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Accelerating the PACE of Digital Transformation

MTN

Ethio Telecom

How Ethio Telecom Spearheads Ethopia's Financial Inclusion Programs

Turkcell's

Evolution as a Digital Experience Provider

XL Axiata

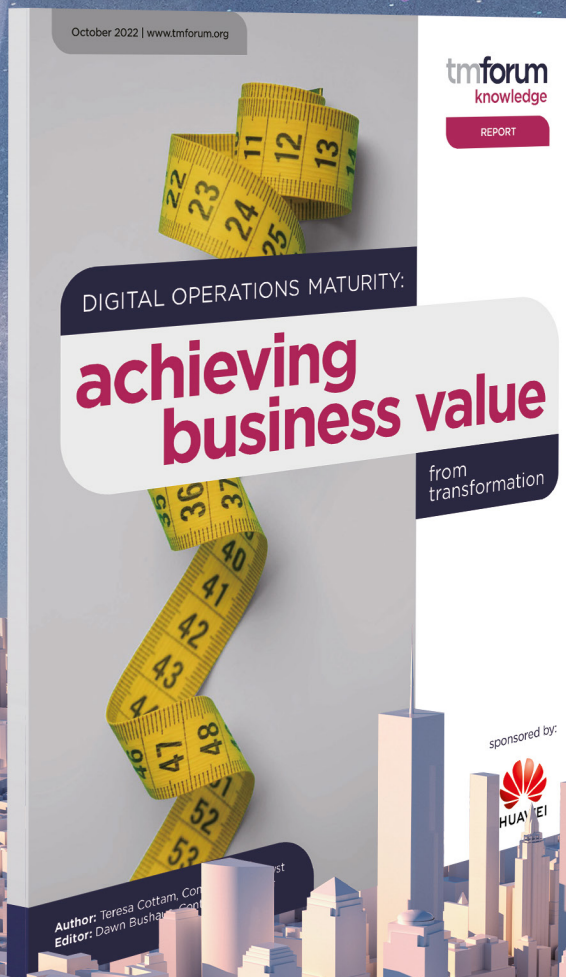**Embarks on Data and Intelligence Driven Digital Transformation to Accelerate Growth**

DIGITAL OPERATIONS MATURITY:

ACHIEVING BUSINESS VALUE FROM TRANSFORMATION

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REPORT

DIGITAL OPERATIONS MATURITY:

achieving business value

from transformation

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Deepening Operational Digitalization for New Business Growth

When we look towards 2030 from the intelligent world of today, we still see digitalization and intelligence as the greatest opportunities for the ICT industry over the next decade. China has already attached great importance to industry digitalization, as set forth in its 14th Five-Year Plan and 2035 Long-Range Objectives. Likewise, the EU has predicted that 75% of enterprises will use cloud computing, big data, and artificial intelligence services by 2030. In our vision for the future, technologies like 5.5G, 10GE home broadband, AI, cloud computing, big data, digital twin, and ultra-automation will help us more deeply extract the value of data. This will facilitate more efficient business decision-making, enable the digital upgrade of industries, and create new types of business models and services. These will create an unlimited market for operators and propel their digital transformation.

Most operators now agree on the importance of accelerating digital transformation. Operators should equip themselves with an end-user perspective and aim to better understand, satisfy, and care for users. Intelligent operations will help unleash the value of data, while allowing different departments to work closely together for better customer experience and higher quality decision-making. This will enable operators' steady and sustainable growth underpinned by agile digital services, high-quality user development, and predictable, intelligent O&M.

Digital transformation in three areas is recommended for operators to seize the opportunities presented by the coming new era. First, service digitalization. Operators can realize business benefits by integrating ecosystems, platforms, and networks to drive rapid second-curve growth. Second, operational digitalization. Operators should transform from being network-centric to customer experience-centric, linking devices, services, platforms, and networks together, and maximize the value of data to drive business decision-making and realize value-based operations. Third, infrastructure digitalization. Operators should integrate their computing and connectivity resources to make networks more intelligent, the cloud more diverse, data flows more efficient, and intelligent applications more widely used.

Many excellent operators work with us to enable differentiated experiences for enterprises through operational digitalization, while using mature digital capabilities to empower more industries, thereby generating new revenue. In addition, leveraging our own transformation practices and our successful experience in enabling the transformation of more than 100 operators, Huawei has worked with industry organizations to develop the Digital Operation Transformation Framework (DOTF), which evaluates transformation maturity from different dimensions: transformation strategy, value criteria, process optimization, data & platform, and organization & people. DOTF guides operators through their individual digital transformation journeys.

Operational digitalization is a structural and systematic transformation aimed at maximizing business and service value for operators along two complementary paths. It enables automation and intelligence to improve quality and efficiency, while enabling precision marketing and lean operations to increase service revenue and improve user experience. This is a tremendous opportunity, so let's move forward together to take digital transformation to the next level.

By Peng Song,
President of ICT Strategy and Marketing, Huawei

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Accelerating the PACE of Digital Transformation

In December 2022, Mr. Mazen MROUE, CTIO of MTN Group, was interviewed by Huawei's WinWin magazine. He shared MTN's innovative practices in digital transformation and explained in detail how MTN's new strategic framework, PACE, is facilitating the company's Ambition 2025.

By Mazen MROUE,
Group CTIO, MTN Group

Transforming for Africa

MTN is the leading telecom operator on the African continent, with a core belief that "everybody deserves the benefits of a modern connected life".

Digital transformation is now at the center of all African telcos' strategy, and MTN is one of the pioneers. In 2021, with the aim of supporting Africa's ongoing development, as well as building the financial strength for our business, we launched our Ambition 2025 strategy to deliver "Leading digital solutions for Africa's progress". Our strategy is focused on positioning MTN as a growth company, we want to be transformed to be seen as a company of connectivity solutions and platforms with FinTech and digital being at the core, by introducing new and compelling digital services to drive economic growth across the African continent. While many best practices are emerging in most markets like South Africa, Ghana and Nigeria, we actually see innovation occurring across all segments. We at the Group level are determined to treat all our markets equally, and facilitate the rollout of such best practices across our footprint, irrespective of market size and value.

Putting the Technology in Place

The execution of MTN Ambition 2025 is embodied in four clear strategic priorities: building the largest and most valuable platforms, driving industry-leading connectivity operations, creating shared value, and accelerating portfolio transformation. We believe that

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A key factor behind our leading customer experience rating is our applications of AI and automation to drive new efficiencies and enhance customers high volume journeys.

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the repositioning of our business will ensure sustained growth and greater relevance to 2025. In previous years, we managed to invest and build **strong core operations** underpinned by the largest fixed and mobile network in all our markets; reinforced by a large, connected, registered customer base; supported by a large registration and distribution network, and a strong brand remaining the most valuable in our markets.

Our new strategy is anchored in building the largest and most valuable platform business with a clear focus on Africa, resting on a scale connectivity and infrastructure business, making use of both mobile and fixed access networks across the Consumer, Enterprise and Wholesale segments. The five platforms are focused on FinTech, Ayoba as Super App, Enterprise, Network-As-A-Service and the API business monetization (Chenosis).

We have identified five vital enablers to assist in operationalising our strategy: Best Talent, Customer Experience, Capital Allocation, ESG at the Core, Technology Platform Second to None.

Speaking about Technology and its role in driving digital transformation, we believe in acceleration as new technologies such as Cloud, AI, Big Data, 5G, Open API adoption, Network Virtualization and Cloudification become pervasive. We are capitalizing on these technologies to transform to a PlatformCo by expanding our core services to the areas of ICT, Cloud and Cybersecurity, as well extending into new adjacencies like FiberCo, Data CenterCo and InfraCo and launching new frontiers within the Fintech, e-Commerce, and Metaverse. Underpinning this transformation is a paradigm shift to a culture that promotes rapid innovation, agility across the organization, focuses on revamping tech employee value proposition and leveraging platforms to create an ecosystem with partners.

As the MTN Group Technology team, we have recently refreshed our Technology strategic framework & operating model, having incorporated findings from deep dive analysis that we conducted and launched PACE framework - focusing on accelerating the execution of Ambition 2025. The four segments anchoring the PACE strategy are:

1. **P**latforms, Ecosystems & Services: enable revenue growth leveraging on Platform play and associated digital ecosystem
2. **A**gile operating model: agility in ways of working, governance and organizational culture
3. **C**onnectivity & optimisation of infrastructure: ubiquitous best-in-class connectivity across hybrid networks and monetisation of infrastructure
4. **E**xperience, Second to None: deliver superior user experience through connectivity, platforms and ecosystems play

The four segments of PACE are underpinned by 15 strategic pillars, for each of these pillars, we have prioritised associated executable programs to deliver on our ambition to transform into a PlatformCo.

In transforming to become a PlatformCo, MTN not only wants to become fully customer-centric, but also digitally focused for the benefit of our own workforce. In order to facilitate and encourage new ways of working, MTN is investing further in Cloud, Cybersecurity and Software Development. We are setting up a software engineering center of excellence and insourcing some of the capabilities that used to be outsourced. The insourcing of software engineering capabilities is being taken as an opportunity to the drive "Women in Tech" program, targeting the female workforce to drive strong diversity across our structure aiming at positively driving gender balance within MTN.
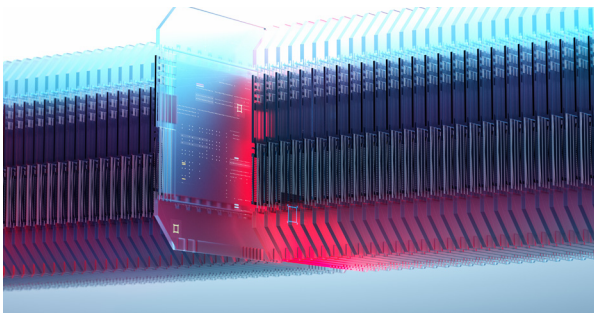
Experience, Second to None

During the launch of the PACE technology strategy, we emphasized "differentiated digital experience" and committed to making our customer experience "Second to None".

A key aim is to allow customers to take the full control of the services they get from us. In an optimized customer-centric environment, customers should be able to use all the services available without physically going to MTN's shops or calling the customer service center. This leads to further investment in self-service platforms including the myMTN app, chatbots and interactive portals.

We are also busy making our networks more customer-centric leveraging the big data capacity we have in our networks. We understand that customer experience is not just focused on network coverage, it's about understanding the end-to-end customer journey and delivering the best network and service experience to our customers.

Leveraging our network capabilities is of course key to delivering great customer experience, and we are investing widely in initiatives to address our customers' needs and improve their overall experience. Whether its network efficiency for service delivery, planning network operations or accessing big data for campaign management, we have found that a unified platform supports the versatile toolset required to drive the next generation of service delivery.

A key factor behind our leading customer experience rating is our applications of AI and automation to drive new efficiencies and enhance customers high volume journeys. We recognize that without automation it will be impossible for us to achieve the "Experience Second to None" target. For this reason, automation is not being limited to our most advanced markets, but leveraged across all markets according to their local requirements. The target is to move all systems toward zero touch, AI powered operations, as singular more flexible networks are required to meet all of our PACE goals.

Choosing the right partners

We understand that we cannot do everything ourselves; we have to partner not only with suppliers, but also increase collaboration with local stakeholders to address national gaps. Indeed, collaboration with partners has to be constant in order to expand the technology capabilities and accommodate growing demand. As an example, collaboration with regulators, notably about spectrum requirements, has proved very effective. We have found that regulators are more supportive when they see steady investment in their market.

For our strategic partners, in areas such a network infrastructure and Cloud platforms, we hold them to extremely high standards. They must be able to do more than deliver competitive solutions, they must be able to understand our evolving requirements, and adapt their solutions accordingly. Joint innovation is an ideal way to accomplish this goal as it allows our respective engineering teams to work together to solve specific challenges. In addition, strategic partners must be able to work with us through the digital transformation processes as we automate more business processes with the goal of improving the overall customer journey. This level of partner engagement is necessary for us to create differentiation in a competitive market, and to provide state-of-the-art digital services to customers in all of our markets.

Looking Ahead

Challenges to successfully implementing digital transformation persist. Internally, the main obstacles we have seen are alignment of stakeholders within the business, ensuring synergy, standardization and efficiency of our efforts. External challenges are driven by the need to continuously improve the value we deliver to our customers, including improving service agility, interface, user experience, and customer education.

Nevertheless, we see from our operational data and financial results that we are making good progress across our markets. Our unified Platform approach is not only helping MTN to improve service experience for all our customers, but is also ensuring greater operational efficiency and effectiveness. Guided by our PACE strategy, we are confident that we will continue to deliver business growth and, more importantly, drive the digital acceleration and development of Africa as a whole.

How Ethio Telecom Spearheads Ethopia's Financial Inclusion Programs

A GSMA report had branded Ethiopia one of Africa's "sleeping giants". Ethio Telecom spearheads Ethopia's financial inclusion programs and enhances the financial inclusion development and digitalisation of the country. Here we will invite Ethio Telecom to share how to launch the TeleBirr service, and evolve into a payment lifestyle brand that gives customers a 'one-stop shop' for all their financial service needs.

By Said Aragaw,
Chief Marketing Officer, Ethio Telecom

In terms of total subscribers, Ethio Telecom is the second largest operator in Africa after MTN, and the 23rd largest operator in the world. Currently we are integrated telecom operator having 69.5 million mobile customers, over 560K Fixed broadband and 860K Fixed voice customers covering 99.1% regions of the country. Driven by a mission to provide reliable communication and digital financial services to simplify life and accelerate digital transformation of Ethiopia. We launched the mobile money solution called TeleBirr in May 2021. Starting in July 01, 2022, Ethio Telecom
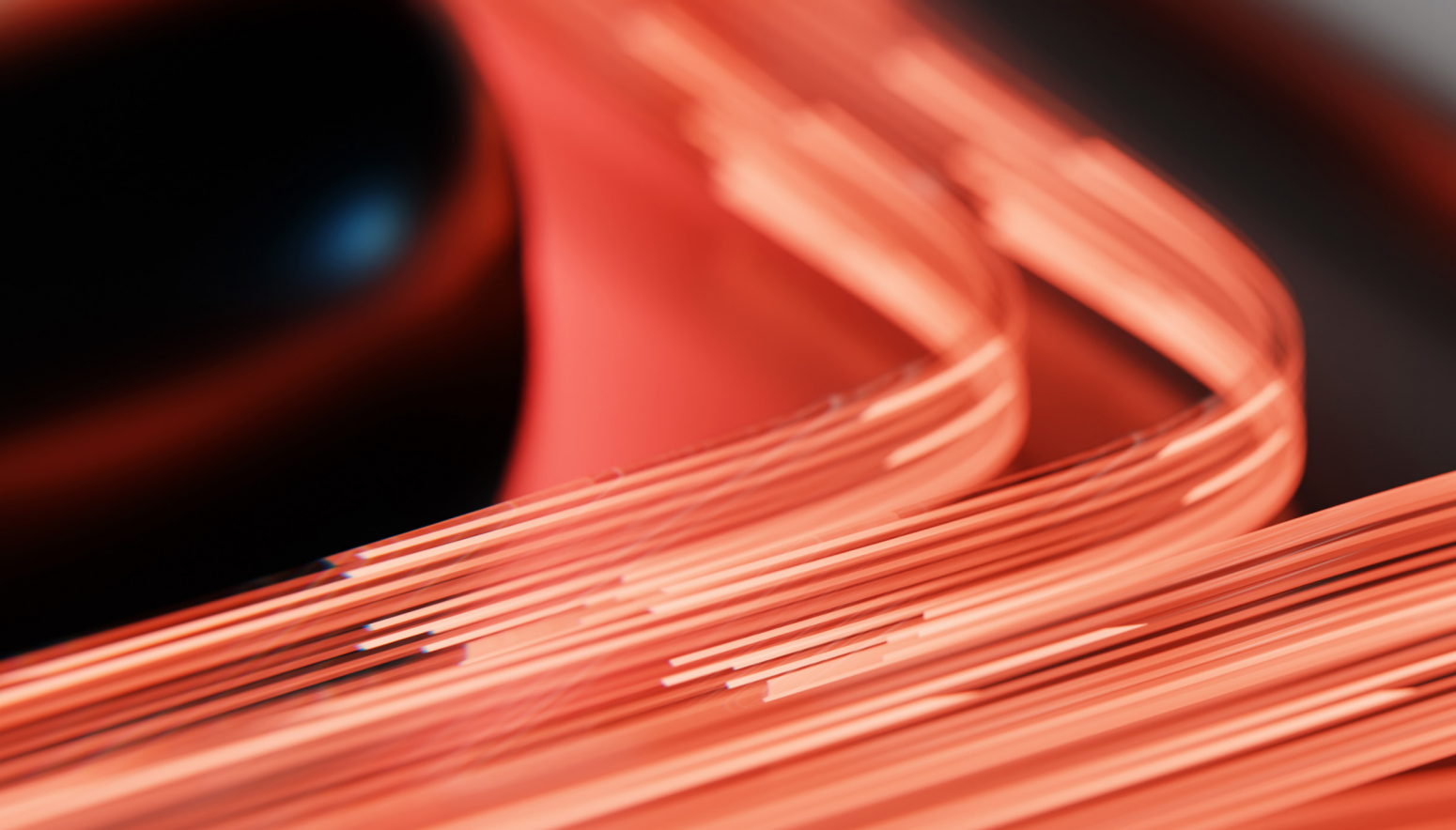
also implemented a three-year LEAD Growth Strategy with a vision to provide service beyond connectivity and enable inclusive growth by providing digital and financial services that simplify the daily activities of organizations and individuals. The strategy also focuses on delivering problems solving and cloud based value-adding, content-driven services and solutions to our mass and enterprises customers and thus opening new revenue streams, apart from the traditional voice and data offerings. TeleBirr has emerged as the pillar of the LEAD strategy because it perfectly aligns with these objectives enhancing the financial inclusion and digitalisation of our country.

TeleBirr – the backbone of the country's financial inclusion program

TeleBirr, developed in collaboration with Huawei Technologies, is the first operator-led mobile money platform in Ethiopia. The potential of mobile money solutions in Ethiopia was already known. A GSMA report on global mobile money adoption released in 2018 had branded Ethiopia one of Africa's "sleeping giants." Thus we positioned TeleBirr as the pillar of the country's financial inclusion program. Since its launch, the penetration of mobile money business in Ethiopia has grown significantly.

TeleBirr offers differentiated services including savings, remittances, mobile wallets, credit pay, micro credit & saving and more. With just a mobile phone, people can carry out transactions like deposits, cash in & out, paying utility bills, sending money to families & friends and receiving payments from them, get instant micro credit, overdraft and saving services. We are also offering foreign remittance, in collaboration with international remittance companies. As a further innovation, we have also integrated the country's start-ups, e-government and enterprise services with TeleBirr, enabling hassle-free cashless transaction for their customers.

Major milestones for TeleBirr

TeleBirr surpassed 1 million customers in barely two weeks after its launch. As of December 2022, TeleBirr subscriber base stands at 26.5 million with customer transactions value touching ETB 128 billion(2.3B USD) becoming the first such achievement by any African mobile money operator. We have also achieved USD 1.5 million in international remittance. Supporting this growing ecosystem, we have 101 master agents, 97,000 agents of whom 30% are women, 24,000 merchants and 17 banks working in tandem. With over 52 public and private institutions integrated on to TeleBirr, we have emerged as the most interoperable mobile money platform in Ethiopia. Back in August, we partnered with Dashen Bank to provide micro-credit & saving services with a local flavor. The services, named TeleBirr Mela (micro-credit service), TeleBirr Sanduk (micro-saving services), and TeleBirr Endekise (credit pay service), fetched half billion ETB transactions reaching over 500K customers within ninety days of the launch. The

launch of digital lottery via TeleBirr is another major milestone in TeleBirr's journey.TeleBirr was also selected as a payment channel to support e-governance and facilitate various G2C payments for Federal Documents Authentication and Registration Agency (DARA), Traffic fine agency, immigration & citizenship service, Hybrid Designs (Ride), Ministry of Foreign Affairs (MoFA), the Accounting Auditing Board of Ethiopia (AABE), and Ministry of Trade and Regional Integration (MoTRI). TeleBirr also acts as the exclusive payment channel for implementation of fuel subsidy scheme of the Ethiopian government. We have created a solution that can help identify customers who are eligible for subsidy and bill them accordingly. Thus TeleBirr helps reduce the complexity associated with such procedures.

Challenges in implementation

While implementing TeleBirr, we faced a diverse set of challenges, of which are mainly attributed to demographic factors. For example, the lower literacy

rate among the agents, customers and merchants emerged as a barrier in educating about TeleBirr's benefits and implementing its use cases effectively in some parts of the country. Merchants who were registered with TeleBirr were also not using it to the expected level. Lack of awareness of the platform in low-income markets and rural areas prevented widespread adoption of the platform among merchants in those areas. The lack of mobile skill also contributed to these challenges in some communities.

Establishing mobile money agent structure was another challenge. After multiple considerations, we built an agent structure by developing our existing airtime distribution channel. Ethio Telecom owns more than 300,000 retail outlets and more than 500 shops across the country. Realizing their potential, we made our major airtime distributors as master agents. However, getting them onboard for our business became challenging in the initial stages. Thus, it became important for us to develop more flexible use cases and offerings which are attractive to the agents as well as the customers.

We had to also deal with a number of regulatory hurdles as well. Over the past few years, the regulatory environment in Ethiopia has improved a lot. However, due to low banking penetration and lack of mature infrastructure for banking, we confronted several complexities while procuring the mobile money service provider license. We achieved it though, thanks to our leadership who got constantly engaged with the authorities to achieve the goal. We are further working towards simplifying the regulatory procedures for not just Ethio Telecom, but the entire telecom operators in Ethiopia.

We are engaging with the National Bank of Ethiopia to address the regulatory challenges associated with mobile payments. For example, we believe the transaction limit should be increased so that customers get the flexibility to do more transactions at the convenience of a mobile connection. Integrating very small business providers like shoe-shiners and street vendors is another challenge because they don't fall under the purview of the country's taxing or licensing codes. Also, we think the tax imposed on incentives,

bonus or rewards is likely to backfire. We hope for a timely intervention of the regulatory and revenue authorities in these matters.

TeleBirr's winning strategy

Since the launch of TeleBirr, we met with several challenges but managed to overcome some of them completely and bring down the impact of others by adopting appropriate strategies. For example, the localized names assigned to the services and the commission-based structure for customers and agents, innovative products and services and partnerships with the ecosystem players have helped wide acceptance of TeleBirr. In addition, we launched aggressive social media campaigns and referral marketing programs such as cash back, cash for recharge and other future transactions. We have also integrated TeleBirr to our loyalty program called Asham Tele and launched an annuity cash reward program for our agents and merchants.

We are also engaging in technology partnerships to integrate merchant platforms on TeleBirr. In a major breakthrough, we partnered with CNET software technologies to integrate TeleBirr across a wide network of retail and business partners. The CNET integrated payment system allows customers in supermarkets, companies in entertainment and hospitality service, hospitals, pharmacies, and cafes which are partners of CNET to pay service charges using TeleBirr. As of December 2022, 99 merchants have already integrated CNET with TeleBirr and transacted a total of ETB 988.43 million (USD 18.37 million).

TeleBirr aspires to become a digital marketplace and largest Fintech platform that supports cashless and digital economies in Ethiopia and in the entire Africa. With TeleBirr acting as a gateway for digitization of Ethiopia, we also aim to emerge as a cross-sectoral player by facilitating industries like education, agriculture, gaming, health, lifestyle, and more on TeleBirr platform. Simultaneously, we are also evolving into a payment lifestyle brand that gives customers a 'one-stop shop' for all their financial service needs.

> TeleBirr aspires to become a digital marketplace and largest Fintech platform that supports cashless and digital economies in Ethiopia and in the entire Africa.

Turkcell's Evolution as a Digital Experience Provider

An increasing number of telecom operators are focusing on providing digital services to shape the second growth curve during their digital transformation. Turkcell has been investing in digitalization for more than 10 years, with remarkable achievements in promoting digital services around the world.

By Ceyhun Özata, CSO, Turkcell
Ataç Tansuğ, CDSO, Turkcell

Digital transformation has been a big trend in Turkey. All companies, ranging from very small businesses to very large enterprises, have the ambitions to transform their businesses by utilizing the latest digital technologies. Turkcell is an integrated communication and technology services player in the region, operating a converged mobile and fixed network platform and offering a wide range of innovative products and services. We are in the midst of a digital revolution, shifting from the traditional models to one that delivers a diverse portfolio of services combining modern technologies and solutions to deliver superior customer experiences.

Turkcell Cloud Transformation

Ceyhun Özata, CSO, Turkcell

Cloud lies in the center of the digital transformation process as it helps the businesses attain efficiency and improve productivity. Thus, Turkcell views cloud as the biggest new opportunity, the same way connectivity has been over the past 30 years. Now it's time for us to venture into new areas with the cloud, which will add additional benefits and more business value to our customers. We are on a journey to evolve ourselves from a traditional telecom operator to an infrastructure player and also an experience provider.

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The evolution to a digital service provider is not easy for a telecom operator, but the times demand that. In order to be successful, you need to adopt a customer-centric strategy, so you will focus on creating additional value through competitive services.

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Turkcell has been pursuing the digital transformation journey for the past 10 years. We have made huge investments in infrastructure and technologies that give us a competitive edge in the market. We also leverage our expertise and knowledge in emerging technologies to create a cloud ecosystem that can deliver more value to our customers. We serve customers across all industries and sectors. Over the course of 30 years, Turkcell has developed certain capabilities and expertise in the technology area, not only for the telecommunications sector but also for the IT sector. Three years ago, we established a new system integration company, Digital Business Services. This has added a new dimension to our cloud transformation journey. We are trying to create new products and services on top of our connectivity and also on top of our IT services, not just with our core technology services, but also with the help of our partners. With a focus on both local and international markets, we have developed that ecosystem as a one-stop shop to end users.

However, the cloud journey is also accompanied by several challenges. We need to build expertise around the new technologies and emerging applications; only then can we deliver value to our customers. We need to have a thorough understanding of the market requirement, and we should be able to comprehend the real issues and then apply the best and the most beneficial solution to them. Thus, we need a talented workforce who can drive our digital journey to deliver value to our customers. The challenge is to create value for the end users, and this is the challenge for us and also for operators and technology providers all over the world.

Turkcell Global Strategy

Ataç Tansuğ, CDSO, Turkcell

Turkcell is developing services for both consumer and enterprise segments, with services ranging from instant messaging to music and from TV to digital publishing and personal cloud systems. In fact, we are growing with our customers, and wherever they are on the Internet, we follow them and apply our solutions to enhance their digital experience.

We have created a BiP suite consisting of an email system, video conferencing solution, document sharing & management and a storage platform. It serves the purpose of office management, like popular software applications including Office 365. BiP is also used by user communities to digitize internal communications and also to share information, documents, and training content with employees or group members. The BiP app is available globally, so anyone interested in this app can download and use it forever. We also have plans to collaborate with operators in international markets to further expand the reach of our solutions. We have engaged in agreements with operators outside Turkey to boost marketing activities in their territories. This will help expand Turkcell's digital services worldwide. Currently Turkcell select digital services are being used in 192 countries.

The TV business is one of the most successful services for Turkcell. We launched the TV service way back in 2014. We have reached around 1.3 million subscribers for IPTV, and our fiber infrastructure and OTT services have already covered around 1 million subscribers. The OTT services, which are infrastructure independent, are a strong growth area for Turkcell. The success comes from the enhanced user experience and the innovative content delivery. Turkcell TV also provides live TV channels, and that has also largely contributed to its success. Thanks to these strategies, we have beaten many global competitors in this area.

As a telco, we are at greater advantage for delivering OTT services. We have the network, operator integrations and network integrations, all of which help us deliver differentiated services while competing with giant global OTT players. For example, we have many operator integrations for BiP. Thus we can enable real GSM calls and real fixed line calls. Users can manage a second number called via BiP, and they can use the fixed number on their mobile when they are at home. In this manner, we can offer several differentiated services.

Partnership with Huawei

Huawei has been the biggest and the most valuable strategic partner in our digital transformation journey, helping us create an ecosystem of technologies and services and generate value for our customers. Turkcell and Huawei have cooperated to build a public cloud in Turkey. With their technology-first insight, Huawei has gained extensive experience and technology expertise in their public cloud business domain. We are expecting to leveraging their expertise not just on the IaaS level but also at the PaaS and the SaaS level.

With their extensive portfolio of solutions, Huawei helps us create a powerful ecosystem, grow the talent pool in Turkey and also make training programs available for Turkcell's engineers and our partners. We have been expecting to build a strong ecosystem across the country to solve different problems coming from different industries. We need to understand the dynamics of the different industries like retail, oil & gas and finance, because there are different kinds of expertise required to understand your customers and you should also be aware of the technologies specific to each domain so that you can use the them to deliver solutions effectively. Huawei can also help us create use cases around our services, which will ultimately benefit our customers. Going forward, we would require Huawei's support at a global level as we expand our solutions to other markets.

The evolution to a digital service provider is not easy for a telecom operator, but the times demand that. In order to be successful, you need to adopt a customer-centric strategy, so you will focus on creating additional value through competitive services like the ones mentioned here. Telecom operators can lead the journey because they have a better understanding of the market and have more resources, so they can deliver better services than traditional digital service providers and OTTs. Data is another important consideration. Data being the most valuable resource of this century, we believe every country needs to not only get hold of their data for security or whatsoever reasons but they should also utilize them intelligently to enhance the value of their digital services. Next, we need to invest in people, need our people to develop deep expertise, because the solutions will come from them. We also need to make targeted investments to create more returns in shorter time. Last, collaboration is important to create an ecosystem. In that ecosystem, there is no single winner; but we all work together with a common goal to solve problems in our domain and our countries.

XL Axiata Embarks on Data and Intelligence Driven Digital Transformation to Accelerate Growth

XL Axiata CTO I Gede Darmayusa shared the Indonesia market dynamics and the growing demand for digital services that drive the need for digital transformation during an interview with Mobile World Live at Huawei's Win-Win Live studio during OTF 2022 in Bangkok.

Digital transformation is not only at the heart of the Indonesian government's strategy for economic growth, but also core to XL Axiata's own strategic roadmap, he remarked.

Darmayusa outlined the four key drivers behind its digital transformation: macroeconomic factors, demand for digital services, rising competition and the fixed-mobile convergence (FMC) trend.

"The unprecedented Covid-19 pandemic is having a tremendous impact on our economy and society, and at the same time accelerated the pace of digital transformation. The outbreak has reshaped the way people work."

To realize the digital operating model in aligning with strategic framework, XL Axiata is developing capabilities that leverage on data analytics and applied on the "Four Rights Actions". This refers to the executing "Right Offer" to the "Right Customer" and investing "Right Place" at the "Right Time".
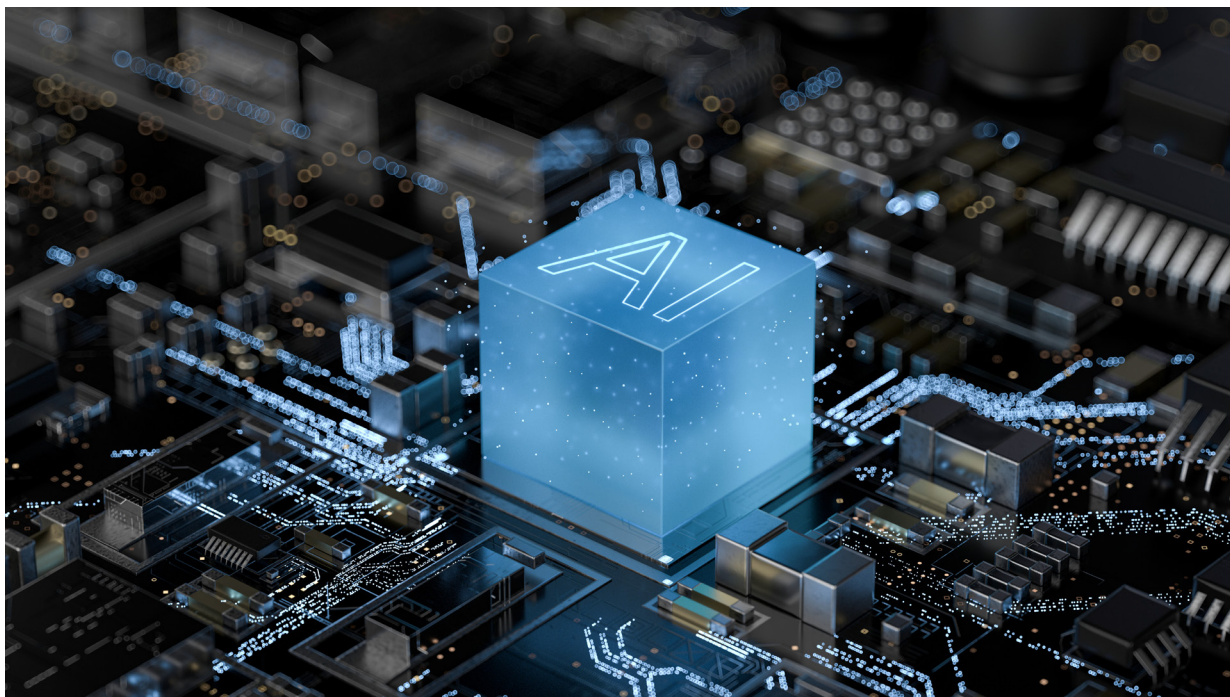
Internet users shifted their day-to-day activities online, creating heightened demand for data as well as increased interest in fixed broadband and FTTH services.

While the country experienced massive growth in mobile broadband adoption, a report from GSMA Intelligence found that internet connectivity remains a key barrier for some citizens' full participation in the digital society.

Meet challenges with Digital Transformation 2.0

The challenging diverse geographical and competitive landscape in the country have driven XL Axiata to accelerate its digital transformation programme that aimed at improving operational efficiency and enhancing on customer experience.

XL Axiata has adopted the Digital Transformation 2.0 strategy in executing its strategic framework that defines the digital operating model, underpinning

digitalization, customer centricity, and convergence. To realize the digital operating model in aligning with strategic framework, XL Axiata is developing capabilities that leverage on data analytics and applied on the "Four Rights Actions". This refers to the executing "Right Offer" to the "Right Customer" and investing "Right Place" at the "Right Time". The capability development includes areas in the customer experience management, focusing on tNPS automation in identifying detractors, demarcating the network performance reason, and recovering performance to the impacted network.

"We had a very positive business outcome from the tNPS solution, with customer complaints reduced by 48% within a year, and the tNPS improved with a double-digit score," Darmayusa said.

As the operator launched FMC service in targeted areas in Jakarta, it also used advanced data analytics to differentiate the offering to attract users and improve customer lifetime value. As a result, XL Axiata registered double-digit annual growth in mobile revenue in Java and improved cost efficiency for the FMC operation process by more than 20%.

Data-driven precision marketing

For converged services, the company used data analytics to enable it to invest in networks in high-value areas and buildings to meet demand from both residential and non-residential sites. "Digital-driven operations enable decisions in prioritising and placing profitable towers in high-demand areas." Darmayusa said. "With intelligent data analytics, we can evaluate KPIs across customer engagement, campaigns and customer loyalty, so we can devise strategies to address the challenges and opportunities at the right time."

XL Axiata realized that this analytics-driven approach is important to evolve themselves in the fixed mobile convergence (FMC) journey and improve Offer Acceptance Rate and ARPU/DoU. It also enables them to understand the customers' needs and communicate with customers at the right time. For example, assuming that XL Axiata is tracking the internet usage pattern of the subscribers. With analytics, XL Axiata can predict how much data they use this month, next month or the next year, and also what activities they perform and how much data they use for each activity, and so on. With predictive analytics, we can also track the upcoming trends, predict customers' behaviours well in advance, and then launch new offers in the future, at the right time.

Convergent data-driven approach to drive operational efficiency

The data-driven intelligent operation is a key operation model to XL Axiata digital transformation success. XL Axiata perceives that excellent operation revolves around three pillars: digitalization, customer centricity and convergence. With this mission, XL Axiata is building capabilities to transform their organization into a fully digital, converged service provider delivering the best customer experience across all areas.

Darmayusa said. "Throughout the past couple of years, we have succeeded in realizing significant cost savings across network investments and digitization of processes and achieved enhanced velocity and responsiveness in go-to-market initiatives.

For the FMC network deployment, XL Axiata faces the challenges with service differentiation. To improve the FMC service, XL Axiata has adopted an analytics-driven Four Rights Action. This helps them to drive network investments in high-value areas and buildings. XL Axiata can gain insights on the existing fiber coverage as well as identify the potential fiber tower locations that can meet the demand from both residential and business customers. Thus, digital-driven operations enable intelligent decisions like prioritizing profitable towers in high-demand areas. These strategies have been paying off. The analytics-driven FMC strategy has helped XL Axiata wins over its competition in the saturated market in Jakarta area.

Future steps

Riding on the strong momentum of the digital transformation, Darmayusa emphasized "We will not stop here and will maintain our momentum on our Digital Transformation 2.0, with the aim to be the number one carrier in converged services in Indonesia."

This will involve developing new capabilities by adopting industry best practices and automating operations, which includes TM Forum's Autonomous Operation Maturity Model (AOMM) and Value Operation Framework (VOF). To do that, XL Axiata will regularly assess their autonomous operation capabilities and identify their capability gaps between the to-be target and as-is maturity level through the AOMM assessment tool. Together with Huawei, XL Axiata will conscientiously identify MVP to deliver business outcome that results in desirable business values all through VOF.

"We are targeting to drive our operation toward autonomy in achieving a higher level of operational efficiency and delivering the next level of customer experience."

Digital Transformation and Opportunities for Operator

By Daniel Khoo,
Principal Consultant, Omdia

Executive Summary

Today, the environment in which enterprises operate has totally changed. Along with uncertainties due to the current global turmoil, customer behaviours and expectations are also rapidly changing. As this situation is likely to persist for some time, all enterprises should seek to become more agile, efficient and innovative if they wish to adapt rapidly to these ever-changing circumstances.

This article looks at the impact of these changes on operators, and in particular the many opportunities that are now open to them. With digitalization at the fore-front of many enterprises' strategies, network operators are well placed to support the resulting high demand for industry wide digital transformation. This can benefit both themselves and society as a whole. However, to capitalize on these opportunities, operators must be prepared to make their own investment in digital transformation, increasing speed to value and accelerating innovation.

How have recent events accelerated change and what lies ahead in 2023?

Plato, the Greek philosopher, once remarked that "Necessity is the mother of invention", and a look back in history reveals the many ways that crises have brought about unexpected benefits for societies and countries. The Covid-19 pandemic has also spurred the world to seize opportunities for growth and positive change, leading to rapid advances in technology and new ways of working globally.

Operators are in a prime position to benefit from this current trend, having all the core capabilities necessary to support the rising demand for digital transformation across industries. However, this will not come easily; operators will need to take urgent action to seize these opportunities. Let's begin by considering the immediate outlook for operators.

The next wave of 5G launches will be in the lower-middle income markets of Africa, Southern Asia and Latin America. By the end of 2023, an additional 22 markets are expected to have launched 5G, bringing the total to 135 markets. The high cost of deploying new technologies such as fiber and 5G should fuel the trend of consolidation in the sector as operators seek to achieve sustainable growth.

The global economic forecast is likely to be challenging for the next few years, although telecom services, being seen as somewhat essential, will be shielded from some of the impact. While the International Monetary Fund (IMF) forecasts a slowdown in world economic growth from 6.1% in 2021 down to 2.9% in 2023, global mobile service revenue is expected to grow by 2.54% in 2023, slightly slower than 3.78% in 2021. Nevertheless, operators will need to sharpen their focus and dispose of operations that are less successful or no longer a strategic fit. Selling assets to reduce debt or generate funds for investment will allow many to expand in new business sectors such as the digital services where they see growth opportunities.

How have Operators been transforming to address these changing priorities?

Across all markets, Omdia has observed varying degrees of transformation ranging from operators introducing advanced innovations in network technology and digital enablement, including 5G deployment and digital service development, to others more focused on a limited range of digital services with the key objective of achieving cost savings, service assurance and revenue growth.

At the Operations Transformation Forum October 2022, some leading operators shared insights into their transformation journeys, be it services and solutions, platforms and technology or customer experience.

● **Services and Solutions-led – Building new innovative digital services and businesses**
○ AIS leveraged its data as a cognitive telco to transform threats and disruptions into opportunities. To advance Thailand's enterprises, AIS established its 5G digital transformation strategy to focus on creating 5G ecosystems and partnerships. By building digital infrastructure and platforms, and supported by an intelligent network and improving staff capabilities it is moving to become a fully data-driven business. With 5G as an enabler, AIS demonstrated creativity and innovation in the consumer space through the creation of a virtual retail platform and other VR/ AR consumer experiences.

○ Turkcell's 1440 strategy saw Turkcell develop OTT digital services to increase the interactions Turkcell had with its customers to 1440 minutes in a day, thereby becoming their go-to digital companion. Turkcell has also taken additional steps to encourage growth, with a continuing emphasis on expanding digital and fintech services, as well as the establishment of a digital business services company providing end-to-end ICT solutions to support the digital transformation of both private and public enterprise customers.

● **Platforms and Technology-led – Building digital platforms to enable success**
○ MTN has embarked on Ambition 2025, a deep digital transformation strategy to manage and monetize services across the 5 growth platforms of fintech, digital products and services, enterprise services, network as a service (NaaS) and an API marketplace. In addition, the digitalization of operations to enable network analytics, AI and automation, and customer experience management has allowed MTN to enhance customer experience, deploy new business services, accelerate broadband coverage, and drive revenue growth.

● **Experience-led – Focusing on customer centricity and NPS**
○ Greater demand for digital services, hybrid working, and FMC have seen XL Axiata strive towards becoming a converged, customer-centric digital provider with the highest NPS. XL has been digitalizing their operations and using data to drive customer profiling, differentiation and improved experience along with key investments in their fiber and tower expansions. With the use of converged data for digital operations they intend to fully automate their network management and operations to attain greater efficiency.

○ stc has focused on digitalizing the end-to-end customer journey allowing stc to generate a 360° customer view, generate predictions and insights and drive business decisions with a data driven approach. Through their customer experience management (CEM) platform, stc has established a digital experience rating mechanism, which by monitoring the usage of digital channels and services offers business insights to enhance overall customer experience.

○ In the digitalizing of their operations and networks, Telecom Argentina used their CEM platform to measure

and establish various customer experience indicators across all their mobile and in-home services with the aim of improving customer experience and establishing a lead in NPS. This digital transformation journey has been strongly supported by a drive to build a corporate culture and operations philosophy centred around providing a positive customer experience, allowing Telecom Argentina to lead the market with its MBB, FBB and TV services.

Opportunities for operators in 2023 and beyond

Operators and their enterprise customers today recognize that digital transformation is critical in ensuring a sustainable business, but where should they begin? What digital maturity gaps should be addressed first and how? The TM Forum's Digital Maturity Model, complemented by the Digital Operations Transformation Framework, provide a good guide for operations transformation activities. In addition, Omdia has identified some initial opportunities for operators to kickstart their enterprise customer's transformation journey.

As mature enterprises seek to innovate faster, their priorities and goals for digitalization will shift. Digitalization of infrastructure and processes is expected to continue with enterprises prioritizing accelerating innovation and increased speed to value when making investments. This means that enterprises are looking to in-source various capabilities to move more quickly, which in turn poses a medium to longer term risk to operators if enterprises do not view them as partners. Let's look at some key opportunities:

● **Improving profitability through operational excellence will be a critical focus**
○ An agile IT architecture along with going cloud-native will be critical.

○ Maximised automation across business processes will be needed to reduce opex and inefficiencies.

  Opportunities:
○ Become key partners to unlock digital value through hyper-automation, using a range of technologies such as RPA across processes and IT operations.

● **Innovating enterprise services using Analytics/AI/ML and reducing corporate risk**
○ Businesses want to be able to extract insights to innovate faster; allowing them to create new services, personalize customer experiences, and create ecosystems with open platforms.

○ The integration of AI/ML in security algorithms and financial operations will improve the assessment of risks and customer buying behaviour to support product innovation.

  Opportunities:
○ Bridge data gaps by implementing proper data governance aligned with business needs.

○ Build open APIs to enable these new services and ecosystems.

○ Improve security, including cybersecurity through Cloud-based integrated cybersecurity, and Cloud management 3.0.

○ Enable a personalized customer experience (CX) with omnichannel powered by advanced analytics and AI including chatbots, and in-app communications.

○ Enable business innovation through 5G, IoT, and Edge Computing powered by AI/ML.

● **Retaining and acquiring Talent**
○ Flexible, virtual working will remain over the medium term and be a key factor in attracting talent.

○ Building new domain capabilities will be critical for the longer term.

○ Next-generation collaboration platforms will be critical to improving employee experience and learning.

  Opportunities:
○ Help businesses use these tools to create a differentiated workplace.

Closing recommendations for Operators

● **Understand the dynamics of operating and target markets.** Operators should develop digital strategies that consider technical, socioeconomic, regulatory and competitive developments. Monitoring the digital strategies of peers and other sectors will allow better identification of opportunities.

● **Partner to invest and co-create.** When competing against native digital companies and hyperscalers, operators need to ensure differentiation and attain scale. Forming strategic partnerships with like-minded partners will enable funding and innovation.

● **Step up training in digital skills and promote a digital culture.** It is critical for operators to equip staff with the necessary skills and digital DNA. Training and retraining of existing staff for new roles and continually upgrading capabilities is necessary for the success of any digital strategy.

● **Formulate a clear plan/digital strategy.** Every operator should ensure its digital strategy is clear and coherent, well communicated and understood, and implemented organization wide. The strategy should be compelling and easy for all to remember.

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CSP's Digital Transformation, from Telco to TechCO

According to the recent TM Forum Digital Transformation Tracker, most CSPs want to transform into a comprehensive digital technology company (TechCo) by providing end-to-end digital services. This article is an interview with George Glass, CTO of TM Forum, and SuYu, Chief Architect of Huawei Digital Operations Transformation about the driving force, strategic direction and path selection of CSPs' digital transformation. Mr. Suyu also discusses how the new Digital Operation Transformation Framework (DOTF) can be used to evaluate the maturity of digital operations.

A WinWin interview with George Glass, CTO, TM Forum and SuYu Chief Architect, Digital Operations Transformation, Huawei

WinWin Editor: Good afternoon gentlemen, and thank you for joining me today to talk about the implications of the latest research published by the TM Forum on the digital transformation of network service providers. Let me begin with George Glass, who is CTO with TM Forum.

WinWin Editor: George, I'd like to start with strategy. What does your research say about the current digital transformation aims of network operators?

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The transformation from Telco to TechCo requires some major changes in their processes. An overwhelming majority of the CSPs (52%) are aspiring to become full digital service providers offering a variety of end-to-end 2C and 2B services built on their existing telco capabilities and supplemented with capabilities from partners in different industries.

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George:

When embarking on digital transformation, it is important for a company to decide what type of digital business it is seeking to become. Digital aspirations vary across communications service providers -CSPs. TM Forum's most recent Digital Transformation Tracker, published in June, revealed that only 15% of the surveyed CSPs wish to stay as digital connectivity providers. Another 19% aspire to become multi-play operators, while 13.5% seek to become platform providers offering services by partnering with others. However, an overwhelming majority of the CSPs (52%) are aspiring to become full digital service providers offering a variety of end-to-end 2C and 2B services built on their existing telco capabilities and supplemented with capabilities from partners in different industries.

WinWin Editor: You mentioned 2B customers. How will the digital transformation of operators impact them?

George:

In a traditional CSP business, customers were unaware of the technology or vendor ecosystem that lay the foundation of the services they received. However, as CSPs evolve to become TechCos, delivering an entire gamut of digital services, there is a need to co-create value by collaborating with their 2B customers and their partners. As a result, a majority of CSPs believe that pushing technology functions closer to customers will help drive co-creation and this will in turn accelerate the Telco-to-TechCo evolution. This requires a fundamental restructuring to devolve the telco's centralized functions to become more customer facing.

WinWin Editor: This will clearly be a big change for operators. Why have they now decided to embark on such a journey?

George:

CSPs mostly view digital transformation as a key strategy to drive business value and improve customer experience. TM Forum has found that digital transformation is enabled and driven by several considerations.

- 5G advanced technologies are opening up a wide range of industry applications.
- The need to flexibly allocate and schedule computing, storage and network resources on demand.
- The need to reduce energy consumption for environmental and economic reasons.
- 10Gbits/sec, ultra-low latency, high availability connectivity can deliver more immersive experiences that connect the virtual and real worlds.
- Deterministic SLAs are now possible with scenario based slicing and elastic bandwidth to meet traffic and service demand in real time.
- The need for zero-wait provisioning and preventive maintenance to deliver zero-trouble experience.

WinWin Editor: Ok, so there's lots of technical reasons for pursuing digital transformation, but what benefits are operators seeking?

George:

That's a good question. After all, the whole point is to get business benefit, and not just invest in shiny technology. Our research shows that 69% of CSPs see improved operational efficiency as the most important. However, customer engagement is gaining in importance, with around 64% of CSPs now aiming to achieve stronger customer engagement. Thus, CSP's digital transformation primarily revolves around operations and digital services.

However, transformation has to be anchored in both what the customer wants and the CSP's own business goals. This is crucial as CSPs have to maintain a cautious approach about their business. In fact, our survey revealed that only 11% of CSPs reckon solid growth will come from expansion to TV, IoT and ICT,

as compared to 18.5% in 2020. Overall, the percentage of CSPs who expect at least some increase in revenues from IoT and ICT is just over half, at 55%.

WinWin Editor: It's clear that this is a challenging time for operators. Did you research reveal anything about the main obstacles facing operators as they pursue transformation?

George:
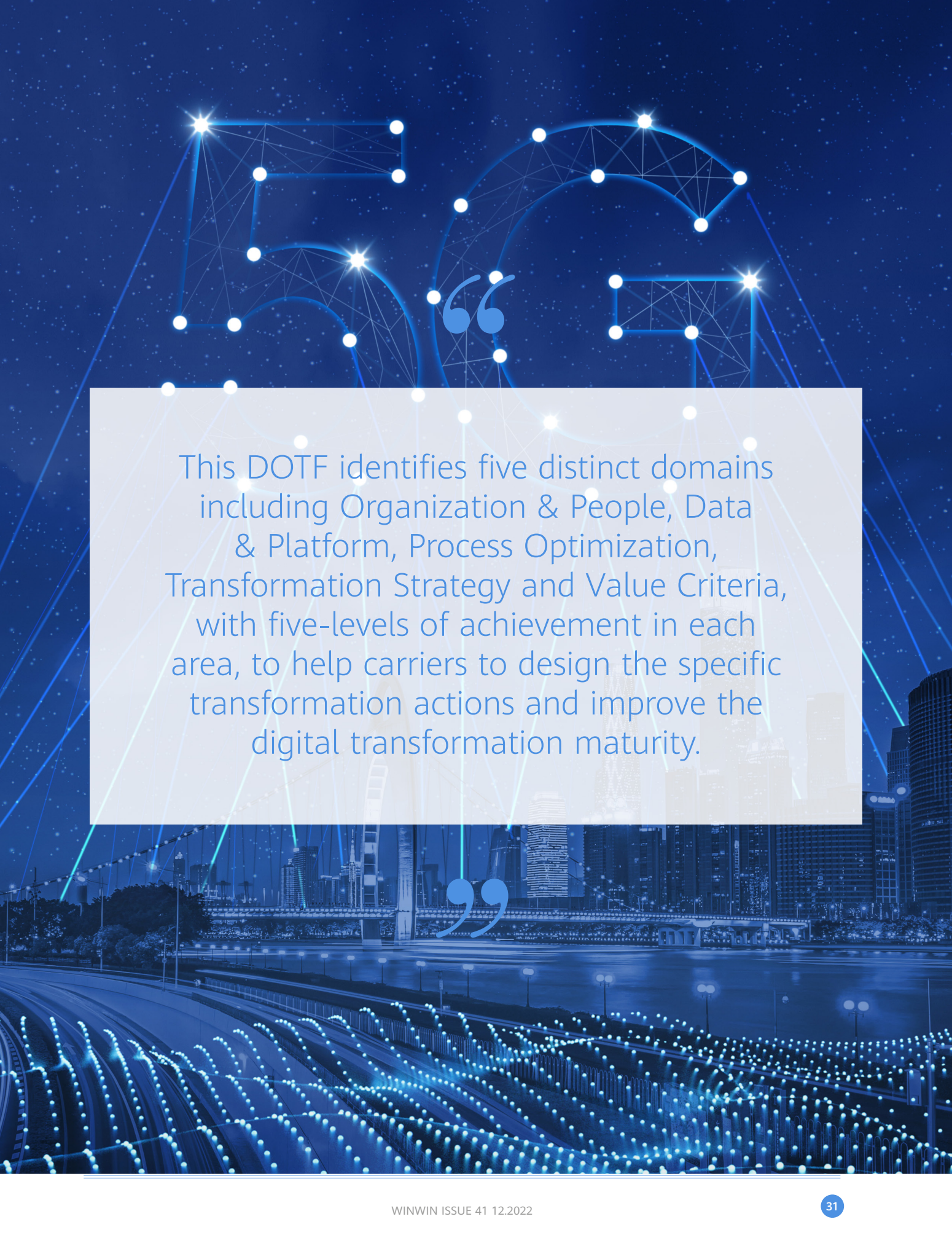
Yes, definitely, there are many obvious barriers to digital transformation. Firstly, CSPs see a lack of a clear, aligned vision as the biggest obstacle with 36% of the vote, while a lack of top management support is seen as a barrier by 34%. The lack of flexibility caused by legacy IT and skills shortage are also concerns.

Also, the transformation from Telco to TechCo requires some major changes in their processes. Automation was an absolute priority for over 82% of the CSPs as they seek to reduce the complexity and improve the consistency of their operations. Vendors must play a significant role in this by providing the technology and resources to support the desired changes, so it is important they are viewed as a partner rather than just a supplier. Then, the relationship will benefit them both as it leads to understanding the capabilities and delivering on the requirements in a more cooperative way. It is not surprising then, that a majority of CSPs (>55%) believe that a 'partner' approach will be beneficial.

WinWin Editor: As operator transformation progresses, what are the key trends you are seeing?

George:

Well, the first thing we are seeing is that as the legacy monolith architecture of a traditional telco evolves into a digital-driven business journey, CSPs are gaining value in terms of customer experience and digital touchpoints. The evolution is also marked by the adoption of cloud and open APIs, and the development of partner ecosystems and marketplaces. The journey is catalyzed by trends such as IoT and 5G. As telcos move up the ladder to emerge as TechCos, they can more deeply engage in cross-industry collaboration and more

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This DOTF identifies five distinct domains including Organization & People, Data & Platform, Process Optimization, Transformation Strategy and Value Criteria, with five-levels of achievement in each area, to help carriers to design the specific transformation actions and improve the digital transformation maturity.

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easily utilize the open source developer community and its innovations.

WinWin Editor: And finally, how is the introduction of 5G influencing the operators' transformation programmes?

George:

They are going hand-in-hand. Delivering differentiated customer experience is an important consideration for the Telcos operating in a 5G environment. With telcos evolving as next-gen digital technology providers, they must be capable of offering flexible products and services that suit the distinct requirements and real-time use cases of their 2B customers. For example, imagine an engineer at a manufacturing facility being guided remotely through an AR headset to repair a machine. Such a use-case can now be delivered by the ultra-high bandwidth and lower latency promised by 5G. This and similar use cases will have a huge impact across industry.

WinWin Editor: Thanks George for those insights. Its clear that operators can achieve significant business growth through digital transformation, although success will not come easily. So now let me turn to SuYu who is Chief Architect for Digital Operations Transformation at Huawei. He is part of a team working with operators world-wide to support their digital transformation efforts.

WinWin Editor: How is Huawei's services business helping operators to digitally transform their operations?

SuYu:

Well, while CSPs are usually clear about their digital transformation goals and the benefits they are seeking, they often lack clarity on where to begin and what elements to focus on. This is where Huawei can help.

Firstly, using the Digital Maturity Model from TM Forum we can get a baseline of an organization's existing digital maturity and help the CSPs identify and prioritise their maturity gaps. Then, aiming to accelerate digital operations transformation, Huawei and our carrier partners have developed the Digital Operations Transformation Framework (DOTF). This model

identifies five distinct domains including Organization & People, Data & Platform, Process Optimization, Transformation Strategy and Value Criteria, with five-levels of achievement in each area, to help carriers to design the specific transformation actions and improve the digital transformation maturity.

WinWin Editor: Oh, that's interesting. So, with this new model you must have a good insight into the current state of operators' transformation progress. Can you tell us where they are doing well, and maybe where they are struggling?

SuYu:

Yes. Based on our DOTF model I can tell you that most carriers are progressing well with the Strategy dimension. With an average score of 3.4, this is the highest across the 5 domains, and shows that carriers already have a clear strategy to guide their transformation work. Data & Platform is the second highest scoring dimension with a 3.3 average score, suggesting that carriers realize the importance of data and platform-based operations. The Process Optimization and Organization & People domains are relatively lagging. Process links digital capabilities to business outcomes, so optimizing processes to improve

working efficiency and quality must be a priority in the next stage of transformation. Finally, helping people develop new digital skills, and encouraging teams to introduce digital tools and practices remains vital for continuous progress.

WinWin Editor: So overall, are you optimistic about operators' prospects?

SuYu:

Absolutely yes! By following the DOTF sequence above, with a clear strategy and line of sight to business value, we have shown that it is definitely possible to deliver real business value with digital operations transformation; delivering both higher revenues and customer experiences while at the same time increasing operational efficiency.

WinWin Editor: Great – that's a positive note to end on. Thank you both for your time today.

Jointly Lighting up a Digital and Intelligent Future

Operators are moving from their own digital transformation to empower thousands of industries digitalization. Although the future is bright, they are also facing great challenges in digital transformation of services, operations, and methodologies. Based on the Arthur D. Hall's model, this article analyzes operators' upgrades in terms of time, logic, and knowledge. As a reliable partner of global operators, Huawei continuously increases digital investment based on the three horizon strategies, offering foundational platforms and technologies and opening up its data, automation, orchestration, and development capabilities. We will handle the complicated parts, and leave our partners and customers with simplicity.

By Tang Qibing,
President, Global Technical Service Department, Huawei

Have you ever wondered how the world will change over the next 10 years? According to Huawei's Intelligent World 2030 report, each person will use an average of 600 GB of mobile data each month, and 23% of homes will have access to 10 Gbit/s broadband. Digital transformation is expected to have a significant impact on the enterprise market, and human-machine collaboration will emerge as a new way of production.

As telecom operators shift their focus from digitalizing their own operations to empowering the digitalization of other industries, they will find themselves in a unique position characterized by new opportunities and challenges.

● **A new engine for business growth has not been developed:** Global telecom operators are investing in the development of new services while monetizing their traditional core services, with the hope of identifying one which will drive a second curve of business growth. However, diversification has not brought them strategic new services that can serve as a reliable source of income.

● **Operators are facing increasing O&M pressure:** As more and more services become available, networks are becoming increasingly complex, and customers are expecting better user experience. However, the challenge for all operators is that there aren't enough O&M engineers to manage this. Leading operators are using digital and intelligent technologies to increase the quality and efficiency of O&M, while transitioning to a future-oriented O&M model.

● **Understandings of digital transformation plans vary:** Different operators, and even different executives working for the same operator, can have different understandings of a digital transformation plan. Operators need to reach consensus on digital transformation goals, value and maturity evaluation criteria, path design, and high-value scenario selection. To effectively drive digital transformation of enterprises, the industry needs to develop generally accepted digital transformation methodologies.

It is clear that digital transformation is essential for operators to improve user experience, make operations more agile, maximize resource utilization, and grow new services. However, this is not easy. There are several reasons for this: The top-layer design is not systematic enough; no business goals are in place to drive the transformation; scenarios and paths are not clearly defined; measures are not well implemented. So to better embrace a digital and intelligent future, how should operators pursue transformation?

Digital transformation is a complex, systematic undertaking. Huawei believes that modern systems engineering methodologies can be used to address structural problems in business transformation.

The three-dimensional lean R&D systems engineering model, which is based on Arthur D. Hall's model,

offers a comprehensive framework for different service scenarios that can support instantiation of different types of features. This model can help telecom operators make upgrades across time, logic, and knowledge dimensions:

1. Business upgrades across the time dimension for new experience, new scenarios, and new value

The time dimension in Arthur D. Hall's model represents the end-to-end process of system engineering activities. The process is divided into seven phases: planning, solution formulation, development, production, installation, operation, and update. Operators need to apply the different phases of the system lifecycle to technology R&D, product R&D, service design, and business model planning, and build a "connectivity + X" product management system and operation and production system.

The following figure depicts an operator's three-track business strategy. Track 1 focuses on optimizing the business portfolio; track 1.5 focuses on expanding the target market; and track 2 focuses on developing new services. By integrating these tracks, the operator aims to grow along two S-shaped curves.
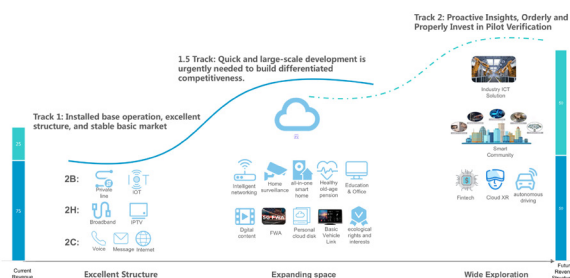
The key to a successful business upgrade is to build on security-native connectivity capabilities and jointly create new commodities by adopting the "connectivity + X" model. This will help operators offer better user experience, a range of new scenarios, and create value.

For example, operators in China have been building on 5G-enabled video calls to offer many new interactive features, such as simultaneous translation, conference

collaboration, and remote assistance. By providing specialized ultra-HD and AR functions, they have made 5G-enabled call services a strategic new service. In parts of Africa, Southern Asia, and the Middle East, Huawei has been working closely with operators to develop the mobile financial market. Currently, 390 million users have access to mobile financial services, and this number is expected to reach 2 billion by 2025. In the Middle East and China, operators are already providing end-to-end integration services that include network connection, DICT solutions, and consulting for industry markets, enabling more than 20 key industries to make significant improvements in production safety, efficiency, capacity, and environmental protection. These services are creating a global market worth US$4.7 trillion.

2. Upgrading operations across the logical dimension to drive human-machine collaboration

Arthur D. Hall's model divides problem solving into four domains of systems engineering: requirement, solution, verification, and physics. It describes the thinking activities of the subjective world in understanding and reconstructing the artificial physical system.

Similarly, operators' services and networks can be divided into five domains: planning, construction, maintenance, optimization, and operation. Operators can transform their O&M by upgrading their online services to automated and intelligent services to meet their business goals.

The key to successfully upgrading O&M models is to apply digital technologies to each phase to transition into a model that features human-machine collaboration. Many operators choose autonomous operation (AO) for network capability development in order to cope with O&M pressure stemming from service diversification and increasing network complexity. Huawei has already discussed the technical

viability of AO with many tier-1 operators across China, Europe, and Asia Pacific. Many believe that the O&M model based on human-machine collaboration will be feasible and have formulated short-, medium-, and long-term capability development plans.

AI will be an essential part of future O&M models. Human-machine collaboration is paramount to AI, as it will change the way people add value. Machines can automate many of the repetitive processes that people used to do, freeing up time for more creative and customer-facing work, as well as monitoring process execution.

3. Unifying assessment standards across the knowledge dimension

The knowledge dimension lists the disciplines that the two-dimensional systems engineering methodology can be applied to, from the most formal and mathematical in structure to the least: engineering, medicine, architecture, business, law, management, social sciences, and arts. In addition to common knowledge, each industry also needs knowledge of other disciplines and technologies of other domains.

Operators are shifting their focus from their own digital transformation to enabling the digitalization of other industries. If they still follow their conventional approach, it would be difficult for them to expand into the industry market. So industry standards organizations, operators, and industry partners need to jointly set digital transformation standards for different industries and upgrade knowledge and standards.

For example, at the recent Operations Transformation Forum (OTF) in Thailand, TM Forum worked together with Huawei and other industry partners to release the Digital Operations Transformation Framework, a digital operations maturity assessment model. TM Forum has also set standards for three digital and intelligent transformation capabilities that have garnered attention across the industry: Value Operation Framework (VOF), Autonomous Operations Maturity Model (AOMM), and Biz DevOps, an integrated standard for business, development, and operations. Huawei hopes that more standards organizations and industry partners will join efforts to set standards and push the industry forward.

Moving forward, Huawei Service plans to increase investment in digitalization following a "three-horizon" strategy:

Digital transformation is a systematic process that requires collaboration between Huawei, customers, industries, and partners. Huawei is already offering foundational platforms and technologies and opening up its data, automation, orchestration, and development capabilities. We will handle the complicated parts, and leave our partners and customers with simplicity. Huawei is ready to help operators succeed in transformation by following the "three-horizon" strategy.

● **Huawei's first horizon is to digitalize its own core businesses.** Over the past six years, Huawei has invested heavily in delivery processes, O&M platforms, and cyber security. One example of this is the Integrated Service Delivery Platform (ISDP) which integrates multiple isolated sub-systems, streamlines project delivery data flows, and automates the end-to-end process. The ISDP now supports the efficient and high-quality delivery of 1,500 networks worldwide.

● **Huawei's second horizon is to help telecom operators succeed.** For example, Huawei leveraged its open, flexible service orchestration platform to help an operator in Pakistan provide customized services that meet 80% of local requirements. The operator gained more than 200,000 clients, became the leading fintech service provider in the country, and increased its market share from 9% to 57%.

● **Huawei's third horizon is to work with operators to digitalize other industries.** Huawei is working with a Chinese operator to jointly expand the market by providing B2B services. The operator saw its revenue from the B2B market double in just three years.

Digital transformation is an ongoing journey. There is a saying in the Middle East that says who travels alone goes fast, who travels in company goes far. Let's work together to create a better future for digital transformation.

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Huawei is already offering foundational platforms and technologies and opening up its data, automation, orchestration, and development capabilities. We will handle the complicated parts, and leave our partners and customers with simplicity.

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Unleashing the Value of Digital Transformation, Moving Towards Digital Operations 2.0

As global digital transformation has deepened, enterprises have increasingly higher requirements on the capacity, quality, and computing power offered by carriers' networks. With the help of our proposed DigiVerse 2.0 solution our new Transformation Value Model Tree, this article will explain how carriers can unleash the value of digital transformation to profitably meet this demand. Firstly, by guiding them on a suitable digital transformation pathway, and secondly by helping them objectively evaluate the business value of each aspect of the transformation.

By Jacky Zhou,
Director of Services & Software Solution & Marketing Dept, Huawei

Strategies to develop the digital economy are currently being made by many nations around the world. As industry digitalization continues and the adoption of intelligent technologies becomes more widespread, the physical and virtual worlds will continue to converge, creating a wave of new digital services. According to a recent third-party survey, the global digital economy is growing by 15.7% year-on-year and the number of companies that have adopted digital transformation strategies has increased by 42%. By 2030, industrial applications of artificial intelligence (AI), and mature immersive digital services are expected to become commonplace, further driving digital transformation. For carriers, this makes digital transformation the biggest opportunity they will see over the next decade.

> The value of digital transformation can be measured at three levels – capability value, service value, and business value. In this model, capability value is like the roots of an apple tree, as it reflects carriers' ability to agilely seize future market opportunities. Service value is like the trunk of that apple tree, as it represents business benefits like quality, efficiency, and product competitiveness. Business value is then represented by the fruit of the apple tree, as it is the commercial value brought by digital transformation.

Digital technologies like 5.5G, AI, cloud computing, and digital twin will enable new applications across different scenarios that can meet the wide variety of industry requirements that are expected to emerge. These technologies will be able to deliver superior customer experiences and support enhanced O&M models, while empowering new business models and services. For example, we will see multi-sensor communication in consumer applications, holographic education and conferencing in the home, and all-AI productivity centers in the enterprise. All of these scenarios will demand ever greater capacity, quality, and computing power from carrier networks.

To address both the opportunities and challenges presented by the digital economy, telecom carriers are now racing to introduce their own digital transformation strategies. From what we've seen so far, these strategies usually focus on three core components:

First, digital service transformation. As data reshapes their value chains, carriers will need to go beyond connectivity services and provide offerings that combine connectivity and digital services, such as FinTech services, Communications Platform as a Service (CPaaS) offerings, and vertical services. We expect these digital services to eventually account for 40–60% of total carrier revenue.
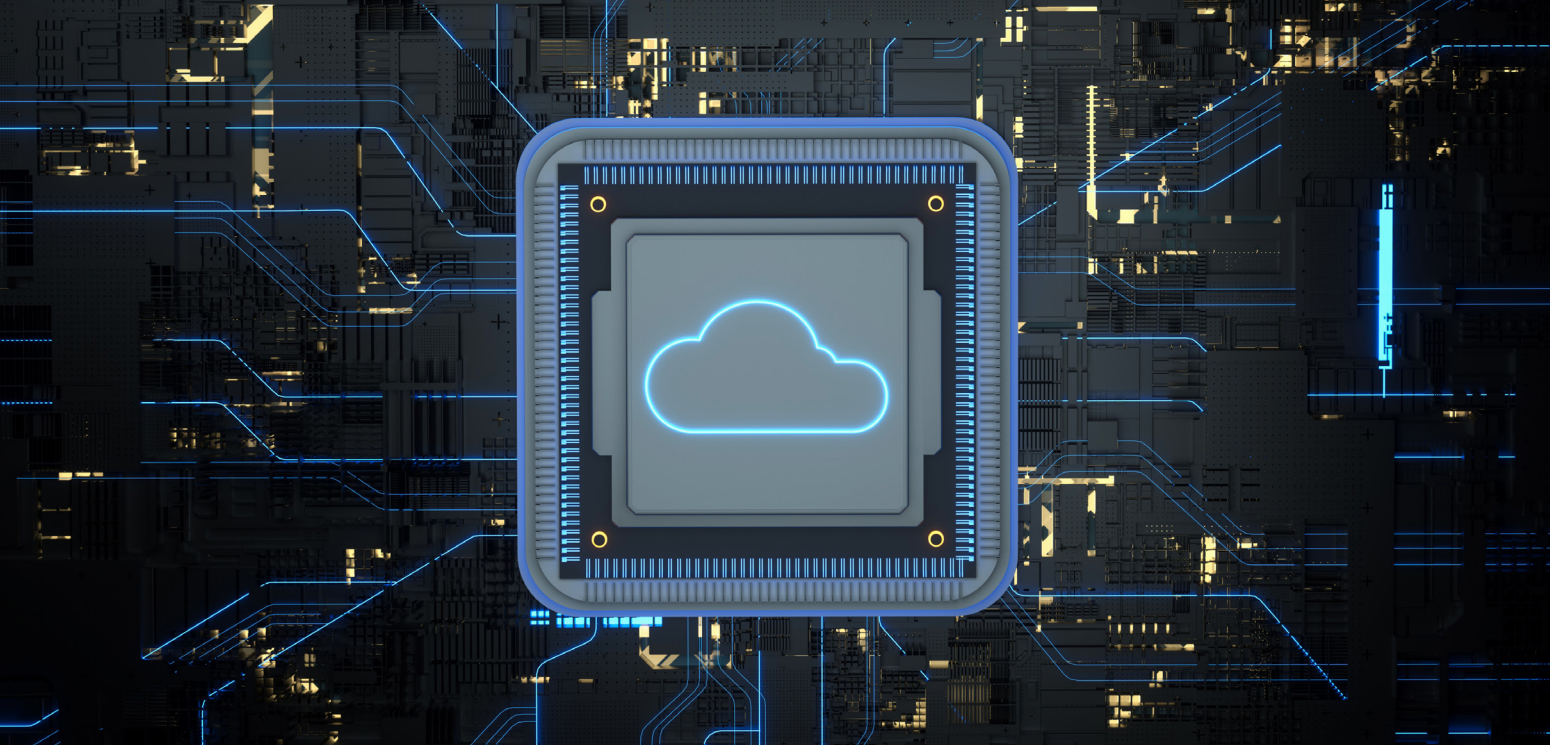
Second, digital operation transformation. New digital operation models will be required if carriers want to make new services more agile and productive. By unlocking the full value of smart data, carriers will be able to shift from network-oriented operation models to customer-oriented models. Up to 80% of future carrier business decisions will likely be driven by data, further promoting value-based operations.

Finally, digital infrastructure transformation. Carriers are currently focusing on transforming their infrastructure to make it smarter, greener, more reliable, and more efficient.

At Huawei's Operations Transformation Forum (OTF 2022), recently held in Bangkok, dozens of carriers shared their digital transformation strategies and the results they have already achieved. AIS Thailand, for example, shared its strategic goal to evolve from a traditional telco into a cognitive telco. During the early stage of its digital transformation journey, AIS Thailand has already made huge progress in data-driven experiences and zero-touch O&M, achieving a 15% increase in its call centers' first contact resolution rate, an 18% drop in its churn rate, a 25% increase in its fault diagnosis rate, and an end-to-end fault diagnosis rate of over 95%. Now, in the current phase of its strategy, AIS is planning to further deepen its digital transformation in the enterprise field. It estimates

that 20% of its revenue will eventually come from its enterprise business.

Another interesting case shared during OTF 2022 was from Indonesia, which is known for its very large youth population. The Indonesian government recently launched an aggressive digital transformation strategy which is being complemented by similar strategies from its leading carriers. XL Axiata, for example, has launched its Digital Transformation 2.0 strategy in response to the ongoing pandemic and intensifying market competition. Through its "4 Rights" smart operation model driven by converged data, this strategy has helped XL Axiata achieve precision marketing and improved O&M efficiency. The "4 Rights" model uses data analytics to make the right offer, to the right people, at the right time, and on the right channel. This model has significantly improved the carrier's Average Revenue Per User (ARPU) and dataflow of usage (DoU). XL Axiata has also been using data analytics to guide investment decisions. By analyzing customer experiences and trends, the carrier has been able to identify the right areas, right schedule, and right solutions for site construction to maximize the network utilization and ROI of its network investments. Within just one year, XL Axiata has achieved a 48% decline in customer complaints and a double-digit improvement in transactional net promoter scores (tNPS).

The three-layer digital transformation strategies we are seeing many carriers adopt often combine CBA (customer, business, and architecture) and ABC (AI, big data, and cloud platforms). Integrating business and technology in this way is allowing digital transformation to make a deeper impact on carriers, allowing them to address increasingly high value scenarios. Of course, measuring the true value delivered by digital transformation remains difficult. At Huawei, we believe the value of digital transformation can be measured at three levels – capability value, service value, and business value. This view is captured in the Transformation Value Model Tree (TVM Tree) which we launched at OTF 2022 to help carriers objectively and comprehensively measure and evaluate the value of digital transformation, considering both short-term benefits and long-term development. In this model, capability value is like the roots of an apple tree, as it reflects carriers' ability to agilely seize future market opportunities. Service value is like the trunk of that apple tree, as it represents business benefits like quality, efficiency, and product competitiveness. Business value is then represented by the fruit of the apple tree, as it is the commercial value brought by digital transformation.

Looking towards the future, Huawei has proposed a DigiVerse 2.0 Solution to further unleash the business value of digital transformation based on carrier's digital transformation strategies and our three-layer digital transformation value model. DigiVerse 2.0 emphasizes for complementary aspects of digital transformation:

First, it emphasizes a shift from clean data to smart data to further maximize the value of data assets.

Second, it helps build a target network architecture for cloud transformation while prioritizing the security of core assets and the efficiency of application assets.

Third, it helps single-scenario solutions evolve into collaborative cross-scenario solutions. Business-network collaboration, for example, promotes the development of high-quality services, while experience-maintenance-optimization collaboration supports ultimate user experiences and closed-loop O&M.

Fourth, DigiVerse 2.0 focuses on the expansion from consumer and home business to include enterprise business. This will allow carriers to innovate and increase revenue from the large industrial market.

As a long-standing partner of many telecom carriers, Huawei has invested in digital transformation operation centers around the world to ensure their successful digital transformation. To date, Huawei has established regional digital transformation operation centers in seven regions: Asia-Pacific, the Middle East, South Africa, Northern Africa, Latin America, Europe, and China. These centers provide carriers with enablement, adoption, and consulting services to promote digital transformation and continuously unleash its value to ensure carrier business success.

+ IT, New Growth: HUAWEI CLOUD Enabling Carriers for Business Success

In the era of cloud transformation, based on 30 years of experience in the telecom industry and rich practices in cloud transformation projects, Huawei designed carrier scenario-based HUAWEI CLOUD solutions to help carriers achieve connection monetization, service innovation, and operation efficiency improvement.

By Chen Xuejun,
Director of Carrier IT Marketing & Solution Sales Dept, Huawei

With the development of technologies such as 5G, Cloud Computing, Big Data and Edge Computing, cloud transformation has become a common choice for global telecom operators. According to Gartner's report, global carriers will increase their IT infrastructure investment in cloud transformation at a compound annual growth rate (CAGR) of 27% in the next five years.

Based on 30 years of experience in the telecom industry and rich practices in cloud transformation projects, Huawei has identified the critical factors for carriers' successful cloud transformation. Carriers need to plan cloud transformation strategies, paths, and partner selection according to their own telecom characteristics. Specifically, three aspects are described as follows:

• Cloud transformation strategies should be formulated based on carriers' own strength

First of all, the biggest advantage of carriers lies in connectivity. Therefore, the cloud transformation should adopt the "Connectivity + Cloud" strategy based on the principle of maximizing the value of connectivity assets, so as to build unique competitiveness in the market. Second, carriers have the advantages of digital applications, massive number of users, and omni-channel. The goal of carriers' cloud transformation is to promote agile development and rapid rollout of innovative applications and develop users in the digital market. Finally, carriers need to improve operation efficiency and provide an efficient and reliable cloud-based operation support system for the continuous expansion of business services.

• The path of cloud transformation should be selected based on the principle of "data security, system stability, and service agility"

Carrier networks run multiple IT systems, such as BSS, OSS, MSS, and Internet applications. Cloud transformation does not simply migrate these systems to the cloud. Instead, we need to determine whether to migrate these systems to the cloud, when to migrate them to the cloud, and what type of cloud to migrate to. To answer whether to migrate a system to the cloud, evaluate whether to migrate the system to the cloud from the technical perspective and business value,

and consider factors such as complexity, migration difficulty, system architecture, and business benefits. As considering the right time to migrate to the cloud, carriers should adhere to the principles of non-mission critical applications before mission critical ones, simple applications before complex ones. As for the cloud to be migrated to, we should consider application data security, service agility and experience requirements, and TCO. Based on those factors, we can choose hybrid cloud, public cloud, and/or edge cloud to move forward.

• Find trusted, capable, and experienced partners to cooperate with as the best partner selection strategy

The partners should have the same strategic goals as the carrier, no competition relationship. For instance, partner should have rich knowledge of the telecom industry, both CT and IT solutions, and delivery service capabilities. Furthermore, the partners need to have rich successful practical experience in the industry. Based on the characteristics of the telecom industry, carriers require partners to provide not only remote services, but also on-site service support when necessary. Therefore, partners must have sufficient local service capabilities to help carriers solve various difficulties encountered during transformation, such as organization management, process, employee training, and on-site services that are ready to respond to urgent problems, etc.

Huawei continues to provide high-quality services to global carriers, and provides leading ICT solutions and local support services around the world. Huawei is an ideal partner for carriers' cloud transformation.

Carrier scenario-based HUAWEI CLOUD solutions are designed to meet the actual requirements and characteristics of the telecom industry. It focuses on helping carriers achieve three goals, connection monetization, service innovation, and operation efficiency improvement.

1."Connection + Cloud" expands the scope of connection monetization

Fully understanding of connectivity and the cloud-network synergy solution, HUAWEI CLOUD helps carriers expand the service and market boundaries related to connectivity and maximize the market value. For ToB industry customers in China, HUAWEI CLOUD uses the "Cloud + Network + Security" integrated deployment solution to expand the scope of traditional private line solutions and provide comprehensive ICT solutions for enterprise customers, as a result, achieved revenue growth by several times. To meet industry security compliance requirements, Huawei provides a resource isolation solution of a private network and a dedicated resource pool. In addition, Huawei uses E2E private network slicing technologies to achieve 99.999% network reliability and ultra-low network latency. As conclusion, Huawei provides cloud and intra-cloud security assurance services, on and off-cloud collaboration with end-to-end security assurance services.

2."Service + Cloud" accelerates service innovation

With experience in the telecom industry and advanced cloud platform capabilities, HUAWEI CLOUD enables carriers to develop innovative services agilely and quickly to the market. In order for carriers to double their innovation speed in the digital era, it requires to

combine the industry experience, service capabilities, and cloud technologies all together. Huawei has accumulated more than 30 years of experience in the telecom industry and service innovation practices in the connectivity field. With cloud services, carriers can achieve faster time to market (TTM) and market efficiency in service innovation, and increase revenue from new services. In Africa, the mobile wallet platform is deployed on HUAWEI CLOUD. The service rollout time is shortened from several months to several weeks. In addition, the HUAWEI CLOUD ecosystem can be shared, and the ecosystem rollout time is shortened from several months to one week. Telecom carriers have their own core telecom industry applications, such as Billing, OCS, and CEM. These core applications have unique requirements on cloud infrastructure. For example, most of the billing systems use the memory cache technology and require large-memory VMs on the cloud infrastructure. Another example is that after the cloud-native billing system's "multi-active" solution deploying on the cloud, the cloud platform must have cross-domain high-speed container channels. Huawei has been developing these core telecom applications for more than 20 years. Compared with other public cloud vendors, Huawei has a deeper understanding of these core telecom applications and uses customized, pre-integrated HUAWEI CLOUD telecom industry solutions to better meet these requirements, enabling core telecom applications to be migrated to the cloud to generate more business values.

3."Operation + Cloud" improves operation efficiency

HUAWEI CLOUD uses the pre-optimized cloud solution to improve the operation efficiency of basic telecom services, increase the number of users, increase the ARPU, and drive the continuous growth of main services. Huawei's logical data lake solution uses the Hetu engine to implement collaborative data analysis without data migration, greatly improving cross-domain performance and reducing the analysis time from minutes to seconds. The HUAWEI CLOUD Stack (HCS) + HUAWEI CLOUD distributed solution is used to store key data locally, ensuring data security and compliance, meeting low latency requirements. Let's

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> Only when carriers take full advantage of telecom industry knowhow, combine cloud technologies that enable the telecom industry, and select the best partners who could understand the telecom industry business, they can seize the opportunities in cloud transformation journey.
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take a carrier in Asia as an example. The number of 5G network users for this carrier accounts for only 10% of all 5G users initially. Huawei uses the logical data lake solution to implement real-time collaborative analysis of data in the BSS and OSS domains, improving service operation efficiency and increasing the 5G user marketing campaign success rate by 180%.

Based on years of telecom industry understanding, cloud migration practices, and cloud technology capabilities, Huawei is able to provide cloud transformation consulting and planning services more closely related to the telecom industry requirements. Over the past decades, carriers have continuously invested in and locally deployed IT infrastructures. During cloud transformation, Huawei will consider reusing carriers' existing investments and give full play to carriers' advantages, such as telecom networks, applications, and data. In addition, Huawei will investigate and analyze carriers' current situation. Based on the overall assessment of strategic planning and service status quo, Huawei will provide customized cloud blueprints and migration planning for carriers, and help carriers smoothly implement cloud transformation to minimize risks.

Currently, HUAWEI CLOUD has world-leading global cloud infrastructure, telecom industry solutions, delivery services, and operation capabilities. It provides distributed cloud architecture and solutions for cloud stack, public cloud, and edge cloud, and supports local deployment. Huawei ensures data security compliance and provides more comprehensive local deployment of high-level cloud services, such as databases, big data, and containers. The local cloud user experience is the same as that of the public, meeting the cloud transformation requirements of telecom services.

The vehicle of cloud transformation is moving forward. Only when carriers take full advantage of telecom industry knowhow, combine cloud technologies that enable the telecom industry, and select the best partners who could understand the telecom industry business, they can seize the opportunities in cloud transformation journey. Over the past 30 years, Huawei has worked with global carriers. By the end of 2022, Huawei has carried out in-depth cloud transformation cooperation with more than 140 carriers around the globe, in which both carriers and Huawei are jointly pioneering the successful cloud transformation journey and creating new business growth in the cloud era.

Thailand AIS: Building New Digital Growth Engine towards Cognitive TechCo

To address its business challenges, AIS formulated a digital transformation strategy to evolve from a digital service provider to become a Cognitive TechCo. This included implementing a data-driven 5G development strategy to support the rapid introduction and adoption of 5G 2C and 2B services. In this article, Tanapong Ittisakulchai, Chief Enterprise Business Officer at AIS, will share the remarkable achievements of their digital transformation strategy in terms of O&M efficiency improvement, experience improvement, and revenue growth.

By Tanapong Ittisakulchai,
Chief Enterprise Business Officer (CEBO), AIS

AIS Thailand is the No.1 operator in Thailand and the first to launch 5G in the country. With nearly 45 million subscribers, of which more than 70% are active data users, the AIS mobile network covers 98% of the country's population. We deliver advanced connectivity and a wide range of digital content and services powered by AIS' high-speed 4G and 5G networks. However, we realize the need to evolve further to address the dynamic requirements of the industry and drive our growth to the next level. With this goal, we are advancing from being a digital service provider to become a Cognitive Tech-Co.

During our transformation journey, we are leveraging advanced technologies like data analytics and artificial intelligence (AI) to build innovative cognitive platforms that enable high levels of automation and intuitive decision-making capabilities. This is chiefly driven by our aspiration to build better capabilities to understand customer requirements and thus create the best value from our offerings. Our mission also aligns with the Thailand 4.0 Strategy that places great focus on accelerating the digital transformation of Thailand's businesses. Through this transformation, AIS aims to emerge as a trusted smart digital partner for Thai organizations and businesses by offering a comprehensive suite of digital services built around modern technologies.

Challenges for AIS business, to become a TechCo under VUCA

We are operating in a business environment filled with volatility, uncertainty, complexity and ambiguity (VUCA) in both consumer and enterprise segments. Inflation and other economic uncertainties are greatly impacting present-day businesses, so they are looking for partners who can help them overcome the VUCA challenges. We, as a business, are also confronting the same challenges, so we have adopted an intelligent technology-driven approach that will help us navigate these challenges successfully while also delivering distinctive customer experience across mobile, fixed broadband, enterprise and digital services.

We are working on four strategies to help us pursue the TechCo journey in the VUCA period: Clear vision, agility & adaptability, data-driven and innovation. Firstly, we have set clear goals and benchmarks to pursue our vision which are communicated across our team. Secondly, we must have the ability to rapidly innovate and build new capabilities to address emerging requirements demanded by today's dynamic market environment. Thirdly, we are developing a data-centric approach that aligns with our mission and helps us build agile, customer-centric and intelligent business strategies that empower our people with better insights to support the needs of our customers. Finally, we are also striving to build zero-touch operations to automate our processes and improve efficiency.

AIS digital transformation achievements: Experience-driven and zero-touch operations

AIS' customer experience-focused digital transformation journey has delivered significant improvements to our processes and created tangible business value.

Our agile O&M has contributed to great improvements in operation efficiency measured by First Call Resolution (FCR), First Time Resolution (FTR) and Average Handle Time (AHT). In fact, during the first year of our transition, FCR improved by 15 percent while AHT reduced by 25%. There was also significant improvement in FTR, growing from 47% to 63%.

Our experience-driven operations now proactively identify and help customers suffering poor experience, leading to great improvements in customer satisfaction. As a result, our churn rate has reduced by 18%, and with VIP Proactive Care, VIP complaints have reduced by 14%. Furthermore, with an effective data monetization strategy built around pillars like AIS Play, Zeed 5G, AIS 5G Insurance and VGI Advertisement, AIS has achieved several millions growth in data monetization revenue.

AIS' journey towards achieving zero-touch operations is highly ambitious. During 2018-20 when we shifted from manual to automated operations, we implemented over 1000 automated rules, which increased the Front Office (FO) efficiency by 25%. During 2021-22, when we moved from alarm-oriented processes to service-oriented operations, we further reduced revenue loss and increased FO efficiency by a further 10%. Now, as we move onwards to introduce fully zero-touch operations, we aim to improve end-to-end fault handling automation to over 95%, mainly driven by AI-enabled alarm analytics and risk prediction capabilities. In a nutshell, our intelligent O&M transformation builds on three capabilities: Platform evolution, process optimization, and organization & talent transformation. At the core of this evolution is Huawei SmartCare that provides us with a unified data platform bridging data silos and driving digital O&M capabilities. Process optimization is achieved through man-machine collaboration largely in automatic root cause

identification and service impact analysis. Organization & talent transformation is achieved with the following three smart strategies:

● **FO skills integration:** Skills are combined in two groups. The separate MBB, fixed access and Tx teams have been combined into one team, while the Core, IG, IR and IP Core have been combined into a second team.

● **NOC+SOC Synergy:** Complaint handling is achieved through network element (NE) problem demarcation, and incident handling is achieved through service impact analysis.

● **New DevOps Roles:** New roles such as Network Strategist, Data Analyst and Application Orchestrator have been created to support our evolution.

AIS Digital Transformation plan, consumers' digital life and enterprises' digital platform

AIS' future plans revolve around enabling a digital lifestyle for consumers, focusing on enterprise or '2B' solutions, and providing digital platforms for enterprises/ businesses in Thailand.

● **5G for consumers:** We are evolving to become the best digital experience enabler for consumers by advancing connectivity and leveraging the metaverse to unlock the future of augmented reality, immersive experiences, gaming and entertainment. V-Avenue.Co from AIS was the world's first virtual store where leading shopping malls and SMEs can showcase and offer their products through VR on Thailand's best and most advanced AIS 5G network, allowing customers to enjoy their shopping anytime, from anywhere — just like they are taking a walk at a shopping mall.

● **5G for 2B customers:** We are enabling digital transformation across a wide range of industries like smart manufacturing, retail, real estate, transport & logistics, agriculture and more. Built on the latest capabilities in cloud, IoT, analytics, and security, these solutions significantly contribute to opex and capex optimization. Here are some examples:

● In smart automation we have used the latest technologies like 3D vision-robotic ARM, AS/RS warehouse, and unmanned AGVs to improve space utilization by 60% and reduce opex by 30%.

● Our omnichannel retail solution delivers a mashup of digital and physical experiences by leveraging AIS V-Avenue.

● In healthcare, our AIS Smart Health solutions enable healthcare providers to build a one-stop ICT and digital platform to support their remote healthcare services requirements.
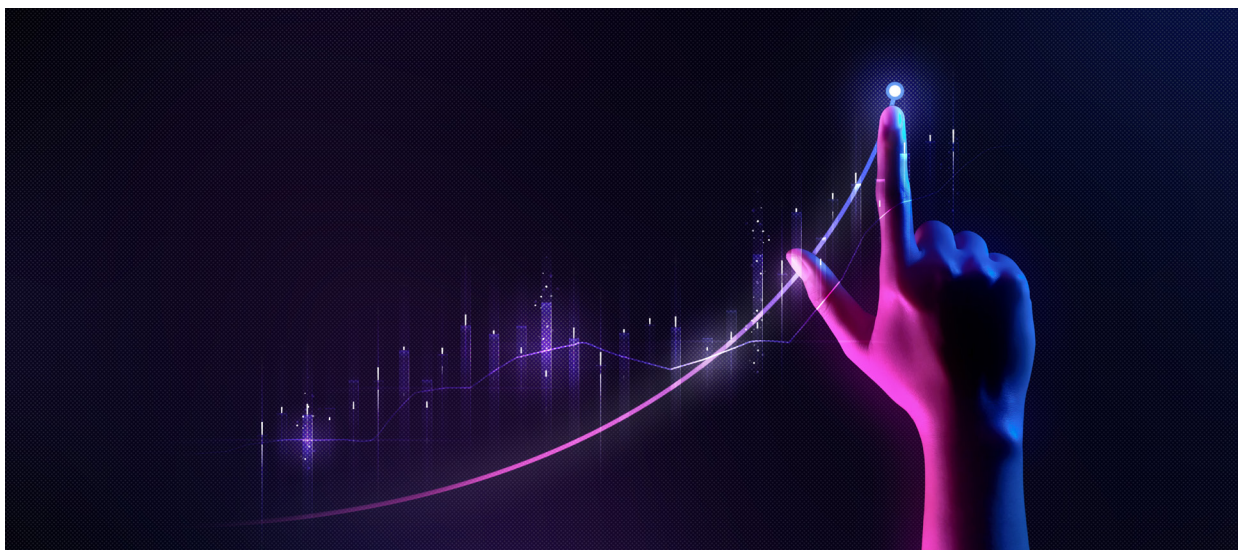
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> Data integration and intelligence is pivotal in the digital transformation journey of both telcos and their enterprise customers.
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- In transportation and logistics, we extensively leverage IoT to enable innovative types of insurance services based on real usage.
- For the agriculture sector, a combination of IoT, analytics and cloud-based applications enable smart farm solutions that can increase productivity by 20% while reducing resource usage by 30%.

2B solutions are emerging as a major component in our services revenue. In addition, we have also built a data monetization model covering several areas like location insights, customer insights, market & competition analysis and target audience selection. Location insight use cases include branch & store analysis, in-mall footfall analysis, new store discovery, public billboard audience measurement, and population density & drift. Customer insight data can be used to measure customer mobility, including commute & transportation, customer segmentation and customer journey analysis. Another major area is market & competition analysis that delivers insights for market

share analysis, competitor & customer behaviour analysis, trend & journey analysis and associated correlation analysis. Lastly, with target audience data, we provide businesses with over 150 attributes for audience profiling. This anonymised data can also be used for persona development and to prepare audience lookalikes.

Convergent data drives 5G development

AIS' data strategy is proving vital across all areas of 5G development, including investment, acquisition and marketing. 'Intelligence' has emerged as the common factor in each strategy. A Business Intelligence (BI-based) smart investment strategy is applied in network selection and construction. Rule-based algorithms help identify high-value areas where the most profitable sites can be constructed, thereby improving revenue

per site by 20%. Artificial Intelligence (AI), which is extensively applied in customer acquisition, identifies different behaviours through model training which can then be applied in subscriber growth strategies. With our AI-based customer acquisition strategy, we have achieved a sharp rise in our 5G customer base from 1 million to 4 million, and this is still growing. Data Intelligence (DI) applied across marketing has greatly helped in improving high value package conversion rate. By applying intelligence across people, place, product and experience, next best actions can be automatically generated to maximise customer adoption of offers. This DI strategy has brought significant growth, leading to an increase of 10-15%, in our 5G ARPU.

All of these examples show that data integration and intelligence is pivotal in the digital transformation journey of both telcos and their enterprise customers.

The 5G evolution has just started, and we still have a long way to go. However, we feel that a roadmap built on data and intelligence will continue delivering value even as the 5G landscape grows bigger and more complex.

From SoC to Digital CEx, Our New Normal Digital Experience

stc embarked on a customer-centric digital strategy long before the pandemic. Then during the pandemic, when the entire world switched to digital mode and every ordinary household embraced digital in one form or another, their strategy paid off well. In this article, Mohammed Alsalem, General Manager for CCEx Strategy and Anlysis at stc, shares how they implemented their customer-centric digital strategy. This included setting up an enterprise-level digital customer experience management system, building a powerful experience management platform centered on a Service Operation Center (SOC), and focusing on digital customer experience to improve internal operational efficiency and develop new digital services for the 5G era.

By Mohammed Alsalem,
General Manager, CCEx Strategy and Analysis, stc

Digital transformation has been the prime focus for stc over the past few years. The stimulus given by the Kingdom of Saudi Arabia and the visionaries who realize the importance of digital technologies in transforming the economy gave a new impetus to our digital mission. In fact, stc had embarked on customer-centric digital strategy long before the pandemic. These strategies also align with Saudi Vision 2030 that aims to transform the country from a traditional economy to a digital economy, by encouraging digital customer experience from all aspects. During the pandemic, when the entire world switched to digital mode and every ordinary household embraced digital in one form or the other,

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Customer centricity with a 360-degree view approach not only improves operational efficiency but also impacts Capex, revenue and profit while enhancing customer satisfaction and loyalty.

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our strategy paid off well. We are pursuing that journey with accelerated momentum powered by innovative strategies that help us scale our digital mission to a new level and drive our journey to become the best digital experience provider in the region.

Digital experience is not optional any more

With digital experience emerging as a major driver to support growth, it is clear that governments, businesses, telcos and other organizations can no longer view customer experience as an option, it has now emerged as an imperative to survive. Like many other leading countries, KSA has set a clear agenda to address customer experience issues from the core. A general department in CITC (Communication & Information Technology Commission) has been created with a customer experience focus. CITC has also started publishing CEx awards and benchmarks. The regulatory authority has also developed the CEx complaints mechanism to focus on customer issues. These initiatives have emerged as a major driver for not only stc but also other operators to adopt customer experience at the center of their digital strategy.

At the same time, we also need to look at how customer behavior is evolving in the new normal. Customers are increasingly becoming more demanding for digital, and the willingness to forgive bad experiences that was seen at the beginning of the pandemic has gone. They have developed higher expectations for digital experience that brands deliver to them. Responsiveness, reliability and intuitiveness have emerged as critical factors to ensure that customers are having good digital experience. If we look at digital native companies which have moved up the ladder, we see that they have established a focused, customer-first operating model, and they believe customer centricity is the most important characteristic that helps them establish a truly digital native culture for the long term.

Huawei and TMF accelerate stc's customer-centric digital journey

Back in 2018, we launched one of the most significant initiatives in our digital transformation journey. In fact, this initiative named DARE laid the foundation for around 170 projects that we have been pursuing across different business areas. The acronym DARE highlights the scope of the project as: Digitalize stc, Accelerate core assist performance, Reinvent customer experience at World-class standards, and Expand aggressively in scale and scope. Pursuant to this, in 2019, stc, in partnership with Huawei and TM Forum, implemented a customer experience transformation program titled CCEx. This program leverages Huawei's SmartCare platform, comprising customer experience management, network performance management and service quality management, and is guided by TM Forum's Business Process Framework (eTOM) to scope the project and the Customer Experience Maturity Model toolkit to define its capabilities. The scope of the project also covers establishing a unified model for the customer lifecycle; some 178 customer journeys have now been certified across all touchpoints based on TM Forum's Lifecycle Metrics standard. The whole idea of the project is to have an industry standard-led implementation that guides us to build a customer centric approach with a business focus to drive digital transformation. It has helped us build standard definitions and metrics across different units and gain a holistic customer view.

Customer Experience strategies to drive Opex and Capex

Customer experience programs are evolving quickly around data analytics. Predictive platforms now allow companies to better measure and manage their customer experience performance. Predictive analytics leverages comprehensive, connected and dynamic customer-level data sets to map and track

customer behavior across interactions, transactions and operations. By leveraging predictive analysis across the entire customer journey, telcos can gain a thorough understanding of individual customer experience. Predictive scores are assigned for each customer based on journey features to assess the ROX (Return on Experience) for particular customer experience investments which can then be tied directly to customer experience initiatives for valuable business outcomes. At the next level, information, insights and suggestions are shared with key stakeholders about the actions they should take to personalize customer experience and improve customer experience outcomes.

The biggest advantage of this predictive model of customer experience is that the near-real-time nature of the insights uplifts satisfaction level, reduces churn, and improves ROX. Thus, with this predictive model, we are talking about a customer-journey-based operational model that is impacting everything. It starts with building a foundation on data by capturing as much relevant data as possible to gain visibility. The next step is to focus on building a customer centric operating model as opposed to a service-centric model, which ultimately places customer experience management at the heart of the company's operations. Thus, CEx programs of the future will be holistic, predictive, precise and clearly tied to business outcomes.

Unified customer experience management

stc believes that establishing a 360-degree view of customer insights is important for driving Opex optimization and achieving customer experience goals. stc has implemented a 360-degree view across marketing & sales and customer services among others as part of optimizing our operation model. Combining customer insights with business insights, we can improve decision making. Huawei SmartCare offers very important operational use cases for this, especially in terms of Opex optimization in marketing campaigns, and hence generating incremental revenue. Upon successful completion of the project in 2021, CCEx now provides a 360-degree view of the customer and fosters a customer-centric culture at stc. Of course, at some point, you should also use this strategy to optimize the design of your network as well as to influence the decision for the next investment. Thus, customer centricity with a 360-degree view approach not only improves operational efficiency but also impacts Capex, revenue and profit while enhancing customer satisfaction and loyalty.

stc digital transformation in 5G era

The new era of digital transformation also calls for innovative strategies around B2B, Cloud, and IoT, in addition to cross-domain collaboration to enable the numerous use cases around 5G. With this understanding, stc has modified its DARE strategy to DARE 2.0. As part of this, we have invested in trending technologies like artificial intelligence (AI), internet of things (IoT), cloud, big data, virtualization and augmented/virtual reality (AR/VR). This strategy demands even greater focus on customer experience, especially considering the mission-critical nature of several applications and the demand for high levels of service quality across many IoT use cases. For example, telehealth has emerged as a focus area for stc after the pandemic. With the aim of delivering quality care at an affordable cost, stc is collaborating with leading partners in the health ecosystem. In a similar manner, we are also developing our IoT capacity to support

applications across smart city, logistics, public service, smart home, industrial automation and more. We have also built a cloud-ready framework to facilitate a stable service ecosystem for the B2B sector. With this, we can deliver solutions that scale on demand as customer needs change and market demands evolve. Customers can build models based on new cloud technologies, which were once considered too complicated and unmanageable, and take full advantage of the benefits of Software as a Service (SaaS).

In today's uncertain economic climate, cost optimization is increasingly becoming one of the focus areas for telecom operators. We believe that an agile approach with automated processes, deployment of new applications, and data-driven decisions will result in faster ROX and a competitive advantage in today's fast-paced digital environment.

China Mobile Zhejiang Accelerates O&M Digital Transformation to Strengthen its 5G Foundation

As a leader in 5G development, China Mobile Zhejiang is facing challenges such as network capabilities, user experience, and network energy saving while 5G has become a new economic engine. This article will share how China Mobile Zhejiang builds a leading green and intelligent 5G high-quality network based on agile and efficient network collaboration, ultimate user experience, and accurate O&M and energy saving. In addition, how to comprehensively promote the development of enterprise operation, O&M, quality, and energy efficiency through the intelligent transformation of operation data.

By China Mobile Zhejiang

China Mobile Zhejiang, a leader in 5G development, has made some remarkable progress over the past three years in terms of 5G construction speed, coverage, and depth of industry engagement. This has helped establish Zhejiang as a national pilot area for 5G network rollout, as well as a demonstration area for innovative 5G applications.

China Mobile Zhejiang now provides 5G coverage to every one of the province's 20,226 administrative villages, and has more than 25 million 5G users across the whole of Zhejiang province. As a result of our efforts to facilitate an intelligent Asian Games, our 5G+ Intelligent Asian Games solutions won best solution awards in six out of ten categories and first prize for 5G applications at the World Internet Conference (WIC) Summit in Wuzhen. In terms of smart manufacturing, we have had deep involvement in the construction of 24 provincial future factories, enabled over 170 5G demonstration factories, and made key contributions to

While aiming to integrate 5G with intelligent digital transformation, find solutions for high-quality digital economy development, and create an entirely new landscape, China Mobile Zhejiang has gained deep insights and developed effective practices in digital and intelligent O&M.
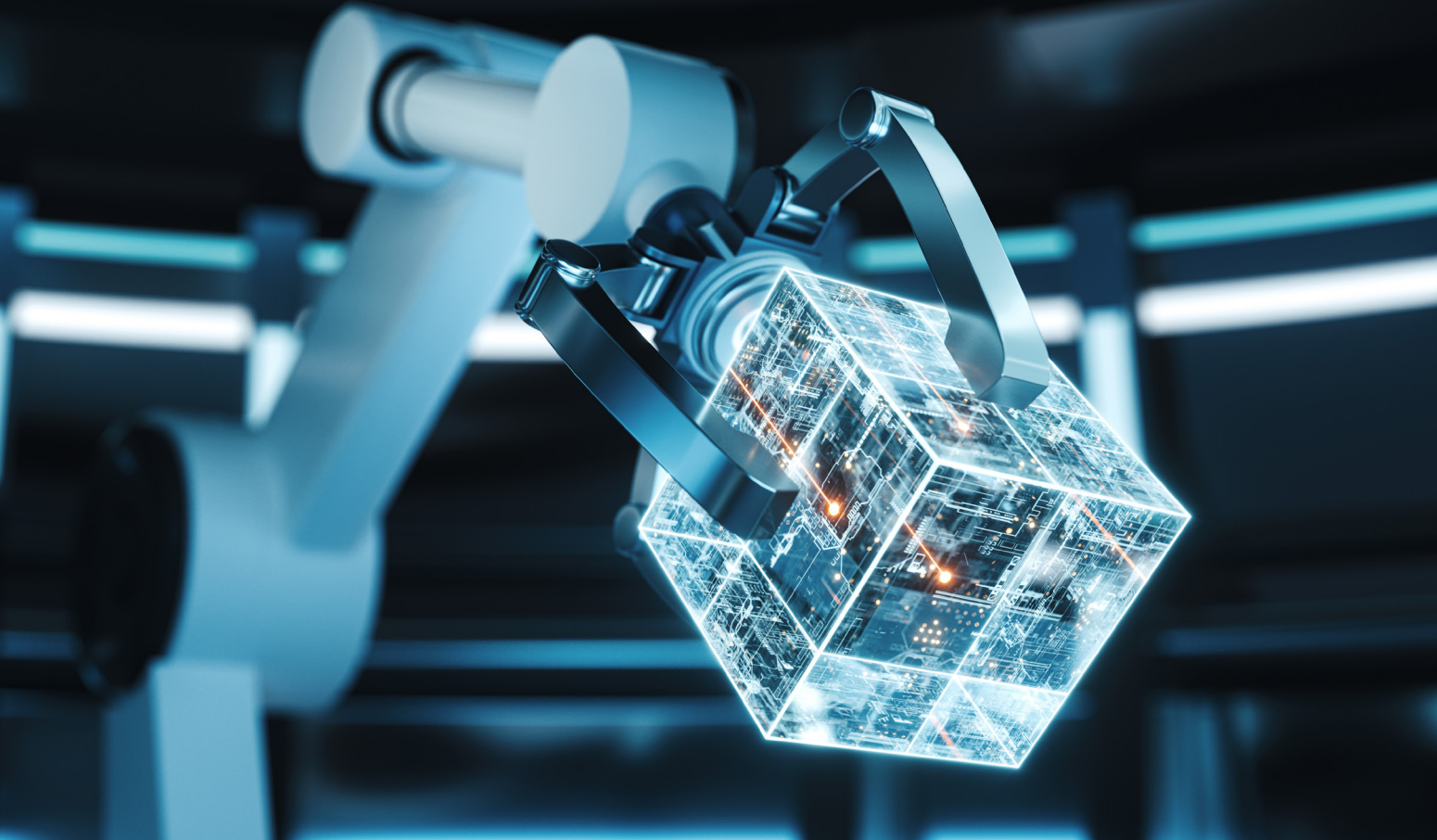
over 100 major industrial Internet projects across the province, including DMEGC, Unisyue, and IKD.

"None of this was achieved overnight," said Zhu Huaxin, Deputy General Manager of China Mobile Zhejiang. "While aiming to integrate 5G with intelligent digital transformation, find solutions for high-quality digital economy development, and create an entirely new landscape, China Mobile Zhejiang has gained deep insights and developed effective practices in digital and intelligent O&M."

Boosting the economy with 5G: Four challenges

Zhejiang is situated in eastern China, a region that has been experiencing rapid economic growth. The growth of the digital economy and China's New Infrastructure initiative have placed high requirements on telecomoperators' services, and posed four key challenges to China Mobile Zhejiang:

Challenge 1: Better network infrastructure.
Overall 5G coverage was falling short, resulting in the unavailability of 5G in high-traffic areas, frequent fallbacks to 4G due to inadequate 5G coverage, and a high number of complaints about 5G. In addition, there was poor coordination between 4G and 5G in some high-traffic areas. 5G high-traffic areas were smaller than those of 4G, and user-perceived rates of 5G in high-traffic cells were low, while 4G high-traffic areas still had a lot of scope for migration.

Challenge 2: Better user experience. As 5G adoption increased among users, it was important to ensure premium user experience. However, the commercial adoption of 5G's voice over NR (VoNR) service was still in its infancy, and its user experience was expected to be worse than that of 4G's voice over LTE (VoLTE) in 5% to 10% of the areas covered. In addition, user experience was expected to deteriorate in some scenarios. Therefore, efforts were needed to ensure the delivery of a consistent, high-quality VoNR experience.

Challenge 3: Faster digital transformation.
Traditional network production processes were manual, and could not easily adapt to autonomous operations in terms of services, capabilities, or processes, nor could they meet new requirements for self-configuration, self-healing, or self-optimization. In addition, network elements (NEs) lacked capabilities regarding automatic configuration, performance awareness, and version compatibility, all of which are necessary for the implementation of autonomous networks.

Challenge 4: More refined network energy saving.
5G was forecast to account for 55% of all network traffic by the end of 2022, making it a key element of data transport. With services continuing to migrate to 5G networks, a range of energy saving challenges were emerging, such as reduced power saving rates, increased user experience risks, and increased solution complexity. It was essential that energy saving results were improved through more refined wireless energy-efficiency solutions and higher levels of intelligence.

The operator's actions to achieve high-quality development

As a major player in efforts to build a "Digital Zhejiang" and as a leader in intelligent digital transformation, China Mobile Zhejiang actively addressed these challenges. Our aim was to pioneer intelligent digital transformation and achieve high-quality development in terms of operation, maintenance, quality, and energy efficiency. This would accelerate our transformation toward digital and intelligent O&M, and give us a competitive edge in high-quality 5G development.

● User Operations: Moving to user operations, with network and services synergy to increase 5G traffic
5G adoption faces a range of challenges, such as relatively idle 5G networks, insufficient network-service synergy, and a high proportion of users disabling 5G on their phones. China Mobile Zhejiang has successfully upgraded network operations to user operations and increased the proportion of 5G within all traffic by realizing synergy between networks and industries. We achieved this through several steps. First, we developed an eight-quadrant evaluation system for user profiling in three dimensions: 4G traffic, 5G traffic, and camping ratio. We then performed special optimization, focusing on quadrants like "high 4G traffic, high 5G traffic, low camping ratio", and "high 4G traffic, low 5G traffic, and high camping ratio". Second, we improved 5G camping through multi-dimensional joint commissioning and optimization, and low-energy efficiency rectification. We also made use of automatic beam adjustment at scale, based on Auto Cell Planning (an innovative radio network planning optimization solution), and adopted a site-specific parameter optimization policy for delivering optimal 5G coverage. Third, we conducted a comprehensive analysis of low-efficiency antennas and indoor distributed sites, compiled the identified issues, surveyed them, and then improved coverage through joint commissioning based on construction, reconstruction, and optimization. Finally, we conducted precision marketing based on operation analysis, SEQ (service, experience, quality) big data, and user behavior data to encourage customers to enable 5G functionality. In addition, precision marketing and intelligent recommendations improved 5G dataflow of usage (DoU). Thanks to these efforts, 5G now accounts for 41% of all traffic on China Mobile Zhejiang's networks, the highest proportion anywhere in China. Additionally, our 5G camping rate of 96.8% is ranked second in China. Our autonomous network score ranks first within the China Mobile Group, and our accuracy of identifying potential customers has improved by 2x.

● Quality Improvement: Delivering high-quality applications, voice services, and scenario-based solutions
In an era where user experience is key, operator competitiveness depends greatly on network quality. China Mobile Zhejiang has made great efforts to improve user satisfaction and develop high-quality voice services, scenario-based solutions, and related applications.

First, to address the industry's lack of effective methods for predicting user experience, we have targeted improving network Net Promoter Score (NPS). We use big data and AI algorithms to identify and resolve issues that might lead users to complain about network performance. This development has helped us reduce the number of user's complaining by 48% and the number of complaints by 20% in 2022.

Second, to address challenges in the initial stages of VoNR deployment, we have implemented scheduling algorithm optimization, route optimization, and multi-network coordination to enhance VoNR robustness and create high-quality voice networks. To date, our VoNR call completion rate has reached 99.62%, while our call drop rate is just 0.05%, lifting overall voice experience to a new level.

Third, we have moved to address the complex challenges related to improving experience in densely populated areas, such as those containing universities and residential buildings We have also looked to meet the high-capacity requirements of high-speed railway scenarios and those encountered when coordinating public and private networks. To do this, we have made use of technologies like indoor-outdoor coordination and the self-coordination of public-private networks. This has increased daily traffic in universities and residential areas by 15% and 8% respectively. The user-perceived rates of 5G on high-speed railways has increased by 26%, where 5G accounts for 52% of all traffic.

Fourth, to support applications that are developed with different technologies and have different network requirements, we provide differentiated assurance services for customers as a key method for improving user experience and maximizing network value. We use DPI to accurately identify popular applications and deliver differentiated solutions and assurance policies. This has reduced service delays by 32.5%, achieved a 99.5% one-time success rate, and greatly improved user satisfaction. Thanks to outstanding network quality, we now lead the country in 5G network satisfaction, and were ranked No.1 in the recent country-wide test by the Ministry of Industry and Information Technology (MIIT). We have also been named an "Operator with Excellent Network Quality in Key Sites".

● Intelligent O&M: Accelerating intelligent digital transformation based on platforms and new operating models

Given the coexistence of multiple generations of networks, traditional network O&M faced three key challenges: a high proportion (60%) of manually modified parameters during O&M, a high proportion (53%) of manual reviews during O&M, and the need to manually store 21 types of massive data sets. To address this, we have developed a wireless OSS support platform based on an automation engine which enables computer-assisted manual operations to be transformed into expert-assisted automated operations. By taking advantage of innovations like the wireless autonomous cockpit and automation engine, we have been able to restructure our services, reshape our capabilities, and reengineer our processes. We have made excellent progress in terms of intelligent O&M practices, reducing the time taken for major fault recovery by 70%, improving the efficiency of intelligent equipment O&M by 11x, and resolving 80% of wireless problems automatically. Together with Huawei Core Networks, our autonomous network innovation practice won the GLOTEL Award "Automation Initiative of the Year" which is issued by Informa.

● Improving Energy Efficiency: Creating a smart energy brain to balance network quality and energy saving

China Mobile Zhejiang was the first operator in China to establish an energy saving team dedicated to the research and development of a smart energy "brain". This aimed to contribute to China's carbon neutrality goals, while responding to calls for energy conservation and tariff reduction. Our team used big data and AI to develop a "central nervous system" and digital intelligent "cockpit" to optimize network energy operations. This expanded energy-saving from just the night-time period to the entire day, and from single-equipment areas to mixed-equipment areas.
This created a new wireless energy-saving operating model that covers the whole day, all areas, and all frequency bands.

As a result, China Mobile Zhejiang's smart energy brain can use AI to forecast scenario-based service demands using maintenance, repair, and operation (MRO) data, and prioritize and implement different

policies for each scenario. The smart energy brain can now automatically implement 25,000 energy-saving schemes a day, reducing power consumption per GB of 5G traffic by 9.5%, and average power consumption of 5G base stations by over 10%. As a result, our smart energy brain was awarded group awards for "Top 10 AI Benchmarks for O&M" and "Technological Innovation".

Conclusion

China Mobile Zhejiang's efforts in the digital and intelligent transformation of 5G O&M, while adhering to China Mobile Group strategy, have significantly improved our service operations, O&M efficiency, and customer experience. In the future, as more industries go digital and intelligent, we will continue to promote agile and efficient network-industry synergy. Through superior customer experience, and accurate and intelligent O&M energy saving, our aim is to deliver leading, green, intelligent, and high-quality 5G networks that support a prosperous digital economy.

The strongest wisdom is the wisdom of all, and the greatest force is the joint force. Looking to the future, we at China Mobile Zhejiang will continue to collaborate with partners like Huawei to expand the industry ecosystem and dive deeper into intelligent O&M. We aim to inject momentum into a Digital Zhejiang, contribute to digital transformation worldwide, and ensure more people can benefit from digitalization.

Safaricom PLC Discussion of Digital Transformation

M-Pesa is one of the most successful mobile money platforms in the world, with revenue growth of 30.3% year-on-year in FY2022. George Njguna, Chief Information Officer of Safaricom, explains how Safaricom chose the distributed cloud architecture and unified storage resource technology to achieve business success in the face of challenges such as low resource utilization, high O&M complexity, complex data governance, and data security risks.

By George Njuguna,
CIO of Safaricom

Safaricom, an 11-billion-dollar telecom company employing over 6,000 people and serving over 38 million customers in Kenya, now contributes around 6.5% to Kenya's GDP. With our core philosophy of putting people and processes before profit, we have embarked on a mission to transform the lives of the people in Africa and beyond. M-Pesa from Safaricom is one of the most successful mobile money platforms in the world and has largely contributed to the financial inclusion programs across Kenya and many parts of Africa. We are applying our inspiring innovations to deliver new solutions also across other sectors like agriculture, healthcare and others. Our core focus is to deliver technology that is relevant to customers and that can enrich their lives.

The Success Story of M-Pesa

M-Pesa has contributed strongly to our service revenue during FY22, growing 30.3% YoY to KES 107.69 billion. With that, it has surpassed the voice revenue and has emerged as the biggest revenue contributor for Safaricom. M-Pesa now accounts for 38.3% of service revenue while voice contributed 29.6% in FY22. Active customers per month for M-Pesa crossed the 30 million mark during the year, growing at 7.8% to 30.53 million. Also the total transaction value grew 34.0% YoY to KES 29.55 trillion while the volume of transactions grew 34.9% YoY to 15.75 billion.

Another significant milestone in the journey was the launch of M-Pesa in Ethiopia. This marks a special achievement for Safaricom in Ethiopia as it was the country's first mobile money license to a foreign company. The investment also marks the largest foreign direct investment by a Kenyan company since our independence in 1963. We believe this journey will take us further, beyond the Kenyan economy to the rest of the Africa and the entire globe.

Safaricom's Digital Transformation Mission

Safaricom is guided by a vision that by 2025, it will be not only a telco with a mobile money proposition but also a purpose-led technology company that strives to accelerate growth around new areas by delivering superior customer experiences. To achieve this, we have to establish a competitive, agile, customer-obsessed technology environment, capable of taking us through the transformation journey. We hope these new growth areas, which are not part of our traditional businesses, will emerge as major contributors to our service revenue by 2025.

The IT As-Is Challenges

While embarking on the digital journey from the legacy siloed infrastructure, telcos confront several challenges.

The longer time spent on marketing, the higher cost arising from the low utilization of the resources: The O&M complexity and the risks associated with data security are the most important concerns. Many OEMs and application vendors are not capable of offering agile platforms. There are huge costs associated with running the infrastructure and applications on disparate infrastructure and platforms. The complexity brought by these platforms and applications result in inefficiencies and unanticipated delays in troubleshooting. Also, various skillsets need to be deployed to deal with local data regulations and service innovation requirements. There are also challenges associated with achieving unified data governance.

Safaricom Cloud Transformation Vision 2022-2025

To address these challenges and realize the goals, it is needed to have a clear IT vision and also a strategy to pursue that vision. The most important thing is to select the right technology architecture and also the right vendors. The first consideration in the technology architecture should be to accelerate innovation through cloud because it drives application supplier decoupling and help us migrate into an agile architecture with abundant services delivered via cloud. With cloud, we can also accelerate the TTM and take advantage of the advancements in machine learning (ML) and cognitive AI that otherwise consume significant time and effort to build on premise.

Achieving cost-resilience is also an important criterion in our mission map. The moment that we are able to stretch our resources to do more and to utilize the

unutilized capacity within our environment, we will start moving a notch on our cost agenda. Open-source technologies are an option, but they also demand cloud for their deployment. Thus, Safaricom's cloud transformation journey envisages that we will have 65% of IT applications on cloud, at least 76% of care interactions on self-service platforms and all of our digital channels deployed on cloud. We have also set robust KPIs to ensure reliability across all our services. With these we hope to emerge as an always-on and always-secure digital service provider with the No.1 NPS. By adopting innovative cloud technologies and implementing automation and consolidation strategies, we aim to achieve more efficiency and cost leadership during the journey.

Selecting the right architecture and the right vendor

As part of the cloud strategy, operators also need to consider whether they should opt for public cloud, and if so, whether they are able to address the security and compliance concerns associated with them. While public cloud promises cost savings, it also brings up issues related to latency and reliability. There are challenges associated with customer data as well. A distributed cloud infrastructure is viewed as the best strategy in the transformation process. At least for a while, it will co-exist with public cloud. There may be some applications running on premise as well. Thus, the management of the hybrid, distributed architecture becomes the next biggest challenge for digital service providers. The cloud O&M architecture should support the co-existence of multiple clouds, allowing synchronization of different types of services. It is also important to ensure cross-collaboration between the heterogeneous cloud resources to eliminate the discrepancies and ensure optimal utilization of resources. This will not only improve the reliability, but also will support the evolution of the organization's legacy service support ecosystem. We also aim to create fully automated O&M that provides end-to-end intelligent capabilities and simple management of the resources from different vendors. A unified management platform with capabilities like centralized

monitoring and remote troubleshooting can help improve operational efficiency and reduce workloads. Consistent cloud architecture plus collaboration and management of multi-cloud are several other factors that need to be considered as well. Lastly, a resilient system that provides end-to-end security with data auditing capabilities can promise greater reliability.

Thus, while deciding the technology vendors, the key question is whether they actually need to step up to understand and bridge the gap between traditional telco services and cloud as a key enabler. I believe telcos actually are in the best space to take advantage of cloud, be it for data centers, connectivity, delivering content or running workloads. They have developed the industry's best practices in terms of security and compliance. Safaricom has a greater advantage at these, especially with our several years of experience with our mobile money platform. A vendor who understands and is familiar with telecom services can effectively reduce migration risks, efficiently make the most take best of the advantages that cloud technology offers, and help the team pass the cloud familiarization period quickly. They can also inspire the telcos to leverage their core capabilities and scale their infrastructure to explore new opportunities.

Storage Considerations

Storage is a critical part of our infrastructure; it is where the data, the most precious asset, lies. The storage of a telecom operator is provided by different manufacturers, so it is important to unify the storage resources for easier management and also to achieve greater control over the resources. For Safaricom, this strategy also aligns well with our SDG agenda - to enable 30% energy savings by 2025 through the use of the latest storage technologies to reduce carbon emission and reduce OPEX.

Let me also explain how the unified architecture helps us realize Safaricom's Storage Vision 2022-2025. The always-on environment in the unified storage pool provides high availability across any application, promising greater resilience and 99.99999% service reliability. Latency across core business services can be reduced to <1ms, which is crucial to meet the

requirements of 5G applications. The fully automated O&M provides E2E intelligence and O&M capabilities to improve efficiency. We also expect the architecture to be open and able to support the future multi-cloud environments. From the CIO perspective, this unified approach leads to a fully automated, highly available and resilient architecture that support not just the public cloud and private cloud, but also the hybrid cloud.

Addressing the culture issues in digital transformation

The cloud journey of telcos is likely to encounter a cultural face-off in many scenarios. Having the courage to think differently and act according to the new norms requires a radical shift in approach. In fact, a study by Deloitte has found that 53% of companies are saying that the challenge they're facing in terms of digital transformation is really coming from culture. So I believe one of the biggest behaviors that one needs to adopt in terms of digital transformation is courage. To take bold steps, to walk a journey that we have never taken, and to hold on to a belief that is not familiar to us demands courage. Next, we need to be agile

and curious. Our team needs to have the openness to know how the world is evolving and how others approach new changes and how much they can evolve to adapt to these changes. We need to make a decision on whether it's the public cloud, private cloud or a distributed cloud, to balance the concerns associated with storage efficiency, latency and security, and address the challenges associated with data regulations, and demands for an agile and open approach.

From the perspective of CAPEX/OPEX, the cloud journey brings a paradigm shift in the conventional approach. Earlier, CAPEX was the top priority for CFOs; but with cloud, CAPEX is going down and OPEX is emerging as the cornerstone. With the As-a-Service approach to software, the platform, and storage – all of these will help drive down TCO. Cloud infrastructure eliminates the clunky procurement process, allowing us to build an agile organization by accelerating TTM. Over the past couple of years, we have seen many organizations that were spending much for digital transformation through cloud, mainly driven by the fact that cloud brings down CAPEX, and also reducing OPEX through automation and unified management capabilities. Thus we are pursuing the digital transformation journey that helps us deliver differentiated services with the help of an agile and secure cloud platform and thus emerge as a leading digital service provider in Kenya.

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A distributed cloud infrastructure is viewed as the best strategy in the transformation process. At least for a while, it will co-exist with public cloud. There may be some applications running on premise as well.

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Digital Transformation – Ready for the Future

As the largest quad-play service provider in Sri Lanka, how can Dialog improve user experience, improve efficiency, and create new business models through digital transformation to facilitate the overall business development?

By Pradeep de Almeida,
Group Chief Technology Officer, Dialog Axiata PLC

Dialog Axiata PLC started its journey as a connectivity service provider, with services starting from mobile then moving to fixed and to TV through acquisitions, eventually emerging as a quad-play service provider. Today, Dialog is the largest quad-play service provider in Sri Lanka and has acquired a strong market position across all business segments. Dialog currently holds a 51% market share in terms of mobile subscribers and approximately 66% in terms of mobile revenue. Dialog also holds 53% of the home broadband market and 72% of the Pay TV market. If we look at the overall performance of the leading operators in Sri Lanka, we can see that the top-performing operators are quad-play providers whereas others are limited to fixed or mobile services.

Addressing the CSP challenges through digital transformation

As in every other sector, telecommunications service providers in Sri Lanka face a multitude of challenges. Users always demand higher levels of experience, and keeping pace with the market dynamics is difficult. We come up with the new technologies, but the applications grow at a much faster rate, further raising the demand for throughput. OPEX continues to grow, challenging the profitability of operators. Traditional businesses like voice and SMS no longer generate revenue as they used to, so we need to invent new revenue streams. Digital transformation is the way forward to address all these challenges. It can impact the overall business by enhancing the user experience, improving efficiency and help create new business models.

Dialog's OWA Model for digitization

At Dialog, we have adopted an OWA model to drive digital transformation. It involves the three pillars:

O for organization, W for work and A for analytics. We believe that any change has to start with the organization. In order to do so, we have to relook at the organization and plan how we can radically change it to face the new demands and address the new challenges. The second pillar, work, involves digitization of the processes. However, to achieve positive results, we need to critically assess all the processes and decide how we can simplify them for the best results before moving with automation and digitization. The third pillar, analytics, is all about data-driven decision making. Each and every decision to be made should be supported by data.

As a first step to achieve this, we reduced the organizational hierarchy from 7 or 8 levels to just 4. To help us inculcate the culture of agility and develop a better way of collaborating we moved to virtual teams. Individuals are not permanently attached to any one team or division; it's an agile way of working together. Next, we reinvented the processes and implemented tools to meet the new requirements such as simplicity, flexibility and agility. Also, we empowered the organization with automation and visualization, by giving everyone the right access to the necessary tools for this. Lastly, analytics, which forms the fundamental layer, helps stakeholders extract the data that is required for decision making.

The data-driven cloud transformation journey

Dialog's cloud journey was the outcome of its OWA strategy. It began when we realized that the conventional siloed organization will not support our digitization process. Thus, we came up with the concept of a 'data lake,' which is also our 'single source of truth.' Data generated or captured from different nodes (RDS, etc) are sent to the data lake in the cloud. This data is used in tandem with query engines and with APIs to create dashboards and reports. Further, end-user requirements are facilitated via various self-developed analytic models (ML/statistical/rule based). We then use several systems backed by the analytics engine to gain insights for our decision making.

Let's look at some interesting examples on how we leveraged the data lake for analytics.

- **Over propagation analysis:** For this, we mainly use two key data sources, mobile data terminal (MDT) data and timing advance (TA) data to verify the reduction in over propagation following a cell optimization exercise. The radio network optimization team can look at a plot of this data to optimize the network, eliminating the impacts due to over propagation issues.

- **Coverage comparison:** To compare Dialog's service with our competitors, we used to carry out physical drive tests on different routes with competitor SIMs to analyse network coverage and throughput. Now we use MDT and physical resource block (PRB) data bundled with data from apps which helps to identify poor coverage and high congestion clusters on major highways. With this, we can assess the performance of our network with greater accuracy, and avoid physical verification tests like drive tests. MDT data comes with great GPS accuracy, so we can detect where the poor coverage patches are and where we get better throughput, faster network, and the like.

- **Value-based CAPEX planning:** All organizations face CAPEX constraints. This is the same reason we need to focus our CAPEX investments on sites that provide the best ROI. By analyzing different parameters like performance data, coverage data, consumer complaint data and even social media, we are able to prioritize our site expansions to optimize our CAPEX investment.

- **Complaint bucketing:** By analyzing the customer experience management (CEM) data, we are able to identify the root causes of customer complaints. This data is then correlated, to identify issues that are causing multiple complaints which can then be addressed at the network level or customer level.

- **AI/ML data-driven virtual NOC journey:** Our Network Operations Center (NOC) used to operate with 30 or 40 people on site. Now, with the virtualized network, there is no longer a requirement for staff in the NOC to receive and process alarms. Instead, the processes are automated with auto detection, auto ticketing, and auto escalation. This empowers the regional staff and the field teams who receive

alarms directly and implement solutions to resolve the detected issues. Only if it does not get resolved at the last point, do we need to attend to it personally.

● **Reactive vs. Predictive Maintenance:** By running historical data in the prediction engine, we are now able to calculate the probability of a fault occurrence at a site or a specific piece of equipment. Over time, we have achieved greater accuracy with our predictive engines, which has given us a 20% reduction in reactive tickets and site visits, 10% to 15% reduction in cost per site visit and 0.5% – 1% improvement in site availability.

● **Data-driven crowdsourcing:** As a quad-play service provider, we require on-site engineers to perform the installation and service at customer premises. We are now leveraging AI/ML technologies to crowd-source engineers to complete the work orders. The system can identify the right skill set for the specific job and allot the work to the next available agent, all without any human intervention. There's also a review mechanism to assess the performance of the agent and to rate their work. This not only improves work efficiency but also enables great cost savings because we are not required to maintain a large workforce, and also because we pay according to the task accomplished by the agent.

Network Transformation to Cloud Native

For the cloud transformation, we started with Network Functions Virtualization ("NFV") cloud on the telco side and a hybrid cloud on the IT side. Later we launched on-premises clouds, one NFV-based cloud for telco and the other virtual cloud for IT applications. Now, we have adopted a cap and grow strategy where we can have a mix of in-house as well as public clouds with over 2000

ecosystem partners, offering 200 industry solutions and advanced services.

On the network side, Huawei is our key partner for core site and core applications. We run a number of different applications including CEM, CWR and OWS. In Phase 1, we have started the migration of all these applications to a single cloud. In the second phase, which is planned for 2022-23, we migrated the siloed applications such as BSS to a cloud environment. This will be used to implement an online charging system and to enhance the billing system. We are now targeting a full-fledged cloud implementation starting from on-prem, which is then expanded to hybrid and eventually to a public cloud.

Enterprise offerings

For enterprise, we started by providing infrastructure, which means we built data centers and power facilities for our enterprise customers. Now we are expanding to other services like storage, compute as well as platform, and then to application development. Dialog offers the end-to-end cloud lifecycle, starting from connectivity infrastructure, platform, application development, integration, billing, and support.

We have Dialog's own on-prem cloud as well as the public cloud and we have also launched partner programs. We also work with multiple partners to offer different services like IaaS, PaaS, SaaS, and Security aaS. In addition, we offer system integration, support, and all the other related services as one package to our enterprise customer services. We have direct sales channels for large enterprises and for SMEs and we have the marketplace where they can go and subscribe to the service. We also have local and international channel partners. Under professional services, we have partners for consultation, architecture, migrations, integration/operation, security and modernization.

We offer multi-cloud platform subscriptions and support, which provide cross cloud connectivity, multi-cloud management tools, and professional services. For multi-cloud management, we offer an integration marketplace where the customers can choose their preferred cloud provider and migration partner. A lot

of enterprises may not have the skill sets to migrate their applications to the cloud, so we can extend our support there too. Even if we don't have a particular skillset, we can offer them through our partners. We also provide 24-hour monitoring of cloud services, availability, disaster recovery and a range of related services including technical support, automation, architecture, design, implementation, best practices and the necessary documentation.

Overall, the journey that we have taken has brought us to a place where we are ready for cloud, in terms of organization, processes, and technical knowledge. We collaborate with multiple partners to offer the best-in-class services to internal customers as well as our valued enterprise customers.

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We are now targeting a full-fledged cloud implementation starting from on-prem, which is then expanded to hybrid and eventually to a public cloud.

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Huawei Cloud, Better Understanding Carriers

Scan to learn more

+ IT, New Growth: Huawei Cloud Enabling Carriers for Business Success

Based on 30 years of experience in the telecom industry and rich practices in cloud transformation projects, Huawei has identified the carrier scenario-based Huawei Cloud solutions. First, "Connection + Cloud" expands the scope of connection monetization. Second, "Service + Cloud" accelerates service innovation. Third, "Operation + Cloud" improves operation efficiency. By the end of 2022, Huawei has carried out in-depth cloud transformation cooperation with more than 140 carriers around the globe.

Building a Fully Connected, Intelligent World

HUAWEI