White Paper


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Executive Summary & Key Findings

As the digital economy gains momentum, companies in every industry are focusing on it. Communications service providers (CSPs) have a key role to play in the economy as connectors of digital service value chains and providers of the digital network services that result from network virtualization. Advanced operators, such as AT&T with its Domain 2.0 program, are leading the way. They are transforming their IT and network assets into digital services with open application programming interfaces (APIs) that can run on the cloud, be composed together in innovative ways and be consumed by digital services partners and customers.

To achieve their business goal of participating in the digital economy, CSPs will need to undergo organizational and operational transformation. Digital services need to be immediately manageable across their lifecycles, whether these last for a few seconds or years, and no matter how fast or broadly the service scales. Existing operational approaches are unlikely to be sufficiently agile or real-time to cope with this requirement.

Heavy Reading’s and TM Forum’s Digital Operations Survey, conducted in January 2016, provides insights into CSP plans for operational transformation. Its key findings are as follows:

The move to digital operations is going hand in hand with network virtualization for the majority of CSPs. Most survey respondents are working on digital operations and network virtualization simultaneously or are preparing a digital operations strategy before embarking on network virtualization. CSPs expect network virtualization to enable them to execute in the same way as leading IT digital service providers, underpinning a similar user experience and faster service innovation and delivery. They recognize that they need appropriate operational capabilities as part of their network transformation.

There is strong alignment between CSPs’ network virtualization and digital operations objectives. Respondents expect both to accelerate service delivery and the creation of new services. They also want a combination of network virtualization and digital operations to help their companies remain competitive, for example, by enabling them to provide an improved and differentiated customer experience. Respondents rank opex reduction slightly higher as a goal for digital operations than for network virtualization. CSPs realize that, in the short term, network virtualization can increase opex, although they expect to gain large operational efficiencies in the longer term.

The top systems CSPs want to acquire to support digital operations are those for the management and orchestration of virtualized networks: the virtualized infrastructure manager (VIM), network functions virtualization (NFV) management and orchestration (MANO) and software-defined networking (SDN) controller. These are top of mind as respondents plan to virtualize a plethora of network functions beyond basic network services in the next few years. They include devices at the network and customer edge, as well as IP services and applications and the mobile packet core. CSPs see the virtualized enterprise edge, in particular, as a source of new revenue. Solutions here require a combination of VIM, MANO and SDN controller to schedule Layer 3-7 virtualized network functions (VNFs) appropriately across customer premises and edge infrastructure resources, support on-demand connectivity and service chaining, and lifecycle manage the VNFs.

Interest is high in organizational changes that bring together CSPs’ IT and network organizations. Respondents showed a strong desire to integrate the two organizations, and in the reskilling of both network and (to a lesser extent) IT personnel, so that they understand each other’s domains. These organizational changes are considered
critical to both network virtualization and digital operations. There is significant respondent support for cross-functional and interdisciplinary teams that enable the DevOps model and bring the business and security closer to network operations.

The digital operations skill sets CSPs need are currently focused on managing and orchestrating the NFV infrastructure (NFVI), rather than on services. Respondents indicate that they urgently need personnel with OpenStack, VMware, SDN and software-defined data center management capabilities, which are associated with the NFVI. This is expected, given that most CSPs are in the very early stages of NFV, concerned with standing up the new cloud platform(s) that will execute VNFs. The survey confirms that very few CSPs are currently provisioning and lifecycle-managing customer-facing services across hybrid physical and virtual networks.

CSPs are introducing digital operations first into existing domains of the network. Most respondents want to transform their management of the existing network, rather than implement digital operations into a greenfield scenario, such as a new network build-out, or to manage a completely new service. CSPs would rather transform one network domain at a time than take a piecemeal approach to changing individual business/operations support systems (B/OSS). There is very little appetite for a “big bang” approach to operational transformation.

CSPs expect that maintaining a digital user experience will be complicated by network virtualization, but the top barrier to achieving it is organizational. Respondents are struggling with creating a single view of the customer across their organization and data silos – a view that is key to providing faster customer service and seamless interaction with the customer. Virtualization will potentially make this situation more difficult due to the need to manage service performance across a virtualized network consisting of many more moving parts and to an immature understanding of what is involved in assuring the customer experience in a virtual, rather than physical, network.

As a result of the close link with network virtualization, ETSI NFV ISG is seen as the standards organization with the most relevance for digital operations. The European Telecommunications Standards Institute (ETSI) NFV Industry Specification Group (ISG) is seen as critical to the specification and development of a new operational stack based on NFV MANO. TM Forum is perceived as the second most relevant standards developing organization, but respondents are also looking to the Open Networking Foundation (ONF) and MEF to provide guidance. The fragmentation of digital operations leadership is a concern to the industry.

CSPs have multiple goals for digital operations that will require the implementation of a raft of new technologies and systems. Although it is clear that respondents’ immediate focus is the set of MANO capabilities needed to support NFV and SDN, they signal the need for new security, big data and analytics, customer experience and service orchestration (lifecycle management automation) tools in future. The priority order in which they adopt these capabilities is likely to be dictated by their business transformation strategies.

## Business Transformation & Digital Operations

### The Race to Digital Services

Digital services – software-based services that are delivered, stored and used in electronic format – have been disrupting the global economy for the past two decades. Increasingly, discrete digital services are being connected through APIs to create
large, complex digital services – such as smart city applications, the connected car, healthcare ecosystems and digital lifestyle support services – that are synchronized with and responsive to users’ daily lives.

Digital services are personalized for the needs of their users, by those users. They are consumed online, on demand. They respond in real time to their users’ context and events and are easy and intuitive to use. In other words, there is a well-understood digital user experience associated with digital services.

Organizations in every industry sector are identifying business assets and/or new opportunities they can turn into digital services. CSPs are joining this race. CSPs have multiple opportunities to influence the market, both as providers of the underlying connectivity to digital service providers, so that they can programmatically integrate their services across the network, and as developers/owners of new network-oriented digital services. CSPs are virtualizing and API-enabling network functions so that they behave and can be consumed as digital services.

Ownership of the network gives CSPs:

- Unique insight into the context and locations of digital service users, digital service usage patterns and other metrics valued by digital services owners.
- The ability to shape the availability, performance, security and monetization opportunities of digital services, including across complex, network-enabled value chains, such as the smart city or connected car.
- The opportunity to generate new revenue from innovative compositions of network and IT-based digital services. This is a goal of AT&T’s Domain 2.0 initiative, for example. Domain 2.0 seeks to expose AT&T’s valuable IT and network assets as digital services that AT&T and third parties can bind together with other digital services in new ways.

Digital Services & the Drivers for Digital Operations

As CSPs reposition themselves as digital service providers and their customers increasingly demand a digital user experience, they are transforming their business assets – and specifically, their networks – into digital services able to participate in new business value chains. Simultaneously, this requires CSPs to transform their operations and the processes and tools they use to design, deploy, configure, monitor, remediate, secure, meter and delete network-oriented digital services.

Heavy Reading defines “digital operations” as: “The new management organization, processes and systems needed to run a digital CSP with a virtualized network and the ambition to sell digital network services.”

In the IT world, digital services leaders are pioneering the concept of “DevOps” in order to streamline and automate the management of digital services. The DevOps approach requires service developers to take more responsibility for the management aspects of their digital services and for operations staff to pre-define those management aspects so it is easy for developers to integrate them. The adoption of DevOps means that digital service providers are beginning to have the ability to very rapidly deliver services with the right digital user experience.

CSPs must catch up with the leading edge of the market and deliver network digital services with the same agility and levels of automation, transforming the end-user experience. CSPs will need to introduce a new operational architecture,
management organization, processes and systems in order to manage the network in software at the same level of abstraction as IT digital services. Next-generation management of both types of digital service needs a new management vision – one that the TM Forum is beginning to describe as a "future mode of operation."

Digital Operations Survey Analysis

Survey Objectives

In January 2016, Heavy Reading and TM Forum set out to survey CSPs’ attitudes to and plans for digital operations. In particular, we wanted to test how strongly CSPs’ operational transformations were driven by their network virtualization initiatives, which will eventually enable CSPs to treat the network as a collection of digital services, exposed and available to digital service provider partners through APIs.

The survey looked at the impact of virtualization on digital operations, how and when CSPs expected to implement digital operations, the systems and skill-set changes required, and the drivers and barriers to achieving a digital user experience.

Survey Demographics

The online survey attracted 67 respondents from 47 discrete CSPs worldwide. Just more than half of the respondents came from converged operators with fixed and mobile assets, with the remaining 49% split fairly evenly between cable operators, pure-play mobile operators and pure-play fixed-line operators.

Figure 1: Type of CSP

About half (51%) of respondents came from North America, while nearly a fifth (19%) came from Europe, 10% from Asia/Pacific and 12% from Latin America. The remaining 7% of respondents work in CSPs headquartered in the Middle East or Africa.
Respondents primarily represent Tier 1 and Tier 2 operators, with 61% of respondents saying they work for Tier 1 CSPs – operators with revenue of more than $1 billion – and a further 11% working for operators with revenue of $500 million to $1 billion.

The largest group of respondents (40%) work in engineering roles, while those responsible for network planning and service operations accounted for 16% and 12% of respondents, respectively. Around 11% of respondents have corporate management roles. Survey results are therefore heavily influenced by respondents from large, North American CSPs with network-facing roles. It is not possible to tell what proportion of respondents from converged operators come from the fixed vs. mobile arm of the CSP’s business.
Relationship Between Digital Operations & Network Virtualization

The survey asked a series of questions designed to tease out what kind of link exists between operator strategies for network virtualization and the implementation of digital operations. A move to digital operations is clearly on CSPs’ agendas, and this is strongly linked to network virtualization. More than two thirds of respondents link the initiatives, with 51% saying they are addressing network virtualization and digital operations simultaneously, and nearly a fifth (18%) wanting to have a clear strategy for digital operations before they start virtualizing their networks.

When asked to select the top three drivers for network virtualization, respondents emphasized speed and agility – the ability to deliver existing services faster and innovate quickly. As NFV gathers momentum, the new note appearing in such rankings is the fear of being uncompetitive. CSPs announcing aggressive plans to virtualize their networks are seen as market leaders with the ability to provide a superior, on-demand user experience; other operators feel pressure to follow suit or lose customers. New market entrants are also using network virtualization to get to market quicker and offer differentiated services, with an agility that incumbents lack – hence they, too, are feared, and are driving CSPs to adopt NFV.
Operators are typically starting with basic network services, where there is already a choice of virtualized products and several years of virtualization experience. Half of the 64 respondents that answered this question are virtualizing network edge devices, such as the SBC. This supports the voice core, which 38% of respondents expect to virtualize within two years, and voice-related applications, such as VoLTE, VoIP and SIP trunking, which nearly half (47%) say they will virtualize.
Virtualized enterprise CPE is becoming a hot NFV use case due to the additional revenue opportunity it represents: 42% of respondents expect to implement it within two years, compared to just 25% that will virtualize home gateways and STBs.

A huge majority of respondents expect NFV to accelerate the design of services, even though NFV is typically associated with the accelerated instantiation of services in the network through the automated, programmatic configuration of network devices (service orchestration). This suggests that respondents expect new cloud approaches and tools for modeling and developing services to reduce service time to market and time to deploy. Increased speed at one end of the service lifecycle will affect downstream areas of service management, underscoring the need for digital operations.

In order to achieve a more streamlined service design process, respondents suggest that challenges need to be overcome at all stages of the service design process, from enabling customers to view and order the new service to configuring virtual devices in the network to support it.

Resource configuration was cited by 31% of respondents as the largest challenge, possibly because VNF management is not well-defined or well-understood: In the ETSI NFV specifications, responsibility for configuration is split between the VNF manager within the NFV MANO system and the resource’s element management system (EMS), and it is unclear whether VNFs should have their own dedicated or generic
VNF manager. But nearly a quarter of respondents have trouble updating product catalogs and self-service portals to support the introduction of new services, and a fifth say order management is a challenge.

The deltas between the top rankings of the organizational changes are relatively small, suggesting that respondents see the majority of them as important. It is interesting, given the preponderance of network-facing respondents in the survey, that the highest rankings are given to changes that would have a significant impact on those respondents and their skill sets. On the other hand, network-facing respondents may wish to acquire IT skill sets in order to maintain their value, rather than risk being replaced by IT counterparts moving into their domain.

**Figure 10: Importance of Organizational Changes to Support Network Virtualization & Digital Operations**

<table>
<thead>
<tr>
<th>Change</th>
<th>Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrating IT &amp; network departments</td>
<td>4.25</td>
</tr>
<tr>
<td>Training network operations personnel in IT skills</td>
<td>4.17</td>
</tr>
<tr>
<td>Involving security &amp; marketing in service design</td>
<td>4.05</td>
</tr>
<tr>
<td>Introducing cross-functional DevOps teams</td>
<td>4.05</td>
</tr>
<tr>
<td>Training IT personnel in network operations</td>
<td>4.02</td>
</tr>
<tr>
<td>Assigning responsibility for inter-domain processes</td>
<td>3.89</td>
</tr>
<tr>
<td>Creating a service operations center</td>
<td>3.59</td>
</tr>
<tr>
<td>Creating a digital operations center</td>
<td>3.52</td>
</tr>
</tbody>
</table>

**Figure 11: Importance of Organizational Changes – Critical & Important**

<table>
<thead>
<tr>
<th>Change</th>
<th>Critical (%)</th>
<th>Important (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrating IT &amp; network departments</td>
<td>48.4%</td>
<td>35.9%</td>
</tr>
<tr>
<td>Training network operations personnel in IT skills</td>
<td>39.4%</td>
<td>42.4%</td>
</tr>
<tr>
<td>Introducing cross-functional DevOps teams</td>
<td>38.1%</td>
<td>36.5%</td>
</tr>
<tr>
<td>Involving security &amp; marketing in service design</td>
<td>36.9%</td>
<td>33.8%</td>
</tr>
<tr>
<td>Assigning responsibility for inter-domain processes</td>
<td>30.2%</td>
<td>41.3%</td>
</tr>
<tr>
<td>Training IT personnel in network operations</td>
<td>29.2%</td>
<td>47.7%</td>
</tr>
<tr>
<td>Creating a digital operations center</td>
<td>20.6%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Creating a service operations center</td>
<td>12.5%</td>
<td>50.0%</td>
</tr>
</tbody>
</table>
There is strong recognition of the need for convergence between IT and the network and for cross-functional teams that not only bring those domains together, but also security and marketing.

**CSP Plans for Digital Operations**

Ranking CSP objectives in implementing digital operations highlights marginal differences between them, implying that almost all the objectives are important. Given the strong link CSPs are making between network virtualization and digital operations, it is unsurprising that introduction of NFV MANO capabilities is in the top spot as the most critical objective, followed very closely by support for SDN.

![Figure 12: Importance of Digital Operations Objectives](chart)

From the high rankings for OSS transformation, CSPs understand that both MANO and SDN technologies have greatest initial impact on OSS. But they acknowledge the importance of transforming BSS, as well, in order to accelerate service delivery. This bears out the previous finding where CSPs identified challenges with customer portals, product catalogs and order management.

Looking more closely at each objective through the lens of respondents’ “critical” and “important” rankings, there is more nuance. It is interesting that almost as many respondents feel it is critical to minimize the disruption involved in introducing digital
operations as said that introducing an NFV MANO is critical, and they are a larger group than the one saying support for SDN is critical.

Support for SDN achieves second place in the rankings through the large number of respondents that see it as important, rather than critical. Similarly, more respondents say that creating a market leading digital experience is critical than believe transforming OSS to reduce the cost and complexity of systems and processes is critical, although more respondents believe the latter is important.

Figure 13: Importance of Digital Operations Objectives – Critical & Important

<table>
<thead>
<tr>
<th>Objective</th>
<th>Critical</th>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduce NFV MANO capabilities</td>
<td>36.5%</td>
<td>42.9%</td>
</tr>
<tr>
<td>Minimize disruption during the digital operations transformation process</td>
<td>35.5%</td>
<td>30.6%</td>
</tr>
<tr>
<td>Transform OSS to accelerate service delivery</td>
<td>34.4%</td>
<td>42.6%</td>
</tr>
<tr>
<td>Create a market-leading digital user experience</td>
<td>34.4%</td>
<td>39.3%</td>
</tr>
<tr>
<td>Transform BSS to accelerate service delivery</td>
<td>33.9%</td>
<td>44.1%</td>
</tr>
<tr>
<td>Support SDN</td>
<td>31.7%</td>
<td>50.8%</td>
</tr>
<tr>
<td>Transform OSS to reduce cost &amp; complexity of systems &amp; processes</td>
<td>29.0%</td>
<td>48.4%</td>
</tr>
<tr>
<td>Find the right partner(s) to enable digital operations transformation &amp; integration</td>
<td>27.9%</td>
<td>45.9%</td>
</tr>
<tr>
<td>Eliminate barriers within the organization (i.e., between CMO, CIO &amp; CTO functions)</td>
<td>26.6%</td>
<td>42.2%</td>
</tr>
<tr>
<td>Transform BSS to reduce cost &amp; complexity of systems &amp; processes</td>
<td>19.7%</td>
<td>50.8%</td>
</tr>
<tr>
<td>Support third-party digital services ecosystem(s)</td>
<td>9.7%</td>
<td>29.0%</td>
</tr>
</tbody>
</table>

When asked to state the top three areas of digital operations for their organizations, respondents agreed by a large margin that creating the right online, on-demand digital user experience is their leading focus. Network virtualization and automation (NFV, SDN) are, as we have seen, considered critical, even prerequisites, for creating such an experience. Again, given the weighting toward network-facing respondents in the survey, it is encouraging that the user experience message resonates with them and they are supportive of transformation initiatives to improve it.

Drivers for digital operations are aligned with those for network virtualization, particularly over accelerating the design and launch of new services. When asked specifically about digital operations, respondents gave more weight to customer experience as a potential differentiator and feel slightly more pressure to reduce opex.
The majority of respondents (49%) plan, or have already begun, to introduce digital operations into an existing network domain. The rest show a wide variance in strategy, with just under a quarter (22%) having begun or planning to introduce digital operations into a greenfield domain, for example, to support a completely new service or technology, such as IoT or LTE/VoLTE.

**Figure 14: Three Most Important Areas of Digital Operations**

Creating the right digital user experience (on-demand, online, real-time) - 93
Accelerating design & launch of new services - 73
Lowering the cost of service delivery - 61
Managing network services end-to-end across hybrid physical/virtual networks - 48
Managing key components of the virtualized network (NFVI, VNFs) - 45
Supporting partner ecosystem(s) for new digital services (e.g., cloud, IoT) - 36
Managing security in a virtualized environment - 28

**Figure 15: Where & When Will Digital Operations Be Introduced First?**

- Have begun to introduce digital operations into an existing network domain: 25.4%
- Plan to introduce digital operations into an existing network domain, but haven’t started yet: 23.8%
- Have begun to introduce digital operations into a greenfield domain: 14.3%
- Plan to introduce digital operations into a greenfield domain, but haven’t started yet: 7.9%
- Have begun to introduce digital operations in a specific BSS/OSS functional area: 4.8%
- Plan to introduce digital operations in a specific BSS/OSS area, but haven’t started yet: 12.7%
- Have begun to introduce digital operations organization-wide, in a "big bang" approach: 0.0%
- Plan to introduce digital operations in a "big bang" approach, but haven’t started yet: 11.1%
A further 18% are taking a B/OSS-specific approach, introducing digital operations into a particular area of B/OSS in need of transformation. A surprising 11% say they will take an ambitious ‘big bang’ approach to the roll out of digital operations, as an end-to-end transformation, but they are in a planning phase at the moment.

In line with the previous finding that CSPs rank the introduction of NFV MANO and support for SDN as key digital operations objectives, so the top new systems they wish to adopt are the VIM, NFV MANO and SDN controller, followed closely by big data and analytics.

**Figure 16: Acquisition of New Systems to Support Digital Operations**

OpenStack is the favored VIM by a small margin, although nearly as many respondents rank a VMware skill set as critical. In an NFV context, many CSPs are starting with VMware since it provides a more robust and proven environment for first-generation VNFs. SDN, in line with previous findings, is seen predominantly as important rather than critical. Software-defined data center management encompasses cloud management for IT applications, VIM for VNFs and intra-data center connectivity (SDN). Its position in fourth place in the ranking supports respondents’ identification of the integration of IT and networking organizations as the top organizational change needed to support digital operations.

It is surprising that cloud configuration languages, such as Chef and Puppet, are ranked more highly than YANG, which is more closely associated with the network. However, TOSCA languishes at the bottom of the ranking, suggesting that there is still market confusion over how these approaches to VNF management and configuration play together in the virtualized network.

There is definite interest in next-generation virtualization and software development technologies for hyperscale cloud (containers and microservices), given their positioning in the ranking, although these are not yet top of mind. The fact that the TM Forum ZOOM program – Zero-touch Orchestration, Operations and Management – is ranked so low may be because the industry as a whole has not definitively associated it with network virtualization and possibly because it is viewed as having more of a business (BSS) transformation focus, rather than an OSS one. The majority of respondents in this survey appear closer to OSS/network operations than to BSS activities.
Despite the low ranking for the ZOOM program, however, TM Forum is viewed as the second most relevant standards organization for digital operations. ETSI NFV ISG is seen as the most relevant by a strong margin, as a result of the perceived close relationship between network virtualization and digital operations. ETSI NFV ISG is seen as critical to the specification and development of a new operational stack based on NFV MANO.

The ONF and MEF are tied for third place, closely behind TM Forum. The ONF is promoting an information model and network management automation for SDN, and MEF is developing a detailed information model for service lifecycle orchestration in the transport network. Both initiatives can be seen as competitive with ZOOM, although a Common Information Model workshop convened in early 2016 and a proposed harmonization program resulting from it, could bring these organizations closer together.

**Figure 19: Three Most Relevant Standards Bodies to Digital Operations**

<table>
<thead>
<tr>
<th>Standards Body</th>
<th>Total Score (Weighted Ranking)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETSI NFV ISG</td>
<td>73</td>
</tr>
<tr>
<td>TM Forum</td>
<td>53</td>
</tr>
<tr>
<td>ONF</td>
<td>49</td>
</tr>
<tr>
<td>MEF</td>
<td>49</td>
</tr>
<tr>
<td>IETF</td>
<td>46</td>
</tr>
<tr>
<td>Open Group</td>
<td>39</td>
</tr>
<tr>
<td>3GPP</td>
<td>33</td>
</tr>
<tr>
<td>DMTF</td>
<td>13</td>
</tr>
<tr>
<td>OASIS</td>
<td>12</td>
</tr>
</tbody>
</table>

**Digital User Experience Considerations**

Respondents say that the largest barrier to achieving a digital user experience is the difficulty in creating a single view of the customer across their organizations. Integrating a 360-degree view of the customer across touchpoints, networks and products and services, both from an outside-in and inside-out perspective, remains difficult for CSPs with siloed operations and fragmented data sources. An online, self-service, on-demand user experience requires the joining-up of data and processes, the aim of digital operations.

Respondents believe that network virtualization will increase the challenge of providing a digital user experience, as it will make the customer journey more complex. The barriers tied for third place are both related to service assurance in a virtualized network context: the difficulty of managing service performance across a virtualized network consisting of many more moving parts and an immature understanding of what is involved in assuring the customer experience in a virtual, rather than physical network.
Respondents believe fast customer service response is of outstanding importance to the digital user experience. As customers increasingly want to resolve their own problems themselves online, it becomes imperative for CSPs to provide the information and take the actions they need in near real time. Speed of service response is achieved through multiple means, including establishing a single view of the customer and the use of automation and big data and analytics technologies.

Figure 20: Three Biggest Barriers to a Digital User Experience

Figure 21: Importance of Metrics to the Digital User Experience
Ease of interaction is also ranked highly, which links to respondents’ unhappiness with customer-facing systems and the challenges of changing/updating them. However, respondents also see trust as a key ingredient in the digital user experience. There have been several high-profile hacking attacks on customers’ online data, reflecting poorly on the CSPs involved. They have created anxiety about the digital user experience, reduced customer satisfaction and increased churn. Respondents don’t believe the remaining metrics contribute significantly to the digital user experience.

Characteristics of the Operations Center of the Future

Respondents were asked to rank the importance of a set of principles relating to the operations center of the future. They see the most critical role as ensuring the security of virtualized networks – despite the fact that, today, they rank this role as the least important among different digital operations areas.
The operations center of the future must support open APIs, so that different functions can be plugged in/removed as its role evolves. Real-time analytics is also seen as important for the future, even if it is not at the top of respondents’ action lists today. Respondents do not yet see closed loop control and automation – a key principle of ZOOM – as a leading capability of a future operations center.

Conclusion

This survey shows that CSPs recognize the interdependence of network virtualization and digital operations and the need for both to achieve business transformation goals, such as the provision of a market-leading user experience of their products and services. CSPs acknowledge the need for organizational and skill set change and, for the most part, intend to tackle these by transforming a network domain at a time.

CSPs are prioritizing the acquisition of foundational systems that support network virtualization. However, to achieve their multiple digital operations objectives, which they rank almost equally, CSPs will need to adopt a broad range of tools in the future. CSPs are beginning to formulate what their future digital operations stack should look like. They want it to have an open API-driven and modular architecture and are seeking guidance from multiple standards organizations as to the information model and components they need in their architecture.

Beyond NFV and SDN tools, CSPs are showing interest in systems that will support the digital user experience of services across the virtualized network, such as big data and analytics and security systems. End-to-end service orchestration and closed-loop automation are also in their sights, but adoption appears to be further off.

The survey highlights the fact that journey to digital operations is an individual one for different CSPs. There is consensus about the urgency and need for digital operations as a key enabler of the transformation CSPs need to undergo to play a successful and competitive role in emerging digital services value chains.

About Huawei

Huawei is a leading global information and communications technology (ICT) solutions provider. The company’s aim is to enrich life and improve efficiency through a better connected world, acting as a responsible corporate citizen, innovative enabler for the information society and collaborative contributor to the industry. Driven by customer-centric innovation and open partnerships, Huawei has established an end-to-end ICT solutions portfolio that gives customers competitive advantages in telecom and enterprise networks, devices and cloud computing. Huawei’s 170,000 employees worldwide are committed to creating maximum value for telecom operators, enterprises and consumers. Its innovative ICT solutions, products and services are used in more than 170 countries and regions, serving more than a third of the world’s population. Founded in 1987, Huawei is a private company fully owned by its employees.

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