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White paper

Advanced telcos are using centralised intelligence to deliver the full promise of AI

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Contents

List of figures

1. Executive summary

Centralised intelligence (CI) implementations are already underway with a wide acknowledgement that it is desirable; nearly 60% of communications service providers (CSPs) in our survey consider it to be a high priority.

For early adopters of CI solutions, automation was the primary motivation in 50% of cases. Concerns about job losses have yet to be realised; in fact, early adopters of CI have identified their most significant challenge as being not having enough trained staff.

5G and its related requirements are going to need a CI approach to support the operational automation that will be required to run 5G processes efficiently. 5G will be the catalyst for significant operational change across the whole organisation.

CI implementation projects need strong internal leadership and support, with an ability to orchestrate and co-ordinate re-development of currently installed OSS/BSS applications and associated processes. This will need cultural change within most CSPs.

Data is the critical component in CI; having a clear process that governs data collection, its integrity and use are a critical pillar in CI success. Good-quality data is needed to drive high-quality timely insights. Tools that support this should be telecoms-aware, where possible, to reduce the effort and provide a library of models around which each CSP's specific needs can be rapidly built.

CSPs that want to deploy a CI solution need to begin by building a specific data layer. This will be a subset of any central data lake that is available. Use cases should be selected before the data components, to help reduce the amount of data needed and gain some early wins, which are critical for gaining support internally within an organisation.

2. Introduction

The hype around artificial intelligence (AI) solutions has set CSPs' expectations beyond current capabilities. Many CSPs have struggled to get expected benefits from their AI projects and many proof-of-concept trials have failed to be put into full production. Despite this, CSPs are continuing to invest in AI, driven by the promise of delivering more-automated, better and cheaper products and services. There is, however, a growing consensus among CSPs that a more efficient, effective approach is needed to support AI and analytics.

This paper is based on the analysis of over 50 CSP surveys and 12 CSP interviews[1] and found a common view that a centralised approach is part of the answer to providing industrial-strength processes and solutions, where

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[1]	A total of 53 CSP executives took part in an online survey: of these, 20 were based in North America, 14 in Western Europe, 14 in Asia–Pacific and 5 in Latin America.

governance, security, model integrity and standardisation of approach are used to generate data insights. In the survey, 15% of CSPs stated that they are already implementing CI solutions.

CI replaces a departmental- or applications-centric approach by consolidating data, using a common set of software tools and standardising the publication of insights or algorithms they produce. In addition, CI often provides the shift to improve the governance processes for data and insights, ensuring privacy and security rules are adhered to in strategic enterprise systems.

Analysys Mason's survey and interviews reveal that CSPs primarily benefit from higher utilisation of their data sciences and the ability to draw on larger, more consistent data sets. In addition, CI provides shared insights across the enterprise, which reduces effort wasted on different teams spending time on creating similar KPIs and brings greater consistency between processes.

Figure 1: A comparison of approaches to data collection and analysis
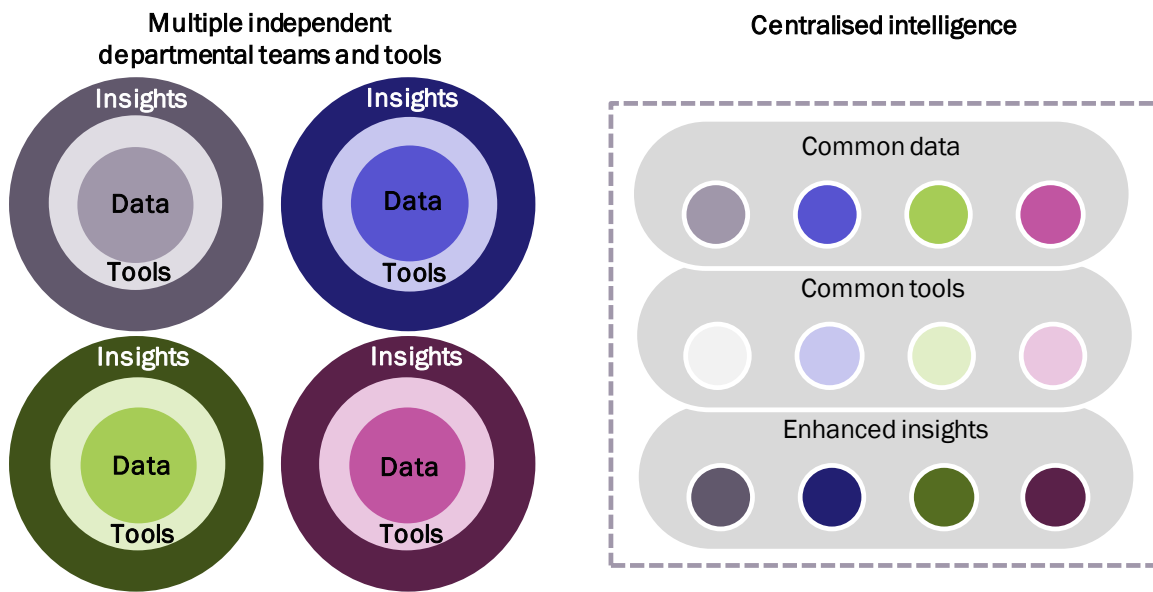
Source: Analysys Mason

CSPs understand the benefits that data-driven insights bring to their business, namely increased efficiency and more precision in their processes. These benefits are important to CSPs and place a strategic importance on the systems and processes that research, develop, maintain and operate data insights. The need to industrialise data insight generation to produce reliable, robust and scalable insights for large organisations is understood; CSPs will need to shift from considering data insight generation systems as a departmental concern to giving these systems the same importance as core systems such as ERP, CRM or billing systems, which CSPs also want to centralise.

CSPs that are rolling out 5G services are confronted with the complexity and cost of its operation and implementation. They know that a high degree of automation is needed. Over 80% of CSPs surveyed regarded 5G as a significant driver for the adoption of a centralised approach to data collection and analysis.

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12 CSP executives participated in in-depth telephone interviews: of the 12, 6 were based in North America, and 2 each in Asia–Pacific, Latin American and Western Europe.

CSPs conduct digital transformation projects with three aspirations in mind; –to increase efficiency, improve customer experience and drive new revenue from new services. These aspirations require current processes to be more automated. The application of AI, machine learning (ML) and analytics systems to provide insights that are more precise than those produced by current processes and systems, and their ability to dynamically react to changes, will enable CSPs to automate processes that were not possible before and will provide marked improvements to current processes. CSPs are recognising the importance of data and analytics and are conducting projects to consolidate data sources and rationalise the tools that are used for data analysis. The next step in this has been to design transformation projects around a CI approach, helping to deliver a clear architecture from which core BSS and OSS domain-specific applications can draw insights. The ability to centralise the generation of insights ensures that each end-to-end business process is treated consistently within a robust development and operational framework.

3. Today's intelligence solutions

3.1   A significant number of CSPs are adopting a centralised approach to data collection and analysis

CSPs have invested in a mixture of AI and analytics tools and services that have required highly skilled staff to support them. According to our survey, CSPs that have implemented CI solutions found that the shortage of skills was the most significant challenge. A significant proportion of CSPs (58%) used general-purpose, non-industry specific AI and analytics solutions, but they also combined these with other tools including domain-specific solutions and open-source software. CI solutions should use, enhance and support the investments already made in established data infrastructure and systems to ensure a wide acceptance at CSPs and rapid deployment. To support this, vendor solutions must be open and sufficiently modular to work within CSPs' current systems architecture rather than replace them.

*Figure 2: CSPs' approaches to applying AI/ML*
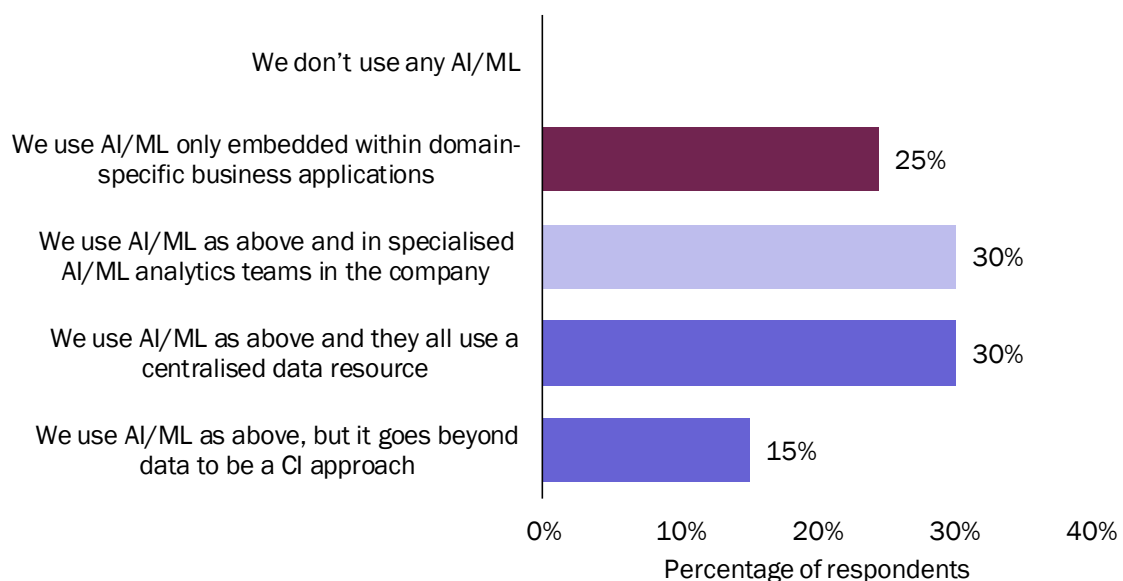
Source: Analysys Mason

The concept of CI is not new. Previous generations of intelligence tools have been designed to do the same thing. Enterprise data warehouses, business intelligence and analytics tools vendors have all strived to create a single solution to address the data and intelligence needs for CSPs. These attempts at centralisation have been largely unsuccessful for a combination of reasons, including costs, unclear outcomes and the dominance of domain-specific applications operating in a high siloed way, but a CI approach has some key developments suggest that it may work. These include the following.

- Technological advances enable wider access to AI tools, more-precise results and access to APIs such as natural language processing (NLP)

- CSPs need to increase automation, and efficiency has become critical for their survival.

- Examples from other sectors, particularly web-scale providers, which are heavy users of AI and analytics, prove that new technologies can deliver in large-scale environments.

- The falling costs of storage, compute and tools enable many more uses of AI to be implemented. The falling costs have been driven by cloud technologies, virtualisation, new business models and the advent of open-source tools.

- Senior managers are accepting and expecting that AI and analytics will be needed to support their business goals.

These drivers have already triggered CI implementations in 15% of the CSPs surveyed, while a further 30% have projects underway to centralise their AI and analytics solutions. Overall, 67% of CSPs are planning or building a CI-based system. In our survey, 59% of CSPs consider the priority for building CI as high or very high, but 100% are considering the approach.

Figure 3: CSPs' prioritisation for building CI capability
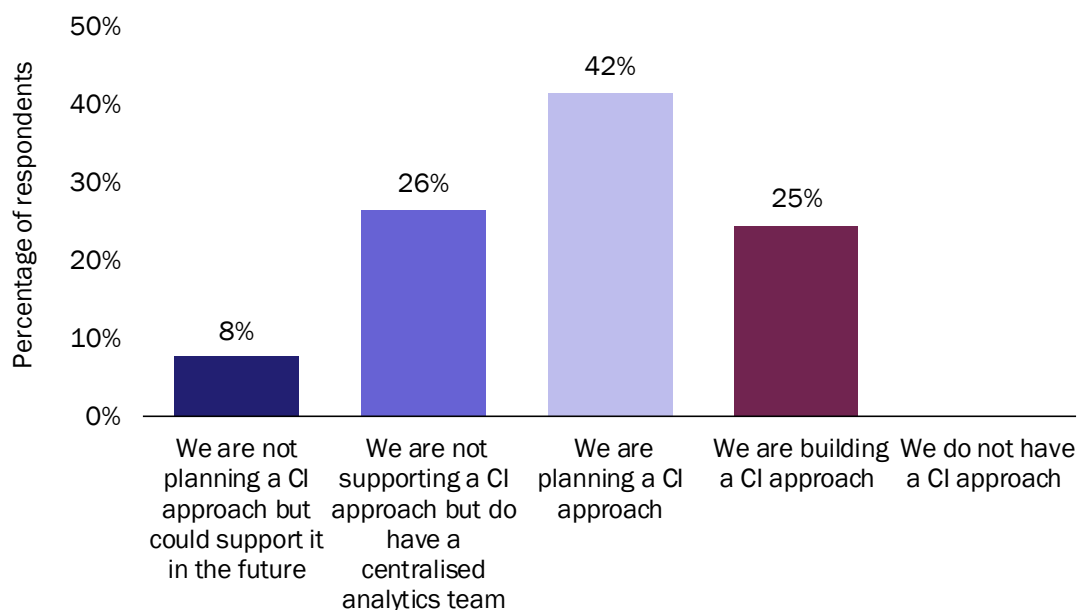

Source: Analysys Mason
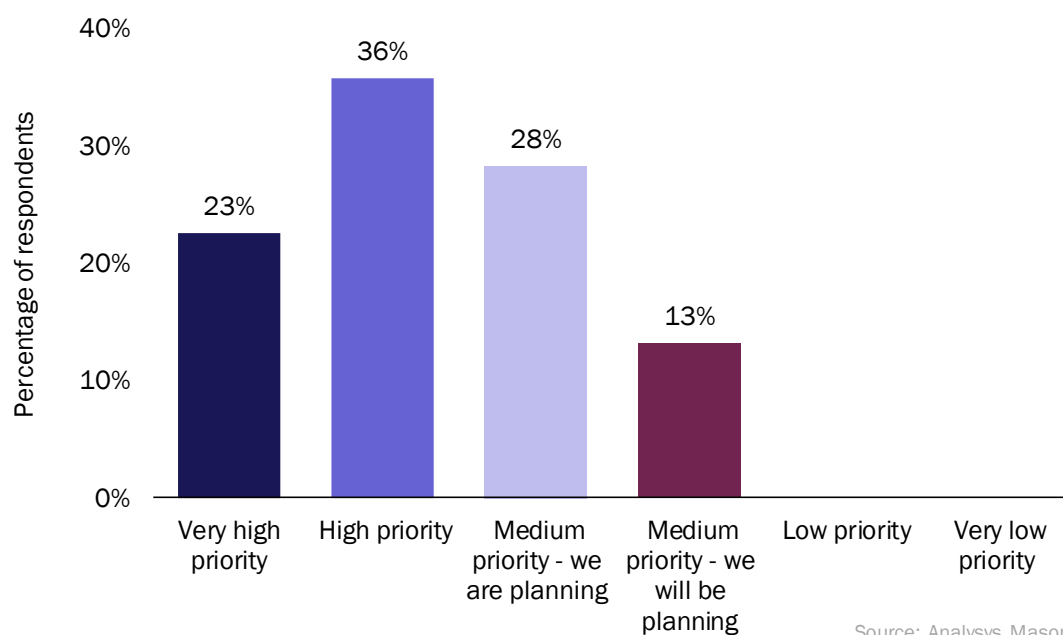
The value of a CI approach is a priority for CSPs and is built into most of their strategies, as they look to capitalise on new AI technology, increase the use of automation and provide better data-driven decisions supported by analytics and AI. Although technology is important, the changing attitude and understanding of senior management is more so.

> *"We are treating CI as a high to a very high priority. The leadership has seen the value in this (CI approach) and they believe in it and that is why a programme has been made and dollars have been spent." Chief Marketing Officer (CMO), Tier 1 CSP in North America*

All CSPs understand the potential value of CI, but relatively few are actively rolling it out fully. CSPs often adopt a strategy that builds out different aspects of a CI solution or make organisational changes to support a future CI approach. For instance, every CSP in our survey has created a centralised analytics and AI team. A high percentage (92%) of CSPs are consolidating data and rationalising their tools, but only 25% are implementing an enterprise-wide CI approach.

Figure 4: Scope of CSPs' CI approaches

Source: Analysys Mason

The level of adoption of AI and analytics solutions varies by geographical region. The adoption of CI in Europe, the Middle East and Africa (EMEA) lags behind that in North America and Asia–Pacific (APAC) where attitudes to innovation are more advanced; the reasons for this are explored later.

3.2 Among those CSPs that are already implementing CI, more automation stands out as the sought-after benefit

CSPs are in danger of building new CI approaches without having a clear business case. An over "hyped" market may rush to adopt the new technology without carrying out stringent investment checks. The optimism of the 67% of the surveyed CSPs that are building or planning to build a CI approach (see Figure 4) is not reflected in CSPs' expectations of the benefits – only 46% expect to get significant benefits. However, where a

CI approach has been deployed, the results are clear: CSPs are looking for a higher degree of automation and are expecting CI to deliver it.

> *"There are big advantages to be gained not only immediately following the launch of that [CI] project but also, from an operational efficiency and sustainment point of view, I see future value there." Automation Manager, North America CSP*

The benefit of a CI approach is not just in the processes and systems that it directly touches, but in supporting a clear architecture around which a business is able to transform, and in providing a clear demarcation for insight creation. The compound business benefits of using a CI approach can be measured in terms of optimising whole business processes and automating beyond single domain-specific applications or single vendor suites.

> *"AI could help us build the business to a 2x level if implemented in the right way." Business unit head, Tier 1 CSP in APAC*

Cost saving is a potential outcome of automation, although improvement to customer experience is often a bigger motivation. Helping staff to increase their productivity through augmentation of complex processes with timely actionable information, or the removal of manual processes through data-driven intelligence, are major benefits of CI. In the survey, only 8% of CSPs felt that staff numbers would not be affected by CI approaches, while 32% felt there would be reduction in staff numbers. However, new staff members will be required to provide the skills needed to support a new CI approach, so the challenge is more about recruitment of staff with the right skills to support CI in the short and medium term. The ability to automate complex processes with CI means a different tier of functions can be addressed.

Figure 5: CSPs' views on whether CI would reduce staff numbers
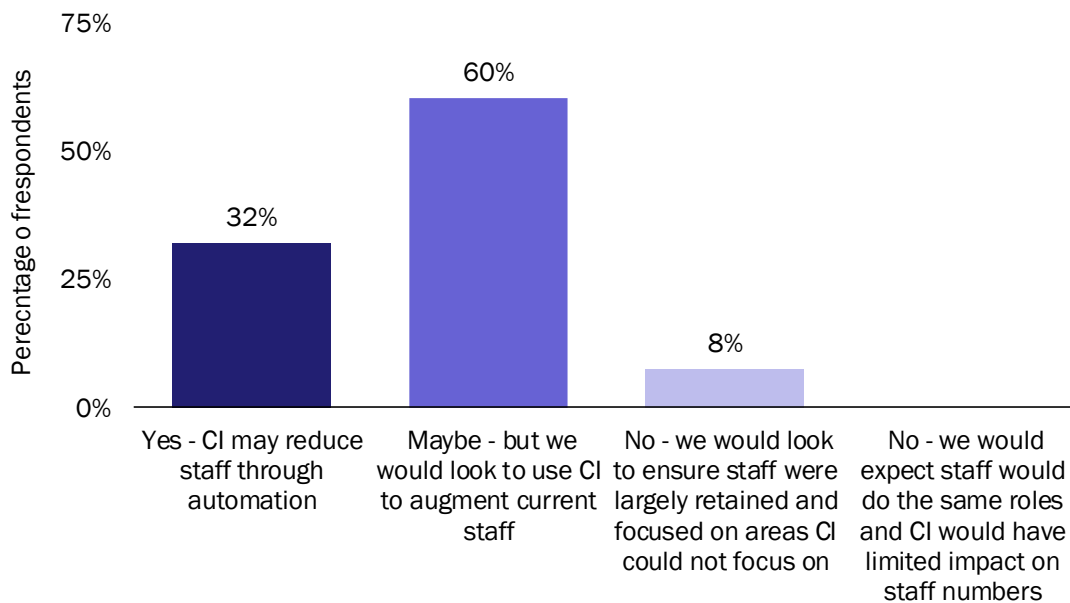
Source: Analysys Mason

Current automations tend to concentrate on high-volume repetitive, simple tasks. CI enables complex tasks that go beyond departmental or application-specific siloes, enabling end-to-end processes, systems and associated staff to be optimised. End-to-end processes include service fulfilment and operation automation for 5G, for example. 81% of CSPs consider 5G as a catalyst for a CI roll-out. 5G's complexity for configuration and its need to react to application-based requirements dynamically has driven many CSPs to conclude that AI-based approaches will be needed to operate and support the technology cost effectively. CI is the framework at the heart of delivering AI-based insights to the systems to support these requirements.

4. Challenges in CI implementations

4.1 CI implementations will take a while to bring about; data quality is critical to its success

CI is a transformational project for CSPs with implications for integrations in many data sources, business processes and applications. However, CI can be implemented in stages, both in technology and in the use cases it addresses, to reduce risk and disruption to current processes.

AI and ML technology rely on data to be effective. The quantity, quality and completeness of the data are the most significant factors in the success of a project. The quality of data is critical in being able to discover insights that are precise and accurate without 'false positives', where data errors cause inferences that are not actually there. Data quality is increasingly significant as CSPs look for more-subtle signals in data to be more precise or to predict models further in advance. Regulatory changes on the use of personal data also have implications for what data can be legally used for. A CI approach can be part of a governance structure to ensure compliance.

Beyond data quality, 21% of the CSPs surveyed felt that AI software solutions are too complex and that this was slowing the decision making within CSPs. Significant changes to data infrastructure, analytics tools, and delivery models of vendors as well as a burgeoning selection of vendors, in comparison to other AI solutions, have added considerable complexity to decisions on AI and analytics solutions specifically within CI solutions and more widely. 15% of CSPs identified the lack of skilled staff as being critical for implementing a CI solution. More recently, self-service and AutoML technologies have helped to 'democratise' data science to less skilled users, but these technologies have not yet reduced the need for more skilled staff.

CSPs that have started to implement CI, cited their biggest challenge as a lack of skilled staff. They highlighted three other challenges:

- the insights are not precise enough or the data and outcomes are too complex to model
- not all data has been centralised at an organisational level
- no support for it at management level in the organisation.

CSPs consistently pointed to the lack of management support during our in-depth interviews. The prospect of AI taking over the roles of staff understandably causes resistance within organisations, but these concerns are not as significant for CSPs that are rolling out CI solutions; their major concerns are the recruitment of staff with appropriate skills. Adopting a CI approach requires departments to pool their staffing resources; some departments will be enthusiastic, but others may not if they lose dedicated staff.

A CI approach needs senior staff to be committed to centralised data – all teams should share data, conform to standardised processes and use the same CI tools. CSPs did not expect this to be a particular challenge (see Figure 6), but CSPs that are at an advanced stage with their CI implementations perceive this to be the second most-significant challenge.

> *"It is having people giving up their control that they seem to think they have over data. And working together to do that. Because there is no way you can do that unless you have everybody and people on board."*
> *AI product owner, Tier 1 CSP in North America*

Figure 6: Expected challenges of adopting a CI approach
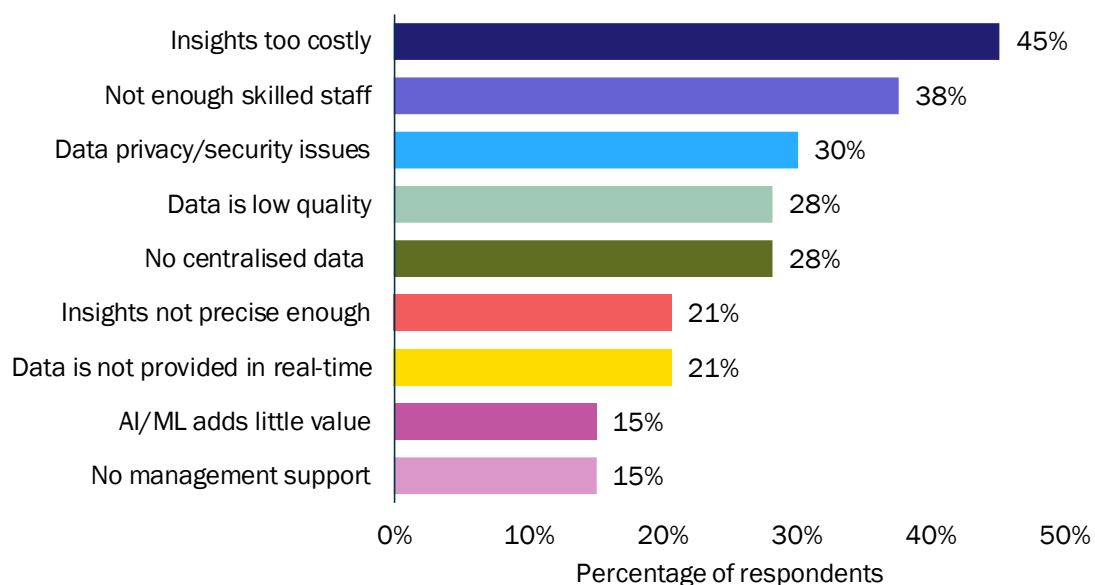
The fear that insights will take too long and cost too much is not realised by the most mature implementations of CI. Furthermore, concerns about privacy and security were not seen as significant. Therefore, perceived challenges are different to those that CSPs face when they begin their implementations.
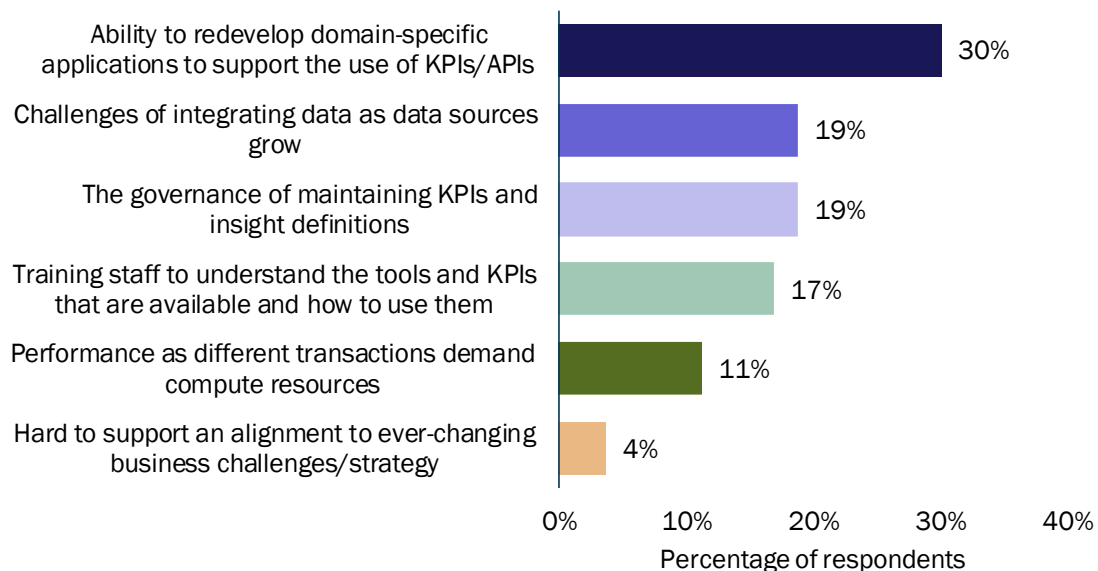
The lack of staff skills is the biggest challenge for CSPs that have implemented a CI approach, the next major issue related to the ability to act on the insights a CI solution creates. This is an ability to integrate insights and KPIs into the currently installed domain-specific applications. Applications have traditionally been autonomous functions that apply logic to data and processes within their specific domain. To take advantage of CI, applications use logic provided externally from the application. This requires each application to be re-developed using integration to web services or APIs. Where CI solutions are provided by the same vendor as the installed applications, there may be advantages in a reduced re-development effort with off-the-shelf integrations.

Data management, governance and integration are critical in maintaining the integrity of the insights, with many users and different use cases being supported. Data needs to be properly managed and manipulated to maintain the quality required. Typically, AI and analytic projects used over 30% of resources in data preparation. This

constitutes a significant challenge, when scaled to an enterprise level. Data management solutions can be supported through large IT solutions, including cloud providers, system integrators or by telecoms-specific vendors with deep knowledge of telecoms data types.

As the volume of KPIs and insights grows, processes and governance are needed to maintain its integrity and to provide access to it. Governance was cited as one of the second-most significant challenge to face CSPs.

Figure 7: Future challenges of a CI approach

Ability to redevelop domain-specific applications to support the use of KPIs/APIs — 30%

Challenges of integrating data as data sources grow — 19%

The governance of maintaining KPIs and insight definitions — 19%

Training staff to understand the tools and KPIs that are available and how to use them — 17%

Performance as different transactions demand compute resources — 11%

Hard to support an alignment to ever-changing business challenges/strategy — 4%

Percentage of respondents

Source: Analysys Mason

5. Solutions for the CI challenge

5.1 CI solutions consist of three layers: data source, analytics tools and results publishing

CI is a framework of solutions. The three layers of any CI solution are:

- a data source layer that ingests data from multiple sources
- analytics tools to investigate the data
- a layer to securely publish any results into decisions making processes or feed back into applications.

Figure 8: Key components of CI solutions
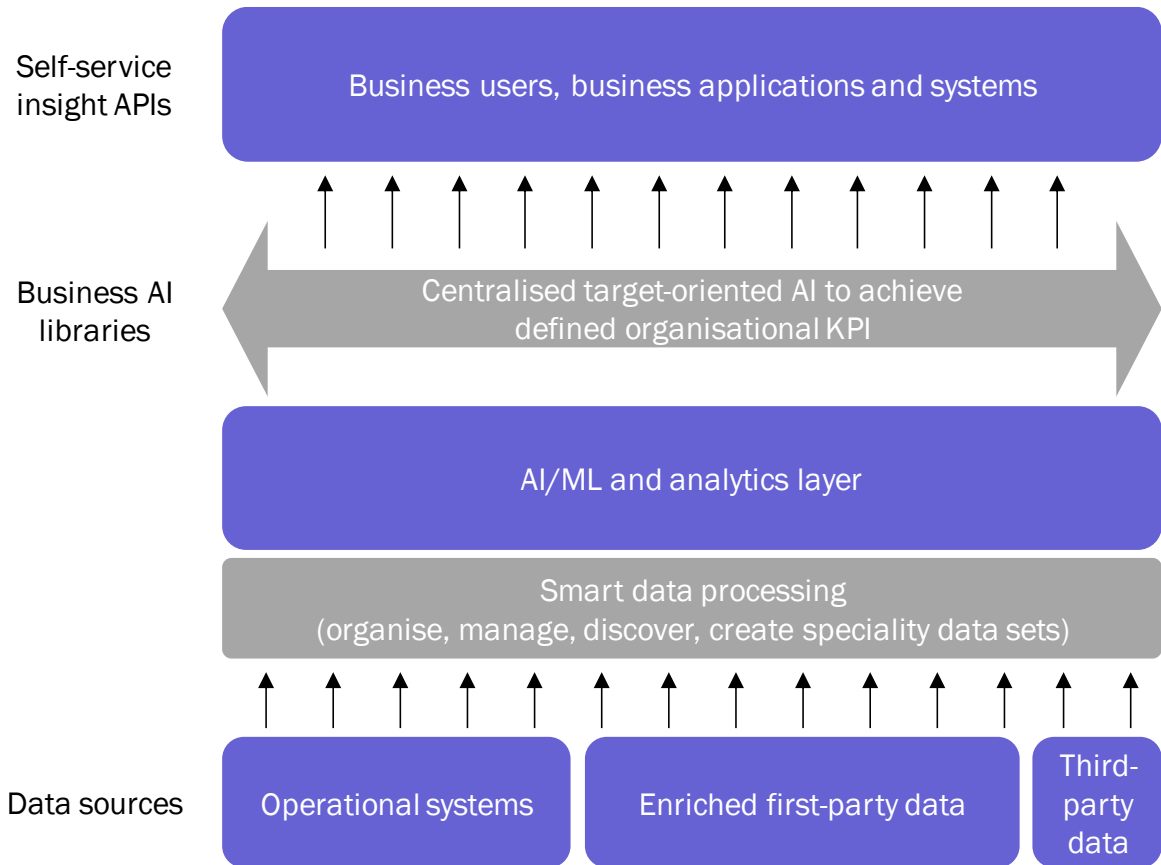
Even though a single vendor can source and in

CI solutions can be supplied from a single vendor or components sourced separately. Some CSPs have built their own CI solutions building an ecosystem of tools to do so. Even though a single vendor can source and integrate every component, they will have to rely on their own ecosystem of components.

5.2 CSPs that are implementing CI solutions want vendors that understand the telecoms industry

Selecting the right vendor to implement a CI approach is complex and depends on several factors, including pricing, capabilities and speed of implementation. CSPs in our survey cited access to pre-built industry specific models and data as the most important characteristic in suppliers.

Figure 9: Characteristics that CSPs consider to be important in suppliers of CI solutions
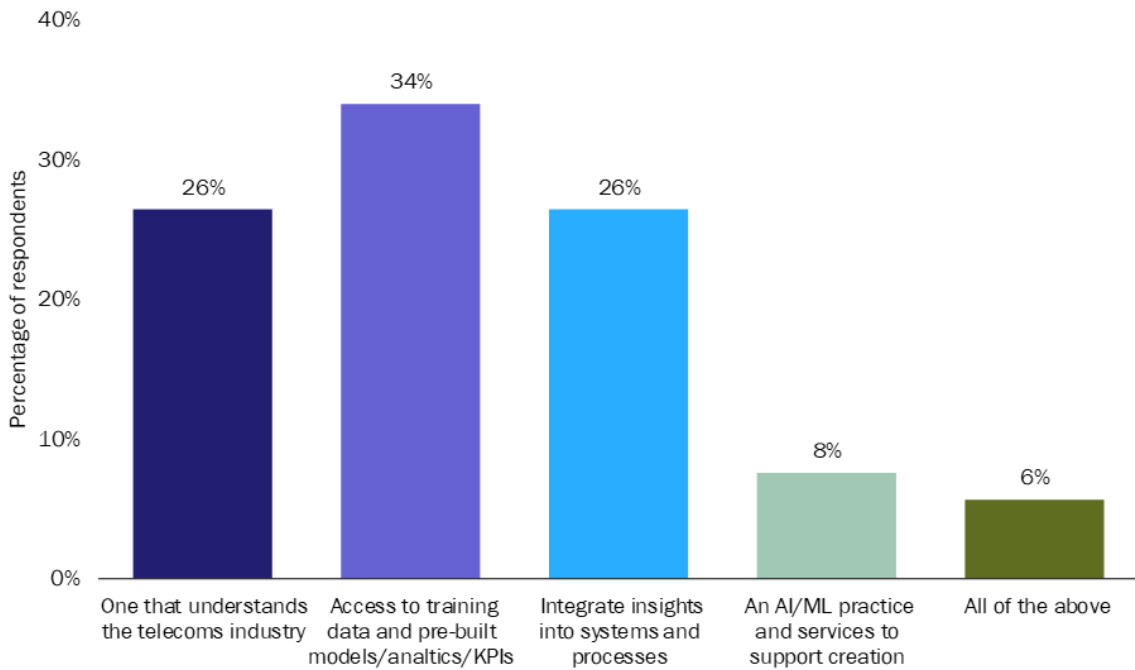
Source: Analysys Mason

CSPs also deemed it important that vendors should understand the telecoms and should be able to integrate insights into systems and processes. Just having AI/ML skills was not deemed the most important characteristic. There were some significant regional differences – CSPs in NA placed the greatest emphasis on telecoms understanding, those in EMEA on an ability to integrate AI/ML insights, and those in CALA are looking for vendors with training data and pre-built models.

More significantly, 50% of vendors with mature CI implementations want a vendor that understands the telecoms industry. Although skills are in short supply within AI and analytics, telecoms expertise coupled with AI/ML was significantly more important, for instance with a library of models around which each CSP's specific needs can be rapidly built.

6. Conclusions

CI implementations are already underway primarily in Asia–Pacific and North America. CSPs acknowledge that a centralised approach is desirable, and nearly 60% of CSPs in our survey consider it a high priority.

For early adopters of CI solutions, automation was their motivation in 50% of cases. However, this will not lead to immediate staff losses. Early adopters of CI cited not having enough trained staff as their most significant challenge.

CSPs agree that 5G and its related operational requirements are going to need a CI approach to support automations. This may be the catalyst for significant operational change across the whole organisation.

The length and scope of the CI project needs strong internal leadership and support to ensure it is successful, and CSPs need to be able to orchestrate and co-ordinate development of currently installed OSS/BSS applications and the processes associated with them. This will need cultural change within most CSPs, but care will need to be taken to confront concerns over AI-related job losses.

Data is the critical component in CI; having a clear process that governs data collection, its integrity and use are a critical pillar in CI success. Good-quality data is needed to drive the second-most critical component of high-quality timely insights. Tools that provide this should be telecoms-aware, where possible, to support telecoms data sets and use cases to help reduce effort and provide a template of ideas for a CSP's specific needs.

CSPs that want to start on a CI journey need to begin by building a specific data layer. This will be a subset of any central data lake that is available. Use cases should be selected before the data components, to help reduce the data needed and gain some early wins, which are critical in winning support internally within an organisation.

7. About the author

Justin Van der Lande (Principal Analyst) leads the *AI and Analytics* research programme, which is part of Analysys Mason's Telecoms Software and Networks research stream. He specialises in business intelligence and analytics tools, which are used in all telecoms business processes and systems. In addition, Justin provides technical expertise for Analysys Mason in consultancy and bespoke large-scale custom research projects. He has more than 20 years of experience in the communications industry in software development, marketing and research. He has held senior positions at NCR/AT&T, Micromuse (IBM), Granite Systems (Telcordia) and at the TM Forum. Justin holds a BSc in Management Science and Computer Studies from the University of Wales.

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