



Environmental Audio and Processing for VR

Nicholas Ward-Foxton

Senior Audio Programmer, Sony Computer
Entertainment

GAME DEVELOPERS CONFERENCE®

MOSCONE CENTER · SAN FRANCISCO, CA

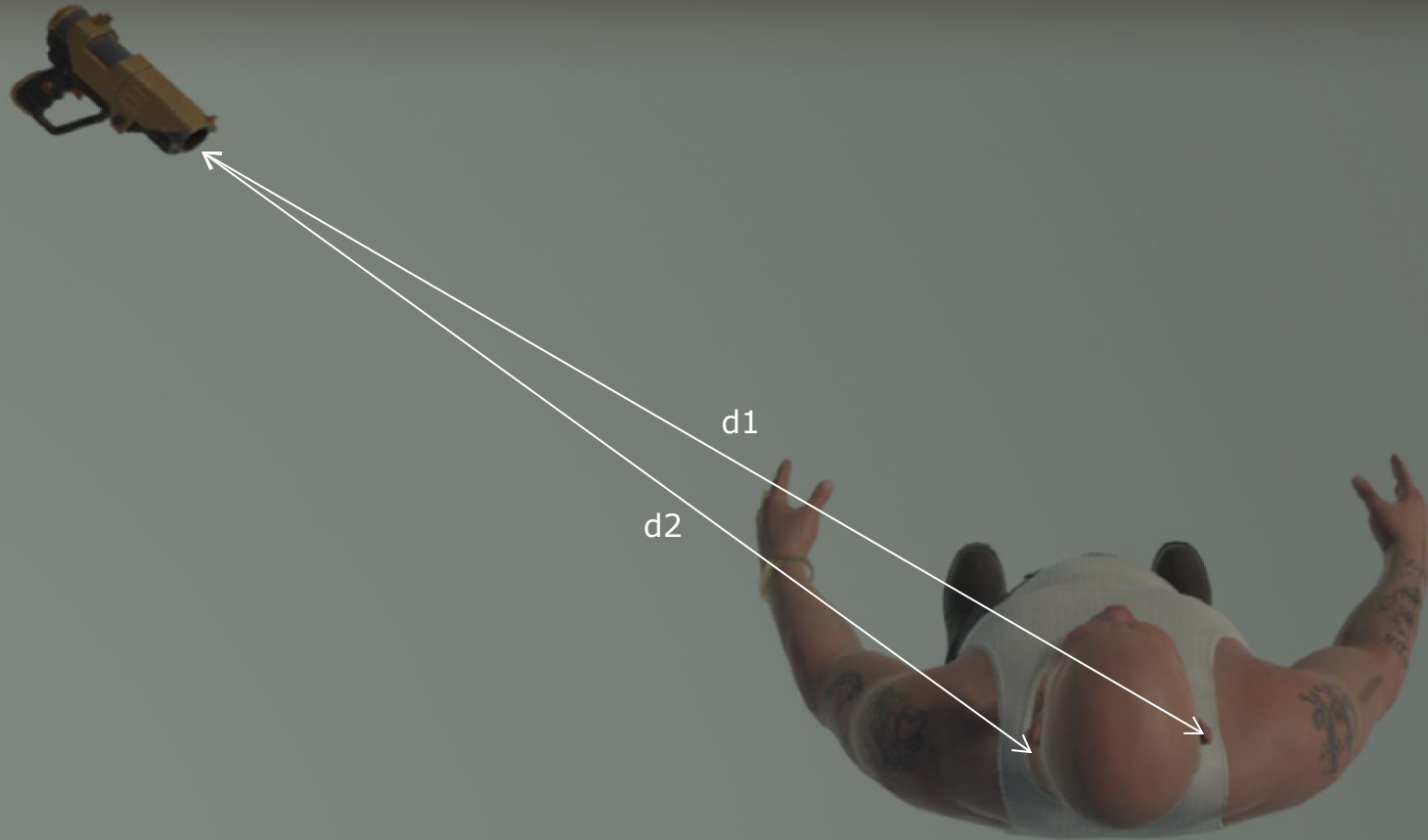
MARCH 2-6, 2015 · EXPO: MARCH 4-6, 2015



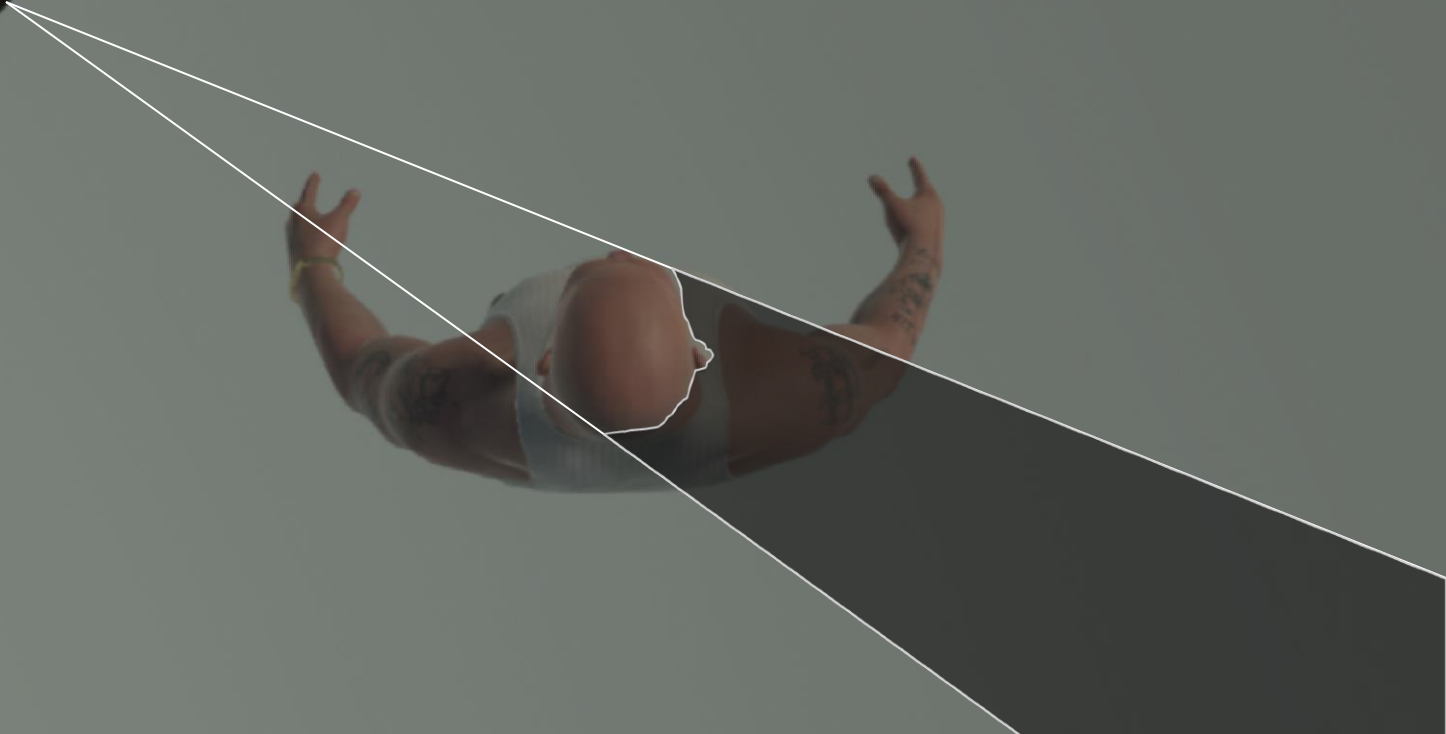
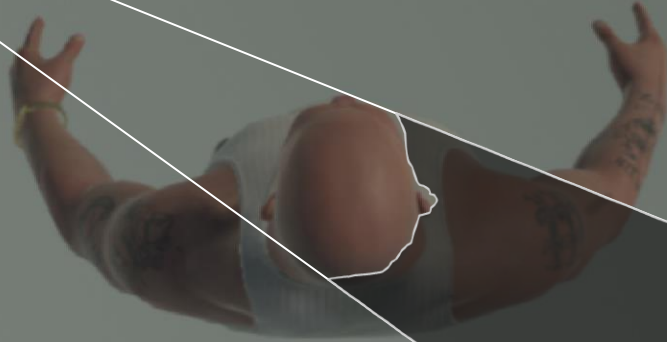
Sound Localisation



Interaural Time Delay



Interaural Level Difference



Pinnae Filtering



Head Related Transfer Function



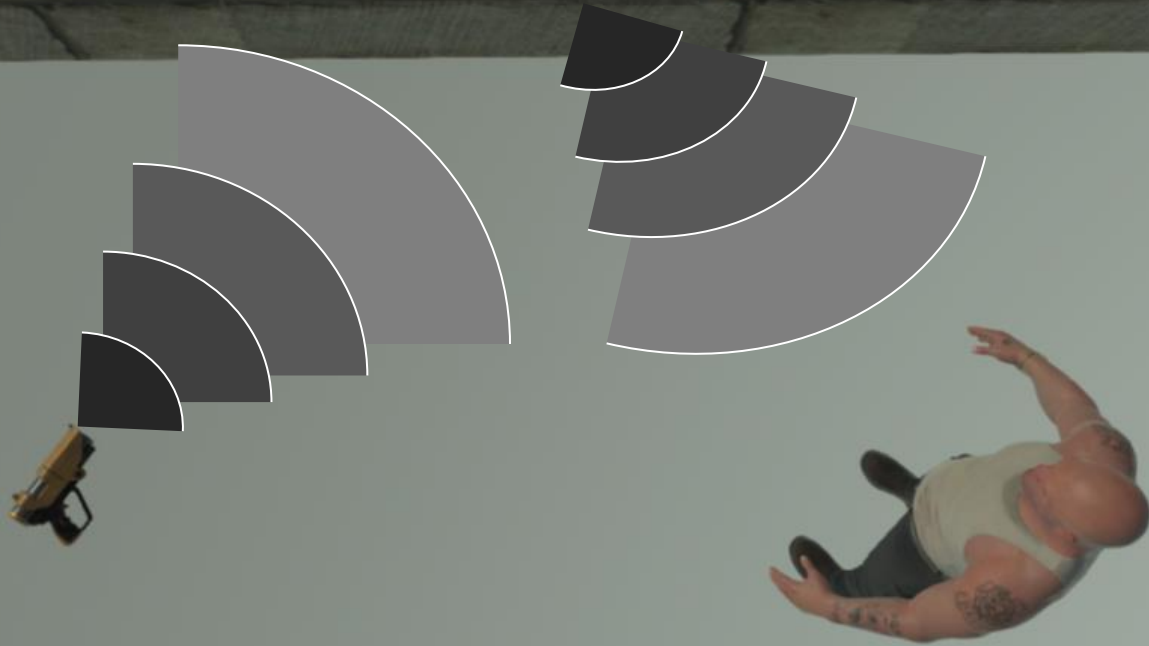
Cone of Confusion

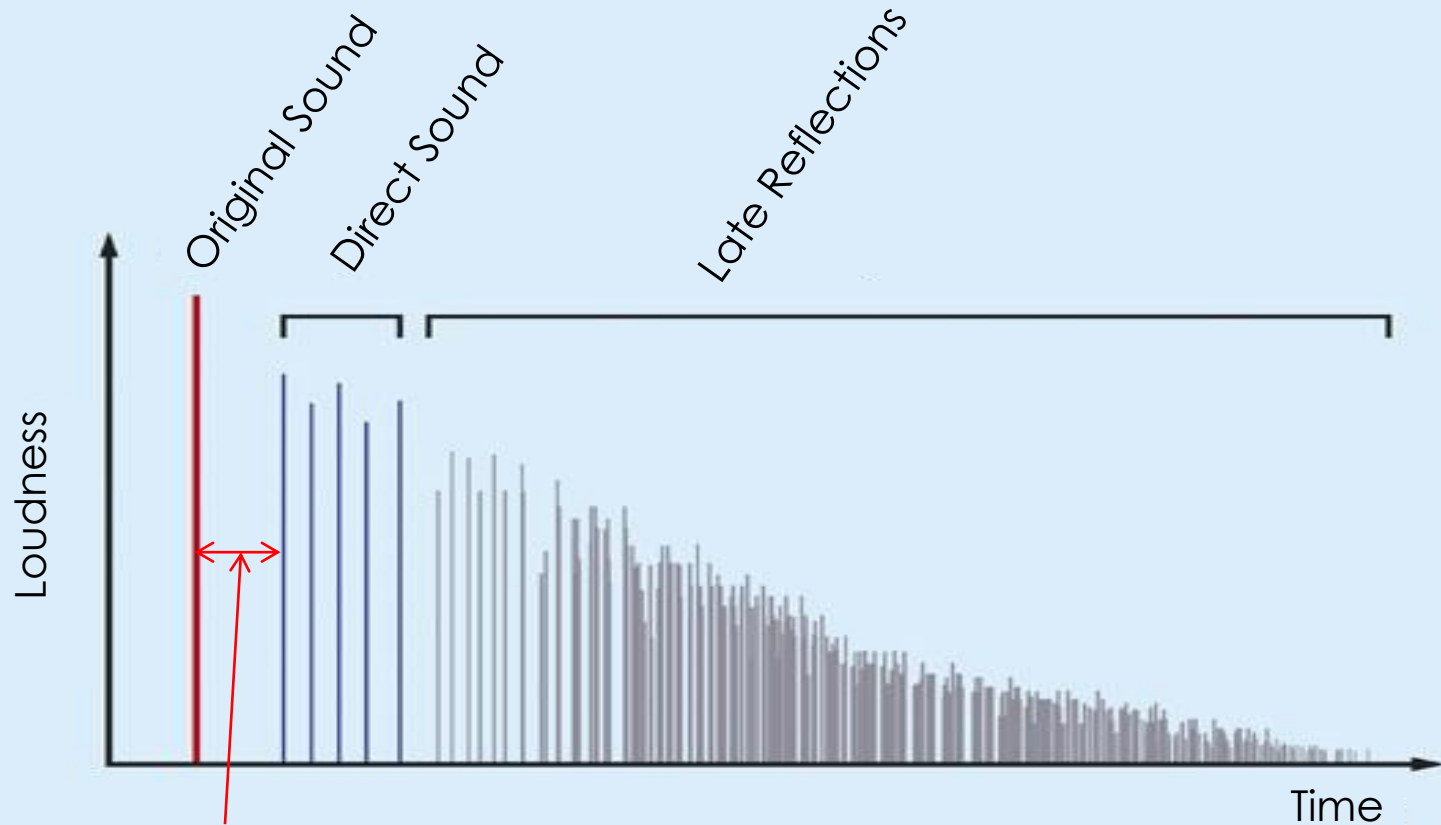


Head Tracking



Indirect Audio





The Initial Time Delay Gap



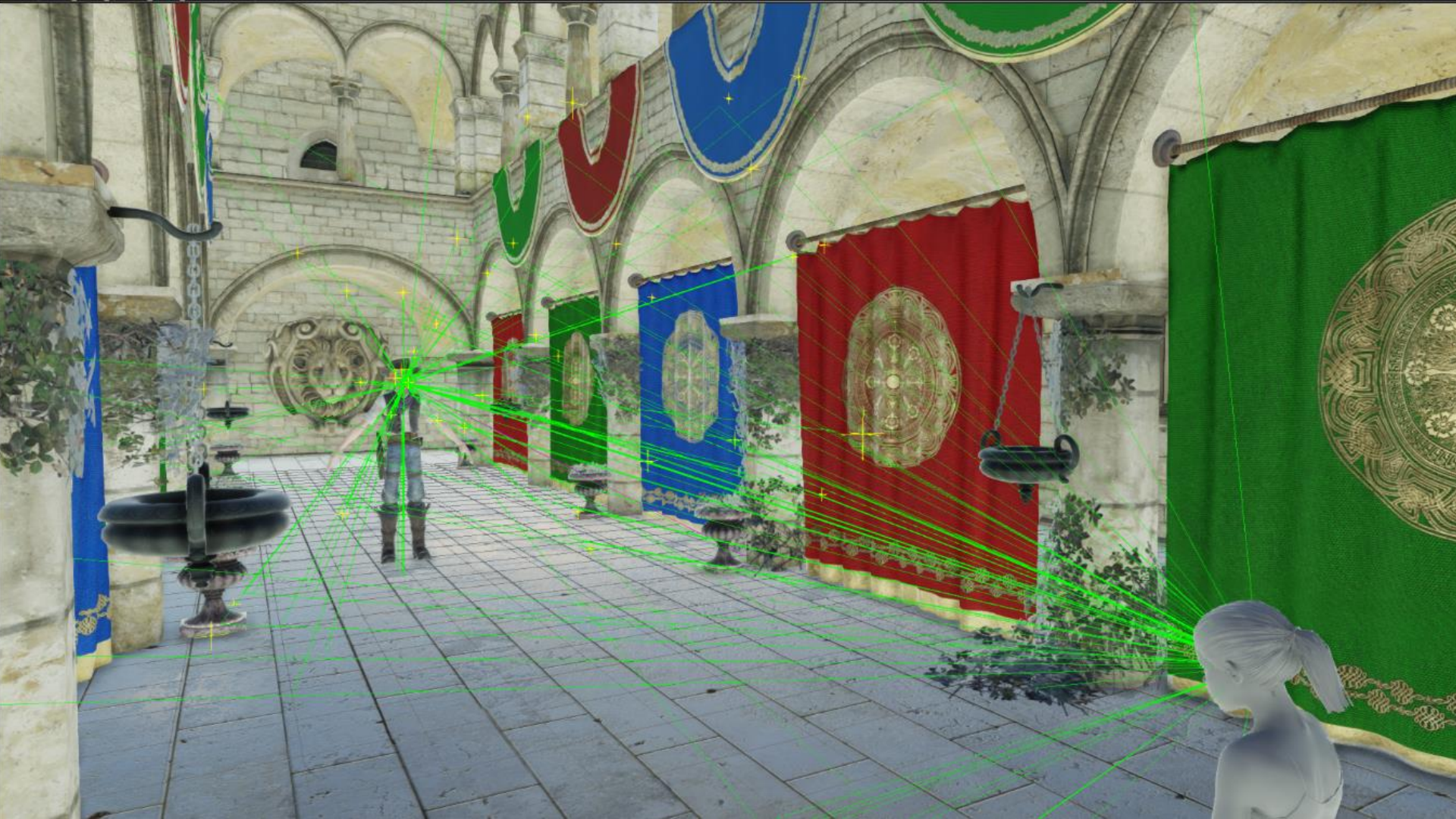
So what have we built?

- Obstruction system
- Dynamic reverberation system



Obstruction Model

- Ray-casts form cone
- Results are integrated
- LPF before HRTF system
- Transmission values are used





Reverb System





Dynamic Reverb – First Reflections

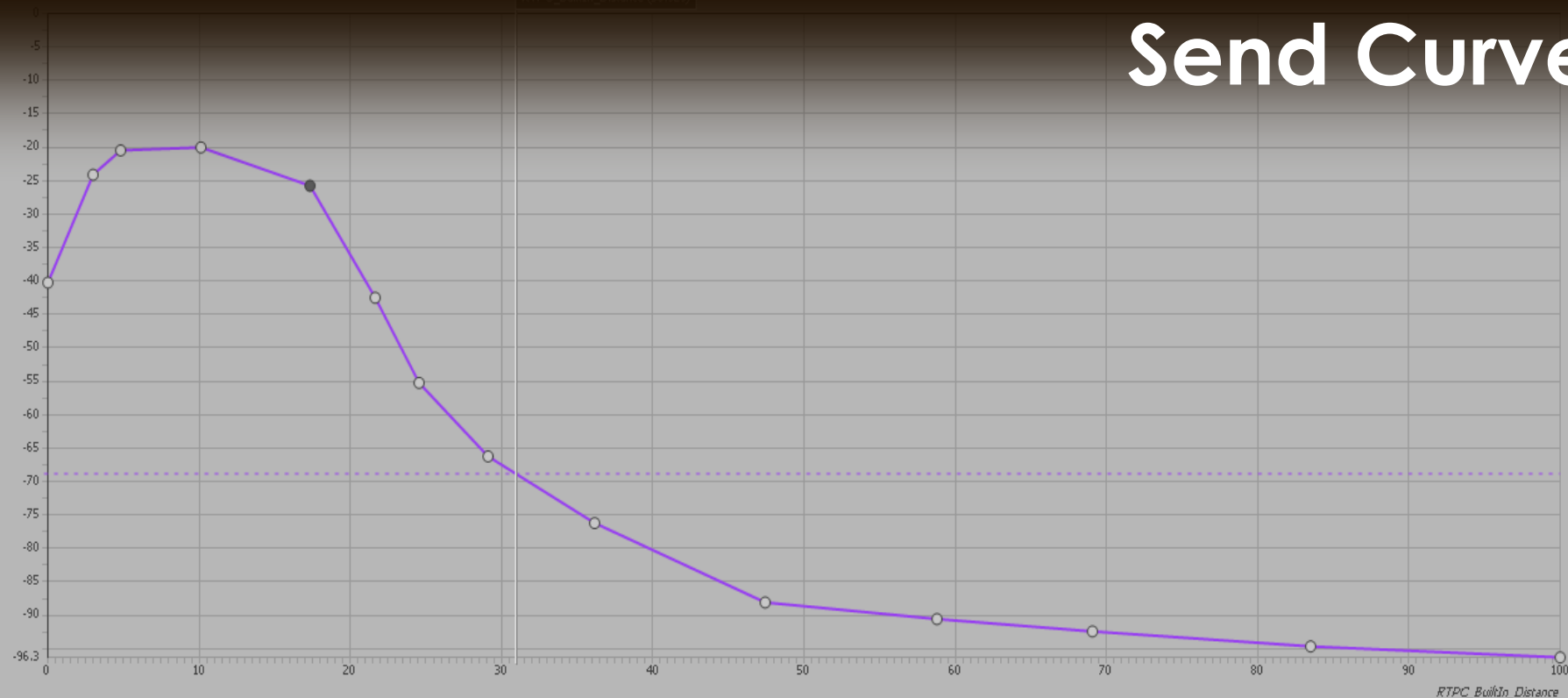
- Ray-casting
- Image source method (6)
- Absorption
- Variable delay line taking into account source distance
- Also HRTF processed



Dynamic Reverb – Tail

- Parametrically driven
- Renders to quad output
- Can use portals

Send Curve




Coordinates


X: 17.33

Y: -25.75

Y Axis

>>  Send amount

X Axis

>>  RTPC_BuiltIn_Distance

Mode

Notes

Direct Sound Falloff



Coordinates

X: Y:

Max distance

Curves

	Properties	Curve
	Output Bus volume	
	Auxiliary send volumes (Game-defined)	Use Output Bus volume
	Auxiliary send volumes (User-defined)	Use Output Bus volume
	Low-pass filter	None
	High-pass filter	None

☒ Cone Attenuation

Inner angle

Outer angle

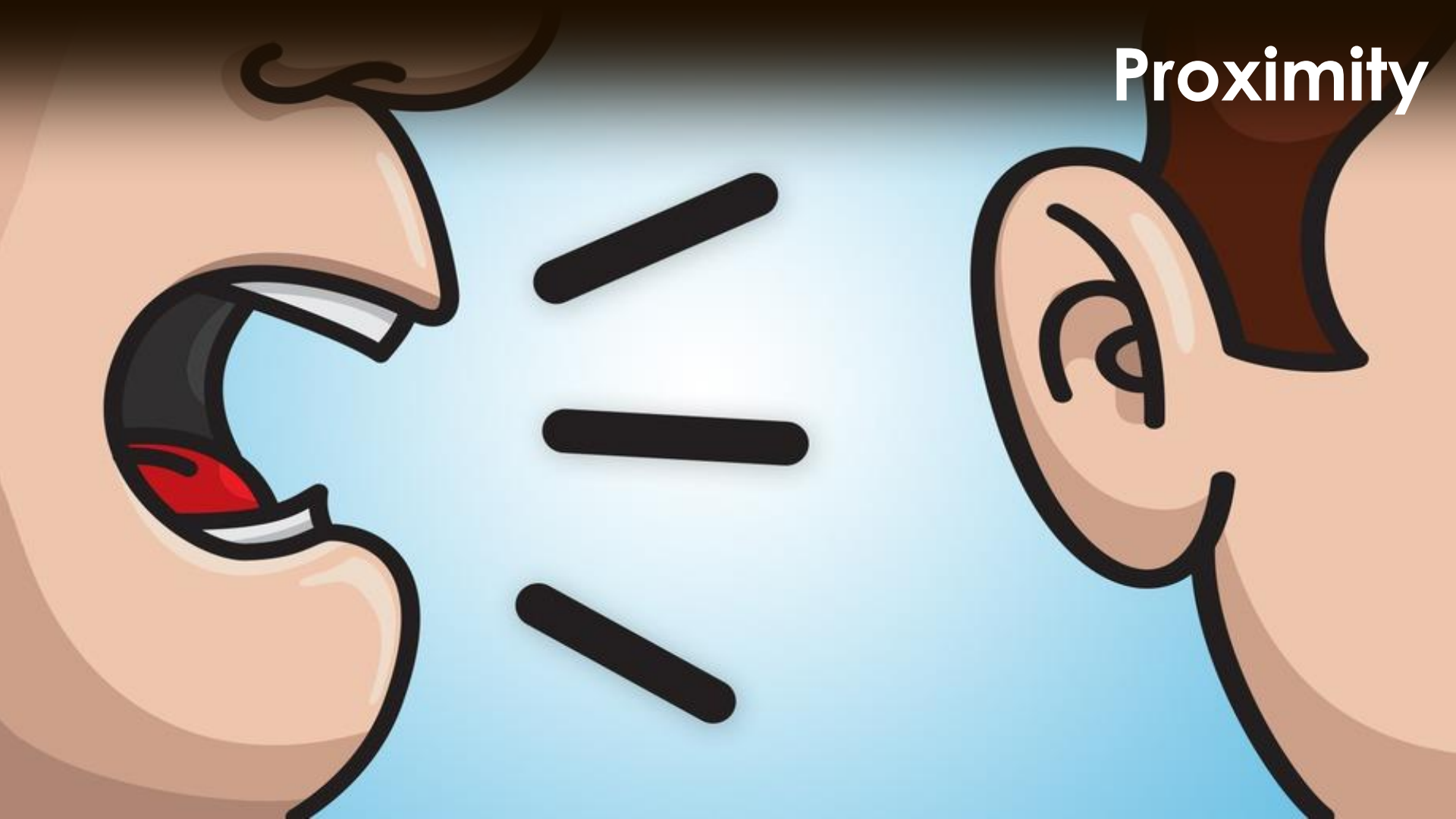
Max attenuation

Low-pass filter

High-pass filter

Attenuation Preview (Game-defined mode only)

Proximity



Mic Input



Multi Channel Ambience



Mixing



Voice Over





Music



069MPH



Summary

- HRTF + Morpheus audio system
- Obstruction + Occlusion System
- Mic Input
- Other VR audio Tips
- Audio for VR is exciting



Questions?

Nick_Ward-Foxton@scee.net