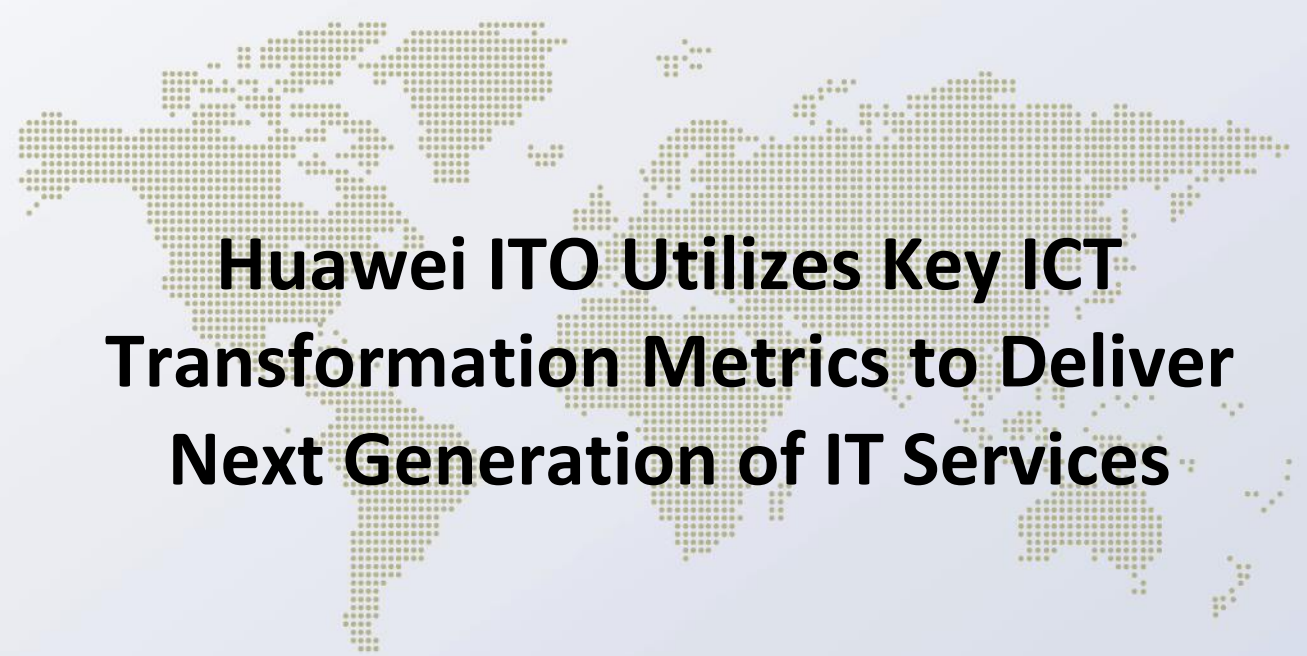


The logo graphic consists of a series of vertical bars of varying heights, resembling a bar chart or a signal waveform, positioned to the right of the 'TBR' text.

TBR

TECHNOLOGY BUSINESS RESEARCH, INC.

A stylized world map composed of small, light-colored dots, centered behind the main title text.

Huawei ITO Utilizes Key ICT Transformation Metrics to Deliver Next Generation of IT Services

Key Service Provider Metrics Market Study

February 2016

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Telecom operators face ICT disruption

To say telecom operators face challenging business conditions is an understatement. They operate in an industry where traditional services enabled by a standard telecom infrastructure are no longer enough. Lower costs and accelerated time to revenue are required to prevent operator business models from failing.

“We cannot survive the way we are going,” said Telefonica CTO Enrico Blanco. “Traffic grows at 50% every year and 100% in some countries. Our network will be growing; we will be improving access and improving capabilities every day. But revenues are not growing at this rate; we have to lower our cost. We need to use additional business levers. In my mind there are no options — now is the time.”

Blanco’s sentiments reflect boardroom discussions worldwide. The industry faces limitations in cost control and revenue growth:

- Factors preventing cost control:
 - **Opex out of control** — In 2015 average opex grew from 77% of total operator spend to 82% to fund expanding network operations, according to TBR’s review of global operator spending based on company financial statements.
 - **Data growth without limit** — Data traffic is estimated to grow tenfold by 2019, requiring continued capacity builds and spectrum purchases, according to operators interviewed by TBR.
- Factors preventing revenue growth:
 - **Price wars** — Disruptive operators that start price wars, lowering average revenue per user (ARPU) for everyone, are operating in saturated markets where subscriber growth is limited.
 - **Digital competition** — Digital service providers (including cable, over-the-top and cloud firms) are competing through “freemium” and advertiser-sponsored services, squeezing the ability of operators to earn revenue from data.

Operators have tried to add new services to their business models with mixed results, largely because their costs have not changed and services revenue growth is limited. This dilemma is similar to that faced by their peers in the information and communications technology (ICT) industry. The industry is evolving rapidly as new technologies and economic models disrupt traditional businesses. TBR benchmarks continue to track flat or declining revenue across traditional segments such as telecom and IT, while new segments such as cloud, software-defined data center and digital business grow at double-digit rates. New products, services, value chains and business models are required as evolution shakes the foundation of the ICT business.

Increasingly, telecom operators must see themselves as ICT companies. They must find market share, revenue and profit in the new economy, and evolve and compete with their infrastructure in new ways.

The rationale for IT outsourcing to support ICT transformation

Rapidly moving to a more competitive ICT infrastructure requires telecom operators to reconsider or adapt investments to manage their evolving networks. TBR research indicates three types of approaches to technology management are emerging in the new paradigm:

1. Investing in business outcomes, enabled by technology, where a third-party supplier provides the innovative platforms and the operator leverages those platforms to create business value
2. Building solutions, but outsourcing technology components
3. Owning and controlling the solution and the basic technology with a goal of using the technology to innovate to create differentiated business value.

TBR believes operators are shifting their budgets — as much and as quickly as possible — from buying, assembling and integrating technology components. Operators are instead purchasing supplier offerings that deliver their needed outcomes (approach No. 1 or No. 2), due to the realization the best way to reap the innovation of ICT infrastructure is to acquire it from suppliers rather than creating it in their labs. Also, industry pressures increasingly dictate the time-to-market advantages of acquiring built technology.

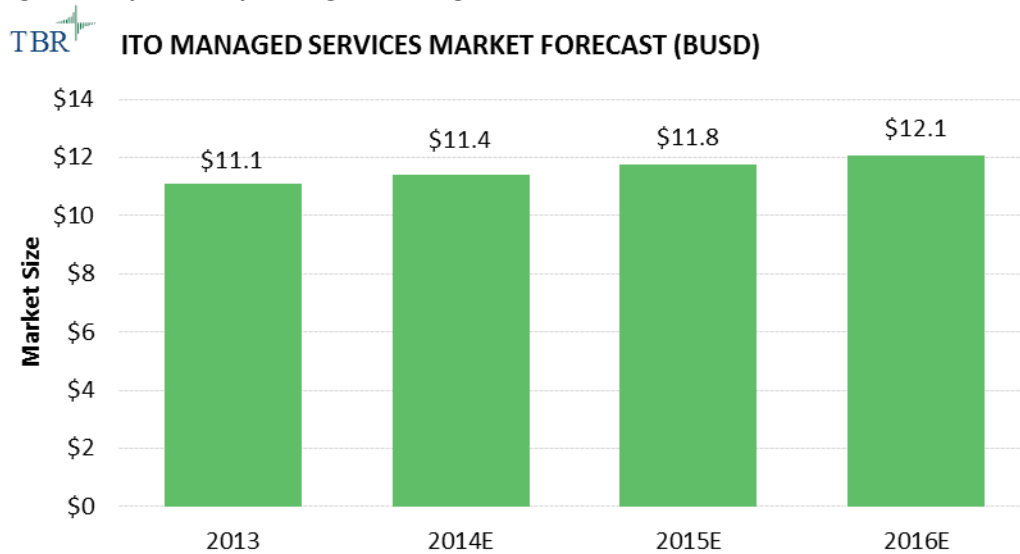
Operators are realizing the value of business-outcome-based investment at a time when they must also evolve their infrastructures. This combination is leading rapidly to a new wave of outsourcing where operators are seeking new relationships with suppliers. PwC calls this wave “second-generation outsourcing,” and one executive stated it is “turning over entire domains — such as IT, mobile network operations and cable networks — to vendors.” The executive went on to say, “The goals of this effort, which we call re-sourcing, are to gain greater flexibility in transforming their own operational models, to restore some of the capabilities lost in turning over operational control to vendors in the past and to reboot their innovation efforts.”

TBR believes this form of outsourcing is becoming a preferred way to drive infrastructure evolution toward more agile ICT infrastructure. Critical to this approach is the evaluation of initiatives in the separate domains of network operations and IT/data center. The new ICT infrastructure requires convergence of these domains. Many operators started evolving their networks. What is needed is a parallel IT outsourcing (ITO) program that will evolve to match the requirements of the new network infrastructure.

Furthermore, the evolution of ITO supports the requirement for operators to extend business models deeper into the enterprise, where similar evolutions are taking place.

TBR’s *Telecom Infrastructure Services Benchmark* indicates that for ITO, managed services will remain a significant investment area as part of ICT transformation. The market is estimated to grow to \$12.1 billion in 2016, according to TBR (Figure 1).

Figure 1: Operator spending on managed services for ITO



SOURCE: TBR

Success metrics for ITO

While operators routinely expect 20% to 30% opex reduction from cost-savings-driven outsourcing, the second-generation multidomain outsourcing driven by business outcomes requires a new set of metrics to assess value.

ITO, in particular, requires a different measurement approach as the conventional IT metrics are limited to generic data centers, not the operational requirements of telecom operators.

TBR conducted interviews with regional operators engaged in outsourcing to determine which metrics they are applying, or would like to apply, to their ITO engagements. TBR fielded a study in December 2015 and January 2016 with the following objectives:

- Uncover key metrics that will help define how to measure success of ITO services based on primary research from service providers.
- Uncover insights on industry trends and challenges and uncover demands of carriers for the ICT transformation process for internal transformation and for enterprise customers.

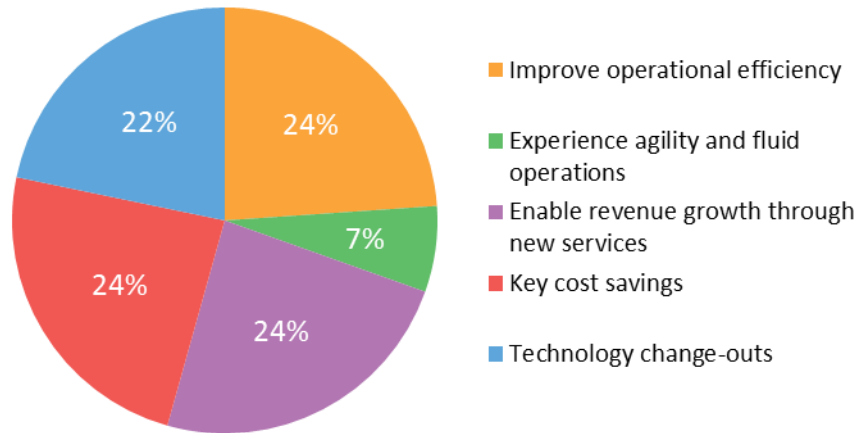
TBR included large telecom operators such as Millicom, MTN and Telefonica in its study, conducting in-depth interviews with senior managers with insight into their organizations' ITO and ICT transformation processes.

The operators interviewed still placed cost savings as the highest priority, tied with improving operational efficiency (which drives cost savings) and enabling revenue growth by introducing new services. Respondents also gave significant weight to evolving technology infrastructure through platform change-outs. The goal of increasing overall agility and fluid operations was the lowest priority (Figure 2). TBR believes as organizations enter ICT transformation, agility will become a more prominent goal.

Figure 2



OPERATORS' ITO GOALS

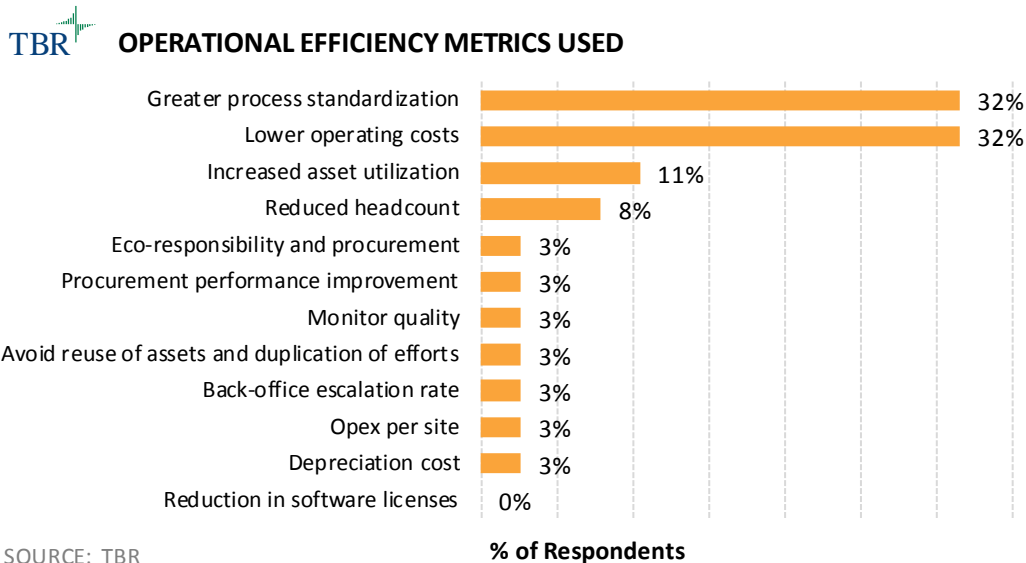


SOURCE: TBR

New services appear to be the major additional driver of cost savings. One senior manager stated the purpose of ITO was to “enhance the innovation process, thereby offering new products by moving toward the digital world and meanwhile enhancing our facilities in areas of procurement.” The manager continued, “With regard to the service that we have implemented [this] includes enterprise and M2M [machine-to-machine] technology.”

While operators’ ITO goals remain fairly consistent (Figure 2), varied approaches to metrics enable them to drive their ITO engagements in different directions. For example, how cost savings, operational efficiency, new service growth and agility are measured helps define the nature of the technology platforms required, the number of domains included and the scope of the agreement with suppliers.

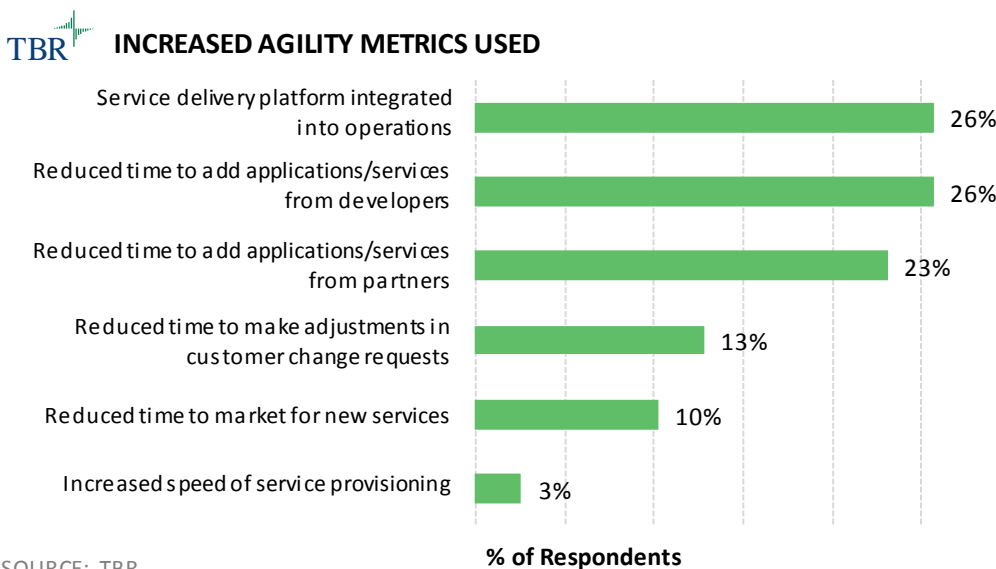
Figure 3



SOURCE: TBR

As Figure 3 illustrates, metrics can vary widely from a focus on personnel, asset utilization or operational cost reduction driven by process standardization to reducing back-office activity. According to TBR research, having a more streamlined, standardized process and lower operating expenses were the highest-rated key metrics.

Figure 4



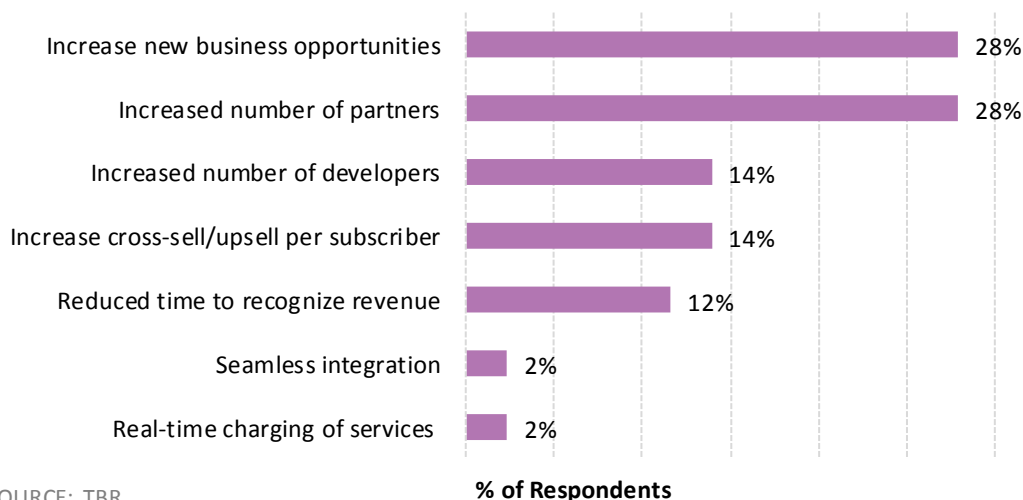
SOURCE: TBR

For operators targeting increased agility and more fluid operations, ITO metrics depicted in Figure 4 reflect nearly equal priority. These priorities include different ways to measure reduced time to provision or change a new service. Less prominent, but still a high-priority metric, is reduced time to add applications and services based on partner offerings. TBR believes this metric will become increasingly important as operators embrace new business models.

Figure 5



ENABLE NEW SERVICES METRICS USED



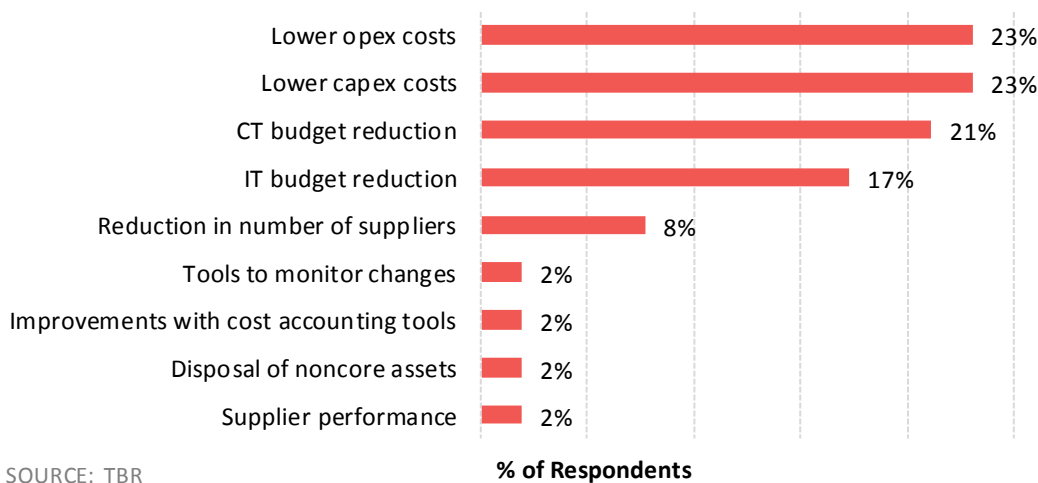
SOURCE: TBR

As shown in Figure 5, operators’ views of metrics regarding enabling new services are more general, led by the need to add partners and business opportunities. Operators are still identifying ways to measure and address new services beyond traditional network value-added voice and data models. TBR’s findings suggest operators are looking more to partners and new business than to developers.

Figure 6



KEY COST-SAVINGS METRICS USED

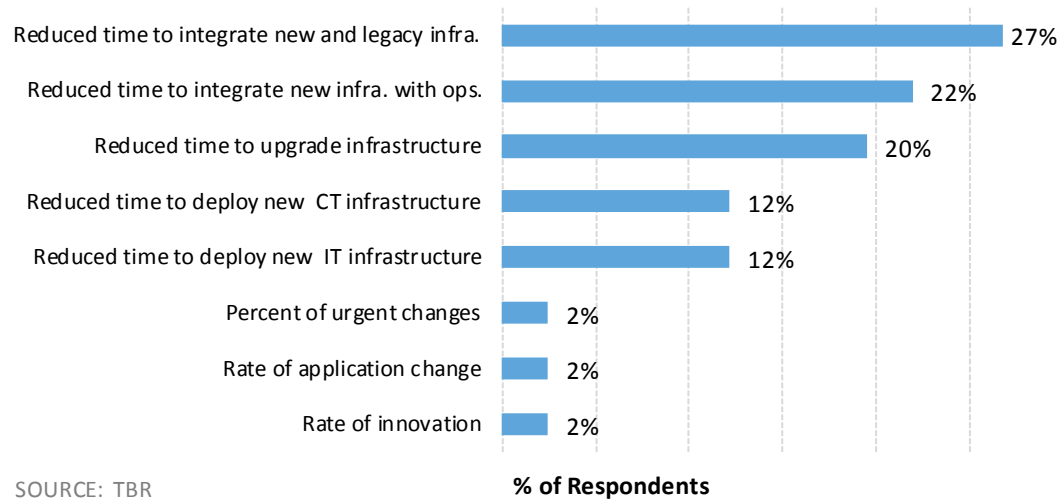


SOURCE: TBR

Cost-savings metrics revolve around equal parts opex and capex savings with nearly equal shares drawn from communications technology (CT) and IT budgets. Supplier performance and consolidation are also parts of current outsourcing metrics as shown in Figure 6.

Figure 7

TBR TECHNOLOGY CHANGE METRICS USED



SOURCE: TBR

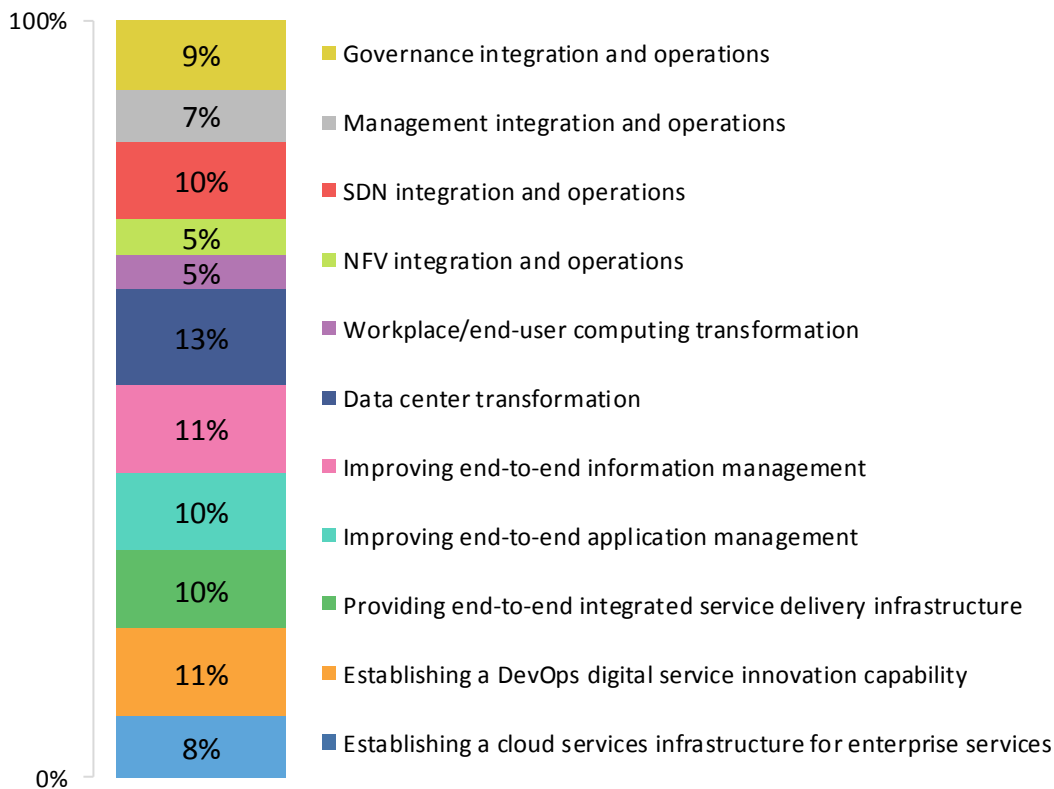
Despite the urgency to evolve to a new, more agile infrastructure, as seen in Figure 7, legacy integration remains the most common metric when operators measure technology change. The overall theme of reducing the time to change is reflected in all metrics.

ITO is an important driver in ICT Transformation

As illustrated by Figure 8, specific operator ICT transformation strategies have yet to coalesce, indicating a market opportunity for vendors to provide strategic guidance and consulting as well as point solutions. Operators indicate a wide variety of ICT transformation managed services focus areas, with the least popular responses (workplace/end-user computing transformation and NFV [network functions virtualization] integration and operations) just eight percentage points below the most popular (data center transformation). As more managed services focus areas are defined, operators need guidance to determine and prioritize the areas they should outsource to align with present needs and objectives. As awareness grows and vendors tout reference wins, TBR expects vendors with strong positions in both CT and IT — such as Huawei — to benefit.

Figure 8

ICT TRANSFORMATION MANAGED SERVICES FOCUS AREAS



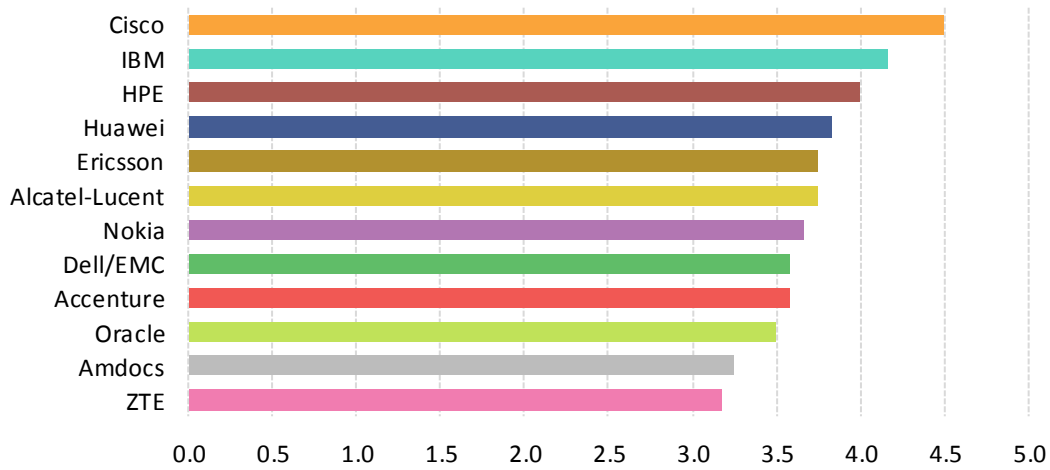
SOURCE: TBR

Note: Does not add up to 100% due to rounding.

ITO is a key requirement for operators and an initial step in their strategic approach to ICT transformation, as ITO will lower opex, drive operational efficiency and enable growth through the faster introduction of new services.

Figure 9

IT TRANSFORMATION CAPABILITY



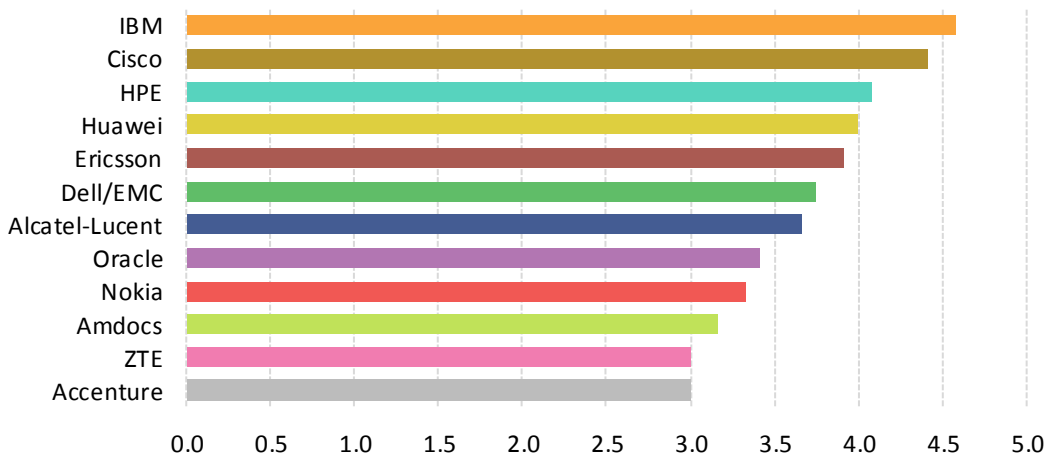
SOURCE: TBR

IT transformation capability, as shown in Figure 9, is led, unsurprisingly, by IT firms holding incumbent positions in operators’ IT environments. The most notable exception is Huawei’s No. 4 position, which places it ahead of traditional CT rivals Alcatel-Lucent, Ericsson and Nokia. Huawei was early to recognize the convergence of CT and IT and focused on transforming its portfolio and adding IT services and products. Huawei’s transformation was noted by customers, with one chief technology and information officer surveyed calling Huawei one of the most “trusted partners to provide managed services for a converged IT and CT infrastructure.” The respondent said, “It has transformed its managed services to become a next-generation provider to offer managed solutions to overcome all the challenges related to ICT and convergence.”

Figure 10



SOFTWARE-DEFINED NETWORKING CAPABILITY



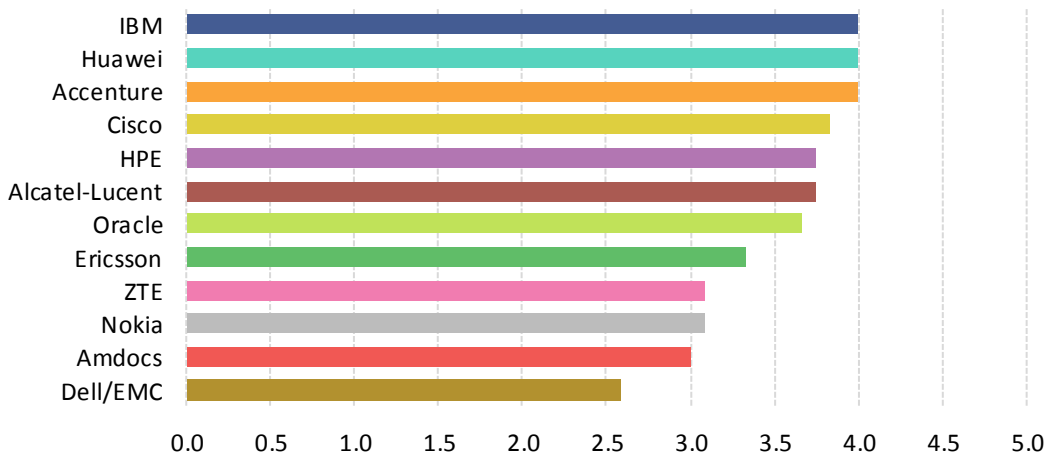
SOURCE: TBR

HPE, Cisco and IBM ranked highest in SDN capability, as shown in Figure 10. Huawei beat out its traditional CT rivals, with one operations head surveyed noting, “Huawei has come a long way in developing SDN.” Suppliers with proofs of concept and commercial deals fared well.

Figure 11



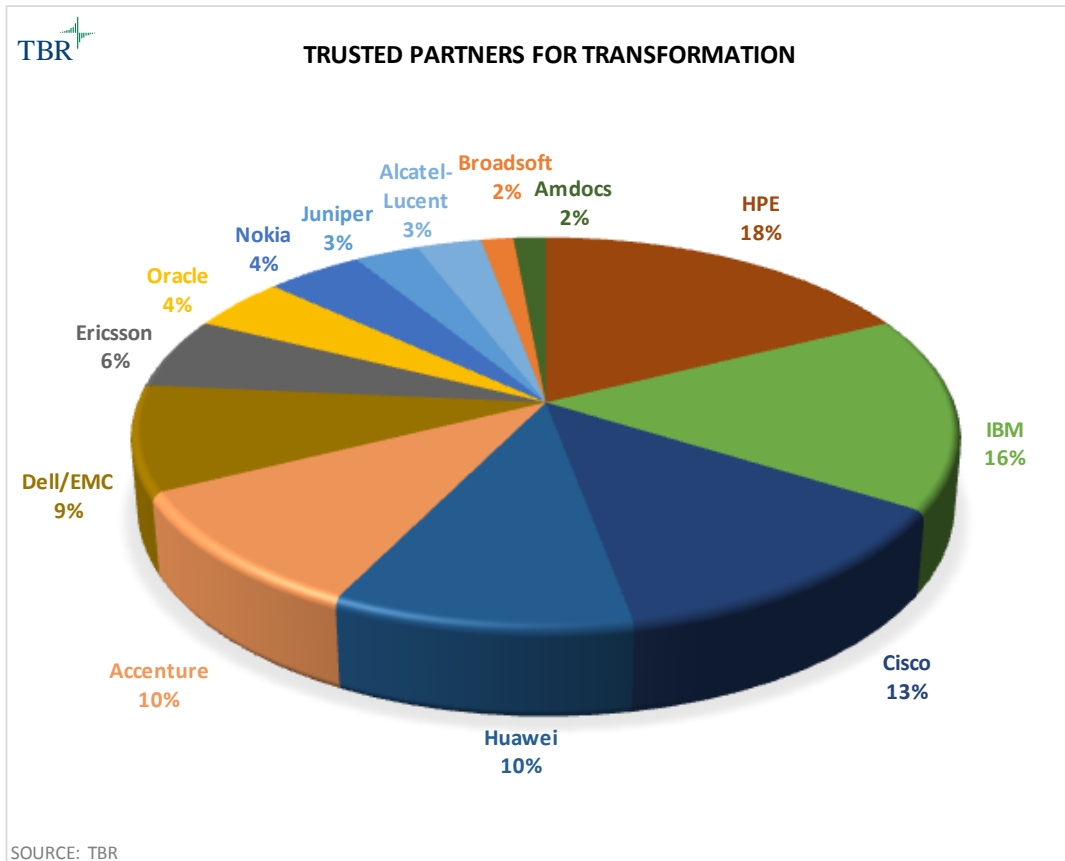
AUTOMATION AND ORCHESTRATION CAPABILITY



SOURCE: TBR

As shown in Figure 11, automation and orchestration capability scores were lower in the aggregate than other surveyed capabilities, suggesting vendors can improve in this area. Reducing opex costs is a strong driver of automation and orchestration adoption.

Figure 12



HPE (18%) was ranked as the most trusted vendor, followed by IBM (16%), Cisco (13%), and Huawei and Accenture tied at 10% as depicted in Figure 12.

One manager of operations and deployments surveyed stated Huawei is “one of the best companies to help transform network infrastructure. [It is] the leader when we talk about a converged ICT environment. [Huawei] came up with new SoftCOM and FusionSphere services that allow operators to make use of NFV and OpenStack technologies to enhance network performance and capacity.” TBR believes Huawei’s participation in open-standards groups contributes to and heightens its standing. Operators will become increasingly comfortable with adding vendors to their IT environments, provided vendors embrace open-source networking.

Huawei’s ITO offerings form a comprehensive solution

The evolution of an operator’s infrastructure requires transformation of both IT and communications networks. Huawei can deliver such transformation through its ITO solution, which consists of its Managed IT Transformation, Managed IT Operation and Managed Enterprise Cloud offerings.

Managed IT Transformation

Huawei's Managed IT Transformation consists of three approaches to address three different IT outsourcing scenarios, with the goal of maximizing the benefits of technology evolution and increased agility.

1. Optimize the existing IT environment — quick win solution

Huawei can help operators establish a standardized service platform to reduce running costs and assure service quality by:

- Standardizing operations management
- Centralizing service management
- Offering self-service
- Optimizing operation tools
- Improving application performance

Additionally, Huawei can deliver asset value maximization by:

- Consolidating data centers
- Increasing hardware utilization
- Rationalizing software license usage

2. Technology transformation

To improve IT infrastructure utilization rates and reduce the time to deploy new services, Huawei deploys a solution based on its Dynamic Architecture Blueprint, which includes:

- Open architecture to consolidate IT commodities
- Network technology evolution
- Unified resource pool
- Automation and orchestration of operations
- Fault tolerance and high availability to support business continuity
- Future workplace — VDI, BYOD

3. Business-led application transformation

To improve business agility, Huawei helps operators adopt cloud technology environments for business applications transformation, including:

- Service platform enablement (PaaS) to support continuous development and deployment
- Business application cloud enablement to leverage SaaS
- Operating model evolution (bimodal/DevOps)
- Business service assurance

Managed IT Operation

To optimize the as-is state of the transitional data center environment, Managed IT Operation establishes a centralized and standardized operation services platform to deliver a high degree of operational efficiency and service quality in day-to-day operations. The solution also includes operational management of the transformed environment during execution of the multiple waves of the transformation and in the resulting operational state.

Huawei quickly built its IT capabilities by leveraging assets of its managed network services including:

- Managed Service Unified Platform (MSUP): an eTOM-, ITIL- and TL9000-compliant platform for telecom IT operations
- Operation Web Service (OWS): a tool set to maximize automation; provides the unified service portal as required in the scope of work (SOW)
- Global Service Delivery Centers in India, Mexico and Romania

Through collaboration with its managed network services portfolio, Huawei's Managed IT Operation is fully capable of supporting a convergent ICT operation.

Managed Enterprise Cloud

Huawei's Managed Enterprise Cloud is designed for the changing IT services business model, where cloud computing brings new revenue opportunities. Huawei can help operators address their challenges (e.g., small partner ecosystem, lack of a go-to-market system, small early ROI).

Huawei's strong cloud ecosystem includes partners offering collaboration, security, customer relationship management (CRM), enterprise resource planning (ERP) and more. Huawei also reduces risk for its customers by planning, building and operating the enterprise cloud and providing go-to-market assistance by offering sales support and partner management and by working in conjunction with operators in marketing efforts. Managed Enterprise Cloud consists of Cloud Platform Build, Joint Business Innovation, Business Operation Support and Operation Management.

This approach enables operators to bring new cloud offerings to market faster, reduce business risks and spur continual innovation. Huawei acts as a reliable strategic partner by providing a flexible business model and end-to-end service assurance.

Operators leverage Huawei's ITO solution for ICT transformation

Ooredoo Kuwait transforms network and IT environments with Huawei ITO

Operator summary: Ooredoo operates in 12 markets in the Middle East, North Africa and Southeast Asia. The priorities of the Kuwait operation include capturing data growth, increasing ICT capabilities and improving operational efficiency. Ooredoo Kuwait provides mobile, broadband Internet and corporate managed services. The company's subscriber base in the Kuwait market was 2.4 million as of October. Revenues increased 11% and EBITDA increased 30.9% year-to-year for the first nine months of 2015.

Project goals: Ooredoo aims to become more cost efficient, decrease the time to market for new services and improve customer experience. The name UNIFY was given to Ooredoo's infrastructure transformation program, which includes the unification of network operation and IT to create a combined service delivery environment with specific goals:

- Provide any service using a common delivery environment

- Deliver the service anywhere across Ooredoo's multicountry footprint
- Reduce service creation and delivery time from months to days
- Disrupt the competition by improving service delivery at significantly lower cost

Ooredoo is testing the power of an NFV-based single infrastructure for networks and IT to deliver services faster and more cost effectively.

Ooredoo's transformation shifts the company from traditional to virtualized IT infrastructure as part of Phase 1: IT virtualization, which will deliver higher hardware utilization, consolidated storage and lower capex. By the end of Phase 2, more than 30% of UNIFY's data centers will be consolidated, in which server racks will be reduced by 30% and proprietary hardware products will be replaced by just a few x86-based hardware products.

Huawei's role: Ooredoo Kuwait plans to increase efficiency and reduce the time to market for new services by outsourcing its infrastructure to Huawei. However, the company's outsourcing agreement is no ordinary contract. Ooredoo is outsourcing both its IT and network operations to Huawei with the plan to unite the two organizations and build a common infrastructure using the latest innovations of NFV as well as network and IT operations.

The operator leveraged several vendors for operations, but wanted to simplify operations. After a few rounds of evaluation, Huawei was selected to support Ooredoo Kuwait's transformation. Huawei was selected as the outsourcing partner in September, and the transition from Ooredoo operations to Huawei was completed in November. The transition included transferring Ooredoo staff in Kuwait to Huawei, as well as the operation of all Ooredoo's Kuwait data centers. Huawei also transferred its staff to the operations centers supporting the operator.

The next phase of the operation will occur in stages, beginning with a hybrid model in which Huawei will initially place its staff in Ooredoo data centers and operate some functions from Huawei's India-based global Network Operations Center (NOC). Eventually, more services will be centralized within the NOC, and Ooredoo will no longer have to operate as many local data centers.

In addition to savings from consolidating and centralizing data center operations, Ooredoo expects reduced costs from its application development management (ADM) processes, which were also part of the outsourcing contracts.

Outsourcing to Huawei enables Ooredoo to address two key issues in the UNIFY strategy: organizational adaptation and skill deficits. Huawei will bring together the network and IT functions in its operations, and provide the skilled staff to upgrade Ooredoo's network and IT operations to NFV capabilities.

As the chosen outsourcer Huawei acts as the primary vendor, and the other vendors act as subcontractors. In Ooredoo's case, Huawei maintains a significant share of the network with its own equipment, but Huawei must manage other vendors as on-site subcontractors.

Ooredoo's UNIFY transformation enables the operator to create a strategy for the combination of outsourcing, ICT convergence and NFV road map deployment. The cost-reductions and time-to-service incentives the operator can achieve may be a game-changer in the Middle East with global reverberations.

Huawei drives Etisalat's global ICT transformation through managed services

Operator summary: With headquarters in Abu Dhabi, United Arab Emirates (UAE), Etisalat operates 2G, 3G and LTE networks throughout 18 countries in MEA and APAC including the UAE, Saudi Arabia, Egypt, Nigeria and Sri Lanka. Etisalat services 169 million subscribers.

Project goals: Etisalat is in the early stages of what it refers to as its Service Vision 2020, an NFV- and SDN-driven transformation that includes an infrastructure overhaul stretching from the data center to the access layer. A cloud-centric architecture will provide Etisalat with a more agile network to offer new services such as Internet of Things (IoT) connectivity to its customers.

Huawei's role: Huawei is a leading ICT provider and strategic partner to Etisalat. For example, in Nigeria Huawei manages Etisalat's communications network and, in a separate agreement signed in 1Q14, Etisalat Nigeria outsourced its IT operations to Huawei. For the IT portion, Huawei manages technical infrastructure, application management and user support. Outsourcing ICT to Huawei enables Etisalat to improve quality, reduce costs, transform infrastructure and increase the speed to market of new services.

XL Axiata taps Huawei for managed services to accelerate transformation

Operator summary: XL Axiata is a leading operator in Indonesia supplying 2G, 3G and LTE to select regions including Java and Bali. Historically, XL Axiata is an early mover in Indonesia, launching 3G and LTE ahead of regional competitors.

Project goals: To accelerate its transformation into a digital telecom operator and address the domestic rise in data traffic, XL Axiata turns to Huawei for managed services. XL Axiata is shifting resources from traditional voice traffic to initiatives that enable it to offer digitally based services. These initiatives include the construction of a network and service operation center in Jakarta.

Huawei's role: Huawei is the leading managed services partner for XL Axiata, enabling it to digitally transform and support new services and applications. Huawei provides its Managed Services for Total Value of Ownership (TVO), which streamlines network operations and allows Huawei to manage IT applications such as OSS. Additionally, Huawei manages XL Axiata's Digital Merchant (DM) ecosystem.

Telefonica leverages Enterprise Cloud Migration from Huawei to offer outsourced IT to enterprise customers

Operator summary: Telefonica is a leading global telecom operator based in Madrid. Telefonica’s operations stretch throughout Europe and Asia, and into North and South America.

Project goals: Telefonica selected Huawei as a strategic partner to enable it to offer cloud IT services to enterprise customers. The operator can now deliver managed compute, backup and storage services leveraging its own data centers. Telefonica calls its new service Telefonica Open Cloud.

Huawei’s role: Huawei is supplying elements of its Managed Enterprise Cloud to enable Telefonica’s Open Cloud globally. Huawei’s OpenStack-based service is deployed in eight Telefonica data centers. Brazil, Mexico and Chile will be the first Telefonica markets with access to the service.

Additionally, Huawei is supporting Telefonica’s business in China, where it is supplying knowledge and experience to enable Telefonica to penetrate the public cloud market.

Huawei’s managed services accelerate ICT transformation for du and KPN

- Huawei provides managed services for du’s mobile, fixed and broadcast networks in the UAE. Huawei is well-equipped to carry out the contract, utilizing its three resource centers and five training centers in the region to deliver comprehensive services to du. du is transforming its networking operations to prepare for 5G deployments.
- Netherlands-based KPN selected Huawei as the sole provider of ITO services, including managing the OSS/BSS, value-added services, delivery and management, for the operator’s Ortel mobile virtual network operator (MVNO) in Spain. Huawei was selected due to its role as a provider of network equipment for the broader KPN Group. The MVNO was launched using KPN’s Magnum platform, which it used to launch multiple MVNOs in Europe. KPN is one of Huawei’s largest OSS/BSS customers in Europe.

TBR perspective

Operators will increasingly require ITO services to deliver key cost savings, promote operational efficiency and enable revenue growth through the introduction of new services. ICT transformation in an operator’s network and IT environments cannot become a reality without a strong ITO partner.

Huawei’s expertise in ITO lies in its telecom managed services foundation, but is strengthened by the vendor’s IT focus, particularly in cloud enablement and the data center. Huawei has accumulated over 450 cumulative contracts in managed services, provided integration for more than 480 data centers, completed over 160 cloud deployments, and engaged in 20 NFV and SDN joint innovation projects with operators.

Huawei must persuade its customers to adopt transformative products and services such as NFV and SDN. This dilemma is not unique to Huawei, as Ericsson and others face similar

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challenges. Huawei is on the right track to build its partner ecosystem and bring an end-to-end ICT solution to the market faster, with best-in-class capabilities.

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