TEAMRGE EVENT 2024
WHERE FUTURE OF END USER COMPUTING MEETS REALITY

10+ community sessions around GPUs, VDI, DaaS, DEX, Remoting Protocols and AI

15th February 2024
16:00 CEST / 10:00AM EDT / 07:00AM PDT

Register Now

www.teamrge.com/events

Dr. Benny Tritsch
Managing Director at
Dr. Tritsch IT Consulting

Bram Wolfs
Consultant at
Wolfs IT Solutions

Eltjo van Gulik
Principal Product Manager
for HDX Graphics & Seamless
at Citrix

Esther Barthel
Solutions Architect
at Cognition IT

Joe DaSilva
PMTS, Solutions Architect, Cloud
Graphics at AMD

Johan van Amersfoort
Technologist EUC & AI
at ITQ

Magnar Johnson
Manager | Solution Architect
Sopra Steria

Rody Kossen
Senior Principal Quality
Engineer at Citrix

Ruben Spruijt
Field CTO
at Dizzion

Ryan Ververs-Bijkerk
Technical Evangelist
at GO-INIT

Shawn Bass
Start-up advisor and
former EUC CTO of Desktop
Technologies at VMware

Thomas Poppelgaard
Independent Consultant and
Technology Evangelist at
Poppelgaard.com

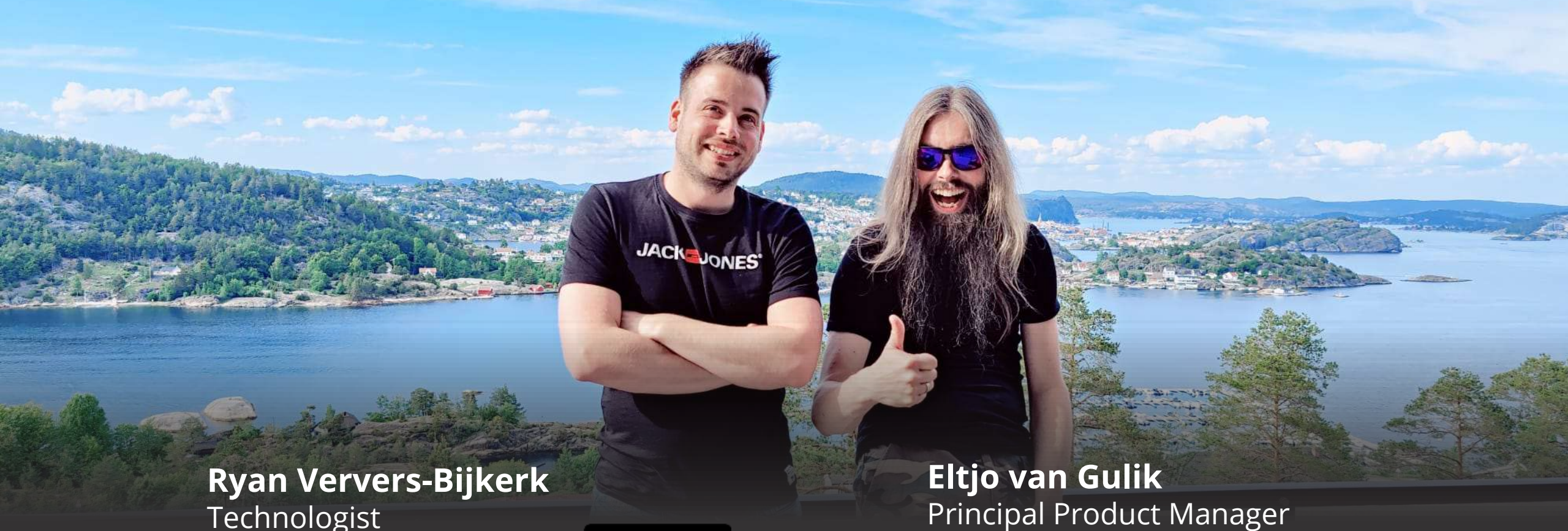
This FREE community event is made possible with support of:

DIZZION itq EUC Score

TeamRGE
Remoting Graphics Experts

Unravelling the user experience puzzle

Eltjo van Gulik & Ryan Ververs-Bijkerk



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GO-INIT

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www.go-init.com

Citrix Technology Professional CTP

NVIDIA COMMUNITY ADVISOR

VIPP
Very Important Parallels Professional

vmware vEXPERT

Eltjo van Gulik
Principal Product Manager
HDX Graphics & Seamless
Citrix

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“
Doing research is creating new knowledge


Research new technologies, to inspire and serve the community by providing new knowledge.


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46 min read Sep 20, 2023

A deep dive into the quality difference of VMware Blast Global Quality Levels

Ryan Ververs-Bijkerk

27 min read Jul 7, 2023

Analyzing Image Quality in Windows 365 Cloud PC: HTML5 Webclient vs. Remote Desktop Client

Eltjo van Gulik

18 min read May 10, 2023

Measuring Latency with Adafruit QT Py: A CircuitPython Approach

Eltjo van Gulik

22 min read Apr 26, 2023

Measuring Input Latency in Virtual Desktops: Citrix HDX

Ryan Ververs-Bijkerk Eltjo van Gulik

20 min read Apr 4, 2023

Measuring Input Latency in Virtual Desktops: VMware Blast

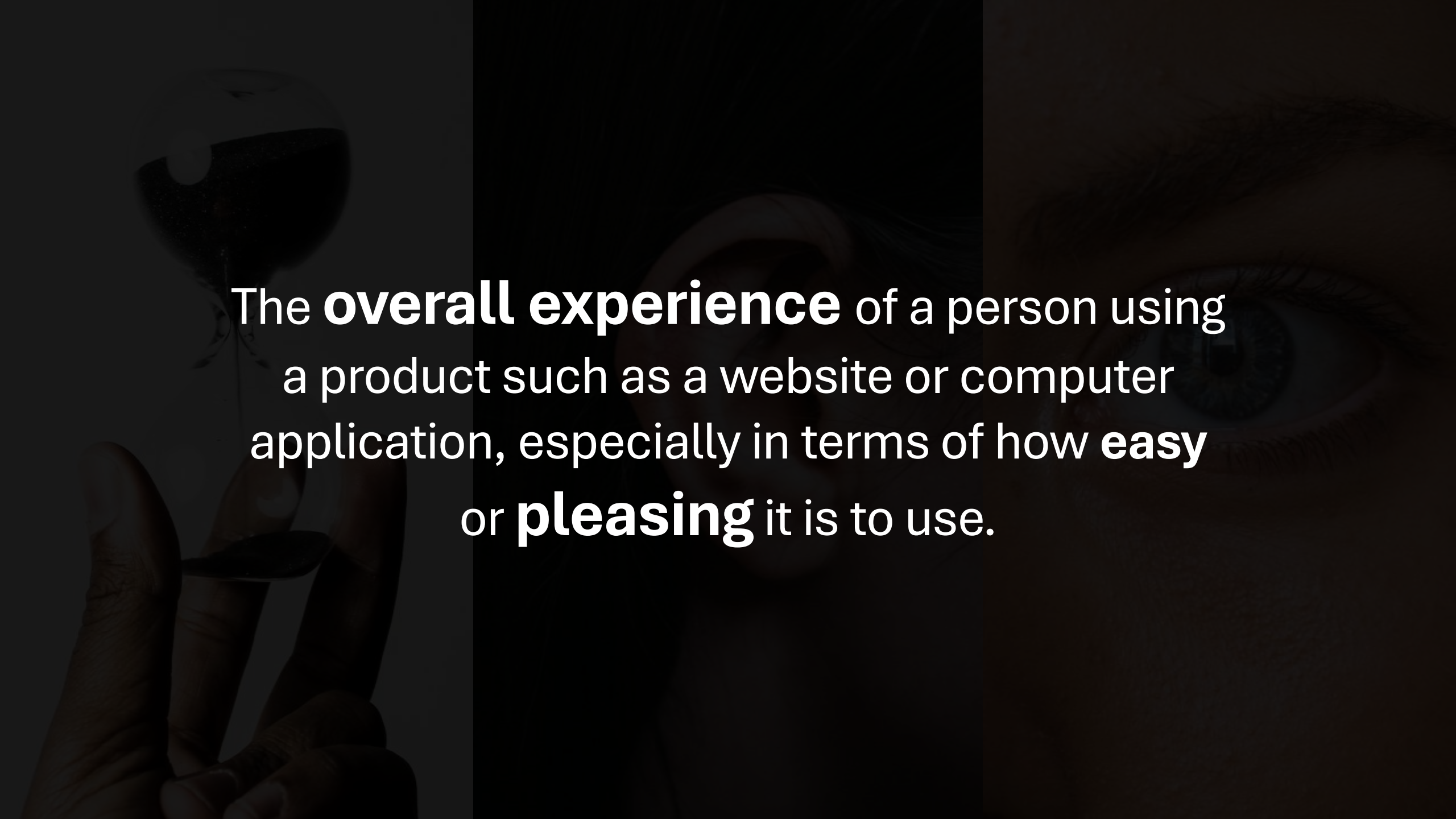
Eltjo van Gulik Ryan Ververs-Bijkerk

18 min read Mar 17, 2023

Measuring Input Latency in Virtual Desktops: Introduction and Baselines of the NVIDIA LDAT Research

Ryan Ververs-Bijkerk Eltjo van Gulik

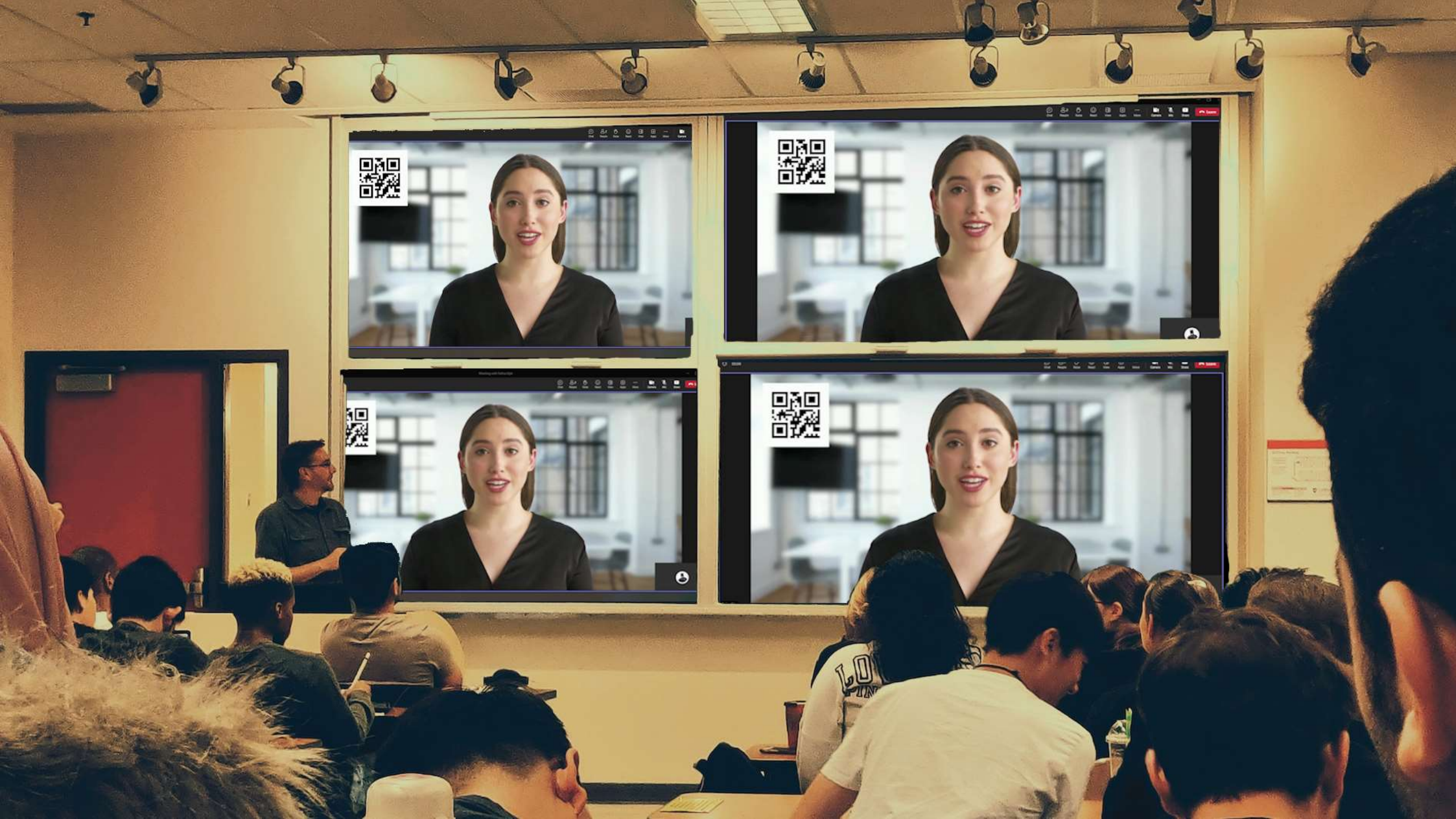
3 min read Dec 30, 2022

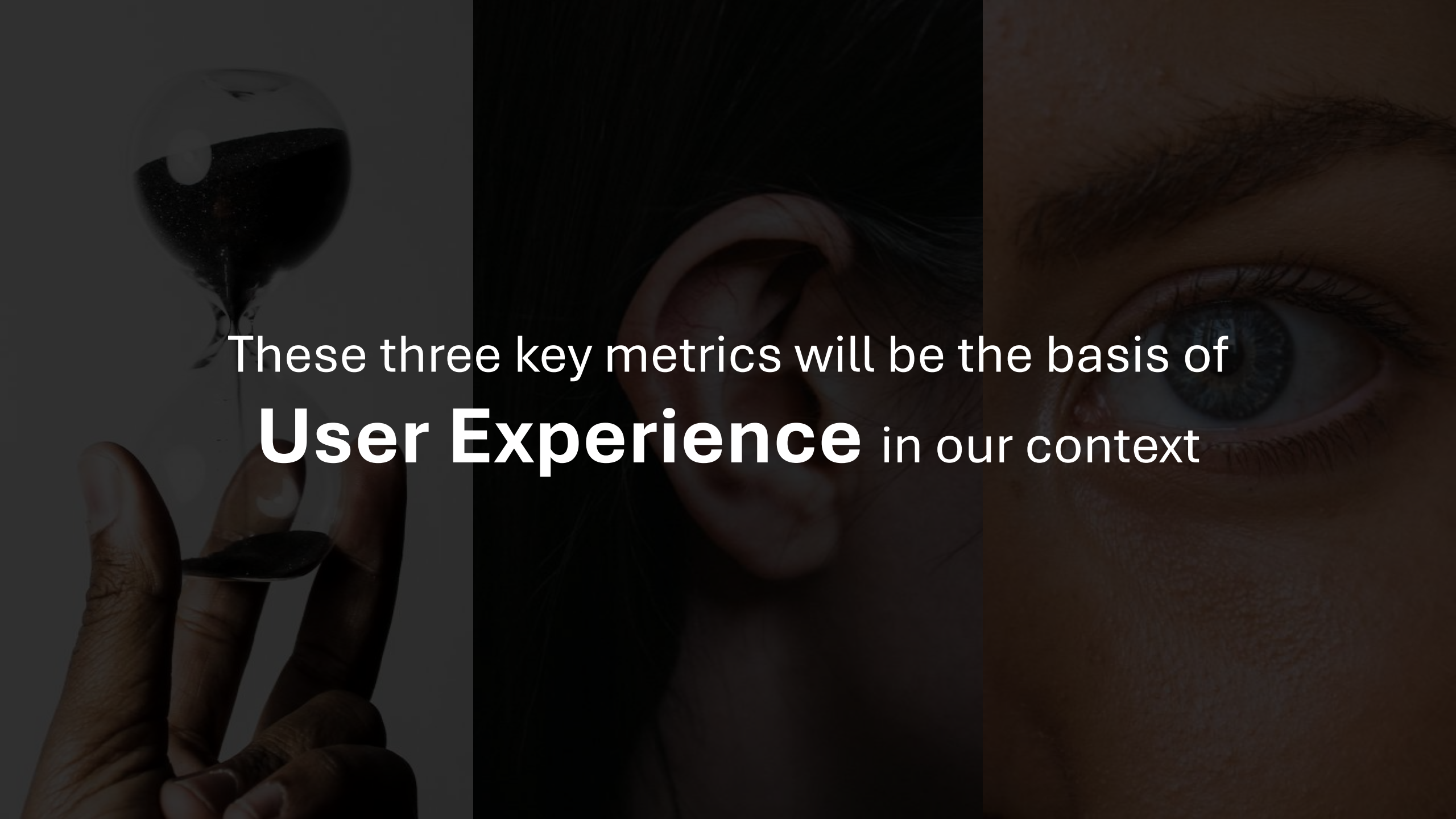


The **overall experience** of a person using a product such as a website or computer application, especially in terms of how **easy** or **pleasing** it is to use.


OK, THAT'S NOT HELPING

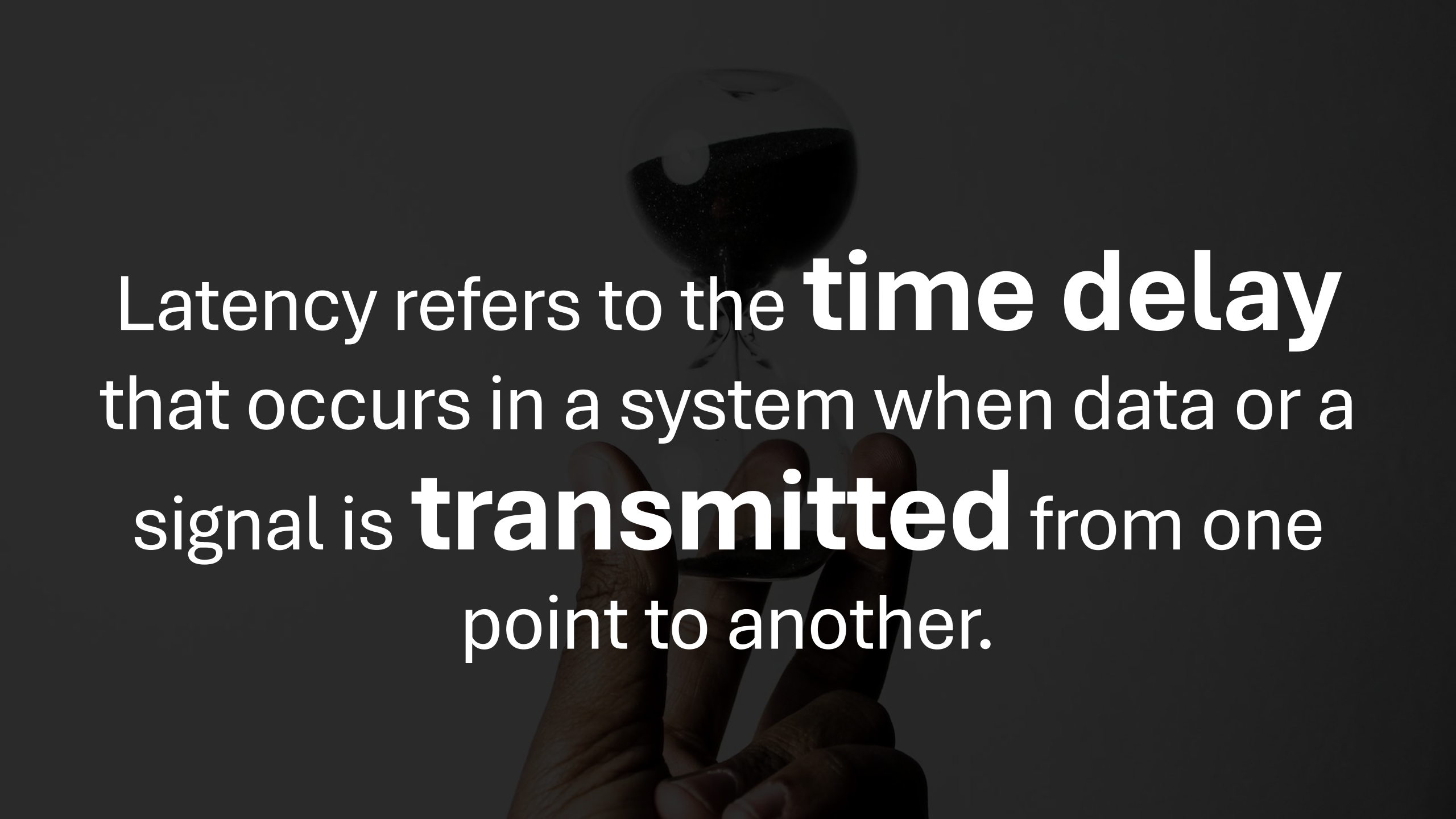
Quantification

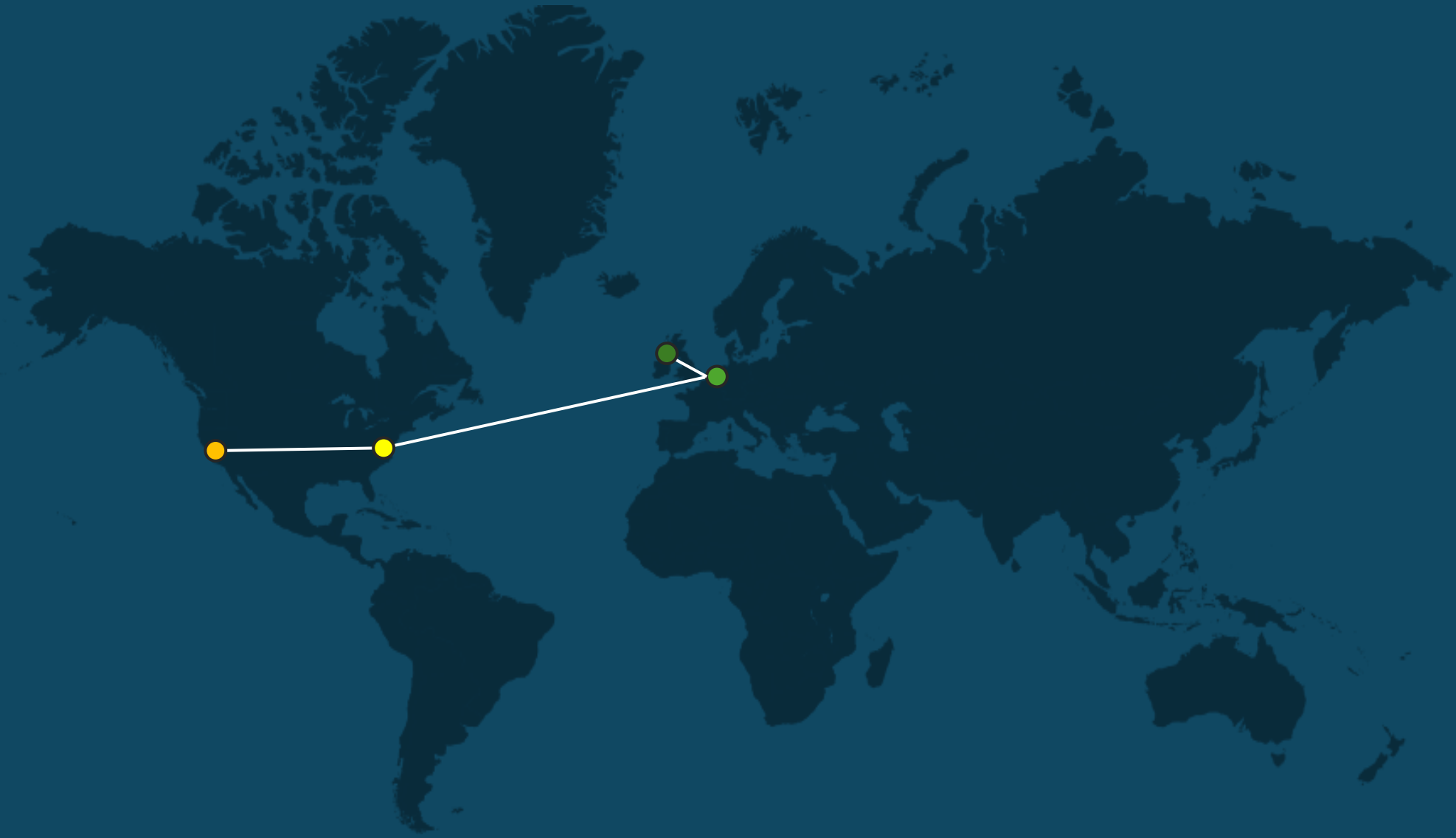


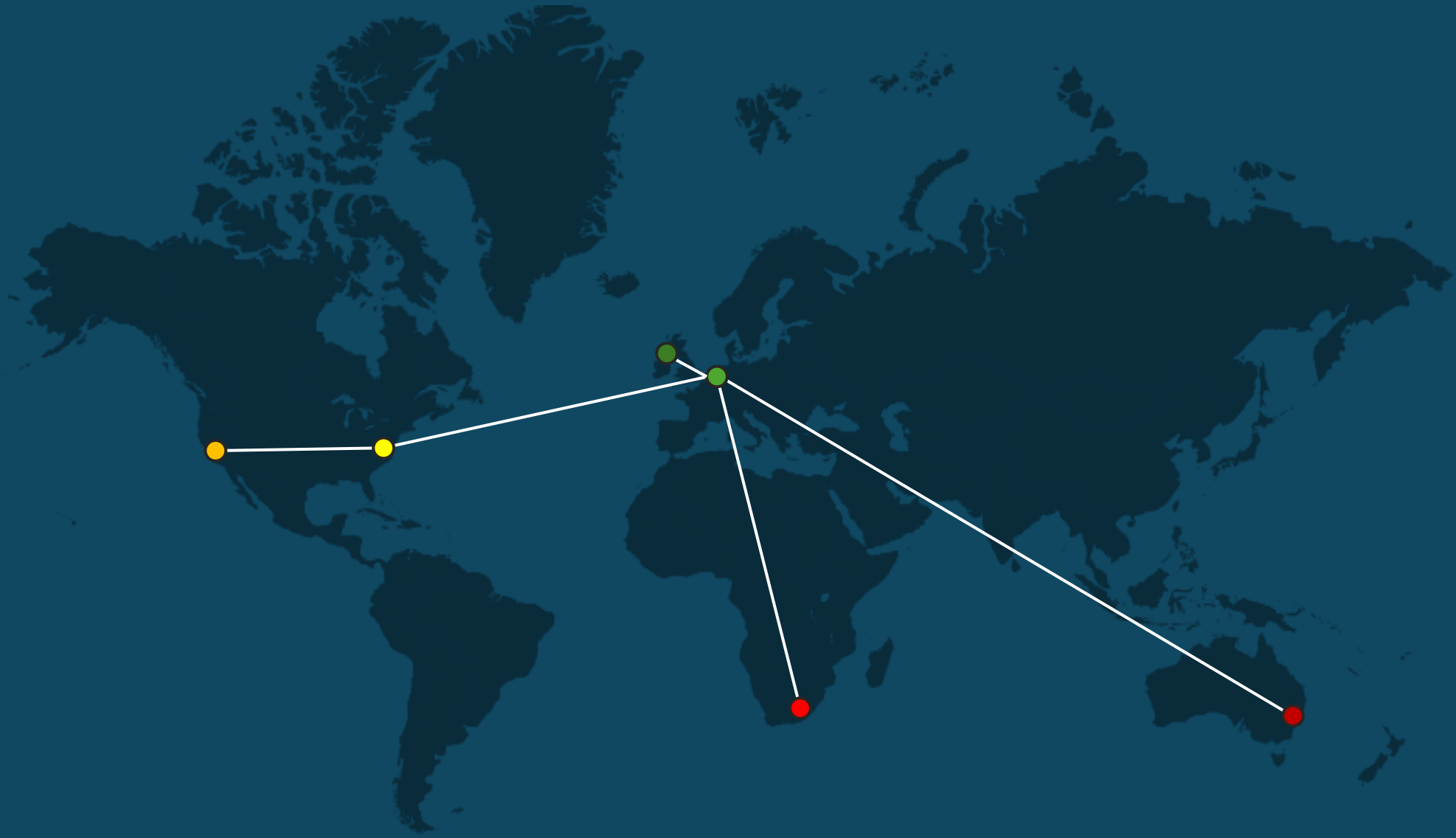


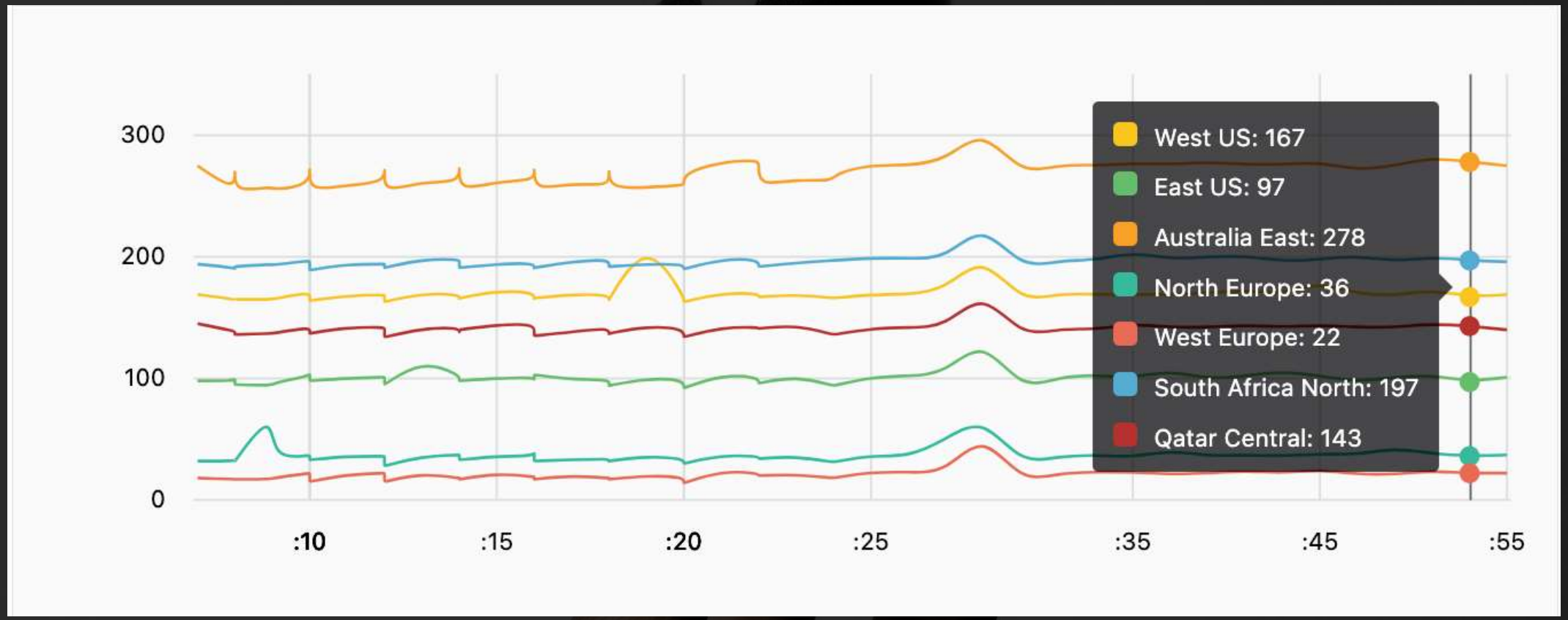
These three key metrics will be the basis of

User Experience in our context

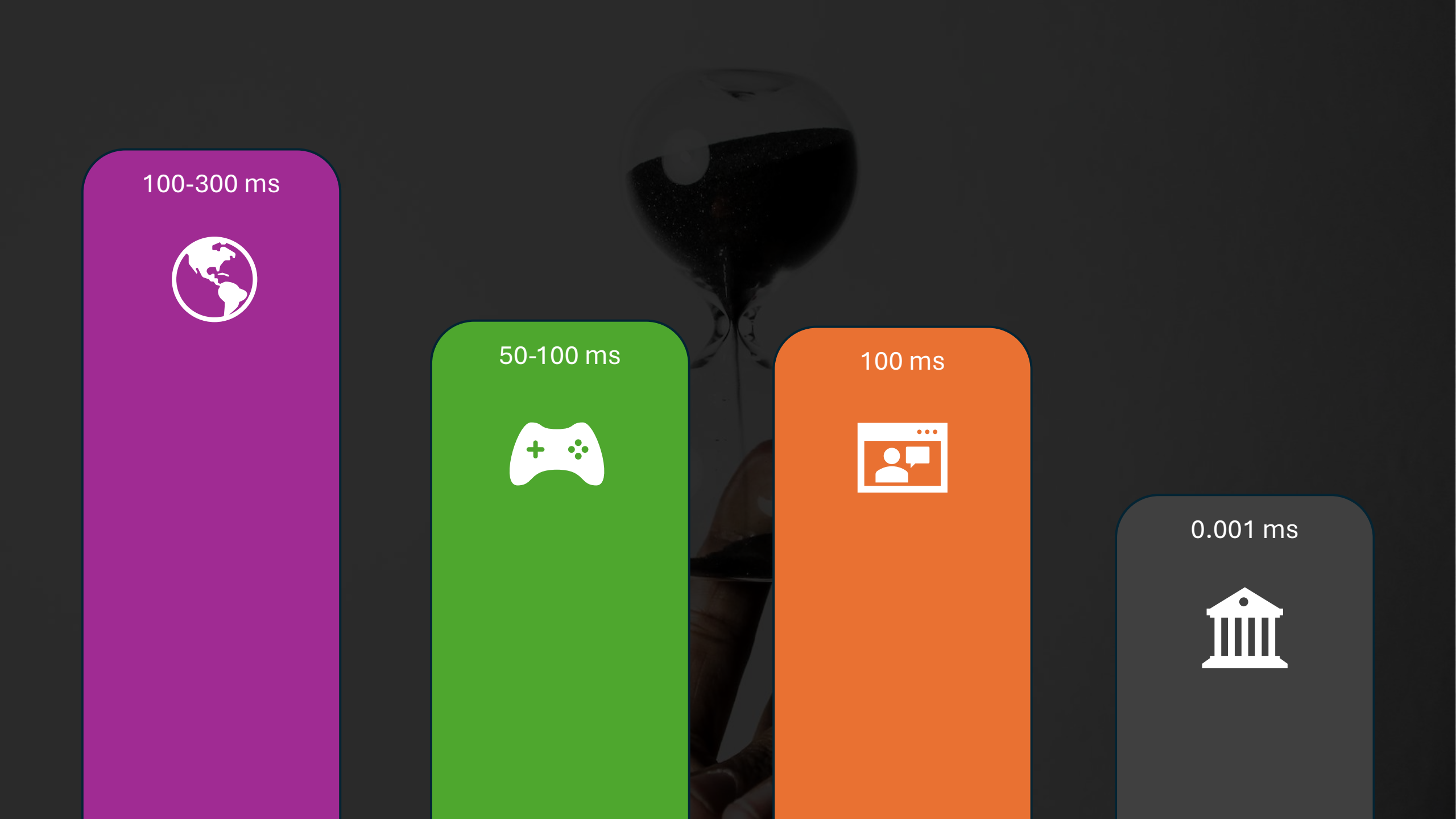

Latency refers to the **time delay** that occurs in a system when data or a signal is **transmitted** from one point to another.



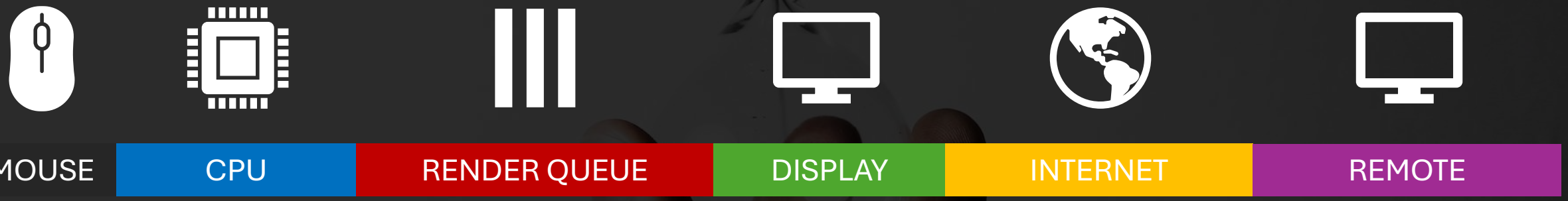



300
200
100
0
:10
:15
:20
:25
:35
:45
:55
West US: 167
East US: 97
Australia East: 278
North Europe: 36
West Europe: 22
South Africa North: 197
Qatar Central: 143

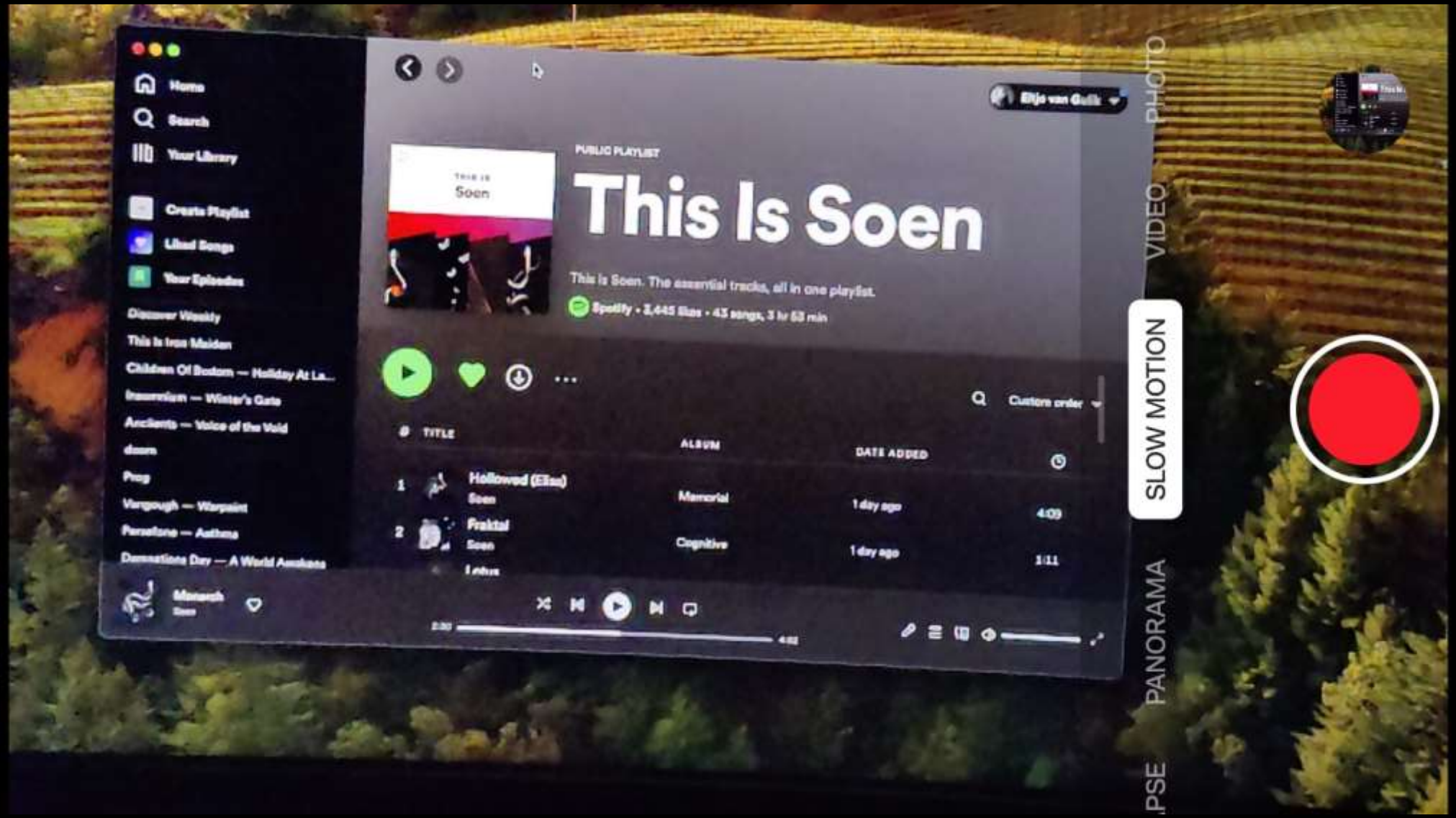

Latency is
workload
dependant

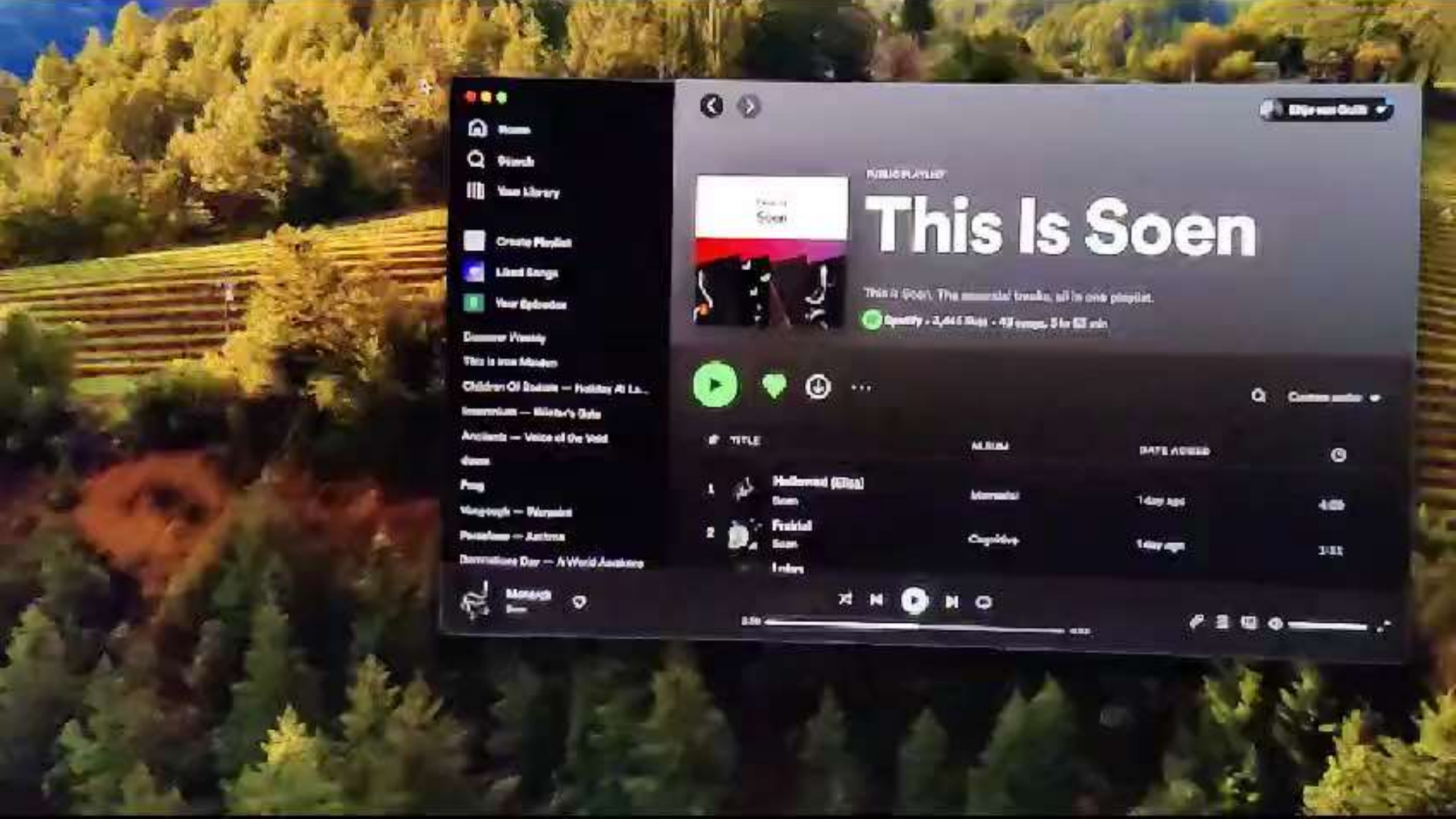

100-300 ms
50-100 ms
100 ms
0.001 ms

Input



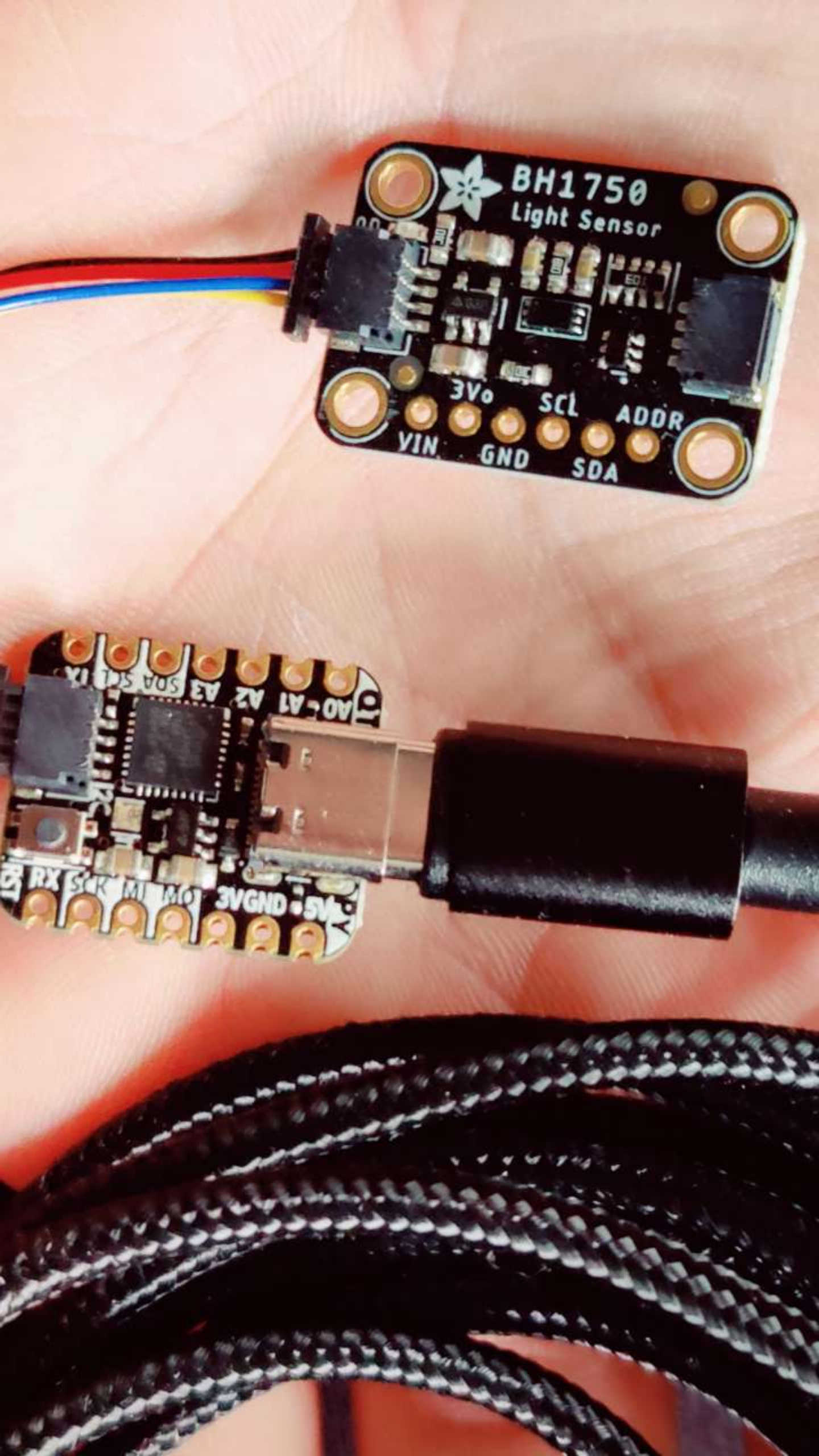

4
1

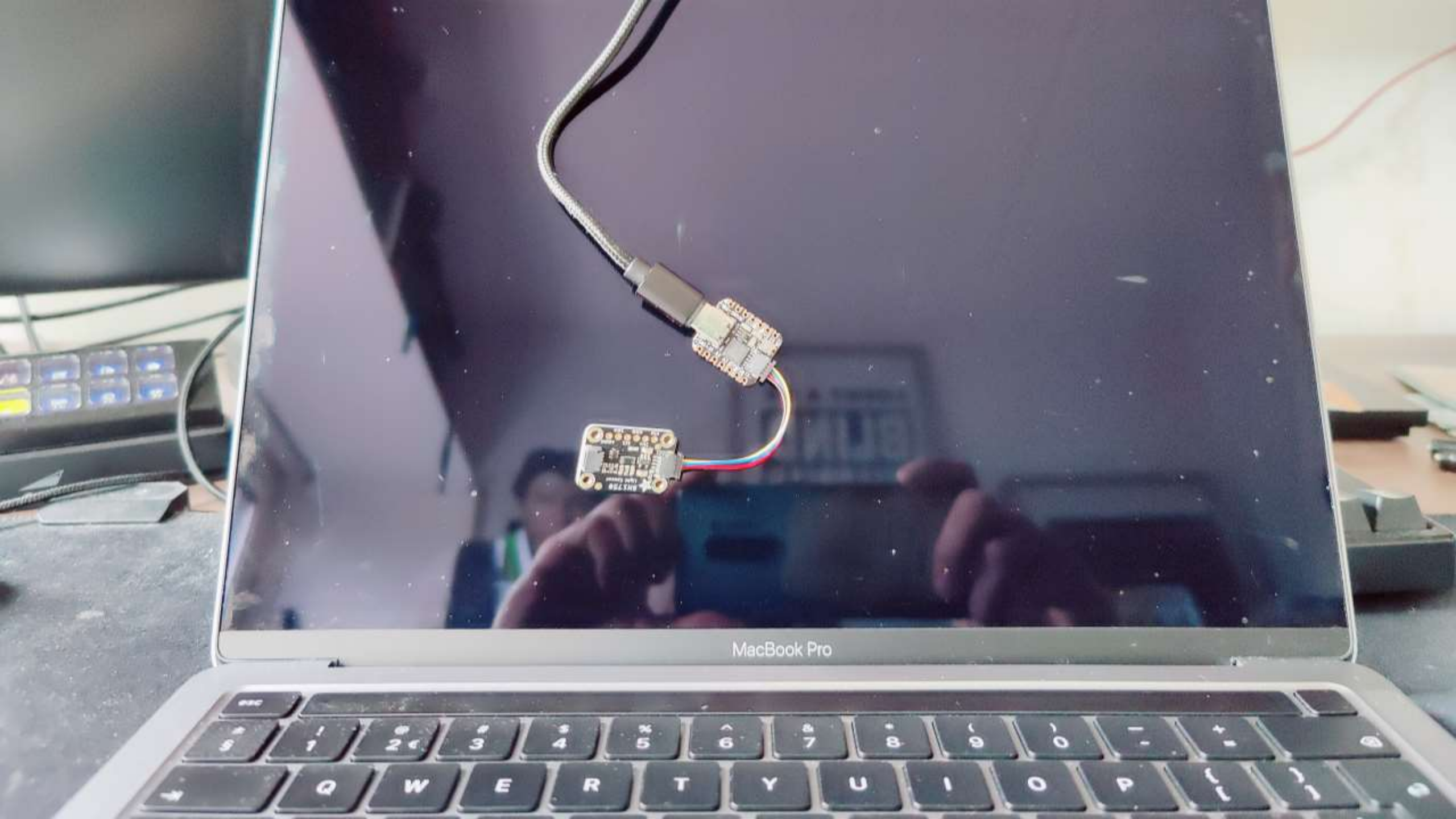

Home
Search
Your Library
Create Playlist
Liked Songs
Your Episodes
PUBLIC PLAYLIST
This Is Soen
This Is Soen. The essential tracks, all in one playlist.
TITLE
ALBUM
DATE ADDED
1 Hollowed (Elsu) Soen Memorial 1 day ago 4:09
2 Fraktal Soen Cognitive 1 day ago 3:11
720P
480FPS
PHOTO
VIDEO
SLOW MOTION
PANORAMA
PSE

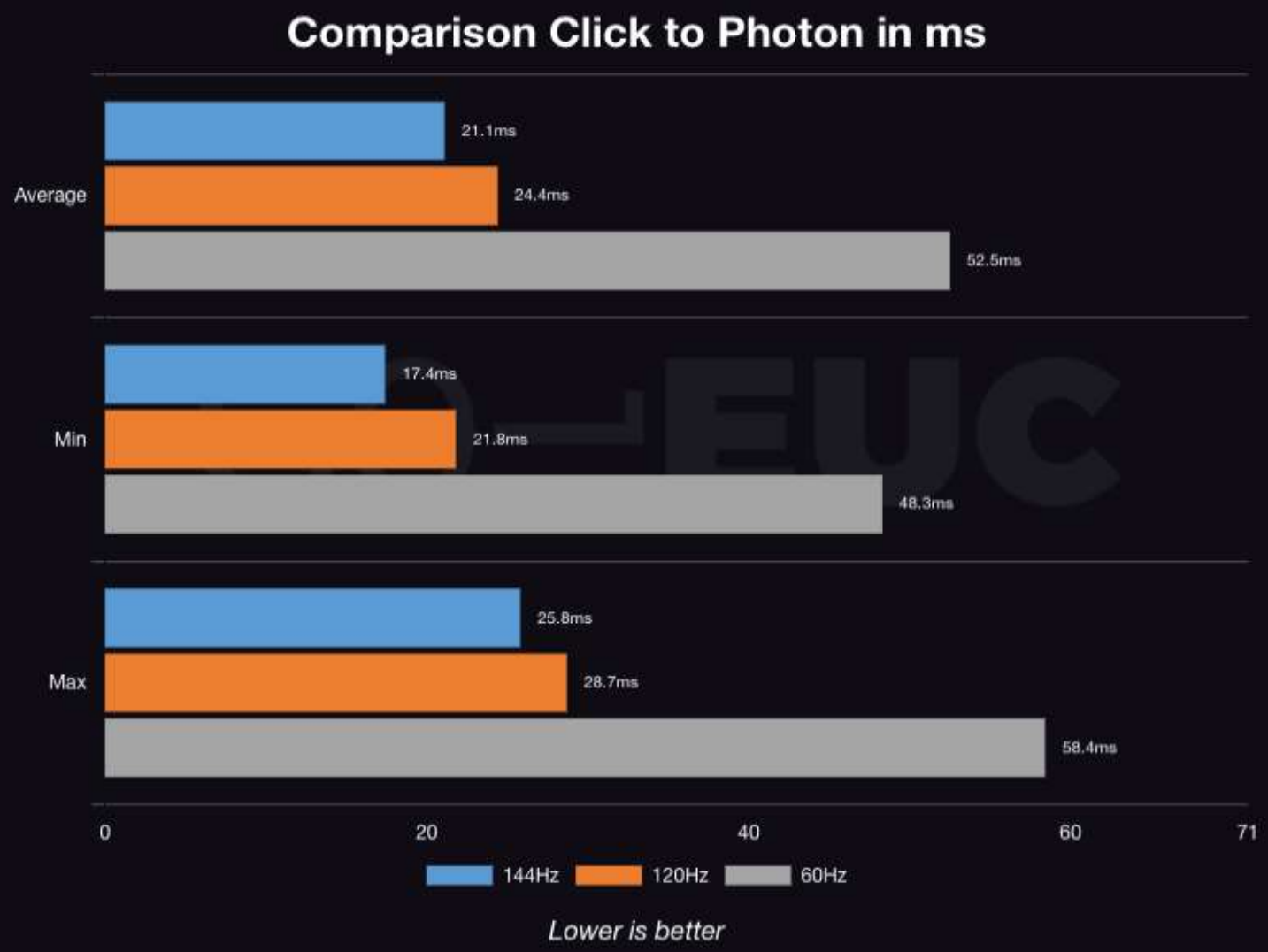

Home
Search
Your Library
Create Playlist
Liked Songs
Your Episodes
PUBLIC PLAYLIST
This Is Soen
TITLE
ALBUM
DATE ADDED


Outside Long
5:12
13
SG 553
+5 POINTS
100
100
22 / 90
NVIDIA G-SYNC HDR
GEFORCE RTX


4:36
30


BH1750
Light Sensor
3Vo
SCL
ADDR
VIN
GND
SDA
A3
A2
A1
A0
RX
3V
GND
5V


MacBook Pro


Comparison Click to Photon in ms
Average
21.1ms
24.4ms
52.5ms
Min
17.4ms
21.8ms
48.3ms
Max
25.8ms
28.7ms
58.4ms
0
20
40
60
71
144Hz
120Hz
60Hz
Lower is better

Audio refers to the representation, transmission, or reproduction of sound through electrical, digital, or analog signals. It encompasses the capture, storage, processing, and playback of **sound waves**, which are variations in air pressure that the **human ear** can perceive as sound.

Slow vibrations

(lower pitched)

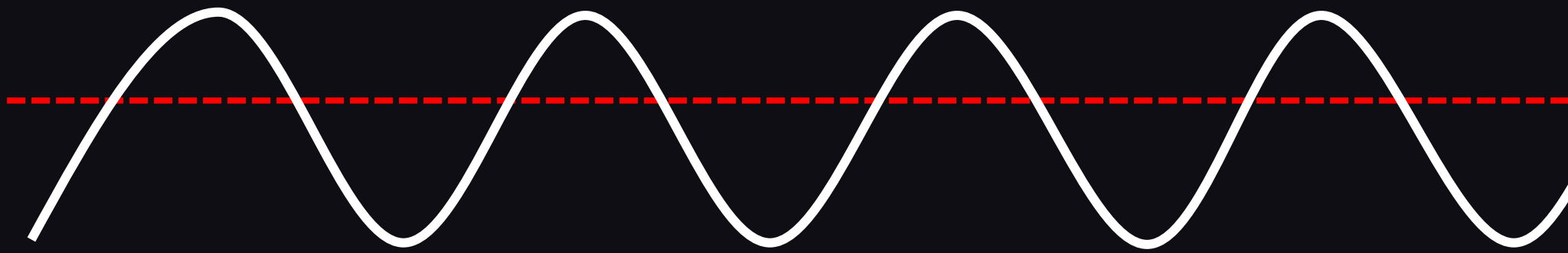
HERTZ (Hz)

Rapid vibrations

(higher pitched)

Slow vibrations

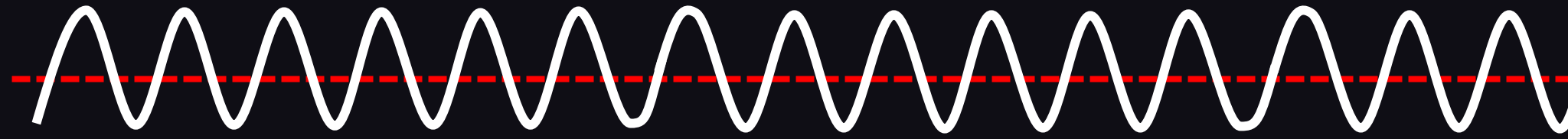
(lower pitched)



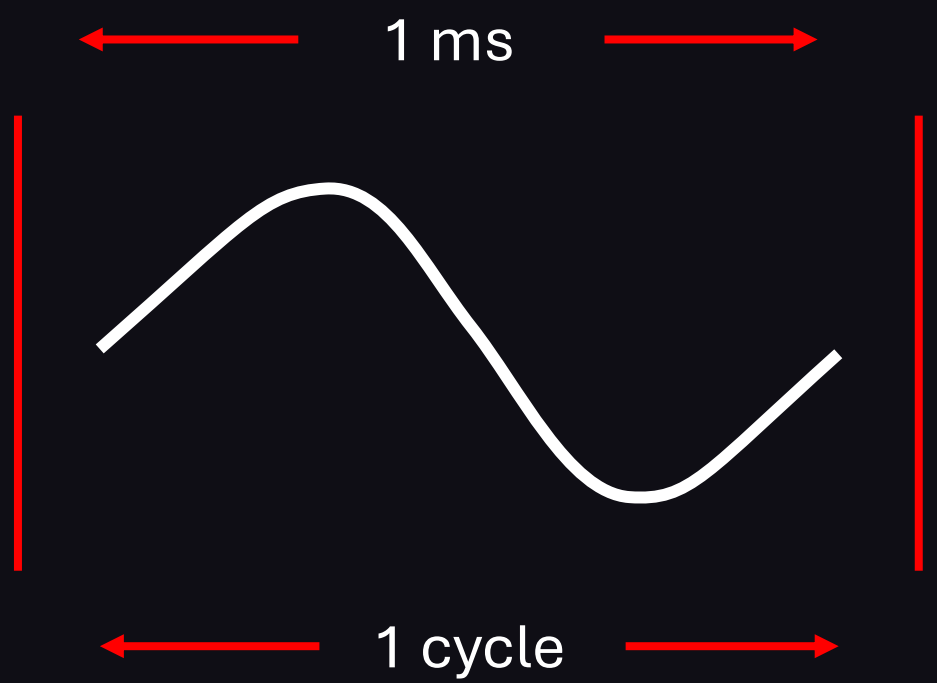
HERTZ (Hz)

Rapid vibrations

(higher pitched)



HERTZ (Hz)



1000 Hz tone

In a few moments a tone will begin playing.

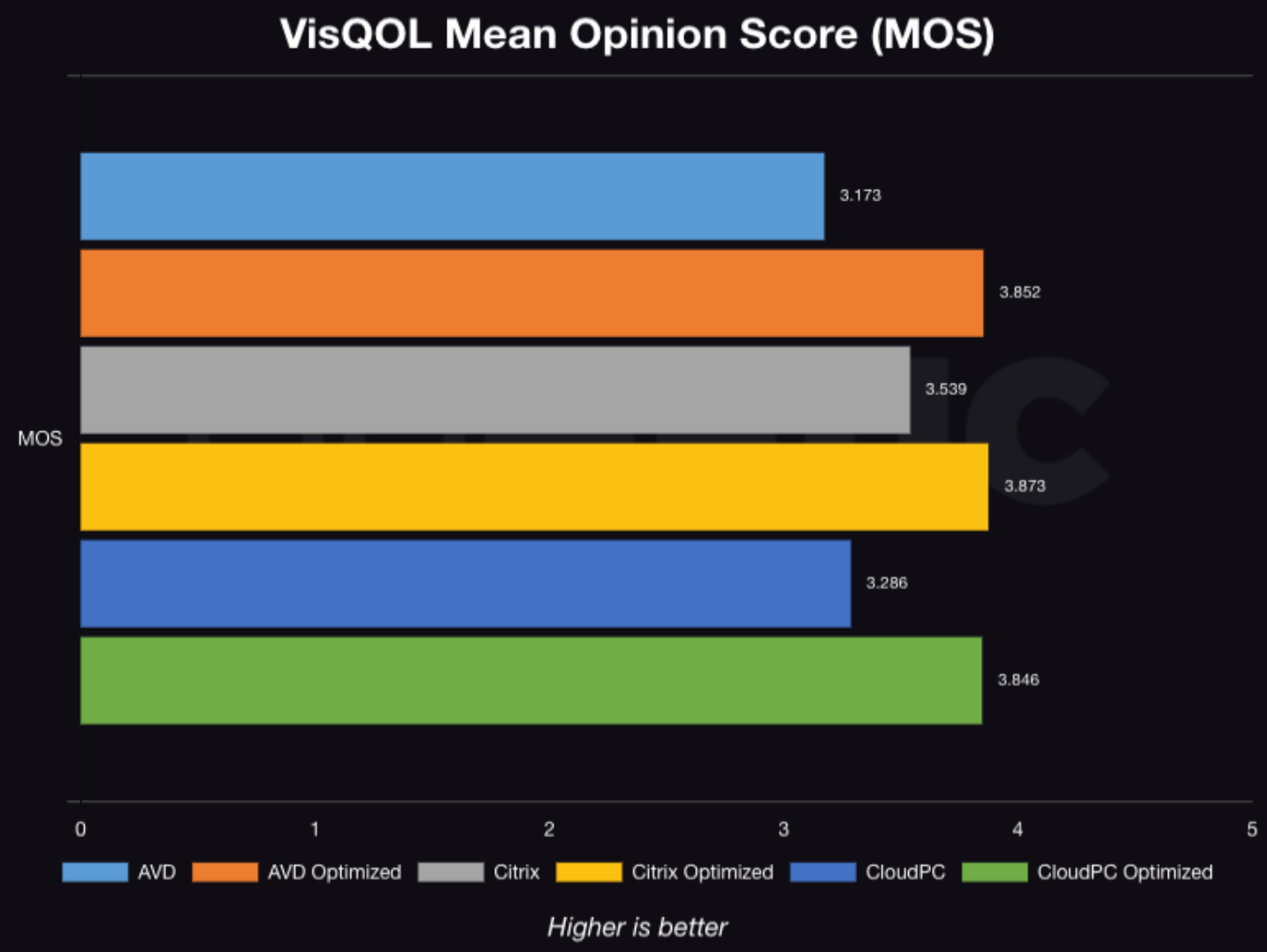
Listen to the tone and press pause as soon as you can no longer hear it.


HOLLYWOOD
PRODUCTION
CUCG Norway
DIRECTOR
Eltjo & Ryan
CAMERA
1337
DATE
SCENE
TAKE
25-10-22
1
1

GO-EUC

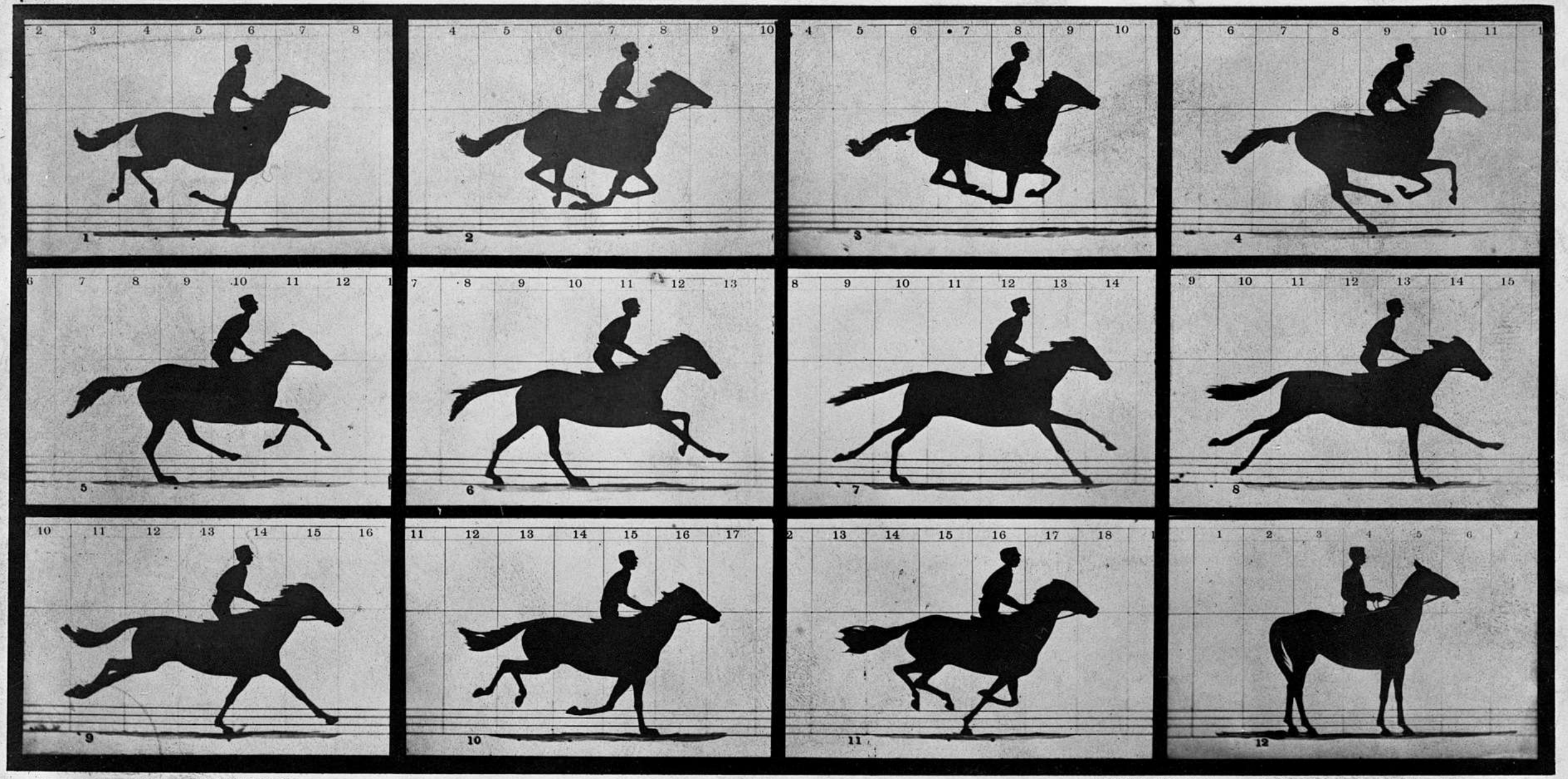
ViSQOL

Virtual Speech Quality Objective Listener


VisQOL Mean Opinion Score (MOS)
MOS
3.173
3.852
3.539
3.873
3.286
3.846
0
1
2
3
4
5
AVD
AVD Optimized
Citrix
Citrix Optimized
CloudPC
CloudPC Optimized
Higher is better

6 KODAK PORTRA 400

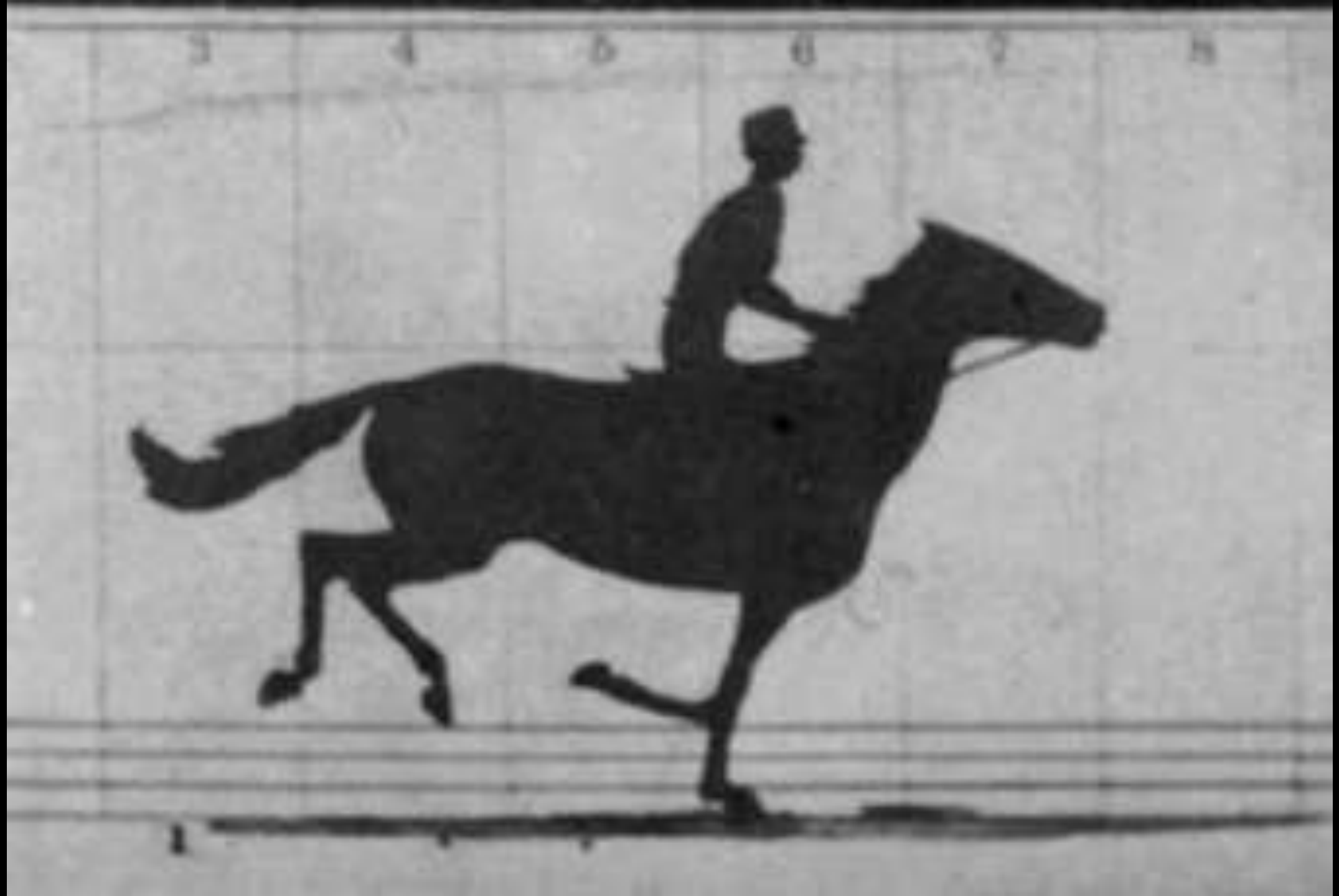
6 6A



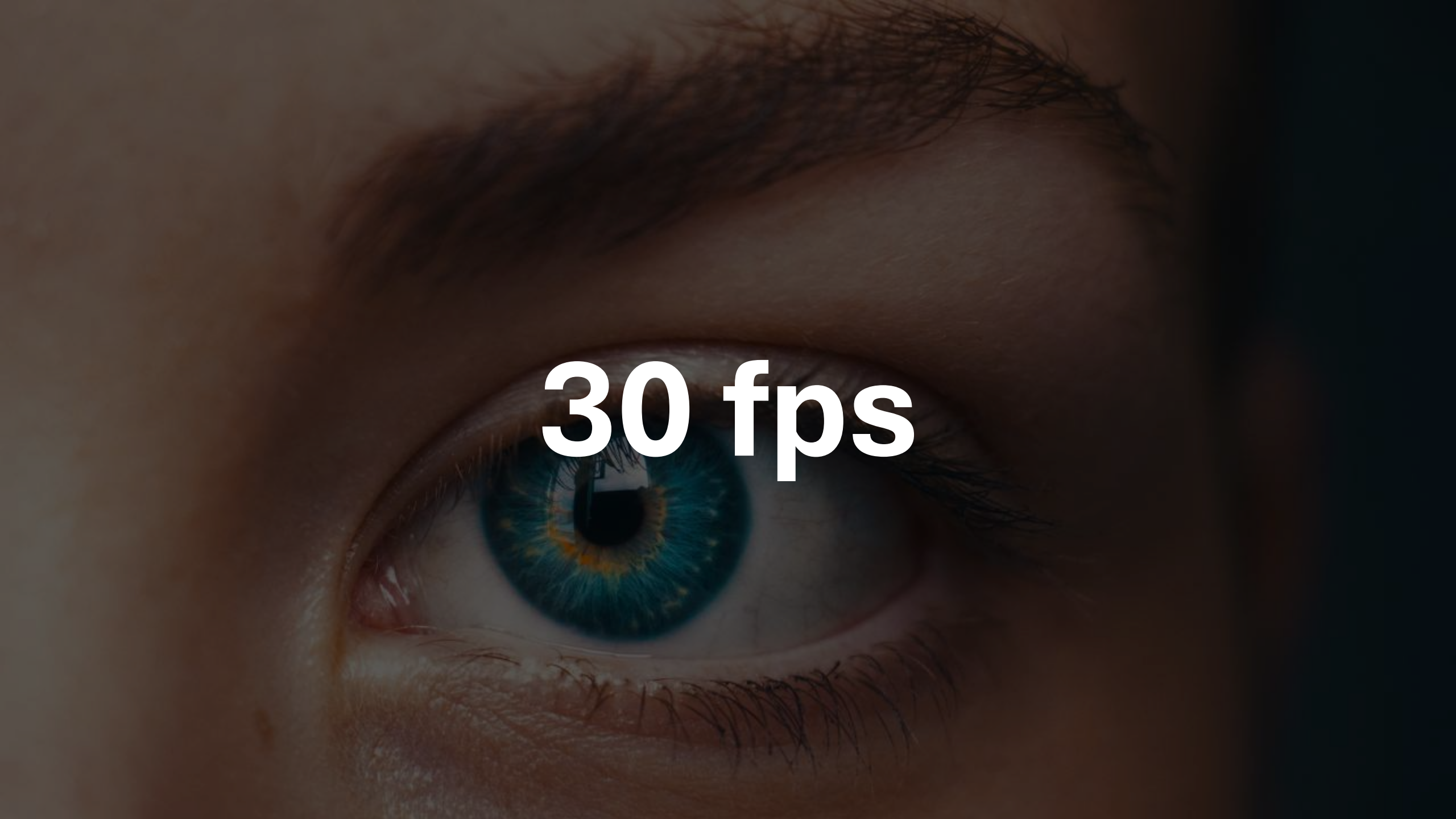
MORSE'S Gallery, 417 Montgomery St., San Francisco.

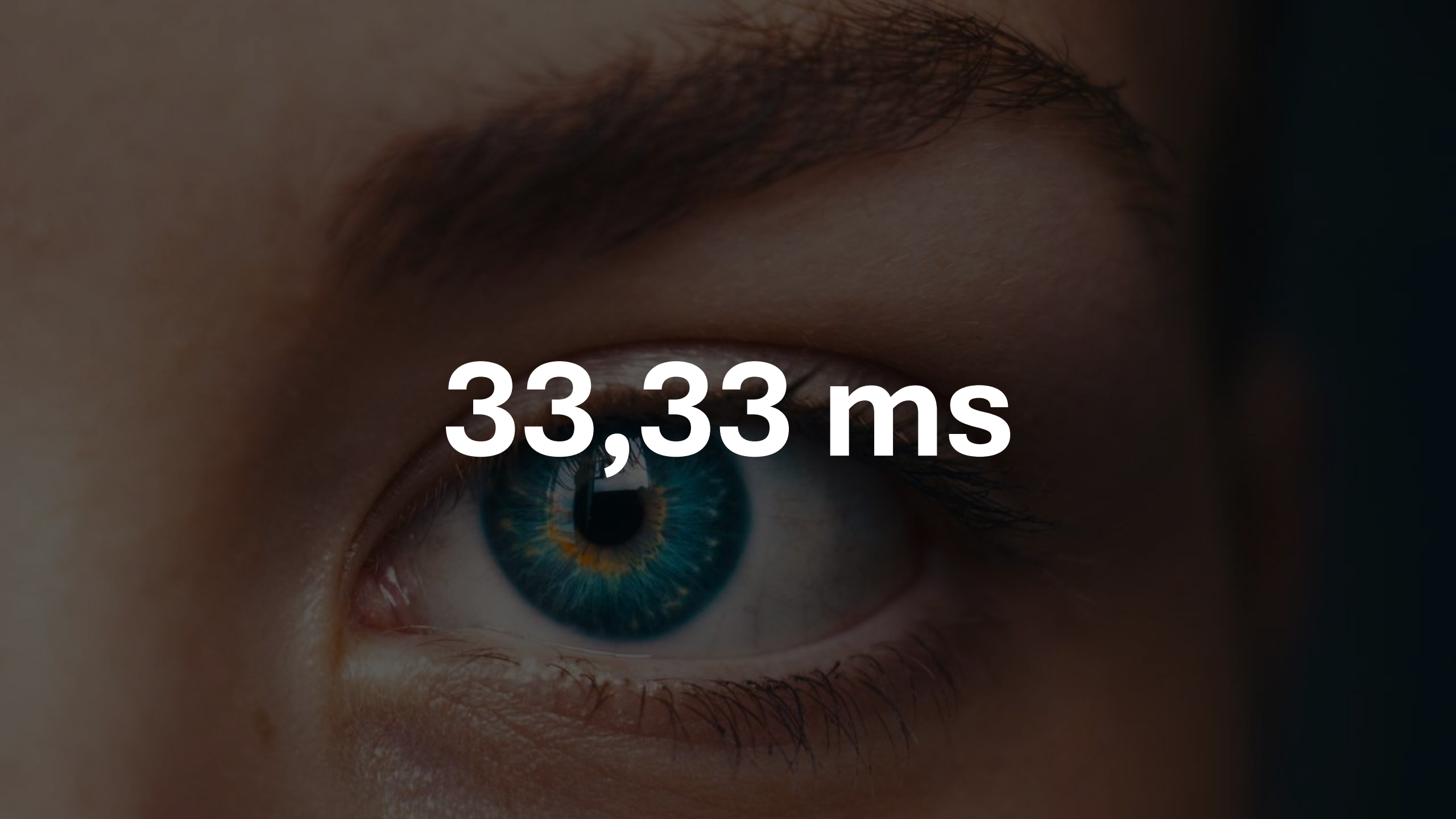
THE HORSE IN MOTION.

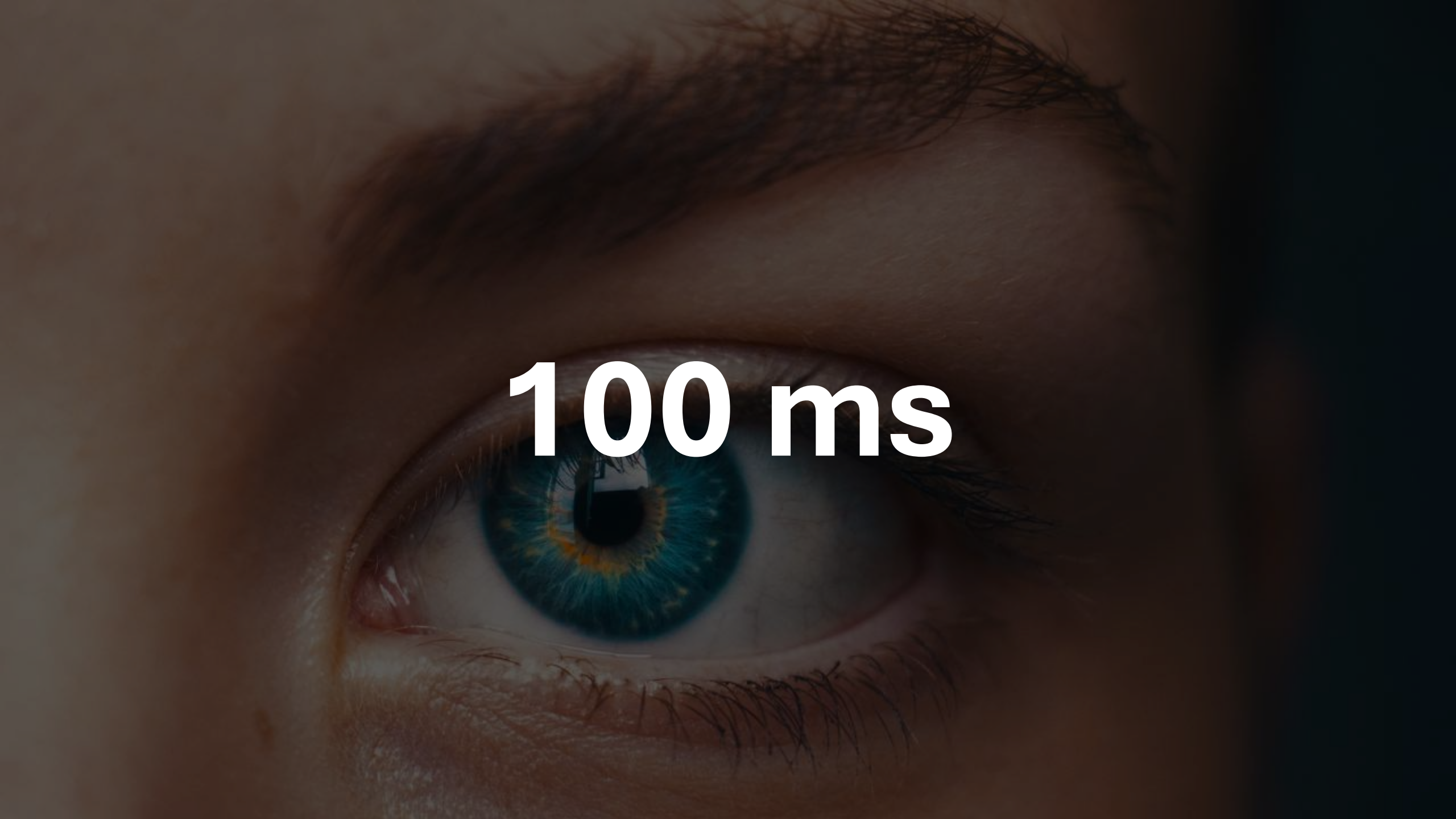
Illustrated by

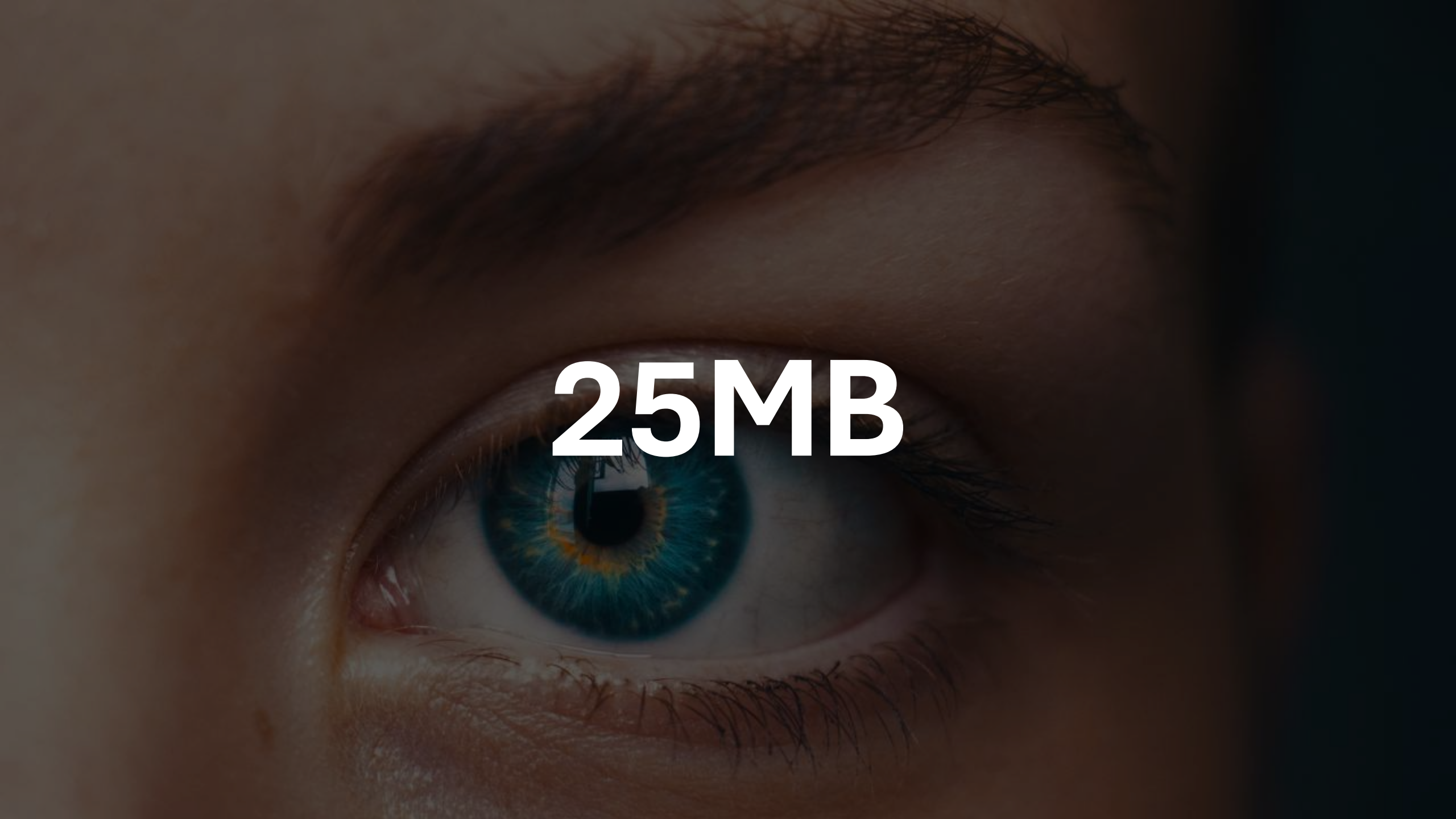



24 fps


30 fps


33,33 ms


100 ms


25MB


750MB


1500MB


Video
codecs


codec
encode
decode


encodec
decode


encodecode


codec


NETFLIX

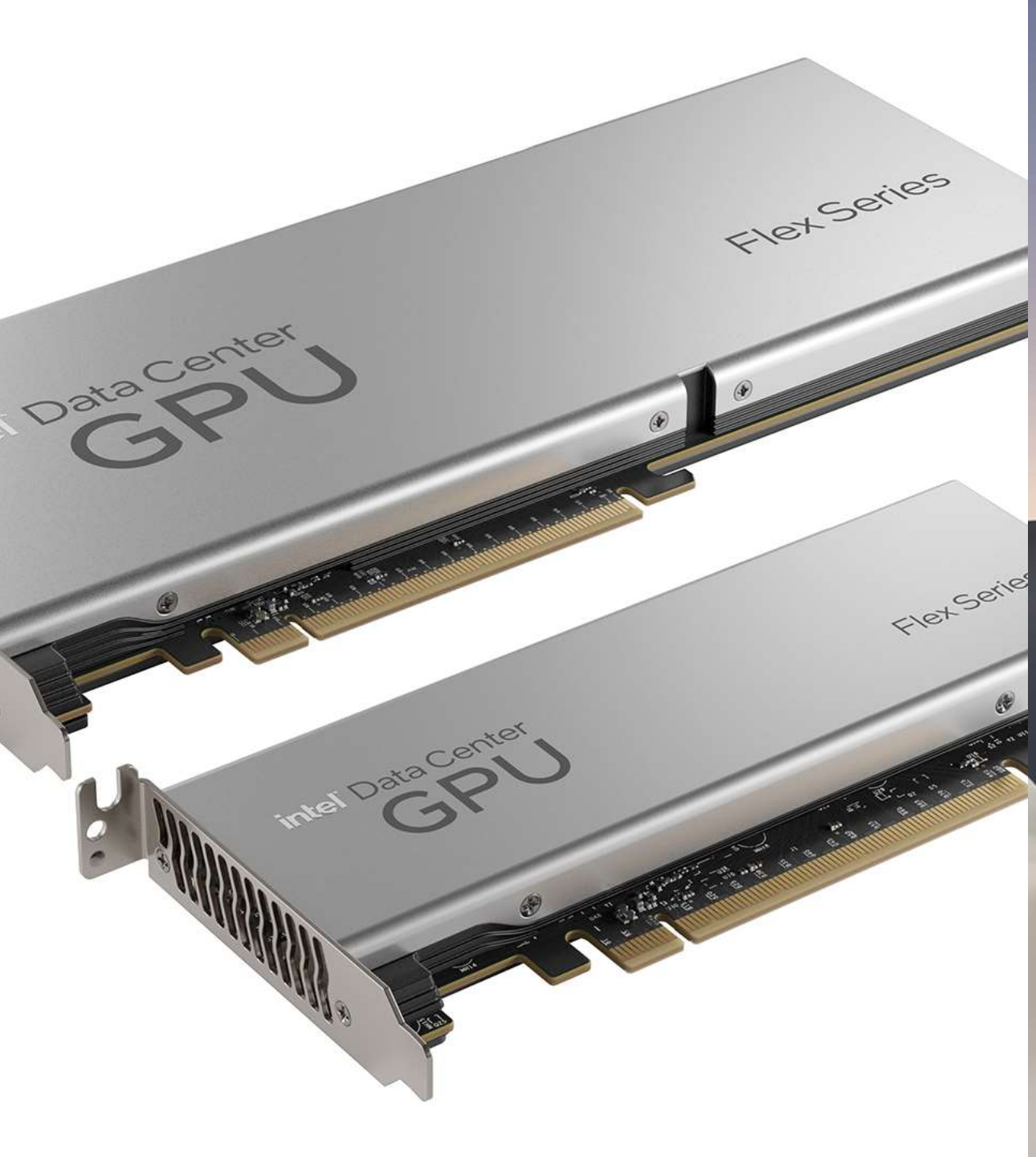

citrix
TM
HDX


Video codecs are used to reduce the bandwidth and size of moving images

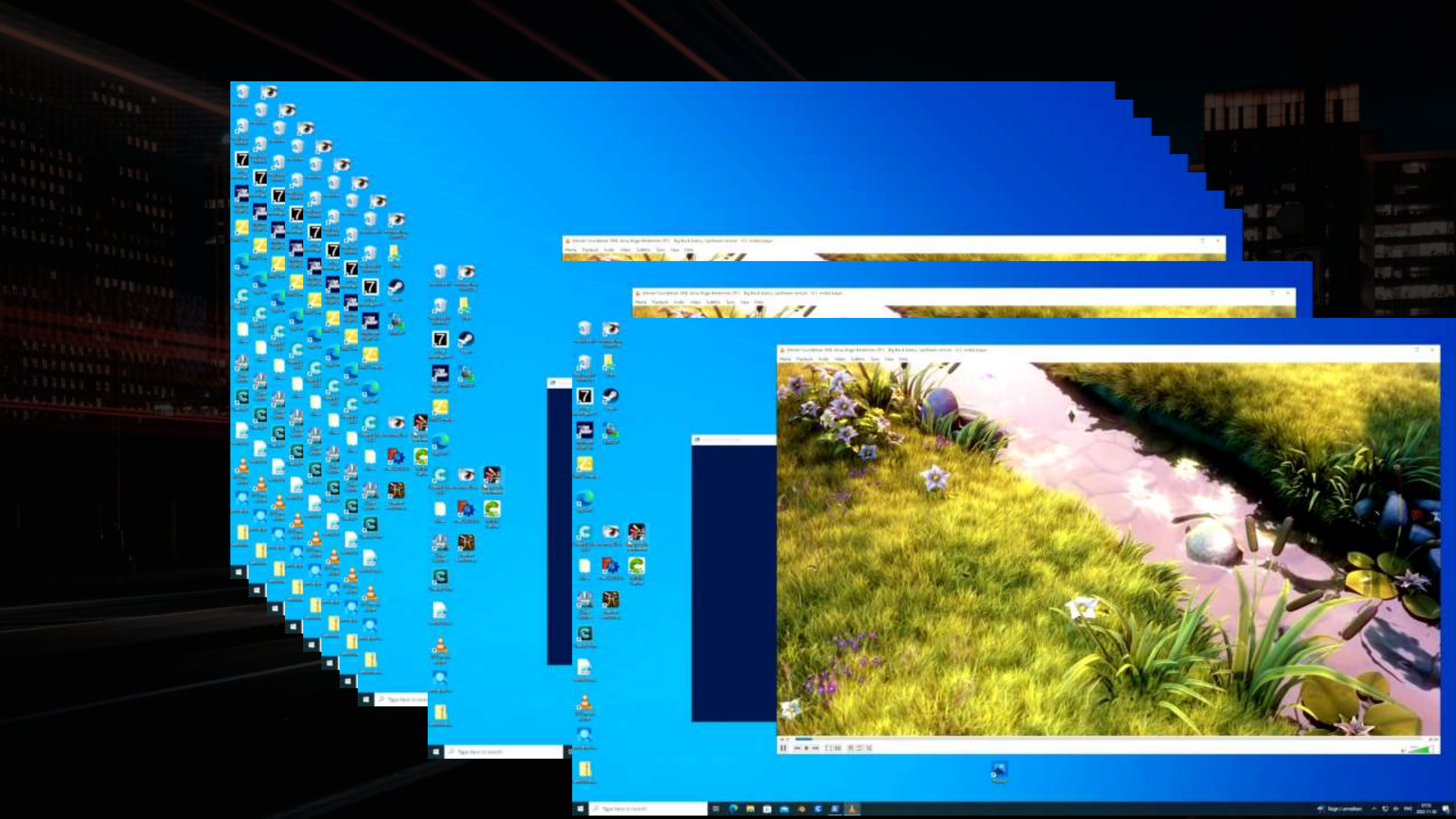

SILD FISK
ALFRED SPULSTAD
KNUT SKUR VEIT
AUDHILD VIKEN
JULEHUSET


AV1
H.265
HEVC
H.264
MPEG-4/AVC


AV1


Flex Series
Data Center
GPU
Flex Series
intel Data Center
GPU


NVIDIA



The DCT for a sequence of N numbers $x(n)$, for $n = 0, 1, \ldots, N-1$ is given by:

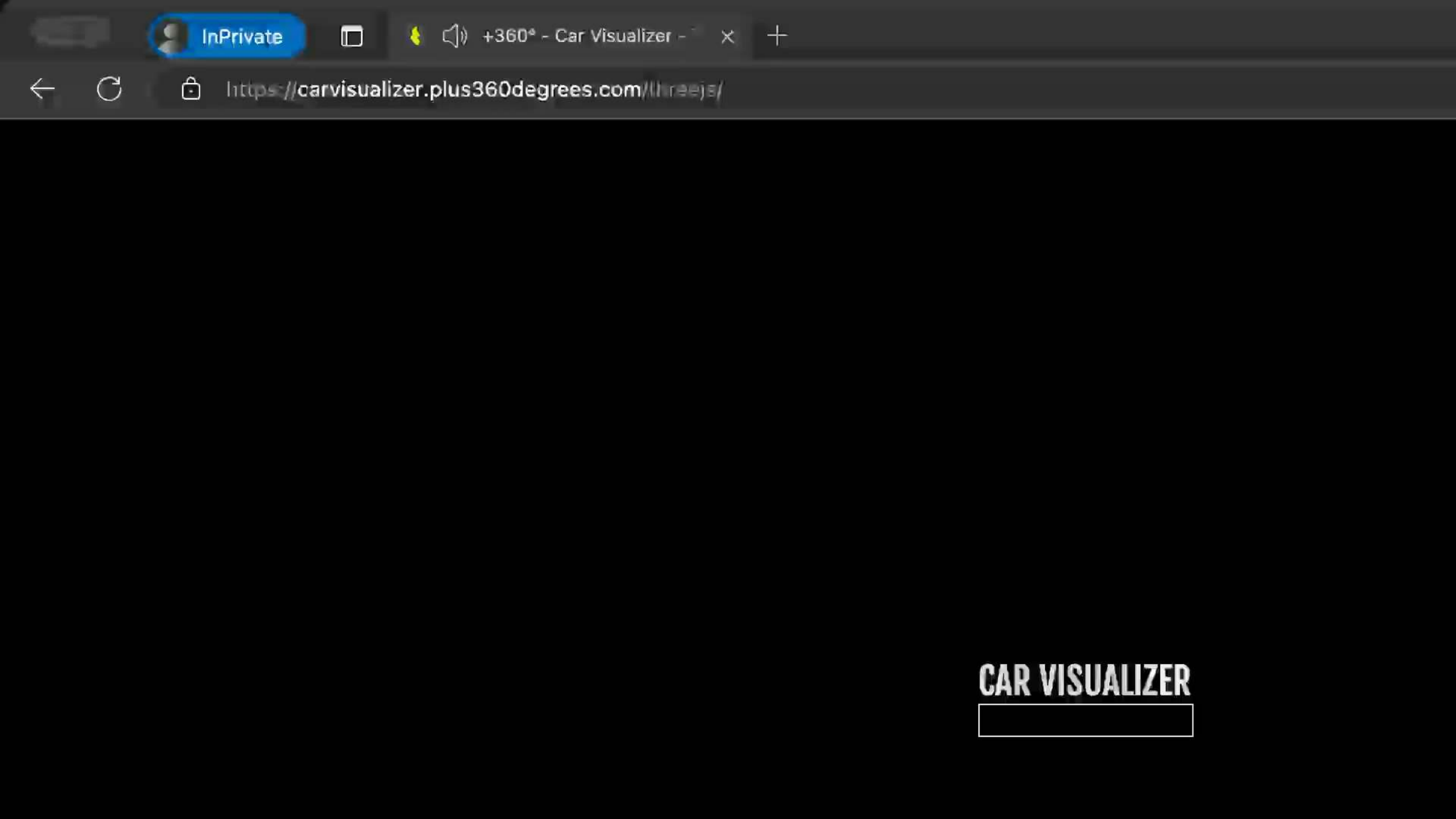
$$X(k) = \alpha(k) \sum_{n=0}^{N-1} x(n) \cos\left(\frac{\pi(2n+1)k}{2N}\right)$$

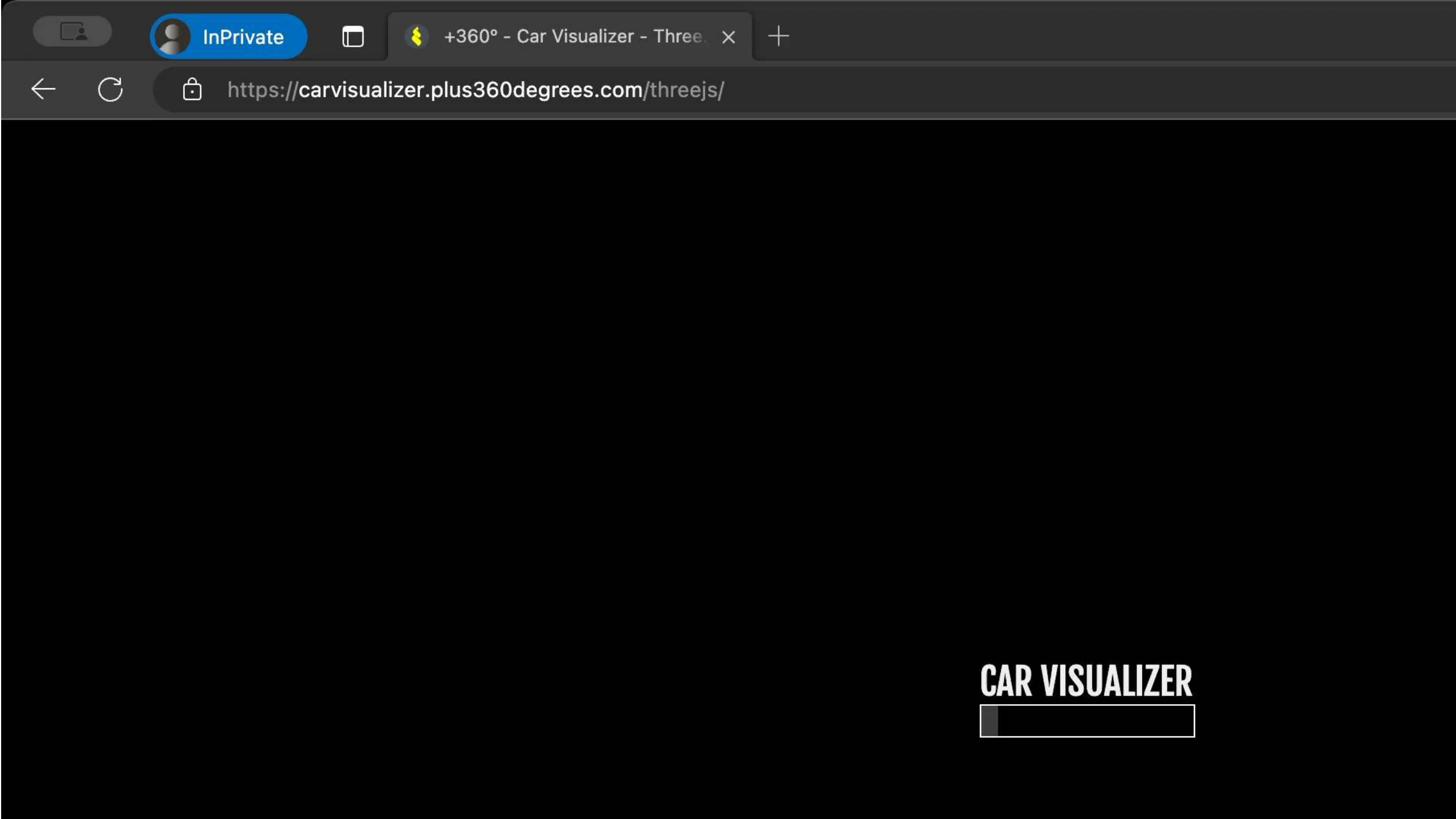
Where:

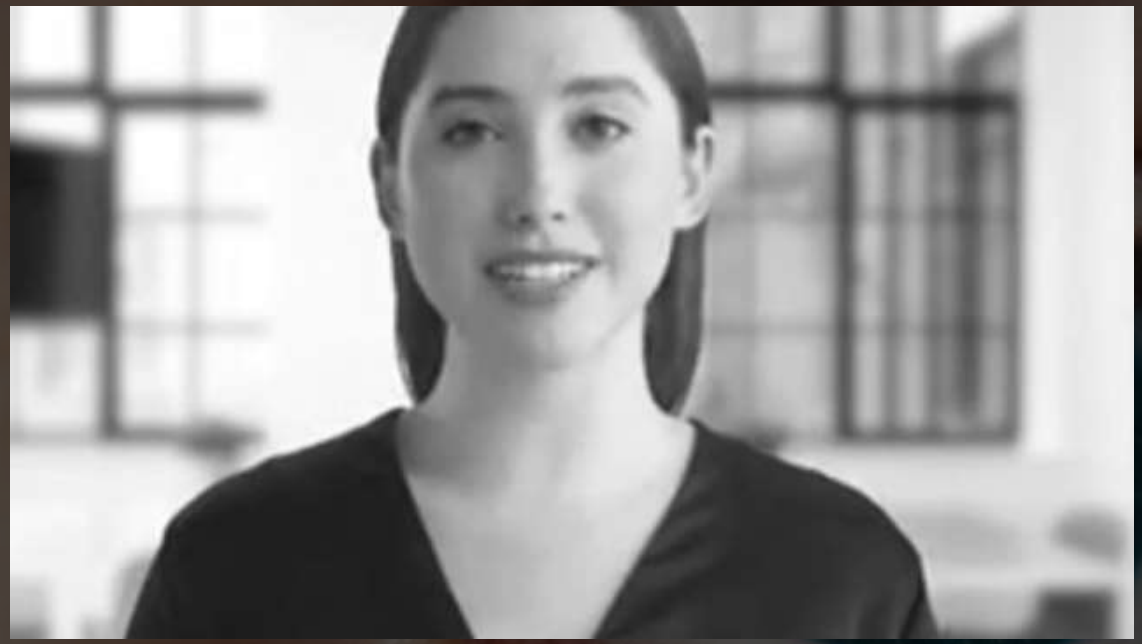
$$\alpha(k) = \begin{cases} \sqrt{\frac{1}{N}} & \text{if } k = 0 \\ \sqrt{\frac{2}{N}} & \text{otherwise} \end{cases}$$

Given a source with a set of symbols $S = \{s_1, s_2, \ldots, s_n\}$ and a corresponding set of probabilities $P = \{p_1, p_2, \ldots, p_n\}$, where p_i is the probability of symbol s_i, the entropy H is defined as:

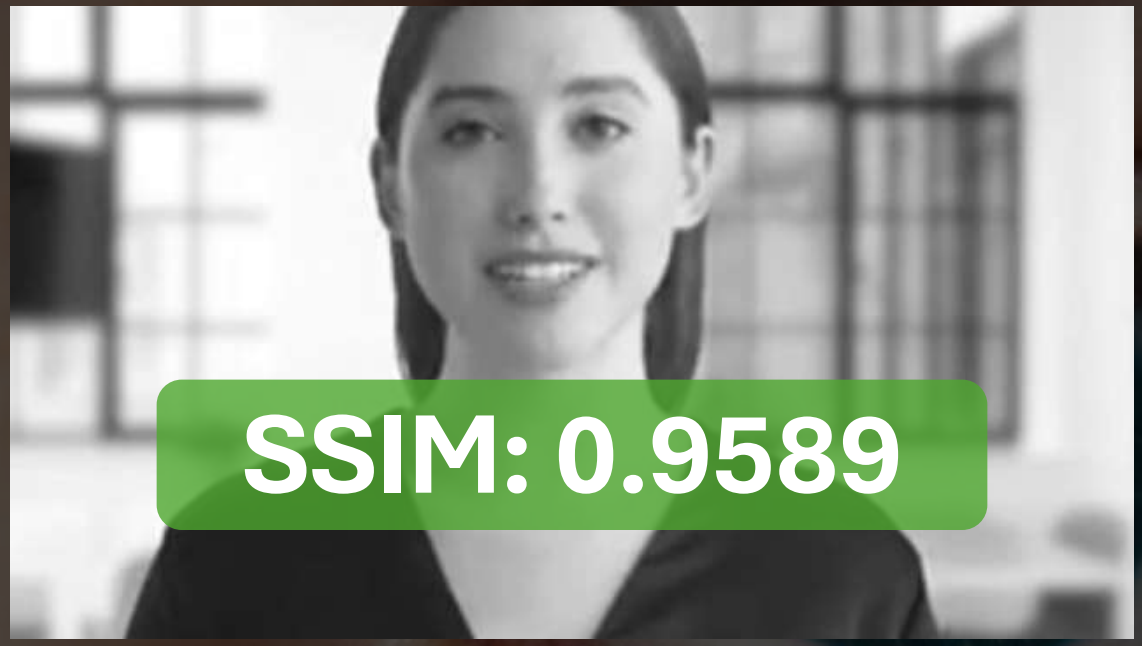
$$H(S) = -\sum_{i=1}^{n} p_i \log_2(p_i)$$


InPrivate
+360° - Car Visualizer -
https://carvisualizer.plus360degrees.com/threejs/
CAR VISUALIZER

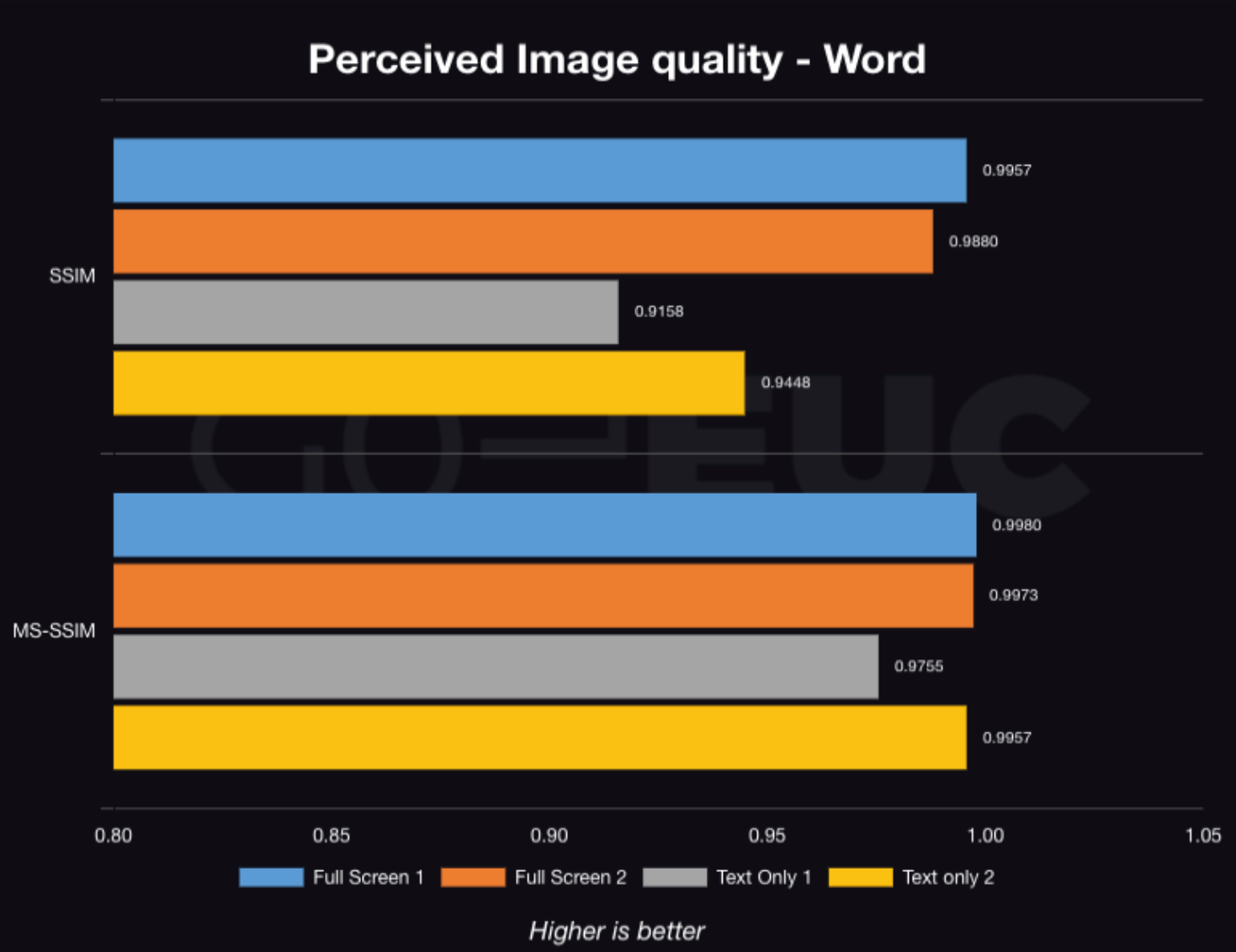

InPrivate
+360° - Car Visualizer - Three
https://carvisualizer.plus360degrees.com/threejs/
CAR VISUALIZER



SSIM is a metric used to measure the **similarity** between two images. SSIM provides **perceptual assessment** of image quality, often aligning better with **human visual judgment** compared to simple error summation methods.


SSIM: 0.9589

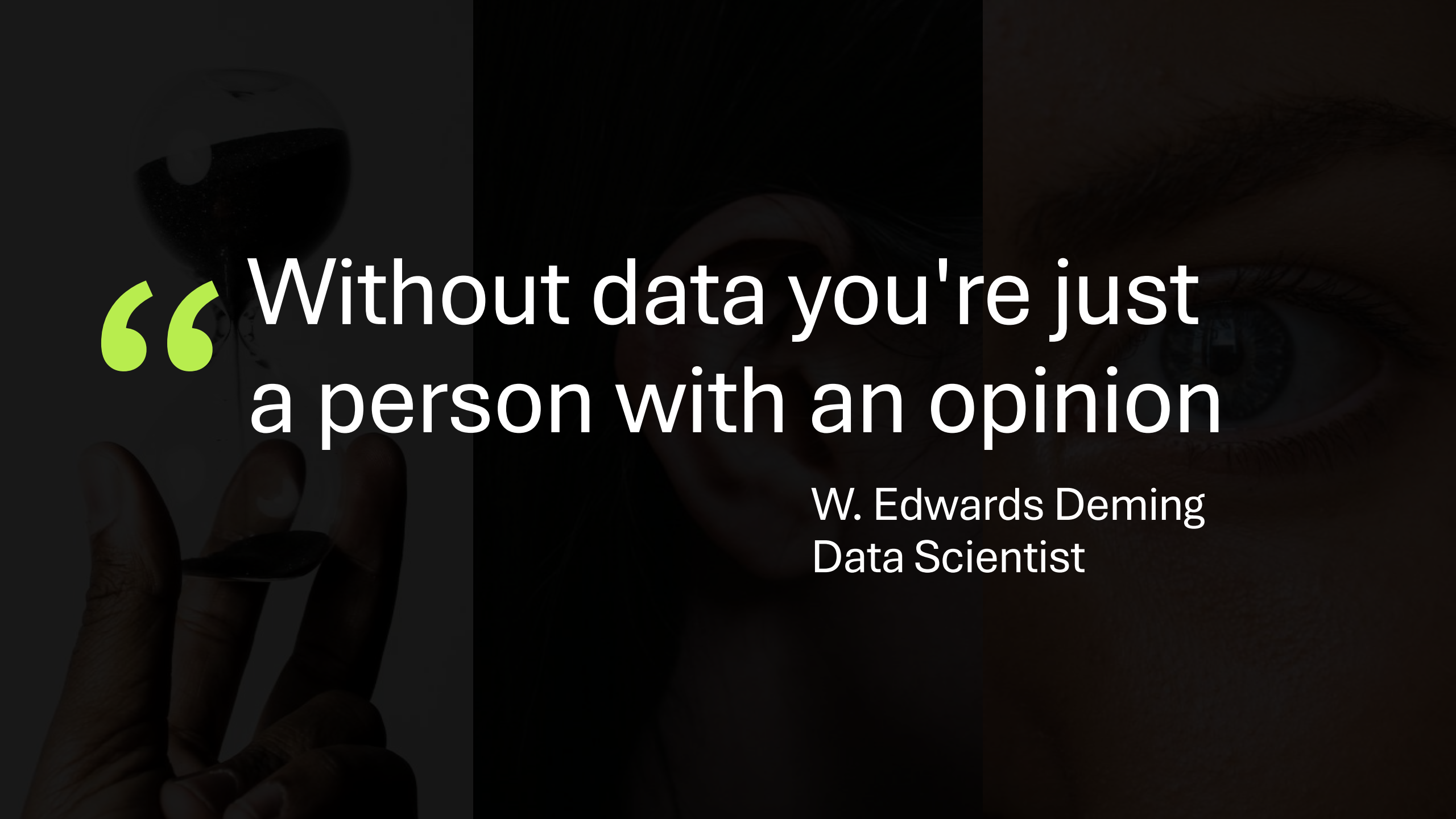

SSIM: 1.0


Perceived Image quality - Word
SSIM
0.9957
0.9880
0.9158
0.9448
MS-SSIM
0.9980
0.9973
0.9755
0.9957
0.80
0.85
0.90
0.95
1.00
1.05
Full Screen 1
Full Screen 2
Text Only 1
Text only 2
Higher is better



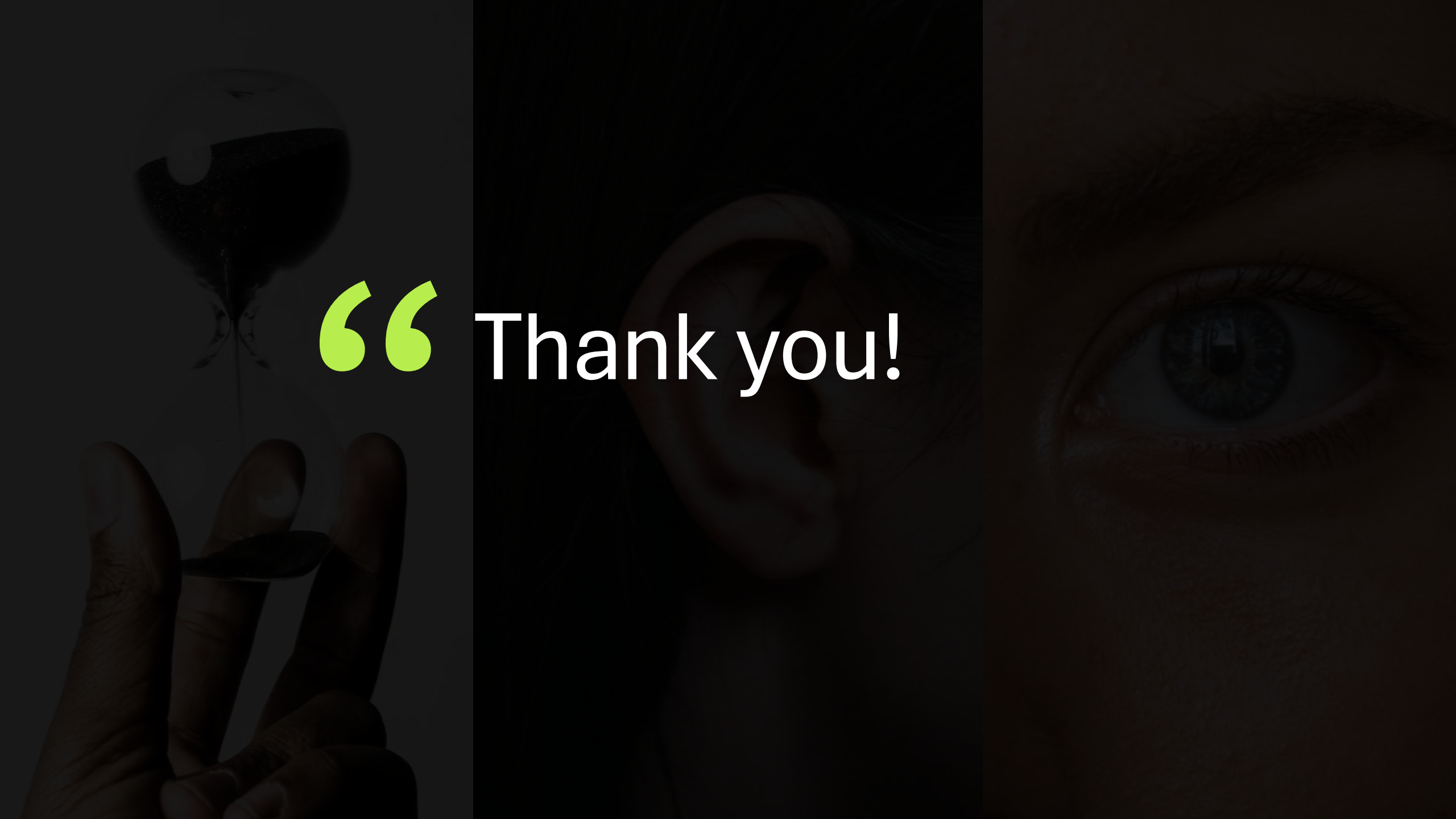
Key takeaways

- Understand the workload of the user
- Tweak the protocol based on the workload
- Reduce latency by select the correct datacenter
- Consider content redirection to improve audio sync



“Without data you're just a person with an opinion

W. Edwards Deming
Data Scientist



“ Thank you!