SURVEY REPORT

Artificial Intelligence, Machine Learning and the Future of Telecoms

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Executive Summary

Telecoms operators are increasingly looking to Artificial Intelligence (AI) and Machine Learning (ML) to make their networks more dynamic and responsive to the different demands on their operations. As the technology promises to offer communication service providers (CSPs) more sophisticated operations, Mobile World Live conducted an online survey of mobile network operators and the wider industry to discover the enthusiasm for the technology, how it is being deployed today and where its future lies. The survey confirmed that the technology is playing a key role today and will in the decade ahead. It also gives insight into its benefits and the areas it will best support.

Key Findings

- **An overwhelming majority of operators believe AI and ML deliver a competitive advantage.** In total, almost 90% of operators said using AI/ML delivers a competitive advantage today or will do in future. Additionally, 58.8% of CSPs surveyed have either implemented AI or ML solutions on a large scale, or are doing so.

- **Improving the customer journey and combating fraud are the technologies' biggest strengths.** The survey found 28.7% of operators believed product recommendation and managing customer orders were the tech's key advantage. CSPs felt chatbots provided the best means of helping customers, followed by personalised portal content.

- **A skills gap is the biggest obstacle to effectively deploying the technology.** With CSPs across the industry working hard to level up their workforce, this finding is arguably unsurprising. A larger proportion of operators (40.7%) than all respondents (35.0%) believe this is the case, revealing a desire to rectify the problem.

Survey methodology

This report is based on responses from an online survey of 226 respondents conducted by Mobile World Live on behalf of Comarch. Mobile network operators with annual revenues of more than $10 billion accounted for 15.5% of respondents and 4.0% were from MNOs with annual sales of between $5 billion and $10 billion. A further 20.8% of respondents were telecoms operators with revenues of less than $5 billion. The remainder comprised telecoms vendors, fellow AI and ML specialists, industry analysts and other interested parties in the field.

Geographically among operators, Europe was most represented (48.4%), followed by Asia (28.6%), North America (11.0%), Africa and the Middle East (both 4.4%), South America (2.2%) and Australia (1.1%).

Introduction

Communication service providers have been working in recent years to transform their networks, making them fit for purpose in an era of massive connectivity and the need for more flexible operations. The deployment of software-based technology will make networks more dynamic, identifying and responding to issues in some cases before they even occur.

A key strand of this innovation has been AI and ML, reflecting an embrace of the technology in wider society. The use cases it offers are diverse, from insight into customer behaviour and making transactions more efficient, to pre-emptive action on problems, making operations more cost effective and gaining greater control over a network.

What's truly exciting about these technologies is that those are just some of the use cases offered today. Given AI and ML are at a relatively embryonic stage, the coming years will see innovation that could transform how a communication service provider operates. This could give them the opportunity to offer greater services to customers, allow its networks to automatically ramp up according to demand, and open up new revenue streams.

This report explores how operators are using AI and ML today, the benefits the technology offers along with what areas they can be best used in, and the obstacles that exist to deploy both technologies.

# Part one: Operators' AI and Machine Learning Strategy

While AI and ML may be characterised as "new" technology, communication service providers' appetite for it is already clear. The survey found 58.8% of operator respondents have either already deployed the technology or are in the process of doing so. Encouragingly for providers of the technology, only 3.3% of operators said they are not interested.

Figure 1: Has your organisation managed to implement any AI/ML-driven solutions on a large scale?
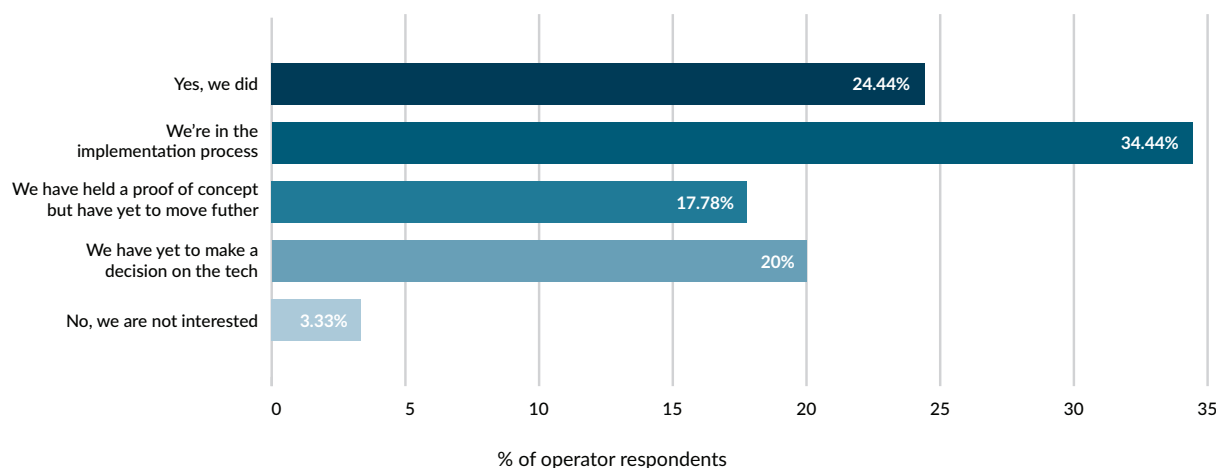
Operators are overwhelmingly convinced as to the technology's benefits, with 62.2% of CSPs surveyed giving an unequivocal "yes" when asked whether it delivers a competitive advantage, while only 26.7% said that it would in the future. Just 10% were more cautious, saying it would but only in some cases. 1.1% said it would not offer a competitive advantage.

Figure 2: Do you believe that utilizing AI/ML builds a competitive advantage?
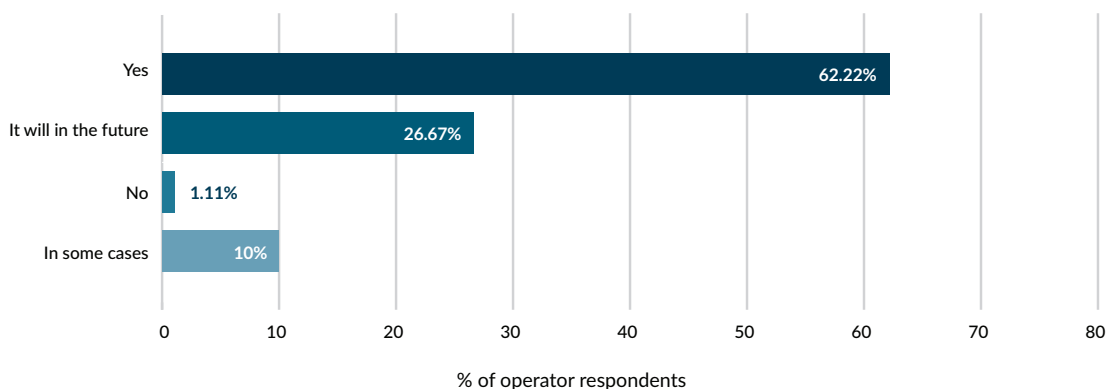
The most common number of AI and ML deployments is between 1-3, according to almost two out of five operators (38.9%), with 16.7% of CSP respondents rolling out between three and five. As might be expected, as the number of deployments increases, the share of operators doing so decreases – 13.3% said they had deployed between five and 10, the same share of respondents who said they had deployed more than 10 AI projects. The survey found 17.8% of operators had not made any deployments of the tech.

Figure 3: How many AI/ML projects have you implemented in your organisation so far?


% of operator respondents
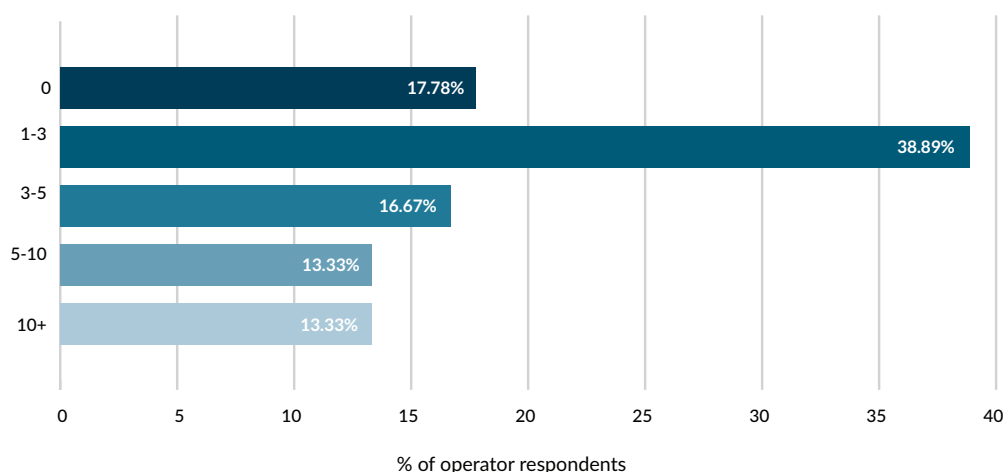
Operators are opting for a safety-first approach to deployments by favouring in-house work alongside partners. This reflects realism among operators that they need external expertise to successfully tap into the benefits of the technology. This caution is additionally supported by only a total of 12.2% operator respondents choosing to work with start-ups or universities. It is clear operators want to work with established, knowledgeable partners.

Figure 4: Who is your partner when introducing ML into your product or service?


% of operator respondents
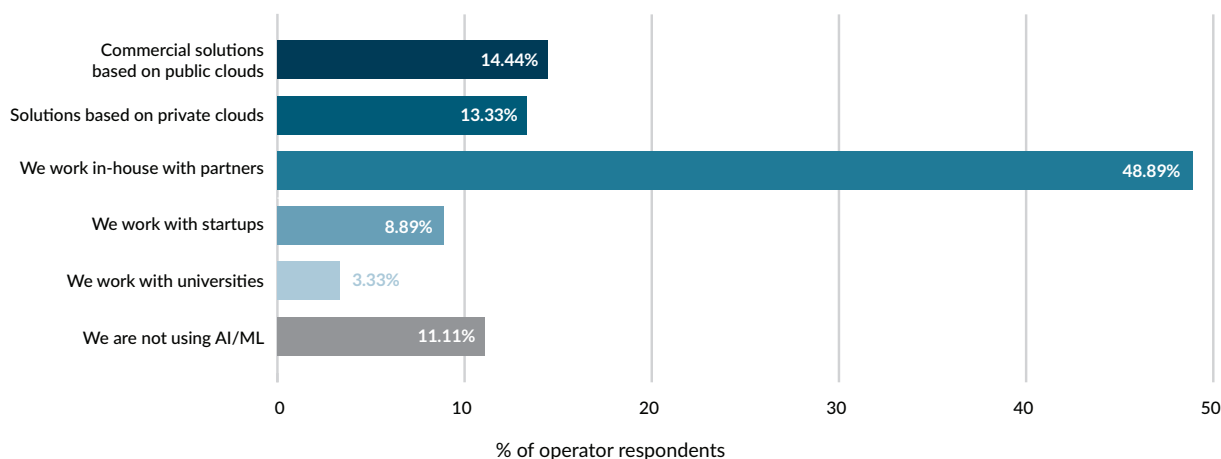
This in-house approach is seen by operators as a means of controlling their technology strategy. Neil Blagden, Vodafone UK's Director of Customer Operations and Digital, said in 2019 that 90% of the operator's tech workforce was in-house rather than outsourced.[1]

He said: "We're investing in our future and controlling our own destiny in terms of delivery, performance and intellectual property."

The overwhelming majority of operators are spending up to 25% of their research and development budget on AI. The greatest share (45.1%) devote up to 10% of R&D budget on AI, with 38.5% spending up to 25%. Only 5.5% is investing more than 50%, with the remaining 11.0% devoting between 25.1% and 50% of its budget on AI.

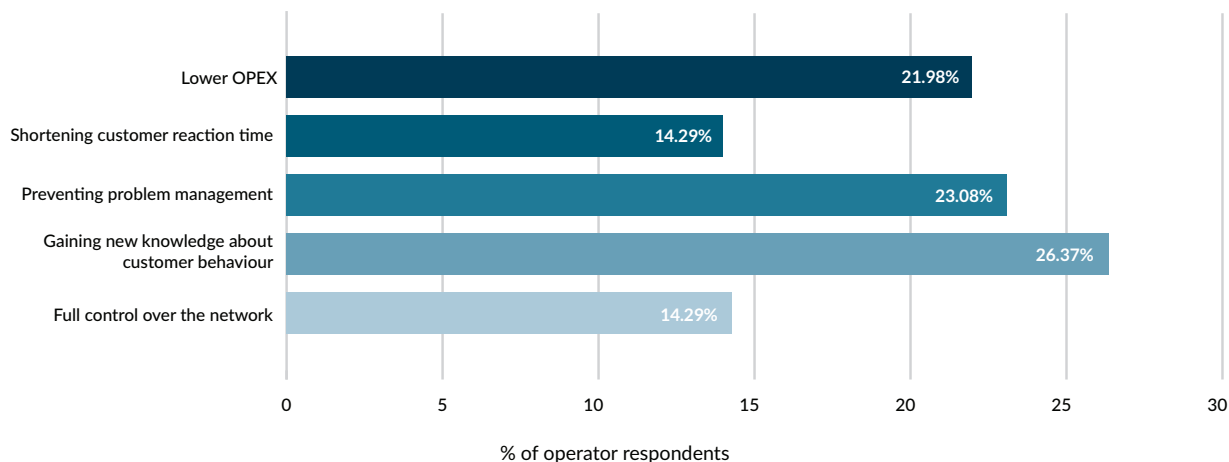**Figure 5: What percentage of expenditure on innovation do you plan to spend on implementing AI/ML?**
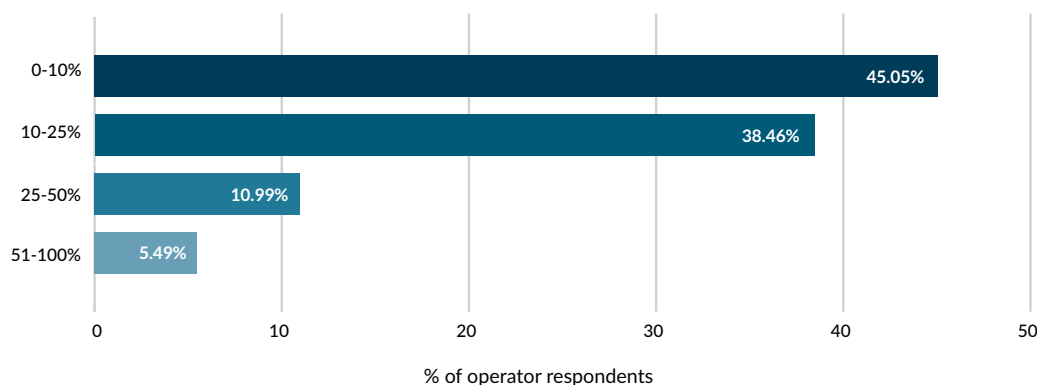
For operators, AI and ML is clearly only one part of the wider R&D picture. At Deutsche Telekom it is one of four strands pursued at its Telekom Labs research and development arm, sitting alongside blockchain, digital services and Academia as a Service. Given the

wealth of future technology available, operators are choosing not to put all their eggs in one basket.

AI/ML deployment is being driven by enabling the ability to gain customer insight and pre-emptively solve problems. A total of 26.4% of operator respondents said learning

about customer behaviour motivated their implementation of the technology, followed by 23.1% of operators who said preventative problem management was behind their decision making. Lower opex followed closely behind and was cited by 22.0% of operators.

Figure 6: What convinced or would convince you to implement AI/ML in your organisation?

[1] https://newscentre.vodafone.co.uk/viewpoint/artificial-brains-and-predictive-care-vodafones-digital-journey/
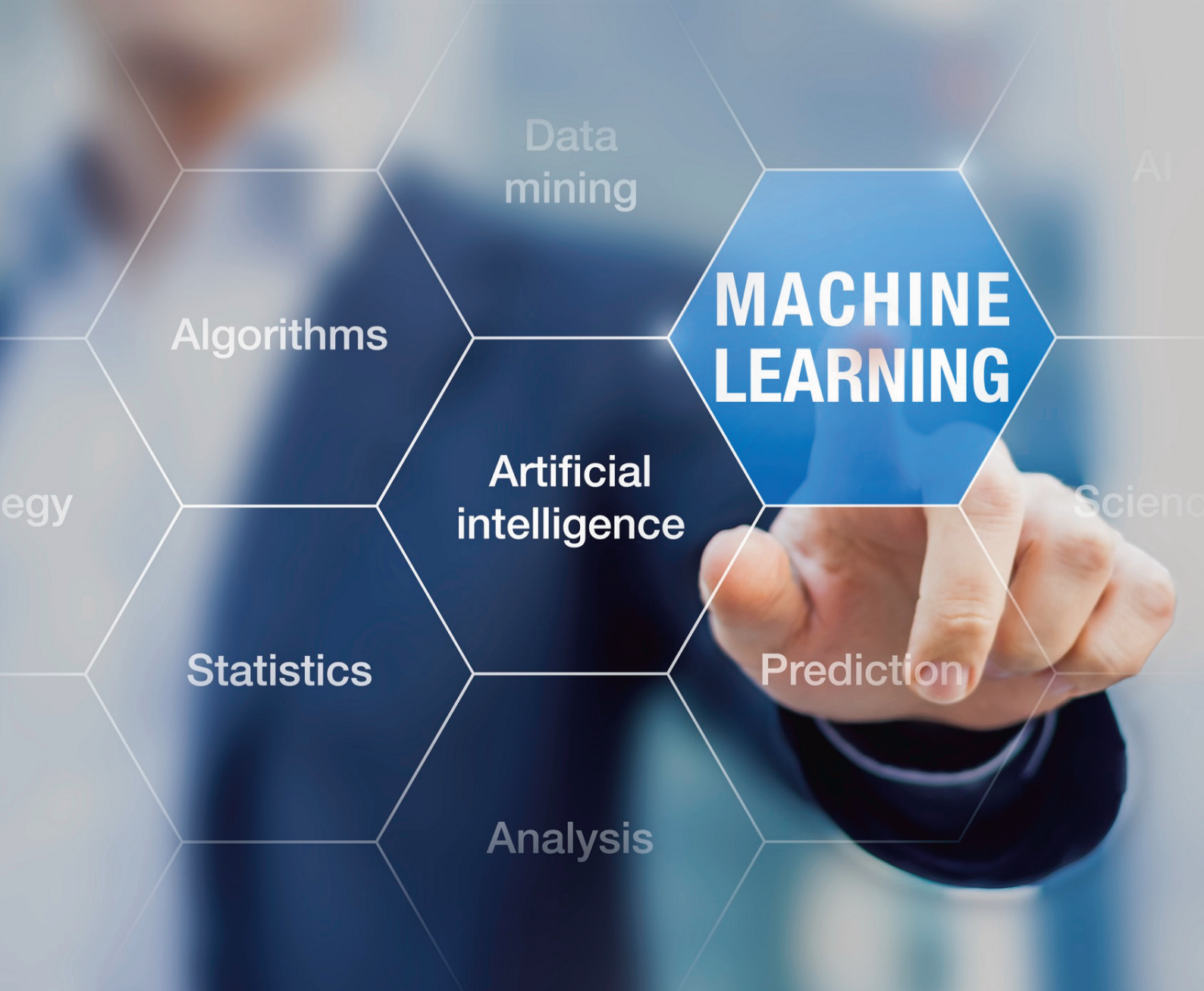
Part two: The Effects of AI/ML on a Network

Part of AI and ML's appeal is its flexibility. The technology can be deployed in myriad industries, bringing innovation and fresh use cases, and unlocking hitherto unknown efficiencies.

This flexibility applies to the telecoms industry, where AI can be used in many areas. When asked to score which area would benefit the most out of deploying the technology, operator respondents placed network monitoring, planning and optimisation top, followed by customer experience, predictive/preventative asset maintenance and finally fraud prevention.

However, when it came to which areas would best be optimised by the technology, the greatest share of operators (28.7%) cited the customer journey such as sales recommendations or order orchestration. Second was fraud detection and prevention (24.3%), followed by billing, including process optimisation and automating validation (20.2%).

Figure 7: Which areas can be optimised with AI/ML? (Multiple answers were selected)

Area	%
Customer journey, for example sales recommendations or order orchestration	28.74%
Billing including process optimization and automating validation	20.24%
Fraud detection and prevention	24.29%
Acquired documents validation & management	11.34%
Asset management	15.38%

% of operator respondents
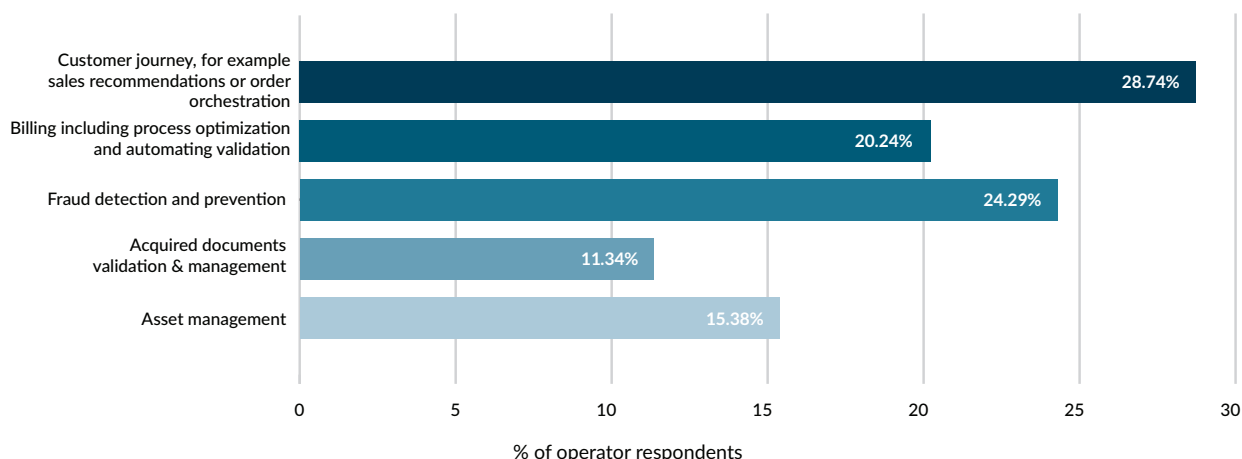
Belief by operators that the customer journey is an area that could benefit from introducing AI and ML could be because of how it could automate large chunks of their online operations. When asked to score customer service oriented AI solutions based on their effectiveness, chatbots came in first place, followed by personalised portal content, voice assistants and next best offer.

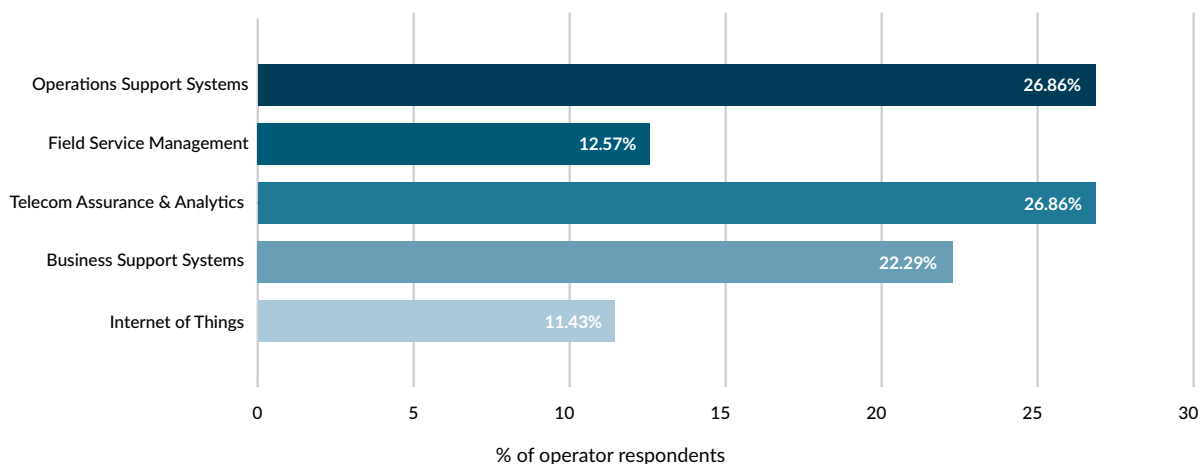Many operators have launched chatbots in recent years, excited about their ability to automate simple customer queries and free up resources for more complex tasks. Deutsche Telekom has said they make customer service more effective and efficient and it has rolled out chatbots across a variety of markets.[2]

When it comes to network operations, CSP respondents were broadly split between three areas bearing the most fruit when using AI. Telecoms assurance and analytics, and operations support systems were in joint first place (26.9%), followed by business support systems (22.3%). This underlines how operators are looking to AI and ML to help it make its networks fit for purpose in a datacentric world, deliver real-time analysis and automate simple processes. Given the financial pressures operators are working under, any solution that delivers efficiencies is a must.

But the perceived advantages of AI and ML do not stop there. Field service management and the Internet of Things scoring above 10% is a sign that operators are conscious of – and positive about – AI's flexibility in different fields.

Figure 8: In which fields do you think the projects were most successful? (Multiple answers were selected)

Field	%
Operations Support Systems	26.86%
Field Service Management	12.57%
Telecom Assurance & Analytics	26.86%
Business Support Systems	22.29%
Internet of Things	11.43%

% of operator respondents

[2] https://www.telekom.com/en/company/digital-responsibility/digital-responsibility-artificial-intelligence/artificial-intelligence/machines-keep-getting-smarter-492102
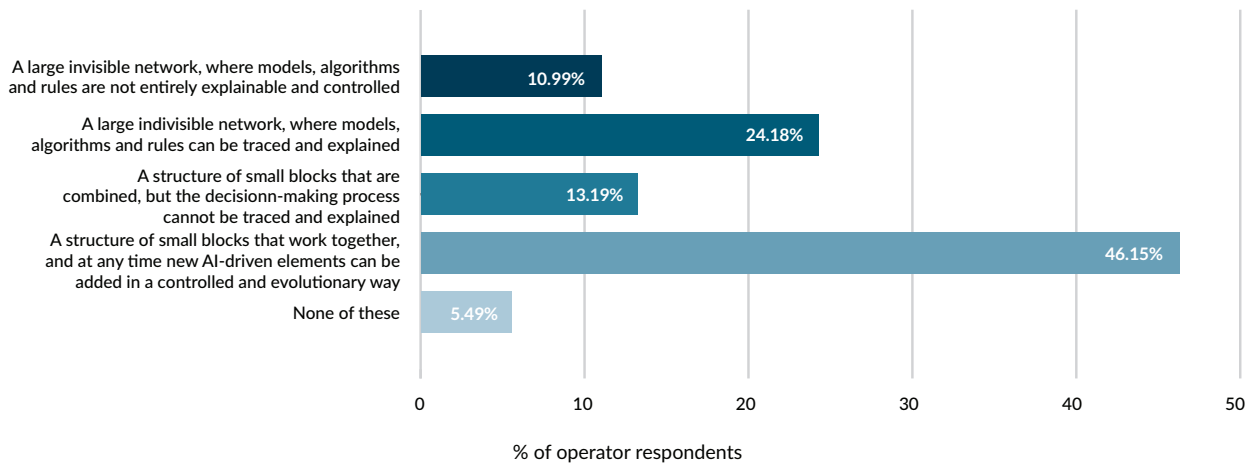
Part three: Operators' AI Technology Preferences

Given the wide-ranging nature of AI and what it offers, it is perhaps no surprise that communication service providers are opting for simplicity and interpretability when it comes to their deployments or preferred kinds of deployments. A total of 46.2% of operators felt a structure of small blocks working together, that could be supplemented by new elements in a controlled manner, was the best framework.

This was followed by a large indivisible network, where rules can be traced and explained (24.2%). A small block structure with an untraceable and inexplicable decision-making process was the preference for 13.2% of CSPs surveyed, followed by a large indivisible network where models, algorithms and rules aren't entirely explained and controlled (11.0%).

Figure 9: What kind of AI/ML driven solution would you accept?

- A large invisible network, where models, algorithms and rules are not entirely explainable and controlled: **10.99%**
- A large indivisible network, where models, algorithms and rules can be traced and explained: **24.18%**
- A structure of small blocks that are combined, but the decisionn-making process cannot be traced and explained: **13.19%**
- A structure of small blocks that work together, and at any time new AI-driven elements can be added in a controlled and evolutionary way: **46.15%**
- None of these: **5.49%**

% of operator respondents

Similarly, the operators surveyed were less keen on a fully autonomous AI, with 13.2% of respondents saying it should have that level of freedom. Instead, the largest share of operators (38.5%) said they preferred an AI that detects events in its networks and recommends the specific actions that can be carried out automatically. This was followed by an AI that detects, recommends and applies solutions after getting to know the system (24.2%), then an AI that detects network events and recommends actions for employees to carry out (23.1%). Only 1.1% of respondents preferred an AI that solely detects and reports on events.

Figure 10: What is the preferable level of system autonomy?

|	%
AI detects events in networks and recommends specific actions to be executed by the team	23.08%
AI detects events & recommends the specific actions that can be done automatically	38.46%
AI detects, recommends and applies solutions after it gets to know the system	24.18%
AI is fully autonomous	13.19%
AI detects and reports on events	1.10%

% of operator respondents
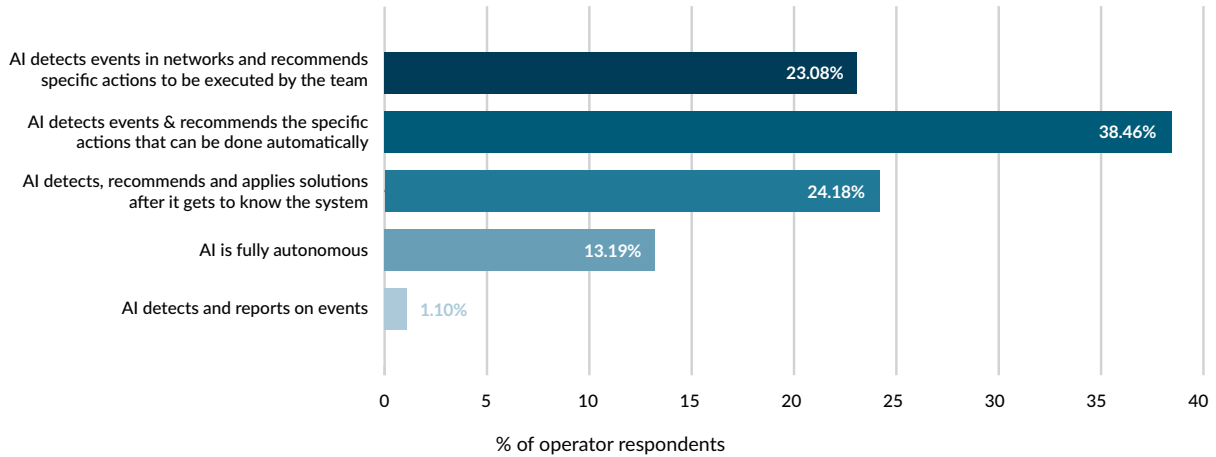
There was broad consensus as to the areas where AI interpretability is most important. Operators clearly want to gain insight into why decisions are being taken across a wide range of areas. This is logical given how new the technology is to the sector, as well as a relative lack of skills in the area compared to other parts of its business. Respondents cited 'predictive, preventative asset maintenance, field task planning and dispatching' as most important (21.3%), followed by 'business assurance and problem detection' (20.8%). 'Data integrity, system discovery, service design recommendation and orchestration' and 'fraud detection and prevention' were joint third (20.3%), followed by 'invoicing, chatbots and sales support' (17.3%).

Figure 11: In which local domains and/or areas is AI interpretability the most important? (Multiple answers were selected)

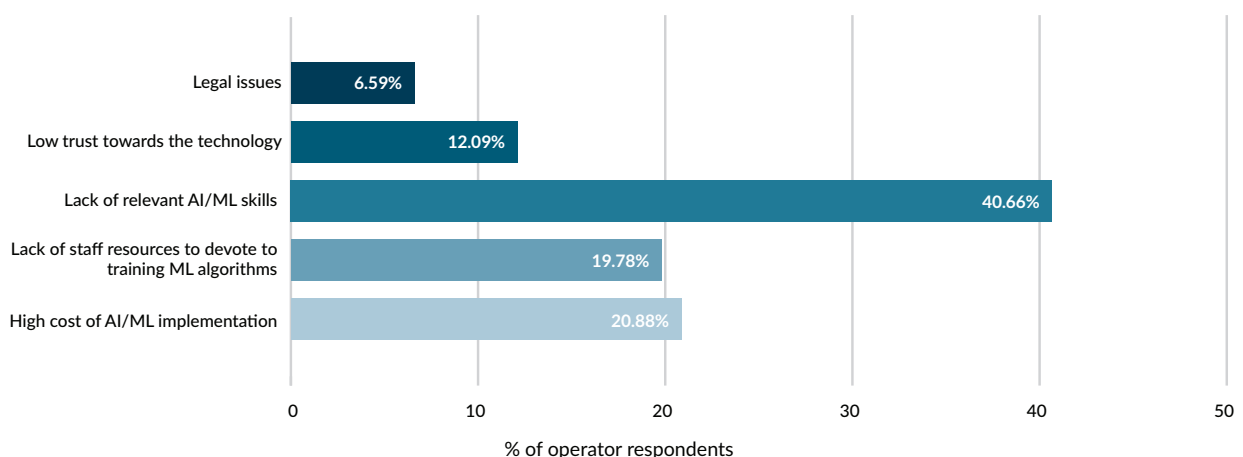|	%
Data Integrity / System Discovery / Service Design Recommendation and Orchestration	20.30%
Business Assurance / Problem Detection	20.81%
Predictive / Preventative Asset Maintenance / Field Task Planning and Dispatching	21.32%
Fraud Detection & Prevention	20.30%
Invoicing / Chatbots / Sales Support	17.26%

% of operator respondents
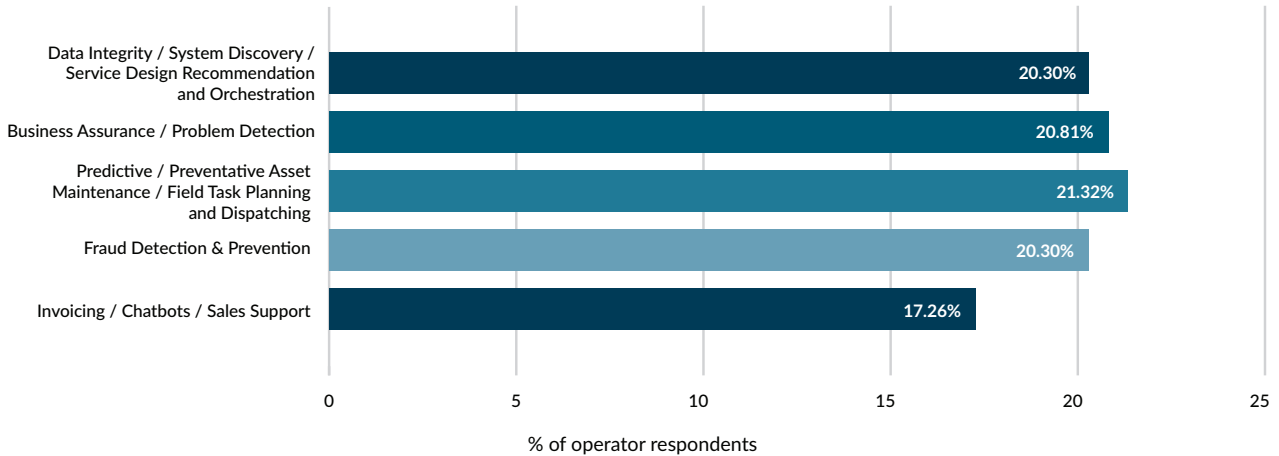
Part four: Problems with Implementing Artificial Intelligence

Operators have been candid about the challenges they face when implementing new kinds of technology, especially software-based ones. Among the survey's respondents, they were more honest about the lack of relevant skills being the biggest obstacle to implementing AI – it was cited by

40.7% of operators, compared to 35.0% of all respondents. This dovetails with operators' desire to work with third parties on AI projects, as well as the need for interpretability across a wide range of areas.

The second biggest obstacle to operators was the high costs of AI or ML implementation (20.9%) – an understandable response given the capex and opex challenges the telecoms sector faces. This was closely followed by a lack of staff resources to devote to training machine learning algorithms (19.8%).

Figure 12: What are, or were, the main obstacles to implementing AI/ML in your organisation?

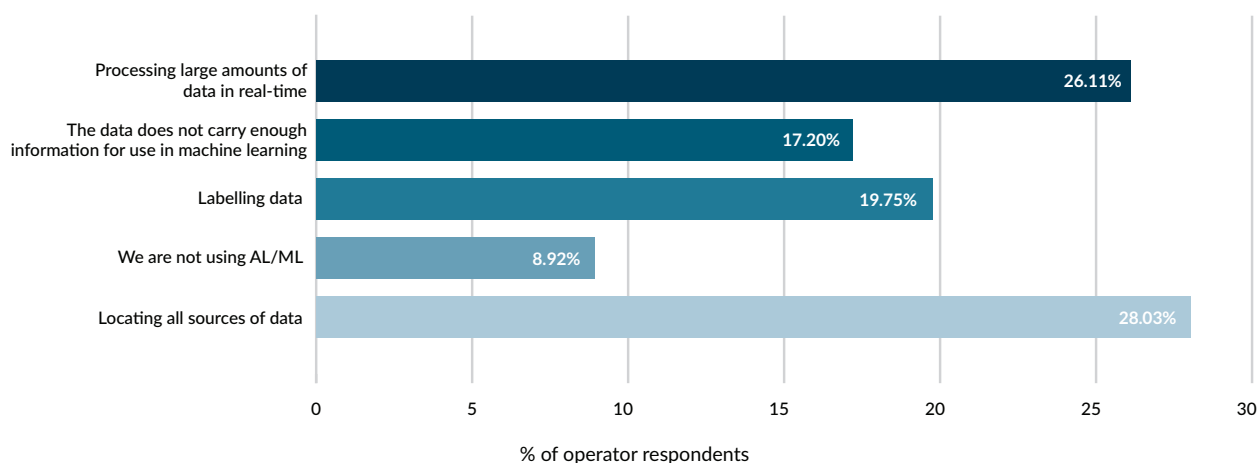|	% of operator respondents
Legal issues	6.59%
Low trust towards the technology	12.09%
Lack of relevant AI/ML skills	40.66%
Lack of staff resources to devote to training ML algorithms	19.78%
High cost of AI/ML implementation	20.88%

When it comes to the technical challenges of using AI/ML to handle data, there was little difference between the share of respondents highlighting locating all sources of it and processing large amounts in real-time as the biggest problems (28.0% and 26.1% respectively). There was similarly a small difference between CSPs citing labelling data (19.8%) and it not containing enough information for use in machine learning (17.2%).

Figure 13: What technical challenges are you facing when utilising AI/ML?
(Multiple answers were selected)

Challenge	%
Processing large amounts of data in real-time	26.11%
The data does not carry enough information for use in machine learning	17.20%
Labelling data	19.75%
We are not using AL/ML	8.92%
Locating all sources of data	28.03%

% of operator respondents

Conclusion

Operators are fully aware that AI could be a central pillar of how they transform and improve their operations as they move into the 5G era. Many have already introduced it to their networks in some form or plan to do so.

Communication service providers are using the technology's flexibility to their advantage by introducing it to areas as diverse as OSS and BSS, customer experience, fraud management and network monitoring, planning and optimisation. The breadth of what operators feel the technology could be used for, from customer services to network operations, just shows how important they see it for the decade ahead.

However, it is clear they need help in order to truly realise the benefits of the technology. Operators admitting a lack of skills being an obstacle to an effective roll-out of AI reveals they are aware that they require the necessary expertise to do so. This also explains the tendency to work in-house with partners.

Artificial intelligence and machine learning have the power to revolutionise all aspects of the telecoms industry over the coming years. In encouraging news for any using a mobile network, from consumer to enterprise, operators realise this. They just need the necessary help to take advantage.

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