

Mobile network QoS/QoE benchmarking trends and the impact of AI

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infovista



Mohamed Lahouij
Regional Solution Sales Director | MEA

Agenda

01 Network benchmarking market evolution

02 6 network benchmarking trends

03 Regulatory case studies

04 Q&A

An ecosystem at an inflection point

Efficiency challenges persist

Rising costs and slow resolution

Customer churn continues

Customers switch when disappointed

Monetization lags investment

Revenue struggles to match spend

Data overload, not insight

Lacking actionable intelligence

\$1.5T

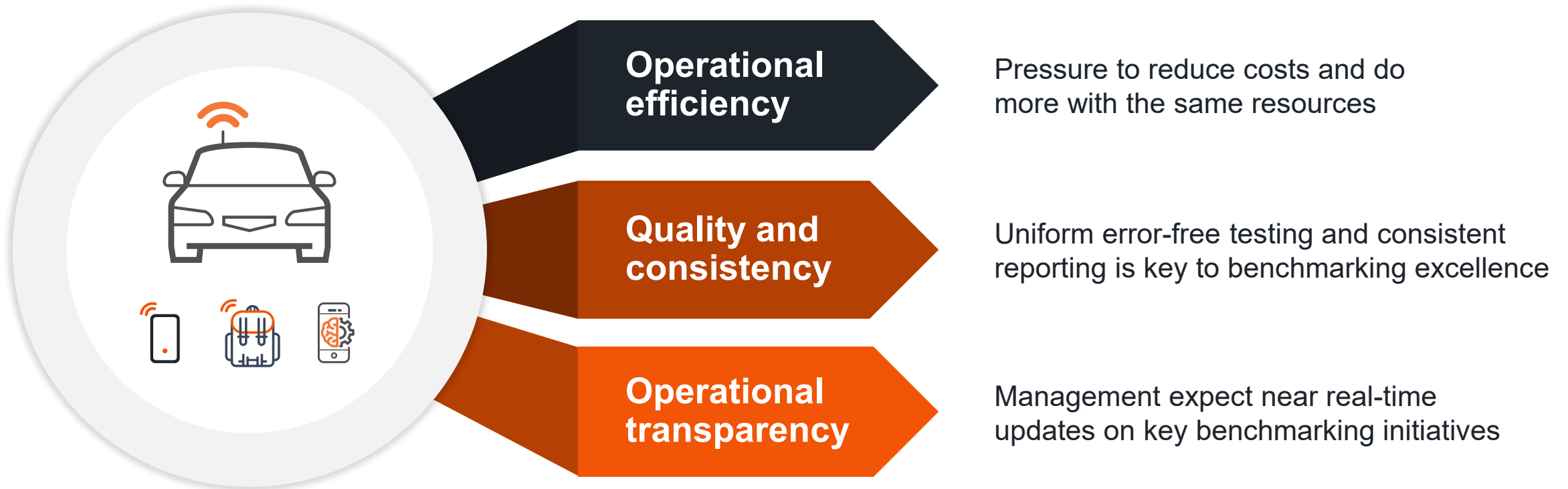
To be invested in 5G
Globally by 2030

Yet ROI remains elusive

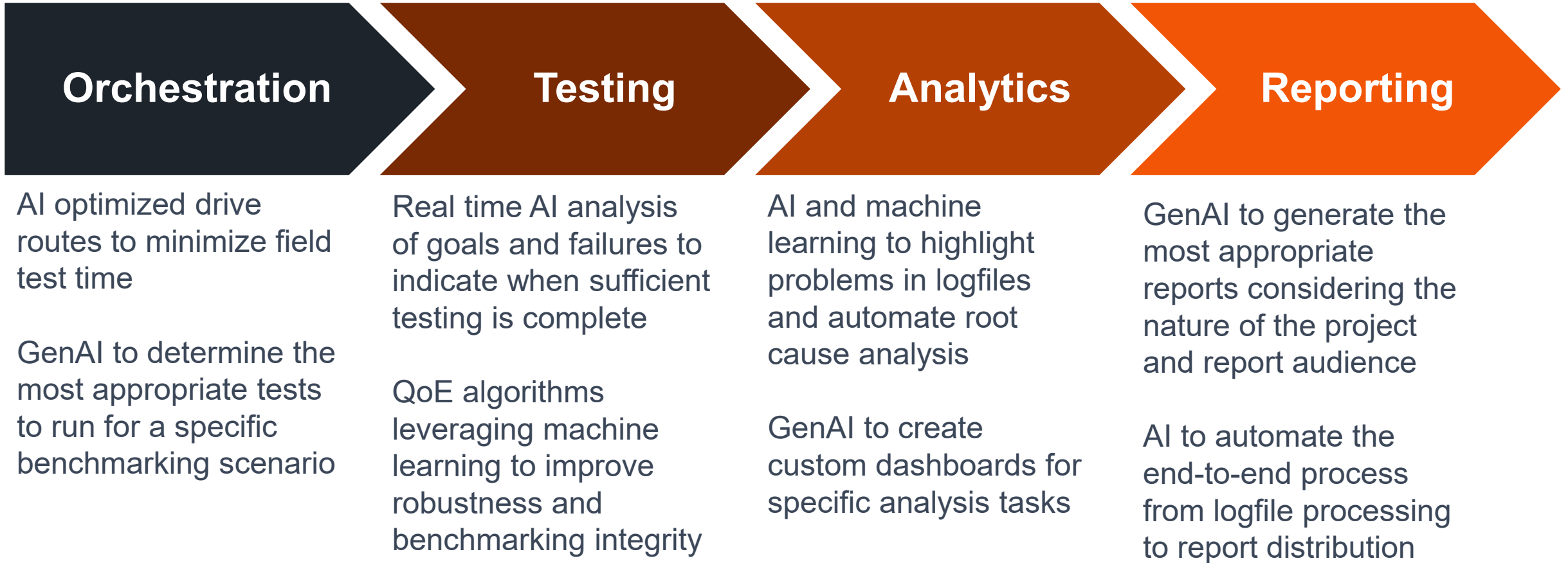
Network benchmarking market evolution



Key challenges for network benchmarking departments



AI is having a dramatic impact on network benchmarking



6 network benchmarking trends

How network benchmarking is currently evolving



Trend 1: Data collection automation

Network benchmarking solutions continue to evolve to more automated data collection. Fully manual testing evolved to running test scripts. Modern solution now feature **guided testing**, **centrally orchestrated testing** and even **fully autonomous testing**.



Data collection automation has multiple levels



Guided

In-field tester is guided on where to go and when to run specific pre-defined tests



Centrally orchestrated

In-field tester is just responsible for driving the pre-defined route and monitoring for any alarms



Fully autonomous

Testing unit is mounted in a fixed location or vehicle. No in-field tester required

Use case example

Competitor benchmarking

- Purpose-built user interface allows a single non-technical driver to perform advanced network testing
- Remote device orchestration from a central office for efficiency and uniform script distribution across drive test teams
- Highly scalable, enabling testing of multiple use cases across all competitors in a single drive test



Use case example

Fully autonomous strategic network testing



VistaTest

Cloud solution providing orchestration and analytics

Remote orchestration

Plan and execute all testing from a centralized back-office

Rapid analysis

Automated data processing and RCA help to identify network issues faster

Automated reporting

Automated dashboard refresh and report distribution to keep stakeholders informed

Access anywhere

Access dashboard from any device with a browser



TEMS Sense

Automated remote network monitoring solution

Remote testing

Deploy at strategic locations beforehand and easily test during events

Minutes between test & report

Much faster than the time it takes to see trends in PM data

Smartphone based

Test with the devices your customers are using for an accurate view of QoE

Multi-SIM

Switch between eSIMs to benchmark against competitors

Trend 2: Centralization

Many aspects of network testing including **orchestration**, **monitoring**, **analytics** and **reporting** are being centralized to increase efficiency, ensure consistency and provide network-wide visibility.



Automated orchestration and monitoring

Transitioning from field engineers planning their tests and drive routes, to controlling everything centrally is critical to **increasing efficiency** in the field and **ensuring testing consistency**

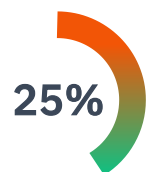
- **Consistent testing** - centrally create test scripts and routes and distribute them in workorders to field teams
- **Reduce re-drives** - monitor testing progress including successful test completion
- **Minimize time to analysis** - Confirm successful auto upload of test data to enable immediate analysis



Why Centralization?



Operational
efficiency



Reduction in drive tests
due to centralization
ensuring right first-time
drives



QoE
Excellence



Reduction in issue
identification time and
resources due to triage,
automation and RCA



Cost
savings



Reduction in IT
infrastructure
cost due to cloud
architecture

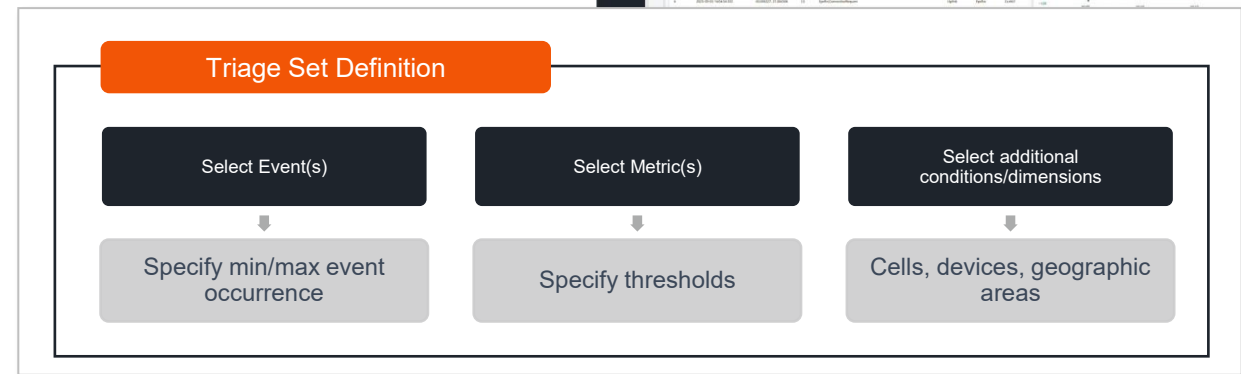
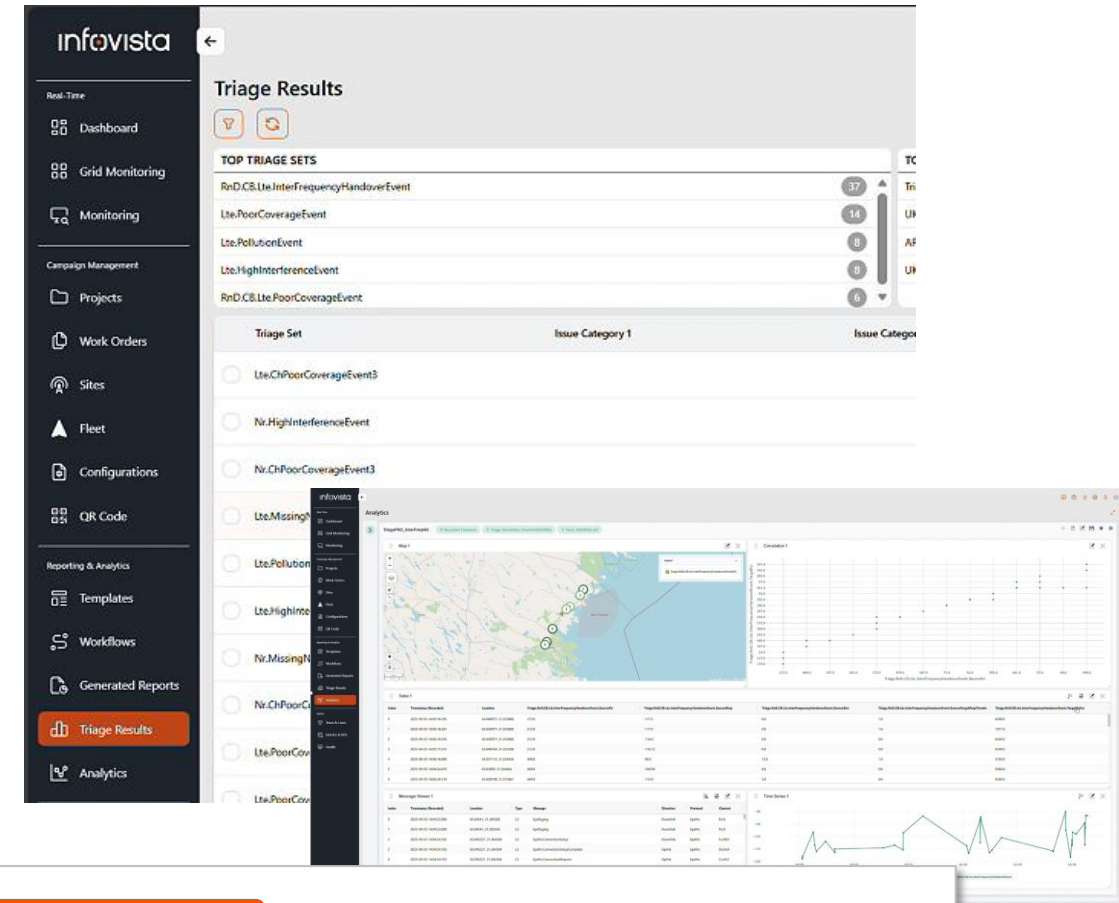
Trend 3: Automated root cause analysis

Manual analysis of drive test data can take as long, and sometimes even longer, than collecting the data. **Automated root cause analysis** to identify issues within logfiles dramatically reduces the human effort required.



Automated root cause analysis

- Root cause analysis is automatically performed on processed logfiles to identify issues
- Leverage predefined templates with out-of-the-box logic covering swapped sectors, high interference, poor coverage, handover failures and more
- Edit existing templates to your preference or create new ones with your preferred RCA logic
- Triage Results screen presents all identified issues. Clicking on an issue opens a contextual dashboard to drill into the data



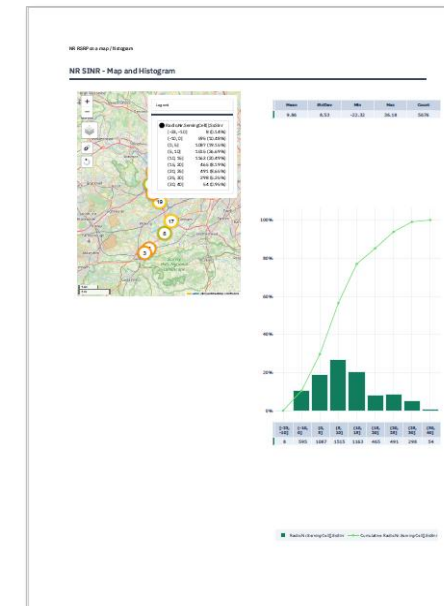
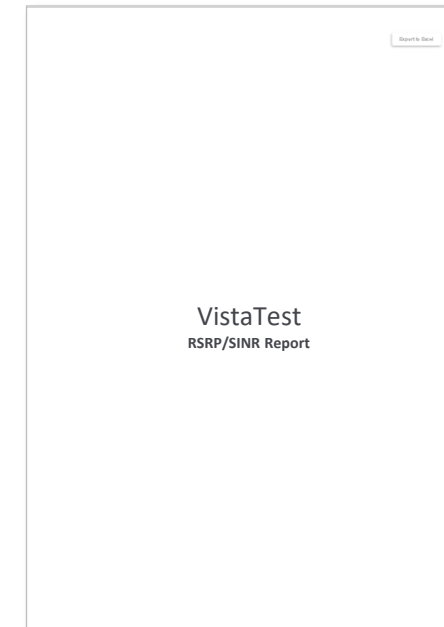
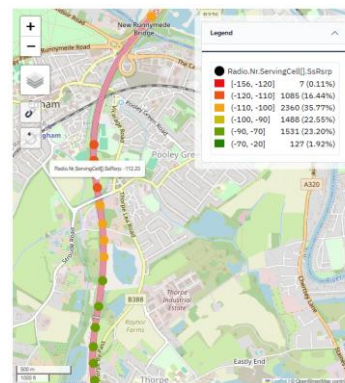
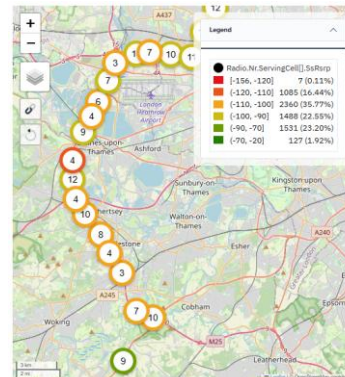
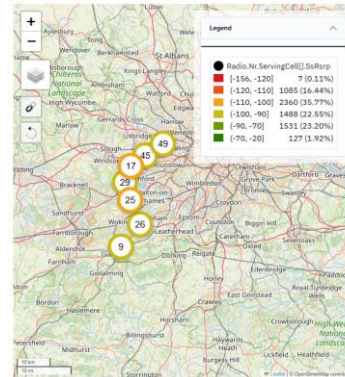
Trend 4: Automated reporting

Reporting is critical to keep stakeholders within the organization informed. **Automated report creation** and distribution dramatically reduce the human effort required, improves quality and ensures stakeholders always have the latest information.



Automated reporting

- Schedule and automate report creation and distribution to keep stakeholders informed
- Create highly customized interactive reports for all network testing use cases including site verification, optimization, benchmarking, marketing, etc.
- Reports can be automatically generated on-demand or to a defined schedule
- Reports can be automatically distributed to teams and/or users
- Reports are presented in an interactive web-based viewer with fully interactive maps and charts and the option to export to Excel and PDF



Trend 5: Evolution of standards toward next gen QoE solutions

With the proliferation of **OTT apps** and the evolution of networks to include capabilities such as **IP voice** and **4K video streaming** and **encryption**, historical QoE solutions are no longer fit for purpose. **Next-gen solutions are required** to adequately test these new capabilities.



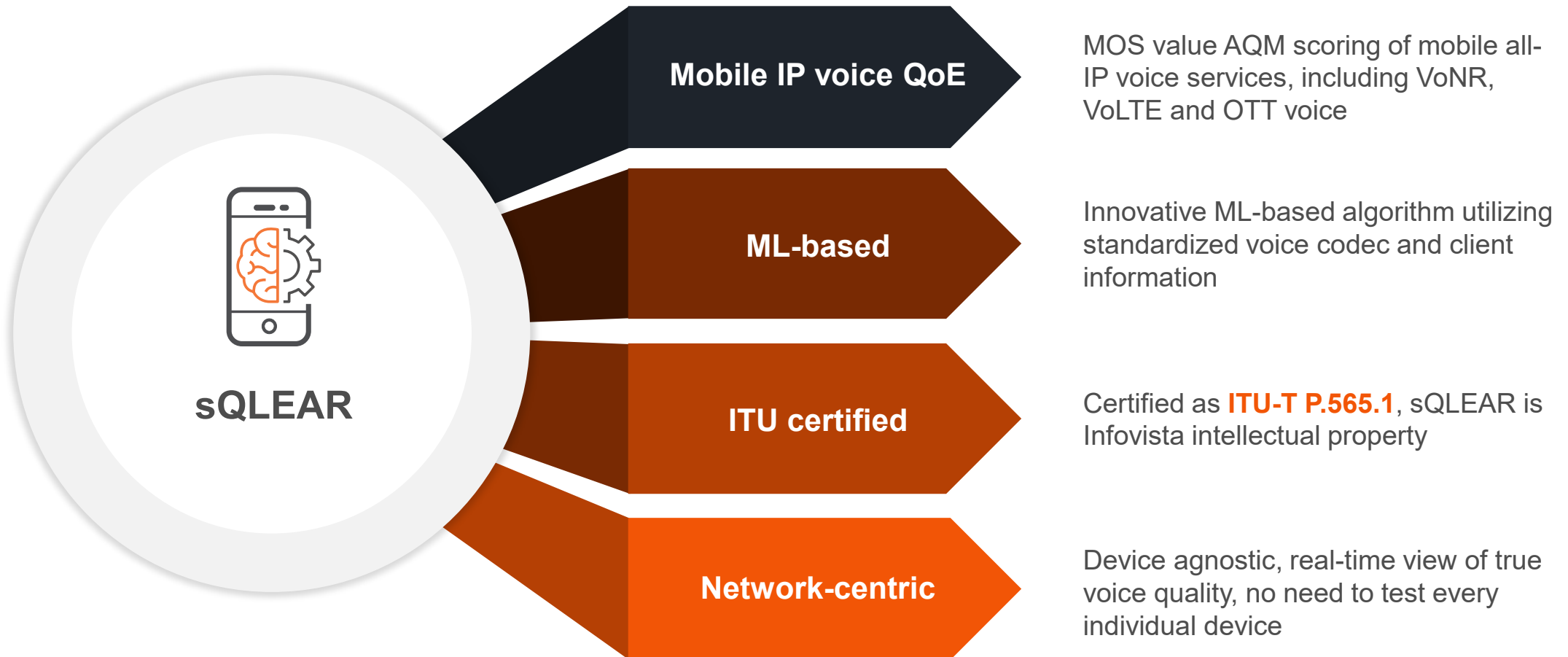
Infovista works closely with standards bodies

- Infovista is an active contributor to **ITU Study Group 12** (Performance, QoS and QoE) and **ETSI STQM** (Service Transmission Quality Mobile)
- A few of examples of Infovista's standards-based approach and work to evolve and update standards include:
 - Infovista's **sQLEAR** algorithm (**ITU-T P.565.1**) is an industry-first ML-based **ITU-certified** QoE assessment algorithm
 - Infovista's proprietary **VSQI** solution is based on **ITU-T P.120x.x** series.
 - TEMS Paragon supports benchmarking standards recommended by ITU-R and ETSI including **TR 103 559**
 - TEMS Interactivity testing uses pre-defined standards-based traffic profiles (**ITU-T G.1051**)



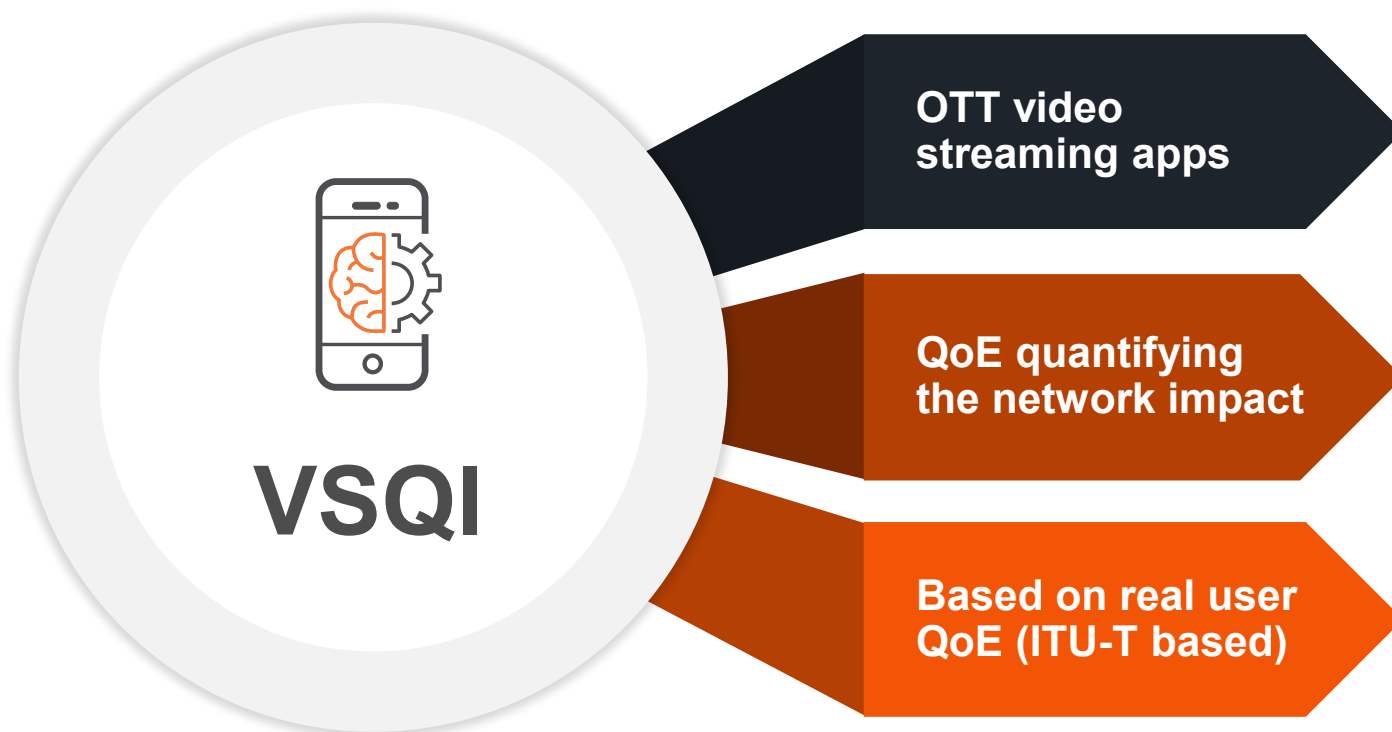
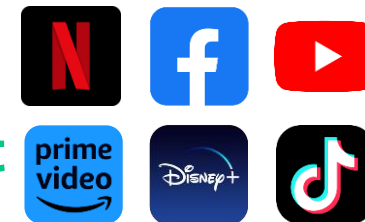
sQLEAR – speech Quality by machine LEARning

VoNR, VoLTE and OTT audio quality testing (MOS scoring)



VSQI – Video Streaming Quality Index

Network-centric and OTT application agnostic video quality assessment



Parametric QoE / MOS values support any OTT video streaming apps up to 8K resolutions

Device and OTT app agnostic with real-time view of “network true” OTT video streaming media quality,

Normalization to most sensitive video content for measurement reliability

Trained/validated alongside PEVQ-S. Infovista proprietary VSI solution is based on ITU-T P.120x.x series.

Understand user experience with TEMS UX testing

Accurately measure QoE for all native and OTT applications and services

sQLEAR and VSQI

Voice and video quality testing for NR, LTE & OTT



Interactivity Scoring

User interactivity testing with generic OTT service/app traffic patterns



OTT voice testing

OTT voice quality testing with a generic client approach



OTT media testing

OTT application testing with a generic framework approach

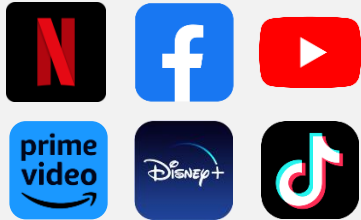


Generic OTT media testing

Actively test OTT applications and keep up with the tremendous pace of evolution

Video streaming

- Test OTT streaming services inline with ETSI



File sharing

- Send audio, video, pictures or documents



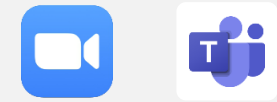
Messaging

- Send messages with various OTT applications



Remote meetings

- Test voice, video, chat, screen share and invite for remote meeting apps



Voice call

- Test dial, answer and hang up on OTT voice apps



Video call

- Test dial, answer and hang up on OTT video apps



Supplementary services

- Test loading a page/feed, liking, commenting, etc.



Interactivity scoring

TWAMP based interactivity testing solution

- Interactivity Score is specifically designed to **test latency-sensitive applications**, critical for 5G
- Generic traffic patterns emulate traffic behavior and its adaptability to network conditions in the same way as a real application would



Mobile
eGaming



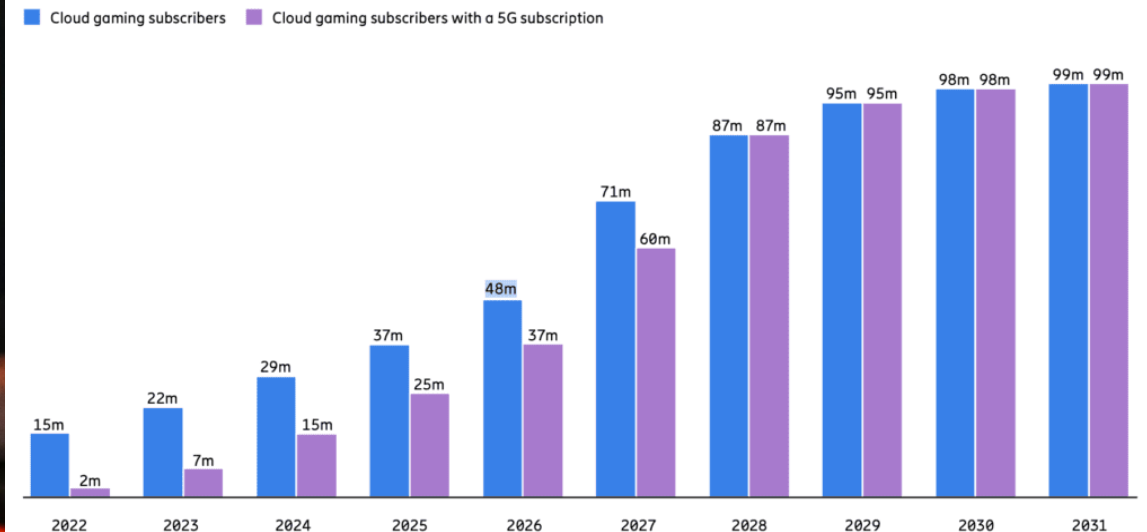
Remote
meetings



Video
Chat

“Service providers can expect a **4 percent service revenue increase** by leveraging estimated upcharges for enhanced 5G connectivity from gaming slices only by the end of the decade”

Figure 2: Cloud gaming subscriber forecast, North America 2022–2031



Source: Ericsson 5G cloud gaming report August 2022

Trend 6: Automating testing tasks with AI

Automation is a key strength of AI. One example, is how the use of **AI agents** to automate tasks for us has expanded exponentially in the past few years. These agents are now also becoming more common place in network testing solutions, enabling users to **perform complex tasks using just natural language prompts**.



Using an AI agent to correlate cross-silo data

Use case example – comparing planned and actual coverage



Show me on a map how the planned coverage in Skelleftea compares to my drive test measurements from the past month.

Show me a table with planned versus drive test coverage statistics, per site and cell.

Use case example - ensuring premium 5G performance for VIPs



Between 8:00 and 9:00, have any 5G customers experienced download speeds less than 50Mbps at Waterloo Station? Are any of these customers VIPs?

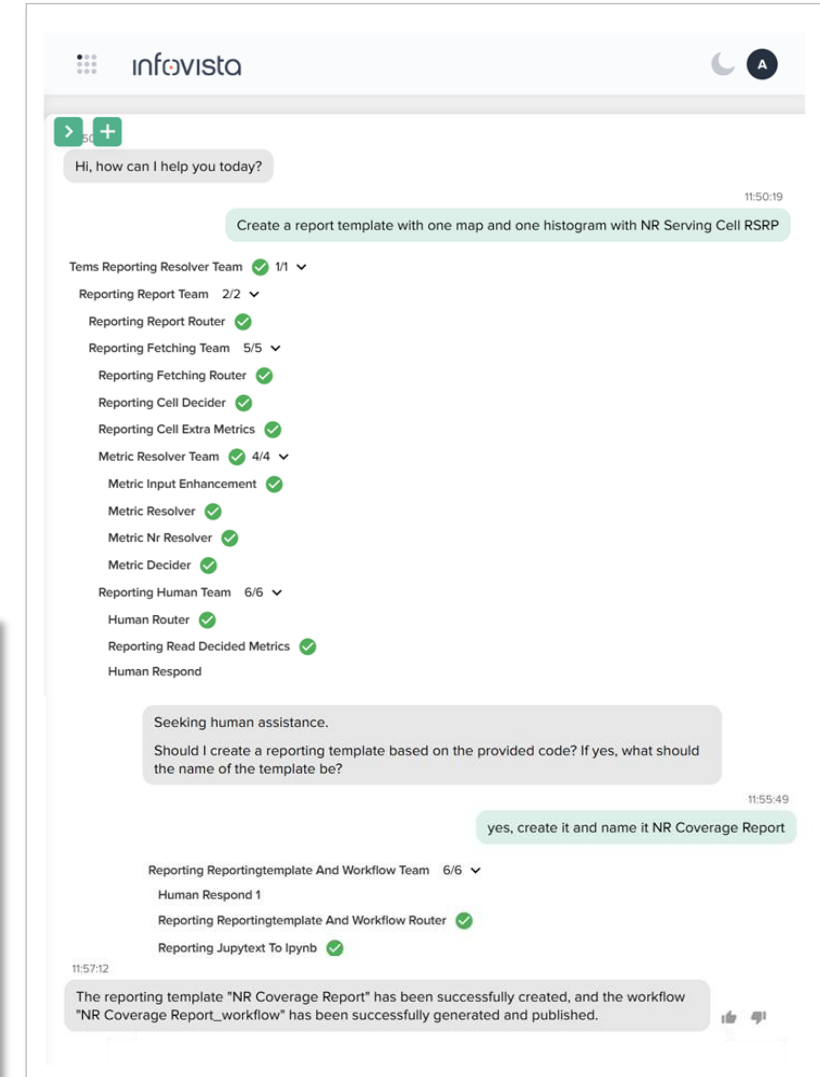
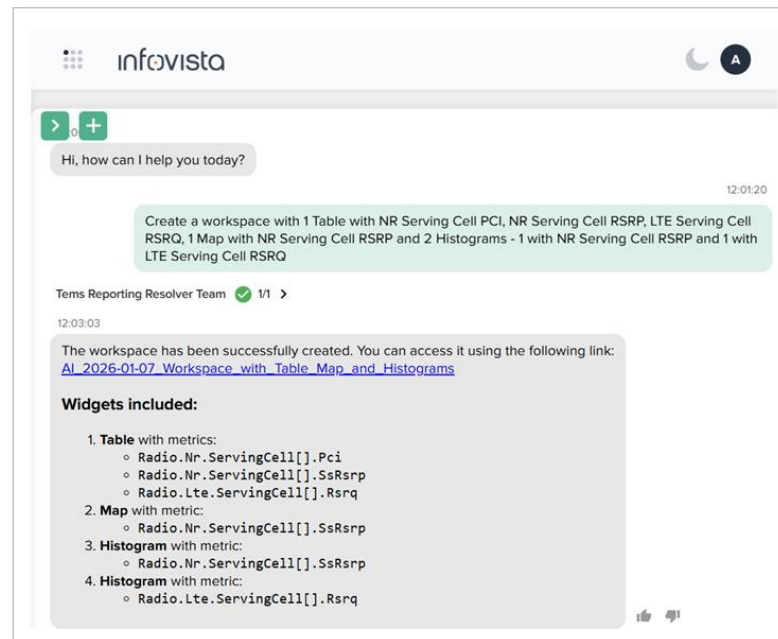
What kind of performance are my competitors delivering on 5G?

Schedule a daily report and create trouble-tickets for all impacted VIPs.

Natural language interface

Powered by VistAI

- Create analytics content using plain language, reducing setup time, lowering expertise barriers, and accelerating insight generation
- Supports natural-language creation of:
 - Custom KPIs
 - Triage Sets
 - Workspaces & visualizations (maps, charts, histograms, correlations)
 - Report templates
 - End-to-end workflows (parameters, schedules, outputs)



Regulatory case studies

How Regulators are leveraging these trends



Customer success story

Operator benchmarking in multiple countries

Customer challenges

- Accenture required a robust and scalable network testing tool which they could rely on when conducting their operator benchmarking exercises across the world

Our solution

- TEMS Paragon with VistaTest for remote control and management
- VistaTest for remote, near real-time monitoring to identify and resolve issues quickly

Proven benefits

- Umlaut has established themselves as the de-facto standard in mobile network benchmarking globally
- TEMS Paragon been used exclusively since 2017 to benchmark operators in more than 120 countries
- Flexibility to adapt to new umlaut technical requirements
- Out of the box ETSI compliant KPI support



Trends: Automated orchestration, automated analytics and reporting, data collection automation, OTT testing...

Customer success story

Special event monitoring by a Regulator

Customer challenges

- With Qatar hosting the FIFA World Cup Qatar 2022™ the country's regulator, CRA, wanted to be able to monitor performance of all the country's operators at key locations

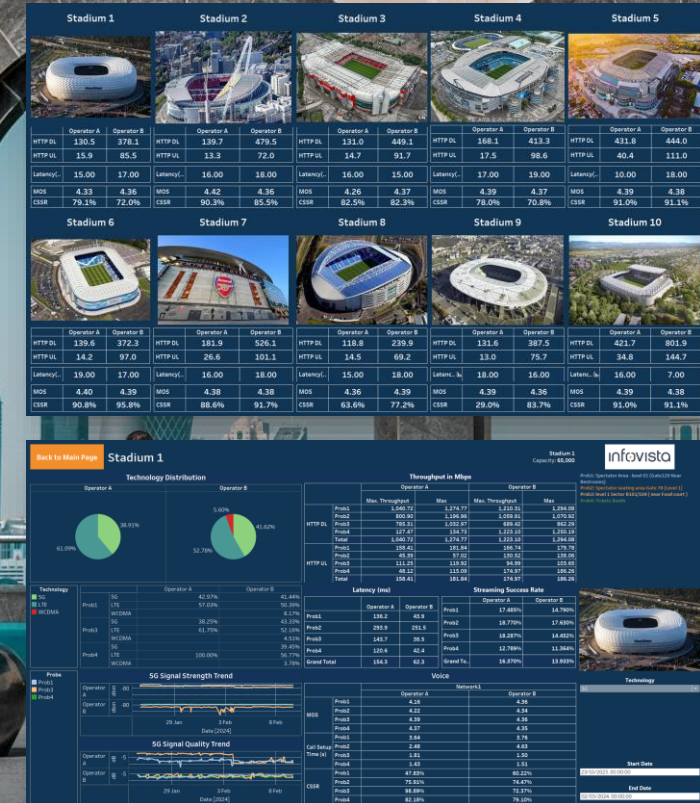
Our solution

- TEMS Sense units were installed at key locations identified by CRA. Each TEMS Sense unit supports up to 4 eSIMs so all operators can be monitored from a single box. The units are remotely managed and configured to automatically test and present the results on a centralized dashboard

Proven benefits

- The solution provides CRA with visibility into the performance of all the mobile networks at key locations such as airports and stadia

infovista



Communications Regulatory Authority
State of Qatar

هيئة تنظيم الاتصالات
دولة قطر

Customer success story

Regulatory compliance

Customer challenges

- Following a merger, the customer was required to prove the consolidated entity met the specified 5G network build-out and performance commitments agreed to with the regulator

Our solution

- TEMS Paragon controlled centrally by VistaTest

Proven benefits

- Uniform script distribution across drive test teams
- Native python scripts to enable testing of regulator specified OTT apps
- Cloud-based device orchestration from a central office for efficiency
- Seamless synchronization between devices and VistaTest
- **Successfully undertaking the largest benchmarking project ever (~1 million drive test miles)**



Thank You