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# **Network Domain Analytics Sets Stage for Automation**

*A Heavy Reading white paper produced for Kentik Inc.*



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## INTRODUCTION

The journey to automation is existentially important to communication service providers (CSPs), with analytics now strategic to the entire business. While network operations have an obvious need to quickly identify the root cause of issues to ensure network quality, the bigger need is to become a truly data-driven business. This is not just about tools but the right operational processes and organization structure that can integrate all various data sources effectively to run the business better.

The short-term driver for having "reliable data at your fingertips" is one of business efficiency, whether it's network cost savings or better decision making. For network operations, this means getting reliable network and service quality data as vital intelligence for real-time network operations and faster troubleshooting, as well as future capacity planning.

Longer-term, getting reliable real-time access to network data builds a solid foundation for automating business processes. This in turn enables a shift in focus from reacting to network issues to predicting what could happen and taking proactive action to avoid customer impact. What's becoming clear is that the journey to automation can't succeed without establishing a culture of mastering data and analytics as the first step.

Verizon Wireless President Ronan Dunne recently outlined a vision that will see the U.S. operator leverage analytics and artificial intelligence (AI) to transition into an "information company." While demand for mobile solutions continues to grow substantially, he said the task is now "looking at how to optimize the monetization" of the demand.

As the price of bandwidth continues to decrease, operators must improve customer experience while cutting the cost to serve customers. Today, siloes of operations support systems (OSSs) carry a significant cost burden that require manual processes to knit these disparate tools together.

Greater automation would enable telcos to reduce the cost burden of OSS, which comprises around 15 percent of their total operating expenses today. According to Accenture's research, typical spending on network operations is around 20 percent of a service provider's total company opex and more than 30 percent of total investments.

This paper looks at the ways CSPs can implement big data analytics to improve business performance and real-time network operations, and how analyzing related network data sets is working in practice for leading service providers to deliver business value. The paper will also examine how choosing the right analytics platform is key to introducing automated processes and AI into network operations.

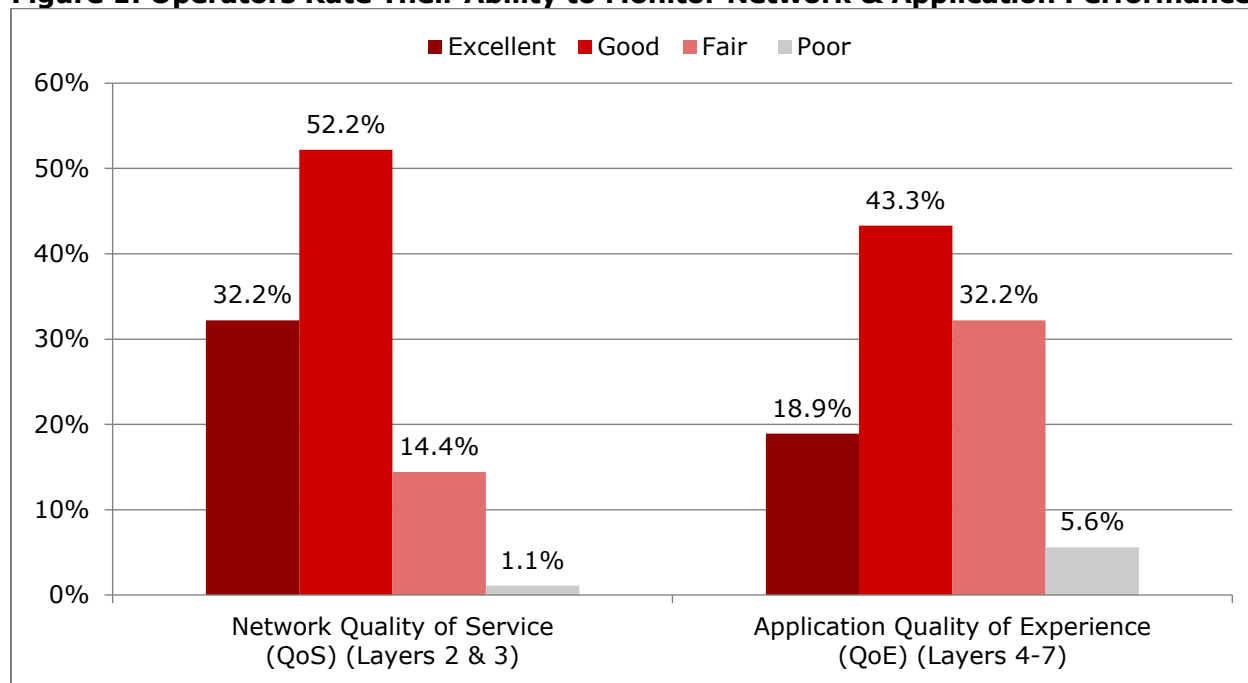
## REQUIREMENTS FOR REAL-TIME NETWORK OPERATIONS

### Real-Time Network & Service Visibility

From Heavy Reading's research in Q4 2016, as much as one third of mobile operators do not currently monitor their network end-to-end across domains, which greatly impacts their visibility and understanding of application, service and network performance.

**Figure 1** shows that only about one in five (19 percent) mobile operators believe they do an excellent job in terms of monitoring application quality of experience (QoE) – essentially, how customers experience the network if they want to make a voice call or use WhatsApp or Netflix.

**Figure 1: Operators Rate Their Ability to Monitor Network & Application Performance**



Source: Heavy Reading Q4 2016 survey with 90+ mobile operators

In order to deliver a consistent QoE, operators need visibility into how everything in the network environment is working together in real time. There is data in every layer that makes up the application or service, but existing network monitoring tools cannot tell the full story.

Operators realize that if they have a holistic view of the network and services through the eyes of customers, they can deliver a better service, which will encourage customers to renew or buy additional services, and ultimately make them more competitive in the market.

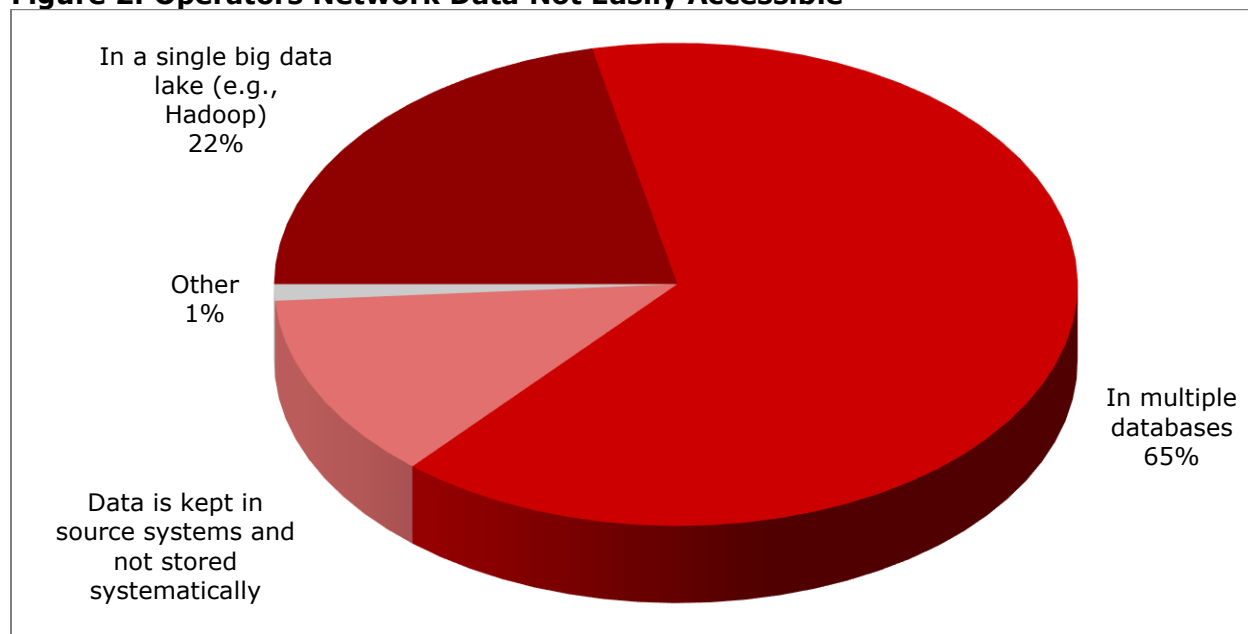
Organizations that use the fastest, most comprehensive data analytics will drive revenue and performance, and can turn their data into powerful insights that drive better business decisions for them and for their customers. Further, analytics-enabled service providers will be able to do all of that more cost-efficiently than their peers.

### **Integrated View of Related Network Data Sets**

Many operators have struggled to integrate disparate data sources from the network, OSSs, etc., in order to get reliable network and service quality insights.

CSPs that started early with analytics tended to run with Hadoop and attempted to build all-inclusive data lakes that have proven difficult to extract value from (see **Figure 2**). It has also proven challenging to extract and integrate multiple data sets from existing OSSs/business support systems (BSSs) with proprietary application programming interfaces (APIs).

**Figure 2: Operators Network Data Not Easily Accessible**



Source: Heavy Reading Q4 2016 survey with 90+ mobile operators

A rich and latent opportunity for CSPs is to take advantage of already available volumetric data sets from the network that can provide immediate operational value. This opportunity is unlocked by the greater availability of modern, scale-out, big data platforms that can support real-time analytics on vast data sets, while cloud hosting and storage makes the economics of big data analytics more viable.

### Network Domain Analytics for Operational Value

For near-term success and business return on investment, service providers can begin by consolidating related sets of network data. Examples of related data sets include end-to-end service performance data (traffic flow data, routing, end-to-end performance metrics, geolocation, DNS) or device and service status metrics (SNMP, streaming metrics data, log data). There are several reasons why this approach works well in practice:

- Related data sets are easier to unify in a way that can be accessed in real time.
- The more pieces of related data that can be rapidly used for common use cases, the better the insights.
- Rather than all-inclusive data lakes that are inherently slow to extract value from, it's possible to build real-time big data platforms and analytics applications around those related data sets.
- This approach yields the maximum value to real-world operations, planning and service creation use cases in the shortest time.

Intelligent analytics can quickly find out the root causes and locations of network issues. This enables CSPs to quickly figure out where the customer problem is – the network, the application or the device? It should also be possible to drill down into network issues by location to a specific cell site and overlay that view with other data, such as high-value enterprise

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customers. Analytics could also be applied to a particular service, such as video, by analyzing processing times by location or other advanced filters to quickly spot the worst-performing network sites. Data can be used to better geo-scope service offerings or create new offerings.

### Openness & Ability to Pull Data From All Key Data Sources in Real Time

CSP operations teams must have real-time data access without exception, otherwise operational use is impacted if an IT or development team has to prep data before it can be accessed, e.g., creating data cubes.

Any system should also offer open API access to a unified set of data to encourage wide-scale usage by employees and machine learning tools, which will rapidly multiply the value of the data across the business.

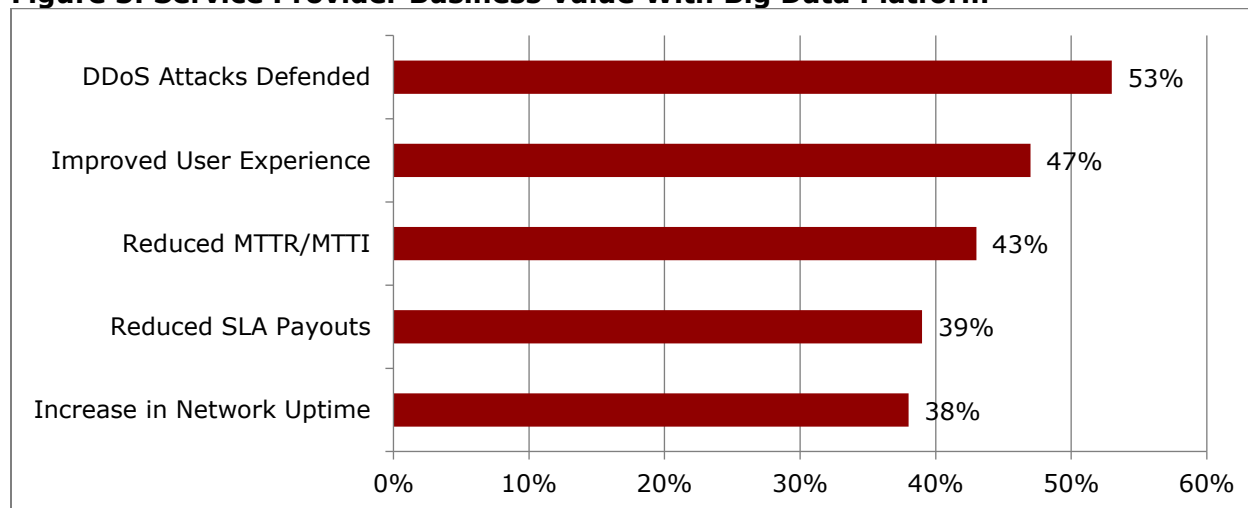
Open architecture does not just mean open source. Across all categories of applications and tools, it has become critical that CSPs are not held back because of integration issues or incompatible systems. This means a shift away from proprietary APIs. Thus, a key requirement is that the analytics platform has open and published APIs that can integrate with in-house, commercial and open source big data platforms such as Hadoop, or commercial platforms such as Splunk.

The analytics platform must also be able to pull data from anywhere in the network across a range of sources, e.g., devices, probes, DPI and policy engines, gateways, etc. Further, it should be able to integrate with APIs to customer billing systems, customer care systems, service assurance, security information and event management systems (SIEMs), etc.

## DOMAIN USE CASES & LESSONS LEARNED

Research into service provider adoption of a big data network intelligence platform resulted in significant business improvements across a variety of key performance indicators (KPIs) (**Figure 3**).

**Figure 3: Service Provider Business Value With Big Data Platform**



Source: TechValidate, weighted averages based on 103 service provider respondents

## KDDI Applies End-to-End Network Performance Data to Network Planning

Japanese operator KDDI's business vision is to "transform into a business that provides customer experience value." The KDDI Group's customer base includes approximately 45 million mobile subscribers and around 8 million fixed-line broadband subscribers. KDDI wanted to improve the efficiency of its network planning teams in improving network and service quality and a better customer experience.

**Figure 4: KDDI Applies Network Performance Data Analytics to Network Planning**

Problem	Opportunity	Solution	Business Value
Huge data sets take a long time to assemble and analyze, limiting the number of planning optimizations that planning teams can even propose.	Faster data analytics multiplies opportunities to optimize use of existing assets, delay new build-outs, identify bottlenecks, increase service performance and improve customer experience.	Big data analytics platform with real-time access to network data sets and ability to visualize complex data. Engineers can easily pivot between visualizations to get multi-dimensional analyses of their network in real time.	Significant capex savings, more competitive services and lower customer churn.

Source: Heavy Reading/Kentik

"At KDDI, we strive to be continuously innovative across our entire organization. However, for our network engineers, that ability was previously held back by the amount of time the team was spending on tracking down answers about our network. Given the sheer scale and complexity of our network and the amount of data it generates, network planning analyses often took days to compile. Our team can now access a rich data set that offers valuable insights about our network within seconds. The big data platform gives us the answers we need to build a better network." – Toru Maruta, General Manager of the IT Network Department

## GTT Applies Network Traffic & Performance Data to Break/Fix Operations

GTT is a global provider of wholesale and enterprise wide-area networking, Internet, managed services and voice services to nine of the top 10 largest telecom providers, more than 5,000 enterprises and customers across industries in more than 100 countries. GTT wanted to improve break/fix processes with more accurate network data and alerts for the operations teams, and ultimately improve customer satisfaction and avoid unnecessary SLA payouts.

**Figure 5: GTT Applies Network Traffic/Performance Analytics to Break/Fix Ops**

Problem	Opportunity	Solution	Business Value
Imprecise alerting based on siloed data sets leading to false positives and negatives. Manual correlation of data from multiple tools slows break/fix processes. Reduced operational productivity means higher percentage of issues in unresolved category. Increased technical debt in the network leads to lower service performance.	Unified data platforms offer increased anomaly detection accuracy that can be linked to contextual dashboards leveraging many data points. Speeds break/fix processes and lowers mean time to repair (MTTR), leading to more root cause fixes and higher overall service performance.	Big data analytics platform with real-time access to unified network data sets.	Better service performance and customer experience, lower customer churn, positive view of brand, lower SLA payouts, higher productivity for operations team and reduced opex.

Source: Heavy Reading/Kentik

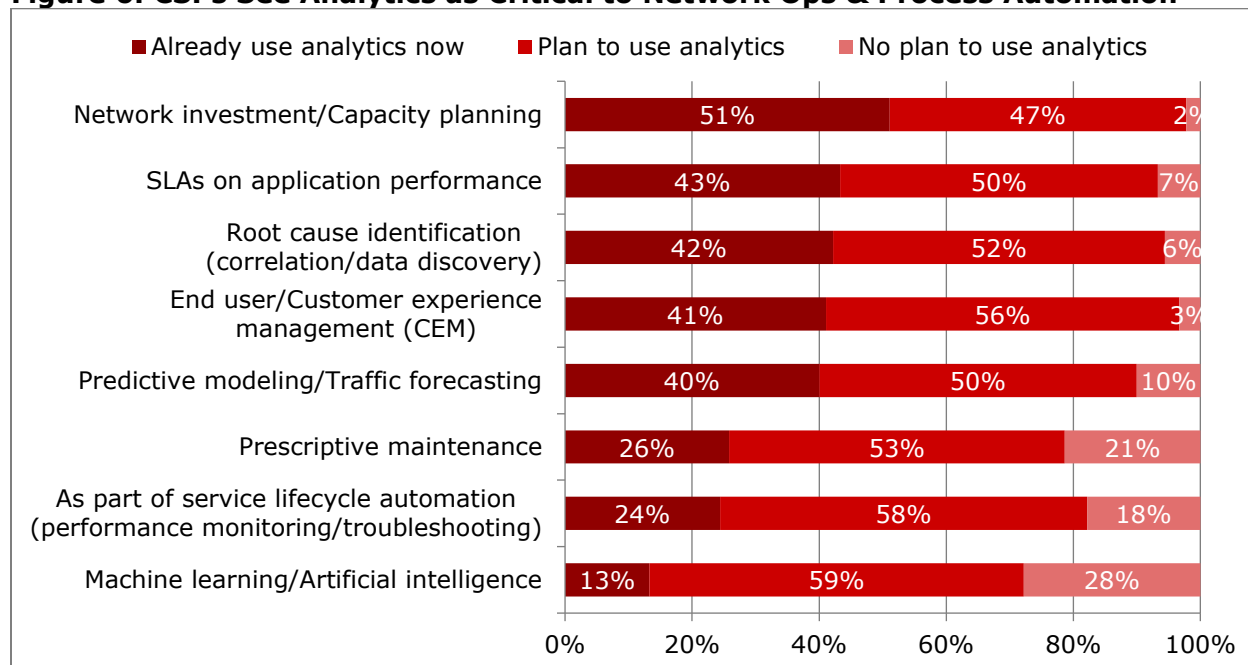
"Based on unifying traffic and related data into a cloud-scale, advanced analytics engine, our teams are able to answer critical network questions ranging from network planning and performance to DDoS [distributed denial-of-service attack] mitigation in near-real time. Simply put, with the limitations of our previous system, we were flying blind in many key areas." – Bob Burris, General Manager of the IT Network Department at GTT

## SETTING THE STAGE FOR AUTOMATION & BEYOND

When Heavy Reading asked service providers about their plans to use analytics, it's pretty much pervasive across the board, with plans to introduce machine learning, AI and automation as part of service performance monitoring and troubleshooting topping the list (see **Figure 6**).

CSPs can run the network "hotter" because more real-time intelligent analytics can optimize and, in the future, help to automate network capacity based on technical and quality of service (QoS) parameters. Smaller operation teams can reduce time spent on manual network trouble-shooting and speed up problem resolution. CSPs are also reducing the number of network operations centers (NOCs) globally for efficiency reasons and fewer people can manage the services. Network investment planning can also be more targeted and linked more directly to customer experience improvements.

**Figure 6: CSPs See Analytics as Critical to Network Ops & Process Automation**



Source: Heavy Reading Q4 2016 survey with 90+ mobile operators

### Pandora's Progress From Push- to Pull-Based Automation

Pandora, an over-the-top music streaming provider with more than 80 million subscribers, adopted a cloud-based big data traffic intelligence platform to consolidate all network traffic, Internet routing, performance and geolocation data generated by its nearly 2 Tbit/s, custom-

built content delivery network. Initially, Pandora's networking staff used fast analytics on large data sets to troubleshoot problems and perform tactical planning to gain cost savings by balancing paid transit and settlement-free peering traffic arrangements. They then built alerts and API integrations to detect and trigger automated mitigation for DDoS attacks.

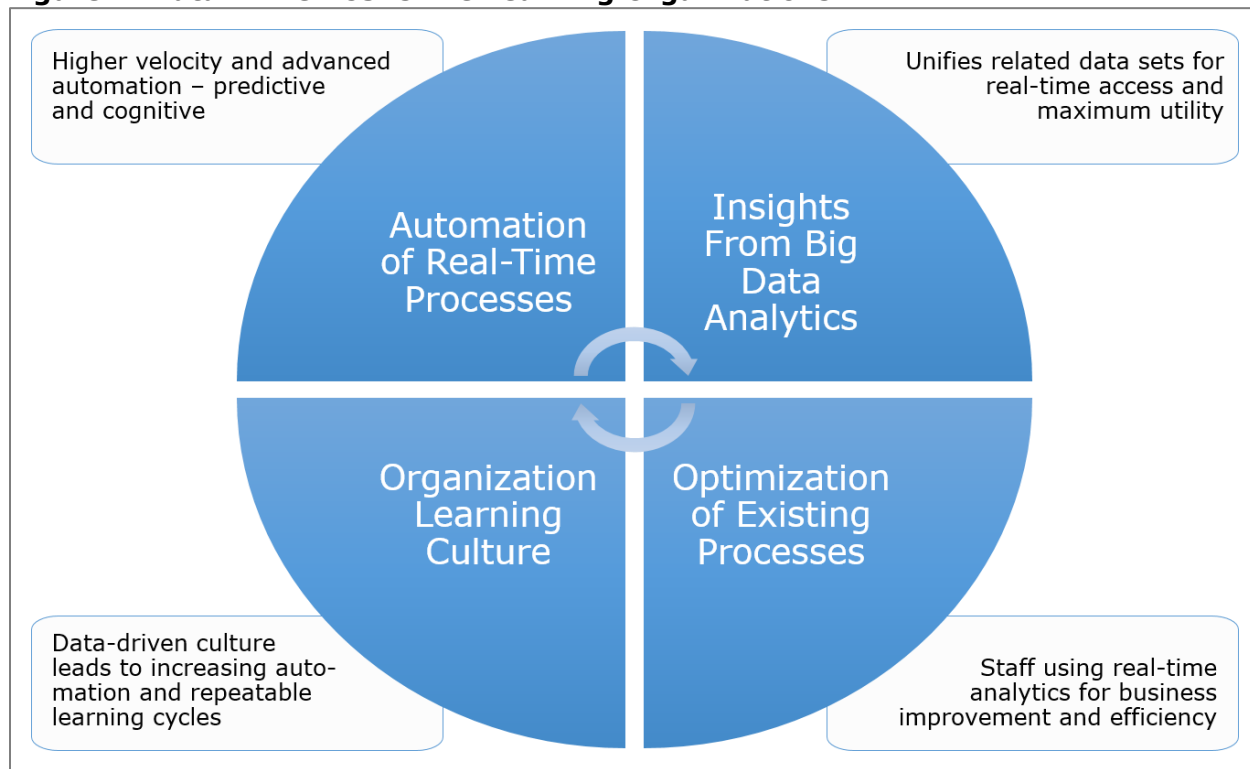
Finally, they built real-time network automation that consumes data sets from the traffic intelligence platform, combines it with configuration data from devices, calculates the optimal set of source data centers for destination geographical locations and autonomous systems based on performance and cost considerations, and reprograms their geo-server load balancers in an ongoing basis to rebalance traffic across their entire edge network.

### CSP Journey to Automation Starts With an Analytics Orientation

Highly advanced versions of automation (predictive, machine learning) are now possible. However, without starting at the right place by employing an operationally relevant big data analytics platform, as well as creating a learning culture that continuously makes incremental improvements based on analytics, service providers can't sustain the journey into automation and beyond.

A successful journey starts with analytics rather than control plane architectures, since data is the key input to the decisions that automation systems make. Once human-based processes can effectively use real-time analytics for business improvement and operations efficiency (e.g., network optimization), this organizational learning can lead to greater automation that progresses from prescriptive to intent-based, to predictive and machine learning (see **Figure 7**).

**Figure 7: Data-Driven CSPs Are Learning Organizations**



Source: Kentik



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In the future, CSPs will deploy dynamic and self-healing virtualized networks, where network and service automation and predictive analytics anticipate service quality and add network capacity automatically as needed. In order to do real-time, per-customer sessions at scale, analytics platforms must be capable of efficiently handling large volumes and crunching the data associated with millions of customers and their services. The accuracy and quality of mediation and streaming analytics engines is also critical, since that will be forming the basis for decision making across the organization, including accurate, complete network data for all revenue-assurance operations. A sound, analytics-driven automation journey is the right foundation for fulfilling the vision of self-healing networks.

## TAKEAWAYS

**1. Adopt an advanced analytics platform that offers real-time access to related sets of network data details.** This helps service providers to show immediate business value and improved KPIs to win management approval for business case and ongoing investment.

- The platform should be able to tap into any network data source.
- The platform should be able to handle high volumes without data summarization.
- The platform should support real-time data analysis and traditional SQL access to the data.
- The platform should have open APIs southbound to accommodate any data source and northbound to enable any analytical application to tap into its data.

**2. Rapidly develop a set of domain-driven analytical practices and applications.**

These could include practices and applications that draw on network performance data to support network planning or network service quality data to address break/fix or specific customer experience management use cases. Analytical applications can be created and used to drive processes that are designed to improve customer experience and cement loyalty, such as network capacity upgrades, root cause analysis and offer generation. The expectation of rapid payoff from analytics provides a sustainable ROI for the platform investment and helps create an iterative learning culture.

**3. Expect growing levels of automation.** Operators must reduce operating expenses to support not only the economics of the service provider business, but also the entire concept of agile, software-based cloud networks and migrating to "automation first, management by exception."

Once service providers have a firm grip on network and domain activity with real-time data, this can be an enabler and the basis for effective and growing levels of automation. Machine learning and AI set the stage for further advances in pattern recognition, recurring faults, self-learning algorithms and predictive maintenance.

The whole concept of dynamic software-defined networks and services and the need for provisioning services at speed only works with automated processes and insights from analytics to correlate relevant data to understand the context to take the right actions. In the future, machine learning and AI software can be trained to "learn" the right actions – but first, operations teams must build the foundations of solid analytics platforms and accurate network and service visibility.

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## ABOUT KENTIK

Kentik ([www.kentik.com](http://www.kentik.com)) is the network traffic intelligence company. Kentik turns network traffic – billions of digital footprints – into real-time intelligence for both business and technical operations. Network operators, engineers and security teams use Kentik to manage and optimize the performance, security and potential of their networks and their business.