Legacy data centers: the risks

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A wave of technological trends is creating an unprecedented pace of change in the data center, with rapidly diversifying business applications generating terabytes of data.

The resulting workloads have exploded onto legacy data center infrastructures ill-equipped to handle them. Typically, these data centers were built many years ago on multiple hardware and software products from multiple vendors, with each product needing its own interface and user training.

In this Expert Perspective, Eaton's François Debray explains why this level of complexity — and the business risks it represents — is no longer sustainable.

4 technology trends that will overwhelm legacy infrastructures

The following are among the most important recent technologies and priorities which few data center designers could have anticipated a decade or more ago. Data centers weren't designed with these things in mind then and, without modernization, they won't be able to cope with them now.

1. Consolidation and virtualization. Seeking to lower capital and operational expenses by consolidating underutilized hardware, businesses today are making widespread use of server virtualization, which enables a single physical server (or host) to support multiple virtual machines. Often used in conjunction with virtualization, blade servers are plug-and-play processing units with shared power feeds, power supplies, fans, cabling and storage.

By compressing large amounts of computing capacity into small amounts of space, blade servers can dramatically reduce data center floor space requirements. For many organizations, the ratio of physical to virtual servers is literally flip-flopping through virtualization.

Consolidation is a popular strategy for medium size data centers that want to identify a path for return on investment with least risk over time so they can focus more on delivering core IT services.

2. Cloud computing. A key question many organizations now face is that of determining where data processing occurs best. Some companies looking to lower overhead and improve efficiency are rapidly adopting cloud computing in either public, private or hybrid implementations. Public cloud solutions deliver applications and infrastructure resources via the Internet, whereas private cloud infrastructures employ the same basic technologies, but reside behind an individual organization's firewall.

While cloud-based strategies continue to attract interest and hype in the news media, enterprise data centers are not disappearing any time soon — especially if prior investments in them were significant — and they will need ongoing investment to ensure they remain fit for purpose.

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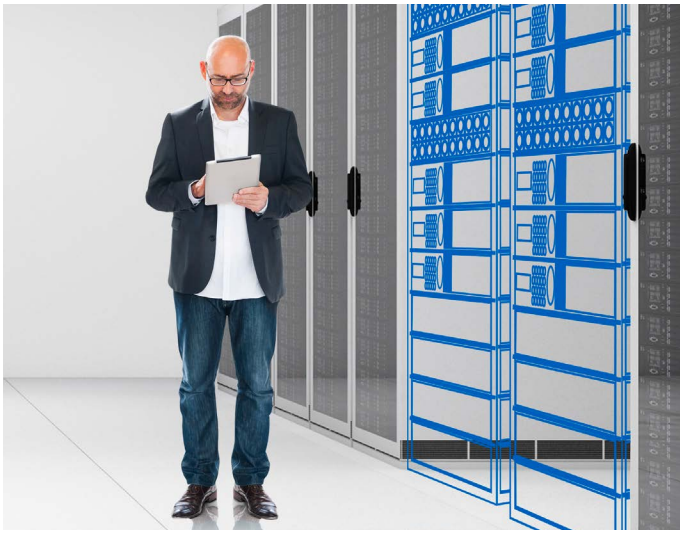
3. Mobile computing and Big Data. There are over 2.5 billion Internet users worldwide. As of 2013, it was observed that a full 90% of the world's data had been produced within the previous two years. As smartphone adoption evolves and rapidly gives way to a new generation of wearable computing devices, Big Data will continue to grow with new needs emerging for real-time data access, storage and processing.

4. Energy efficiency and sustainability. Though sustainability is a worthwhile goal in its own right, building a sustainable data center also delivers tangible and significant business benefits including financial savings and an enhanced public reputation. legacy infrastructures cannot be as efficient or secure as their more modern counterparts, putting these benefits at risk. Fortunately, practising sustainable site development, reducing water and energy consumption and using fewer harmful materials are all practical options for improving the environmental responsibility of IT operations.



8 key challenges facing legacy infrastructures

On average, most data centers in use today are roughly eight to ten years old with an average power density of 5 to 7 kilowatts (kW) per rack enclosure. These older data centers are usually ill-equipped to fully handle trends like those just discussed. As a result, many face the following challenges:

1. Aging equipment. In legacy data centers, core mechanical and electrical components such as uninterruptible power systems (UPSs), static transfer switches (STSs), building switchgear, and power distribution units (PDUs) are often nearing the end of their recommended service life. Regular inspection and maintenance must be kept up to assure equipment is functioning properly, safely, and efficiently. Over time, such systems inevitably become less reliable, more expensive to maintain and significantly riskier. Further, as conditions evolve in the data center, the power requirement inevitably increases and additional generators and backup power may become necessary.

2. Low efficiency power and cooling equipment. The more work a server performs, the more energy-efficient it is. Fully loaded equipment runs best, but sometimes older mechanical and electrical systems are not fully loaded. In addition, this hardware tends to deliver lower energy-efficiency than newer, more modern products, further increasing operating costs. Weak power and cooling efficiency can also make compliance with environmental regulations exceedingly difficult, if not impossible, as current data trends continue to evolve.

"The average server operates at no more than 12 to 18 percent of its capacity while still drawing 30 to 60 percent of maximum power.

Even sitting virtually idle, servers draw power 24/7, which adds up to a substantial amount of energy use."

Natural Resources Defense Council

3. Insufficient cooling capacity or ineffective cooling. Cooling alone accounts for 30 to 40 percent of the power costs for the entire data center. The cooling systems used in most legacy data centers date back to an era of significantly lower power densities. As a result, they often struggle to cope with the intense heat generated by today's dense, power-hungry IT equipment.

4. Crisis response and disaster recovery (DR). In many legacy data centers, updated or brand new crisis response plans need to be established and implemented as a high priority for the central data center AND all secondary sites. What will happen if something goes wrong in a smaller but mission-critical site? Downtime and lost data are simply not permissible in today's culture, making DR a key driver for every data center project.

5. Speed to deploy. Some data centers have a requirement for avoiding hot electrical or mechanical work during peak operations time, but often the site may not have the same level of discipline or structure with respect to the wiring. This double standard should be avoided. It's important to take the higher transfer of data into account and not put the data center at risk due to piping.

6. Security. Early consolidation efforts have already resulted in a heavily increased emphasis on security, as organizations are forced to protect massive amounts of mission-critical or regulated data. Many legacy data centers simply don't have the infrastructure to meet today's strict data security and increased privacy needs: modernization is required simply to avoid being hacked.

7. Inappropriate sizing. Organizations now face a delicate balancing act with respect to managing data load levels amidst the proliferation of data and rising power densities. While many data centers built in the last decade assumed growth would occur on massive scale, they now find themselves inefficiently over-provisioned in some respects. Bigger is not always better. At the same time, with data generation continuing to explode, some may yet face an exponential increase in demand for compute and storage. To meet these demands, power must be abundant, reliable, renewable, and energy-efficient. Data center managers must ask themselves if their existing electrical infrastructure can cope with the data they generate today? And will it be able to support their growing data needs in the future?

In today's data centers, utilization rates tend to range between just 30% and 50% percent on average.

8. Lack of flexibility and scalability. The integration of newer IT technologies means MEP infrastructure must adapt to changes and load demands so it can meet future business drivers while still keeping costs low. Virtualization and cloud environments can cause roaming hot spots in the data center due to dynamic shifting of workloads. The resulting fluctuations in power demand can be managed safely with planning and technology, as the operators of the electrical grid have shown,

"The data center industry should follow the lead of the utility industry, which ramps its power plants up and down depending on demand."

Natural Resources Defense Council

Vendors, data centers, and utilities will need to work together to find viable solutions for supporting increasingly dense IT environments and fluctuating data processing conditions more sustainably.

Conclusion

The world of technology has seen plenty of change in recent years. To keep up with it and avoid multiple risks, organizations with data centers that are 10 years of age or older should seriously consider modernization. Upgrading a legacy data center's mechanical and electrical infrastructure can boost reliability, efficiency, flexibility and scalability while reducing operational spending. It can also save companies the considerable expense of building entirely new facilities.

About the expert

François is currently Business Development Manager for Eaton (EMEA) and is instrumental in helping organizations innovate and increase efficiency with the best white space solutions. His deep understanding of the sector is built upon more than a decade of experience in technical training as well as technology sales and marketing.

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