CSPs' DIY data center network automation: key motivations, challenges and true costs of in-house-built automation

Ameer Gaili, Gorkem Yigit and Caroline Chappell

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Executive summary

Data center network automation is a strategic imperative for every digital organization. This is driven by the need to run business-critical applications in a more reliable and efficient manner and to accelerate digital transformation activities. However, progress in automating data center networks has been limited to-date. The use of fragmented sets of in-house built tools and solutions is prevalent, and this current DIY-based approach to automation is not delivering the desired results.

Juniper Networks partnered with Analysys Mason to gain a deeper understanding of the DIY data center network automation activities within communications service providers (CSPs), enterprises and cloud service providers. We identified the key motivations and challenges of the DIY approach, examined overall data center automation strategies and benchmarked the level of automation across key operational processes. This report focuses on the results from the CSP segment and builds on previous research on the state of CSP data center network automation.[1]

This report showcases the key findings from an online survey of 20 CSPs and complementary deep-dive interviews with senior decision makers and data center network operations staff.

Geography

Western Europe (WE)	4
North America (NA)	3
Developed Asia–Pacific (DVAP)	3
Latin America (LATAM)	3
Central and Eastern Europe (CEE)	2
Middle East (ME)	2
Emerging Asia–Pacific (EMAP)	2
China	1

Total: 20 CSPs

CSP profile

Tier-1 CSPs
80%

Mobile network service provider
85%

Managed ICT provider
75%

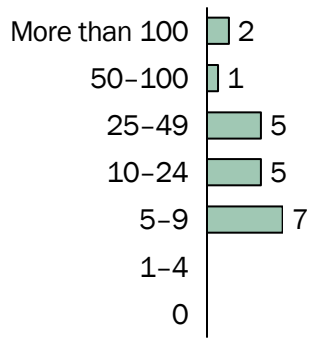
Respondent profile

Head of data center department
13

Network architect
4

Network engineer
3

Data center footprint



Deep-dive interviews with Tier-1 CSPs

- CTO, WE, >100 data centers
- Head of Network, IT and Technology Strategy, NA, 50–100 data centers
- Digital Transformation Leader, NA, 10–24 data centers
- Data center operations manager, LATAM, 1–4 data centers

[1] For more information, see Analysys Mason's *Data center network automation for CSPs: key trends, challenges and requirements for the cloud-native networking era*.

Key findings

Overall data center automation trends

- The level of data center automation among CSPs is low (27%); this is lower than enterprises and cloud providers on average.
- The move to hybrid/multi-cloud environments and the change in data center ownership models are having an increasing influence on CSPs' data center automation strategies.
- 95% of CSPs suffer from operational complexity stemming from vendor/technology silos and fragmented automation solutions.
- The most-automated CSPs are far more operationally efficient than their less-automated peers; this shows the strong ROI/business case for automation.

In-house/DIY data center automation

- DIY tools account for 57% of CSPs' data center network automation solutions used across Day 0, 1 and 2 operations.
- The use of DIY tools is primarily driven by the need to stitch together complex multi-vendor network environments.
- The least-automated CSPs rely considerably more on DIY tools than average, thereby indicating the inefficiencies of the DIY-heavy automation approach.
- CSPs are not fully satisfied with the outcome of their DIY automation activities; many CSPs would opt for third-party vendors' automation solutions in retrospect.

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Overall data center automation trends

The state of in-house data center automation

Recommendations

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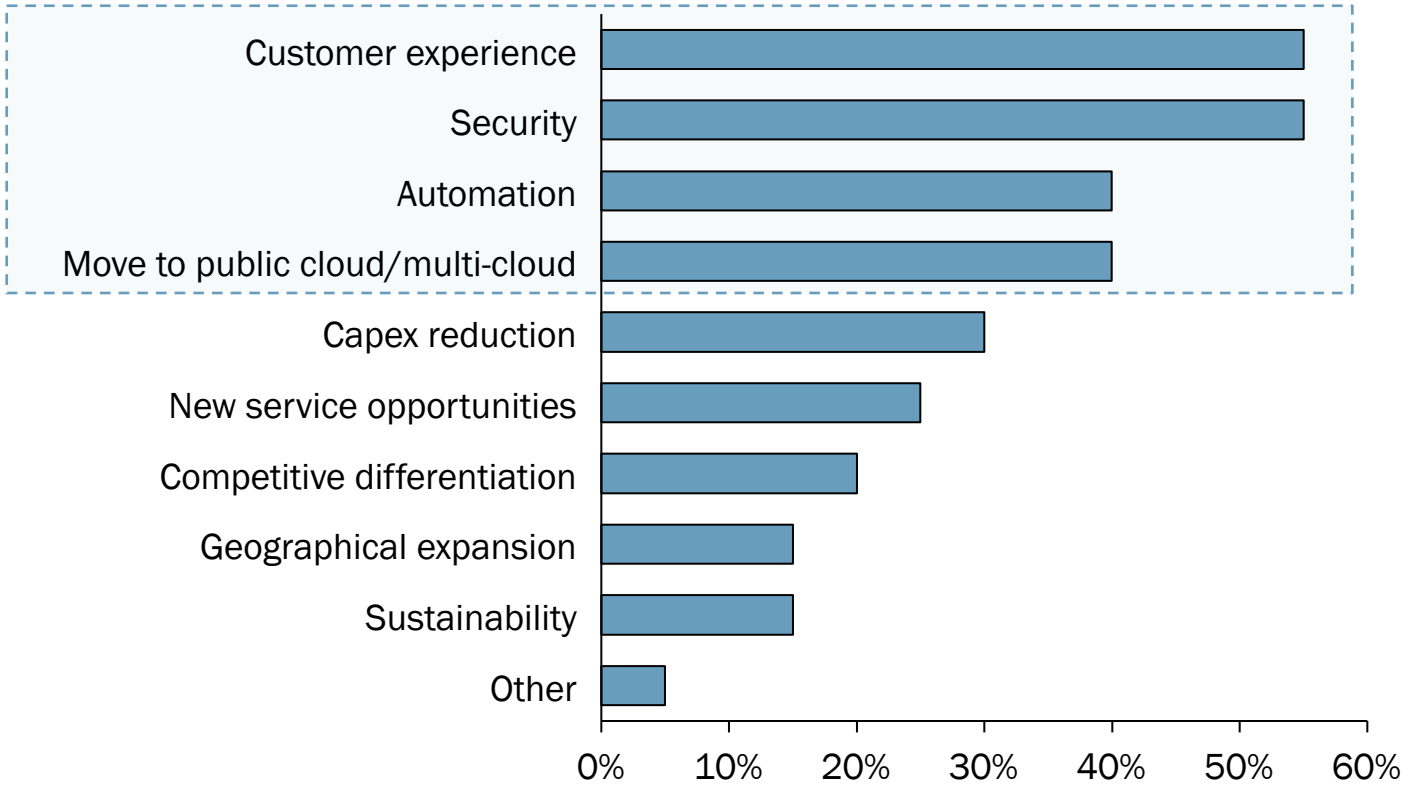
The move to hybrid/multi-cloud environments is the driving force behind CSPs' data center strategies

- Many CSPs have been consolidating and divesting their own data centers in favor of **partnering with public cloud providers (PCPs) and carrier neutral co-location providers.**
- However, these CSPs also continue to maintain and transform a set of strategic data center assets for their 5G networks and edge computing services.
- CSPs are also **increasingly relying on managed service providers** to handle their automation needs.
- The major structural changes to data centers have resulted in new challenges and requirements for CSPs regarding data center automation, security, performance/SLAs and customer experience.

> "We want to become an asset-light operation, we will not own large number of big data centers anymore. But as we go through the hybrid-cloud journey, we want to apply next-generation processes and tools for automation.
>
> *CTO, Tier-1 CSP from Western Europe*

Question: What are the **top business drivers** for your data center strategy?



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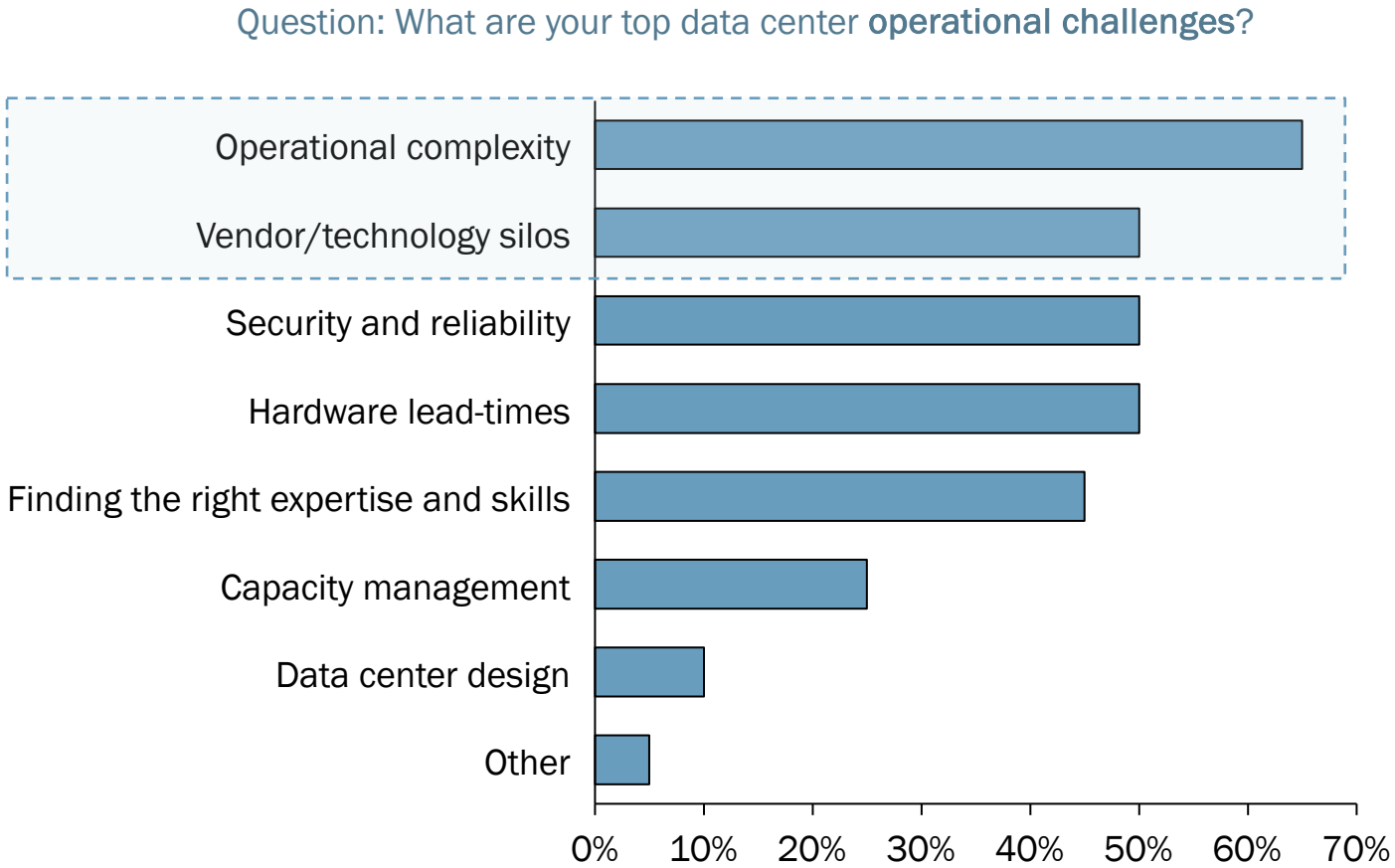
CSPs are suffering with operational complexity due to vendor and technology silos

- CSP data center environments are **highly complex and fragmented because** CSPs have built many snowflake clouds across their IT, networks and enterprise lines of businesses.
- These cloud silos use different equipment, management tools and data models, and CSPs providing co-location services must use the vendors and equipment specified by customers.
- This leads to vendor silos and difficulties in managing workloads across environments, as shown by the fact that 95% of CSPs selected either operational complexity or vendor silos as a top challenge.

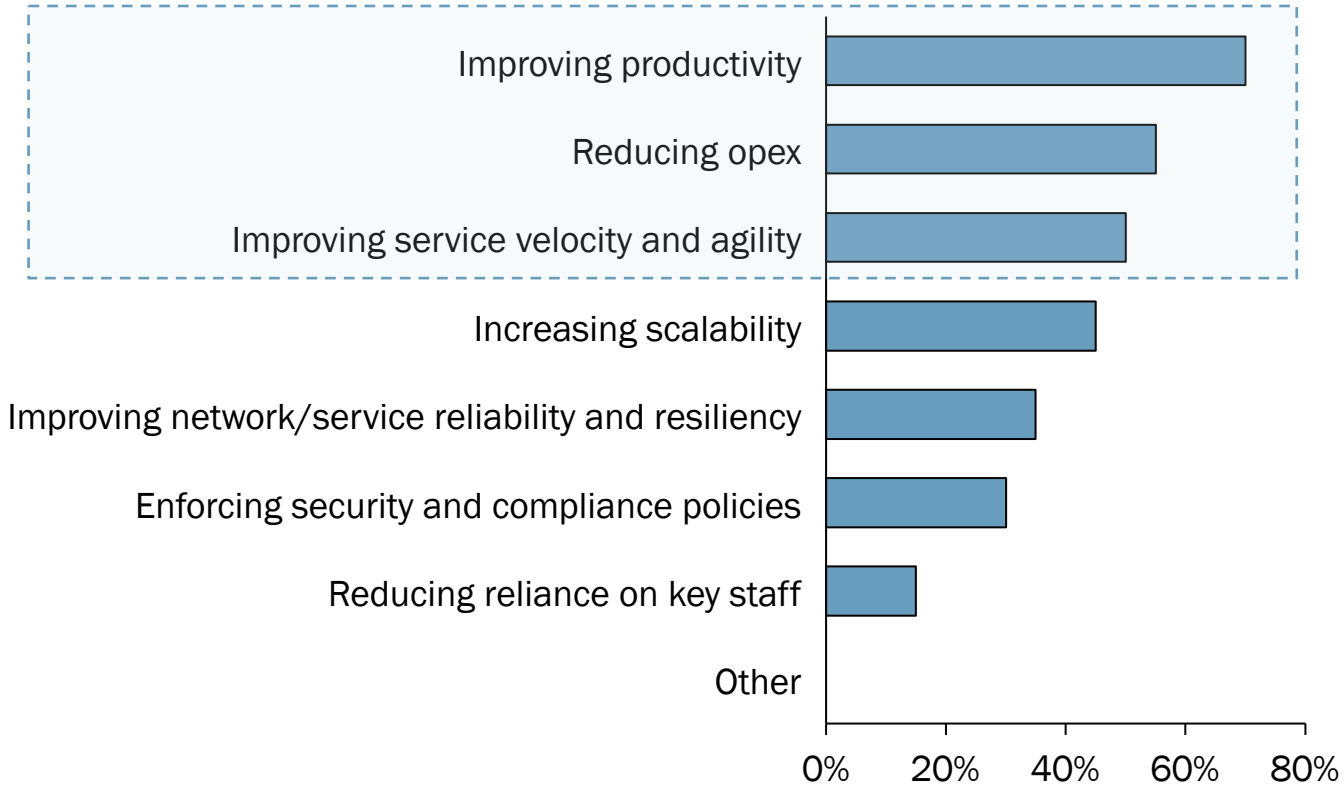


The automation of data center networks is driven by a desire to improve productivity

- Reducing opex continues to be a strong motivator for automating data center networks (55% of CSPs).
- The biggest Tier-1 CSPs are focusing on improving service velocity and agility.
- These CSPs provide fixed and mobile services, have more than 25 data centers and are primarily from North America and Western Europe.

> “Automation started more like an opportunity but then turned into a need during the pandemic. The reason we automate is that our customers are demanding more services. They need more efficiency. So, it’s important for us to be able to offer our customers a better service than the competitors.
>
> *Data center operations manager, Tier-1 CSP from Latin America*

Question: What are your **top motivations** for automating your data center network?



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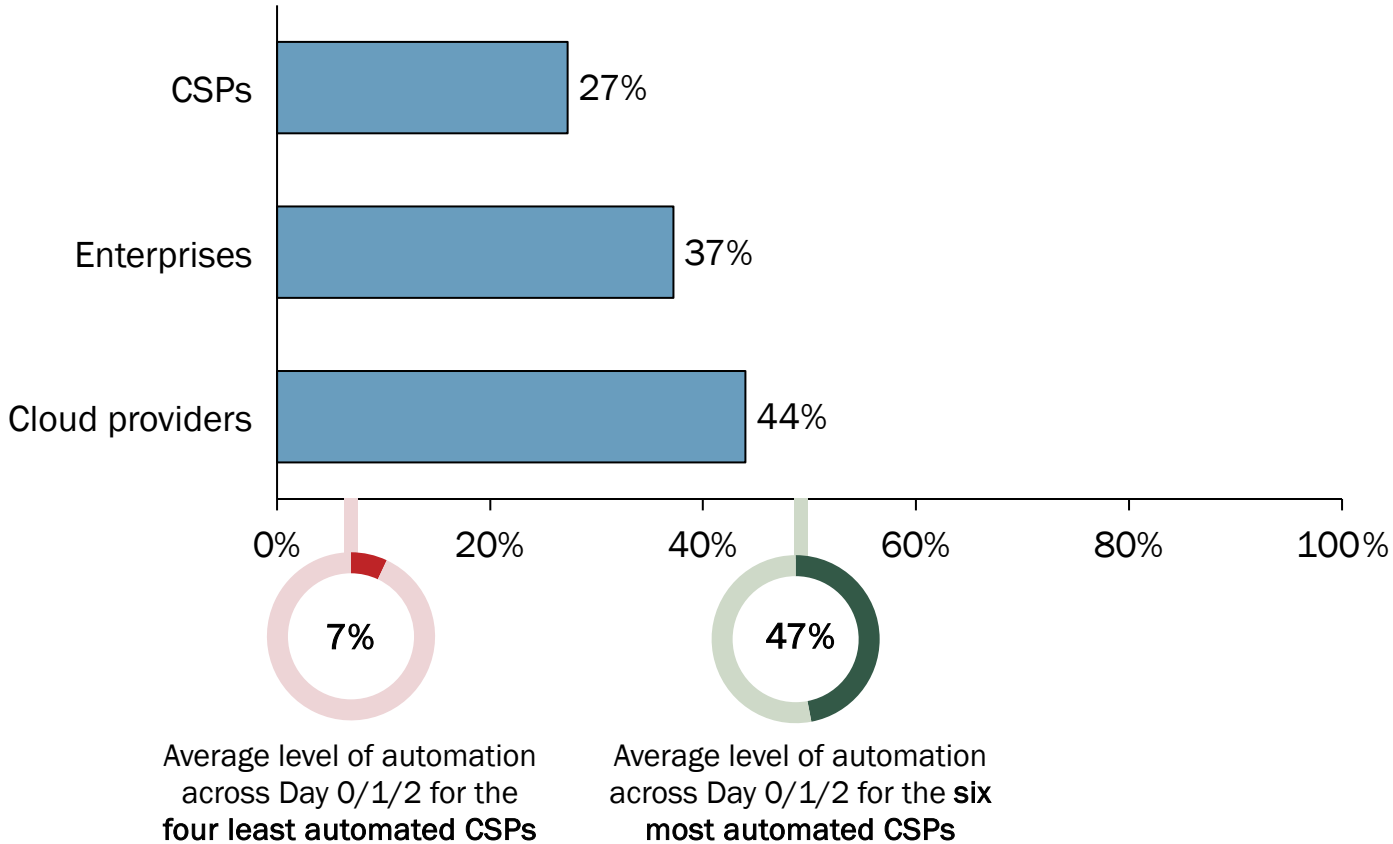
CSPs have low levels of automation across Day 0, 1 and 2+ operations

- CSPs are **less automated** than cloud providers and enterprises on average, and only on par with some of the least automated enterprises
- The most automated CSPs are driven by **improving network/service reliability and resiliency**, productivity and service velocity.
- The least automated CSPs are motivated by **opex reduction** and increasing productivity.
- **CSPs are most automated in Day 2+ operations** (average level of 35% automation) because they have a direct effect on their business. Customer experience, quality of service, SLA assurance and reliability are key elements of CSPs' businesses and require concerted ongoing efforts

Question: What **level of automation** have you reached in the following data center network operational areas today?



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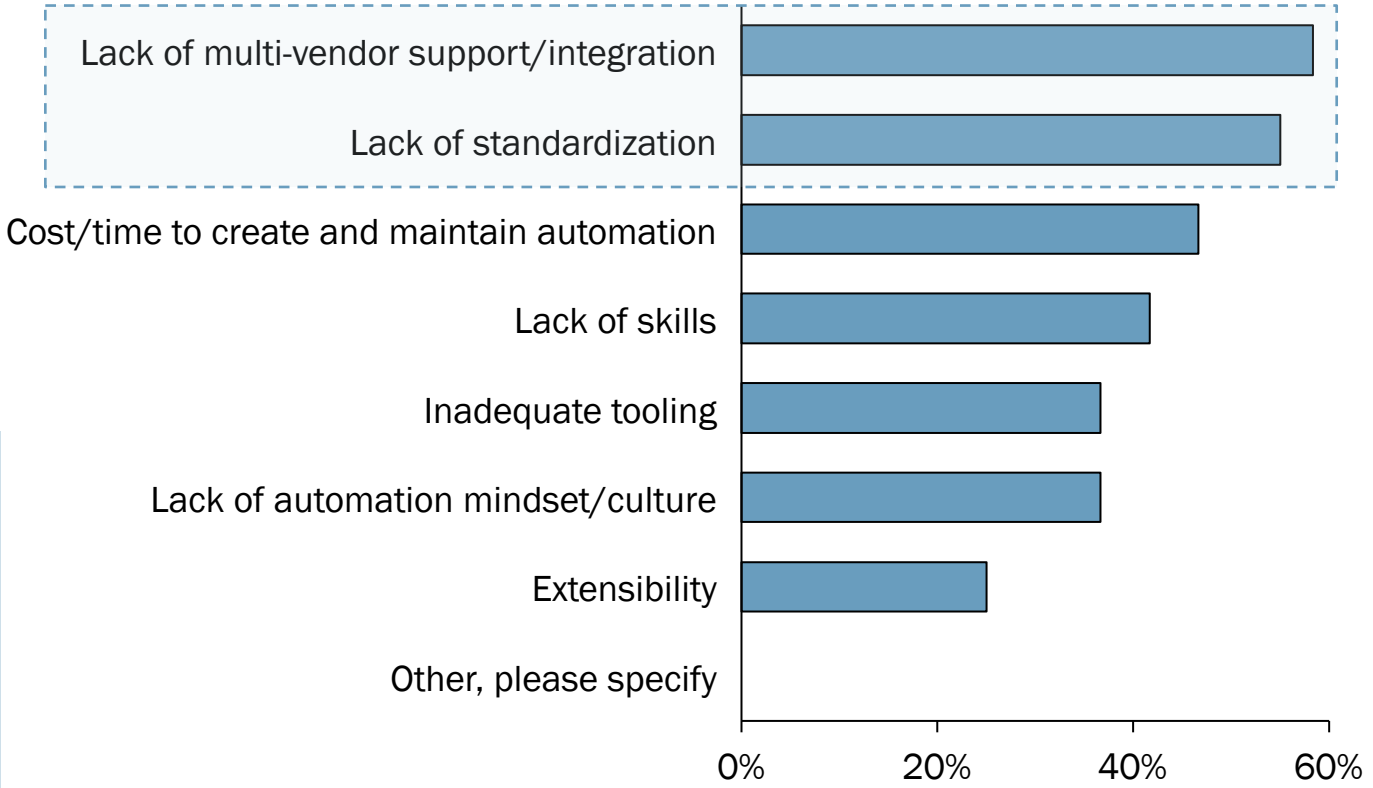
Lack of multi-vendor support is the biggest data center network automation pain point for CSPs

- A lack of multi-vendor support and a lack of standardization are consistently ranked among CSPs' top pain points across Day 0, 1 and 2+ operations.
- Data center automation in multi-vendor environments is challenging because CSPs have to navigate vendor/technology silos by combining vendor-proprietary management solutions with DIY automation tools.
- A **lack of standardization** is the biggest pain point for the most automated CSPs.
- A **lack of automation culture** is the biggest pain point for the least automated CSPs.

> "Our multi-vendor environment becomes tougher and tougher to automate, primarily because the standards are not evolving as fast as we expect them to. All the automation we build for Vendor X will not automatically work for other vendor devices because each vendor has their own interpretation of the standards.
>
> *Head of Network, IT and Technology Strategy, Tier-1 CSP from North America*

Question: What are the top data center network automation **pain points** in the following operational area?



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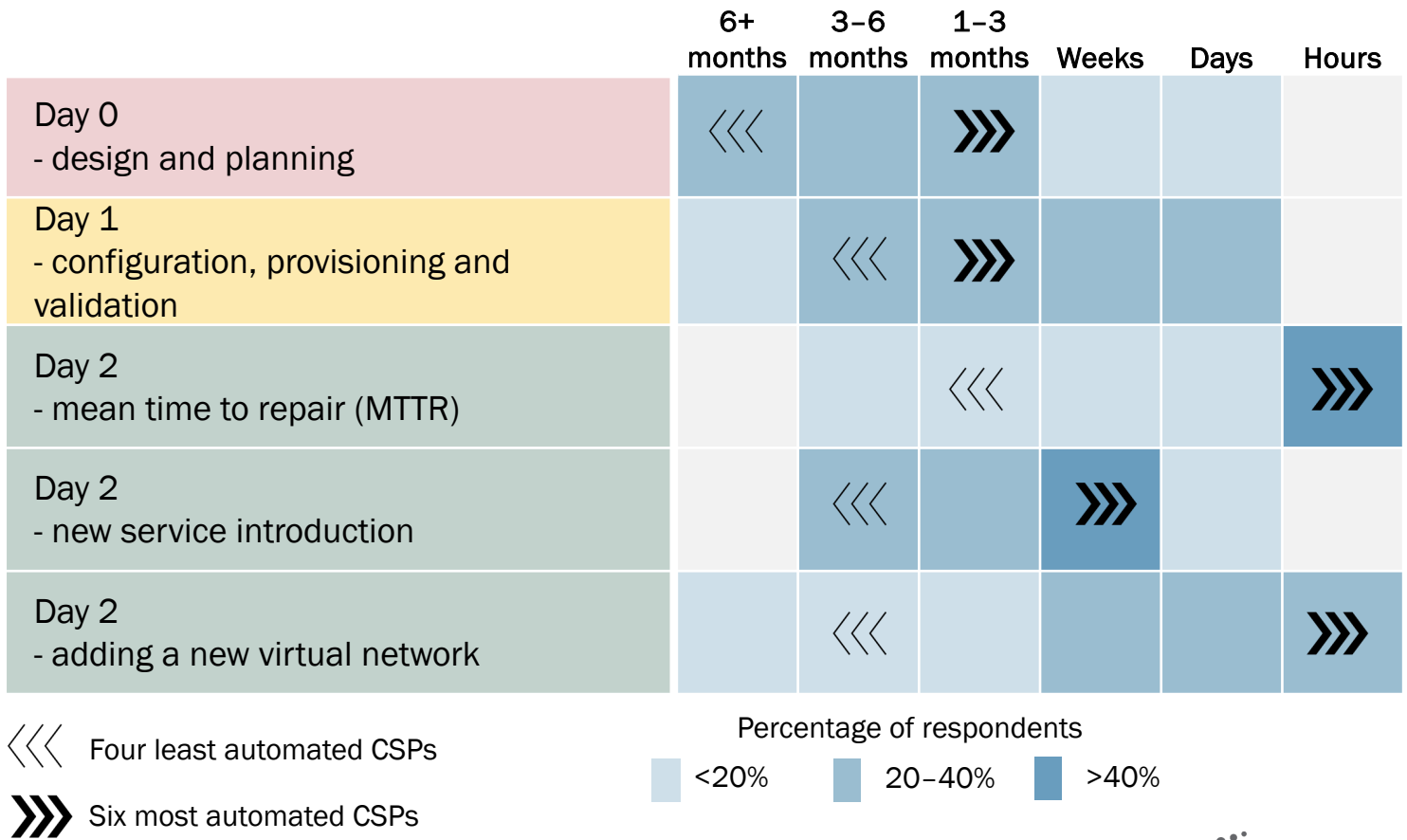
The most automated CSPs take significantly less time to carry out key operational processes

- There is a clear difference between the length of time taken to carry out key Day 0, 1 and 2+ operational processes for the least and most automated CSPs.
- There is still considerable potential for improvement, even for the most automated CSPs.
- The most automated CSPs are performing the key Day 0 and 1 activities in months, compared to weeks for highly automated cloud providers, so further automation will enable significant opex and efficiency improvements.

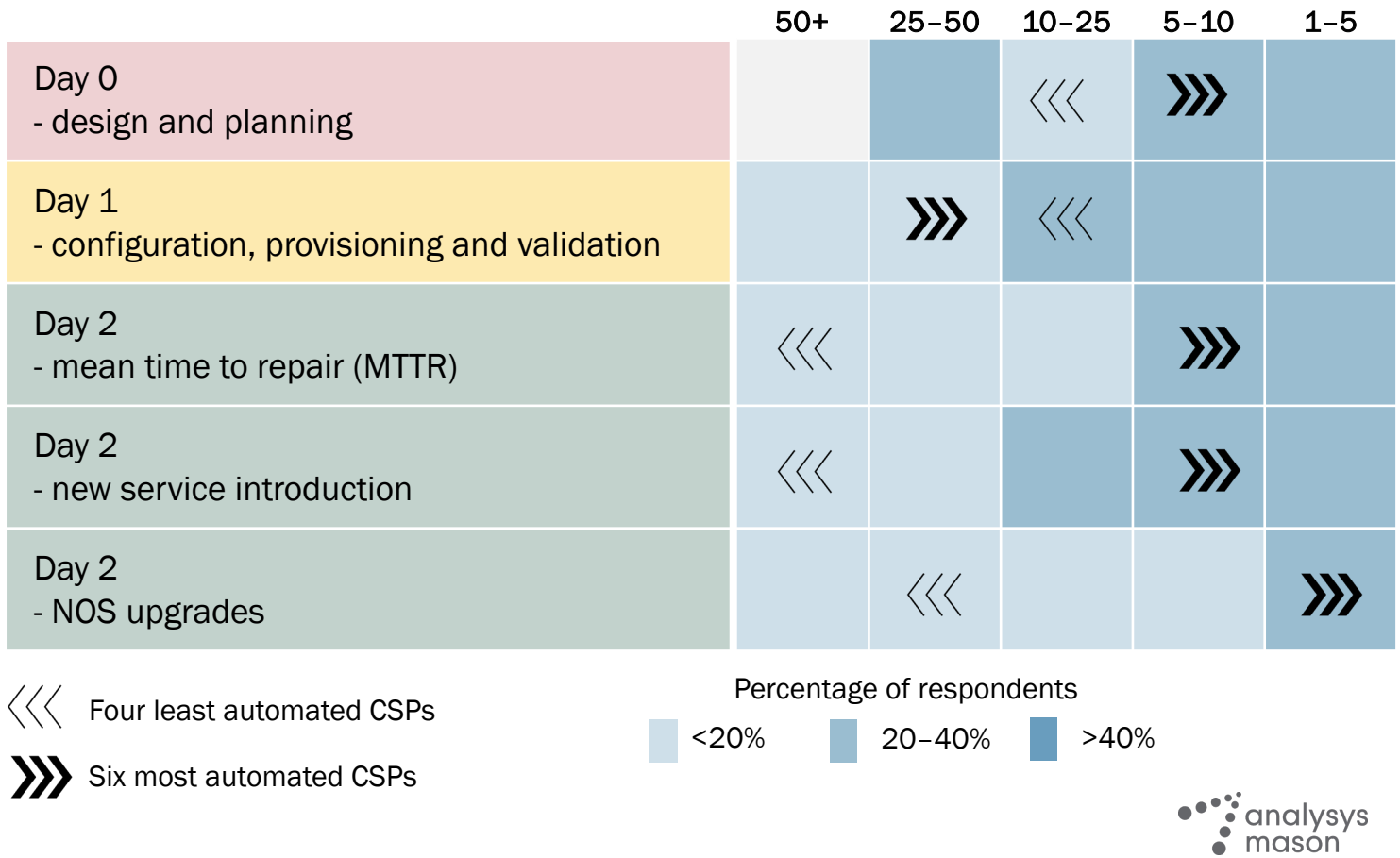
Question: On average, **how long does it take to perform** the following data center network operational processes?



The most automated CSPs also deploy significantly fewer staff for most operational processes

- The most automated CSPs average 5–10 full-time employees (FTEs) for key Day 0, 1 and 2+ processes, whereas the least automated CSPs average 25–50 FTEs.
- Reducing the number of FTE hours for key operational processes can lead to significant opex savings and these resources can be allocated to more strategic activities.
- A large number of CSPs reported that they face difficulties justifying the business case for data center network automation investments. However, this chart and the chart on the previous slide provide supporting evidence that can strengthen the ROI for automation.

Question: On average, **how many FTEs** are involved in performing the following data center network operational processes? Per data center



Overall data center automation trends

The state of in-house data center automation

Recommendations

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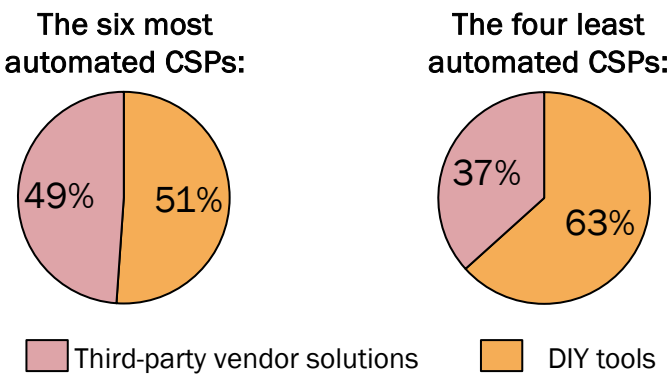
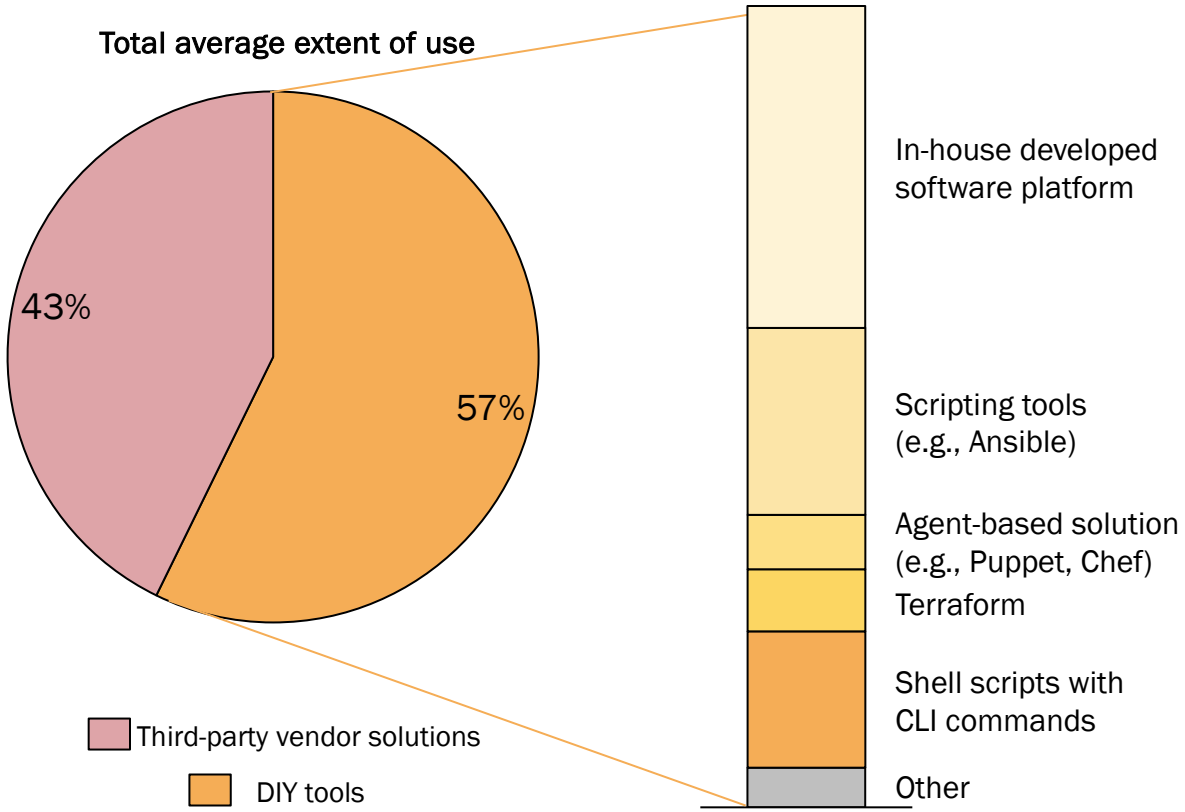
57% of CSPs rely on in-house/DIY automation tools for data center network operations

- CSPs use DIY tools the most for Day 2 operations.
- CSPs use significantly more third-party vendor solutions than cloud providers and enterprises on average.
- The six most automated CSPs use significantly more third-party vendor solutions than the four least automated CSPs:



- This shows that the increased use of third-party vendor solutions can improve operational efficiency and reduce FTE numbers

Question: Which of the following data center **network automation solutions** do you currently use and to what extent in the following operational areas?

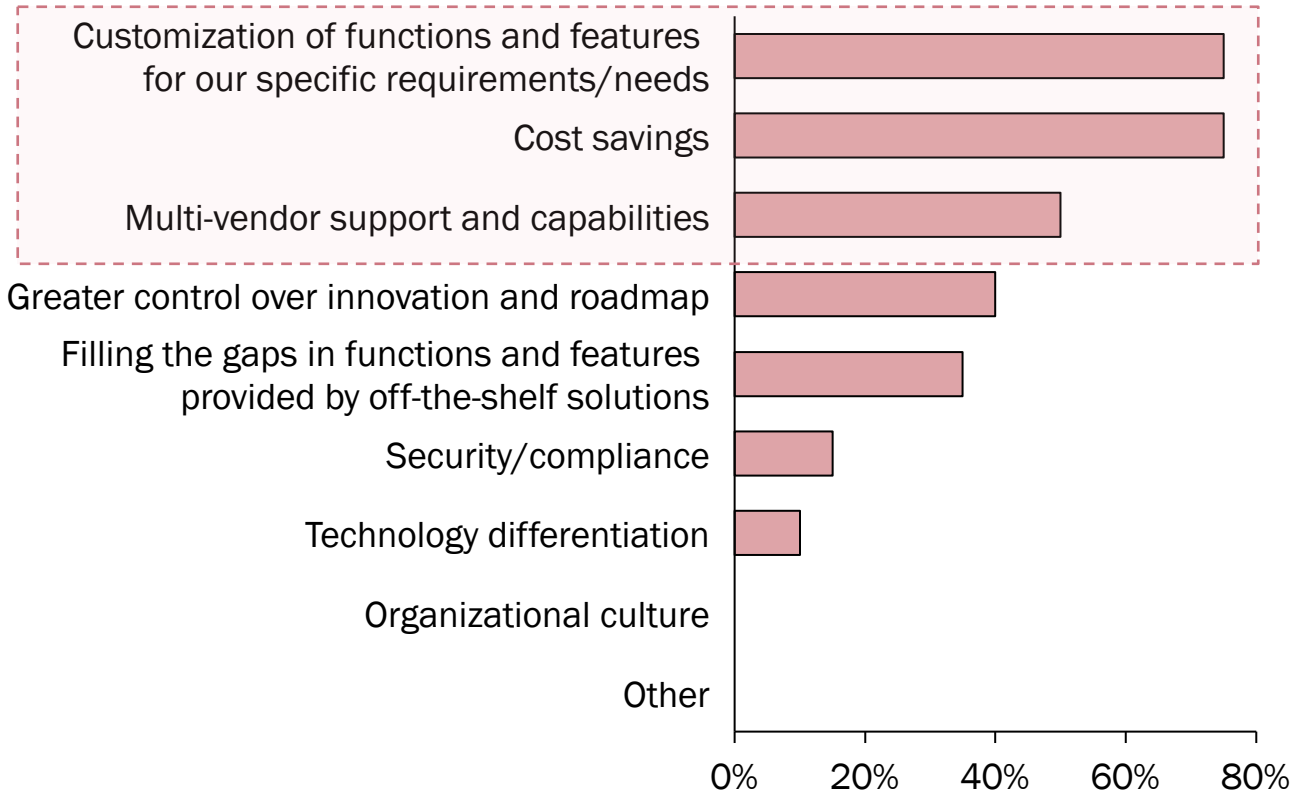


DIY data center automation solution development is driven by a need for customization, cost savings and multi-vendor interoperability

- CSPs' **multi-vendor environments** and operational complexity has led to the need for **bespoke DIY solutions** and customizations to get around silos and fill in the gaps from vendor solutions.
- Multi-vendor support and function customization are some of CSPs' main drivers for developing automation software internally.
- CSPs prefer DIY solutions to avoid high professional services costs and achieve **short-term capex savings.**
- Customization of functions was the main motivator for all six of the most automated CSPs.
- **Cost savings** were the main motivator for all four of the least automated CSPs.

> "In our telco cloud, there are too many networking vendors so we built our own automation tool for multi-vendor automation but we are only at 30% of where we want to be and it's been a long journey even to reach that. It is becoming unsustainable to keep up with the complexity by ourselves.
>
> *Digital Transformation Leader, Tier-1 CSP from North America*

Question: What are your top 3 **motivations** for **developing data center automation software internally?**



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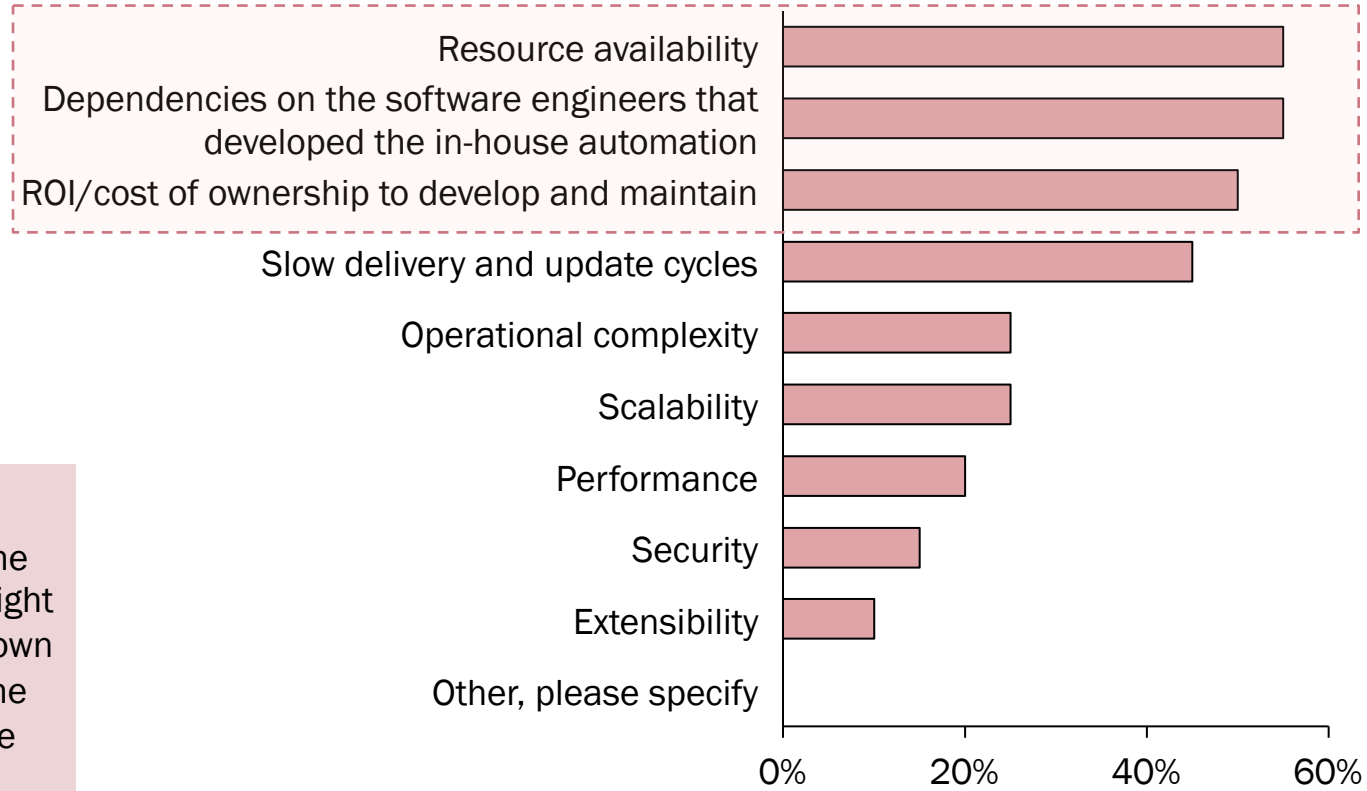
DIY development leads to challenges in terms of resource availability and dependencies on key staff

- Few CSP network engineers have programming language capabilities, so CSPs need more software engineers to reduce their dependencies on key staff and to improve resource availability across the software lifecycle.
- 75% of CSPs struggle with resource availability or dependencies on software engineers.
- The ROI to develop and maintain in-house network automation is a challenge for 50% of CSPs.
- CSPs struggle to quantify ROI due to the often significant amount of in-house development that goes under the radar of CTOs.

> DIY is high-cost operation. It is also very difficult to maintain the level of support to get the right skills in-house and to keep the right skills. This is really a big issue and the more we rely on homegrown management, the more difficult it is when somebody leaves the organization, or needs to be replaced, or new people are to be added on.
>
> *CTO, Tier-1 CSP from Western Europe*

Question: What are the top 3 **challenges** you have with your **in-house developed data center network automation**?



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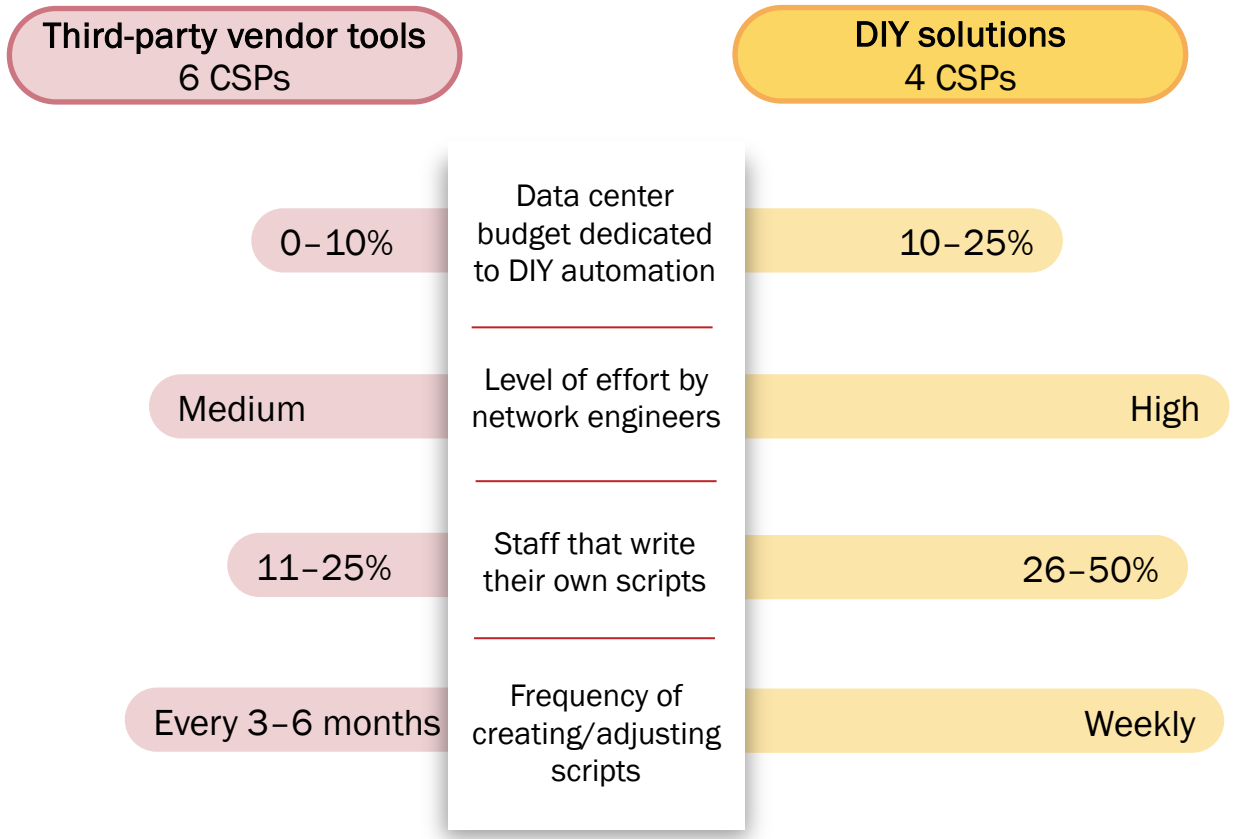
CSPs that are reliant on DIY solutions face significant opex related to data center network automation

- DIY automation comes with significant hidden opex and efficiency weak points.
- CSPs that rely on DIY automation dedicate a greater percentage of their data center budgets to automation than those that use third-party vendor solutions.
- CSPs that rely on DIY solutions have less ‘true’ automation because scripts are created/adjusted on a weekly basis.
- 70% of CSPs rely on network engineers to develop and maintain data center network automation in addition to their day-to-day tasks.
- Network engineers at CSPs that rely on DIY solutions work harder than their peers at CSPs that use third-party vendor tools. A greater proportion write scripts, too.

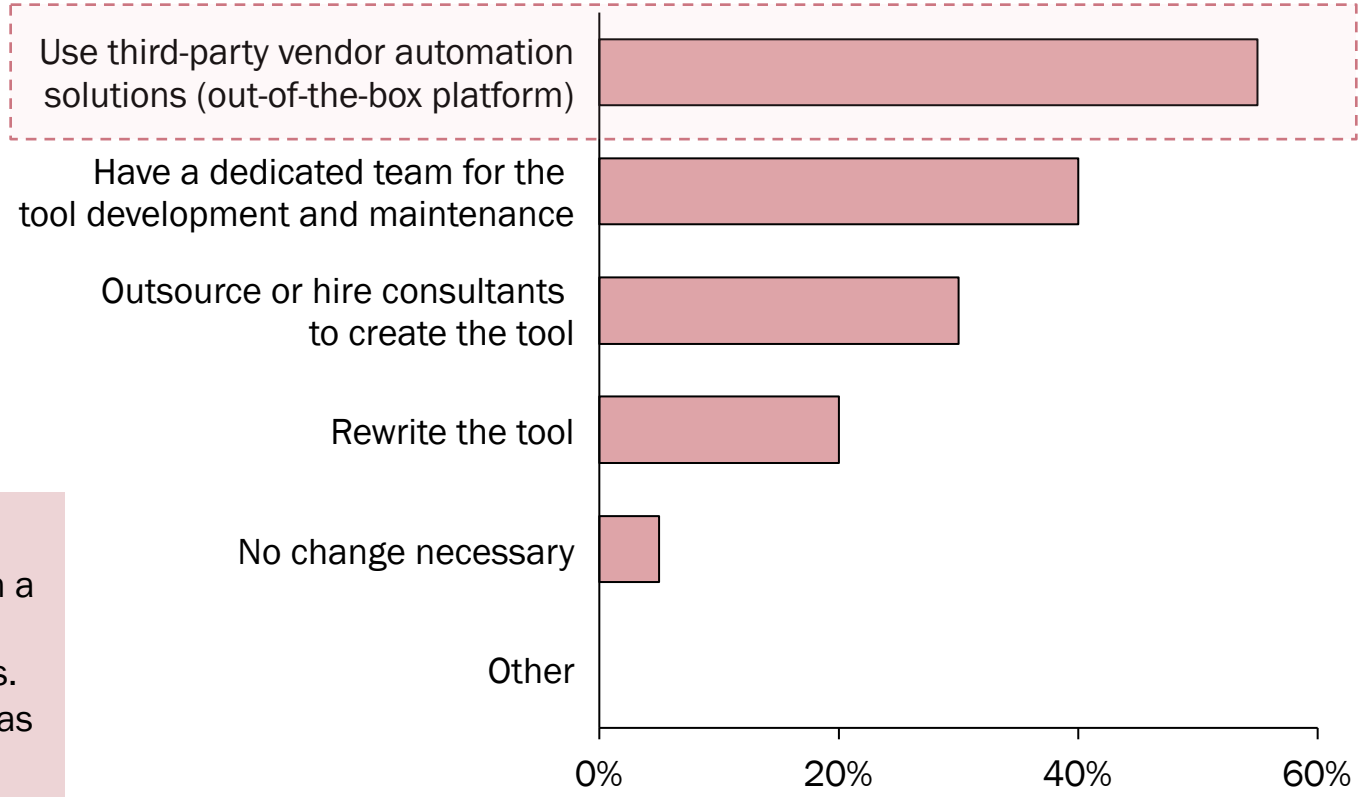


Many CSPs would opt for third-party solutions in retrospect to address key data center automation challenges

- Very few CSPs are fully satisfied with their DIY automation tools and most of them are looking for improvements and/or replacement solutions:
  - 55% of CSPs would opt for a third-party vendor solution if they could go back and choose
  - CSPs that already use third-party vendor solutions would continue to do so.
- The most automated CSPs would overwhelmingly continue their automation journey with third-party vendor solutions. They have learned from experience that out-of-the-box solutions might be the better way forward for their automation needs.

> "We had a lot of in-house developed scripting and it has been a big issue. The operations were scattered and everybody was developing their own scripts and even sometimes big platforms. We are now moving towards total standardization and as much as possible use the market tools.
>
> *CTO, Tier-1 CSP from Western Europe*

Question: In retrospect, if you were to make a change to your in-house tooling, what would that be?



Overall data center automation trends

The state of in-house DC automation

Recommendations

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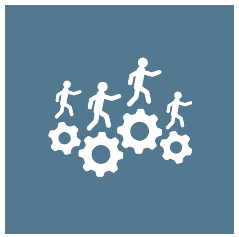
Recommendations

CSPs must continue to automate their data center networks, despite the current trend of hybrid/multi-cloud migrations and data center rationalizations.

CSPs must urgently increase their focus on data center network automation to support mission-critical applications such as cloud-native networks (5G standalone core and vRAN/Open RAN) and advanced enterprise and edge computing services because these will require high levels of automation and programmability.



CSPs should rethink their DIY data center network automation strategies.

In-house software and automation capabilities are important for digital companies, but the current DIY-heavy approach to data center network automation is failing to deliver the desired level of operational automation. Organizations should consider reducing their reliance on DIY solution in the areas where third-party, out-of-the-box solutions are available.

CSPs should adopt the right vendor solutions to increase their level of data center network automation.

The primary use case for DIY solutions is a complex multi-vendor environment. CSPs need truly multi-vendor, intent-based platforms that provide best practice reference designs and templates and enable reliable and repeatable automation to tackle operational complexity, reduce reliance on key staff and maximize ROI.

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Further reading

Enterprise survey

Enterprises use significantly higher proportions of DIY automation tools than CSPs. This is posing a risk to their businesses due to the labor-intensive nature and high opex of these solutions. They are also time-consuming for enterprises' limited number skilled software engineers that can be better deployed elsewhere.

The full perspective can be found here:

Cloud provider survey

In-house automation development is ingrained in their organizational culture and DIY automation is their main approach to building tailored services and achieving a technological edge against competition. However, this takes significant opex and is not essential in all areas of operations.

The full perspective can be found here:

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Contact details

Ameer Gaili

Analyst

Ameer.gaili@analysysmason.com

ameergaili

Gorkem Yigit

Principal Analyst

Gorkem.yigit@analysysmason.com

@GorkemYigitAM

gorkemyigit

Caroline Chappell

Research Director

Caroline.chappell@analysysmason.com

caroline-chappell-89898a11

Bonn
Tel: +49 176 1154 2109
bonn@analysysmason.com

Cambridge
Tel: +44 (0)1223 460600
cambridge@analysysmason.com

Dubai
Tel: +971 (0)4 446 7473
dubai@analysysmason.com

Dublin
Tel: +353 (0)1 602 4755
dublin@analysysmason.com

Hong Kong
hongkong@analysysmason.com

Kolkata
Tel: +91 33 4084 5700
kolkata@analysysmason.com

London
Tel: +44 (0)20 7395 9000
london@analysysmason.com

Lund
Tel: +46 8 587 120 00
lund@analysysmason.com

Madrid
Tel: +34 91 399 5016
madrid@analysysmason.com

Manchester
Tel: +44 (0)161 877 7808
manchester@analysysmason.com

Milan
Tel: +39 02 76 31 88 34
milan@analysysmason.com

New Delhi
Tel: +91 124 4501860
newdelhi@analysysmason.com

New York
Tel: +212 944 5100
newyork@analysysmason.com

Oslo
Tel: +47 920 49 000
oslo@analysysmason.com

Paris
Tel: +33 (0)1 72 71 96 96
paris@analysysmason.com

Singapore
Tel: +65 6493 6038
singapore@analysysmason.com

Stockholm
Tel: +46 8 587 120 00
stockholm@analysysmason.com

@AnalysysMason linkedin.com/company/analysys-mason youtube.com/AnalysysMason

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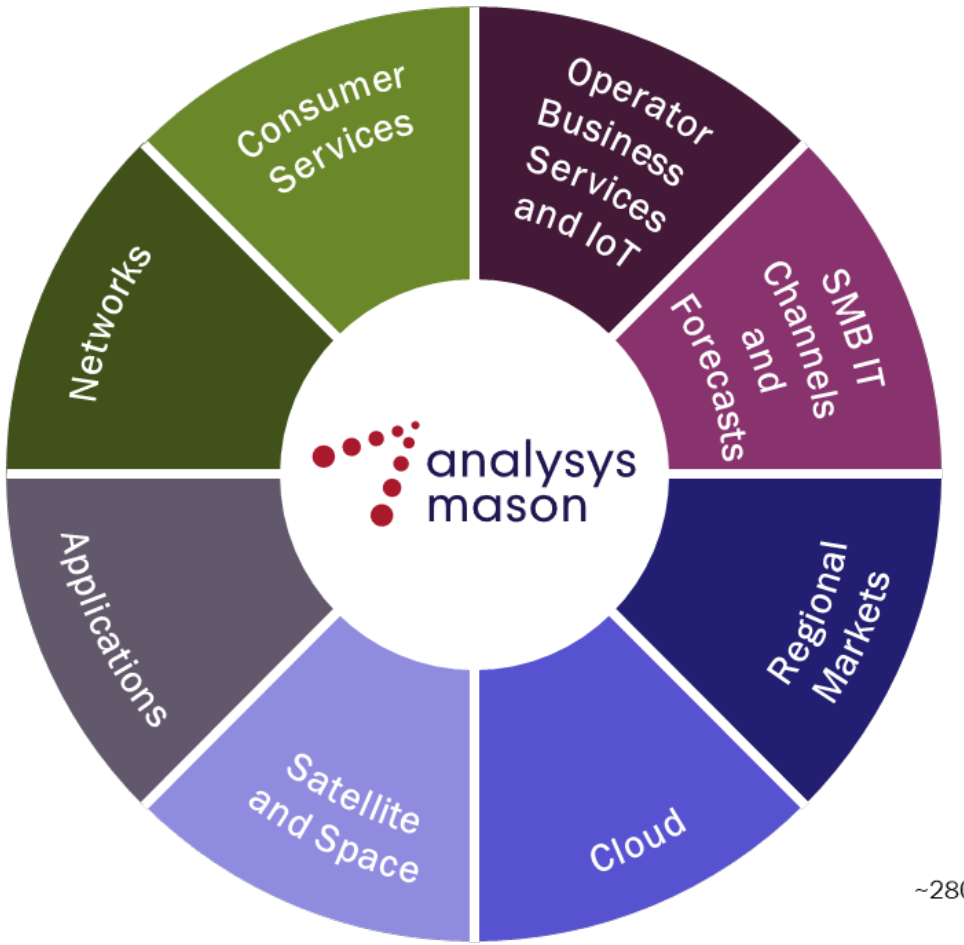

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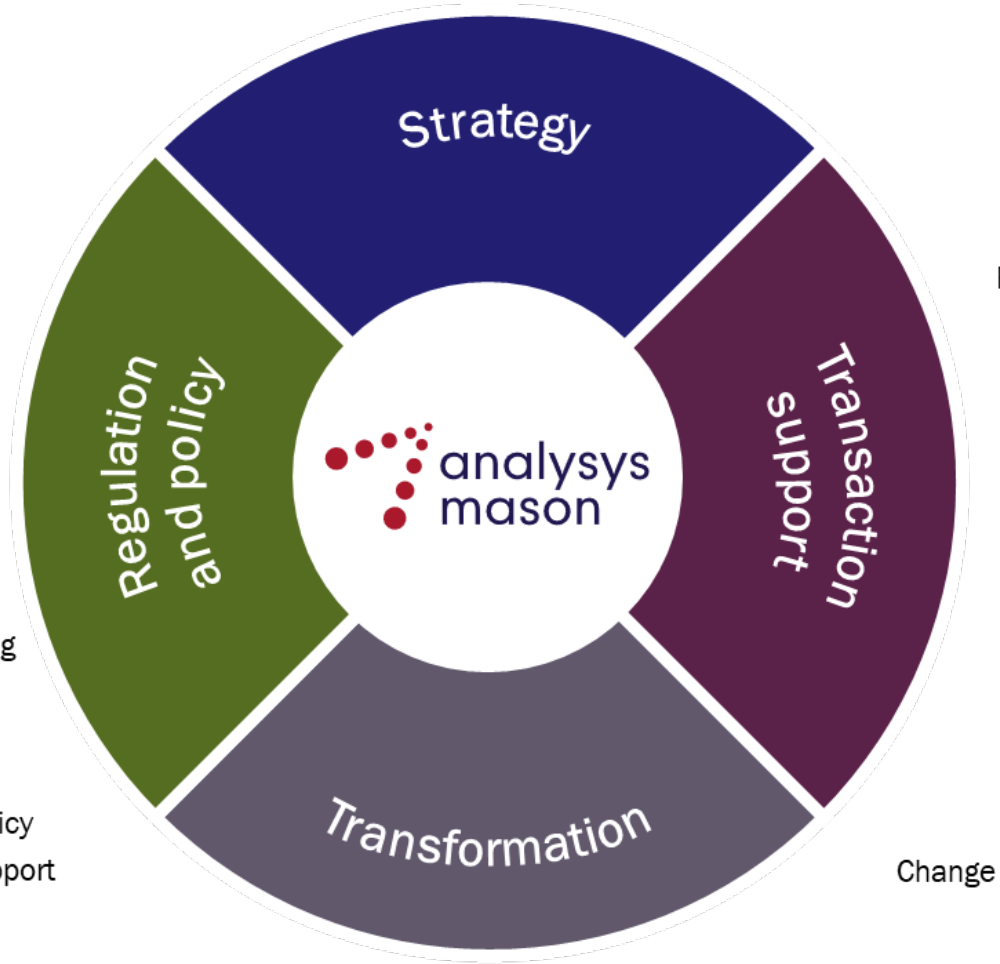

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