# EXFO Context

Dynamic topology of customers, services and network infrastructure



**EXFO**

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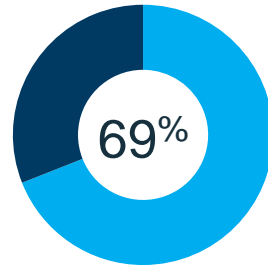
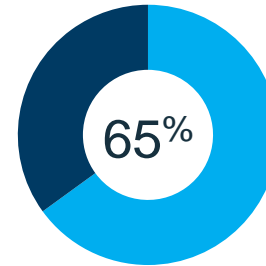# Growing complexity demands change

> Operations have to be one step ahead of customers, identify possible problems that affect services before customers realize them.
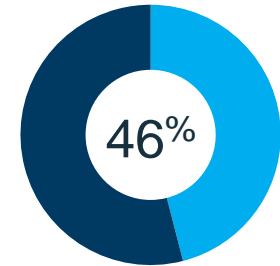
Ahmet Fethi Ayhan
Director Network
Operations, Turk Telecom

**69%**

of networks are now virtualized, orchestrated

**65%**

of faults originate from virtualized domains and functions

**46%**

more outages in the past 3 years

IT and network systems were originally built for physical networks; they're simply not up to the task of managing virtual and hybrid networks. Unchecked, more virtual networks means more outages, in part because it's hard to identify where issues originate from. The number of outages reported bears this out.[2,3]

> Automation is essential to support real-time operations. Topology and the dependencies it reveals are critical to effectively managing and troubleshooting virtualized networks and services.

Caught between shrinking OPEX budgets and increasing pressure to deliver more reliable services, operations teams must rethink their approach.
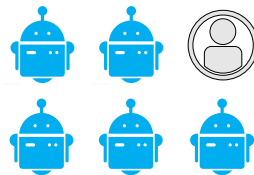
**5x**
more machines than humans by 2025

**53%** CAGR
Mobile data growth accelerates

1. Heavy Reading 2019 global CSP survey
2. 2019 GSMA Mobility Report
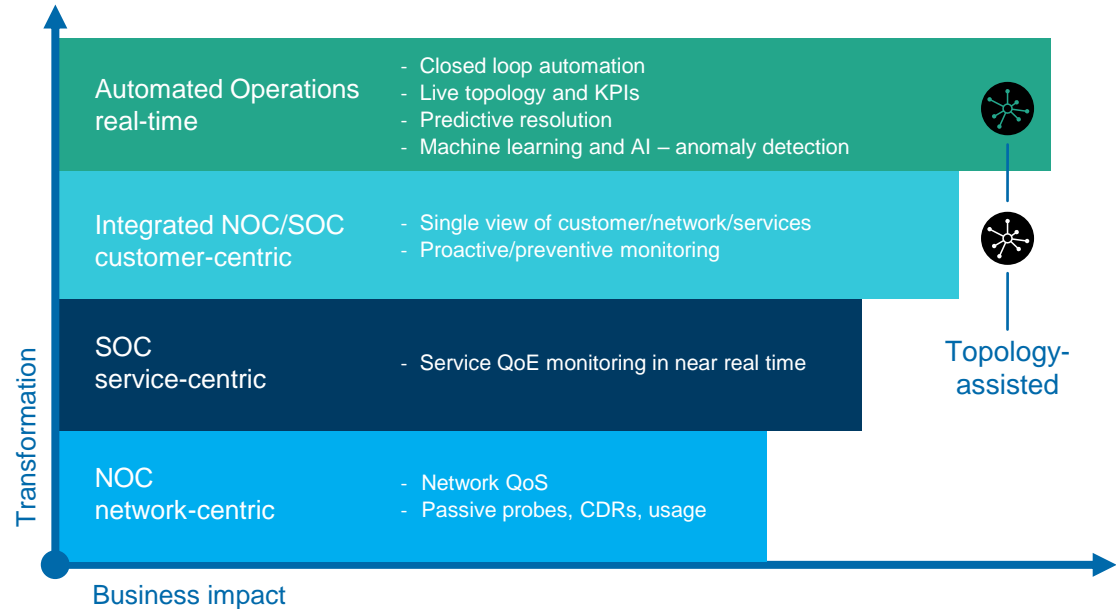3. 2019 Analysys Mason, European Telecoms Summit

# Intelligent automated operations

Operations teams are feeling the squeeze. Budgets are flat. Network complexity is growing. The expectation to 'do more with less' is prevalent.

There is a growing need to streamline processes, automate wherever possible, and be proactive and accountable for service quality.

> Customer-impacting issues must be detected and resolved faster. Multiple siloed systems, limited visibility and data quality issues make this difficult.

Managing, monitoring, reporting and assuring real-time business-critical mobile services will be a key requirement to monetize 5G and ultra-reliable low-latency (URLLC) services.

**Transformation** ↑

**Automated Operations real-time**
- Closed loop automation
- Live topology and KPIs
- Predictive resolution
- Machine learning and AI – anomaly detection

**Integrated NOC/SOC customer-centric**
- Single view of customer/network/services
- Proactive/preventive monitoring

**SOC service-centric**
- Service QoE monitoring in near real time

**NOC network-centric**
- Network QoS
- Passive probes, CDRs, usage

**Business impact** →

Topology-assisted

> ❝
> You can't automate with aggregate visibility. 5G devices and users have diverse performance requirements that can only be met with customer-centric, insight-driven automation.
>
> Peter Jarrich
> Head of GSMA Intelligence

# Simplify to automate

## IT siloes. Multiple network domains and layers. High data volumes.

| Mounting technical debt | Increasing complexity | Drowning in data |
| --- | --- | --- |

**9** Inventory systems

**20** Separately managed network domains

**12** Systems to get work done

## Overcoming operational complexity

Service providers suffer from an overload of disjointed IT and network management systems and lack good quality data. Only 15%[1] have an accurate view of network and services inventory.
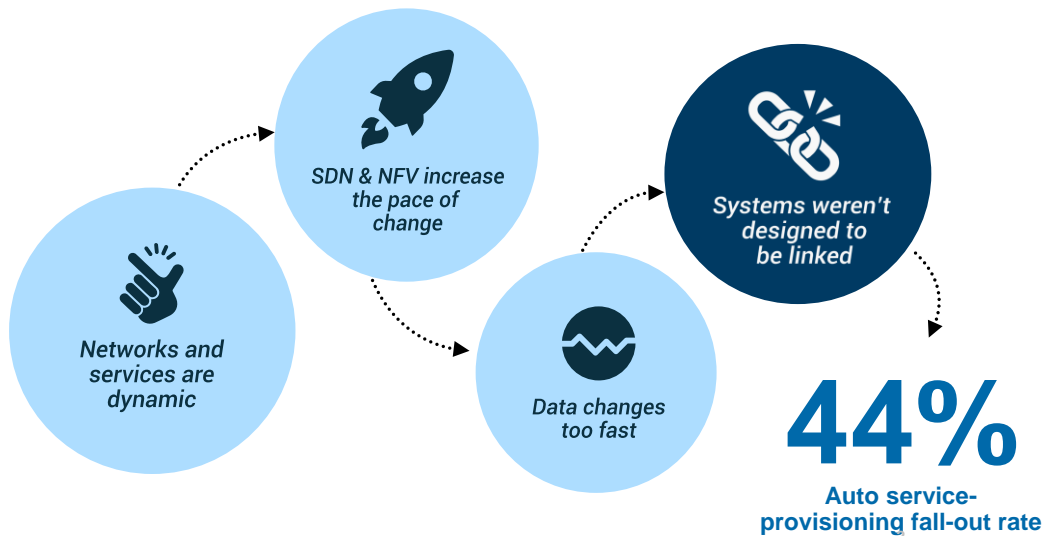
To speed up transformation, service providers are optimizing and simplifying processes to be agile and digital end-to-end and then looking at automation. The key is not to automate poor processes.

## Impacts of poor data quality

- Teams are less likely to believe in the power of automation if the **data integral to processes** is questionable, also automation might just fail.

- **Accurate data provides business context.** A current view of customers, services and network topology **puts operations in control and improves critical decision-making.**

- In dynamic service environments, **provisioning services 'right first time'** and resolving service issues depend on accurate real-time data.

# Dynamic real-time services

An **accurate, current and unified view** of networks, services and customers is **hard to get**.

SDN & NFV increase
the pace of
change

Networks and
services are
dynamic

Systems weren't
designed to
be linked

Data changes
too fast

## 44%

**Auto service-
provisioning fall-out rate** [2]

In dynamic network as a service (NaaS) applications, enterprise customers want to define, manage and prioritize connectivity and applications based on their needs, and they want it done fast.

For this to work, service providers need an accurate **live network and service topology model** to automate 'right first time' provisioning for network-as-a-service and dynamic service design models that rely on transient resources.

Once services are activated and tested, performance KPIs should then stream directly to end customers via APIs and self-serve portals. This live reporting is necessary to effectively manage and guarantee business-critical services.

Telco networks weren't designed to match evolving customer expectations…
we need to make it simple for end users.

Art Nichols
Director Operations, Windstream
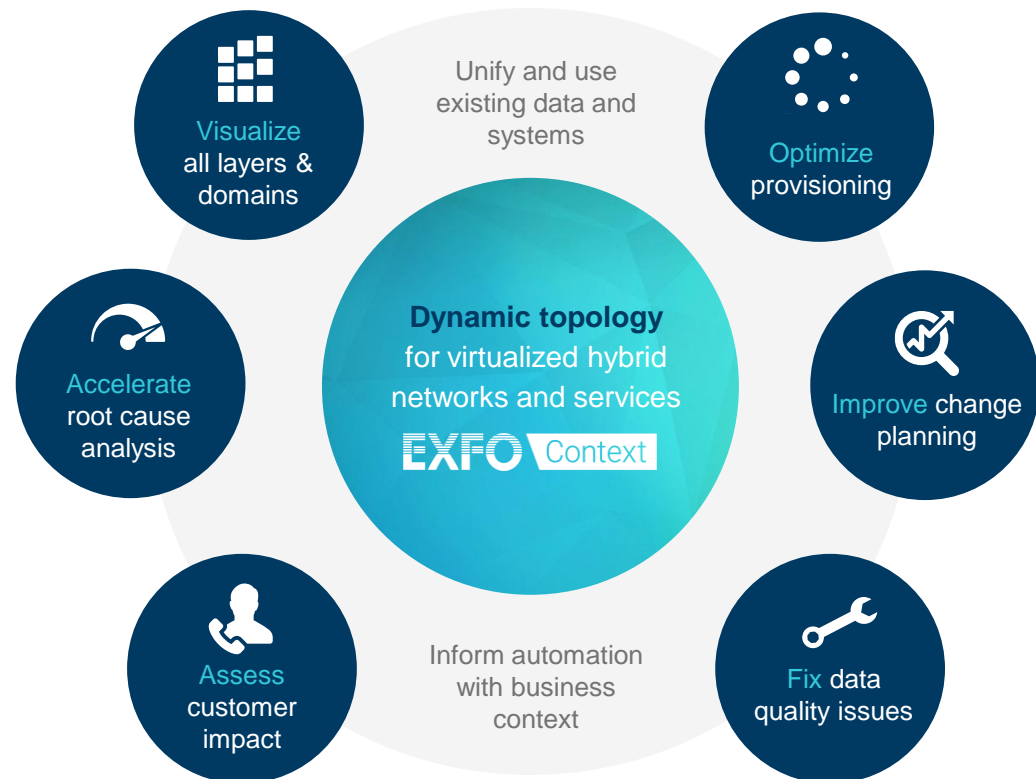
# Know the current state of your network

## Visualize all layers and domains with dynamic topology

An accurate, solid view of network and services topology (routers, functions, paths, dependencies) is the foundation for **efficient network operations, trusted automation, real-time service delivery and customer quality of experience (QoE).**

Dynamic topology means seeing which services rely on which routes and equipment. This creates 'a single source of truth' that can be easily adapted to support a range of use cases.

**Virtualized, cloud-native networks require operators to have 'dynamic topology' capabilities. Otherwise, it's impossible to take informed actions to:**

- provision services over optimal network paths

- assess how performance issues impact customers

- troubleshoot and correlate issues to identify root cause and service impact



Visualize all layers & domains

Optimize provisioning

Unify and use existing data and systems

Accelerate root cause analysis

**Dynamic topology** for virtualized hybrid networks and services

EXFO Context

Improve change planning

Assess customer impact

Inform automation with business context

Fix data quality issues

# Provision and assure on-demand network services

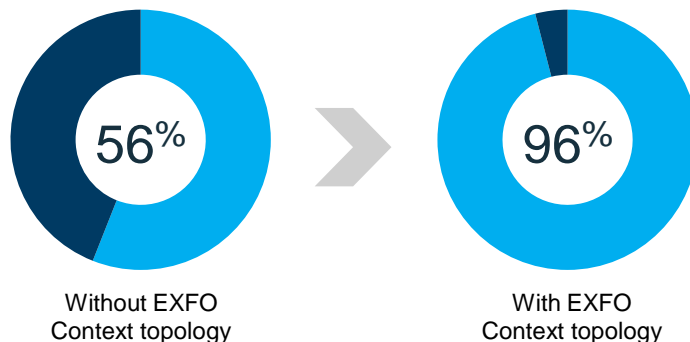## Dynamic topology provides visibility, accuracy and context

Operations teams are challenged by the **massive amount of data generated by dozens of systems.** 5G virtualized networks and edge functions exacerbates this problem.

Service providers must **bring new services to market faster,** and be able to **activate, test, assure and monitor those services on-demand in real time.**

EXFO Context dynamic topology can be integrated into existing systems to:

- **Model and visualize accurate and dynamic topology** from diverse multi-vendor element and network management systems (EMS/NMS).
- Quickly **determine optimal routes** across multiple network domains.

## Auto-provisioning success rate



56%
Without EXFO
Context topology

96%
With EXFO
Context topology



**EXFO** Context

| Assure | *Automated root cause investigation and service impact analysis* |
| Provision | *Provisioning and path computation* |
| Visualize | *QoS and QoE overlaid on topology* |
| Runtime | Access and visualize: ✓ Data quality ✓ Inventory ✓ Performance metrics ✓ Topology |
| Model | Federate and relate data |

Source Systems
BSS — TT CRM OMS BILL
OSS — FM NMS BMS NRM
PM / SA / CEM
Events & Alerts

1. As reported by CenturyLink before and after EXFO Context was deployed

# Performance troubleshooting

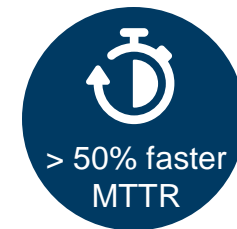## Dynamic topology accelerates root cause analysis and time to resolve

Troubleshooting is difficult without seeing the customer, network and services in context. **Topology reveals the relationships and dependencies between them.**

EXFO Context visualizes and analyzes performance data, customer impact, network configuration and alarms using topology to provide insight.

**Events with a common root cause are automatically grouped and diagnosed together,** revealing dependencies between seemingly unrelated issues.
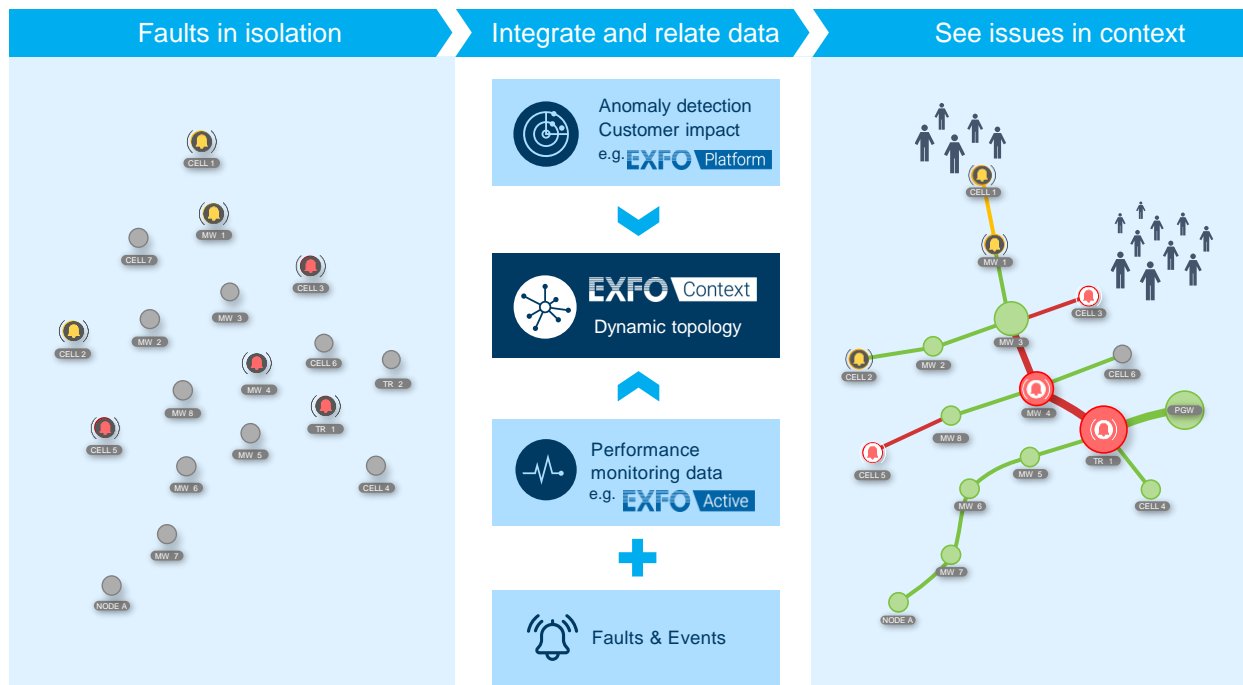


Dynamic topology allows impairments to be quickly correlated and isolated.
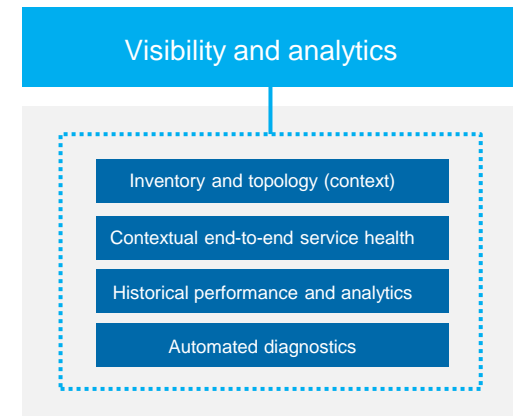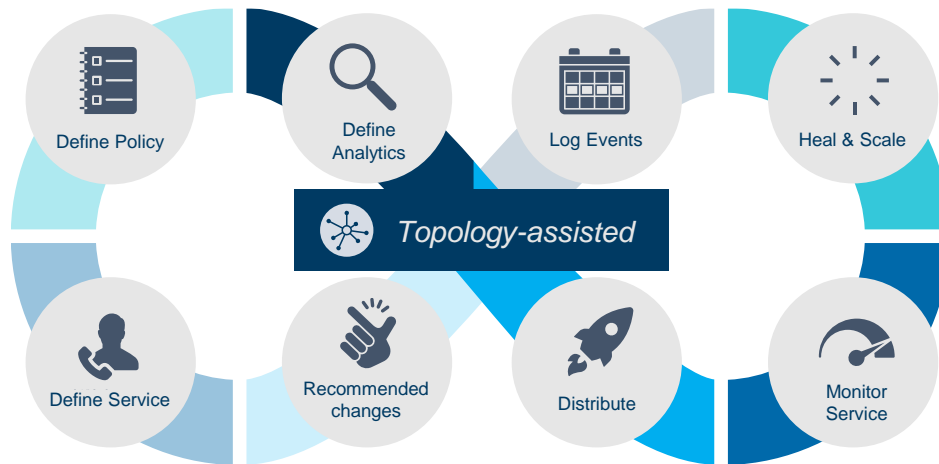
> 50% faster MTTR

**EXFO** Platform

**Automate further**

The EXFO Adaptive Service Assurance platform can automatically initiate root cause analysis in EXFO Context when customer impacting events are detected.

# Automated operations

## Dynamic topology for managing services in cloud-native networks



For virtualized cloud networks and 5G, OSS must transform into agile software components. On-demand service activation and provisioning, service monitoring assurance and fault management become critical parts of service lifecycle management.

This is driven by the move to virtualized networks, micro services and cloud network architectures, 5G network slicing, agile service design and service chaining.

EXFO Context dynamic topology plays a key role in the complete service lifecycle management from design and provisioning through to assurance, monitoring and fault management.

EXFO Context provides the critical multi-layer network path and service topology in real time which the orchestrator and analytics functions need to make reliable and fast decisions across the service lifecycle.

# Accelerate transformation

## EXFO Context addresses the challenges of virtualized and dynamic 5G networks

| Dynamic topology<br>Increase visibility | Dynamic services<br>Automate processes | Assured benefits<br>Grow top and bottom line |
|---|---|---|

- **Leverage existing data sources** to deliver an accurate model of network and service topology.

- **Improve data quality, bridge siloes and visualize** inventory and multi-vendor network management systems.

- Leverage **automated provisioning of hybrid physical and virtual networks.**

- **Cut troubleshooting time** by finding common root causes of customer-impacting issues.

- Dynamic topology and visualization shows the current network and service state, making **closed loop automation** possible.

- Automate provisioning of on-demand network-as-a-service **with full control of all network layers and service paths.**

- **Increase efficiency of managing hybrid networks** using physical and virtual network topology.

- **Reduce customer-impact of change planning** with dynamic view of dependencies before maintenance begins.

- **Accelerate revenue with accurate fast provisioning** and inline path computation in seconds, and eliminate errors.

- **Prioritize faults based on business impact** and customer importance. **Reduce churn and increase loyalty.**

- Assure performance of business-critical services with real-time data and automated assurance to **guarantee SLAs.**

- **Manage services in hybrid networks and domains** with integrated visualization of topology and 'current state' of network and service views.
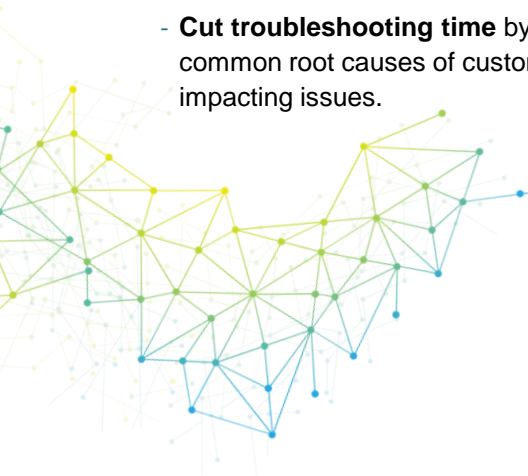
# Summary

Operations teams find themselves squeezed between budget pressures while being tasked to deliver a better customer experience, improved service quality and faster troubleshooting.

Improving and automating processes, as well as speeding up operations in general, requires more dynamic real-time operations tools. Fundamental to everything is having an accurate topology on the network and services for decision-making as well as the ability to prioritize issues that are impacting customers.

There's no need to 'rip-and-replace' any of your existing analytics, assurance or inventory solutions.

EXFO Context is an open platform that ingests data from multiple sources and integrates via APIs with other systems, which protects existing investments.

**EXFO** Context

**Dynamic topology model** that delivers insight and data quality by integrating and correlating multiple existing network, service and customer data sources

**Manage complex networks**: cross-domain, multi-vendor, multi-layer and hybrid

**Enable service lifecycle automation** by rapidly aligning topology data for provisioning, monitoring, and troubleshooting.

**Optimize network-as-a-service provisioning** with accurate path identification based on customer criteria

**Troubleshoot customer-impacting events** faster with accurate insight on the customer's network and service topology elements

# Glossary

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

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