Uptime Institute® INTELLIGENCE

PLANNING & STRATEGY

UI Intelligence report 40

Uptime Institute 2020 supply-side survey

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Data center spending is on the rise; forecasting capacity requirements remains a top challenge for operators; and data center infrastructure management and prefabricated data center components are now mainstream. These are some of the findings of the 2020 Uptime Institute research survey of data center designers, service suppliers and equipment vendors.

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This Uptime Institute Intelligence report includes:

KEY FINDINGS

- For the second year running, around 80% of suppliers/advisors and designers report data center operators are spending at or above normal levels.
- The industry at large has gradually become more realistic about the much-hyped expansion of edge computing. However, there are clear signs that demand for edge computing is real and is growing.
- Resiliency is a top priority. While suppliers/designers see a marginal decrease in the number of data centers that are primarily 2N, there is also a steady, multiyear shift from N+1 to N+2 — in both power and cooling.
- Forecasting data center capacity is a long-standing challenge — and for the third year running, suppliers say it is the biggest strategic challenge their clients face.
- Artificial intelligence is expected to be adopted more widely in the next five years but will not alleviate the staffing shortage. This aligns with Uptime Institute operator survey findings.
- Prefab is becoming predominant. While roughly half their customers are not using prefabricated components for their current facilities, about two-thirds of suppliers expect their clients to use prefab, to some degree, in their future facilities.
- Adoption of lithium-ion batteries is still low, especially for distributed deployments. It is increasing for centralized use cases, however, with over 20% of suppliers saying most of their customers now use this battery technology in centralized uninterruptible power supplies.
- Indirect cooling is the most popular choice for cooling economization, ahead of direct cooling. However, both technologies are increasingly being adopted.
- Alternative power technologies, such as fuel cells and direct current, remain niche.

Introduction

Uptime Institute has been conducting a large global survey of the data center industry for nearly a decade. In our 2018 and 2019 surveys, we separated out suppliers and influencers in the industry from the wider group of operators and asked this group different questions. We continued this practice in 2020. The results of the data center operator survey (**Uptime Institute global data center survey 2020**) were published earlier this year. Both surveys were conducted during the early months of the pandemic – a survey undertaken since has confirmed many of the trends described here.

The 2020 supplier survey provides a unique perspective on the progress of the data center industry. Overall, it shows the industry to be in a state of robust health, with the majority of suppliers, in all categories and geographies, saying demand is at or above normal levels – continuing a trend from previous years.

Forecasting future capacity requirements was once again at the top of the list of challenges for operators, according to the suppliers.

End-user data and supplier data are not always consistent, as vendors (which in our survey includes consultants, design engineers and product providers) can hold different opinions from IT managers and data center operators. Even so, there is considerable alignment on most topics. The operator survey results can be found on the Uptime Institute website here or via the Inside Track Uptime Network community portal.

A full description of the 2020 supply-side survey demographics is provided in the **Appendix**.

Spending is steady to increasing

The health of the data center sector — in strict business terms — can be difficult to measure. The major public cloud operators (such as Microsoft, Google, Amazon Web Services, Alibaba and IBM) provide some high-level capital spending data, as do some major colocation companies (e.g., Equinix and Digital Realty). Studies are also available showing the build-outs in cloud and colocation sectors, but these operators represent only a minority proportion of data centers (by number). Insights into the entire sector's spending are difficult to find.

For this reason, the Uptime Institute supplier survey may provide some directional insight: The results show that overall, the industry continues to boom (this covers all sectors of the market).

For the second year running, around 80% of suppliers/advisors and designers report spending at or above normal levels (see Figure 1). Although marginally down from last year, the continued boom in demand for IT, only partly driven by the hyperscale build-out, continues across the industry.

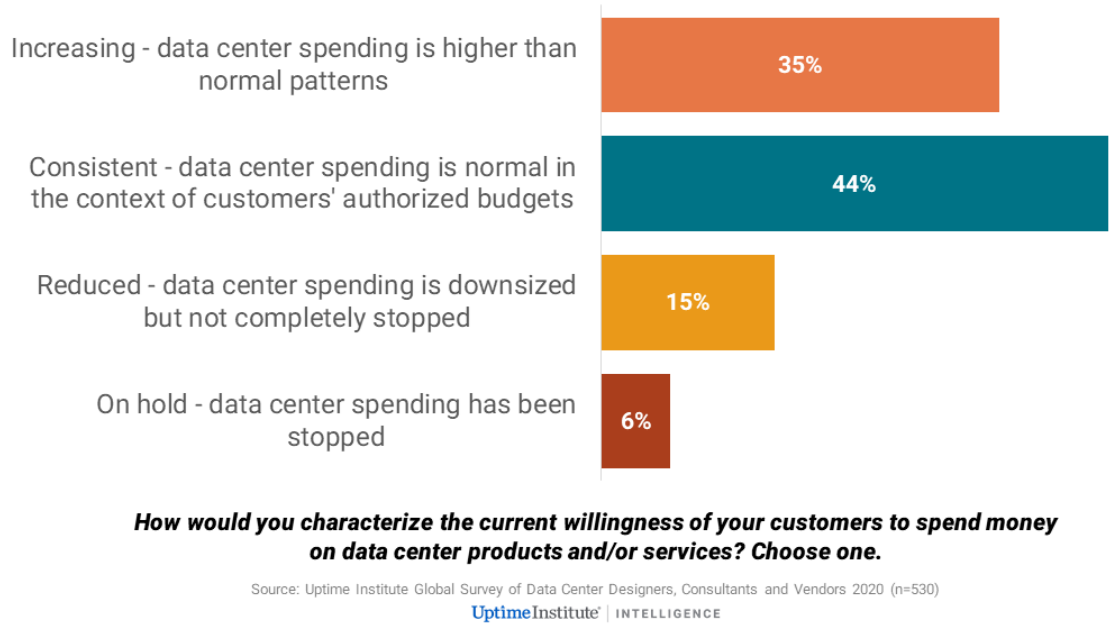

Figure 1. **Data center spending continues to be healthy**

In our analysis, we did not find a significant difference between spending patterns on design/advisory services and spending on data center products. We also found that in Asia/China, a slightly higher number said that spending is above normal/increasing, while in the US/Canada, the percentage reporting increasing/above normal spending was below global averages. All the analyses, however, show the sector is healthy across the board.

Some data centers may close

Healthy spending doesn't necessarily mean that there will be more data centers, or more data center capacity (at least, not at a site or enterprise level). Many operators, for example, are moving more workloads to colocation and cloud, closing smaller regional data centers but, at the same time, investing more in upgrading central data centers. Given the inefficiencies in current IT use, it is also common for operators to increase their on-premises compute capacity but decrease their data center physical footprint. As Figure 2 shows, almost a quarter of suppliers expect their customers to close at least one major data center.

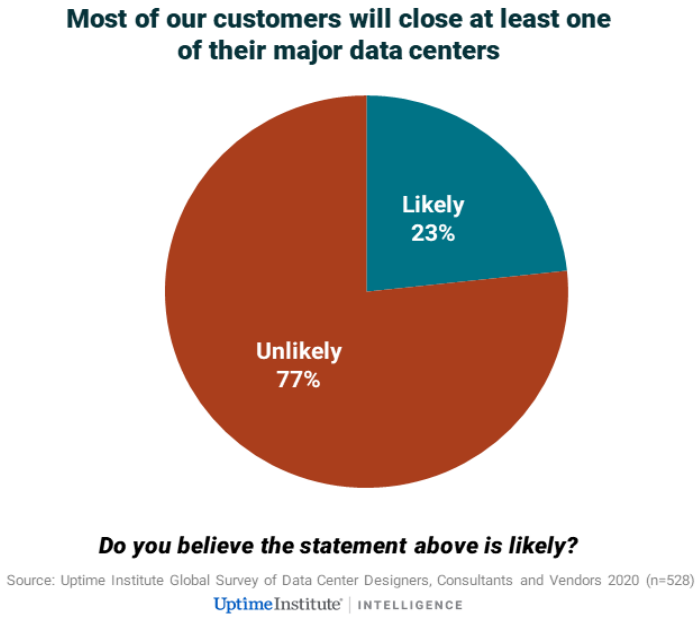

Figure 2. **Some customers are likely to close at least one data center, suppliers say**

Edge demand is growing — slowly

For several years, suppliers and analysts have been confidently predicting a dramatic surge in edge computing, with an increased amount of processing, storage and, hence, data center capacity at the edge. This will be driven by the Internet of Things, more digital services, more mobile devices, connected vehicles, edge analytics, more video and augmented reality, and, most recently, by more remote working.

Even so, Uptime Institute has been guarded on this issue: We expect a tilt toward more work being conducted at the edge, with more investment, but not a dramatic flip, as some have forecast. The great majority of the work can be processed at large metro edge data centers and at large core data centers.

The latest evidence suggests the industry has gradually become more realistic about the adoption rate and more cautious of inflated expectations surrounding edge computing. At the same time, there are clear signs that demand for edge computing is real and is growing. In the Uptime Institute annual operator survey 2020, 40% expected their edge computing needs to increase in 2020, and 18% expected that increase to be significant.

As Figure 3 shows, suppliers' expectations on the demand for small (sub-150 kW) data centers were very high in 2018, fell in 2019, and then

increased — following a familiar hype cycle as reality (i.e., genuine demand) set in. The overall picture suggests that, for suppliers of micro data centers, overall demand will eventually be strong.

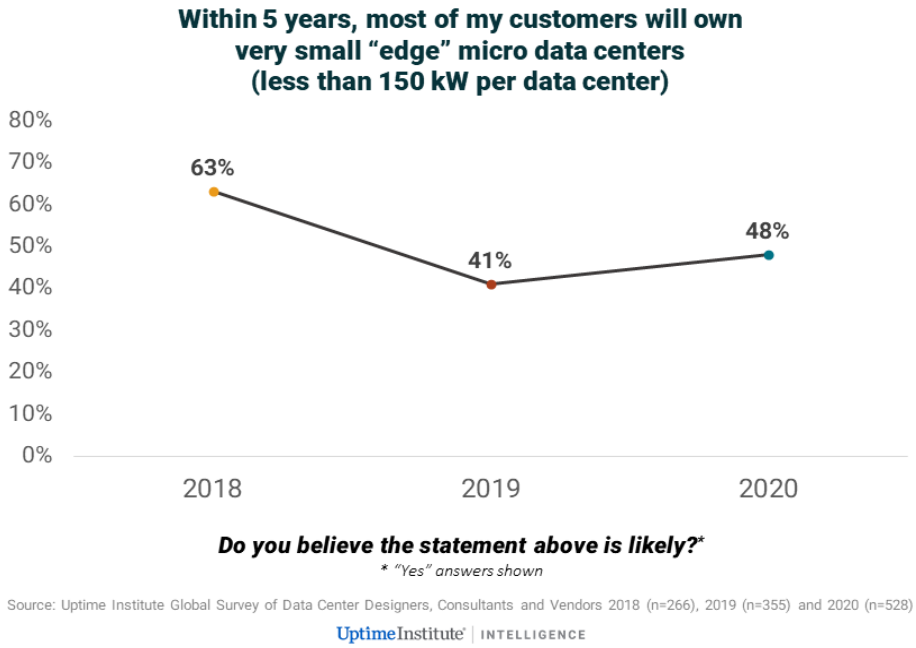

Figure 3. **After the hype, interest in edge deployment grows**

Redundancy: More are doubling down

In recent years, there has been a strong narrative in the IT industry that runs as follows: Cloud computing (private or public) redesigns IT so that work is fluid and can automatically reroute around or move away from failed infrastructure. For this reason, the infrastructure itself (data center or IT) does not need to be as resilient.

There is a counternarrative: More critical work than ever is running in data centers, the software running these services is opaque, complex, and may be prone to errors of programming or configuration. Further, any big component failures can cascade, making recovery difficult and expensive. For this reason, it is important to increase infrastructure resiliency.

The latter argument is winning. While suppliers/designers see a marginal decrease in the number of data centers that are 2N, there is also a steady three-year shift from N+1 to N+2 — not only in power, but also in cooling (see Figure 4).

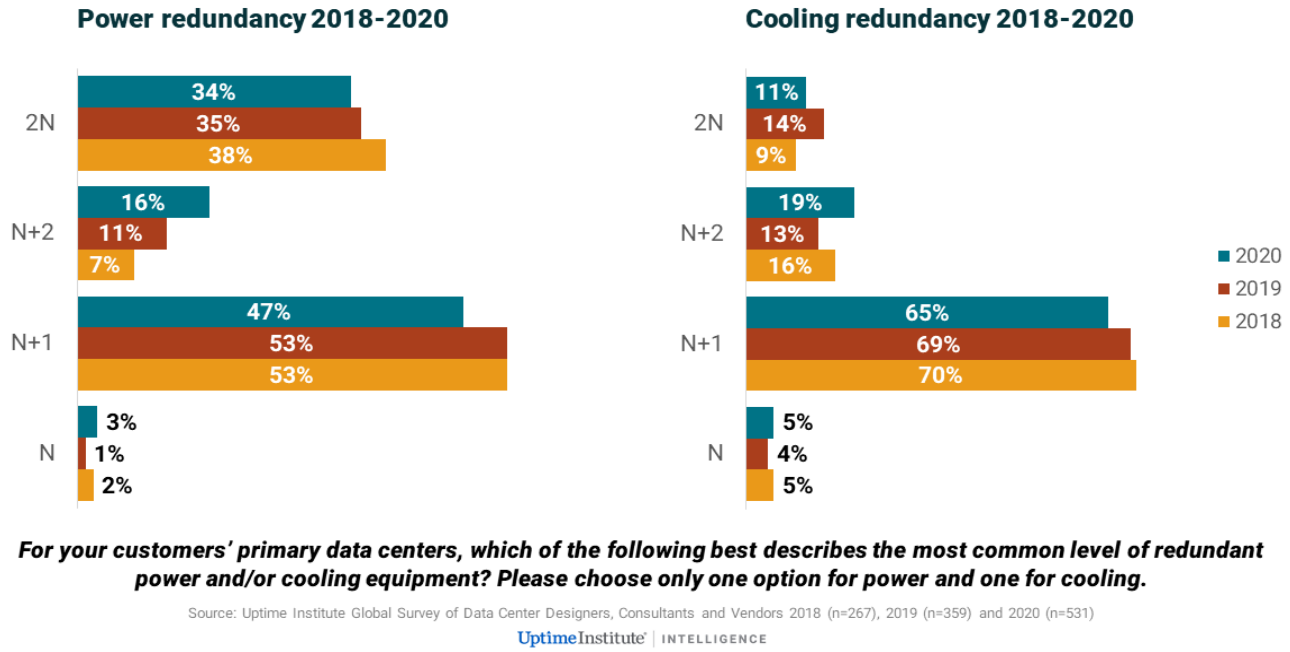

Figure 4. **N+1 configurations remain dominant but the proportion of N+2 configurations is rising**

In the years ahead, Uptime Institute expects this trend to continue, and, following the pandemic, probably increase. Our report on this topic, Post-pandemic data centers, cites an Uptime Institute research study in which almost two-thirds of data center operators said they expect to increase their resiliency as a result of the pandemic (a move likely to be associated with greater use of remote staff).

Suppliers have little doubt about the trend, with far more expecting to see increases in redundancy than decreases.

Top challenges have not changed

Each year, we ask suppliers what they perceive to be the major challenges facing their customers. In 2020, their answers matched those from 2019 (Figure 5).

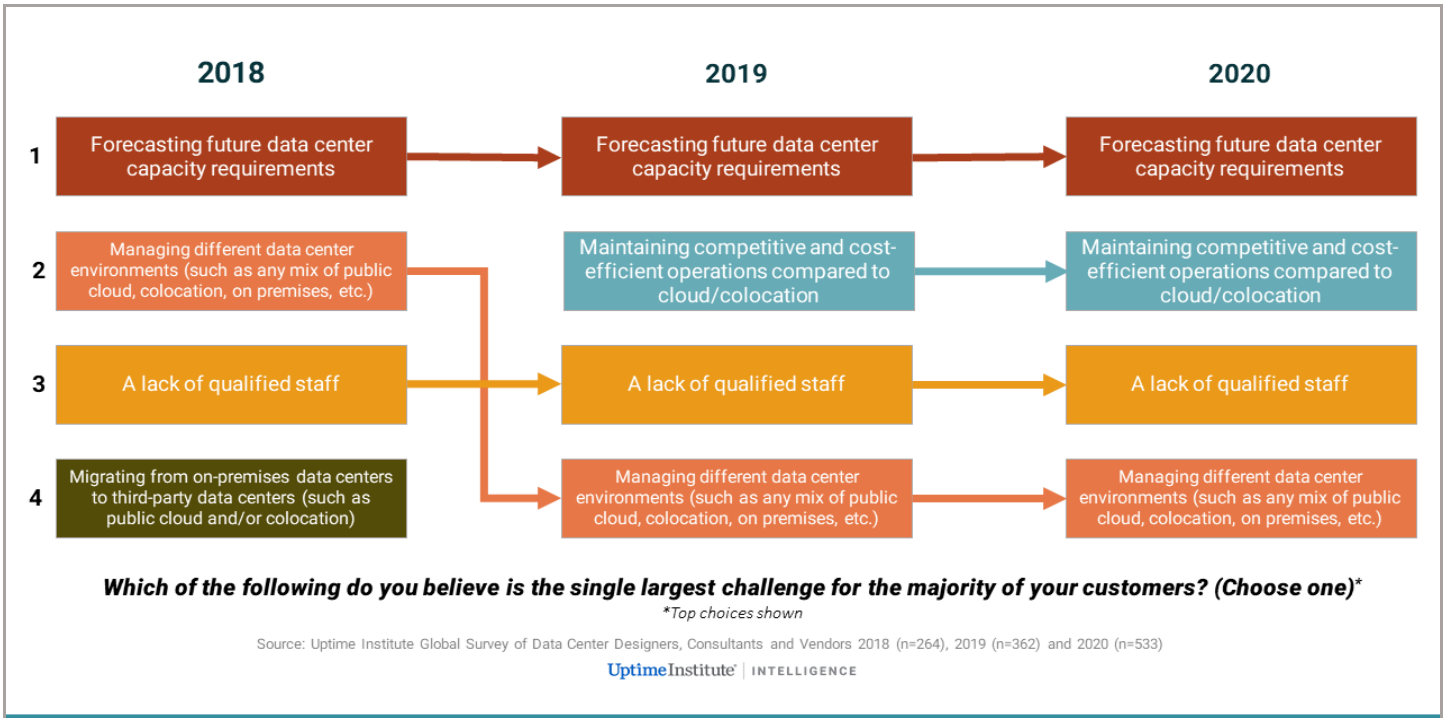

Figure 5. **Capacity forecasting remains the top challenge facing data center operators**

Forecasting data center capacity is a long-standing challenge, and for the third year running, suppliers say it is the biggest strategic challenge their clients face. For some operators, it is about meeting runaway demand, but for others it is also about anticipating a reduction in demand as work is moved to a public cloud.

For most, it is more nuanced and is not just about capacity, but also about where workloads should run (best execution venue/ best storage venue) — with a choice of on-premises, public cloud or colocation data centers. Increasingly, work moves dynamically among these environments. It is about cost, resiliency, compliance and other factors.

While the task of managing different environments has dropped down the list of operator concerns, operational efficiency across all platforms is clearly an issue. Meanwhile, severity of the staffing crisis means it is an ever-present concern.

AI is coming, but robots are not

The data center has a consistent attitude to the use of artificial intelligence (AI) and robotics — both suppliers and operators share similar views: AI will become much more widely used over the next five years (see Uptime Institute global data center survey 2020). However, the majority believe it will do little in reducing employment needs or alleviating the staffing crisis in that timeframe (see Figure 6). Operators are more likely than suppliers to believe AI will play some role in reducing staff needs.

Figure 6. **Suppliers say artificial intelligence is coming, but robots aren't**

The difference between robotics and automation can, in some instances, be blurred. There is some evidence that data center operators are becoming more willing to embrace automation (which might simply mean intelligently managing pumps, power switches, cooling, etc.), but the role of robotics is seen as being more limited. (Here, "robotics" is interpreted to mean devices that could be mobile or semi-mobile and may either be remotely managed in real time or programmed to be at least somewhat autonomous.) Only one in ten suppliers believe robotics will play in role in replacing humans in the next five years.

Prefab is predominant

Prefabricated data centers have come a long way in 15 years. Early products were in fixed containers, difficult to scale, and were pre-populated with proprietary racks and IT — forcing potential customers to lock themselves into certain technologies and suppliers. Few did. Moreover, data showed prefab data centers were no cheaper, and no more flexible, than traditionally built alternatives (although they were faster to deploy).

Today the term "prefabricated" is variously applied to everything from pre-manufactured, turnkey micro data centers to hyperscale data halls, where significant subsystems (cooling, electrical) are pre-manufactured off-site and then re-assembled on-site. Almost all use standard racks and conform to common standards. Reliability, cost, and deployment speeds are all impressive — with the only major drawback being around the difficulty of accommodating some custom requirements. As a result, true ground-up, stick-built designs are becoming rarer.

Figure 7 shows supplier perceptions on how their customers are building data centers. The data is very similar to our 2019 survey findings. While suppliers report roughly half of their customers are not using prefab for their current facilities, over two-thirds expect their clients to use prefab, in some degree, in their future facilities.

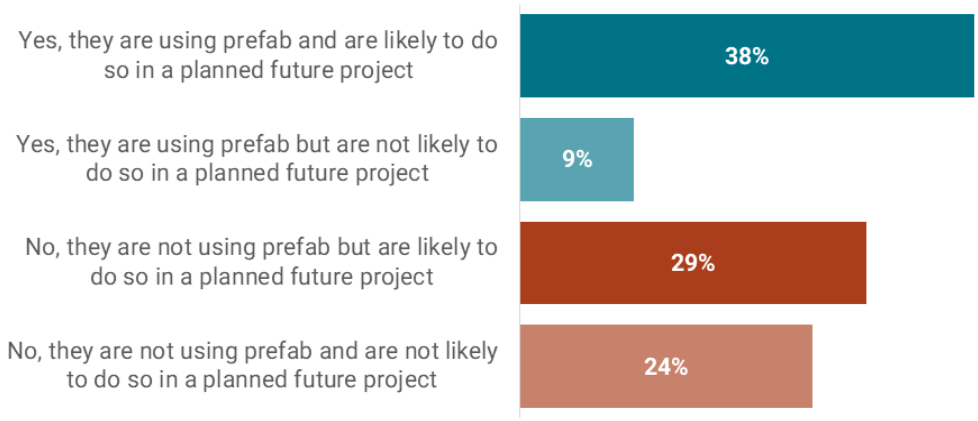

Figure 7. **Prefab data centers seem set to become mainstream**

The huge variation in project types that use prefabricated components partly explains the high adoption rate. The use of electrical skids, for example, does not suggest that the overall design is prefabricated or standardized. Effectively, the use of prefabricated methods is becoming so common in data center builds that a reclassification of terminology may be needed.

Li-ion battery adoption charges ahead

Lithium-ion (Li-ion) battery technology continues to mature in terms of density, safety profile and cost (thanks primarily to the electric car industry) compared with valve-regulated lead-acid batteries, which have not changed much in recent years. Li-ion, although currently more expensive, can be charged and discharged thousands of times, opening the possibility of using energy storage more dynamically and under intelligent control. It also has a higher power density, enabling operators to recover space.

Li-ion battery use is becoming more accepted in data centers — although there remains a body of operators who still see enough drawbacks with the technology to resist any immediate switch.

Li-ion batteries can be deployed in three ways — distributed in the rack, distributed at the row/pod/room level, or deployed centrally. The first — in the rack – is a favored Open Compute Project (OCP) design, although it may simply be used tactically in non-OCP deployments to provide some additional power availability during planned or unplanned downtime. However, adoption of distributed uninterruptible power supplies (UPS) still remains low. About one in ten suppliers say most of their customers use one of these distributed approaches — a small proportion, but higher than in 2019 (see Figure 8). In some geographies, including the US, fire regulations have made distributed Li-ion deployment more difficult.

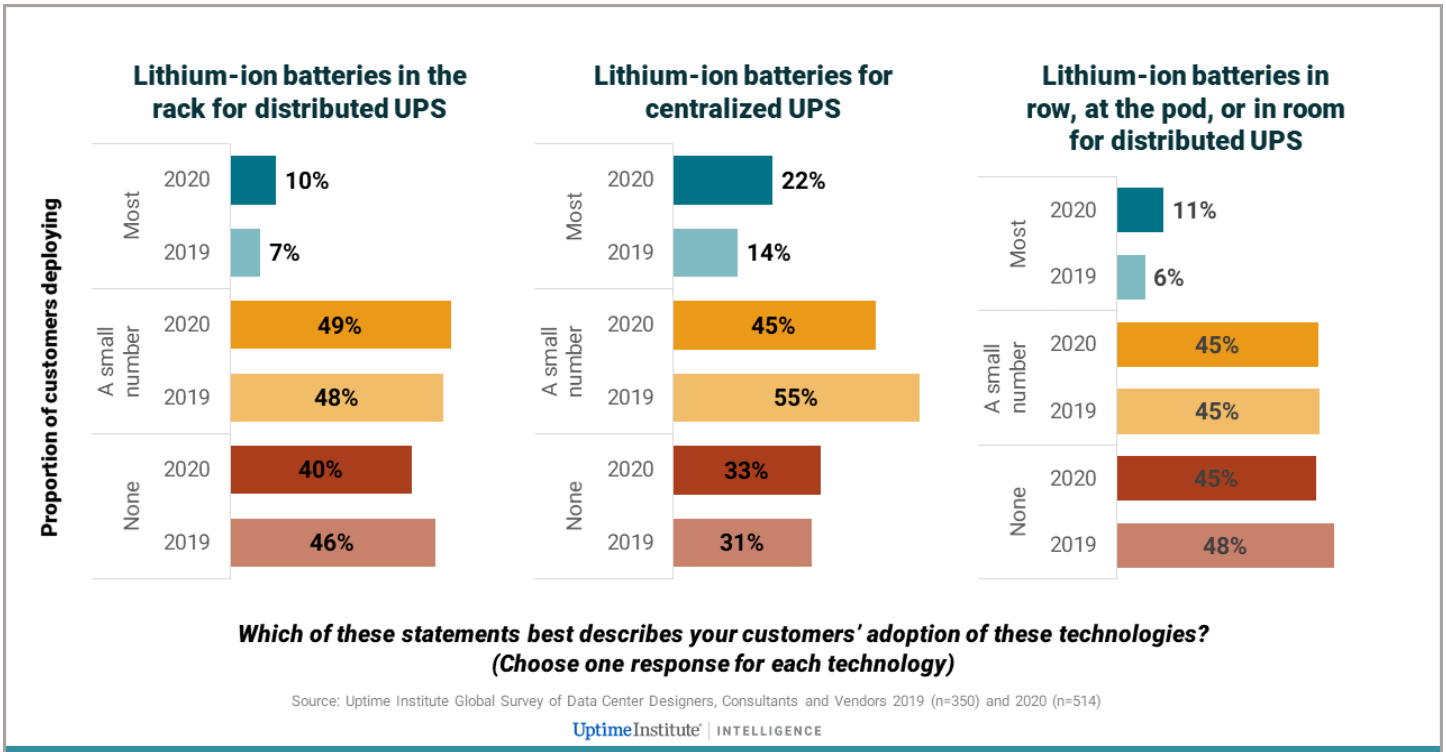

Figure 8. **More are deploying Li-ion batteries for centralized uninterruptible power supplies (UPS)**

It is a slightly different story for centralized UPS systems, where over a fifth of suppliers now say that most of their customers are deploying Li-ion. Uptime Institute expects this number to grow steadily, with centralized UPS approaches remaining the preferred approach for most operators. (Uptime Institute Intelligence will release a report on the future of UPS in the coming months.)

DCIM is mainstream

Data center infrastructure management (DCIM) took many years to win widespread market acceptance, and even now, its use is far from universal. Even so, four of 10 suppliers surveyed say most of their customers use DCIM, and another five of 10 say some do. Only one in 10 say none of their customers use DCIM (see Figure 9).

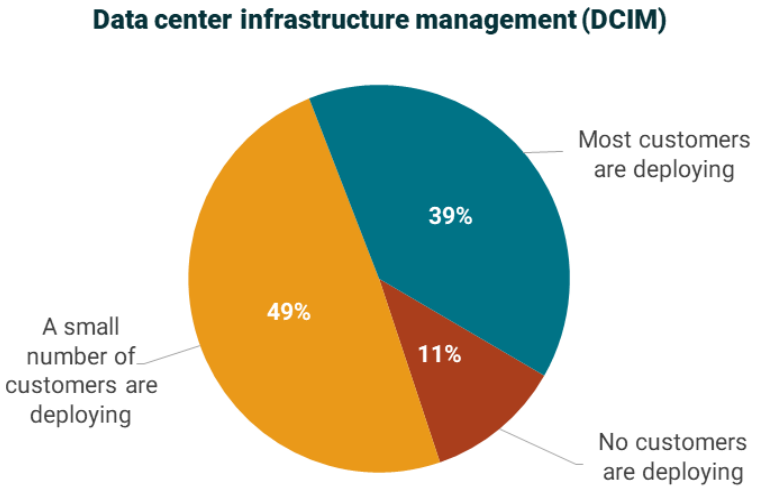

Figure 9. **The majority of suppliers say at least some of their customers use DCIM**

Uptime Institute expects adoption rates will continue to rise as operators develop a better understanding of what DCIM can and cannot offer, the level of investment required for value realization, and the minimum facility size above which DCIM economics start adding up.

Note that when we refer to DCIM, we include cloud-based data center management as a service. The continued introduction of new DCIM services, which may offer AI-based solutions, further strengthens the case for DCIM, allowing operators to draw more value from the large amount of data collected.

Indirect cooling tops direct

Among data centers using economization technologies, indirect cooling is more popular than direct (fresh air) cooling, suppliers say (confirming findings from recent operator surveys). As shown in Figure 10, 25% of suppliers say that most of their customers use indirect free air cooling, compared with 19% for direct air cooling (still a high number).

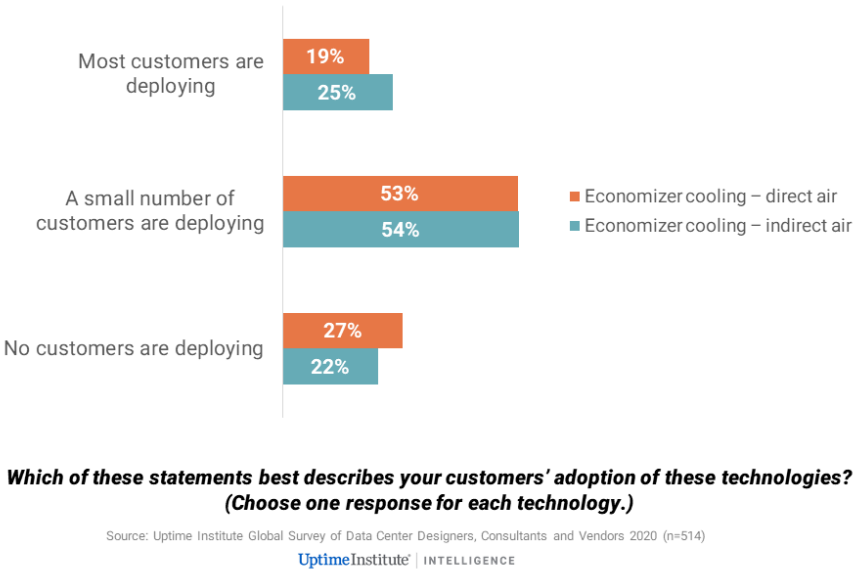

Figure 10. **Indirect free cooling has a higher adoption rate in data centers than direct air free cooling**

The continued pressure to increase cost efficiency, as well as the rising awareness of and interest in sustainability, is likely to continue driving uptake of free air cooling. Compared with traditional compressor-based cooling systems, free air cooling requires less upfront capital investment and involves lower operational expenses, while having a lower environmental impact (e.g., no refrigerants, low embedded carbon and a higher proportion of recyclable components).

Yet, some issues hampering the uptake of free air-cooling will likely continue in the short term. These include the upfront retrofit investment required for existing facilities; humidity and air quality constraints (which are less of a problem for indirect air cooling); lack of reliable weather models in some areas (and the potential impact of climate change); and restrictive service level agreements, particularly in the colocation sector.

Fuel cells, direct current remain niche

Two technologies that have, on and off, received considerable interest for data center applications are fuel cells and direct current to rack. The former promises a low carbon alternative to both utility power and expensive/dirty generators; the latter, a more efficient method of distributing power to racks.

Both of these technologies continue to garner some interest, with direct current, in particular, of interest to large-scale hyperscale operators. However, despite their relative maturity, neither technology has achieved significant traction in the data center sector (see Figure 11).

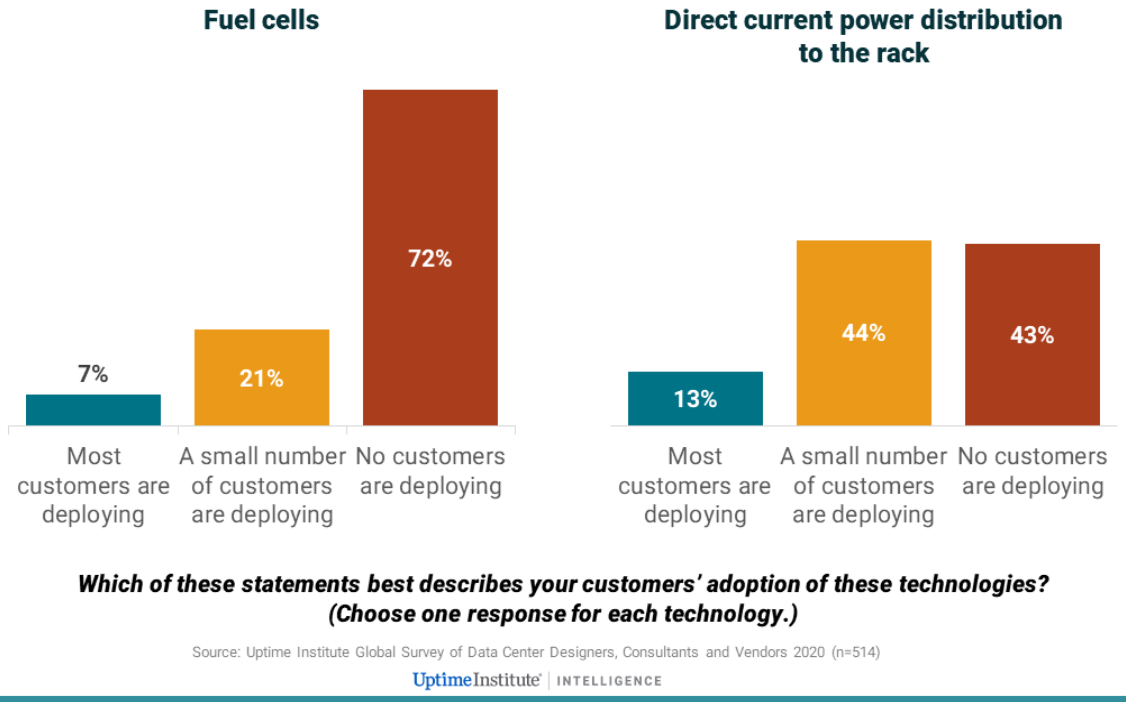

Figure 11. **Use of fuel cell and direct current power technologies in data centers remains niche**

Conclusions

The results from this year's supplier survey were largely consistent with the results of last year's supplier survey and the 2020 operator survey. The main findings include:

- For the second year running, around 80% of suppliers/advisors and designers report data center operators are spending at or above normal levels.
- The industry at large has gradually become more realistic about the much-hyped expansion of edge computing. However, there are clear signs that demand for edge computing is real and is growing.
- Resiliency is a top priority. While suppliers/designers see a marginal decrease in the number of data centers that are primarily 2N, there is also a steady, multiyear shift from N+1 to N+2 — in both power and cooling.
- Forecasting data center capacity is a long-standing challenge — and for the third year running, suppliers say it is the biggest strategic challenge their clients face.

- Artificial intelligence is expected to be adopted more widely in the next five years but will not alleviate the staffing shortage. This aligns with Uptime Institute operator survey findings.
- Prefab is becoming predominant. While roughly half their customers are not using prefabricated components for their current facilities, about two-thirds of suppliers expect their clients to use prefab, to some degree, in their future facilities.
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- Indirect cooling is the most popular choice for cooling economization, ahead of direct cooling. However, both technologies are increasingly being adopted.
- Alternative power technologies, such as fuel cells and direct current, remain niche.

This year, Uptime's annual global data center survey was conducted during the first months of the COVID-19 pandemic; it is as yet unclear if any changes in these trends will be revealed in our 2021 survey. Uptime Institute has published several reports on the immediate, short-term and anticipated long-term impacts of the pandemic; visit Uptime Institute's website to download our pandemic-related research, much of which is available in multiple languages.

Appendix

2020 Supply-side survey demographics

Uptime Institute's annual global data center survey, now in its tenth year, is conducted online and by email. The 2020 survey was conducted between March and April 2020. Participants were split (in the survey) into two groups: data center operators (managers, engineers, designers, etc.) and data center suppliers (vendors, designers and consultants). This report includes responses from 715 data center service and equipment suppliers — people responsible for designing and building data centers, as well as suppliers of data center equipment. As shown in Figure A1, the majority are data center consultants, followed by data center design engineers and product vendors.

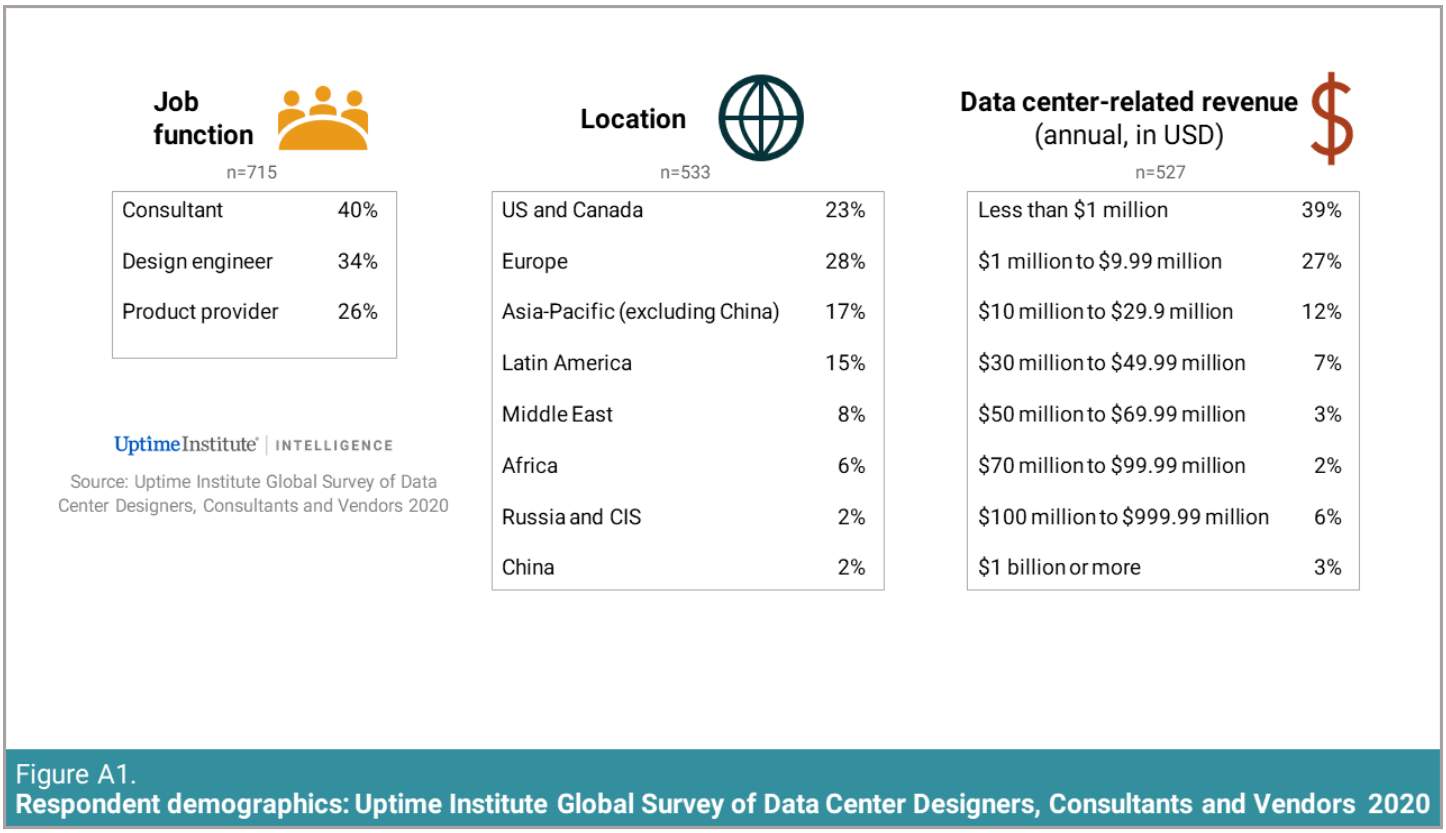

Figure A1.
Respondent demographics: Uptime Institute Global Survey of Data Center Designers, Consultants and Vendors 2020

Because respondents were not required to answer all questions, the number of respondents for individual questions ("n") varies widely. Previous survey findings are available on the Uptime Institute Network member portal, Inside Track.

For more information on our surveys or Uptime Intelligence, contact the Intelligence team (intel@uptimeinstitute.com) or Brenda South, Vice President, Communications (bsouth@uptimeinstitute.com).

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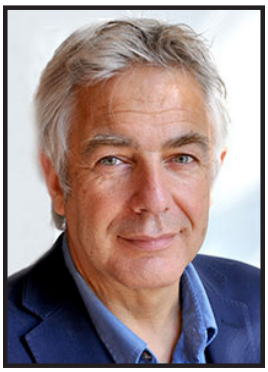

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