

VideoQ

Technologies and Products

December 2020



www.videoq.com

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VideoQ Philosophy of Media Data Processing



1. Automatically generated **Technical Metadata and Reports** are must be and must cover:
Image aspect ratio, contrast, sharpness, sound loudness, noise and other unwanted components levels are among the most critical parameters affecting the subjective estimation of AV content quality.
2. Traditional professional image & sound QA/QC methodology, based on the usage of large number of high-grade video & audio monitors, etc. is no longer the answer, **but we learn that QA/QC is still needed.**
3. In this automated environment a **smaller number of human operators** should focus **only** on optional final checks and/or complicated cases.
4. And these operators must be equipped with appropriate **software tools and indicators** presenting all relevant parameters in a time-saving “easy to spot at a glance” way.
*The VideoQ **VQPT** modules answer the need for such automatic tools.*
*Combination of VQPT suite modules with other VideoQ tools, such as **VQV** – Player/Viewer/Analyzer , will result in further increase of workflow efficiency.*

VideoQ Technologies and Media Ambits



What it is:

- [*me·dia am·bit*] noun: Technical and semantic **metadata** about moving images, sounds, and timed text; **embedded** in files or **externally centralized**.
- Sentence example: Their system uses media ambits to automate ingest and delivery.
- Variations: Video Ambit, HDR Ambit, Audio Ambit, Timed Text Ambit, etc.

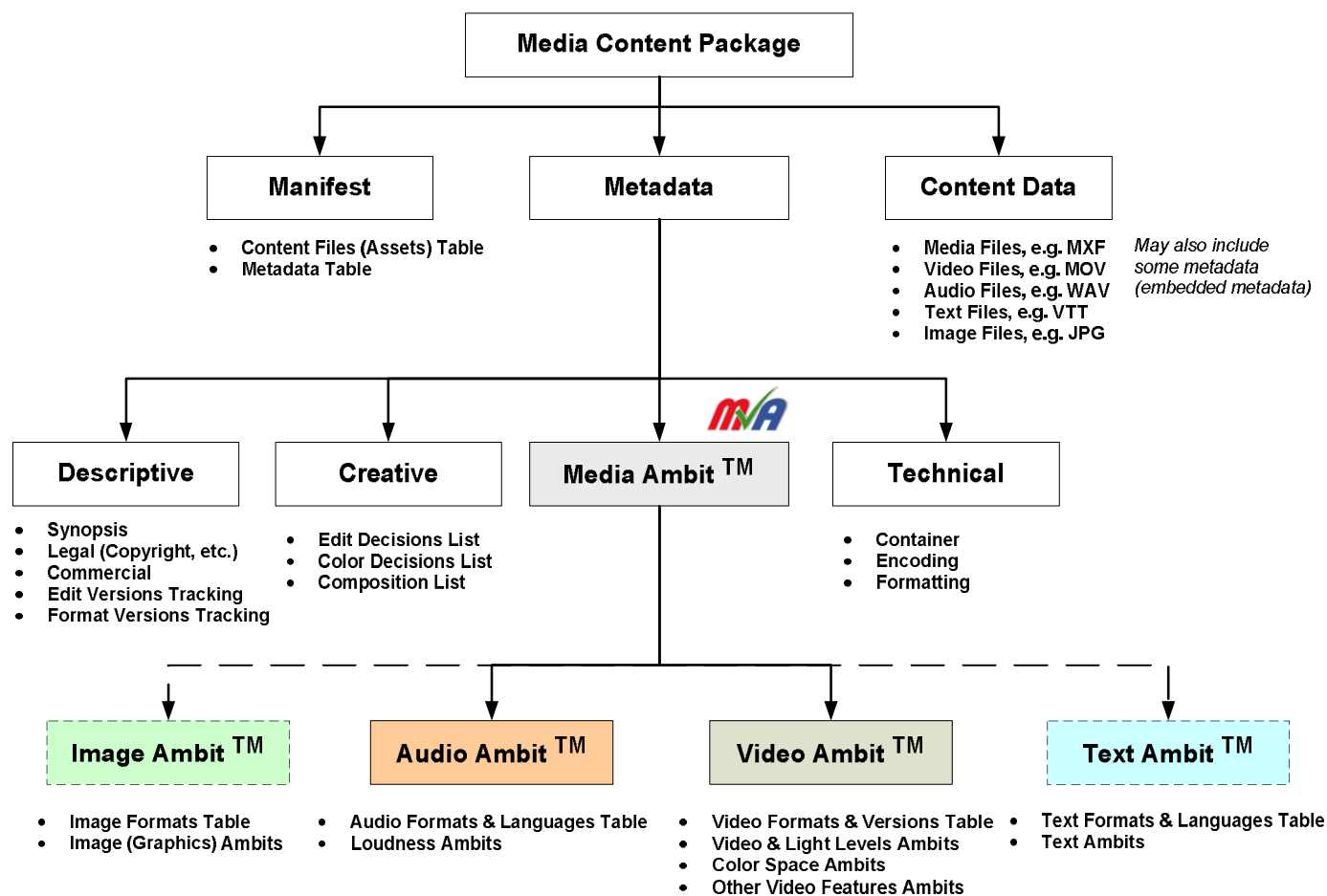
Ambit's Role for Automated and Automation-Assisted Workflows:

- Robot-assisted human decision-making **tools**.
- Robots-learning-from-people **tools**.
- **Ambits repositories** and **machine services** optimized for automation, web services, and directed acyclic workflows.
- Automated and manual control of **optimized** video and audio processing/conversion
- Automated and manual **quality assurance** and **quality control** tools
- Measure, annotate and automatically **modify** files to match **target ambits**.
- **Notify** machines, people and dashboards in **automated workflows**.

Learn more about Media Ambits:

www.videoq.com/Downloads/VideoQ_Media_Ambit_Presentation.pdf

Media Ambit and Media Package Data Structure



Media Ambits and VideoQ



VideoQ developed essential tools for Ambit-based Automated and Automation-Assisted Workflows:

- **VQPT** - **V**ideo**Q** **P**roductivity **T**ools, unattended program modules for Windows/Mac/Linux platforms that make Media Ambit metadata, plots, and images required for databases & orchestrators
- **VQMA** - Video Quality Measurement & Analysis Software Tool
- **VQCP** - Video QC player for human review and supervision, compatible with Media Ambit tools and practices.
- **VQV** - Media Files Player/Viewer/Analyzer/Converter for deep analysis QA/QC applications.

VideoQ Product Lines

VQDM – Video Latency & AV Sync Analyzer

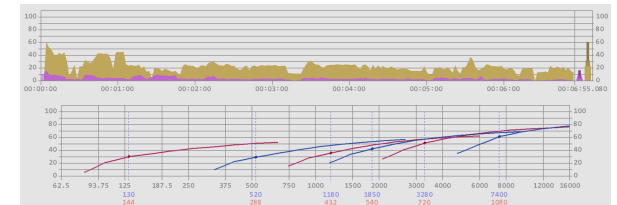
VQL – Comprehensive Library of sophisticated test patterns

VQMA – Video Quality Matrix Analyzer

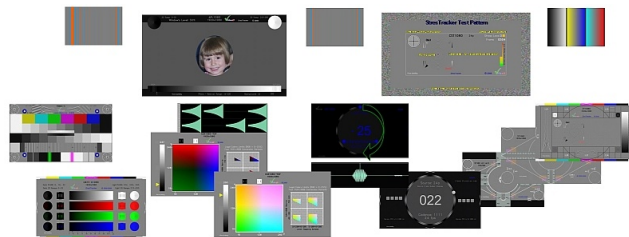
VQPT – Suite of Productivity Tools for cloud transcoding & streaming

VQTS – Complete Video Quality Test Systems

VQV – Video Files Viewer-Analyzer



STUDENT NAME		F. Test Summary		YOUR TEST RESULTS	
STUDENT NAME	Percentage	Maximum Score	Score	Score	Grade
John Smith	83.3%	100	83.3	83.3	A
Jane Doe	80.0%	100	80.0	80.0	A
Bob Johnson	75.0%	100	75.0	75.0	B
Alice Smith	70.0%	100	70.0	70.0	C
David Brown	65.0%	100	65.0	65.0	D
Emily White	60.0%	100	60.0	60.0	E
Michael Green	55.0%	100	55.0	55.0	F
Sarah Black	50.0%	100	50.0	50.0	G
James Blue	45.0%	100	45.0	45.0	H
Olivia Red	40.0%	100	40.0	40.0	I
Benjamin Yellow	35.0%	100	35.0	35.0	J
Isabella Purple	30.0%	100	30.0	30.0	K
Ethan Silver	25.0%	100	25.0	25.0	L
Ava Gold	20.0%	100	20.0	20.0	M
Lucas Bronze	15.0%	100	15.0	15.0	N
Mia Copper	10.0%	100	10.0	10.0	O
Noah Nickel	5.0%	100	5.0	5.0	P
Charlotte Iron	0.0%	100	0.0	0.0	Q



VQDM – Video Latency & AV Sync Analyzer



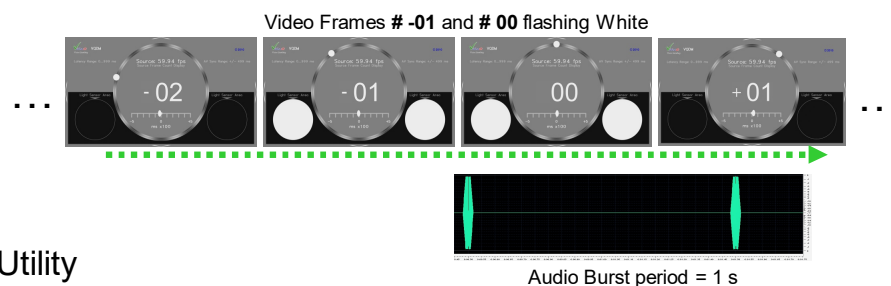
- VQDM Features:

- Combination of Test Generator and Delay Analyzer to measure AV latency and AV sync errors
- Self-contained hardware/software solution allows measurement in normal work conditions *without any interference into the System Under Test*
- Windows SW Application with *multi-channel* GUI, revealing *in real time*:
AV delay time profiles, AV sync errors and AV delay statistics
- Two reporting modes:
 - a) Machine-readable .txt or .csv file for test automation QA/QC applications
 - b) Windows GUI and detailed multi-page PDF document print-out for engineers
- Provides for calibration and prequalification of System Under Test using built-in subset of VideoQ test patterns library



- VQDM Components:

- **VQDM-100** – Main Video Capture and Conversion Unit
- **VQDM Executable** (Windows Application) – AV Delay Analyzer SW
- **Saleas Logic** (Windows Application) – Preview, Capture and Scope Utility



VQL – Audio and Video Test Patterns Library



- VideoQ **static** and **dynamic** test patterns are available in a variety of resolutions from **192x108** to **8K**, interlace modes, aspect ratios and frame rates
- VQL files are designed to be compatible with all commonly used software or hardware codecs and media players.
- All test patterns remain suitable for accurate measurements even after low bitrate coding, heavy scaling and/or cropping, e.g. after down-conversion for mobile devices
- Full custom compressed and uncompressed test files and application-specific live video clips are available on request

Learn more about **VQL** Test Patterns: www.videoq.com/vql.html



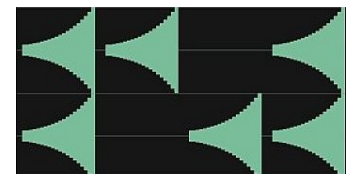
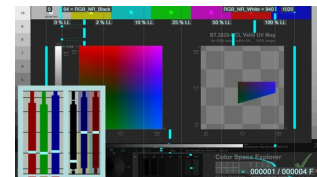
VideoQ Approach to Test Patterns Usage

VideoQ approach combines “classic”, “digital” and “cloud” methodologies, sharing same test patterns and covering all 3 levels of video quality control:

Instant visual-aural quality estimation



Objective measurements of video and audio parameters



Fully automated Quality Control



```
> (0) "header": {} (11)
> (0) "generalFileInfo": {} (25)
> (0) "videoStream": {} (43)
> (0) "testConditions": {} (7)
> (0) "videoParameters": {} (19)
> (0) "activeImageFormats": {} (4)
✓ (0) "videoLevelsStatistics": {} (6)
  1."videoDataVolume_pct" "100.457"
  1."chromaDataVolume_pct" "36.935"
  1."averageU_pct" "-4.814"
  1."averageV_pct" "4.992"
```

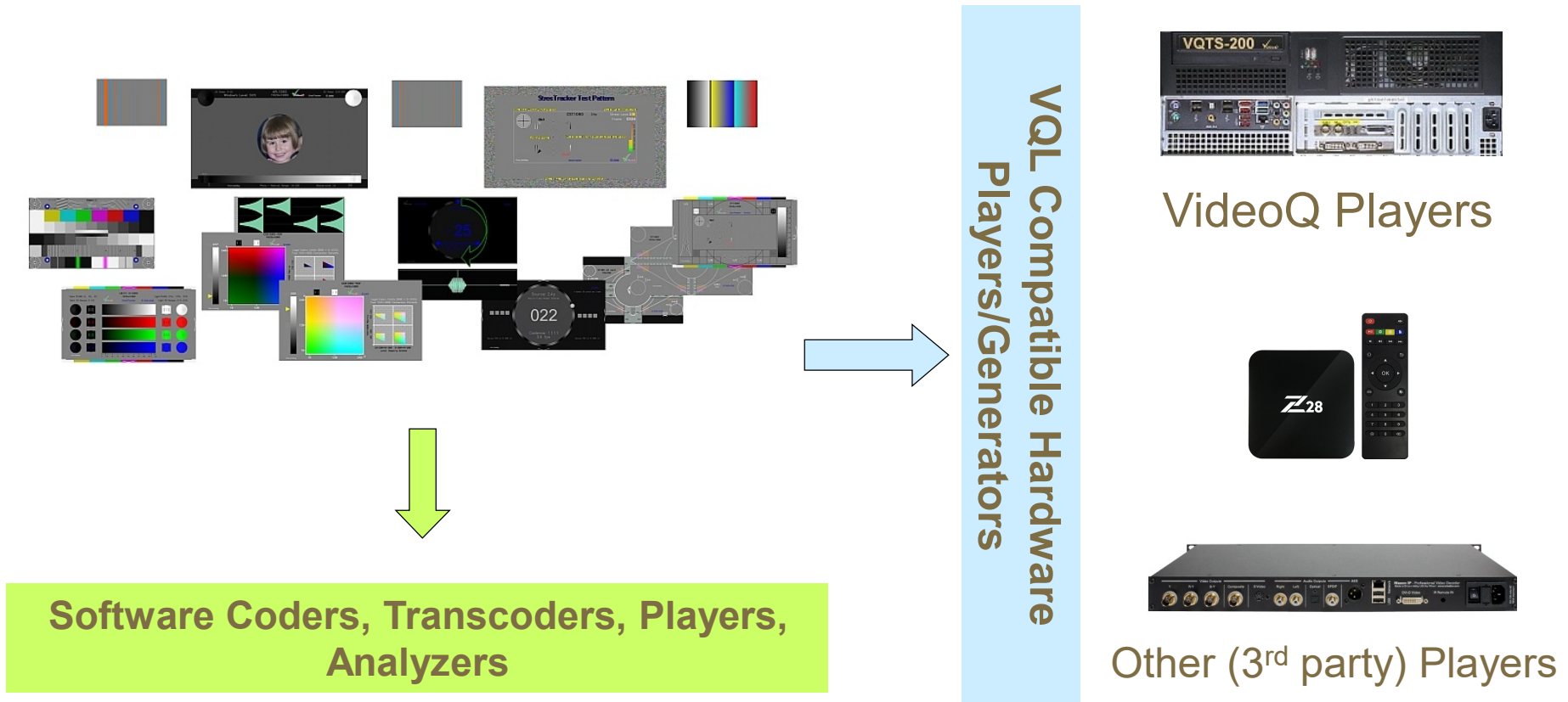


VQL Test Patterns by Categories

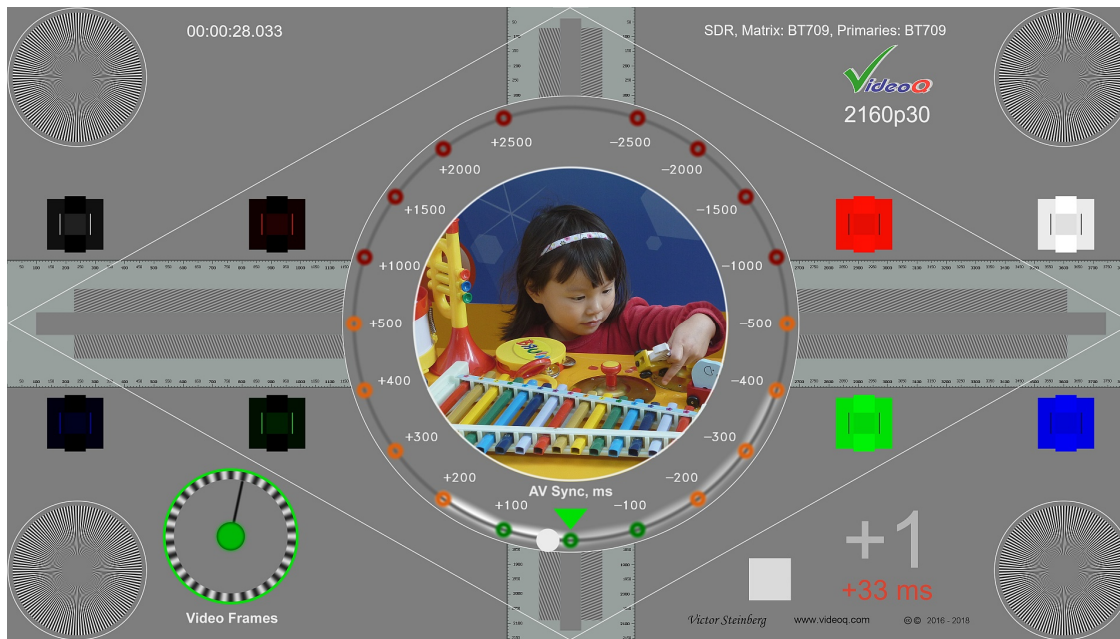
1. Color Space, Gradations and Linearity Tests – **GradTracker™** series
 - 1.A Special **HDR (High Dynamic Range)** Tests, including “Wonder Bars” – VQCB suite
2. Geometry, Scaling, and Sharpness Tests – **ScalTracker™** series
3. Motion Portrayal Tests: Frames Continuity, De-Interlacing, and AV Sync – **ChronTracker™** series
4. Compression Quality Tests – **StressTracker™** series
5. Static and Dynamic Multi-purpose Test Charts, including widely used **VQMPC** test
6. Reference Live Clips in a variety of formats
7. Audio Tests

Learn more about **VQL** Test Patterns: www.videoq.com/vql.html

VQL for Software and Hardware Applications



VQMPC – Dynamic Test Pattern with AV Sync Components



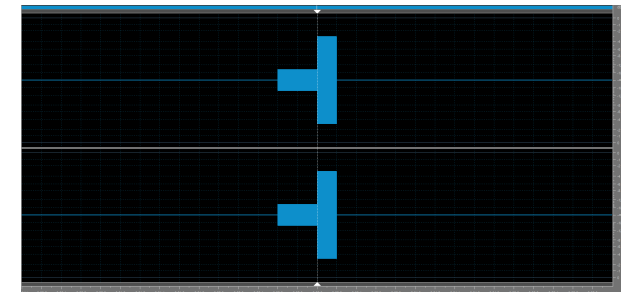
Set of test pattern video and audio files to check:

- Geometry and Aspect Ratio
- Video Levels and Color Rendition
- Scaling distortions or proof of no-scaling
- Frames continuity and AV Sync Errors
- Compression artifacts

Variety of video formats:

- Frame sizes from 720x480 to UHD & 4K
- Frame rates from 23.976 to 60.0 fps

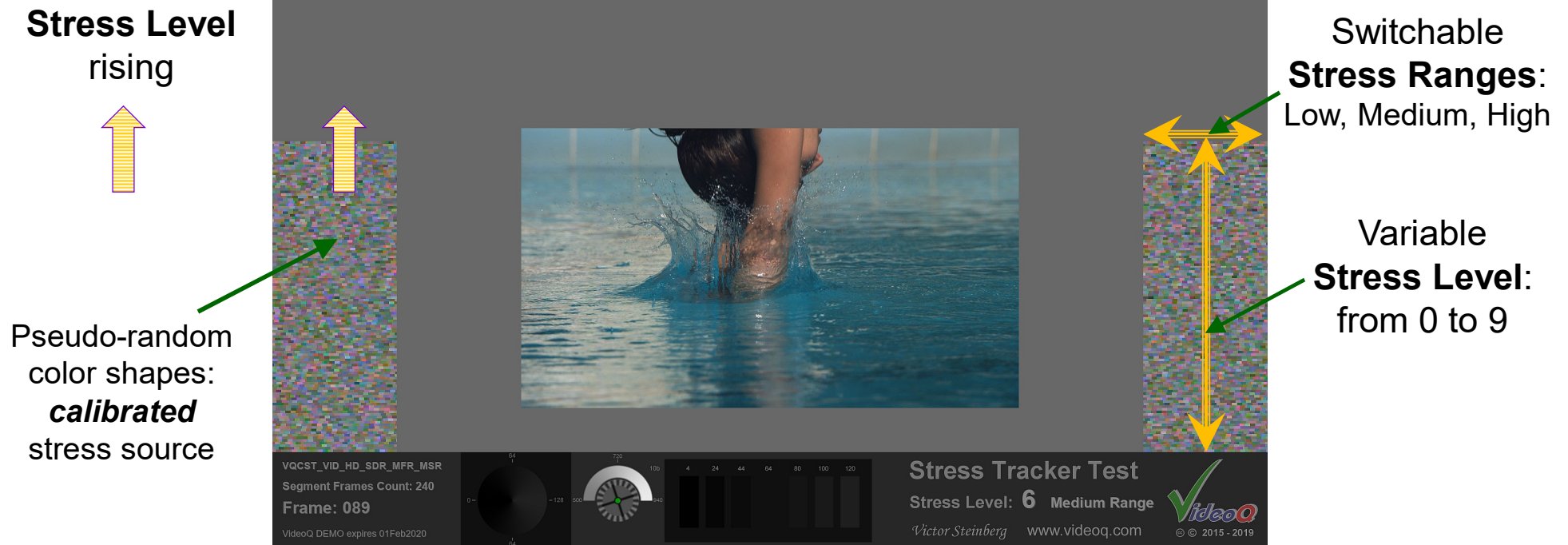
AV Sync Reference: “Beep-bop” burst



Ideal tool for instant “at glance” video system performance estimation, e.g. for fast setup, functionality test and debugging

VQMPC test is used world-wide by a number of major companies.

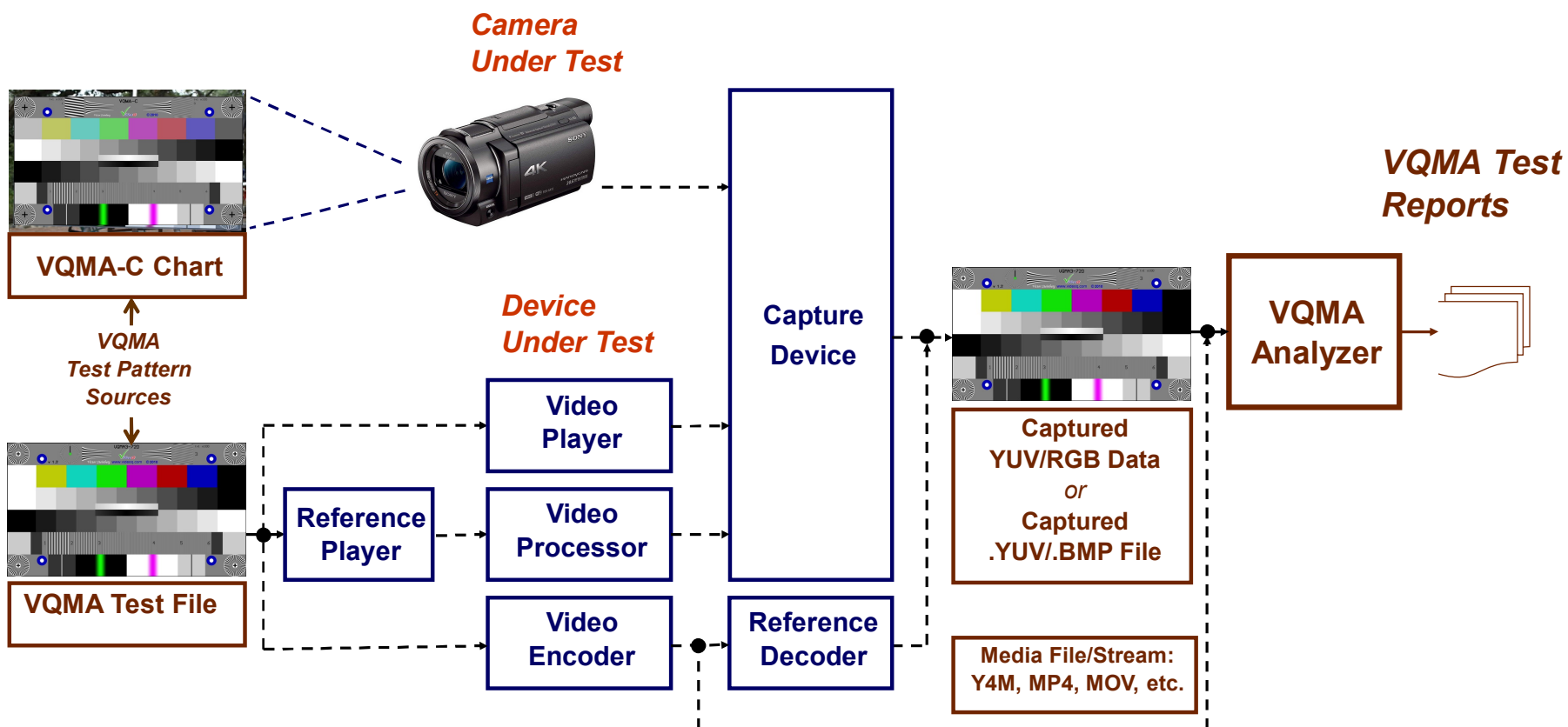
Stress Tracker – Test Pattern for Compression Codecs



VQCST is a sequence of **10 Segments (10 Stress Levels)**, each segment duration: 4.0, 4.8 or 5.0 seconds. Total sequence duration is 40, 48 or 50 seconds, depending on the selected frame rate.

Stress Tracker™ test is suitable for **subjective image quality estimation** in real time and for **automated** measurement of **Stress Response Profile**.

VQMA – Video Quality Software Analyzer



Learn more about **VQMA**: www.videoq.com/vqma.html

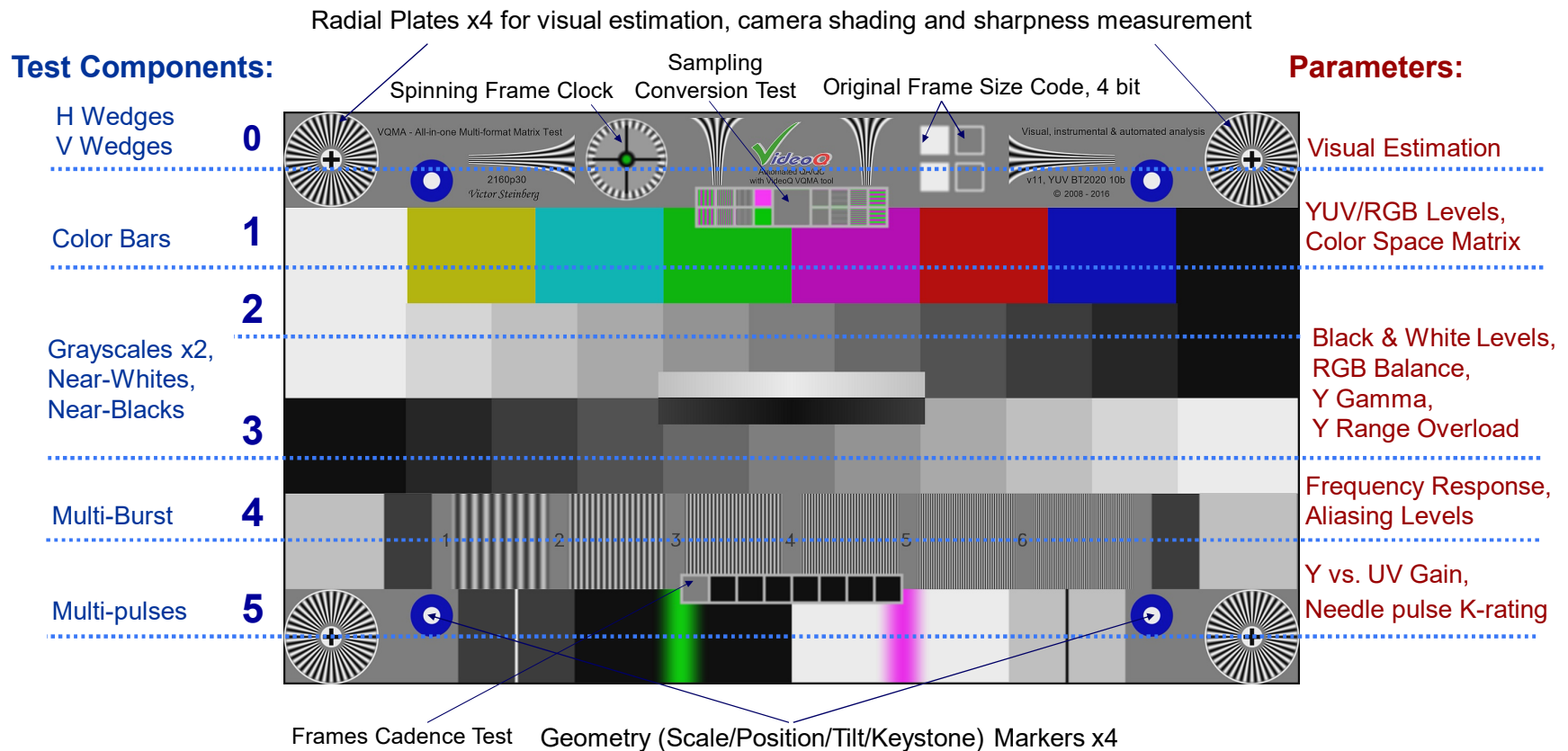
VQMA Features



- 4th generation of VideoQ best-selling software product, *suitable for any video format, any frame size (from 192x108 to 4096x3072), any frame rate*
- Software executable under Windows™ (XP, 7, 8, 10)
- USB dongle copy-protected, dongle-per-workstation
- Auto-analysis on the companion VQMA Matrix Test Pattern
- Variety of VQMA Test Pattern formats: Optical Chart, File, Signal, Stream
- Unique patented algorithms for accurate & fast measurements (typically 2-5 seconds)
- Built-in Software Scope: YUV/RGB waveform monitor
- Noise Measurement and Scope work on any static image
- Windows GUI Mode for R&D and product verification
- Command Line Interface (Batch) Mode for automated QA/QC operation

VQMA Test Pattern Composition

All-In-One: Single pattern allows automatic measurement of multiple video image parameters

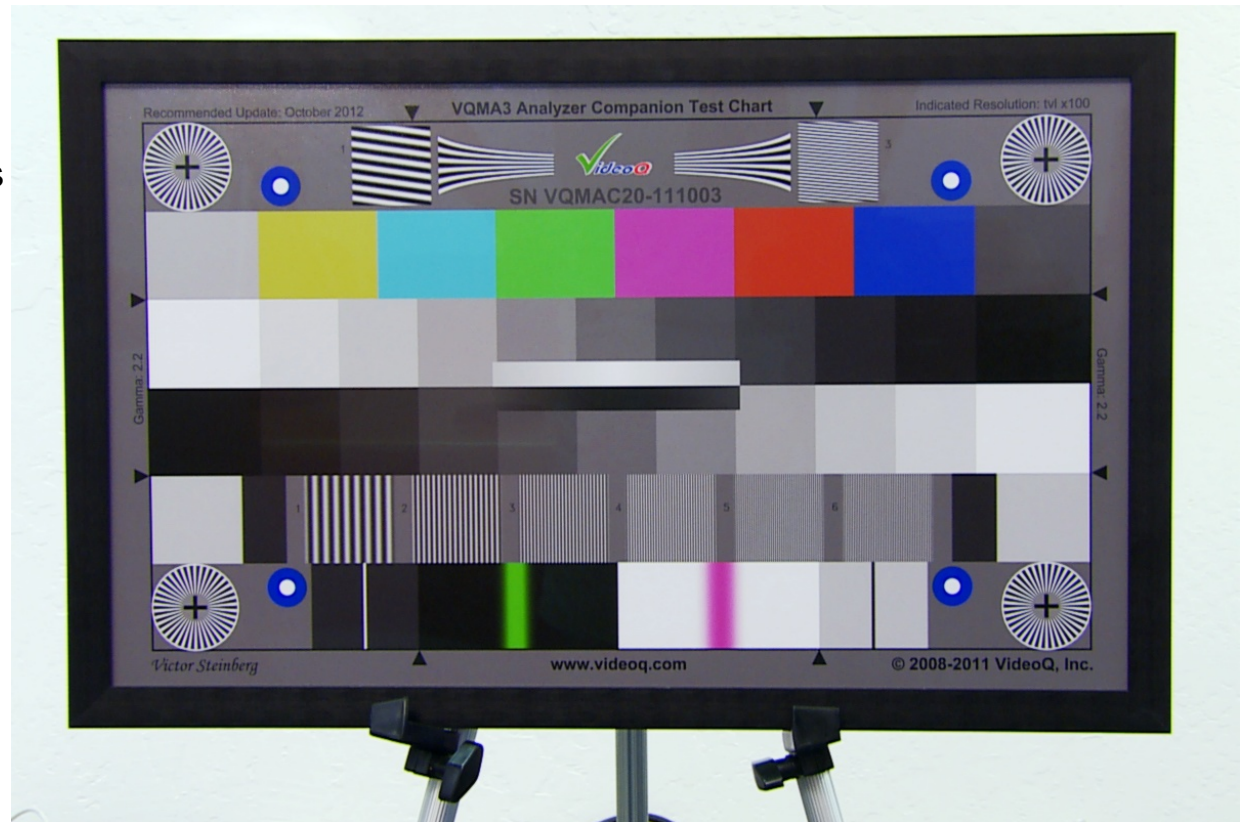


VQMA-C Optical Chart



- Precise color bars XYZ and grayscale densities
- Robust metal frame
- Abrasion-resistant low-glare glass
- Adjustable tilt to minimize reflections

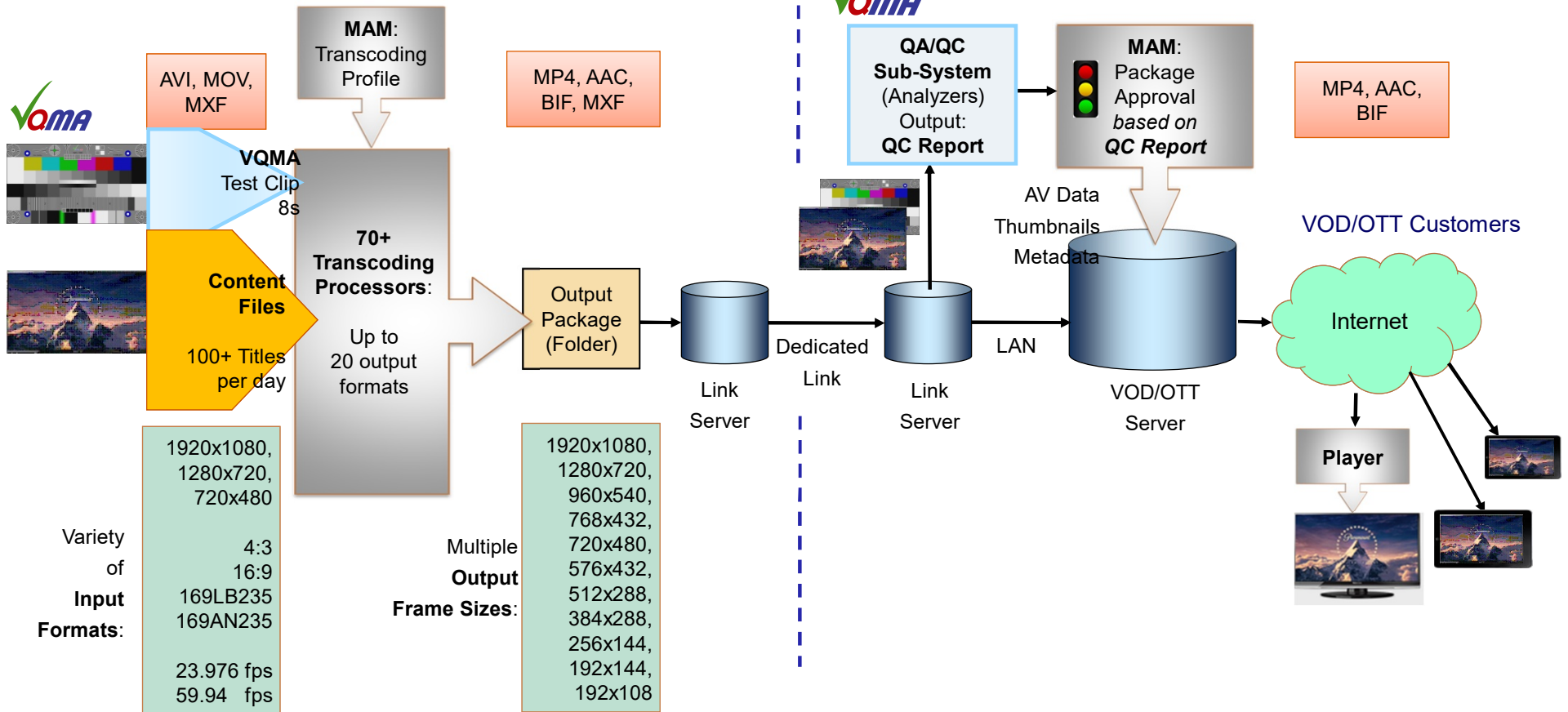
VQMAC20: 20" diagonal size variant



VQMA Analyzer – Workflow Test Application Example

A Large Transcoding Facility, Los Angeles

A Large VOD/OTT Service Facility, Toronto



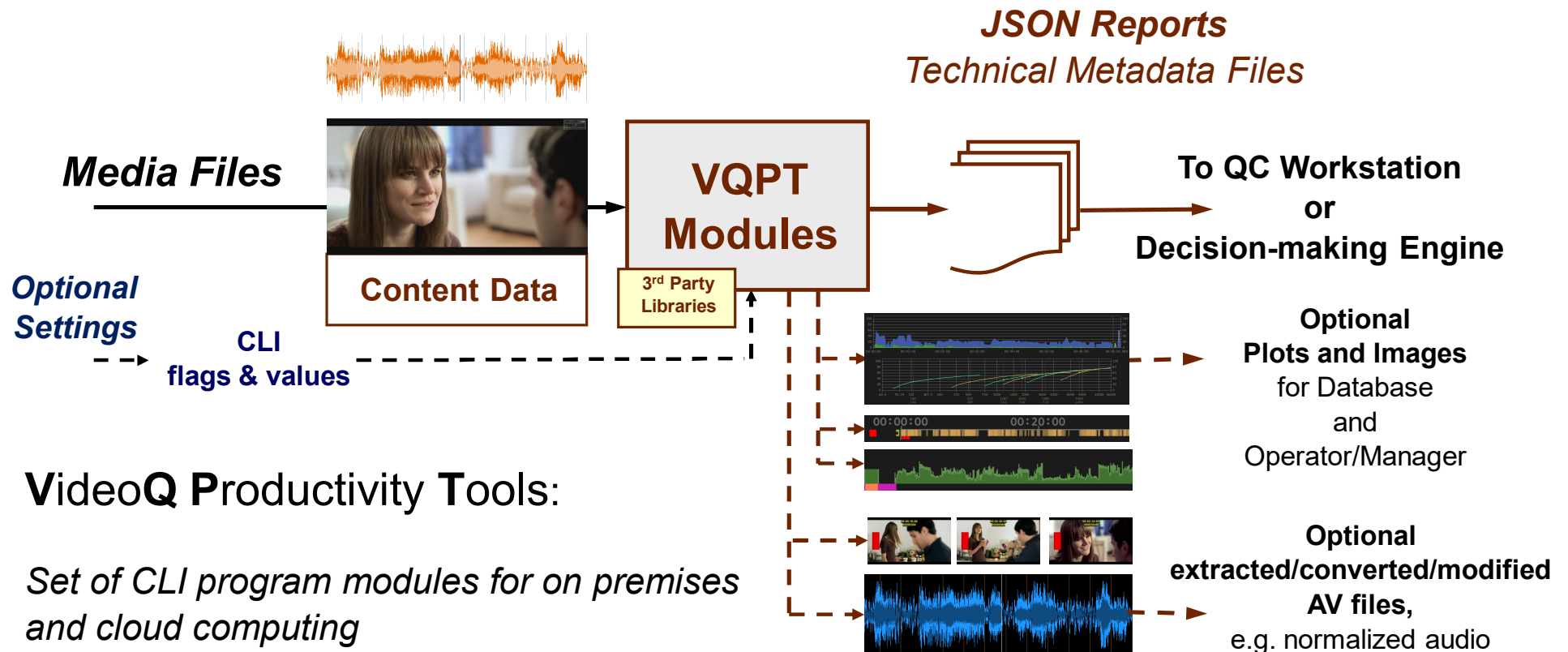


VideoQ Productivity Tools

1. VideoQ Productivity Tools are designed “**by engineers, for engineers**”
2. An ever higher number of channels/programs/titles
3. And a permanently growing number of formats, frames sizes, bitrates, etc.
4. Human resources required for input QC and output QC has escalated
5. A new approach and **new tools** are needed *as demanded by our customers*
6. Hence VideoQ has changed the focus from our traditional T&M tools to
Automated Productivity Tools
7. Automation is essential, but ...
8. Human intervention cannot be excluded
9. Thus, our slogan is: ‘**Robot-assisted human decisions**’

Learn more about VideoQ Productivity Tools: www.videoq.com/vqpt.html

VQPT Metadata Acquisition Workflow



VideoQ Productivity Tools:

Set of CLI program modules for on premises and cloud computing

VideoQ Productivity Tools Applications



With the massive increase of volumes of hardware items and video related software, the strict rules established for the broadcast TV are not always recognized.

The solution is in establishing easy-to-use and straightforward **rules** and matching **tools**.

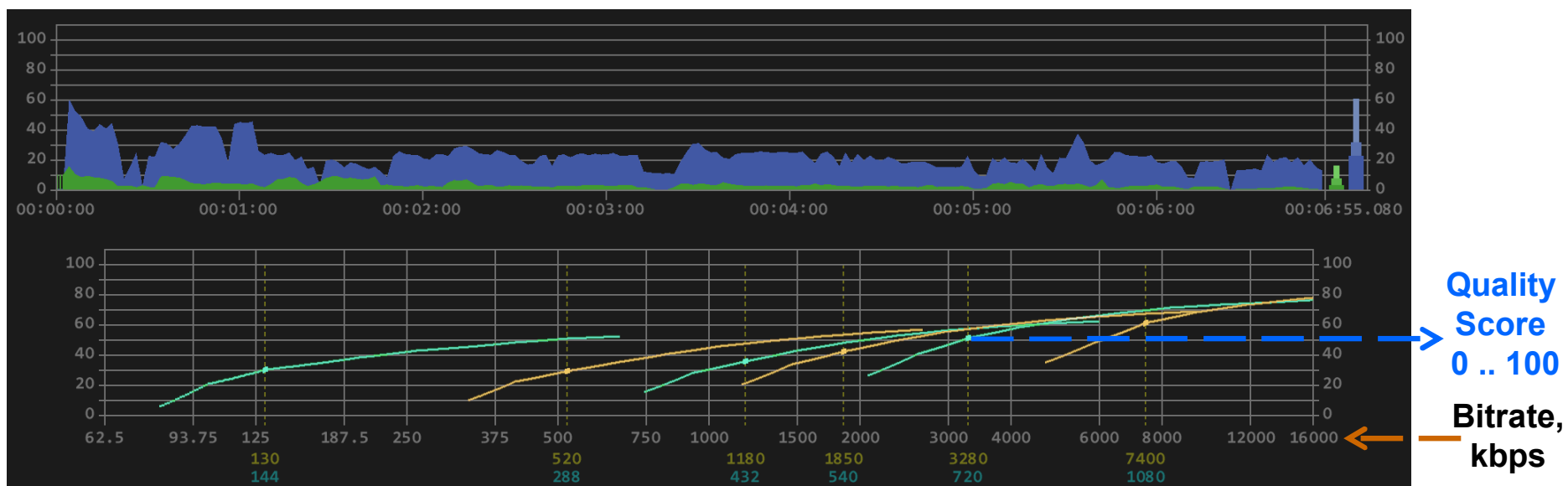
1. VideoQ **VQPT** is the cloud-based **QA/QC** and **transcoding workflow optimization tool**, that answers this challenge
2. Periodic testing of the **workflow health** should be combined with permanent checking of input and output **AV content parameters**
3. The most efficient methodology of such QA/QC operations is the creation of machine readable **reports** built by automated program modules and the subsequent review of these reports by a **human operator**
4. Storage of such reports in the **centralized database**, that allows the **remote access** by authorized users, is vitally important for the efficient **management** of the whole content delivery process

VQPT Tools & Adaptive Bit Rate Optimization

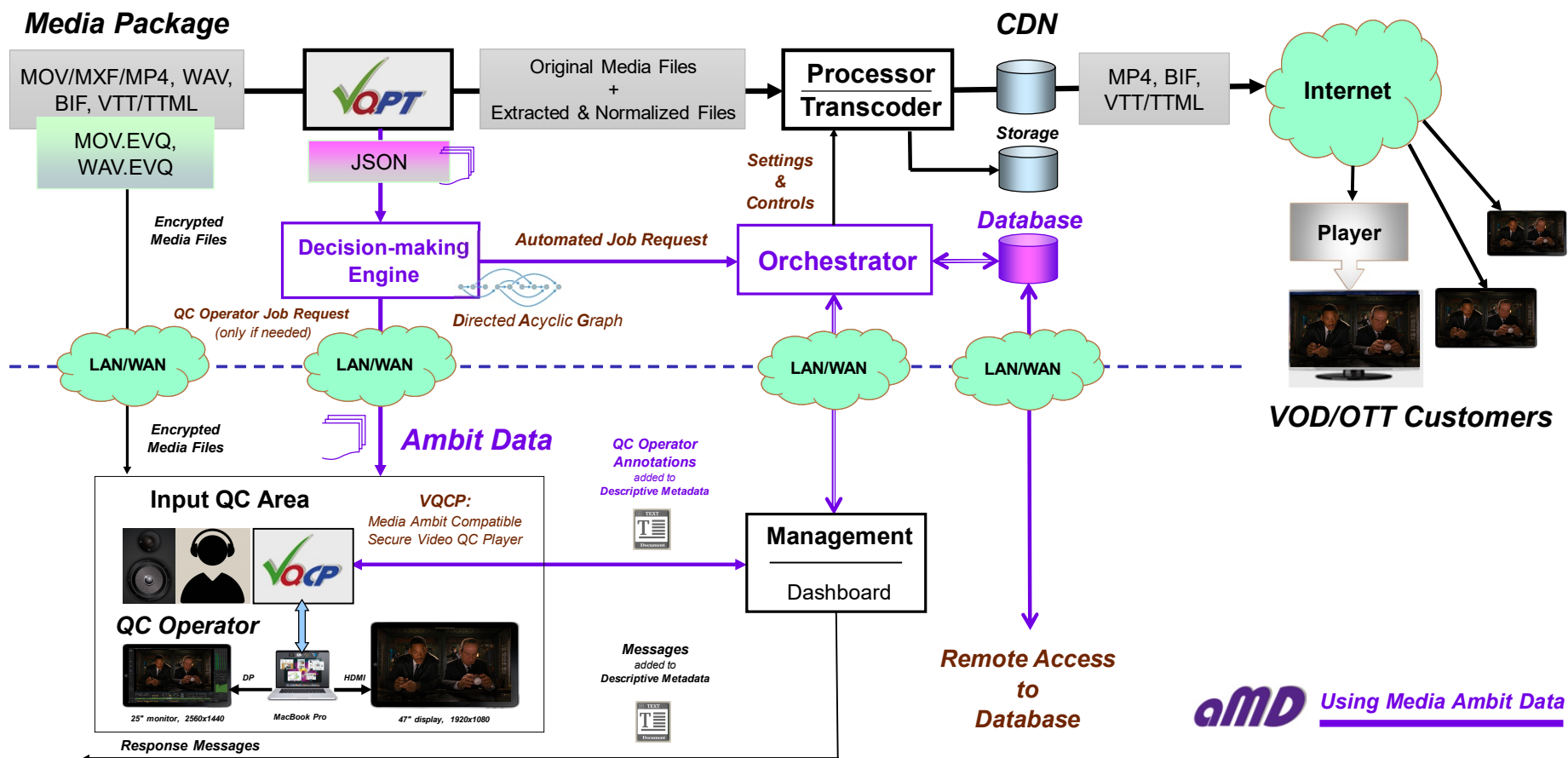


VideoQ Productivity Tools provide for up to 30% reduction of average VOD/OTT **bitrate** (and **CDN cost**) while preserving the **image quality score**.

This goal is achieved thru the application of optimized encoder settings based on the analysis reports generated by **VQFTC**, **VQTSF**, and **VQBLA** tools.



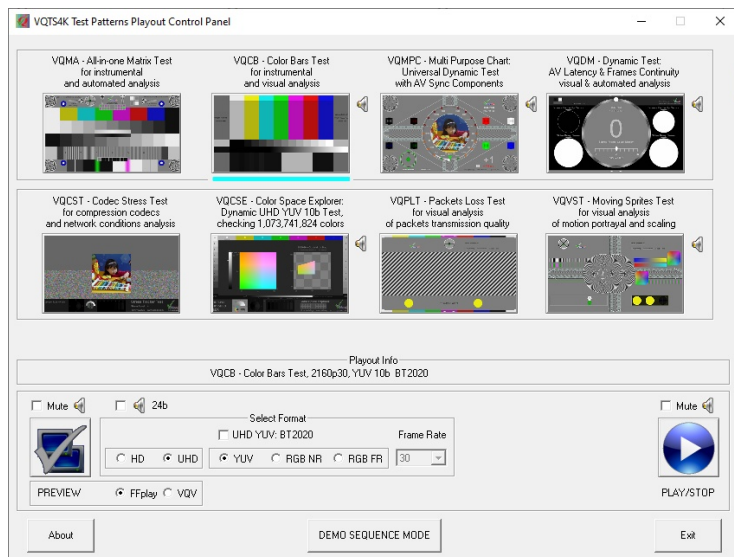
VQPT and Media Ambit Data Usage Workflow



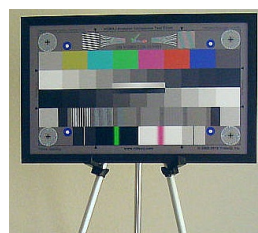
VQTS4K – Complete Video Quality Test System



Test Pattern Generator



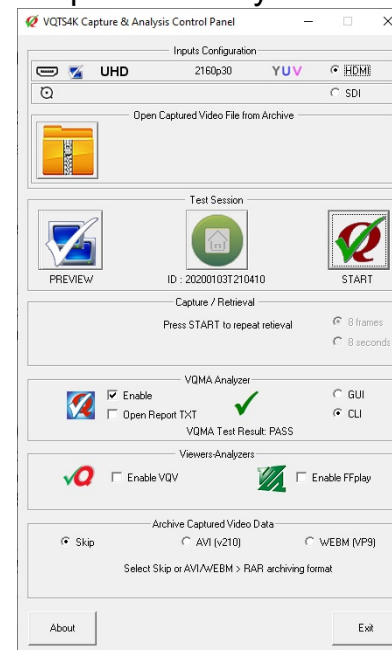
Camera Test Chart Option



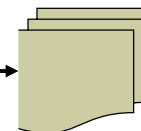
Network Connectivity Options



Capture & Analysis Tools



Test Samples & Test Reports



BMD Playout Card

HDMI or SDI

System Under Test

HDMI or SDI

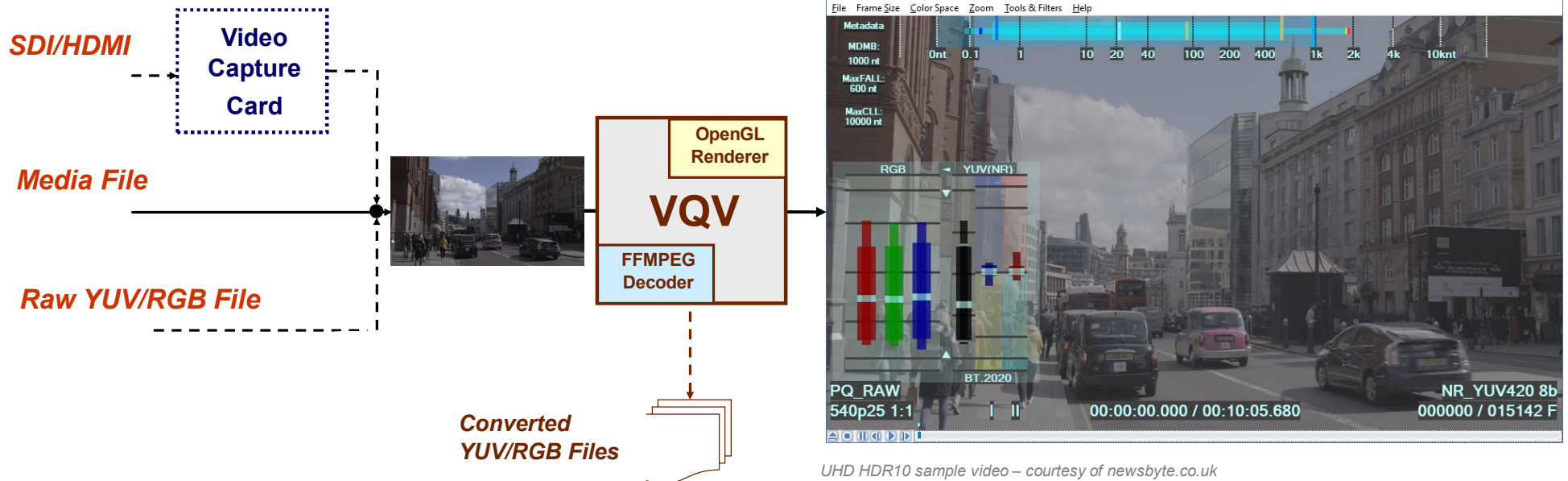
BMD Capture Card



VQV – VideoQ Viewer-Analyzer



A rendered image with the unique VQV readout and VQV filters/meters overlays



UHD HDR10 sample video – courtesy of newsbyte.co.uk

Learn more about **VQV**: www.videoq.com/vqv.html



VQV Tools & Meters

- VQV **analyzers** and **meters** can be sorted out into 3 categories:
 - YUV & RGB **Levels Analyzers**, providing for several secondary analyzers, such as **Frame Lines RGB Range Profile**, **Video Volume Meter**, **VectorScope**, **ChromaScope**, etc.
 - Intra-frame Activity and Inter-frame **Activity Analyzers**, also providing for **Noise Level Meter**
 - **Bitrate Statistics Analyzers**
- For all 3 categories the analysis results are presented in two formats:
 - **Graphical overlays** – Bargraphs, Waveforms and VectorScope Display formats
 - **Numerical readouts**, shown as Title Bar Message and/or Text Overlay
- Some analyzers, filters and overlays can be combined, some others are mutually exclusive
- See separate VQV presentation for detailed description of:
 - Active Image Size Meter
 - Video Volume Meter – **VV-Bars™**
 - VectorScope
 - ChromaScope
 - RGB Frame Profile Monitor – **FrameScope™**
 - RGB/YUV Line Parade Waveform Monitor
 - RGB/Light Levels Histograms
 - RGB/Light Levels Frame Statistics Analyzer – **L-Bar™**
 - Bitrate Analyzer – **C-Bar™**
 - Noise Meter



ViDiChoice (VDC) Technology

VideoQ **ViDiChoice™** (VDC) technology uses cost-effective automated software tools for AV content post-processing and transcoding. It provides an efficient solution for well-known critical **viewing/listening environment** issues.

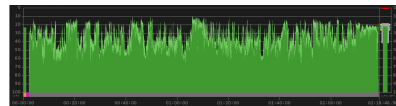
Original dynamic range Video



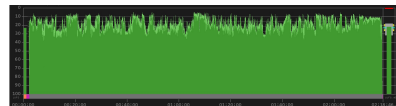
Processed *subjectively brighter* Video



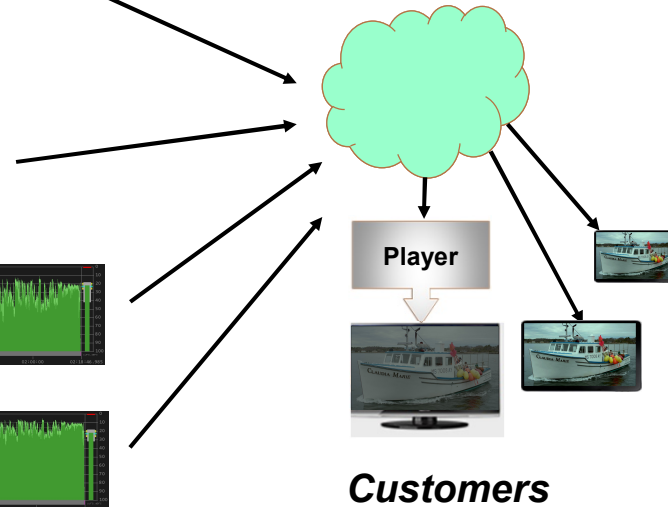
Original loudness range Audio



Processed *subjectively louder* Audio



User or player manually or semi-automatically **selects the stream** with desired (***subjectively optimal***) video and audio levels profiles



Who needs VDC Technology ?



Customers:

Their TVs, desktop computers and mobile devices are operating in unpredictable ambient light and acoustic noise environment.

VideoQ **ViDiChoice**™ (VDC) technology provides the customers with a range of content versions.

Each customer can select the content version better matching the current viewing/listening conditions.

Content Distributors:

More happy viewers, less churn, marketing edge advantage.

And these goals can be achieved in a relatively short time without massive investment and significant changes of the existing workflow.

Content Originators:

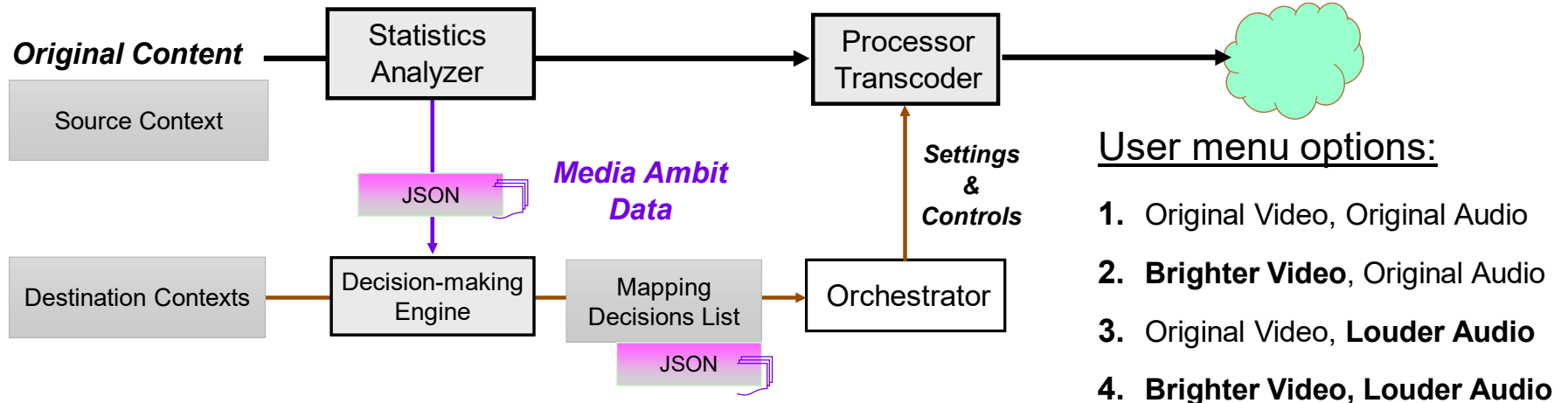
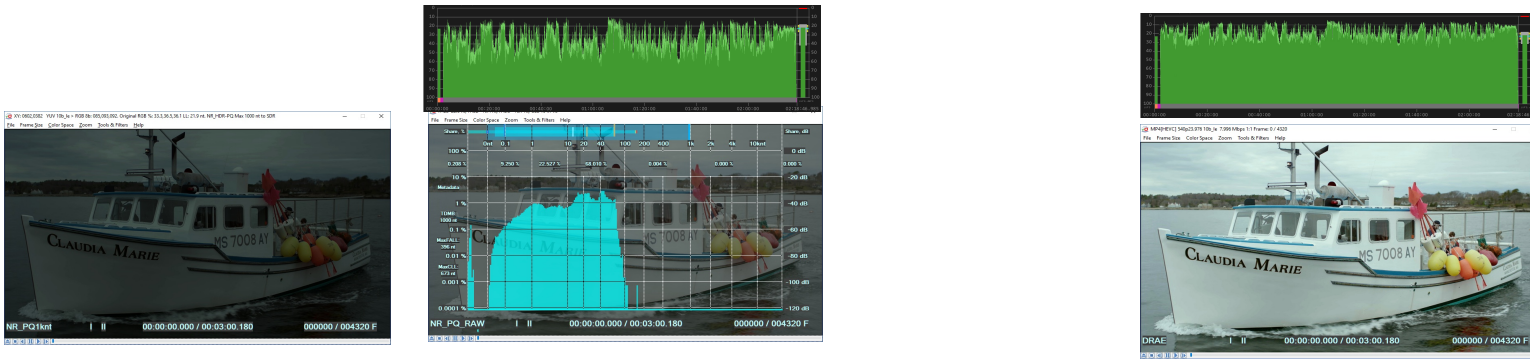
More happy viewers, better ratings.

No need to prepare and release special “broadcast” and/or “web” versions of the content.



How it works ?

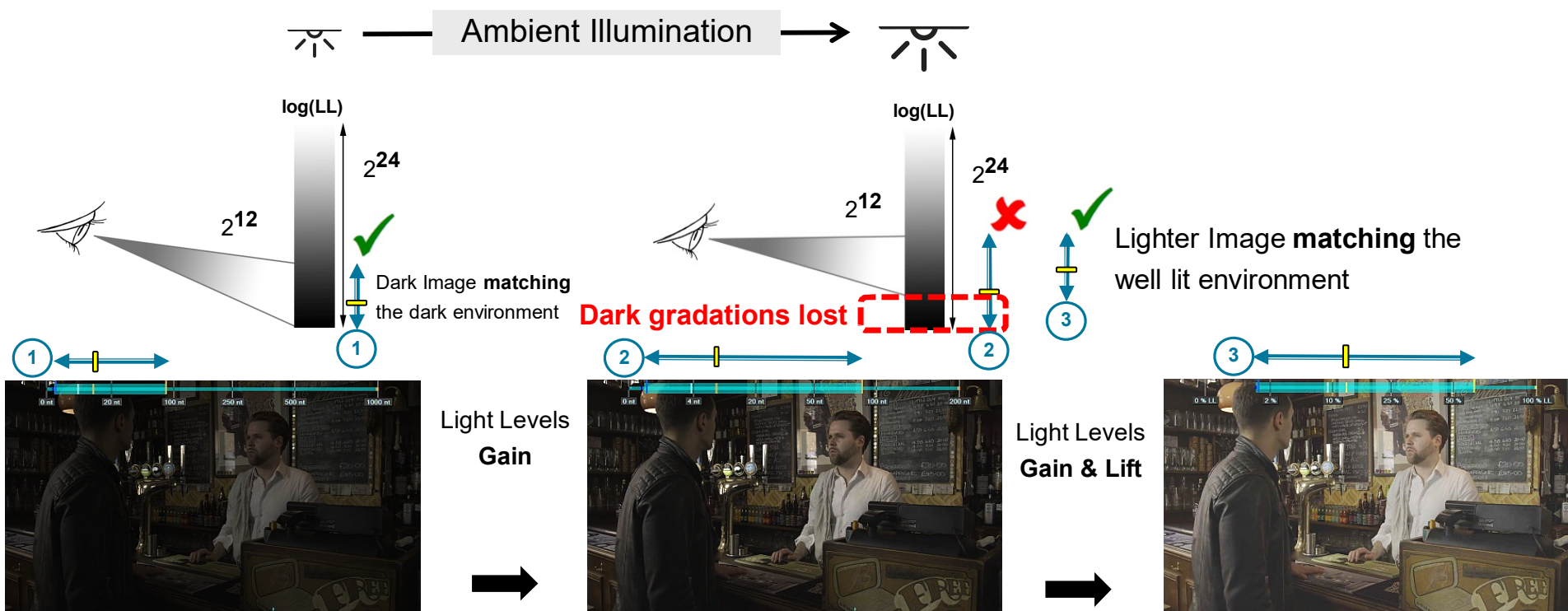
A Happy Viewer is the only measure of success.



VDC: Ambient Illumination & Video Image Dynamic Range



When the **ambient illumination light level** goes up, the **logarithmic range of visible gradations** does not increase nor decrease, it **moves upwards**. Therefore, to provide the best **viewing comfort** all gradations of the **rendered video image** must also go up, **following the visible range**.



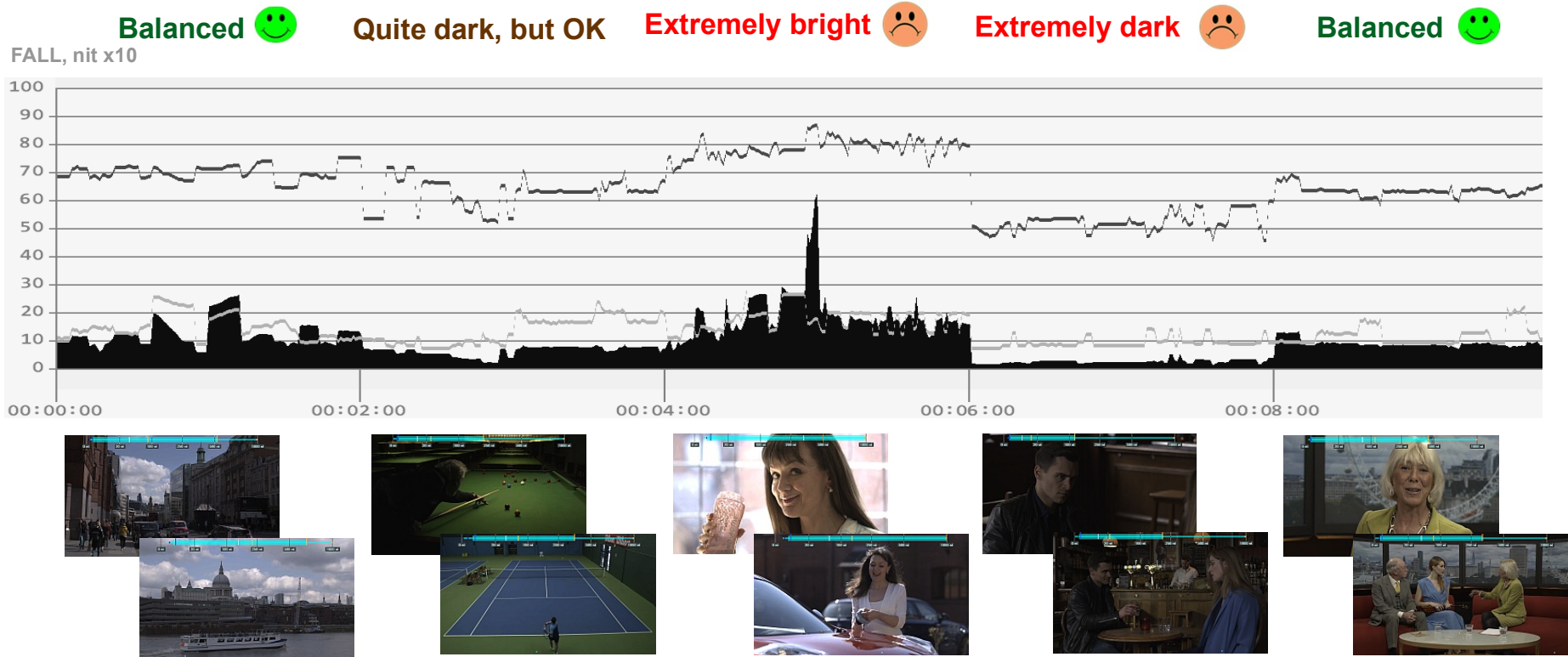
Video images – courtesy of newsbyte.co.uk

VideoQ, Inc. Presentation. © 2016-2020 All rights reserved



VDC: HDR-PQ Video Content Viewing Comfort

Example of inconsistent light levels timeline profile





VDC: Audio Content Listening Comfort

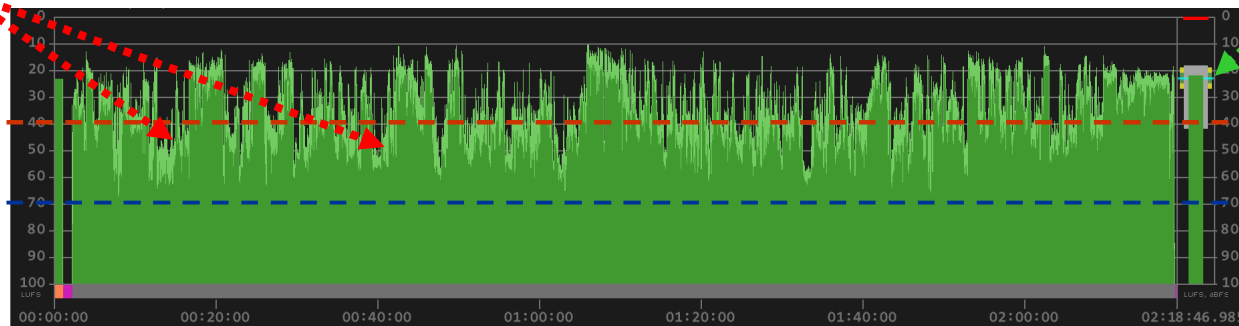
A Happy Listener is the only measure of success.

Some audio segments are **below** the Noise Level

Original audio loudness timeline profile

High ambient
noise level

Low ambient
noise level



The same
Integrated Loudness

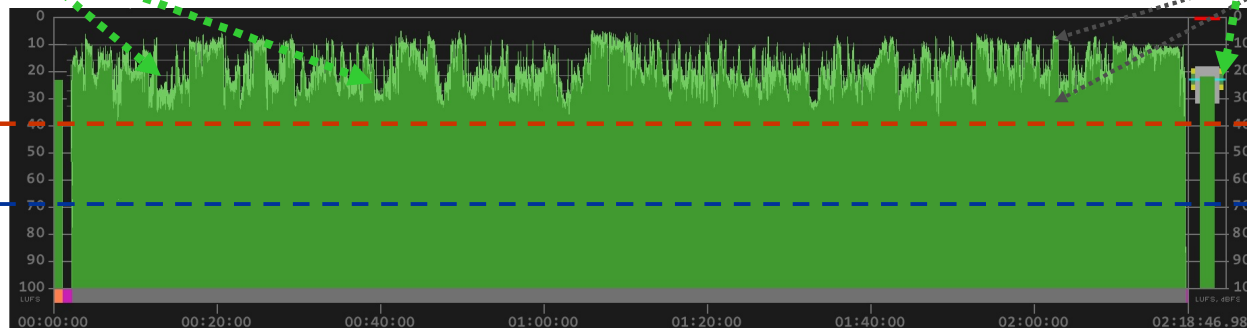
Original audio is good **only**
for **low noise** environment.

All processed audio segments are **above** the Noise Level

Processed audio loudness timeline profile

High ambient
noise level

Low ambient
noise level



Reduced
Loudness Range

On average
the processed audio
sounds **louder**.

About VideoQ



Company History

- Founded in 2005
- Formed by an Engineering Awards winning team sharing between them decades of global video technology.
- VideoQ is a renown player in calibration and benchmarking of Video Processors, Transcoders and Displays, providing tools and technologies instantly revealing artifacts, problems and deficiencies, thus raising the bar in productivity and video quality experience.
- VideoQ products and services cover all aspects of video processing and quality assurance - from visual picture quality estimation and quality control to fully automated processing, utilizing advanced VideoQ algorithms and robotic video quality analyzers, including latest UHD and HDR developments.

Operations

- Headquarters in CA, USA
- Software developers in Silicon Valley and worldwide
- Distributors and partners in several countries
- Sales & support offices in USA, UK