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AI and automation

Trends shaping the digital economy

What customers expect in the digital economy

To be relevant in the new digital economy, it is crucial to excel in delivering what is needed, when it is needed, and doing so for every customer.

Only with a telecom industry fit to participate in the new market realities of the rising digital economy will the current opportunities be turned into a much-needed business-growth agenda.

Ease of access

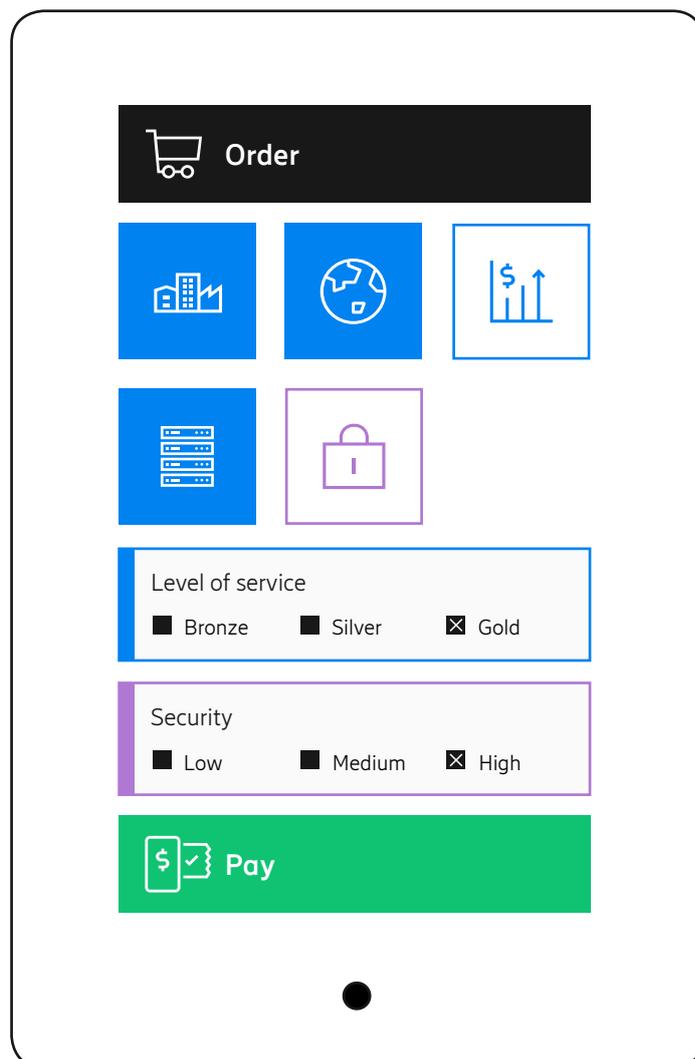
Imagine one of your customers wants to provision additional resources or services from you, but instead of setting up a meeting with you, they simply order it themselves from a menu like the one shown here. Do they need more capacity? Or perhaps faster storage? In what location? Fast or slow compute and network? What level of service: bronze, silver or gold? Which security capabilities? Which features? The customer simply selects what they want from the pull-down menu and gains access to it as quickly as they could get a movie from Netflix.

This vision is not as far off as it may seem. Enterprise IT customers have been ordering services and resources in this manner for a few years now, with Salesforce, followed by Amazon Cloud, then Azure, Google, and others. In the telecom industry, end users are already accustomed to a user experience that masks complexity and is not interrupted for upgrade, repair or management of the underlying technologies. That user experience is becoming increasingly personalized.

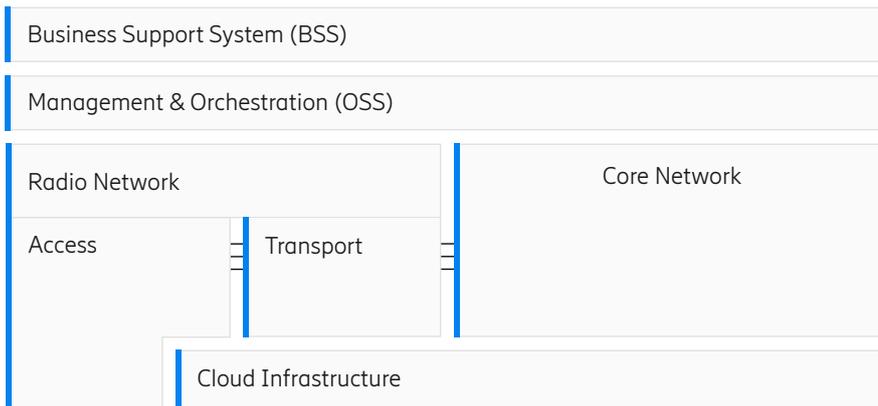
It's time now for communications service providers to offer their customers and partners the flexibility to rapidly onboard their new customers and services with resources optimized for their needs. In the past, this was economically unfeasible, which is why telecom services were bundled into packages, forcing customers to accept services they didn't need in order to get the ones they wanted. Not only are those bundles no longer

necessary, but if service providers don't personalize their services, cloud players from enterprise IT will do it for them.

The good news is that many of the components are already in place (see the figure overleaf).



Key areas of the telecom stack



Four principal factors are creating this market opportunity:

- The value of data
- New use cases enabled by 5G
- Network transformations
- Service provider digital transformations

Today, a telecom stack is able to manage resources and orchestrate cloud workloads through software, and procure them from either on-premise or public clouds. Its OSS/BSS systems provide either interfaces to applications or as-a-service resources to customers, and are able to handle the billing.

However, that is only the start. Speed, agility, low cost, reliability, scale and

interoperability are necessary in the telecom industry. For the various telecom stacks for radio access or transport networks, the core network or the cloud infrastructure, you also need to deploy AI and automation.

Before understanding the role that AI and automation can play in digital telecom infrastructures, though, it helps to recognize what is driving these advances.



A telecom stack is able to manage new cloud infrastructures

The value of data

Data's value can be extracted through analytics that provide insights to help address the needs of your customers, identify market trends or spot new business opportunities. However, the value of the insights varies depending on the time frame in which you collect them.

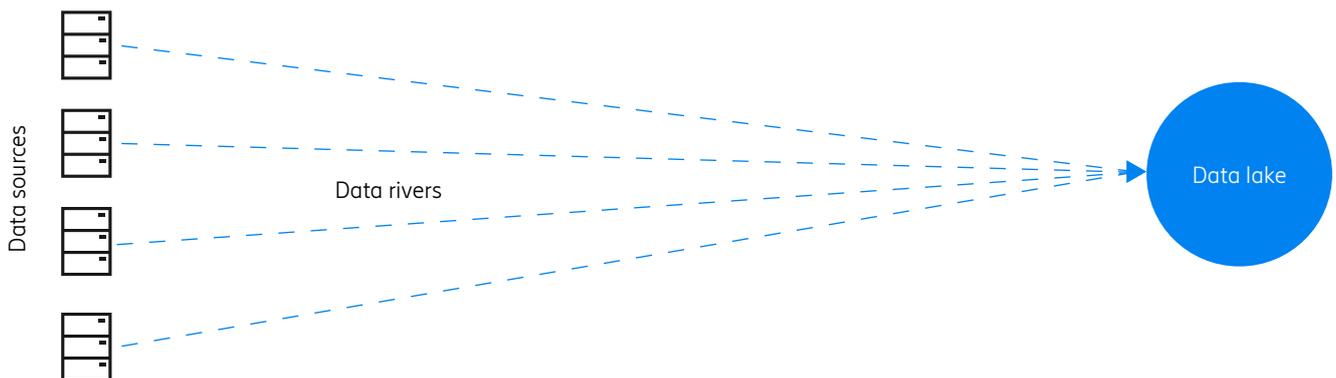
Until Ford's Model T powered its engine with petrol, oil had been converted into kerosene and used primarily for lighting. The popularity of the automobile turned oil into such a valuable commodity that it came to be called black gold.

In a similar way, consumer and industrial data has been "lying in the ground", so to speak, since humans first started expressing preferences. As storage became cheap and consumers

and industries did more of their business first through browsers and then in the cloud, it became possible to mine data about their preferences and behaviors. In fact, by 2024 total mobile traffic is projected to be 5 times higher than it is today. In the same period, cellular IoT connections will exceed 4.1 billion, and 5G services for machine communication, massive mobile broadband and fixed wireless access will become available to 40 percent of the world's population.

That data is extremely valuable because it can help businesses refine their target populations and direct much more compelling content and advertisements toward not just general populations but also the very individuals or enterprises most likely to purchase their products or services. This digital gold enables agile, personalized experiences like the menu example mentioned earlier.

The flow of data



Data sources, rivers and lakes

This data is being gathered in great quantities into what is commonly referred to as a data river. Different rivers of data, such as relational data from applications or log files, non-relational data from IoT devices flowing through a telecommunications spectrum, customer data from mobile applications, and analytics from social media marketing and interactions, all flow into a single data lake. The benefit of these rivers

and lakes is that you can collect the data from multiple sources without having to restructure it beforehand.

Once the data is flowing into a river or gathered in a lake, you can extract its value by running analytics that will give you the insights to better address the needs of your customers, identify market trends or spot new business opportunities.

However, the value of the insights you collect varies depending on the time frame in which you collect them (see the top graph overleaf).

40%

5G is projected to cover more than 40 percent of the world's population in 2024.

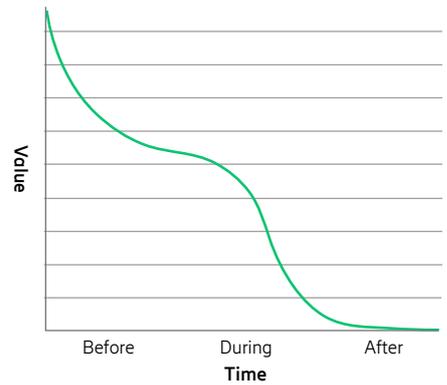
The sooner you collect the data, the greater the value. For instance, if you can learn early in a manufacturing cycle that a particular product is not selling well in one market but selling very well in another, you can adjust your distribution and logistics to both reduce excess inventory in the first location and capture more sales in the second. The time at which you extract those insights also affects cost (see the lower graph to the right).

If you can extract the insights while the data is in a source, the processing costs and analytics complexity are lower. As data accumulates into a lake or perhaps even a data ocean, there is a need for both greater processing power and more powerful analytics to extract its value.

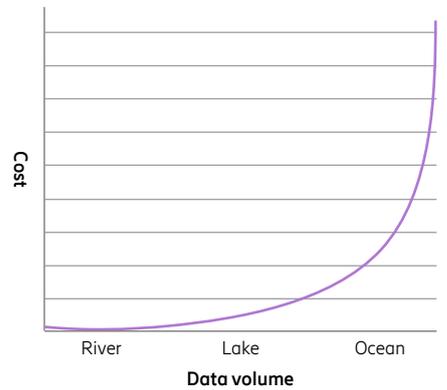
However, not everyone can do this. Data science is not simply a technical skill; it requires domain expertise.

Although an enterprise IT vendor might have the technical data science skills, it will lack the domain expertise of an experienced telecom vendor. The telecom vendor, for instance, will have end-to-end expertise across the full telecom stack, from the type of compute, storage and network resources best suited to the needs of telecom services, to the software-defined network that manages not only the bandwidth and latency differences, but also the distribution of workloads across a distributed (edge) network. Management and orchestration of the applications both require in-depth knowledge of virtual network functions (VNFs) and their resource use, as well as their dependencies, interactions and likely causes of faults.

Value of insight



Cost to insight



Full telecom expertise is required to extract data insights

New use cases enabled by 5G

5G promises broadband anywhere, anytime, media available everywhere, communication with smart vehicles and infrastructure, critical control of remote devices, and human-IoT interaction.

The rollout of 5G will be faster than that of any previous "G". We predict that 5G coverage will go from almost zero today to becoming available to 40 percent of the world's population by the end of 2024. In the same time frame, we expect 1.5 billion 5G subscriptions for enhanced mobile broadband. 5G will enable capabilities that a few years ago were only dreamed of by visionaries.



5G unlocks new opportunities: enhancing medical services to become more accessible

Massive machine type communication

Massive machine type communications (mMTC) will allow cities, transportation and infrastructure to transmit real-time data for improved maintenance and greater operational efficiency.

Vehicle-to-vehicle and vehicle-to-infrastructure communication will make roads safer, protect the environment, and allow buses and public transportation to run more efficiently. Sensors embedded in roads, railways and airfields will communicate with each other and with smart vehicles, enabling new services and business models.

Critical machine type communication

5G introduces the ability to remotely control devices and heavy machinery, unlocking the potential for improved medical services and surgeries that would otherwise remain unavailable to rural communities. Heavy machinery can be controlled remotely, improving safety in hazardous environments. Industries like manufacturing and mining will experience better efficiency and reduced costs.

The IoT era will become a reality by breaking constraints and capturing information in new ways. For instance, sensors will be implemented throughout farms, allowing crops to communicate moisture and fertilization needs. Utility companies will be able to monitor and report energy usage, improving the reliability and sustainability of energy production and distribution.

Enhanced mobile broadband

5G will make it possible for customers to download 4K movies in seconds without a Wi-Fi connection. It will provide broadband in crowded areas like concerts, sporting events and festivals with abundant capacity, telco reliability and lack of interference from surrounding frequencies. Live TV broadcasts and sporting events will be immersive, as if you were at the event. 5G will dramatically improve connectivity indoors and out, offering high quality of service (QoS) broadband even in challenging network conditions.

Fixed wireless access

Wireless radio links will replace leased lines or physical cables to provide fixed access between two or more locations, making it faster and cheaper to provide or change services with customers.

Network transformations

Service providers can tap into the market opportunity available to them through various network transformations.

Critical services and infrastructure control

The high reliability and low latency of 5G unlocks the ability to control critical services and infrastructure for public safety, special events, traffic management and weather. Government bodies, city management and utility companies will be able to connect to millions of networked devices, making real-time, intelligent and autonomous decisions.

5G will become the backbone of IoT, connecting devices in ways we never thought possible. Smart cars will communicate with traffic lights, users will immerse themselves in augmented reality and 360-degree games and movies, and the tactile internet will be enabled through the transmission of touch and texture.

Service providers will be unable to economically support IoT device-to-device and device-to-human communication by simply upgrading their existing network services such as evolved packet core (EPC). To participate in the 5G ecosystem, they will have to transform their infrastructures with these technologies.

Radio evolution

Access-agnostic mobility centralizes registration, authentication and management of communication sessions for all devices and networks. A network slice (see below) can be provisioned for fixed services, another for mobile, and another for converged.

Instead of limiting communications within the narrow bands of radio frequencies assigned in the slow and expensive traditional manner, flexible spectrum usage will make seamless communications possible, through portions of the spectrum that make the most economic sense or comply with relevant security or governance policies. This flexibility will be aided by millimeter wave and adaptive beamforming, which improve spectral efficiency and peak rate capacity.

Virtualization

Traditional network services hosted on vertically optimized hardware are being replaced by VNFs hosted on cloud infrastructures. This virtualization will spread throughout the telecommunications infrastructure to eventually include radio access networks (RAN) – see below. However, to be competitive in the 5G ecosystem, telecom services will all have to be reconstituted as cloud-native applications composed of microservices.

Software-defined networking and network slicing

A software-defined network can dynamically allocate network bandwidth to applications. Whether to meet performance, cost or other requirements, network slicing within a software-defined network provides dramatically greater flexibility at lower cost than manual re-cabling.

Cloud-native network functions

Cloud-native network functions allow service providers to launch applications in days instead of months with the reliability and security expected by the telecom industry.

End-to-end service management

A single provider takes responsibility for every aspect of a service to a customer, including purchase, monitoring, repair, upgrades and life cycle management, so that the customer has a single point of contact.

Edge (distributed) computing

Edge computing moves the processing of data and functions to the point in a network architecture that provides the maximum benefit, whether low latency, lower cost or compliance with government regulations.

RAN-as-a-service

RAN are delivered as a cloud service and managed alongside compute, storage and network resources within the same cloud infrastructure.

Multi-site domain services

These manage the distributed IT and telecom environments of a customer from a central location in order to provide end-to-end incident management, optimize performance and expenses, ensure security and compliance, and resolve irregularities.

Security, reliability and availability

Security, reliability and availability can be provided at cloud scale, encompassing distributed/edge computing and devices, according to telecom-industry standards.

5G will also require a restructuring of the radio spectrum in the face of political pressures, geographic difficulties and corporate agendas. As RAN evolve onto either existing clouds or a cloud of their own, network topology will have to evolve alongside them and become dynamic. This is because the heart of the global telecommunications infrastructure is going to transform from physically hosted to software-controlled.

4.1bn

Cellular IoT connections are set to pass the 4.1 billion mark by 2024, driven by strong uptake in North East Asia.

Service provider digital transformations

The value of AI and automation becomes more and more apparent as more service providers complete their transformations.

When service providers began their transformations to digital services hosted on cloud infrastructures, it was a challenge to marry the speed, flexibility and efficiency of the cloud with the deterministic behavior and much higher reliability requirements of telco networks. Today, software-defined infrastructures enable early adopters to launch new services in hours instead of months, increasing operational efficiency and reducing time-to-market (TTM).

Service providers are building or subscribing to infrastructures with components such as software-defined data centers, network slicing, distributed cloud, edge computing and cloud-native applications.

Just as importantly, they are restructuring their operations – not to mirror their infrastructure, but rather to reflect the way their digital services are assembled within a partner ecosystem and consumed by customers. This restructuring includes a change in the corporate culture from the relentless drive to optimize the efficiency

of vertical value chains into a culture of innovation and agility, and to contribute superior value to partner ecosystems.

As more service providers complete their transformations, the value of automation and AI solutions becomes more evident.

The capabilities that new technologies are already providing or will soon provide are not just pleasant features with appealing benefits; they are changing the way you will have to conduct your business.

How new technology is changing business:

- Basic services are becoming commodities
- Partner ecosystems are replacing value chains
- Relationships are becoming digital
- New development models are increasing the pace of innovation
- Open source is displacing standards bodies
- Open source is blurring support boundaries



Restructured operations: AI can optimize the efficiency of service providers

Basic services are becoming commodities

New "over-the-top" service providers are commoditizing connectivity and eroding the profitability of traditional value services such as voice, video and text messaging. Revenues are being pressured by large players who have the advantage of economies of scale. Simple examples are Google, whose basic product is free to users, and Facebook, whose entire platform is free to users. They earn tremendous revenue on their add-on services precisely because their installed base is so vast. These two forces are commoditizing basic services, so if you try to compete only with basic services, you get caught in a race to the bottom.

Partner ecosystems are replacing value chains

The industry is transforming from traditional value chains to partner ecosystems. Instead of offering customers a single, fully featured platform, you will partner with other vendors to offer different combinations of services. Some of those services you will build in-house, some you will resell for other vendors, some you may co-develop with partners. Just as important, you will reshuffle those partnerships and services quickly as business needs change.

Relationships are becoming digital

Industrial customers are growing accustomed to carrying out typical account management tasks through digital interfaces instead of human account representatives. They order new services, manage existing services, perform their own self-care, and handle end-to-end provisioning of the network services they offer their customers. They deploy analytics to gain insights into customer engagement, and they target upsell recommendations based on customer preferences derived from those analytics.

New development models are increasing the pace of innovation

The rapid evolution of technologies and customer expectations is forcing even profitable business models to change much quicker than they used to. Because services can have much shorter life cycles, they must be launched faster, with cost containment from the beginning to obtain a rapid return on investment. Service providers must become skilled at migrating customers from the old to the new. Model-driven development and management as well as cloud-native development are primary forces contributing to the fast pace of innovation.

Open source is complementing standards bodies

Open-source technologies such as OpenStack have established sufficient market share in telecom services to become credible alternatives to traditional standards bodies such as ETSI.

Open source offers a number of advantages: instead of several vendors developing different versions of the same capability, an open-source community develops the common aspects, and each vendor can focus on writing their own set of more advanced and differentiating features. The result is more efficient product development, since open-source projects can leverage a far greater community and broader perspective of developers than is possible within a single vendor. Open source is also proving a useful distribution channel for technologies that vendors would like to see more widely adopted, such as AT&T's ECOMP platform for network automation.

Open source is blurring support boundaries

When you host telecom applications from multiple vendors, sitting on a multi-layered cloud stack, within a software-defined cloud infrastructure, that runs hardware which is also from multiple vendors, support boundaries can become difficult to establish and maintain. Add open-source components, some of which are delivered by the vendor and some by the operator, and support boundaries become impossible to maintain.



Network expansion: open-source projects can leverage a far greater community

The role of AI and automation

As you build your infrastructure and operations from components such as software-defined data centers, network slicing, distributed cloud, edge computing and cloud-native applications, AI-enhanced automation becomes a necessity to keep your entire digital business operating reliably.

As mentioned earlier, total mobile traffic is expected to increase by a factor of 5 over the next 6 years – it is set to reach 136EB/month by the end of 2024. In the same time period, the number of cellular IoT connections is expected to reach 4.1 billion, increasing with an annual growth rate of 27 percent. Humans, unaided, cannot manage the scale and complexity of that much data and that many devices.

x5

Total mobile data traffic is expected to increase five times by 2024.

To succeed in a digital marketplace that delivers a rich industrial experience within partner ecosystems, employees must be more alert, aware, engaged, insightful, creative and innovative than ever before. To rise to that challenge, employees must be set free from the repetitive tasks, continuous monitoring and fire drills that today consume so much of their time and attention. If deployed judiciously, AI and automation can do just that: let computers do what they do best, so people can focus their attention on what they do best.

This is why we believe the most important challenge is making the right machine versus people decisions. Instead of looking to automation and AI merely as a way to reduce staffing and other opex, the focus should be on how to deploy automation and AI solutions in a way that will make people most effective. Getting that right sets employees free to delight customers, partners, communities and stockholders.

In subsequent eBriefs, we will dive more deeply into some of the challenges AI and automation can address, the added value they provide and the types of solutions to look for.



Automation can be deployed in ways that make people more effective

Key insights

- Service providers need to be able to give partners and industrial customers the same personalized experiences they give consumers.
- This level of personalization is being driven by industrial customers and ecosystem partners who want to replace preconfigured service bundles with individual services they select themselves, to more closely match their business needs and those of their customers.
- This level of selectivity is now economically feasible thanks to the use cases enabled by 5G and its digital infrastructure, the explosion in the quantity and value of data, and the accelerating digital transformations within service providers.
- The resulting business models will offer tremendous opportunities, but they will be difficult to manage because of complex infrastructures and fluid partner ecosystems.
- AI and automation solutions, if applied judiciously, can not only manage the complexity but also empower your employees to apply their unique skills to help you become more competitive.



AI can empower employees: businesses are able to embrace emerging technologies

Ericsson enables communications service providers to capture the full value of connectivity. The company's portfolio spans Networks, Digital Services, Managed Services, and Emerging Business and is designed to help our customers go digital, increase efficiency and find new revenue streams. Ericsson's investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. The Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.

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