# ITU Workshop:
# Quality assessment of OTT services : KPIs, measurement approaches

**Freetown, Sierra Leone**

01/07/25

**Ayoub EL HADDOUJ**

Account Manager, MEA

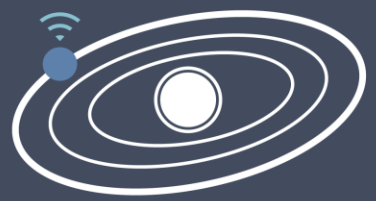

axiros
Lasting Advantage
At a Glance
From QoS to QoE to Full Experience
EAQ Model
QoE vs OTT Services
A USE CASE EXAMPLE

# AT A GLANCE

**100%**
Independent Since 2002

Customer Responsibility

**400+**
Customers Worldwide



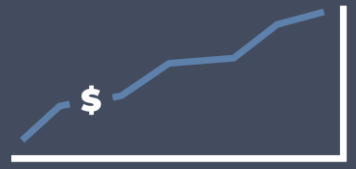
Global in Scope

**11+**
Sales & Service Offices


**150+**
Software Engineers

**400+**
Deployed & Live
Solution Platforms

**100%**
Self-financed




Profitable From the First


Partner Enablement
Through Standard Libraries

Broadband Forum Member

Exportpreis Award Winner

Bavaria 2022

ISO/IEC 27001:2022

Certified

Technology Leader in
Open Device Management

**20+y**
Leading the Market


At a Glance

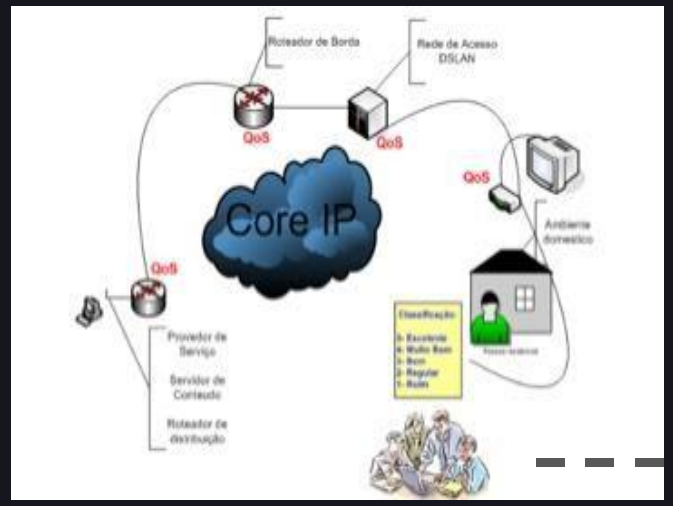
From QoS to QoE to Full Experience

EAQ Model

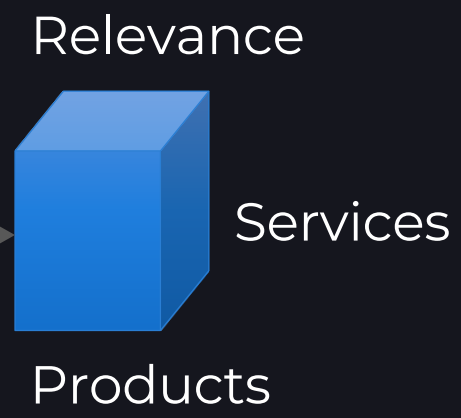
QoE vs OTT Services

A USE CASE EXAMPLE

# From QoS to QoE to Full Experience




Quality of User Experience
**(QoE)**

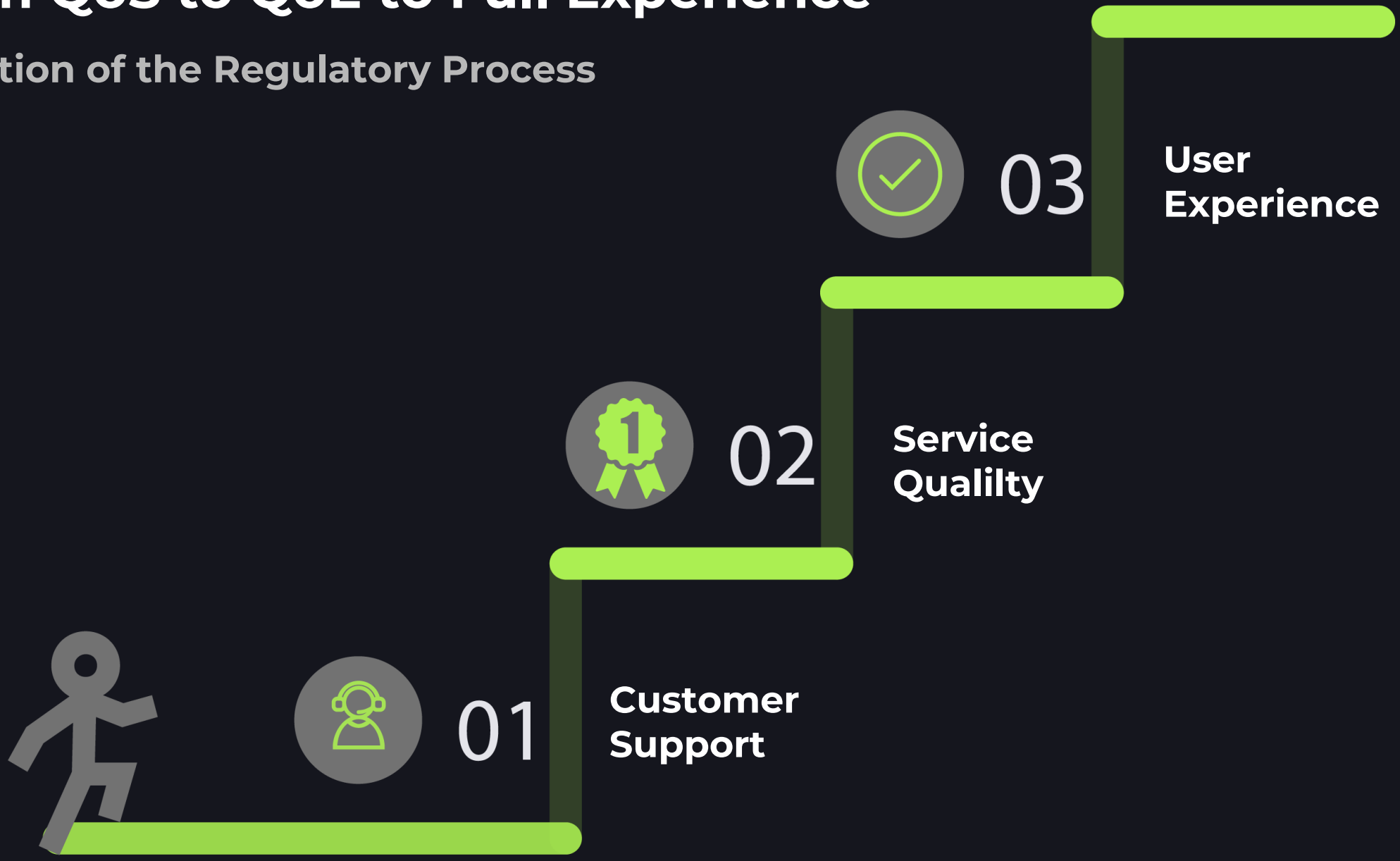



**Full Experience** represents the user perception about a particular Service Provider:

| Products | Service | Relevance |
|---|---|---|
| • Web access<br>• Video streaming<br>• VOIP<br>• Video on Demand<br>• TTs<br>• Other... | • Call center<br>• Billing / Collections<br>• Provisioning<br>• Other | • Price<br>• Perceived Pricing<br>• Fidelization<br>• Other |

# From QoS to QoE to Full Experience

## Evolution of the Regulatory Process



# From QoS to QoE to Full Experience

## ITU-T Recommendations

- ITU-T P.10: QoE is about the user’s emotional response.
- ITU-T G.1030: Measures IP service performance estimation.
- TR-143 (BBF): Broadband KPIs — latency, throughput, reliability.
- ITU-T P.1203.1, .2, .3: Defines methods for evaluating video streaming quality, including:
    - Initial delay
    - Rebuffering/stall time
    - Resolution changes
    - Overall perceived quality (MOS/vMOS)

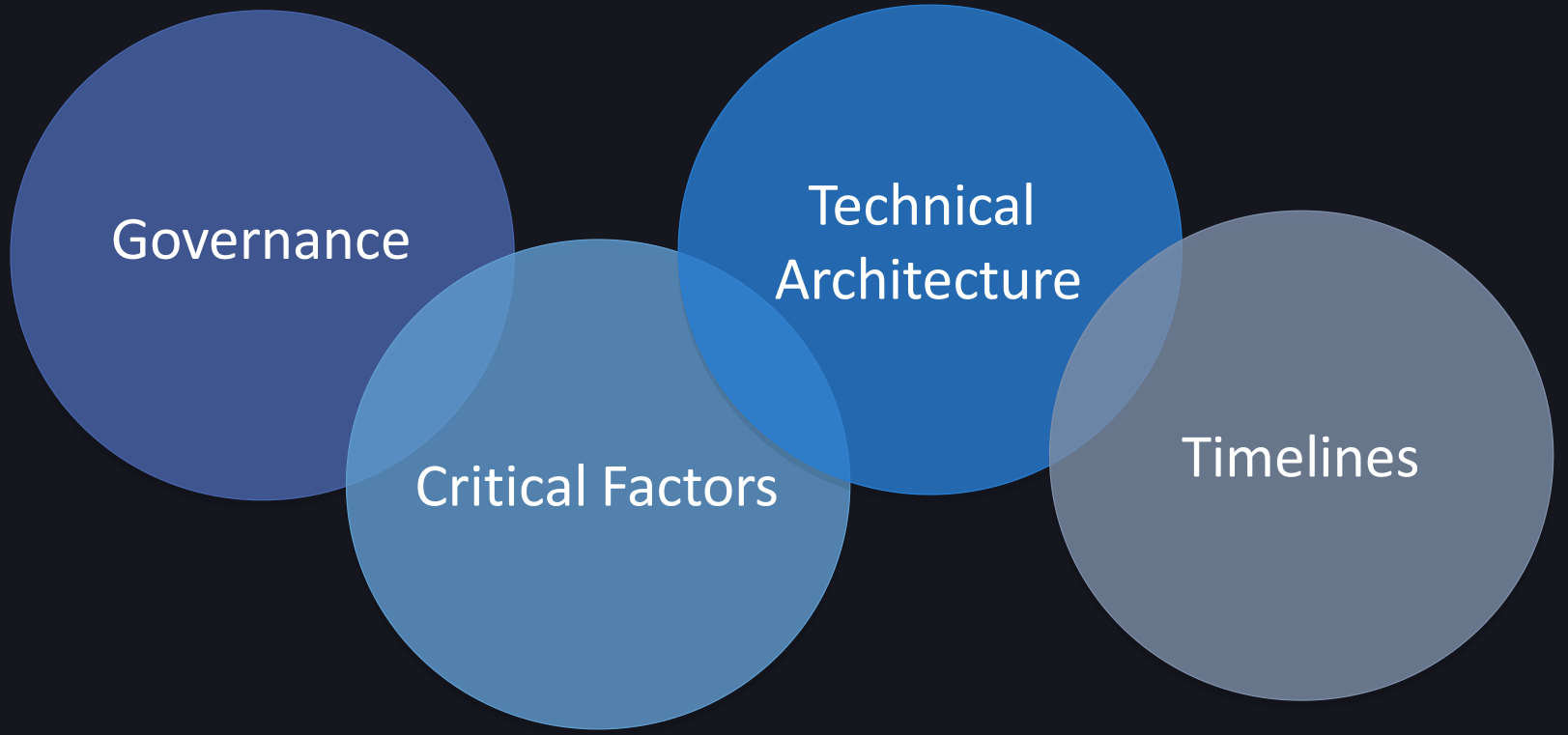
📄 These standards collectively guide objective, comparable, and regulator-friendly measurements..


axiros
Lasting Advantage
At a Glance
From QoS to QoE to Full Experience
EAQ Model
QoE vs OTT Services
A USE CASE EXAMPLE

# EAQ Model

## A Scalable Approach

- EAQ (Quality Admin. Entity **)** Developed by Axiros with Cleartech Partnership for ANATEL.
- Uses millions of embedded probes in CPEs.
- Provides statistically significant, unbiased measurement data.
- Governance ensures neutrality, transparency, and collaboration.



# EAQ Model

## Scalable, Standards-Based Deployment

**Axiros EAQ – Large-Scale QoE Measurement Framework**

**Smart CPE Transformation**

- Fixed (SCM) or Mobile (SMP) probes
- Based on TR-143 (BBF) or OpenWRT
- Probes embedded in existing CPEs or carrier apps

**Dormant-to-Active Measurement Model**

- Activated via centralized platform campaigns
- Measures QoE from CPE to pre-positioned PTT servers

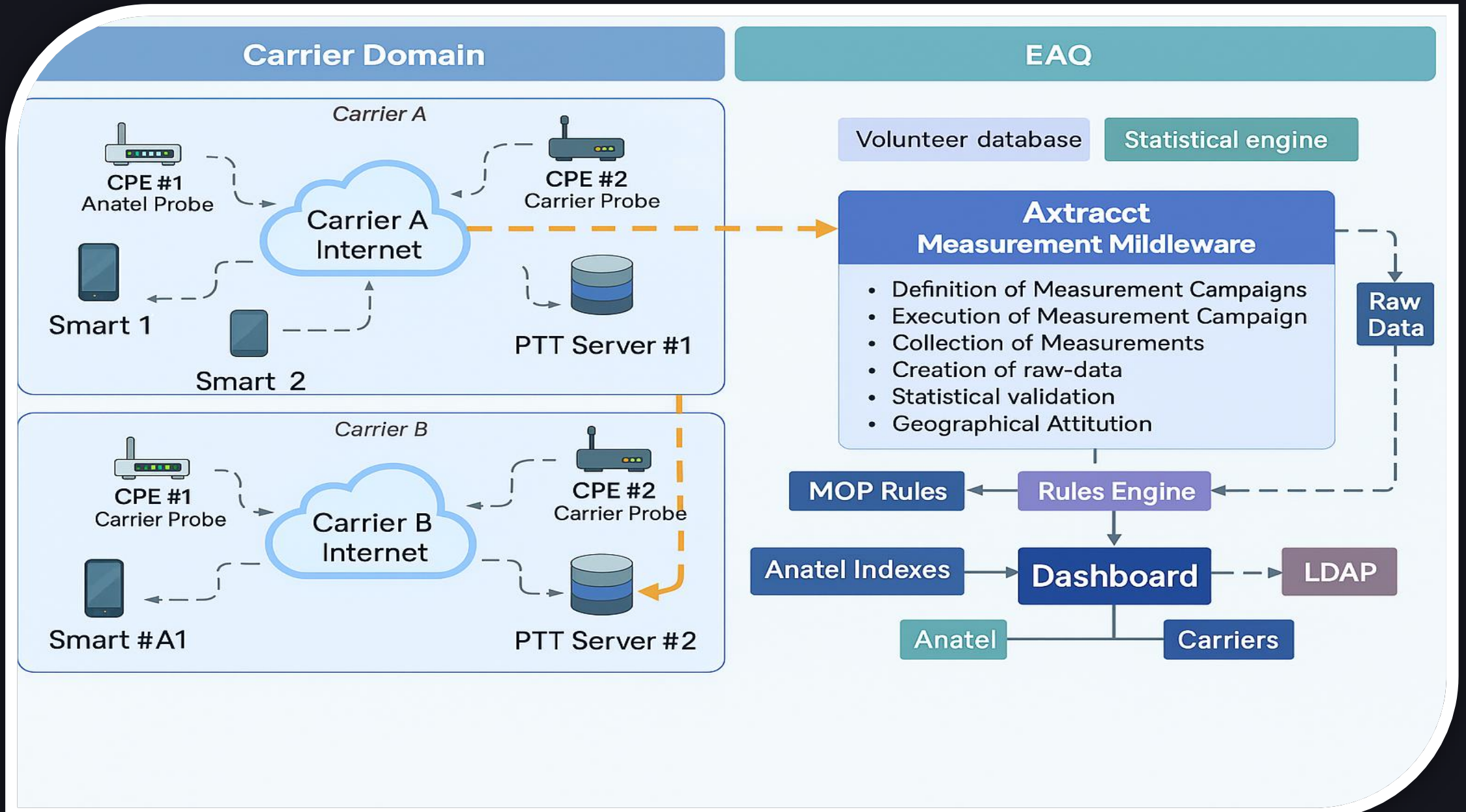
**Massive Scale, Statistical Validity**

- Millions of probes ensure **device-independence**
- Volunteer or randomized user sampling
- MOP (Manual of Operations) guides all index calculation rules

**Regulator Dashboard Access**

- View raw & processed data
- Transparent, standards-aligned evaluation

# EAQ Model
## Architecture



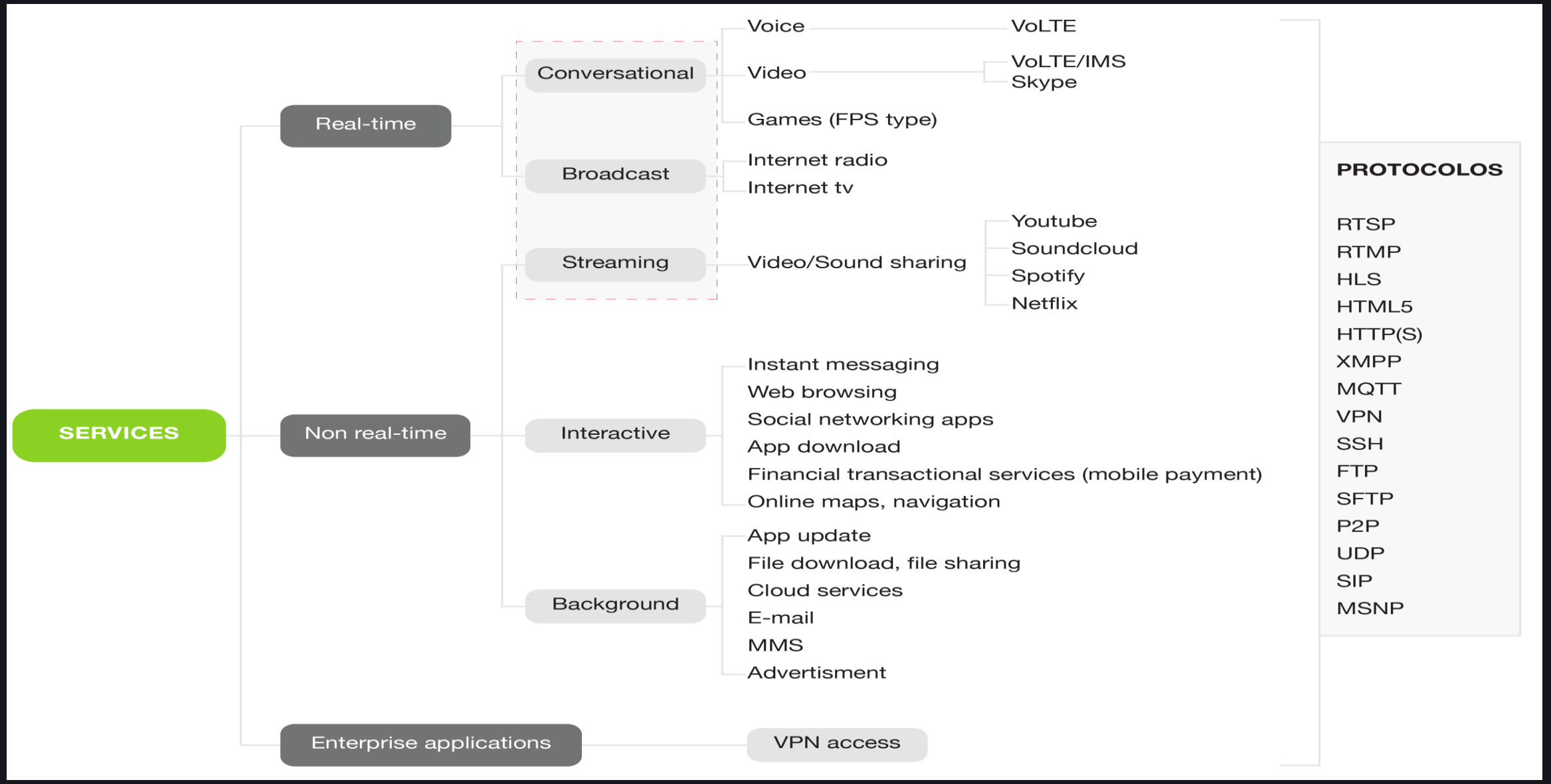

axiros
Lasting Advantage
At a Glance
From QoS to QoE to Full Experience
EAQ Model
QoE vs OTT Services
A USE CASE EXAMPLE

# QoE vs OTT Services

- OTT services (e.g. Netflix, WhatsApp) are shaping modern connectivity demands.
- Traditional QoS alone does not reflect user satisfaction.
- QoE introduces user perception as a core metric: delight vs. annoyance.
- Regulators must adapt frameworks to evaluate true service experience.

# QoE vs OTT Services

## TARGET ENVIRONMENT



# QoE vs OTT Services

## KPIs – User-Centric Metrics

- Startup delay – how long before the video starts?
- Rebuffering ratio – how often does it pause?
- Playback failures and resolution drops.
- End-to-end latency – critical for gaming/voice.


At a Glance

From QoS to QoE to Full Experience

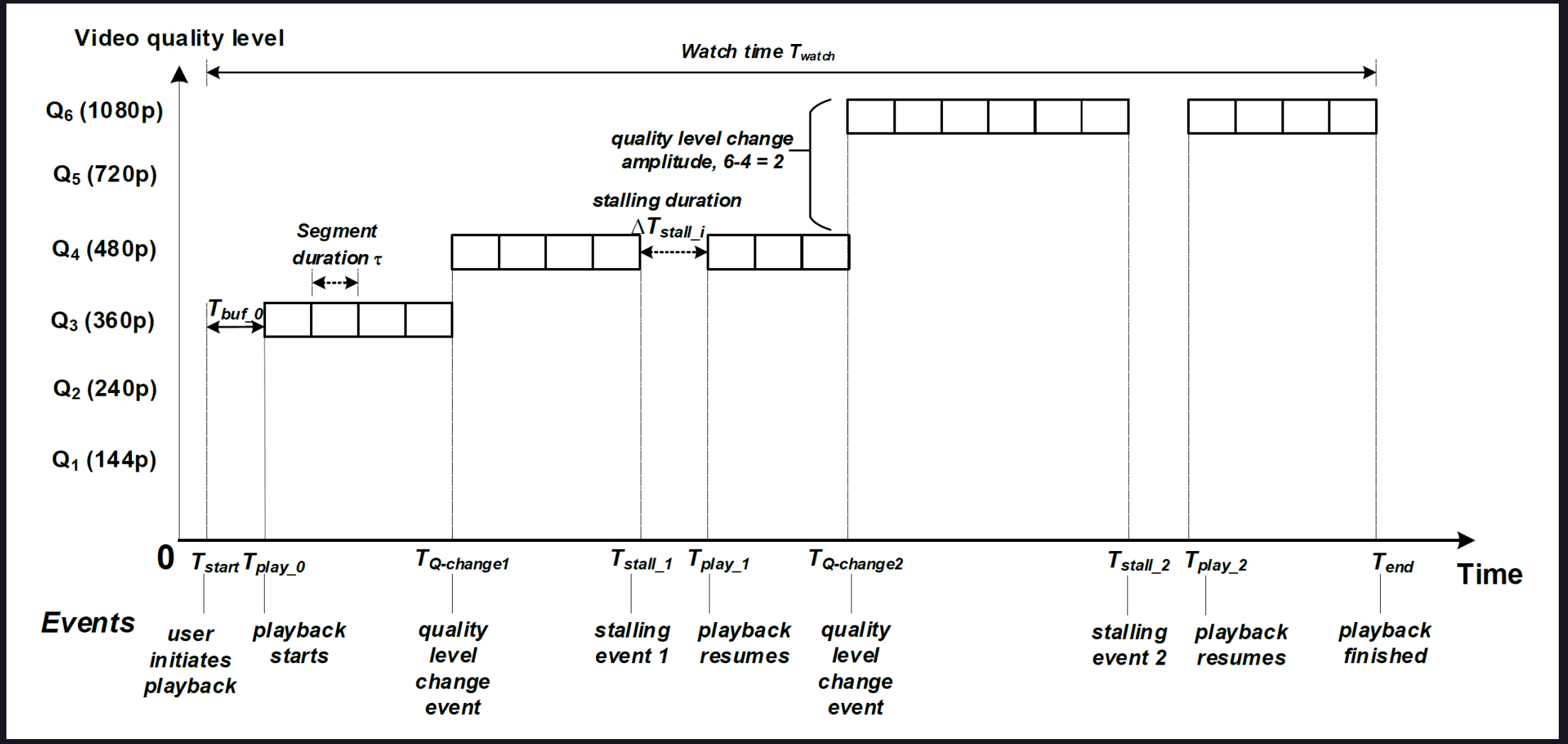
EAQ Model

QoE vs OTT Services

A USE CASE EXAMPLE

# A USE CASE EXAMPLE

## Events in an Audio/Video Playback Process



# A USE CASE EXAMPLE

## INDICATORS

**INDICADORES**

- Service Access Time
- Initial Buffering Delay
- Overhead Ratio
- Stalling Count
- AVG Stalling Time
- AVG Bitrate
- Quality Change Count
- vMOS (ITU-T P.910)

**AGREGACIÓN DE RESULTADOS**

- Por operadora
- Por tecnología de acceso
- Por región geográfica
- Por tipo de servicio

**CORRELACIONES**

- Correlaciones temporales
- Correlación con espacio muestral mínimoPor región geográfica

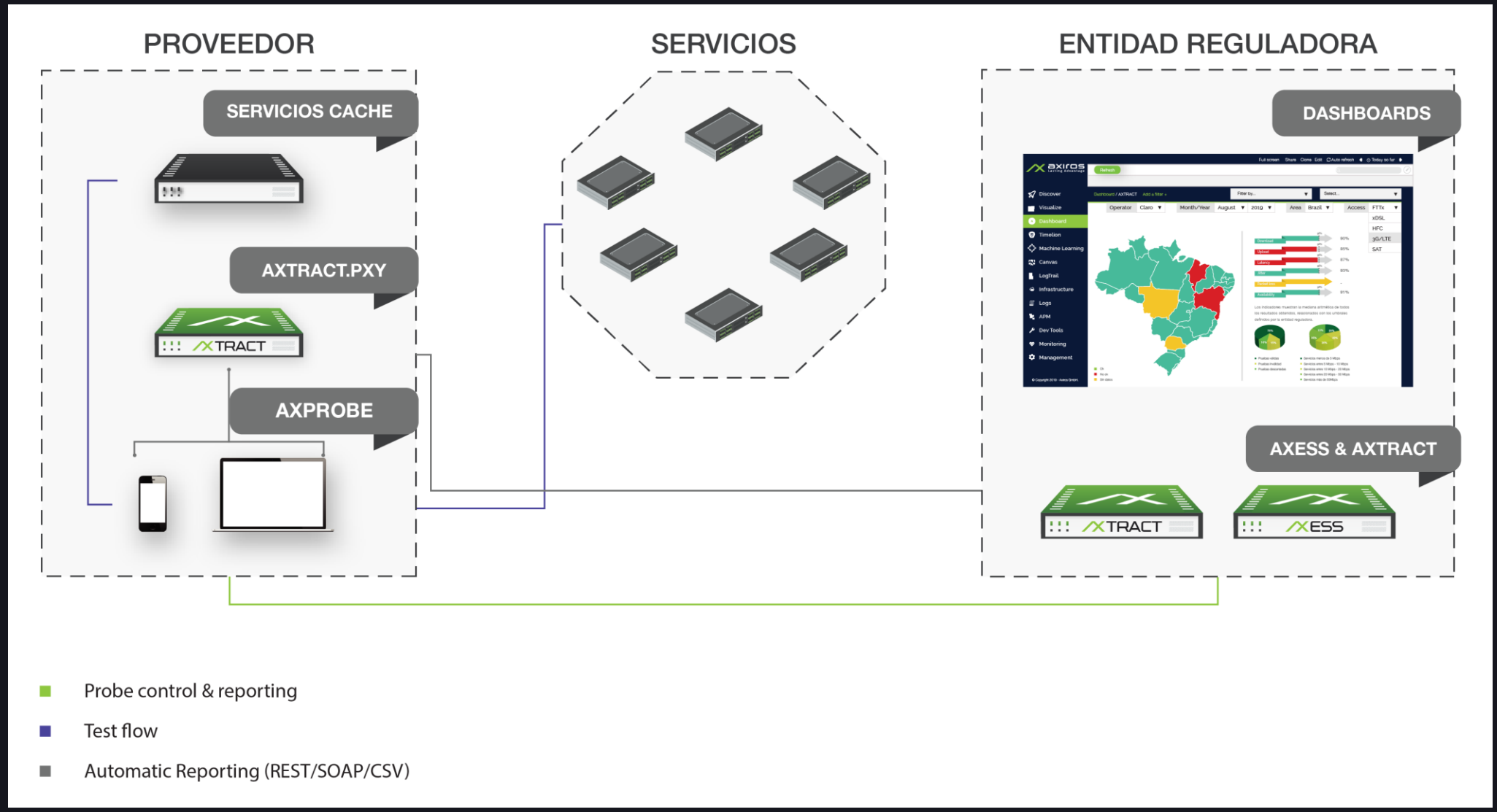

**COLLECTORS**


**POST-PROCESSING**

# A USE CASE EXAMPLE

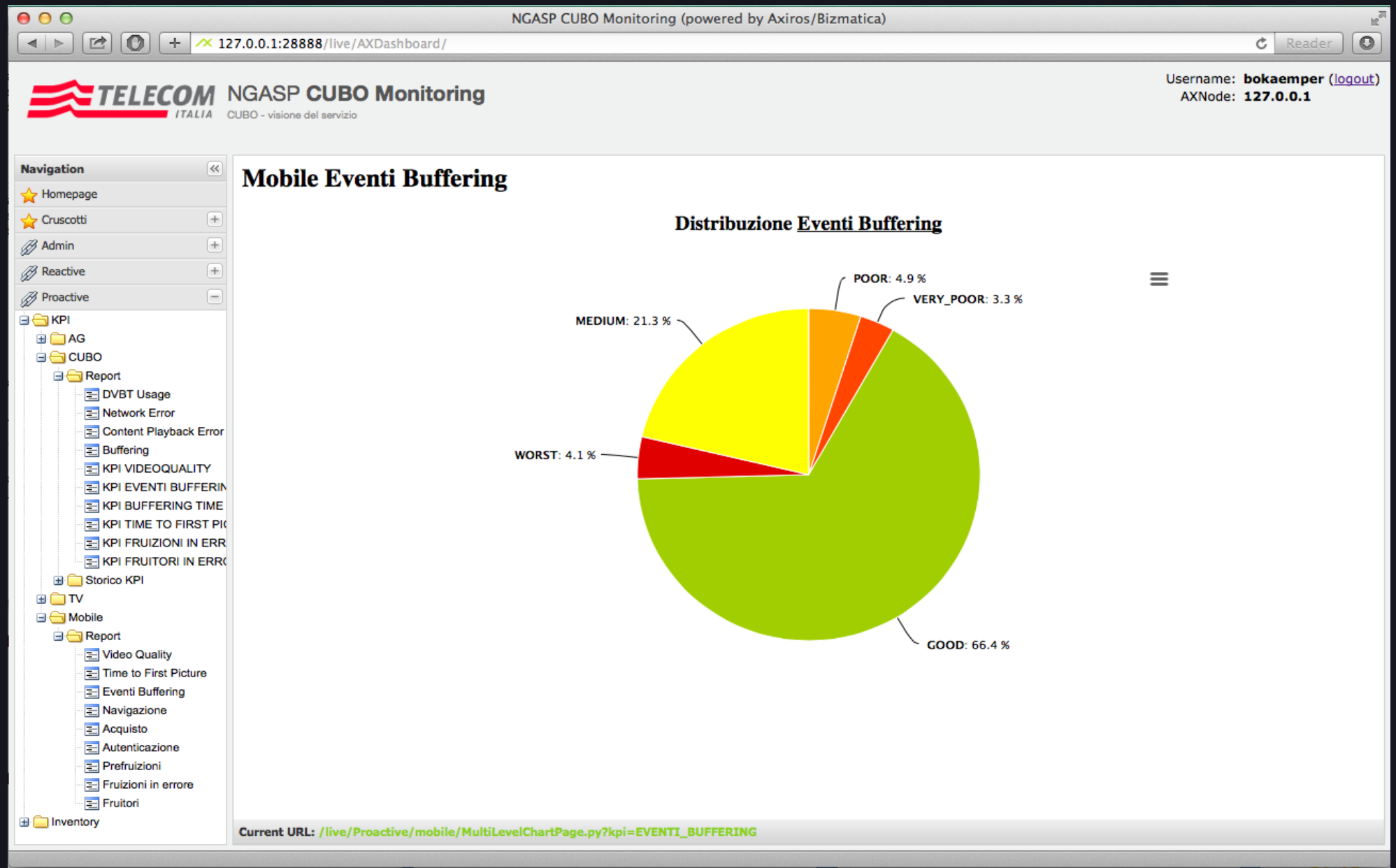
## How to Measure

Application-layer diagnostics using ITU-T P.1203 specifications (1, 2, and 3)



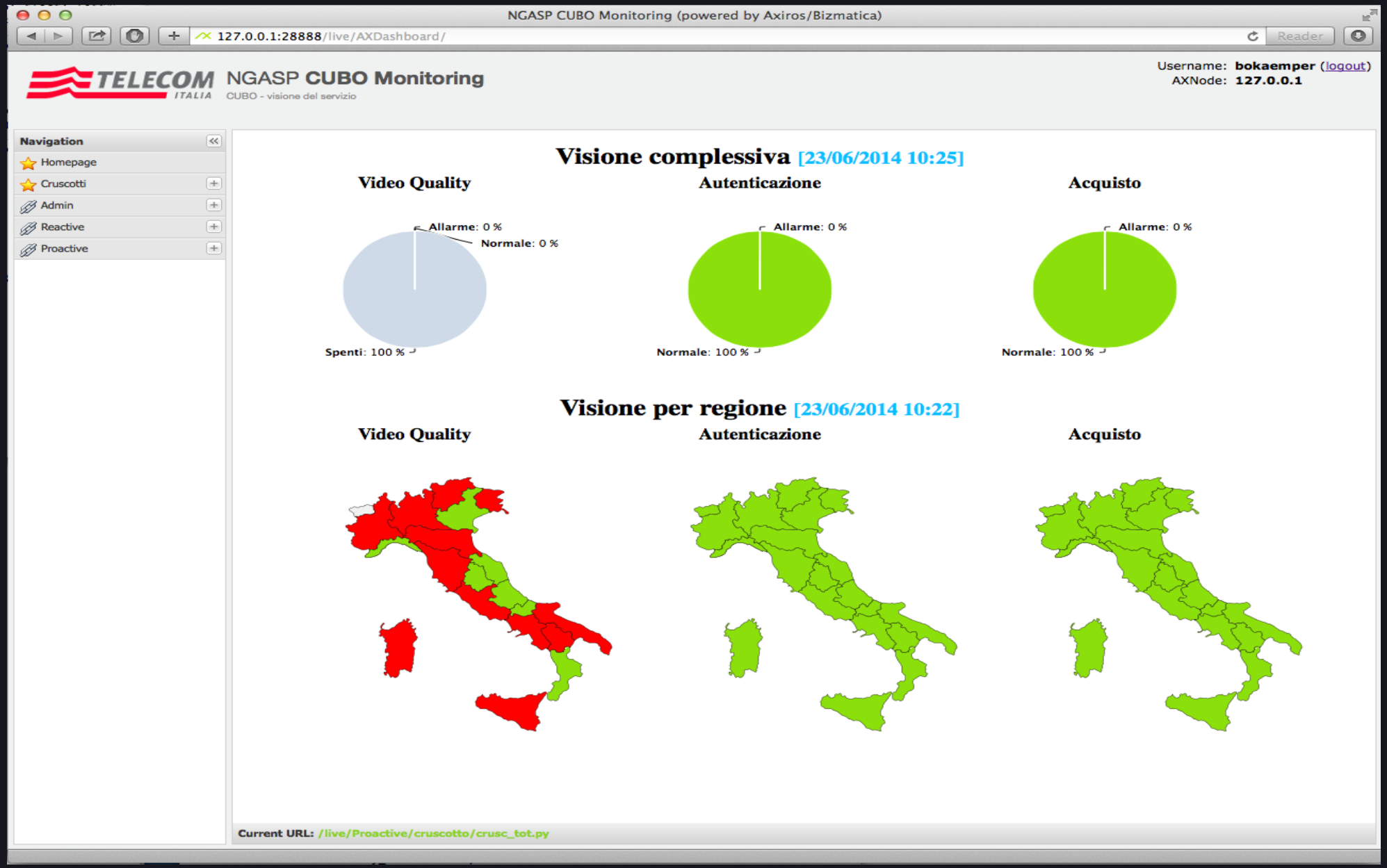
# A USE CASE EXAMPLE

## VISUAL EXAMPLE 1/3



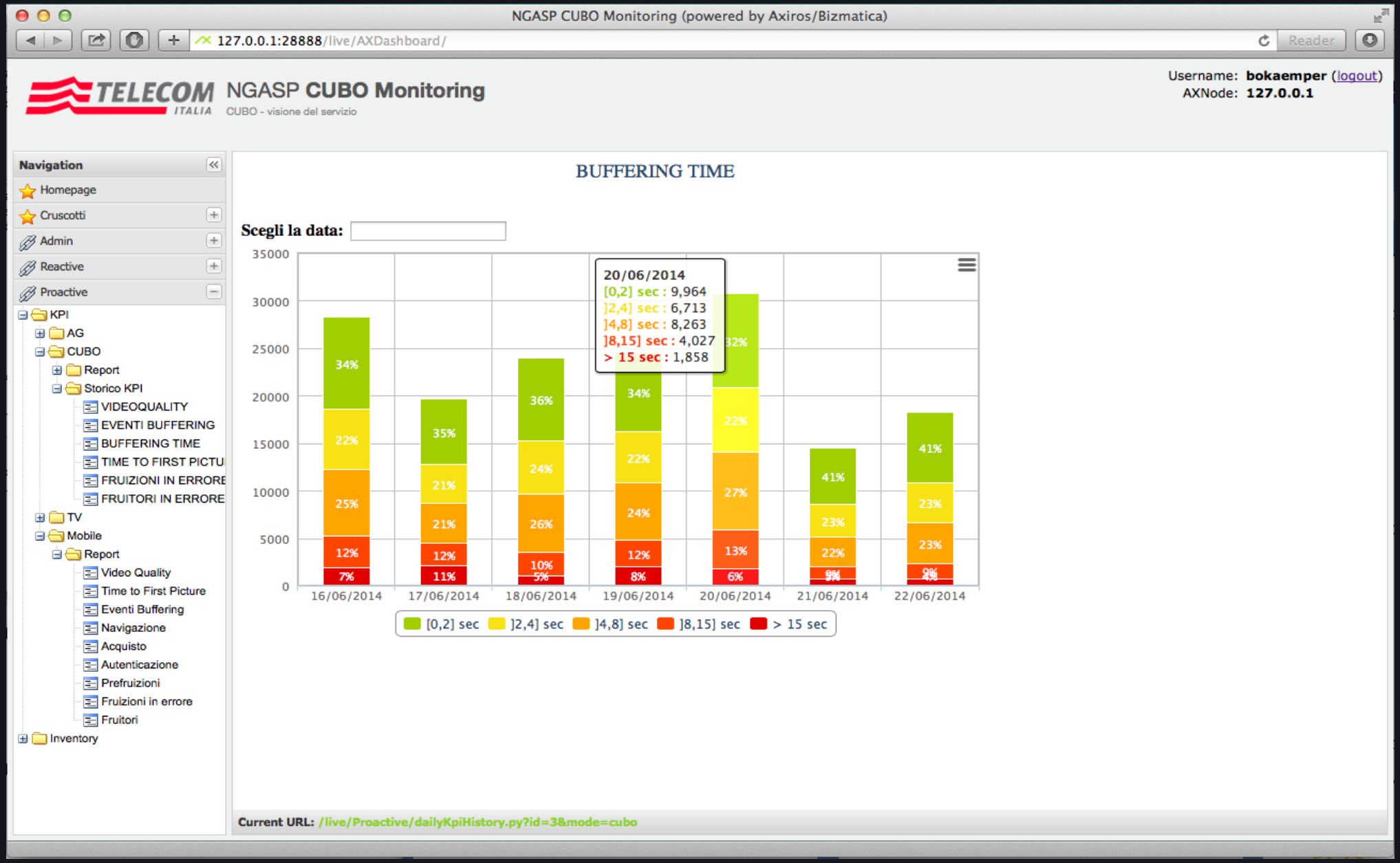
# A USE CASE EXAMPLE

## VISUAL EXAMPLE 2/3



# A USE CASE EXAMPLE

## VISUAL EXAMPLE 3/3



# Conclusion & Future Directions

- QoE frameworks must scale with OTT demand.
- Regulators can lead with proactive measurement strategies.
- Proposal: co-develop testbeds for OTT KPI evaluation.
- ITU guidelines + real deployment = meaningful insights.

# References


1. ITU-T Recommendation P.10: Vocabulary for performance, QoS and QoE.

2. ITU-T Recommendation G.1030: Estimating end-to-end performance in IP networks.

3. Broadband Forum TR-143: Protocol for broadband service quality testing.

4. Cleartech & Axiros EAQ Brazil Presentation (Luis_Bandeira.pptx).

5. Anatel EAQ Model – Publicly available documentation on regulator-driven QoE measurement.

6. Industry best practices on OTT KPIs (e.g., startup delay, buffering ratio, end-to-end latency).

axiros
Lasting Advantage

# THANK YOU!

sales@axiros.com

www.axiros.com