

The Nokia logo is displayed in white, uppercase letters on a dark red background. The background of the entire page is a complex, glowing network of orange and yellow lines with small, multi-colored dots (blue, green, purple, yellow) scattered throughout, resembling a digital or fiber-optic network.

Perspective

# Accelerating the adoption of telco AI to deliver autonomous networks

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# 1. Executive summary

Communication service providers (CSPs) want to accelerate the migration to autonomous networks in order to address mounting pressures to manage costs, grow revenue and improve customer experience. CSPs need to automate network and service operations as much as possible to grow revenue margins and maximise the return on their investments. Analysys Mason's research indicates that USD125 billion of CSP capex investment was spent on building 5G networks in 2022 and we expect a further USD132 billion to be spent in 2023.<sup>1</sup> CSPs that can automate their processes can also address emerging sustainable demands such as energy consumption and other associated metrics. CSPs are therefore investing in automation to drive the improved efficiency of their network infrastructure and operations.

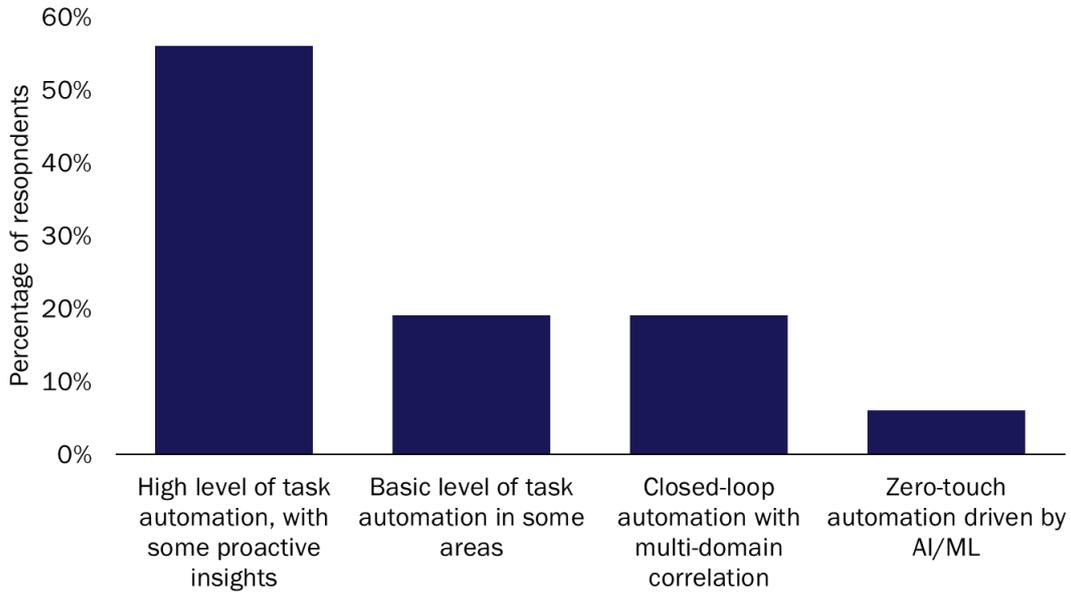
Telco AI<sup>2</sup> has also been a key facilitator of automation in the telecoms sector. For example, several CSPs are using AI models to analyse large volumes of data. The insights that these CSPs obtain via these models are used to trigger automated functions that support activities such as network planning and optimisation, customer care/service and marketing. Unfortunately, CSPs are unable to access high-quality data sets (which will enable them to make more-accurate decisions) because they are using legacy systems with proprietary interfaces. This will restrict how quickly they can integrate AI into their networks. CSPs need to examine their approach to implementing AI so that they can generate value as quickly as possible. They also need to identify ways to improve data access to enable more AI use cases, which will help to make operations more efficient and will help to capture new revenue opportunities.

Analysys Mason conducted a survey of 84 senior CSP executives worldwide between September and November 2022, to assess their CSPs' levels of AI adoption, technology-readiness and upcoming investment plans. The results highlight the urgent need for CSPs to address barriers to deploying AI in order to reach the level of autonomous networks. Only 6% of respondents view themselves as being at the most-advanced level of automation (zero-touch automation), which relies on AI and machine learning (ML) algorithms to manage their networks (see Figure 1.1).

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<sup>1</sup> See Analysys Mason's [Telecoms capex: worldwide trends and forecasts 2018-2028](#).

<sup>2</sup> Telco AI refers to the use of AI-based solutions that enable the analysis of telecoms network data to address CSP business priorities such as automation, improving customer experience and operational efficiency.

Figure 1.1: CSPs' current levels of automation<sup>3</sup>

Source: Analysys Mason

The key findings of the survey are as follows.

- CSPs believe that AI will help them to achieve their operational and business objectives. Improving service quality, growing revenue and improving customer experience are CSPs' top-three priorities. Other priorities include energy optimisation to meet sustainability goals and operational efficiency.
- CSPs are deploying several AI use cases with over half running in production and the others running as either proof of concepts (PoCs) or still being explored. Network-related use cases are most common, followed by customer service-related use cases with a focus on improving operational efficiency.
- CSPs are recruiting expert personnel and developing strategies to ensure that they are able to implement their telco AI initiatives. Only a small percentage of CSP respondents reported that they have invested in AI platforms. Most CSPs do not intend to develop these AI platforms themselves but plan to acquire them 'as a service' from their cloud AI platform providers.
- Access to high-quality data remains a key challenge for CSPs that want to use AI to meet their goals for autonomous networks. This challenge is impacting CSPs' ability to retain AI talent and this, in turn, is affecting AI maturity.
- CSPs can outsource AI development and management tasks to fast-track AI use case implementation. This demand creates opportunities for vendors that offer telecoms-specific AI solutions, but these vendors need to demonstrate that their solutions incorporate telecoms, AI, and software expertise.

This perspective summarises the key findings and takeaways from our research.

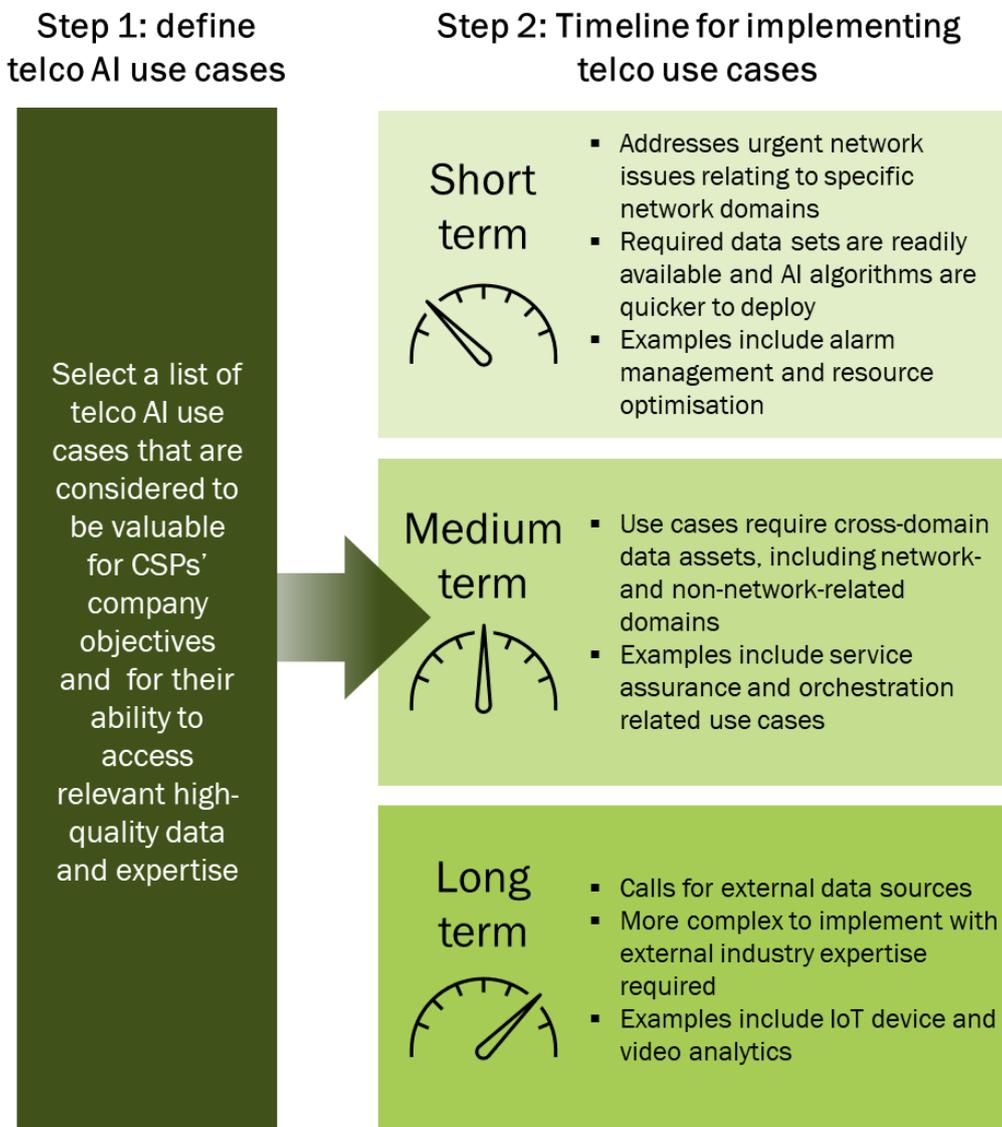
<sup>3</sup> Question: "How would you describe the current level of automation across your organisation's operations?"; n = 84.

## 2. Recommendations

CSPs should quickly implement AI within networks to gain a competitive advantage. One of CSPs' key challenges to the deployment of AI use cases is their limited access to high-quality data, so they must critically evaluate their telco AI implementation strategies to circumvent this challenge.

Figure 2.1 shows a two-step blueprint that CSPs can use to speed up AI use case deployment, identify key use cases and determine implementation timelines based on data availability. This blueprint helps CSPs to prioritise investment in value-generating telco AI use cases, in line with business objectives such as operational efficiency. It also lays the foundation for pursuing other advanced use cases that can drive new revenue opportunities using more-efficient networks.

Figure 2.1: Two-stage blueprint for accelerating telco AI use case deployments



Source: Analysys Mason

CSPs should also build the right ecosystem of vendor partners that can bring meet the needs of the telecoms domain using AI and software-as-a-service (SaaS) delivery expertise to ensure that CSPs' AI investments deliver value and are cost-effective.

Vendors, on the other hand, should consider taking a platform-based approach to developing and deploying AI applications to support relevant use cases. The platform approach involves using common middleware resources, including data and AI capabilities to accelerate the development of AI applications. Cloud based data and AI platforms will play a critical role because they utilise the cloud to drive agile development, delivery and operations of AI applications at scale.

## 3. CSPs are adopting AI on their path to deploying autonomous networks, but data access is the top challenge

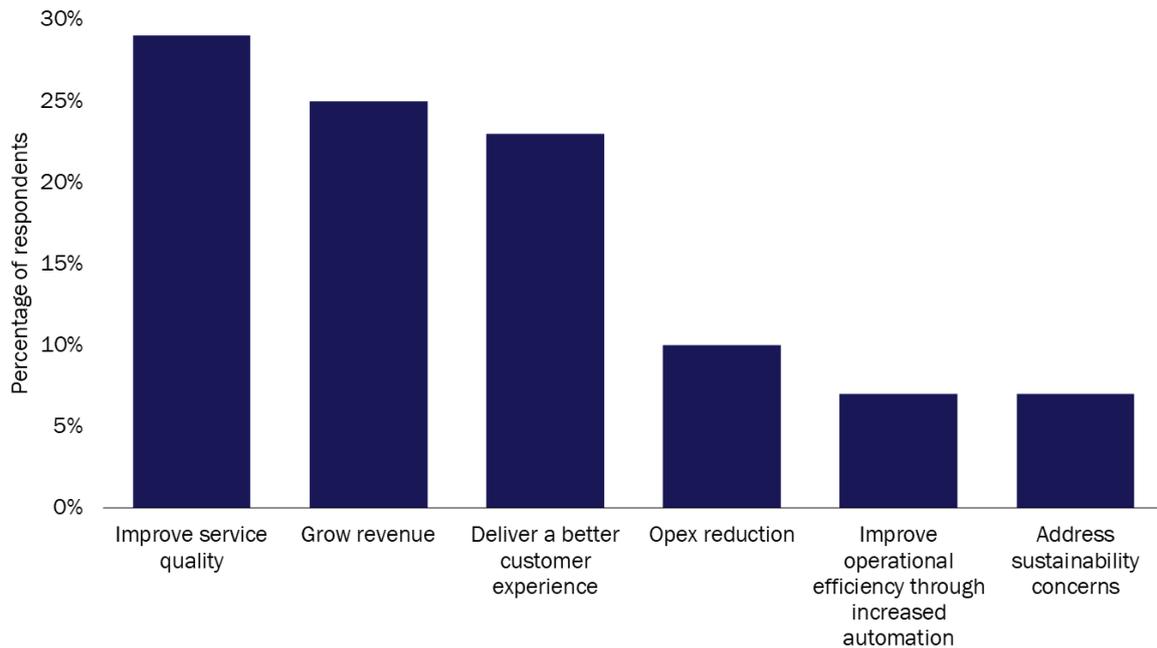
### 3.1 Growing revenue, and improving service quality and customer experience are among the strategic objectives driving CSPs' investment in AI

CSPs believe that investment in AI will help them to meet their operational and business objectives. Analysys Mason's recent survey<sup>4</sup> shows that CSPs want to use AI to address their top-three business priorities (see Figure 3.1).

- **Growing revenue** using AI-based tools to identify new revenue opportunities for upsell by using data about customers' consumption patterns. CSPs can also increase revenue by using network intelligence to improve the services offered to customers and to develop new services (for example, using network insights to increase retailers' footfall).
- **Delivering a better customer experience** using AI models to provide insights that support CSPs' customer engagements, including services to provide targeted customer service/care. These are important for reducing churn and growing revenue.
- **Improving service quality** where AI algorithms automatically detect and predict issues that affect the quality of services offered to customers. Remedial steps are also prescribed or executed. As the network gets more complex, CSPs need to leverage AI tools to automate these functions to maintain high-quality outcomes.

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<sup>4</sup> Analysys Mason surveyed 84 senior CSP executives worldwide between September and November 2022 to assess each CSP's level of AI adoption, technology-readiness and upcoming investment plans.

Figure 3.1: CSPs' strategic business objectives for AI<sup>5</sup>

Source: Analysys Mason

CSPs are also using AI to address other concerns, such as reducing opex, driving operational efficiencies through automation and sustainability. Tier-1<sup>6</sup> CSP respondents, primarily those in developed Asia-Pacific, North America and Western Europe, are investing in AI to drive operational efficiencies for 5G networks. They need to grow revenue and maintain profitability to justify these investments, while also improving customer experience. Vodafone Italy, for example, implemented an anomaly detection solution using AI to automate network planning and optimisation functions. Following this trial, Vodafone achieved increased operational efficiency of 25% to 30% as a result of the reduced time to detect and resolve issues and the associated cost savings gained from automating these workflows.

CSPs' energy costs are rising and 5G deployments are expected to drive energy consumption to even higher levels. This is due to the additional cell sites and active powered elements that are required to achieve low latency and to meet increased capacity demands. A more-wholistic approach to maximising energy efficiency is needed to ensure that service quality is not negatively impacted in the pursuit of reduced energy consumption. Japan-based Tier-1 CSP, KDDI, has proven in a recent trial that AI technologies can help to reduce energy utilisation at radio cells by up to 50%, without impairing customer experience. KDDI implemented a network energy management system that utilised ML to create models that analysed real-time demand and traffic patterns, and then automatically adjusted the amount of power consumed by RAN resources to match demand.

CSPs must use AI to address these business priorities to respond to increasing competition and to the economic pressures that they currently face. The cost and revenue gains of using AI will help CSPs to improve their profitability and, more importantly, help them to enhance the level of service that they deliver to their customers.

<sup>5</sup> Question: "What are your organisation's business objectives for AI and automation? (Rank top-3 objectives, 1= most important)?" *n* = 84.

<sup>6</sup> Tier-1 CSPs have an annual revenue of more than USD10 billion.

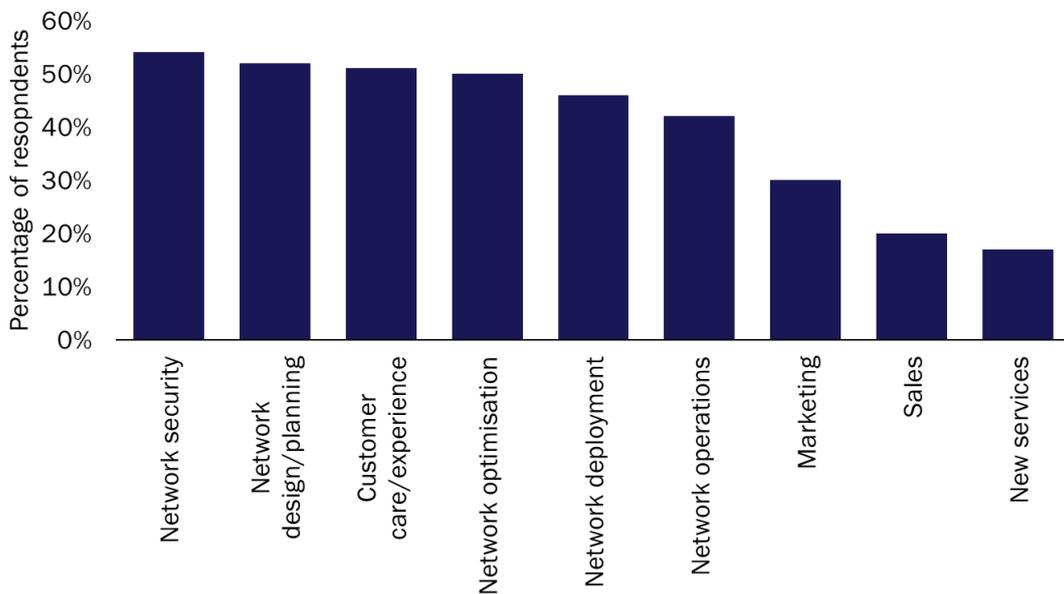
### 3.2 CSPs should focus on telco AI use cases that create value for their networks and their customers

According to our survey, 57% of CSP respondents have deployed telco AI use cases to the point of production, while 43% are either exploring or running AI use cases as PoCs. The CSP network remains a key point of investment for telco AI. Over 50% of surveyed respondents have already implemented some AI activities related to the networks in order to address the increased complexity associated with managing higher traffic volumes and services running within the networks.

The network use cases that have been most frequently deployed include network security, network design and planning use cases, with over 80% of respondents reporting that these use cases are in production. Customer care and experience use cases (such as AI-based chatbots, customer issue prediction and intelligent routing) have also been deployed in production by almost 60% of survey respondents.

About 20% of CSP respondents are investing in new services based on data insights derived from AI. These services include video analytics and IoT-related services \*such as smart manufacturing and autonomous driving). This gives CSPs the opportunity to provide customers (particularly enterprises) with services beyond traditional connectivity services. However, such use cases are complex to implement, given the data sources and the external domain expertise that is required to support them.

Figure 3.2: CSPs' telco AI use case categories<sup>7</sup>



Source: Analysys Mason

CSPs are also redefining their data and AI strategies by recruiting C-level executives (for example Chief Data Officers) to lead AI initiatives, and by modernising data infrastructure and processes. Almost 50% of Tier-1 CSP respondents ranked having a well-defined AI strategy as a key investment that they have made to meet

<sup>7</sup> Question: "Which of the following telco AI use case categories have you started working on?"; n = 84.

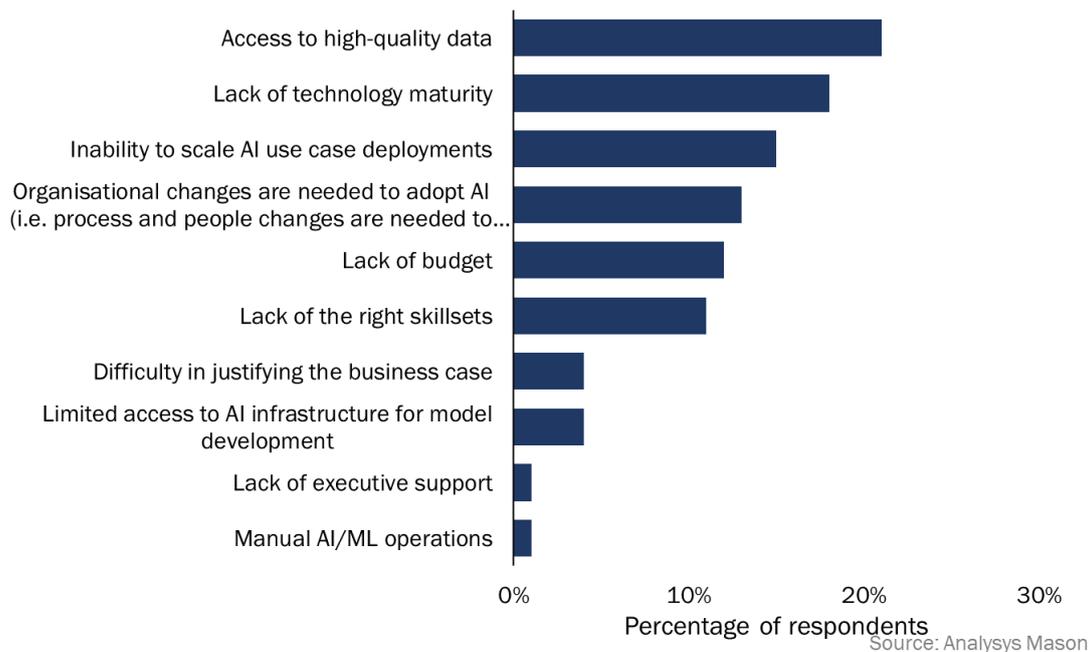
their telco AI goals. An AI strategy provides the right structure and processes needed to accelerate AI adoption, especially given the scale of operations at Tier-1 CSPs organisations.

However, only 25% of respondents indicated that they are investing in AI platforms. These AI platforms provide the common toolsets required to create and manage AI models. As AI technologies evolve, these platforms will require continuous investment and expertise. CSPs acknowledge that they do not have the expertise to develop these platforms and will need to rely on vendor partners, such as public cloud platform vendors; CSPs can acquire this help as a service. CSPs therefore do not need to make upfront capex investments in AI platforms.

### 3.3 CSPs' main obstacle to AI adoption is their lack of access to high-quality data

CSPs still face several challenges despite ongoing investment to support telco AI. The top-ranked challenge (in terms of priority) is CSPs' inability to access high-quality data, which was highlighted by 21% of the surveyed respondents (see Figure 3.3).

Figure 3.3: Top-ranked challenges that CSPs face when developing AI use cases<sup>8</sup>



Current data infrastructures and processes are siloed, which makes it difficult for CSPs to develop AI-driven use cases. In addition, data pipelines fail to provide the data needed to support AI model development at the time required or to the quality standards expected. CSP network infrastructure and systems have proprietary interfaces, and these affect the functions of these data pipelines, especially during the data collection stages. According to our survey, data collection is a more-significant challenge than other challenges for Tier-1 CSP respondents given the scale of network infrastructure that they operate. Almost 50% of Tier-1 CSPs ranked the data collection stage as the most-challenging stage of the telco AI use case development cycle.

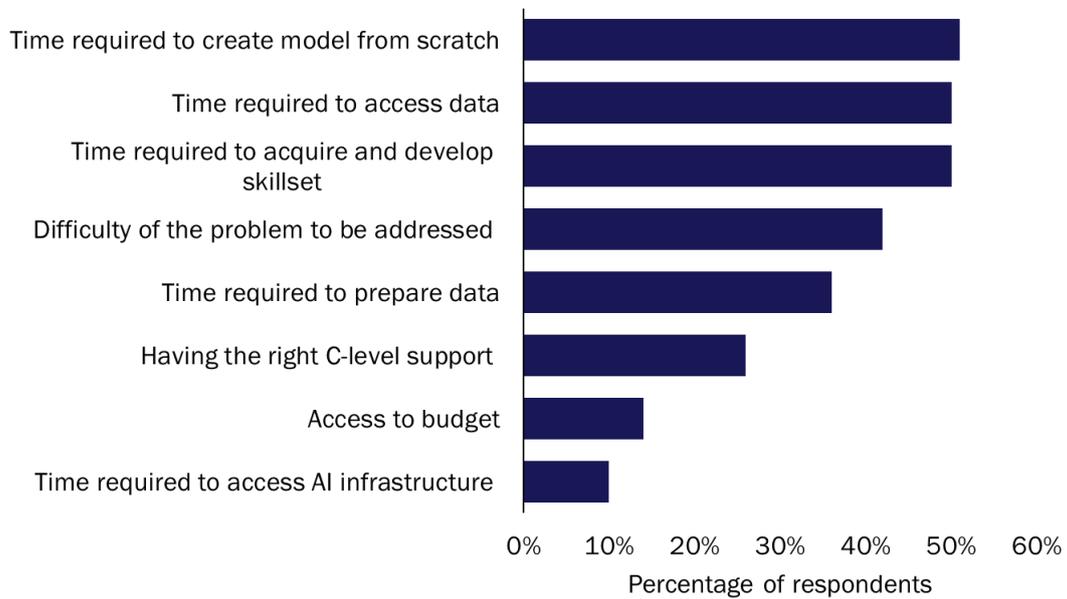
<sup>8</sup> Question: "What are the main challenges that you are facing/or expect to face in achieving telco AI/analytics goals?"; n = 84.

These data issues continue to impact CSPs’ ability to integrate AI into the network; they are also hindering CSPs’ AI talent retention initiatives. Executives at Tier-1 CSPs, such as Verizon’s Chief Data Officer and Senior Vice President, Linda Avery, reported at the Digital Transformation World 2021 that data scientists spend around 70% of their time accessing and preparing data. Consequently, data scientists spend less time deriving insights and are less motivated to remain in such environments.

Scaling AI use cases is also flagged by CSPs as a challenge, given the time and cost required to provision and manage the infrastructure and use cases as they go into commercial production.

These challenges affect the time to implement AI use cases. Our survey shows that the average duration to implement a telco AI use case is 6–7 months. At least 50% of CSPs noted that the factors influencing this timeline include the time needed to build models from scratch, as well as access to the required data sets and skillsets. These issues are the result of the challenges that CSPs face when implementing AI.

Figure 3.4: Factors that influence the timeline for delivering AI use cases<sup>9</sup>



Source: Analysys Mason

CSPs should develop a clear roadmap for AI implementation, to reduce these timelines, which would enable them to derive more value from AI faster. Otherwise, CSPs will risk losing out on the opportunities that AI investments offer in terms of meeting their current business objectives and remaining competitive.

<sup>9</sup> Question: “What factors have influenced the timeline to deliver your AI use cases?”; n = 84.

## 4. CSPs need a clear blueprint for deploying AI uses case and the right vendor partnerships to move to autonomous networks

CSPs can move more quickly towards autonomous networks by adopting AI use cases more quickly. Factors that can help CSPs to accelerate AI adoption include creating a clearly defined blueprint for deploying AI use cases and building partnerships with vendors that have the right skillsets. Other factors include modernising data infrastructure and using the cloud's scalability and elasticity to fast-track deployments. This section of the paper discusses defining a blueprint for implementing AI use cases and building the right vendor partnerships.

### 4.1 CSPs should adopt an AI use case implementation blueprint, which should be driven by the ease of access to data and the time that it takes to derive value

Given the competing priorities that CSPs have – and the challenges that they expect AI to address – a well-defined blueprint should help CSPs to develop a strategy to deploying AI use cases. This blueprint should consider which use cases to implement, and the timescales required to develop and deploy them. Figure 4.1 shows the factors that will help CSPs to identify and prioritise AI use case investment.

Figure 4.1: Factors that CSPs should consider when selecting which AI use cases to deploy



Source: Analysys Mason

CSPs should start by identifying AI use cases that can address their top business priorities. This step is critical for ensuring that CSPs target value-generating use cases. Once use cases are selected, as well as the data sets to help them deploy the use cases, the relevant data sources (for example network equipment and OSS systems) should be identified. CSPs need to determine how quickly data can be accessed from these sources, as well as the quality of the data that they generate. Inaccessible and poor-quality data sets make it difficult and time-consuming to develop use cases. Finally, CSPs should determine the expertise and skillsets required to implement use cases. Telco domain and AI expertise will be relevant as they ensure that use cases deliver accurate and relevant insights.

CSPs can move on to define the timescales for developing telco AI use cases. CSPs should determine these timescales based on how quickly the use cases can deliver value, on the effort that is required to implement them. Value should be measured based on each use case's ability to help CSPs to achieve their top business priorities. These priorities are often measured using key performing indicators (KPIs) such as revenue growth

and savings in cost and time. Ease of implementation should be determined based on access to data and expertise and the complexity of the algorithms involved in creating the use case.

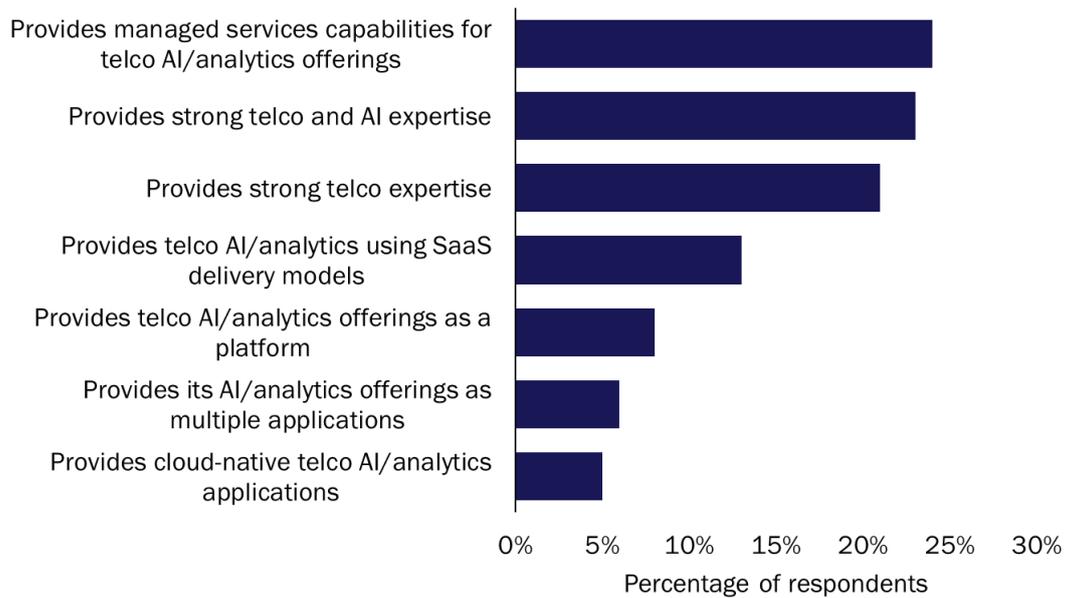
Following this assessment, CSPs should be able to categorise the use cases as follows.

- **Use cases that can be implemented in the short term.** These use cases address immediate concerns about internal network operations, such as improving performance in network infrastructure management and operations, and energy optimisation. They are relatively easy to deploy because the data required to train the models can be derived from internal systems within the same network organisation. The approvals to access the data are provided by internal CSP network stakeholders. Examples include automated incident detection, alarm reduction, automated health checks of network infrastructure, energy optimisation and smart capex allocation.
- **Use cases that can be implemented in the mid-term:** The data sets required to deliver these use cases come from multiple network (that is access, core, and transport) and non-network related teams. Examples include service quality monitoring and end-to-end service orchestration. End-to-end service orchestration, for example, will require creating AI/ML models that can detect issues occurring within multiple network domains and in response, can initiate remedial actions via the orchestrator.
- **Use cases that can be implemented in the long term:** These use cases are often driven by the need to capture new revenue. They require access to third-party data sets and so could be more complex to achieve and may require more investment. For example, the model development and deployment processes require more time than the internal use cases and external industry expertise. Examples of these use cases include video and IoT device analytics. When using AI for video analytics, large data storage infrastructure will be required. It can take a long time to assemble the right approval to access data, pre-processing the unstructured video data sets and developing models that combine network and video-related data. Consequently, the time to generate value for these use cases is longer than the internal operational use cases and should be considered as a long-term use case.

Several benefits can be derived from adopting this blueprint approach to implementing telco AI use cases. By first deploying use cases that focus on optimising the operations of the network infrastructure, CSPs are able to position themselves to support the needs of customers, especially those in the enterprise market. The implementation of domain- or infrastructure-specific use cases first also lays the foundation for developing cross-domain-related use cases such as end-to-end service orchestration. Additional knowledge and expertise can also be gained from deploying the short- to mid-term use cases, which can be leveraged to drive long-term use cases.

## 4.2 CSPs should build partnerships with vendors that have combined expertise in telecoms, AI and software

According to our survey, 45% of surveyed CSP respondents plan to outsource the development of their AI use cases. By outsourcing AI development, CSPs can fast-track their AI projects as they get access to AI expertise; this helps them to avoid the delays that they would otherwise face if trying to attract and hire staff with these skills. However, in addition to having a third-party develop the AI use cases, core responsibilities such as data and model management will need to be addressed. Consequently, CSPs will require a partner that has the relevant expertise to meet their expectations. In our research, surveyed CSP respondents were asked to rank their vendor selection criteria (see Figure 4.2 for a summary of their responses).

Figure 4.2: CSPs' top vendor selection criteria for AI solutions<sup>10</sup>

Source: Analysys Mason

23% of the surveyed CSP respondents ranked vendors' combined telco and AI expertise and managed services capabilities more highly than other selection criteria. Vendors with deep telco domain knowledge understand CSPs' networks and operations and have a clear view of the pain points that can be addressed with AI. These vendors can also bring a wealth of experience to designing, deploying, and managing networks and associated operations, to validate the insights obtained from AI models before they are deployed into the CSP environment.

In addition to having telco and AI expertise, 15% of surveyed CSPs want to partner with vendors that can offer AI solutions using the software-as-a-service (SaaS) delivery model. CSPs are finding SaaS-based solutions easy to use (relative to the complexity of the problem to be addressed) but also agile and scalable in response to changes occurring in the CSP environment. While SaaS-based offerings are attractive to CSPs, they will involve vendors meeting CSPs' stringent security requirements, especially in relation to where and how CSPs' data is stored and managed. Current data sovereignty regulations will place more pressure on vendors that offer SaaS-based AI solutions to align with these requirements.

Vendors that offer AI solutions to CSPs should also consider leveraging cloud platform services to deliver these solutions. CSPs are subscribing to data and AI cloud-based platform services as part of their runtime environments because they are scalable and offer CSPs the opportunity to gain faster access to the innovative data and AI services from hyperscalers and other cloud data and AI solution providers. In our research, 70% of CSPs would expect their vendor partners to either become direct consumers of these cloud-based data and AI platform services or become providers of application platforms with capabilities to offer telco-specific platform services that run in the cloud.

CSPs expect their vendor partners to take a platform-based approach to delivering their AI use cases. This approach creates opportunities for CSPs to reuse platform capabilities to accelerate AI development. It also enables vendors that offer AI-enabled solutions to develop AI use cases at a faster pace as reusable assets present within the platform and that can be extended to support new use cases. Vendors can also expose their

<sup>10</sup> Question: "What factors would you consider when selecting a vendor partner to support your telco AI strategies?"; n = 84.

platforms to CSPs (those that have the software expertise) to develop use cases that align with their specific needs.

For those vendors that want to target telecoms operators with AI-enabled solutions, enhancing their telco expertise, SaaS delivery capabilities and taking advantage of cloud-based AI and data platform services will be critical to building their competitive advantage.

## 5. Conclusion

Cellular data traffic is expected to more than triple between 2021 and 2026 to 2571ZB,<sup>11</sup> so CSPs must transition to more-autonomous operations in order to manage networks more efficiently and to meet their main business priorities. Telco AI will be a core capability required to make this change. However, for most CSPs, accessing high-quality data remains the main obstacle to deploying telco AI within their networks. Data infrastructure and processes operate in silos, and data pipelines fail to deliver data in the timeframe and at the quality levels required to support the functions that help to integrate AI capabilities into network operational workflows.

Analysys Mason's survey highlights the critical role that telco AI will play as CSPs aim for more-autonomous operations. It also shows CSPs' readiness to implement this technology and the key factors that can help CSPs to accelerate the deployment of telco AI. 87% of CSPs have started to implement AI, either as PoCs or into production, leaving those who are yet to begin their telco AI activities at a disadvantage.

CSPs will need to define a clear roadmap for implementing AI in order to meet their ambitions for autonomous networks. CSPs must identify and prioritise which use cases to deploy, and they must set out the deployment timelines for these use cases. These steps need to be performed by taking the value of the use cases into consideration, as well the ease of access to that data required that is required to deliver them. CSPs should also create partnerships with vendors that have telco domain, AI and software expertise in order to fast-track AI implementation.

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<sup>11</sup> For more information, see [Analysys Mason's DataHub](#).

## 6. About the author



**Adaora Okeleke (Principal Analyst)** leads Analysys Mason’s Data, AI and Development Platforms research programme. Her research focuses on service providers' adoption and use of data management, artificial intelligence, analytics and development tools to support the digital transformation of network, customer and other business operations. Adaora tracks vendor strategies for the telecoms industry to understand how they are evolving their product portfolios to include data, AI and development capabilities. She also provides key industry insights to operators and vendors on strategies for adopting these technologies.

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