

Digital transformation for 2020 and beyond

A global telecommunications study

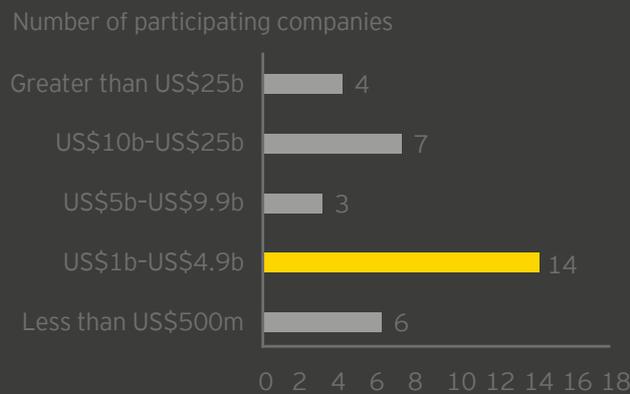


Building a better working world

About this report

The 2017 global telecommunications study has been conducted by EY to monitor and evaluate the evolving views of leaders across the global telecommunications industry. This latest survey forms part of EY's ongoing series of global telecommunications studies. Based on in-depth conversations with industry leaders worldwide, the resulting insights help us to assess the current state and future state of this rapidly changing sector. Our 2017 survey drills down into perspectives from the industry's CIO and CTO community in order to explore the role of IT and networks and to examine how this is supporting long-term digital transformation. We conducted 39 in-depth interviews with participants from 36 organizations, supported by insights and analysis from EY's sector professionals and secondary research sources. The 36 organizations taking part this year account for annual revenue of US\$421 billion and an aggregate market capitalization of US\$603 billion.

Figure 1: Participating companies in 2017 – annual revenues



2017 global telecommunications study: highlights

39 interviews with 36 organizations

Participant organizations' annual revenue:

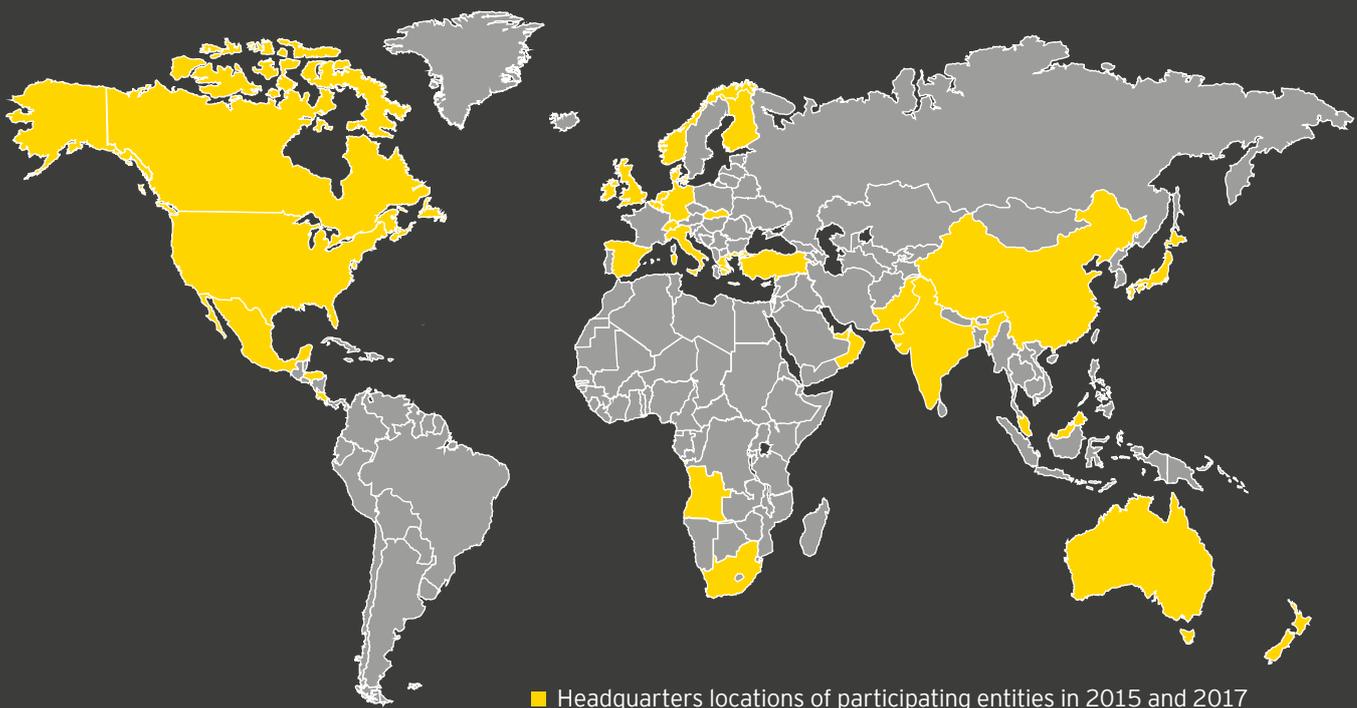
US\$421 billion

Participant organizations' aggregate market capitalization:

US\$603 billion

Taken together, our 2015 and 2017 surveys have involved a total of 83 interviews with 76 organizations, with the aggregate annual revenues of the participating companies standing at over US\$1 trillion. These interviews have covered 44% of the top 50 global carriers by revenue.

Figure 2: : Geographic locations of participating companies, 2015 and 2017



Participating industry executives*

Cosmas Adam

Chief Technology and Information Officer
MTN Cyprus

Daniel Mizrachi Belisario

Chief Technology Officer
Millicom International Cellular Costa Rica

Enrique Blanco

Chief Technology Officer
Telefonica Group

Axel Clauberg

Vice President, Aggregation, Transport, IP
(CTO-ATI)
Deutsche Telekom

Mike Cole

Chief Information Officer
Bell Canada

Nicolas Costaras

Chief Information Officer
Wind Hellas

Claudio Farina

Head Financial Planning & Analysis
Vodafone Italia

Jay Ferro

Executive Vice President, Chief Information
Officer, Chief Product Officer
EarthLink

Vikas Grover

Chief Information Officer
Vodafone India

David Havercroft

Chief Operating Officer
Spark New Zealand

Kashif Syed Haq

Chief Technology Officer
Axiata Digital

Hisham Fathy Hassan

Director, Technology Strategy & Control
Viva Bahrain

Luis Martin Hernandez

Chief Information Officer
America Movil – Telcel (Mexico)

Bouke Hoving

Executive Vice President Simplification &
Innovation and CIO
KPN

Phil Jordan

Chief Information Officer
Telefonica Group

Panicos Kallenos

Chief Technology and Information Officer
CYTA

Veenod Kurup

Group Chief Information Officer
Liberty Global

Francois Mairey

Chief Technology and Information Officer
Tele2 Group

Amit Marwah

Head of Sales, End to End Solutions
Nokia Solutions and Networks India

Gary McLaren

Chief Technology Officer
HKBN

Shin Murakami

Corporate Officer, Executive
Vice President, Chief Mobile Officer
Yahoo Japan



Ali Obtel

Chief Technology Officer
Viva Kuwait

Tommy Olenius

Chief Technology Officer
DNA Oyj

Peter Jantosovic

Director Technology Transformation &
Optimization
Slovak Telekom

Gunar Post

Head of IT Strategy
Deutsche Telekom

Scott Rice

Chief Information Officer
Sprint Corporation

John Romano

Acting Chief Information Officer
Telstra

Ruza Sabanovic

Chief Technology and Information Officer
Telenor Group

Daniele Schneeberg

Head of Transformation
Vodafone Italia

Ken Smithard

Vice President, Performance
Organizational Efficiency & IT
Cogeco Connexion

Peter Taylor

Vice President, Technology
Operations and Support
Shaw Communications Inc

Hugo Van Zyl

Chief Technology and Information Officer
OpenServe Pty Ltd (Telkom Group)

Saad Muzaffar Waraich

Chief Technology and Information Officer
PTCL Pakistan

Marlon Yu-Shan

Chief Information Officer, Millicom
International Cellular Honduras

*Five participants requested to remain anonymous.

The methodology

We met with each of the senior industry executives who participated in the study, asking them 15 questions that focused on the industry as a whole, as well as on specific areas and issues within their organizations. We asked participants to provide their top three answers to provide full insight into the opportunities and challenges confronting them now and in the future. We also captured key comments from the dialogue generated by the interviews, an anonymized selection of which appears in this report.

If you would like to see the complete results of the study, please contact your local EY representative.

Sector snapshot: the paradigm shift to digital is well underway

The global telecoms industry landscape is changing faster than ever. Erosion of legacy revenue streams driven by over-the-top (OTT) competitors continues, forcing operators to consider new ways of remaining relevant to consumer and enterprise customers.

While many have embarked on journeys to become digital service providers, the sector remains vulnerable to quickening shifts in terms of technology cycles, competitor actions and customer needs.

A decade of disruptive dynamics

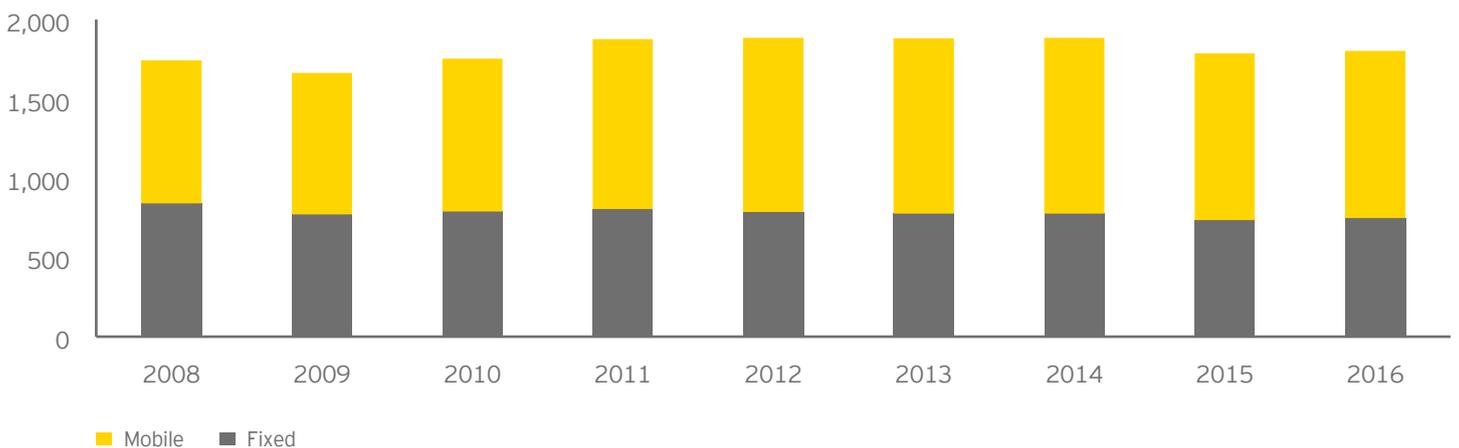
Telecommunications companies have endured a challenging decade, with the industry subjected to a number of disruptions in recent years. The smartphone revolution has led to an explosion in data demand, while the accompanying growth of mobile applications has seen a range of disruptive players monetize new customer behaviors.

While this has resulted in a range of interconnected phenomena, from the sharing economy to frictionless marketplaces, operators' revenue streams remain under pressure. The rise of OTT players has been accompanied by macroeconomic pressure and mandated price reductions to mobile termination and roaming rates that

have further weakened the sector's growth profile. During the period 2008 to 2016, global fixed and mobile revenues increased at a compound annual growth rate of 0.4%.

At the same time, network investments remain burdensome as operators upgrade their infrastructure to sustain an exponential rise in data demand. Large-scale 4G rollout continues, supported by the acquisition of new spectrum frequencies, while last-mile connections to the home are also the scene of continued investment.

Figure 3: Global telecoms revenue development 2008-16 (US\$b)



Source: Ovum



“Consumer interaction with devices creates instant needs. The challenge for us is to keep up with customer demands given our legacy network elements and investments.”

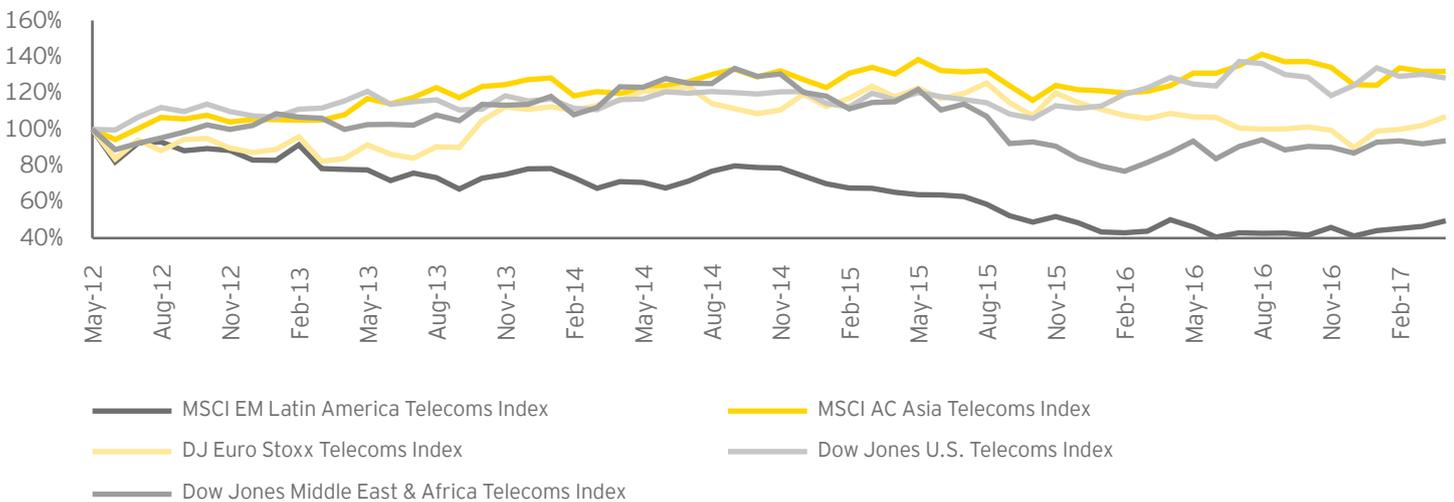
Regional landscapes vary in telecommunications

From a geographical perspective, North American and Asia-Pacific telcos have performed best in terms of share prices in the past five years. This outperformance has been helped by consolidated market structures and early access to new spectrum in North America and by strong smartphone penetration growth and demand for mobile data services in Asia-Pacific.

Meanwhile, European telco stocks have recovered since 2013 due to the anticipation of large-scale M&A – yet although the revenue growth outlook is improving, regulatory attitudes

remain difficult to predict. External factors are weighing down telco share performance in emerging regions, whether in the form of recession in Latin America or falling commodity prices in Africa. And while telcos across regions remain well-positioned as defensive stocks, dividend yields remain under pressure, having trended slightly down in recent years.

Figure 4: Operator share performance



Source: Capital IQ



Telcos are diversifying their revenue streams but margin management remains challenging

Telcos in all regions have expanded their service portfolios in recent years to include a widening array of offerings, as they look to capitalize on growth opportunities across technology, media and telecommunications (TMT) in areas like enterprise cloud, TV and the Internet of Things (IoT). Meanwhile rapid smartphone adoption is driving growth in areas such as mobile advertising, and bundles with new combinations of fixed, mobile and TV services are gaining ground.

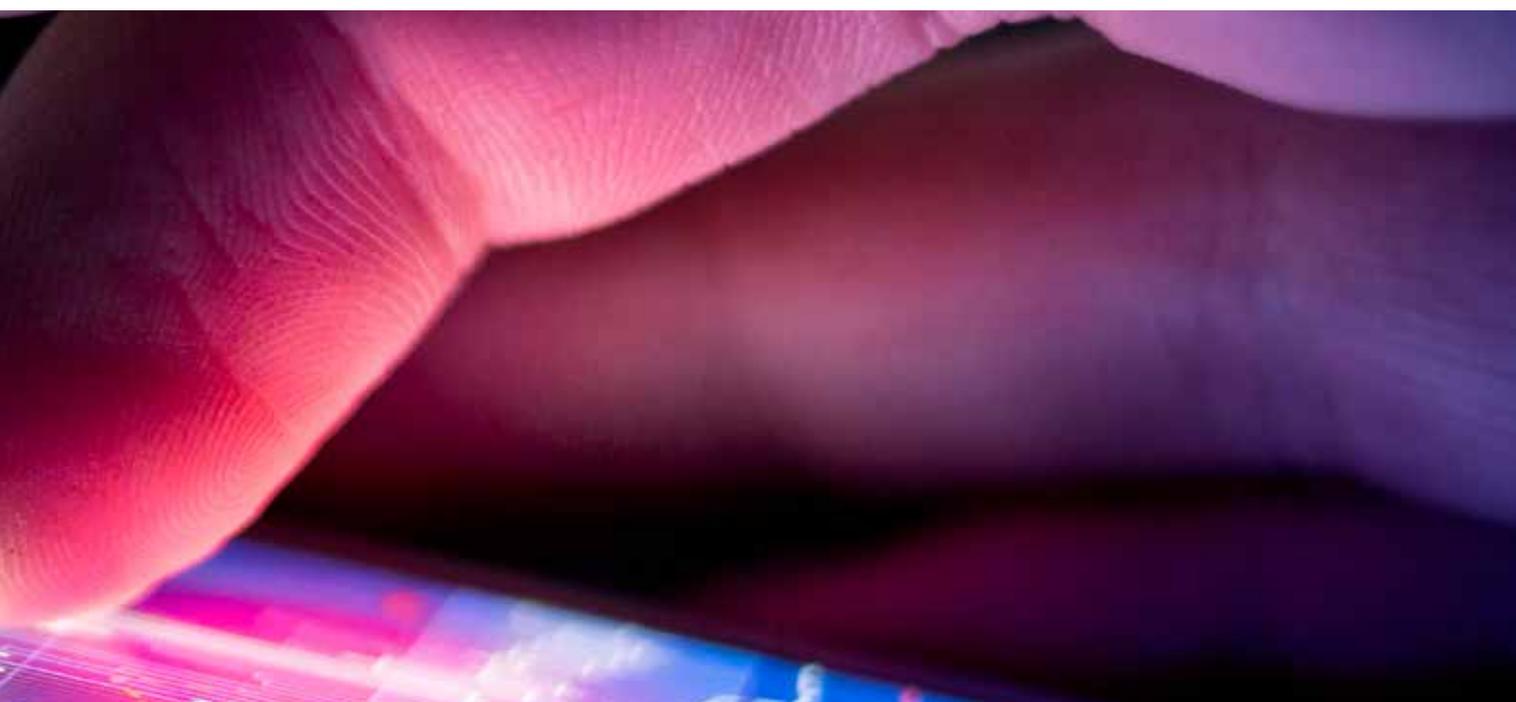
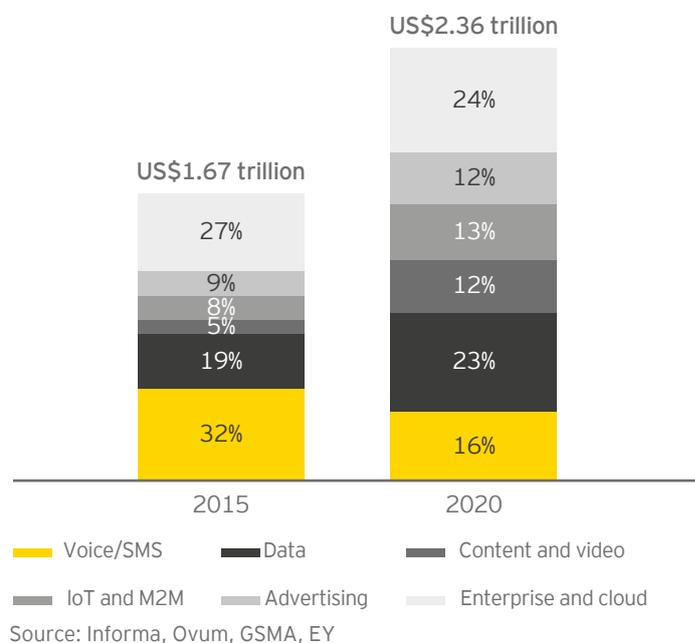
However, a key challenge for telcos as they expand their service portfolios is that adjacent market segments tend to offer lower margins, and disruptive competitors are already well-positioned in key segments such as cloud and advertising.

Partly as a result, profitability is under pressure, with operators' return on invested capital (ROIC) trending downward. In combination with the lower margins available from adjacent services, this squeeze on profitability reflects other factors, including regulatory price reductions and the high capital intensity required to service the surging demand for mobile data.



“The future for telcos is uncertain. Players are taking virtual positions in the market, but it is doubtful whether they are substantially different from each other.”

Figure 5: Digital TMT ecosystem value forecast

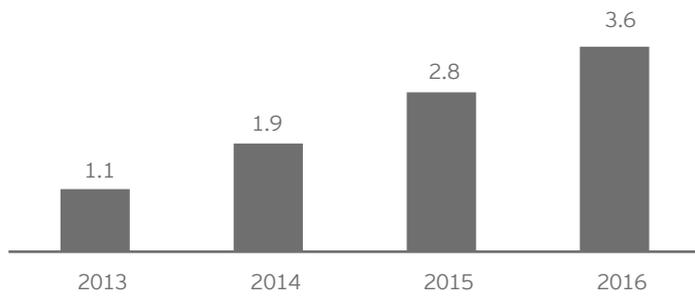


Competitive intensity is higher than ever

OTT players such as WhatsApp, Facebook and WeChat have redefined the customer experience in messaging and video services, luring traffic away from telco offerings such as SMS.

These trends are playing out against a market background in which consumers and enterprises increasingly see value in multi-service packages, with quad-play and cloud packages driving new opportunities in each segment respectively.

Figure 6: Active user base of major instant messaging platforms (billions)



Source: GSMA

However, many consumers are looking to customize their own bundle combinations, with OTT video playing an increasingly important role – in turn driving further M&A and partnerships. Meanwhile, on the enterprise side, telcos are seeking growth by offering more advanced services to multinational customers. This shift is fostering a growing focus on strategic services based on IP, Ethernet, VPN and managed services capabilities. In focusing on network-adjacent services, telcos' aim is to "protect the core" while also avoiding head-on competition with IT outsourcers and technology specialists.

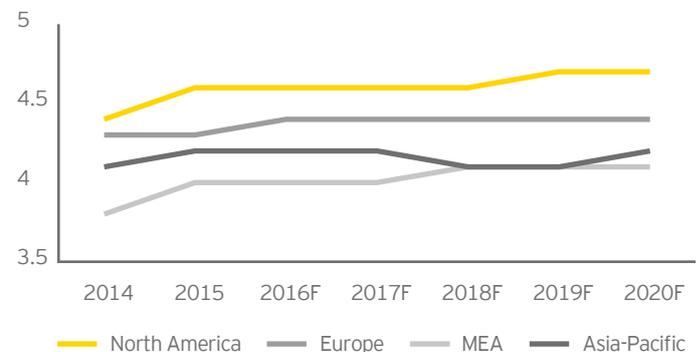
Overhaul of systems and processes is fueling telcos' digital transformation

IT spending by telcos is set to keep rising through the period from 2015 to 2020, as operators leverage new hardware and software in search of long-term efficiency gains and greater agility and flexibility. However – as Figure 7 shows – spending profiles as a proportion of revenues vary between regions, with Americas operators demonstrating higher relative spending propensity.

The rising global trend in IT spend reflects the fact that such investment remains critical to supporting digital growth, with quality of experience and reduced costs at the heart of operators' strategic agenda. While budget constraints in developed markets are dis-incentivizing large-scale transformation programs, emerging markets will continue to drive IT spending growth through 2020. In combination, these factors are projected to see global telco IT investment reach US\$85b in 2020, with 74% of this total being spent with external providers rather than internally.¹

Growth in spending on systems hardware and packaged software will be particularly strong, reflecting the move to more flexible virtualization technologies. In contrast, internal IT spending on areas like IT desktop capabilities and IT departments will see relatively slow growth between 2015 and 2020, at a CAGR of just 1%.

Figure 7: Global telco IT spending forecast by region



Source: Ovum

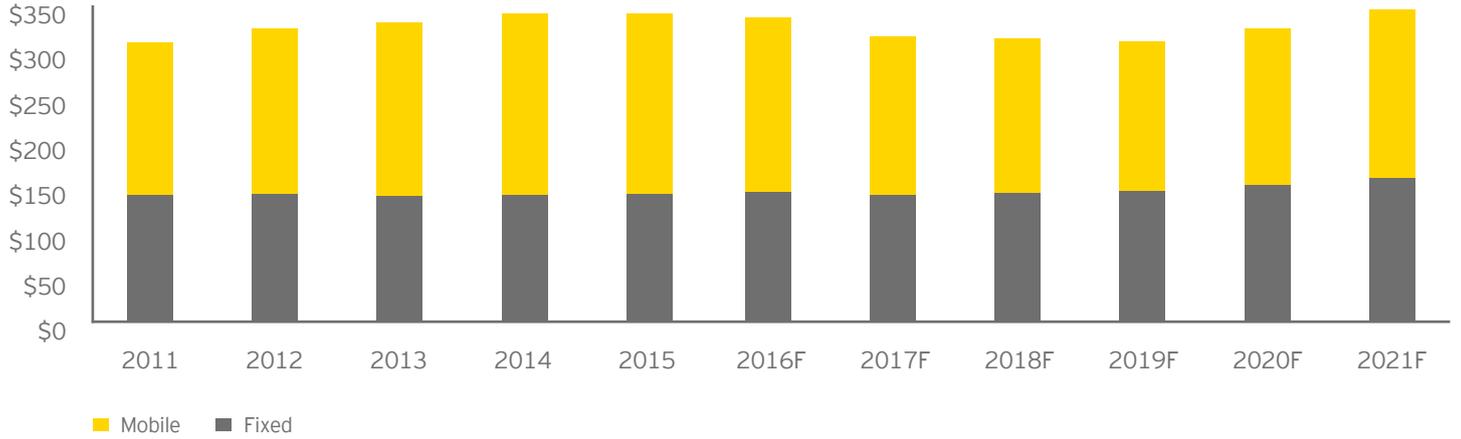
¹ Ovum.

Capital intensity is set to rise toward the end of the decade

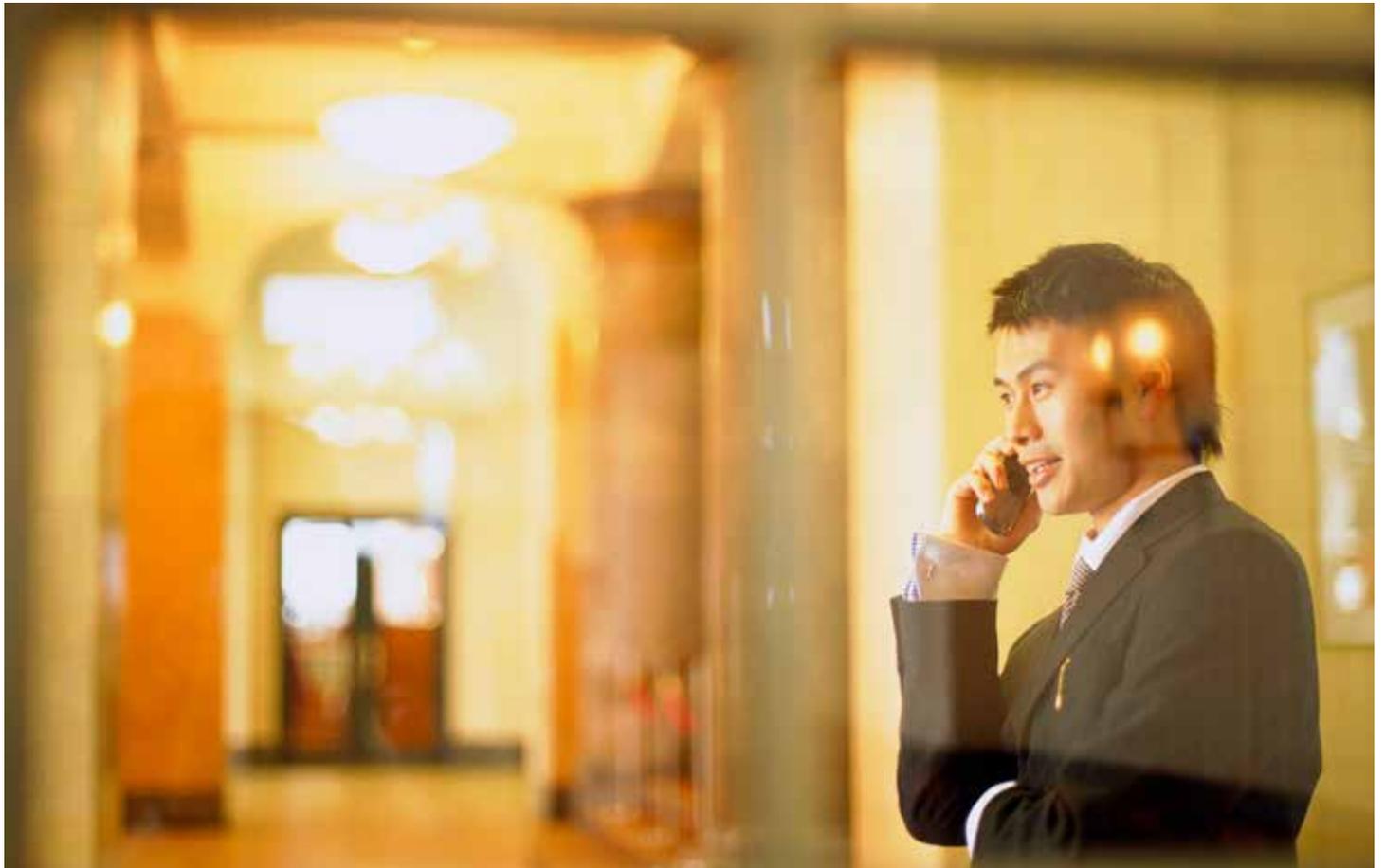
Carriers' capital expenditure has been falling following their large-scale 4G and fiber rollouts. However, as Figure 8 illustrates, an acceleration of "pure fiber" rollouts and the advent of 5G will lead to sharp rises in capex in 2020-21, both in fixed and mobile

segments. Operators will need to consider new ways of generating capex efficiency as they strive to meet growing demand for high-speed and low-latency data services.

Figure 8: Global telecoms capex development (US\$b)



Source: Ovum





Headline survey findings

Looking across the views of the global telecoms industry leaders elicited in our research, eight key messages emerge strongly.

Eight key messages from our research

1. Disruptive competition tops the list of industry challenges.
2. Digital business models, customer experience and cost control lead the 2020 strategic agenda.
3. The network dominates the near-term spending agenda, but a range of IT improvements are also being sought.
4. Network capex is trending up but IT spending profiles vary.
5. Confidence is rising in the digital services opportunity, yet caveats remain.
6. Analytics and virtualization are the top innovation drivers, but legacy IT and a lack of skills are acting as brakes.
7. Process automation leads the list of long-term IT enablers.
8. The post-2020 landscape will be transformed by 5G.

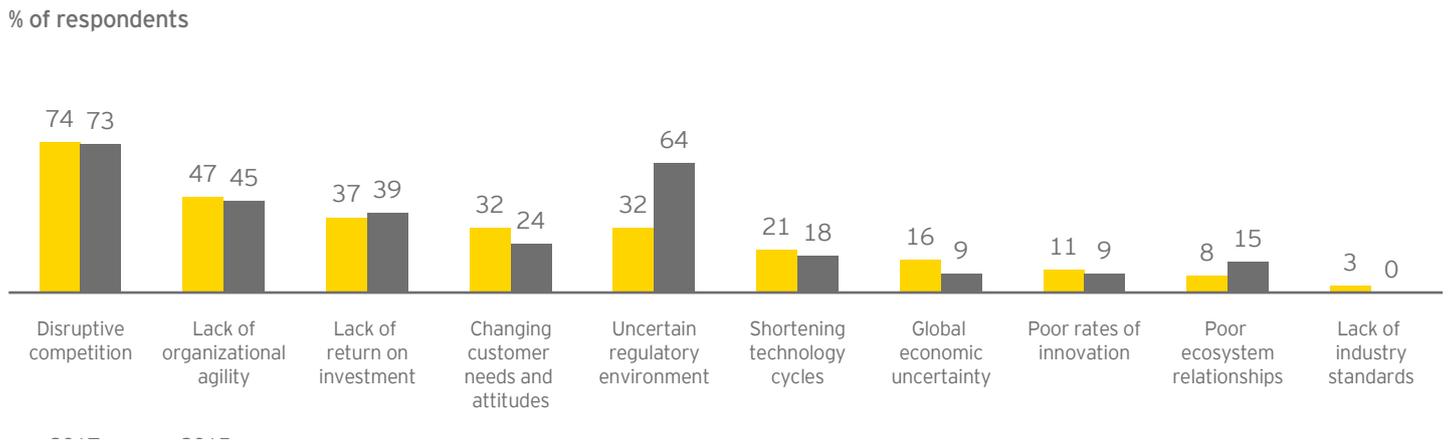
1. Disruptive competition tops the list of industry challenges.

Asked to cite the top strategic challenges facing their business, almost three-quarters – 74% – of our survey participants highlight disruptive competition, followed by 47% mentioning a lack of organizational agility (see Figure 9). While neither of these findings

is significantly different from our 2015 survey, what has changed markedly is the rating given to regulatory uncertainty, which is ranked as a top-three challenge by only half as many respondents this time (32%) as in 2015.

Figure 9: Operator views on challenges facing the telecommunications industry

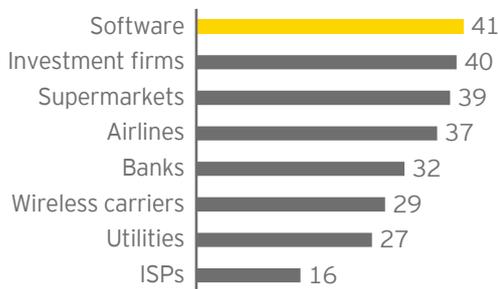
What are the most significant challenges facing the industry? (top three responses)



More than one in three respondents see disruptive competition as the single largest challenge facing the industry, and this concern is reinforced by a comparison of net promoter scores (NPS), which highlight customer willingness to recommend a company’s product or service, between different industries.

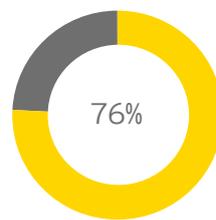
However, there is a divergence of views between operators depending on market maturity. Carriers in developing markets are proportionately less likely to cite disruptive competition as a leading challenge, reflecting lower rates of smartphone penetration and more straightforward relationships with OTTs that leverage partnerships to widen addressable markets.

Figure 10: Average US net promoter scores across industries

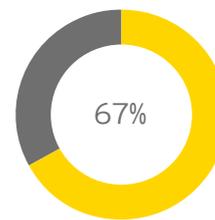


Source: Temkin Group

Developed markets



Emerging markets



Participants citing disruptive competition as a leading industry challenge

“There is no brand loyalty to carriers; all the mindshare goes to OTTs.”

“Change used to be technology-driven, but now it’s competitor-driven.”

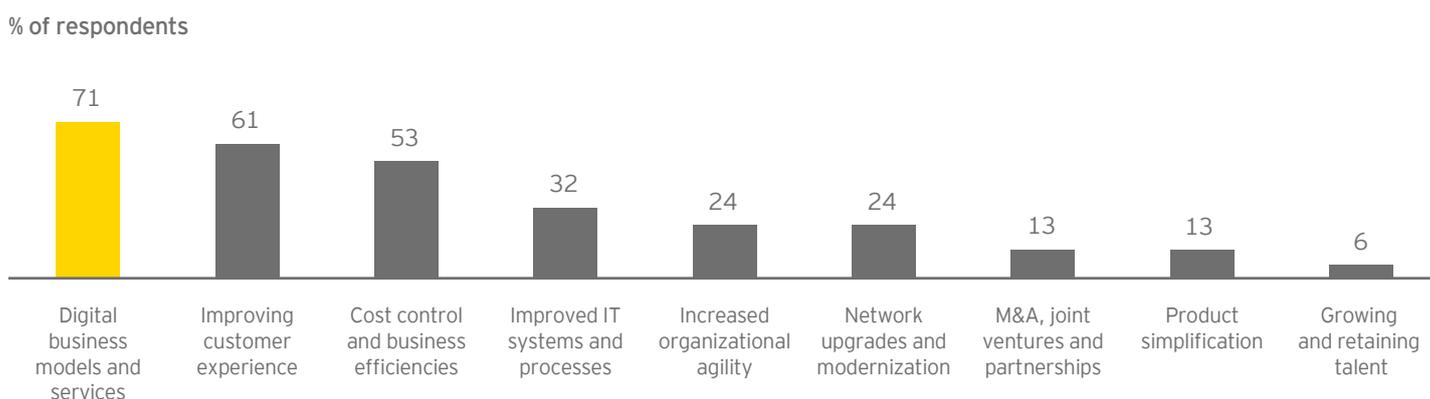
2. Digital business models, customer experience and cost control lead the 2020 strategic agenda.

When we asked the survey participants to name their top three strategic priorities through 2020, three focus areas were cited by more than half of respondents: digital business models (71%),

customer experience (61%), and cost control and business efficiencies (53%).

Figure 11: Operator strategic priorities over the next three years

What are your most important strategic priorities over the next three years? (top three responses)



While a focus on customer experience is well understood as a key strategic objective of the telecommunications industry – and explains the growing focus on net promoter score as a performance metric – the primacy of digital business models and services is telling in its own right.

As operators move beyond into adjacent growth segments, business model adjustments are more critical than ever before if operators are to create winning customer experiences in both legacy and new service domains. At the same time, digital business models are unlocking a new wave of efficiencies.

“ At the same time, digital business models are key to unlocking a new wave of efficiencies.”

Nevertheless, the ongoing importance executives attach to improving customer experience and satisfaction is further underlined by the fact that this gains the most votes as the number one strategic priority – 41% – ahead of digital business models and services (22%) and cost control and business efficiencies (17%).

“Friendly customer service and trust of customers are assets that are impossible to copy when you do it better than the competitors.”

Overall, what comes across loud and clear is a symbiotic relationship among digital business models, customer experience, and efficiency and agility gains. Only by harnessing these related objectives as part of a common purpose do operators see themselves unlocking the full benefits of their transformation agenda. Nevertheless, the low relative focus on acquiring and retaining talent suggests that skills management may be lacking within this set of interconnected priorities.

“Digital enables ‘increased organizational agility’ and ‘improved IT systems and processes’ as a by-product of improving customer experience.”

“Automation and efficiency improvement of all processes will serve customer experience.”

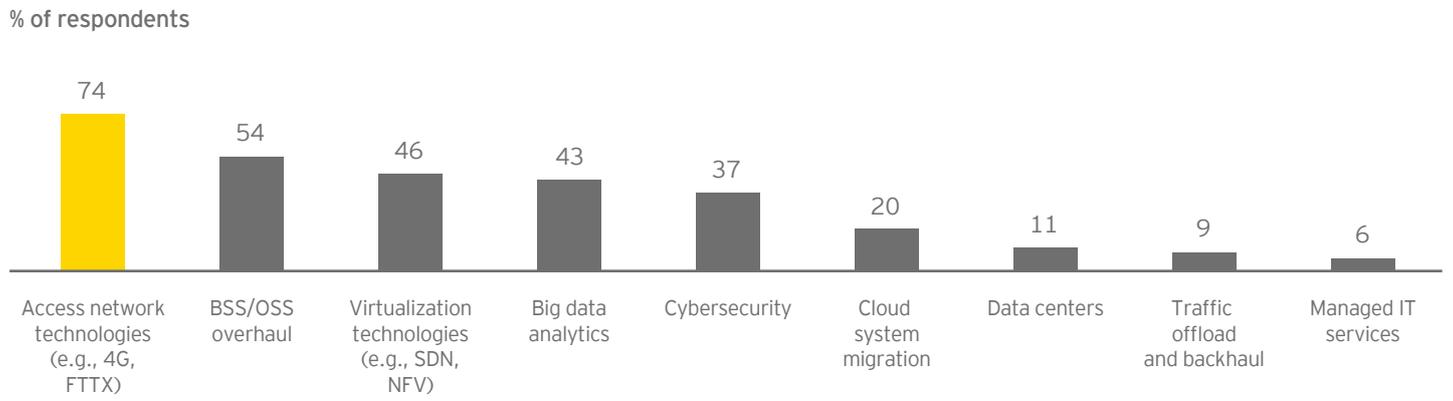
3. The network dominates the near-term spending agenda, but a range of IT improvements are also being sought.

Turning to what they expect to be their organization’s top three most critical IT and network investment domains over the next two years, respondents opt for access network technologies like 4G and FTTX by a wide margin – cited by 74% – ahead of overhauling BSS/OSS at 54% (see Figure 12).

“Our estimation is that volumes of mobile data will increase 10 times in the next 5 years.”

Figure 12: Operator views on network and IT spending domains

What are your organization’s most critical IT and network investment domains over the next two years? (top three responses)



While the prominence of access network spending reflects high capital intensity driven by long-term growth in data demand, the challenge for network and IT executives remains how to balance network modernization with a range of mission-critical objectives that are equally critical to long-term differentiation. BSS/OSS overhaul, virtualization technology, cloud migration and cybersecurity are all cited by more than one-third of participants.

The difficult nature of this balancing act is made more obvious when participants are asked to name their single most critical networks and IT investment priority. Nearly two-thirds of respondents cite the network, and no other domain scores above 15%.



Figure 13: Most critical IT and network investment domains over the next two years (top answer)



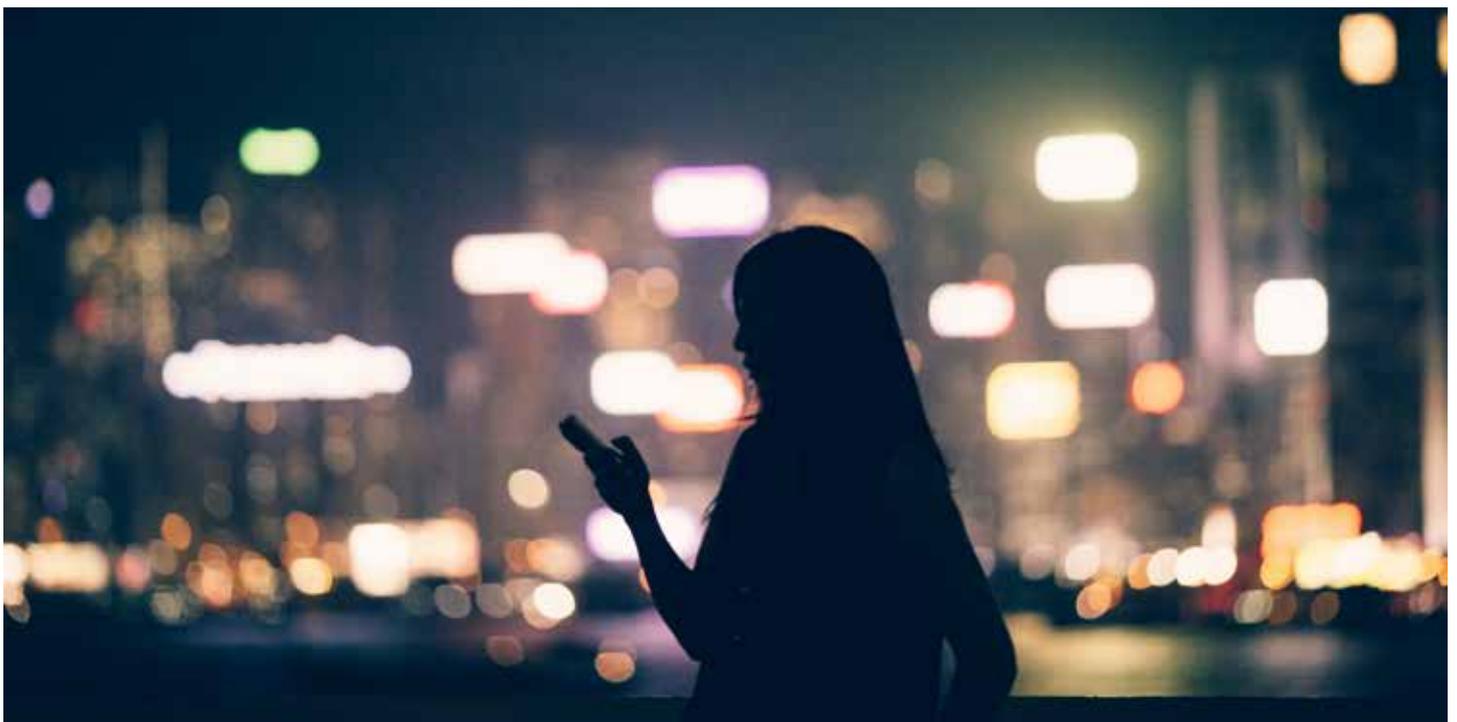
The implicit challenge in this network-centric view of investment is that building, running and enhancing networks is what telcos have always done, which raises the question of whether they're paying too little attention to newer forms of differential investment.

“Even during a cost reduction phase, our new initiatives are mainly driven by IT systems transformation.”

“Coverage and quality are the most important attributes of our network upgrade program.”

“BSS/OSS is a big draw on capital because we have a lot of legacy systems.”

The relatively strong focus on upgrading BSS/OSS is also interesting, since it indicates that these have become a particular pain point, perhaps reflecting the patchwork of billing, CRM and other support systems that many operators have built up over time through acquisition.



4. Network capex is trending up but IT spending profiles vary.

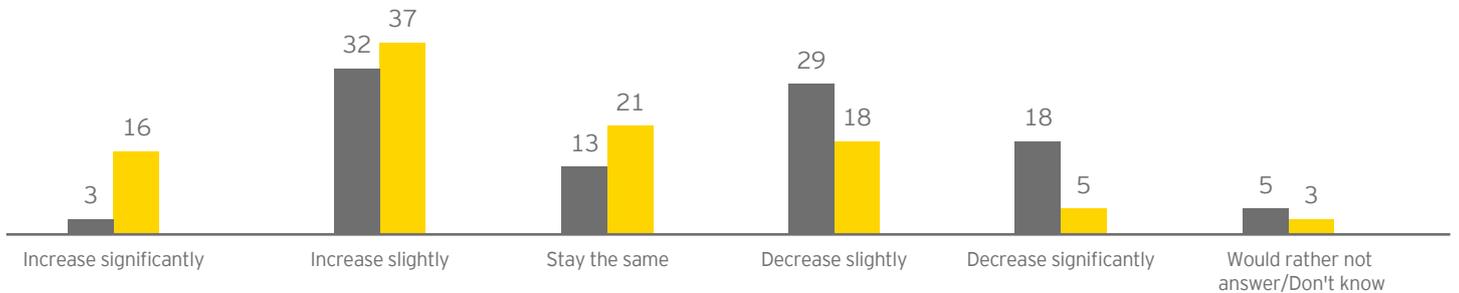
Drilling down into the impact of these priorities on network capex and IT opex in the coming year, 53% of respondents see network capex rising in the next 12 months, while 21% think it will remain unchanged (see Figure 14). This expected increase in network capex spend will inevitably put pressure on spending on other priorities, such as IT and blue-sky digital services development projects.

Meanwhile, the near-term prospects for IT opex are more mixed. Thirty-five percent of respondents see IT opex increasing, driven by the continuing migration to the cloud, while 47% predict a decline, with new rationalization initiatives such as vendor management helping to contribute to a downtick in operational expenditure.

Figure 14: Operator views on network capex and IT opex development

What are your expectations regarding network capex/IT opex in the next 12 months?

% of respondents



“The shift to cloud is driving an increase in opex – since it’s an ongoing program that’s not a short-term focus.”

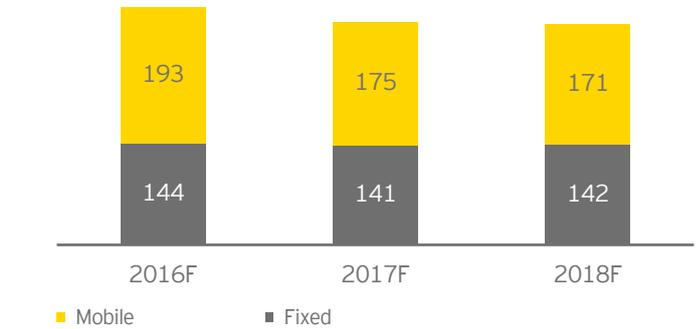
“What are the most important drivers of IT cost savings? Rationalizing older systems, virtualization, standardization of the offer, customer care automation and optimized cloud.”

“IT opex will decrease significantly. Internalization of IT activities, rationalization of vendors and new vendor agreements are the main drivers.”

Competing forces are driving the IT agenda for operators, and while the primacy of the network as the investment domain may be unsurprising, it is worth underlining that IT systems overhaul (32%) outscores network modernization (24%) as a top-three strategic priority.

Interestingly, the expectation of rising network capex revealed by our study is not mirrored by forecasts at an industry-wide level. As Figure 15 shows, current projections point to a decline in overall network capex through 2018. Despite such forecasts, it's clear that increased network spend is vital for many players. Operators who decide to reduce network capex cannot assume that their competitors are doing – or will do – the same.

Figure 15: Global telecoms capex (US\$b)



Source: Ovum



“We see a significant increase in network capex. Firstly, to have the edge on speed; secondly, expansion of the network footprint is also important for us.”

5. Confidence is rising in the digital services opportunity, yet caveats remain.

Asked which digital services offer the best opportunities for incremental revenue growth, the survey participants cite a wide range of service areas, suggesting a broadly rising sense of confidence. However, while it's clear that operators do now see IoT services as a leading revenue stream for the future, some doubts persist, reservations that are absent for established adjacent market propositions in TV, for example.

While TV and video services, enterprise cloud and advertising/e-commerce are seen as the top three drivers of incremental revenue growth, the perceived opportunities presented by each have fallen since our 2015 study. These declines have been offset by increased expectations surrounding new use cases in the IoT. As Figure 16 shows, smart home, connected car, security services and smart city have all improved their scores in the past two years.

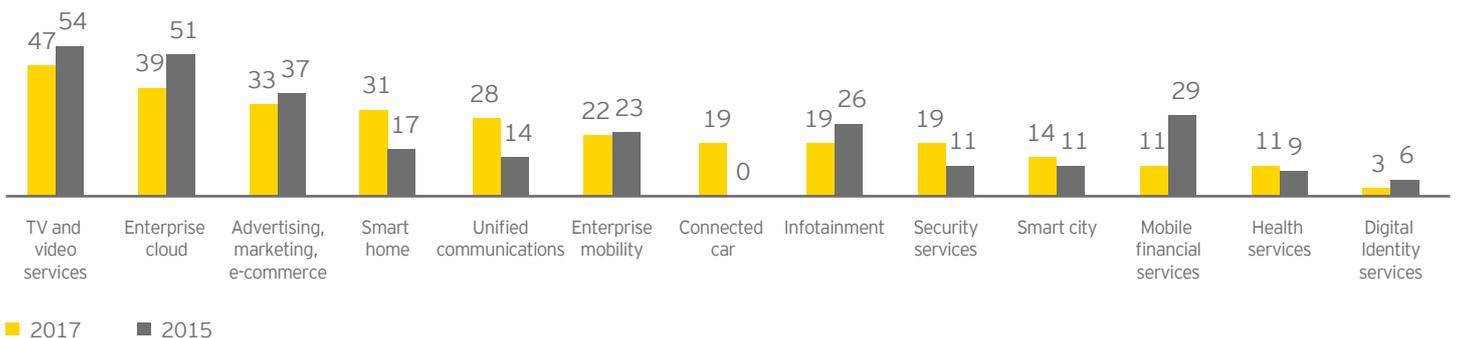


“TV is important because it makes customers so much more sticky. We've had a lot of success bundling compelling content with broadband.”

Figure 16: Operator confidence in digital service revenue development

Which digital services represent the best opportunities for incremental revenue growth? (top three responses)

% of respondents

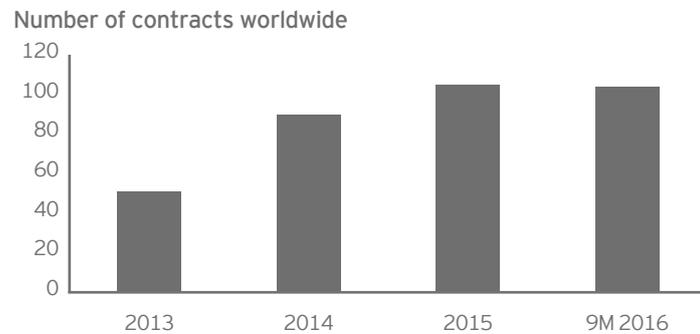




“Security services will grow alongside the introduction of other innovative services.”

Operators’ increasingly optimistic view of IoT as a revenue stream is supported by the gradually expanding flow of telco IoT contracts being awarded globally (see Figure 17). Growing government support for digital society initiatives, increased investment from key sectors such as automotive and the arrival of low-power wide area networks are all helping with the formation of more mature digital service ecosystems.

Figure 17: Annual telecoms IoT contract awards worldwide



Source: Ovum

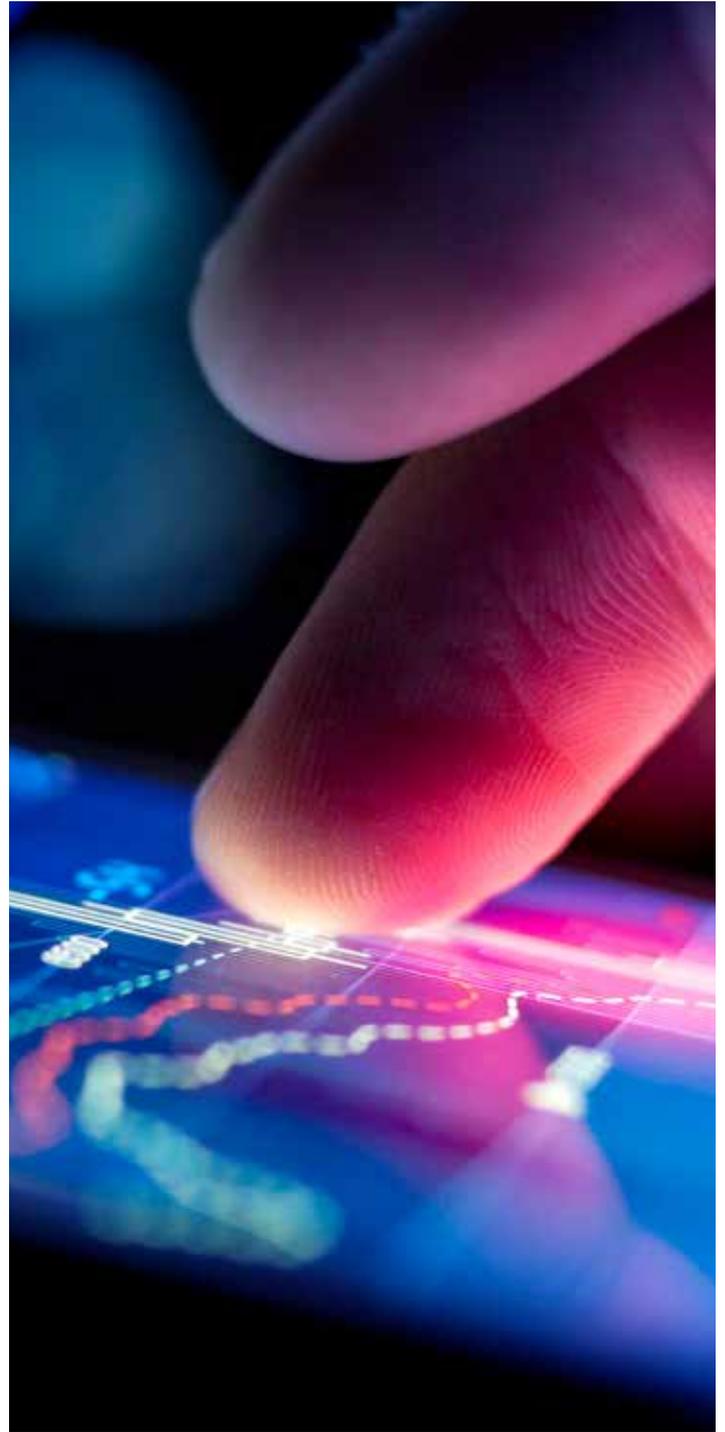
Yet many existing contracts are focused on the provision of connectivity, with value-added managed services capability a less meaningful component. Participants voiced fears that the growth profile of some digital services may suffer from a lack of more specialized business models, as well as supply-side challenges in standardization and regulation.



“Smart home will not succeed unless there is a common standard.”

“The IoT market is very narrow, very vertical and very specialized.”

“There are lots of legacy regulations in payments that prevent us from going full-blown on mobile financial services.”



6. Analytics and virtualization are the top innovation drivers, but legacy IT and a lack of skills are acting as brakes.

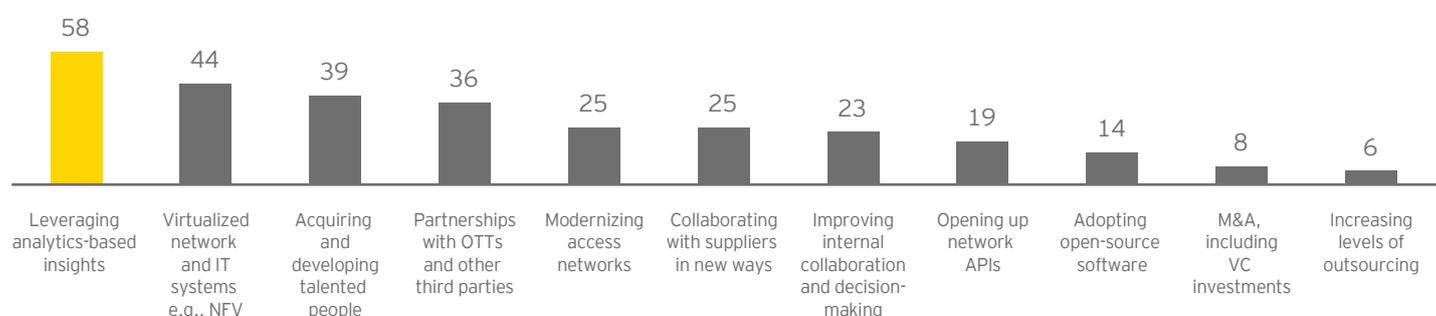
Asked what the most important enablers of innovation for their organization will be in the next three years, participants cite analytics-based insights and virtualized networks and IT as the top drivers of innovative capabilities followed by acquiring and developing talented people, and then partnerships with OTT players and other third parties.

While analytics is widely perceived as being mainly about gaining deeper understanding of customers, there are additional opportunities at the network level to drive greater capex efficiency, while its role in value-added IoT propositions also gives it a vital role to play in the revenue diversification agenda.

Figure 18: Operator views on enablers of innovation

What will be the most important enablers of innovation for your organization in the next three years? (top three responses)

% of respondents



While a majority of participants see analytics-based insights as a top-three driver of innovation, there are reservations as to whether operators are doing enough to maximize its impact. Despite the telecommunications industry ranking above other industries when it comes to adopting analytics, executives in our survey feel that their existing strategies can go further, which reflects the wealth of product, network and customer data at their disposal.

Figure 19: Advanced analytics – ranking of adoption maturity by industry, 2016

Sector	2016 rank	2015 rank	Change
Telecommunications	1	-	-
Technology	2	3	▲ +1
Manufacturing	3	6	▲ +3
Financial Services	4	7	▲ +3
Pharmaceuticals	5	9	▲ +4
Healthcare	6	8	▲ +2
Media & Entertainment	7	-	-
Energy – Oil & Gas	8	10	▲ +2
Government	9	11	▲ +2
Consumer & Retail	10	4	▼ -6
Automotive	11	-	-

Source: Forbes Insights/EY

“Analytics in telecoms is still behind the OTT players. We need to utilize this better and make more use of off-the-shelf software.”

While the move toward analytics and virtualization of both networks and IT systems is underway, the importance of organizational refinements also figures strongly as a driver of change. Developing talent scores strongly, while improving internal collaboration and decision-making (23%) is a mid-ranking innovation driver. Yet some participants believe that the IT function and associated skill sets require a fundamentally closer alignment with the rest of the business.

“The perception of IT will change. It will become more entwined with the business and will be expected to bring synergies to functions and verticals as well as better packaging of services. IT assets are likely to be owned by core functions.”

Meanwhile, opening up application programming interfaces (APIs) underscores as an innovation driver. Going forward, APIs and engagement with developers may require more consideration as part of digital business model development.

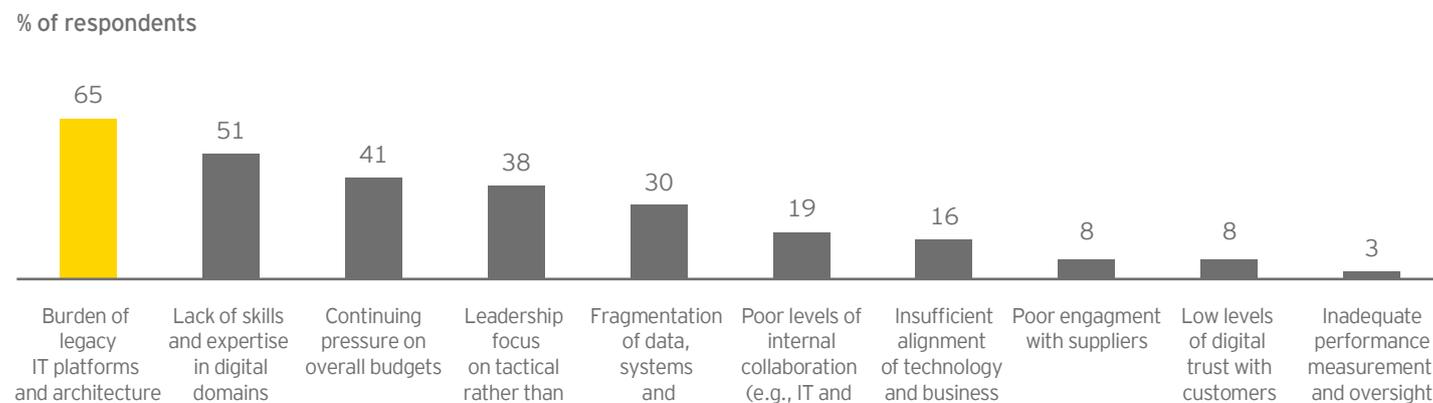
Turning to the barriers facing operators on their digital transformation journey, legacy IT and a lack of digital skills are seen as the two main impediments to transformation – cited by a majority of participants. The challenge here is to harness front- and back-end improvements, while the importance of digital skills

stretches across the organization, from specific new roles to the C-suite itself.

Interestingly, poor levels of internal collaboration are not viewed as a leading inhibitor of transformation. This suggests operators are moving beyond the siloed organization structures of the past, and may reflect the creation of digital business units and leadership roles in recent years. Likewise, operators do not believe that a lack of customer trust is a threat to their transformation agenda.

Figure 20: Operator views on barriers to digital transformation

What are the greatest barriers to your organization's digital transformation journey? (top three responses)

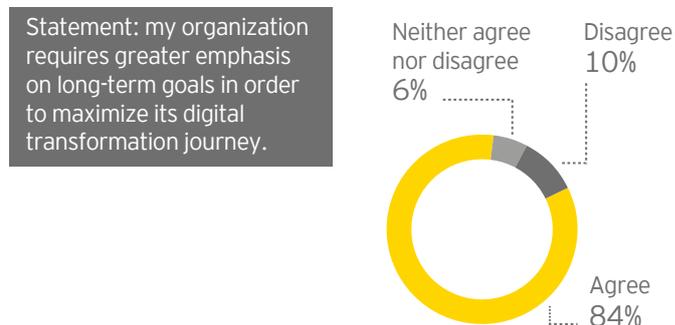


“You cannot change your front end and just hope that your BSS will follow. Legacy systems, that’s a really tough nut to crack.”

“IT skills need to be part of all C-suite roles; everyone should learn about its impact on the business.”

“Our organization is starting a program to develop digital skills inside the organization.”

However, leadership focus on tactical rather than strategic goals ranks number four as an impediment to transformation and is related to the challenges of long-term planning. Some 84% of participants agree that a greater emphasis on long-range objectives would help to maximize their organization’s digital transformation journey.



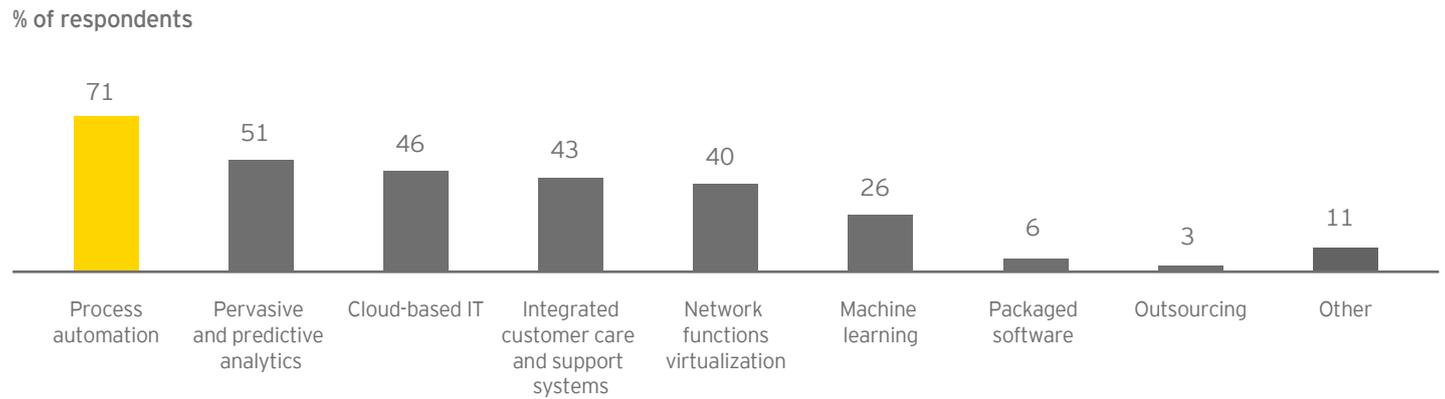
7. Process automation leads the list of long-term technology enablers.

According to our survey participants, a wide variety of technologies will help telcos to build long-term operational excellence. As Figure 21 shows, process automation (cited by 71% of respondents) and analytics (51%) are expected to lead the way as enablers, and participants were keen to highlight their

importance to customer experience improvements. With process automation, the focus is likely to be largely on cost reduction, though some telcos are looking increasingly at the opportunities it opens up in driving monetization and growth.

Figure 21: Technology enablers of long-term operational excellence

What IT and technology enablers will be most important to your organization's long-term operational excellence? (top three responses)



“Automation and other efficiency improvements will all make for a better customer experience.”

“Process automation is largely focused on the self-serve/self-heal approach, and has fewer requirements for human intervention.”

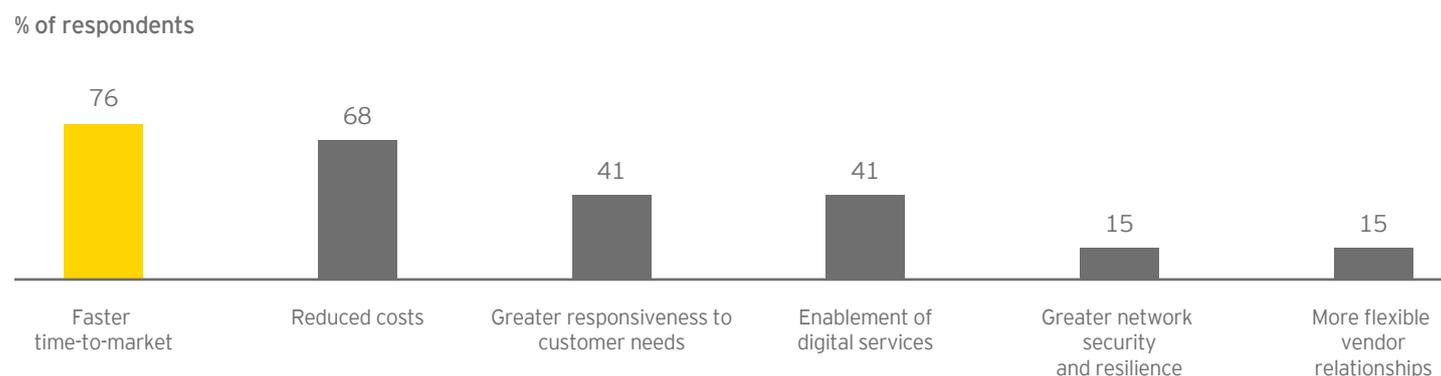
Software-centric networks and IT – such as network functions virtualization (NFV) – will also have a growing role to play. The benefits being targeted here center on increased agility and efficiency, with upside in terms of improved network security and more flexible vendor relationships ranking further down the list of projected outcomes.



However, some participants believe that while the industry at large recognizes the benefits of software-centric networks, the concept should be higher up the list of technology enablers. At the same time, three-quarters of respondents do not as yet see newer concepts such as machine learning figuring as a driver of long-term efficiency gains.

Figure 22: Operator views on the impact of software-centric networks and IT

What will be the most significant impact of software-centric networks and IT (e.g., NFV) for your organization? (top three responses)



“Current time-to-market is insufficient and caused by the complexity of the IT infrastructure. Software-based systems will improve this significantly.”

“With respect to NFV, companies are going to wake up one day soon and realize they need to be more proactive in this area.”



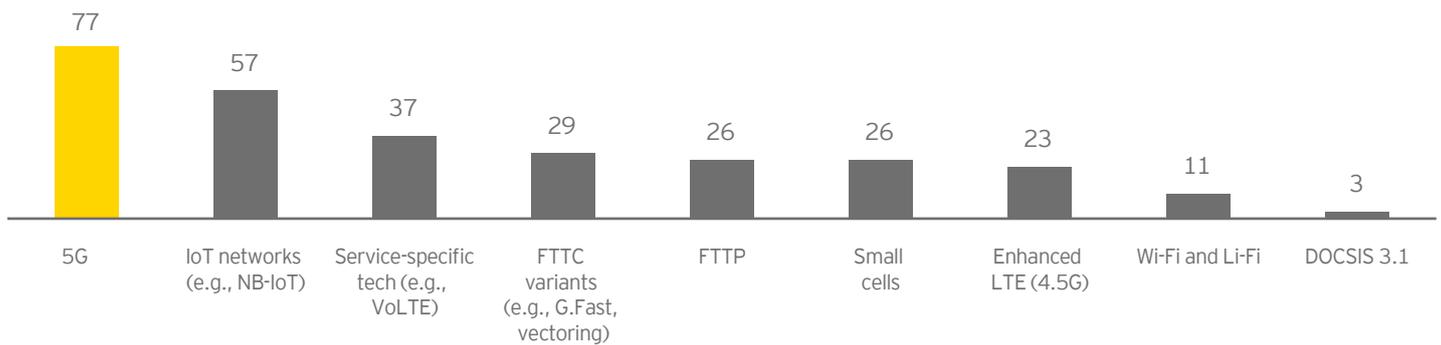
8. The post-2020 networks landscape will be transformed by 5G.

The communications carriers taking part in our survey expect a range of network technologies to support industry transformation on the road to 2020. As Figure 23 shows, most attention is

focused on 5G (cited by 77%) and IoT (57%), with variations of fixed-line fiber (fiber-to-the-premises and fiber-to-the-cabinet) together also highlighted by a majority of respondents (56%).

Figure 23: Operator views on the future impact of network access technologies

Which network access technologies will have the greatest impact on the industry over the next five years? (top three responses)
% of respondents



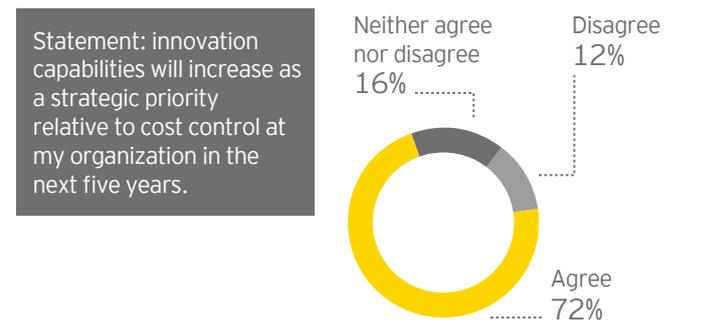
While participants recognize that brand-new 5G and low-power wide area networks for IoT will act as game changers, there is a lack of consensus on how different technologies will interact. Some see 5G signaling a paradigm shift in mobile network capability, while others believe it will play an important role in the fixed market. Still others believe that a near-term focus on VoLTE and small cells will deliver superior coverage and service quality over the next three years.

Alongside the twin focus on 5G and IoT, operators believe that innovation capabilities will trump cost control as organization priorities on the road to 2020. Cost control may rank third as an overall strategic priority, and as a barrier to digital transformation in the near term, but participants are confident that innovation will become more important in the next decade.



“5G is the clear leader for us. There’s lots of discussion about IoT technologies, but they will only transform the networks landscape incrementally.”

“It looks like the initial focus for 5G will be as a fixed-wireless technology, so telcos will be able to use it to compete in the fixed market.”



“5G will be very important but, until 2020, VoLTE and small cells will be more important.”

Operators' views differ markedly according to market maturity

An analysis of the findings by geography shows that operators' views differ according to market maturity, with their outlook on industry priorities, transformation barriers and the next wave of network access technologies varying significantly among different regions. Operators in developed markets are more concerned with customer experience improvements, a higher level of focus that dovetails with their greater anxiety surrounding disruptive competition.

Percentage of respondents citing customer experience as a leading strategic priority between now and 2020

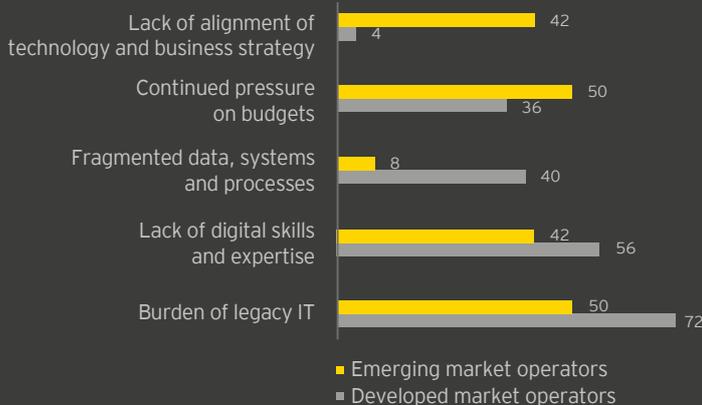


In terms of the barriers to transformation, developed market operators see legacy IT and fragmented data as significant impediments, while operators in emerging markets are more concerned with cost pressures and a lack of alignment between technology and business strategy. Developed market operators are also less confident that cost control concerns will fade and give way to a greater focus on innovation over the next five years.

Operator views on the digital transformation barriers

What are the greatest barriers to your organization's digital transformation journey? (Please select three)

% of respondents



Percentage of participants strongly agreeing that innovation capabilities will increase as a strategic priority relative to cost control in next five years

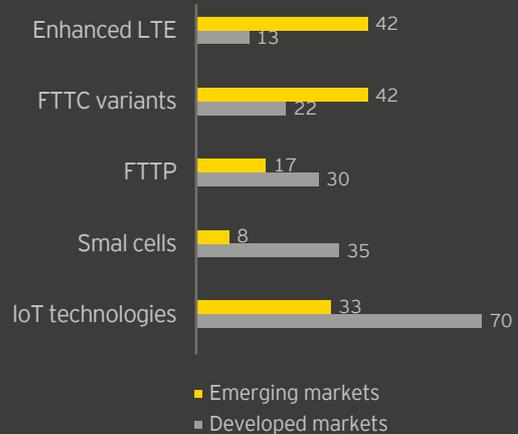


Views also diverge between developed and emerging markets on the impact of new network technologies. Developed market operators are more focused on IoT, while emerging market telcos see 4.5G as a game changer. Interestingly, both developed and emerging market operators lay an equal stress on fiber-based technologies (FTTC variants and FTTP), which underlines the importance of robust fixed-line infrastructure in years to come.

Operator views on the future impact of access technologies

Which network access technologies will have the greatest impact on the industry over the next five years? (Please select three)

% of respondents





Optimizing the transformation agenda for 2020 and beyond

Seven key considerations for telcos on their digital journey

1. Improved organizational agility is at the heart of successful digital transformation.
2. A more structured approach to digital services development will deliver long-term upside.
3. New forms of ecosystem engagement are essential.
4. A holistic approach to analytics will maximize its benefits.
5. A wider set of demand drivers requires a more nuanced network infrastructure road map.
6. Process automation will define the telco of the future.
7. Going digital requires a shift in organizational mind-set, structure and interaction.

Based on our research findings, we've identified seven key considerations for telcos to keep front of mind as they undertake their journey of digital transformation through 2020 and beyond.

1. Improved organizational agility is at the heart of successful digital transformation.

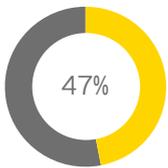
To accelerate their transformation and improve their long-term agility, telcos must overcome the burden of legacy IT. If they succeed in doing this, then they will be positioned and equipped to thrive in an OTT world. If they fail, they will inevitably struggle.



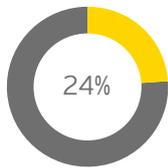
“We need to become an agile software-based business. We are fighting with stones against OTT providers who are armed with laser swords.”

However, as operators prepare to become more agile organizations, our research points to a mismatch in operators’ attitudes toward it. While they recognize the challenge ahead, it is telling that twice as many operators see a lack of agility as an industry challenge, as opposed to a priority for their own organizations to tackle.

Figure 24: Organizational agility underperforms as a strategic objective



Operators that see a lack of organizational agility as a leading industry challenge



Operators that see increased organizational agility as a top strategic priority over the next three years

In EY’s view, operators have no choice but to tackle the world of legacy IT head-on. Exacerbated by a new wave of M&A, legacy systems are preventing them from increasing their levels of agility.

Key agility drivers for 2020 and beyond include consolidation of data and systems, overhaul of BSS/OSS, a focus on digital skills and collaboration, improved governance, and artificial intelligence (AI). Within this broad vision, incremental steps are needed – early wins can validate more ambitious long-term initiatives, which themselves will require continual reassessment and refinement.

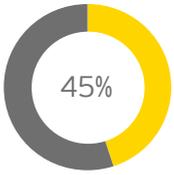
Figure 25: Agility drivers for 2020 and beyond



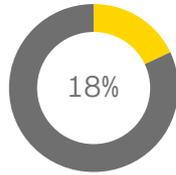
“For the digital transformation journey, you have to be a lot more responsive than just sticking to goals, you need to be more nimble and agile.”

Ongoing cloud migration will necessarily partner a new range of agility drivers, acting as the bedrock of long-term efficiency gains – but a more near-term focus on the operational and strategic benefits of cloud IT may be needed to drive progress. Although nearly half of our survey participants see cloud IT as a driver of operational excellence, less than one in five see it as a spending priority over the next two to three years.

Figure 26: Cloud migration underperforms as a leading investment priority



Operators that see cloud-based IT as a leading enabler of long-term operational excellence



Operators that see cloud systems migration as a leading investment priority in next two to three years

The findings suggest that telcos can – and should – be much bolder in their cloud strategies. Telcos currently favor private cloud approaches, but public cloud offers greater ROI in the long term, as long as operators accept that successful public cloud strategies require a greater focus on security implications and changing regulatory scenarios.

Looking forward, cloud adoption – accelerated through partnerships – can improve the centralization of IT management, enabling more flexibility in staffing and recruitment while paving the way for greater focus on product and service innovation.



“Effective use of cloud-based IT should support enterprise process improvement, better product development and accelerated execution on initiatives.”



“We want partners to take over our hardware but struggle to compare what they can achieve vs. what we can put in the cloud ourselves. It’s a difficult comparison to make. But the ‘cloudified’ telco is the telco of the future.”



2. A more structured approach to digital services development will deliver long-term upside.

More innovative business models will depend on implementing a selective growth agenda. This agenda should focus on carefully chosen vertical markets and/or segments, supported by new value chain relationships that can help operators respond quickly to emerging opportunities and risks.

To achieve this type of positioning and agility, operators should delineate clearly among different IoT use cases based on their own unique and distinctive mix of capabilities, including:

- ▶ Licensed spectrum
- ▶ Mix of technologies – e.g., cellular, LPWA
- ▶ Existing sales channels
- ▶ Application development
- ▶ Analytics capability
- ▶ Systems integration

Different elements of the IoT value chain have contrasting relative revenue and margin profiles in the context of end-to-end service contracts. To make the most of these opportunities, operators will need a deeper understanding of vertical-specific ecosystems in order to deliver optimal financial returns within acceptable risk/reward frameworks.

Figure 27: IoT value chain revenue and margin considerations

Value chain element	Network	Device	Application	Service provision	System integration
Relative revenue profile	Medium	Medium	High	High	Low
Relative margin profile	Medium	Low	High	Low	Medium

Operators will also need to align people and processes to build credibility in emerging use cases and forge more consultative relationships with customers to communicate value-added propositions more effectively. And they will be able to maximize their share of IoT spend by leveraging their differentiated capabilities in customer experience management, analytics and security.



“You need a sales team that can communicate the value proposition in IoT – and that can be challenging.”

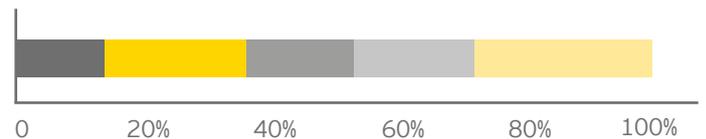
As telcos expand their service portfolios into adjacent markets, their success in these new areas will hinge on generating higher levels of trust with customers. Reassuring customers on the privacy and security credentials of new services will be vital, and segmentation of customer needs will require greater commitment as different, more aggregated business models involve both direct and indirect customers.



“Security services should provide opportunities for small- to medium-sized businesses, but also at the individual consumer level.”

Figure 28: Credibility in adjacent markets will hinge on higher levels of trust

Statement: customer privacy and security concerns are likely to hold back the development of innovative business models at my organization.



- Strongly agree
- Slightly agree
- Neither agree nor disagree
- Slightly disagree
- Strongly disagree

3. New forms of ecosystem engagement are essential.

A balanced partnering and M&A agenda can help telcos unlock opportunities for internal improvements and revenue diversification. However, while our findings show partnerships are recognized as important, they also rank relatively low as an overall priority. Our study shows that 34% of operators see partnerships with OTTs and other third parties as a top enabler of innovation, but that only 14% regard M&A, joint ventures and partnerships as a top strategic priority.

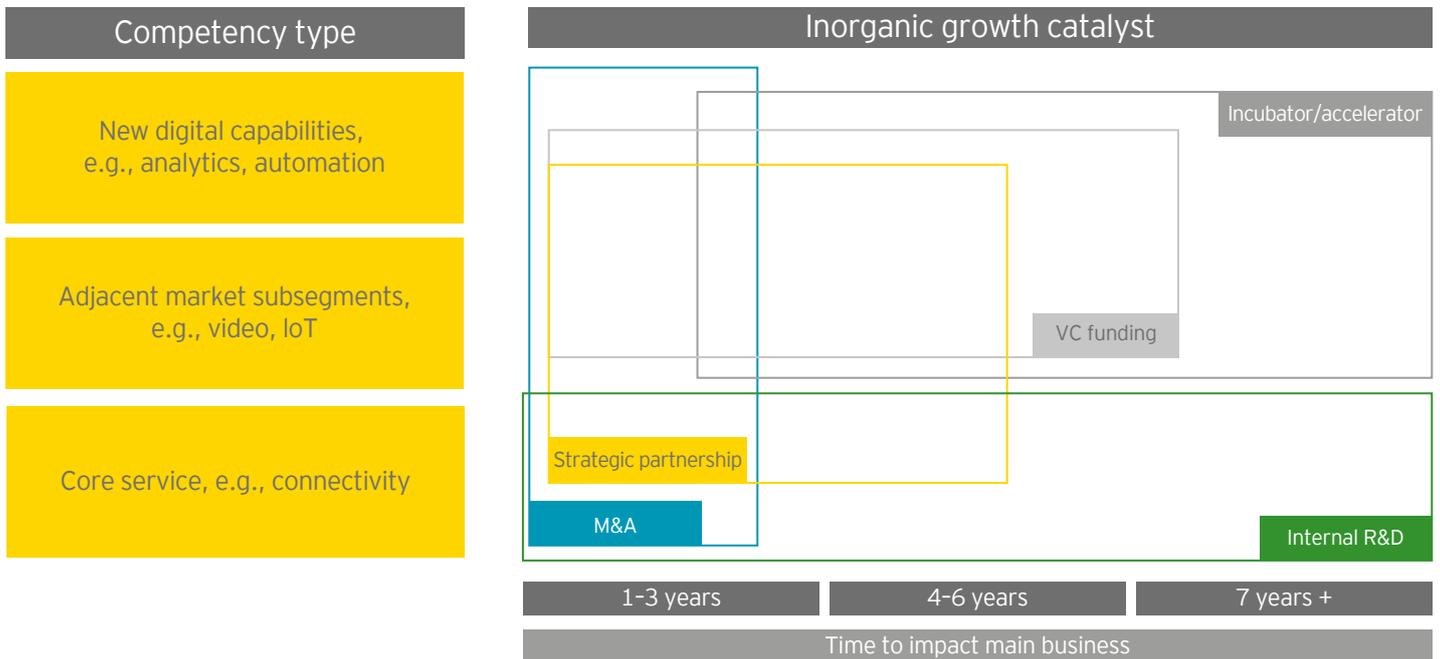
To address this mismatch, operators should accelerate toward a new partnering mindset. This will mean delineating clearly among different routes toward inorganic growth – M&A, strategic partnerships, start-up incubation and more. Then telcos should rationalize the partnering universe where appropriate and explore the collaboration horizon for high-priority partners. A framework for the interplay and impact of inorganic growth drivers is shown in Figure 29.

With all the partnerships they form, operators should regularly revisit objectives and adjust performance measurement criteria, paying more attention to partner-oriented KPIs.



“How do we trade off partnering with investments outside our core expertise, beyond the network itself?”

Figure 29: Inorganic growth drivers – interplay and impact



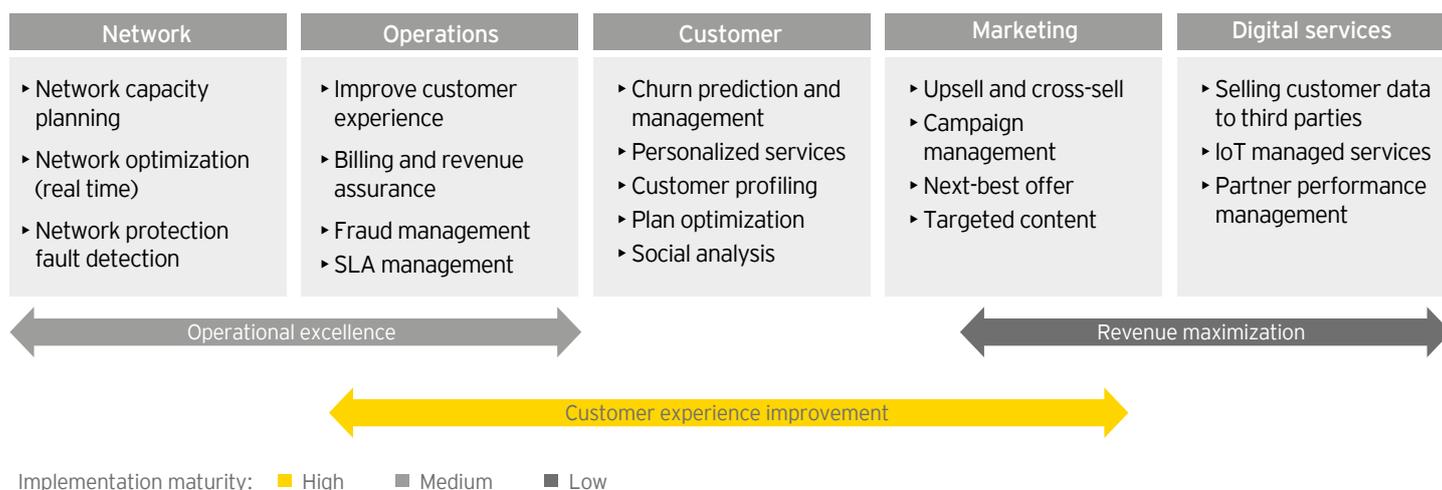
“Partnerships are vital because we cannot imitate or ignore the innovative power of all the players attacking the different layers of our value chain.”

4. A holistic approach to analytics will maximize its benefits.

For telecoms carriers' new digital business and operating models to be effective, they'll need to be underpinned by pervasive analytics. This will mean operators looking beyond the traditional domain of analytics in developing customer insight and working out how to weave network analytics into digital service

propositions. The wide spectrum of analytics use cases open to telcos is illustrated in Figure 30 – each brings its own potential benefits and is at a different level of current implementation maturity.

Figure 30: Telco analytics use cases and implementation maturity



“We are creating a centralized data store including infrastructure requirements, and need a high-level master data management/strategy.”

“We have a few hundred data scientists, so are well staffed, but are yet to monetize our capability. It’s not a product offering – we use analytics in operations and as an enabler for marketing and customer insights.”

For operators to widen their analytics use cases successfully across this spectrum, more sophisticated strategies and implementation will be vital. These will require a three-stage improvement and optimization process:

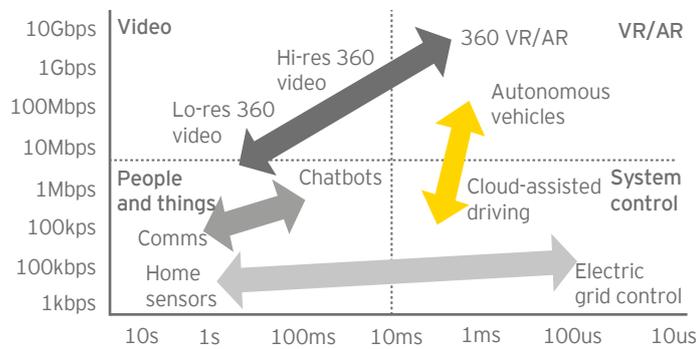
- ▶ **Stage 1 – speed the execution of analytics initiatives**
Leverage metadata as part of data integration and centralization to improve decision-making
- ▶ **Stage 2 – remove barriers to use case extension**
Improve communication with customers and stakeholders, and improve data collection and re-use
- ▶ **Stage 3 – widen analytics competencies**
Prioritize dynamic partnerships that can help add analytics to digital services capability.

5. A wider set of demand drivers requires a more nuanced network infrastructure road map.

While industry forecasts continue to highlight an exponential increase in data demand, operators will also have to ensure that the network of the future is responsive to a range of use cases. Latency and bandwidth requirements will vary widely depending on the specific application involved, meaning that operators must provide a range of capabilities if they are to meet the needs of consumers and enterprises of the future.

Against this background, operators will need to adopt a phased approach to upgrade programs, reflecting the fact that points of performance differentiation are in flux and regulatory demands are also shifting. While our study shows that 5G is seen as having the most impact in the next five years, question marks persist – both over 5G’s primary roles and over its interrelationship with previous mobile standards. For example, LTE-A Pro already offers gigabit speeds while NB-IoT standards are already positioned to serve a range of IoT use cases.

Figure 31: Latency and bandwidth requirements by use case



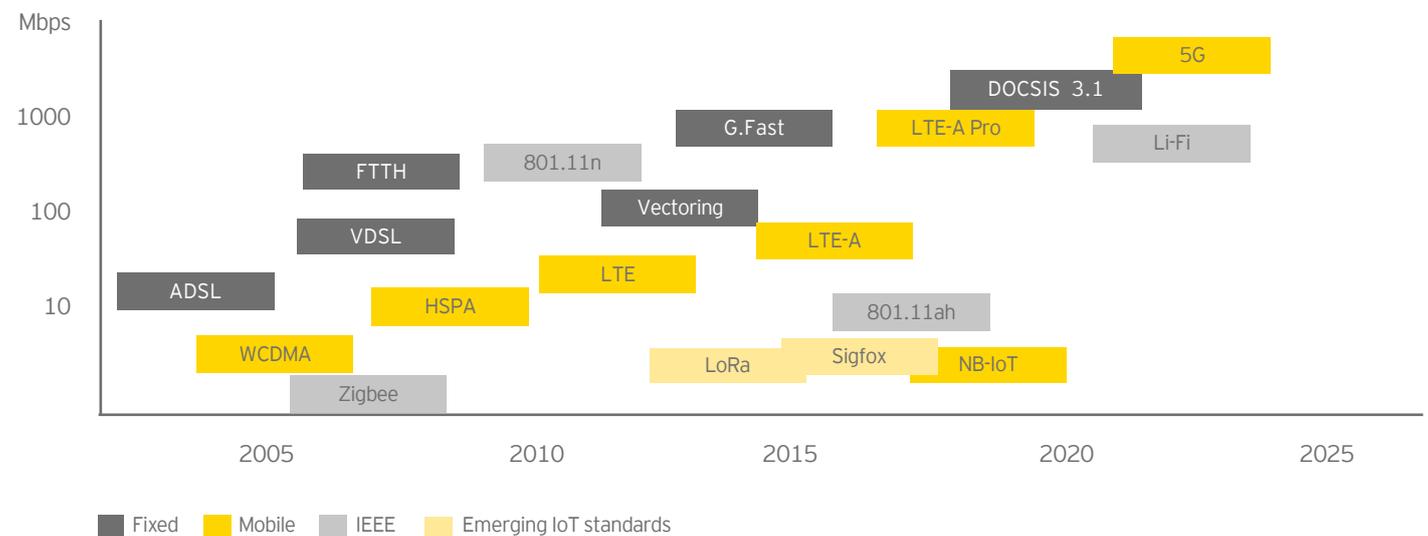
Source: Nokia

“I don’t think that the 5G and IoT market will come together that well, since you need a huge market for chipset manufacturers to scale.”

As such uncertainties play out, the interplay of coverage and quality needs will place more importance on network densification initiatives. Virtualization will also help network infrastructure become more agile – potentially altering network topology at large – while “digital society” policies will influence the pace of network rollout, as with the EU’s Gigabit Society initiative. At the same time, there is scope for disruptive technologies such as Li-Fi to alter received industry thinking.

“Virtualization should enable new ways to create networks, which means decreasing the amount of base stations and centralizing the ‘logic’ of the network.”

Figure 32: Network access evolution to 2020 and beyond



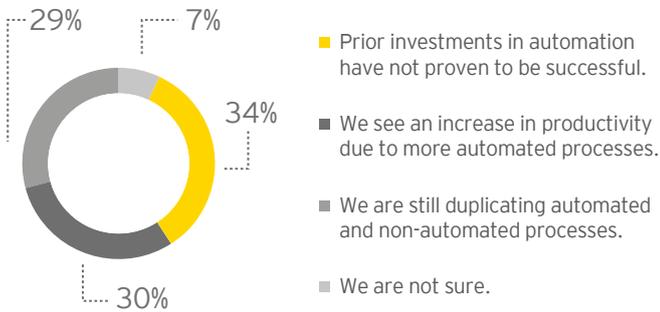
Source: EY analysis

6. Process automation will define the telco of the future.

An expanding horizon of evolving automation possibilities will fundamentally alter the relationship between people and processes – yet many telcos are currently struggling to unlock the resulting benefits. Operators have been investing in automation for some time, but are fully aware that they need to raise their game in generating returns on this investment.

Figure 33: Impact of automation on telco productivity

How do you see automation impacting productivity within your company?



Source: *Global Capital Confidence Barometer*, 15th edition, EYGM Limited, 2016.

What's needed is a clearly defined automation journey balancing short-term gains with long-term perspective. During this journey, it will be important to reap incremental benefits through noninvasive initiatives, capitalizing on the fact that robotic process automation (RPA) decouples process transformation from the overall redesign of IT systems and infrastructure.

“Automation, particularly around customer care, has an important role.”

“Automating the manual tasks of end-to-end processes will be the next big thing.”

Figure 34: The automation journey for operators

Traditional automation	Business process management	Robotics process automation	Semi-cognitive and cognitive
<ul style="list-style-type: none"> ▶ Faster processing ▶ Reduced error rate 	<ul style="list-style-type: none"> ▶ Better monitoring ▶ Stronger control 	<ul style="list-style-type: none"> ▶ Improved quality and compliance ▶ Low up-front and maintenance cost 	<ul style="list-style-type: none"> ▶ Simple models, predictable outcomes ▶ Machine learning, algorithms

Source: EY

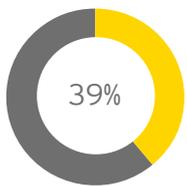
As initial automation projects give way to more ambitious programs, operators should revisit their overarching road maps as new technologies alter what is possible.

7. Going digital requires a shift in organizational mind-set, structure and interaction.

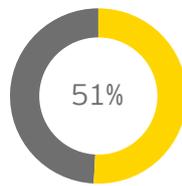
Some of the most thought-provoking findings in our research study are those around the role and importance of people in telcos' digital transformation. While telcos say they see talent as a key transformation catalyst, and a lack of digital skills as a top transformation barrier, the people agenda ranks very low as a strategic priority.

Going forward, people require as much focus as systems and processes. The need to intensify the focus on talent is underlined by other EY research, showing that the telecoms industry is lagging behind other sectors in sensitizing its people agenda to opportunities arising from automation, for example.²

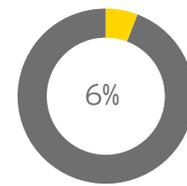
Figure 35: The talent agenda scores poorly as a strategic priority



Operators that believe acquiring and developing talent is a top enabler of innovation



Operators that believe a lack of digital skills is a top transformation barrier



Operators that see growing and retaining talent as a top strategic priority



"We need the right talent around technology and the right thinking on engaging with customers and suppliers."

To reshape and re-energize their workforce for the new market realities, operators need to develop a more experimental culture that accepts failure as a vital element of successful innovation and transformation in all areas of the business. But developing and embedding such a culture will require fundamental and potentially painful organizational change – including cutting through the traditional silos among the network, IT and business information functions to unite these formerly distinct teams and mind-sets.

As operators approach this seismic shift in their organizational structures, the outlook for the people agenda to 2020 and beyond is coalescing around four imperatives, all of which were articulated in verbatim comments by our survey participants:

1. Understand that a receptive and tolerant mind-set is critical



"It's a cultural challenge to find people that embrace a different, disruptive style of doing business."



"The evolution of a failure culture is needed to improve internal collaboration and decision-making."

² Global Capital Confidence Barometer, 15th edition, EY GM Limited 2016.

2. Prepare for a new era of organizational design



“Now there are network, IT and BI people. In 2021, there will only be one unit for all functions. Networks and IT are already nearly together, and in a few years BI will join them.”

3. Seek a balance between up-skilling and new roles



“Most COOs have a network background, so you could argue whether they ‘think’ IT. This is delaying the software-centric telco.”



4. Optimize the alignment of people and processes



“The move to the cloud also requires a balance between the impacts on people and advantageous changes to operations.”

Conclusion

Moving forward with a flexible transformation road map

Many of the findings in our survey point to an industry in transition, from the search for digital business models to the short- and long-term focus on analytics as a driver of improved customer experiences and increased operational efficiency.

Yet the transformation of existing platforms, systems and processes will be as important as the creation of new digital-led

competencies. In this sense, transformation is a holistic exercise for all, and one that also involves accurately monitoring, assessing and reevaluating progress. Not all operators are pursuing their transformation goals at the same rate, and long-term goals will also need to be flexible given the scope for further disruptions and shifts in regulatory and technology landscapes.

Creating an agile, efficient and empowered organization

By comparing the survey results across our participant group, we can also understand more about the different transformation perspectives across the telecommunications industry and uncover

hidden tensions or gaps within the different types of approach. A segmentation of our survey responses highlights specific pain points unique to each type of strategy.

Figure 36: Segmentation of telecoms operators' strategies

Committed to cost control	Agility advocates	Digital service devotees	People-powered organizations
View cost control as a #1 or #2 strategic priority	View organizational agility as a #1, #2 or #3 strategic priority	View advertising/ e-commerce or IoT as the #1 digital revenue driver	View digital skills as #1 or #2 transformation driver
A lack of near-term investment may stifle long-term agility.	The talent agenda is conspicuous by its absence.	Ecosystem engagement is a greater priority but the skill barrier remains.	Systems and processes are acting as a block on progress.

Source: EY analysis

Our survey results suggest that the interplay of cost reduction, portfolio diversification, digital skills and organizational agility within strategic road maps presents a new set of challenges.

Those who prize cost control may sacrifice long-term agility by underinvesting in the next two years, while those who prize agility and digital service development may already be facing a more pronounced skills gap than the rest of the survey sample.

And even those organizations that are putting their people at the front and center of transformation should take care that they also maximize their exposure to new technologies that can transform their operations and customer-centricity.

Looking ahead, all players will have to strike a balance between more proactive support of the customer experience and more dynamic business and operating models. The rise of the software-centric operator, where IT is interwoven in the fabric of the business, will determine the winners and losers. Previous distinctions between “dumb pipe” and “smart pipe” are increasingly redundant – only those with an “agile pipe” will prosper in the long term.



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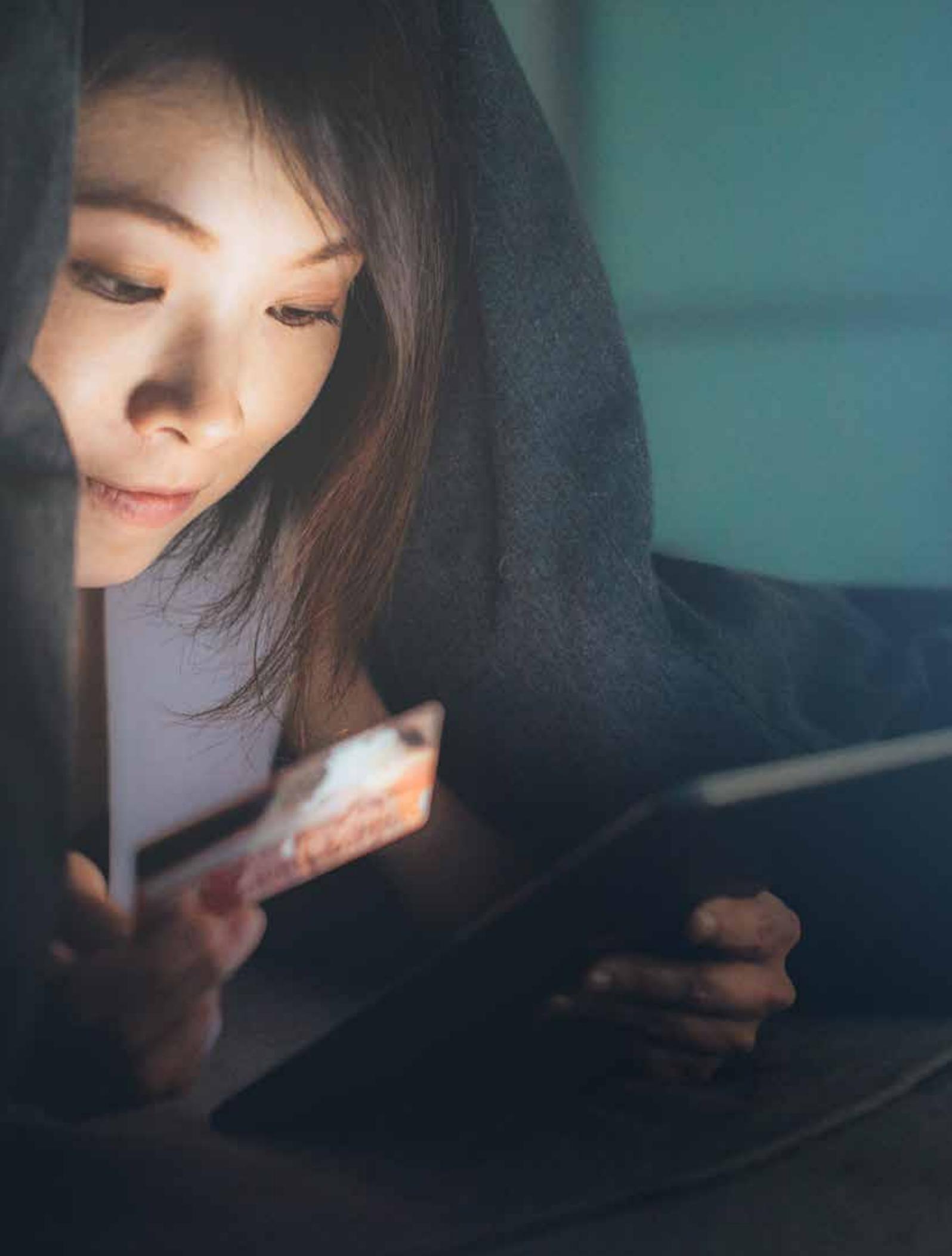
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