# ARE DATA CENTRE DESIGNERS HEADING FOR 'JUDGEMENT DAY' OVER AI?

eBook by

**ONNEC**

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# THE AI REVOLUTION IS HERE

**Artificial Intelligence has taken centre stage. From machine learning to deep neural networks, generative AI and natural language processing, AI models are powering business growth and productivity.**

Like the Internet before it, AI will revolutionise every facet of society. And it's already having an impact, with the explosion in generative AI putting us at a tipping point where adoption is becoming exponential:

## $300bn

**Global spending on AI by 2026, up from $154bn in 2023 [1]**

## 35%

**The percentage of global companies using AI, with 42% exploring AI adoption [2]**

## $1.3tn

**Value of generative AI market over the next ten years, up from $40bn in 2022 [3]**

[1] www.idc.com
[2] www.ibm.com
[3] www.bloomberg.com

**For AI ambitions to be realised, data centres will be under pressure to meet demand.**

There are major implications for operators over how to design data centres in the AI era. What will AI-compute demand look like tomorrow? What support might customers want for AI-compute requirements? What will this mean for infrastructure? These questions, and more, loom large over data centre designers facing AI 'judgement day' – design decisions taken today can impact the business for decades to come.

AI will rewrite everything we know about data centre design. But efforts to rethink and redesign data centres must not be done in siloes. To future-proof and cope with explosive demand, operators need to take a holistic approach that considers all parts of the data centre.

**If you work for a data centre operator, or are responsible for data centre design or operations, read on to learn about the impact of AI and the steps operators can take to adopt a holistic approach to data centre design.**

**"Generative AI will increase demand for data centres as we know them today and will drastically change what data centres and their associated technology look like in the future."**

– Brian Lewis, Managing Director, advisory, at KPMG [4]

[4] www.networkworld.com

# THE AI CONUNDRUM FORCING A RETHINK ON DATA CENTRE BUILDS

## Amidst rising AI adoption, the boom in AI is driving greater need for data centres.

Operators are at a stage where they have been thinking about the impact of AI on how they design future data centres. This could explain why they vacant capacity in 2022-23 dropped by 17.6% in North America, 4.3% in Europe, and 3.6% in Latin America. We've seen some hyperscalers take a breath to understand the AI implications on future design.

Some of the areas that operators have been considering come down to the compute power and resources required for AI – or AI-compute. Traditionally, data centres relied on racks powered by Central Processing Units (CPUs). AI requires Graphics Processing Units (GPUs) racks that consume more power, emit more heat, and occupy more space than CPU racks. GPU racks also require more cooling and power infrastructure.

Power and cooling infrastructure is difficult to replace once built, so decisions around the "split" between CPU and GPU capacity at the design stage are irrevocable for operators – or prohibitively costly to amend. Because of this, many operators held back on building new sites to gauge demand.

AI has turned everything on its head, forcing data centre operators back into the test and design phase. The cost of making an expensive, or irreversible, mistake means operators must rethink data centre architecture.

> "We're experiencing growth in AI tech, so we need to make sure that our data centre can adapt to something that's still evolving."
>
> - Alan Duong, Global Director of Data Centre Strategic Engineering, Meta [5]

[5] www.networkworld.com

# AI'S FAR-REACHING IMPACT ON DESIGN REQUIREMENTS

When designing data centres in the AI era, the focus tends to be on the compute and storage requirements. But designers must also account for sustainability challenges. AI-compute demands much greater power and cooling, which could increase carbon emissions. Designers must also compete for chips that are in high demand, making them difficult to obtain.

From a design perspective, AI will dramatically change requirements in a variety of domains, including these five areas:

### Power
AI-compute requires high-performance processors (GPUs & DPUs) that draw more power than traditional CPUs. Data centre designers must be conscious of how many KW per rack they need and where this may fluctuate to create hot spots.

### Cooling
As AI-compute demands rise, racks will become more demanding. Liquid cooling is preferred for high-performance chips and can be more cost-effective, but air cooling will still have a role to play. Designers will need to consider how to incorporate and manage both liquid and air cooling, and how they split up a data centre to cater to demand.

### Networks
The rise of AI-compute will bring an explosion in network traffic between applications within data centres, between data centres, and to end users. Network infrastructure will be under increased pressure, with much higher data throughput than ever before.

### Cabling
Poor quality cabling will struggle in intense environments with lots of throughput. Cabling is the foundation for data centre connectivity and a critical component for AI-compute. Without superior cabling, data won't be delivered on time so is often retransmitted multiple times, creating bottlenecks and increasing latency. This issue can be expensive and time consuming to address once installed.

### Cyber Security
As well as physical infrastructure, data centre operators also need to consider the shift to AI-assisted data centre operations. This comes with a new threat to defend against – preventing the hijacking of remote operations. Designers must factor in countermeasures to ensure malicious forces cannot overtake or sabotage data centre operations.

# THE FORGOTTEN FOUNDATIONS OF EVERY DATA CENTRE

**When designing the data centre of the future, operators cannot afford to look at the pieces of the puzzle in isolation.**

Designers must treat data centres as a living breathing giant. A small change in one area creates ripples that can sabotage the performance of an entire data centre.

Structured cabling is critical to data centre design – it's the foundation of connectivity. Investing in high quality cabling allows data centre operators to future-proof for AI and whatever comes next. Just as a second-rate HDMI cable can waste the quality of a top-end TV, poor cabling can squander the value of high-performance data centre hardware. High quality cabling enables data centre operators to:

- ✓ **Reduce long-term costs**

- ✓ **Enable high data throughput**

- ✓ **Reduce downtime and outages**

- ✓ **Be flexible and reduce the need for refits**

- ✓ **Cut data centre degradation and extend its lifetime**

# 5 PRINCIPLES OF HOLISTIC DATA CENTRE DESIGN

A more holistic approach to design ensures a complete view that takes in every aspect of the data centre. This approach marks a major departure from traditional processes. When developing future data centres, designers should consider five principles of holistic data centre design:

**1**    **Step back and take a more strategic approach to data centre design**

**2**    **Involve more stakeholders to create a shared vision**

**3**    **Give data centres the flexibility needed to adapt**

**4**    **Consider how AI may help optimise data centre operations**

**5**    **Beware of false economies**

# 1

## STEP BACK AND TAKE A MORE STRATEGIC APPROACH TO DATA CENTRE DESIGN

Before any conversation about design, operators must think strategically about what they anticipate the data centre will be used for. It's no use having design conversations about power and cooling without strategic insight.

Defining a data centre's purpose must be a business-driven decision. Organisations need to step back and take a more strategic approach to:

- Evaluate current customer demand
- Evaluate industry trends and AI sentiment
- Forecast future demand for AI-compute

These factors will underpin decisions around data centre design. It might be that the forecast shows a need to cater for AI and non-AI customers. This might mean splitting the data centre into AI and non-AI-compute areas.

AI itself can be a key tool for helping to forecast customer demand and predict where the AI market is headed – these data-driven decisions allow operators to adapt and build future data centres without needing to hit the pause button.

# 2

## INVOLVE MORE STAKEHOLDERS TO CREATE A SHARED VISION

Once the business has outlined what the data centre will be used for, bring together teams responsible for everything from power, cooling and cabling to security, operations teams and business stakeholders.

Frequent collaborative workshops will foster a shared vision for the final data centre and ensure design decisions are made collectively.

A shared vision ensures a data centre can cater to AI and non-AI customers, with teams deciding together on how to split the data centre and what the requirements are for each group of customers.

This is also a good point to bring up lessons learned from the last build to ensure they are applied to design choices for the next site.

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# 3

## GIVE DATA CENTRES THE FLEXIBILITY NEEDED TO ADAPT

It's important to bake flexibility into the heart of the data centre because it's hard for designers to know what the new hardware requirements will be in two or three years.

To reduce uncertainty, data centres can be designed to be modular; ensuring infrastructure is in place that doesn't need to be changed as regularly as the hardware.

Building this flexibility into the data centre means that installing or swapping out hardware is a minor change and not a major problem.

This approach also gives data centre operators the time and space to install more capacity than they need, so operations teams can manage and upgrade data centres to adapt in line with demand.

# 4

## CONSIDER HOW AI MAY HELP OPTIMISE DATA CENTRE OPERATIONS

It's not only customers who will want to reap the benefits of AI – it can be the support system that empowers operations teams and helps data centres live a long and healthy life, by:

- Managing power usage effectiveness to improve energy efficiency
- Detecting & fixing issues with facility hardware to extend its usable life
- Assist in planning the physical space within the data centre
- Monitoring temperature and humidity constraints
- Operating data centre security systems

AI-led operations can also help to improve data centre sustainability by optimising cooling and power usage, and by modelling and deploying systems to capture and reuse waste heat.

Operations teams must ensure that they clearly outline the tasks and parameters AI should perform and apply layered security to prevent systems from being compromised.

# 5

## BEWARE OF FALSE ECONOMIES

When designing the data centre of the future, it's important to invest the right amount of capital in the early stages. Data centre designers are facing an AI 'judgement day' – design decisions made today will impact the success of the business and the data centre, potentially for the next decade.

This is why it's important not to focus on short-term cost savings, for example:

- Working with consultants that reuse designs and solutions for data centres. These won't consider your vision and structure, so won't deliver the final build the business or customers want.

- Opting for lower quality cabling creates an obvious weak link in the data centre. Operators will end up spending more money maintaining and replacing these cables than they will have saved by not opting for high-quality connectivity.

- Purchasing materials and components directly instead of working with a partner. This may appear to save money, but consultancies do a lot of work behind the scenes that will instead fall to the buyer, resulting in wasted time and budget.

Any short-term cost savings inevitably create a false economy because the final build could potentially require an expensive refit.

Operators must focus on delivering long-term cost savings that help build an AI-ready, future-proofed data centre.

# ENABLING DATA CENTRES TO MAINTAIN CONNECTIONS

**To future-proof design and cope with explosive AI demand, data centre operators must consider every aspect of their future designs.**

Failure to take a holistic approach to design will result in sites that aren't fit for purpose, don't deliver on customer needs, and degrade over time.

By taking the time to consider the business and the design requirements to deliver their shared vision, operators will be able to:

- ☑ Deliver for a wide range of customers

- ☑ Reduce long-term operating costs

- ☑ Create flexible data centres that reduce the need for refits

- ☑ Establish the foundations to meet AI demand

**If you'd like to learn more about the challenges of AI, the importance of holistic design and the critical foundation that cabling provides, speak with Onnec today.**

# ABOUT ONNEC

Onnec sits at the centre of connections. We're a single provider of multi-layered data centre solutions – our expertise spans data centre environments, and we support customers with:



**Infrastructure and containment design**



**Network hardware installations, changes and support**



**Installation of cabling, ODFs, PDUs and containment solutions**



**Connectivity and equipment upgrades and changes**



**Fully managed support service**

Onnec helps to lay the foundations today that can support your data centre for years to come. Connect with us to learn how we help to deliver business growth and certainty in your data centre.

Email: info@onnecgroup.com
Visit: www.onnecgroup.com

Learn more about the unique capabilities we've built over 30 years, delivering cabling and networking at scale, in multiple locations across the globe.

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