THE ESSENTIAL GUIDE TO THE DATA CENTER FACILITY OF THE FUTURE
INTRODUCTION
THE DATA CENTER IS THE BACKBONE OF TODAY’S BUSINESS.

An efficient, well-designed data center allows you to scale and better support customers. However, if something goes wrong in the data center, your company could grind to a standstill.

Are you trying to run a 21st-century business on 20th-century infrastructure?

With the average age of a data center facility at 18 years old, you run the risk of more failures and downtime.

IT’S TIME TO START PREPARING FOR THE DATA CENTER FACILITY OF THE FUTURE, TODAY.

When many data center managers design data centers, they base their decisions on what someone else is doing. However, what works for your competitor or your neighbor might not work for you.

This guide outlines what to consider when designing the data center facility of the future. Continue reading to learn how to maximize your data center’s flexibility so you can scale and increase your capacity on demand. You’ll also learn how to make your infrastructure more efficient, so you can reduce your costs while driving business innovation.

Data Center Key to Success
Develop a long-term data center strategy that maximizes flexibility, scalability and efficiency.
WHY IT SHOULD THINK DIFFERENTLY ABOUT THE DATA CENTER
A data center that is more than 7 years old is obsolete*.

The average data center in the United States is 18 years old. This means that many businesses are relying on infrastructures that were built when 16 MB RAM was considered to be a lot of storage and iPhones were the stuff of science fiction.

These aging data centers were designed in a different compute era and cannot meet today’s power, cooling, redundancy, and other technology requirements. If you’re trying to run a 21st-century business on a 20th-century infrastructure, then you should consider updating your data center.

The Data Center of the Future is About More Than Just 4 Walls.

Data centers need more and more power to operate. In 2012, global data centers used 1.5 times more electricity than New York City. By 2020, they will require six times the electricity of New York City.

According to IT Business Edge, “Changes in the hardware infrastructure environment have focused a lot of attention on the capabilities of data center facilities. The problem lies in the amount of power and cooling that new high-density infrastructures require. Most data centers are not designed for such power increases and the commensurate rise in costs is typically unsustainable when using older facilities.”

High power consumption is only one challenge that aging data centers face. You should also consider the changes in how we communicate and stay connected using the cloud and mobile devices. According to Skyhigh Networks, organizations run an average of 545 services in the cloud. Meanwhile, analysts stated that 30.2 percent of computing workloads are expected to run in the public cloud by 2018. Since your information now resides on both personal and corporate devices, you should adjust your data center strategy to keep your information secure.

Use the Data Center to Drive Business Innovation While Cutting Costs.

IT faces a Catch-22: Drive innovation to give your business a competitive advantage while cutting costs. One way you can do this is by finding green opportunities in the data center. For example, you can determine how efficiently a device is using power and then look for ways to reduce your power consumption. You might discover that you have a server operating at 15 percent capacity and that virtualizing it will reduce your power consumption, hardware and rack space.

THE BIGGEST DATA CENTER DESIGN MISTAKE

Steve Harris Vice President of Data Center Development, Forsythe Data Centers
Many data center managers and facilities teams focus on expanding floor space versus expanding their compute power. They may think, “we have 10,000 square feet now, which means we’ll need 15,000 square feet to cover our future IT needs.”

This thinking is flawed.

Many companies base their estimates on what current floor space they have and calculate future space needs based on the growth rate that has occurred to date.

There are two issues with this approach:

1. The assumption is based on the premise that the current floor space is being maximized.
2. The assumption that your data center should grow horizontally with more floor space rather than grow up with better use of your vertical space.

For example, you can get better use out of a cabinet if you support 10kW of equipment, as opposed to 4kW. This maximizes your vertical space so you don’t need to expand horizontally.

It’s important to look at every part of your data center (i.e. power, network, cooling, floor space, etc.). Then, strengthen all of these components at the same time.

Focusing only on floor space is like the guy at the gym who only weight trains his chest and arms. You don’t want to be the top-heavy guy with the puny legs.

**Data Center Key to Success**

The key is to use grow horizontally and vertically. You can reduce the amount of floor space and cabinets you need.
WHY YOU SHOULD KNOW YOUR DATA CENTER FROM THE FLOOR TO THE CEILING

Steve Harris  Vice President of Data Center Development, Forsythe Data Centers.
Building more data center floor space will not solve all of your problems. The key is to have a full picture of how potential failures and outages could impact your data center.

Many data center managers don't have full visibility into the failures and outages that can occur in their data centers.

If you don't know all the risks, you may have to deal with the following:

- **Things are always breaking.** With aging or poorly designed data centers, there is always another problem just around the corner. It’s like having a 20-year-old car. You fix one thing, and another thing fails.

- **Unscheduled downtime.** Today’s data centers support critical parts of the business, so unplanned outages can cause lasting damage. According to the Ponemon Institute, unscheduled downtime costs businesses an average of $7,900 per minute—41-percent increase from 2010.

Trouble in the data center can also cause security concerns, legal problems and serious brand damage.

- **Hard hits to your capital budget.** When your data center is down, you must operate in crisis mode. This means that you won’t have the time to properly plan the project and may overspend to fix the problem.

- **Constant distractions from your job.** You won’t be able to concentrate on other projects if you are busy correcting problems in your data center. The bigger the problem, the more time and resources you must use to fix it.

Failures or outages likely signal a problem in the design, age or health of the building systems' infrastructure. It can also be a capacity or load issue. If you can’t identify the cause of the failure, you may need to bring in forensic engineers to trace the problem.

The key is to understand all the potential failures and outages better so you can plan for them.

Failures in the data center may also cause your company to lose productivity, customers and revenue.

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**Data Center Key to Success**

Understand all of the risks and potential failures that may occur so you can be ready for them.
HOW CAN IT PREPARE FOR THE DATA CENTER FACILITY OF THE FUTURE?
Go into any enterprise data center and you’ll see that it’s a snapshot of a specific point in time. All of its systems were designed for the enterprise’s IT needs at that moment. For example, a server will store a set amount of data while an air conditioner can cool only so much heat.

The problem when you invest in building systems is that IT changes so fast that your systems will become obsolete before they lose their “new car smell”. The average IT refresh cycle is three years, which means that IT will refresh four times before an air conditioner with a 12-year lifespan needs replacing. But how much more of a demand will IT place on that air conditioner in the next five or 10 years?

Over time, your systems will start to fail. If you use quick fixes to temporarily patch them, you’ll see the same issues again and again.

The high-density environment paired with ever-increasing IT equipment efficiency creates a revolving cycle of upgrades that do not require additional floor space—thus creating the “Infinite Data Center.”

The Infinite Data Center

One answer to this problem is to build the Infinite Data Center. With this model, you focus on maximizing your compute capacity—not increasing your floor space.

For example, constructing a facility with a power density of 10kW/cabinet or higher will allow you to accommodate new IT equipment without the need for additional floor space or building infrastructure replacement.

This is accomplished by maximizing the vertical cabinet space before expanding horizontally. A higher power density allows you to maximize your compute capacity per cabinet, which reduces your overall footprint requirement.

Also, with each and every IT refresh, the equipment becomes increasingly efficient from a space and power perspective.

Data Center Key to Success

Focus on increasing your compute capacity ... not your floor space.
10 questions that can help your company gain an understanding of how your data center can support you—both now and years from now:

1. What is our designed/realized tier level?
2. What are the electrical capacities or loads of our generator, uninterruptible power supply (UPS)?
3. Can we determine our per-cabinet power profile?
4. Can we calculate the power usage effectiveness (PUE) for our data center?
5. How will we grow in one, three and five-plus years?
6. What is the value of the hardware and data located in our data center?
7. If there were a major issue or outage, how much would it cost, and how long would it take to replace our data center facility?
8. If the data center went down, what business functions would be impacted?
9. How would that impact look after day one, day three?
10. Are we aware of all or most of the risks facing our data center today?

By using metrics obtained from answering these types of questions, your company can better illustrate the business costs, risks and opportunities associated with your data center.

HOW FAR IN ADVANCE SHOULD YOU START TO PLAN YOUR DATA CENTER?

Building an owned and operated data center from scratch can take three to four years. The capital approval process alone can take 18 to 24 months, as major data center projects often see price tags in the millions to tens of millions of dollars. Then come the requirements gathering, planning, design and possible site selection that need to happen before a single floor board is ordered or installed. As a result, most organizations should allow a three- to four-year window to accommodate the full project lifecycle.

Leasing data center space is typically a better option if you are short on time. If you do your due diligence, it could take between six and nine months to get up and running in a leased data center. However, if you have an emergency, you can be operational in as little as 30 to 60 days.
6 questions that will give you a better idea of what problems exist in your data center and how you may want to address them:

1. What does the space situation (horizontal and vertical) look like in my data center?
2. How has the power and cooling capacity or load changed?
3. Am I better or worse off than a year ago?
4. Does my organization have a private and/or public cloud strategy?
5. How am I modernizing legacy applications?
6. Have virtualization, consolidation and optimization been accomplished?

You should address the most pressing issues first. If you aren't sure what the most pressing issue is, you may want to have a vulnerability assessment done. Most likely, there are a few problems that will stand out over the others, and those issues should be addressed in a timely manner. Remember, there is always going to be another problem around the corner.

WHAT YOU SHOULD KNOW ABOUT FLOOR SPACE BEFORE YOU BRING IN NEW TECHNOLOGIES

You need ample floor space to optimize, consolidate and virtualize your data center. These projects typically increase the demand on floor space before reducing it. If you’re migrating to new technologies, you’ll need enough floor space to operate both the old and new technologies during the migration.

You’ll also need enough floor space to handle sudden influxes in business demand and growth that could occur from mergers and acquisitions.

Data Center Key to Success
Don’t wait until you have an emergency to plan.
THE TOP 5 DATA NETWORKING BEST PRACTICES

Andrew Jimenez
Vice President of Technology, Anixter
Many data center managers think there’s only one way to build a data networking infrastructure. However, data networking systems aren’t one-size-fits-all. Factors such as cost, performance and your data center’s physical footprint all come into play.

Here are five data networking best practices that can help you migrate to new technology:

1. **Create a migration strategy.** Your strategy should ensure that your cabling supports you through multiple technology refreshes. Since cabling systems have a lifespan of 10–15 years, you want them to support you through two to three refreshes.

2. **Select the network cabling architecture based on your capacity and cost requirements.** You can choose from a variety of architectures (e.g., centralized, end of row, top of rack, etc.). Each one has pros and cons, so you must understand which will work best in your environment.

3. **Make sure your cabling systems meet the high-density requirements of today’s networking hardware.** Server and networking appliances are becoming denser to optimize the physical footprint of the data center, so your cabling systems should accommodate the increased density requirements, as well as allow for flexibility in the future.

4. **Be flexible and scalable.** Many subsystems co-exist within the data center such as security, out-of-band management, DCIM and lighting systems. Make sure your cabling system can accommodate all of these systems efficiently by using a standards-based structured cabling system.

5. **Refer to industry standards and best practices for guidance.** Your choices in data networking technologies can be overwhelming. That’s why it’s important to learn about your options before you make a purchasing decision. Groups such as the Telecommunications Industry Association (TIA), the International Organization for Standardization (ISO) and the Institute of Electrical and Electronic Engineers (IEEE) provide best practices. Data networking manufacturers offer resources that can help you build the data center facility of the future.

Another key data networking consideration is cabinets. Your cabinets are integral to your thermal management strategy, so you should have a good assessment of the critical loads you will support in the data center on a per-cabinet basis. Can you support high-density loads? How well do your cabinets accommodate cable management? Can you easily scale your cabinets as your computing needs change?

**A WORD ON WIRELESS...**

Wireless systems tie your sensors together and allow you to better manage your systems (e.g., power, cooling, etc.). However, many data center managers think wireless systems are unreliable and don’t provide enough bandwidth. Because most data center wireless systems support sensors, you don’t necessarily need high-capacity wireless systems. Multiple-input and multiple-output (MIMO) technologies can also increase your wireless systems’ reliability.
BEST PRACTICES FOR POWERING YOUR DATA CENTER

Q&A with Peter Panfil
Vice President, Global Power, Emerson Network Power
Q: WHAT TRENDS SHOULD DATA CENTER MANAGERS BE AWARE OF WHEN THEY PLAN THE DATA CENTER FACILITY OF THE FUTURE?

A: We survey our users twice a year to ask about their top concerns. For the past three years, availability, energy efficiency and adequate monitoring have vied for the top three spots. Here are some ways these—and other—trends are impacting data centers:

• **Availability**
  Since an outage can impact millions of users, even a short period of downtime can make headlines. We are finding that data center managers want higher availability without sacrificing their utilization rates. They need to deploy servers at the snap of their fingers to meet customer demands—without putting their availability at risk.

• **Energy efficiency**
  Energy efficiency is not just about cost reduction. It also includes:
  - Design and deployment efficiency
  - Operational efficiency
  - Management and planning efficiency
  - Resource utilization
  - Spending optimization

• **Adequate monitoring**
  Data center managers also want more accurate insights into their assets, especially during a new build. If it is a retrofit, they are more concerned about asset utilization. In general, operators want to know, “What do I have, where is it and how is it operating?”

• **Scalability**
  The more flexibility you have, the easier it is to take on new business. You don’t want to be in a situation where your space, technology or systems prevent you from meeting customer demands. For example, you may need to separate your tier two, three, and four loads to give the data center greater flexibility and security. Build this separation into your data center’s design, so if a customer wants to double their business in the next year, you can help them do so.

• **Simplification**
  The previous generation of data centers were designed like tailored suits. They were measured, cut, sewn and hemmed on site. Today’s data centers are built with blocks that can be deployed all at once or slowly over time. This allows you to use your existing infrastructure when you expand—reducing your costs and improving your utilization rates.

Q: WHAT ADVICE WOULD YOU GIVE SOMEONE WHO WANTS TO MOVE DATA TO THE CLOUD?

A: Moving data to the cloud can lower your costs and power consumption. However, you should do your homework when choosing a provider. Where will they store your data? And how will it be governed? Can they meet your standards? For example, will your cloud applications be as reliable and scalable as the applications you currently deploy?

Q: WHAT IS THE BIGGEST MISCONCEPTION THAT DATA CENTER MANAGERS HAVE ABOUT POWERING THEIR DATA CENTERS?

A: Many data center managers think they need to trade availability for greater efficiency. However, you can achieve higher efficiency without sacrificing your reliability and vice versa.
Q: HOW CAN YOU OPTIMIZE YOUR DATA CENTER’S POWER AND COOLING SYSTEMS?

A: Here are seven best practices for increasing the efficiency, availability and capacity of your data center:

1. **Maximize the return temperatures at the cooling units.**
   The higher the return temperature, the more efficiently the system operates. Maximizing your return temperatures can help you decrease your cooling energy costs by 35 to 50 percent.

2. **Match cooling capacity and airflow with your IT loads.**
   Many data center cooling units are sized for peak demand. However, most applications don't require that much cooling. Intelligent cooling controls will align your cooling with the current conditions in your data center. This will help you operate more efficiently and reduce your power costs.

3. **Use a cooling design that reduces energy consumption.**
   Select a cooling system that senses the temperature of both the supply and return air. This will maximize your cooling system's performance.

4. **Select a power system that optimizes your availability and reduces your power consumption.**
   Since your data center is dependent on your power system, electrical blips can lead to disastrous consequences such as downtime. You'll want to find a power system that is optimal for your needs – one that provides the ideal level of protection while simultaneously meeting your energy efficiency goals. You can also gain efficiencies through new control options to increase energy optimization with “eco modes” and “intelligent paralleling”.

5. **Design a scalable architecture.**
   One of the biggest data center design challenges is configuring systems to meet both your current and future needs. Data center managers often tie themselves into a set starting point with oversized, inefficient systems. These bulky systems don't give you the flexibility to quickly and cost effectively scale. There's a new generation of systems that let you scale without risk.

6. **Enable data center infrastructure management (DCIM).**
   Our 2013 Ponemon study found that data center managers who implement DCIM experience 2.5 times less downtime than the industry average. This is because DCIM gives you insight into your assets, so you know what's critical. If you don't have this information, you must assume that everything is critical and will overspend on systems power and maintenance.

7. **Leverage local design and service expertise.**
   Bringing in local experts can help you optimize your data center, lower your costs, improve your utilization rates and scale in the future.
Q: HOW CAN I ENSURE MY DATA CENTER IS POWERED DURING AN OUTAGE?
A: When it comes to protecting yourself during an outage, we are seeing the following two trends that take opposite approaches:

- **Shorter run times.** Many data center managers are using very short battery run bridges to connect to a generator during an outage. They want just enough time on battery to get them to the generator.

- **Maximum protection without a utility.** Since it’s possible to run out of generator fuel during an outage, data center managers are accounting for the time it would take to get fuel delivered. For example, one of our customers expanded his battery life to two hours, because that’s how long it would take to get fuel shipped to him. This allows him to operate when his utilities are down.

Q: ARE ALTERNATIVE POWERING METHODS VIABLE FOR MY DATA CENTER?
A: Our Data Center 2025 survey revealed optimism about renewable energy. Respondents believe that solar will account for 21 percent of data center power by 2025. This number surprised us, as less than one percent of the power generated in the U.S. in 2012 was solar. For these predictions to become a reality, data center managers need to start planning for alternative energies today.

Q: I’VE BEEN HEARING ABOUT LITHIUM ION BATTERIES. WHAT ARE SOME OF THEIR ADVANTAGES?
A: Our Ponemon study found that battery problems caused more than 50 percent of data center outages. Batteries are a lot like bananas: If they get too hot or too cold, they die quickly.

Data center managers typically run batteries within a tight temperature window to keep them from going bad. Lithium ion batteries don’t need to be babied like this. They allow you to run your battery room at the same temperature as your IT room. This gives you **capacity on demand**, so you can quickly scale as your IT load changes. Plus, the hotter you run your IT, the more savings you will achieve.

Lithium ion batteries also have a much longer lifespan than **valve-regulated lead acid (VRLA)** batteries. The average VRLA battery lasts three or four years, while a lithium ion battery will last 15. This reduces your total cost of ownership while increasing your availability.

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**Data Center Key to Success**
Maximize the return temperatures at your cooling units to save 35 to 50 percent on your cooling energy costs.

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*IN 2012 LESS THAN 1% OF POWER GENERATED IN THE U.S. WAS SOLAR.*
HOW TO SECURE YOUR DATA CENTER NOW AND IN THE FUTURE

Interview with Andrew Jimenez
Vice President of Technology, Anixter
The first step in securing your data center is to use a multilayer approach.

One of the biggest trends in data center operations that we have observed over the last several years is the shift from enterprise owned-and-operated data centers to multi-tenant and hosted facilities. Even though this trend is driving down costs for many organizations, it also creates a need for greater security, as multiple stakeholders share the physical and network infrastructure resources in these environments.

Many data center managers focus on cyber security and overlook their facility’s physical security. Cyber security helps keep your data safe from malicious attacks on the logical layer elements of the data center, but it’s not enough to protect you from insider threats on the data center’s physical assets.

Because authorized personnel and employees are often the source of an organization’s security breaches, improving your data center’s physical security not only prevents unauthorized access but also keeps your tenants’ data in compliance with their respective industry regulations.

The first step in securing your data center is to use a multilayer approach to make sure that only authorized personnel have access, but also that there are auditing controls in place. This means securing everything from the perimeter of your building, the facility itself, the data center and potentially the individual cabinets.

Additionally, you should have a technology migration strategy for your security system. Physical security technology is moving from more traditional analog to IP-based systems. If you’re making this shift, you must decide if you want to keep your existing analog systems, use a hybrid solution that integrates these analog systems within the network or use a fully integrated IP-enabled security system that integrates all your physical security systems together. The Open Network Video Interface Forum (ONVIF) is developing interoperability standards that will allow you to seamlessly integrate multi-manufacturer systems.

In addition, your access control systems should meet your organization’s audit trail and compliance requirements.

Another security consideration is proper camera selection. Look for high-resolution cameras that operate in low-light conditions that are common in data center environments.

And finally, select the right security integrator partner. Your partner should know how to deploy both analog and IP-based technologies efficiently.

Data Center Key to Success

Address physical security, as well as cyber security, to prevent breaches and protect your sensitive data.
5 STEPS TO OPTIMIZING YOUR DATA CENTER’S COOLING

Q&A with Steve Madara
Vice President of Global Thermal Management, Emerson Network Power
Q: WHAT TRENDS SHOULD DATA CENTER MANAGERS BE AWARE OF WHEN THEY PLAN THE DATA CENTER FACILITY OF THE FUTURE?

A: Due to the explosion of software-as-a-service (SaaS), there have been more changes to data centers in the last five years than there have been in the last 15 years. Employees now rely on apps to do their jobs, but enterprises don’t want to spend a lot on SaaS. This means that IT must ensure the availability of these apps while driving costs down.

Once you put an infrastructure in place, it’s hard to make changes. So now is the time to think about what you need to support these apps and achieve your desired cost structure. You must design your data center for the level of availability that your apps and customers need. For example, different apps require different levels of availability. You don’t need to run all of them in-house and can drive down costs by running some through the cloud or a colocation service.

Q: WHAT IS THE BIGGEST MISCONCEPTION THAT DATA CENTER MANAGERS HAVE ABOUT COOLING THEIR DATA CENTERS?

A: Many data center managers have a “colder is better” philosophy. After all, the cooler the temps and the greater the airflow, the better you can meet customer service level agreements (SLAs). However, keeping it too cool causes waste and drives your energy bills up.

You also shouldn’t think in terms of a cooling system. Instead, think of it as a heat rejection system that gets heat out of the data center in the most efficient way possible.

Q: WHAT IS THE BEST HEAT REJECTION SYSTEM FOR MY DATA CENTER?

A: You have a number of options available. The best system will depend on your geography, what existing infrastructure you have in place and your future growth plans:

- **Direct expansion (DX)** air-cooled units are indoor cooling units. They reject heat from an air-cooled condenser to the outside, similar to a home air conditioner.

- **Chilled water systems** use a mechanical refrigeration system that can be air-cooled or water-cooled. They pick up heat indoors and transfer it to a chiller, which rejects it to the air or a cooling tower.

- **Evaporative cooling** takes hot air in the data center and runs it through a heat exchanger. It wets the heat exchanger and creates evaporation that cools air. The hot air is then rejected outside.

Data Center Key to Success

Colder is not always better. The colder your data center, the higher your energy bills.
The most efficient cooling method is using refrigerant to transport heat out of the data center—using as few heat exchangers as possible.

- **Direct evaporative cooling** systems bring in outside air and spray water inside. Heat is absorbed by the water, which evaporates and creates a cooling effect.
- **Liquid cooling** uses water to transport heat. It brings water to the IT equipment to cool it and runs heat outside the building.

At certain times of the year, it may be more cost effective to bring outside air into the data center instead of transferring heat out. You can bring outside air in using any of the mechanical refrigeration systems mentioned above.

These cooling methods all have advantages and disadvantages. The most efficient cooling method is using refrigerant to transport heat out of the data center—using as few heat exchangers as possible. The more heat exchangers you have, the greater your inefficiencies.

**Q:** **WHAT ARE THE TOP FIVE BEST PRACTICES FOR COOLING YOUR DATA CENTER?**

**A:** To optimize your data center's cooling, I recommend doing the following five steps (in the order listed below):

1. **Address containment to separate incoming air from exit air.** This allows you to maintain your desired temperature, increase your availability and meet SLAs. The hotter the air, the more efficient your heat rejection.
2. **Decide what supply temperature to run your IT equipment.** The recommended temperature range is 65° to 80°F. Many data center managers like to run at higher temperatures to be more efficient. However, if the incoming air is too hot, your server fans need to ramp up and use more energy.
3. **Use a variable capacity system that adjusts to your IT load.** In legacy data centers, fans deliver too much air and waste electricity. With a variable capacity system, you won't waste energy by using too much air or have reliability problems caused by not delivering enough air.
4. **Put controls in place to optimize your data center.** This includes measuring temperatures in front of the servers and in the aisles, as well as controlling the cooling equipment to ensure that you have the right amount of heat rejection.
5. **Use economization to lower your costs and power consumption.** For example, you can bring in outside air to reject heat without using mechanical refrigeration.

Legacy cooling systems consume roughly 40 percent of the power in a data center—and all of this is waste. By using the best practices outlined above, you can reduce this to less than 15 percent of your data center energy's consumption. Optimizing your thermal management system is just one of the steps highlighted in our *Energy Logic* white paper.
Evaporative cooling systems are gaining popularity because they are low-cost. However, what will it cost to run if water prices spike?

This is an industry-recognized approach that optimizes the energy consumption of your data center by starting with your IT components.

Q: HOW DOES YOUR LOCATION IMPACT YOUR CHOICE IN HEAT REJECTION TECHNOLOGIES?

A: Your location has a huge impact on the type of equipment you should use in your data center. When you look into heat rejection technologies, you should consider:

• **The physical construction of building.** A high-rise requires different cooling than a single- or two-story building.

• **Climate.** If you are in a cold climate, you can get more economization than someone in a hot, humid climate. If your data center is in a hot, dry climate, you can consider evaporative cooling methods.

• **Utility costs.** In addition to looking at your utility costs, you should also consider the availability of your resources. For example, evaporative cooling systems are gaining popularity because they are low-cost. However, what will it cost to run an evaporative cooling system if water prices spike? Do you want to rely on water for your cooling?

Q: WHAT CHANGES ARE COMING TO HOW DATA CENTERS ARE COOLED?

A: In the past, data centers were designed to be filled. However, virtualization has reduced the amount of IT equipment that you need, which means that many data centers have too much empty floor space. Today, it’s more important to build data centers on demand so you can quickly meet new business and technology needs. For example, instead of building one, 10-megawatt facility to house massive amounts of equipment, you’ll build 10, 1-metawatt facilities and deploy them as you need them.

This also means that you need to deploy cooling systems faster, and these systems must be more responsive.

Q: WHAT CAN DATA CENTER MANAGERS DO TODAY TO START PREPARING FOR THE DATA CENTER FACILITY OF THE FUTURE?

A: Understand your IT and customer requirements—along with the ins and outs of your data center’s infrastructure. You also must know cooling best practices—or have access to experts in this area. Then, use those best practices to plan your data center and gain greater efficiencies.

The new cooling systems are smaller and more modular, which allows you to build on demand while achieving cost savings.
SHOULD YOU LEASE OR OWN YOUR DATA CENTER?
Most enterprises have the following IT systems:

• Conventional enterprise IT or legacy systems
• On-premise, private clouds for mission-critical systems
• Third-party, off-premise infrastructures such as managed services, hosting providers and cloud providers

For this reason, many enterprises are choosing a hybrid data center model where they own and operate an on-site data center and lease or colocate servers in a third-party facility. One data center holds more critical data, while the other serves as a secondary storage space.

If you use a hybrid model, you can match your compute requirements with the infrastructure capabilities of your data center. For example, if you’re running a Tier 3 data center, you can put your most critical infrastructure in it while you save money by storing less critical infrastructure elsewhere. Putting backup equipment in a Tier 3 data center is a poor use of finances.

The hybrid data center model also offers a number of advantages:

• You can balance your CAPEX and OPEX. In today's economy, it's often easier for enterprises to get an operating expense approved than a capital expense. Leasing or colocating data center space gives you predictable monthly costs and makes forecasting easier.

• You can get up and running quickly when you lease space. Most decisions around expanding or upgrading a data center are left until it becomes an emergency. Building a data center could take years – which is too long to wait if you are out of storage.

When you lease or colocate space, you can be operational within 90 days. If you need to add more capacity at a later date, your colocation provider can help you scale quickly and cost-effectively.

• You don't need to worry about maintaining the facility or equipment. Running a data center is probably not one of your company's core areas of expertise. When you lease or colocate space, you leave the day-to-day operations of your data center to the experts, so you can focus on key IT initiatives.

However, owning your own data center gives you complete control over every aspect of your facility, including where your data resides and who has access to your servers. This can make it easier for you to comply with industry regulations.

**Data Center Key to Success**

Match your compute requirements with your infrastructure.
WHAT YOU SHOULD KNOW BEFORE YOU WORK WITH A COLOCATION PROVIDER
It’s vital to take your time when you select a partner to ensure they can meet your needs.

Before you sign a contract with a provider, you must first understand your needs. It costs a lot to pick a provider, move in and become operational. If you make the wrong choice, the costs of moving out later will be much higher than the costs of moving in. It’s vital to take your time when you select a partner to ensure they can meet your needs.

When you’re determining your needs, figure out what you want to achieve.

- What are your business and technical requirements?
- What does your growth plan look like in three, five and seven years?

Your provider should be able to help you scale and move in different directions in the future.

You should also decide where you want your colocation provider to be located.

- Should it be located in your city or further away?
- How will its location impact your disaster recovery?
- How will its location impact how your data is governed and who can access it?

Once you understand your requirements, send a request for proposal (RFP) to six to eight providers in your ideal locations. The RFP should be designed so you can easily compare and contrast providers.

When you’re reviewing the RFPs, don’t base your decision too heavily on price. Look for a provider that can meet your needs in terms of capabilities, reliability, uptime, infrastructure, services, etc.

**Data Center Key to Success**
Ensure your colocation provider can meet both your current and future needs.
HOW TO OPTIMIZE YOUR COSTS AND MAXIMIZE YOUR IT BUDGET
Instead of focusing on achieving cost savings in a specific area—such as power—think about how all of your systems impact each other.

THE FIRST KEY TO OPTIMIZING YOUR DATA CENTER COSTS IS TO LOOK AT YOUR DATA CENTER HOLISTICALLY.

Instead of focusing on achieving cost savings in a specific area—such as power—think about how all of your systems impact each other.

For example, did you know that removing one watt of power on the IT side of the house results in almost three watts of total power savings? This is called the cascade effect. For example, if you save a single watt of power by removing old technology, you can reduce demand on your power, cooling, etc. elsewhere in the data center.

YOU CAN ALSO OPTIMIZE YOUR COSTS BY:

• Determining how much you spend on power, heating, and cooling. You can reduce your costs if you integrate these systems.

• Finding hidden savings. Look at your short- and long-term strategies. Are you going after short-term savings that will only cost you more down the road?

• Understand what services your colocation provider offers. You may not need all of your provider’s services on day one, but you may want them down the road.

Data Center Key to Success
Reconsider your short-term savings if they will cost you more in the long term.
ARE YOU READY FOR THE DATA CENTER FACILITY OF THE FUTURE?
Designing the data center facility of the future is a long-term decision.

PLANNING FOR THE DATA CENTER FACILITY OF THE FUTURE STARTS TODAY.

Designing the data center facility of the future is a long-term decision. Take the time to do your homework, assess your needs and find the right provider. Waiting until you have an emergency to move into a new facility will increase your costs and your risks.

For additional resources on how to plan the data center facility of the future, visit the Forsythe Data Centers’ Knowledge Center.

FORSYTHE DATA CENTERS IS THE NEXT EVOLUTION OF DATA CENTER FACILITIES.

Forsythe Data Centers brings together all of the different IT integration services Forsythe offers, providing convenience, along with choice and control for clients.

CONTACT US TO LEARN MORE
1-800-843-4488 or info@forsythe.com
Steve Harris leads Forsythe Technology’s new business entity, a multi-tenant data center of private suites that operates under the name Forsythe Data Centers, Inc. Forsythe Data Centers’ Elk Grove Village, Ill. facility will be ready for tenant occupancy in early 2015.

Harris has more than 25 years of project management and 20 years of data center design/build, consolidation and assessment experience. His areas of expertise include data center design, project management, data center assessment & optimization, floor plan layout and workflow analysis. He also has extensive experience in data center site selection and real estate lease/purchase negotiation and administration. He has been the lead in proposing and managing data center design/build, reorganization and consolidation projects ranging from 500 square feet to 300,000 square feet and has managed a data center portfolio in excess of 35 sites and 2 million square feet.

Harris joined Forsythe in 2002, and previously served as director of data center engineering, bringing Forsythe’s comprehensive capabilities to clients, and working with them to address their data center facility planning/design needs as well as expansion and consolidation opportunities.

A respected industry expert, Harris has been published and quoted on the topic of data center best practices in a variety of tech industry publications.

Peter Panfil leads global power sales for Emerson Network Power’s Liebert AC Power business. He works to apply the latest power and control technology to industry-proven and emerging topologies to provide the highest availability and highest efficiency systems for business-critical applications. Additionally, Panfil partners with customer groups to incorporate industry trends into new product development.

Panfil is a frequent presenter at industry trade shows and conferences, and provides regular expert commentary in leading IT, facilities and engineering media outlets.

Steve Madara is responsible for supporting global customers in determining the best solutions to meet the needs of their mission critical facilities.

Madara regularly serves as an industry expert for business and trade publications and is a frequent presenter at industry conferences and events.

Andrew Jimenez has more than 20 years of experience in the fields of telecommunications testing and product certification. He has held various engineering and management positions with test laboratories specializing in the certification of voice/data communications systems and components. While an engineer at Underwriters Laboratories (UL), he directed the launch of their Category 5 connecting hardware verification program. Currently, his primary responsibilities include the management of the day-to-day operations of Anixter’s Enterprise Cabling Lab, standards development, and product research.

He is an active voting member of the Telecommunication Industry Association (TIA) TR-42.7 cabling and the Institute of Electrical and Electronics Engineers (IEEE) 802.3 LAN/MAN standards committee. Andy is also a Cisco CCNA with Wireless Specialization. He has given numerous technical presentations at trade shows, and is a regular speaker at Anixter’s National Seminar Series.
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