



2021 Global Data Center Survey

4th November 2021

The most comprehensive, longest-running study of its kind in the data center sector

Findings reveal significant growth but also increasing complexity and challenges for data center owners and operators, and for the suppliers that serve them

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[Uptime Institute](#)

Uptime Institute Global Survey of IT and Data Center Managers

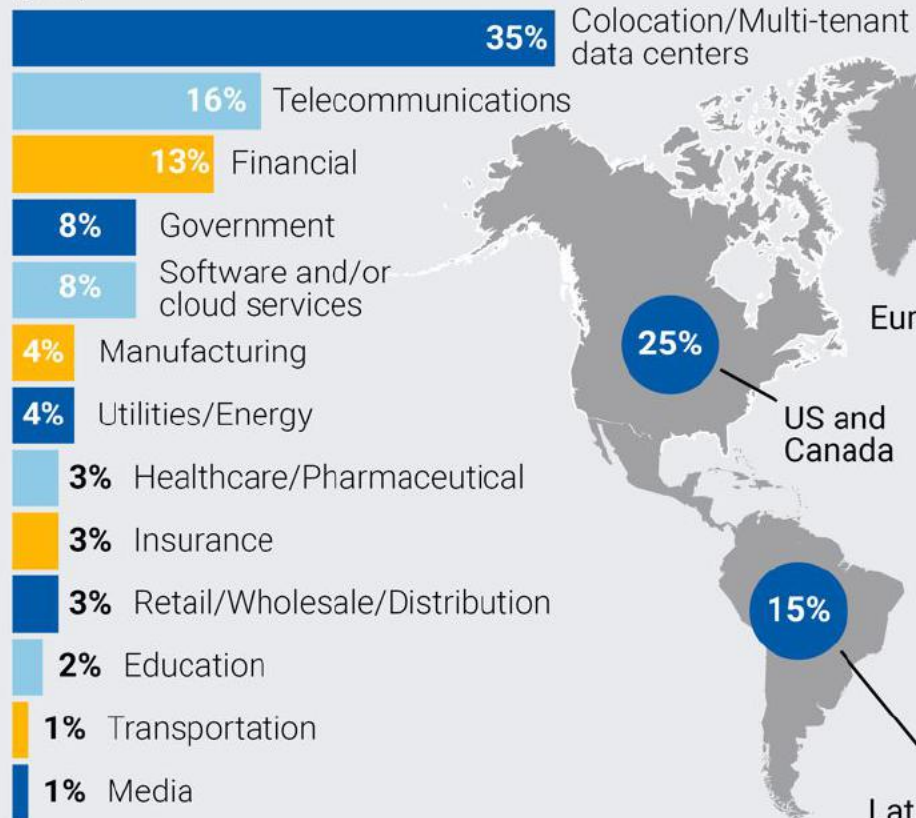
- Eleventh annual industry survey
- Conducted January – June 2021
- Over 1,300 respondents (800+ end users)
 - Critical facilities or IT management; senior executives; design engineers
 - Global pool of respondents
 - 13 verticals represented



Demographics

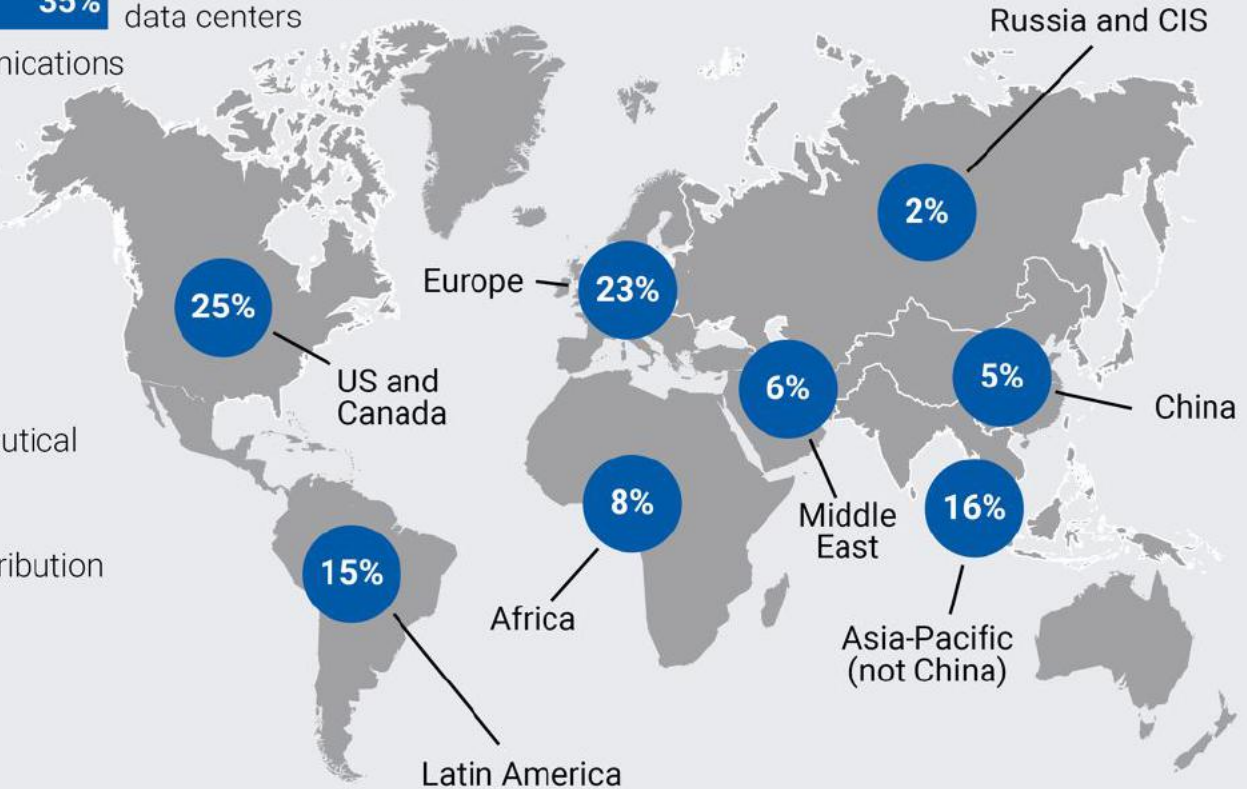
VERTICALS

(n=786)



COMPANY LOCATION

(n=786)



JOB FUNCTION

(n=801)



Facilities efficiency and rack density

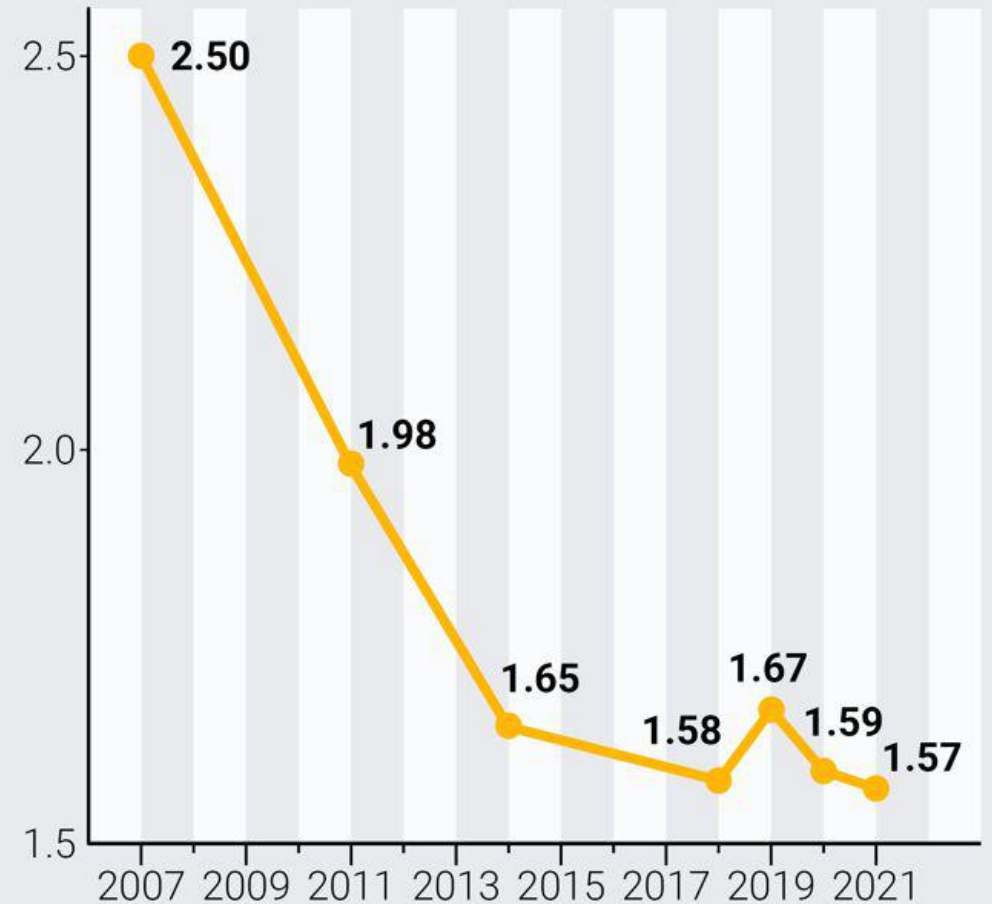
Though imperfect, certain metrics are widely used to define data center efficiency



PUE gains have stalled

- Growing number of new builds have PUEs of 1.3 or better
- However, major efficiency overhauls are not economically or technically feasible for many older facilities
- Focus on rack-level measures for greater efficiency gains is needed

What is the average annual PUE for your largest data center?

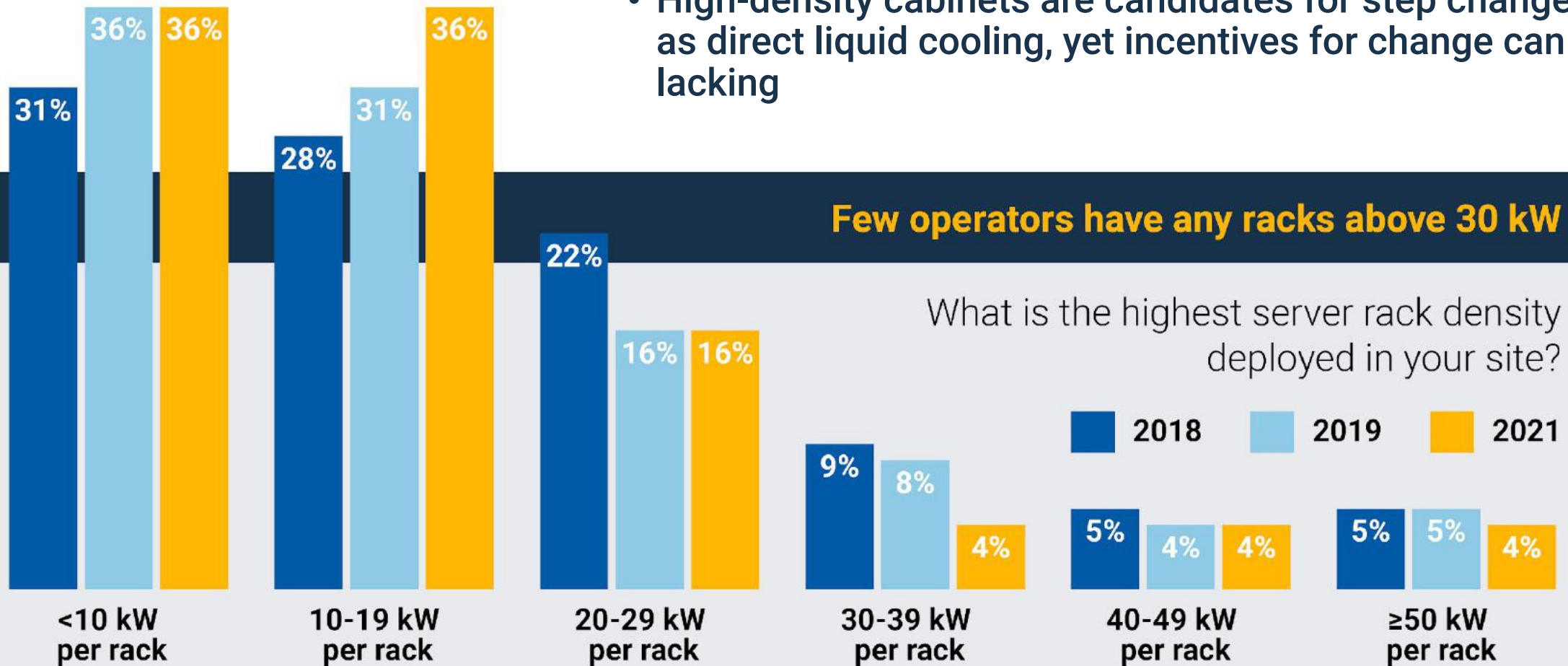


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UPTIME INSTITUTE GLOBAL SURVEY OF IT AND DATA CENTER MANAGERS 2007-2021 (n=566)

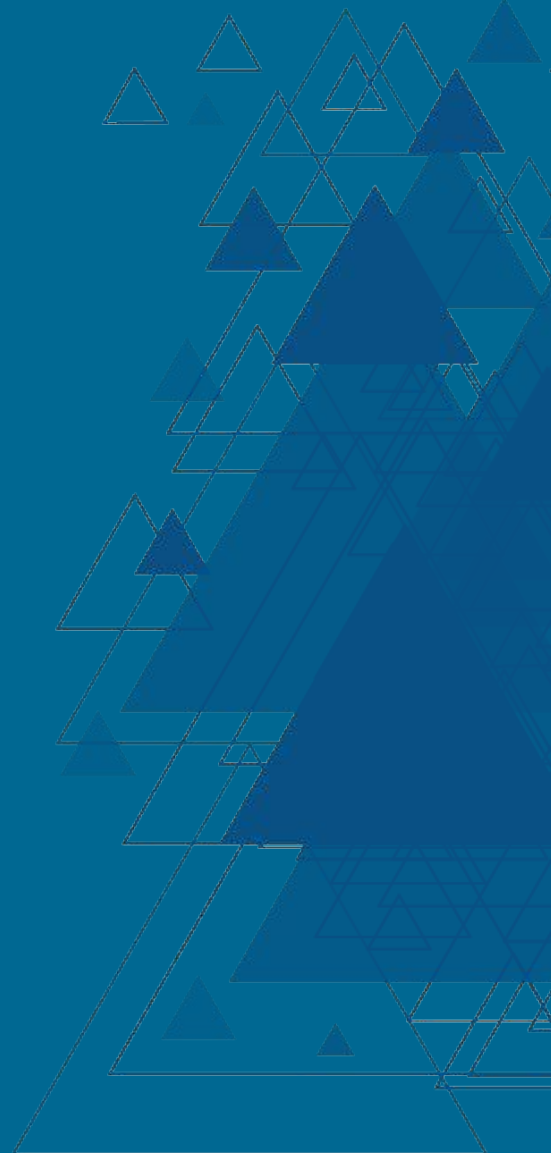
Low rack densities remain most common

- High-density cabinets are candidates for step changes such as direct liquid cooling, yet incentives for change can be lacking



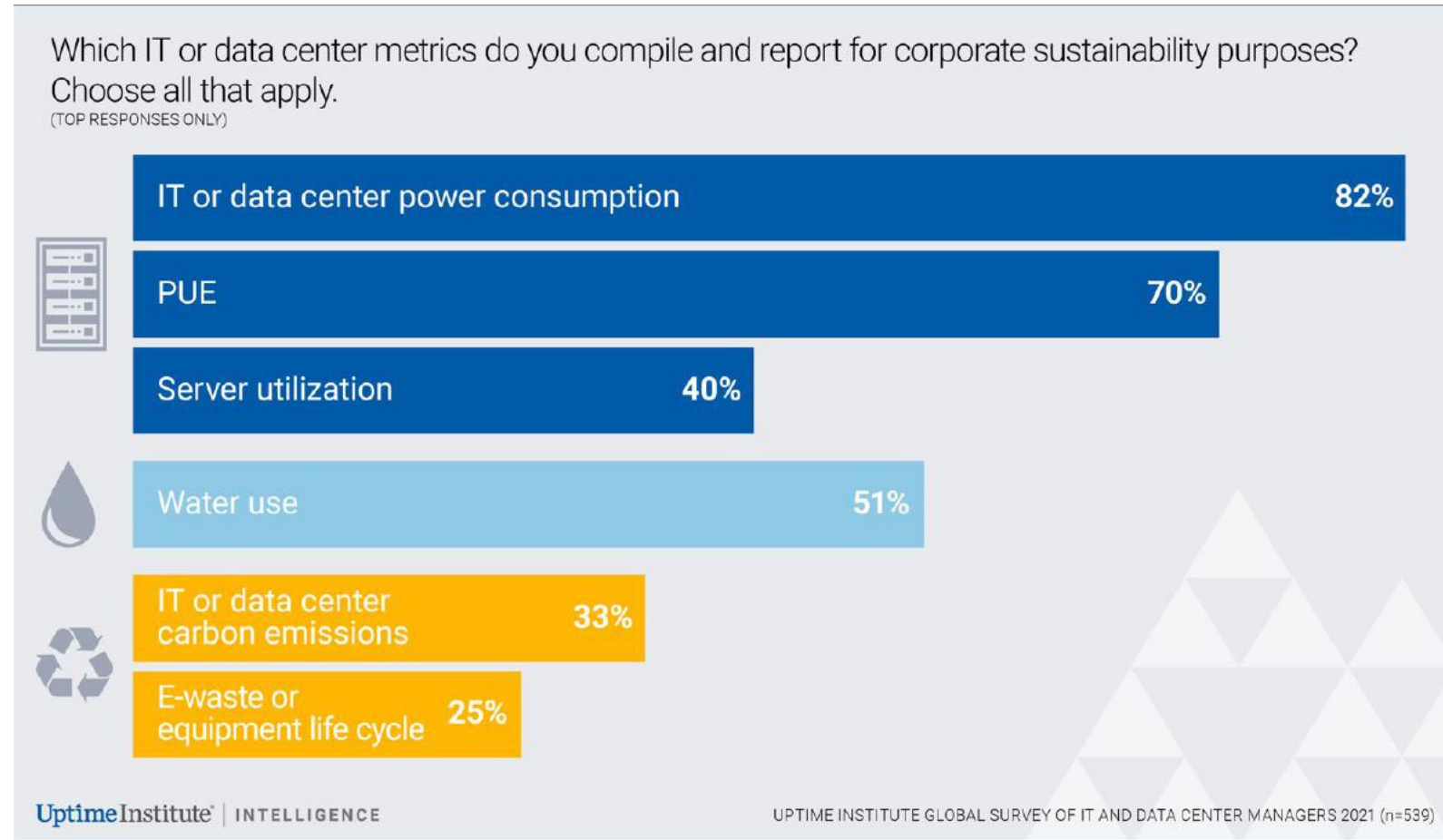
Sustainability and measurement

Global capacity growth has led to higher scrutiny of resource use by customers, pressure groups, media and, more recently, policymakers



Power use, PUE are most tracked

- Immaturity in adopting comprehensive sustainability is reflected in low tracking of emissions and the disposal of end-of-life kit
- Most (still) don't track server utilization, arguably the most important factor in overall efficiency

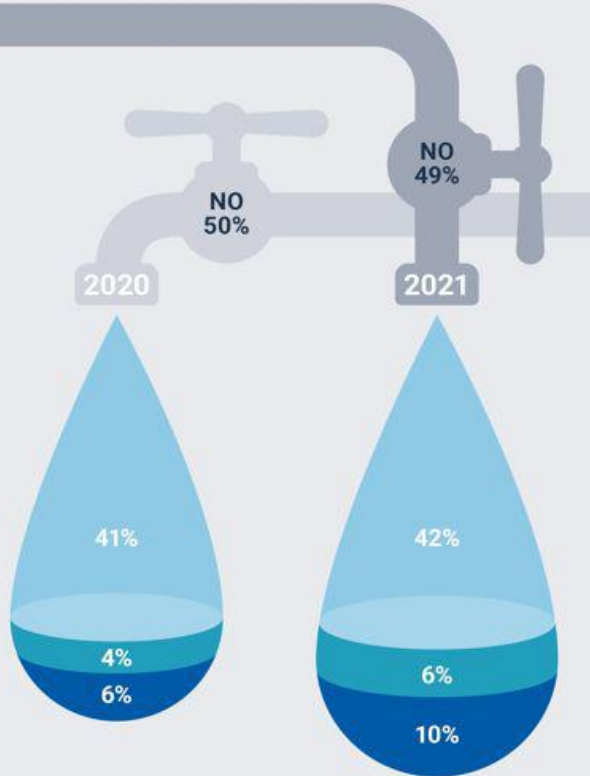


Does your organization track water usage data for your IT/data center operations?
Choose all that apply.

Yes – at a site level (for each data center)

Yes – at a regional level
(all data centers in a specific geographic region)

Yes – at a portfolio/fleet level
(all data centers aggregated)



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CENTER MANAGERS 2020 (n=431) and 2021 (n=552)

Water tracking gradually increasing

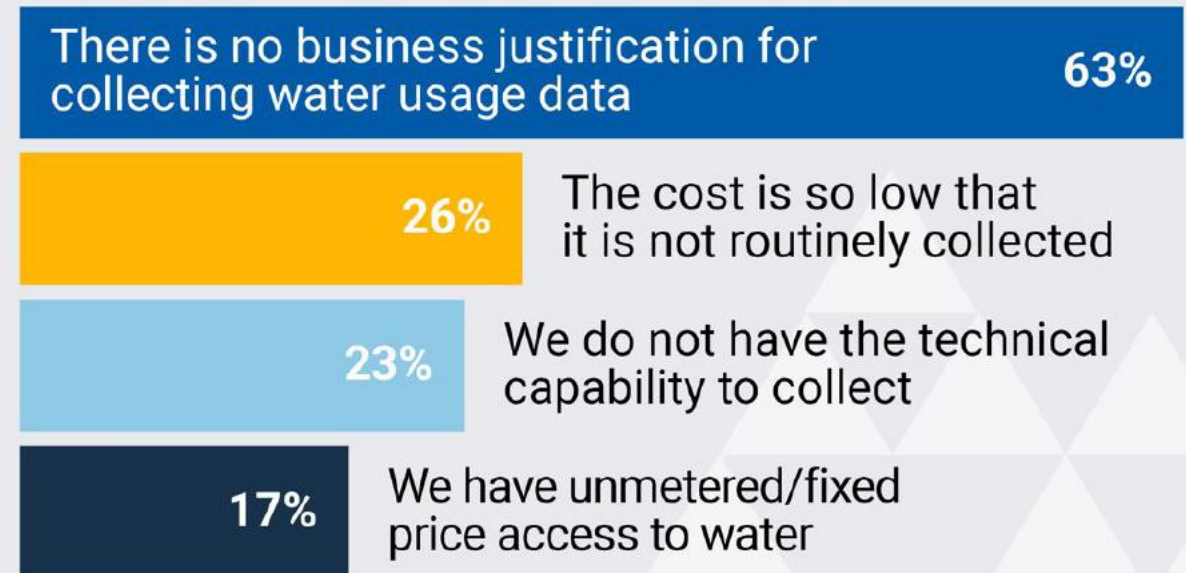
- Only about half track water usage in some way
- Measuring water usage across a fleet remains uncommon (just 1 in 10), but is increasing



Many still consider water an inexpensive commodity

- Most don't track water because there is no business justification
- This suggests a low priority for management – be it cost, risk or environmental considerations
- External and regulatory pressure may soon begin to drive down water use

Why doesn't your organization track data center water use? Choose all that apply.



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Fewer outages, but impacts rise

Progress toward reducing downtime and managing the impact of outages is mixed



No reduction in outage severity from 2019 to 2021

•69% had some type of outage in past 3 years, down from 78% in 2020

•Improvement is partially due to COVID-19 impact

•Just over half of all outages have few consequences – the rest have a significant impact in cost, time and reputation

•One fifth of outages had big financial, reputational and impacts

	2019	2020	2021
Severe	8%	6%	8%
Serious	10%	14%	12%
Significant	23%	24%	24%
Minimal	32%	28%	26%
Negligible	26%	29%	30%

UPTIME INSTITUTE GLOBAL SURVEY OF IT AND DATA CENTER MANAGERS 2019 (n=448), 2020 (n=494), 2021 (n=645)



More outages are preventable

Most operators think their most recent downtime was preventable

Would your organization's most recent significant downtime incident have been preventable with better management/processes or configuration?



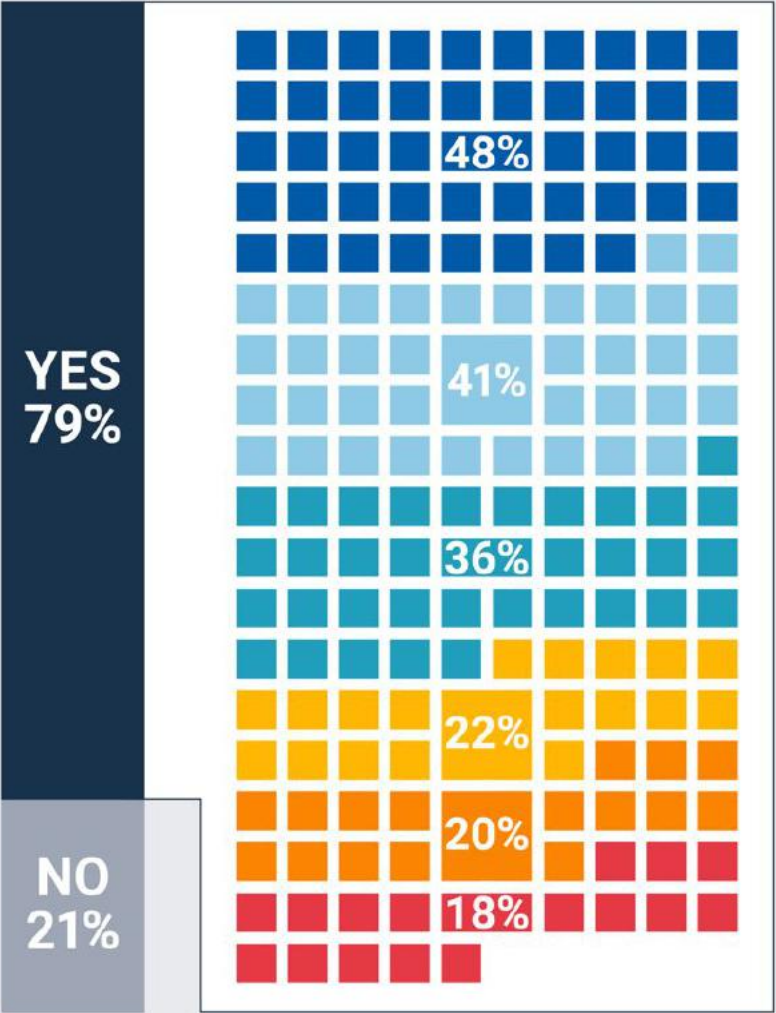
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Investment in training almost certainly reduces outages

Human error is often implicated in data center outages. In the past three years, has your organization had an outage in which human error played a role? If so, which of the following applies? Choose all that apply.

- Data center staff execution (e.g., failure to follow procedure)
- Incorrect staff processes/procedures
- In-service issue (e.g., inadequate maintenance or equipment adjustment)
- Data center design issues or omissions
- Preventative maintenance frequency issues
- Insufficient staff



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Power remains leading cause of outages

- Primary causes of most recent major outages are largely consistent
- Our annual outages report shows most-cited data center power outages are failures of:
 - uninterruptible power systems (UPSs)
 - transfer switches and
 - generators
- Cooling failures, software/IT system errors, and network issues are particularly troubling. All others causes are rare
- The frequency of problems at third-party providers (e.g., SaaS, hosting and cloud providers) is creeping up

	2020	2021
Power	37%	43%
Network	17%	14%
Cooling	13%	14%
Software/IT systems error	22%	14%
Software as a service or hosting	3%	5%
Info security-related	2%	4%
Fire	0%	3%
Third-party cloud provider	2%	2%
Not known	1%	1%
Fire suppression	4%	0%

UPTIME INSTITUTE GLOBAL SURVEY OF IT AND DATA CENTER MANAGERS 2020 (n=152), 2021 (n=187)

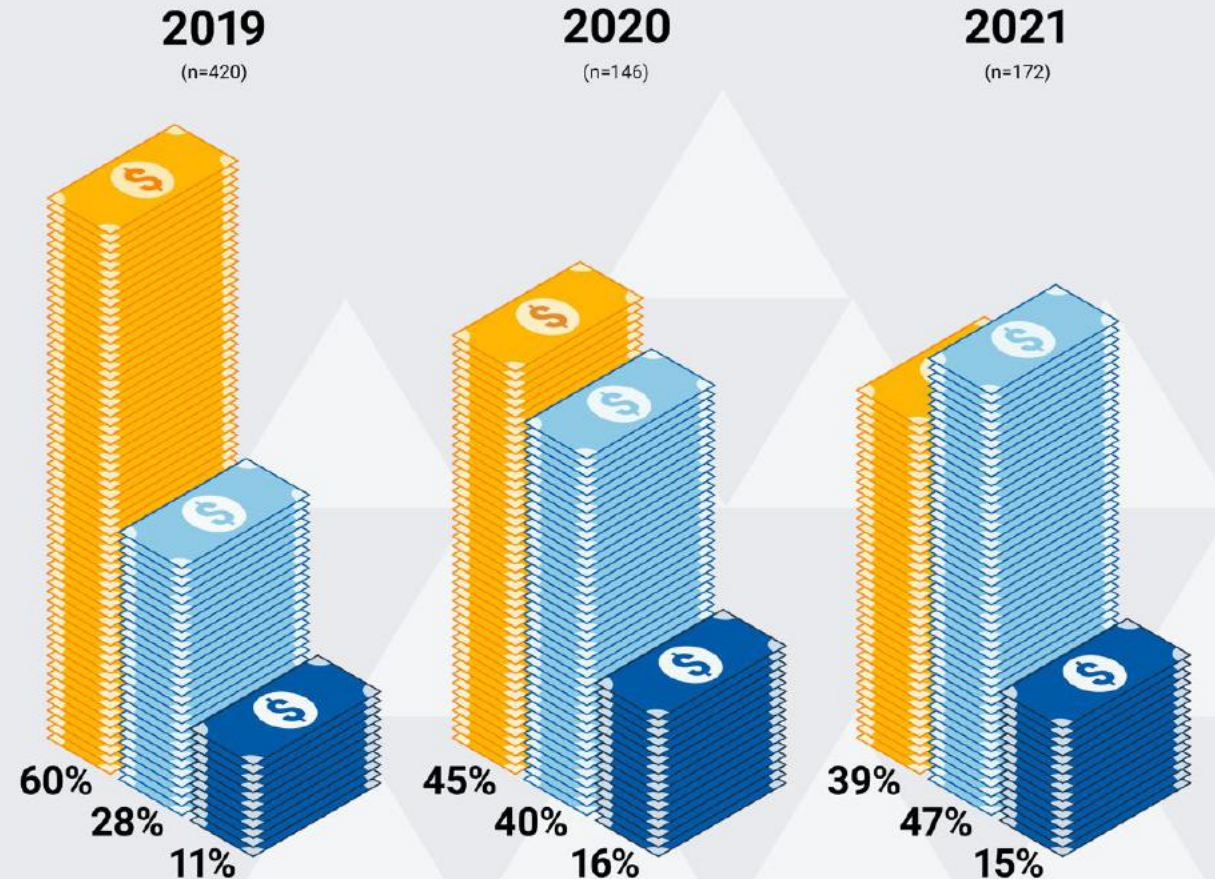


Increased proportion of single major outages costing \$100,000+

- Higher costs likely as dependency on digital services increases
- Stronger SLAs are expected by some
- More and higher regulatory fines and compensation for affected customers could increase costs

Please estimate the total cost of this downtime incident (from outage to full recovery) for your organization, including direct, opportunity, and reputation costs, using the following options.

- Under \$100,000
- \$100,000 - \$1 million
- Over \$1 million

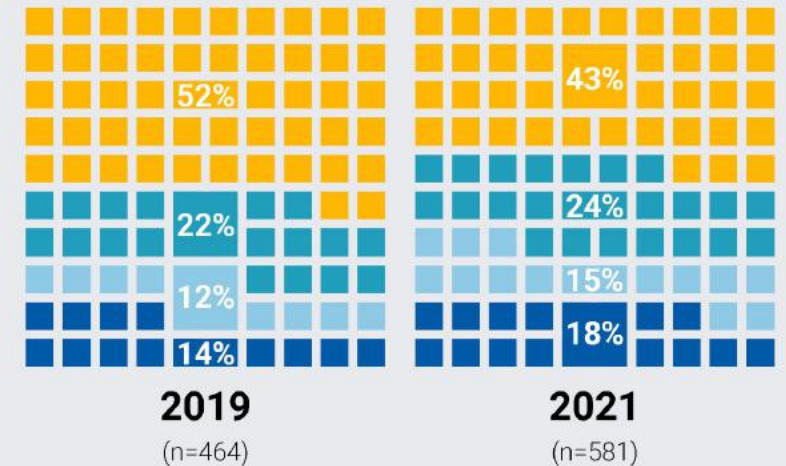


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UPTIME INSTITUTE GLOBAL SURVEY OF IT AND
DATA CENTER MANAGERS 2019-2021 (N=179)

Cloud providers lack transparency

- Data center owners and operators are increasingly moving mission-critical workloads to a public cloud
- An additional quarter would be likely to do so if visibility of the operational resiliency of the service were better
- Early trend toward improved access and auditability by cloud providers will likely increase with competition and compliance requirements

Does your organization have adequate visibility into the resiliency of public cloud operations (e.g., AWS, Azure, Google Cloud Platform) in terms of architecture, availability record, management processes, and full understanding of options?



- We place mission-critical workloads into public clouds, and we have adequate visibility into the operational resiliency of the service
- We place mission-critical workloads into public clouds, but we do not think we have adequate visibility into the operational resiliency of the service
- We don't place mission-critical workloads into public clouds but would be more likely to do so if there was a higher level of visibility into the operational resiliency of the service
- We don't place mission-critical workloads into public clouds and have no plans to do so

Hybrid IT improves resilience for most, but not all

Has having workloads spread across private on-premises, cloud and colocation data centers made your overall IT more resilient or less?



Rapid expansion – growing pains

Vendors of data center equipment and engineering/consulting services say most customers' spending is at or above normal levels.

Most agree that capital spending on data centers will grow in the next 3-5 years.

However, scaling will be a challenge.

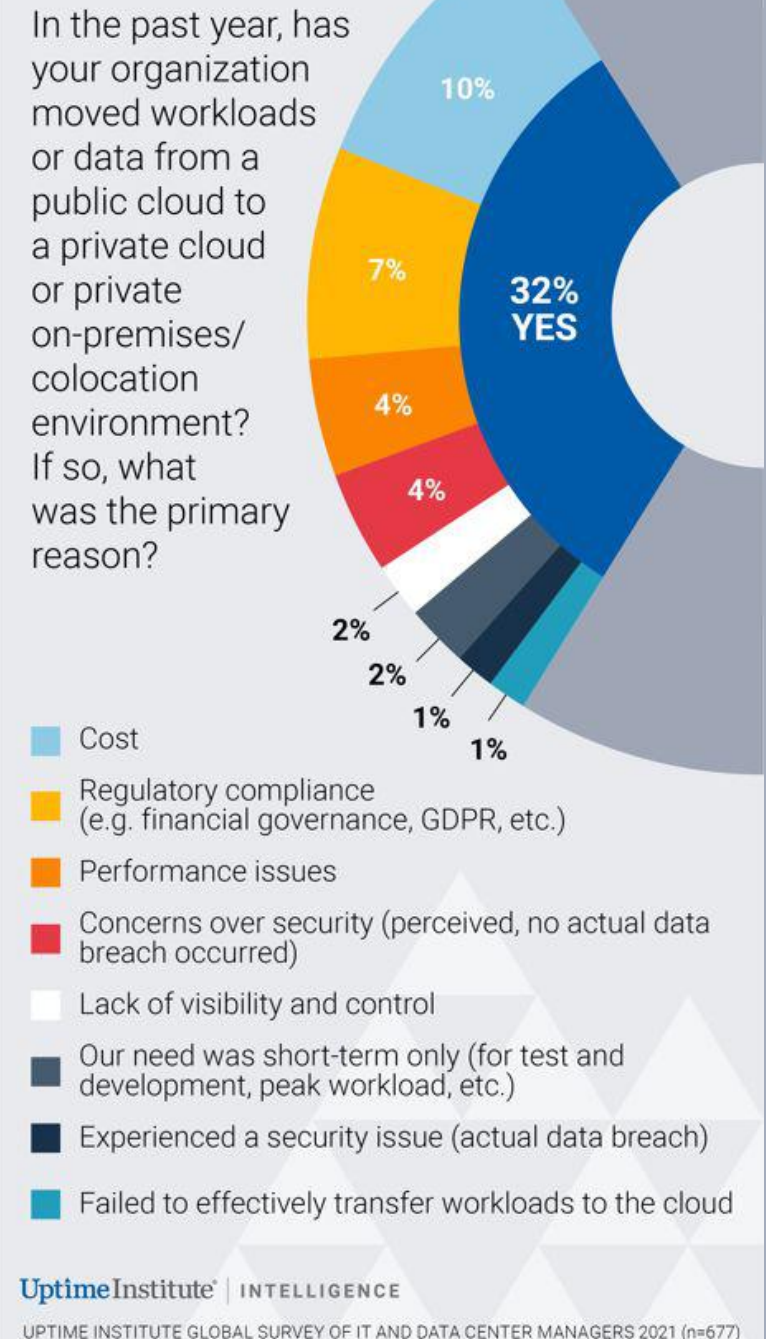
Sector scaling stresses suppliers – changes ahead

- The pandemic, extreme weather and political issues have increased supply-chain interruptions
- Most suppliers expect problems with critical product supply chains in the next 2 years – only 1 in 4 expect no delays
- 63% of suppliers say in 3-5 years, large cloud/internet operators will reduce competition among equipment suppliers
- Half of suppliers say in 3-5 years, large operators will take more control of custom designs and will also create their own supply chains for power and cooling systems manufacturing, bypassing traditional equipment vendors

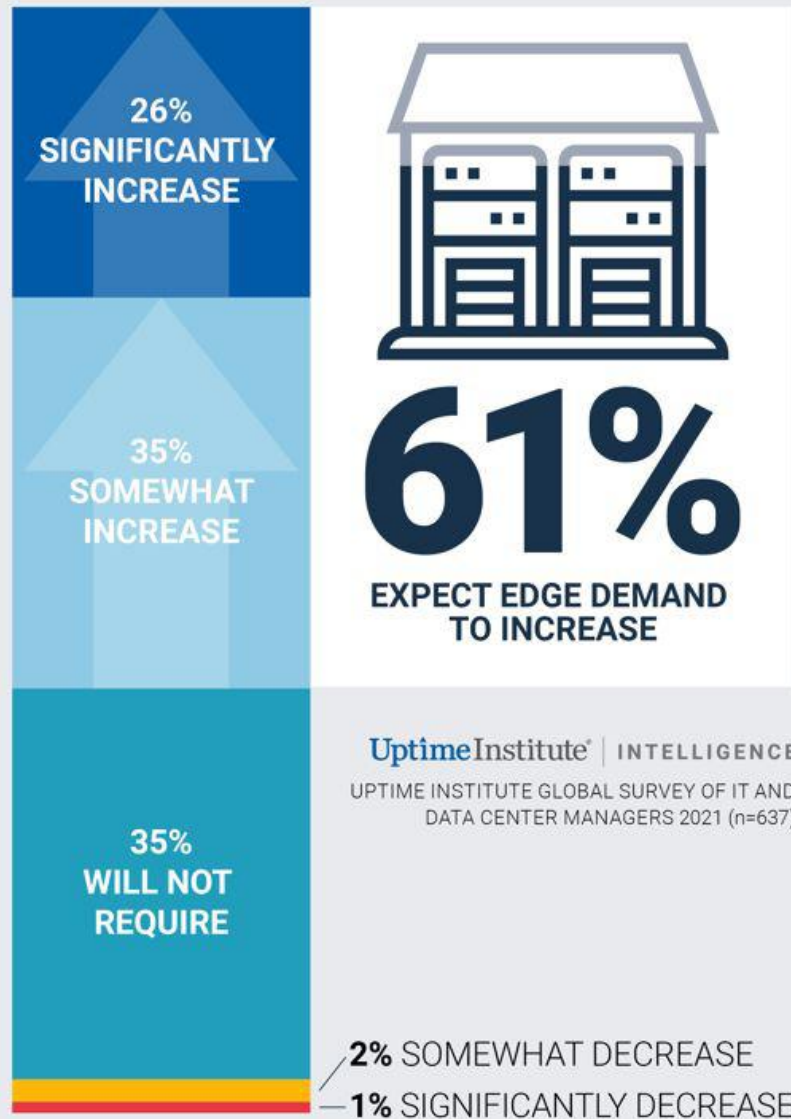


Workload repatriation from public cloud remains low

- When organizations deploy in a public cloud, their workloads typically remain there, despite speculation about an imminent wave of cloud repatriation
- About 70% of owners and operators surveyed have not repatriated any workloads from a public cloud
- Cost is most common reason for repatriation, followed by regulatory compliance



What does your organization expect in terms of edge computing demand for 2021?



Most expect edge demand to increase, significantly in some cases

- 1 in 4 operators think this increase will be significant – a higher proportion than 1 in 5 last year
- Suppliers of equipment and engineering and consulting services are also bullish: Over half expect most of their customers will own edge micro data centers
- Still early days: expectations are likely to change as more edge workloads are deployed
- Shared edge sites may play a larger role over time

Staffing shortages continue

When asked about their single largest challenge, one in five survey respondents pointed to the lack of qualified staff



Staffing challenges intensify

- 47% of operators have difficulty finding qualified candidates, up from 38% in 2018

- A third face additional challenge of staff being hired away, up significantly from 17% -- and most leave to join rivals

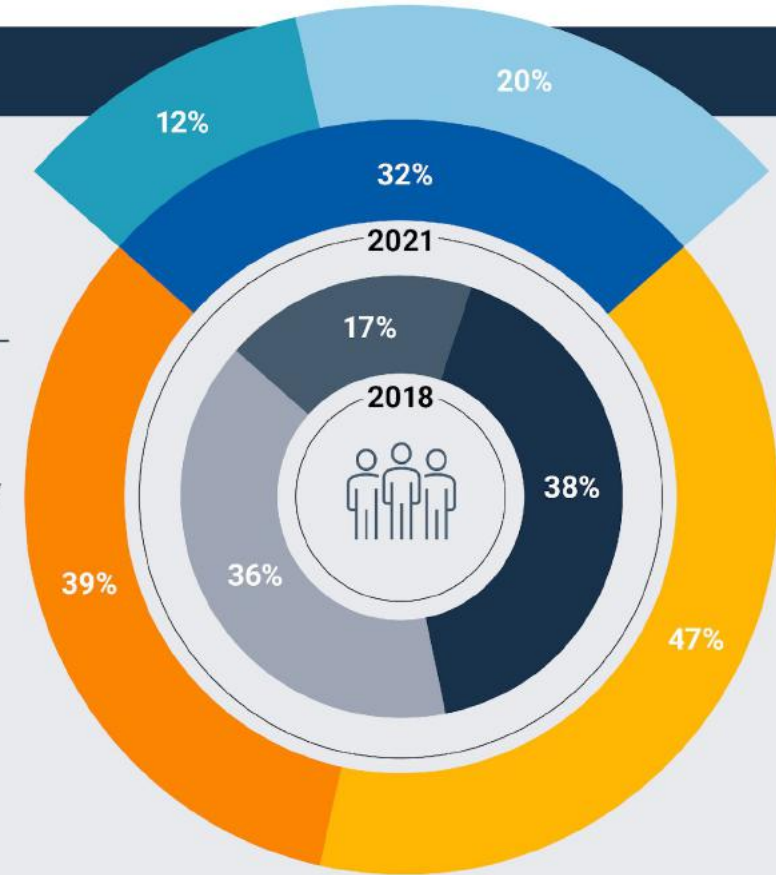
- Three of four operators agree that most in the sector have long-term job security

More find it difficult to retain staff

Please select any of the following statements that apply:

2018 2021

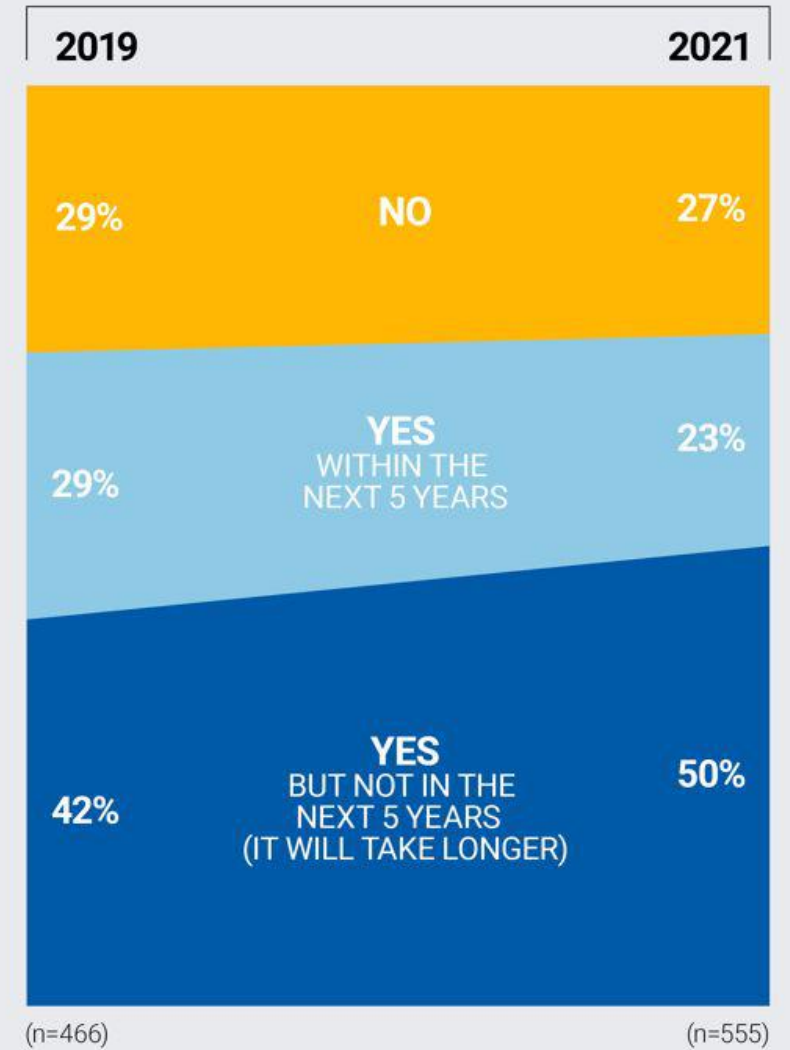
2018	2021	
■	■	We are having difficulty retaining staff, as they are being hired away
N/A	■	We are having difficulty retaining staff, as they are being hired away by non-competitors (doing non-data center work)
N/A	■	We are having difficulty retaining staff, as they are being hired away by competitors (doing data center work)
■	■	We are having difficulty finding qualified candidates for open jobs
■	■	None of the above



Most operators think AI will reduce staffing levels, eventually

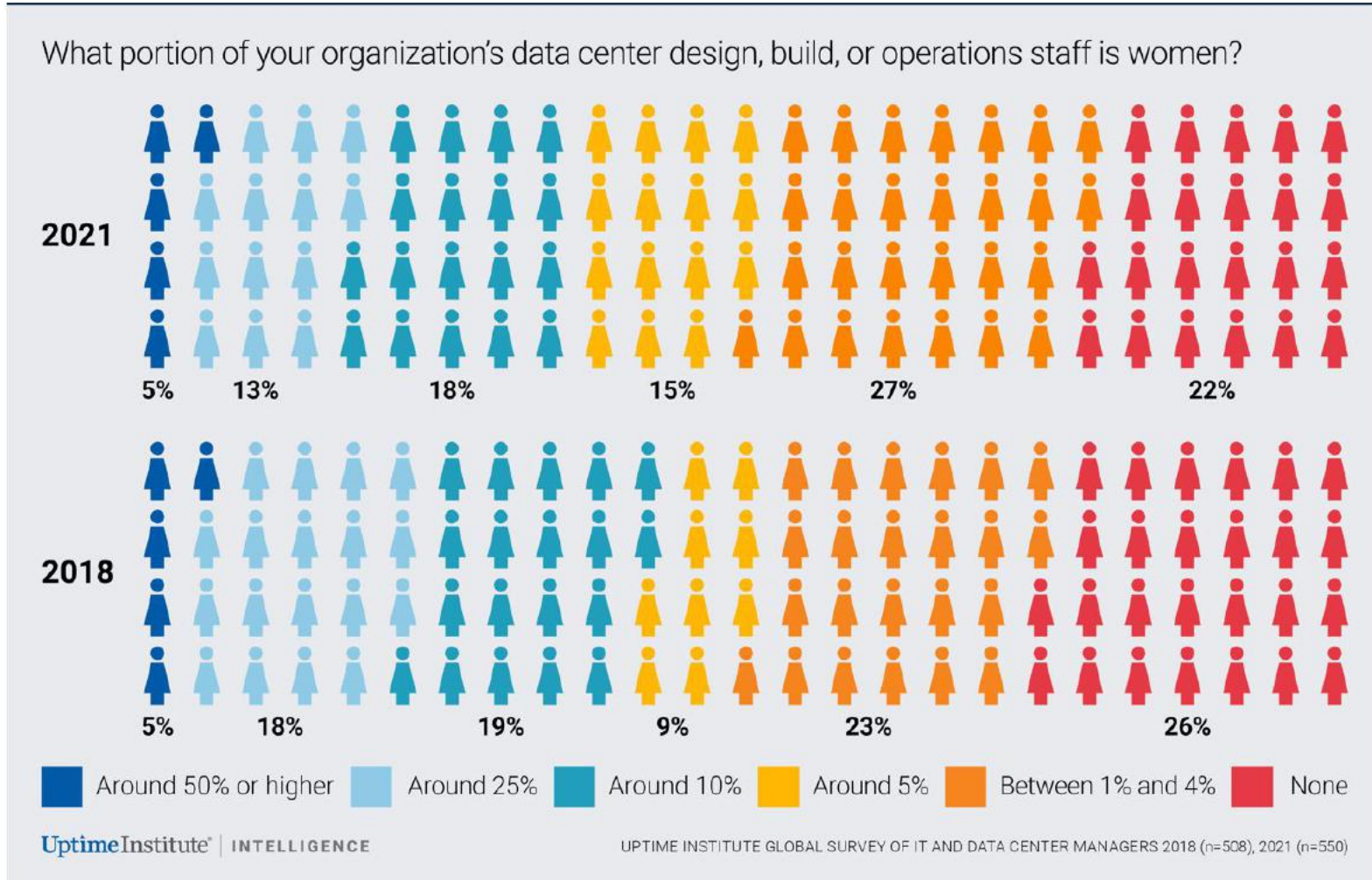
- AI could decouple data center growth from job growth, but not within the next 5 years
- Nearly half of operators would trust AI to make operational decisions but only if the AI is adequately trained on historic data

Do you believe artificial intelligence (AI) will reduce your data center operations staffing levels in the next 5 years?



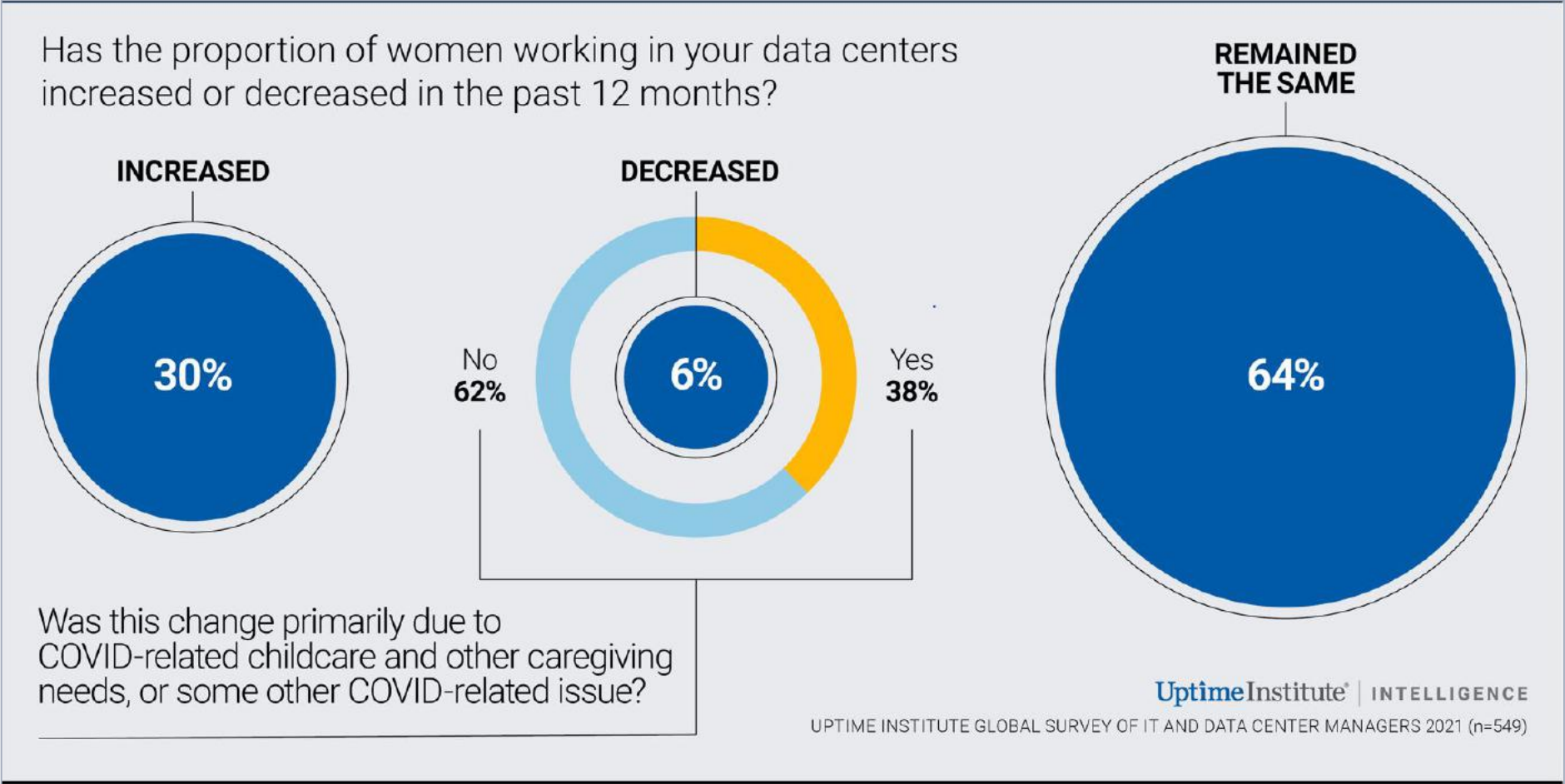
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DATA CENTER MANAGERS 2019 AND 2021

Proportion of women remains low



- 88% of operators expect significantly more diverse recruitment in the next 3-5 years
- Intentions are yet to translate into widespread action
- 5% say about half of their data center staff are women
- More than three-quarters have 10% women or fewer
- Almost 1 in 4 have no women as part of their design, build and operations staff

More are hiring women, despite toll of COVID-related caregiving issues



Summary

- PUE flatlines – further efficiency gains to be found at rack level
- However, few even track server utilization
- Rack densities are slowly edging up
- Sustainability focus is growing, yet practices lag
- The pandemic reduced the overall number of outages but not their impact – outage costs are rising
- Staffing and supply chains are being stretched by continued growth
- Very large operators likely to further disrupt supply chains
- Edge demand is expected to increase, significantly in some cases



A crowd of people at a conference or event, illuminated with blue light. A hand in the center is pointing upwards. The text "Thank you. Questions?" is overlaid in white.

Thank you. Questions?

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