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Welcome

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“May you live in interesting times” is allegedly a translation of an old curse in Mandarin that at first glance has the ring of a blessing. In the same way, the international row that has engulfed Huawei is far from simply being about the misfortunes of the world's biggest maker of telecoms equipment, it is a curse for the European telecoms industry too.

According to John Strand (see page 42) Europe is already two years behind the US and Asia regarding 5G rollout. Deutsche Telekom is fretting that if its government bans the use of 5G equipment in its national infrastructure, it could add up to three years' delay. It is not alone.

Why is 5G so critical to telecoms in Europe? Because it offers operators a fabulous chance to “transform their fortunes by reversing their dire stock market performance after a damaging decade-long price war over mobile data during the 4G era,” according to the *Financial Times*. Also, operators need the affordable capacity provided by 5G to carry data traffic, which is growing at around 60% a year.

This is critical when, as Bloomberg points out, the value of Europe's telecoms companies all but halved in the six years after 2012, falling from \$234 billion to \$133 billion, while that of their US counterparts rose by 71% to \$532 billion and Asian telcos by 13% to \$561 billion.

The Huawei situation is complex, with suspicions of politicking and protecting home-grown champions on all sides. The global telecoms community (not to mention governments, legal systems, regulators and other parties that have weighed in) will be trying to sort out the facts for years – and will probably never agree.

If there is anything we can be sure of, though, it is that necessity is the mother of invention and that the telecoms industry is nothing if not inventive. So, against this backdrop, we are delighted and proud to kick off our CTO Awards for 2019 (see page 12), which will be given to two individuals who have shown excellence in their strategy for and deployment of technology.

Make sure you don't miss the two, very different CTO interviews (on pages 6 and 10) for inspiration.

The big theme of the magazine though is digital transformation, starting with an analysis of our readers' views on where we are now (page 26), and how their priorities are changing, and what 2019 will bring. The report includes explorations of two essential, if perhaps less immediately obvious, components of digital transformation: open APIs (page 34); and turning 'dirty' data into usable fuel for analytics and automation (page 36).

I hope you enjoy the magazine. See you in Barcelona?

Annie Turner, Editor

CTO INSIGHT

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Orange opts for identity as a key enabler for the future

Mari-Noëlle Jégo-Laveissière is Deputy CEO, Technology and Global Innovation at Orange. She talked to **Sarah Wray** about 5G, digital identity and what's keeping her awake at night.

Mari-Noëlle Jégo-Laveissière has been with the Orange Group since 1996, when she was hired to manage a collection of shops on the Paris Left Bank. Over 20 years later, and as she has moved through more technical positions, this customer service focus has remained. It acts as the guiding light in her current role.

Jégo-Laveissière said, “We’re not doing technology for technology’s sake. We want to use all the technologies and take advantage of all the new possibilities, but we always have to map that with the needs of our customers.”

She describes her role as “something in-between” creating a business which is “technology-proof and customer-proof”.

While any one of the three C-level areas of responsibility in Jégo-Laveissière’s job title might be more than enough for many people, she sees the strands as inextricable. She notes that the hybrid nature of her role is particularly important right now as so many things are changing around telcos and at terrific speed, and that’s changing the role of the CTO too.

The timeframe is one major aspect, Jégo-Laveissière explained: “The CTO was once the role looking towards long-term evolution, especially in the network because you’re building the network for years [to come]. Now, we are always jumping between the short-term and the long-term. We need to be very agile but on the other hand, we need to make sure that we can invest ... in building fibre and building 4G and 5G.”

Into the unknown

This means preparing for an unknown future. “5G will change the world,” Jégo-Laveissière said.

“When there was the evolution between 3G and 4G, it was a technological evolution and the effect changed the way we live every day. Nokia and Blackberry were strong players in 3G – they’re not there any longer. Facebook and Google popped up with 4G, and they scaled. I’m sure that the transition for 5G will be even bigger. We don’t know everything yet, but 5G technology will definitely be a game changer.”

With this in mind, she admitted: “This is something that keeps me awake at night. How to make sure we can keep working on our own transformation and become a data-driven company? How [can] we keep on adding that agility [so] we have the right competencies to be in a position to catch the ideas and react to everything? Because that’s part of my role – to make sure that the organisation that we build is ready for something new, even when we don’t know what that something is.”

Opening up

One way to do this is to become more open and work with partners in ecosystems. Orange has partnered with a number of companies for varied reasons: with Amazon to combine its voice-activated assistant technologies; with Google to work on a private undersea cable connecting the Atlantic coasts of France and the US; with Deutsche Telekom on jointly developing a smart speaker; and with AT&T and others on the open network automation platform (ONAP) initiative, which is all about orchestrating automation.

“We understand that even if you’re right, if you’re alone it won’t work,” Jégo-Laveissière explained.

This partnering is also a key strategy for 5G as Orange prepares to launch the technology in 17 European cities in Belgium, France, Luxembourg, Poland, Romania and Spain in 2019.

Orange has built a 5G Lab at its Orange Gardens technology campus in Châtillon, France. Partners, large and small, are invited to come and test 5G solutions and applications at the Lab. The operator recently launched its 5G Challenge, inviting start-ups to come and experiment on the 5G network.

Jégo-Laveissière said, “We need to build together and to have that global direction for 5G and to really test things. If it works, good. If it does not, then it does not”. This ‘try it and see’ approach is something she has learned from experience and gave the example of Orange’s Libon (for Life is Better ON) OTT messaging and voice service, which the company launched in 2009 and spun off in 2018.

“Maybe we launched OTT services a bit too early or perhaps it wasn’t fully consistent with the local country operations’ activity. In one way we failed but in another I wouldn’t call it a failure. We learned there that just because you have the right technology and the right idea doesn’t mean that it will work. You also need to be consistent and understood by the customers,” she stated.

The ‘true telco’

Branching out is paying off for Orange elsewhere, though, as the company pursues its multi-service strategy to bring in revenues from new sources. In January, Orange teamed up with Groupama to form a jointly owned firm, Protectline, to enter the tele-surveillance market in France. The two previously joined forces to support Orange’s entry into banking in France in early 2017.

With initiatives like these, Jégo-Laveissière sees Orange having a central role to play beyond connectivity – in “taking care of the most important things in our life”. A key strength that operators have is trust from the customer, she said.

An example of this, according to Jégo-Laveissière, is Orange’s move into smart homes. Orange already offers fibre and 4G connectivity to the home, as well as its LiveBox router and Smart Home subscription service.

“We are very legitimate in the home,” she said. “We have the capability to deliver the right connectivity at home, and we know where our

“ We need to build together and have that global direction for 5G

customers are because we deliver that connectivity. Based on that trust, I think that we’re in a position to deliver a new experience – such as a new way of banking and more – that utilises the benefits of the digital world.”

“This multi-service operator is the true telco,” she added, saying she envisions Orange’s future as a ‘smart life’ provider.

In this context, Jégo-Laveissière also sees identity as a key opportunity for Orange. “We all have digital identities,” she explained. “Facebook can be one, but I hope that the operator identity will also be a key one. If I want to enter into a relationship with my customers, I need to have an identity and a way of sharing things.”

Mari-Noëlle Jégo-Laveissière, Deputy CEO,
Technology and Global Innovation at Orange



Orange’s Mobile Connect service allows customers to use their mobile number and a personal passcode to securely identify themselves on websites and online services.

“When you have built that connectivity everywhere and when you know and have a relationship with your customers because you have that identity, then you can talk about value-added services like IoT, mobile finance, TV, etc.” Jégo-Laveissière said.

5G and particularly network slicing will also be a key enabler of new services, she noted, as one physical network will be able to have an almost infinite number of digital networks which can be used in a very



dynamic way, depending on the requirements of the use case.

Jégo-Laveissière believes that 5G will offer particular opportunities to Orange and its customers in smart cities, automotive and entertainment, although she doesn't expect these areas to be commercialised until 2021 or 2022.

True to her roots, she believes user experience will be the key consideration for making these services a success. As applications incorporate virtual reality – 360-degree video and more real-time data, enabled by 5G – something as simple as checking the weather forecast could use ten or even 50 times more data than today, according to Jégo-Laveissière. Then the challenge for Orange will be, “Our capability to deliver the same customer experience,” she added.

The need for speed

Jégo-Laveissière says her proudest accomplishment in the role so far isn't directly related to technology but rather to people and the culture of the company. This, she says, is what will also see Orange through these huge opportunities and challenges that 5G and other big shifts will bring.

“For me, my biggest achievement has been to manage and recognise

expertise,” she said. “In the world we live in now – all that fast-moving technology – expertise is key.”

In February 2018, for the third consecutive year, Orange was awarded Top Employer Global 2018 certification. Orange was the only telecoms operator among the 13 top global employers. Jégo-Laveissière says she is helping to drive change to tap and capitalise on the individual expertise of all staff, regardless of their position in the company.

“Software is everywhere today,” she said. “We need to understand what it means for us and our future networks, but also what it means for the agility that we need to put in place. When you're making decisions 50 times a day – big decisions – they can't all be made at the top. We need to make sure the system in place allows people to make the right decisions and that they feel comfortable doing it. That's a long journey; it's an ongoing process.”

Having laid some of the groundwork, Jégo-Laveissière's main focus now is speeding things up.

She said, “Identity, for example, is really key for operators and for customers. It is moving forward, but I'm not sure that it's moving forward at the right speed. We need to go faster.” ■■■

MYCOM OSI and AWS collaboration will help operators automate their networks

MYCOM OSI, a leading provider of assurance, automation and analytics to tier 1 CSPs, recently unveiled the telecoms industry's first carrier-grade cloud-native service assurance solution available as a public cloud service, powered by Amazon Web Services (AWS) cloud platform.

After a recent presentation with AWS at the Telecom Review Leaders Summit in Dubai, MYCOM OSI's President and CTO, Mounir Ladki, discussed its Assurance Cloud and AWS collaboration. Below are curated highlights of the interview.

How will MYCOM OSI's collaboration with AWS enhance the services you provide to CSPs?

We are combining our software solutions with Amazon's infrastructure, to offer them as a service to telecommunication operators, because our customers today are on a journey. They are transforming from CSPs into digital service providers (DSPs). As such, they need to massively automate network operations in order to offer real-time on-demand digital services.

However, in order for CSPs to do that, they must manage massive complexity and web-scale infrastructure and services. So, they are moving towards autonomic networks and highly automated software-defined operations. The public cloud supports this through scalability, flexibility and agility to innovate, and allows CSPs to deploy artificial intelligence (AI) at scale. Automation has to be driven by AI in order to discover new patterns and use-cases, adapt and evolve.

All of this can only happen if you are relying on the public cloud, hence teaming with AWS.

How can moving to public cloud help CSPs achieve their digital transformation aspirations and goals?

Today, CSPs are at a crossroad. 5G promises many new use-cases and possibilities. One such possibility is for CSPs to act as the backbone in the digital economy, serving various industry verticals. One of the key use-cases and business models we advocate is for CSPs to expose their know-how, domain expertise and the systems such as the ones that MYCOM OSI provides, to be the guarantor of digital experiences delivered via these various industry verticals, such as transport, logistics, smart cities and connected factories.

These would be very innovative business models, and would require massive scalability and agility, innovating, bundling and dismantling services in real-time. This innovation, agility and scale are only possible in a public cloud environment. AWS gives us access to scalability and some of their innovations, especially in AI, ML and automation.

We want to enable CSPs to create new monetization models by enabling their customers across industry verticals to spin up 5G slices in



real-time. This is a revolution, not an evolution. The marriage between the value-added intellectual properties that MYCOM OSI offers, the open-source provided by our partner Red Hat and the AWS public cloud enable an open, scalable, intelligent ecosystem for our CSP customers.

MYCOM OSI is one of the first providers to offer a cloud-based solution across the industry. Can you tell us more about this solution and how it will impact operators?

MYCOM OSI's expertise is in maintaining networks at peak performance, and managing all the events that can happen in a network, as well as managing and optimizing the quality of digital services and customer experience. Today we serve some of the largest operators in the world. Around 2 billion customers are served by networks that we are managing on an on-going basis.

We anticipated the digital opportunity that is opening up with the need for further automation, and have evolved in step with our customers. We are helping CSPs to move to 'zero-touch networks', so that our solutions can take over the management of networks in a closed loop. This frees up capital, cash flow and resources to be redeployed to create and enable innovative 5G business models. We have had great success thus far, and we recently announced a partnership with CK Hutchinson as one of the first customers to be served from the public cloud. We also have one of the largest operators in the world in India as a customer and it is on a journey with us to target the automation of 95% of their operations.

Many CSPs around the world are today adopting MYCOM OSI's new cloud-based solutions. We share a vision to realise the brain that enables autonomic, zero-touch network operations.

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In the spotlight:

Toomas Polli, Head of Technology Unit and Board Member, **Elisa Estonia**



What is the biggest issue on your mind now?

Issues not so much, let's call them challenges. We are challenged daily to take the organisation further. One of the important questions in my mind now is 5G and timing: 5G will be more disruptive than the evolution from 3G to 4G was. The question is, "When is the right time to switch the investment focus to be just on time?"

Which person has most influenced your career?

It is hard to point to one definite person, but the person who influences your career most is you and the actions that you undertake yourself. Of course, there are other influences as well in the people you work with – my team and colleagues from the management board. I'm a people person and I like Sir Richard Branson's philosophy on employees.

What is the most important lesson you have learned professionally?

The latest saying by Netflix's CEO, Reed Hastings: when asked what his company does with "brilliant jerks" he replied, it gets rid of them because, "For us, the cost to effective teamwork is too high". The big lesson for me from this is that sometimes we postpone decisions for too long.

You launched a 5G commercial network in June 2018, underlining your pioneering credentials. What do you think will be the biggest change 5G will make to telecoms?

For sure 5G will bring lots of new services – things that we currently cannot even fully imagine.

What we are likely to witness is that telcos will become even more open to cooperating with different start-ups. There will be a boom in new services, and after that, in the second stage, many of them will die. Then there will be market consolidation among the remaining ones. Out of that we could see the definition of telecom operations changing, compared with what we have today. Then the main revenue stream will come from totally different lines of business.

When I look from a narrow CTO point of view, 5G will change how we manage our networks – a lot.

What's the biggest obstacle to 5G's success and how will you overcome it?

In some cases, 5G is needed already today to solve telecoms challenges such as congested

network hotspots or to provide better capacity for existing services. But still, when 5G is rolled out, it will enable lots of different types of connections. Take, for example, IoT – today, many business cases are not viable due to the cost of sensors being too high. What 5G needs to become successful and go to being mass market is a little more time.

What is your greatest professional achievement?

Here I would point out two things: one is 'done', the other in progress. I put the 'done' item in inverted commas because we know that processes are never really finished. But I'm happy that we have transformed Elisa development from waterfall to agile, and we have transformed not just the technology unit, but the whole company. This enables us to deliver the most important things to customers and we can quickly adapt to market changes.

The other thing I would highlight is the merger of Elisa (one of the biggest mobile operators in Estonia) with Starman in 2017 (one of the biggest TV and fixed broadband providers).

Of course I can not take 100% credit for those achievements, there are lot of good people behind them.

What do you like to do when you're not working?

We have a very active sports club in Elisa, so there is training and other activities to take part in. Last year we formed a group, trained and made the Otepää 70.3 Ironman competition. That was an experience. My personal hobby is cooking – with very quick iteration you can get positive feedback.

What do you see as the biggest challenge facing the telecoms industry?

The industry needs to change, and more rapidly than it is now. Above I mentioned adaptability, and telcos have not yet done it fully. I mean, look at the ecosystems that are developing in parallel in the start-up scene – we need to become more open. Just as example, at MWC there are hordes of suit-and-tie people going around and a big amount of space given over to demos of cellular devices when we can see that the service part is what we really need to build. I have nothing against nicely dressed people or devices! 🇫🇮

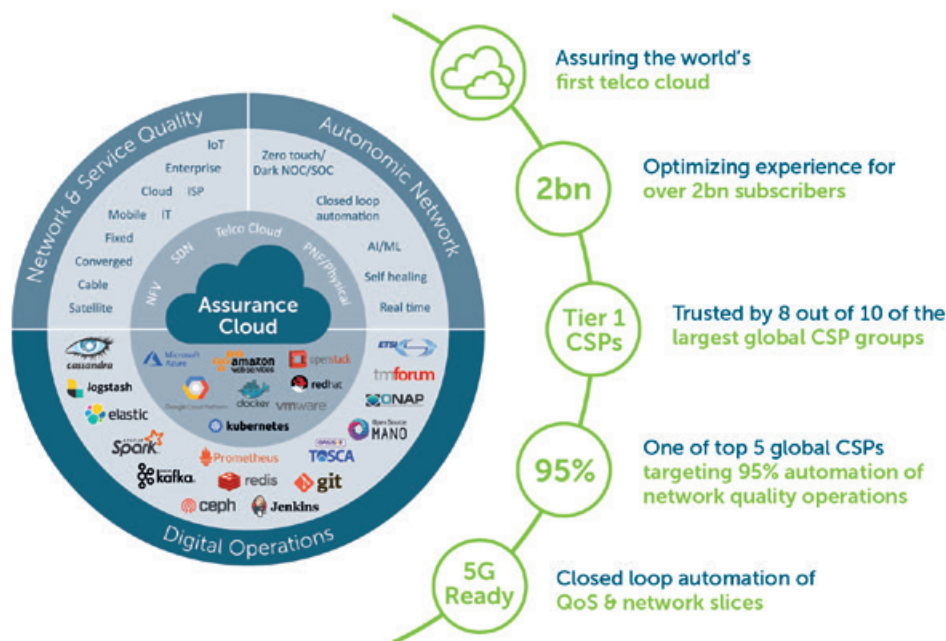
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CTO of the Year 2019

The annual awards celebrating outstanding use of technology by mobile network operators

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We're launching our search for Mobile Europe's CTO of 2019 Awards, which have become a fixture in the European telecoms industry since they began in 2013. They are designed to celebrate the achievements of two CTOs – one who has a centralised group role, the other who heads up technology strategy and deployment within a single country or territory. As we have discovered over the years, inspiration, dedication and innovation come in all shapes and sizes, and sometimes from the least expected places.

Being a CTO has never been so demanding as it is right now. 5G is imminent and building out the network – and leveraging its capabilities – will require unprecedented

levels of investment and ingenuity. Yet, as we explore in our annual readership survey (see page 26), figuring out use cases and business models are critical to 5G's roll-out, evolving the CTO's role still further down the path of driving operators' businesses and strategy, not simply facilitating them.

The awards are accompanied by a unique roundtable, where CTOs from across the continent come together to discuss the issues that both excite and concern them, and the organisations they lead. There's no shortage of areas to explore, from the growing importance of IoT to the impact artificial intelligence (AI) will have on the network as it is built into mobile devices, operations and the network itself.

Then there is virtualisation – again as our readership survey shows, software-controlled networking and network functions virtualis-

ation have failed to deliver what they promised and fallen down CTOs' agendas, but this could hold back 5G in essential areas (particularly concerning ROI) such as network slicing. And who's afraid of cloud-native and what are CTOs going to do about it?

In many ways, technology is the easy bit, the real issues are timing, deployment strategy and boardroom negotiations – and that applies to today's technology as well as tomorrow's. In a three-month period of 2018, the UK's four mobile operators rolled out 4G to an area the size of Wales, while Deutsche Telekom expanded its 4G coverage to an area bigger than the area of Germany's second largest Land (state), Lower Saxony, last year.

So, the conversation between Europe's finest is most definitely where you want to be, so apply to join their ranks right now.

How the awards work

In 2019, as in previous years, we have two awards. The first is for Group CTO of the Year, which is open to any CTO responsible for technology strategy across a number of markets. Who will follow last year's distinguished and popular winner, Vodafone Group's Johan Wibergh?

The Regional CTO of the Year Award is open to an executive who is either working in an operating company of a larger mobile network operator, or in charge of technology strategy within a standalone operator, like last year's winner, Turkcell's Gediz Sezgin. He showed himself to be a CTO of great conviction and determination.

You can see brief profiles of both last year's winners below for inspiration.

Previous years' Award winners are an impressive group, including Deutsche Telekom Group's Bruno Jacobfeuerborn, Telefónica's Enrique Blanco, EE's Fotis Karonis, Proximus' Geert Standaert and Yogesh Malik from VEON.

This year's contenders have a lot to deal with. The imminent arrival of 5G will make 2019 a pivotal year right across the telecoms industry, and have a profound effect on other sectors.

It will be fascinating to see how a range of issues play out – from Brexit to new regulation – and how CTOs negotiate them.

We look forward to applauding the best that the European telecoms industry has to offer.

1. Criteria

Candidates for the 2019 CTO of the Year Awards must demonstrate what they have achieved in the following categories:

Delivery – the execution of network-changing projects during the past 12 months, such as extension of LTE coverage, or launch of voice over LTE.

Transformation – the implementation and leadership of new technology, such as software-defined networking or network function virtualisation, NB-IoT or other cutting-edge services.

Satisfaction – how customers have responded to the CTO's work, whether that's reflected in lower churn or high acquisition of customers, or the rapid adoption of new technology.

Influence – how the applicant has effected change within the industry, influenced peers and set the agenda with telecoms.

2. Nominate

If you, or a CTO at your organisation, meets the criteria and deserves to be crowned CTO of the Year 2019, please nominate them using the short form on our website – www.mobileeurope.co.uk/ctoy. Don't delay – the closing date for entries is 31 March 2019.

3. The award

The winners will be presented with their awards at an exclusive CTO roundtable and Awards dinner which will take place in London on 24 May. The shortlist of candidates will be announced on our website – www.mobileeurope.co.uk – before the judging panel on 25 April. Good luck.

Take inspiration from last year's award winners

Group CTO of the Year 2018

Johan Wibergh, Vodafone Group

Johan Wibergh was the judges' unanimous choice for the Group CTO of the Year 2018. He is leading the Vodafone Group on a journey of transformation and innovation that would have been unimaginable under any of his predecessors. One of his major preoccupations is ensuring 5G succeeds – along with implementing AI and cloudification. He admitted to working too much – although he also has many hobbies from photography to reading and fitness – but then again, he is responsible for the delivery of services to more than 500 million customers across a diverse range of markets. He joined Vodafone in his current role in 2015 from Ericsson, where he'd worked for almost two decades, latterly as head of the networks business. He has lived and worked in the US and Brazil, and is now based in London.



Regional CTO of the Year 2018

Gediz Sezgin, Turkcell

Gediz Sezgin is in charge of making Turkcell's singular vision for digital transformation a reality – to outrun the over-the-top players in his territory. The judges were drawn to him because he presented authentic solutions to some of the industry's greatest challenges. His major achievements include the rapid rollout of a nationwide 4.5G network, which involved two-carrier aggregation, 4x4 MIMO and leveraging quadrature amplitude modulation technology to double the effective bandwidth. Then there's the NB-IoT network and its twin LTE-M, faster fibre to the home and an upgraded 10Gb optical transport network, and of course preparing for 5G. He joined Turkcell the year after it was founded, in 1995, as a network engineer.





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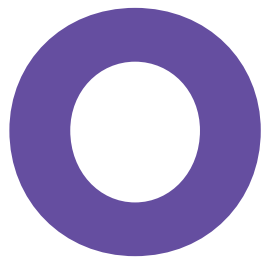
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Be more than you can B2B

CSPs acting as digitisation partners for enterprises has been hotly debated for more than a decade. While CSPs have broadly failed to deliver on this promise, the opportunity has never been more relevant. The market for digital services around cloud, IoT and security is growing at high double digits, and is likely to double in the next five years. Enterprises – especially small and medium enterprises (SMEs) – are desperate to find the right partner. CSPs must act quickly, to offer outcome-driven innovation and expert partnerships, as the big OTT brands are eyeballing the opportunity, warns Accenture’s Gary Heffernan.



perators are at a critical inflection point right now. The Accenture Disruptability Index, which analyses 3,269

companies across 20 industries and 98 segments, shows that the communications industry is in the middle of unprecedented disruption. While CSPs must commit to ever more colossal infrastructure investments to maintain and build next generation networks, most are failing to create new revenue streams or command premium prices. This has put pressure on them to become leaner and more cost-efficient, and consequently more virtual, smarter and more automated.

Focusing on cost-trimming alone is a race to the bottom and will not sustain CSPs’ businesses. They need to focus again on profitable growth – a race to the top – and reinvent their role with enterprise customers, offering new services where they can shine and justifiably charge more by leveraging their unique competitive position. This is not about throwing more money into infrastructure projects; it is about deciding where future revenue is going to come from,

by re-evaluating where CSPs have something valuable to add.

CSPs’ position has been steadily eroding in B2B, with some incumbents losing as much as half those revenues due to intense price competition around their legacy products and services. The real value-add to enterprise customers must come from a broader ecosystem

role for CSPs, using their position and sales force to bring standardised digital offers to their customers. They must also take away the insecurity and burden of ongoing increasing complexity, changes and updates. This is what we call the connected industry orchestrator.

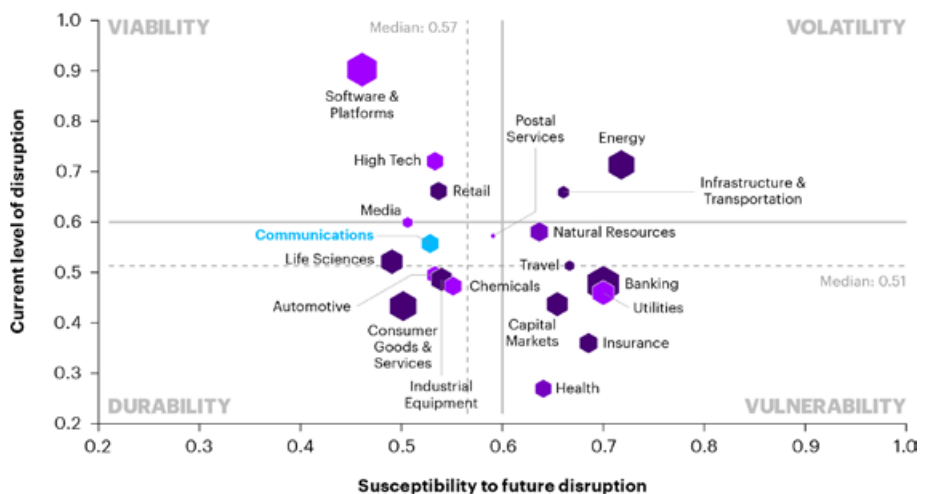
The perfect opportunity is here now: 5G and Internet of Things (IoT) – combined with applied intelligence (analytics, AI and automation) – will unlock huge value in the enterprise and SME markets.

The B2B opportunity

While pricing wars are raging in B2C, the enterprise market has significantly shifted in the last couple of years due to disruptive new technologies and global competition. All businesses need to stay competitive and relevant through digital solutions that drive more efficiency in their core business and enable them to explore new business models. Those solutions require specialist infrastructure, consultancy, inside industry knowledge and value-added capabilities.

Business customers need cloud services, IoT

The communications industry is going through major disruption right now



Source: Accenture Disruptability Index (<https://www.accenture.com/us-en/insight-leading-new-disruptability-index>)

connectivity and data management, secure connections to advanced analytics platforms, and help with data protection. This opens the door to robust, recurring and profitable revenue streams for CSPs. IDC's latest technology spending predictions reckon digital transformation will hit \$2 trillion in 2022. That's a lot of business potential to tap.

Digital markets evolve quickly and CSPs must secure a foothold early to show they are serious about the enterprise. OTT players are growing their enterprise business at a rate of 30% to 50% annually, making a strong bid for enterprise cloud opportunities by leveraging huge economies of scale. In telecoms, B2B growth is confined to a few firms like Elisa and Deutsche Telekom; others stunt their potential through limited offerings.

There is a gap to be exploited by established telecom brands which have a starting advantage. Operators have a strong foundation in the enterprise market as their reputation is built on trust, reliability, regulation-friendly credentials, and direct and indirect customer channels. What they lack in scale is compensated for by close relationships with enterprise customers, and a deep appreciation of regional and national requirements – for instance, local data legislation.

5G investment is a strong catalyst for the enterprise renaissance through attributes like network slices with guaranteed latency

and throughput, and multi-access edge computing (MEC) and 'cloud for industries' (cloud ecosystems with solutions for vertical markets), for instance.

They could power the 'Industry X.0' agenda, by forging a stronger role upstream in sectors expected to grow massively – like automotive, retail, logistics and freight. They could help build collaborative relationships with government to drive country-specific digital agendas because nothing happens without connectivity. Operators are at the core of the new wave of digital innovation, building networks of the future.

“ Operators are at the core of the new wave of digital innovation

Reinventing the operating model

Now operators need a plan that focuses on four main challenges.

First, they need to reinvent selling to the enterprise. CSPs must go back to brilliant basics in sales and marketing – they have failed to

grow their enterprise business in the last ten years because their salesforces and go-to-market partners couldn't sell what was on offer. Firstly, offerings were not standardised and too complicated. Secondly, CSPs did not try hard enough to be a relevant channel that added value to enterprises, many of which decided to procure services directly.

CSPs must reinvent their enterprise service portfolio, simplifying and standardising their offerings to meet customers' needs. They need to take a 'digital-first' approach to the entire portfolio, bringing it to the cloud and making offerings extremely easy to buy and simple to use – then they can add new features and services more easily. Also, they can open up to a larger ecosystem of partners by enabling fast and easy onboarding of third-party products and services to respond to enterprises' needs, fast.

In short, 5G presents a unique opportunity for CSPs to become powerful ecosystem partners.

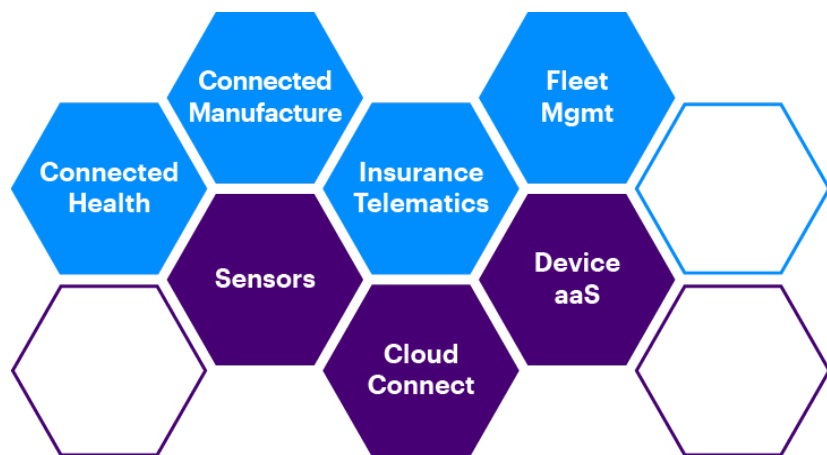
Second, they need to free up resources. Stepping up internal efficiency in the core business is critical to release the investment capacity to fuel new ventures. By harnessing automation, aided by smart analytics, operators can focus resources optimally and drive unnecessary cost out of the network and its management – and out of customer experience and account billing.

There are exceptions such as KPN, Swisscom and Telefonica's efforts to transform their core, but European operators' legacy transformations tend to be limited to proofs-of-concept while siloed systems and processes dictate the day-to-day. In the US, major players are already putting AI at the heart of all their core processes to dramatically transform cost structures and operating models. They offer examples of good best practice and what's possible.

Third, they need to (really) put innovation to work. As part of any new strategy, CSPs must decide how to facilitate innovation – that is, create capacity and budget for real experimentation. It will help if they pilot their own propositions internally. Becoming users of advanced digital solutions – for example, cloud-based, data-rich, AI-powered capabilities – to manage and improve their own operations, shows customers they are serious about the technology, and have first-hand experience of the benefits and challenges.

Jointly owned 'field labs' or 'innovation

CSPs have an opportunity to become connected industry orchestrators



Source: Accenture white paper, "B2B growth in the communications industry", February 2019

centres' bring together players from multiple industries to become test beds for new services and to solve real business problems with new approaches. This is what KPN is doing with Shell, Accenture and others in their own Field Lab in Rotterdam.

And finally, they need to build an inclusive culture. Operators should reorganise themselves to become more experience-driven, and able to design future processes, products and services by starting with the desired end results, rather than from within the confines of individual departments. A willingness to think laterally and collaborate widely will be crucial to progress.

We're talking about no less than profoundly evolving the old telco culture into the digital age. The prerequisite for that change is a radical shift to what we call the "workforce of the future", one that is more inclusive and balanced across gender, race and cultures; and where diversity is valued and nurtured as a unique source of creativity and competitive advantage in a fast changing digital world. The GSMA's Women4Tech program demonstrates that this is a major concern for CEOs.

Making it real (this time)

Diverse examples are emerging of operators that have spotted an opening and claimed it with some targeted developments and strategic partnerships.

For instance, Dutch operator KPN joined forces with companies from different industries to experiment with early industrial 5G applications in Rotterdam harbour. Rather than promote 5G for its own sake, KPN has collaborated with a diverse group of partners to create solutions that address known industrial challenges. Test applications include using Ultra High Definition (UHD) cameras connected to 5G, combined with machine learning algorithms applications, to pre-emptively maintain thousands of kilometres of Shell pipelines. And that's just one of many test cases.

Also in Europe, Vodafone and partners are rolling out IoT solutions to improve the efficiency of supply chains, better managing transport and logistics. Connected sensors enable companies to see the location and status of vehicles, freight and other assets as cargo is transported from point to point. Among Vodafone's partners are Arviem, a service provider for real-time cargo monitoring, set

up specifically to uncover inefficiencies in the global supply chain.

With more streamlined, productive supply chains, business customers stand to benefit from increased revenue and improved customer satisfaction, as well as the reassurance that they're legally compliant – for instance by ensuring and being able to demonstrate adherence to rules about driver safety.

Across the Atlantic, T-Mobile and partners have ventured into telehealth. In December, The US Department of Veterans Affairs (VA) announced plans to extend its Anywhere-to-Anywhere VA Health Care for telehealth and telemedicine partnerships, via new 'connected care' initiatives enabled by Walmart, T-Mobile and Philips. The idea is to give veterans more opportunities to connect with healthcare providers via digital channels.

“ It's time for boards to give CEOs... a real mandate to think boldly

T-Mobile will host the VA's mHealth mobile health app for free on veterans' digital health devices – an innovative move that will create positive associations for the operator's brand at the healthcare digital solutions front line.

In Asia, KDDI, Toyota and Accenture are exploiting consolidated data to rethink the taxi business. Working with the JapanTaxi Co. Ltd, the partners have developed a dispatch support system which combines data from taxi logs, smartphone information, event metrics and analytic engines to predict demand and allocate cabs where they are needed most at any given time.

And in Australia, Telstra has been busy building a comprehensive partner ecosystem which can provide a seamless, end-to-end IoT experience for B2B customers. The integrated delivery and support model, which encompasses data and network security, coordinates all IoT devices from a single, centralised

location and integrates them with back-end applications in near real-time.

These projects all have three key elements in common: their use of diverse, cross-industry partnerships; a focus on vertical applications; and their ability to drive innovative applications through creativity and experimentation.

A time for bold leadership

Betting on B2B demands authentic leadership and on making tough choices. It's about driving a culture that can free up precious resources and investment from the most commoditised areas of the business. We need leaders who can maintain focus and unleash talent and resources to secure market leadership; one who can create new value models in the enterprise markets of tomorrow.

Encouragingly the telecoms industry is seeing an influx of new blood, which should inspire fresh thinking. Among our own CSP client base, there are seven or eight new CEOs taking up positions. We would go so far as to assert this signifies a once-in-a-generation chance for operators to place strategic bets on their long-term survival – just as long as the CEO has a strong, collaborative leadership team around them. They need help to hone decisions on where to allocate investment, resources and leadership in real time.

Bold executive leadership requires new governance that focuses on delivering long-term transformation goals through difficult strategic decisions. These decisions might affect short-term results so the governance must truly reward strong vision and brilliant execution of that vision, as opposed to quick cost cutting to release cash for shareholders in the next quarter. It's time for boards to give CEOs of this industry a real mandate to think boldly and transform to create long-term shareholder value again.

The epic disruption experienced now will continue to move value away from the CSPs to the global digital leaders if operators do nothing, or the minimum. 5G will be a formidable enabler of new growth, but it's up to individual CSPs whether 2019 is a make or break year.

To find out more about how Accenture is helping CSPs exploit new enterprise digital solutions opportunities, and to see innovative, real-life examples of B2B products and services, we welcome operators to our booth at MWC 2019.

Future Telco is Here and Now

When you think of Future Telco, all-pervasive speed coupled with intelligent connectivity offering smarter, efficient and digital services on demand comes to mind. For most Communications Service Providers (CSPs), the journey will be a non-linear, complex and iterative process, spanning technology nuances, and various business ecosystems to overcome cultural barriers.

Smaller tech companies have shown the tenacity and appetite for some outstanding innovation. So, what ails CSPs? Telco networks are plagued by complexity due to legacy B/OSS systems making digital transformation overwhelming for CSPs: telco infrastructure is hard-wired and requires extensive, multi-domain integration to enable intelligent and smart operations.

Transformation is the key

To match the attributes of the Future Telco, CSPs must transform infrastructure to ensure connectivity for billions of devices (Internet of Things), become virtualised, and self-driven to simplify operations through hyper-automation, orchestration of services, and deploying platforms and devices. This transformation will need massive analytical capabilities to understand patterns, time sequencing of events, market trends and customer behaviour by embracing artificial intelligence (AI)

with deep neural techniques for machine learning (ML) and self-healing capabilities.

CSPs need a complex mix of transformations across multiple domains. Given the immensity of the task, there is a huge role for CSPs' professional service partners, not just in implementing projects, but guidance throughout the journey. This can take various forms, but there must be a framework, or roadmap, to help CSPs transform.

Future telco is now & here

Future Telco will be a multi-service player offering a range of consultancy, technology, digital and managed services while creating new and innovative solutions. Each CSP's transformation journey will be unique, but they should all aim at regaining competitiveness, and securing a better operational and commercial position. There are common considerations, and using a framework can help accelerate and de-risk these transformation journeys – SIMPLIFY | AUTOMATE | INNOVATE.

Move your business to a simpler structure – simplify

A transformation roadmap will align and prioritise projects. Areas that typically need significant attention are legacy migration, consolidation, centralisation and virtualisation.

Drive efficiencies with new tools and technology – automate

CSPs should drive efficiencies via aggressive

automation of the complete business operations. Some key areas to look at are a digital maturity model (identify candidates for rapid automation), process benchmarking and optimisations (business excellence), OSS orchestration (real-time OSS) and on-demand service management capabilities across channels and more.

Accelerate revenues with digitisation – innovate

Potential areas worth exploring could be how to monetise IoT services, high definition video-on-demand services, cloud services, SD-WAN, UCC and managed security services.

Technology transformation is the way to go. The first step is embedding a culture of INNOVATION. THINK FUTURE – THINK. TRANSFORM.

About Tata Communications Transformation Services (TCTS)

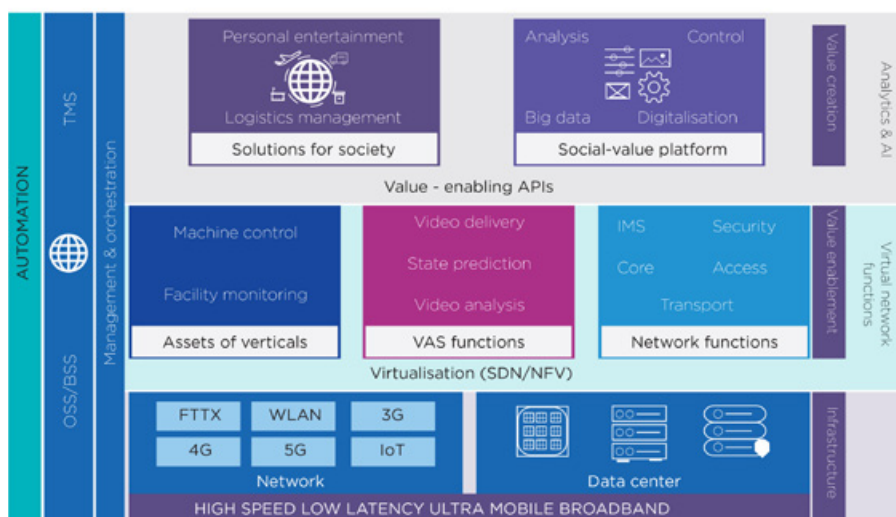
Tata Communications Transformation Services (TCTS), a 100% subsidiary of Tata Communications Ltd, provides leading business transformation, managed network operations, network outsourcing and consultancy services to telecommunication companies around the world. TCTS delivers operational efficiency, cost transformation and revenue acceleration solutions for all the stages of the carrier process lifecycle including but not limited to network engineering and design, implementation and operations functions.

TCTS is a part of the USD \$100+ billion Tata group. Tata group comprises of over 100 operating companies in seven business sectors. TCTS leverages the market expertise of Tata group's global telecom operation capabilities and globally established IT, process and consulting skills. It carries the rich traditions and business ethics of the Tata companies.

For more details on TCTS and how we can help your company build, operate and transform, please contact us at tcts.marketing@tatacommunications.com or visit www.tatacommunications-ts.com. To hear more from TCTS experts, join us on LinkedIn <https://www.linkedin.com/company/tata-communications-transformation-services> and follow us on Twitter https://twitter.com/Tata_TCTSL.

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THE FUTURE TELCO (SCHEMATIC)





THE FUTURE TELCO AN INTELLIGENT CONNECTIVITY HUB SIMPLIFY | AUTOMATE | INNOVATE

NEW TECHNOLOGY
ADOPTION- 5G

DIGITAL
SERVICES- IoT

VIRTUALISATION
SDN/NFV

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Meet us at

MWC19 Barcelona

TCTS Booth #5i81, Hall 5

25-28 February 2019





MFV: A new way for telcos to compete in TV and video

Emerging media functions virtualisation (MFV) technology offers telcos a range of benefits. Executives at two roundtable discussions heard how they are looking to compete in a world where TV and video services are increasingly delivered over-the-top (OTT) and viewed on multiple devices by a growing number of competing providers.

Operators, analysts and a host of companies in the media and broadcast supply chain gathered at the events, hosted by Mobile Europe and European Communications, and sponsored by Red Hat. They discussed the opportunities MFV provides and the challenges service pro-

viders face as and when they decide to adopt it.

But what exactly is MFV? In short, it is a derivative of network functions virtualisation (NFV) focused on areas such as the headend – a range of technical functions that control the ingestion, processing, storage, management and packaging of TV and video services before they are delivered to end users.

Just like in NFV, the traditional hardware used to perform these tasks can be replaced by software. MFV has wider ambitions than the headend, however, and can also be applied to create virtual content delivery networks (vCDNs) and cloud-based video recorders at the delivery end of the spectrum, and used in content creation and production at the other.

Yet it is, at this stage, something of a 'bleeding-edge' technology. Indeed, several participants admitted to being unsure as to what MFV actually is.

Blazing the MFV trail

One trailblazing telco that has not only heard of MFV but has embraced it is Swisscom. The operator, which has a growing band of 1.5 million TV subscribers, has worked with HPE and Red Hat to virtualise the headend of its live linear TV offering. The deployment combines HPE's Virtual Headend Manager solution and Red Hat's multicast-enabled OpenStack cloud platform and software-based transcoding running on standard x86 hardware.

There are multiple drivers for the Swiss incumbent moving to MFV. As telcos' TV businesses continue to come under pressure from streaming providers, reducing costs is a key goal. In common with NFV, MFV promises to lower costs by replacing capex-heavy hardware, which has to be amortised over several years, to a software-based, on-demand model.

Upping the stakes

The likes of Amazon Prime and Netflix are also upping the stakes in terms of new content and customer experience, so MFV promises telcos the ability to create, for example, new channels in minutes rather than weeks. The open-source nature of MFV also enables operators to move away from an over-reliance on traditional vendors and associated technology lock-in to embrace a wider ecosystem of partners, and introduce DevOps methodology into their work.

According to Werner Gold, Emerging Solutions Evangelist, Telecommunications, at software multinational Red Hat, Swisscom has achieved significant cost savings thanks to MFV. The incumbent has over 300 channels running on its virtual headend.

He noted that achieving some of the other benefits required some profound changes, saying, "The most challenging process is internally – to

adopt the thinking of agility and to learn how to operate this way. In the past you purchased a box [from a vendor] and when this box was broken you called the vendor to ship a new box. This does not work any more in the platform business.

"Carriers have to learn how to deal with that, while they move from closed architectures to open platforms. It is an organisational issue, a journey, which Enterprise IT organisations had to walk through within the last two decades. Broadcasters and CSPs still need to

“Some telcos see themselves in the future as super-aggregators – MFV is essential to this

embrace that change. Some of them are ready and some of them struggle with it.”

Paolo Pescatore, an independent telecoms, media and tech analyst, agreed, "Swisscom is one of those innovative telcos that are very few and far between. Part of the challenge is to

convince other telcos to come on board with the culture and organisational beliefs. Many are so entrenched with existing partners and philosophies that it is hard to change that mindset.”

Before delving deeper into the challenges, participants shared their thoughts on the potential of MFV. According to former Liberty Global veteran Mourad Veeneman, now Cloud Transformation Architect at video systems integrator Divitel, the agility to “scale up and down as required” is a key benefit of the technology.

Analyst Pescatore also picked up on this point. “Virtualisation offers a wealth of opportunity to be more agile,” he said. “It offers the chance to work with a range of new partners and to position [telcos] as aggregators – that is the key point in all of this. MFV also offers immense opportunity to add services and to take services away.”

Mark Smith, an independent marketing consultant who spent over 18 years at GSMA, is another who sees MFV as an enabler of content aggregation. “Some telcos see themselves in the future as super-aggregators, bringing together linear, on demand and other third-party services – MFV is essential to this,” he said.

For Steven Soenens, VP of Product Marketing at Skyline Communications, a provider of network management and OSS solutions, there are clear cost reduction benefits. “There is a lot





of equipment that is not doing anything – look at an encoder,” he explained. “In the past [a broadcaster] would buy two encoders just to do one channel. In a virtualised environment they only need one and if they need more capacity they can pay per hour for more. There is a definite capex reduction as a result.”

Sky takes the MFV route

Sky is another operator that has gone down the MFV route. The company’s Italian opco, which offers both traditional pay-TV via satellite and IP as well as its OTT service NOWtv, opted to virtualise its on-premise video on demand (VoD) solution. The aim was to improve how it encodes and transcodes files – turning raw source content into a compressed digital format and converting one digital format into another type of digital format respectively.

Virtualising the process, and combining on-premise and public cloud services, reduced transcoding costs and peering traffic, according to a paper prepared by analysts at IDC and Red Hat, which provided the platform and storage.

Richard Mills is Technical Director at Sky VR Studios, a startup with the now Comcast-owned company that produces mostly 360-degree video content. Like his counterparts in Italy, Mills can see the benefits of MFV. In particular, he thinks it would be helpful when it comes to speeding up the

“process-intensive” act of post production rendering – creating 3D images – and in the dissemination of content to end users.

To illustrate the point, Mills cited the “huge uptake” in viewing that is generated when customers click on Sky’s weekly all-subscriber email marketing campaign, which promotes a range of content and offers. “A scalable, virtual solution would be able to handle [the peaks and troughs] much better,” he said.

“What we give clients is two types of flexibility – operational and commercial

Nick Moreno, Director of Strategy, Satellite & Media, at UK-based infrastructure provider Arqiva, revealed his company is already offering the technology to its global multichannel broadcaster customers – it just brands it under a more general virtualisation moniker. “What are we virtualising? It’s media management, play-out and we’re starting to push into distri-

bution,” he said. “What we really give clients is two types of flexibility: operational – spinning up and down services quickly; and commercial – opex- rather than capex-based pricing.”

MFV versus NFV?

At this point, Red Hat’s Gold looked to set the record straight on the MFV versus NFV debate. “Swisscom is making use of the ETSI [European Telecommunications Standards Institute] NFV model... and applying it to the media headend,” he explained. “The transcoders, the digital rights manager (DRM), the multiplexer are all just virtualised [network] functions [VNFs]. The whole media/broadcast industry is turning towards virtualisation and cloud computing. It is replicating what telcos have done in NFV.

“The ETSI model is a great way to ensure compatibility and interoperability of a complex architecture, by setting the focus on standardization of the interfaces between the components.”

For William Crowe, a Technical Account Manager at Intel, there is another reason for viewing the two terms separately. “MFV is moving ahead faster as it doesn’t have the legacy that NFV has suffered from,” he said. “If you look at what has happened in NFV for the past six years, there have been vendor agendas, derailments, hundreds of proofs-of-concepts everywhere and closed ecosystems of five or

six vendors getting together and not really delivering a whole lot,” he lamented.

There was general agreement that if the media/broadcast industry could continue to avoid these pitfalls, it could be seen as “a fundamental breakthrough” in Crowe’s words.

Challenging times

Substantial challenges still lie ahead though to achieving the benefits of MFV. Take the central promise of cost reduction; according to Arqiva’s Moreno, “the total cost of ownership of a virtualised solution is more expensive than a ‘tin’ solution at the moment.” Sky’s Mills is sympathetic to this: “There is a cost involved and at low volumes it is quite expensive. When it’s scaled it is more useful.”

For Mills the problem is that viewership of VR remains “nowhere near” the scale of traditional TV so unless MFV is implemented as “part of a wider offer”, it is “cost prohibitive”. Moreno added: “The big problem with virtualised services is the ingest and outgest costs of lots of data flying into data centres. If you are doing UHD or VR it can be very expensive.”

The topic of skills and staff was never far from the discussions. Skyline’s Soenens, remarked, “If you look purely at the bodies you need to run [MFV], the cost is going to go up... But I think the fall in capex will offset that.” He continued: “If you look at the pure media-related functions

in telcos, they’ve been used to getting solutions from their suppliers. It is probably one of the biggest hurdles that I see – having the knowledge and the teams in place to bring media to the level of virtualisation that they have on other services.”

Divitel’s Veeneman agreed. Referring to his time at Liberty Global, he said: “Coming from a large operator I know how hard it is to re-train your engineers to become software developers. We had the same transition with SDN/NFV. They suddenly needed to write bytes, scripts and codes – things they hadn’t done before. For some it’s a lot more difficult than for others, so there is a natural resistance. It means you need a really strong management.”

This also has implications for another cited benefit of MFV – ushering in a new wave of partners, as Red Hat’s Gold explained, again citing the example of Swisscom, “One of their business goals was to move towards a platform to become more vendor independent, but on the other hand that requires the carrier to take more responsibility. If you do not have the requisite skills in-house this can be tricky.”

Size matters

According to Soenens, there is a clear divide here between Tier 1 telcos, who are more able to handle this responsibility internally and Tier 2 telcos, who are more reliant on as-a-service solutions. “[It is said that] avoiding

vendor lock-in was one of the main drivers for virtualisation but I see the exact opposite happening,” he warned. “Media functions as-a-service providers get very much locked in to certain technologies.”

Struggling to sell solutions

More widely, the Skyline exec thought vendors were “struggling” to sell their virtualised solutions. “They are also trying to lock down the whole thing,” he claimed. “This is related to the complexity – it is so damn difficult to set something up reliably with a large-scale production. They also need these IT engineers to do it and these guys are simply not there.”

For Moreno, the key question for companies like Arqiva is where to add value in a virtualised world. “It’s really tough – we struggled with that for nearly two years,” he explained. “The only real value-add is orchestration – orchestrating the entire process so if something goes wrong who do you go to? You go to us.”

For any major technology transformation towards software, the question of security is always one that rears its head and creates debate. Red Hat’s Gold defended MFV’s capabilities in this regard: “From a headend perspective, as long as you are in a private cloud environment there is not much difference to physical transcoding because you are in a controlled environment.

“Someone might try to hack into that – IP





is probably easier than traditional serial digital interfaces (SDIs) – but it's still not easy to break into." With migration to IP happening "regardless of MFV" it was a moot point anyway, according to Gold. He added: "If you leave that [private cloud] environment and you do transcoding in Amazon [Web Services (AWS)] then you have those kind of security issues."

Sky's Mills was unequivocal, saying, "There is nothing that would stop you from virtualising media functions from a security point of view".

Reaction needed

As the discussions began to draw to a close, thoughts turned to the risks of not deploying MFV. To put things in context, analyst house IDC predicts that the OTT TV market in Europe will grow at a compound annual growth rate of 16.1% to reach around \$15 billion in 2021. In concert, the penetration rate of OTT TV will reach 32% in 2021, up from just 10% in 2016. IDC forecasts that this "will contribute to an ongoing erosion of pay TV's subscriber base and negatively impact traditional pay TV revenues going forward".

In light of this shift in the market, Red Hat's Gold warned that providers "need to react dynamically" to the changing landscape as the discussion moved from MFV onto CDN. Clearly, the growth of video on demand, and

the associated traffic, will put additional strain on the networks. CDNs are about delivering a consistent experience to customers, for example, by enabling viewers in Europe to download static content that originates from the US from a server in London or Paris.

Gold underlined the need for this by giving an example: "With more and more UHD TVs coming up the sheer traffic that they are creating is killing our current internet infrastructure. You need 25Mbps per stream for decent UHD delivery so 1,500 viewers can saturate a 40GB network interface. If you want to avoid this you need to move the caches [closer to the end user]. Imagine how many boxes you need if you stay with the current physical infrastructure approach – it's just not feasible."

Sky's Mills summed it up the best. "What the viewer wants is good quality pictures delivered seamlessly otherwise it's a very disappointing experience," he said. The shift to virtualised video processing should therefore be measured on "better viewing quality for lower bandwidth".

Consumers have the last word

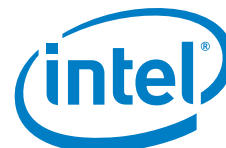
The last word was left to the major stakeholder not present in the room – the consumer. If cost savings, great agility and flexibility, as well as the opportunity to create new services and

embrace new partners are benefits for TV and video providers, what do their customers get out of a shift to MFV?

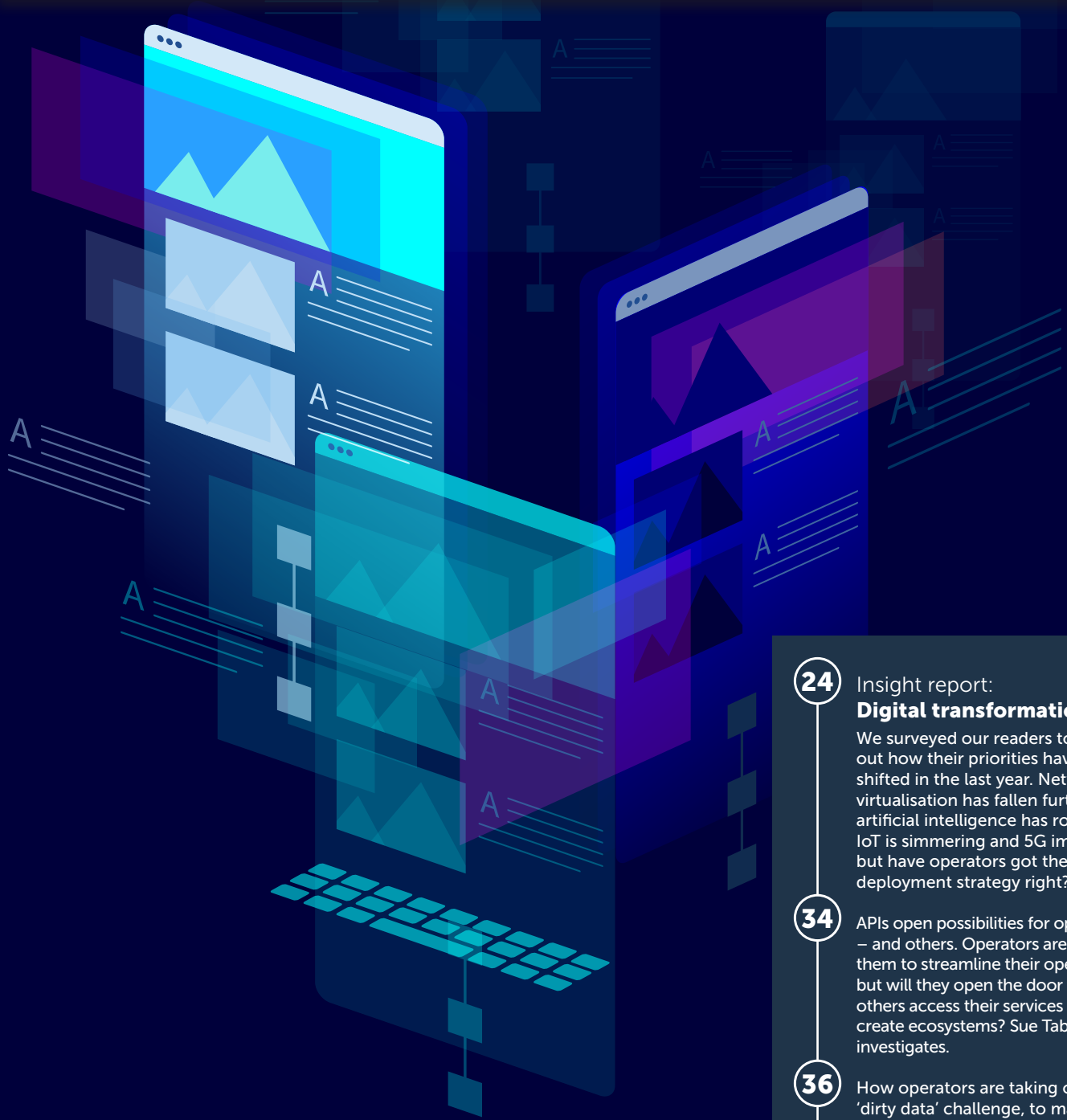
Viewing habits have shifted dynamically during the past decade, giving the consumer great control of what they watch, how and when. MFV gives TV operators the opportunity to respond effectively; the benefits outlined above are huge advantages but, most importantly, they can ensure the high levels of performance and quality of service demanded by the switched-on consumer. ■

Mobile Europe and European Communications hosted two roundtable discussions, in Amsterdam and London, in October 2018. This article is a synthesis of the two sessions.

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Digital Transformation



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Insight report: **Digital transformation**

We surveyed our readers to find out how their priorities have shifted in the last year. Network virtualisation has fallen further, but artificial intelligence has rocketed, IoT is simmering and 5G imminent, but have operators got their deployment strategy right?

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APIs open possibilities for operators – and others. Operators are using them to streamline their operations, but will they open the door to let others access their services and create ecosystems? Sue Tabbitt investigates.

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How operators are taking on the 'dirty data' challenge, to make their data siloed, inconsistent, incompatible and incomplete data fit for analytics and automation. By Kate O'Flaherty.

2019 Reader Survey:

Operators are deploying 5G, network virtualisation and AI, but they are still struggling to develop the business case





It might be hard to believe, but 5G hype is still on the way to its peak on Gartner's Hype Cycle, the most recent version of which was published in August 2018. But we are nearing the summit, and once the technology begins its slide into the infamous "trough of disillusionment", the real work will begin.

As usual, in January we surveyed Mobile Europe's readers: we asked them about operators' plans to deploy 5G, the markets they intend to target and the challenges they're

facing. We also asked about the importance of technologies like network virtualisation, network slicing and artificial intelligence (AI) to mobile operators' businesses. The short answer is that they are all important, though operators may not be paying enough attention to the potential for network slicing (see page 30).

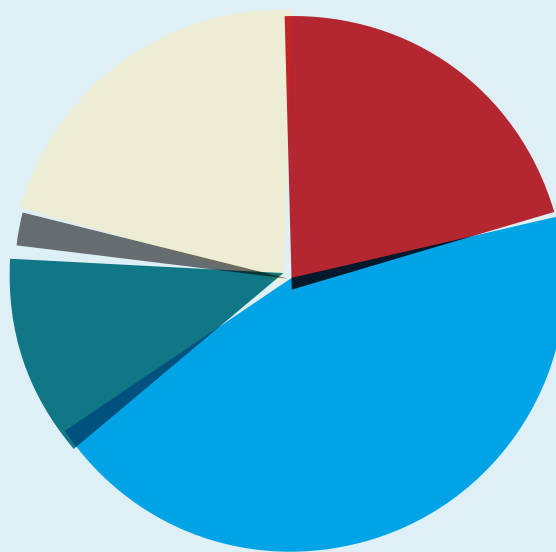
Two thirds of respondents said they (or their operator customers) are deploying 5G in some markets today or are participating in trials or proofs of concept. The number is even higher among operators (84%), so it's clear 5G

is becoming real. Still, the perceived challenges operators face are worrying, chief among them the cost of deploying the technology and the struggle to develop a business case (and business models) to help them recoup the investment (see page 29).

This year and next will be pivotal for 5G. So far, most activity has been in Asia and the US with Europe moving a bit more slowly, but that will change as spectrum is allocated and standards are finalised. The question is: "Can operators make the case for widespread deployment of the technology?"

In 2018 the biggest priority for mobile operators was preparing for and deploying 5G, and it's no surprise that this is 2019's top priority as well. Readers also ranked other priorities largely the same as they did last year except that we added two new options: AI and clean usable data, which go hand in hand. Nearly a third of respondents put AI in their top three, and indeed many operators are beginning to deploy AI for customer care and in operations (see page 31).

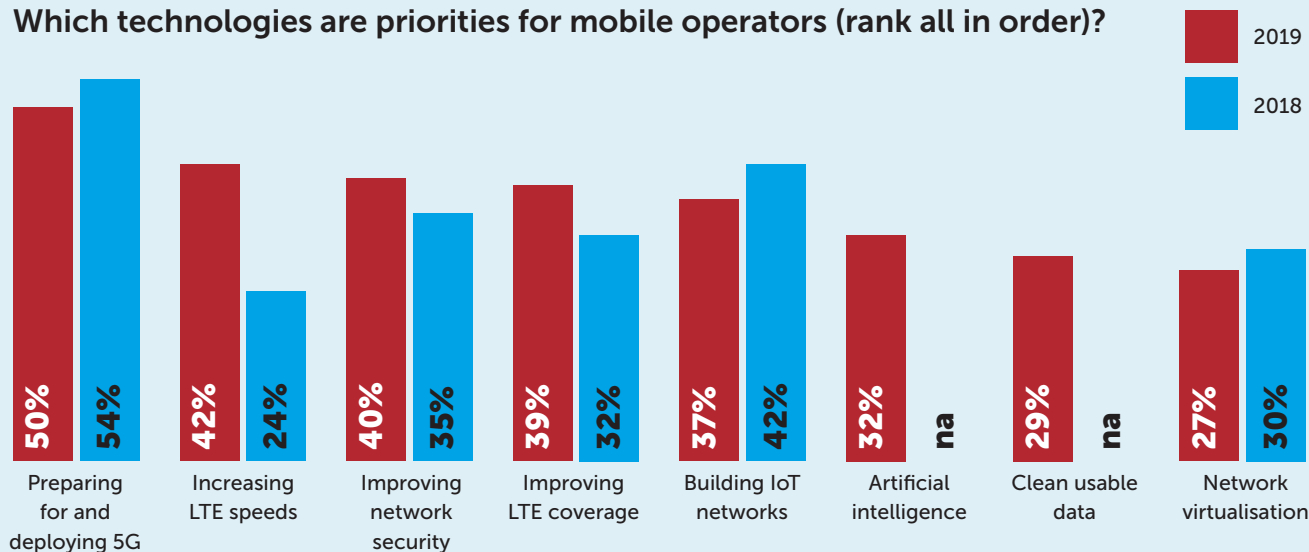
Network virtualisation comes in at the bottom of the list again, which is not particularly surprising since all types of communications service providers are struggling to justify deployment of network functions virtualisation (NFV) and software-defined networking (SDN). This could pose a problem because the technologies are necessary to deliver network slices through the core to accommodate a wide range of applications with varying requirements for throughput, latency and availability. This capability will be essential, particularly for operators seeking to build a business case around delivering 5G internet of things (IoT) services to enterprise customers.



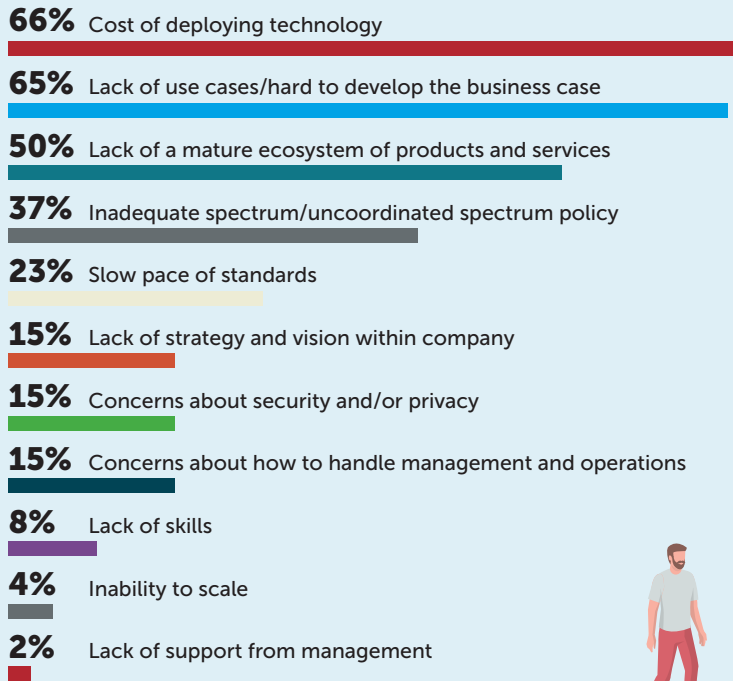
Where are you with your 5G strategy?

- **21%** Deploying 5G in some markets today
- **44%** Participating in 5G trials/proofs of concepts but not actively deploying the technology
- **12%** Will wait until all standards are finalised to deliver 5G technology
- **2%** No plans to deploy 5G
- **21%** N/A

Which technologies are priorities for mobile operators (rank all in order)?



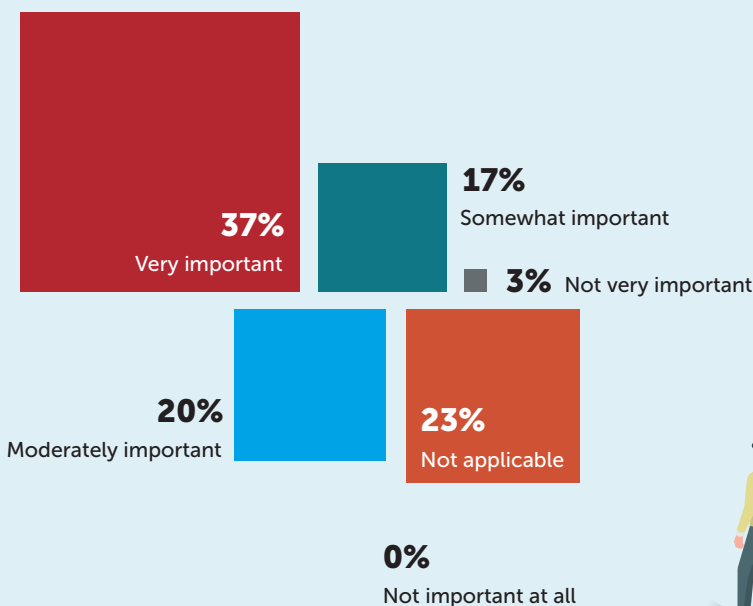
What are the top three challenges to deploying 5G?



The top two challenges mobile operators face in deploying 5G are the same ones they struggle with in justifying deployment of NFV and SDN, namely the high cost of rolling out the technology and lack of a business case. Operators face an age-old chicken-and-egg dilemma when it comes to both 5G and virtualisation: They need to deploy the technologies to develop new use cases, but to justify the capital outlay, they first need solid use cases.

About half of respondents feel there is not enough mature 5G equipment, which is understandable given that 3GPP only completed the first New Radio (NR) standards (Release 15) in June 2018. The pace of standardisation also affects operators' ability to deliver network slicing, in that Release 15 only covers how to do it within an operator's network. Hand off of slices in a multi-operator environment will be addressed in Release 16, due for release at the end of 2019.

How important are NFV and SDN to your 5G strategy?



Spectrum is another thorny issue. GSMA issued a report in November warning that successful deployment of 5G services is at risk if governments and regulators can't work with the mobile industry to deliver access to the required radio spectrum.

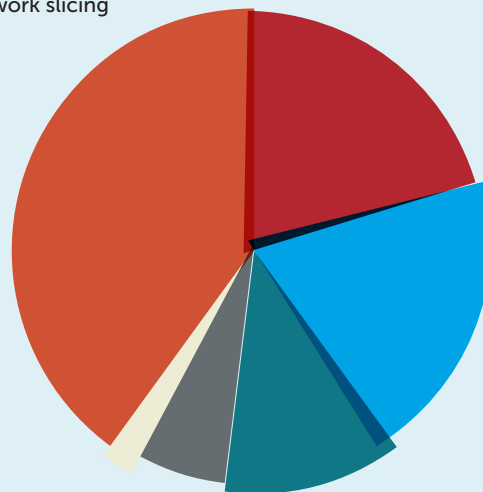
"Operators urgently need more spectrum to deliver the endless array of services that 5G will enable – our 5G future depends heavily on the decisions governments are making in the next year as we head into WRC-19 [World Radiocommunication Conference 2019]," says Brett Tarnutzer, Head of Spectrum at GSMA. "Without strong government support to allocate sufficient spectrum to next generation mobile services, it will be impossible to achieve the global scale that will make 5G affordable and accessible for everyone."

Only 15% of respondents cited concerns about how to handle operations and management as a top challenge for 5G deployment. This is troubling because automating network management, in particular network slicing, will be critical for delivering 5G and IoT services at scale.

The promise of 5G is that it can handle a wide range of applications with diverse requirements for coverage, throughput, latency, availability, and so on – for example, an application like remote robotic surgery, which needs low latency, high throughput and guaranteed availability versus a network of industrial sensors, which doesn't need guaranteed throughput or availability but does need to transmit small amounts of data frequently.

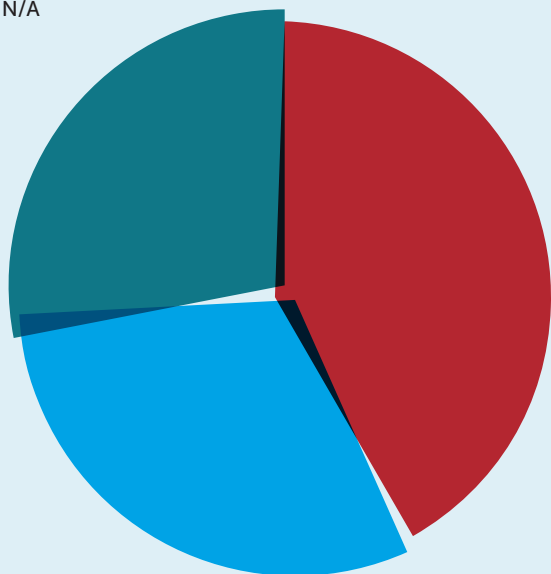
When do you plan to roll out network slicing capabilities?

- **20%** At the same time that 5G RANs are deployed
- **20%** Within 1 year of 5G RAN deployment
- **12%** Within 2 years of 5G RAN deployment
- **6%** Within 5 years of 5G RAN deployment
- **2%** No plans to use network slicing
- **40%** Not applicable



Are operators targeting consumers or enterprises first?

- **41%** Enterprise
- **31%** Consumer
- **28%** N/A



Many operators plan to use network slicing to accommodate these varying requirements, which means they must implement NFV and SDN in the core network and automate operations using intent-based management, machine learning and policy. This autonomous approach is the only way to handle the massive volume and speed of change that 5G and IoT applications will demand.

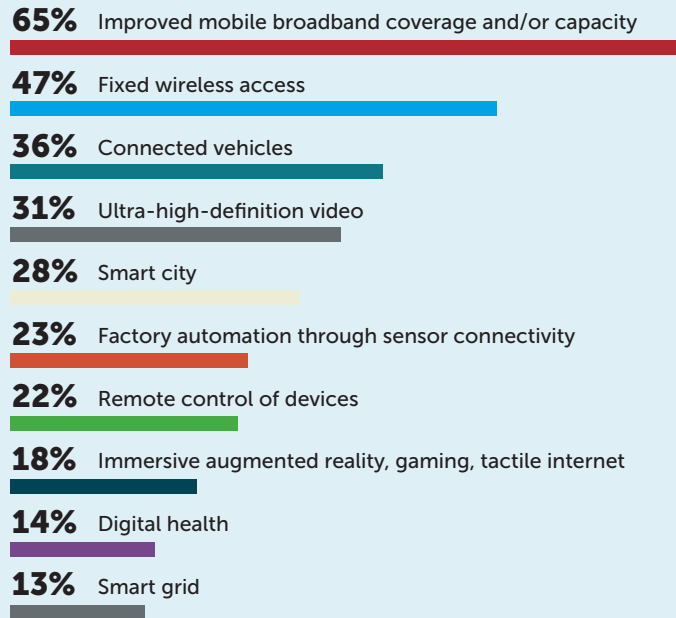
Interestingly, more than 40% of respondents said the first targets for 5G services are enterprises (as opposed to 31% who said operators are targeting consumers), but answers to a more detailed question about the kinds of services they're planning to offer don't necessarily support that. When asked which services operators are delivering first, less than a quarter of respondents picked applications aimed at enterprises, such as industrial automation and remote control of devices. Rather they said they are focusing on use cases like improved broadband coverage and capacity, fixed wireless access, and high-definition video, which are typically geared towards consumers.

Yet, many industry watchers agree that the best potential for 5G success lies with enterprises rather than consumers. A recent survey by Gartner found, for example, that enterprises want 5G sooner than operators can deliver it.

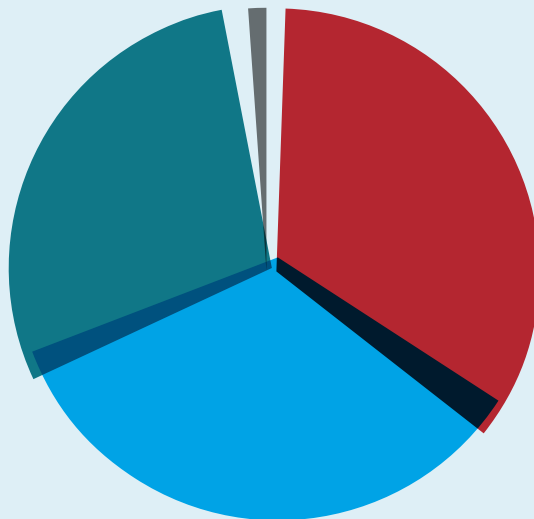
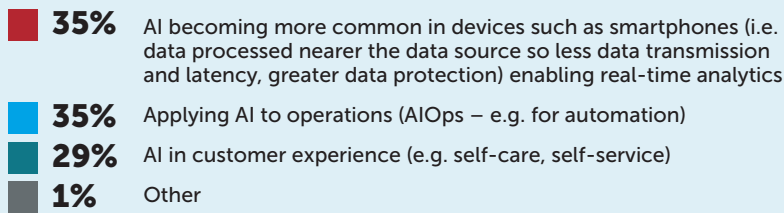
“In terms of 5G adoption, end-user organisations have clear demands and expectations for 5G use cases,” Sylvain Fabre, Senior Research Director at Gartner, stated. “However, one major issue that 5G users face is the lack of readiness of [operators].”

Similarly, Bain & Company predicts that the market for B2B IoT services could reach \$300 billion by 2020. That’s twice as much as the projected \$150 billion consumer market.

Which 5G services will operators deploy first (rank all in in order of importance)?

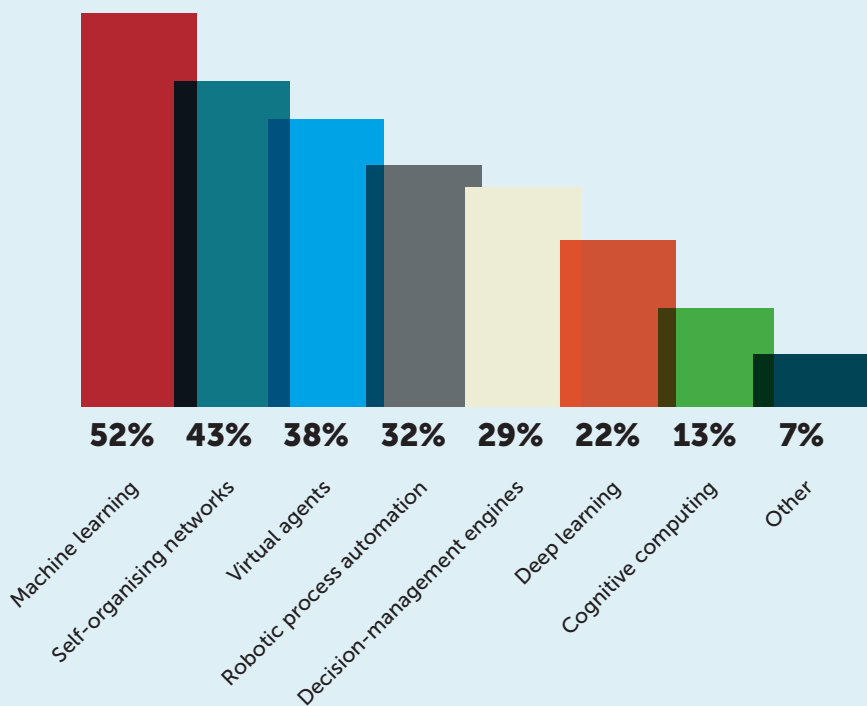


How will AI make the biggest impact in the mobile industry this year?



While 5G was the most hyped technology at telecoms events in 2018, look for AI to rival it this year. Mobile operators and other service providers are anxious to deploy AI (and its cousins machine learning and deep learning) to increase automation throughout their networks and operations. Nearly equal percentages of respondents to our survey said their companies are using or exploring use of AI in mobile devices, for customer service and in operations.

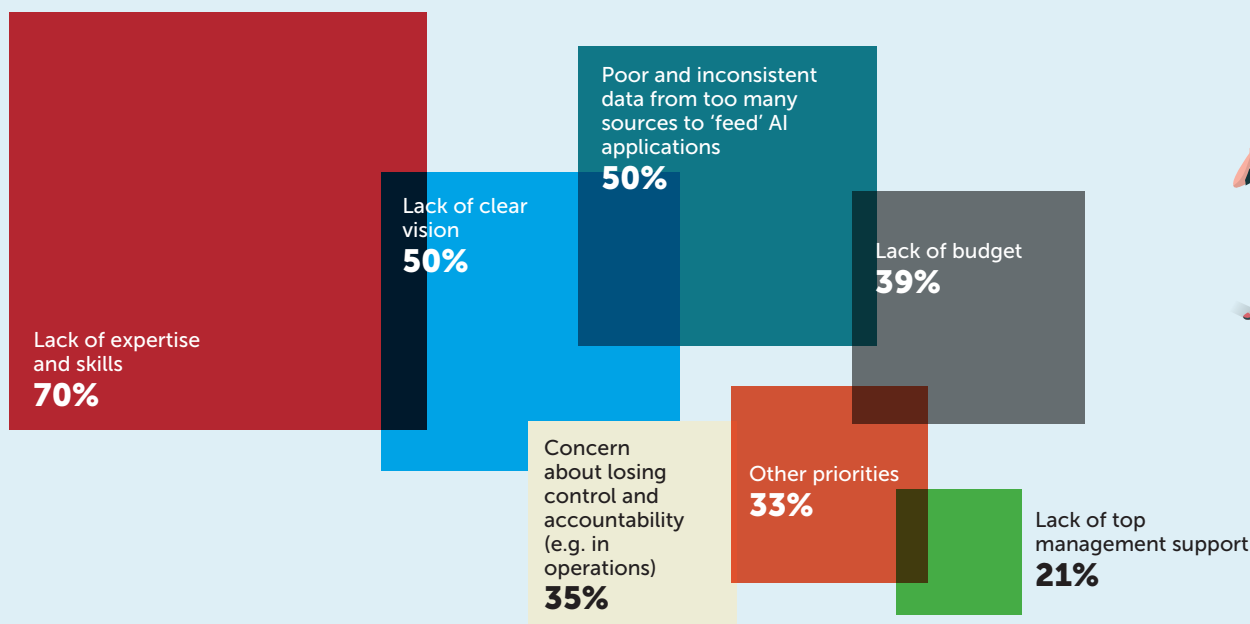
What kind of AI is your company deploying or planning to deploy this year (choose all that apply)?



Among the specific types of AI technology, the top vote-getters (machine learning and self-organising networks – SON) fit into a category known as AIOps (AI in operations). With machine learning, network components and operational systems “learn” automatically based on experience and then improve without being explicitly programmed. This capability will be critical for network management. SON is a companion technology for automating planning, configuration, management, optimisation and healing in mobile radio access networks (RANs). Most operators envision combining SON with SDN and machine learning for management front end to end.

Deploying AI, however, is quite challenging, and our survey results show that operators are rightly concerned about their ability to succeed. A majority (70%) worry that they lack the expertise and skills to implement AI successfully, and half are not sure their companies have a clear vision for how to use the technology.

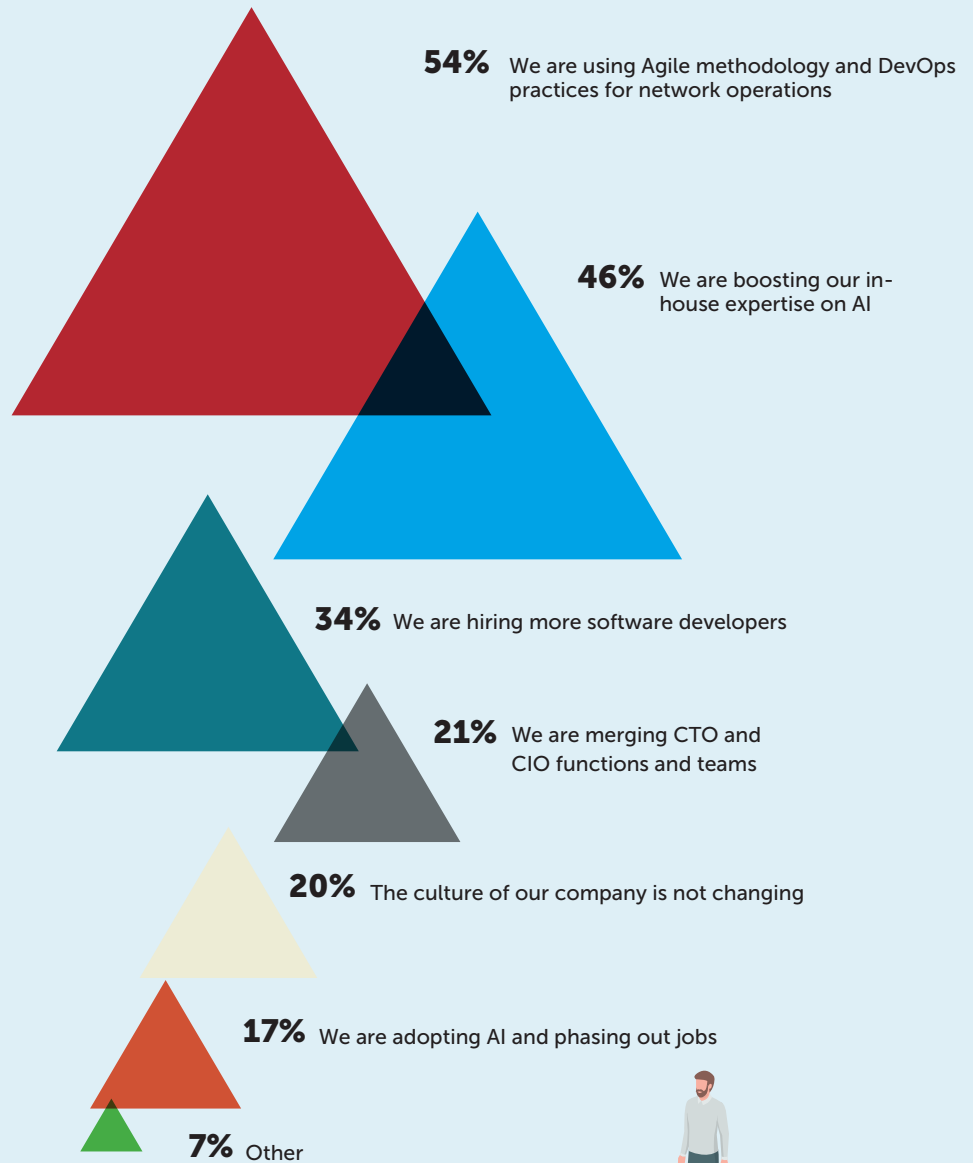
What are the top three barriers to exploiting AI?



How is the corporate culture of mobile operators changing as they embrace digitisation (choose all that apply)?

Consistency of data is another key obstacle, one that could derail AI deployment if not addressed early on. AI applications require access to huge amounts of data, preferably from a centralised source, but in most mobile operators' environments, data exists in many formats and is stored in silos that are difficult to access. To address this many companies are developing strategies to "clean" data so that they can apply analytics, machine learning and AI and this includes developing huge data lake repositories.

On the issue of skills, operators are hiring more AI expertise internally. In our final survey question, we asked respondents about how their corporate culture is changing as they digitise, and 46% said they are acquiring AI talent. A third also said they are hiring more software expertise, and more than half are using Agile methodology and DevOps practices in their network operations. These are steps in the right direction. 🏠



About this survey

Mobile Europe conducted its reader survey in January 2019. Of 105 respondents, 43% were network operators, 24% were suppliers and a third were other types of companies, such as consulting firms, systems integrators, analysts and regulators. Nearly 83% of respondents were from Europe, 7.5% from the Asia-Pacific region and 5% from the Middle East and Africa. The remaining 5% were from the Americas.

APIs open possibilities for operators – and others

Will operators ever give up control and invite the wider world to join them in driving new digital service innovations that justify all that investment in their shiny new networks, via the promotion of standards-based APIs? By Sue Tabbitt

As telecom operators refresh their digital transformation plans for 2019, they may need to consider greater openness as part of their vision. As long as they remain locked in their own discrete, proprietary worlds, they will be forced to fall back on their own resources, skillsets and experience to lead the digital charge – both internally, and externally. This not only limits their potential; it is also very costly. Meanwhile, competitors with alternative mind-sets could be fostering all kinds of diverse ecosystems of applications and transformational customer experiences which drive traffic and revenue streams to their platforms.

As well as multiplying the rewards, a partnership model means they get to dilute their own costs.

Application programming interfaces (APIs) may have been hard for service providers to get their heads around in the early days, because they're all about getting different platforms and software applications to connect and exchange data with each other – and telcos grew up as a hardware-based industry.

As network functions and operations have become more reliant on and even based in software, though, the importance of having the right development and connectivity interfaces has become more appreciable.

Too often operators' vision has stopped there. Yes, they want to be able to provision their networks in a more agile, intelligent and cost-efficient way, via self-organising networks and AI-based problem-solving, for instance. Yet APIs, especially open ones (with open meaning open source, that is free to use and developed collaboratively), are even more crucial to enticing app partners who might create exciting new products and experiences that help to breathe new life (and profit) into operators' networks.

This requires a big shift in mindset, however.

An open and closed case

"The whole premise of APIs is about opening up what you're doing to partners in the outside world, but historically operators have been very closed," says Patrice Slupowski, senior VP of digital innovation at Orange, and a passionate advocate of the API approach to driving digital innovation.

"When the API story first began, 12 years ago, 99% of the effort was probably spent on

making the case internally for doing this. As a result, the first APIs that emerged in 2008/9 weren't very good and the take-up by developers wasn't there."

Today, API-enabled innovation is taking off outside the telco domain, producing some interesting use cases from specialist vertical Internet of Things (IoT) applications to new solutions for modern, 'open banking'. Worried that they might let an important opportunity pass them by, and aware that their costs are rising while their income flat-lines, the more ambitious telcos are having another shot at developing API strategies.

Deutsche Telekom, for instance, has rolled out a single, global customer self-service mobile app which is now used by its operations in nine European countries. Using TM Forum's Open API standards as the basis for the core central app has simplified DT's development and support costs; meanwhile the APIs can be exposed externally so that DT's partners can connect more easily to its telco operational and business support system (OSS/BSS) environment in their own activities.

Which in turn starts to open up new possibilities.

Slow progress

"Many operators have multiple mobile operations across different European countries, a fully bespoke OSS/BSS per country, and very few shared services," comments Aaron Boasman-Patel, VP of AI & customer centricity at TM Forum, which promotes a standards-based modular architecture that exposes business services as open APIs. "This makes it possible to build out a shared capability that will support multiple operators in multiple countries on a single application base," he says, adding that deployment via the cloud can make this even easier.

Yet tangible progress seems to be taking a long time, and in most cases, operators seem to be focusing their activities on internal improvements rather than on innovating for the external markets that use their services. Swisscom, like Deutsche Telekom, is focusing on streamlining the way it deals with its customers.

If telcos don't make it easier for startups to build innovative new apps that harness their networks, or transform the way customers use them, however, those potential partners will simply find a provider or platform that does. And before long, operators will be largely bypassed, as data feeds are channelled straight

into the big cloud platforms.

Twilio, a communications API provider, is doing phenomenally well with its proposition of making it easier for app-based businesses to incorporate convenient call, messaging and SMS facilities into their online and mobile services. These include smart facilities such as proxy numbers that mask identities, so Uber or JustEat drivers can't see and store customers' personal mobile numbers (and vice versa) during their interactions, for example.

"We exist because there was a gap in the market, a limit to what the market could do with telecoms," explains Genevieve Haldeman, Twilio's VP for corporate communications. "This whole area was a black box that no-one else could access, so we built a software layer on top for developers."

Mutual need and benefit

Although operators might well see Twilio as competition, both parties need each other. "Telcos are key partners for us in maintaining the connectivity," Haldeman says. "Meanwhile we allow developers to readily use their services in software on a global basis." So operators get to play in some interesting new use cases, and Twilio's developer customers don't have to strike up multiple relationships with different operators to exploit international market opportunities.

But aren't operators going to want a greater slice of the value-added action, as they wise up to the bigger opportunity Twilio has captured?

"They could add their own value by improving the whole ecosystem, to underpin today's innovation-driven economy – by improving uptime, the quality of lines, and numbers," Haldeman suggests.

At the same time, Twilio is also introducing operators into interesting new areas, such as IoT opportunities; Haldeman references a partnership with T-Mobile in the US, designed to provide developers with all they need – the network connectivity, platform, APIs and tools – to bring appealing narrowband IoT solutions to market. Other similar alliances are on the cards in Europe.

Not an opportunity to miss

Operators would do well to keep an eye on where Twilio's opportunities are unfolding. Prospects include solutions for keeping track of cities' dockless bikes and scooters, and applications for connected health, transport,

finance and retail – substantial markets where the customer experience is ripe for transformation, through improved real-time communications. "There is so much greenfield potential," Haldeman notes.

APIs and cloud-based platforms are pivotal to rapid, efficient delivery of innovative new services, so the challenge for telcos is to raise their profile in this movement or be left on the fringes as utility providers.

Fitbit and Google are exploring the potential for cooperation on consumer and enterprise health solutions. The plans involve Fitbit using Google's new Cloud Healthcare API, providing consolidated data from across its users to enable new insights into the state of a nation's health, and discoveries about conditions and their triggers.

“ The challenge for telcos is to raise their profile in this movement or be left on the fringes as utility providers

There is no mention of a communications provider as part of the tie-up, perhaps because connectivity's role is seen as a technicality rather than a strategic focus. Even though the reliability and security of connections will be paramount where patients are agreeing to transmit their own health data across networks to cloud platforms.

Not all operators are hanging back, though. Orange kicked off its current API drive in 2016, generating more than 750 APIs for its infrastructure in the first year, a figure which doubled in 2018. Although the vast majority of the toolkits are private ones for internal developers, to transform Orange's own IT estate and customer relationships, up to 60 of the APIs are public facing. That is, they are available to external developers, startups and the B2B/wholesale market, to inspire new apps and services that harness and enhance the Orange brand.

One initiative has been to drive the use of SMS in Africa. Another involves food and agriculture. The model sees Orange work with part-

ners to create an ecosystem of apps and services, using APIs that Orange has co-designed.

"We bring the digital mindset, the platform and the APIs," Slupowski says of the operator's role. "Benefits to our partners include rapid implementation and testing; a major shift in the time and cost of development. Before it might have involved very lengthy projects and hundreds of thousands of euros to integrate carrier billing into an app; now it just takes a few days."

Internal transformation

Orange is probably making the most progress internally, he admits. "Here, transformation is happening despite strong legacy, which we've achieved with a lot of evangelisation, training for architects on how to design for APIs and so on."

To this end, the operator has been training up teams in large numbers – 1,000 last year alone. Not just technical teams, but also marketing armies who can take the Orange API message out to developers and consumers of the tools. There are developer challenges too, such as the LTE-M event Orange ran late last year to address practical issues faced by French train company SNCF.

The signals Orange is sending to the market are important. "We're seen as a modern provider. Our API strategy lets us play well with startups who prefer a 'try and buy' model," Slupowski explains. Championing open standards is a big part of this, he adds. "We're very active in initiatives by TM Forum, iM2M and FIWARE. Collaboration is key to success, and open APIs help drive fast results. That's how cities will generate maximum benefits for citizens, and so on; not by everyone being closed and proprietary."

The luxury of choice is fading

Although some other operators have yet to catch up in their thinking, the luxury of choice won't always be there. "Commercially there is a conundrum: open source means losing control and potentially not being able to access all the value of the applications that are developed," says James Gray, director of Graystone Strategy, which advises telcos on subscription-based business models. "But the ecosystem requires developer innovation to succeed. Is this a Catch 22 situation? Possibly, and that's why I expect to see a more open approach to APIs over the next three to five years from smaller challenger telco networks with more to win than lose." ■■

How operators are taking on the 'dirty data' challenge

Operators' data is often siloed, inconsistent, incompatible and incomplete. What can they do to ensure it's of a high enough quality to enable analytics, AI and automation? By Kate O'Flaherty



Artificial intelligence (AI), automation and analytics are the foundation of mobile operators' digital transformation. But in order to take advantage of these technologies to better serve customers and improve network functionality, operators need access to usable data.

This is not as easy as it sounds. Despite years of grappling with so-called 'big data', operators' information is often siloed, inconsistent, incompatible and incomplete. In fact, 57% cited 'dirty data' as the single biggest obstacle to leveraging AI in operations in a recent TM Forum report.

As the stakes get higher with 5G, virtualisation and cloudification looming, automation and orchestration are becoming more critical to service delivery. This is resulting in operators adopting a range of approaches and strategies to ensure the data they have is clean.

It has been a long time coming: In the past, operators haven't taken data very seriously, says Ravi Palepu, Global Head of Telco Solutions, Virtusa. Now data is increasing rapidly, with more added all the time. "The biggest challenge is how to manage that data and how to clean what you already have," he says.

It's a complex issue – and operators' interest in exploiting the potential of AI is exposing the challenges in gaining access to the right data across the organisation, says Mark Newman, Chief Analyst at TM Forum.

He admits 'dirty data' is an issue but says an even bigger problem is the way information is stored and categorised across an organisation. In fact, he says, there are technical challenges involved in aggregating, filtering and using disparate data sets. "That is assuming, of course, that people know where to go in their organisations to access the right data and that different departments have the same policy and approach as to who is allowed to access and use it."

Data silos

Indeed, according to Jennifer Kyriakakis, Founder, MATRIX Software, telecoms operators haven't been able to leverage data in the same way as modern digital companies because their sources are often "a mishmash of

legacy applications with too many databases that aren't synchronised".

These siloed stacks and multiple billing systems create many differing views of the customer, resulting in data that's not leveragable in the moment it's most valuable, says Kyriakakis.

At the same time, a major challenge for mobile operators is the fact that the technology enabling the collection and storage of data has developed faster than techniques for ensuring its quality and reliability, says Kamal Bhadada, President, Tata Consultancy Services Communications, Media and Technology. "Simply put: We're generating data faster than we can manage it."

Operators accept this, but some are already starting to gain value from their own strategies. Kyriakakis says the operators MATRXXX Software works with are looking at improving their digital IT stacks. "They are simplifying, automating and streamlining processes to ensure a single source of truth for customer, service and usage data that can drive analytics and AI. This data can then be used in real-time to drive actions towards the consumer that are relevant in the moment."

She says clean data starts with a new digital stack so "out of date, legacy, batch-based processes" can be phased out. "Through building out a new digital stack, telcos are creating an IT environment best suited to leverage AI, offering accurate, real-time data to all other systems and channels with the ability to trigger actions in real-time based on network or customer behaviour."

Vodafone's strategy

Katia Walsh, Chief Global Data and AI Officer, Vodafone Group, has other ideas. She thinks the notion of "pristine data" is outdated. She admits there are cases where trusted data is key, such as financial results, "But it doesn't mean every data point has to be exact: it's just agreeing on the key points."

The operator is already having some success with this pragmatic approach. As part of a wider strategy, Vodafone is using data to boost customer experience including communications with the customer and offering predictive care. This area has hugely improved over the last few years, Walsh says. "Before that, Vodafone was doing good marketing, but it was not personalised and informed by what specific customers needed."



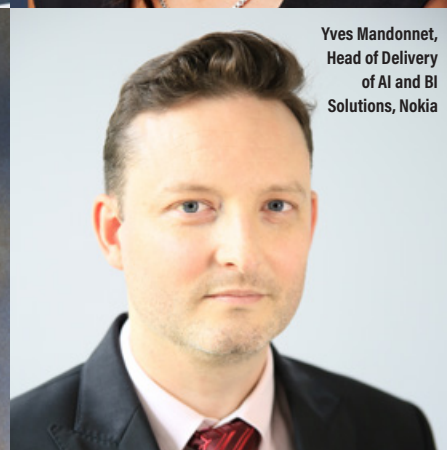
Dr Athina Kanioura,
Managing Director
and Lead Data
Scientist, Accenture
Applied



Jennifer Kyriakakis,
Founder, MATRXXX Software



Katia Walsh, Chief Global
Data and AI Officer,
Vodafone Group



Yves Mandonnet,
Head of Delivery
of AI and BI
Solutions, Nokia

Now, around 60% of Vodafone's customer interactions in Europe are supported by AI. "We understand which customers need what, for which point in time, and for what reason – and the time and day of the week that is most relevant to them.

"We want to predict with some certainty when a customer is likely to call and to proactively contact them through the My Vodafone app before an issue happens. That also provides internal efficiencies for Vodafone."

Other parts of the operator's strategy focus on smart internal operations such as network planning and optimising retail footprint and preventing fraud; areas within B2B such as understanding people's mobility around branches or shops, data science and R&D.

Vodafone is not alone in its proactive approach to using data. Laurent Mons, Data Governance and Quality Leader at Belgium's largest operator Proximus says it is investing in data governance as "a vital component" of the wider business strategy.

He explains, "With huge volumes of data

coming in from multiple sources, leveraging data governance helps break down data silos across the organisation. More importantly, it empowers employees to go beyond the mere consumption of data and begin trusting and using it to drive business value through analytics and AI."

Proximus uses data governance software by Collibra to contextualise its data landscape and make information fit for use. This enables the firm to develop and maintain actionable algorithms based on reliable and qualitative data sets, according to Mons.

For example, he says, it helps improve field operations: "If a customer is experiencing problems with our service, we can correlate the incident data with our technical data to accurately predict what kind of technician they will need, and the type of support required to be sent out into the field.

"Leveraging data via these types of improvements would be difficult without governance: it plays a vital role in allowing us to find, understand and trust the data assets in our organisation."

The skills gap is key to resolving the data crisis

Skills are key to navigating the rapidly changing data landscape. Yet as networks transform to include concepts such as virtualisation, many operators are finding they are lacking them on a big scale.

Technology has moved very fast, but there is a lack of skillset to use it effectively, says Athina Kanioura, Managing Director and Lead Data Scientist, Accenture Applied Intelligence: “Historically their IT is legacy: they have data management, data architects and engineers, but no AI architects. The fact they have the technology but not the talent to optimise this and use it in [their] business verticals...slows them down.”

Ravi Palepu, Global Head of Telco Solutions, Virtusa, agrees there is a huge skillset gap: “I think the option in telcos is not that great largely because the domain is very complex. So just putting a data scientist in place will not solve the problem.”

“We need to close the gap between technical competencies when dealing with huge amounts of data, and people who understand the business. This is one of the biggest difficulties,” asserts Yves Mandonnet, Head of Delivery of AI and BI Solutions, Nokia, concurring that skills are an issue, whether at an operator or vendor.

Nokia is both retraining employees and recruiting people from outside, he says.

Vodafone is also working hard on increasing skills. In addition to hiring people, the operator is re-training 100 employees. “We put people in a classroom for two months and they get hands on training on machine learning and agile and then they go into data science jobs,” Walsh says.

Data lakes can become a swamp

In the struggle to ensure quality, data lakes can certainly help. Among the benefits, Kyriakakis says, data lakes can be used for long-term planning, segmentation and tariff analysis, and process effectiveness. “They help fix macro-level issues. Real-time analytics more directly impacts individual user’s experience on a day-to-day basis and is critical for things like ‘next best offer’”

All of the operators have invested in data lakes, says Athina Kanioura, Managing Director and Lead Data Scientist, Accenture Applied Intelligence. She explains, “This started a long

time ago. Many telcos have cloud infrastructure and the data lake is hosted there, but many have multiple data lakes within the organisation which can create complexity with data integration.”

This is because it’s easy to get carried away getting more data – and the data lake can become a “data swamp”, says Kanioura. Therefore, she says, a data quality assurance process is key.

She explains: “There are various technologies in the data lake space. A lot of the data operators have is structured but increasingly, it’s unstructured. Many of our clients have struggled to consolidate, cleanse and collate the information together. You have to use statistical techniques and AI to fill the gaps.”

“The data lake can become a ‘data swamp’

Bhadada reckons data lakes will be ineffective unless they include metadata management and enterprise data cataloguing through advanced data-wrangling techniques; that is, transforming and mapping data from one ‘raw’ data form into another format to make it more useful for downstream purposes like analytics.

They could include machine learning-based solutions that continuously learn from data quality patterns and feed back into an engine. This would see them constantly building data quality rules without human intervention and improving accuracy in detecting and correcting issues. He says, “This approach promises to free employees within the organisation to pursue more advanced and qualitative tasks, and leaves the heavy data lifting to the machines.”

It’s true that technology can help, but it’s also critical for mobile operators to understand that this on its own is not enough, says Kanioura. “A lot of their investments in the past have been on the technology side. They need to rethink their business processes [as] they are old school, they are slow.”

Data lakes also need governance to make sure they work, says Kevin Hasley, Head

of Product at RootMetrics and Executive Director of Performance Benchmarking at IHS Markit. As part of this, he says: “The organisation needs to agree on inputs and outputs. That can be a huge burden especially when data you accept is dirty and does not have a framework before it.”

When you clean that data, it should be categorised in the right way, states Hasley.

The results of doing this in an effective way are clear: Walsh points out that when combined, customer and network data can provide new insights. “Sometimes, when you can combine data types [that have] never been used before, you get great results.

“We can see if customers are having network issues using network data and billing issues using billing data. You are combining data sets that have never been put together in an aggregated or sophisticated way and this allows you to discover things you never knew before.”

Vast amounts of information are available, but at the same time, data protection is important; even more so since the EU Update to General Data Protection Regulation (GDPR) came into place in May 2018.

At Vodafone, Walsh points out that data is always collected and analysed with customers’ permission. “We had a programme in place even before the GDPR: data is pseudonymised so they cannot be identified.”

Clearly, operators are making progress, but the 5G networks rolling out over the coming year will need AI and analytics to properly operate and of course, data will continue to be at the heart of this. So, what strategy should operators be following?

Overall, it is important to have good data to analyse, says Tom Footitt, Senior Director, Product Management, Accedian. Once it is clean, Footitt says, the system must be able to share data with other elements in the orchestration ecosystem, via query and real-time notification using an ‘event bus’ that allows components to communicate with each other.

“Open APIs and the ability to share the results or analysis using machine learning and AI allow this data to greatly improve automation,” he says.

It’s a major challenge, but rather than having perfect data, Walsh concludes it’s important to focus on the outcome. “That’s the beauty of AI: We can put the customer front and centre, and provide a predictive and proactive decision for each person.” ■



Planning wireless networks for a 5G World

5G is set to revolutionise the way we communicate, collaborate and exchange data. As people are predicted to consume more data over the next few years and as the number of connected devices is set to increase exponentially, these next generation of networks will need to be robust to meet their promise of faster speeds, greater coverage, and ultra-reliability to deliver enhanced quality of experience.

It is estimated that over 80% of 5G traffic will take place indoors and that the vast majority of in-building traffic will be provided by indoor wireless networks in the 5G era, which is unseen in previous generations of mobile networks.

The need to provide excellent in-building mobile coverage and capacity will therefore be a pre-requisite as a competitive differentiator for mobile operators to achieve long term customer loyalty and capitalise on the commercial opportunities presented with 5G.

We launched Ranplan Professional 5.2 last year, the world's first heterogeneous wireless planning tool supporting 5G New Radio (NR). This tool enables telecommunications companies to efficiently plan, design and optimise the next generation of mobile networks, supporting key features of 5G NR as specified in 3GPP Rel 15 for both non-standalone (NSA) and standalone (SA) deployment modes, as well as all foreseen 5G frequency bands from 700MHz to 100GHz.

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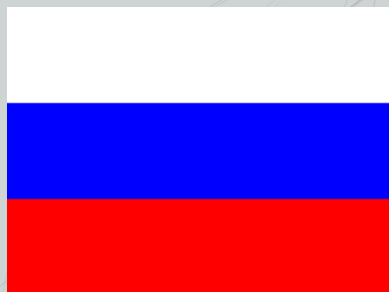
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Russia

The three biggest mobile operators, MTS, MegaFon and Beeline, are against having one infrastructure operator for 5G networks, while the national fixed provider, Rostelecom, and its associate mobile company Tele2 Russia favour the proposal. It seems the Federal Antimonopoly Service is not a fan either.



Guatemala and El Salvador

Heavily indebted Telefónica has sold its businesses in Guatemala and El Salvador to rival America Movil for a total of €566.34 million. Telefónica Moviles Guatemala and Telefónica Moviles El Salvador are owned by Telefonica Centroamerica Inversiones, an entity jointly owned in turn by Telefónica (60%) and Corporacion Multi Inversiones (40%). Both will sell their shares.



Germany

1&1 Drillisch

United Internet's mobile unit 1&1 Drillisch has bid for a 5G licence to become the country's fourth network operator, with national roaming rights with the others. The auction is mired in controversy, with Deutsche Telekom, Telefónica and Vodafone suing the German regulator over what they call the unfair conditions attached to the licences.

Belgium

Belgium's Telecom Minister, Philippe De Backer, is proposing to offer lower spectrum fees - discounted by up to 80% - to mobile network operators that agree to improve coverage in the country's 23 designated grey and white spots, which have poor or no coverage.

USA

Verizon Communications

Verizon Communications has "paused" its 5G Home fixed-wireless network deployment until standardised 5G customer premises equipment emerges, its CEO, Hans Vestberg, said. He expects this will be in the second half of 2019. Motorola and Samsung are the operator's handset partners.

Romania

Mobile operators are baulking at high prices for 5G licences - up to €2.7 billion and €8 billion. Also, while 4G licences cost €700 million, operators will have to pay double that to renew them. The National Authority for Management & Regulations is warning the government that high fees will jeopardise the 5G auction.

Thailand

National Broadcasting and Telecommunication Commission

National Broadcasting and Telecommunication Commission (NBTC) will auction 5G spectrum in the 2600MHz, 26GHz and 28GHz bands this year. The three largest operators will not bid for the 700MHz band, which will be auctioned in May, with only one likely domestic bidder, CAT Telecom, lined up.

Saudi Arabia

Zain KSA and Nokia

Zain KSA and Nokia embarked on a Massive MIMO trial over a TD-LTE network in the 2600MHz band in Jeddah. Nokia's 5G-ready AirScale Massive MIMO antenna provides speeds of more than 700Mbps per user. After the trial, Zain will deploy the technology to meet the demand for ultra-broadband services.

Australia

TPG Telecom

Australia's TPG Telecom has halted its planned mobile network deployment, which was to have relied on equipment from vendor Huawei, after the Australian government's decision to ban Huawei's equipment on security grounds. It is believed TPG stopped the infrastructure project as it reached the stage where it would have needed to place new orders for equipment to progress.

EU's net neutrality is biased, flawed – and entrenched

After a year's investigation, John Strand of Strand Consult explains how Europe's net neutrality law is doing far more harm than good to operators and consumers alike, and is built on many wrong-headed assumptions.



The EU's net neutrality law has been in place for more than two years, and the European Commission has scheduled to review its implementation in 2019. Policymakers promised that the law would bring more innovation and protect end user rights, but it appears to do the opposite.

The EU cannot point to new innovation arising from law, rather it is used by European regulators to restrict internet products and services that consumers want. In the meantime, dominant Silicon Valley platforms have increased their market share in Europe and the investment gap in the EU has widened; now the region is two years behind the US and Asia on 5G rollout.

In early December 2018, the Body of European Regulators for Electronic Communications (BEREC) released its opinion about its implementation of the net neutrality law. It declared the implementation correct, but did not mention the many problems it created for operators, including six or more regulatory investigations of 'net neutrality violations' to justify its heavy-handed approach.

BEREC is striving to invent a reason to extend its regulation of the internet and attract public attention. Rather than implementing the law, BEREC re-interprets it to realise its vision of the

internet. Though BEREC's pronouncements are non-binding, it exerts peer-pressure on national regulators to align to a common view and exploits the law's reporting requirement to force the toughest interpretations.

Over the past year Strand Consult fought to create transparency in BEREC's work and faced considerable opposition to its legal requests made under Europe's freedom of information laws. Despite significant protest and delay from the organisation, Strand Consult succeeded in gathering the minutes of more than 40 meetings on net neutrality held behind closed doors, many of which were heavily redacted.

The information sheds light on how a subset of activist EU regulators are pushing the interpretation of the law to conform to their personal ideologies and how a select group of net neutrality activists (funded by powerful Silicon Valley companies and global foundations) receive privileged access to the process to inform BEREC's decisions.

Here are some of the investigation's main findings:

- BEREC's goal is to create a de facto regulatory regime designed around speed measurement to give preference to certain kinds of technologies and methods – a clear violation of the EU law's provision for technological neutrality.
- Those speed measurements are gratuitous and egregious, garnered from bogus crowd-sourced measuring tools to create user-generated complaints on missed speed targets.
- These are automatically forwarded to regulators so that operators can be penalised.
- EU policymakers wrongly assume connection speeds will increase linearly indefinitely, regardless of whether users want to pay for higher speeds or applications need them. This fixation with speed has limited consumers' choice of preferred features like flexible

pricing, service quality, safety, durability, and so on and amounts to a regulatory taking of consumers' and producers' welfare without compensation.

- BEREC's preferred group of stakeholders are advocacy organisations AccessNow, EDRI, ISOC, and BEUC, all of which apart from BEUC are funded by Google and only deal with consumers in the capacity of ISP customers. Yet information from these organisations is how BEREC claims to know what all consumers want.
- The invasive nature of monitoring networks and BEREC's desire to implement always-on surveillance amounts to an invasion of users' privacy and violation of provisions 8, 9, and 10 of the European Convention on Human Rights.
- Penalties for net neutrality violations differ wildly across countries, from thousands to millions of euros for an infraction, which seems to violate EU competition standards.
- Operators' efforts to protect users and secure their networks is being increasingly hindered by net neutrality rules.
- EU law allows zero rating, but some countries and regulatory authorities want to criminalise it, prosecuting operators for traffic management practices rather than commercial ones to avoid time-consuming economic assessments which often favour the operators. Having been exposed for lack of transparency, BEREC has promised to do better. It will be interesting to see if it improves under the leadership of Jeremy Godfrey, the head of Ireland's ComReg. 

*Strand Consult's report, **Neutrality in EU after 2 Years: Why the operators keep losing the battle against net neutrality regulation, investigates each country in depth and provides an overall summary on the law's implementation both quantitatively and qualitatively.***



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