Nova SensAI

Reveal the invisible

Table of contents

Complexity is outpacing operations

Eric Kuisch
CTO[1]
vodafone

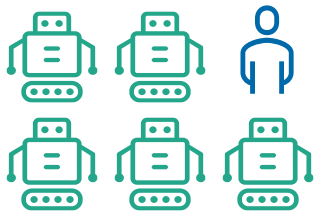
Operations spends 6x more effort fixing issues than preventing them—their task is about to get 10x harder

46%
More outages in the past 3 years

65%
Of faults originate in virtual domains

69%
more virtualized, orchestrated, past 3 years[4] networks

53% CAGR
Mobile data growth accelerates



5X more machines than humans by 2025

As networks continue to virtualize, they are becoming more difficult to manage. OSS tools, originally built for physical networks, are simply not up to the task. Old ways of doing things just don't cut it, and we're seeing this in the number of outages reported[2,3].

If carriers are to survive—and even thrive—in this new world order, they will need to embrace automation, ML and AI to support their operations.

Caught between shrinking OPEX budgets and increasing pressure to deliver more reliable services, **operations teams will need to rethink their existing approach and processes.**

1. Retired—Held role through 2018
2. Heavy Reading 2019 global CSP survey
3. 2019 GSMA Mobility Report
4. 2019 Analysys Mason, European Telecoms Summit

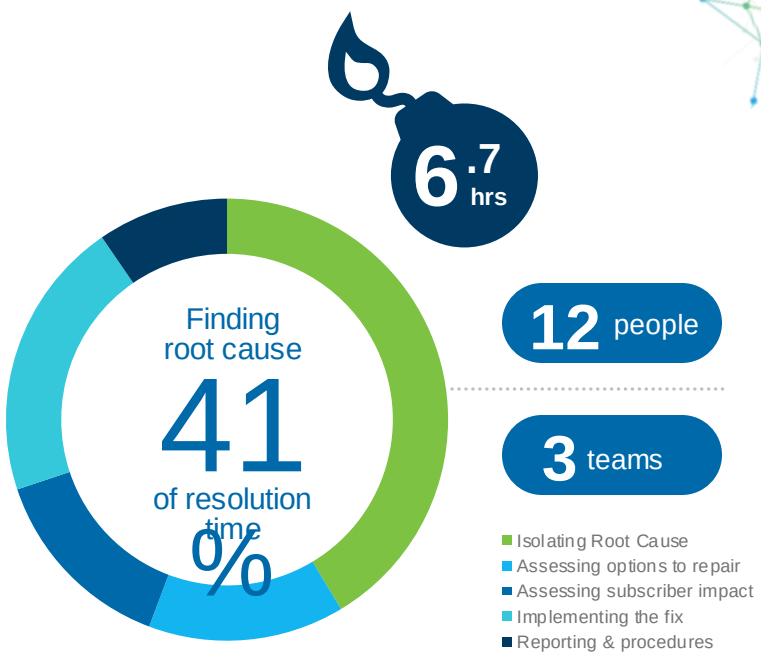
Virtualization makes troubleshooting harder

Bill Hogg
President, Technology Operations[1]

AT&T

Resolving outages
the way we do today
will become impossible

Critical outages



With the complexity of networks increasing and the number of outages increasing too, **carriers cannot afford a 'business as usual' approach** to troubleshooting.

Today's war room consumes precious time trying to identify root cause and customer impact.

1. Retired—Held role through 2018
2. Heavy Reading 2019 global CSP survey

Degradations impact customers more than outages

Bryn Jones
CTO[1]

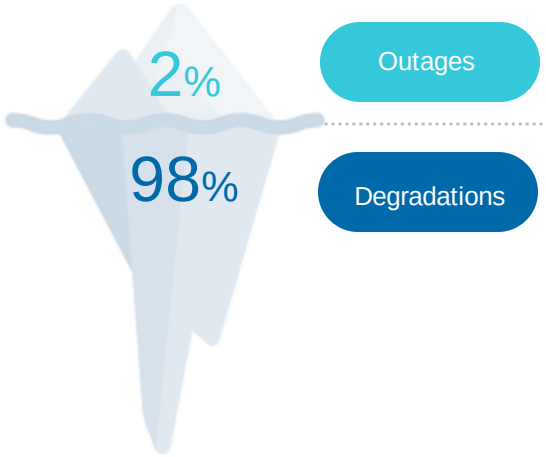
Service degradations impact customers more than outages.

Operations teams are lucky if they see 10% of them.

Outages are just the tip of the iceberg—and while they may get a lot of press and visibility, the fact is they represent only a small fraction of the customer-impacting issues.

> Customers consider degradations to be outages, since they can't get things done.

Customer impacting events[2]

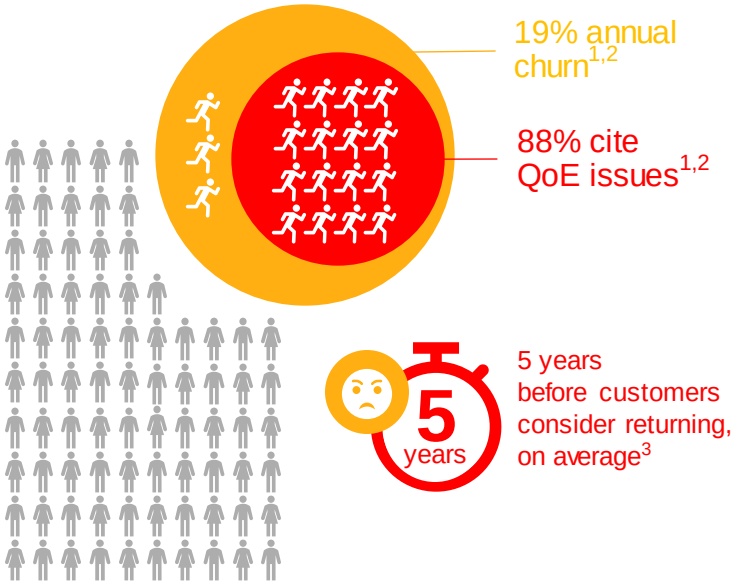


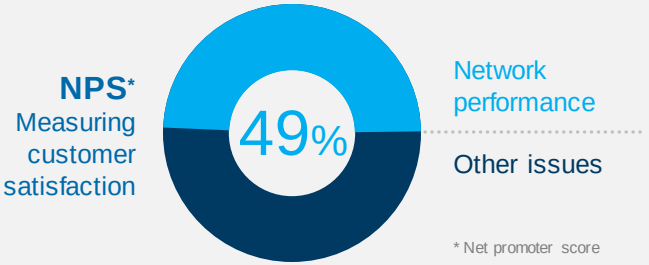
5% of customers experience → **15** minutes of degraded performance → **Every day**

1. CTO at PurePlanet as of 2019
2. Heavy Reading custom survey July 2019

Churn is a reality for all carriers

Poor customer experience makes replacing them increasingly difficult





Even the best run networks suffer about 12% churn per year[3]—customers that need to be replaced to maintain market share.

> Higher than average churn directly correlates with poor customer experience—and specifically, a low NPS

Impact of low NPS

- Carrier **brand suffers** at the hands of detractors and loyalty is low
- Unhappy customers are **less likely to renew** contracts
- Unhappy customers **do not recommend** their provider to friends and acquaintances
- A low NPS significantly **increases the cost** of customer acquisition.

1. Ovum 2019
2. Heavy Reading 2019
3. Portevo Consulting, 2020

Poor QoE is expensive

Money spent on customer acquisition and retention impacts new service rollout and profitability

Impact of bad QoE per customer, per year

For an operator with 100 million customers, this amounts to an $800M problem annually

Money that could otherwise be spent on accelerating network and service rollouts, like 5G.

Customer acquisition and retention is the MNOs largest expense after the network itself

High churn (low NPS) puts enormous pressure on mobile operator margins. **New subscribers are less profitable than existing ones.** Once gone, customers typically won't consider returning for five years

Acquisition costs are biggest piece of this pie, driven by things like advertising, handset subsidies and promotions to attract new subscribers.

Retention costs are driven by credits and promotions offered to compensate for QoE issues.

1. Portevo Consulting, 2020

Speed of impact is greater than the speed to detect

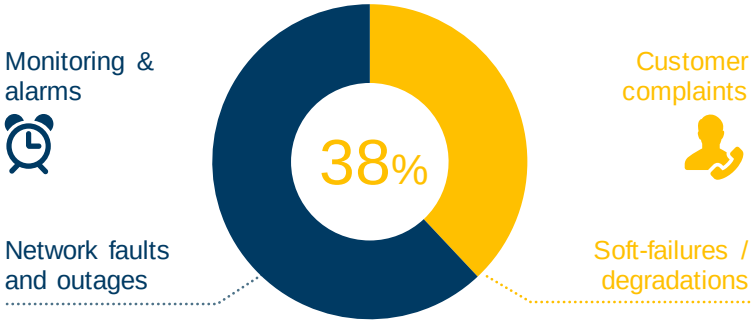
Resulting in more unhappy customers than it appears

Time to detect

Impairments are often transient and disappear before the NOC is aware

KPI averaging and 15-minute reporting intervals mask many customer impacting degradations, resulting in undetected issues.

Trouble-ticket origin



Customers detect issues traditional monitoring do not. At the same time, **customers report less than 1%** of the issues they experience.

As a result, as much as 98% of customer impacting issues go undetected by the operator

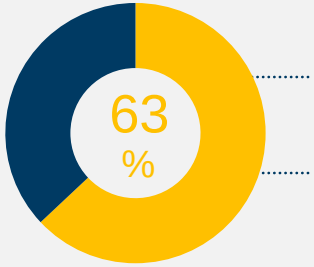
1. Heavy Reading custom survey July 2019

MNOs recognize the need for automation

So what's holding them back?

believe that automation* is needed to improve reliability

* fault correlation, prediction and root cause analysis

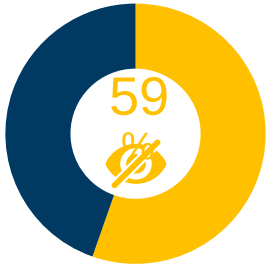


say automation is critical to obtain increased visibility within 18 months.

expect it's their biggest opportunity to save money within 2 years.

There's no doubt about the need for automation. By now everyone is fully aware of the challenges facing operations teams.

But despite this recognition, many automation efforts are progressing slowly or simply stalled:



say their inability to detect impairments in real-time prevents them from automating

To work effectively, automation needs real-time visibility into the performance of the network and services.

This real-time visibility is not something traditional assurance solutions have provided. Additionally, **97% existing assurance solutions do not support the APIs needed** to build an integrated automation solution.

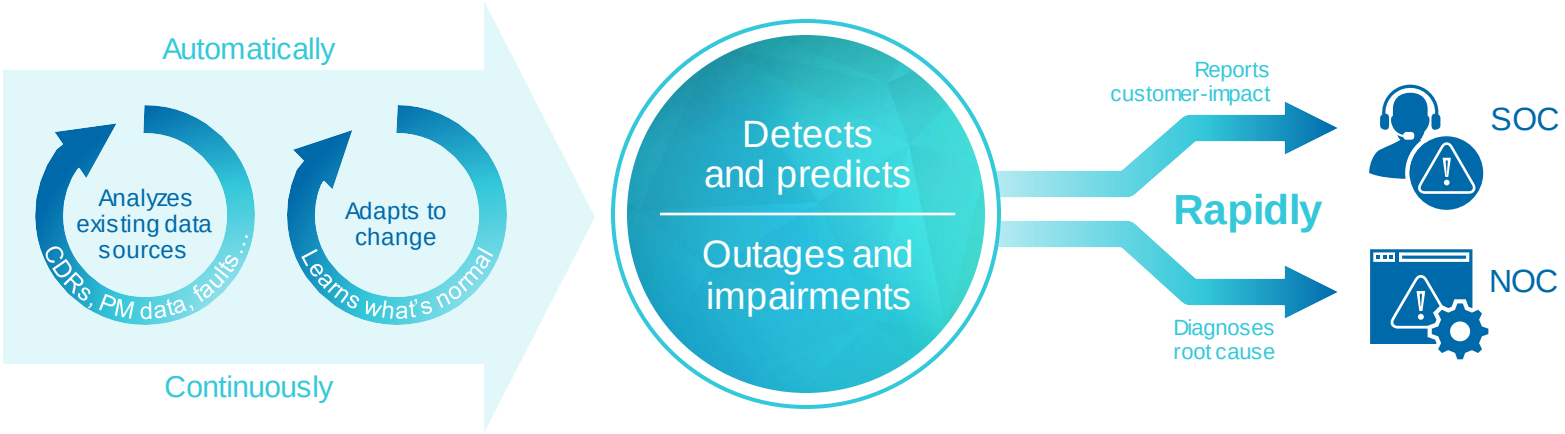
Reveal the invisible

It's your monitoring data—see it in a new light

Operations needs a tool that can automatically detect and measure customer-impacting events in real time, **including knowing who is impacted, where and for how long.**

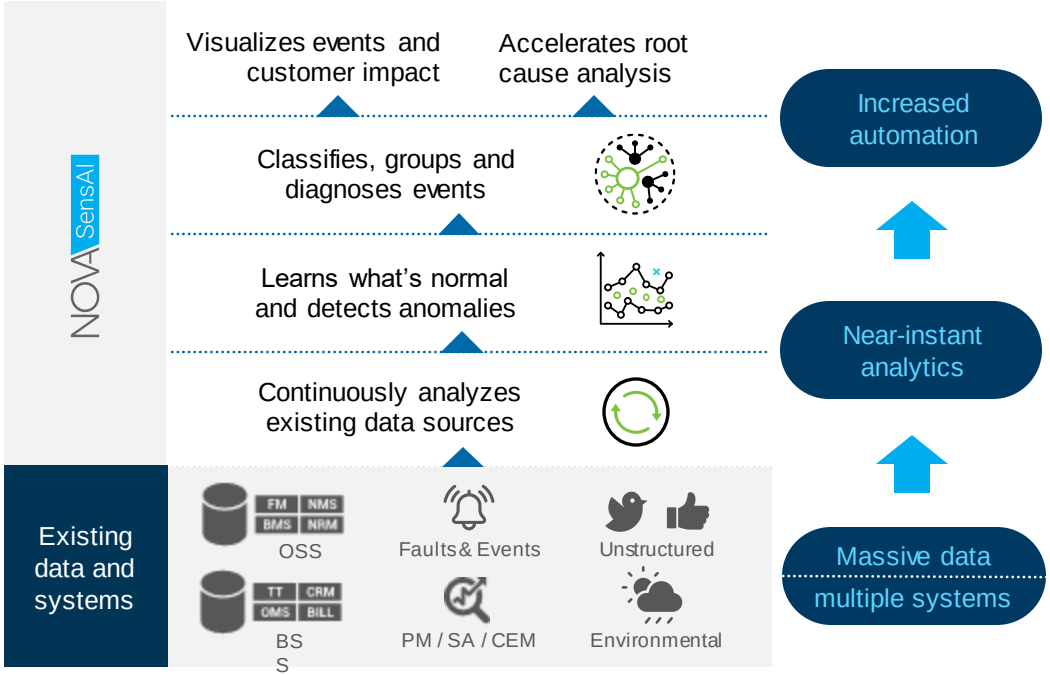
Even more important, a tool that can 'learn the state of normal', automatically set thresholds, and even predict future customer impacting events.

This is NOVA SensAI



Extract valuable insight from existing data

An open solution to enhance your existing tools and systems



A key challenge facing operations teams is the massive amount of data being generated by dozens of tools and systems. And, as networks scale to address 5G and IoT, this problem will only get worse.

> This is the "Big Data Barrier". A flood of data overwhelming the ability to extract insight when it's needed.

Nova SensAI is built to break through this barrier. Machine learning quickly identifies, assesses, and classifies customer-impacting events. Automated diagnostics drives down MTTR to optimize customer experience.

‘Customer first’ actionable insight

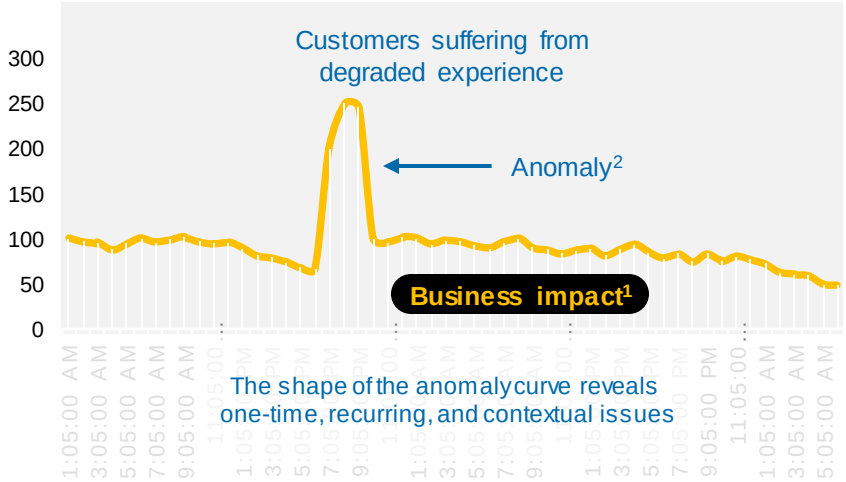
Not all faults are created equal

Not every fault impacts the customer’s QoE –and not all faults impact the same number of customers or impact customers equally.

Faults that do not impact QoE—for example, where protection activities have rerouted user traffic—**should be prioritized lower than faults that do**. Just like faults that impact 1 customer should be prioritized lower than a fault impacting 1,000 customers.

> Nova SensAI automatically prioritizes anomalies in the network based on their business impact.

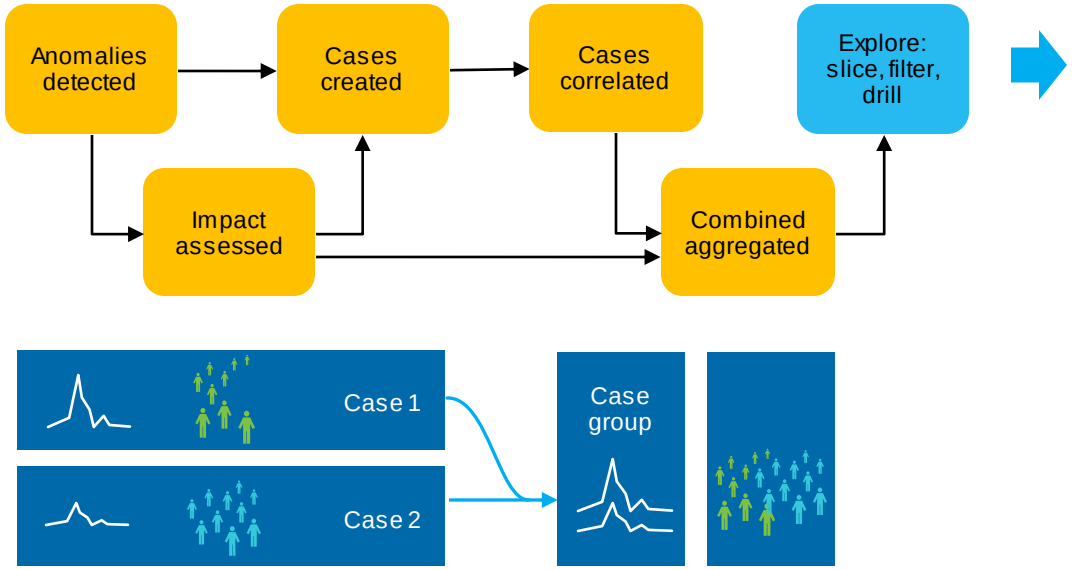
The longer the anomaly lasts, the more customers impacted, the kinds of customers impacted, and the type of service all factor into the business impact.



Nova SensAI focuses on customer impact over network QoS to deliver actionable insight

1. Business impact: the number of customers or devices impacted over a period of time
2. An anomaly is a deviation of a KPI away from its ‘normal value’ – and SensAI automatically determine ‘normal’ through ML.

Accelerate operations



The power of Nova SensAI is its ability to **identify anomalies** and create 'cases', **correlate seemly disparate cases** automatically, **assess the overall customer impact** and present the data in a meaningful way in near real-time.

Interactive, case-focused visualization

Event-impact timeline | Map view | Diagnosis assessment

Captures distinct count of customers that fall into bad experience groups.

View by services, subscriber types, and category

Nova SensAI delivers insight through a unique UI which focuses the operator on the **cases with the highest business impact.** The ability to filter by services, subscriber types and much more make the tool extremely flexible and easy to customize.

Through intuitive drill-down capabilities, the user can quickly move from an aggregated, case timeline to the diagnosed root cause analysis, greatly reducing the time and effort.

Shorten MTTR with automation

Current way

Need to define per service

– Service models
– KPIs
– Thresholds

– Manual process
– Time consuming
– Error prone
– Manual updates

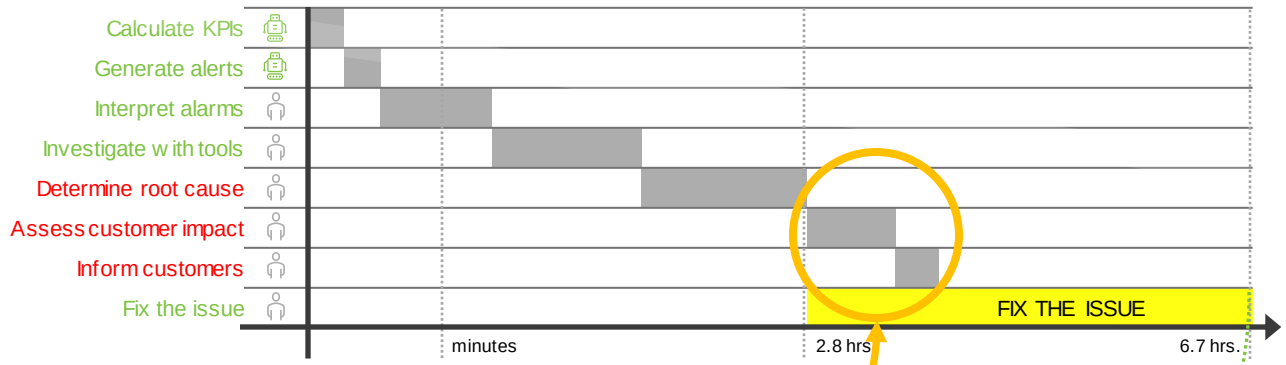
NOVA SensAI

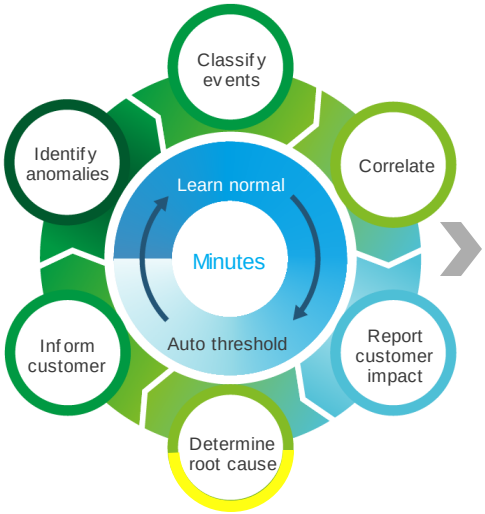
Autonomously generate per service

– 'State of normal'
– Thresholds

– Automated process
– Continuous, ongoing
– Real-time generation
– Accurate
– Real-time updates

Minutes instead of hours, and no war room





Start fixing faster

FIX THE ISSUE

Nova SensAI shortens the MTTR and greatly simplifies root cause determination. What might **typically take hours can be done in minutes.**

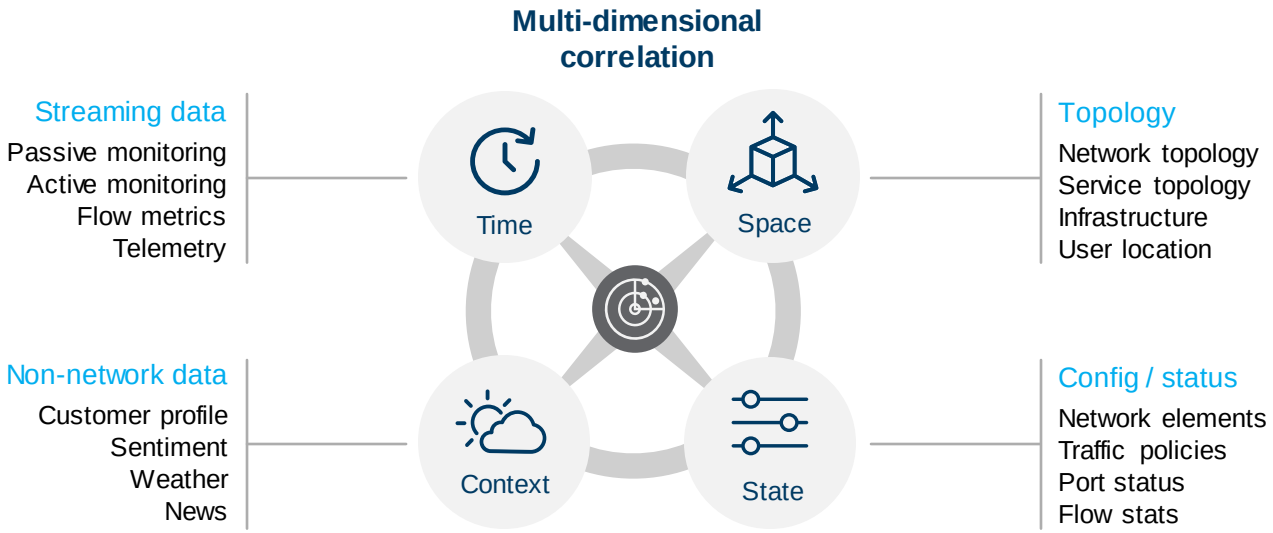
And, because Nova SensAI covers QoE from the user to the core, it eliminates the need for multidomain war rooms and manual troubleshooting of complex outages–saving time and money.

Extensible, data-driven insight

Each data source contributes a unique perspective

Nova SensAI can analyze a range of streaming data sources to detect anomalies and correlate events across multiple dimensions.

It can also integrate network state, alarms and environmental context into near-instant root cause diagnosis.



By analyzing diverse data sets SensAI can associate events that would otherwise remain isolated across siloed systems.

Diagnostic data sources

Network QoS and customer QoE are essential inputs

Network and service operations staff consult 12 tools, on average, to monitor and troubleshoot quality of service and experience.[1] Nova SensAI can analyze these same data sources to automate manual processes and accelerate problem resolution.

Each system contributes to capturing a complete picture of user experience and network performance.

Key inputs for AI detection and automated diagnostics

Passive monitoring — CDRs / XDRs

Call and data detail records provide **customer and device-level insight into QoE,** location, services, event impact and transactions.

Active monitoring — QoS / QoE

Consistent, granular metrics provide a **real-time pulse of network and service performance** from core-to-edge, independent of user device or behavior.

Fiber monitoring — optical QoS

Effective troubleshooting requires insight into how optical faults and **degraded transmission performance** impact QoS and QoE.

RAN — network / UE analytics

Insight into coverage, capacity, mobility, and user-centric geo-analytics highlight **radio and RAN performance** issues impacting customer experience.

Topology — dependencies

Topology helps visualize and isolate fault location using infrastructure dependencies. It **enables service impact analysis, and event correlation.**

Fault / alarms — Diverse alerts

Many alarms don't relate to QoE. By correlating them with customer impacting events, operations can **prioritize actions to optimize outcomes.**

Config / status — state, policy, KPIs

Network element config and status, traffic policies and performance KPIs (flow stats) **identify how infrastructure contributes to QoS and QoE.**

Nova SensAI automates troubleshooting processes by applying AI analytics to pertinent data sources. Incrementally add new data sets to address new use cases.

Mobile QoE — detection and diagnostics

Customer-centric fault resolution

Nova SensAI uses machine learning to detect anomalies across massive data streams. It instantly analyzes call and data-detail records (C/XDRs) for **every mobile subscriber**, identifies customer-impacting events then correlates those with a common root cause.

Nova SensAI automatically classifies issues by severity and type (accessibility, mobility, retainability, data and service performance). It detects short-term events impacting a few individuals, and large-scale degradations that often fail to trip alarms.

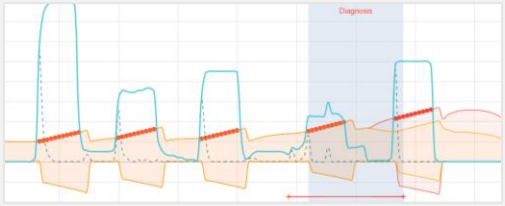
Inputs

Passive xDRs

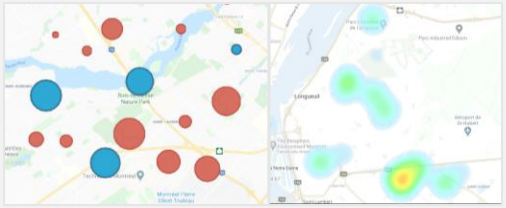
NOVA SensAI

Augmented insight

Anomaly detection



Impact mapping



Event correlation

Root cause analysis

Benefits

> 90% Faster fault isolation*

> 37% Faster MTTR*

* Based on averages from 2019 Heavy Reading survey of global operational norms, results vary by operator

Network QoS — troubleshooting and optimization

Overcome alarm fatigue to resolve the real problems

Operators can face tens-of-thousands of network alarms each day representing thousands of cases to diagnose and resolve. With all this information, **why do so many large-scale events go undetected?** Soft failures often don't trigger threshold-based alarms.

SensAI detects network performance degradations using anomaly detection, not manually-set thresholds. **It captures short-term and multi-factor impairments** that fly under the radar, then groups them together by common root cause to accelerate MTTR.

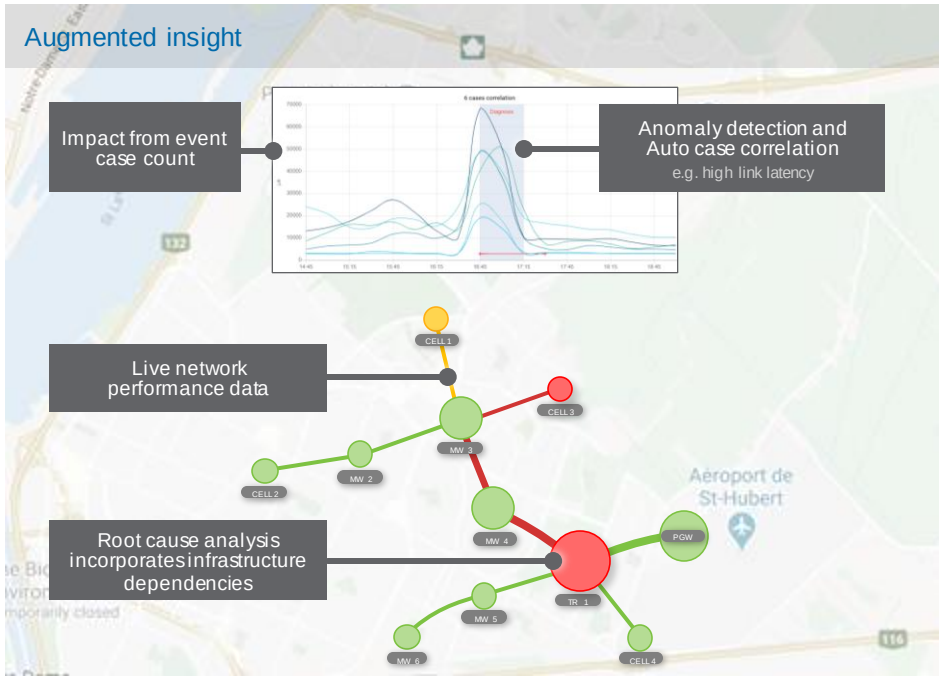
Inputs

Active monitoring

Topology

NOVA SensAI

Augmented insight



Benefits[1]

15× Faster detection

50× Less faults to diagnose

Root cause **50×** faster

1. Results from Tier-1 mobile operator deployments.

Network QoS — enhanced troubleshooting

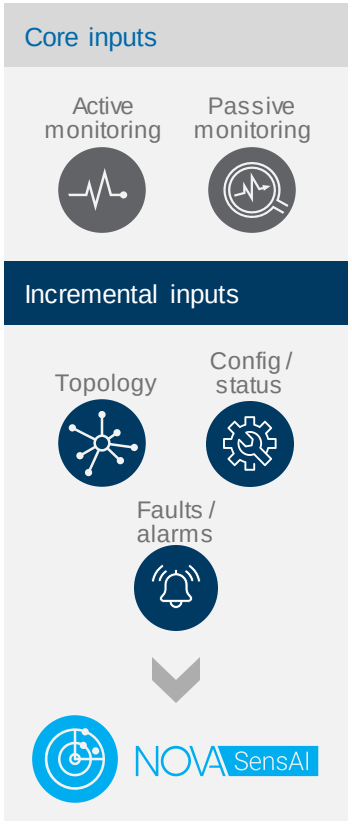
Incremental data sources strengthen root cause analysis

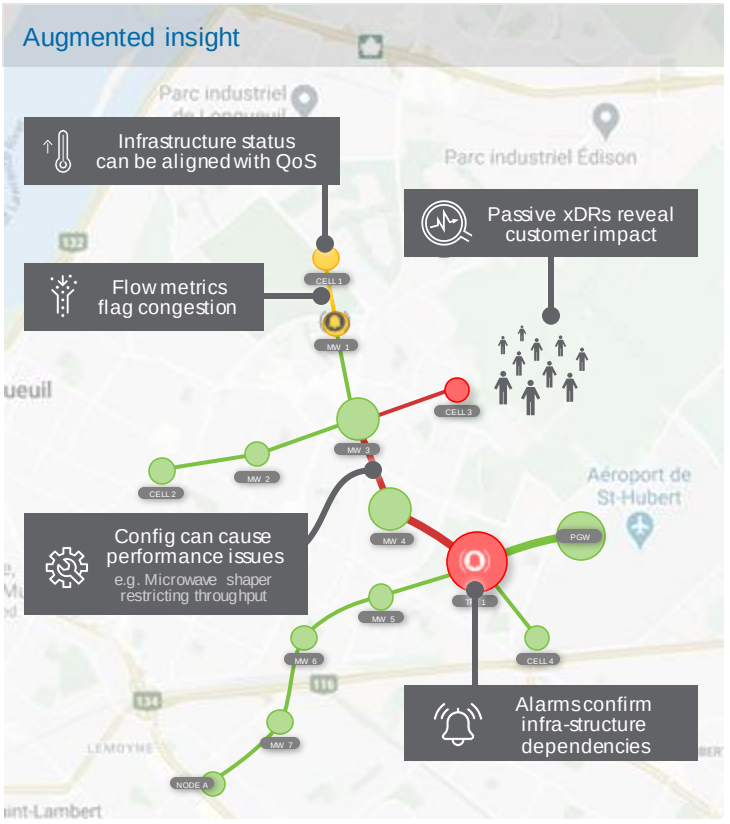
Active monitoring and topology data enable Nova SensAI to perform rapid root cause analysis that identifies a fault's link layer, and location.

> Additional data sources increase the level of insights and diagnostic detail.

Passive monitoring adds customer-centric visibility: device-type, application QoE and subscriber impact.

When correlated with monitoring and topology data, fault management, network configuration and performance KPIs confirm infrastructure and capacity dependencies.





> Nova SensAI is extensible. New data sources allow more granular root cause diagnostics and can also extend Nova SensAI to entirely new use cases.

Accelerate transformation

Nova SensAI is an essential tool for enabling operators to successfully transform to address the challenges of virtualized and 5G networks.

Major investments

Reduce cost

- **Eliminates the need for war rooms** by automating fault detection and root cause determination
- **Leverages existing data sources** to deliver actionable insight
- Reduces many of the manually intensive NOC operations allowing **better utilization of people and resources**
- **Cuts MTTR in half** delivering better QoE, reducing churn and associated costs

Uncharted territories

Reduce risk

- Provides the tools to know exactly what the problem is and **who is impacted**
- Automatically correlate multiple KPIs to **see the 'real' problem** and group similar issues to see the overall business impact
- Leverage ML and AI to predict faults before they happen, ensuring a **flawless customer experience**
- **See where investment is required** to address underperforming QoE

Secure the return

Reduce time

- Detect faults and determine root cause in **minutes, rather than hours**
- **Prioritize based on business impact** and customer importance
- ML for auto-learning of the state-of-normal and threshold setting, **eliminating time and errors**
- **Automatically notify customers** with critical services, such as E911, within minutes of an issue

Summary

Operations teams find themselves stuck between a rock and a hard place—squeezed between budget pressures while being tasked to deliver a better QoE and faster fault resolution. They need a solution built to help them cut through the overwhelming sea of alarms, eliminate much of the manual, error prone activities and deliver meaningful insight.

NOVA SensAI … simplifies operations

- Autonomously determines the 'state-of-normal' in the network and configures KPI threshold levels
- Detects impairments, correlates and prioritized them to determine the true business impact
- Identifies recurring events to deliver predictive fault identification
- Catches intermittent (silent) issues, typically not seen by traditional monitoring solutions
- Provides positive feedback that identified issues have been addressed fully

And no need to 'rip-and-replace' any of your existing monitoring solutions.

> Nova SensAI is an open platform that supports 3rd party active and passive monitoring systems, protecting the carriers existing investments.

It augments your existing NOC or SOC solutions to deliver QoE insight, rather than simply KPI data. With Nova SensAI, your NoC or SoC teams can focus more of their time on delivering a better customer experience through **proactive network and service management.**

Glossary

AI	artificial intelligence
AMPU	average margin per user
API	application programming interface
CNF	containerized network function
CSP	communications service providers
eMBB	enhanced mobile broadband communications
IoT	Internet of Things
LLC	low latency communications
LTE	long term evolution (4G)
M2M	machine to machine
MEC	mobile edge compute
ML	machine learning
mMTC	massive machine type communications
NFV	network function virtualization
NFVI	network function virtualization infrastructure
NPS	net promoter score
OTT	over the top
PNF	physical network function
QoE	quality of experience
QoS	quality of service
SLA	service level agreement
SP	service provider
UR	ultra reliable
VNF	virtualized network function
VoIP	Voice over IP
VoLTE	Voice or LTE

EXFO corporate headquarters

400 Godin Avenue, Quebec, Quebec G1M 2K2. CANADA
Tel.: +1 418 683-0211 — Fax: +1 418 683-2170

Toll-free (USA and Canada)
1 800 663-3936

info@EXFO.com
EXFO.com