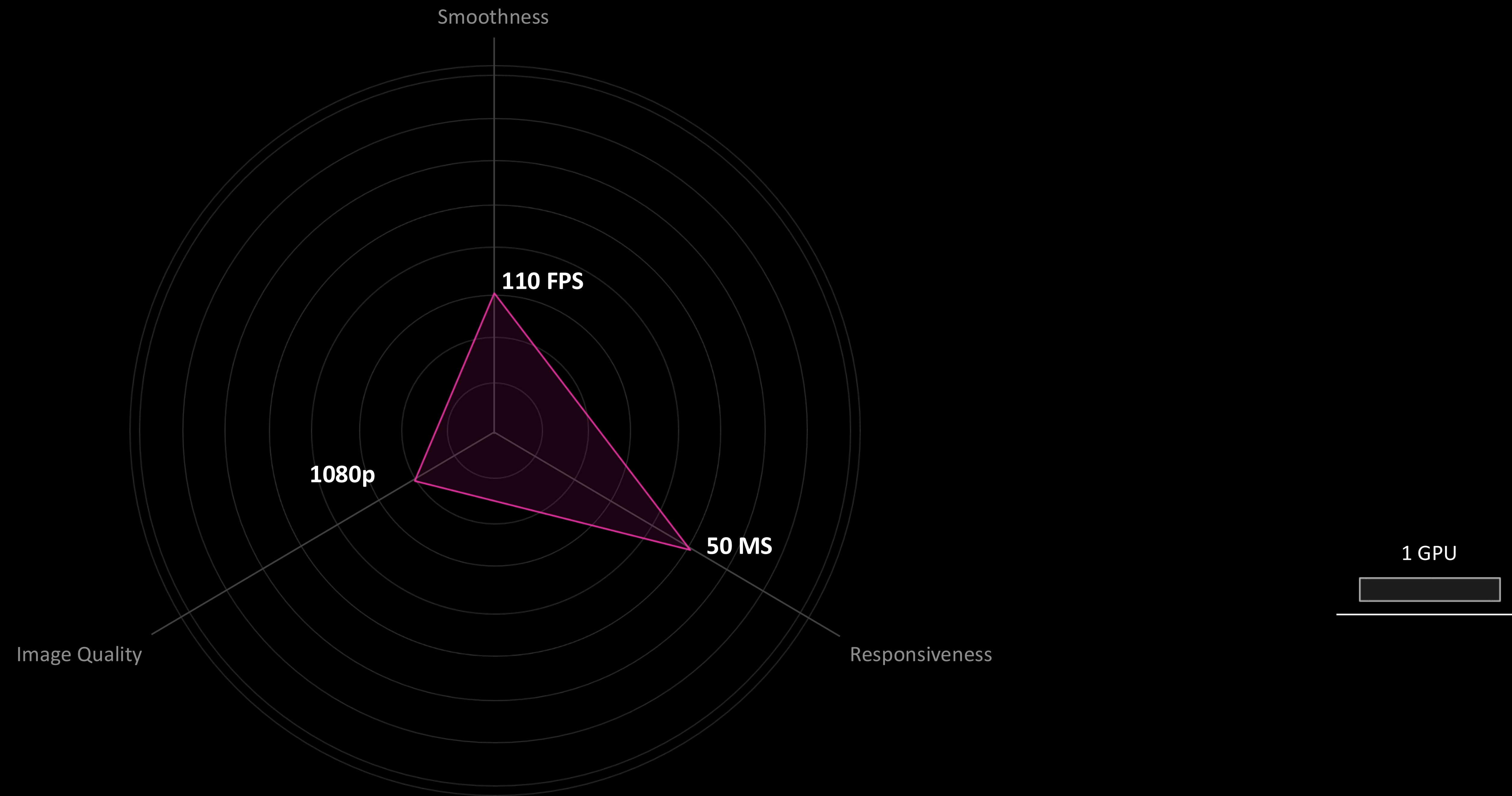
CES Editor's Day 2025 Session 1

Bryan Catanzaro | VP of Applied Deep Learning Research, NVIDIA

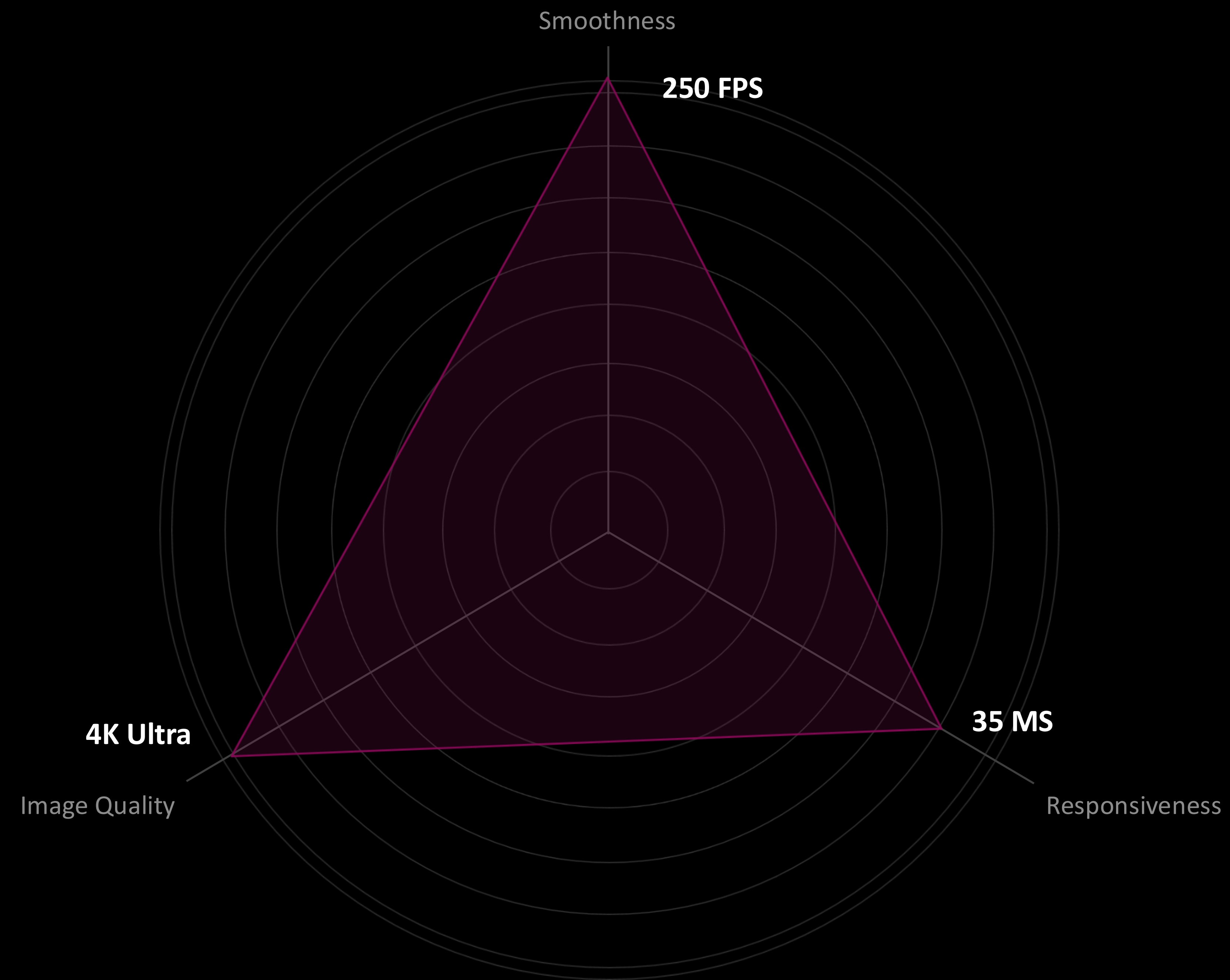
Three Pillars of Real-Time Graphics



Three Pillars of Real-Time Graphics

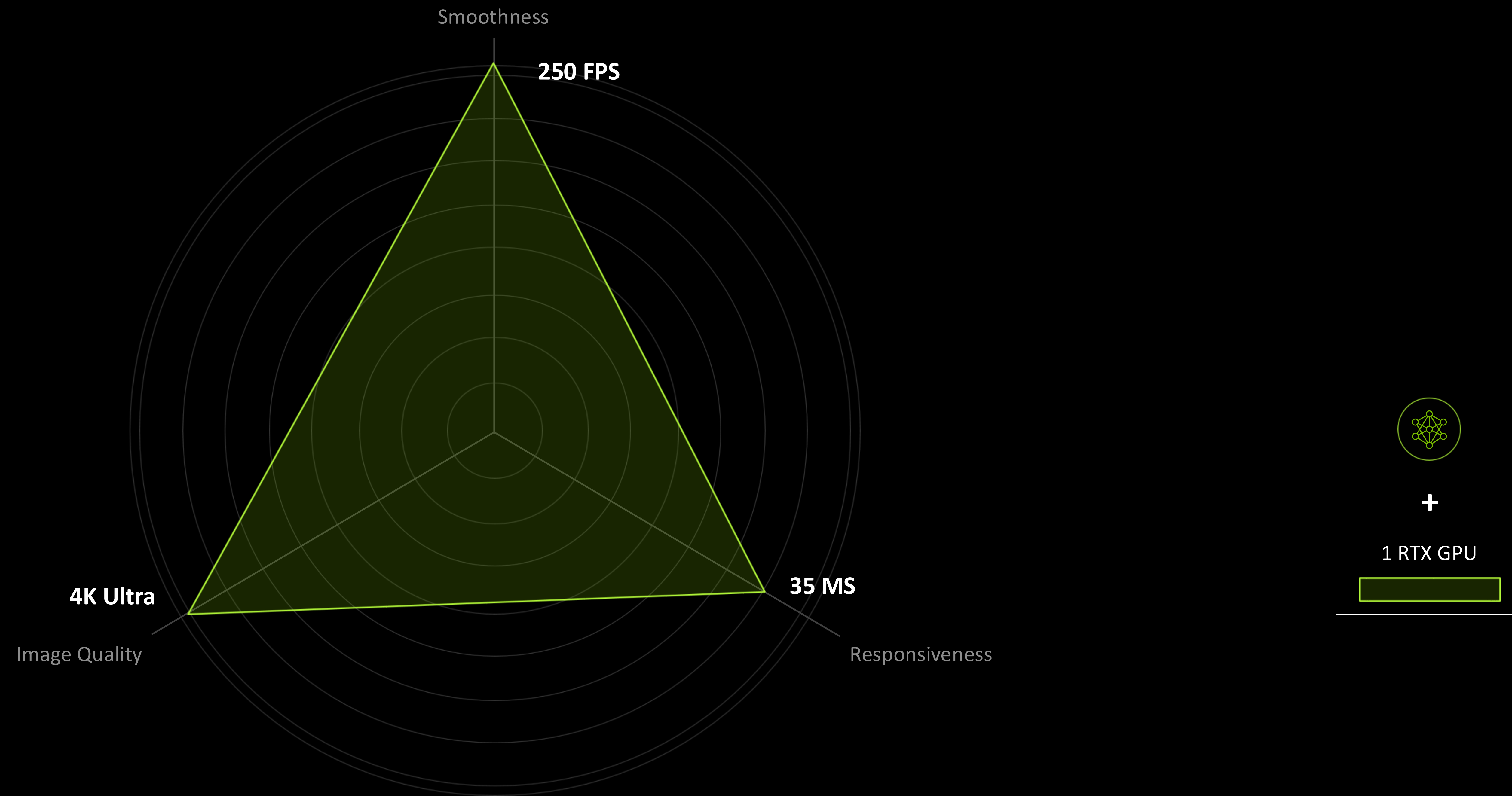


Three Pillars of Real-Time Graphics



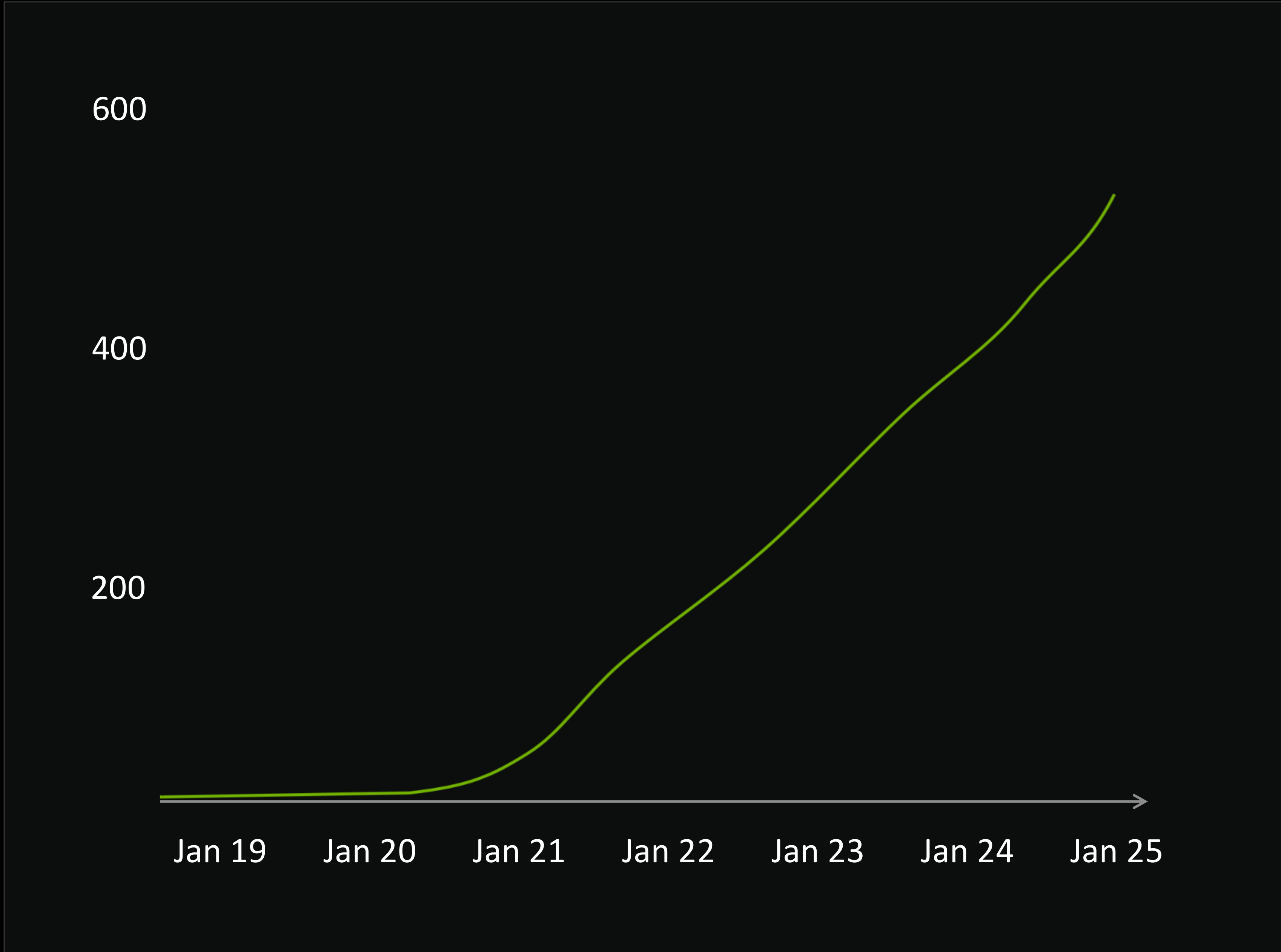
10 GPUS?

AI Provides 10X Leap in Graphics



NVIDIA DLSS

Supreme speed, superior visuals, powered by AI



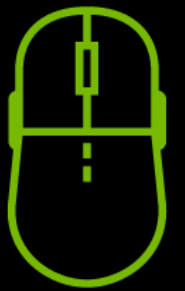
540+
DLSS games & apps



15 of 20
Top 2024 games

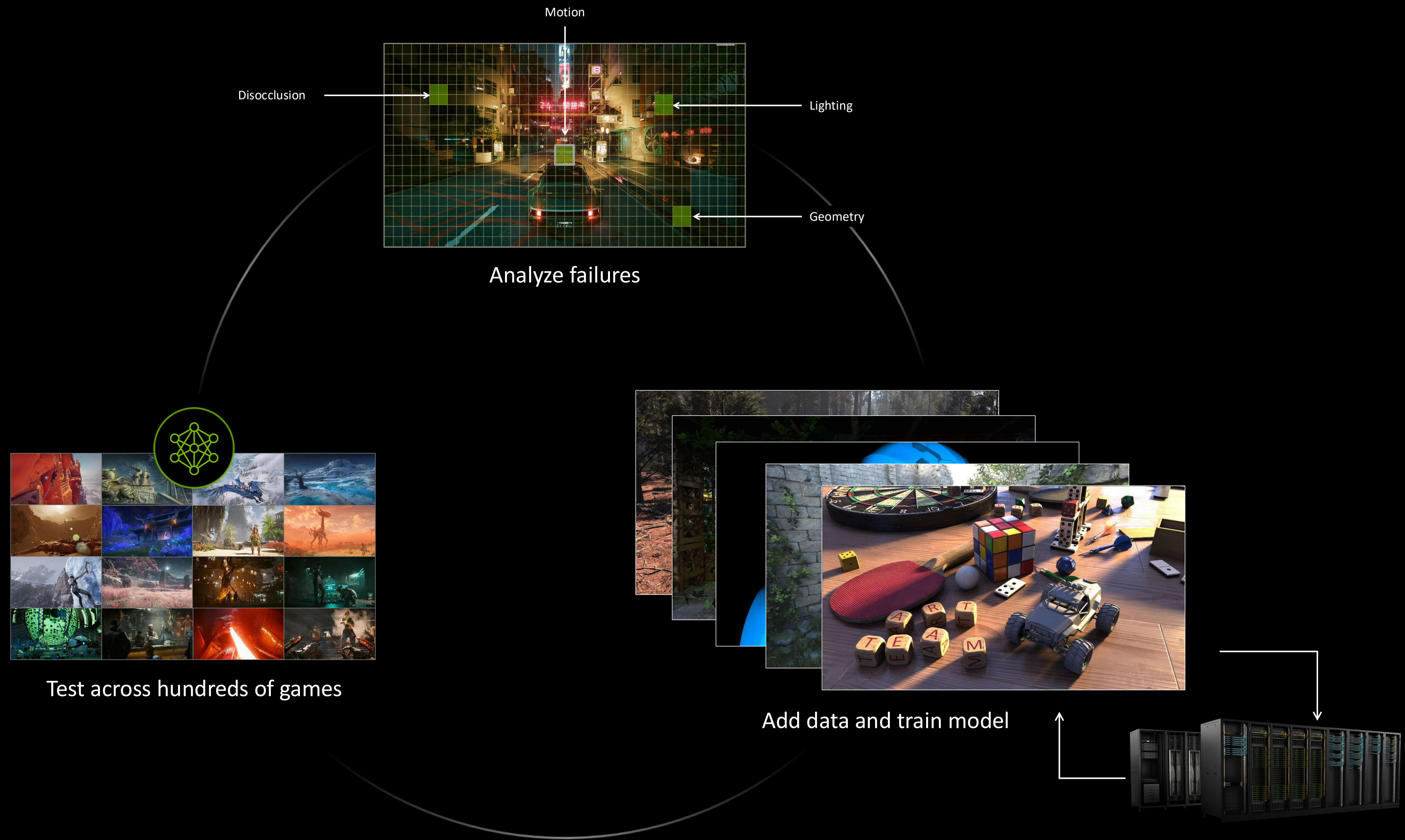


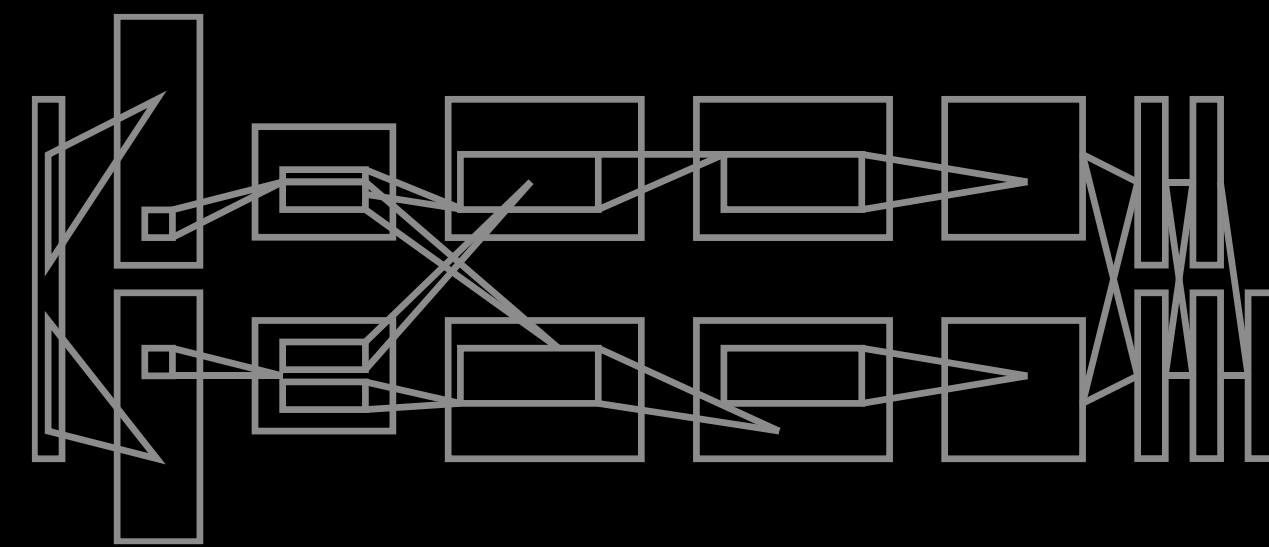
>80%
of RTX players
activate DLSS



3 Billion Hours
of hours played
with DLSS

DLSS: 6 Years of Continuous Learning

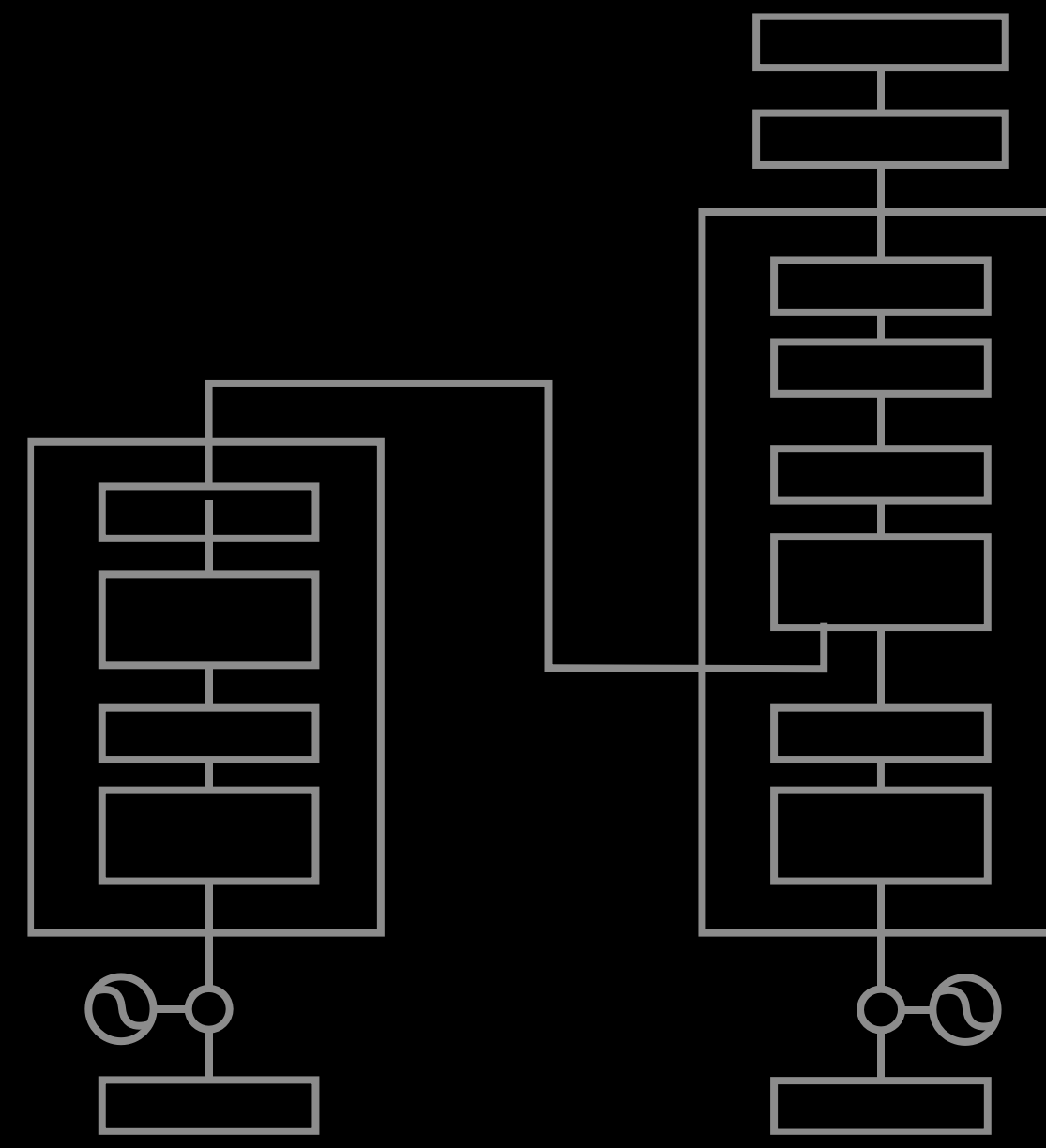




CNN Model



**“Curious Cat’s
Hummingbird Encounter”**

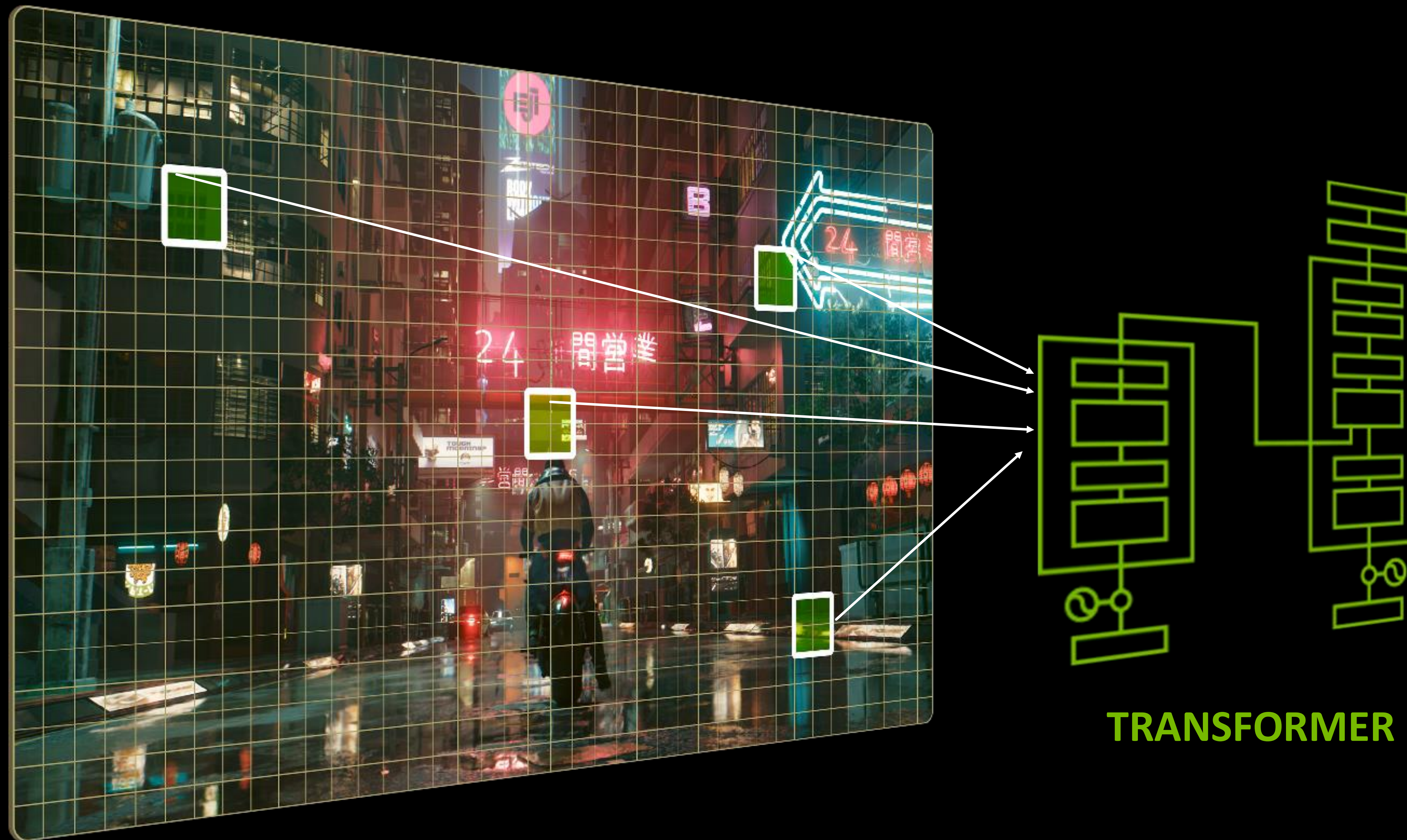


Transformer Model



Transformers Come to DLSS

2X parameters, 4X compute, amazing image quality





Ray Reconstruction
(CNN Model)



Ray Reconstruction
(Transformer Model)



Super Resolution
(Current CNN)



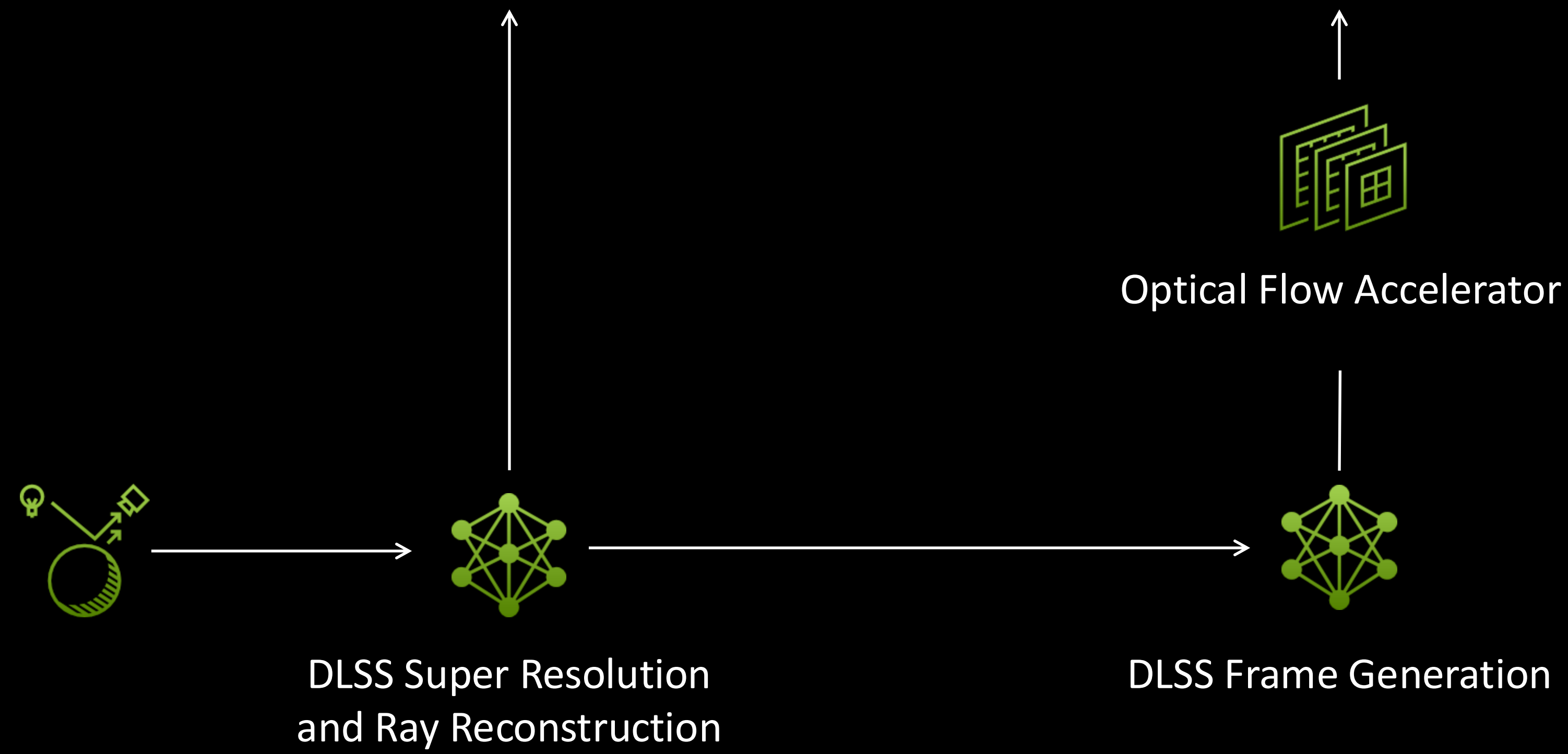
Super Resolution
(New Transformer)

DLSS 3 Frame Generation

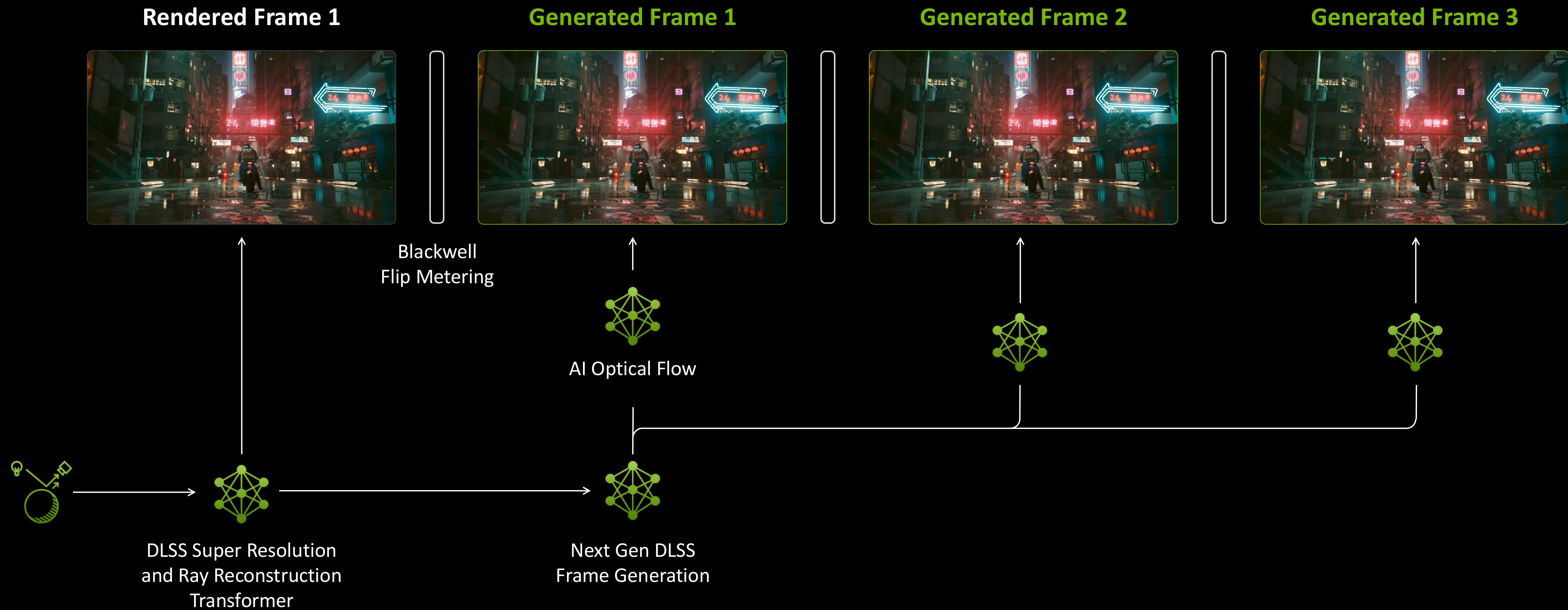
Rendered Frame 1



Generated Frame 1

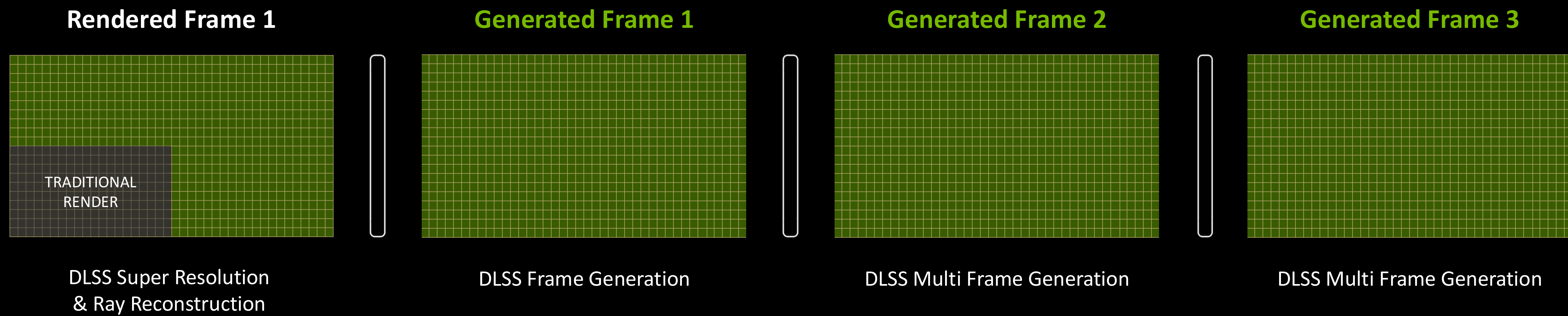


DLSS 4 Multi Frame Generation

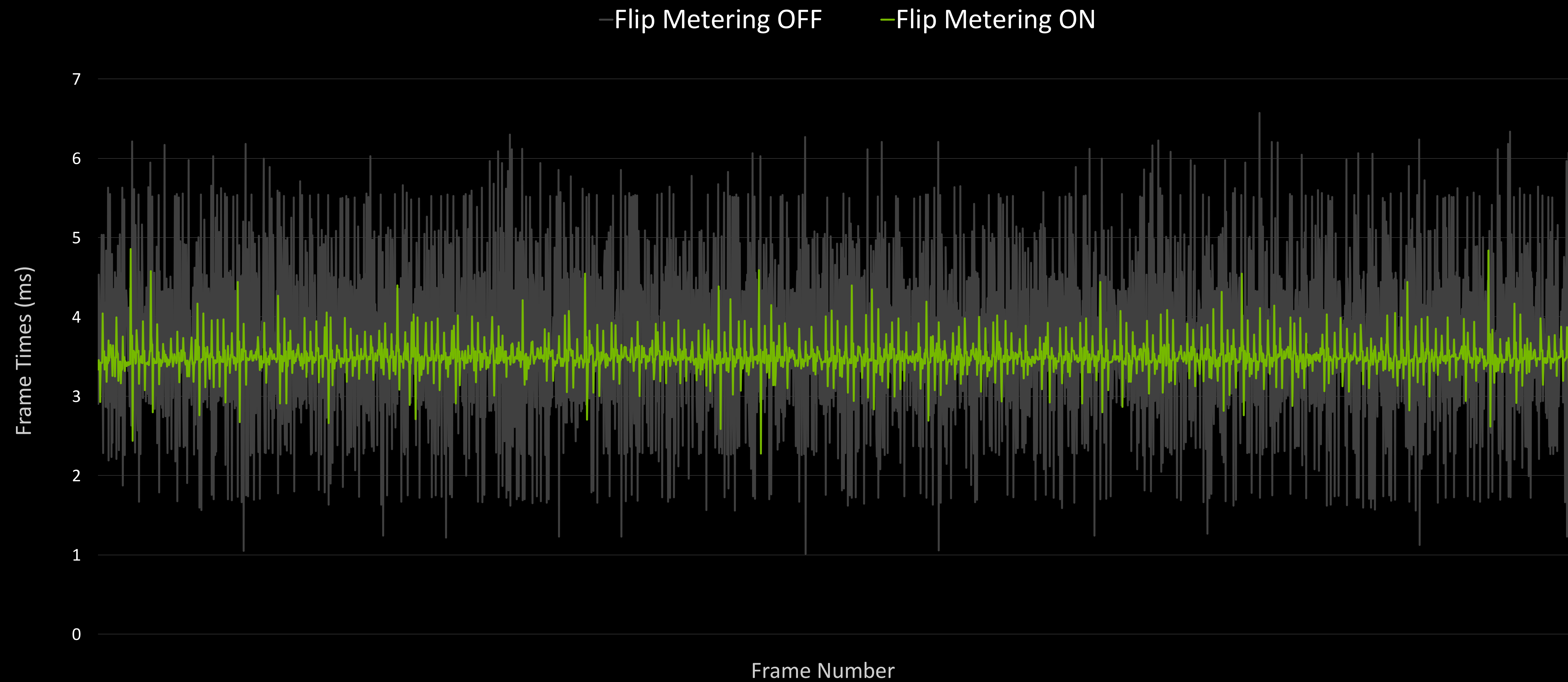


DLSS 4 with Multi Frame Generation

15 of 16 pixels generated by AI



Flip Metering Accurately Paces Frames



27
FPS

PC Latency: 71 ms



71
FPS

PC Latency: 34 ms



140
FPS

PC Latency: 35 ms



248
FPS

PC Latency: 34 ms



Video: DLSS 4 Way

DLSS OFF

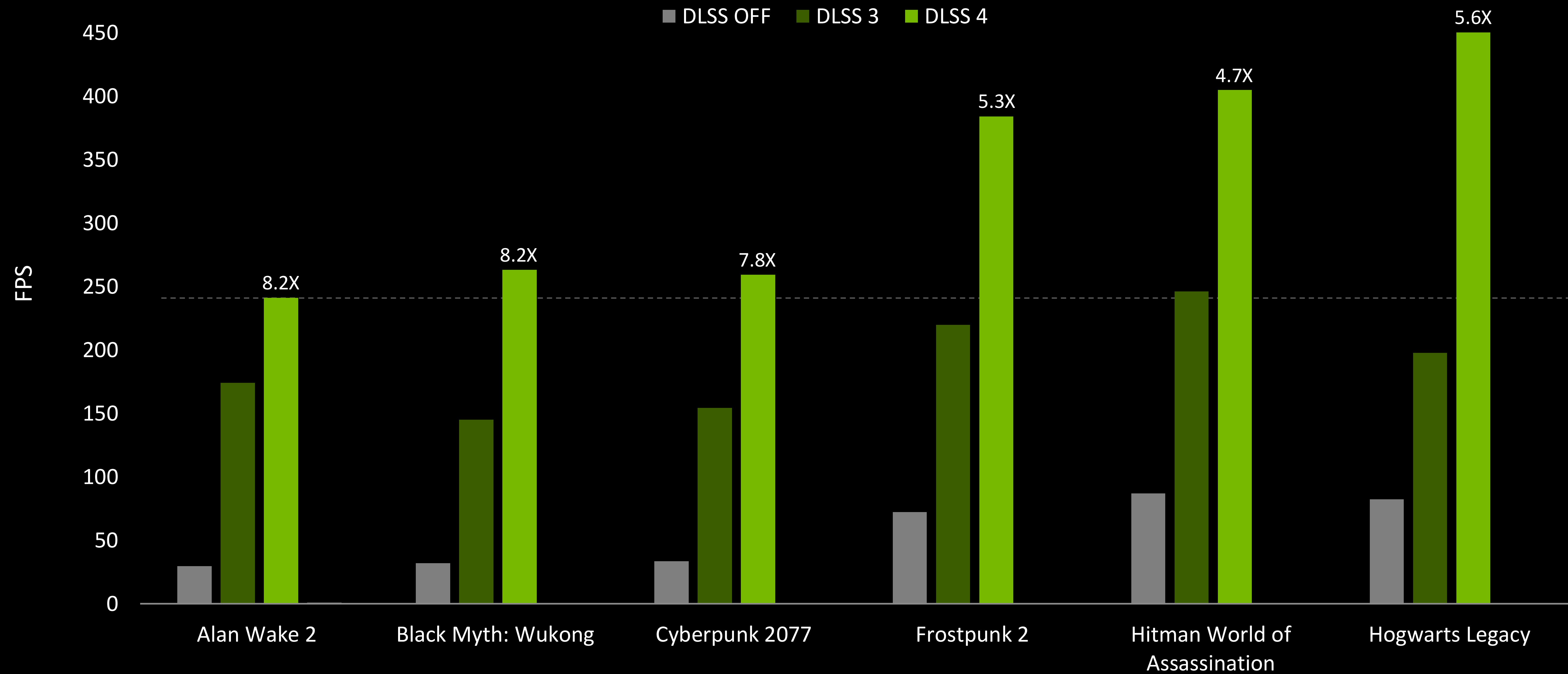
DLSS 2
Super Resolution

DLSS 3.5
Frame Generation and
Ray Reconstruction

DLSS 4
Multi Frame Generation
and Transformer Model

4K 240 Hz Gaming with RTX 5090 and DLSS 4

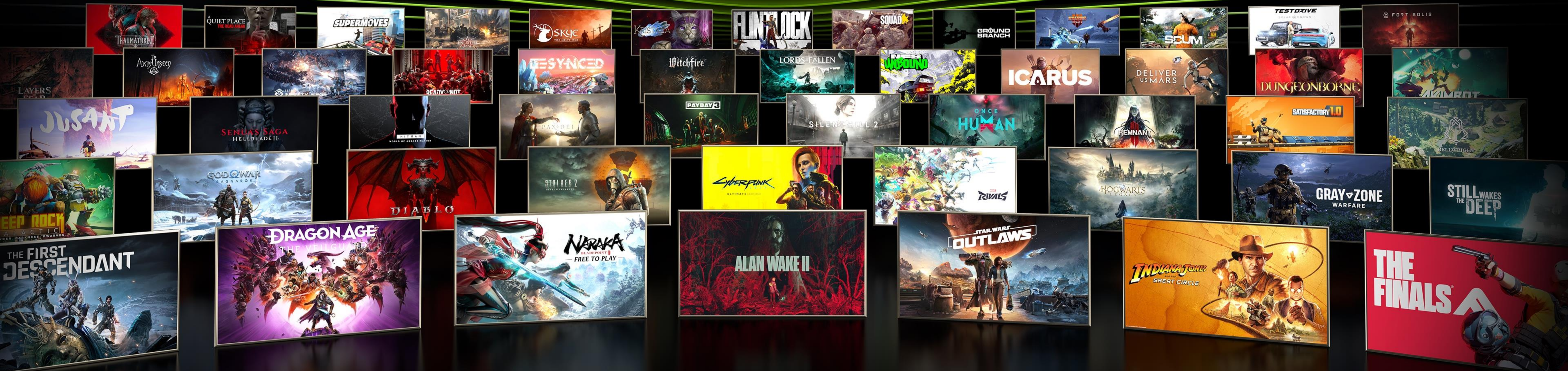
Up to 8X performance with DLSS 4



GeForce RTX 5090, 4K Resolution, Path Tracing where applicable or RT Max, AMD Ryzen 7 9800X3D 8-Core Processor, ASUS X870E Creator Pro Art, 64 GB DDR5
DLSS 4: Multi Frame Generation (4X Mode), Super Resolution (Performance Mode), Ray Reconstruction where applicable. DLSS 3: Frame Generation, Super Resolution (Performance Mode), Ray Reconstruction where applicable.

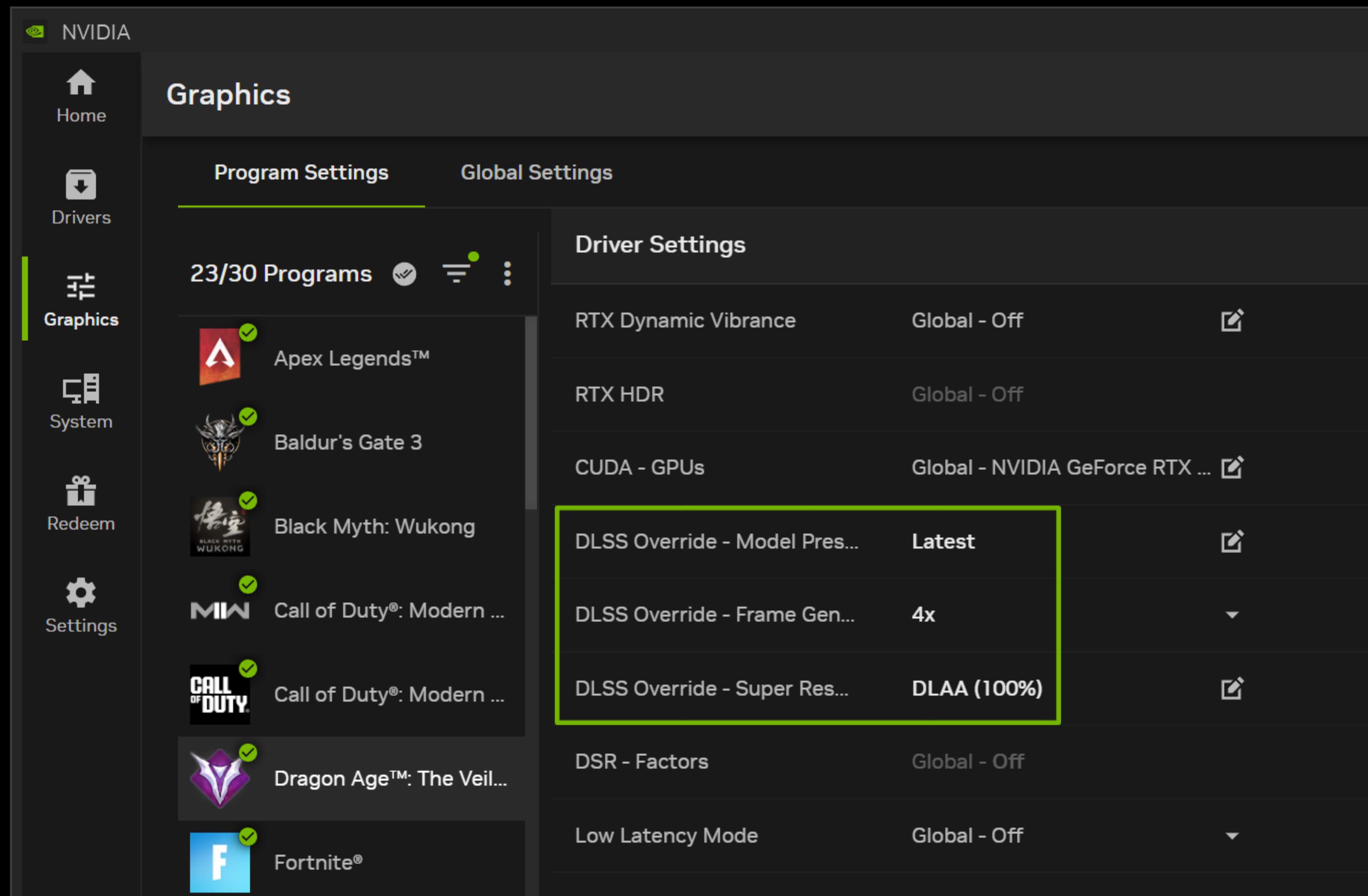
DLSS 4: Day 0 Support for 75 Games and Apps

With many more on the way



New DLSS Overrides in NVIDIA App

Bring the latest DLSS technology to existing DLSS games



- Enable DLSS Multi Frame Generation in 75 DLSS Frame Generation titles
- Try out latest transformer models in DLSS Super Resolution titles
- Override DLAA and ultra performance mode for DLSS Super Resolution titles

NVIDIA DLSS 4 Features

An upgrade for all RTX gamers

	GeForce RTX 50 Series	GeForce RTX 40 Series	GeForce RTX 30 Series	GeForce RTX 20 Series
NEW: DLSS Multi Frame Generation Multiplies performance by generating multiple frames	✓			
ENHANCED: DLSS Frame Generation Increased performance and reduced memory usage	✓	✓		
ENHANCED: DLSS Ray Reconstruction Increased stability and lighting detail with ray tracing	✓	✓	✓	✓
ENHANCED: DLSS Super Resolution—Beta Improved stability and higher detail in motion	✓	✓	✓	✓
ENHANCED: Deep Learning Anti-Aliasing (DLAA)—Beta Improved stability and higher detail in motion	✓	✓	✓	✓

NVIDIA Reflex

Increased responsiveness for competitive gaming



120
Reflex games



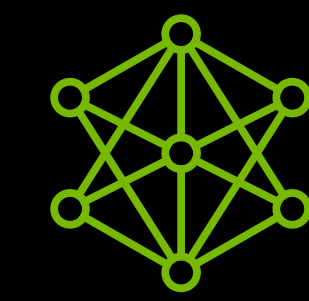
9 of top 10
shooters



>90%
of GeForce players
activate Reflex

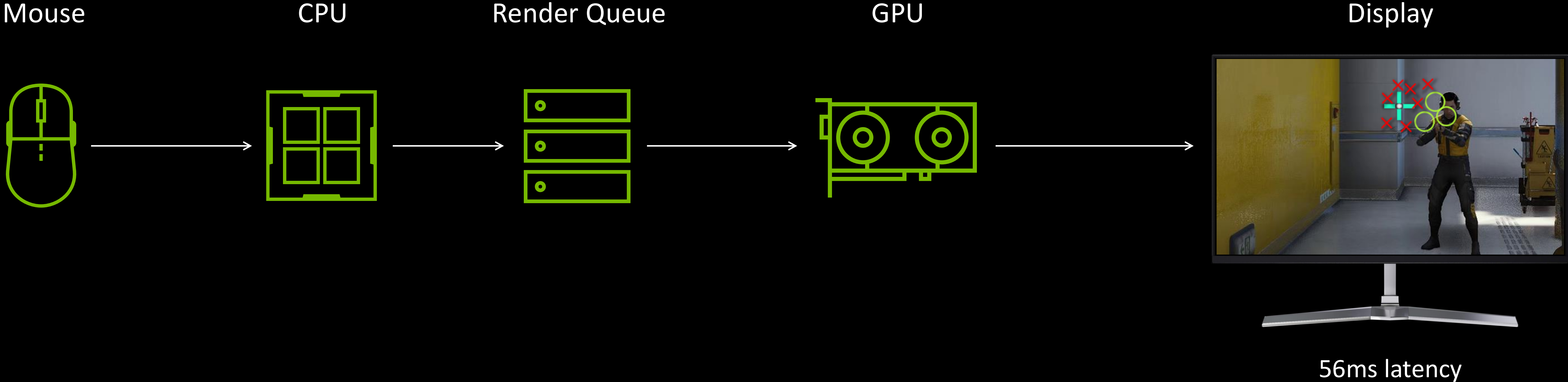


75%
of GeForce gamers play
competitive games



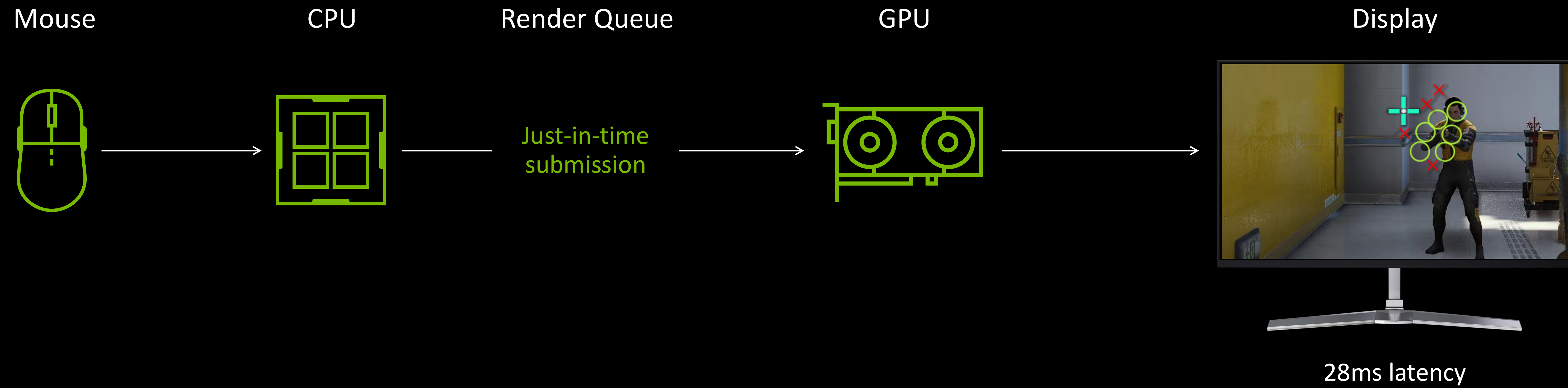
>100
DLSS Games
enhanced with Reflex

Latency Pipeline



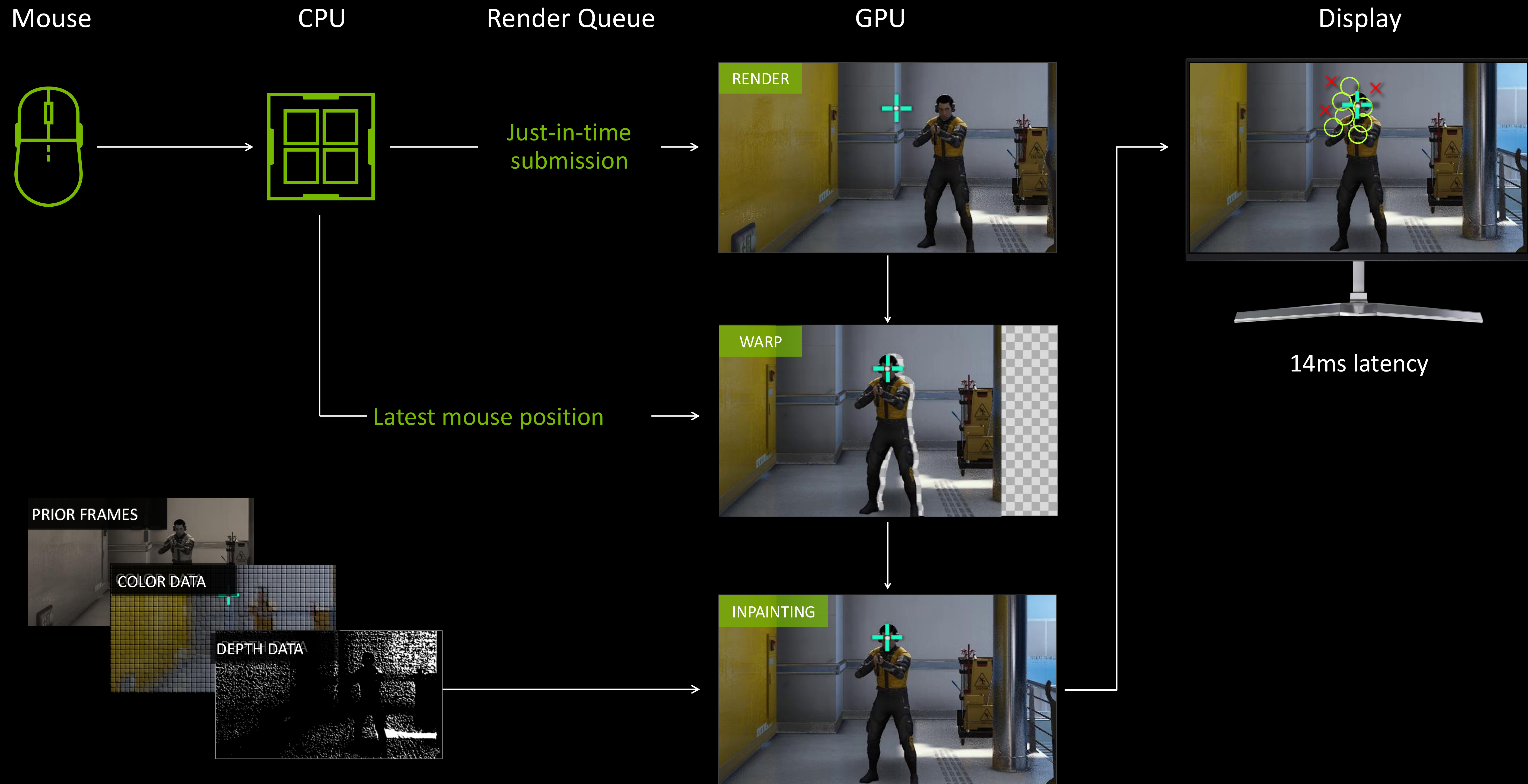
NVIDIA Reflex

50% faster responsiveness via CPU-GPU synchronization



NVIDIA Reflex 2

75% faster responsiveness with Frame Warp





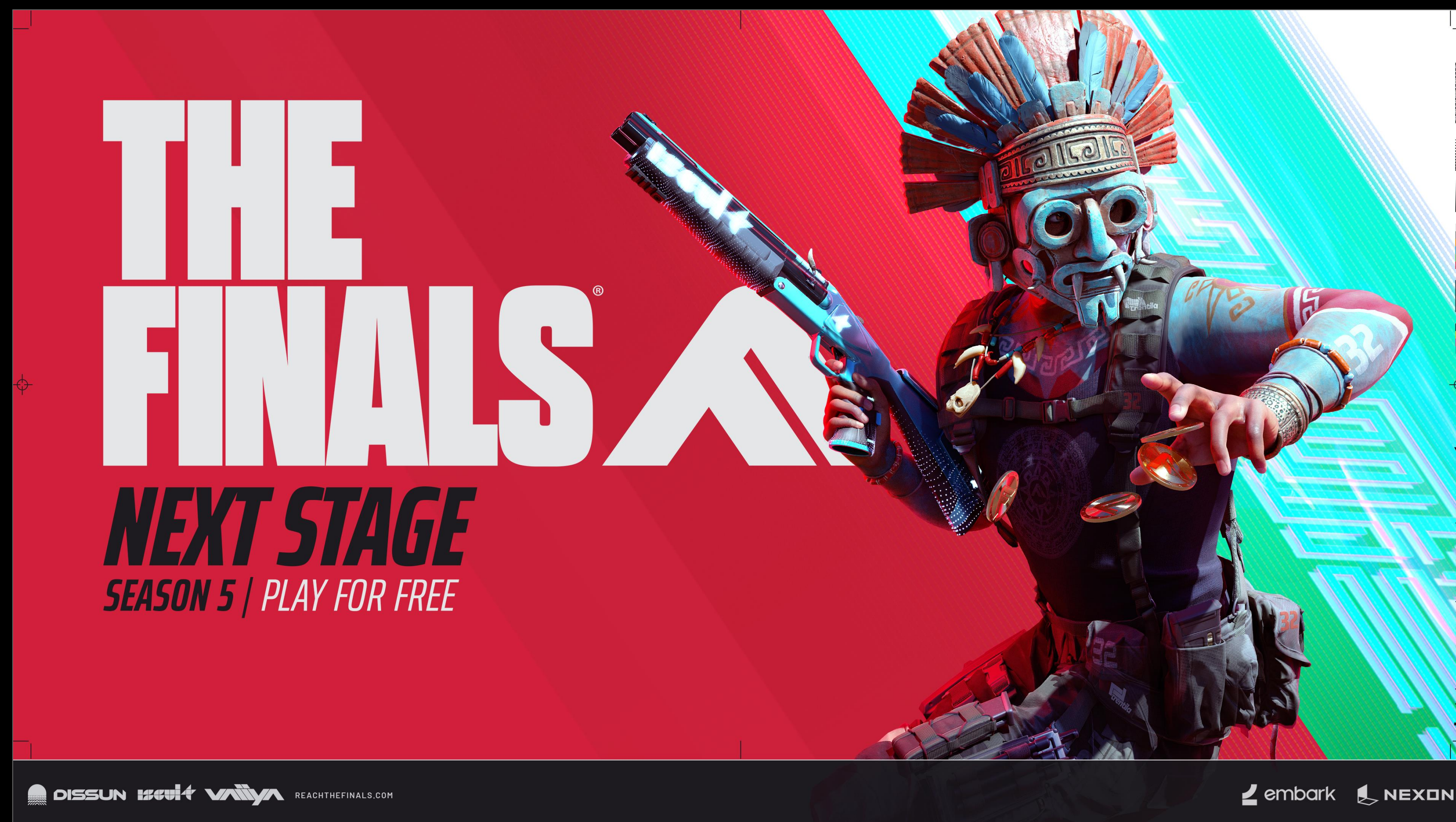
Inpainting Off



Inpainted
With Predictive Rendering

Reflex 2 Coming to Top Shooters

Available for all RTX GPUs | Coming first to 50-Series



THE FINALS



VALORANT



Video: Compete at Warp Speed in Valorant

NVIDIA RTX Kit

Delivering neural rendering to developers



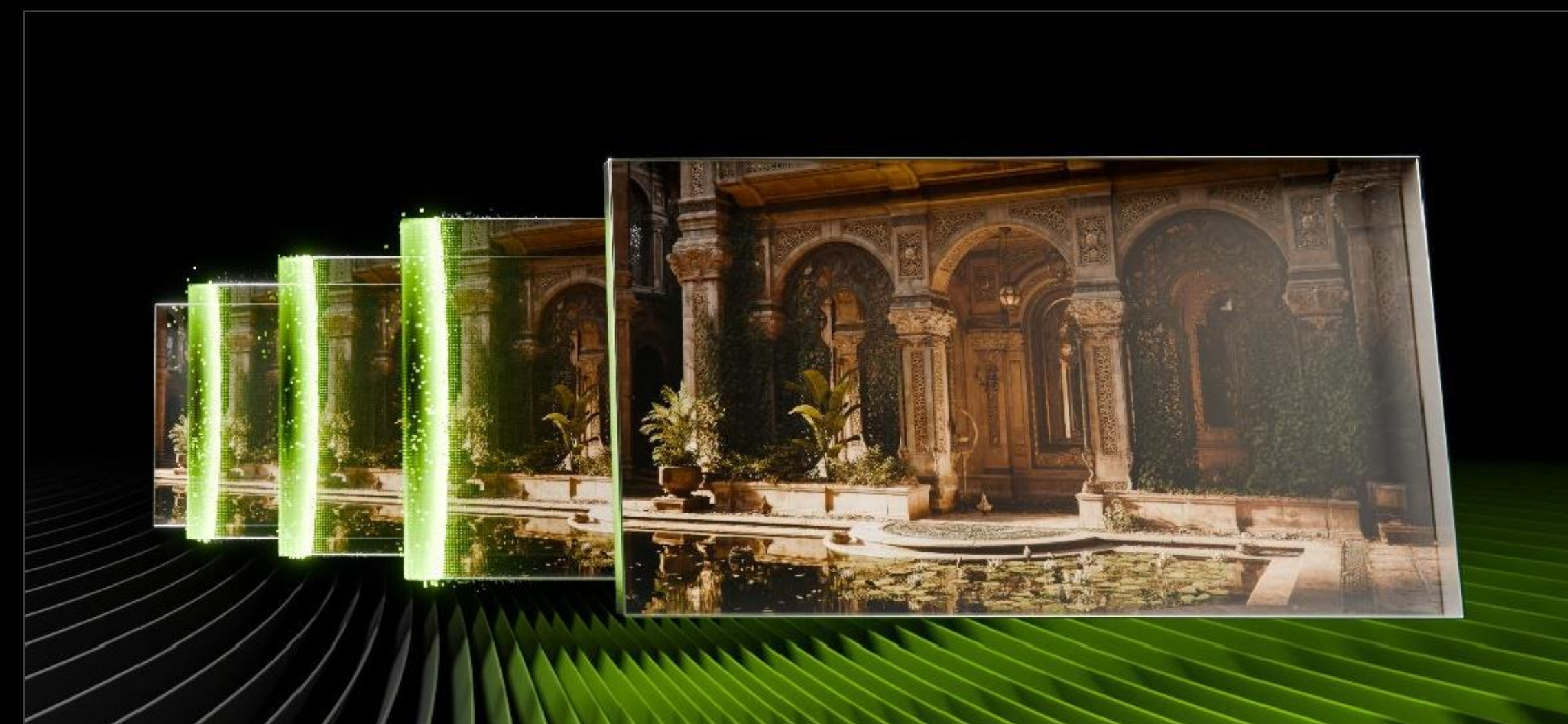
RTX Neural Shaders



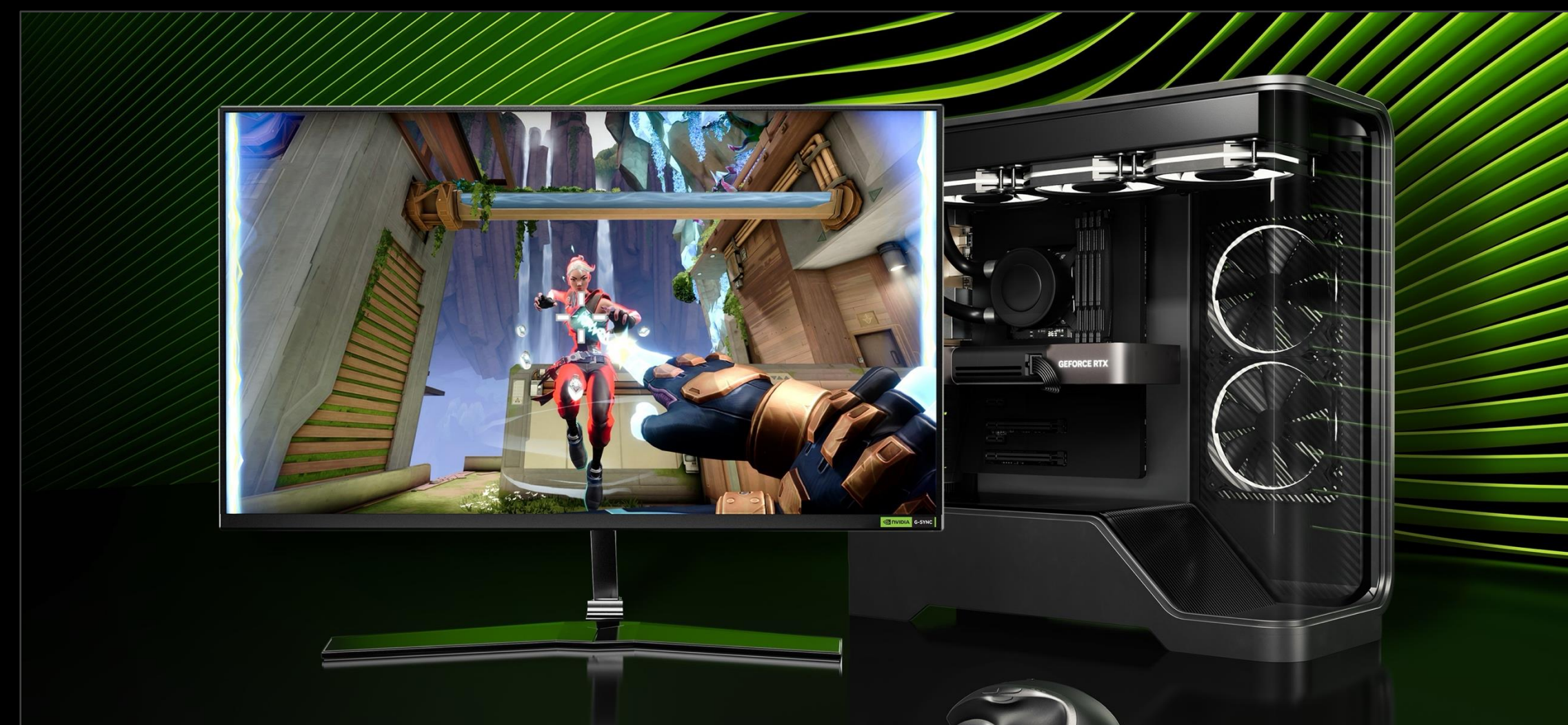
RTX Mega Geometry



RTX Hair & Skin



DLSS 4



Reflex 2



RTX Remix

