GSMA Intelligence

Netcracker
An NEC Company

GSMA Intelligence Radar Series

2023 and the automation imperative

February 2023

GSMA™

The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

We invite you to find out more at gsma.com

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GSMA™ Intelligence

GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts, and publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily.

GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself.

Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

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2023 and the automation imperative
Operators in focus

Leveraging a global survey of mobile operators, the insights that follow capture current thinking on automation, what's needed to execute on its promise, and the misunderstandings that could be holding it back.

- **Automation: a strategic priority.** Across several years of GSMA Intelligence Network Transformation research, automation of network and service resources has been a perennial strategic priority and the top focus for opex efficiencies.

- **Automation in 2023**. Expectations for the near-term evolution of mobile networks include many dynamics that will elevate the value of automation: 5G standalone, cloud adoption, increasingly demanding users, and new service rollouts.

- **Diverse technologies and demands**. While the importance of automation is well understood, application to a wide array of network and service assets – across a range of operators – means it cannot be viewed as a single, monolithic technology.

- **Operator insight imperative**. To fully understand the state of automation among mobile operators, a deep view into operator perspectives and plans is critical.

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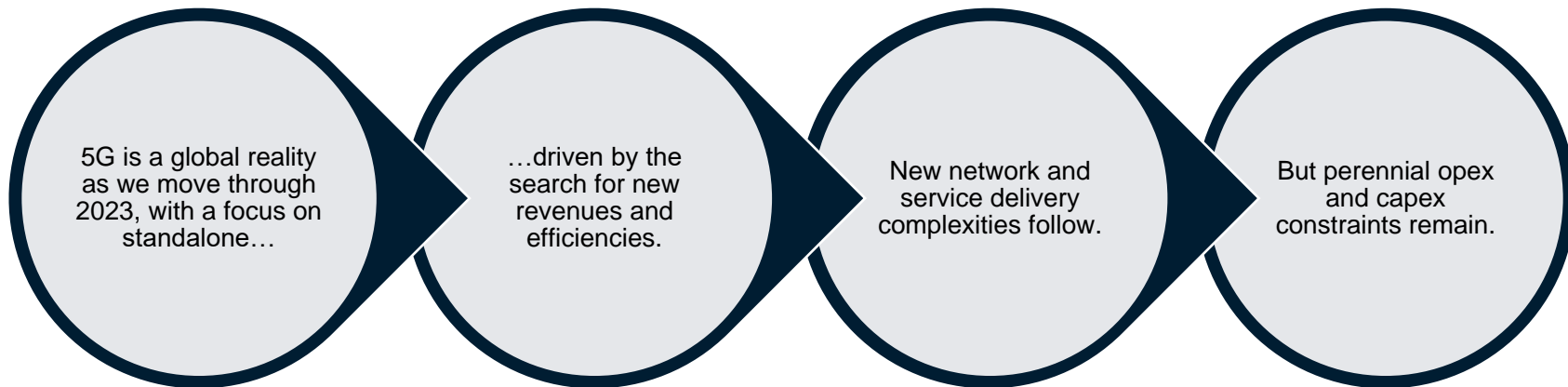## 4 2023 outlook: progress, requirements, misunderstandings

- Automation versus 2023 network and service dynamics: 5G, open RAN, B2B and cloud
- Progress, planning and perceptions
- Misunderstandings: five things operators are getting wrong
- Scaling the market: 5G requirements for automation in 2023

Automation in context
Networks and services, people and profits in 2023

Taken together, today's dynamics make an argument for network and service automation.
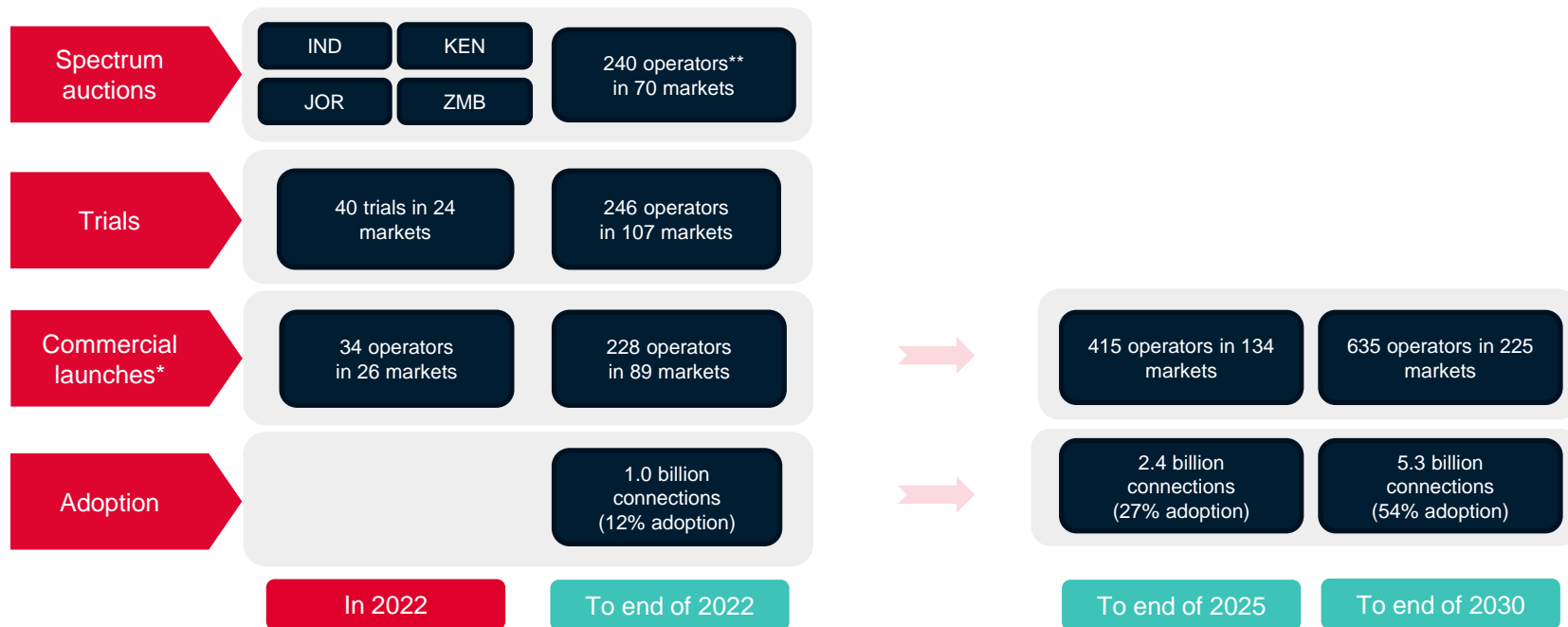
Comparing the argument for automation with real-world deployments, obstacles and deployment realities requires hearing directly from operators.

| 5G is a global reality as we move through 2023, with a focus on standalone… | …driven by the search for new revenues and efficiencies. | New network and service delivery complexities follow. | But perennial opex and capex constraints remain. |

Automation in context
2023 in metrics and trends – 5G scale and scope

At the start of 2023, we are no longer waiting for the 5G era to arrive. 5G spectrum allocations, trials, launches and connections reflect a maturing market.

Spectrum auctions

IND	KEN
JOR	ZMB

240 operators** in 70 markets

Trials

40 trials in 24 markets

246 operators in 107 markets

Commercial launches*

34 operators in 26 markets

228 operators in 89 markets

415 operators in 134 markets

635 operators in 225 markets

Adoption

1.0 billion connections (12% adoption)

2.4 billion connections (27% adoption)

5.3 billion connections (54% adoption)

In 2022	To end of 2022

To end of 2025	To end of 2030

* Launches of commercial mobile and FWA 5G services
** Excludes regional US and Canadian operators

Data correct to 30 November 2022. For updates, see gsmaintelligence.com
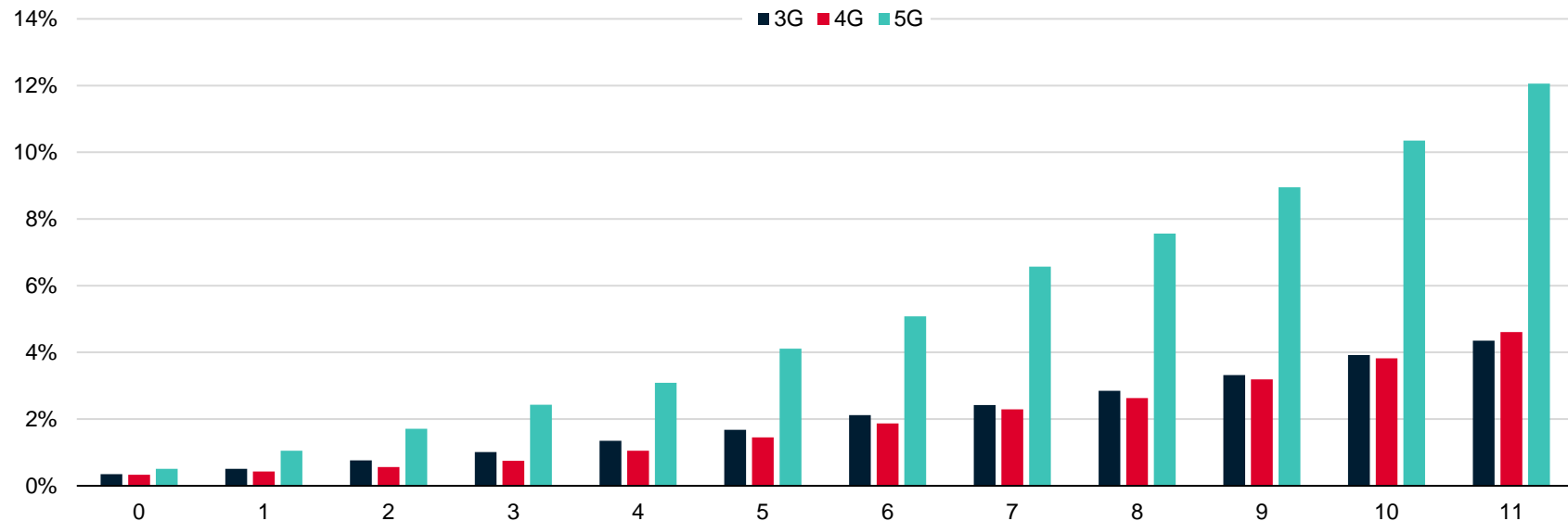Source: GSMA Intelligence

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Automation in context
2023 in metrics and trends – 5G scale and uptake

5G maturity can be credited to extremely rapid user adoption.
Compared to prior mobile broadband generations, the pace of
5G uptake is remarkable.

Share of total mobile connections by generation
By quarter, post 0.25% achievement
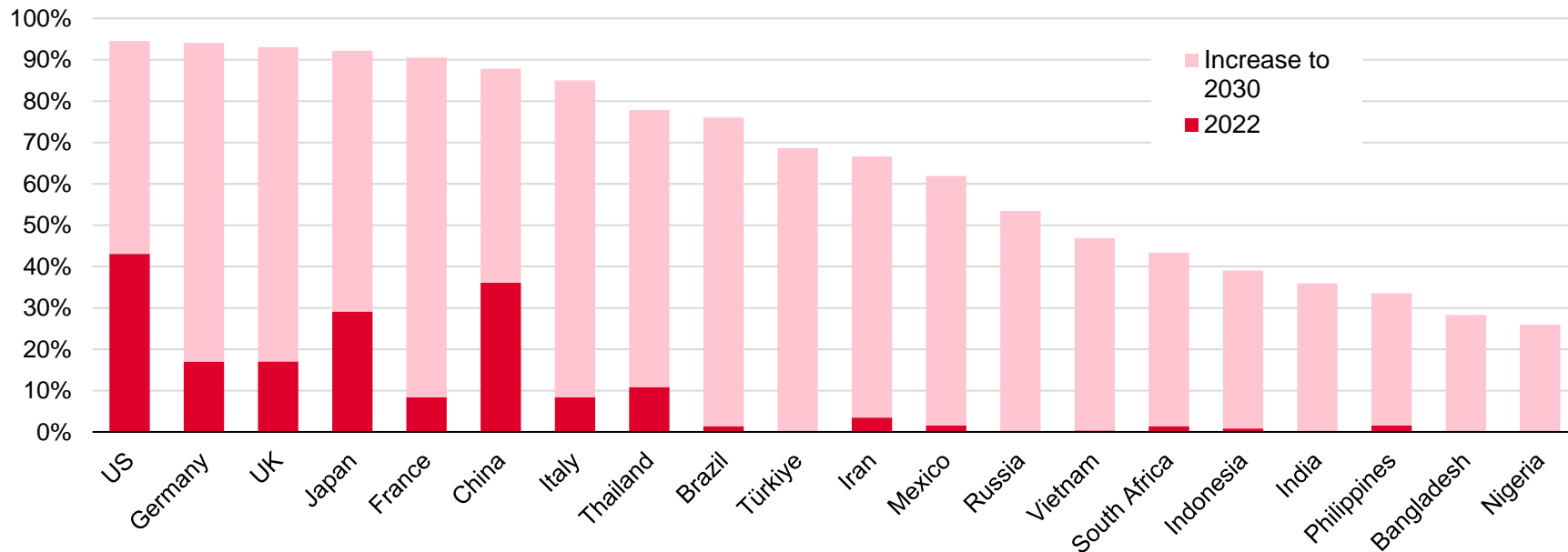

Source: GSMA Intelligence

Automation in context
2023 in metrics and trends – 5G growth trajectory

Today's 5G penetration is a fraction of what it will be.
A few key markets have driven 5G's global success, with more growth to come.

Share of total mobile connections on 5G by country

Legend:
- Increase to 2030
- 2022

X-axis categories: US, Germany, UK, Japan, France, China, Italy, Thailand, Brazil, Türkiye, Iran, Mexico, Russia, Vietnam, South Africa, Indonesia, India, Philippines, Bangladesh, Nigeria
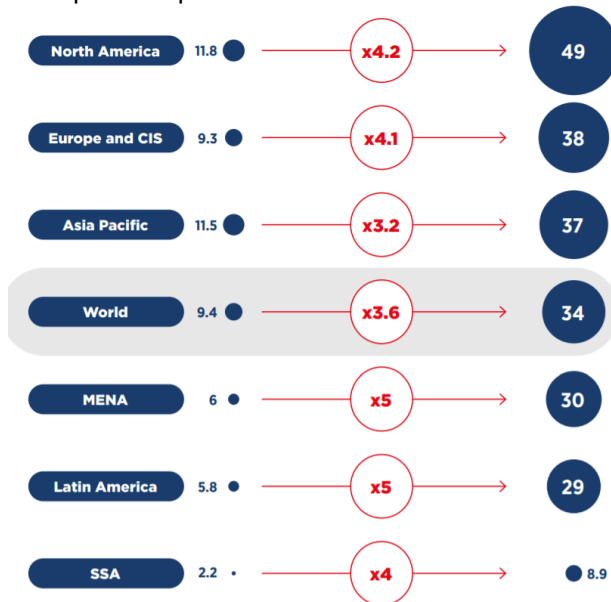
Automation in context
2023 in metrics and trends – the search for revenues

5G was built to do two things:
- address traffic demand
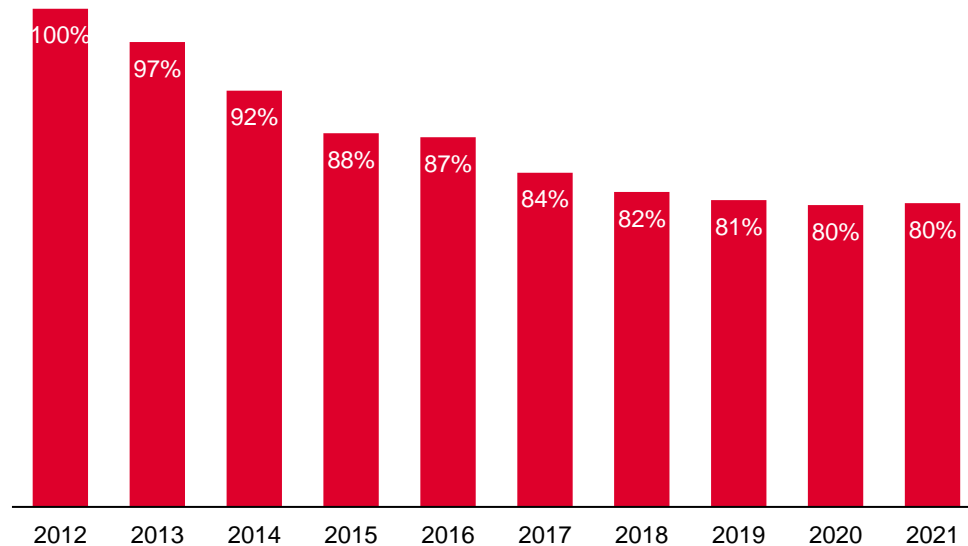- accelerate revenue growth – particularly from B2B.

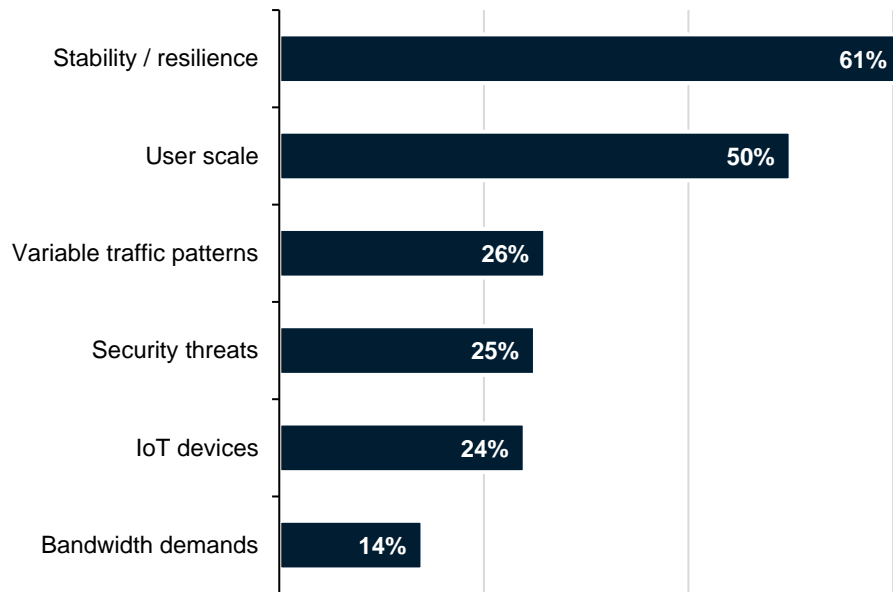**Mobile data usage: 2020 versus 2026**
GB per user per month

Region	2020	Factor	2026
North America	11.8	x4.2	49
Europe and CIS	9.3	x4.1	38
Asia Pacific	11.5	x3.2	37
World	9.4	x3.6	34
MENA	6	x5	30
Latin America	5.8	x5	29
SSA	2.2	x4	8.9

Global ARPU: 2012–2021
Percentage versus 2012

2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
100%	97%	92%	88%	87%	84%	82%	81%	80%	80%

Source: Ericsson, GSMA Intelligence

Source: GSMA Intelligence

Automation in context
2023 in metrics and trends – user versus network demand

Mobile broadband user demand is driving network architecture evolution.
More users expecting reliable broadband are driving dense, open,
distributed networks.

Top user dynamics driving network strategies

How operators are responding to user demands

Category	Value
Stability / resilience	61%
User scale	50%
Variable traffic patterns	26%
Security threats	25%
IoT devices	24%
Bandwidth demands	14%

Densification
More cells to support capacity

Open networks
More suppliers to ensure business continuity

Cloud – public and private
Use of cloud for flexible scale

Edge networking
Distributed compute for latency and security
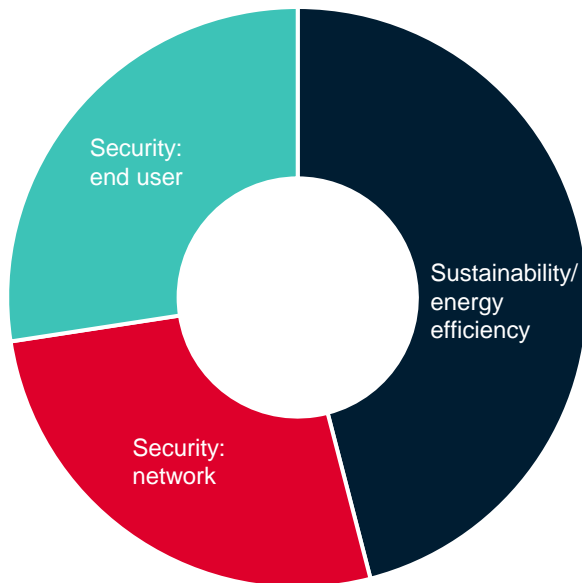
Source: GSMA Intelligence

Automation in context
2023 in metrics and trends – the three Ss

Beyond specific user demands, three priorities are driving network thinking. **Security** and **sustainability** are strategic focal points, with **standalone** (SA) gaining momentum.
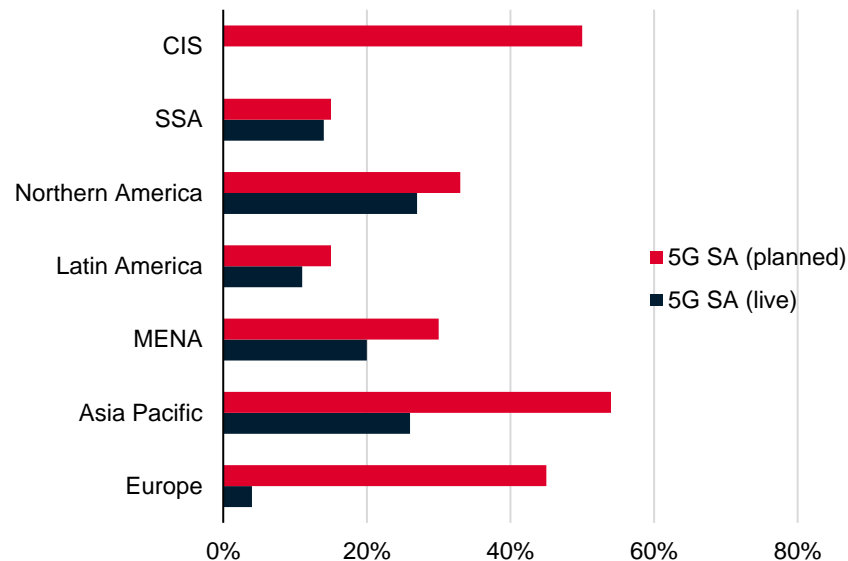
Network transformation strategy priorities
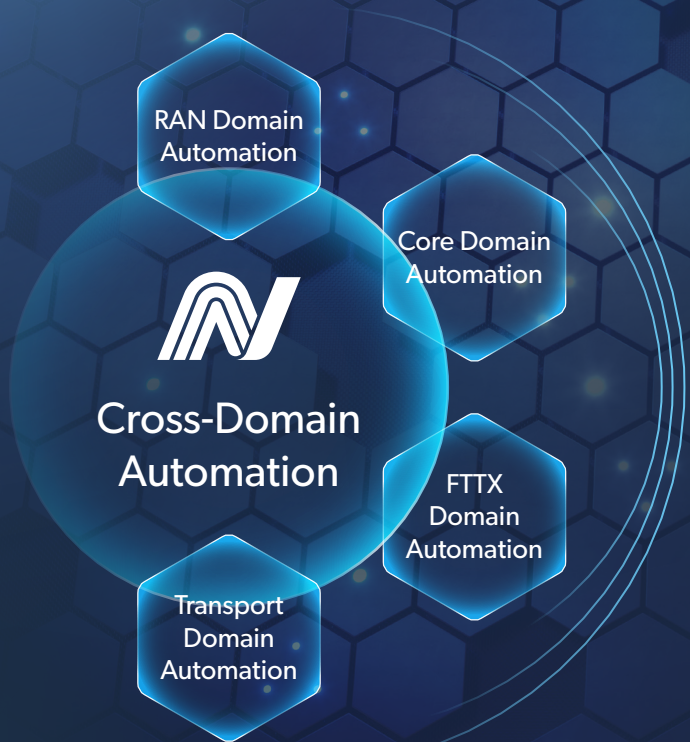Top three "extremely important" priorities among operators

Donut chart segments: Sustainability/energy efficiency; Security: network; Security: end user

5G SA launches and plans
As a percentage of live 5G deployments, end of 2022

Bar chart categories (top to bottom): CIS, SSA, Northern America, Latin America, MENA, Asia Pacific, Europe

Legend:
- 5G SA (planned)
- 5G SA (live)

X-axis: 0%, 20%, 40%, 60%, 80%

Source: GSMA Intelligence

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BREAK DOWN DISAGGREGATION BARRIERS WITH NETCRACKER AUTOMATION SOLUTIONS

Delivering the Digital Future

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- RAN Domain Automation
- Core Domain Automation
- Cross-Domain Automation
- FTTX Domain Automation
- Transport Domain Automation

Flexible deployment models

- Cross-domain
- Domain-specific
- Multilayer
- Multicloud

Advanced technology

- Intent and model driven
- Cloud-native
- AIOps integration
- Closed-loop automation

Open APIs and strong ecosystem

3GPP A GLOBAL INITIATIVE

MEF

tmforum

O-RAN ALLIANCE

ETSI

Automation in context
The role of automation – in theory

Networks

New technologies, complexities and architectures make network deployment and operation more complicated than ever, requiring automation to efficiently run them and upgrade with new features.

Services

Operators need new consumer and B2B services to drive 5G revenues while users are expecting reliability.

Automation promises improved time to market for new services (at scale) while assuring quality.

Profits

Network and service efficiencies (opex and capex) keep costs in check.

Meeting customer demands drives revenues.

Combined, the ultimate goal is improved profitability.
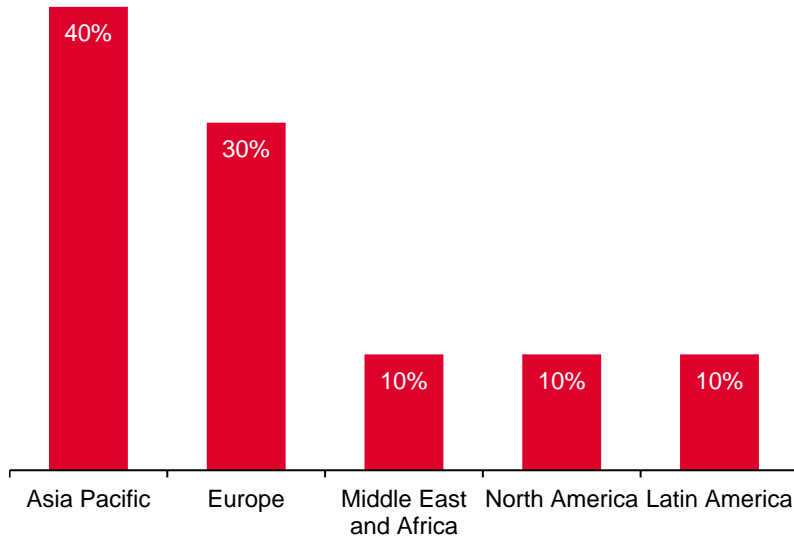
Skills and expertise
Skills gaps represent a barrier to deployment of network technologies, including automation, which can be a substitute for some expertise.
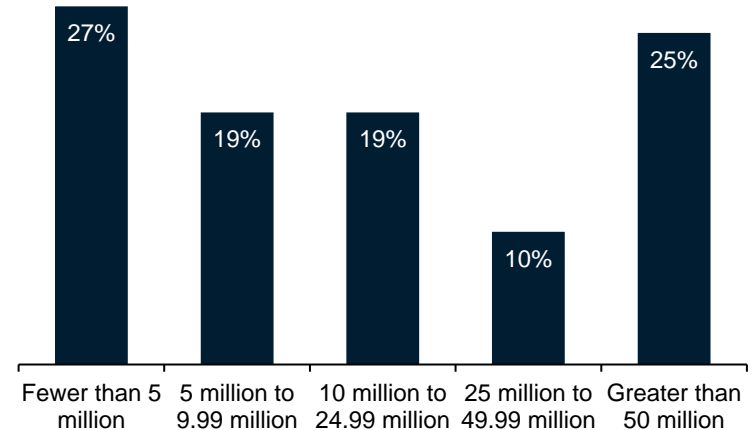
Automation in context
The role of automation – in practice

In Q3 2022, GSMA Intelligence surveyed 100 network and service automation decision-makers from mobile and converged operators around the world to understand their views on automation strategies, priorities, progress and obstacles. The goal was to better understand how and why operators are adopting automation, and where opportunities exist to drive automation forward.

Respondents: regional distribution
N=100

Region	Percentage
Asia Pacific	40%
Europe	30%
Middle East and Africa	10%
North America	10%
Latin America	10%

Respondents: organisation size (subscribers)
N=100

Organisation size	Percentage
Fewer than 5 million	27%
5 million to 9.99 million	19%
10 million to 24.99 million	19%
25 million to 49.99 million	10%
Greater than 50 million	25%

Source: GSMA Intelligence

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- Progress, planning and perceptions

- Misunderstandings: five things operators are getting wrong

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Automation versus network transformation

Revenues continue to trump costs. GSMA Intelligence research from mid-2022 found improved customer experiences and new revenue generation to be the top drivers of holistic network transformation strategies.

Automation strategies. The same dynamic holds for automation strategies; user experience and revenue generation outweighed capex and opex efficiencies by a significant margin.

Automation efficiency bias. Compared with broader network transformation strategies, capex and opex efficiencies factor more prominently into automation strategies. Given the role of network strategy in ensuring network performance and enabling new services, this might simply represent a realistic view of where operators are focused. Beyond this reality, a failure to fully connect automation thinking to the 'making money' side of their strategic priorities could jeopardise revenue goals.

Network automation versus service automation

Networks and services priorities – broadly aligned. Whether automating network deployment and operations, or service deployment and assurance, experience and revenue-centric criteria are the greater priorities. In no cases are expected opex or capex efficiencies seen as a bigger strategic priority.

Service automation and savings. While customer experience and revenue generation remain top priorities, operators look to service automation for opex and capex efficiencies more than they do network automation.

Service automation confusion. At a basic level, this is quite surprising. Service rollout and assurance are directly linked to revenue generation and the service experience of any given user. Automation across networks and services is key to executing fully on the automation value proposition. Of course, the fact that network and service teams may operate independently can hold back holistic automation thinking, which may require organisational changes to overcome.

Automation trajectory and strategy
Network automation: drivers and obstacles

Drivers

Service demand trumps network demand. Automation and broader network transformation strategies are driven by service-centric issues including customer experience and revenue generation. Service complexity and service expectations as the top two network automation drivers aligns with this view.

Automation: a tonic for complexity. Extending to the top three drivers, complexity is a key focus, with service complexity the No.1 driver and network complexity at No.3. Automation has long been pitched as a solution for dealing with complex networks and services; this message is clearly resonating.

Spectrum and sunsets. Nearly 20% of operators identify spectrum asset diversity as their top network automation driver. As operators gain access to new spectrum assets and re-farm older spectrum to support 5G, this is only likely to grow as a priority.

What about skills and security? Security is a top network transformation priority for operators, while skills and expertise are a perennial focal point – particularly as operators battle other technology companies for talent. To see skills towards the bottom may not be surprising; it is more often seen as an obstacle to automation deployment than a reason for deployment. Meanwhile, a lack of understanding around the necessity of automation for securing networks could represent a risk for operators.

Obstacles

Internal coordination is lacking. Across various domains of mobile networks, uncertain internal ownership of automation projects is the top or second greatest obstacle to deployment. This is a common refrain for many network initiatives, reflecting the diverse teams and business units involved in implementing an automation solution.

Kudos to data teams. Lack of access to internal data needed to support automation projects is seen a minor obstacle, suggesting those teams are not a significant part of any automation deployment 'turf wars'.

Ecosystem isn't much an issue. Vendor ecosystem limitations and multi-vendor support are seen as minor automation obstacles across network domains. That points to a robust set of vendors ready to support operators and their diverse network solutions. Since multi-vendor implementations (causing network and service complexity) are often a driver for automation efforts, this signals that suppliers are seen as delivering what is needed.

C-suite, RoI and bias. After uncertain internal ownership, unclear RoI was near the top of the automation obstacles. Alongside employee bias against automation tools (near the top or middle of ranked obstacles), this is a challenge that requires support from executive ranks, who must make clear the will and rationale for automation (including RoI) across the organisation.

Automation trajectory and strategy
Service automation: drivers and obstacles

Drivers

Services and complexity – a common refrain. As with network automation, increasing service complexity is the top driver of service automation efforts. Given the direct connection between the two, it would be surprising if this was not the case.

Security and skills – another common refrain. As with network automation views, lack of internal skills and security demands were at the bottom of operators' service automation drivers. This is understandable where skills are seen as a prerequisite for automation deployment, but it potentially misses an opportunity to substitute people skills with automated processes, and is a risk given security demands.

5G and B2B service expansion. 5G investments and rollouts have often been justified by an opportunity to push deeper into enterprise verticals, driving revenue diversification. To this end, the fact that new customer segments are a solidly ranked No.2 in terms of service automation drivers is encouraging, linking service automation priorities to broader service strategies.

Network versus service linkages. While not the top driver, network complexity is in the middle of service automation drivers. Along with a solid showing for the integration of cloud technologies, it is clear that operators see the link between network and service operations – a benefit to solution providers who link the two in their messaging and portfolios.

Obstacles

Expertise, RoI and ownership. Lack of internal expertise, uncertain RoI and internal ownership issues represent the top obstacles to automation across service rollout and assurance. All are ranked similarly. While this makes sense where service activation and operations are managed holistically, operators must understand that the dynamics across these domains are unique.

Is expertise an issue or not? Lack of skills was the lowest ranked driver for service automation but the greatest obstacle to implementation. Operators clearly believe they have the right people to manage their service operations but not implement automation solutions – an opportunity for solution providers to offer support.

Data, ecosystem and multi-vendor consistency. Across network and service automation, the lowest ranked obstacles are identical: vendor ecosystems, access to data and multi-vendor support. A testament to solution support, this also signals that operators must look at network and service automation as unique, with their own dynamics.
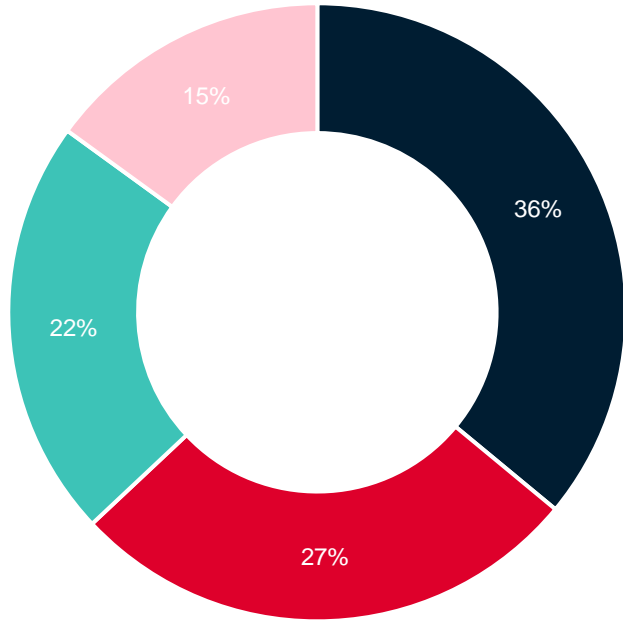
Assurance and rollout consistency, across the board. Beyond the top obstacles, rankings across service rollout and assurance automation are almost identical from top to bottom. Where identical rankings suggest operators are viewing the domains in the same way, it's another reminder that operators should see them as unique, each with its own drivers and challenges.

Automation trajectory and strategy
Strategic priorities: network and service automation

What is the top priority driving your network deployment and operations automation strategy?
N=100

What is the top priority driving your service provisioning and assurance automation strategy?
N=100

Network deployment and operations automation:
- 36% Improved customer experience
- 27% New revenue generation
- 22% Opex efficiencies
- 15% Capex efficiencies

Service provisioning and assurance automation:
- 32% Improved customer experience
- 25% New revenue generation
- 23% Opex efficiencies
- 20% Capex efficiencies

■ Improved customer experience   ■ New revenue generation   ■ Opex efficiencies   ■ Capex efficiencies
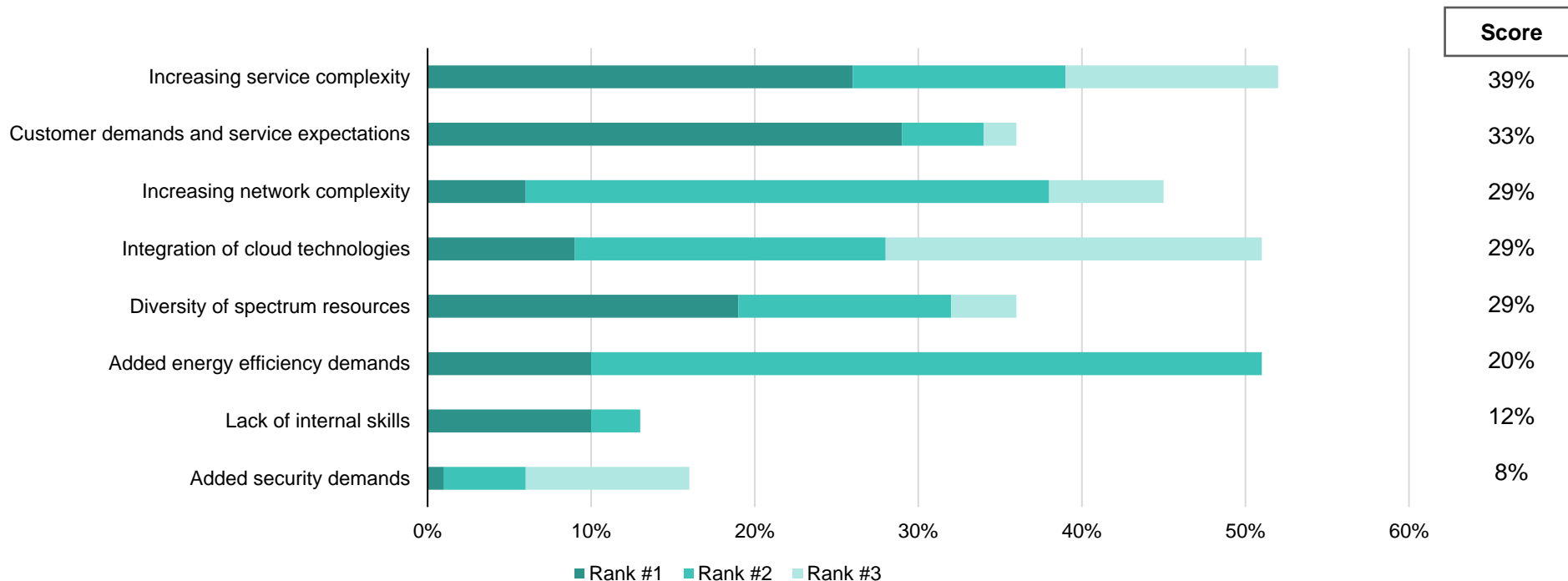
Source: GSMA Intelligence

Automation trajectory and strategy
Network automation: key business drivers

What are the primary drivers of automation (including support deployment, operations) across your network assets?
N=100

	Score
Increasing service complexity	39%
Customer demands and service expectations	33%
Increasing network complexity	29%
Integration of cloud technologies	29%
Diversity of spectrum resources	29%
Added energy efficiency demands	20%
Lack of internal skills	12%
Added security demands	8%

■ Rank #1　■ Rank #2　■ Rank #3

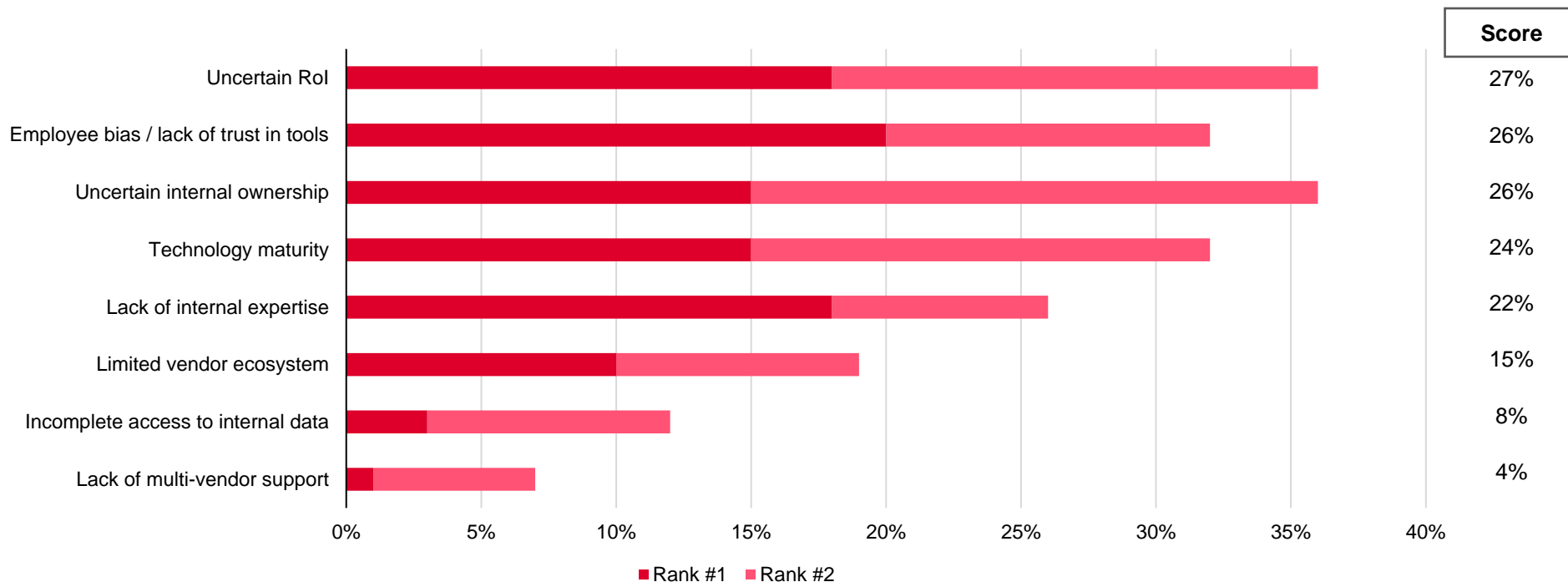Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.66) + (Rank #3 * 0.33)

Automation trajectory and strategy
Network automation: RAN obstacles

What are the primary obstacles to automating RAN functions in your network?
N=100

	Score
Uncertain RoI	27%
Employee bias / lack of trust in tools	26%
Uncertain internal ownership	26%
Technology maturity	24%
Lack of internal expertise	22%
Limited vendor ecosystem	15%
Incomplete access to internal data	8%
Lack of multi-vendor support	4%

■ Rank #1   ■ Rank #2

Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.50)

Source: GSMA Intelligence

Automation trajectory and strategy
Network automation: core and edge obstacles

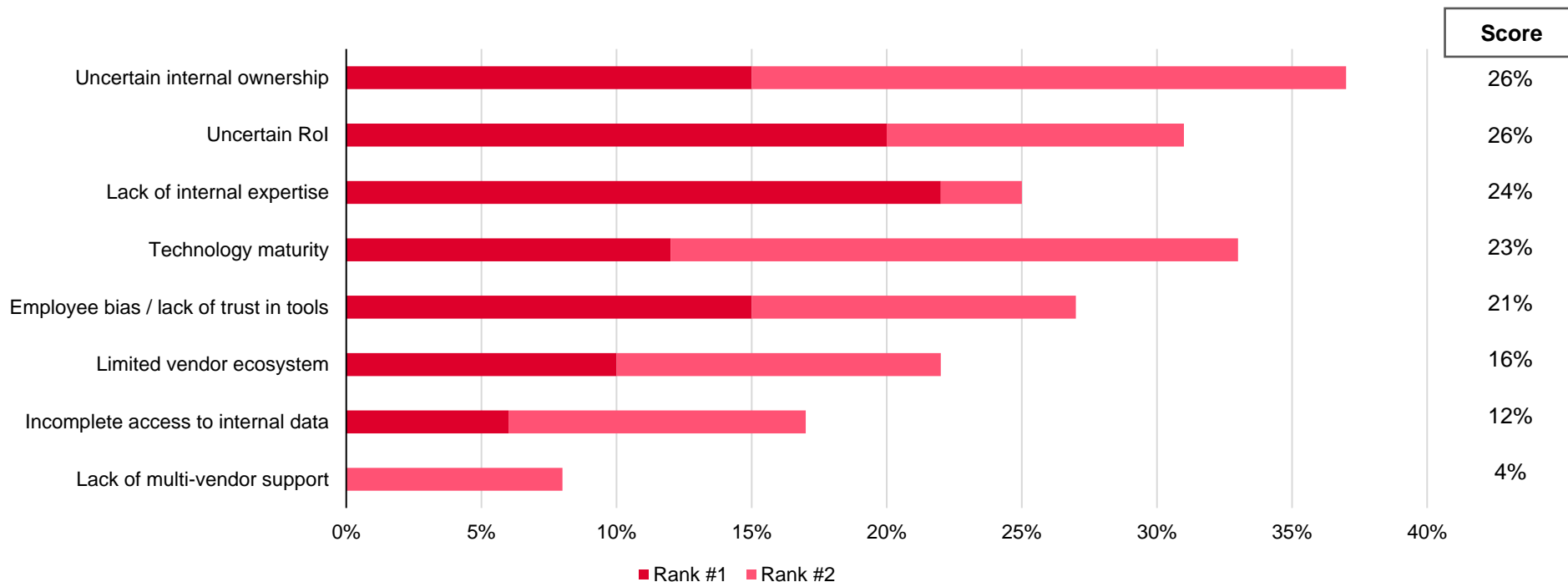**What are the primary obstacles to automating core and edge functions in your network?**
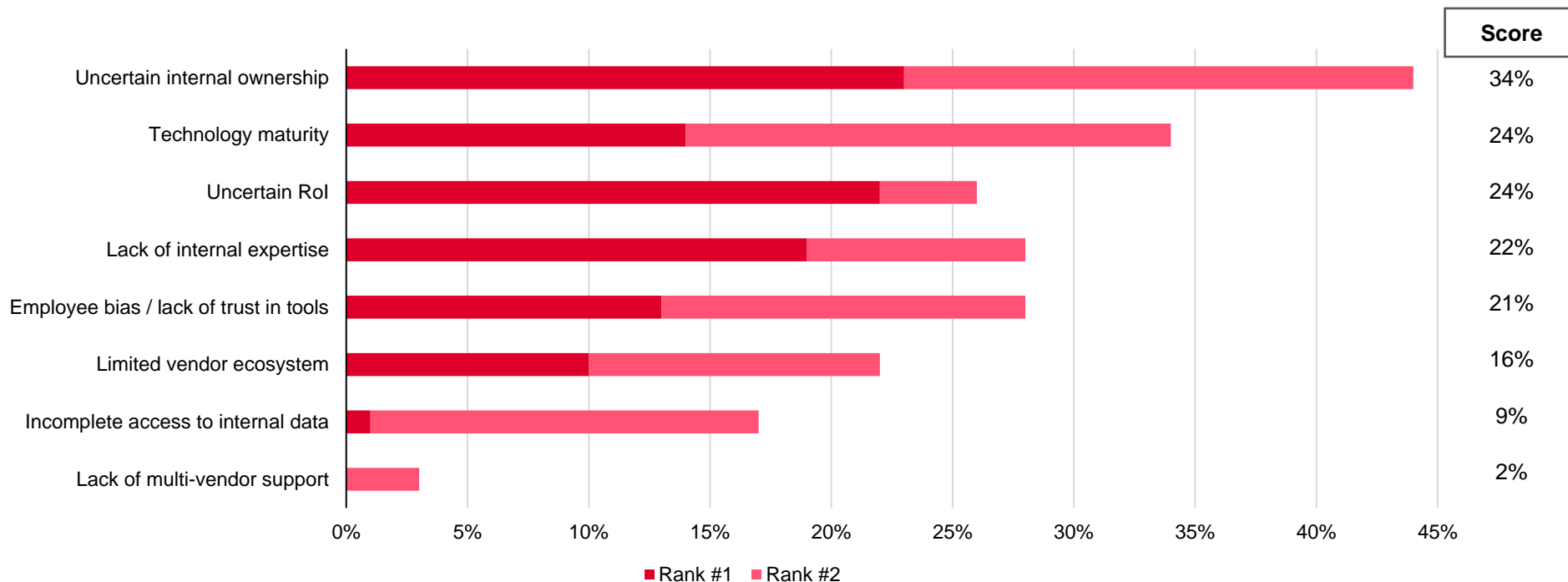N=100

	Score
Uncertain internal ownership	26%
Uncertain RoI	26%
Lack of internal expertise	24%
Technology maturity	23%
Employee bias / lack of trust in tools	21%
Limited vendor ecosystem	16%
Incomplete access to internal data	12%
Lack of multi-vendor support	4%

■ Rank #1   ■ Rank #2

Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.50)

Source: GSMA Intelligence

Automation trajectory and strategy
Network automation: transport obstacles

What are the primary obstacles to automating transport network functions in your network?
N=100

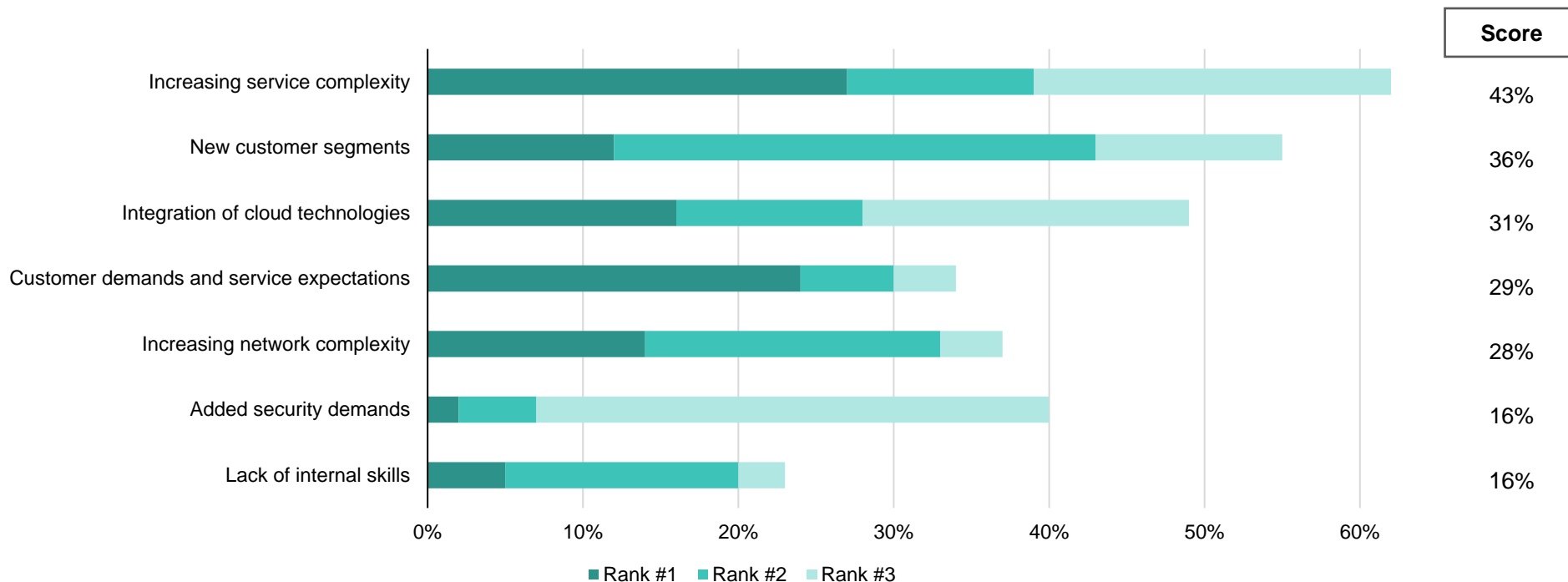|	Score
Uncertain internal ownership	34%
Technology maturity	24%
Uncertain RoI	24%
Lack of internal expertise	22%
Employee bias / lack of trust in tools	21%
Limited vendor ecosystem	16%
Incomplete access to internal data	9%
Lack of multi-vendor support	2%

■ Rank #1   ■ Rank #2

Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.50)

Automation trajectory and strategy
Service automation: key business drivers

What are the primary drivers of automation (support, rollout, operations) supporting your service offerings and delivery?
N=100

Driver	Score
Increasing service complexity	43%
New customer segments	36%
Integration of cloud technologies	31%
Customer demands and service expectations	29%
Increasing network complexity	28%
Added security demands	16%
Lack of internal skills	16%

■ Rank #1   ■ Rank #2   ■ Rank #3

Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.66) + (Rank #3 * 0.33)
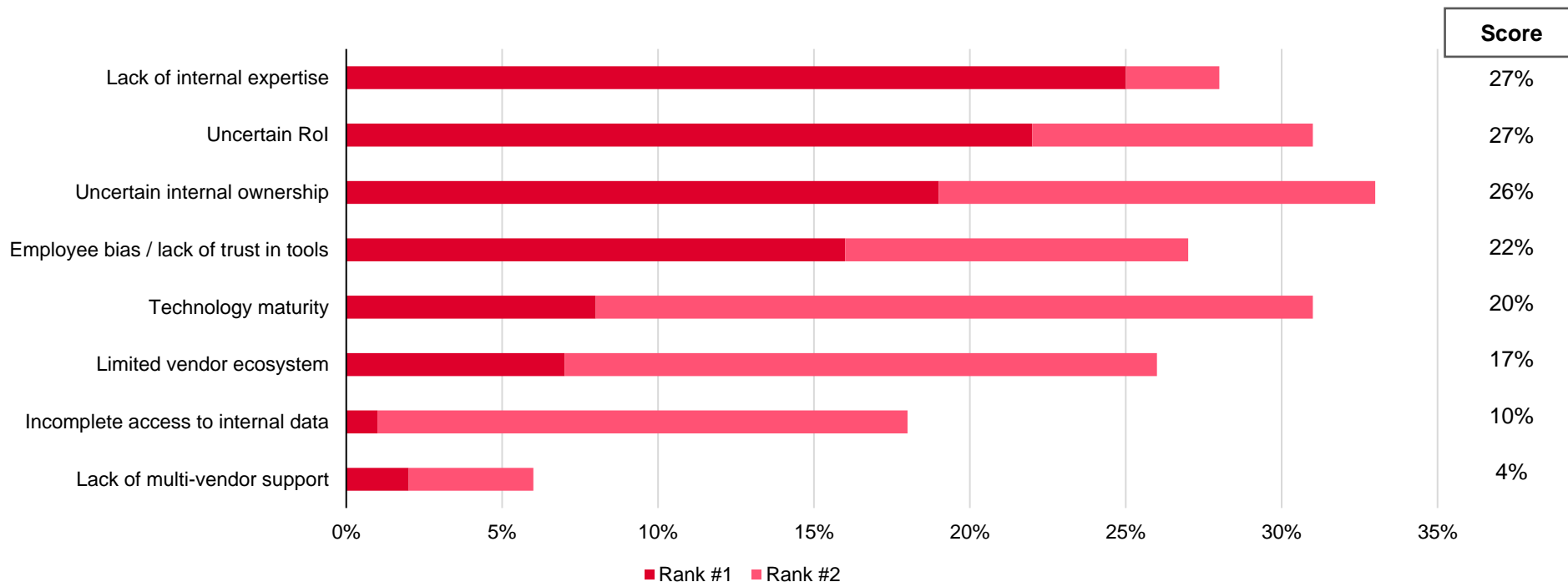
Automation trajectory and strategy
Service automation: service rollout obstacles

What are the primary obstacles to automating service rollout across your organisation?
N=100

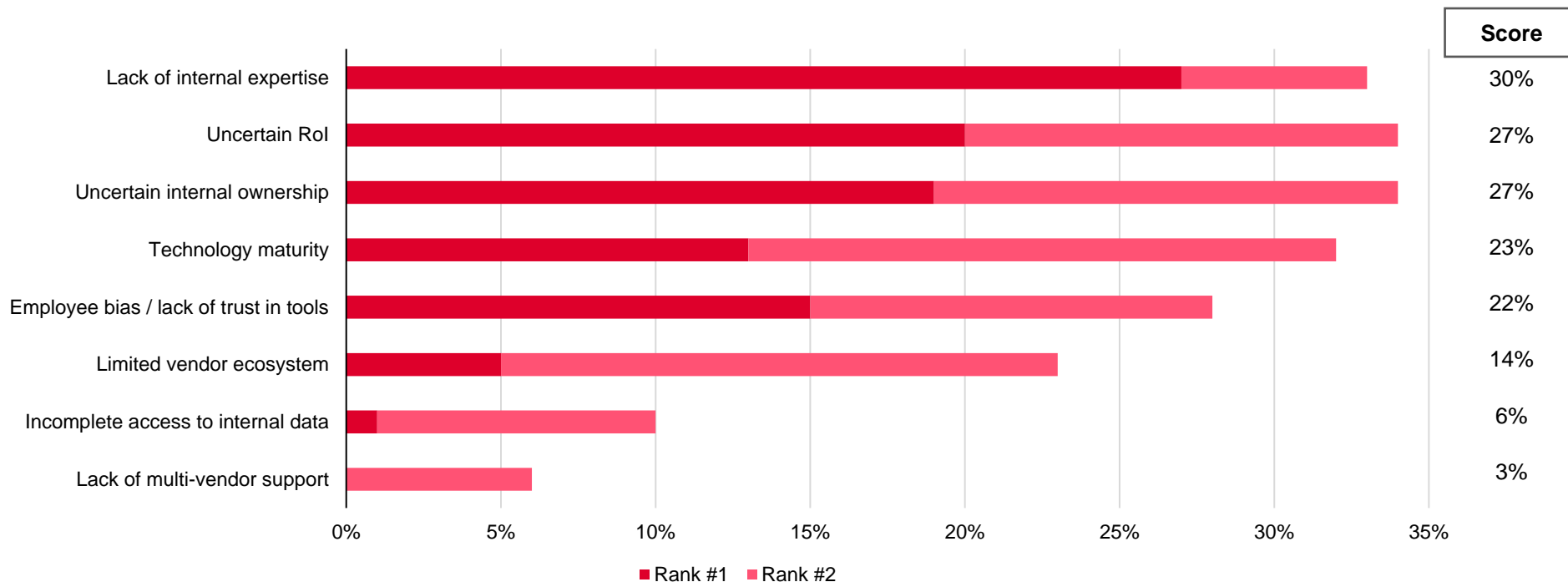| Obstacle	Score
Lack of internal expertise	27%
Uncertain RoI	27%
Uncertain internal ownership	26%
Employee bias / lack of trust in tools	22%
Technology maturity	20%
Limited vendor ecosystem	17%
Incomplete access to internal data	10%
Lack of multi-vendor support	4%

■ Rank #1   ■ Rank #2

Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.50)

Automation trajectory and strategy
Service automation: service assurance obstacles

What are the primary obstacles to automating service assurance and support across your organisation?
N=100

	Score
Lack of internal expertise	30%
Uncertain RoI	27%
Uncertain internal ownership	27%
Technology maturity	23%
Employee bias / lack of trust in tools	22%
Limited vendor ecosystem	14%
Incomplete access to internal data	6%
Lack of multi-vendor support	3%

■ Rank #1   ■ Rank #2

Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.50)

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RAN

Services beat costs. The top two ranked benefits of RAN automation both involve service performance – data speeds and coverage. This is testament to the value operators see in RAN automation supporting user experiences.

Cost savings still important. Rounding out the top five benefits are opex, capex and energy savings – a reminder that top- and bottom-line concerns are RAN priorities.

Spectrum and feature rollout. Spectrum efficiency and the rollout of new network features ranked near the bottom of perceived benefits. As operators look to leverage spectrum assets and take advantage of new network features, this view will need to change, or operators risk running inefficient networks.

Cloud RAN and automation. As operators site RAN functions in the cloud, automation should be key. Rolling out RAN across cloud locations will be impossible if not automated. However, improved cloud support ranked last, suggesting operators don't think they need support – a mistake.

Core/edge

Services beat costs. As with RAN automation, operators see the top benefits of automation in the network core and edge to be service focused. Improved reliability was top by a large margin, with capacity improvements essentially tied at second with energy.

Energy crisis concerns. While improved energy efficiency was a top five benefit for RAN automation, it was the second-ranked benefit in the core and edge. Given the scale and power consumption of RAN assets, this comparison is surprising but could be attributed to the availability of RAN power efficiency technologies and worries about cloud power consumption (linked to the core and edge).

Cloud in the core. The move to site RAN functions in the cloud is still somewhat nascent. The move to site core functions in the cloud (including public cloud) has been in motion for years. The poor showing for improved cloud support is therefore worrying.

Transport

Services and energy versus features and cloud – a familiar story. As with core/edge automation, service reliability and energy cost savings were the top expected transport automation benefits, while cloud and new network feature support ranked last. Transport networks connect core and edge nodes, potentially explaining the similarity.

Transport's unique requirements. Transport connects access networks to core/edge resources, but that doesn't imply they are the same or face identical requirements. That automation benefits are viewed so similarly across domains suggests operators may need to look more closely at their core, edge and transport automation requirements.

Rethinking reliability. A strategic focus on user experience helps to explain the fact that service reliability is seen by operators as the top transport automation benefit. Improved cloud support and new network feature rollout can also play a role in reliability. Operators must ensure they know all the components feeding into their goals.

RAN

Planning and detection in the mainstream. It is logical that automated RAN planning and hardware detection enjoy the most commercial progress; they address basic RAN functions and needs that have existed for years. They solve problems that are not new.

Shutdowns and energy fears. More operators claim to have deployed automated cell sleep functions at scale than any other RAN automation tech. The relative maturity of these solutions could be one explanation, but rising energy costs are another likely factor.

SMO/RIC confusion. As a new RAN innovation tied to open RAN, it is understandable that commercial deployment of service management and orchestration (SMO) and RAN intelligent controller (RIC) solutions ranked last. Less credible is the notion that 12% of operators have already deployed these solutions at scale.

Core/edge

Capacity benefits. With reliability and capacity improvements highlighted as top benefits of automation in the core and edge domains, it is encouraging to see capacity management coming out at the top of commercially deployed core/edge automation technologies.

Cloud alignment. Another case of perceived benefits matching up with automation deployment progress is in the cloud. A relative lack of progress with multi-cloud orchestration clearly follows on from a poor perception of cloud architecture support as a benefit of automation in the core and edge domain.

Slicing on the horizon. A paltry 3% of operators claim to have deployed resource allocation automation at scale. But the number who have begun commercial deployment or are in the testing phase is on par with many other core/edge automation technologies, setting the scene for better network slicing support in the future.

Transport

Transport maintenance priorities. Operators claim predictive maintenance as the most deployed transport automation technology but least deployed in the core/edge domain. With transport links playing a critical role in connecting other network domains, the focus is easy to understand.

Slicing begins with transport. Resource allocation automation (including slicing) had its best showing in the transport network – deployed more often than in the RAN or core/edge. RAN and core slicing may require an upgrade to SA. Transport slicing can be done before that, and resource allocation has always been critical for ensuring sufficient RAN and core capacity.

Focus on capacity. With capacity management a key automation benefit in the core and edge, the deployment of core/edge capacity management automation makes sense. It also requires operators to support this with more capacity management automation progress in the transport domain (claimed as the least deployed technology).

Service rollout

Experience on top. Customer experience as a leading network transformation priority is a common refrain from operators. It is also reflected in capacity planning and reliability being identified as top service rollout automation benefits.

Experience and revenues. Rounding out the top service rollout automation benefits are customer conversion, service upsell and new service time to market, in line with new revenue generation being at the leading edge of network transformation priorities alongside customer experience.

Security and experience. Many different service characteristics contribute to the customer 'experience'. Security is presumably one of them. It is therefore disappointing to see threat mitigation near the bottom of expected benefits from service rollout automation investments.

Developers and revenues. By most accounts, 2023 will be marked by increased momentum behind network API exposure in support of enabling new services and monetising network capabilities. Third-party developer support as the least important service rollout automation benefit suggests most operators don't yet see the connection to revenues, or don't believe they need automation support to execute on them.

Service assurance

Revenues and experience. While experience-related benefits topped operator expectations around service rollout automation, a revenue-related benefit (customer upsell) topped service assurance expectations. Reliability improvements came in as a close No.2, but the implication is that assuring services is tightly linked to revenue generation and automation support is key to executing.

Assuring services and the cloud. Support for cloud architectures was seen as a relatively minor benefit of service rollout automation but more important in automating service assurance (ranked in the top half). Creating/deploying services that leverage the cloud may not be seen as complicated enough to require cloud support, but supporting those services is. Tying service to creation, however, is an important part of ensuring a solid user experience from the outset.

Support cost priorities. Keeping support costs in check may rank in the bottom half of service assurance automation benefits, but it is notable that almost 20% of operators claim it is the No.1 benefit; for those who see the value, it is critical.

Security and developer attention. As with service rollout automation, threat mitigation and third-party developer support are at the bottom of perceived service assurance automation benefits. As with service rollout automation, operators need to better connect security and API exposure to customer experience and revenue generation priorities.

Automation trajectory and technology
Service automation: the progress picture

Service rollout

Commercial progress. On average, 10% of the service rollout automation technologies we looked at were deployed at scale, with 35% at scale or in the initial state of commercial deployment. This matches service assurance progress and is roughly in line with automation across network domains – a good sign for progress.

Order management and getting the job done. At a basic level, service rollout involves managing orders. Order management automation (most deployed) highlights this, with progress following the value and fact that this has been a long-term requirement.

SLA conformance and service recommendation optimism. Progress with SLA conformance automation (second most deployed) and service recommendation automation (most deployed at scale) might seem encouraging. How sophisticated these deployments are, though, is unclear; SLA monitoring has historically focused on narrow, easy to track metrics (e.g. call drops) with service recommendation focused on a narrow set of assets. The good news is that deployment progress sets the scene to build on the solutions deployed.

Inventory, recommendation, discovery and new revenues. The least deployed service rollout automation technologies include inventory management, service recommendation and service discovery. All touch on new revenue generation (new service delivery). Since this is a strategy priority for operators, we should expect to see more progress.

Service assurance

Further SLA optimism. If we question progress with automated SLA conformance verification in terms of service rollout, we must carefully consider progress in service assurance. Claimed as the most deployed automation technology, it is also the least deployed at scale, suggesting progress is soon to come or operators are over-optimistic about their current progress.

Threat concerns versus progress. Security threat mitigation was highlighted as the least important expected benefit from service assurance automation. At the same time, fraud detection and mitigation automation are both relatively well deployed, with fraud detection the most widely deployed at scale. Reconciling weak benefit expectations with solid deployment could be explained by regulatory requirements (deployment is mandated) or an expectation that solutions may not deliver on promises.

QoS prediction versus mitigation. Fraud detection automation is more widely deployed than fraud mitigation automation. This is intuitive since detection should be a prerequisite to mitigation. It is unclear, then, how to explain that QoS degradation mitigation automation is more widely deployed than QoS degradation detection. It could point to use of closed loop automation to sort out problems rather than simply identify them.

Multi-domain requirements. Weak progress with multi-domain orchestration automation (the least deployed assurance technology) may be a result of multi-domain service requirements being relatively novel. Where they can meaningfully impact service experience, more progress needs to be made.
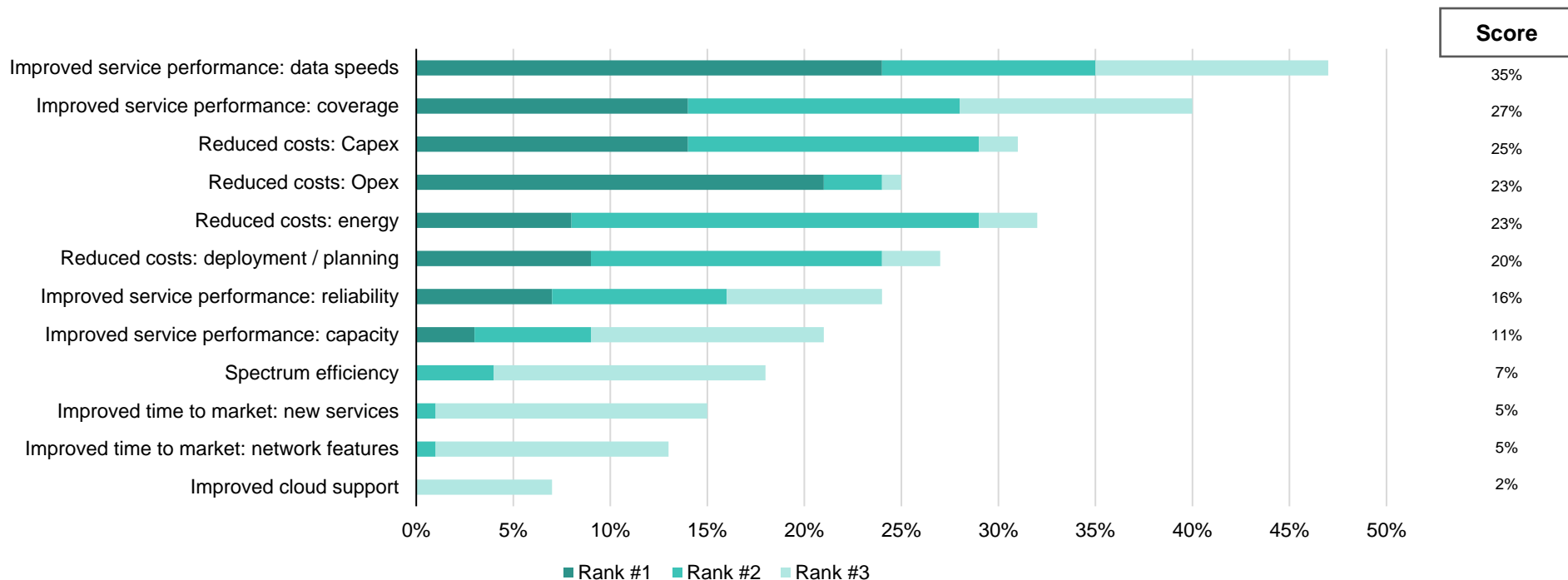
Automation trajectory and technology
RAN automation: benefits

What are the primary benefits expected from automation of your RAN functions?
N=100

	Score
Improved service performance: data speeds	35%
Improved service performance: coverage	27%
Reduced costs: Capex	25%
Reduced costs: Opex	23%
Reduced costs: energy	23%
Reduced costs: deployment / planning	20%
Improved service performance: reliability	16%
Improved service performance: capacity	11%
Spectrum efficiency	7%
Improved time to market: new services	5%
Improved time to market: network features	5%
Improved cloud support	2%

■ Rank #1 ■ Rank #2 ■ Rank #3

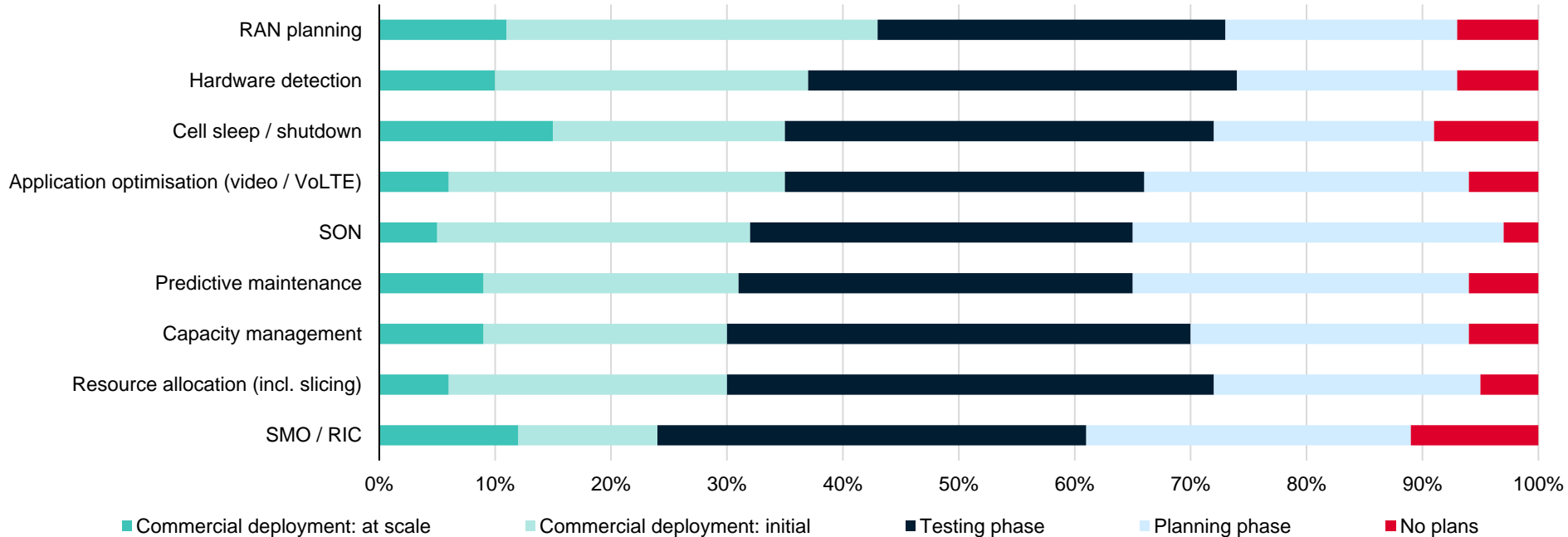Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.66) + (Rank #3 * 0.33)

Automation trajectory and technology
RAN automation: deployment progress

What are you in the process of deploying the following RAN automation technologies?
N=100

Legend: ■ Commercial deployment: at scale ■ Commercial deployment: initial ■ Testing phase ■ Planning phase ■ No plans
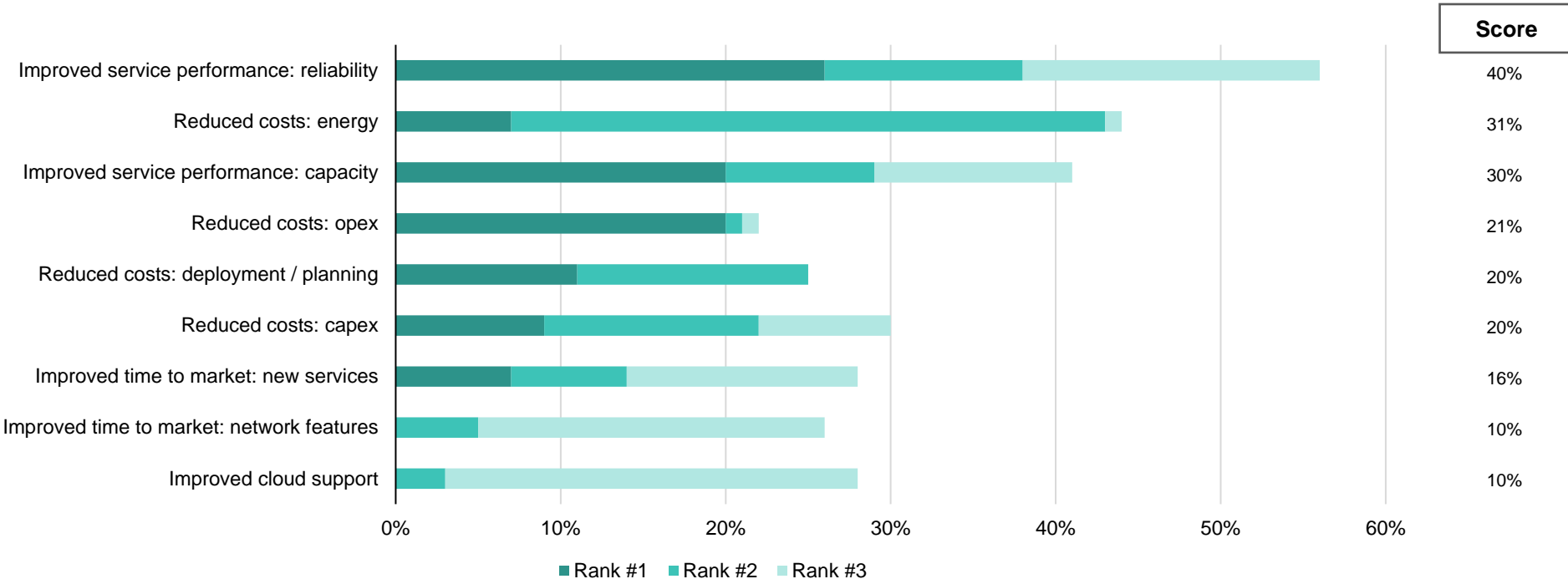
Automation trajectory and technology
Core/edge automation: benefits

What are the primary benefits expected from automation of your core and edge network functions?
N=100

	Score
Improved service performance: reliability	40%
Reduced costs: energy	31%
Improved service performance: capacity	30%
Reduced costs: opex	21%
Reduced costs: deployment / planning	20%
Reduced costs: capex	20%
Improved time to market: new services	16%
Improved time to market: network features	10%
Improved cloud support	10%

■ Rank #1   ■ Rank #2   ■ Rank #3

Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.66) + (Rank #3 * 0.33)

What are the primary benefits expected from automation of your transport network functions?
N=100
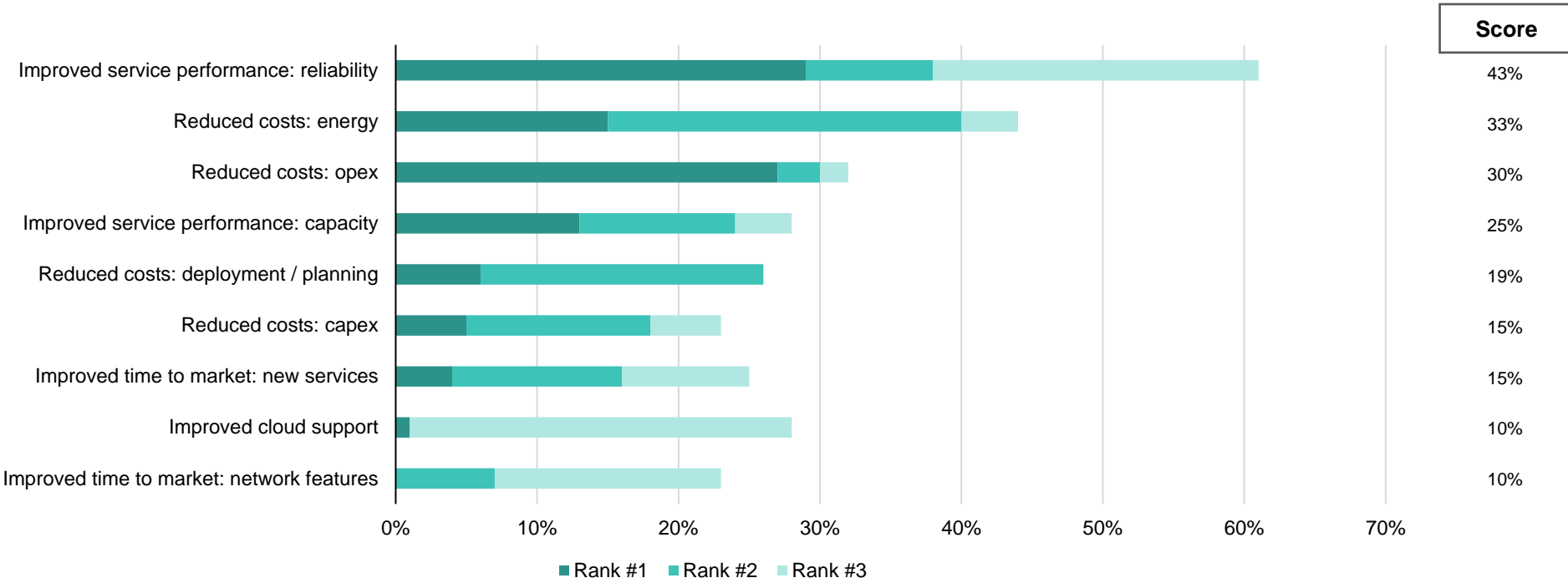
Benefit	Score
Improved service performance: reliability	43%
Reduced costs: energy	33%
Reduced costs: opex	30%
Improved service performance: capacity	25%
Reduced costs: deployment / planning	19%
Reduced costs: capex	15%
Improved time to market: new services	15%
Improved cloud support	10%
Improved time to market: network features	10%

■ Rank #1   ■ Rank #2   ■ Rank #3

Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.66) + (Rank #3 * 0.33)

Source: GSMA Intelligence

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Where are you in the process of deploying the following transport network automation technologies?
N=100
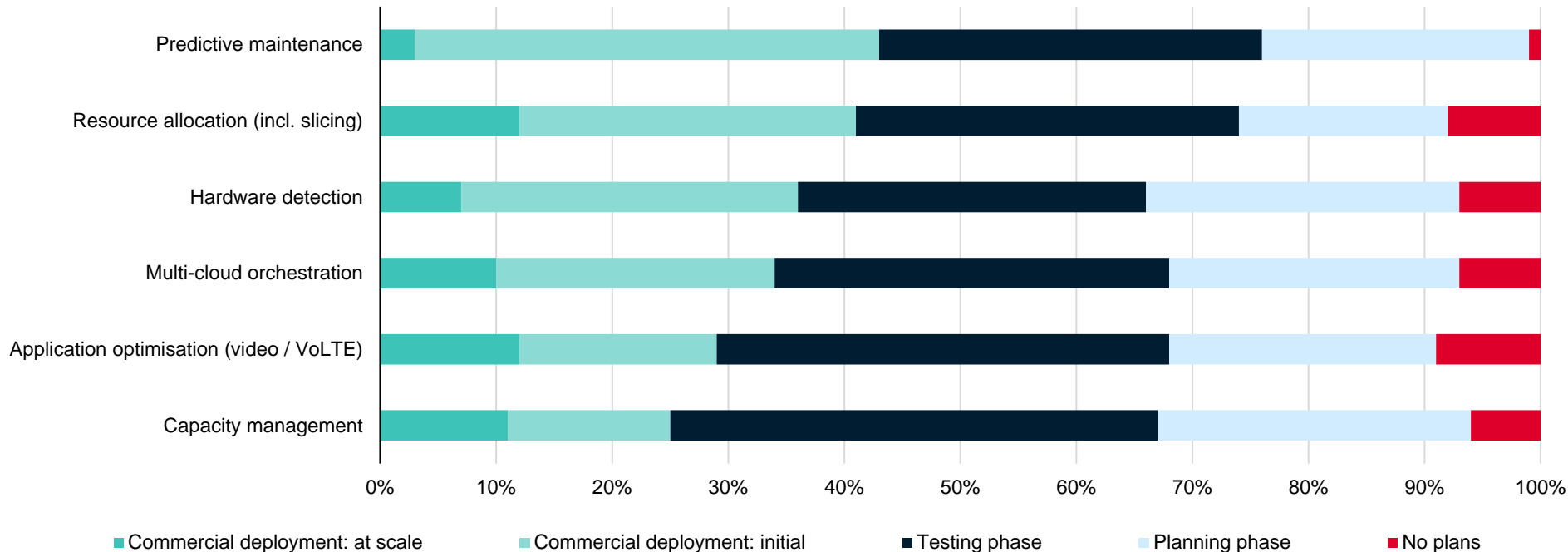
Legend: Commercial deployment: at scale · Commercial deployment: initial · Testing phase · Planning phase · No plans

What are the primary benefits driving service rollout automation investments within your organisation?
N=100

Benefit	Score
Improved service performance: capacity planning	39%
Improved service performance: reliability	35%
Improved business performance: customer conversion	28%
Improved business performance: service upsell	22%
Improved time to market: new services	21%
Reduced costs: deployment / planning	17%
Improved cloud support	16%
Security threat mitigation	11%
Improved support for 3rd party developer apps (open APIs)	10%

0%   10%   20%   30%   40%   50%   60%

■ Rank #1   ■ Rank #2   ■ Rank #3

Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.66) + (Rank #3 * 0.33)

Automation trajectory and technology
Service rollout automation: deployment progress

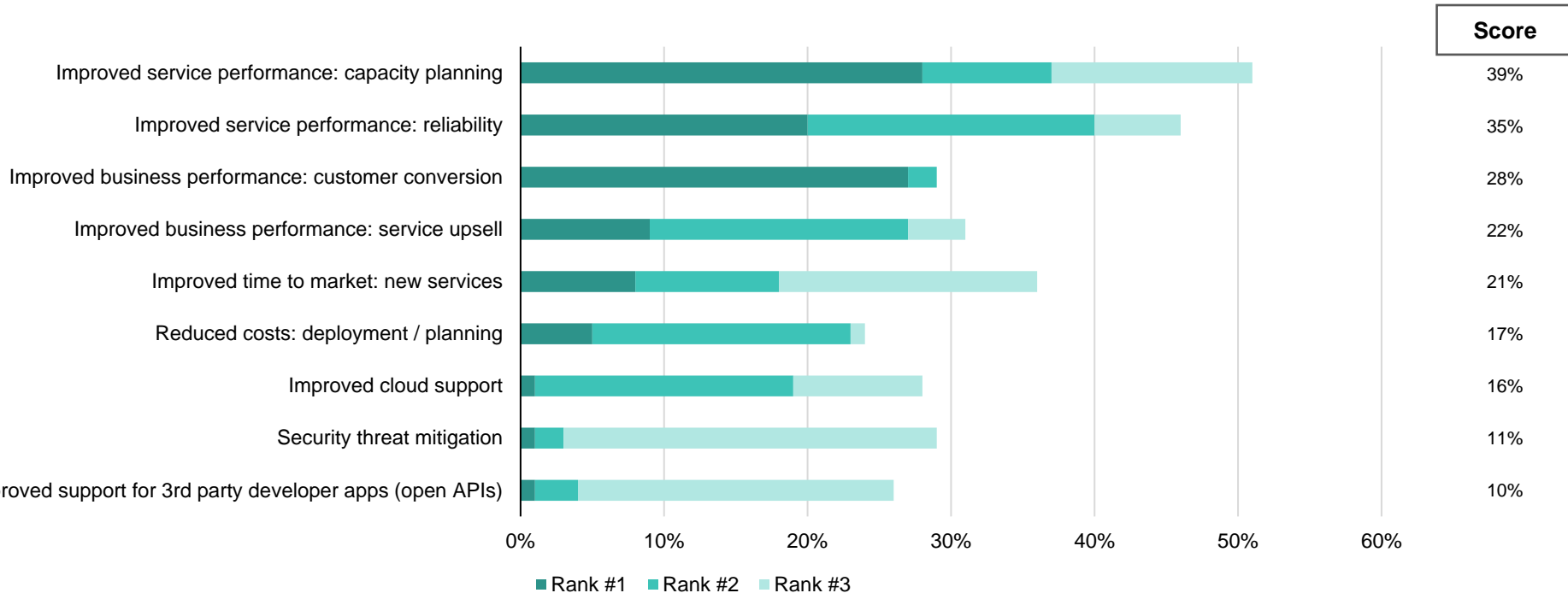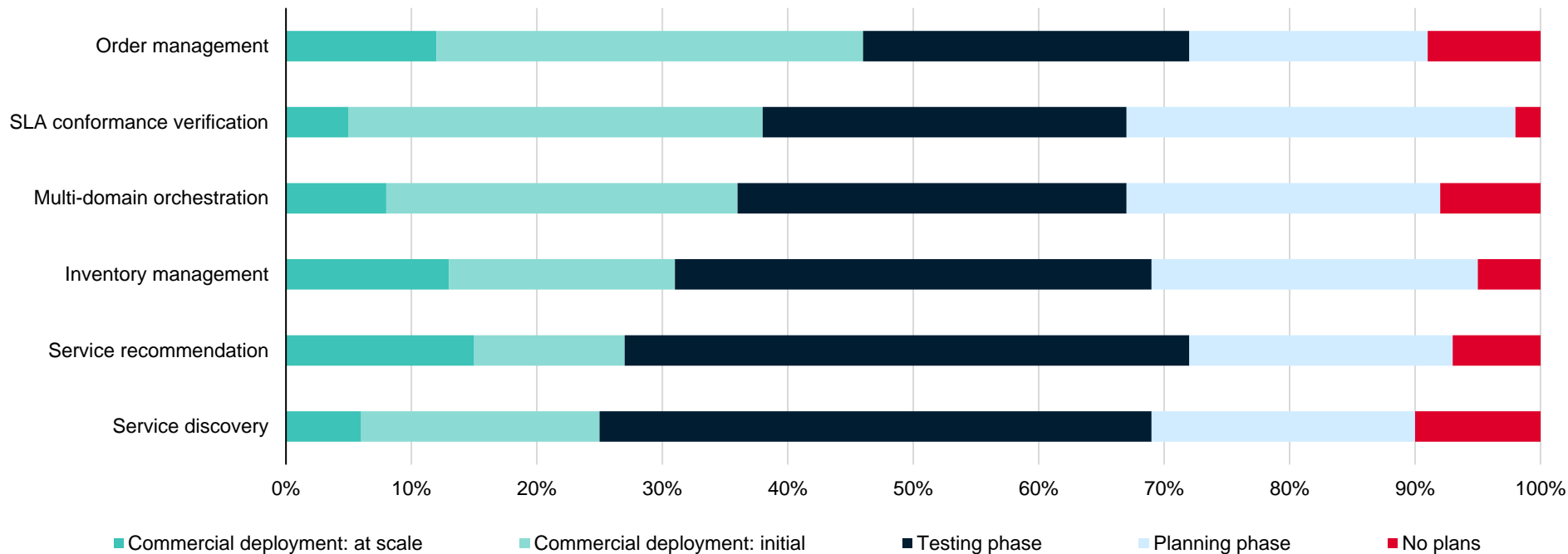**Where are you in the process of deploying the following service rollout automation technologies?**
N=100

Legend: ■ Commercial deployment: at scale ■ Commercial deployment: initial ■ Testing phase ■ Planning phase ■ No plans
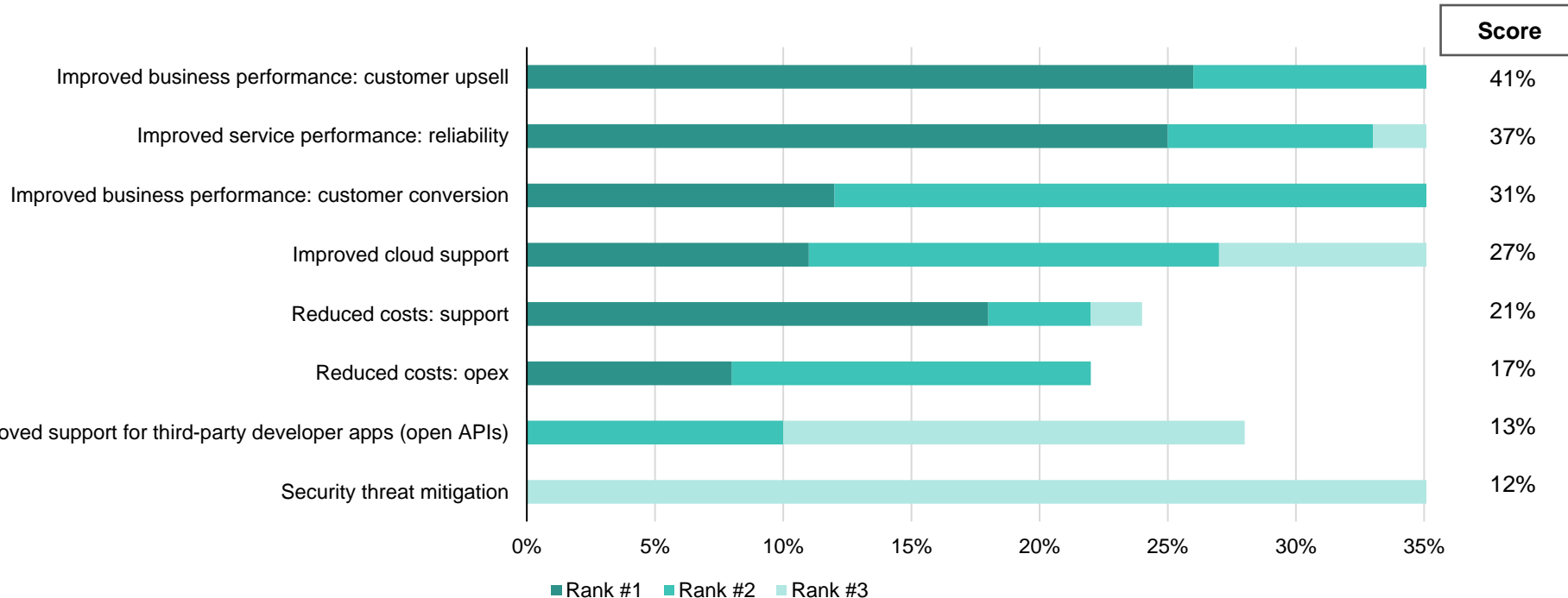
Automation trajectory and technology
Service assurance automation: benefits

What are the primary benefits expected from automation of your service assurance and support assets?
N=100

Benefit	Score
Improved business performance: customer upsell	41%
Improved service performance: reliability	37%
Improved business performance: customer conversion	31%
Improved cloud support	27%
Reduced costs: support	21%
Reduced costs: opex	17%
Improved support for third-party developer apps (open APIs)	13%
Security threat mitigation	12%

■ Rank #1 ■ Rank #2 ■ Rank #3

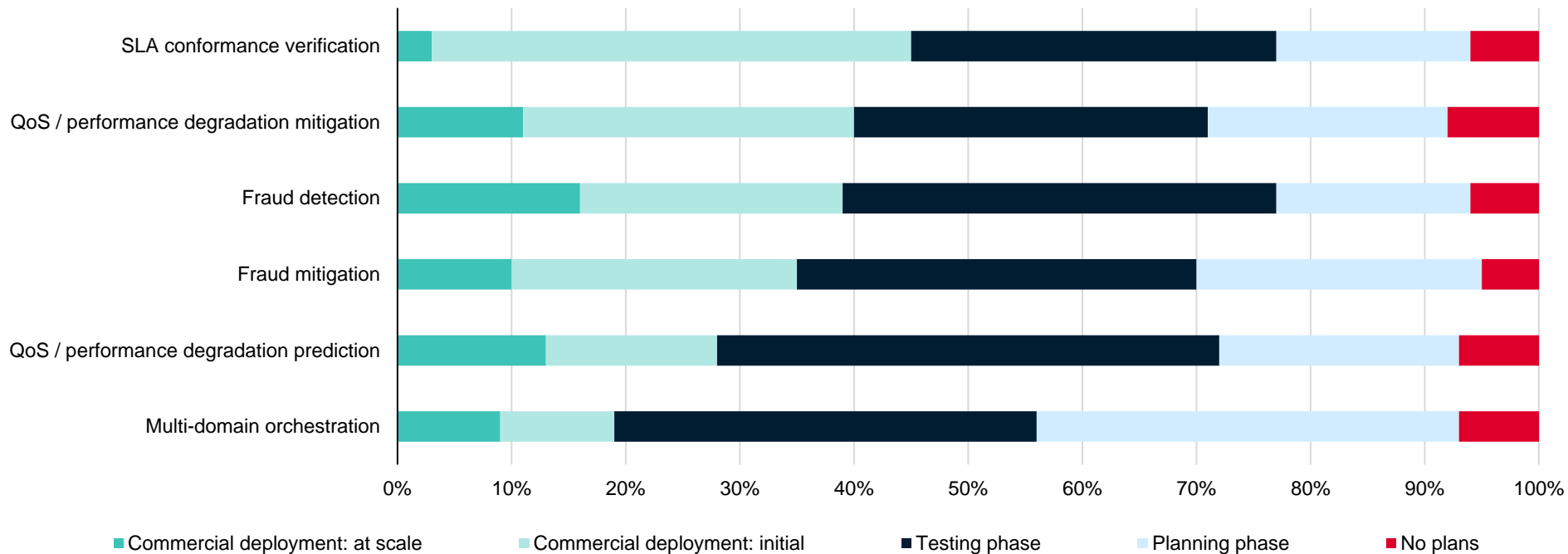Note: Score = (Rank #1 * 1.0) + (Rank #2 * 0.66) + (Rank #3 * 0.33)

Automation trajectory and technology
Service assurance automation: deployment progress

Where are you in the process of deploying the following service assurance automation technologies?
N=100

Legend: Commercial deployment: at scale ■ Commercial deployment: initial ■ Testing phase ■ Planning phase ■ No plans

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2023 outlook: progress, requirements, misunderstandings
Automation in support of strategic priorities

5G

Critical automation. Across network and service automation, more than three quarters of operators see automation as very or extremely important to 5G success.

Networks support services. 5G might be a network technology, but operators see it as a solution to enable new services. It is natural, then, to see both network and service automation as priorities.

Small operator requirements. Operators with fewer than 5 million subscribers see automation as less important to 5G success than their larger competitors. This is surprising given the role automation plays in augmenting resources, but may be explained by the limited scope of their 5G deployments.

Open RAN

Open RAN and 5G. Open RAN deployment may be driven by 5G, but operators see automation as less important to its success. Where a central open RAN value proposition is leveraging diverse vendors across virtual and cloud assets, automation should be a prerequisite – not to mention a rationale for moving to open RAN.

Networks versus services. Open RAN may drive new services in the future, but it is largely a network initiative today, reflected in the fact that operators see network automation as more important to making it work.

Asia Pacific connection. China notwithstanding, Asia Pacific operators have been some of the most active in open RAN, particularly in Japan. It's telling, then, that they also see automation as more important to open RAN success.

B2B services

B2B services and 5G. B2B service delivery is a major justification for 5G deployment requiring 5G bandwidth but also self-service delivery and portals for service visibility. Service automation, in turn, is seen as nearly equally important for both 5G and B2B service success.

Networks versus services. Where operator views on B2B services truly diverge from 5G is in terms of network automation. However, operators cannot forget that network performance and rollout (and automation) play a critical role in enabling B2B services.

MEA focus. Middle East and African operators see service automaton as more important to B2B success than their counterparts in other regions – notable given the focus of MEA operators on enterprise digital transformation efforts.

2023 outlook: progress, requirements, misunderstandings
Automation progress, value and planning

Automation value

Core as strategic. Given the attention, and capex, on RAN solutions, 39% of operators identifying core/transport as delivering the greatest automation value might seem strange. Investment across core (service/packet) and transport domains, however, nearly matches the RAN, touching just as many users.

Services as strategic. Revenue generation and user experience top opex and capex in operator network priorities, helping explain how service rollout automation ties with the core/transport domain for value – especially when considering how the network core supports service creation and delivery.

RAN risks. RANs support mobile broadband connectivity foundational to delivering high-quality (monetisable) services. They are also increasingly complex. That a small minority of operators see RAN automation as delivering the greatest value to their operators suggests many are ignoring these dynamics.

Automation progress

Value and progress. Automation deployment progress across network and service domains is proportional to the value operators ascribe to automation. Progress is greatest in those domains where value is seen as greatest. Alignment is encouraging, adding credence to their claims.

RAN risks. Alignment of automation deployment progress with automation value perception means progress in automating RAN processes is limited; nearly 40% have automated 20% or less of their RAN processes. While not surprising given the poor views of RAN automation value, limited progress in automating the RAN could add to deployment and operations costs while jeopardising service quality at a time when operators are looking to 5G for new revenues.

Progress optimism. Outside the RAN, operators claim to have automated more than 40% of service and network processes. While plausible, continuing work on automation programmes suggests this might be an exaggeration.

Automation planning

The value in coordination. Mobile network operations require RAN, core and transport domains to work in tandem. Delivering services across those networks requires the coordination of service delivery and assurance with network domains. Coordinating automation across these domains – as claimed by 42% of operators – promises obvious efficiencies.

Coordination optimism. Where the value of coordinated automation efforts is obvious, operators will be inclined to claim that this is how they are progressing, regardless of whether those claims match reality. In their defence, automation decision makers may well not have sight of ad hoc efforts taken on within disparate businesses or domains.
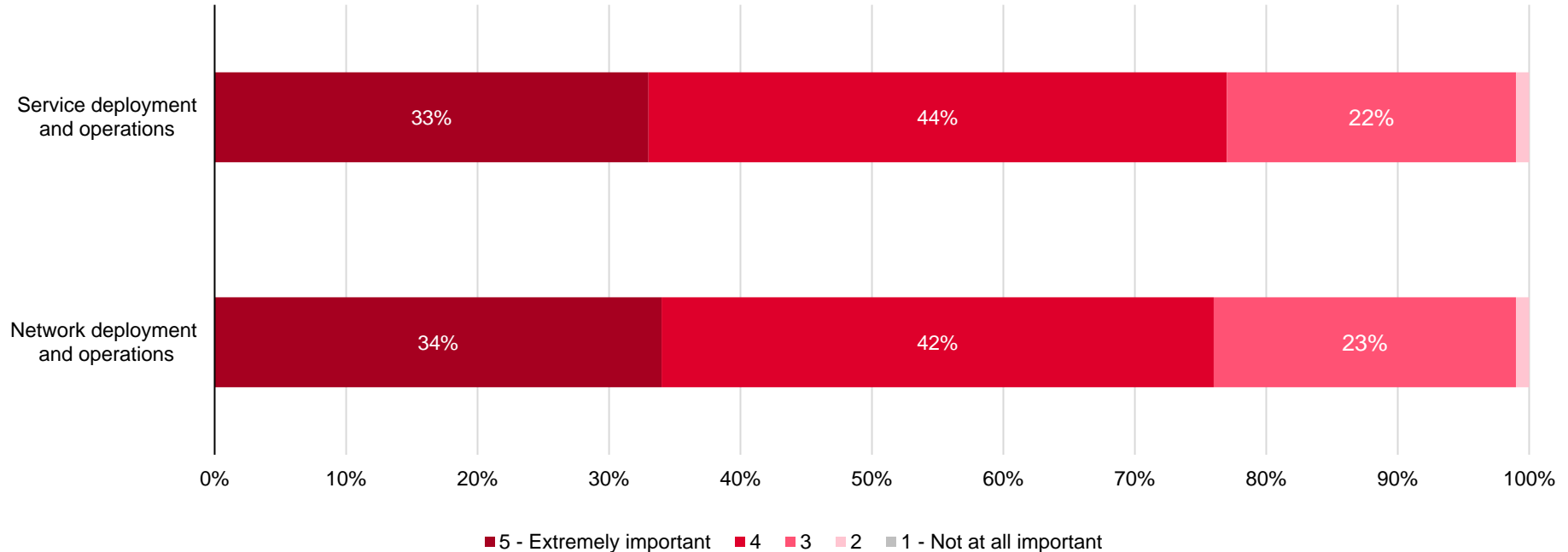
Automation and operations scale. Large operators (50 million+ subscribers) are most likely to claim holistically implemented automation activities, a testament to the need for coordination in the face of massive network and service scale – and the resources required to coordinate these activities.

2023 outlook: progress, requirements, misunderstandings
Automation in support of 5G

How important are network and service deployment / operations automation to your success in 5G?
N=100

Legend: ■ 5 - Extremely important ■ 4 ■ 3 ■ 2 ■ 1 - Not at all important

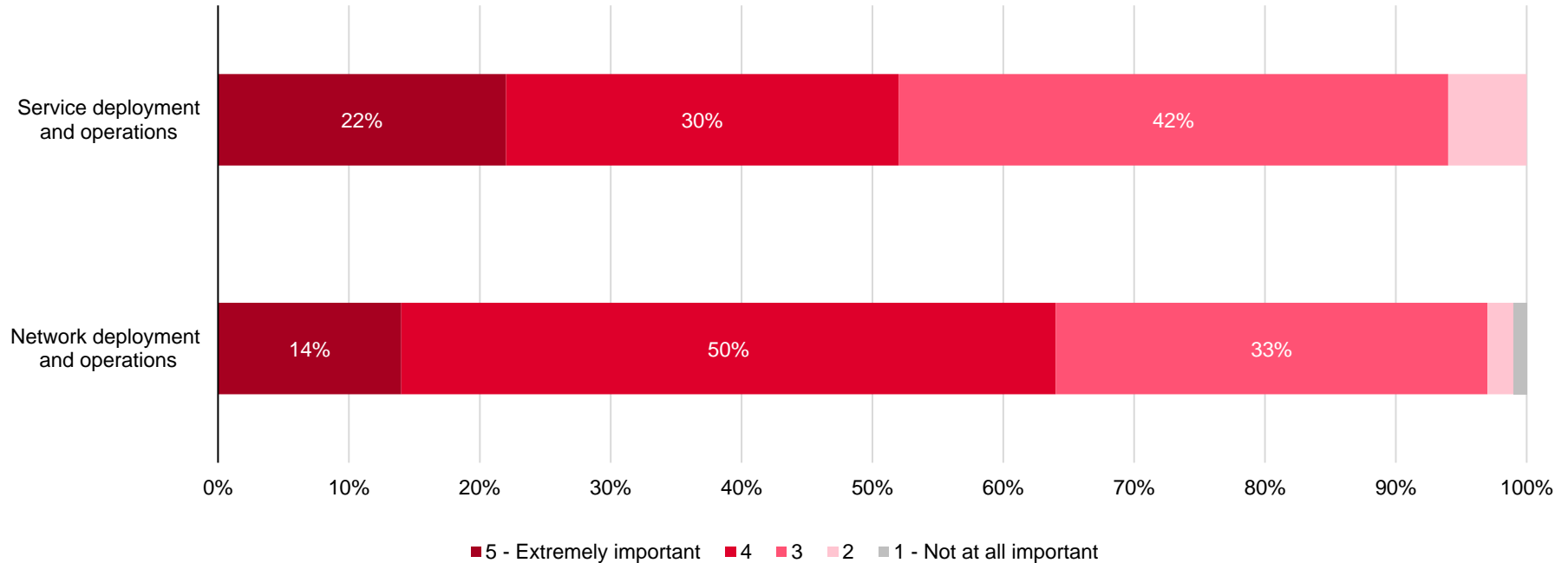| Category	5 - Extremely important	4	3
Service deployment and operations	33%	44%	22%
Network deployment and operations	34%	42%	23%

2023 outlook: progress, requirements, misunderstandings
Automation in support of open RAN

How important is network and service automation (deployment / operations) to success in open RAN?
N=100

Service deployment and operations: 22% | 30% | 42%

Network deployment and operations: 14% | 50% | 33%

Legend:
- 5 - Extremely important
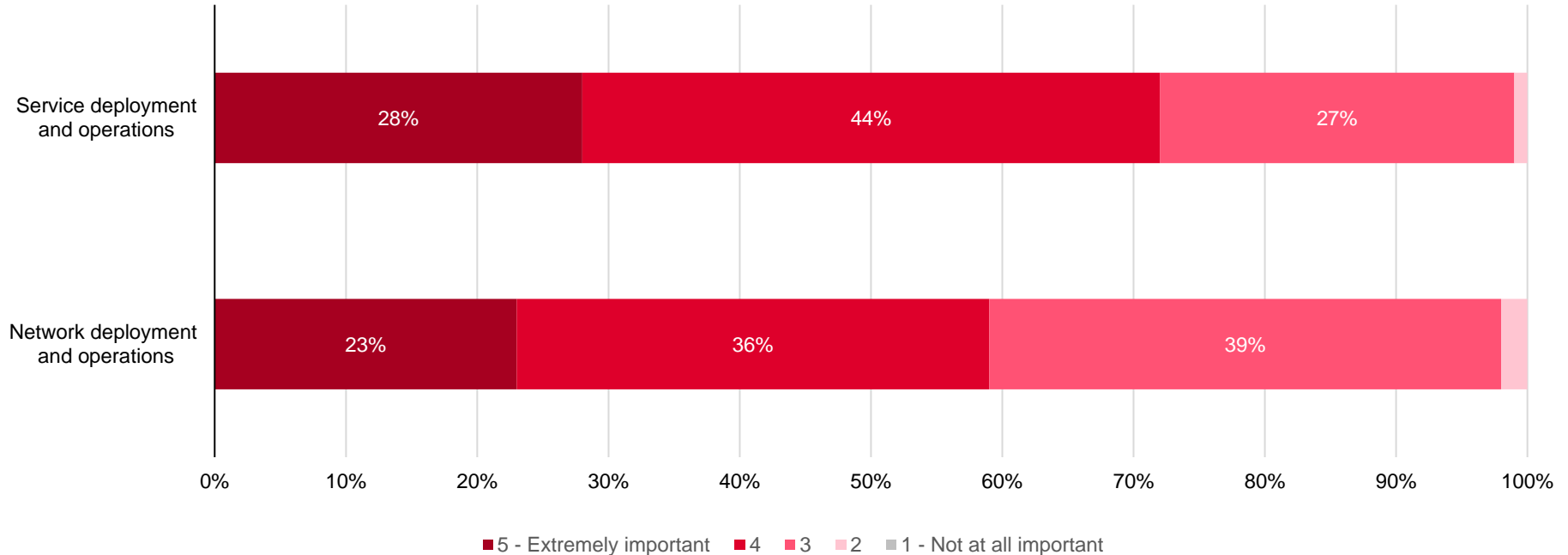- 4
- 3
- 2
- 1 - Not at all important

2023 outlook: progress, requirements, misunderstandings
Automation in support of B2B services

How important is network and service automation (deployment/operations) to success in B2B services?
N=100

Legend: ■ 5 - Extremely important ■ 4 ■ 3 ■ 2 ■ 1 - Not at all important

Service deployment and operations: 28% | 44% | 27%

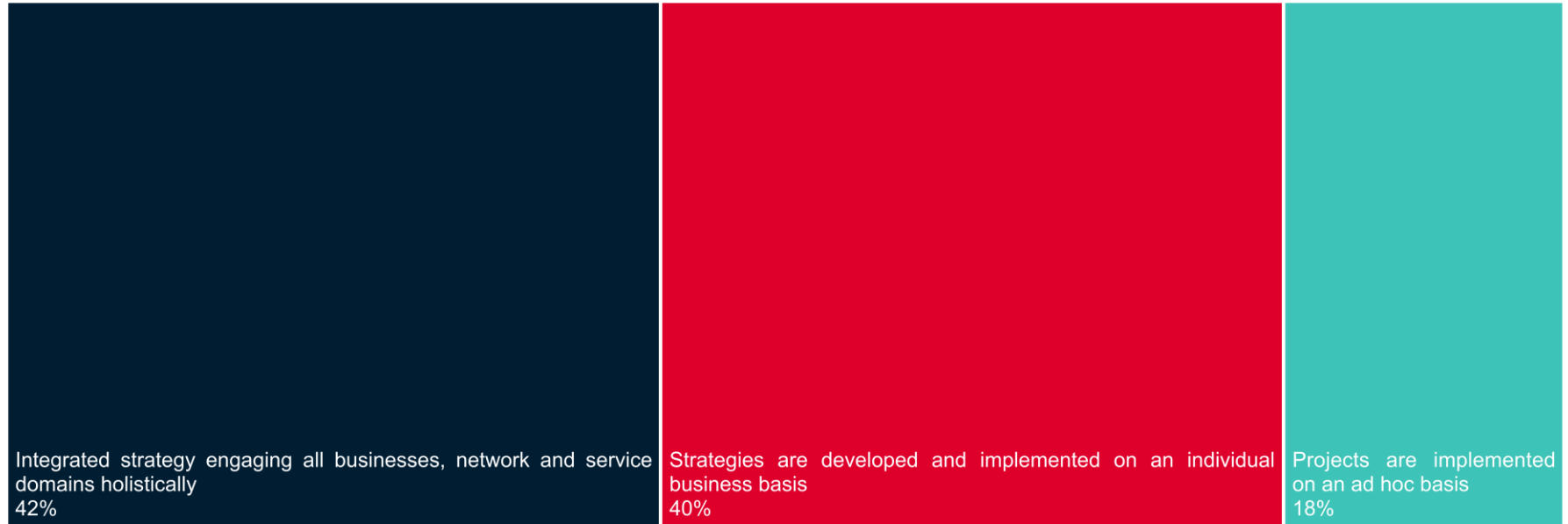Network deployment and operations: 23% | 36% | 39%

2023 outlook: progress, requirements, misunderstandings
Automation project planning

How are automation projects planned for and implemented across your organisation?
N=100

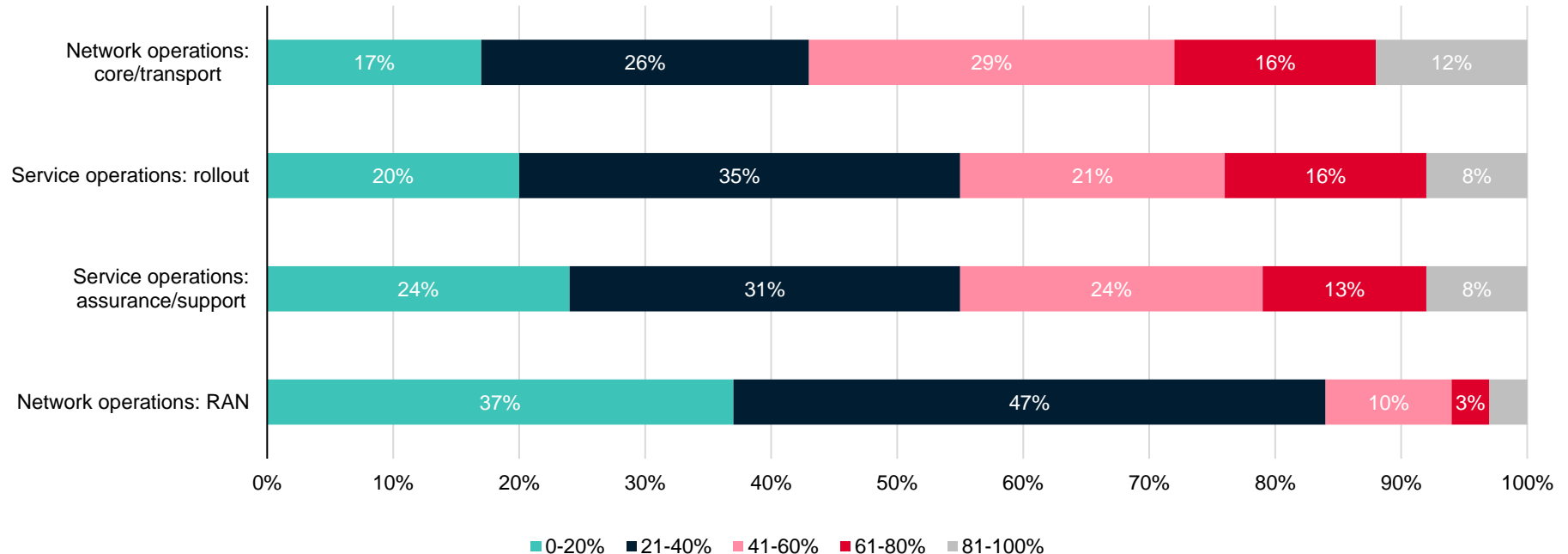| Integrated strategy engaging all businesses, network and service domains holistically 42% | Strategies are developed and implemented on an individual business basis 40% | Projects are implemented on an ad hoc basis 18% |

2023 outlook: progress, requirements, misunderstandings
Automation deployment progress

What share of processes have you automated in the following network and service domains?
N=100

Legend: 0-20% | 21-40% | 41-60% | 61-80% | 81-100%

Domain	0-20%	21-40%	41-60%	61-80%	81-100%
Network operations: core/transport	17%	26%	29%	16%	12%
Service operations: rollout	20%	35%	21%	16%	8%
Service operations: assurance/support	24%	31%	24%	13%	8%
Network operations: RAN	37%	47%	10%	3%	

2023 outlook: progress, requirements, misunderstandings
Automation value ranking

Where do you believe automation can deliver the greatest value across your operations?
N=100

Network operations: core/transport
39%

Service operations: rollout
39%

Service operations: assurance/support
16%

Network operations: RAN
6%

Source: GSMA Intelligence

2023 outlook: progress, requirements, misunderstandings
What are operators mistaken about?

1 **RAN value.** RAN automation will not have the same value for all operators. However, there are many reasons why it is too important to be ranked so poorly compared to other domains. Whether operators don't understand the need or think they have it handled, they risk finding themselves with added costs or poor RAN performance, which impacts their customer experience and revenue generation goals.

2 **Automation progress.** Across network and service domains, roughly a third of operators claim to be in some state of commercial deployment across automation technologies. At the same time, across domains, less than half of operators have automated more than 40% of their processes, with a small minority automating more than 60% of processes in any given domain. In many cases, operators may be overestimating the progress they have made with automation, and underestimating the work still to be done.

3 **Networks and services.** We looked at automation in network and service domains separately, as they are tasked with delivering different outcomes and are often planned for (and deployed by) different business units. However, they are linked. Network automation can be critical for delivering capabilities and qualities that drive service success. Where operators pursue projects holistically, you see this understanding. The majority of operators claim that they are not deploying this way, which could yield sub-par results.

4 **Network features and cloud.** Improved support for cloud architectures and improved time to market for new network features were both ranked at the bottom of expected benefits of automation across network domains. That automation can deliver these benefits is not in question. Operators, then, would seem to value these benefits less than others, regardless of the fact that cloud is increasingly integral to the way networks are built and operated, and new features can be critical to delivering the services (and quality) that end users demand.

5 **Services, security and developers.** If operators are wrong about the value of network automation in terms of feature rollout and cloud support, they are just as mistaken about the value of service automation in support of threat mitigation and third-party developer applications. Again, there is no question of the role that automation can play. If operators doubt the importance of threat mitigation of supporting developers, they do so at their own peril.

2023 outlook: progress, requirements, misunderstandings
What is required to scale automation?

1 **Resolve internal issues.** At the top of the list of obstacles for network and service automation are a number of common issues including uncertain internal ownership, employee bias and internal expertise – all obstacles that exist within an operator's own organisation. As they are ingrained in how a company works, it can be easy to ignore them and hard to solve them. However, if they are holding back progress with automation, it is within operators' control to align their teams and processes in support of automation as a strategic priority.

2 **Drive automation from exec ranks.** Attempts to rally internal teams behind automation can look to open RAN for a lesson. Commercial deployment is still in its infancy, but open RAN ecosystem development has been phenomenal, driven by vocal commitments from across the C-suite of operators across the globe, and all based on a simple story of open RAN benefits. Overcoming internal friction almost always depends on executive champions who can help coalesce their teams behind a common purpose.

3 **Recognise the services and network link.** Service complexity is the No.1 driver of automation across network assets, which makes sense given the strategic importance of end-user experience and new revenue generation. Increasing network complexity, however, is near the bottom of service automation drivers. While it is encouraging that operators see the link between networks and service enablement (and the role automation can play in supporting both), they need to apply this thinking to automation holistically.

4 **Don't ignore costs.** A top-line focus implied by revenue generation and end-user experience priorities could easily overshadow bottom-line considerations such as saving on opex and capex. However, in reality, cost savings are among the top five benefits expected by operators from automation across network domains (if not at the very top). This is a reminder to operators and vendors that cost efficiencies need to factor into automation messaging and strategies as they look to get buy-in.

5 **Be honest.** On many fronts, operator views of progress with automation seem optimistic. Given the importance of automation to key business goals, this optimism is understandable, Yet, it is important for operators to look realistically at what they have done to assess where more work is needed and how to achieve their goals. Public progress statements from vendors and/or operators (e.g. quantifying benefits in the public domain) could also help to drive the market forward, demonstrating what is possible.

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