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

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Executive summary

Data center network automation is a strategic imperative for every digital organization. This is driven by the need for running business-critical applications in a more reliable and efficient manner and accelerating digital transformation activities. However, the progress in automating data center networks has been limited to-date. The use of a fragmented set 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 on a study to gain a deeper understanding of DIY data center network automation activities in communications service providers (CSPs), enterprises and cloud service providers. We identified the key motivations and challenges, examined overall data center automation strategies and benchmarked the level of automation across key operational processes. This report focuses on the results from the enterprise segment.

The report showcases the key findings from the online survey of 47 enterprises and complementary deep-dive interviews[1] with senior decision makers and data center network operations staff.

[1] CTO from an insurance company with 1–4 data centers (Western Europe) and Senior Director IT from a logistics company with 10–24 data centers (Asia–Pacific).

Geography

North America	16
Western Europe	11
Developed Asia-Pacific	8
Middle East	5
Emerging Asia–Pacific	4
Latin America	2
Central and Eastern Europe	1

Total: 47 enterprises

Enterprise verticals

Manufacturing and logistics	8
Financial services	7
Tech/IT	7
Healthcare	5
Retail and FMCG	4
Education	4
Government	3
Media and entertainment	3

28%
over USD1 billion annual revenue

Other = 6
(Utilities (x2), Oil&Gas, Construction, Real Estate, Consulting)
*FMCG – Fast moving consumer goods

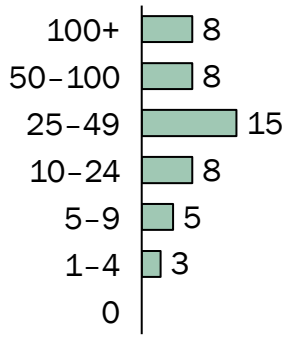
Respondent profile

CxO
14

Head of data center
19

Manager/technical staff
14

Data center footprint



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Key findings

Overall data center automation trends

- Level of data center automation among enterprises is low (37% on average)– levels of automation across enterprise verticals are similar, but vary significantly within verticals.
- Enterprises' attitude towards their data center has a major impact on their level of automation; the ones that see data centers as strategic assets made more automation progress than others.
- Enterprises suffer from a wide range of data center network automation challenges, but data center design is the most common.
- The most automated enterprises are far more operationally efficient than their less automated peers – but their automations are not anywhere near zero touch, requiring manual input and interventions, which prevents them from making significant headcount reductions.

In-house/DIY data center automation

- DIY automation is highly prevalent in enterprise data centers: DIY tools account for 78% of enterprise data center network automation solutions used across Day 0, 1 and 2 operations.
- Use of DIY tools is primarily driven by customization requirements and cost savings (capex); security/compliance is the main driver for those in highly regulated industries (finance, healthcare).
- The most automated enterprises are allocating a substantial amount of their DC budget (50%+) into DIY automation.
- Enterprises are generally not fully satisfied with the outcome of their DIY automation activities; many enterprises would opt for third-party vendor automation solutions in retrospect.

Overall data center automation trends

The state of in-house data center automation

Recommendations

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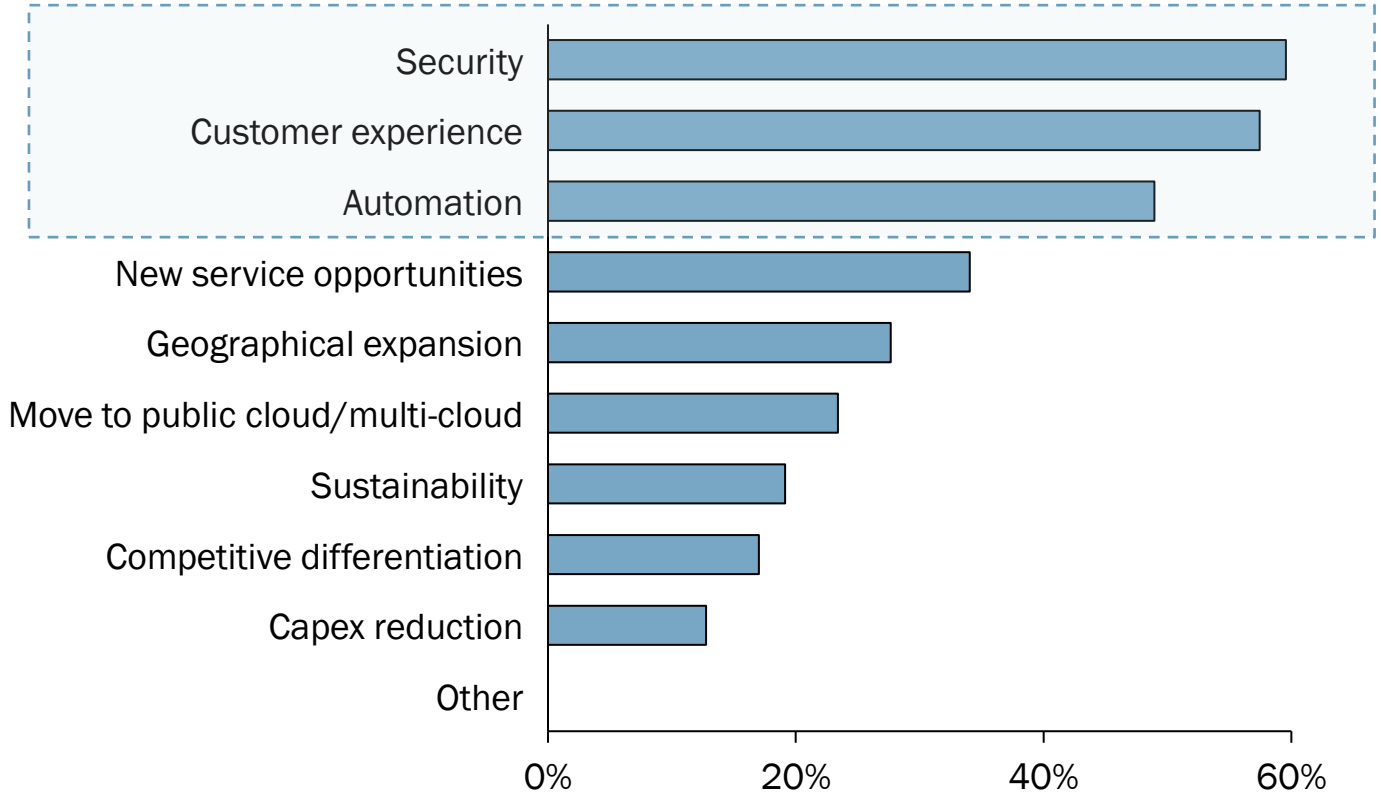
Security, customer experience and automation are common data center strategy drivers across all industries

- Enterprises are linking customer experience and security with the automation of their data centers.
- Large enterprises, which have more than a billion dollar in revenue, are more focused on using automation to drive customer experience.
- Enterprises in developed markets rank customer experience as number 1, whereas enterprises in developing markets overwhelmingly chose security as their top driver.

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



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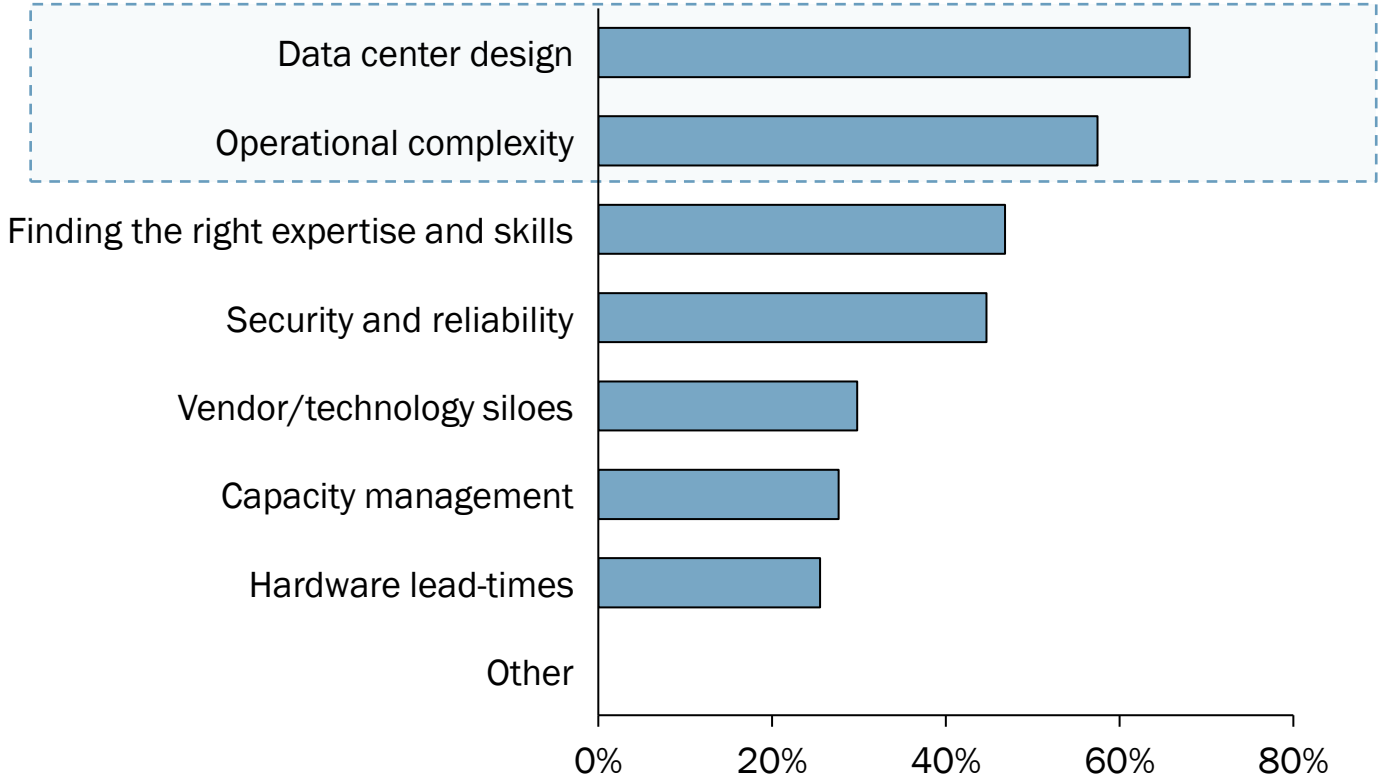
Data center design and operational complexity are the biggest challenges for enterprises

- Data center design, operational complexity and finding the right expertise and skills are common challenges in all enterprise verticals.
- Data center design is a challenge for 2 out of 3 enterprises. It is a complex and critical process that involves balancing multiple factors, including cost, technology/vendors, performance, scalability, security, and energy efficiency – this balancing act is the biggest operational pain point for most enterprises.

Question: What are your top data center **operational challenges**?



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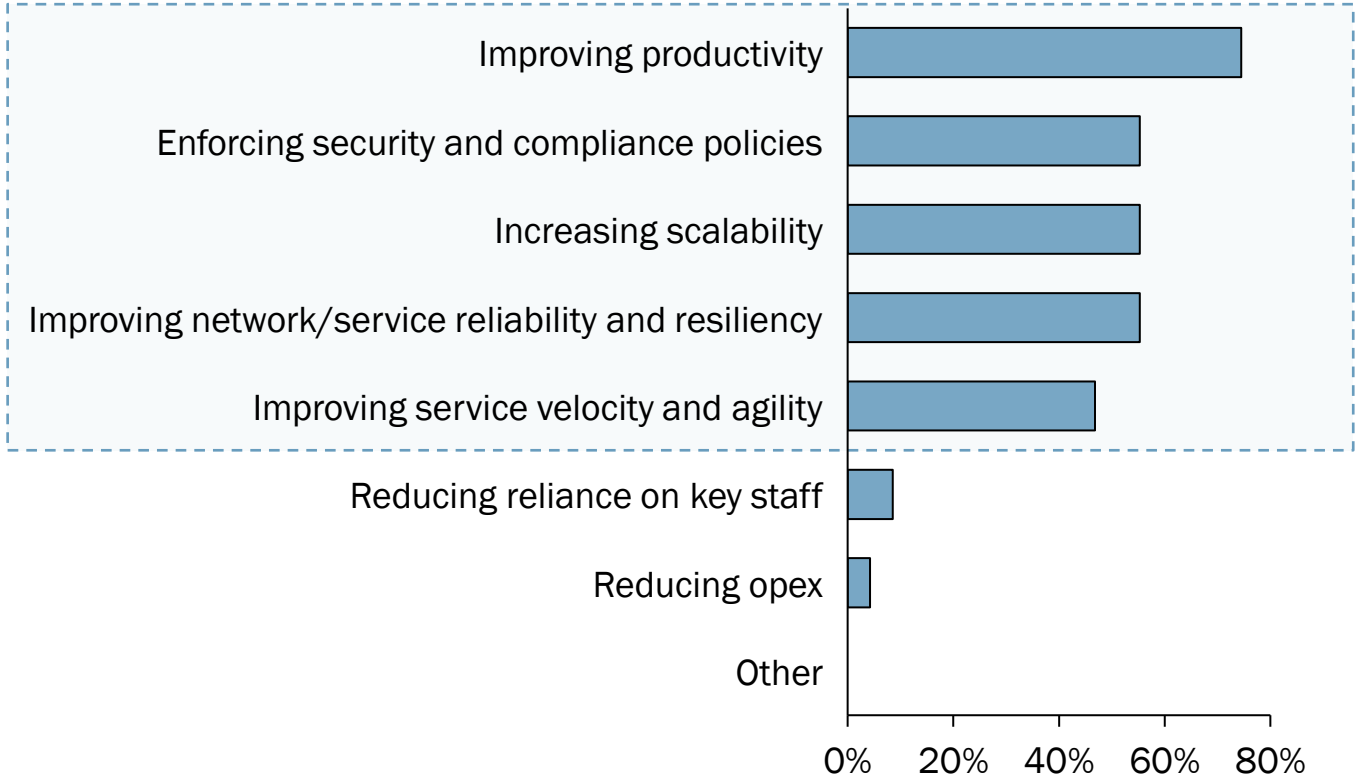
74% of enterprises want data center network automation to bring productivity improvements

- Enterprises are mainly motivated by technological and operational improvements, as opposed to drivers such as reducing opex and reducing reliance on key staff.
- Most enterprises are thinking about data center network automation in a strategic way, and view it as an enabler to gain a competitive edge
- Developing markets focus more on improving network/service reliability and resiliency, whereas developed markets are motivated by improving operational efficiencies

> "We have a 5-year plan for becoming cloud-native and data center networks are a key part of this plan. We want to automate as much as possible for deployment velocity, reduced delivery times and fewer incidents.
>
> *CTO, insurance company from Western Europe*

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



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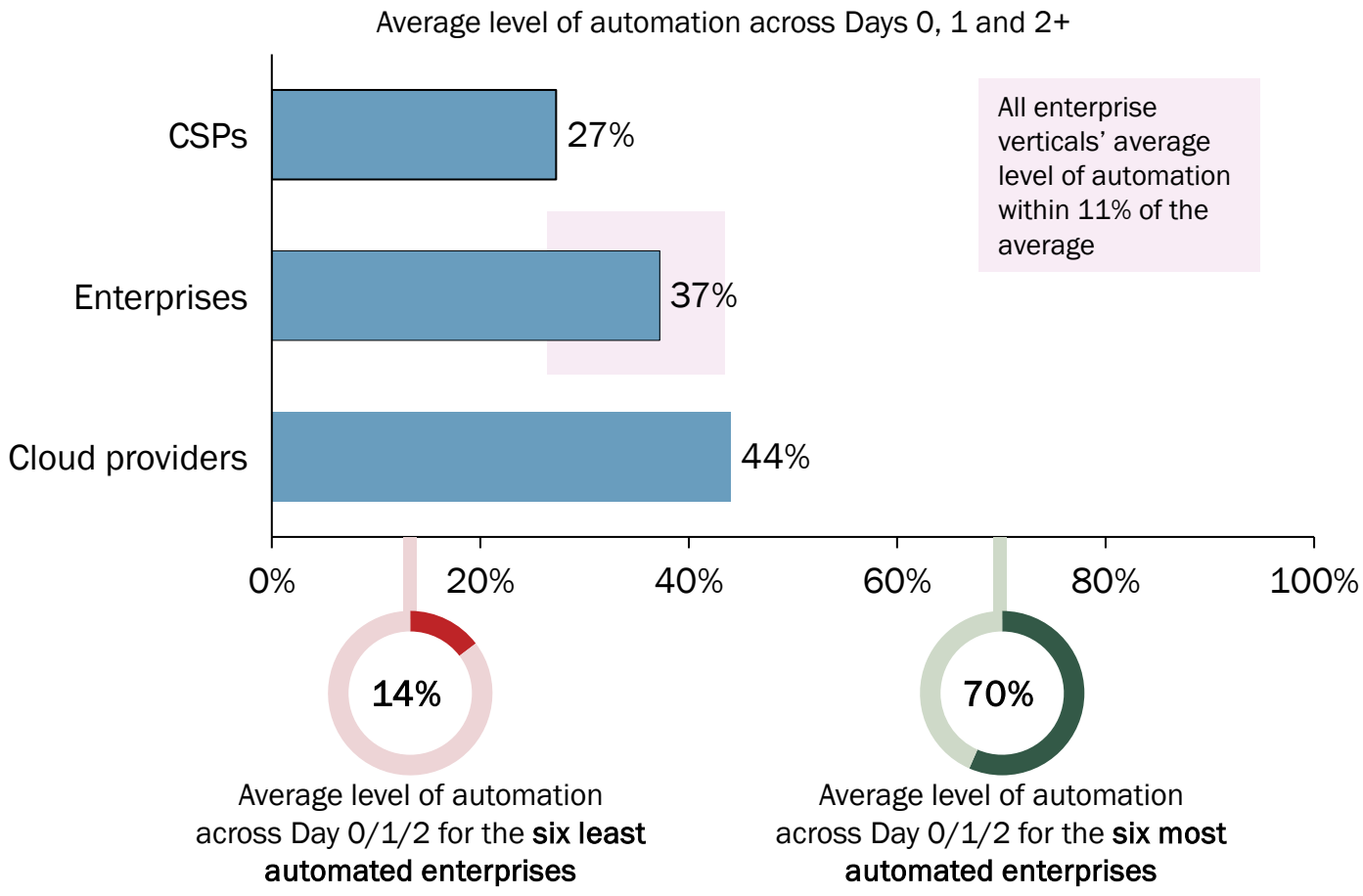
Levels of automation across enterprise verticals are similar, but vary significantly within verticals

- Enterprises are marginally more automated in Day 2 operational process (41%) than Day 0 (36%) or Day 1 (34%).
- Level of automation variance is stark within industry verticals (average of 40% difference between the most and least automated) – but converge to a similar overall average across verticals (all verticals' averages are within 11% of the total average).
- The six most and least automated enterprises are each from different industries.
- This indicates that differences in data center network automation motivations, challenges and levels of automation depend more on the individual enterprise rather than the verticals.

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



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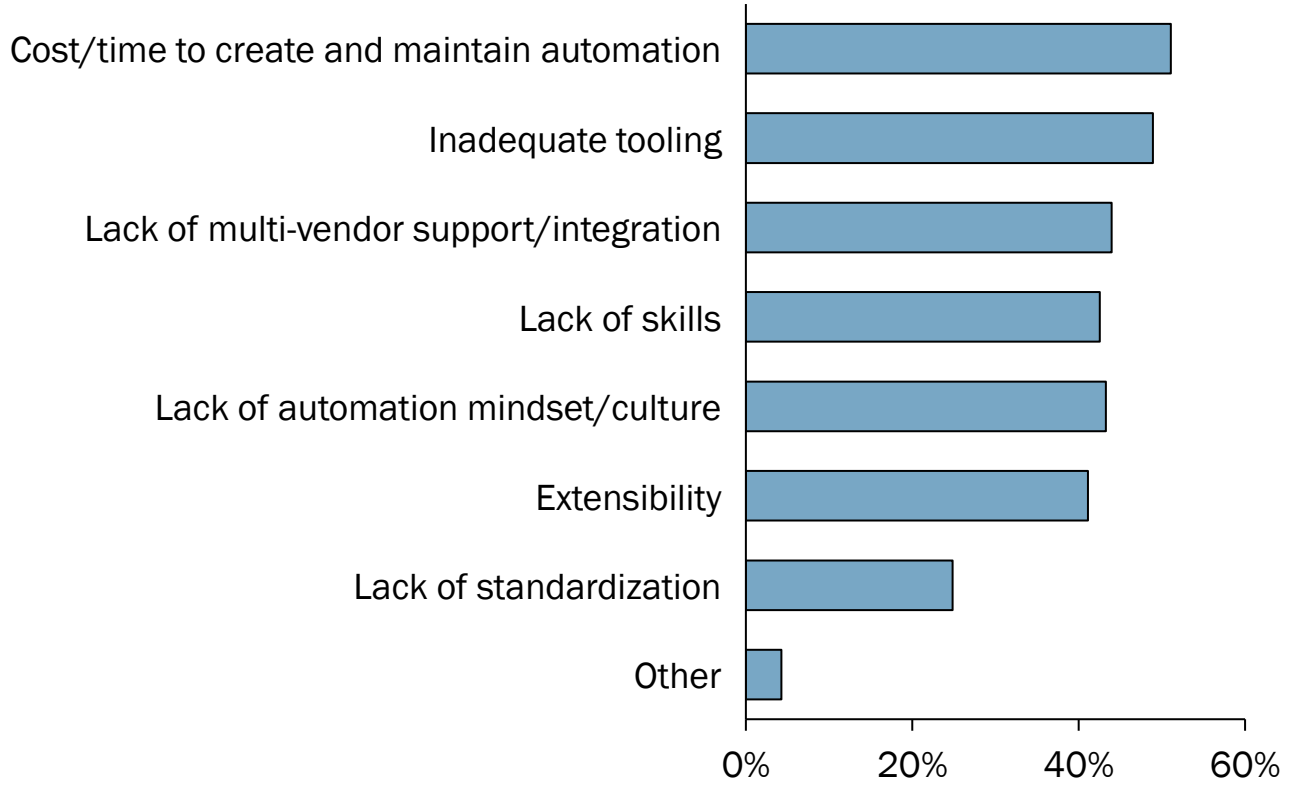
DC network automation is hindered by a range of technological, organizational and cultural problems

- Lack of automation mindset/culture is the biggest Day 2+ pain point, while cost/time to create and maintain automation is the overwhelming Day 0 pain point for most industries.
- For the most automated enterprises, technological pain points (such as inadequate tooling, and a lack of multi-vendor support) are dominant for Days 0 and 1.
- For the least automated enterprises, a lack of skills for Day 1 and 2+ is their biggest pain point.

> “Network is our main pain point for increasing automation in the data center, not the servers or storage. We had several failures last year due to ‘fat finger’ errors in the network operations, we can’t afford this.
>
> *CTO, insurance company from Western Europe*

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



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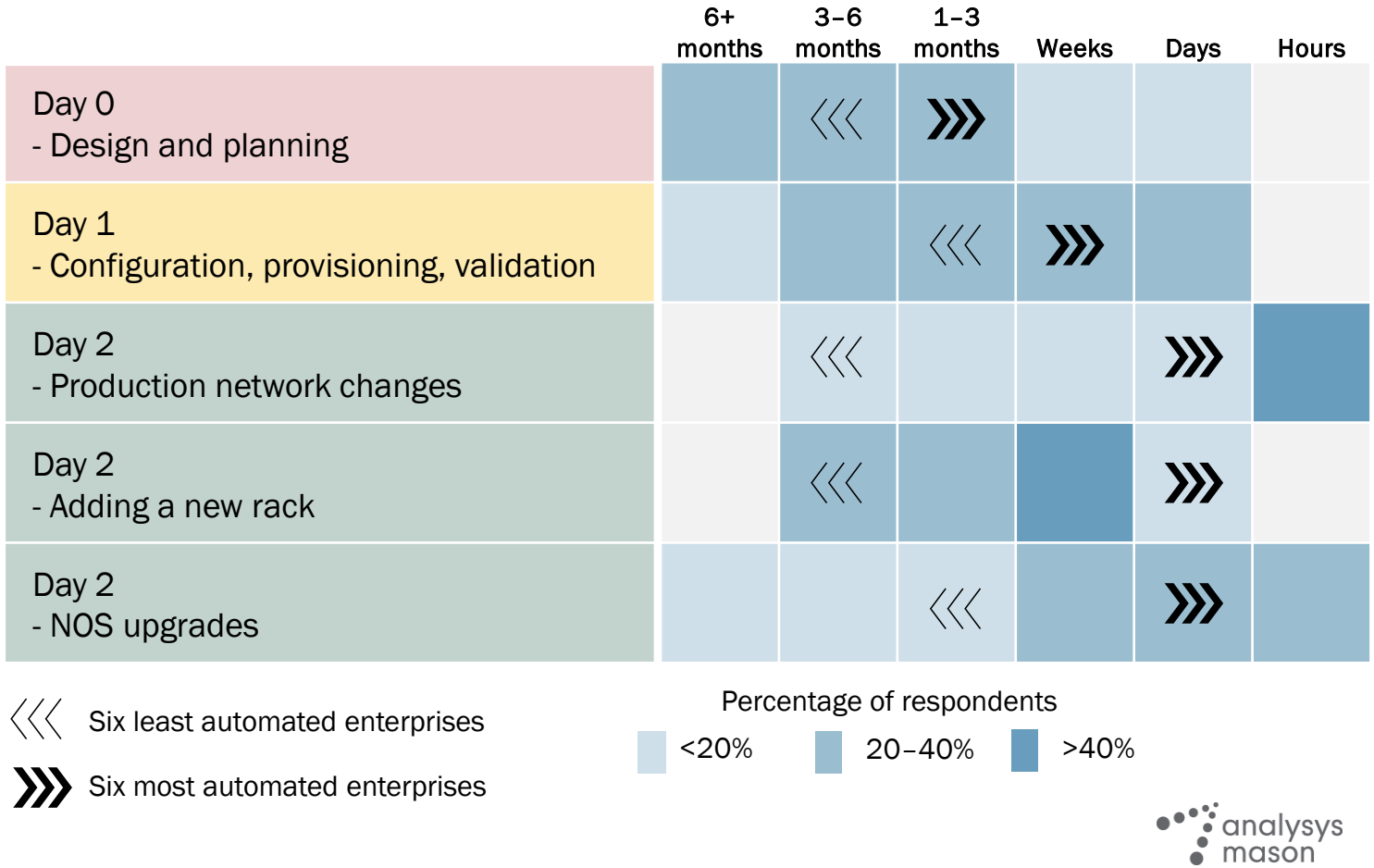
The most automated enterprises take significantly less time to carry out Day 2+ operational processes

- There is a significant gap in the length of time taken to carry out Day 2+ automation.
- The most automated enterprises take only a few days on average to carry out key Day 2+ processes, whereas the least automated carry out these processes in 3-6 months.
- This saves months in resources and effort, and increases agility while allowing redeployment of engineers to enable further productivity gains.
- Most enterprises find Day 0 and 1 the most challenging, but the more automated enterprises have successfully improved operational efficiency here as well.

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



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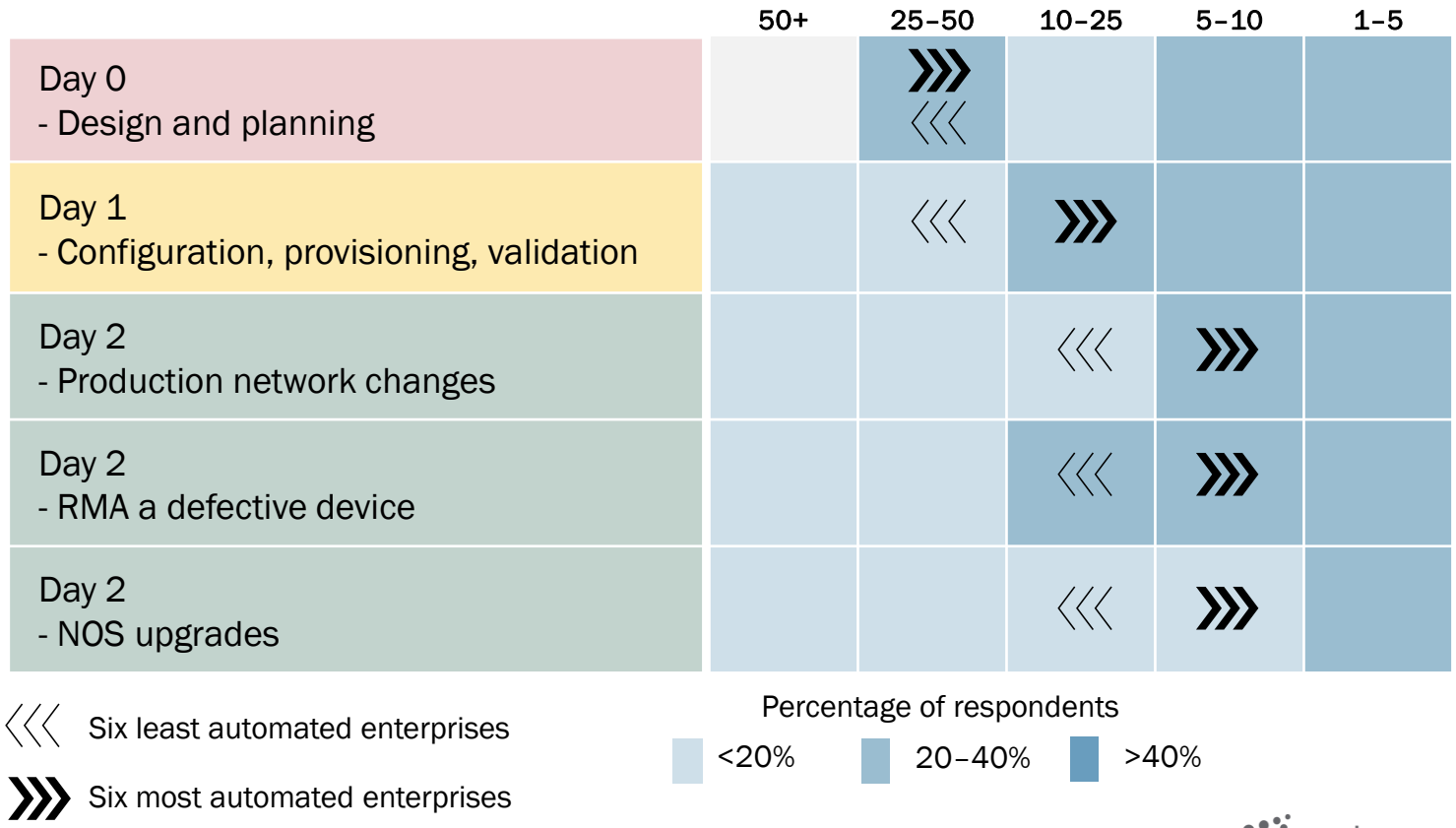
The most automated enterprises only deploy marginally fewer staff to carry out these key operational processes

- The small gap in the number of FTEs between the most and least automated enterprises shows that the most automated have yet to maximize the opex savings with increased automation i.e., a reduced headcount. Due in part to:
  - heavy reliance on ‘manual’ automation, with very little zero touch – this requires large automation teams to maintain
  - organizational structure change reluctance from the data center network automation budget holders, stemming from a desire maintain power and protect jobs.
- Nevertheless, the most automated enterprises generally can do more with fewer people compared to their less automated peers.

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



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Overall data center automation trends

The state of in-house data center automation

Recommendations

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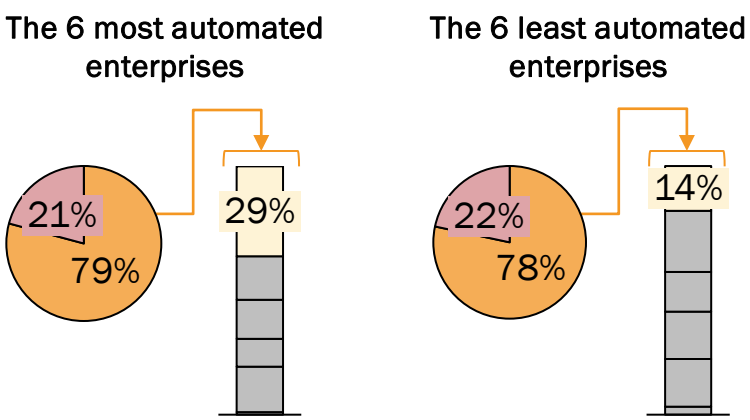
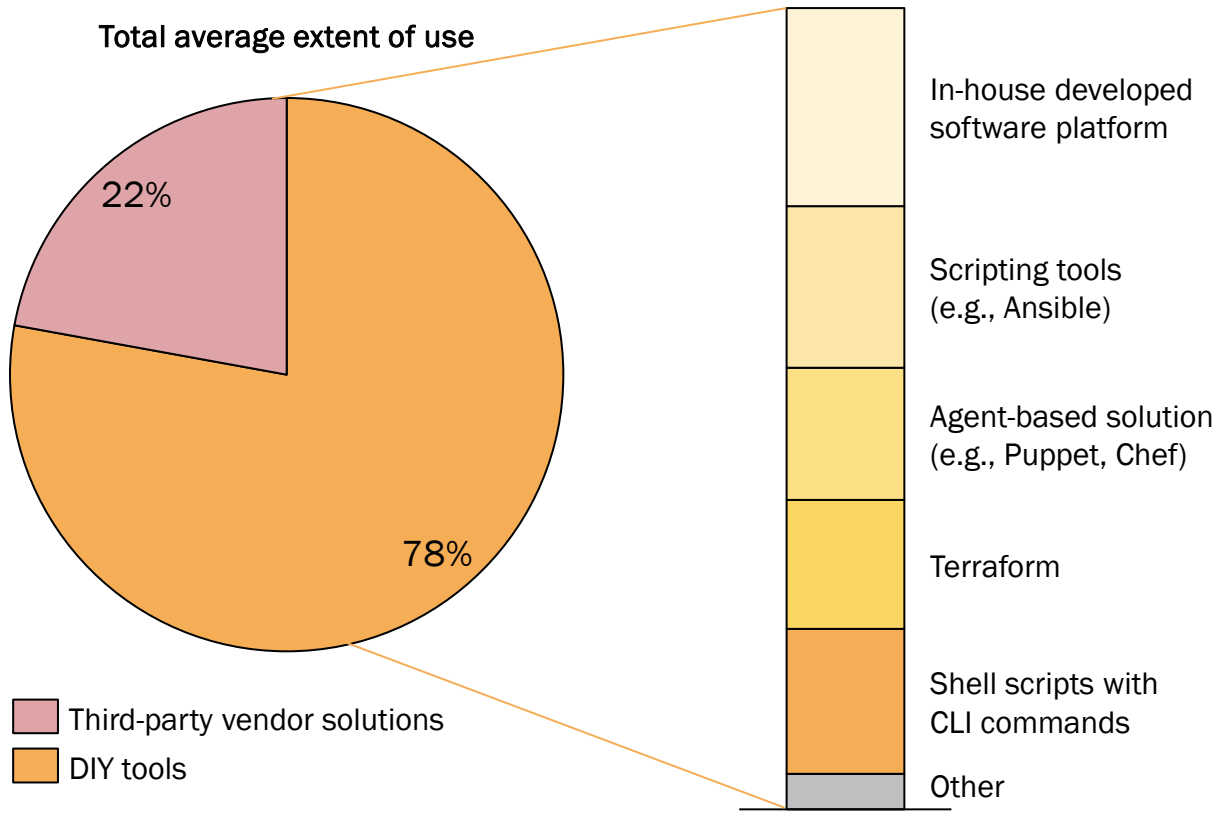
78% of enterprises' data center network operations rely on in-house/DIY automation tools

- Enterprises rely on a wide range of DIY automation tools and solutions and use these almost evenly across Days 0, 1 and 2+.
- The most automated enterprises are focusing their efforts on in-house developed platforms. This makes staff reduction for opex savings difficult because a large number of developers and engineers are required to manage the lifecycle of these software platforms.

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





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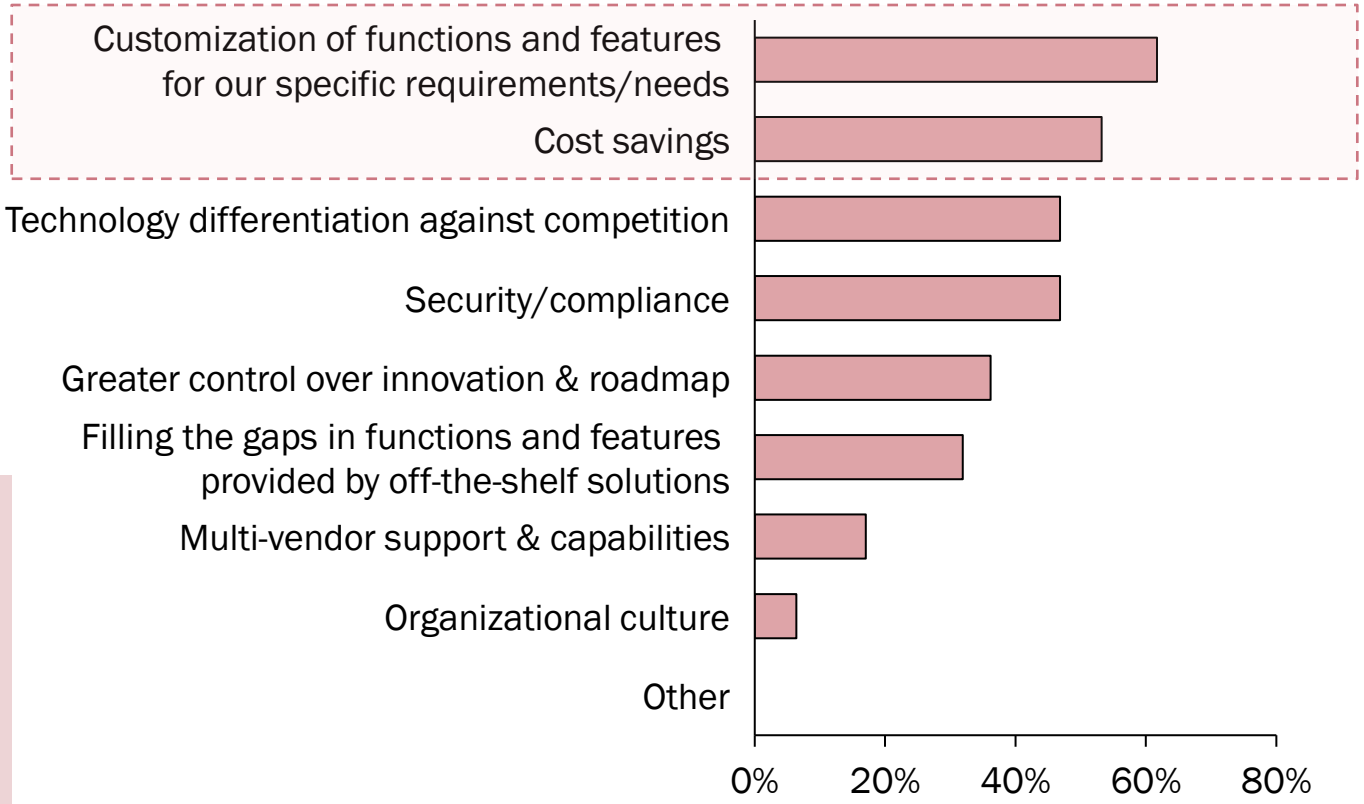
DIY DC automation development is primarily driven by a need for customization and cost savings

- Enterprises believe in-house developed data center network automation is the most cost-effective method to produce industry-specific customizations of function and features.
- The six most automated enterprises focus more on security/compliance; they need specific customizations revolving around sensitive data and regulations.
- The six least automated enterprises are driven by cost savings, mainly in terms of capex.

> "Our automation is done mostly in ad-hoc ways. We have lots of customized scripts for monitoring, incident analysis and device configuration.
>
> *Senior Director IT, logistics company from Asia–Pacific*

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



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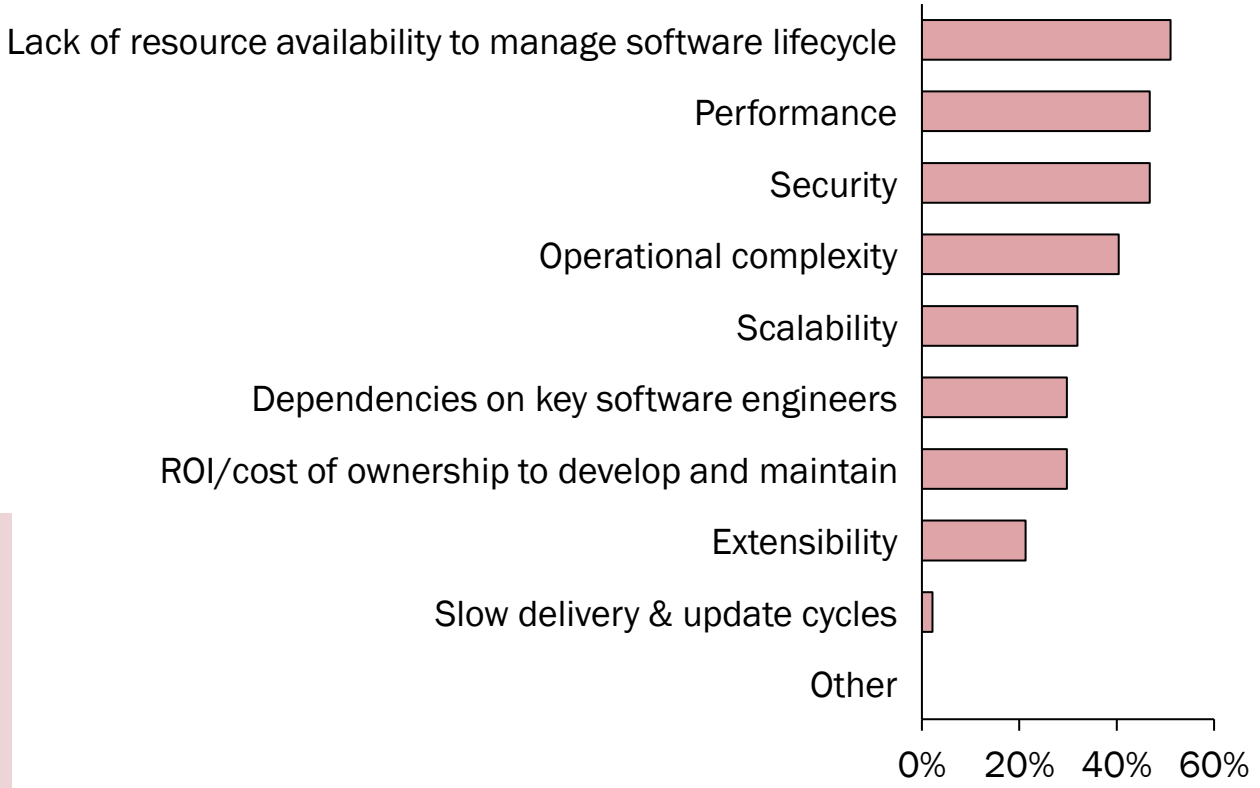
Most industries' biggest challenges with DIY development are a lack of resources and performance

- The least automated enterprises' top challenges for in-house developed data center network automation are a lack of resource availability and ROI.
- These enterprises are generally struggling with finding and attracting skilled individuals to carry out their DIY automation activities.
- The most automated enterprises have security as their top challenge, followed by operational complexity and scalability.
- Their security challenges refer to internal security and governance of DIY tools in terms of access, consistency, change management and lack of single source of truth.

> "We want to automate our data centers but we cannot find the people who understand both managing networks and coding to build automation. Currently, I have only one guy in my team who can do this.
>
> *CTO, insurance company 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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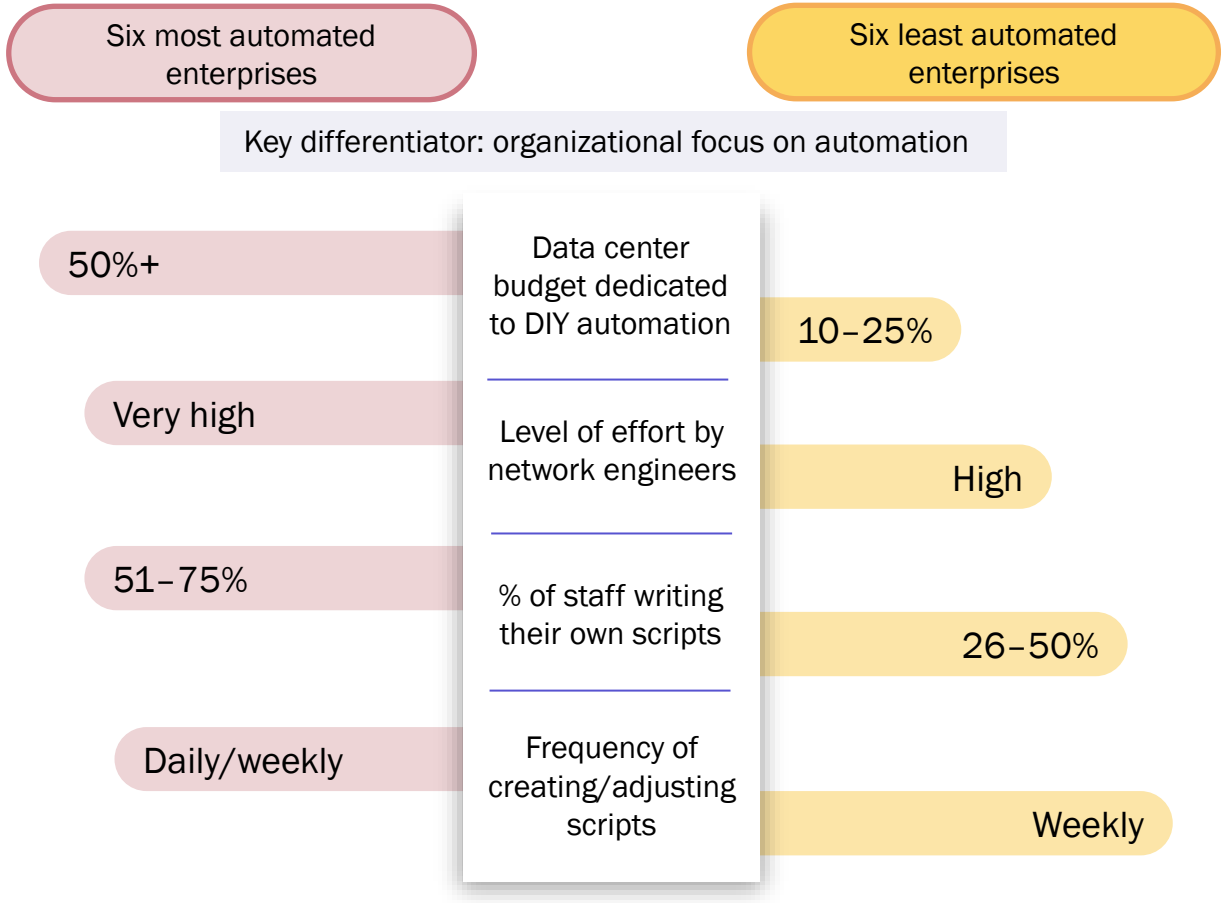
Increased use of DIY tools to improve data center network automation can lead to significant OPEX

- The most automated enterprises are putting significant resources and effort into their DIY automation activities.
  - All six of the most automated enterprises have a formal dedicated team for developing and maintaining data center network automation.
  - Formal dedicated teams of 20+ staff for the most automated, 6–10 for the least automated, on average.
  - The most automated enterprises dedicate a far higher portion of IT budget to data centers, and 50% of this budget to DIY automation.
  - Over half of the staff write scripts on a daily/weekly basis for the most automated enterprises– therefore, ‘true’ automation has yet to be achieved due to the amount of regular manual interventions.



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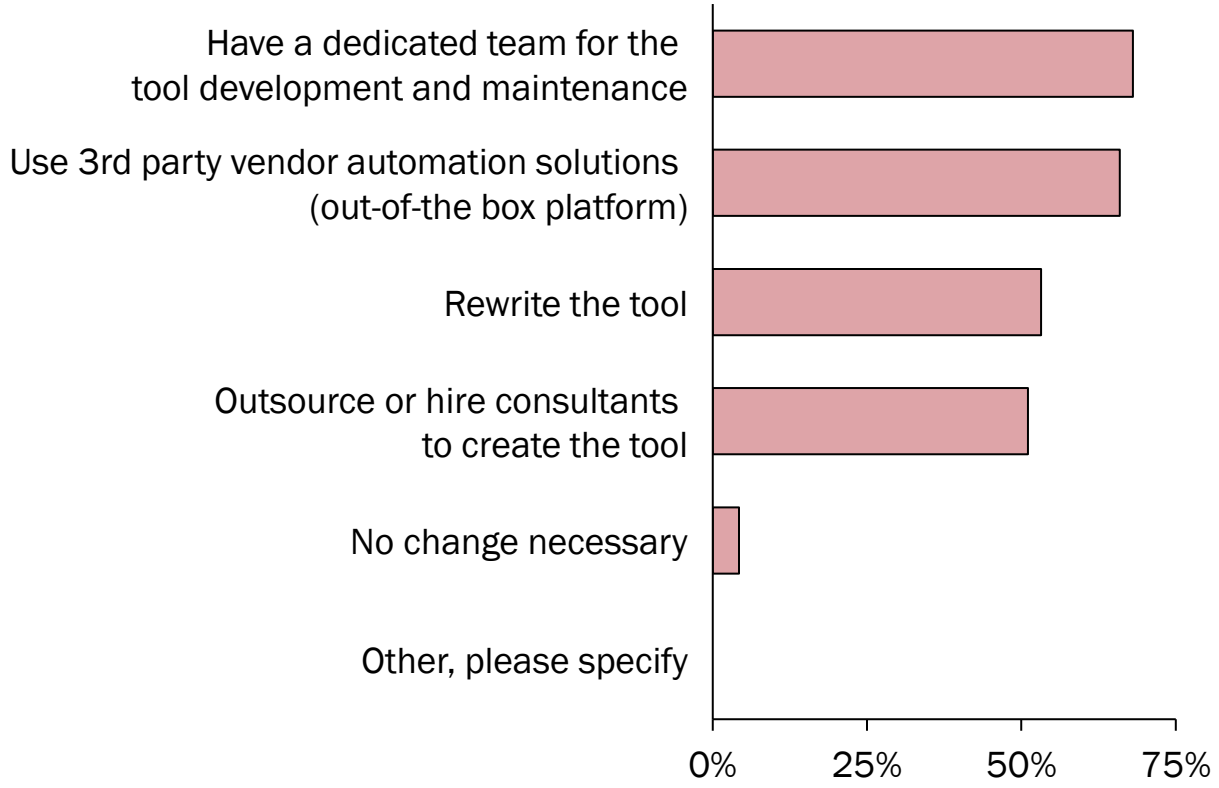
Many enterprises acknowledge that adopting the right 3rd party vendor solution would be a better approach going forward

- Very few enterprises are fully satisfied with their DIY automation tools and most of them are looking for improvements.
- 66% of enterprises would opt for a third-party vendor solution in retrospect, including:
  - five of the six least automated enterprises; these enterprises struggle with DIY automation ROI and finding the right skills – therefore they view vendor tools as the solution.
- Four of the six most automated enterprises.
  - The most automated feel that the level of investment, continuous effort and opex increase can be better utilized elsewhere, and hence use a vendor tool for some aspects of data center network automation.

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



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Overall data center automation trends

The state of in-house DC automation

Recommendations

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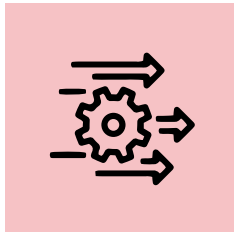
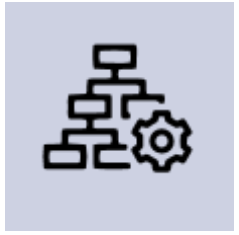
Recommendations



Enterprises should invest in, and focus on, data center automation to support their digital transformations.

A low level of data center network automation is posing a risk to delivering digital customer experiences, service agility and business continuity. Enterprises should benchmark against their most automated peers within and across verticals to understand how they are addressing the common challenges such as data center design, operational complexity, and a lack of resource availability in order to remain competitive.



Enterprises should consider revising their DIY data center network automation strategy to enable more effective resource deployment.

Enterprise DIY efforts are resource-intensive, and they are struggling to achieve scalable, cost-effective automation. Most organizations have a limited number of skilled staff who are stretched across the automation lifecycle, as well as other operational and engineering tasks. These resources can be more effectively deployed by identifying tasks that can be carried out by vendor out-of-the-box solutions.

Adopting the right vendor solutions can help increase data center automation levels.

Operational complexity is a major challenge of data center network automation for most enterprises, particularly those with security/compliance requirements and multi-vendor ecosystems. Therefore, enterprises should adopt multi-vendor, intent-based platforms to enable repeatable and reliable zero-touch automation that helps maximize ROI, improve performance, and empowers organizations to focus efforts on strategic ambitions.

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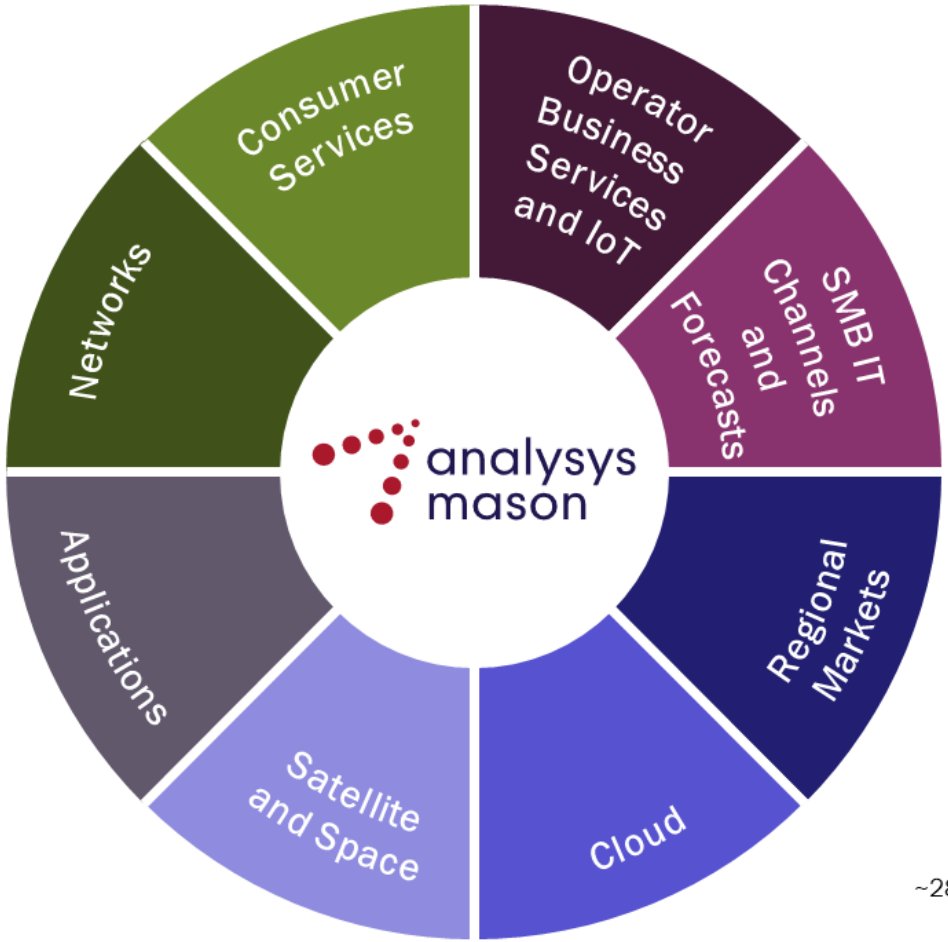

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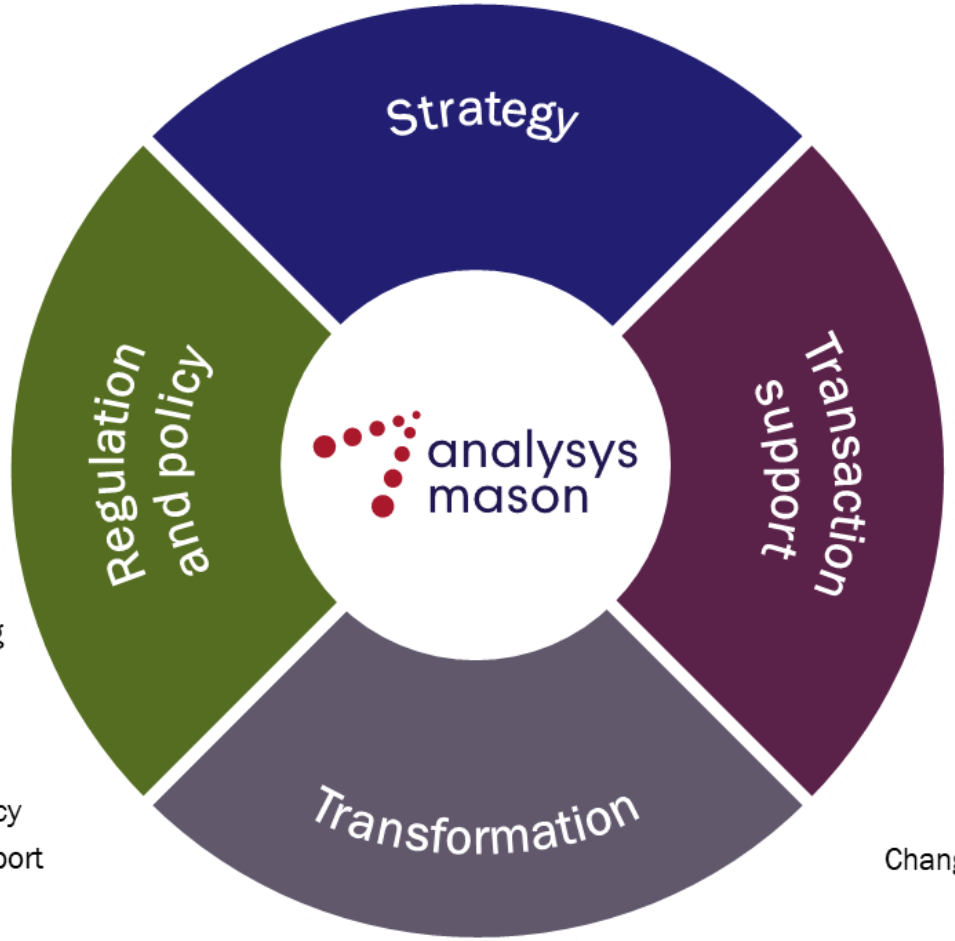

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