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FINAL report for Centralised Intelligence Research Project

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RESEARCH

Contents

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Contents

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Key findings for Amdocs

1. Centralised Intelligence (CI) implementations are already underway with a wide acknowledgement that it is desirable, with nearly 60% of CSPs surveyed considering its implementation as aa high priority.
2. For early adopters of CI solutions, automation was their primary motivation in 50% of cases. Concerns over immediate job losses have yet to realise, in fact early adopters of CI cited not having enough trained staff as their most significant challenge.
3. 5G and its related operational requirements are going to need a CI approach to full support the operational automation to run 5G processes efficiently, providing the catalyst for significant operational change across the whole organisation.
4. 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 often need cultural change within most CSPs.
5. 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.
6. CSPs wishing 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.

Contents

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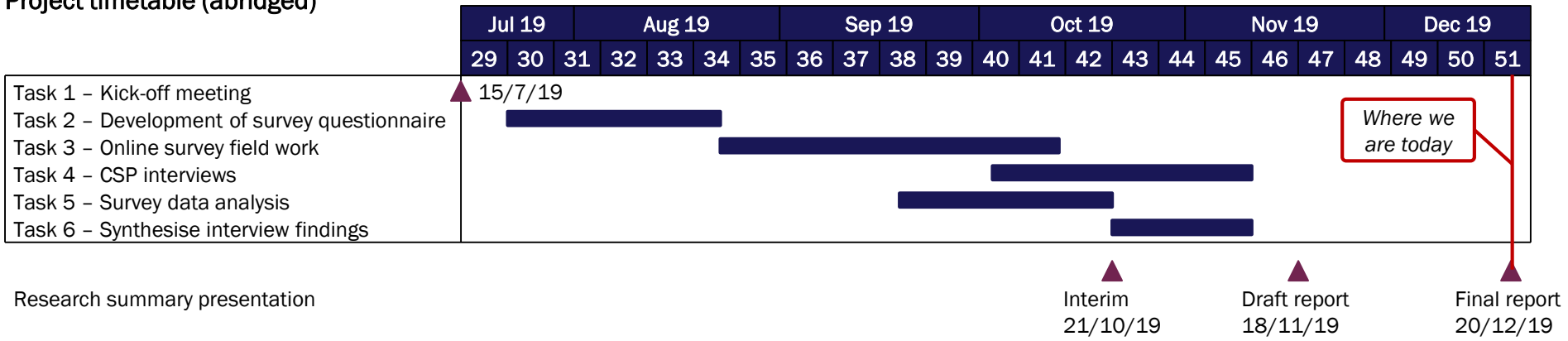
Introduction. This is the FINAL report of a project carried out by Analysys Mason for Amdocs to study the status of centralised intelligence systems

- **Context**. Most of Amdocs' operator customers are experimenting with artificial intelligence and numerous CSPs use AI in common use cases such as contextual customer engagement, NBA/NBO, intelligent virtual assistants, RPA, etc. However, the way AI is used today (sporadic 'micro-AI' insights based on limited & siloed data and AI-inside) does not fully benefit operators.
- **Objectives**. In this context, Amdocs Analysys Mason to:
  - test the assumption that there is a need to move away from AI inside solutions and products in specific business domains or solutions (like intelligent virtualized assistant) to an approach that looks at centralized intelligence in order to leverage benefits of this technology.
  - gain a better understanding on whether operators are deploying or considering to deploy a centralized brain (centralised intelligence) to help them leverage data across the organization and get the maximum out of this investment.
- **Methodology**. Our approach for this exercise comprises:
  - The co-creation of a survey questionnaire and interview guide
  - Online interviews with 53, mostly tier 1&2, CSPs across the globe
  - In-depth interviews with 12 tier 1&2 CSPs

Status update. This FINAL report includes results and analysis of 53 completed CSP surveys as well as 12 completed interviews

Project timetable (abridged)

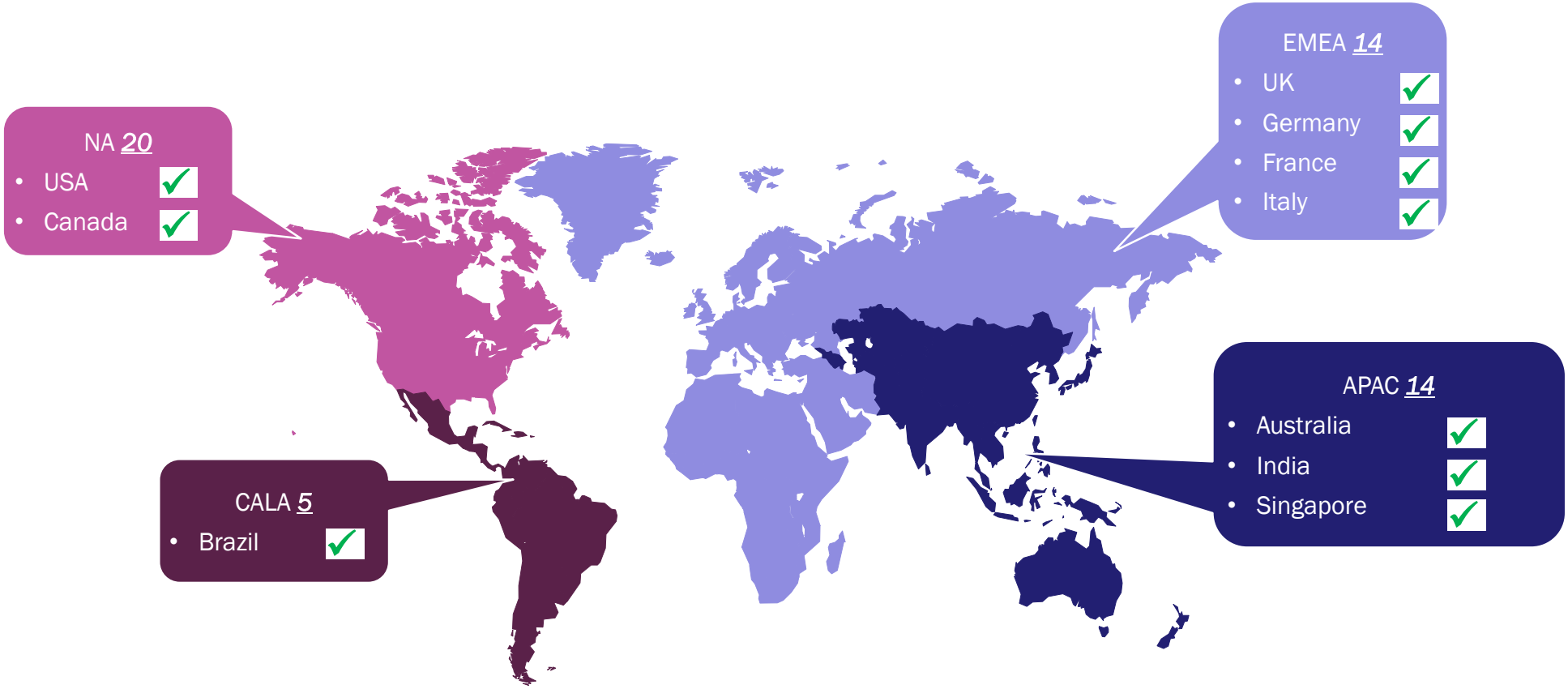


What we have done so far

- Co-created the survey questionnaire and interview guide
- Completed 53 (against the target of 50) surveys
- Carried out detailed analysis of the survey results
- Completed 12 in-depth interviews, against the target of 12
- Synthesised findings from completed interviews

We have received and analysed 53 completed online surveys from qualified CSP executives*

Geographic distribution of survey respondents *



* Qualified CSPs include ***Tier 1&2 CSPs*** that have annual revenue in excess of USD10 billion and ***domestic challenger CSPs*** that enjoy an eminent position in a single national market with annual revenue well in excess of USD1 billion

** More detailed information about the interviews and the survey [e.g. type of CSPs that participated in surveys and interviews] is available in the Annex

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Contents

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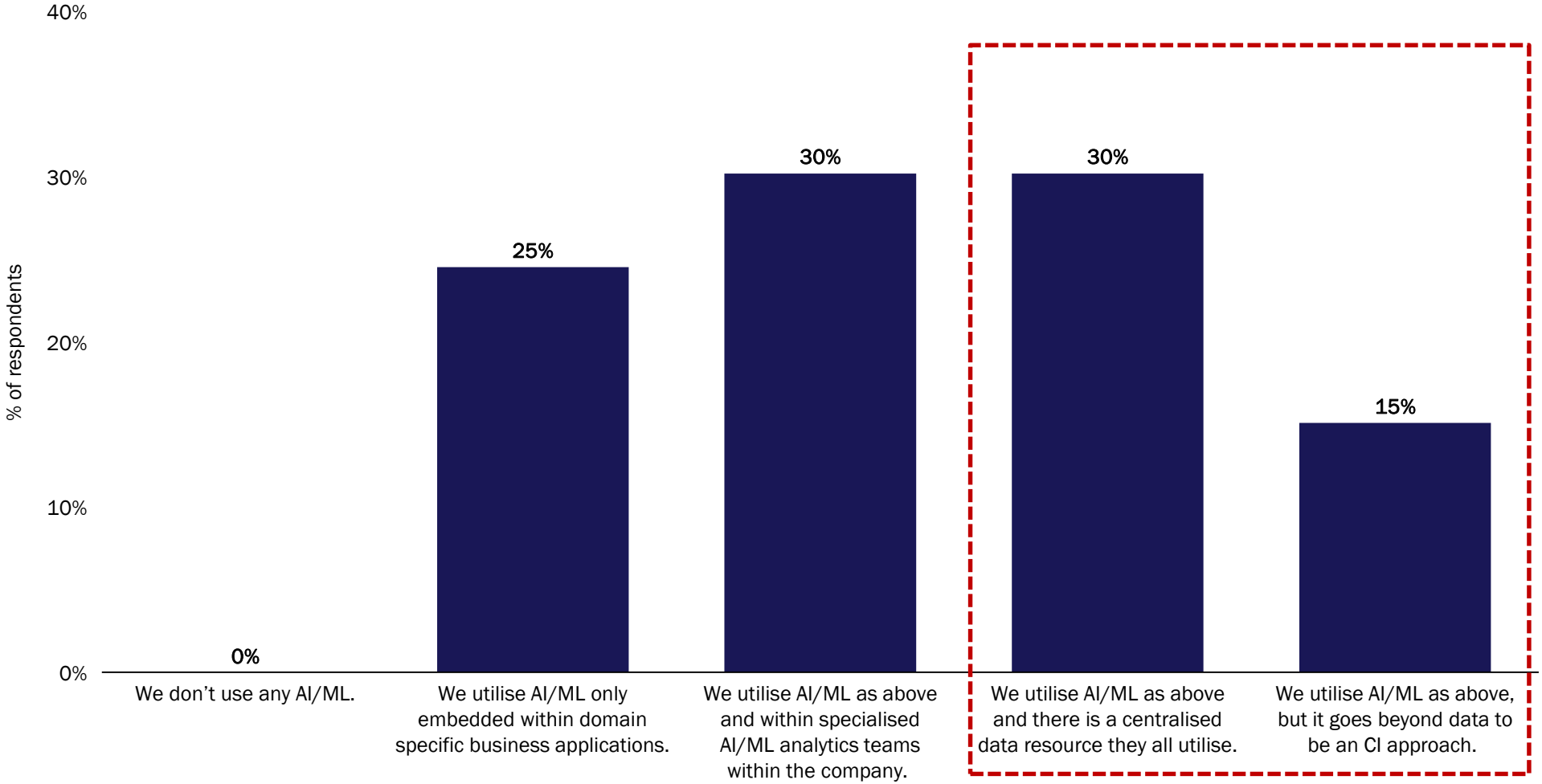
Overview of the section

- In this section, we present the survey results of all 15 questions in the survey questionnaire.
- Each survey question* is presented on two slides showing
  - The overall results
  - The results segmented by the region (i.e. APAC, CALA, NA and EMEA)
  - The correlation analysis (respondents' choice after choosing a certain option from an earlier question)

*: Question 6 is the exception as it is an open-ended question

All CSPs surveyed have utilised AI/ML to some degree – nearly half of surveyed CSPs have a centralised data source or use a CI approach

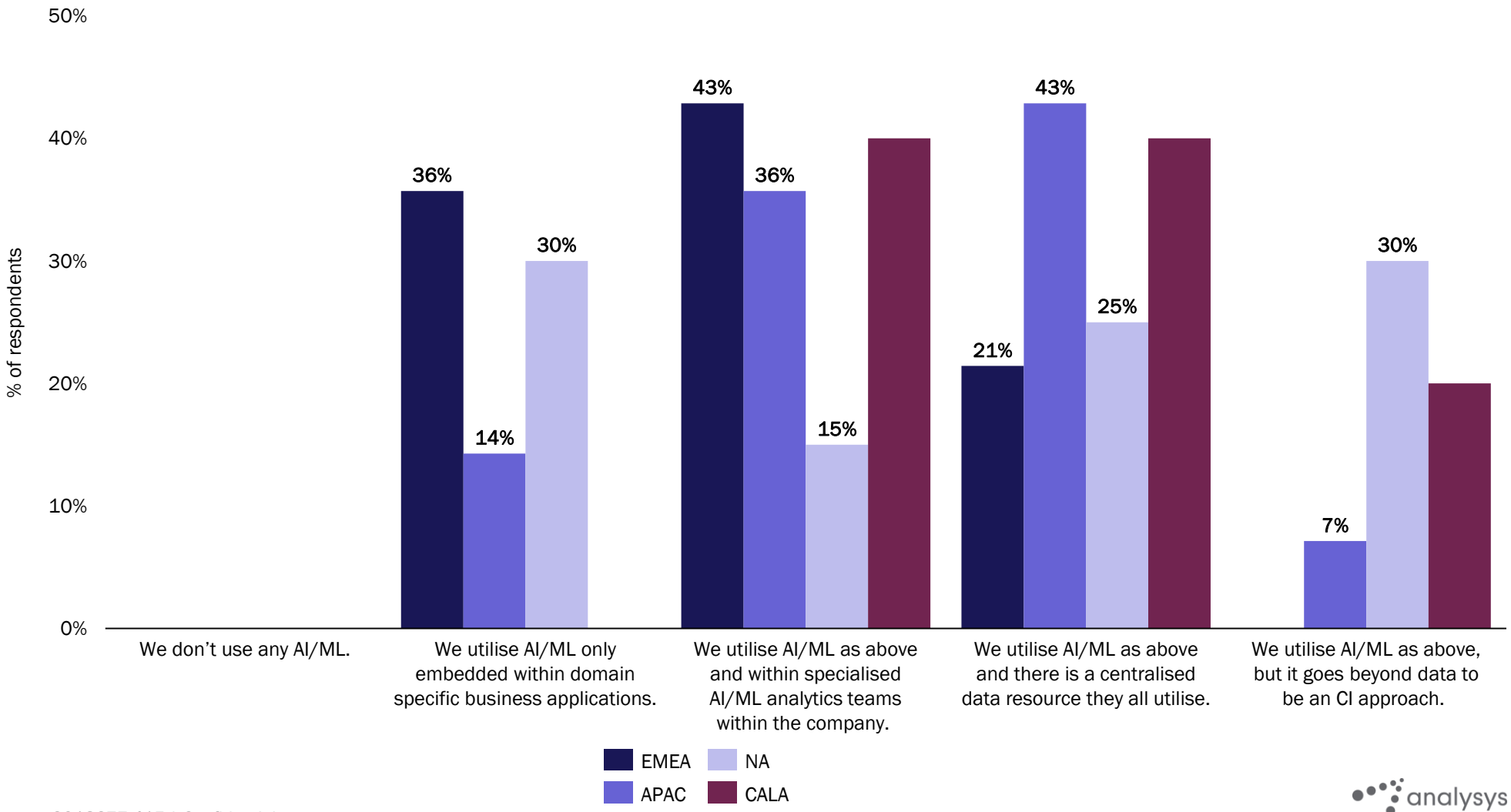
CSPs' approach to applying AI/ML today*



*: Q1: What is your organisation's approach to applying AI/ML today?

NA CSPs are most advanced in the adoption of a CI approach although some NA CSPs are still using AI/ML embedded specific applications too

CSPs' approach to applying AI/ML, by region



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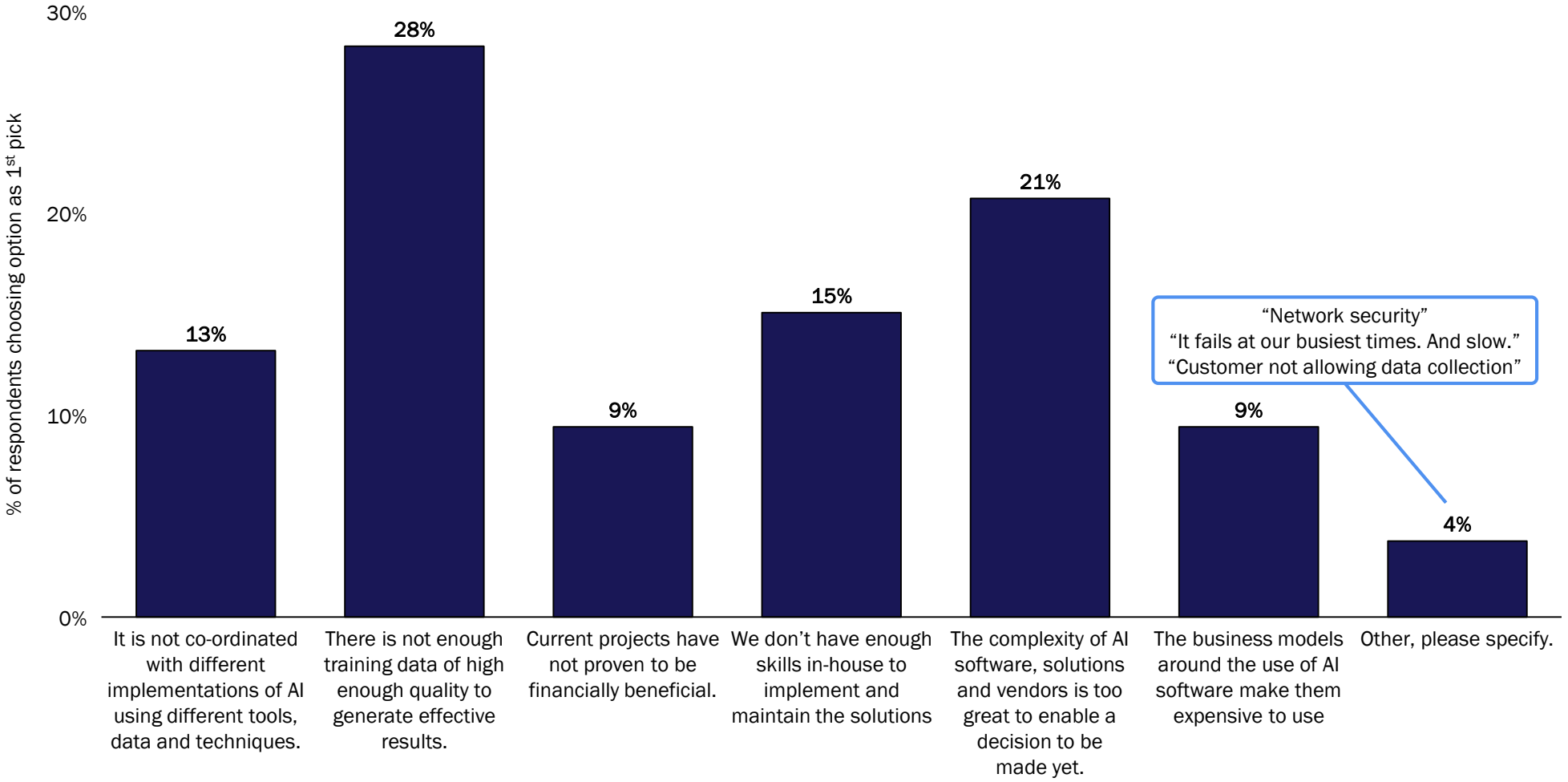
The Top 2 challenges surveyed CSPs grapple with are a lack of training data and complexity of AI software/solution

CSPs' greatest challenges with their AI approaches*



*: Q2: What do you consider the greatest challenges with your current AI approach? [Please rank 1-7 with 1 as the most serious challenge]

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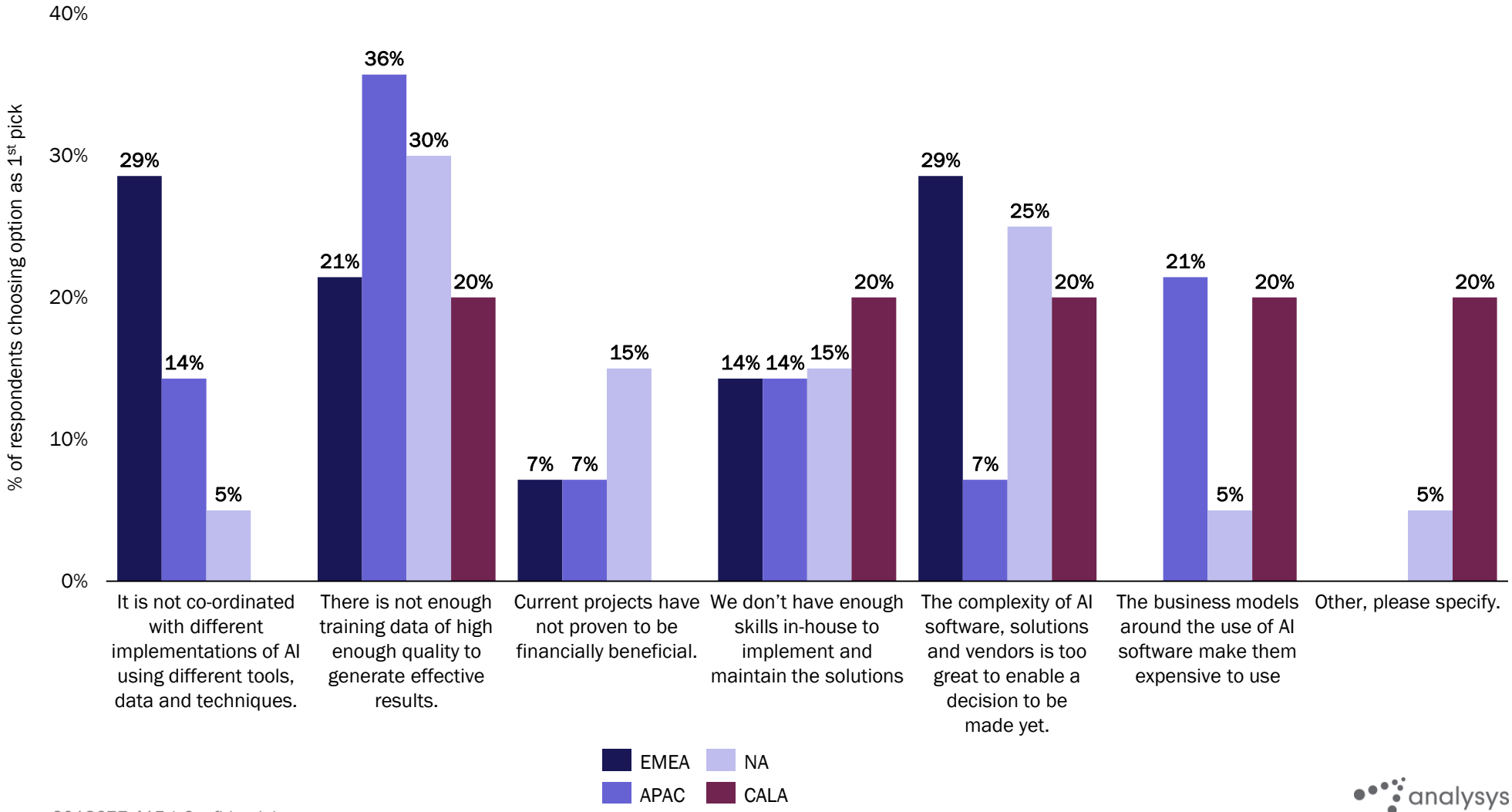
A lack of training data and the cost of AI solutions are particularly acute challenges for APAC CSPs while EMEA grapple with a lack of co-ordination and solution complexity

CSPs' greatest challenges with their AI approaches, by region



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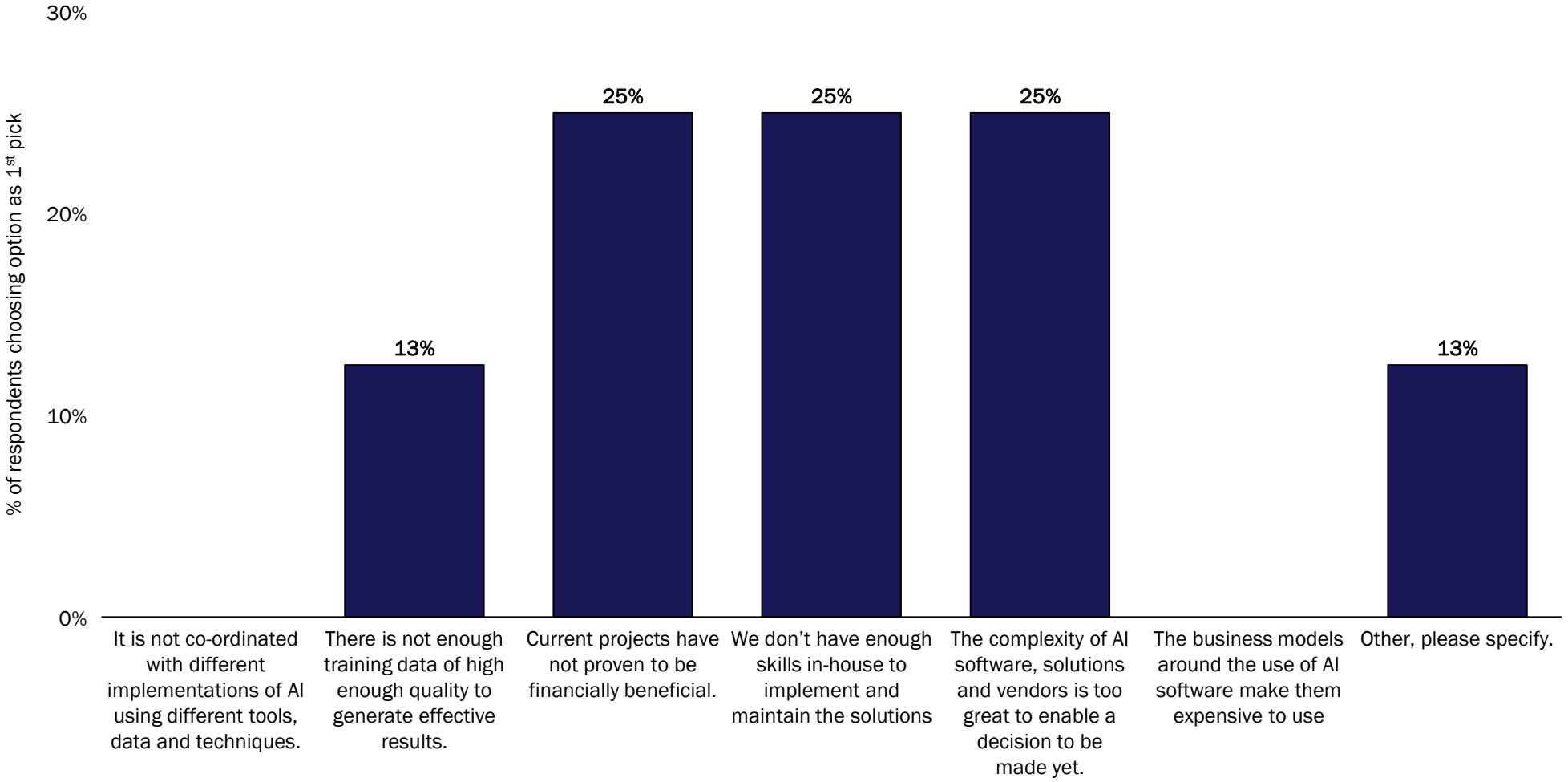
[correlation with Q1] For CSPs that are more engaged with CI, staffing, financial viability and complexity of AI solutions are more significant issues

CSPs' greatest challenges with their AI approaches, among CSPs that selected "…it goes beyond data to be an CI approach" in Q1.



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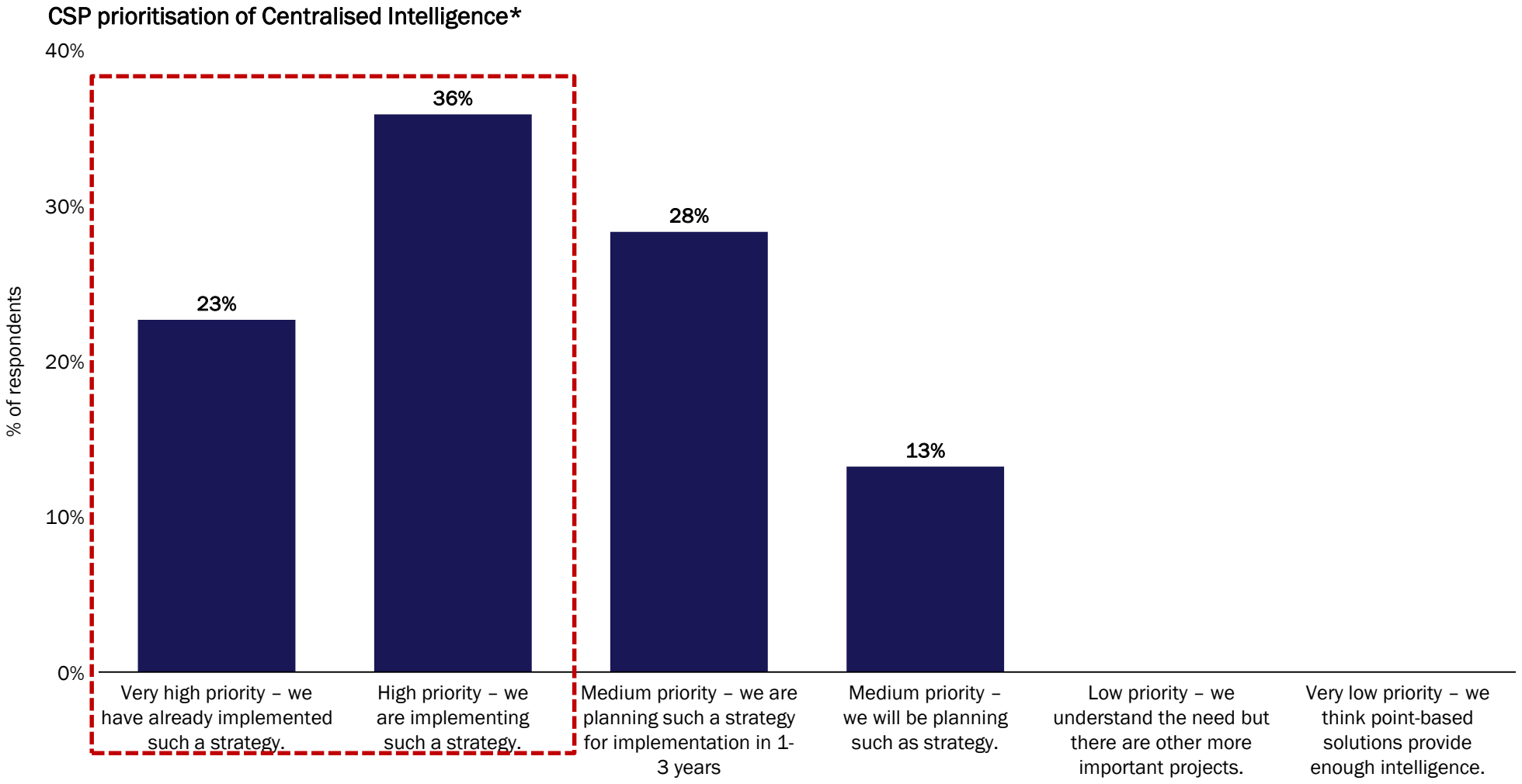
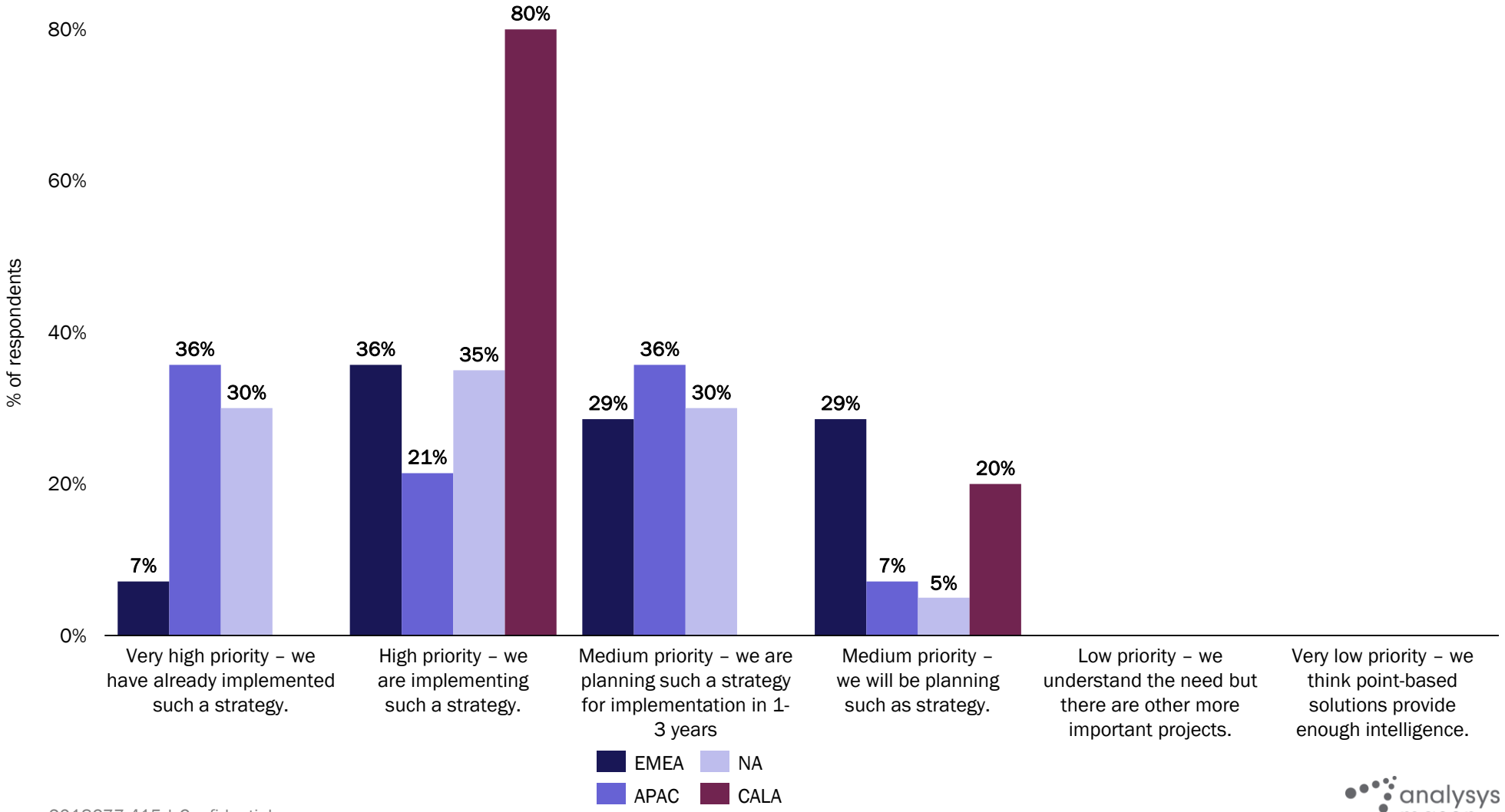
Over half of surveyed CSPs consider the capability building of centralised intelligence as high priority



*: Q3: How do you consider the priority of building a Centralised Intelligence (CI) capability? [Select one answer only]

APAC beats other regions with the highest percentage that places CI as very-high while 65% of NA CSPs place a high priority on CI capability building

CSP prioritisation of Centralised Intelligence, by region



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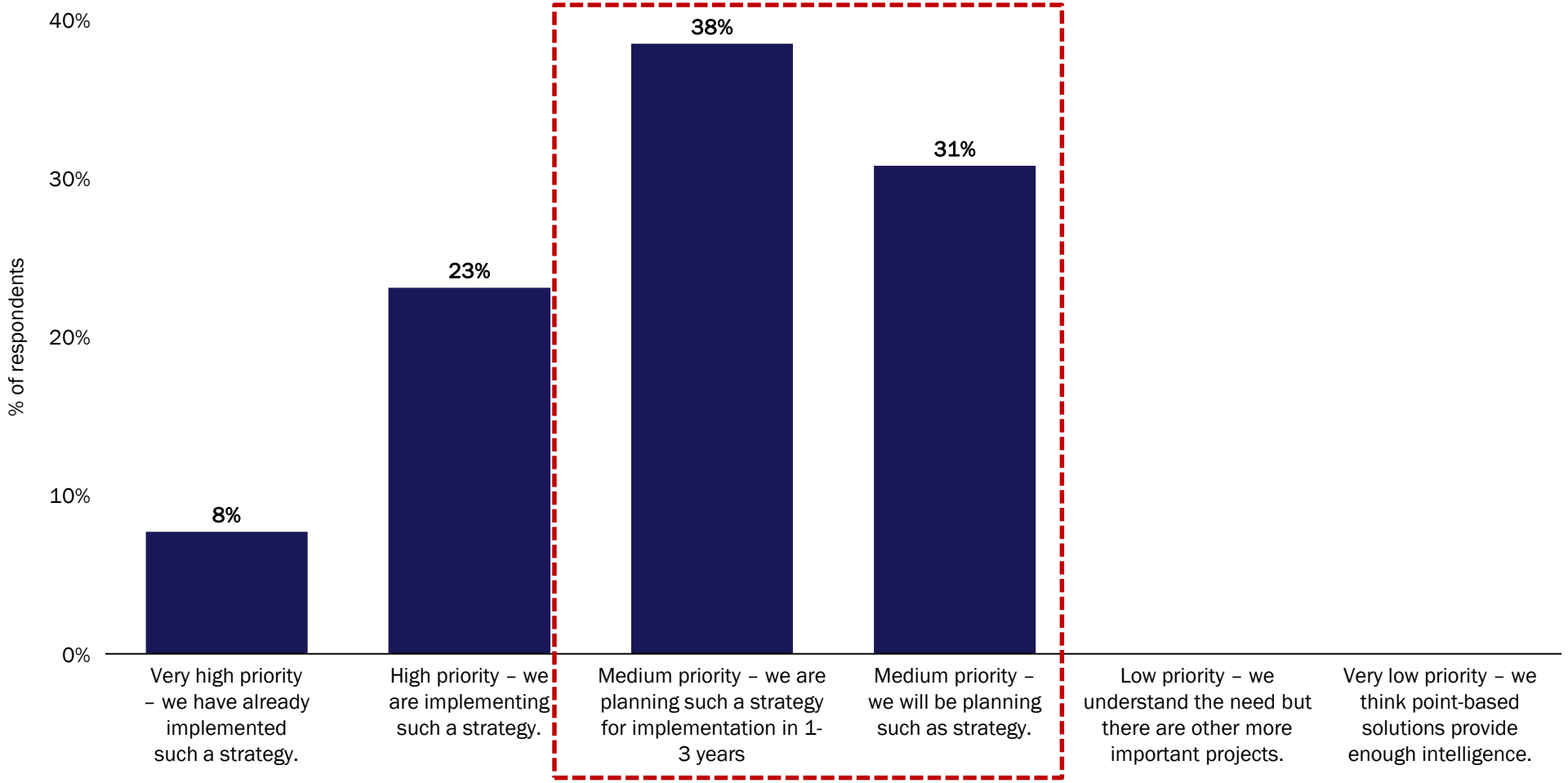
[correlation with Q1] CSPs that use AI/ML in domain specific applications are more likely to assign medium priority to CI

CSP prioritisation of Centralised Intelligence, among CSPs that selected "…domain specific applications" in Q1.



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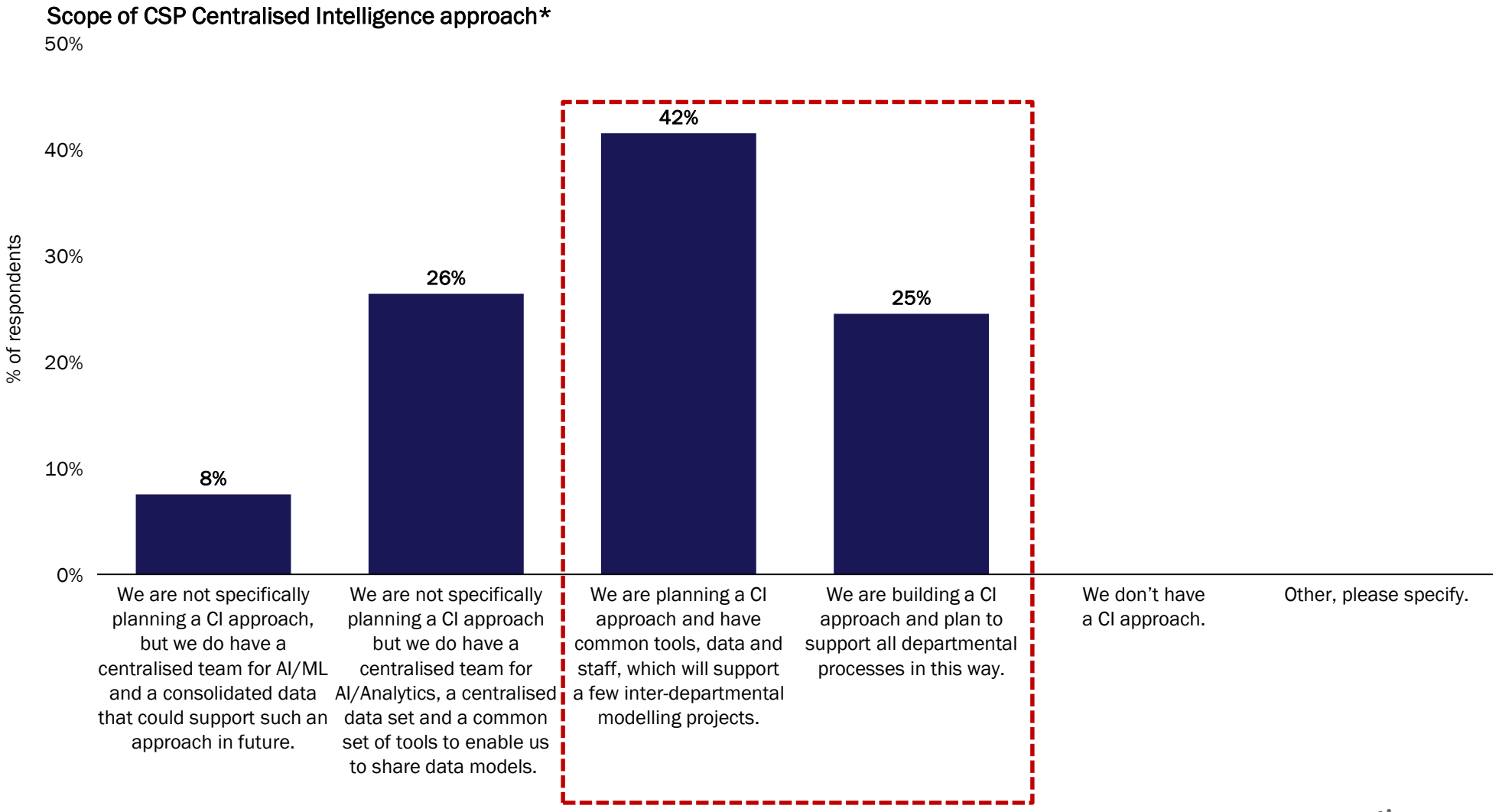
Two thirds of surveyed CSP are at least planning a CI approach that spans a few department – a quarter plan to involve all departments



*: Q4: If your organisation is building, or planning a Centralised Intelligence (CI) approach how would you describe the scope? [Select one answer only]

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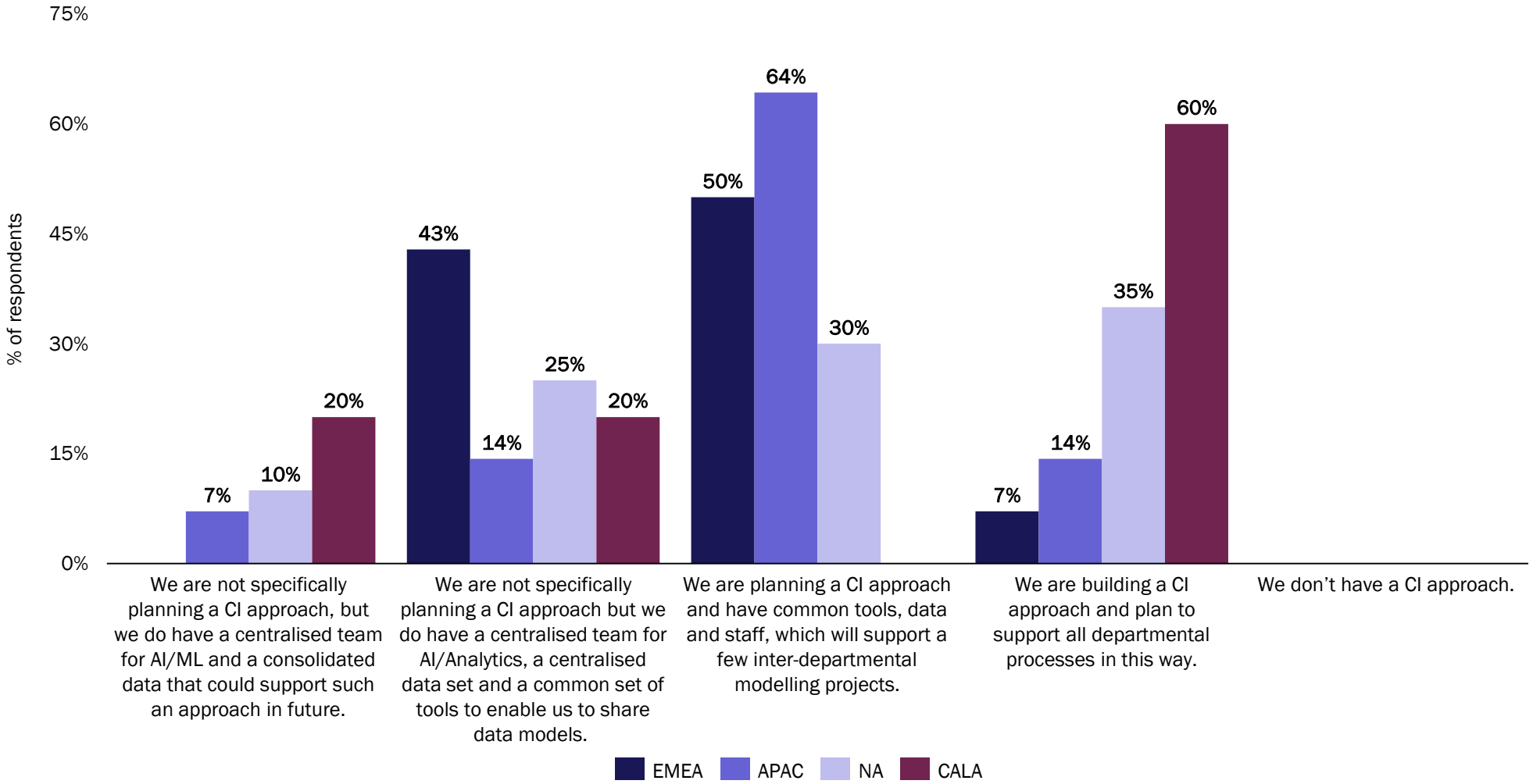
CALA CSPs were more advanced in the planned CI scope touching all departments at 60%, NA CSPs are trailing at 35%

Scope of CSP Centralised Intelligence approach, by region



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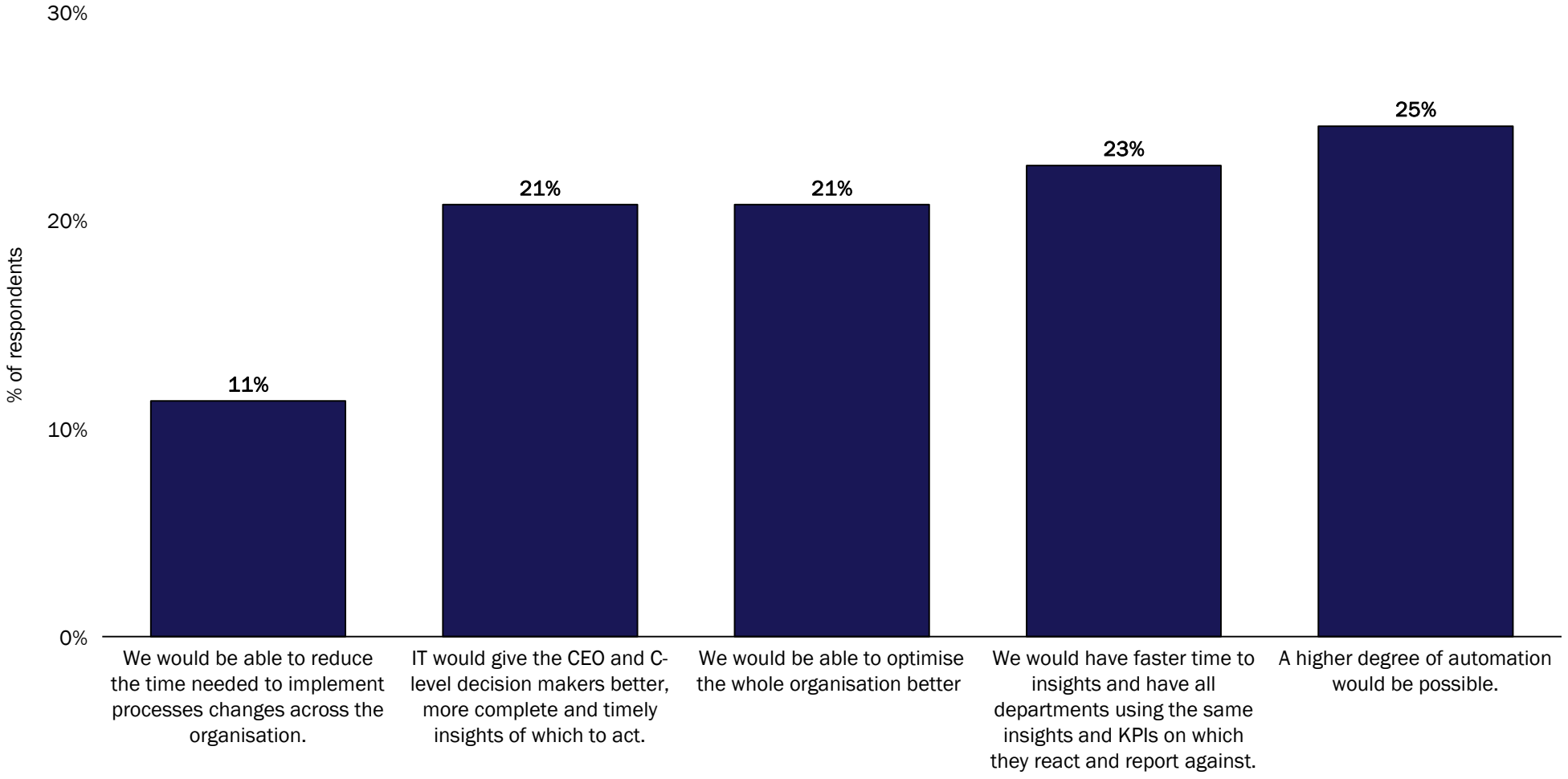
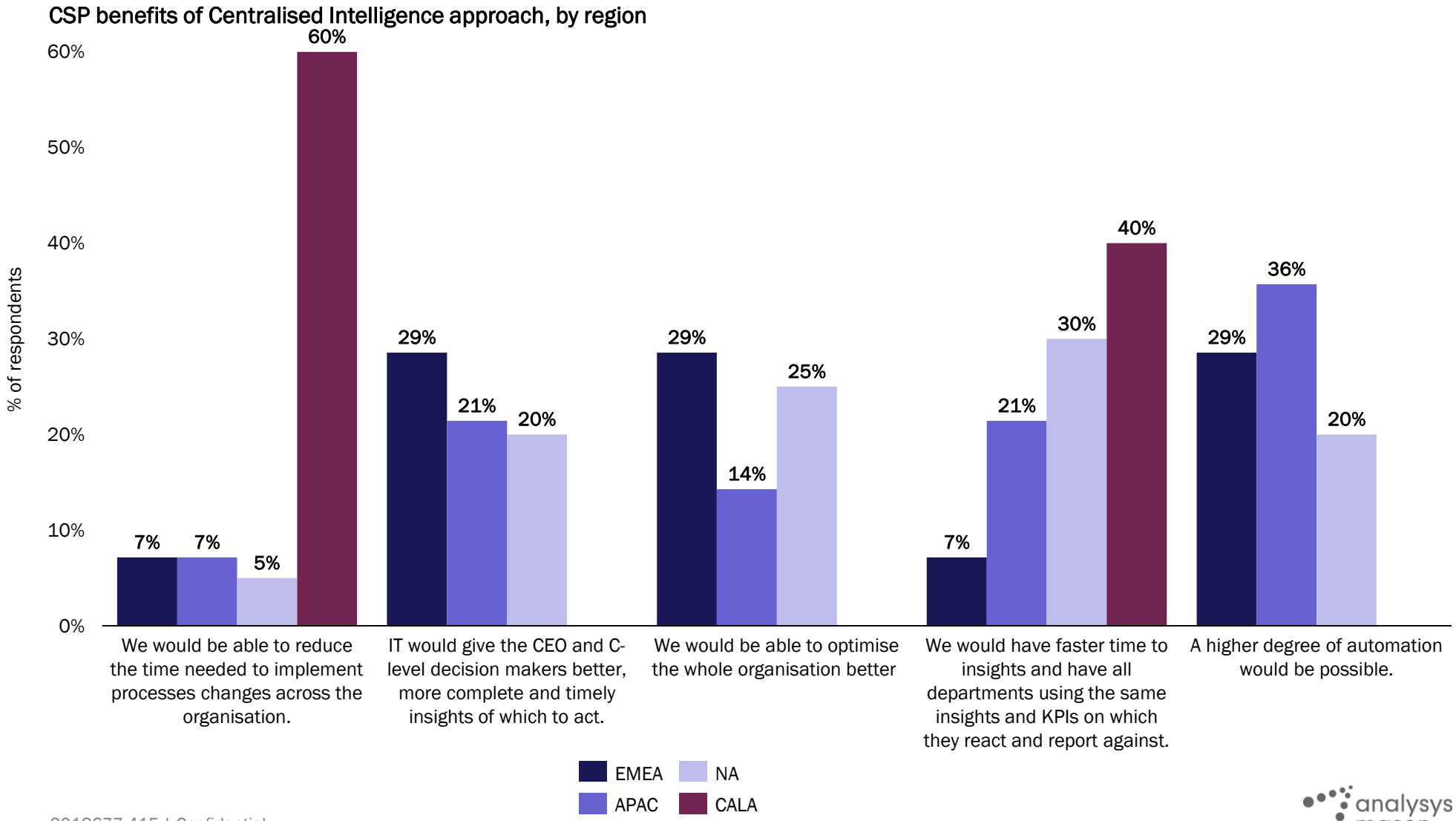
Surveyed CSPs evenly recognise the benefits brought about by a CI approach except for time needed for organisation-wide process implementation

CSP benefits of Centralised Intelligence approach*



*: Q5: What do you foresee as the key benefits of a centralised intelligence approach? [Please rank 1-6 with 1 as the highest benefit]

NA CSPs considered optimising organisation, faster insights across the organisation as more important



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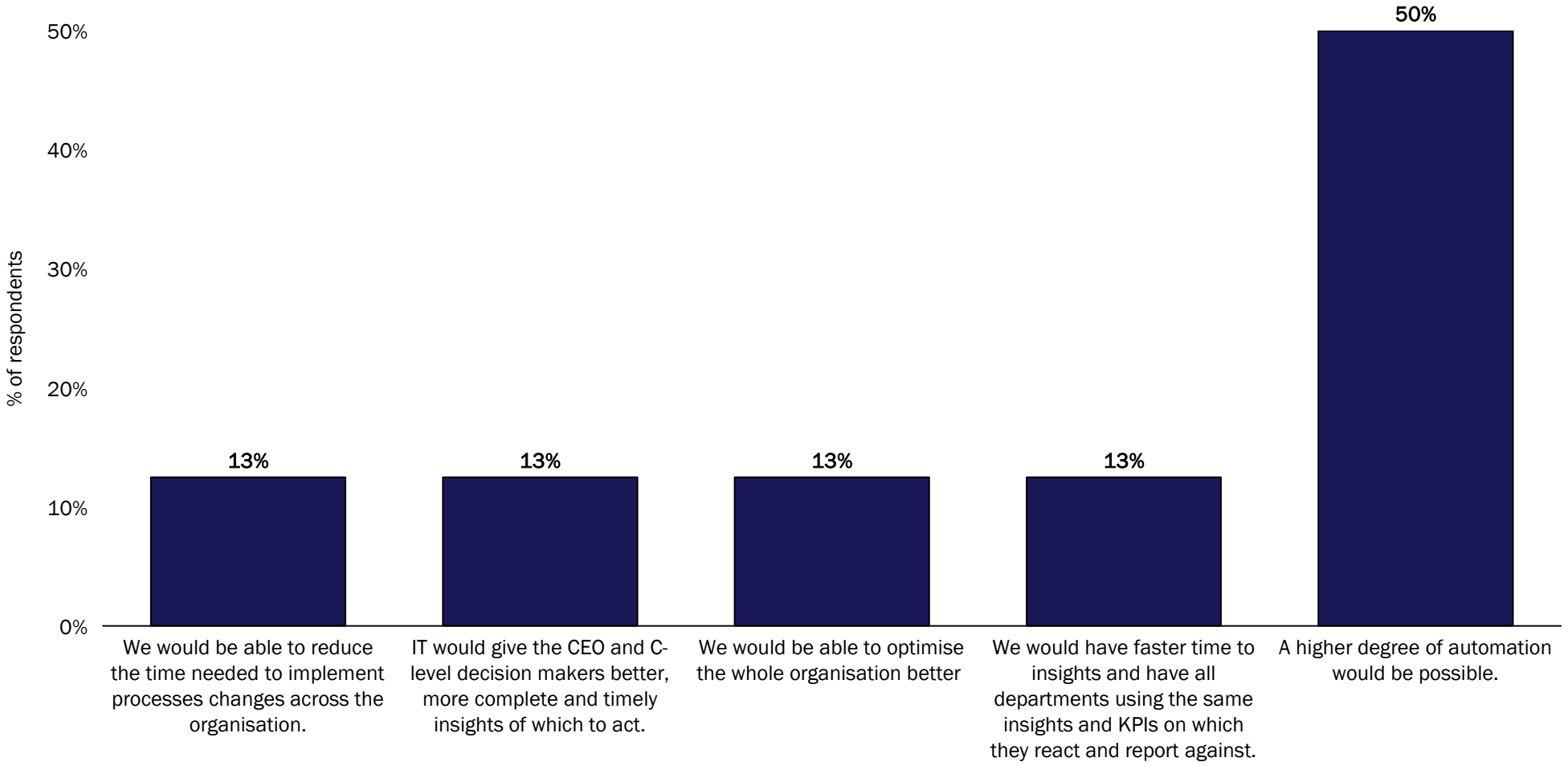
[correlation with Q1] For CSPs that are more mature in CI, a higher degree of automation is the standout benefit

CSP benefits of Centralised Intelligence approach, among CSPs that selected "…it goes beyond data to be an CI approach" in Q1.



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CSPs have resorted to an array of AI/ML use cases to improve marketing efficiency, customer satisfaction, network performance and operational efficiency

Use cases of AI/ML from surveyed CSP executives by category*

Marketing-related

- Sales and marketing
- Sales analytics
- Identifying marketing trends
- Customer segmentation
- Recommendation engine
- Online direct sales,

Customer-related

- Self-service channels
- Chatbot/ live chat/, virtual assistant
- Voice recognition
- Authentication
- Validation
- Information/data security
- Fraud detection
- CRM, customer monitoring

Network-related

- Incident triage and resolution
- Performance monitoring/ network monitoring
- Network change requests
- Network optimisation
- Operational alert/isolation of network trouble
- Predictive maintenance/ preventative maintenance
- Insight into ops data

Others

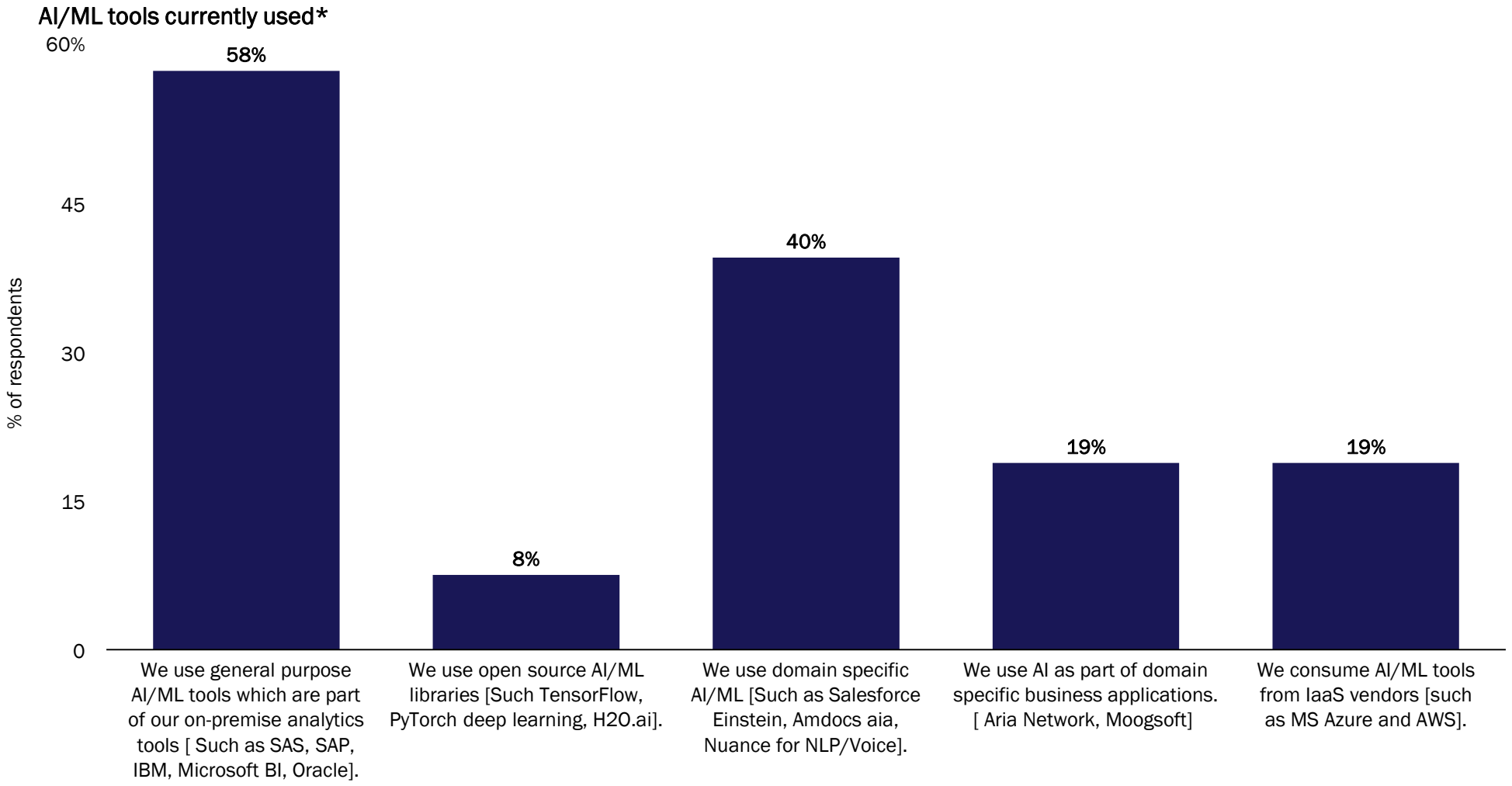
- Report generation
- Automation of processes within knowledge base
- Robust handoff between departments
- Automating IT processes
- Invoicing

Top 5 most-quoted use cases, the majority come from the customer-related category

- Sales and marketing
- Chatbot
- Fraud detection
- CRM, customer monitoring
- Network optimisation

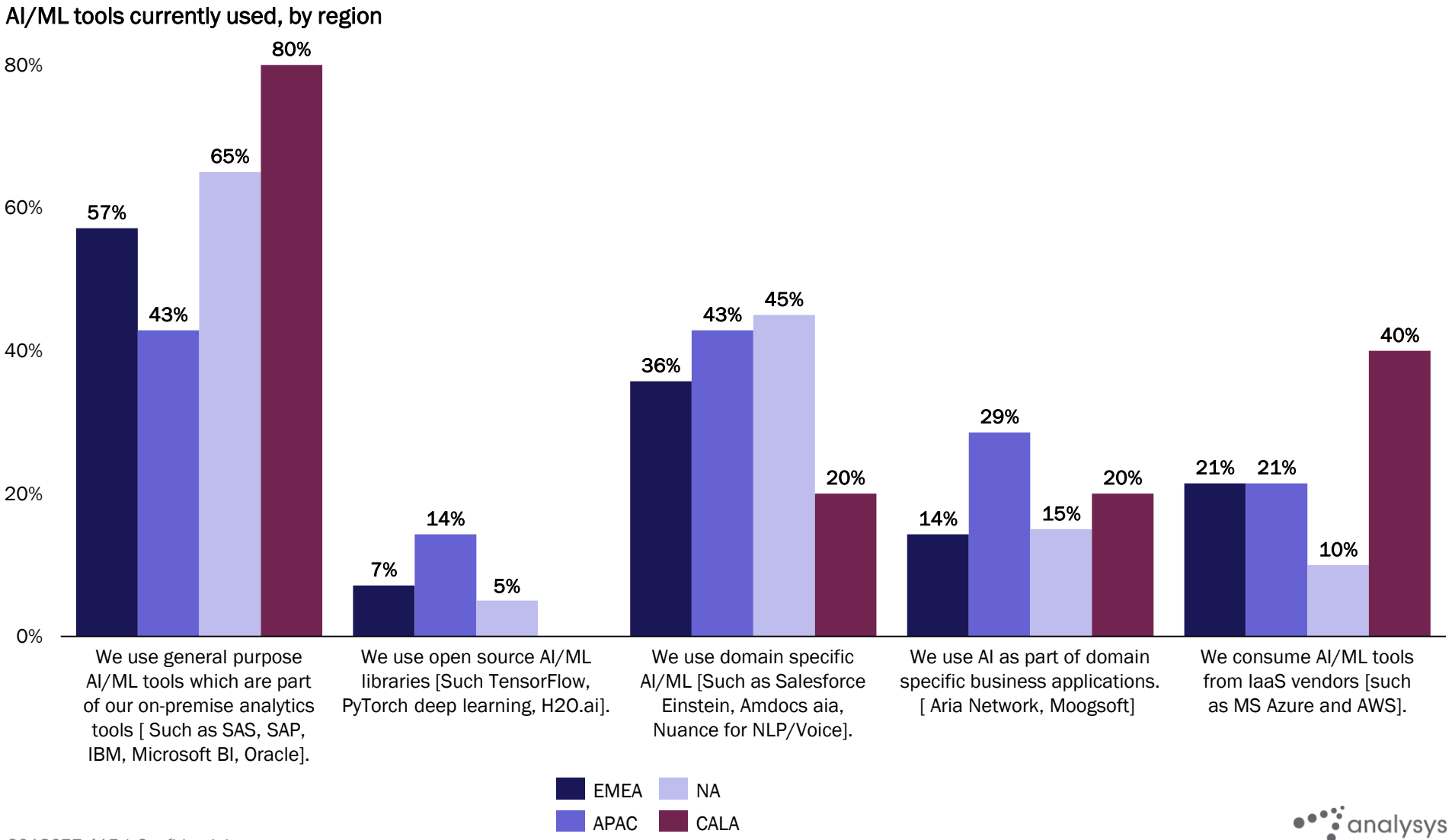
*: Q6: What are the 3 most common use cases your organisation uses AI/ML for today?

General purpose tools came out top among surveyed CSPs and open source emerged as the least favoured choice



*: Q7: What AI/ML tools do you use today to support the most common use cases? [Select all that apply]

NA CSPs count general purpose and domain specific tools as their favourite types of AI/ML tools



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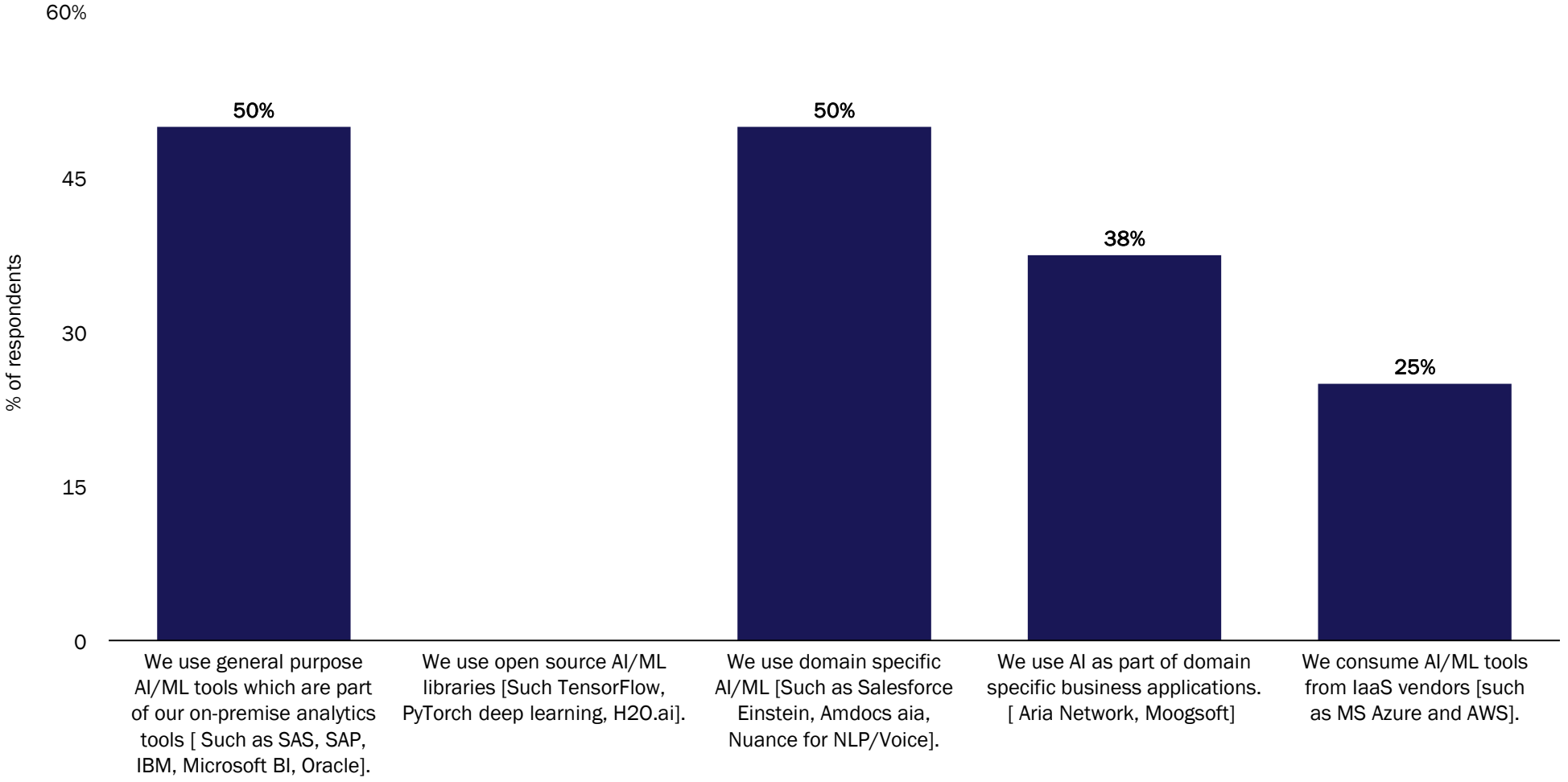
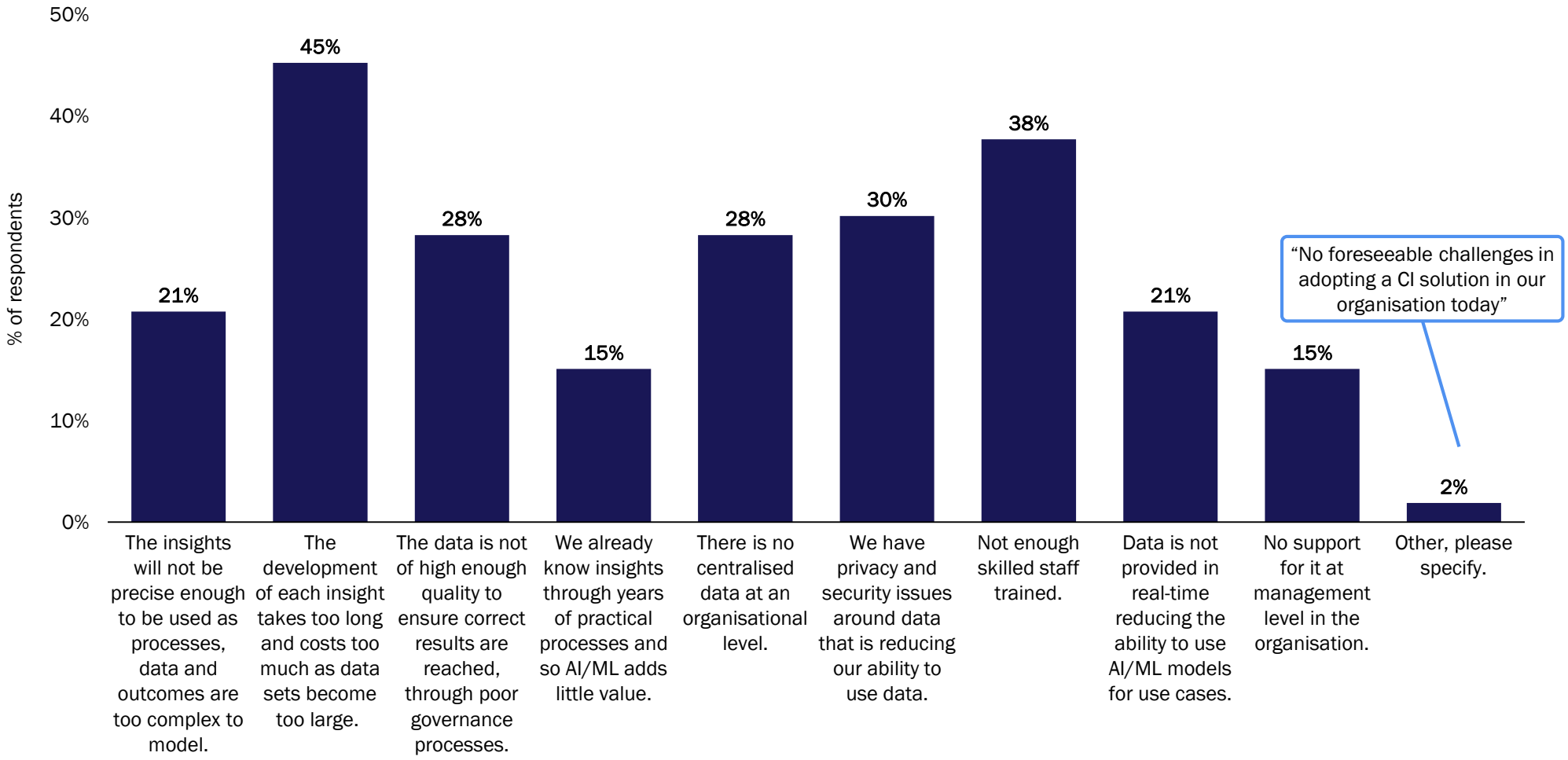
[correlation with Q1] For CSPs more mature in CI, they are relatively more likely to use domain specific applications, business applications and tools from IaaS vendors

AI/ML tools currently used, among CSPs that selected "…it goes beyond data to be an CI approach" in Q1.



The biggest challenges to CI are development of insights taking too long due to data sets becoming too large and a lack of skilled staff

Expected challenges of adopting a Centralised Intelligence approach*



*: Q8: What do you foresee as challenges in adopting a CI solution in your organisation today? [Select all that apply]

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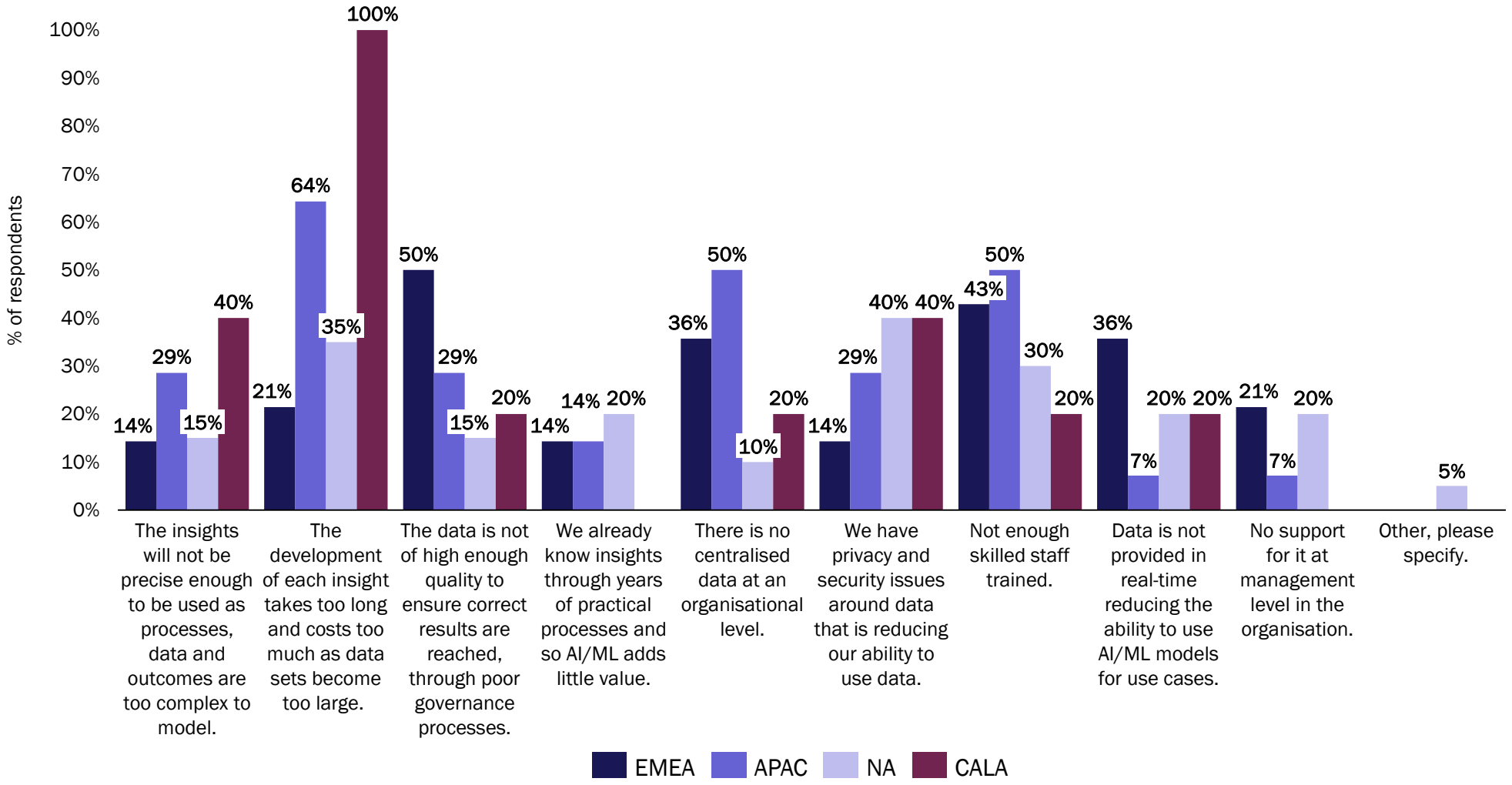
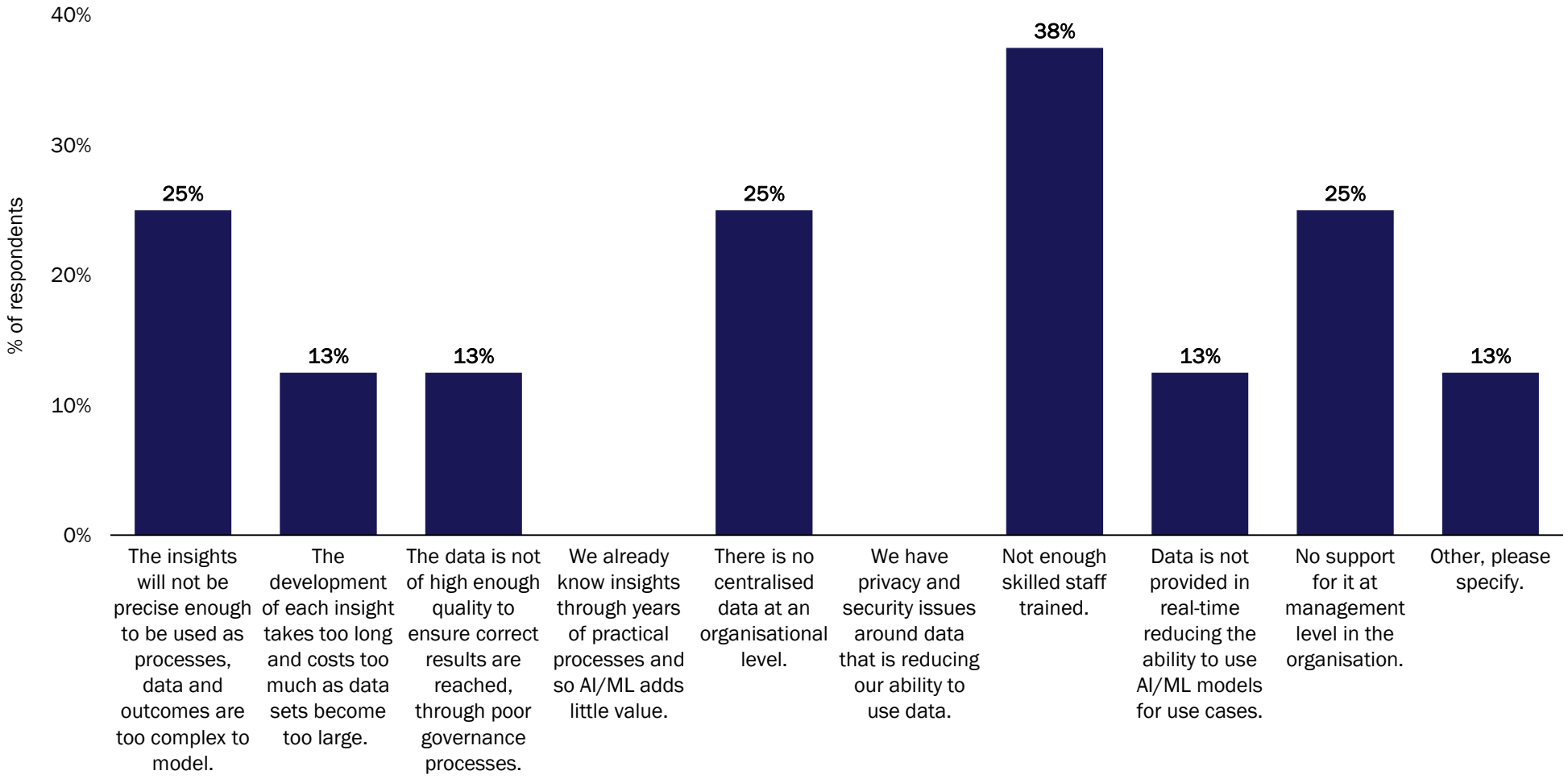
Both CALA and APAC CSPs were concerned about costs being too high while EMEA CSPs worried about data quality and NA CSPs about privacy and a lack of staff

Expected challenges of adopting a Centralised Intelligence approach, by region



[correlation with Q1] Among CSPs more mature in CI, staffing is the biggest headache

Expected challenges of adopting a CI approach, among CSPs that selected "...it goes beyond data to be an CI approach" in Q1.



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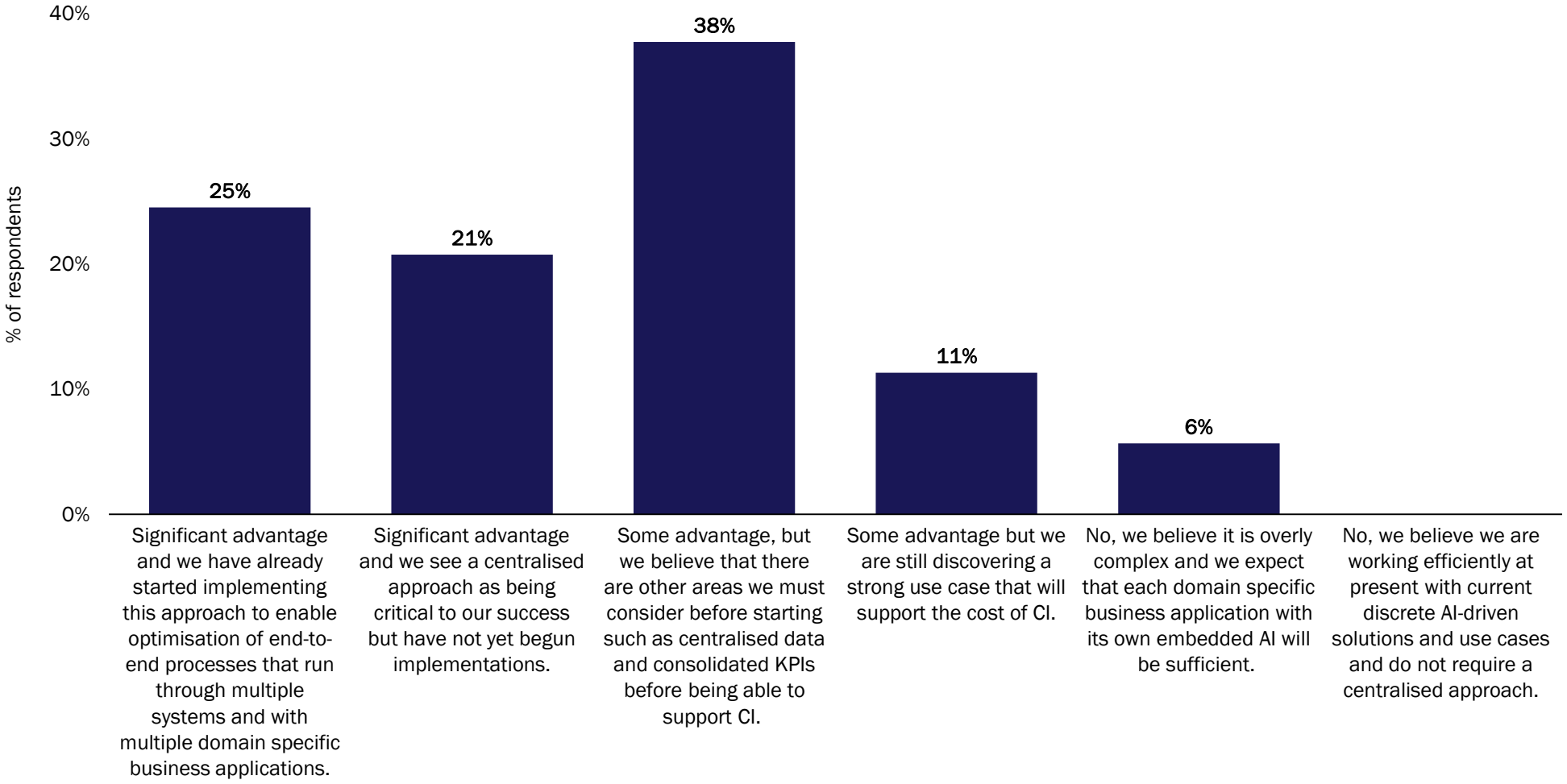
Nearly half surveyed of CSPs believe CI will bring about significant advantage

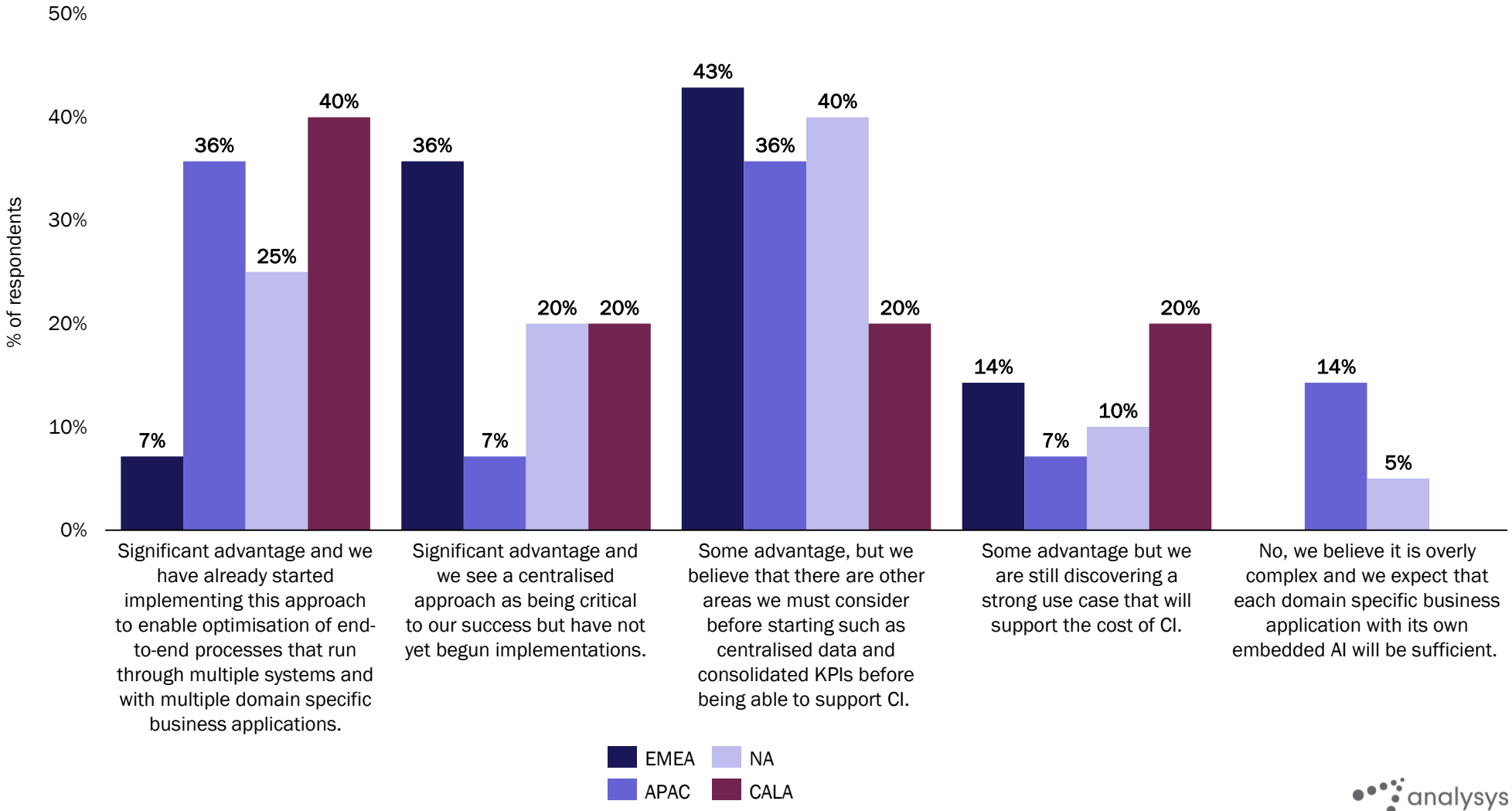
Expected advantage brought about by a Centralised Intelligence approach*



*: 9: Do you feel that a CI approach is important enough to budget and prioritise to bring the right approach and advantage? [Select one answer only]

APAC and CALA CSPs thought CI can bring about significant advantages and have already started work.

Expected advantage brought about by a Centralised Intelligence approach, by region



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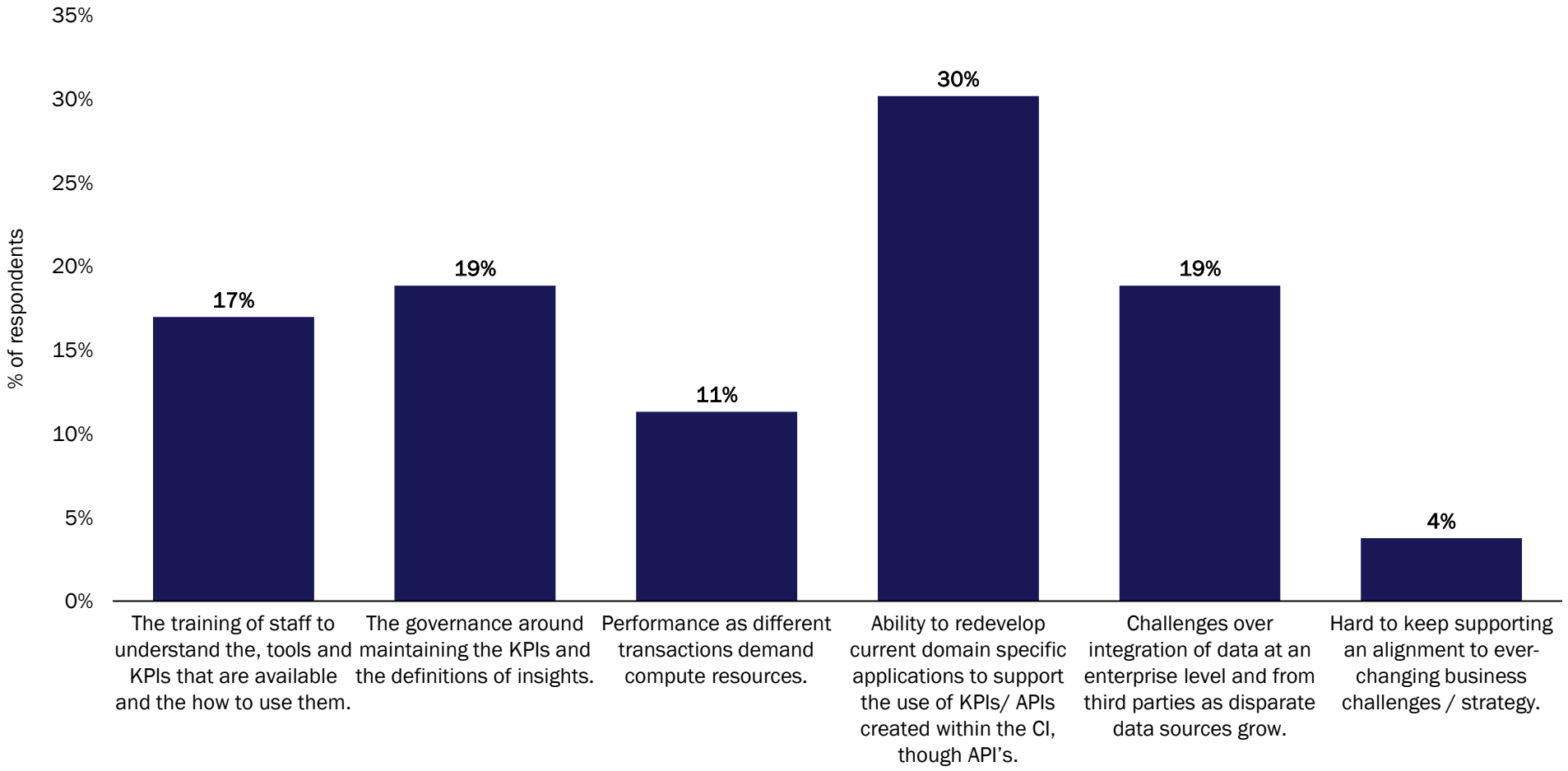
Four challenges stand out - redevelopment of current applications, data integration, governance and staff training

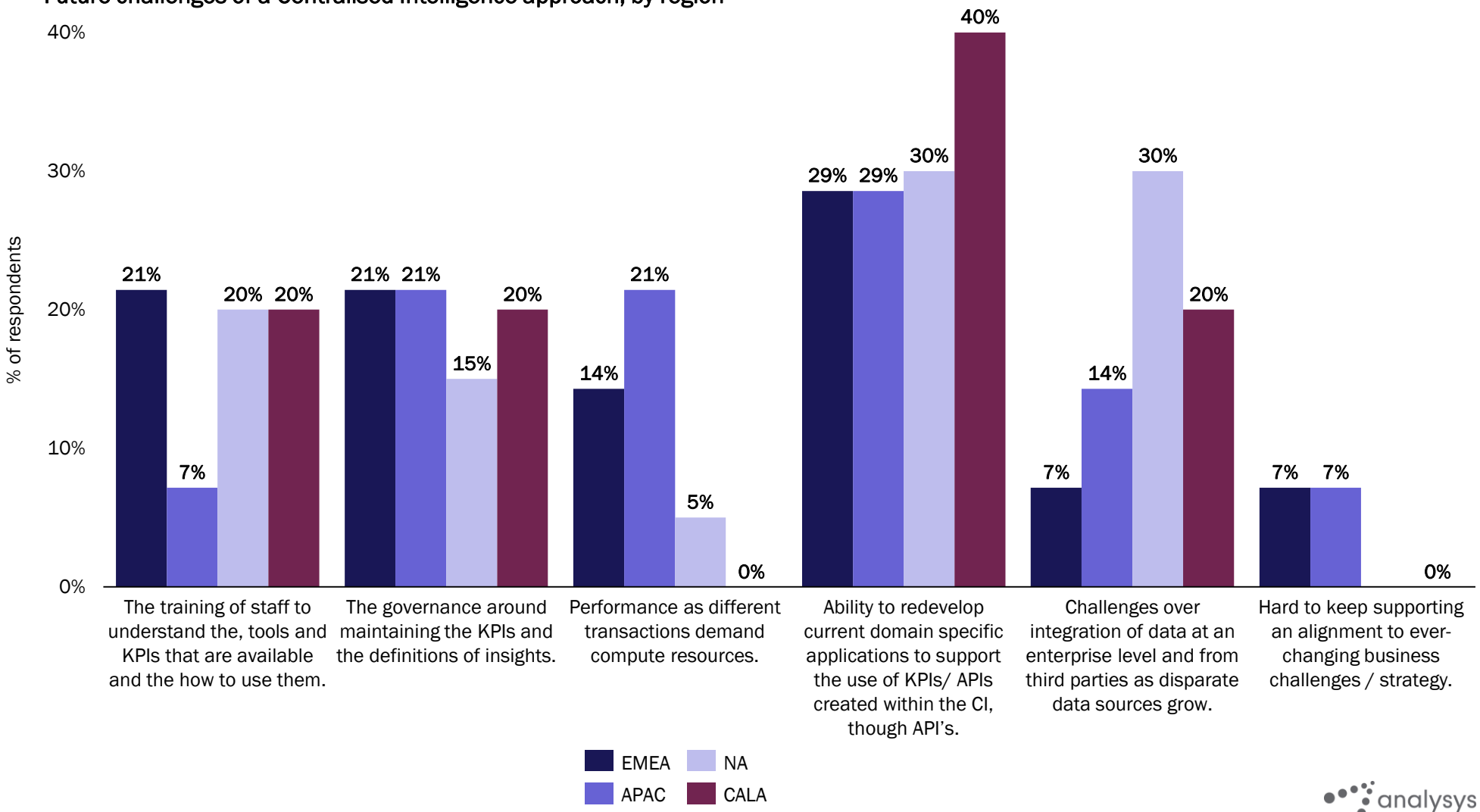
Future challenges of a Centralised Intelligence approach*



*: Q10: What future challenges are you likely to face with a CI approach? [Select one answer only]

Data integration, application redevelopment and staff training are particularly acute challenges for NA CSPs

Future challenges of a Centralised Intelligence approach, by region



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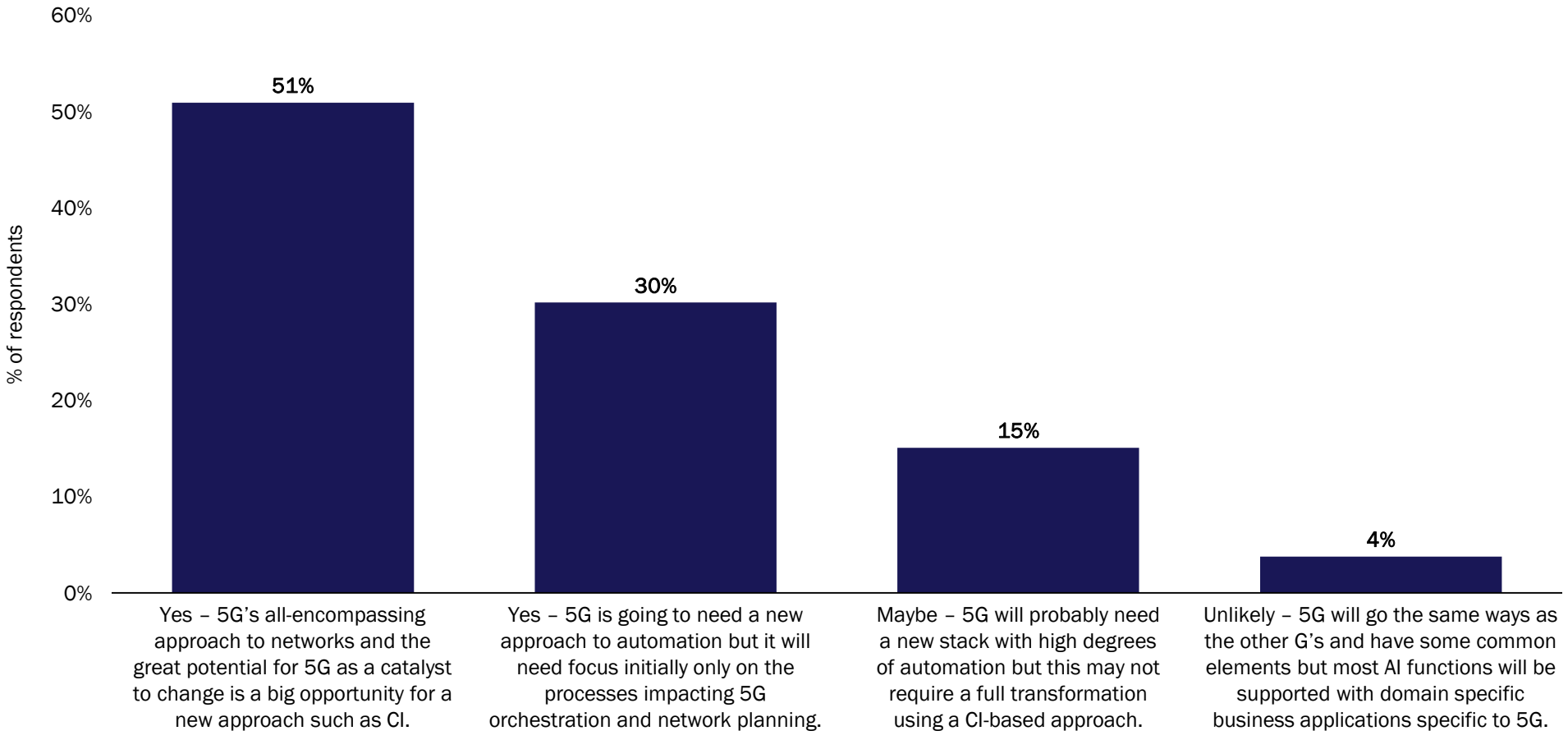
The majority of CSPs see 5G as a significant driver for the adoption of a CI approach

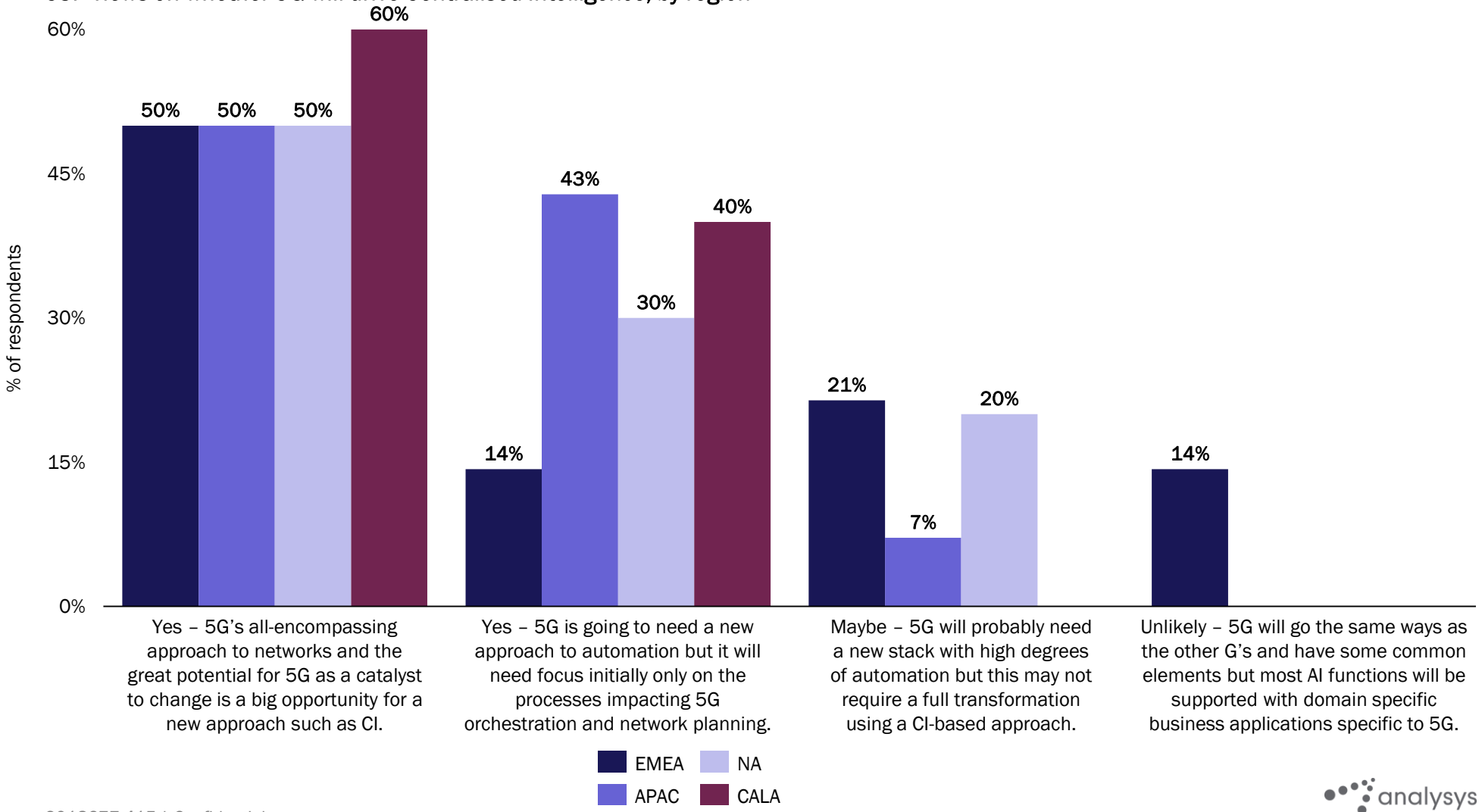
CSP views on whether 5G will drive Centralised Intelligence*



*: Q11: Do you see 5G as a significant driver for a CI approach? [Select one answer only]

CALA CSPs were particularly bullish about 5G's role driving CI adoption and on orchestration

CSP views on whether 5G will drive Centralised Intelligence, by region



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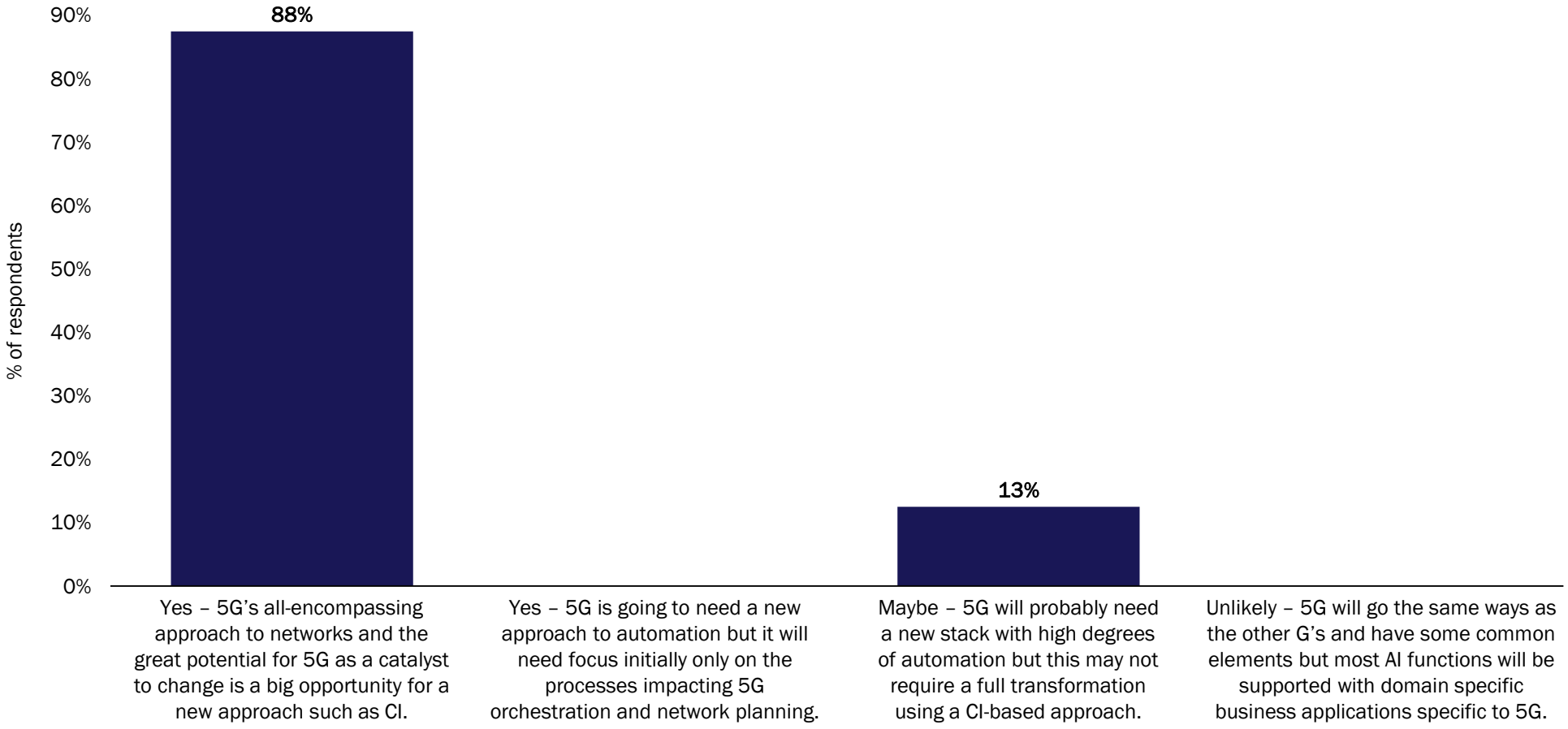
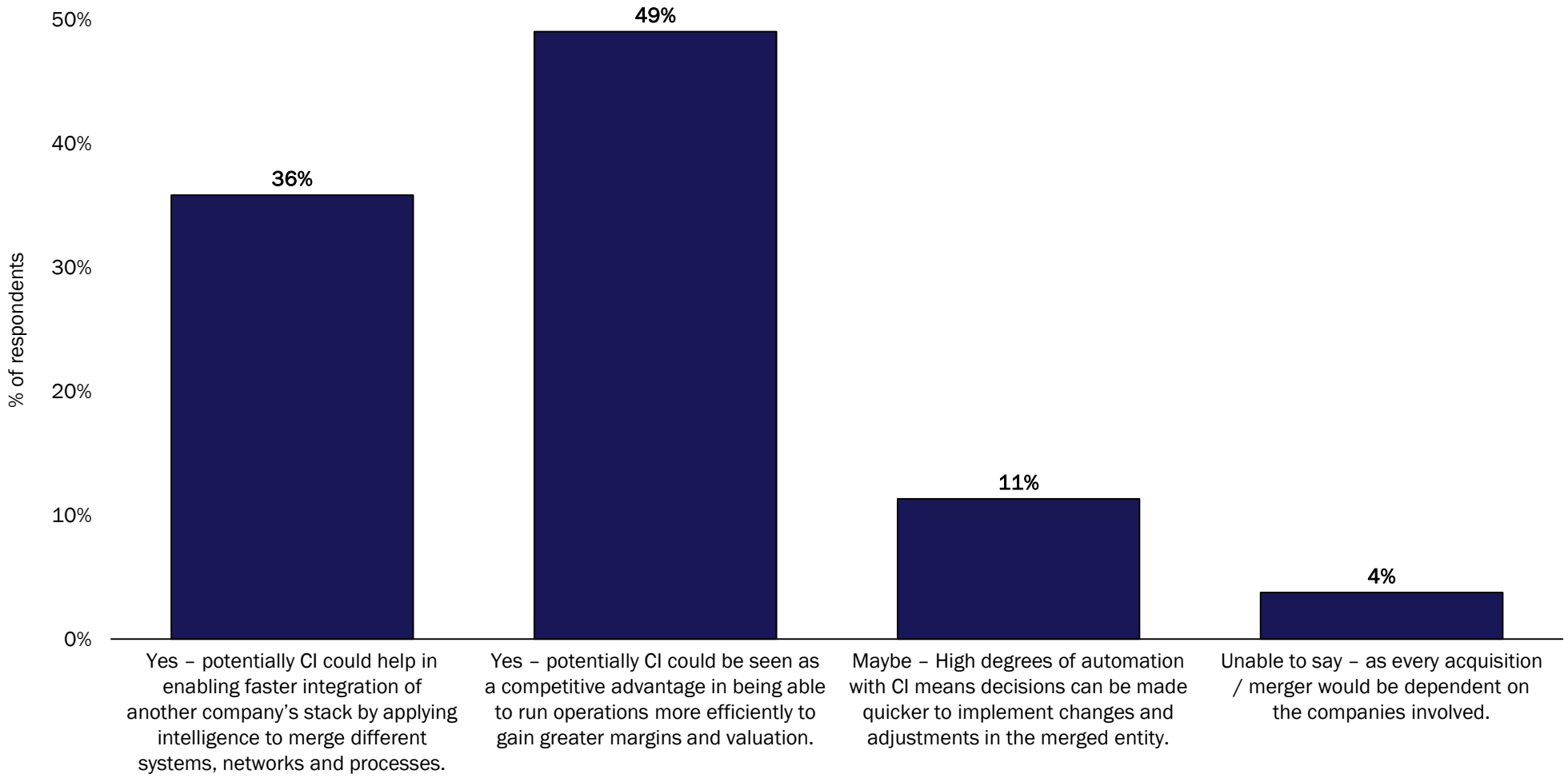
[correlation with Q1] CSPs that are more mature with CI, they are overwhelmingly in favour of the all-encompassing approach

CSP views on whether 5G will drive Centralised Intelligence, among CSPs that selected "…it goes beyond data to be an CI approach" in Q1.



Four fifths said yes to CI being helpful in merger and acquisition transactions

CSP views on whether Centralised Intelligence would be helpful in a merger and acquisition transaction*



*: Q12: Do you see CI as helpful in a merger and acquisition transaction? [Select one answer only]

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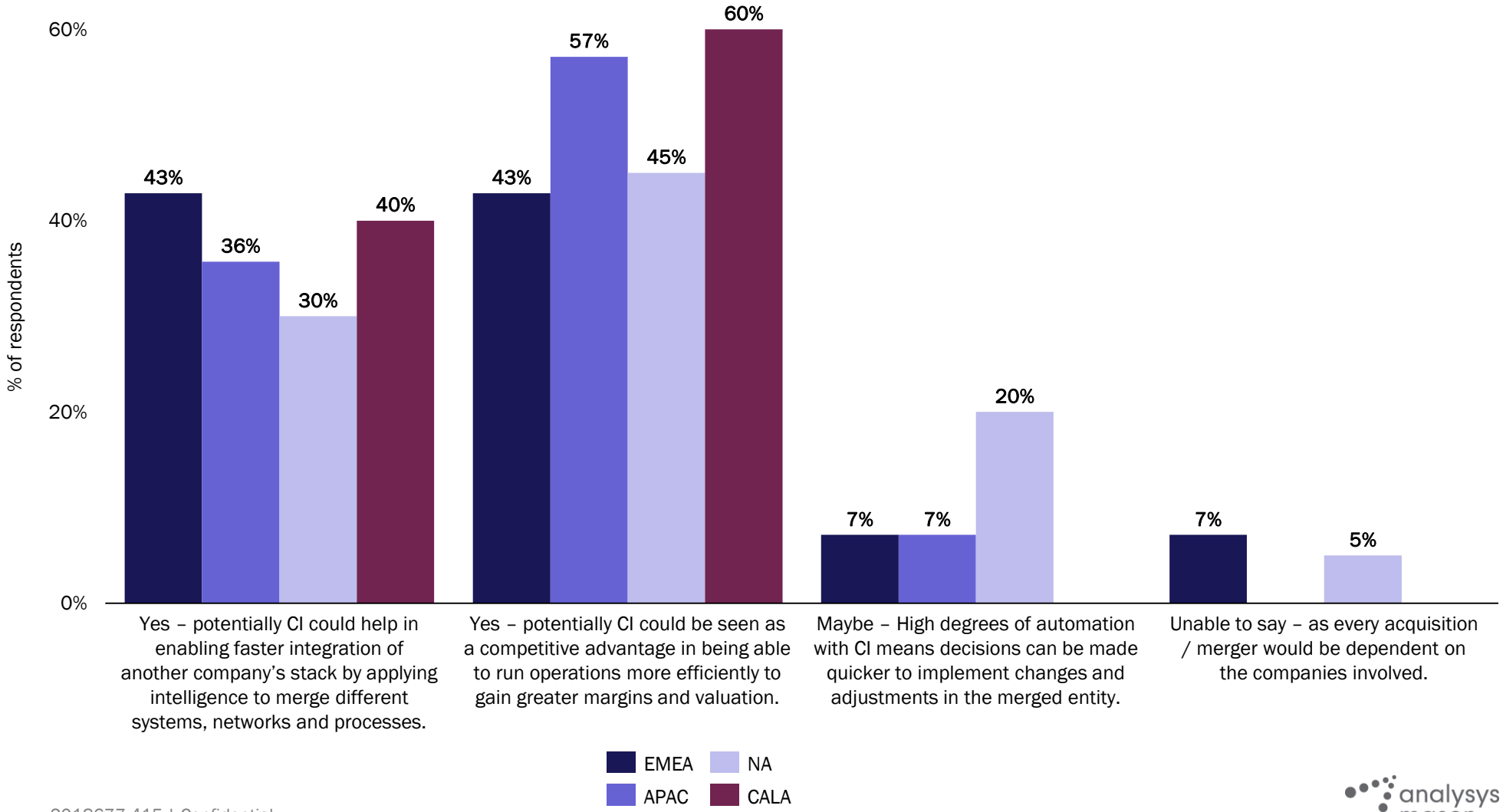
All but a few NA CSPs are positive about the effect of CI in M&A transactions

CSP views on whether Centralised Intelligence would be helpful in a merger and acquisition transaction, by region



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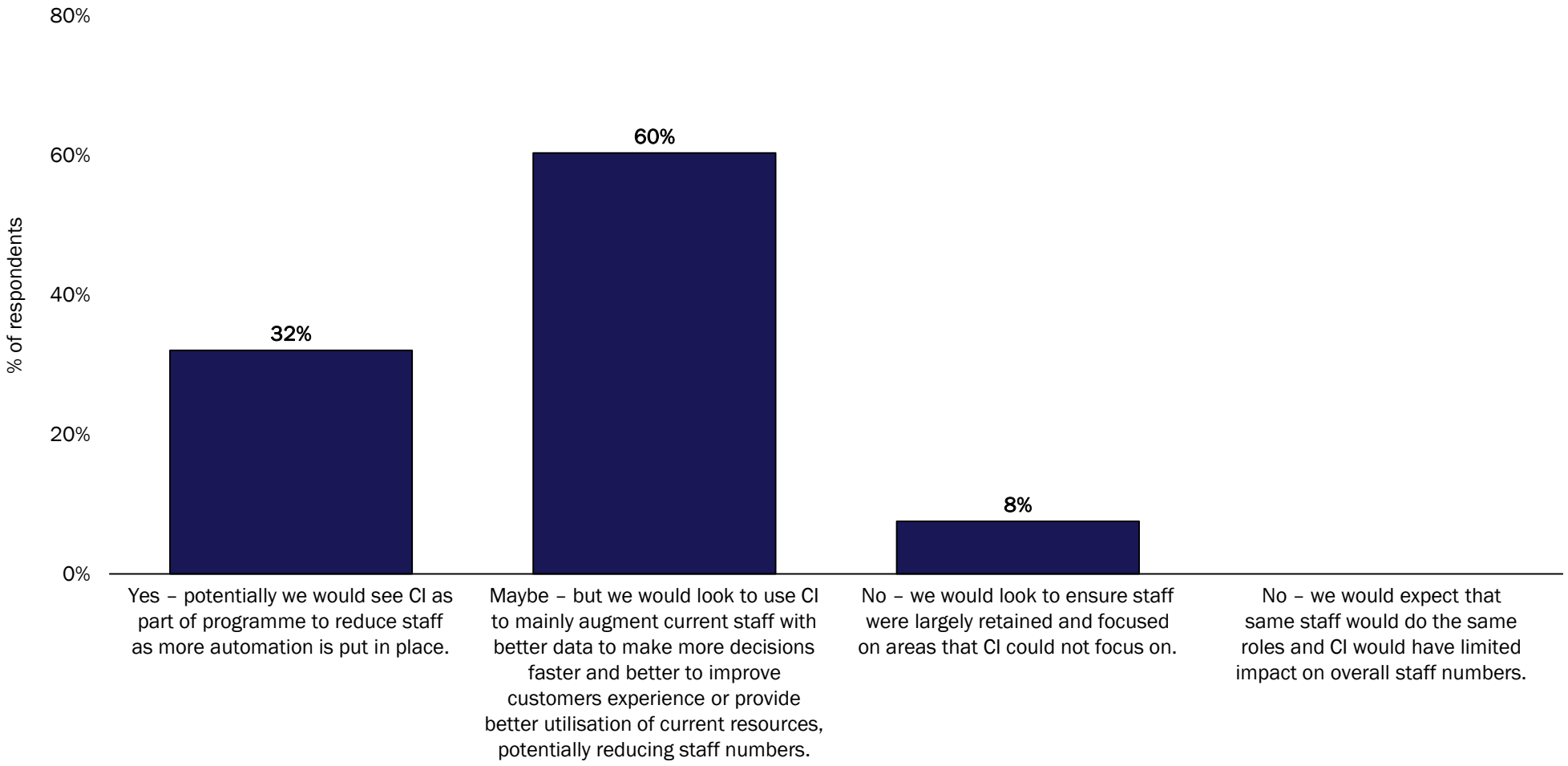
Well over half of surveyed CSPs are saying *maybe* to the impact of CI on staff reduction

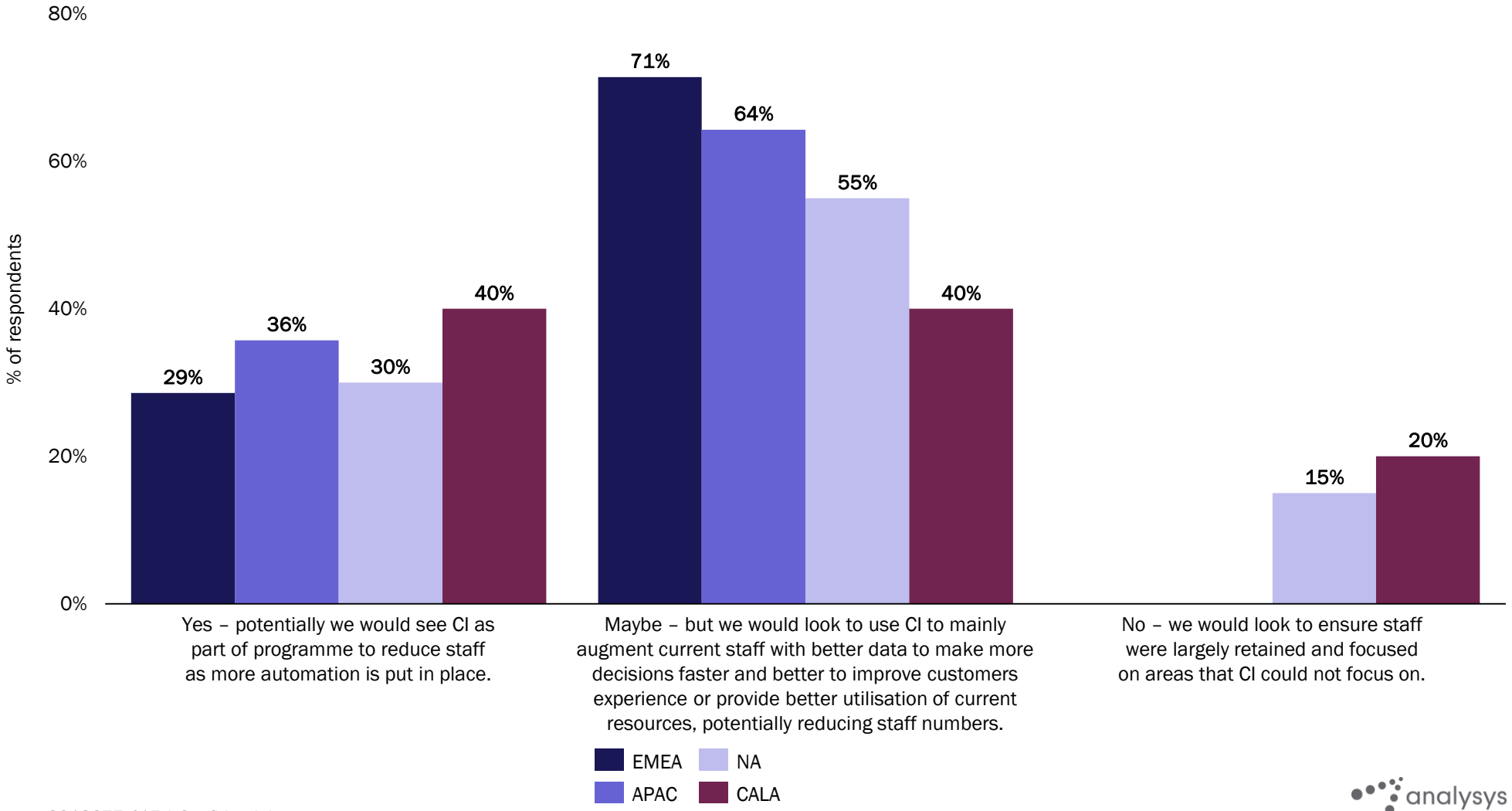
CSP views on whether Centralised Intelligence would reduce staff*



*: Q13: AI is often seen as way of reducing staff – would you see CI as doing this? [Select one answer only]

APAC and CALA CSPs were slightly more certain on staff reduction while EMEA CSPs are more on the side of *maybe*

CSP views on whether Centralised Intelligence would reduce staff, by region



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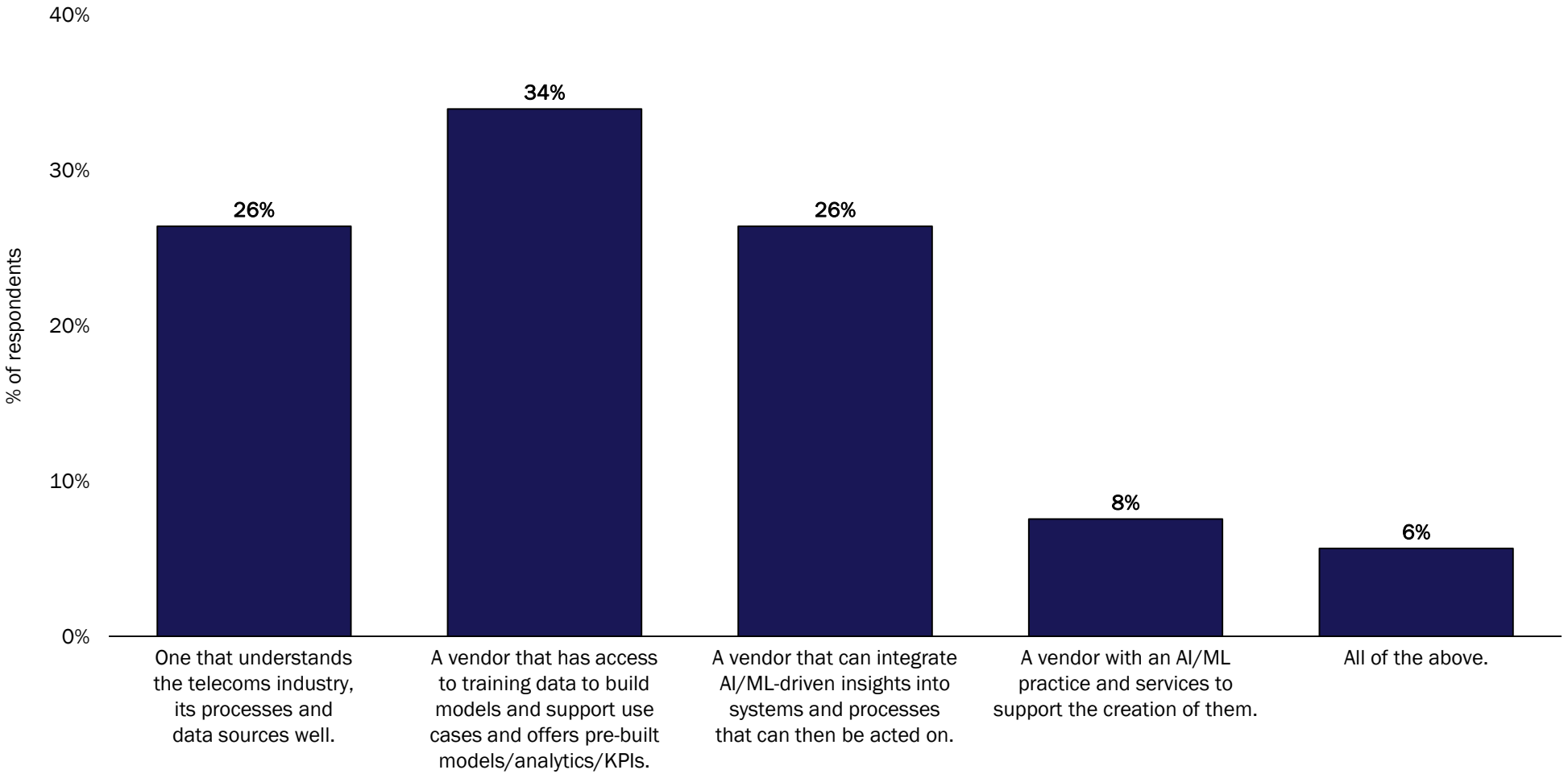
Top 3 characteristics CSPs associate with a good supplier include access to training data, ability to integrate AI/ML insights into systems, and understanding telecoms

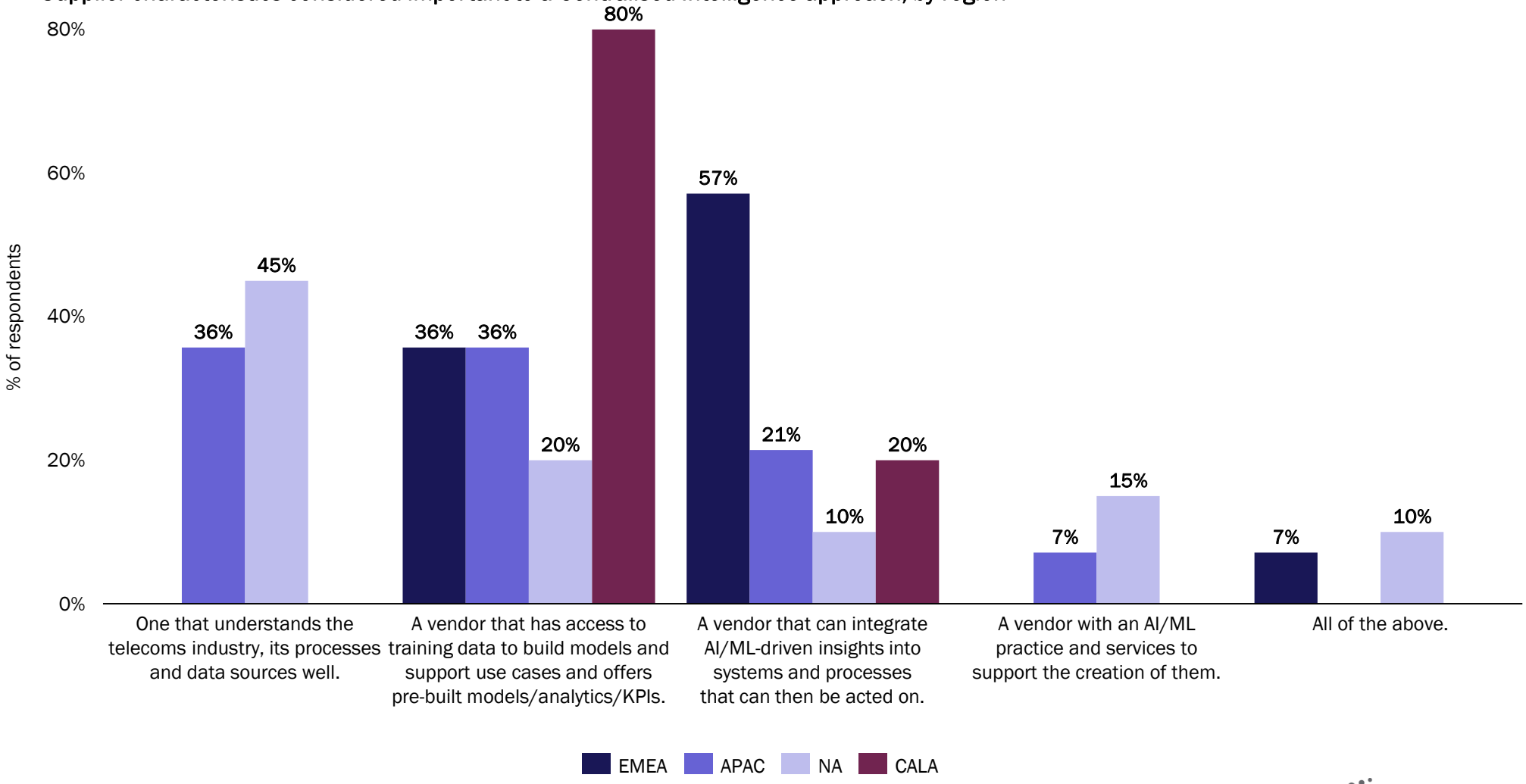
Supplier characteristics considered important to a Centralised Intelligence approach*



*: Q14: What type of supplier characteristics would you consider to be most important to support a CI approach? [Select one answer only]

EMEA CSPs prioritise integration, CALA ones are focused on training data and NA ones on understanding experience in the telecoms industry

Supplier characteristics considered important to a Centralised Intelligence approach, by region



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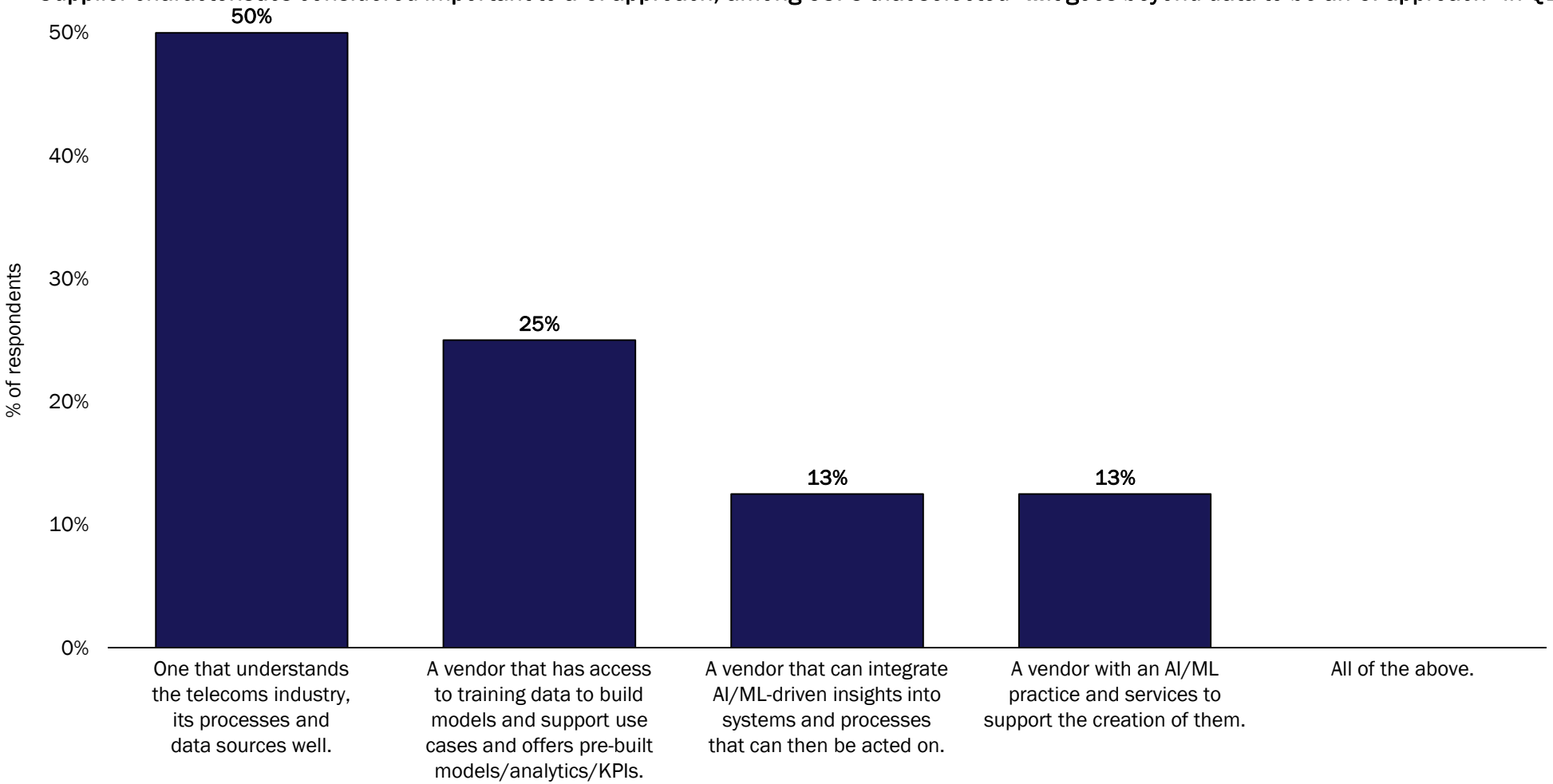
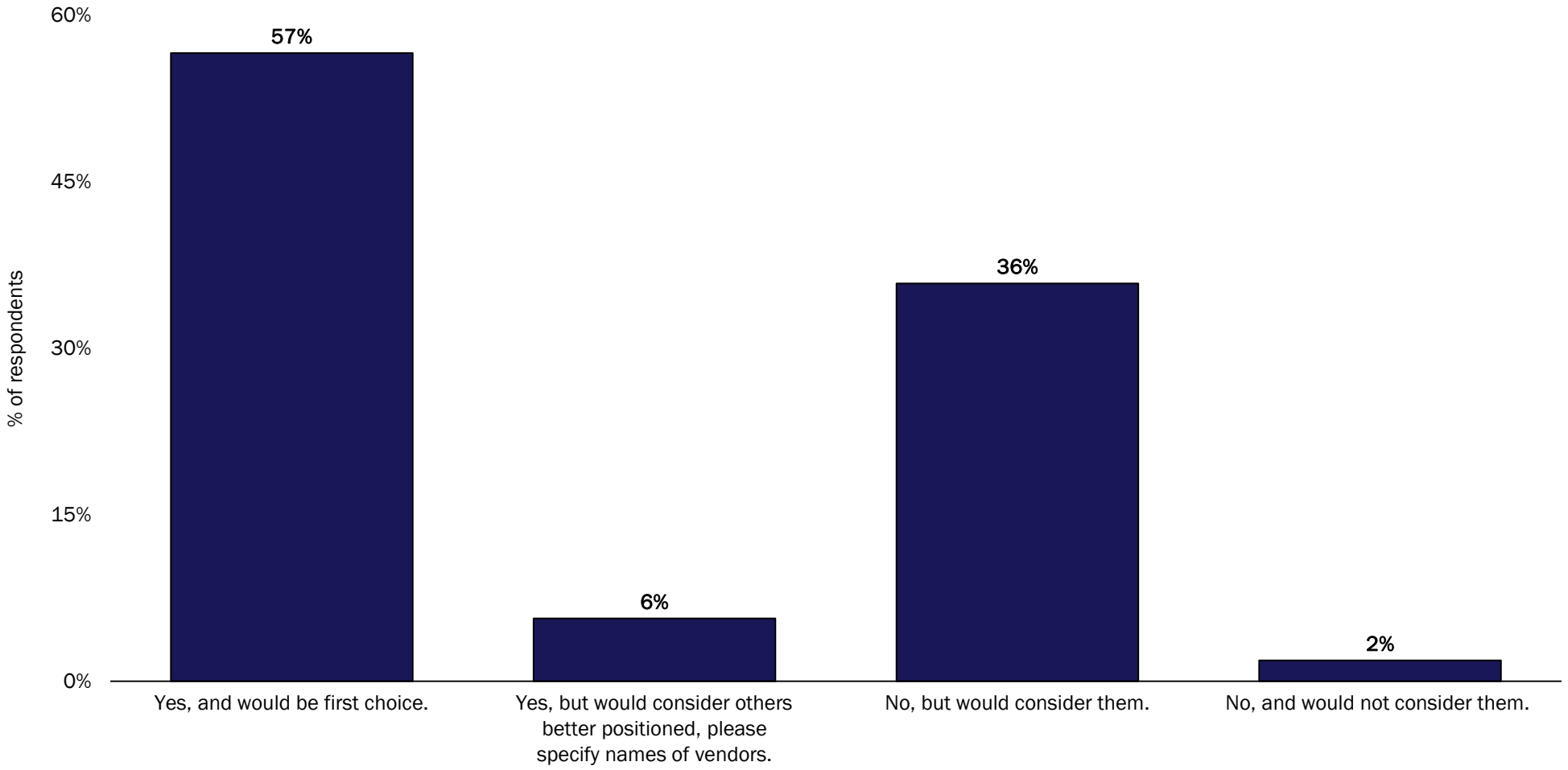
[correlation with Q1] For CSPs that are more advanced in CI, telco expertise is crucial

Supplier characteristics considered important to a CI approach, among CSPs that selected "…it goes beyond data to be an CI approach" in Q1.



Over half of surveyed CSPs considered Amdocs as the first choice provider for AI implementation

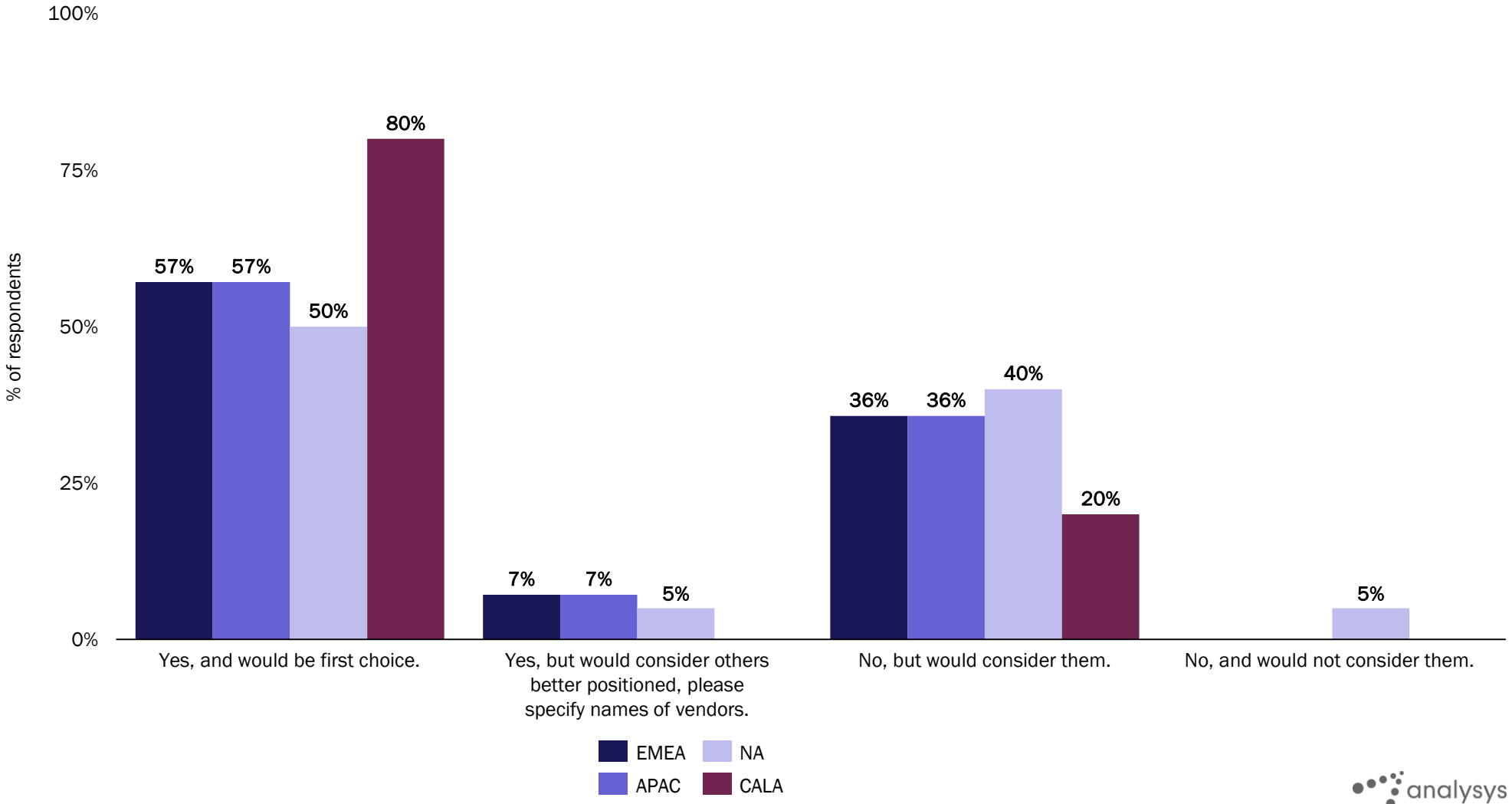
CSP opinion on whether Amdocs is a significant provider of services to support AI implementation*



*: Q15: Would you consider Amdocs as a significant provider of services to support an AI implementation? [Select one answer only]

CSPs from most regions have quite favourable views on Amdocs, the reception among a NA CPSs are marginally not as favourable

CSP opinion on whether Amdocs is a significant provider of services to support AI implementation, by region



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Contents

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Contents

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This section provides a summary of CSPs' views on centralised intelligence and their approaches to AI based on a series of 12 interviews

- To validate the hypotheses relevant to Centralised Intelligence, Analysys Mason has conducted interviews with 12 CSPs around the globe.
- Each interview was structured as an open discussion, rather than a set list of questions, but aimed to cover the following areas:

1. ***Organisation approach to AI.*** Explore CSPs' current approaches to Artificial Intelligence and Machine Learning, including how much centralised intelligence capabilities are prioritised

2. ***Benefits and challenges of CI.*** Discusses the benefits and challenges CSPs will encounter both internally and externally as they evolve their centralised intelligence approaches

3. ***Supplier decisions.*** Explore the factors affecting choices of AI solution suppliers, including desired supplier characteristics as well as how current use cases are supported

- The following slides offer an aggregated summary of the interviews provided by CSPs interviewed across these three key areas

Introduction – All but one CSP interviewed are Tier-1&2

Profile of CSPs interviewed

No.	Region	Tier	Position
1	Europe, Middle East and Africa	1 & 2	Business and Digital Transformation Manager
2	North America	3 & 4	Monitoring & Automation Manager
3	Asia Pacific	1 & 2	Business Unit Head
4	North America	1 & 2	AI Product Owner
5	North America	1 & 2	Executive Director of IoT, AI and ML
6	North America	1 & 2	AI and ML Manager
7	North America	1 & 2	Senior Manager for Data Science and Products
8	North America	1 & 2	Project manager , AI/ML products
9	Asia Pacific	1 & 2	Development Lead Manager for IT and ML Automation
10	Europe, Middle East and Africa	1 & 2	CIO
11	Latin America	1 & 2	Sub Director of Cloud Technologies and IT
12	Latin America	1 & 2	Director of IT Infrastructure

Source: Analysys Mason

1 Organisation approach to AI. CSPs highly prioritise CI approaches but not many have made significant progress in implementation

Current approach to AI/ML	▪ ***A majority of CSPs are using domain specific applications of AI and ML, or domain specific applications in addition to a specialised analytics team.*** Only a couple of interviewees were currently employing a centralised intelligence approach.
Greatest challenges with current AI approach	▪ ***Lack of co-ordination was the biggest issue***. The majority of CSPs mentioned a lack of centralised or uniform data as the greatest challenge with their current AI approach, particularly among the large North American operators. There was also a lack of co-ordination with tools and techniques- one North American CSP commented *"We have a hotchpotch of different AI and data solutions living in one infrastructure",* with another CSP saying *"the challenges with those teams is moving the data, it is all over the place".* ▪ ***CSPs were also concerned about a lack of in-house skills.*** The second most common response referred to a lack of in-house skills and staff that could implement and maintain AI solutions. This was a point touched on later in the interview, as many interviewees mentioned the need to hire staff to work on AI and data analysis teams – *"you're going to have to broaden your team, add more data scientists and business scientists".* ▪ ***Some CSPs mentioned a lack of high quality data.*** One Latin American operator in particular had concerns that the quality of the data they had available would not lead to effective and beneficial results. This was also echoed by some North American CSPs.
Priority of building Centralised Intelligence capability	▪ ***The majority of CSPs called Centralised Intelligence a high priority.*** Only 3 CSPs considered CI a low priority and another 2 considered CI a medium priority that they were still in the process of planning. One CSP said *"The leadership has seen the value in this and they believe in it and that is why a programme has been made and dollars have been spent".* ▪ ***Almost all CSPs agreed that CI approaches would bring 'significant advantages'.*** Only 3 CSPs stated CI would bring some advantage but that other areas must be considered.
Scope of centralised intelligence approach	▪ ***CSPs had a wide range of scopes for their centralised intelligence approaches.*** CSPs interviewed were split fairly evenly between building a CI approach to support all departmental processes, planning a CI approach with common data and tools for some inter-departmental modelling, and not specifically planning a CI approach at all.

Source: CSPs, Analysys Mason

2 Benefits and challenges of CI. Most CSPs believed that CI could provide a number of benefits, and many saw changing organisation culture as the main challenge

Benefits of adopting a CI solution

- ***Faster time to insights was the most mentioned benefit to a CI approach.*** CSPs mentioned a number of key benefits to a centralised intelligence approach. The most common benefits included faster time to insights, optimisation of the organisation as a whole *("Efficiency gain of probably 25-30%")* and more complete insights for C-level decision makers to act on. Some also mentioned the benefit of having all departments using the same insights and KPIs, which aligns with the earlier challenge of lack of co-ordination. Other benefits that were mentioned included a higher degree of automation and reduced time to implement changes across the organisation.
- ***CI enables faster integration in M&A.*** 2/3 of CSPs saw centralised intelligence enabling faster integration in merger and acquisition transactions; one CSP said *"it would help you see the customer data and metrics and make them a lot more adjustable- it makes it an easier transition".*
- ***CSPs disagreed CI would lead to staff reduction.*** Interviewees often saw a centralised intelligence approach requiring the hiring of new staff, with any reduction in headcount coming a long way down the line.
- ***Almost all CSPs saw 5G as a driver of CI.*** Interviewees saw the explosion in data generated by the introduction of 5G as very helpful in enabling AI and CI approaches. The only exception came from one working for a fixed- line CSP, who felt that the increase in data provided by 5G was immaterial because enough data could be generated already.

Challenges to adopting a CI solution

- ***CSPs face a wide range of current challenges.*** One of the most commonly mentioned challenges was that insights would not be precise enough to be useful at present, or similarly that data and outcomes are currently too complex to model. Another common challenge was a lack of support at management level in the organisation, with one damning comment stating *"AI is considered to be a threat to the current leadership"*. Other challenges included data being either unavailable in real-time, not of high enough quality or not being centralised. Again, a lack of skilled staff was also highlighted by interviewees in this context.
- ***The greatest challenge for the future was changing organisation cultures.*** The most mentioned challenge was that organisation or management culture had to be changed to fully support a CI approach. One CSP said "*The potential of AI is pretty much established. It is only the perceived threat to leadership that makes it difficult"*, while another said "*It is about having people give up the control they seem to think they have over data, and working together"*. Other future challenges mentioned included cost, training of staff and integration of data.

Source: CSPs, Analysys Mason

3 Supplier decisions. The most desirable supplier characteristic was a good understanding of the telecoms industry

AI/ML tools used today to support common use cases	▪ ***The most common use case for AI today was in customer interfaces*** Every CSP had used AI in customer-facing roles, with conversational AI and natural language processing to enable call reduction, call centre optimisation and better resource allocation. Similarly, AI was used in chat bots for predictive live chat. Other uses included proactive network monitoring, network automation and image recognition. ▪ ***CSPs use open source libraries or tools from IaaS vendors to support these use cases.*** The most common AI/ML tools used to support these use cases were open source libraries such as PyTorch, or from vendors such as Microsoft Azure or AWS.
Most important supplier characteristics	▪ ***Most CSPs felt that an understanding of the telecoms industry was important.*** Around half of CSPs interviewed required a good understanding of the telecoms industry and its associated processes and data sources, while many considered it beneficial. However, one interviewee stated a strong preference for a vendor without industry experience, stating *"I think the problem is that if you have done it twenty times then you have found ways to get around the challenges which means that when you have already found a way around a particular challenge then you get lost in a state that is inefficient."* ▪ ***CSPs considered the ability to integrate insights important.*** The second most desirable characteristic was an ability to integrate insights into systems and processes that could then be acted on. This may be borne out of current struggles with producing valuable insights, with CSPs increasingly looking to vendors that can provide more complete solutions. ▪ ***Two CSPs specifically desired hybrid approaches to their AI solutions.*** Interviewees from these CSPs stated that no single provider could effectively meet their needs- One said *"Each of these tools are good but none of them have all the attributes"*, while the other was more specific: *"It would be a combination. A cloud platform and a fast service."*
Vendor likely to be chosen to provide AI implementation	▪ ***There was a large variety in responses for which vendor CSPs were likely to go for.*** CSPs mentioned preferred vendors largely based off previous personal experiences, with one preferring a single provider due to problems with integrating multiple providers in the past, for example. Another preferred IBM as they were the existing provider to the organisation. ▪ ***Two interviewees mentioned Amdocs as their first-choice provider***. An executive director of a North American CSP referred to Amdocs in glowing terms *"Amdocs is providing a brilliant system to all the major carriers"*.

Source: CSPs, Analysys Mason

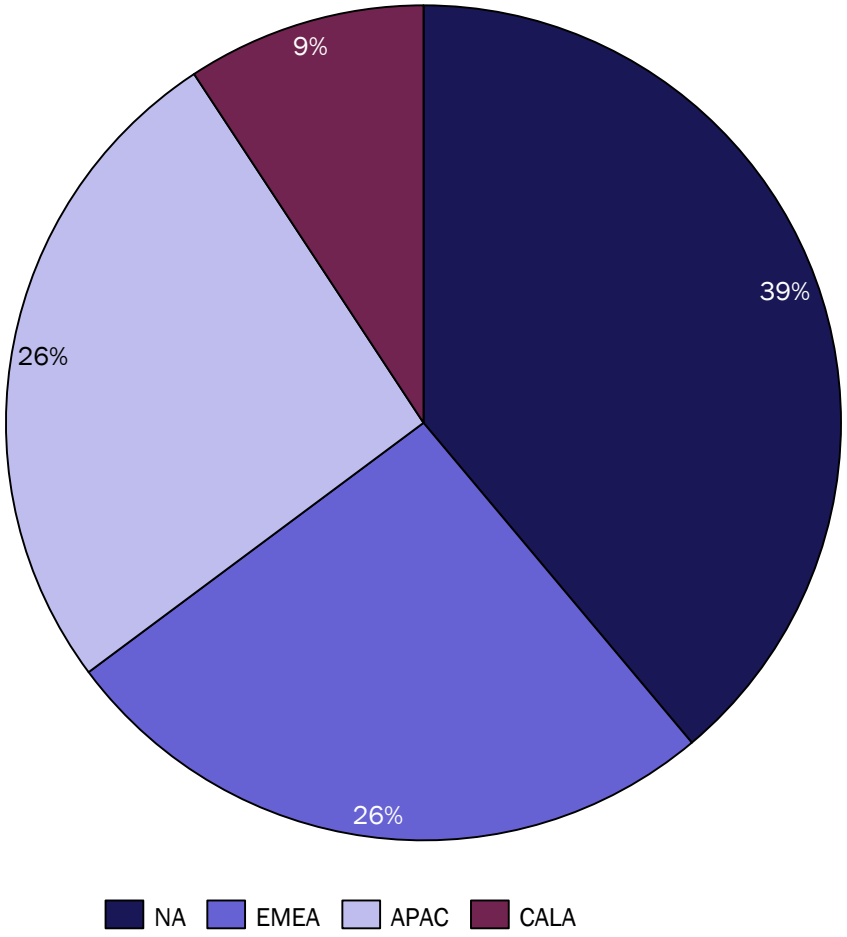
Contents

List of survey respondents

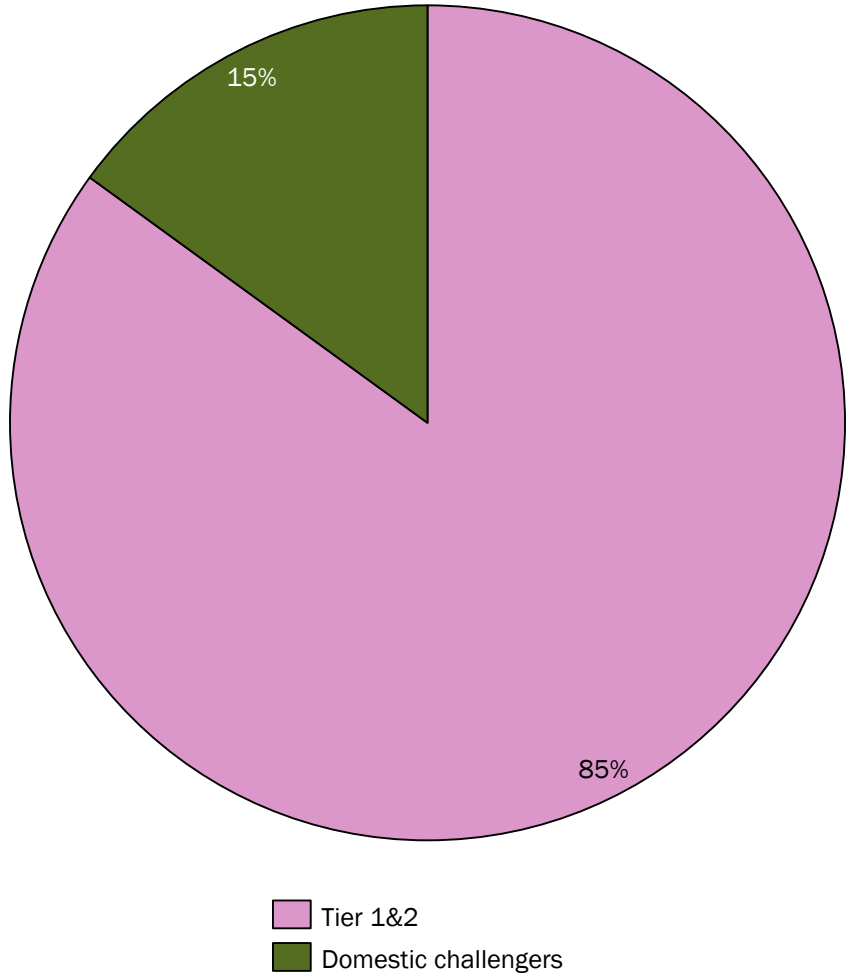
No.	Region	Tier	No.	Region	Tier	No.	Region	Tier
1	APAC	1/2	19	CALA	Domestic challenger	37	APAC	1/2
2	EMEA	1/2	20	EMEA	1/2	38	NA	1/2
3	APAC	Domestic challenger	21	APAC	1/2	39	APAC	1/2
4	APAC	Domestic challenger	22	NA	1/2	40	NA	1/2
5	EMEA	1/2	23	APAC	1/2	41	NA	1/2
6	EMEA	1/2	24	NA	1/2	42	APAC	1/2
7	EMEA	1/2	25	APAC	1/2	43	NA	1/2
8	EMEA	1/2	26	NA	1/2	44	APAC	1/2
9	EMEA	1/2	27	EMEA	1/2	45	NA	1/2
10	EMEA	1/2	28	APAC	Domestic challenger	46	EMEA	1/2
11	APAC	Domestic challenger	29	NA	1/2	47	NA	1/2
12	CALA	1/2	30	EMEA	1/2	48	NA	1/2
13	APAC	1/2	31	EMEA	1/2	49	NA	1/2
14	CALA	Domestic challenger	32	NA	1/2	50	NA	1/2
15	NA	1/2	33	NA	1/2	51	NA	1/2
16	CALA	Domestic challenger	34	EMEA	1/2	52	NA	1/2
17	CALA	1/2	35	APAC	Domestic challenger	53	NA	1/2
18	NA	1/2	36	EMEA	1/2			

The vast majority of survey respondents work for Tier 1&2 CSPs

CSPs surveyed, by region



CSPs surveyed, by tier



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