
The growing human hunger for data

Gareth Evans, associate at Currie & Brown, examines the increasing demand for data in the construction industry and details how the resilience of data centres can be increased.

With increasing frequency, the ingenuity of humans utterly changes the world. Steam power and locomotion, electricity, the internal combustion engine, flight, antibiotics - all of these have transformed and advanced civilisation.

To this list, we can add a new entrant - data. This now drives every aspect of our existence, from PCs and mobile phones through to artificial intelligence (AI), augmented reality and building management systems. Data is now said to be more precious than oil.

As we move forward with new and disruptive technologies such as 5G and the internet of things, demand for processing, flow and storage of information is going to grow to previously unimaginable levels.

By 2025, demands driven by intensively computer-hungry evolutions, such as driverless vehicles, facial recognition security and robotics to name but a few, mean that the amount of data processing and storage is forecast to be more than five times greater than today, creating a whole new set of opportunities and challenges.

One issue to overcome is how to build and service the vast amount of infrastructure necessary for this growth. This is particularly true of data centres, many of which are already colossal in their scale. It is estimated that collectively they currently consume two per cent of the world's power, the same as is used across the entire United Kingdom. And they are only going to get bigger, as the numbers continue to grow.

Clearly, the construction sector is going to be critical in facilitating this expected growth. As the technology and the market are ever changing, the industry needs to be smart and nimble. That is likely to mean a requirement for greater pre-fabrication by manufacturers and an ability to respond to new and more efficient paradigms such as quantum computing.

Designers, developers, technical staff, consultancies and builders are all going to have to develop truly new thinking. The pressures they will face to create data facilities rapidly enough to meet the requirement for ever-more powerful processing and greater storage, while at the same time reducing power usage and dissipating generated heat, are going to be formidable.

This general trend towards creating more and more power and functionality within an ever-decreasing physical footprint is not new; indeed, it has been going on for decades. The giant, chiller-cooled machine rooms of the 1970s arguably had less processing power than a modern smartwatch contains!

Growing the computing-power of data centres, however, while shrinking their size and energy, requires imaginative solutions. One way of doing this is to improve spatial efficiency - in other words, to reduce the space taken up within the building for cooling units and an electrical plant.

At present, this can account for about half a data centre's overall gross internal area (GIA). Frankly, that is a poor and inefficient ratio. One method of addressing this, which is already being considered by some operators, is to remove this hardware from the GIA and replace it with packaged prefabricated plant units that can be brought to site or removed on the back of an articulated lorry.

Increasing the resilience of data centres, through plant-redundancy and dual path infrastructures, enlarges footprint, GIA and carbon footprint. So is a high level of resilience always necessary? For example, it clearly makes sense for a hospital operating theatre or a global bank to have uncompromising 'Tier 4' levels of back-up, as human lives or global finances are at risk. But is that same robustness really needed for, say, a chat-forum website?

Over-engineering resilience may mean more power is being used than is required, through, for instance, the energising of uninterruptible power supply units, which in turn usually means that extra cooling and ventilation are required. In other words, it adds another layer of capital and operational costs. Cutting back on building services invariably leads to greater cost efficiency.

One novel way of reducing cooling cost may be to build data centres undersea, where ambient temperatures are more stable, and less environmental management is required. Is this kind of vision shared by the major players? Certainly, it is on the radar of certain web giants.

In northern climes, the huge amount of waste-heat may be harvested for district heating schemes - this offers the twin benefits of improving cost efficiency through the income from exported heat while reducing the environmental impact.

Collaboration between owner-operators, town and country planners, power infrastructure operators, architects, building services designers, building controls specialists, cost engineers and the people who are developing computing technology is going to be vital in the future, but keeping the current momentum going will again require imagination.

The construction sector needs to be properly resourced in order to deal with the expected demand, and that means getting more young people into the industry. Given that it continues to be hampered by the fact that it is not always seen as an attractive career choice, that creates its own difficulties.

There are major challenges, then, to be faced and conquered. But we have no choice but to tackle them and overcome them. The world demands it.

And that, however you look at it, is a pretty powerful incentive to succeed!