Turning Your Data Center Into a Strategic Asset

Our Unique Perspective on the Data Center Market

EMERSON™
Network Power

Table of Contents

3 Executive Summary
4 A Data Center Starts With Data
4 There is More Data Than Ever Before
5 Disruption in the Data Center
- These ought to be good times for enterprise data centers, but they are not
  - Only indirectly has the cloud caused this disruption
6 - Buy vs. lease decisions
6 Emerson Network Power's Unique Perspective on the Market
- Our work developing monitoring tools gives us a unique perspective
6 4 Steps Towards Making Your Data Center More Efficient
- Measure
- Model
- Plan
7 - Change
7 Conclusion
7 Sources

Executive Summary

The most successful enterprises in the digital economy, companies like Google, Apple, and Facebook, regard their data centers as strategic assets to realize an enormous competitive advantage. Many organizations, both large and small, are looking for ways to turn their data centers into strategic assets as well, but they want to strike a balance between efficiency and reliability. This was much easier to do when IT had a monopoly on enterprise computing. Now with a credit card, users can spin up a virtual machine in a matter of minutes. To remain competitive, IT departments must reorganize data centers to manage the collection of and access to data and improve service while at the same time lowering the cost of operating their facilities. Captive data centers have two advantages over cloud providers. The growing amount of data produced by mobile phones, social media, and the "internet of things", as well as our society's increasing reorganization around data, is convincing more and more traditional businesses that treating data as a strategic asset will give them an advantage over their competitors. Since the data an organization creates going about its business is proprietary, if secured properly and managed cost-effectively, it makes good business sense to keep valuable data within the four walls of the organization. The other advantage internal data centers may have is that as with any buy/lease decision, building and operating your own data center can be more cost-effective than outsourcing it. However, this is not the case in many organizations. As a company that develops data center monitoring and management tools, Emerson Network Power has a unique perspective on efficiency. This white paper shares some of the insights we have gathered about the ways successful companies use data centers to give them a strategic advantage and how you can do the same in your data center. Emerson Network Power suggests four steps—measure, model, plan and change—to move your data center towards higher efficiency.

A Data Center Starts With Data

During the course of day-to-day operations, it's easy to forget what makes a data center different from any other part of an organization. Data necessary to run the business operations is what makes this difference. The data center is the one place where the storage, processing, and distribution of large amounts of business-relevant data can be centrally managed. Other parts of the organization may generate data, and increasingly, this is the case. Some areas of the company may also use data as part of their operations, planning, or analysis work. However, data centers are the only places where all of the organization's data can be reliably gathered, preserved, and protected. In short, the data center is the one part of the organization capable of treating data as an asset that aids in the growth of the business. In order to capture the most value from data, IT needs to better balance the trade-off between capital expenses and operating expenses and to shift costs from operations to supporting business initiatives.

There is More Data Than Ever Before

The amount of data in the world is exploding. The volume of data is growing so fast that nobody really knows how much there is, but educated guesses have been made in some quarters. In 2013, IBM estimated that 90% of the data in the world had been created in the two preceding years. Researchers at IBM also estimated that 2.5 quintillion bytes of data—that is 2.5 with 17 zeroes after it—are created every day. More descriptively, other researchers estimate there are more bytes in the digital universe than there are stars in the physical universe. And the growth in data is accelerating. IDC's best guess is that the total amount of data will grow another 50 times by the year 2020.[i] Whatever the estimate, the explosion in the rate of information is staggering. Three trends are contributing to this acceleration.

Mobile devices – In the 40 or so years since Martin Cooper placed the first wireless call, the number of mobile phones has expanded exponentially. In 2014, an estimated 4.55 billion people will use one during the year.[ii] Mobile phone penetration is forecasted to grow from about 61% of the global population to nearly 70% by 2017. Since a smart phone is much more than just a communication device, typically also containing a camera, email client, and texting capability (along with other apps), the amount of data mobile phones generate can only be expected to grow with the increasing rate of mobile phone adoption.

Social media – Use of social media is also increasing exponentially. The Pew Internet and American Life Project found that that 73% of online adults now use a social network of some kind in the US, and 42% use multiple social networks. Some 63% of Facebook users report using the platform at least daily, with 40% logging on multiple times per day. Although social media usage overlaps with mobile phone usage, the amount of data generated by social media interaction is enormous and growing.

The internet of things – Dwarfing even these trends are the plans to increase the number of gadgets producing and transmitting data. This may expand the amount of data logarithmically. Today, General Electric builds wind turbines that capture data from internal sensors at a rate of 400 times a second.[iii] Since GE has already built around 20,000 of these turbines, this makes for a lot of data. Similar functionality is appearing in everything from automobiles to intelligent fridges, as industrial sensors are being built into devices of all sizes. Considering the one-to-many relationship between owners and devices, the internet of things may produce a volume of data many times greater than either mobile devices or social media.

At the same time as data is being created by mobile phones, social media, and the internet of things, data is also being generated by loyalty card programs, digitized medical records, and electronic tax returns. In short, the world is rapidly becoming digitized. In just one example, the centuries-old Vatican Library is being digitized to allow its unique and rare texts to be searched and viewed online.

At the 2014 EMC World, the CIO of the Vatican Library, Luciano Ammenti described his efforts to capture the library's books and manuscripts in the Biblioteca Apostolica Vaticana in CIFS format. It is not an easy undertaking. Books illustrated using gold and silver in the illuminations require special scanning equipment and some documents date as far back as the first century anno domini (AD). In total, the library has 75,000 handwritten manuscripts and 1.1 million printed books stored on 26 miles of shelving. The point is that if a library that has served the information needs of such an important institution for centuries is changing, you can bet the information needs for your organization are changing as well.

> *"I have to thank EMC for their patience with us. We changed our philosophy day after day. One day we need one petabyte of storage and the next it's two petabytes."*
>
> – Luciano Ammenti, CIO of the Vatican Library

While there may be some roadblocks to digitizing the world's information (such as the fixed amount of wireless bandwidth and power usage constraints), knowledge is power and the effort is likely to continue for some time. Some organizations are now even claiming that data, and not people, is their most important asset. Their efforts at digitization are having an effect on the larger society outside the data center. Not only is there more data, but data in general is becoming more valuable.

Disruption in the Data Center

These ought to be good times for the enterprise data center, but they are not

With more data than ever before, and the corresponding increase in value, business should be good in the data center. But it's not. The Bureau of Labor Statics ranks network and computer systems administrators as growing only 12% over the next decade[iv], less than computer occupations, in general, and 25% less than security analysts, in particular. This is just a prediction, of course, but growth in data center employment is certainly not keeping pace with the growth in data volume or value. On the surface, this imbalance does not make sense, and even seems unfair to data center administrators. Throughout its history, the data center has consistently been asked to do more: handle more capacity, deliver more availability, and achieve more efficiency. Thanks to the resourcefulness and dedication of the people responsible, the data center has consistently seen significant improvements year in and year out in systems technology, deployment architectures, and resource utilization. However, conventional data centers have been able to cope with these changes incrementally.

For better or worse, we are living through the first authentic time of data center technological disruption in almost 50 years. The last time data centers were truly disrupted was when IBM introduced the System 370 in 1970. This innovative technology introduced backwards compatibility, virtualization, and cooperative multitasking—all features still in use today. After the System 370, the industry predictably followed Moore's law for processors, Kryder's law for storage, and Butters' law for optical networking by incrementally improving on the same basic architecture. This led to the advent of client-server computing, which was quickly followed by Internet technologies. Thus, mainframe growth was eclipsed by much faster growth in other parts of the industry. Yet over this entire time IBM mainframe sales grew continually. Obviously, despite a steady increase, the relative size of the mainframe business declined. By the year 2012, mainframe sales represented only 4% of IBM's total revenues. The cycle finally reached a tipping point in 2013 when IBM's sales of mainframes declined 37% in the fourth quarter of the year.

This reversal was arguably caused by the first truly disruptive innovation in the infrastructure market since the System 370—cloud computing. During that same fourth quarter of 2013, Amazon.com's North America Other category sales—which includes its AWS cloud division—increased 52 percent. Amazon has never specifically broken down AWS's revenues, so the Other category also includes revenue from advertising, branded credit cards, and other non-retail activities, but it is safe to assume the bulk of this growth came from AWS.

Only indirectly has the cloud caused this disruption

The cloud itself has not directly caused the disruption in conventional data centers. Rather, what are causing disruption are the innovative new business models some companies in the cloud were forced to adopt because of their business models. Unlike banks or railroads, Google, Facebook, and Twitter businesses were based on giving away services for free, attracting very large audiences, and then selling advertising. This approach of betting-on-the-come did not allow them to build data centers in a traditional way. Fifty years ago, no one would have thought that giving away services was a good way to build a highly profitable company. The companies that adopted computing and bought enormously expensive mainframes already had large, profitable businesses that they did not want to disrupt. The emphasis of computing at the time was firmly placed on reliability and stability, not cost containment. Information technology made existing profitable businesses even more profitable; they did not create new forms of wealth. In order to provide their services for free, these new companies could not afford to utilize conventional data center technologies. As the old English proverb states, necessity is the mother of invention. Rather than following established formulas, they rethought how all the components—computer, networking, storage, and cooling—worked and how they fit together.

One example, Facebook utilized cheap micro-server technology for computing and located its European data center in Luleå, Sweden just south of the Arctic Circle so it could take advantage of ambient air cooling. Over the years, and after trying many approaches, some of which worked and some of which did not, these hyper-scale data centers could be built and operated at a fraction of the cost of conventional data centers. They are built in units of computing that are reliable, repeatable, and scalable when needed. When a micro-server fails, it is replaced, so agility was a core service requirement of IT. At the heart, businesses like Google, Facebook, and Netflix provide some programming and a lot data center services.

By the same token, the pioneers have taken one step forward and one step back. Their centers are so highly customized, so highly optimized for one use, and so difficult to commercialize that they resemble legacy mainframe applications, which so many companies are trying to get away from supporting. Following closely behind the Googles and Facebooks of the world in terms of efficiency are AWS, Microsoft Azure, and other companies that sell PaaS and IaaS to third parties. What is threatening conventional data centers is that all these providers operate orders of magnitude more efficiently. For example, the typical data center administrator at Facebook supports 25,000 servers. How many servers can one person support in your data center?

Buy vs. lease decisions

Hyper-scale centers have one big operating advantage, economies of scale, but they also have a disadvantage. All things being equal, it should be cheaper to build and maintain your own data center than to buy services from someone else. The cheapest way to buy a car is to pay cash, maintain it yourself, and operate it until it no longer runs. Data centers can be operated the same way. The key is to balance capital expenditures with operational expenditures and improve service.

Emerson Network Power's Unique Perspective on the Market

Our work developing monitoring tools gives us a unique perspective

As a provider of data center infrastructure management tools, Emerson Network Power has a unique perspective on the data center. Our hardware and software tools monitor the health and status as well as manage the performance of the underlying infrastructure to ensure high application availability. Our experience dealing with thousands of customers over the past 20 years has given us insights into the best practices the industry leaders use, which we would like to share in this paper. To start with, we believe that to turn data centers into a strategic asset, people in IT first need to adjust their thinking in three ways.

1. **You are already in the cloud.** If your data center is connected to the internet then you are already a part of the cloud. You will be measured by the same criteria as the rest of the cloud and problems in other parts of the cloud are your problems too.
2. **You will have to conform to cloud standards and operations.** Going forward, you increasingly will have to conform to cloud standards and practices. Not only are governmental agencies around the world mandating standards that apply to everyone, but private organizations such as the Security Standards Council are setting commercial standards that you must comply with if you want to store data such as credit card numbers.
3. **Defending data will be a never-ending task.** As we have seen earlier in this paper, data is increasing in volume and value. The more valuable data becomes the greater the temptation will be to steal it. As crooks develop new ways to attack your data, you will need to develop new defenses.

Operating data centers has become a complex problem, but within that complexity is an opportunity to balance data center expenses and even tip the balance towards activities that impact the business. "In what ways?" you may ask. That is the topic of the next white paper in this series, "Improving Visibility into Data Center Operations," which describes a scientific method of determining where IT personnel can bring the most benefit to the business.

4 Steps Towards Making Your Data Center More Efficient

Almost every data center is looking for ways to become more efficient—reducing power consumption, reducing or eliminating underutilized resources, deferring equipment purchases, and optimizing how people get their jobs done while maintaining reliability. Following these four steps will help cut operating expenses and improve the consistent delivery of services.

Measure

To optimize your data center for efficiency, you first need to be able to quantify the capacity of your space, power, and cooling assets, in order to have an accurate benchmark to measure against. Usually this requires a lot of time to manually gather data. Having a tool like our *Trellis*™ platform solution, which provides visual, real-time data on the consumption and availability of space, power, and cooling resources helps with this process of data collection and process improvement. It is especially important to identify stranded power and unused space capacity (at the rack and room levels). This is where the largest opportunity for improvement with the least effort usually lies since most data centers have excess or underutilized capacity. By better managing existing assets, data centers can improve service level response and lower operational costs without incurring any additional capital expenses.

Model

Now comes the tricky part. Maximizing efficiency requires a holistic view of the data center. In order to start to achieve efficiency, you need to model your entire infrastructure, so that you can see exactly what your assets cost to operate, and the interdependent relationships between power, cooling, and IT devices availability. It is helpful to have historical data and do "what if" testing to model various provisioning scenarios. For example, a way to improve operating costs is to model the temperature of the space and determine if the operating temperature can be increased without affecting reliability of the devices. Without any outlay of capital, expenses can be immediately reduced by turning up the thermostat.

To blow our own horn for a moment, the *Trellis*™ platform, our DCIM solution creates a comprehensive model of all data center assets. Because the model shows the existing capacity, including the growth in rate of consumption, space, power, and cooling systems, along with interdependencies between IT device availability, you can more accurately calculate the impact of change. The visual model also makes staff more efficient as they can quickly identify the optimal device location and find devices without physically searching for them.

Plan

A first step is to reduce operating expenses by planning to do more with less. By making use of underutilized equipment and turning off unused equipment until needed, you can reduce operating expenses. With less equipment, you need fewer resources for installation and maintenance, leading to substantially lower operating expenses. Equipment is only part of the process.

Streamlining processes for locating devices, managing alarms and adding, moving, renaming, or decommissioning devices also has to be a priority. New metrics for what determines efficiency need to be developed and then implemented. These metrics should help IT operations deliver the level of services required of IT by the functional units in the business and link to facilities' capabilities in ensuring the availability of the underlying physical infrastructure.

Change

Change presents one of the greatest challenges—and risks—to the data center. It gets even more complicated when different groups in the data center use different tools and different sets of data. Making changes adds to inefficient use of time and resources, errors, and a high risk of overloaded circuits or placement in areas that do not have the required redundancy. Everyone in the data center benefits from a single source of truth to plan and execute changes. Users can improve planning because they can see installations and changes made by other groups and the effect that these have on capacity. They must record their own installations and changes and adjust capacities based on new data.

These four steps will ensure that organizations have the necessary information to operate their data centers efficiently and at high availability while reducing the resources spent on "keeping-the-lights-on" type of activities. In turn, IT executives can expend more resources in supporting initiatives that help the business grow. This helps the IT department move from a cost center to a strategic partner to the business and functional units within the firm.

Conclusion

As computing becomes ubiquitous, society will increasingly be driven by data. Organizations such as Google, Facebook, and eBay have proven data is not just a cost of doing business but also an asset. In the course of day-to-day operations, every business collects, creates and saves data that is valuable. As in any buy/lease decision, the IT department has an inherent cost advantage over outside competitors, provided it can operate at the same level of efficiency. By following the steps outlined in this paper – Measure, Model, Plan, and Change – IT organizations can close the operational gap with cloud providers and regain their status as a strategic asset within the organization.

Sources

[i] IDC 2011 Digital Universe Study: Extracting Value from Chaos

[ii] eMarketer Smartphone Users Worldwide Will Total 1.75 Billion in 2014 http://www.emarketer.com/Article/Smartphone-Users-Worldwide-Will-Total-175-Billion-2014/1010536#sthash.x4zFQJFG.dpuf

[iii] New York Times. G.E. Makes the Machine, and Then Uses Sensors to Listen to It http://bits.blogs.nytimes.com/2013/06/19/g-e-makes-the-machine-and-then-uses-sensors-to-listen-to-it/?_php=true&_type=blogs&_r=0

[iv] http://www.bls.gov/ooh/computer-and-information-technology/network-and-computer-systems-administrators.htm#tab-6

About Emerson Network Power

Emerson Network Power, a business of Emerson (NYSE:EMR), delivers software, hardware and services that maximize availability, capacity and efficiency for data centers, health care and industrial facilities. A trusted industry leader in smart infrastructure technologies, Emerson Network Power provides innovative data center infrastructure management solutions that bridge the gap between IT and facility management and deliver efficiency and uncompromised availability regardless of capacity demands. Our solutions are supported globally by local Emerson Network Power service technicians. Learn more about Emerson Network Power products and services at **www.EmersonNetworkPower.com**

Emerson Network Power - Global Headquarters
1050 Dearborn Drive
P.O. Box 29186
Columbus, OH 43085
Tel: +1 614 888 0246

Emerson Network Power - Avocent Products and Services
4991 Corporate Drive
Huntsville, AL 35805
Tel: +1 256 430 4000

Emerson Network Power
EmersonNetworkPower.com

1214-DCSA-WP-EN