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REPORT

DIGITAL OPERATIONS MATURITY:

achieving business value

from transformation

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HUAWEI

contents

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the big picture

Communications service providers (CSPs) need to move beyond operational efficiency as the focus of digital transformation and target commercial maximization. Yet, in 2022 many factors are threatening to dampen demand just as operators bring powerful new networks to market.

Geopolitical instability and supply chain disruptions are perceived to be among the top threats to growth, according to McKinsey's latest Global Survey on economic conditions. But another factor looms even higher: fear about the effects of inflation. Inflation itself makes services less affordable, particularly for households and small businesses, but fear of inflation lasts far longer – discouraging customers from spending on discretionary items and making them pay more attention to essential costs.

While economic pessimism is rumbling in the background in much of the world – dampening demand and thus the monetization of new service offerings – the Asia-Pacific region and China have managed to maintain a more positive outlook. But the interconnectedness of the world's economy means that prolonged pessimism elsewhere will eventually impact even the more robust economies.

Macroeconomic factors are creating a "Catch 22" situation for CSPs. On one hand, despite power and labor costs rising, they cannot simply pass these on to their customers in the form of increased prices. Doing so could undermine mid- and long-term demand, create negative publicity for their brands, and might not even be permitted by governments and regulators that perceive broadband in particular as an essential service and therefore potentially susceptible to price controls. Yet, on the other hand, it's essential that CSPs begin to show a return on investment from their new network offerings.

Addressing the challenges

The answer to this seemingly intractable challenge is that operators must find new sources of revenue and new ways of charging for services. The latter is particularly important in the current environment and vital to addressing their goal of closing the digital divide, in order to spread the dividends of digitalization more widely and ensure more affordable access.

This goal is not simply about altruism and social good. Many regulators and governments are developing accessibility targets and expect CSPs to comply (voluntarily or because they are mandated). But beyond this, closing the digital divide and making new services more widely available makes good business sense.

It's essential that CSPs begin to show a return on investment from their new network offerings.

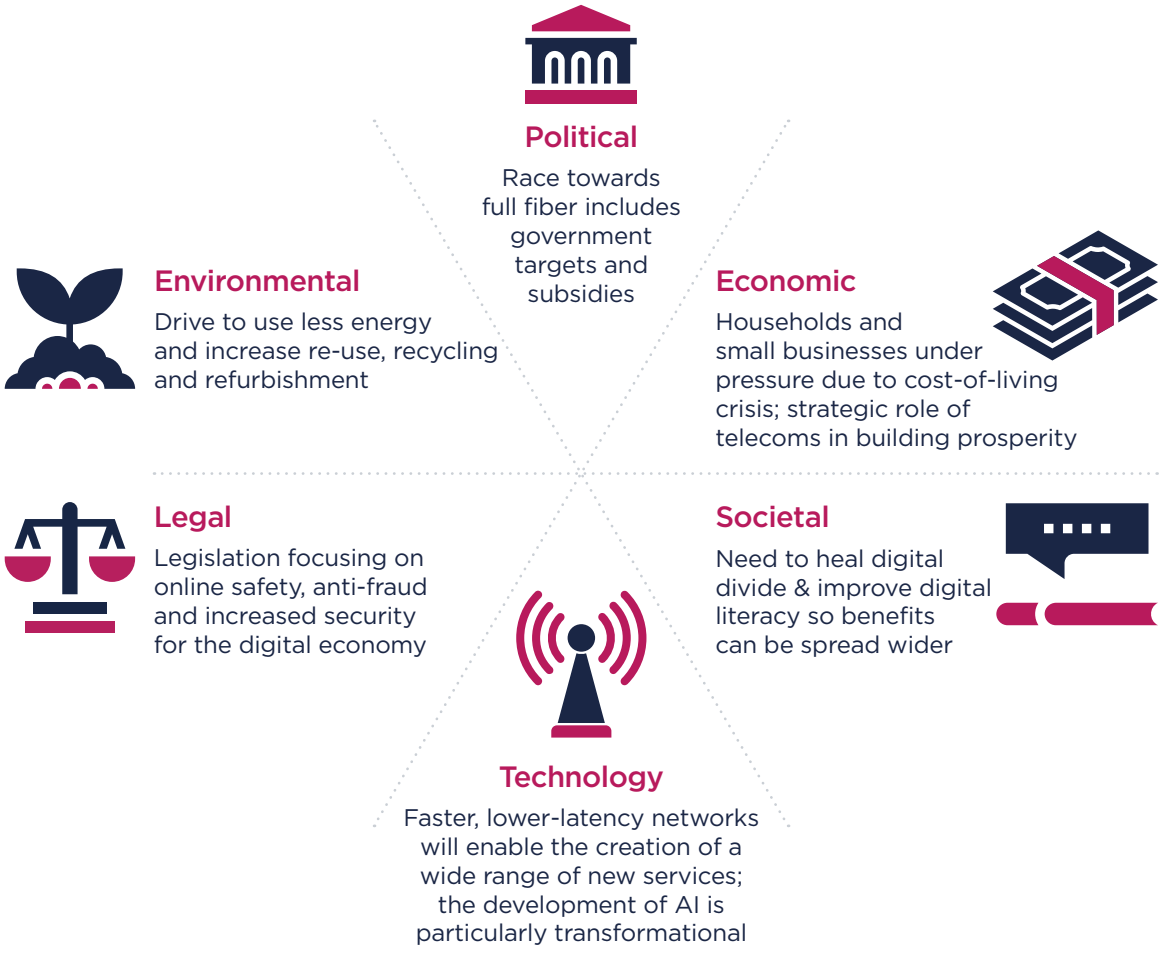
It speaks to long-term market building and strategically creating the future demand upon which their ongoing success depends.

One more complex factor bears consideration. In addition to pricing and affordability issues, CSPs are simultaneously being forced to navigate their environmental impact. They are tasked with lessening their impact on the environment both directly (minimizing their own footprint) and indirectly (through the supply chain and by aiding customers).

Environmental impact reduction involves short-term costs and is a risk factor for CSPs' businesses, but it also promises longer-term benefits and encapsulates a key opportunity. Digitalization is one of the most powerful tools households and businesses possess to meet environmental targets – substituting for travel, for example, and other carbon heavy activities.

All these factors in combination are refocusing CSPs on their business infrastructure. The high level of market uncertainty and complex factors at play mean that it's vital they are able to react rapidly to new opportunities and shifting demand. Business agility has never been more important.

analysis of PESTLE factors



TM Forum, 2022 (source: Omnisperience)

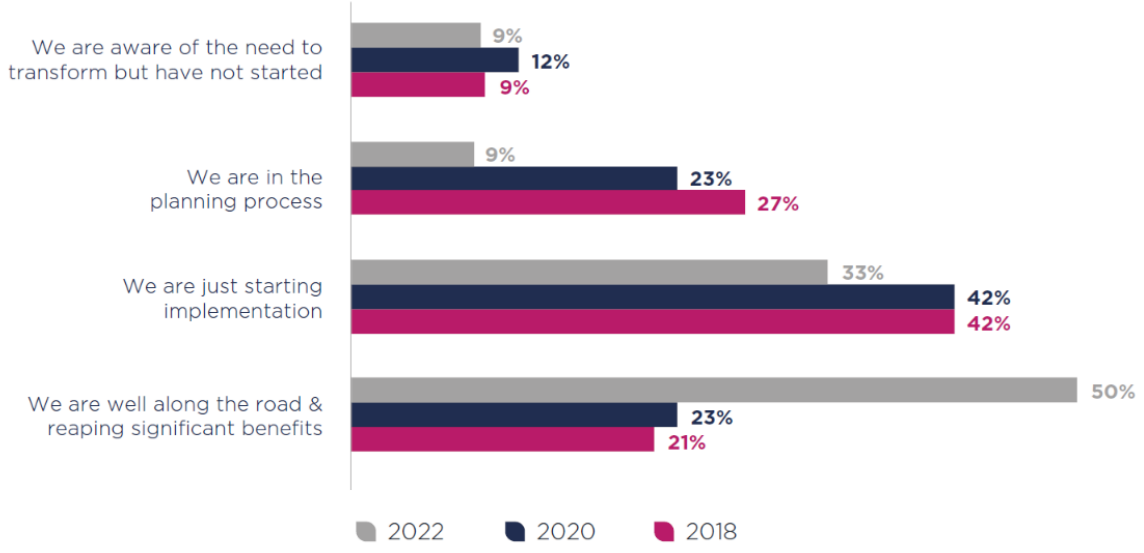
Making progress

TM Forum's most recent Digital Transformation Tracker survey found that CSPs' progress with digital transformation has accelerated substantially in the past year. Much of this has been motivated by a desire to increase operational efficiency. But CSPs' next goal must be to transform their business outcomes – for example, retain more customers, keep them happier and make more revenue from them – and deliver the level of business flexibility and agility they now require to remain aligned with rapidly changing markets and emerging opportunities.

This report explores CSPs' reasons and goals for transformation, focusing on the value they are getting from their efforts. Read it to understand:

- Where the opportunities lie for CSPs to exploit the digital capabilities they are developing
- What assets they have (or will need to have) to be successful
- How they can track value
- How companies like Axiata Group, China Mobile, Deutsche Telekom, Orange, SK Telecom and others are leveraging transformation
- Which further changes will be required to ensure success.

status of CSPs' digital transformation programs



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section 1

where will value come from?

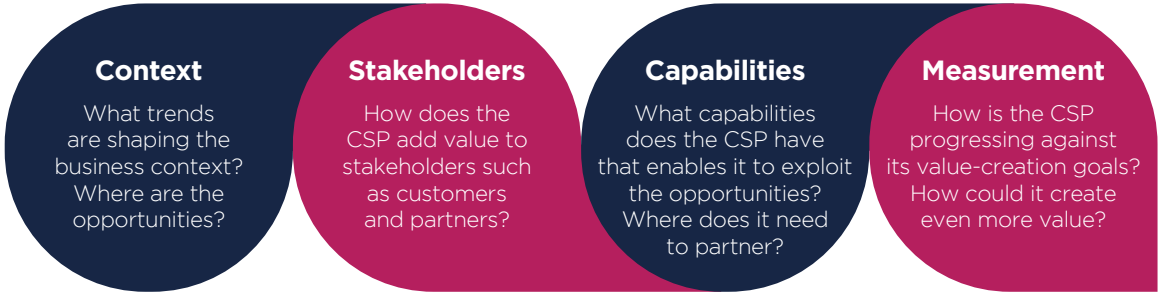
Current market conditions are far from ideal in many countries. In Europe, for example, the cost-of-living crisis is having a significant impact on short-term demand in both B2B and B2C markets, forcing CSPs to walk a fine line between supporting their customers and protecting their own businesses in the face of rising costs and possible recession. There is demand weakness across some B2B sectors, and consumers are also seeking ways to reduce their spending, looking for loyalty bonuses and shifting to smaller bundles. So far, customers are not dropping their telecoms services completely – partly because so many other vital services (banking, pensions, tax, benefits, etc.) are now digital and households wish to retain access to them.

In time, the most pressurized sectors – such as households and hospitality businesses – will rebound. Meanwhile, other sectors still offer opportunities for growth. It is essential, however, to be able to accurately identify which sectors to target immediately, which are good mid-term prospects and which will only bear fruit in the longer term. It's also important to decide which of these opportunities to target directly, which to leave to resellers, and where new forms of partnership are desirable to co-create new product and service offerings.

Power of data

CSPs' greatest ally in deciding where their opportunities lie, as well as how to exploit them, is their data. Freeing data from silos and bringing disparate data together (such as customer behavior data, network data and even external data from partners or social media), and applying AI and machine learning for enhanced decision-making, will deliver unprecedented business insight and control.

determining the opportunities



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The graphic on the next page shows some of the ways CSPs can use data to improve business performance.

CSPs must leverage their data

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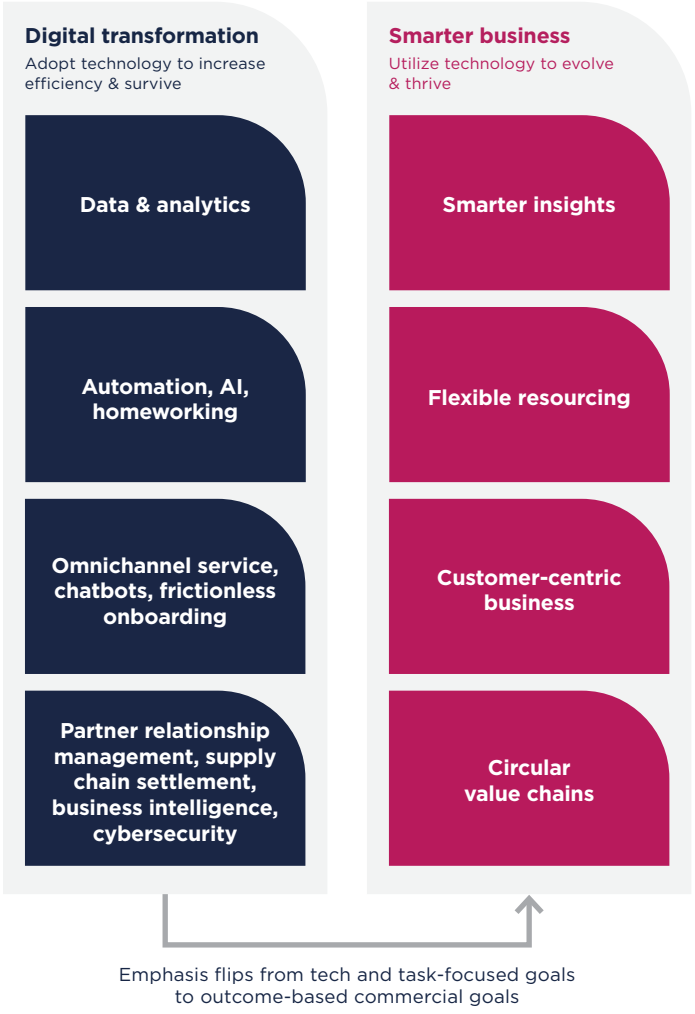
recipes for smarter business



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With upwards of $1.8 trillion being spent globally on digital transformation in 2022 and over a decade of transformation projects complete, we are entering what Accenture has termed the 'post-digital' era. In today's market, being digital is no longer a powerful differentiator – it's simply the price of doing business. Differentiation comes not from digital tools and platforms themselves, but in how they are applied to doing business.

Whereas digital transformation initially focused on operational integration, the next stage of transformation will focus on business integration and relationships with customers, partners and employees. In this market a CSP must act rapidly as a single entity to achieve its value creation goals – adapting its offer to individuals and niche markets, and exploiting transient opportunities.

Good quality data will be a vital component of this level of business agility and commercial maximization, as will digital platforms that bring together the capabilities of CSPs and their partners, enabling them to not only target short-term opportunities but also create greater long-term value by iteratively improving their performance.

In the next section, we'll look at opportunities for CSPs to increase value by targeting consumers.

> Being digital is no longer a powerful differentiator – it's simply the price of doing business.

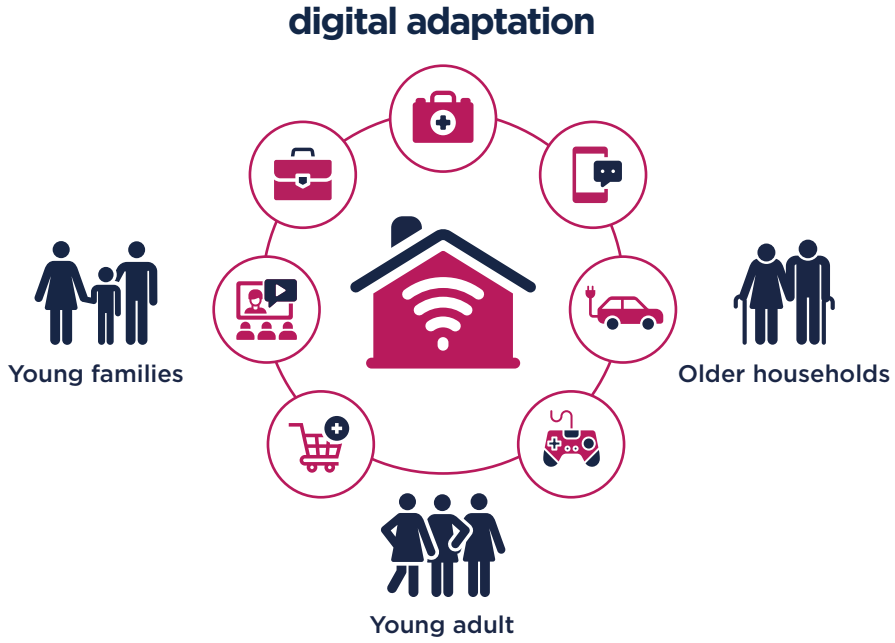
section 2

opportunities in the household market

In the past, households were largely treated as atomic units requiring either a small, medium or large connectivity package. In the future, CSPs will recognize the differences between household composition and needs, designing packages aimed at different types of households and enabling the smart home to adapt to its occupants.

Consider the following examples:

- **A young family** moving into a new home may require a combination of homeworking support, cybersecurity applications, smart home tech, baby monitoring and wi-fi optimization. As the children grow, the household's needs will likewise evolve, requiring them to add applications such as online gaming or education apps, parental controls and additional mobile devices to support changing habits.
- **A young adult household** (such as students or young workers) may have entirely different needs, with intensive use of the network for gaming, social media and video applications and the requirement to split bills between inhabitants.
- **A household with older inhabitants** may need a combination of videoconferencing to stay in touch with loved ones and healthcare apps to enable them to stay safe and healthy.



The combination of services will be tailored to the needs of the household's inhabitants

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Quantifying the opportunity

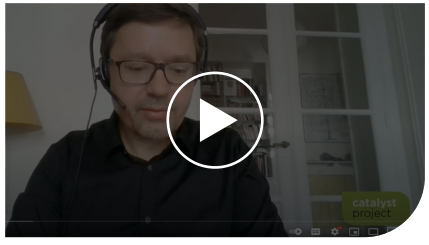
eHealth is an example of just one household service that is growing rapidly. Revenues are forecast to grow by a CAGR of 16.5% annually to €700 billion by 2027.

Example of innovation

A recent TM Forum Catalyst proof of concept called Ecosoft eHealth showed how to deliver e-health capabilities via 5G slices, incorporating the use of AI, virtual reality (VR) and counseling agents. The Catalyst addressed operational automation and dynamic scalability of inter-carrier network resources, ordering, provisioning, assurance, billing and quality of experience (QoE) monitoring.

Participants included Chunghwa Telecom, IOTA Foundation, Mavenir, NTT, Orange, TIM, Sparkle and the University of Milan. The project explored use cases such as the ability to remotely diagnose patients via video calling. One key component was to ensure not only high performance, but also patient confidentiality.

Watch the video to learn more:



spotlighted offering: orange business services

Enovacom is the Orange Business Services subsidiary supporting healthcare providers. Orange acquired the company, which provides remote monitoring, telemedicine and homecare solutions, in 2018. Two-thirds of France's hospitals and 70% of general practitioners use its services.

According to Orange Business Services, which provides the telecoms capabilities to support the healthcare solutions, Enovacom is a critical component of its future success. As part of Orange's initiatives in this area, the company has launched Future4care, alongside Sanofi, Capgemini and Generali, a health-focused startup accelerator. It also invests in startups in this sector via Orange Ventures.

This approach is a tacit recognition by Orange that it needs to collaborate with startups to address specialist areas of e-health. An example of one benefitting from Orange's help is Rofim, which provides a solution for collaborative diagnosis and secure data sharing for healthcare professionals. Rofim received investment from Orange Ventures and is being accelerated by Future4care.

"The value of data to every vertical cannot be over-stated," says Laurent Frigara, Co-founder – Deputy CEO. "In e-health, Orange Business Services – via its subsidiary Enovacom – has become a trusted partner for digital transformation by empowering healthcare professionals to acquire, protect, exchange and make the most out of their data."

Special focus on the digital divide

When it comes to residential customers, digital inequality is a pervasive and so far seemingly intractable challenge for the telecoms market. It's also somewhat misunderstood.

It's clear that people in developing countries lack access to connectivity, but the lack of high-quality connections for many inhabitants of the world's most developed markets has often been overlooked. Consider the EU. Great progress has been made in delivering high-speed internet access across the countries, with 70% of homes enjoying this in 2021, according to Eurostat, compared to 16% in 2013. But only 37% of EU homes in rural areas have high-speed connections in 2021, up from 4% in 2013.

Rurality isn't the only cause of the divide, however. There are pockets of poor connectivity within urban areas that have been missed during the fiber build-out, or which have proven difficult or uneconomic to connect. Many social housing developments have struggled to attract a CSP to connect them with full fiber, due to the belief that there would be poor service take-up of such services.

But these beliefs are not always accurate. VX Fiber, for example, points to a social housing development it connected in partnership with the local government authority in Stoke-on-Trent, UK, which saw initial take-up at above 80%. While the company emphasized that this development hosted many young families, it indicates that really understanding customer demographics and needs – rather than making broad and perhaps inaccurate assumptions – is essential when making business decisions.

"Extending access to full fiber not only delivers new broadband subscribers today, but by spreading the digital dividend more widely it lays the foundation of long-term prosperity for both service providers and the communities they serve," says Ian Taylor, Head of Product, VX Fiber.

Using FMC to bridge the divide

Fixed-mobile convergence (FMC) is extremely useful in healing the digital divide and widening access to innovative new services. CSPs have long explored how to get fixed and mobile networks to interwork to deliver seamless services. Now, as standalone 5G rolls out, this idea is coming to full fruition.

Extending access to full fiber not only delivers new broadband subscribers today, but by spreading the digital dividend more widely it lays the foundation of long-term prosperity for both service providers and the communities they serve."

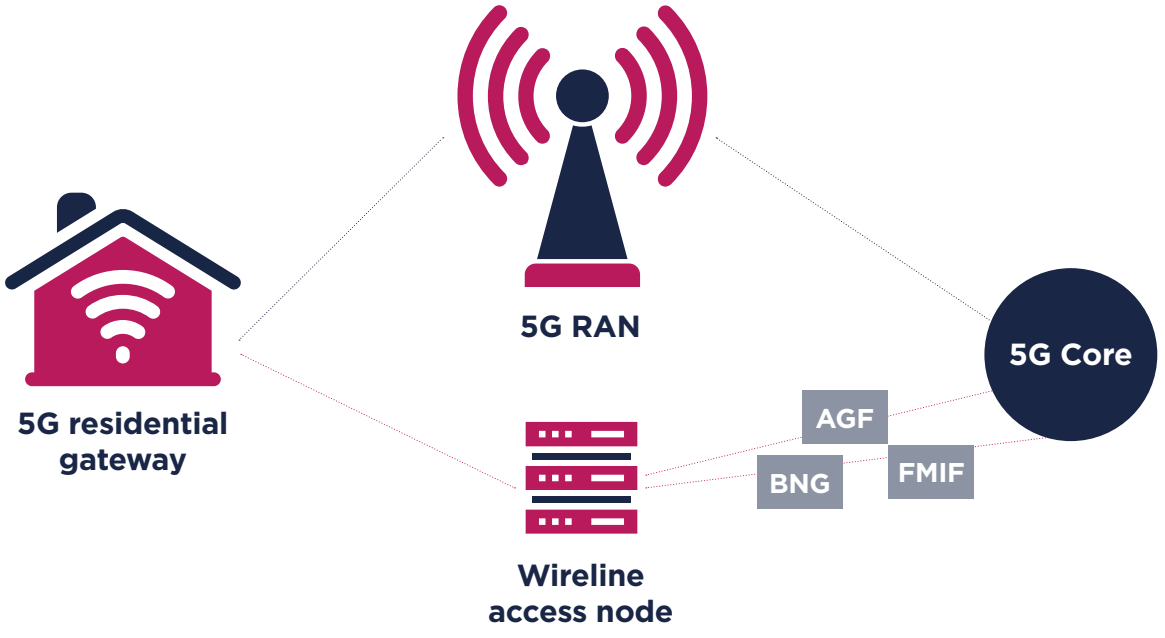
Mobile can be used in a hybrid approach for difficult-to-connect housing and communities (whether they're difficult to connect for geographical or economic reasons). But with 5G standalone (SA), the FMC architecture framework is being driven deeper into the network, as fixed and mobile networks are disaggregated and virtualized and the 5G core becomes the anchor.

Fixed-wireless access (FWA) promises to be a useful tool to connect people without fiber connections as it delivers more bandwidth over 5G, higher service quality and even the possibility of network slices finely tuned to support specific quality of service (QoS) parameters. FWA can also be invaluable as a backup or failover for when things go wrong, with services seamlessly dropping back to the mobile network if there's a problem with fiber connectivity to ensure continuous network availability and assurance.

Multi-network FMC is not just about allowing devices to access services through 5G or fiber via residential gateways, however, but also about the convergence of operational and business support systems (OSS/BSS). This is required to fully optimize the value of multi-network access – enabling CSPs to quickly offer, fulfill, activate, secure, monitor and monetize new FMC services to the household.

In the next two sections, we'll look at opportunities for CSPs to increase value by targeting small and large businesses.

fixed-mobile convergence in 5G networks



5G RAN = 5G radio access network
AGF = Access gateway function, provides AAA services, traffic shaping and policing
FMIF = Fixed mobile interworking function, interconnects the broadband network gateway (BNG) to the 5G core

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section 3

opportunities in the small business market

Small and medium enterprises (SMEs) are vital to the health of most economies. According to a report by the UK's Office for National Statistics (ONS), for example, microbusinesses now employ 33% of the UK workforce and their growth has outpaced that of all other businesses, growing by 34% between 2010 and 2020 compared to 7% for large businesses. The number of very small businesses – part-time or nanobusinesses – is also increasing rapidly as households seek additional income to cope with the cost-of-living crisis.

The small business sector is highly complex and somewhat bifurcated. While digital technologies are the key enabler of many micobusinesses – because they are dependent on digital platforms that help connect them to buyers – other parts of the sector lack digital skills and the time to invest in applying digital technologies to their businesses, and so trail the rest of the economy.

One opportunity is for CSPs to accurately identify and triage microbusinesses in order to match their offers to the needs of the individual business. Then they have the chance to proactively adapt the offer as the business grows, diversifies and changes.

The first challenge is to identify a microbusiness, because they are often disguised within a household account due to the owner working at home and using a consumer package. Here, characteristic usage patterns can be used to identify likely microbusinesses for upsell of business-oriented services.

Another challenge is to create simple, easy-to-use and cost-effective propositions. Microbusinesses do not want to have to assemble complex service packages but do need additional business-oriented services and applications compared to consumers. CSPs must create easily customizable packages of services for this sector, which microbusinesses can then configure through self-service. Such services could include:

- Different tiers of QoS to support videoconferencing and other business applications
- Business-oriented software-as-a-service (SaaS)
- Cybersecurity
- Wi-Fi optimization for better homeworking.

Being able to make better business decisions about such a complex sector is greatly aided by having good quality, holistic data that can be mined to boost business performance. As we move further into the "meconomy", being able to personalize offers, products and packages to the needs of individual tiny businesses – including via self-configuration and self-bundling – will be vital for CSPs' success in the market.

Being able to personalize offers for tiny businesses will be vital for success.

Quantifying the opportunity

Most revenue forecasts for the SME market are underestimates, because a considerable proportion of microbusiness spending is concealed within consumer spending. However, Accenture's Davide Bellini has calculated that CSPs have a $110 billion opportunity deriving from just four services aimed at SMEs, with core connectivity generating $56 billion, bundled SaaS apps $17 billion, consulting and professional services $14 billion and the industry marketplace potential a further $23 billion.

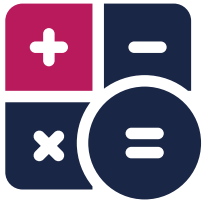
Example of innovation

The TM Forum Open Digital Architecture (ODA) represents a new approach to building software and opens a market for standardized, cloud-native software components. The ODA comprises an architecture framework, common language, design principles and specifications for standardized, interoperable software components and Open APIs.

A CSP is "Running on ODA" if it uses ODA as its default reference enterprise architecture, has widespread ODA competence, is actively contributing to ODA development, has deployed Open APIs with conformance mandatory for its suppliers and demonstrates ODA competence with training certifications.

what do SMEs want?

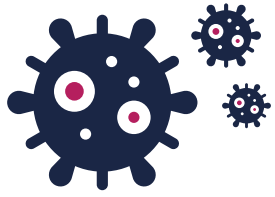
Top priorities for new service adoption are customer relationship management (CRM), billing and enterprise resource planning (ERP)



2 in 3
Purchase ICT from 3+ providers

1 in 2
Want to work with fewer suppliers

1 in 3
SMEs now sell exclusively online



4 in 10
Increased their use of broadband during the pandemic

TM Forum, 2022 (source for data: Accenture)

Axiata Group, a leading telecommunications group in Asia with operations in 11 countries, has achieved Running on ODA status, which has contributed to its success in building Ideamart, an API marketplace for small businesses that allows them to develop innovative services using the Axiata network. CIO Anthony Rodrigo explained recently that when he and his team carefully assessed why initial take-up was slow, they were surprised to discover it wasn't the APIs, the go-to-market campaign or the developer experience that was the problem.

"The issue was really around education and engagement," Rodrigo said. "We had to go beyond the marketplace – we had to really build cool tools for developers. We had to engage developers in a very different way." Doing this level of analysis paid off because by the end of 2021 Axiata had 70,000 developers and 90,000 apps monetized, which together generated revenues of more than $100 million.

Read this ebook to learn more about the ODA:

spotlighted offering: vodafone business

In 2021, Vodafone Business unveiled a new growth strategy that had an SME focus as one of its three key levers of future profitability. The company said it wanted to be a "champion" for SMEs and a "trusted partner" offering both connectivity and cloud services.

In its presentation to investors, the company revealed that SMEs accounted for 54% of its revenues, with microbusinesses representing 26% of the total. CEO Vinod Kumar noted that the SME sector is still underserved and a lot less digitalized compared to larger rivals. He said his company's strategy would be to use scale – building once and deploying across many markets – with local operating companies able to contribute to product and solution development to ensure it met local market needs.

Vodafone expects to have to partner extensively to provide a full portfolio of unified communications, cloud services, security solutions and IoT support to this market. An example is a recent tie-up with Accenture for managed security services for SMEs.

In July 2020 Vodafone launched its V-Hub advisory service for SMEs, which provides advice on creating websites, digital marketing, cybersecurity or remote working. In October 2021 it launched its Business Broadband Pro offer aimed at microbusinesses and homeworkers. This features automatic failover to mobile if the broadband connection is lost and comes with smart mesh wi-fi that extends the signal throughout the building plus intelligent routing to avoid in-building congestion.

section 4

opportunities in the large enterprise market

Unlocking growth in the large enterprise market requires CSPs to verticalize their offers by producing contextual, tailored solutions and price plans for each vertical market. There are huge opportunities as enterprises invest in IoT, robotics, drones, hyper-accurate location services, AI and more. However, while revenues from IoT are set to triple according to the GSMA, only 5% of the $906 billion forecast for 2025 will derive from connectivity.

CSPs will need to decide how they approach the process of verticalization: which opportunities to target first and which to sell into directly or via partnerships and co-creation initiatives. The challenge is that each large enterprise is likely to require a high level of customization, a process that has traditionally only been achieved at high cost and which has resulted in a relatively inflexible solution.

Responding to more dynamic change within the enterprise, as well as enabling customization at scale – including self-customization – are key benefits of higher levels of automation, software-driven networks and digital platforms. Utilizing these digital assets, verticalized solutions can be kept continually aligned to the customer's evolving requirements, shifting the relationship between the two to be more of a partnership than a traditional supplier-customer relationship.

In future, CSPs may offer complex guarantees of service with penalties if not met, but rewards when they help create additional value for their large enterprise partners. This will require an unprecedented level of visibility and control over network experience, including precisely tuned network slicing over 5G. Such services are highly dependent on real-time data so that operators can successfully and proactively manage QoS.

Quantifying the opportunity

Bessemer Venture Partners estimates that the market cap for public verticalized software has risen from $71 billion to $653 billion in the last decade.

Example of innovation

Another TM Forum Catalyst project called 5G Enabled Manufacturing (5GEM) was designed to demonstrate how 5G, mobile private networks, multi-access edge computing, IoT, big data, cloud and AI can be combined to deliver Industry 4.0 applications in the factory of the future. Partners in the project, which was co-funded by the UK government, included Ford, Vodafone, TWI, and Lancaster University.

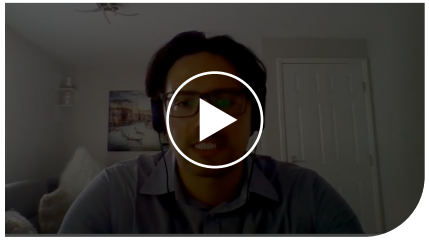
While revenues from IoT are set to triple according to the GSMA, only 5% of the $906 billion forecast for 2025 will derive from connectivity.

The project demonstrated how 5G could be used to connect machines and enable real-time feedback, control, analysis and remote support – for example, allowing machine reconfiguration in real time in response to environmental changes measured by 5G-connected sensors. It also showed how AI-based predictive maintenance could reduce downtime and demonstrated remote maintenance of factory equipment using real-time augmented and mixed reality to diagnose and fix problems quickly.

A common data model was used throughout to enable components from different companies to interoperate. Data from welding machines, for example, used the Vodafone mobile private network to expose that data to a cloud edge device for analysis. TWI used this same data to identify improvements to the welding process.

In the next section, we'll look at future opportunities for CSPs to increase value.

Watch the video to learn more:



spotlighted offering: china mobile

China Mobile is supporting consumer electronics company Haier in transitioning to smart manufacturing. Haier has integrated China Mobile's 5G edge computing, AI and machine learning vision into its smart factories across China. The smart vision application can perform quality checks with at least 99% accuracy – considerably more accurate than humans are able to achieve.

Huawei is acting as Haier's integration and transformation partner, helping it transform 100 facilities in total. The smart manufacturing solution includes AI surveillance to boost staff safety, with real-time alarms if workers are not where they should be. The partners are also delivering automated vehicles and hyper-location services to enable even greater efficiency within the smart factory environment.

section 5

What's next?

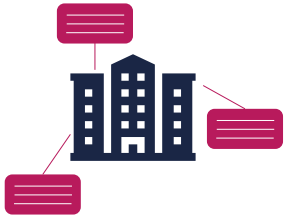
When the current socioeconomic conditions shift, European and North American markets are likely to rapidly adopt advanced technologies made possible by the high bandwidth and low latency of full fiber and 5G. Extended realities (XR) and the metaverse are promising related technologies that have wide applicability but are highly dependent on having premium network connections.

There is a wide range of compelling use cases for these technologies, with the potential for CSPs to move beyond providing only connectivity to develop co-creative partnerships with verticalized specialists targeting consumers and businesses. In the business market this might be as simple as providing metaverse or virtual reality meetings (an extension of what they already provide) or enabling completely new ways for companies to do business in virtual worlds. The opportunity is for CSPs to bring together an ecosystem of specialists underpinned by their own core services (such as secure high-performance networks, billing and customer care).

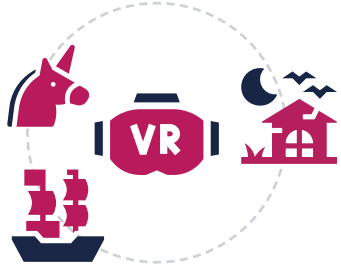
Quantifying the opportunity

Global shipments of VR headsets jumped 241.6% during the first quarter of 2022 compared to the same period in 2021, according to IDC. Global spending on services will grow from $12 billion in 2020 to $73 billion in 2024, at a compound annual growth rate (CAGR) of 54%. By 2025, Europe will be spending $21 billion per year on AR/VR. The metaverse will be worth $5 trillion by 2030, according to McKinsey. The graphic on the next page shows some possible XR and metaverse use cases.

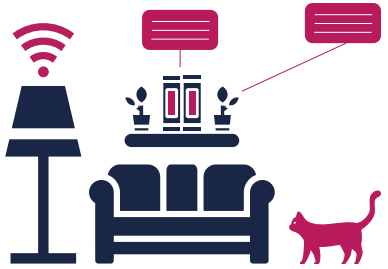
types of XR



Augmented reality (AR)
Overlays the real world with additional information

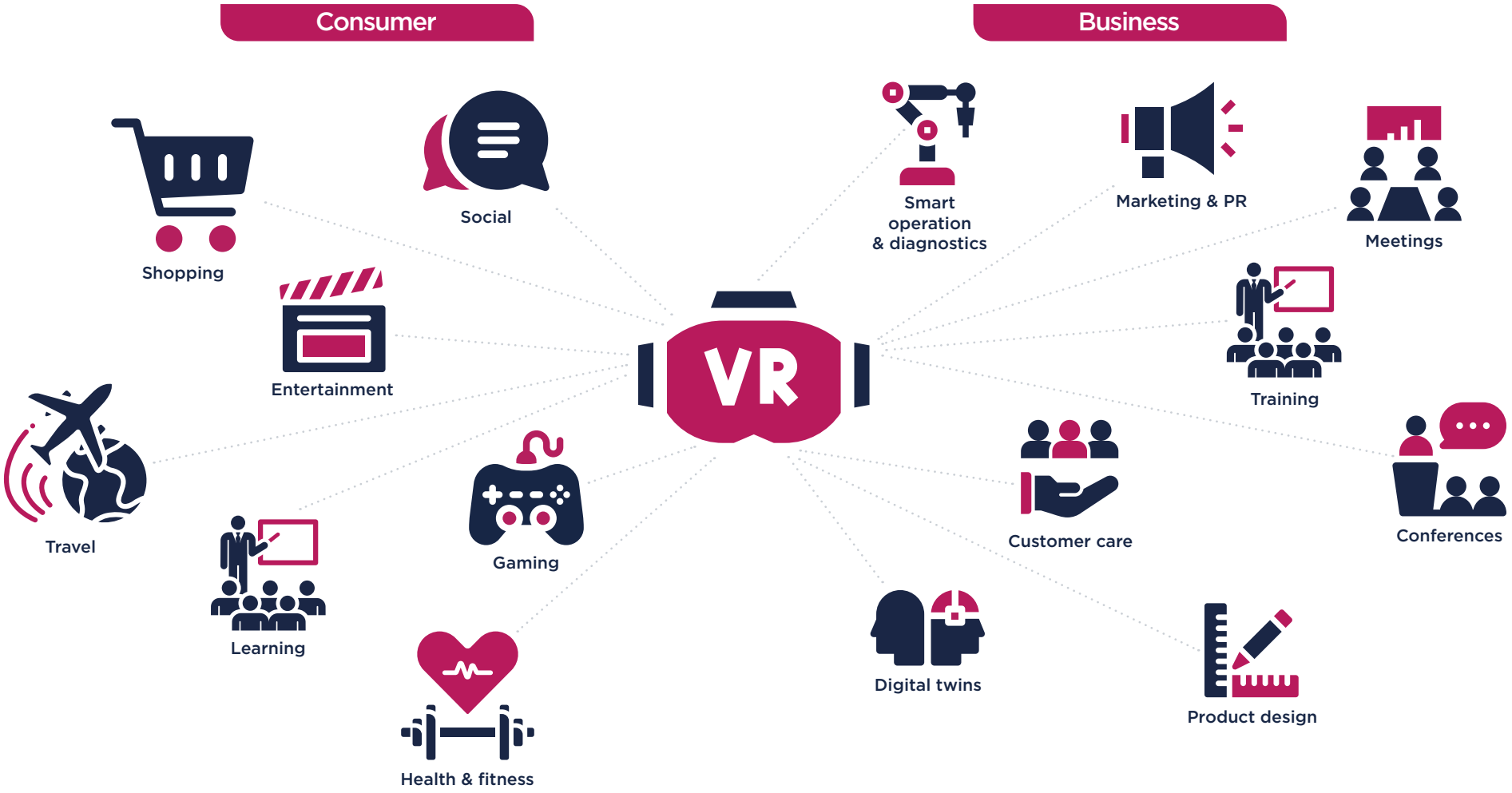


Virtual reality (VR)
Consists solely of virtual or digital elements



Mixed reality (MR)
A mix of AR and VR where real and virtual objects are combined

XR and metaverse use cases



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spotlighted offerings: SK Telecom and Deutsche Telekom

SK Telecom has developed a new offering called ifland (unveiled in July 2021), a metaverse platform it says is "designed to maximize user experience through diverse virtual spaces and avatars" with initial services such as 'Social VR' and 'Virtual Meet-up.' It has also partnered with Deutsche Telekom to bring ifland to Europe.

Initial tests between the two partners will include a virtual space modelled after a specific city in Germany. Other areas of collaboration between the two companies are digital infrastructure security and cybersecurity protection.

Having seen much of the value from social media innovation flow away from CSPs to over-the-top (OTT) players, this early move by SK Telecom and Deutsche Telekom shows a determination not to be cut out of the value chain but to find new ways of exploiting the high bandwidth, low latency and customizability of fully-fledged, cloud-oriented, next-generation 5G and fiber networks to enable new revenue-generating services.

Example of innovation

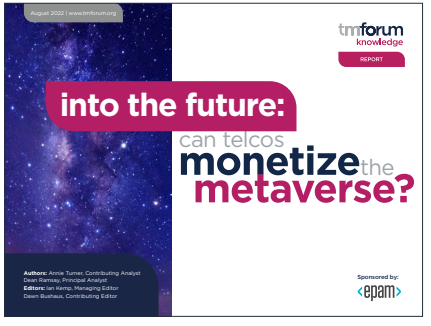
A TM Forum Catalyst proof of concept called Customer avatars unlock metaverse experience has developed a prototype of a customer avatar using digital twin technology. The idea is to help CSPs win customer advocacy by creating more trust, interaction and empathy.

The project demonstrates three key features of customer avatars: trusted identity, data ownership and human-like intelligence. Participants include AsiaInfo, BonCloud, CAICT, China Mobile, China Telecom, China Unicom, STC, Si-Tech and SLT Mobitel.

In the final section, we offer recommendations to help CSPs find value in digital transformation.

Watch this video to learn more:

Read this report to learn more about the metaverse:



section 6

make it happen – strategies for delivering value

The good news is that CSPs' digital transformation efforts to date will help them cope with the current unpredictable demand and changeable market. By optimizing their operational efficiency, they have laid strong foundations for the next phase of transformation which will result in business performance improvements. Following are steps operators can take to deliver real value in the short, medium and long term.

Don't slow down

Although the economic outlook is challenging, CSPs cannot afford to slow down their transformational efforts. It is even more important that they are able to make accurate data-driven decisions in this uncertain climate, and pivot to new opportunities as they arise. Having optimized their operational efficiency, the most digitally mature CSPs are in a good position to take a two-pronged approach to the current market: They can support customers, maintain their market share and wait for market upturn in those sectors that are struggling, while continuing to benefit from supporting more robust sectors that are still growing.

Take a cloud-native approach

Many of the CSPs profiled in this report are transforming their networks and operations to take advantage of cloud-native architectures by using TM Forum's Open Digital Framework (see page 38). The ODA, for example, replaces traditional OSS/BSS with a new approach to building software that is more flexible and enables CSPs to respond more effectively during uncertain economic conditions.

Empower data-driven decision-making

CSPs need to utilize their rich data assets for decision-making. This data also underpins smarter partnership strategies – such as co-creation – as CSPs carve out valuable roles for themselves within the future digital ecosystem. TM Forum's AI & Data project is helping the ICT industry deploy and manage AI at scale by reducing risks within and between different organizations. The team has created a framework and toolset for governing and deploying AI at scale, which also empowers CSPs to get more intelligence from their data, allowing better decision-making.

Measure business value to optimize it

Progressive CSPs will have a detailed strategy to measure and evaluate the business value that is being created – with metrics to assess both their own performance and that of their partners – because if you can't measure it, you can't optimize it. As CSPs switch from tech- and task-focused operational efficiency to commercial goals focusing on outcomes, the importance of business- and customer-focused KPIs will increase. TM Forum's Digital Maturity Model (DMM) can help operators assess business value because it provides the top 30 foundational KPIs they need. These indicators are the cumulative result of hard-hitting knowledge gained by CSPs, suppliers and global advisory firms over many projects and years of experience. To learn more about TM Forum's digital transformation assets, please contact George Glass.

Introducing the Digital Operations Transformation Framework

A Guide to Delivering Value from Digital Transformation

The Digital Transformation Conundrum – Where to Begin?

The latest Digital Transformation Tracker from TM Forum shows that Carriers now widely appreciate that digital transformation is an imperative to maintain a long-term sustainable business, but where to begin? Maturity models such as the TM Forum DMM provide a comprehensive baseline of an organization's existing digital maturity, and can identify maturity gaps across the business. However, once an assessment result is available, the target organization is faced with the challenge of what to do next. Which digital maturity gaps should be addressed first, and how?

Digital transformation can involve significant investment in both time and resources, so when assessing the maturity gaps to be addressed it is important that measurable business value is created as soon as possible, not only for obvious financial reasons, but also to reassure stakeholders that the transformation program is worthwhile and progressing well.

Business value can be created through additional sales and/or reduced costs, both of which are primarily achieved through digital transformation of a business's core operations: The ability to quickly develop and deploy new services which reliably deliver compelling experiences is key to growing revenue, while improved operational efficiency is the main driver to controlling costs. These two aspects are represented as orthogonal axes in MIT CISR's transformation pathway diagram, shown in figure 1.

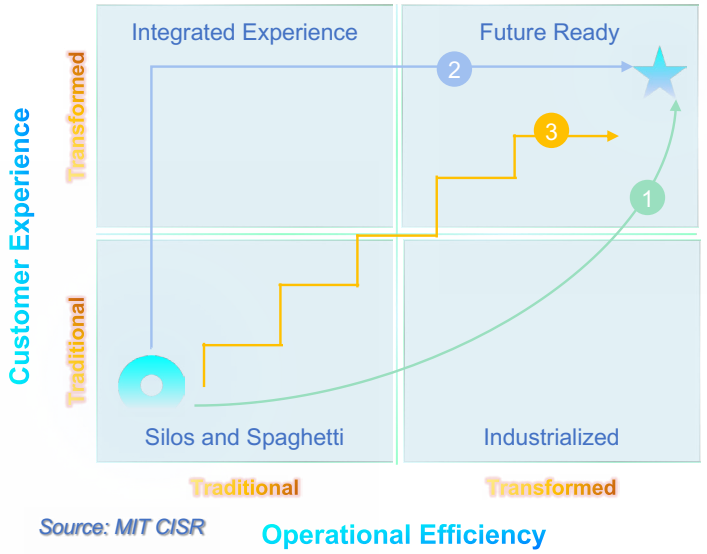


Figure 1: Digital Transformation Pathways

This framework nicely expresses the different digital transformation pathways an organization might follow. Transformation pathway 1 initially focuses on improving operational efficiency before addressing new experiences, services and revenue growth. Conversely, pathway 2 places customer experience and hence revenue development as the highest priority. Pathway 3 might seem to be the most sensible approach, pursuing improved customer experience and operational efficiency in parallel.

> Digital transformation is an imperative to maintain a long-term sustainable business.

Introducing the Digital Operations Transformation Framework

However, MIT's research suggests that this pathway is the most challenging due to the difficulty in fully aligning business and engineering staff around sometimes conflicting objectives.

Fortunately, Huawei's experience from multiple projects suggests that any desired pathway can be followed once a single centralized operations platform has been established. By bringing engineering and business data together in a single repository, data silos can be eliminated. This offers each team increased visibility of the organization's overall activities and builds confidence in other teams' competencies, encouraging inter-team trust and co-operation. Furthermore, by adding a low-code development capability, complemented by pre-built data models and analysis applications, domain experts can be quickly enabled to fully exploit this data, without requiring formal software or data science training. This truly democratizes the organization's data, opening up powerful new insights and decision-making capabilities to each team, and allowing the organization to more confidently pursue the pathway of choice.

Getting Started

Once a decision has been made to adopt platform-based operations to improve revenues, experience and operational efficiency, carriers still face the challenge of where to begin. What changes and investments need to be made, and in what order, to quickly demonstrate improved business value?

To help guide digital operations transformation activities, Huawei and our carrier partners have developed the Digital Operations Transformation Framework (DOTF) shown in figure 2 below.

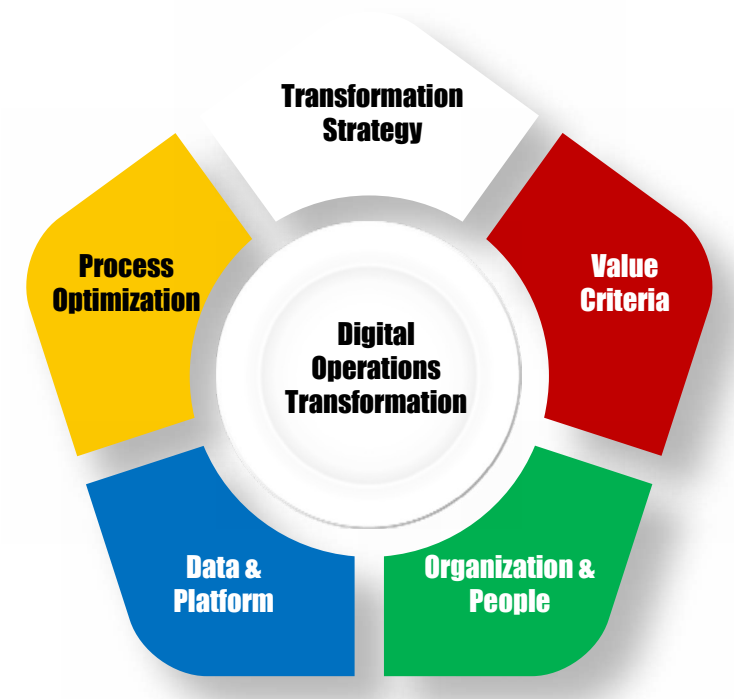


Figure 2: Digital Operations Transformation Framework

> Carriers still face the challenge of where to begin.

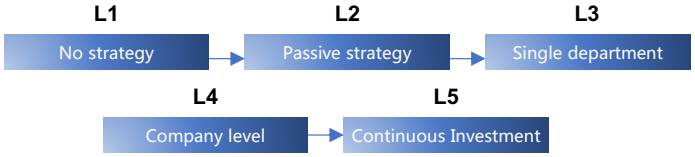
Introducing the Digital Operations Transformation Framework

This model identifies 5 distinct domains where the carrier should focus to begin executing digital operations transformation, defining 5 levels of achievement in each area:

Transformation Strategy

Firstly, business leaders should take positive steps to understand the digital opportunities and threats facing their business and create a sense of urgency across the organization. They should select a few business opportunities to focus on and establish a team to develop a transformation blueprint focusing on platform and capability digitalization to meet the requirements of these opportunities.

The five levels of achievement span from "No strategy" through to having a comprehensive organizational-wide strategy tied to a well-defined, regularly updated, digital transformation blueprint:



Value Criteria

This item aligns closely with transformation strategy development. It is imperative that digital initiatives are able to quickly and visibly deliver business value. Hence the business objectives for digital transformation should be clearly articulated and understood across the organization. In particular, KPIs should be defined which can accurately track the transformation progress and which closely link to business value. Such value KPIs can be defined using a 3-layer value model:

- Capability Value: Data quality, future-proof platform...
- Service Value: User complaint handling efficiency, O&M automation rate...
- Business Value: Profit growth rate, NPS...

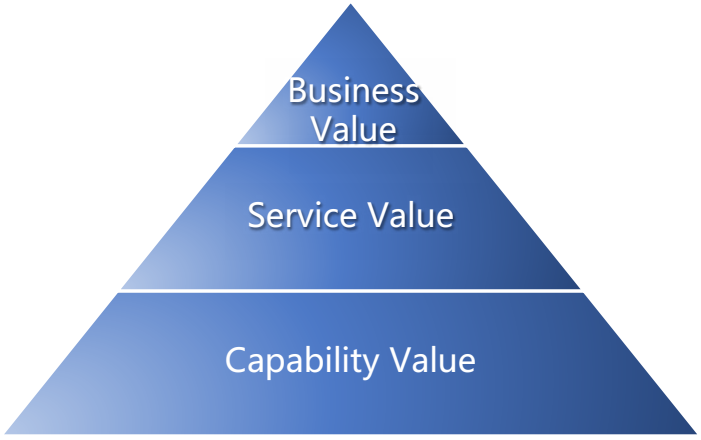


Figure 3: Transformation Achievement Measurement Model

This model identifies 5 distinct domains where the carrier should focus.

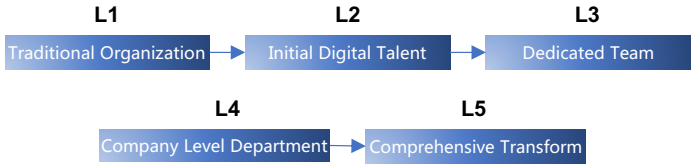
Introducing the Digital Operations Transformation Framework

The five levels of achievement span from "No criteria" through to having a complete set of leading and lagging metrics which are regularly updated to track ongoing initiatives and their direct link to business value.

Organization and People

The organization must be structured not just to allow digital transformation, but to actively encourage it. Firstly, it is essential that multi-skilled teams are established to ensure that both business and technical aspects are considered in all decisions. Secondly, staff should be enabled and incentivized to introduce digital practices into the business, and thirdly, it should be remembered that staff are naturally fearful of change, so open communication is essential to reassure staff and avoid needless speculation.

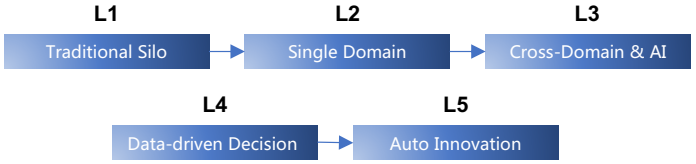
The five levels of achievement span from having a siloed organization, with partitioned centers of excellence, and staff lacking clear development goals and opportunities through to an environment where cross-functional working is the norm, with staff incentivized to continually develop their skills and innovatively evolve their ways of working to leverage digital developments.



Data and Platform

A converged data storage and analytics platform should be established which can collect and govern data from across all the organization domains and also from third parties. This platform should facilitate easy data sharing and advanced analytics. A cloud-ready approach ensures full scalability and deployment flexibility, allowing the carrier to focus on core activities and less on IT maintenance should they so choose.

The five levels of achievement span from having legacy specialized hardware and software with siloed data and functionality through to having a common, cloud-ready, API-enabled platform with fully converged data, enhanced by a full suite of knowledge and AI-based capabilities which enable agile, low-code development.



Process Optimization

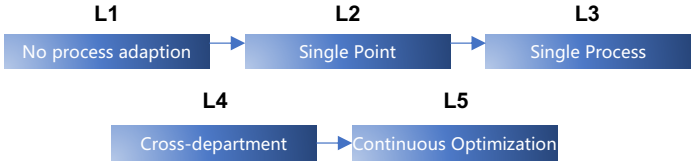
Processes sit at the heart of the operations transformation activity. Driven and prioritized by the value objectives of the digital transformation investment, each operational process should be optimized to fully benefit from new digital technologies such as AI and autonomous operations. Some typical carrier processes which might be addressed are:

Processes sit at the heart of the operations transformation activity.

Introducing the Digital Operations Transformation Framework

- **Network Planning and Dimensioning.** AI can introduce market forecasts and economic value into network planning, fully accounting for latent demand. This can speed up and increase the ROI of 5G investments for example, while protecting the carrier's brand.
- **Routine Maintenance.** AI modelling using predictive techniques can identify possible points of failure in advance, allowing them to be addressed during routine maintenance, rather than through expensive emergency call-outs.
- **Network Optimization.** Network performance issues can be automatically detected and demarcated. In most cases the necessary corrective actions can be automatically determined, and if they cannot be immediately corrected the necessary information can be forwarded to the optimization team.
- **Complaint Handling.** The customer care system can minimize complaints by predicting and proactively handling complaint causes in advance of the actual complaint. When complaints do occur, the system can provide rich diagnostic information to allow the complaint to be handled rapidly.

The five levels of achievement range from having rigid, deeply ingrained, legacy processes across the organization through to having a complete set of processes which fully leverage digital technology and converged data to enable wide and deep automation and associated new ways of working.



Real-world Experience

To help navigate their digital transformation journeys, a number of leading carriers have used the DOTF to evaluate their current progress, as well as stimulate insights and opinions. The results of this evaluation are provided below, showing aggregate progress against the five domains:

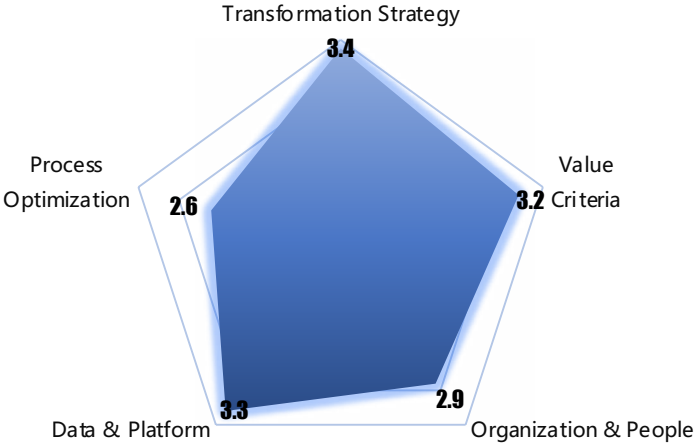


Figure 4: DOTF Survey Results

> A number of leading carriers have used the DOTF to evaluate their current progress.

Introducing the Digital Operations Transformation Framework

The results show:

- Most carriers are progressing well with Transformation Strategy. An average score of 3.4, the highest across the 5 domains, shows that carriers already have a clear strategy to guide their transformation work.
- Data & Platform is the second highest with a 3.3 average score, suggesting that carriers realize the importance of data and digital platform in their transformation.
- 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 practices and equipment remains vital for continuous progress in the digital transformation journey.

In addition, many service providers worldwide have contributed to the structured approach offered by the DOTF. Two examples are shown below:

stc

Saudi Arabia's leading carrier, stc, helped develop these principles when establishing its 2030 Vision to guide its digital transformation, with customer experience and time-to-market as key drivers. To measure and drive success, their CCEx initiative was developed to measure the perceived customer experience of the new digital services, while other leading metrics included % Digitized Customer Journeys and % Adoption of Digital Services (now at 98%). They established a matrix organization with a dedicated digital transformation team supported by multi-skilled execution teams to ensure all projects benefitted from cross-organizational support. To stimulate new ideas, a digital innovation center was established with support from industry bodies and other partners.

A single, cloud-based core platform was established to integrate all the organization's data and offer a single-source of truth while reducing data management overhead. AI modules are now gradually being introduced to improve process efficiency and effectiveness through improved data-driven insights and decisions. Process performance is being closely monitored to ensure expected business value is being delivered and the 2030 Vision can be realized.

Many service providers worldwide have contributed to the structured approach offered by the DOTF.

Introducing the Digital Operations Transformation Framework

AIS, Thailand's leading carrier, created a vision to become a Cognitive Tech-Co, and deliver a distinctive experience to all customers. Using the DOTF principles as a guide, it chose to prioritize Autonomous Network and IT Automation, referencing TMF IG1269 Autonomous Level Assessment Approach. This is bringing converged data and automation to support all the business lines of AIS.

With a target to establish Autonomous Network L3 and L4 in 2023 and 2025 respectively, AIS used the DOTF and TMF IG1269 to identify its key capability gaps, particularly in the areas of people, process and platform. With carefully targeted investment, AIS is now closing these capability gaps to achieve its desired target.

Next steps

By following the DOTF sequence above, with a clear strategy and line of sight to business value, it is 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.

If you would like to know more about this methodology, and how our Digital Operations Transformation Framework can help guide your digital operations transformation towards business success, then please visit https://carrier.huawei.com/en/products/service-and-software

About Huawei
Founded in 1987, Huawei is a leading global provider of information and communications technology (ICT) infrastructure and smart devices. Huawei's mission is to bring digital to every person, home and organization for a fully connected, intelligent world. To this end, we will drive ubiquitous connectivity and promote equal access to networks to lay the foundation for the intelligent world; provide diversified computing power to deliver ubiquitous cloud and intelligence; build powerful digital platforms to help all industries and organizations become more agile, efficient, and dynamic; redefine user experience with AI, offering consumers a more personalized and intelligent experience across all scenarios, including home, travel, office, entertainment, and fitness & health.

tm forum
open digital framework

A blueprint for intelligent operations fit for the 5G era

The TM Forum Open Digital Framework provides a migration path from legacy IT systems and processes to modular, cloud native software orchestrated using AI. The framework comprises tools, code, knowledge and standards (machine-readable assets, not just documents). It is delivering business value for TM Forum members today, accelerating concept-to-cash, eliminating IT and network costs, and enhancing digital customer experience. Developed by TM Forum members through our Collaboration Community and Catalyst proofs of concept and building on TM Forum's established standards, the Open Digital Framework is being used by leading service providers and software companies worldwide.

Core elements of the Open Digital Framework

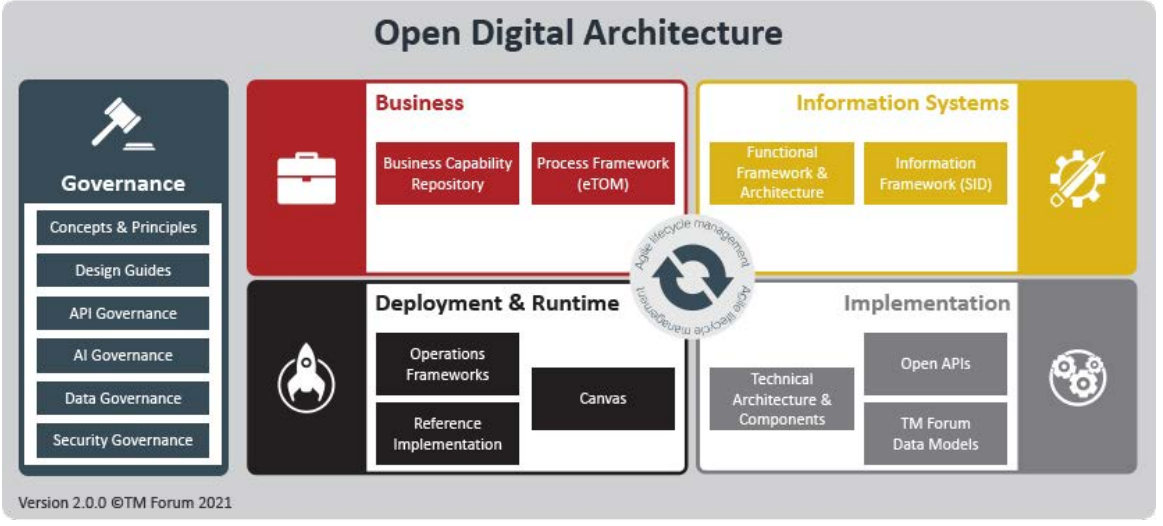
The framework comprises TM Forum's Open Digital Architecture (ODA), together with tools, models and data that guide the transformation to ODA from legacy IT systems and operations.

Open Digital Architecture

- Architecture framework, common language and design principles
- Open APIs exposing business services
- Standardized software components
- Reference implementation and test environment

Transformation tools

- Guides to navigate digital transformation
- Tools to support the migration from legacy architecture to ODA



Maturity tools & data

- Maturity models and readiness checks to baseline digital capabilities
- Data for benchmarking progress and training AI

Goals of the Open Digital Framework

The Open Digital Framework aims to transform business agility (accelerating concept-to-cash from 18 months to 18 days), enable simpler IT solutions that are easier and cheaper to deploy, integrate and upgrade, and to establish a standardized software model and market which benefits all parties (service providers, vendors and systems integrators).

Learn more about collaboration

If you would like to learn more about the project or how to get involved in the TM Forum Collaboration Community, please contact George Glass.

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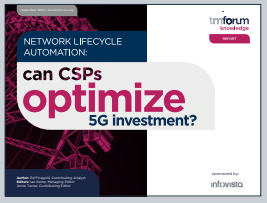
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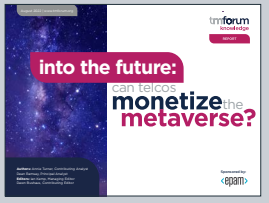
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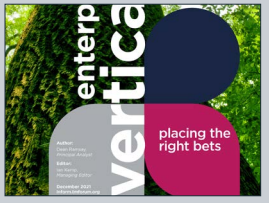
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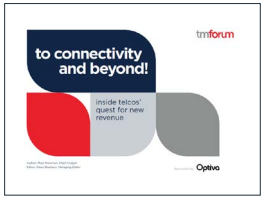
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For more information about how TM Forum can help with digital transformation, please contact **George Glass**