



NOKIA

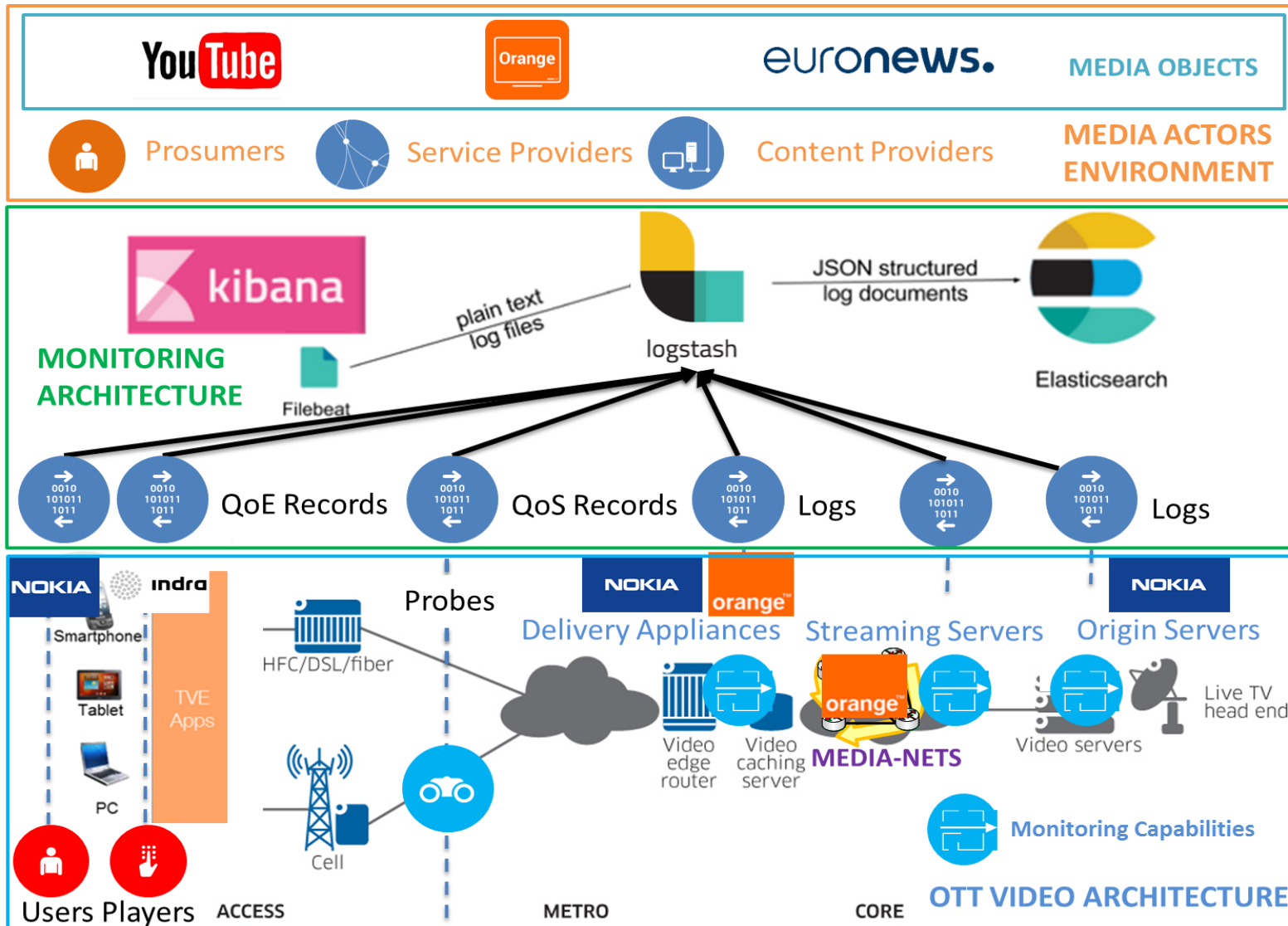
CELTIC-NEXT panel

Business impacts of CELTIC projects

Ongoing CELTIC MONALIS

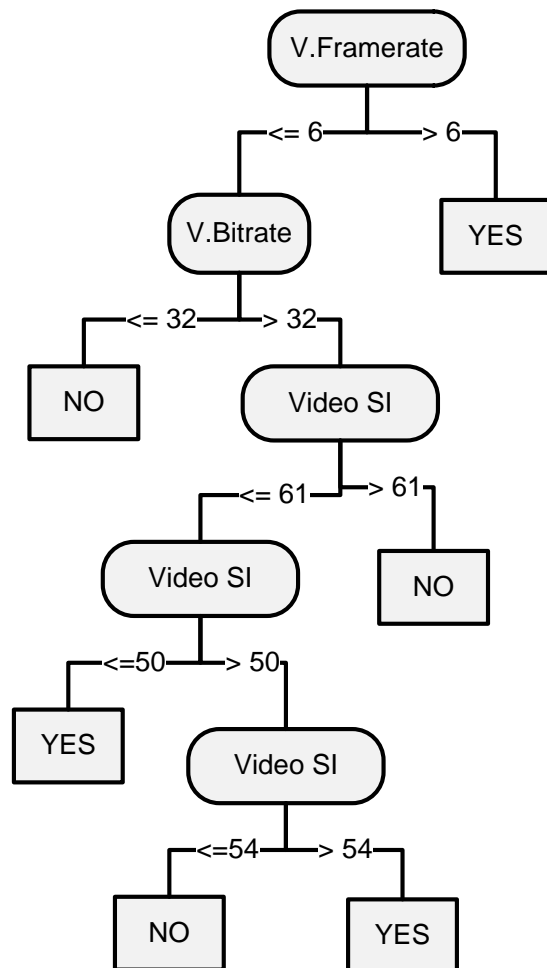
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Performance monitoring for Large-scale media delivery



Single user behavior analysis and QoE assessment model design

We have investigated ML techniques to be adopted in next steps for Quality model and evaluate QoE



Testing scenarios for QoE evaluation



- 22 test subjects
 - 17 male / 5 female, age 28-55
 - Technical background
- 2 video sequences (30s each)
 - High movement: cellar visit
 - Low movement: metro lightweight rail stop
- 4 PVS
 - Original sequence
 - Fixed-position logos
 - Fixed-position circular windows
 - Fixed-position horizontal & vertical bars

Figure 10. Testing scenario for vertigo situations

Original sequences: Metro Lightweight Rail low motion, fixed camera



Adding logos in fixed positions



Overlay of jail-like bars



Overlay of circular windows



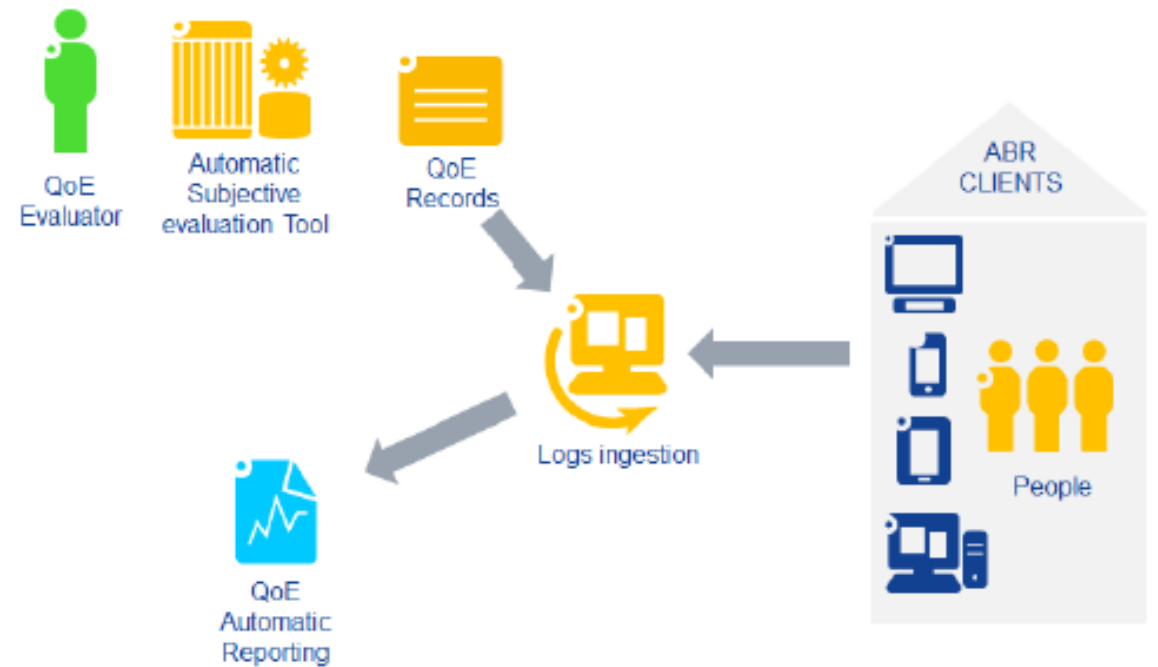
Figure 11. Examples used in the video test

QoE Assessment and evaluation techniques for Adaptive streaming

We have defined performance and quality indicators that will be converted Mean Opinion Score in next steps, validated by users

KPI	Description	Algorithm
Knok	To determine video interruptions or unavailable	<ul style="list-style-type: none"> OK ->Knok=1 Other-> Knok=0
Kdc	% downloaded chunk ok	$\text{HTTP_VIDEO_CHUNKS_OK} / \text{HTTP_VIDEO_CHUNKS_TOT}$
Kdp	% downloaded playlists ok	$\text{HTTP_NUM_PLAY_LIST_OK} / (\text{HTTP_NUM_PLAY_LIST_ERR} + \text{HTTP_NUM_PLAY_LIST_OK})$
Khhs	% stalled time from HTML (might substitute HTML5 object if not available)	$1 - (\text{TTP_STALLED_PORC_TIME}) / 100$
Kqc	Video quality changes	<ul style="list-style-type: none"> $(10 - \text{HTTP_QLTY_NUM_CHANGES}) / 10$, for num_changes < 9; 0,1 otherwise
Kqp	% Max Quality detected	$\text{QLTY_AVG} / \text{HTTP_QLTY_MAX}$
Ksd	% of Video Quality from standard deviation	$1 - (\text{HTTP_QLTY_DSV} / \text{HTTP_QLTY_AVG})$ If $\text{Ksd} < 0 \rightarrow \text{Ksd} = 0$
Kqmp	% of time taken by video mode quality	$\text{HTTP_QMODA_PORC_TIME} / 100$
Kfp	% frames processed	$(\text{HTML5_FRAMES_TOT} - \text{HTML5_FRAMES_CORRUPTED} - \text{HTML5_FRAMES_DROPPED}) / \text{HTML5_FRAMES_TOT}$
K5hs	% stalled time from HTML5 object	$\text{HTML5_STALLED_TIME_AVG} / \text{TML5_TIME_PLAYING}$
Kfd	% frames painted	$\text{HTML5_FRAMES_PAINTED} / \text{HTML5_FRAMES_PARSED}$
K_fr	% frames painted rate	$\text{HTML5_FRAMES_PAINTED_RATE} / \text{HTTP_QMODA_CODEC_ID}$
Ktcp	% TCP packets ok	$1 - (\text{TCP_NUM_RETRANS} + \text{TCP_NUM_ACK_DUPLI} + \text{TCP_NUM_RESET}) / \text{TCP_NUM_PQ}$

Subjective video QoE assessment



Achievements: NOKIA

- NOKIA is developing the technology to monitor the Video QoE in large scale networks
 - New colateral sources of information about Video QoE: biometric, analytics, statistics
 - Alignment with Industry about QoE impact, evaluation, measurements with VQEG active participation
 - New tool created to evaluate massive video deployments QoE, integrating users votes, network measurements and new sources of information
- Next steps
 - Validation of prototype and algorithms with real users
 - Integration under Kibana environment
- Industrialization of the technology
 - New system for NOKIA portfolio for Quality assurance

Achievements: NOKIA

User perception quality relies on the display size and resolution

The optimum experience in terms of perception and delivery guarantee happen when the delivered format is the minimum required for a given display

A close-up photograph of several children's hands gathered around a wooden table. They are using various metal cookie cutters to shape dough. The table is covered with a layer of white flour, and some dough has been pressed into the cutters. The scene is brightly lit, creating a warm and collaborative atmosphere.

Let's get Ready to build the
multimedia delivery
ecosystem for innovating
the future together

Building an innovation
platform for the 2020
and beyond

The journey has
already started

QoE can be a key
differentiation
enabler

Gradual, selective
introduction of
multimedia
capabilities on top
of mobile networks

NOKIA

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Thanks !!

