With the possible exception of underground pipes and cables, urban infrastructure tends to be highly visible.

But one of the most critical branches of infrastructure – the servers that host today’s technology – are typically deliberately hidden from view.

Data centres are the temperature and humidity-controlled sites built to house the computing power - in the form of servers and IT infrastructure - that together form the cloud.

The servers that store vast amounts of data and run much of the software that underpins modern life could of course be located anywhere.

Though much of what we now take for granted in a city in the developed world would quickly grind to a halt if its connection to the internet were lost, there’s no requirement for the data centres that house the cloud to be in similarly urban locations. Yet increasing numbers of them are appearing in towns and cities.

Cold is not essential

The popular and well publicised image of data centres as being built in remote – and frequently cold – parts of the world is an enduring one. In part it stems from companies like Facebook and its decision to site its first non-US data centre in the Arctic.

This publicly advertised 30,000m² facility in Lulea, Sweden, processes data from all over Europe, Africa and the Middle East. Its vast rows of computers generate considerable heat – and need constant cooling to function properly. Cold air is in plentiful supply in the Arctic – and the site is able to use outside air for cooling for ten months of the year. Such free cooling clearly provides a huge cost saving.

But server technology has improved and the innovative data centre industry has been pushing boundaries, as a consequence the recommended operating temperatures for data centres have been allowed to creep up.

In the past decade typical data centre operating temperatures have increased by at least 10° Fahrenheit, (from 65° to 75°). And while no global standard exists for data centre temperatures, most follow or at least
acknowledge the advice of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) which most recently (2011) recommended a temperature limit of 80.6°F Fahrenheit.

Sitting pretty

Of course site selection is still of critical importance. It is largely determined by three variables – the availability of a truly reliable power supply, fibre connectivity, and the cost of land.

A loss of electrical power would be disastrous for a data centre, so all come equipped with backup generators and an Uninterruptible Power Supply as standard. Nevertheless a proven and reliable power grid – such as that of an advanced city - is a big selling point for a data centre location.

Just as urban areas will have a power infrastructure already in place, they will also tend to have the fibre connectivity that data centre operators crave. The proximity to such existing infrastructure is likely to make an urban location more economically attractive to many potential data centre developers.

Conversely, the cost of land is certain to be higher in a city than it would be in a remote or rural location.

Ultimately the precedence given to these different variables depends on who the data centre is to be used by.

Three types of developer

There are principally three types of data centre clients: owners that design and operate their own facilities (Private or Public); developers that host; and providers of a managed service.

Private sector owner-occupiers tend to be the most innovative, invest in research and development and will typically customise their data centres to meet specific needs.

Developers and managed service providers, particularly those that are ‘Colocation service providers’ have a different brief: they want their space to be flexible, to offer the widest appeal to potential customers. Some are now employing a modular approach so that space can be developed and brought into operation as customers are signed up.

Security and sustainability

There are other factors to take into account too. The servers in all data centres are designed to be resilient – both to cyber attack and power cuts.

Banks and governments – for whom just a few minutes of downtime could have dire consequences – often demand the highest level of resilience. This tends to mean a lot of duplication of infrastructure, commonly referred to as redundancy, which carries a cost premium.

But in physical terms it can also mean building a bombproof data centre. Developers who fear a terrorist attack as much as a hacker-led one may specify that the site be encased in concrete or even sited underground.

At the opposite end of the scale, for other data centre operators, access to "green" sources of energy is attractive for both advertising their green credentials to their customers as well as the obvious operational cost savings.

No two projects alike

The net effect of these variables is to ensure that more often than not, no two data centres are quite the same. Turner & Townsend works with several global organisations that build and operate their data centres differently.

For each one, the question of whether power and fibre connectivity are already present or need building, the level of resilience required and the availability of free cooling all combine to prevent a “one size fits all” approach.

Needless to say the technology sector is seldom short of innovation – and constant advances in both the servers, associated IT infrastructure itself and the data centres that house them mean this mix will continue to evolve too.

Have we got the power?

The US IT giant Cisco projects that global data centre traffic will triple in just a five-year period.
Just as our generation, and future generations, will continue to demand greater volumes of data in our personal lives, companies and governments are also demanding greater amounts of data storage and computing power.

Clearly, this has a direct implication on power demand. Data centres are already estimated to consume 3% of the world’s electricity - but growing demand for data is being mitigated by constant advances in both server technology and data centre design and operation.

This is the beginning of a new era; with ‘big data’ and the ‘internet of things’ creating ever more data, there is a continuing need for more data centres to process it. These are seismic changes, and the urban landscape has a big role to play in them.

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