DCD INTELLIGENCE

THE PRACTICAL SCIENCE OF DATA CENTER CAPACITY PLANNING

How to succesfully build capacity planning into your new build or retrofit project

Sponsored by

Server Technology
Quality Rack Power Solutions

Introduction

As the need to balance current and future IT requirements against resource consumption becomes more urgent, the data center industry increasingly views capacity planning as a way of achieving a critical component to planning a new build or retrofit. Data center capacity planning can be a complex undertaking with far-reaching strategic and operational implications. DCD Intelligence has therefore compiled this White Paper in order to share some industry insights and lessons on the practical steps that are needed to develop a successful power and capacity planning strategy.

These insights are based on a series of 15 in-depth interviews conducted with market-leading data center owners and operators. They include Cisco WebEx, Defense.net, Edmunds, Gigamon, IBM Global Technology Services, ING Bank and Scale Matrix. Between them, the organizations interviewed account for just less than 1 million staff worldwide and annual revenues of approximately US$ 350 billion. They own or operate approximately 400 data centers and labs world-wide.

DCD Intelligence conducted the interviews in December 2013 and January 2014. The interviews covered capacity planning and power management strategies adopted, paying particular attention to the differences in capacity planning between new-build data centers and retrofit environments.

This paper has been researched and published by DCD Intelligence on behalf of Server Technology, Inc.

Key Points in Developing a Capacity Plan

Starting Points

To start your capacity plan, the first key step is to establish a baseline understanding of what your requirements are in terms of key facility resources such as power, infrastructure, cooling and space. You need to look at your requirements as they currently stand and how they might change in the future. At this critical initial stage, it is essential that you fully understand your own company strategy, its IT priorities, the possible build or buy options, and its historic power usage. Additionally, it is important to conduct your own research on background information by talking to your peers, to vendors, and by searching the Web. Also, try to attend relevant conferences, trade shows, and training courses. Understand the current and potential real estate for labs and data centers.

If you Intend to Retrofit your Facilities

If your likely solution will be to retrofit an existing facility, then you will need to understand the current limitations of power, cooling and space within the facility. Review the life cycle status of devices (generators, row-level PDUs, chillers, CRAC, UPSes), as well as the opportunities and challenges presented by an upgrade - as part of this process, some organizations have introduced sustainable components and adopted a modular approach to facility deployment. In addition, you should discuss the facility and resource requirements for the applications, as well as the IT and communications equipment to be used within the refurbished facility over time. Also forecast the power draw and life expectancy of the new facility.

If you Intend to Build a New Facility

Some of the steps that have been taken to facilitate capacity planning include:

- Choosing a location and modifying the build specifications to allow for the consideration of both modular and traditional design options, sustainability measures, and ease of upgrading over time.
- Choose appropriate devices with long life cycles for the physical infrastructure.
- Design the limitations of power, cooling and space.
- Discuss the requirements for applications to be run. Some organizations have decided to focus on high-density modular racks which maximize utilization through advanced virtualization. Negotiate the initial occupancy of IT and communications equipment – this typically represents 50% of total space and capacity in order to allow for future expansion.

Common Factors that may Impact Capacity Planning

- Industry specific regulations – understand carbon taxes in different countries, data jurisdictions, privacy and protection laws and how the specific standards you adhere to might affect the amount of power you need.
- Rack density and optimization requirements.
- Power utilities – for new-builds, understand the different prices around the world, the possibilities of long-term contracts with low prices, and dual supply for redundancy. Consider the lower infrastructure costs and higher efficiencies of high voltage 3-phase power (such as 400 or 415VAC).
- Cooling – understand the requirements for cooling and its power draw, as well as how requirements may vary according to different times of the day, different seasons and different loads. Also, examine the potential of fresh-air cooling and of running equipment

at higher ambient temperatures to reduce the cooling requirement.

- Plan for business continuity and disaster recovery – depending on your facility profile, explore the use of cloud servers and colocation providers as back-up; test your active data centers to reduce the risk of potential disaster. Whatever the scenario, calculate the capacity needed for protection.
- Sustainability and 'green' performance – understand your firm's corporate and social responsibility (CSR) policy and the way your data centers relate to it; calculate the comparative costs of traditional versus renewable energy sources.
- Budgeting – fit the multi-year capacity plan into the annual budgeting process, underlining the effects of consolidation and/or the expansion of IT and communications equipment. Consolidation can be the result of virtualization, decreasing the number or size of assets, or migrating all assets into one area. For service providers, it is important to understand the relationship between customer acquisition and power usage.

Run With your Plan but Remain Open to Opportunities

A plan is there to be followed but that should not stop you from being creative and using your experience to make modifications over time. Our research indicates that the strongest factor in successful capacity planning is the experience of the executives running the plan and their ability to make appropriate changes. Very few of the respondents felt comfortable forecasting the power draw of the equipment even in the near future. Therefore, don't be overly-optimistic in the forward scope of your plan: 2 to 3 years in the future was the typical length of those we interviewed.

It is important to encourage higher utilization of IT and communications resources within the facilities you manage: the current practices of never turning equipment off and reserving servers 'just in case' they are needed creates massive inefficiencies which will need to be addressed - especially as the cost of electricity increases and as vulnerability to black outs and brown outs becomes far more widespread.

Share your knowledge with others – especially the non-specialists within your company and your peers in other companies. As in so many areas of our industry one size doesn't fit all when it comes to capacity planning; social interaction and informal discussion will also therefore help to identify the differences in your approach to the subject.

The objective of the guidelines in this White Paper is to help you avoid some of the pitfalls and take advantage of new opportunities as you manage an increasingly important business process.

The guidelines are based on the experiences of the 15 leading companies interviewed.

The Practical Science of Capacity Planning

Introduction

Key emerging industry trends towards Data Center Infrastructure Management (DCIM) and Software Defined Data Centers (SDDC) demonstrate a continuing need to look at the key balance between IT and communications and facilities management.

Capacity planning brings together all the key resource and output factors that constitute a data center's reason for commission and its means of fulfilling that. As critical resources become more expensive or scarce, being able to plan for future capacity requirements becomes more critical.

Therefore DCD Intelligence spoke in depth with 15 executives to find out how they do their capacity planning and the issues they faced in doing so. These companies have combined revenues of $350 billion, employ 1 million staff and run in excess of 400 data centers and labs. They varied in size between global IT supply companies, colocation companies, smaller vendors and suppliers and enterprise organizations.

The information from interviews conducted has been segmented into sections on:

- The Planning Process
- What should be Included in the Plan
- Modifying your Plan
- Power as the Key
- Retrofitting an Existing Facility versus New Build
- Key Lessons

The Planning Process

Who Does the Planning?

While capacity planning remains a critical undertaking to all organizations interviewed, the profile of who is responsible varies greatly. Our respondents' job titles include VP Operations, Data Center Design, Services, Staffing Engineer, Services Area Executive, VP Engineering and Web Operations to Infrastructure Managers. We also found differences in planning processes between lab services and data centers – and between end-user organizations and those providing colocation for their customers. For many of our respondents, IT is their main business. As such, the importance of data centers and labs are constantly increasing.

For those building their own facility it is a major capital investment - 'hundreds of millions' in one case – but many non-specialists underestimate the importance at this early stage of properly planning power consumption. The planners we interviewed don't work in isolation however. Instead, they interact with networking, business, engineering, building, real estate and IT departments as well as customers and CXOs to help forecast power requirements. In the case of the colocation vendors there are also strong ties to the salesforce, to business planners and with product designers in the lab services area.

How Do the Planners Keep Abreast of Market Developments?

The planners we interviewed rely heavily on external sources of information to keep up to date. They attend training courses, conferences (DCD Converged included) and trade shows, and they meet regularly with vendors they trust. Some use standards such as those published by the Uptime Institute and the Data Center Alliance (DCA).

They improve their plans through peer level discussions with those in similar businesses, learning and passing on their own knowledge on new issues and developments. Even within our relatively small survey, some of our respondents had been discussing this research project with each other.

What Should be Included in the Plan

Among the companies we spoke to no two planning processes were the same. We discovered deep domain knowledge and practical knowledge of the environment in almost all interviews. In a couple of cases experts have been brought in to oversee modernization of the capacity planning, joining with good experience of similar environments. The plans themselves usually involve using historical metered data and almost always include essential provisions beyond the comprehension of the non-specialists they work with.

While there are a whole series of factors that need to be considered in capacity planning, inclusions in the Plan may depend on a number of factors, principally connected to the stage of development and lifecycle – from pre-commissioning to de-commissioning, as well as performance standards for the data center such as those governing efficiency and utilization, risk/'future proofing' and asset management. As noted by Mark Potloff, Senior Manager of Systems Operations at Edmunds, "in capacity planning, it is important to be flexible, to be confident that there's an answer, and to leave yourself options".

Capacity Planning as an Input to the Choice of Physical Locations

The planners interviewed are required to put more thought than their predecessors into where data centers and labs are built. However, some are still required to work within the physical limitations of facilities built next to (or on top of) their headquarters.

Choosing a location tends to be based on where customers are located (for the colocation suppliers), where the network is most accessible (for network and IT suppliers), where there is plenty of cheap power available and, in some cases, whether the area is free from the risk of natural disasters. These planners are well aware of the upsides and downsides of the new locations being selected as part of their companies' expansion plans – whether balancing East, Central and West coast locations in the USA, or adding new facilities in Singapore, Frankfurt, London City, Slough, Amsterdam, Hong Kong, Switzerland or Scandinavia. A number of respondents pointed to the extra cost of power in Germany following the government's decision to move away from nuclear power. Almost all noted that energy costs were higher outside the USA.

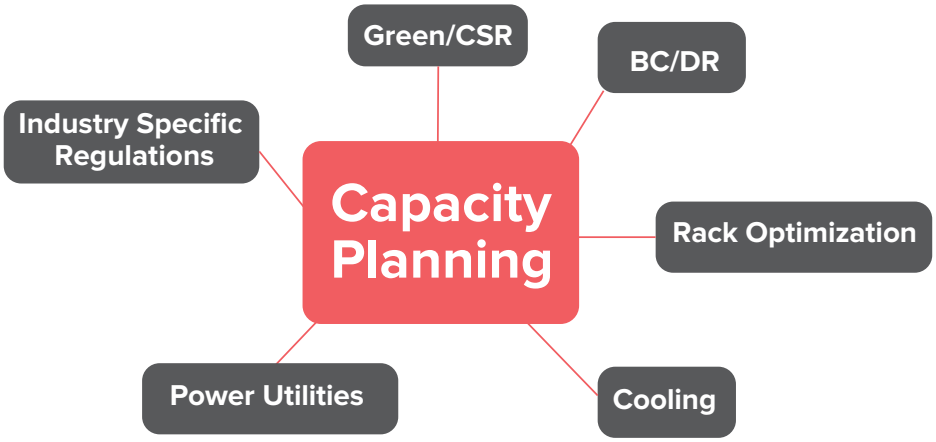
Getting involved as early as possible allows planners to provision for future adjustments to the mechanical infrastructure as the facility matures. Specific provisions include increasing the size of cooling units and associated HVAC infrastructure and raised floor height. They can also include adopting a modular approach to facility expansion. A good capacity plan makes provisions to avoid costly modifications over time. In one case this involved being able to add infrastructure in a few hours on a Saturday, rather than closing the data center down for weeks.

In capacity planning, it is really important to be flexible, to be confident that there's an answer, and to leave yourself options

Mark Potloff, Senior Manager, Systems Operations, Edmunds

Itemizing the Plan's Components

Typical Capacity Planning Components



Most capacity plans cover power first and then, subsequently, the physical space needed for the equipment. However there are several components that our respondents take into account. In particular, they pay attention to:

- Industry specific regulations – these vary with the type of business being run from the facility and include the need to pay various carbon taxes (mainly in European countries, but under consideration, or being launched in a number of other established markets), to comply with privacy and data protection regulations and to provide extra security procedures for state and federal government customers. Some of the colocation providers interviewed have achieved, or are looking at ways of achieving, external accreditation by working to ISO 9001/2001 standards in Europe, as well as a number working with ASHRAE standards in the US.
- Rack optimization – the companies we spoke to reported vast differences in power draw, which ranged from 3KW per rack to over 40KW per rack. When planning, respondents typically provision for standard versus high-density cabinets and racks, taking into account the tendency for IT departments to over-provision their resources. Some are making major savings through improving utilization rates based on increasing rack component density.
- Power utilities – according to Joe Daly, VP Operations, Facilities Management, Defense.net, "you run out of power before you run out of space". Achieving some degree of certainty by negotiating long contracts (sometimes for periods of 10 to 15 years) and reasonable prices for set amounts of electricity are important components of most plans. The planner in one organization reports studying comparative prices in the UK, Ireland, Holland and the Nordic region as part of its plan, while a couple of the US-based companies are worried that their government will introduce carbon taxes similar to those prevalent in Europe. Companies using colocation facilities often pay per circuit rather than metered electricity usage, thus putting the onus back onto the supplier.
- In general we found little evidence that the price of electricity itself was causing enough concern to change behaviour significantly; one company (very much the exception) reported cutting its electricity costs by 20% year on year through consolidation.
- Cooling – getting this right is an essential part of the plan, especially as there is typically an exponential growth in the power draw of equipment over time. The companies studied are involved in adding cold-aisle containment, chimneys to vent equipment, fresh air ('free') cooling and chillers at the right time to maintain their environments. One respondent stated that his facility would suffer cooling failure before it ran out of power.

You run out of power before you run out of space
Joe Daly, VP Operations, Facilities Management, Defense.net

I work from the ground up - it's an uphill battle – it's about using a designed way to fit things in
Matthew Adelman, Data Centre Design Capacity Planning and Governance, Cisco WebEx

- Business continuity and disaster recovery – these are included as services by several of the IT and network companies in our sample. In terms of capacity planning, the provision of redundant hardware, UPS systems, generators and other features add to the costs. Larger companies interviewed often run active data centers, while those running lab services are moving to virtual labs to avoid the normal process delays of physical testing. A couple of respondents pointed to potential savings from switching equipment off when not in use, despite the tendency for IT to leave their systems running 24 hours a day.
- Green issues/meeting corporate and social responsibility commitments – several of our respondents have significant commitments to these initiatives; keeping the PUE readings as low as possible, purchasing (or offering) 'green' power and working with environmental teams for part of the capacity plan.
- Budgeting – we found little evidence of concern over the cost of electricity among our respondents. One respondent indicated that he gets questioned on overall operational costs (but never specifically on energy). Most of our companies are involved in annual budgeting processes, matching new projects to available capacity and occasionally turning down potential developments as a result. However, smart planners are able to extend the life of their existing facilities by adding extra components over time. In the case of colocation suppliers, additional resources and challenges have to be addressed at shorter notice as the business acquires new customers. Slow response, based on lack of budget might actually cause a loss of customers or extra time to get a customer up and running, and thus paying their bills quicker.

Five percent of the real estate takes up fifty percent of the power

Chris Scott,
Service Product Line Executive,
Site and Facilities Services
IBM Global Technology Services

Power as the Key

Power Consumption Forecast Requirements

According to the 2013 DatacenterDynamics Industry Census, total power consumption among global data center operators increased by 7% in the twelve months to June 2013. Consumption growth was down significantly from 19% in the previous year. Despite this, power remains one of the single largest costs for data center operators and, because of this, the use of energy-saving strategies is widespread across all of the markets surveyed in the Census. Specific strategies include the implementation of more energy efficient technologies, the increased use of outsourcing and the deployment of capacity management solutions.

To make power capacity forecasts, the companies interviewed use information on historic power usage, as well as future equipment purchases, utilization rates, consolidation plans and customer acquisition. While the life expectancy of the data centers and labs themselves typically span from 10 to 20 years, the capacity forecasts are typically much shorter: many of our respondents work on the basis of reaching maximum capacity within a couple of years. Data center and lab operations are growing in importance in the majority of the companies we spoke with, putting significant pressure on their capacity plans. However, several of the companies interviewed have been able to cut back on power usage through consolidating servers and other efficiency measures. As Ton Robers from ING's Physical Planning Data Centre Consultancy notes, "When the data center is sixty percent full, you have to work out where the best place to install the new servers will be".

When the data center is sixty percent full, you have to work out where the best place to install the new servers will be

Ton Robers,
Physical Planning
Data Centre Consultancy,
ING Bank

Many of our respondents say that there is a big difference between the amount of energy IT and communications administrators say they will need for their applications and the amount they actually use. Monitoring power and cooling allows them to determine where they have some stranded capacity through under-utilization of existing circuits, allowing that capacity to be redeployed in other areas of the data center.

Software Tools in Use

While several companies stated they were using branded DCIM systems, there was no widespread use of the same DCIM tools. In fact, no two of the companies we talked to used the same software to monitor their power usage. There was also a great variety in the tools, equipment, location and experiences they have. Most have developed their own software tools for measuring and recording power usage and often link these with Building Management Systems, Asset Management and other purchased programs. In a couple of cases the high cost and requirement for dedicated staff to run more sophisticated software were given as barriers to adoption. Server Technology positions its Sentry Power Manager as a cheaper alternative to DCIM.

The reliability of PDUs is extremely important. Obviously you don't want non-redundant switches to fail during firmware updates

Mark Potloff, Senior Manager, Systems Operations, Edmunds

The Importance of Rack Power Distribution Units (PDUs)

Most of our sample use dual A+B power feeds to their data centers and labs to minimize the consequences of power disruptions. Also, they all stressed the need for reliable PDUs within their facilities using a combination of room-based and cabinet based products. As Mark Potloff puts it, "the reliability of PDUs is extremely important. Obviously you don't want non-redundant switches to fail during firmware updates".

One company had experienced widespread switch failure following a firmware upgrade some years ago, while another keeps tabs on the failure rates and usability of various vendors' PDUs. One respondent has just upgraded a number of PDUs from 16A to 32A in order to improve the reliability of part of his environment.

There is a widespread use of intelligent PDUs among our sample, on the basis that it allows power usage to be measured at the room, rack and (sometimes even) port level. PDUs with remote switching and outlet level monitoring can monitor and alarm if a piece of equipment is under-utilized. That idling equipment can then be remotely switched off. Our responders also report major advantages over the legacy devices they still have, especially in locating problematic equipment and avoiding the spikes of turning everything on or off at once. One of our respondents noted that vendors adding dual power feeds to new servers create issues that have to be addressed at the data center level.

Most of these companies are doing remote management of their PDUs at some level, collecting data on power, humidity and temperature to pre-empt potential problems and feed back into the capacity planning forecast. Remote management is also minimizing the time spent on manual intervention, although not entirely doing away with the need for a physical walk around and examination of the facility. Most of these organizations are utilizing remote management and monitoring of their cabinet PDUs at some level, collecting data on power, humidity, and temperature to pre-empt potential problems. After the information is obtained and aggregated it is fed back into their DCIM tools for their capacity planning forecasts.

Out of the organizations we surveyed, many relied on their colocation provider to handle management of servers. However, while this works for some, it may not be right for all instances and the benefits and costs of remote management should be carefully evaluated. Those companies using colocation facilities were less interested in the remote management features, which tend to be handled by the supplier.

PDUs - uptime and reliability are what you're striving for - they can become the weakest links in the chain if you get it wrong

Chris Orlando, Co-Founder, Scale Matrix

Intelligent PDUs and remote management are considered to provide valuable ways of measuring and controlling the use of power in data centers and labs. They will undoubtedly become more important over time as electricity prices rise and users are forced to improve their operational efficiency.

There is some consensus in this research that to ensure service continuity, the implementation of dual A+B power to the facility and deployment of intelligent PDUs are important steps and

that, when procuring PDUs, it is important to check out the reliability of the devices and the responsiveness of the supplier. Chris Orlando, Co-Founder of Scale Matrix, argues that "PDUs - uptime and reliability are what you're striving for - they can become the weakest links in the chain if you get it wrong".

PDUs can be used (in conjunction with a power monitoring platform) to collect accurate information on how the facility is performing against the plan, how the deployment of high and low density racks is tracking and how potential future problems can be anticipated. Monitoring options include Inlet and/or Outlet monitoring. Using a higher granularity of monitoring will result in the highest achievable efficiencies, since it will ease the task of locating inefficient equipment or stranded power capacity. Several companies have used remote management software to reduce the need on the need for manual intervention and to provide accurate historical data to feed into the evolving plan. PDU monitoring data can be fed into a DCIM, BSM or asset management program to extend the plan beyond facilities management into IT.

The older the power equipment, the worse it is - it can cause a chain reaction where everything fails

Joe Daly, VP Operations, Facilities Management, Defense.net

New Build and Retrofit Capacity Planning Differences

Very different requirements exist between the capacity planning calculations used for new builds and those used for retrofit data centers or labs. Calculation differences also exist between traditional IT and cloud architectures.

Retrofitting of Existing Facilities

Capacity planning leading to the retrofitting of existing facilities needs to work within the limitations set by the physical constraints of the existing facility. Many of the organizations interviewed have drawn up capacity plans for facilities which have been around for decades. These planners consider it easier to plan for capacity on a retrofit basis than for new-builds because there tend to be set limitations for power, cooling and space to work within. The end of product life cycles for the UPS systems, chillers and CRAC units often drives the timing of the retrofit, but there are often barriers to upgrading to fully modern specifications – such as the size of ducting and the potential space for new chillers and generators. The larger and older companies in our research often have no alternative but to retrofit older facilities, reserving their greenfield data centers for their state-of-the art applications. Joe Daly argues that "the older the power equipment, the worse it is - it can cause a chain reaction where everything fails".

Upgrading PDUs is therefore an important part of most retrofits, with one of our sample indicating that he would leave behind the dumb power strips. One of our respondents removed the old equipment and electrical waste before opening the new lab to prevent his users from scavenging, while another considers that removing older equipment is an essential feature of server consolidation.

New-Build Requirements and Capacity Planning

The smaller companies in our sample often work exclusively with new-build facilities, giving them a potential advantage over their older and larger competitors; however there is still a key requirement for capacity planning to ensure the technological and corporate benefits of a new site. Some of the tasks that have been undertaken to facilitate future capacity increases include the use of modular growth strategies, increasing the size of the ducting and potential locations for an additional chiller.

You plan out for twelve to twenty-four months; but equipment has a life cycle of about eighteen months, making things difficult

Matthew Adelman, Data Centre Design Capacity Planning and Governance, Cisco WebEx

Capacity planning for a new location holds the advantage of being able to implement a wider set of elements in the capacity plan, including being able to negotiate long contracts with low pricing from power utilities. Building on new sites allows our planners a more sustainable

approach and many are being creative in the adoption of fresh air-cooling, alternative generators and 'green' energy supplies. The biggest advantage of new builds mentioned by the planners in our sample is the ability to take a more modular approach to the infrastructure, with planning permission being sought for the addition of larger generators, different types of chiller and other power and cooling equipment over time. One company first fitted a PDU to every other rack, with the option of having one per rack as the plan evolves; another built the data center with 50% of the space free for expansion.

New build is always more fun

Dan Lunderville,

Manager Lab Services, Gigamon

The Implications of Cloud Computing and Advanced Virtualization for Utilization and Capacity Planning

Running parallel to the decisions made on the physical power and cooling infrastructure, our capacity planners are well aware of the differences between traditional IT and communications equipment and high-density racks built to accommodate advanced virtualization and Cloud Computing. Multi-tenancy Cloud services are almost always cheaper than private or hybrid Cloud environments because data center or lab resources can be shared and utilization increased. One of our sample noted that IT equipment tends to draw 50% of its maximum power when idling, so ensuring applications are always running is a vital element in improving efficiency.

Regardless of the style of computing, it is clear that there are advantages to having fewer servers running harder in your data center. Most of the colocation providers in our survey report a growth in the balance of Cloud over traditional server configurations. Two companies interviewed have decided to outsource some of their own workload to Cloud providers – thereby eliminating the need to do capacity planning.

Capitalize, Plan to Fit your Challenge

While capacity planning is considered easier for retrofit facilities, building new data centers allows our planners to stretch the capabilities of the physical infrastructure, adding new devices in future years to extend the overall life of the facility.

There is much to gain from increasing the utilization of the IT and communications equipment through advanced virtualization typical of Cloud Computing. Most of our sample differentiate between standard and high-performance racks.

New-build facilities allow for a more modular approach to the equipment used and greater sustainability for the building and infrastructure. Few of the executives we interviewed had much choice in the beginning between retro-fitting or new builds, or between the style of applications or product design and testing being done by their companies. However, a few of them have gained enough experience over the years to play a leading role in the commissioning of major new facilities. The capacity plans vary with the history, business and strategy of the companies they serve, but they share common features from which we can all learn.

Racks running Cloud applications draw 25% more power, but provide five times more computing

Matthew Adelman,

Data Centre Design

Capacity Planning

and Governance,

Cisco WebEx

Key Lessons

The Most Important Lessons Learned

We asked each of our respondents to identify the most important lesson they had learned from their time doing capacity planning. Their observations included:

- ‘Don’t try to save too much money’
- ‘Don’t plug redundant power supplies into the same circuit
- ‘Understand whether the capacity is limited by the site or the contract’
- ‘Plan the power to meet the cabinet needs for what’s coming’
- ‘Get everyone to understand the balance between OPEX and CAPEX as energy costs rise’
- ‘Use a proper process for getting things onto the data center floor, or you’ll end up with a mess of computer equipment after a few years’
- ‘Get customers to move away from the requirement for contiguous expansion in the same data center’
- ‘Align the capacity plan with customer objectives’
- ‘Move up from template-level to product-level planning’
- ‘Be honest and look at reality – operations will usually over-specify the capacity they need’
- ‘Be flexible – let IT understand the difference between peak and normal capacity’
- ‘Go for maximum scalability and flexibility’
- ‘Measure twice, cut once and build as much as you can afford’

Conclusion

From a research perspective, capacity planning is a vital process for any company with its own lab or data center; this view is shared by the experience and insight of the executives we spoke with.

Based on current trends, the power draw of IT and communications equipment will continue to rise, creating an exponential demand for the power needed to run and cool it, while the cost of power increases and its ready availability is threatened in some locations. Only a small number of companies will be able to reduce their workload and power draw through consolidation, although there is still plenty of scope for improving the efficiency of operations by turning off equipment when not in use and improving the utilization of the devices that are.

The activities and perspectives of IT and facilities management professionals continue to differ and it looks unlikely that many companies will be merging these silos any time soon. However, the provision of intelligent and remotely-managed PDUs, as well as the development of DCIM and SDDC tools, are important bridges between the two silos.

All the companies we spoke to have addressed capacity planning in subtly different ways, taking into account their own history and strategy. We discovered that no single plan fits all and that this is a very practical science.

DCD
INTELLIGENCE

FOR MORE INFORMATION:

+44 (0)20 7426 7835
darran.blatch@datacenterdynamics.com
www.dcd-intelligence.com